County of Los Angeles

Draft
Environmental Impact Report
SCH No. 2005051143

Volume V
Appendix 4.1 (continued) –
Appendix 4.2

MISSION VILLAGE

Prepared for:

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NEWHALL RANCH
Newhall Ranch Company

OCTOBER 2010

County of Los Angeles

Draft Environmental Impact Report

SCH No. 2005051143

Volume V
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MISSION VILLAGE

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Oak Tree Permit No.	ROAK200500032
Oak Tree Permit No.	T200500043
Conditional Use Permit (Off-Site Improvements)	RCUP200500081

Substantial Conformance Determinations for Grading and Hillside Management Guidelines

NEWHALL RANCH
Newhall Ranch Company

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OCTOBER 2010

DRAFT
ENVIRONMENTAL IMPACT REPORT
for
MISSION VILLAGE

SCH No. 2005051143

County Project No. 04-181
Vesting Tentative Tract Map No. 61105
SEA Conditional Use Permit No. RCUP200500080
Oak Tree Permit No. ROAK200500032

Oak Tree Permit No. T200500043
Conditional Use Permit RCUP200500081
(Off-Site Improvements)

Volume V
Appendix 4.1 (continued)–Appendix 4.2

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October 2010

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COUNTY OF LOS ANGELES, CALIFORNIA

Prepared For:

Newhall Land and Farming Company
23823 Valencia Boulevard
Valencia, California 91355

Project Number 062273-001

November 26, 2007

Leighton and Associates, Inc.

A LEIGHTON GROUP COMPANY

Leighton and Associates, Inc.
A LEIGHTON GROUP COMPANY

November 26, 2007

Project Number 062273-001

To: Newhall Land and Farming Company
23823 Valencia Boulevard
Valencia, California 91355

Attention: Mr. Corey Harpole

Subject: Geotechnical Report, Off-site Grading for Proposed Southern California Edison Substation Alternatives, Responses to the County of Los Angeles Department of Public Works Geologic and Soils Engineering Review Sheets dated September 17 and September 19, 2007 for Tentative Tract Map No. 61105 (Mission Village Project), County of Los Angeles, California.

Reference: County of Los Angeles Department of Public Works (LADPW), Geotechnical and Materials Engineering Division, 2006, Geologic and Soils Engineering Review Sheets, dated 9/17/07 and 9/19/07, respectively.

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Introduction

In accordance with your request and authorization, Leighton and Associates, Inc. (Leighton) has prepared this geotechnical report to respond to review sheets prepared by the Los Angeles County Department of Public Works (LADPW) for Tentative Tract Map No. 61105 (Mission Village Project), Off-site Grading for the proposed Southern California Edison (SCE) Substation Alternatives, Newhall Ranch, County of Los Angeles, California. Copies of the referenced LADPW review sheets are attached in Appendix B.

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Based on the findings summarized in this report, it is our professional opinion that the proposed offsite grading and development associated with the SCE Substation Alternatives as shown on TTM No. 61105 are feasible from the geologic and geotechnical points of view. With proper grading and implementation of the geotechnical recommendations contained herewith, the planned development will be safe from hazards of landslide, settlement, or slippage. Furthermore, proposed development and related grading will not adversely affect adjacent properties provided our recommendations concerning the proposed construction are followed.

If you have any questions, please do not hesitate to contact any of the undersigned. We appreciate this opportunity to be of service.

Respectfully submitted,

LEIGHTON AND ASSOCIATES, INC.

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JGS/RM/dlj

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Distribution: (1) Addressee
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Attention: Mr. Stuart Mayes (including 2 wet signature copies for submittal to County of Los Angeles Department of Public Works)
(1) Psomas
Attention: Mr. Matthew Heideman

1. INTRODUCTION

1.1 General

Leighton and Associates, Inc. (Leighton) has prepared this geotechnical report to evaluate the proposed off-site grading of Vesting Tentative Tract Map (VTTM) No. 61105 (Mission Village Project) for the proposed SCE substation alternatives. We have used VTTM No. 61105 at a scale of 1-inch equals 100 feet prepared by Psomas dated October 16, 2007 as the base map for presenting the geologic and geotechnical data gathered during this study.

This report does not address any other design elements associated with VTTM No 61105. Allan E. Seward Engineering Geology, Inc. (AES) is providing geotechnical services for this tract. We understand that our report will be a stand-alone geotechnical attachment to support the proposed off-site grading of this tract as it relates solely to the planned SCE substation alternatives.

Our recommendations are based on the findings of our geotechnical study performed for the 100-Scale grading plan review of Vesting Tentative Tract Map (VTTM) No. 061996, Legacy Village Project, and the review of other available geologic and geotechnical data from ongoing studies being performed for Potrero Canyon.

This work was performed for Newhall Land and Farming Company in general accordance with our proposal dated November 2, 2007

1.2 Objective

The purpose of our study was to evaluate the existing geologic and geotechnical conditions of the proposed SCE substation sites and associated off-site grading of TTM No. 61105 to address the review comments from LADPW (LADPW, 2007).

1.3 Scope of Work

The scope of work performed during our study consisted of the following tasks:

- Reviewing of the referenced review sheets (LADPW, 2007) and Leighton's report dated November 10, 2005.
- Reviewing available geologic and seismic maps, published literature, aerial photographs, and other geotechnical reports relevant to the subject SCE substation alternatives contained in Leighton's in-house library.
- Performing a site reconnaissance and field mapping

- Preparing a Geotechnical Map (Plate 1) showing site geology and required mitigation alternatives.

- Preparing 4 geotechnical cross-sections transecting the proposed manufactured slopes and natural slopes associated with the proposed off-site grading for the SCE substation alternatives.

- Performing slope stability analyses on cross-sections considered to be critical with respect to the natural slopes and proposed manufactured slopes.

- Performing geologic and engineering analyses as warranted addressing other technical items of the County of Los Angeles review comments.

- Preparing this geotechnical report to respond to the referenced County of Los Angeles review sheets.

2. SITE DESCRIPTION

The off-site grading for VTTM No. 61105 associated with the proposed SCE substation alternatives is located along the southwestern perimeter of VTTM No. 061996 (Legacy Village Project) and immediate vicinty, in the Stevenson Ranch area of the County of Los Angeles, California (see Figure 1).

The proposed SCE substation alternatives and associated grading are generally straddling an existing northwest-southeast trending ridge with an approximate topographic relief ranging from 1250 feet mean sea level (msl) in lower areas to 1540 feet msl at the ridgeline. In general, the majority of the existing natural slopes at the site and immediate vicinity have gradients of approximately 2:1 (horizontal to vertical). However, 1.5:1 up to 1:1 slopes occur locally along the ridgeline. An easement for high-voltage power lines and a high-pressure gas line exist along the southeastern portion of the proposed substation alternatives.

3. PROPOSED DEVELOPMENT

Based on the review of the available VTTM No. 61105 plan prepared by Psomas (Psomas, 2007), two alternative sites are proposed to accommodate the future SCE substation facilities. The proposed grading scheme for each substation site will consist of the following:

Substation Alternative 1: Minor cut and fill grading to accommodate a pad of approximately 670 square feet. The proposed cut and fill slopes will be constructed at gradients of 2:1. The proposed maximum cut slope height is approximately 30 feet. The proposed maximum fill slope height is approximately 20 feet.

Substation Alternative 2: Significant cuts of the existing ridge with minor fill grading to accommodate a pad of approximately 650 square feet. The proposed cut and fill slopes will be constructed at gradients of 2:1. The proposed maximum cut slope height is approximately 100 feet. The proposed maximum fill slope height is approximately 10 feet. Additionally, a fill disposal area is proposed to accommodate the excess soils to be generated by the proposed cuts of Substation Alternative 2. This disposal site is located to the west of Substation Alternative 1. The excess soils will be placed as engineered fill with an approximate fill thickness of 10 feet.

We anticipate that the future SCE substation facility structures will be constructed with concrete masonry unit (CMU) walls and slab-on-grade floor with the wall loads anticipated not to exceed 2 kips per lineal foot. Design building loads should be forwarded to us to re-evaluate and possibly modify our foundation and earthwork recommendations, as needed, to accommodate the design.

4. PREVIOUS INVESTIGATIONS

Leighton has performed geotechnical studies to support the proposed development of VTTM No. 061996, (Leighton, 2005). Allan E. Seward Engineering Geology, Inc. has conducted preliminary studies in Potrero Canyon, which is adjacent and to the southwest of the proposed substation alternatives (AES, 2004). Leighton is currently performing geotechnical studies in Potrero Canyon. Pertinent data obtained from these investigations was reviewed and utilized in the preparation of this report.

5. GEOLOGIC SETTING

5.1 Regional Tectonic Setting

The proposed substation alternatives are located in the northeastern foothills of the Santa Susana Mountains, near the eastern end of the Western Transverse Ranges of southern California. The Transverse Ranges are a belt of east/west-trending folds and associated thrusts that formed in response to northeast to north-northeast crustal shortening that initiated in Pliocene time, approximately 4 to 5 million years before the present (Yeats and others, 1988). The area continues to undergo intense deformation by geological standards. As the region is compressed in a north-south direction, the bedrock units become progressively folded and faulted, forming valleys (such as Simi Valley, the Oxnard Plain, and the Ventura and Ojai Valleys), and uplands (including the Santa Monica Mountains, the Simi Hills, Big Mountain, South Mountain, and the Topatopa Mountains). Reverse faults and/or thrust faults generally bound these valleys and mountains.

5.2 Local Geology

The proposed substation sites are underlain by marine bedrock of Pico Formation (Pliocene age. The surficial deposits exposed at the proposed sites consist of younger alluvium, debris flow, and landslide deposits which overlie the bedrock. Undocumented artificial fill exist along the easement for the existing high-pressure gas line and on an existing pad for an abandoned oil well at the proposed fill disposal site. . The surface distribution of these earth units is shown on the Geotechnical Map (Plate 1). The following is a brief description of the earth units observed at the proposed substation sites.

Undocumented Artificial Fill (map symbol af)

Undocumented artificial fill is present along the existing easement for the high-pressure gas line an on the northern portion of the proposed fill disposal site. Based on our field observations elsewhere along the existing easement, the fill soils generally consist of dry, loose, silty sand, clayey sand, and sandy silt with gravel and cobbles.

Younger Alluvium (Map Symbol: Qal)

Younger alluvium consists primarily of interbedded sand and silty sand mixtures with gravel, and varying amounts of interbedded, silts, sandy silts, few clays, gravels, cobbles, and localized boulders. Based on available exploratory excavations in the vicinity of the substation alternatives, the alluvial soils are light to medium brown, dry to moist, and loose, and contain varying amounts of organic debris.

Debris Flows/ Surficial Slumping

Based on our field mapping, localized areas with shallow debris flows and surficial slumping occur in the steep swales near the top of the existing ridge in the general area of the proposed substation sites.

Landslide Debris (Map Symbol: Qls)

Deep-seated landslides have not been mapped or observed at the proposed substation sites or immediate vicinity. A shallow landslide was mapped within the limits of Substation Alternative 2. This landslide appears to be created during the grading to accommodate the existing high-pressure gas line.

Pico Formation (Map symbol: Tp)

Outcrops of Pico Formation (mostly Pliocene age) are present in the general area of the substation alternative sites. The bedrock materials consist of interbedded, light grayish brown and brown siltstones, sandstones, and conglomeratic sandstones. Based on down-hole observations in borings drilled in the general vicinity of the proposed substation sites, these bedrock units are massive to bedded, hard to very hard and slightly fractured.

5.3 Geologic Structure

The bedrock structure at the proposed substation sites consistently strikes to the northwest and dips at moderate angles (between 31- to 48-degrees) to the north-northeast.

5.4 Ground Water

No ground water was observed in the exploratory excavations located in the vicinity of the proposed substation alternatives. Ground water was recorded at 33 feet and 37 feet below the ground surface (bgs) during the CPT soundings CPT-80P and CPT-48P, respectively. An existing monitoring well (RW-12P) is located approximately 200 feet to the southwest of the proposed fill disposal site. The ground water level in this monitoring well was measured at approximately 37 feet bgs (at elevation 1215 feet msl) on September 2007.

6. FAULTING AND SEISMICITY

6.1 Faulting

Regional Active Faults

Numerous faults have been mapped within the southern California region. The closest active and potentially active fault systems that could produce significant ground shaking at the site include:

Fault Name	Approximate Distance (miles)	Maximum Earthquake Magnitude (Mw)
Santa Susana	<0.1	6.7
Holser	<0.1	6.5
Northridge / East Oak Ridge	1.7	7.0
San Gabriel	3.1	7.2
Oak Ridge	6.2	7.0
Sierra Madre / San Fernando	7.2	6.7
San Cayetano	8.9	7.0
San Andreas	20	7.8

Local Faulting and Fault Rupture

No active or potentially active faults have been mapped or are known to cross the project site and the project site does not lie within an Alquist-Priolo Earthquake Fault Zone (APEFZ). The nearest APEFZ is located approximately 2 miles to the east of the proposed substation sites.

6.2 Probabilistic Seismic Hazard Analysis

Based on the results of the probabilistic seismic hazard analysis performed for VTTM No. 061996, the anticipated peak ground acceleration at the proposed substation alternatives corresponding to the Design Basis Earthquake (DBE) with a 10 percent probability of exceedance in 50 years ranges from 0.8g to 1.0g depending upon the underlying materials and specific location for each of the of the substation sites.

6.3 Secondary Seismic Hazards

In addition to surface rupture due to faulting and seismic shaking, other effects of seismic activity include liquefaction, seismically induced settlement, and landsliding, and lateral spreading.

Liquefaction

Based on the Seismic Hazard Zones maps published by the CGS (CGS, 1998), portions of the proposed substation alternatives and the fill disposal site are located within areas that have the potential to be impacted by liquefaction. Alluvial soils are not considered suitable for the support of structures and will require complete removals during the grading phase of the selected substation site. Subsequently, if Substation Alternative 2 is selected as the substation site, the alluvium under the proposed fill disposal site may require complete removals to support the planned structural fill for future development. Additional explorations, laboratory testing, and analysis will be required at the 40 scale grading plan review stage to evaluate the liquefaction potential and provide the necessary mitigation at the proposed fill disposal area.

Seismically Induced Settlement

Alluvium, colluvium, topsoil, and undocumented fill are not considered suitable for support of structures and will require complete removals during the grading phase of the selected substation site.

Lurching and Lateral Spreading

As mentioned in the preceding sections, the surficial soils are considered susceptible to lurching and lateral spreading during a seismic event. These soils are not suitable for support of structures and are recommended to be removed and replaced with engineered fill.

Seismically Induced Landslides

The Seismic Hazard Zones maps published by the State of California (CGS, 1998), indicate that the majority of the natural slopes at the proposed substation sites are susceptible to seismically-induced landslides. The stability of the natural slopes considering seismic conditions has been evaluated and the results are presented in Appendix D.

7. OIL WELLS

Two abandoned oil wells are located within and in the immediate vicinity of the grading limits of Substation Alternative 2 and the fill disposal site. The approximate locations of these oil wells are shown on the attached Plate 1.

8. SLOPES

8.1 Slope Stability

After a review of the geologic conditions at proposed SCE substation sites and planned off-site grading for TTM No. 61105, four geotechnical cross-sections (SA1-1, SA1-2, SA2-1 and SA2-2) were drawn for representative proposed cut slopes and natural slopes. The cross-sections are presented on Plate 2, Geotechnical Cross-Sections. We have analyzed the natural slopes and cut slopes considered most critical with respect to the planned development. The results of our slope stability analyses are presented in Appendix D.

8.2 Geologic Factors

Slopes at the proposed SCE substation sites are underlain by bedrock units of the Pico Formation. Based on our site geologic knowledge (Leighton 2005), the Pico Formation bedrock can range from massive to thinly bedded sedimentary rock units (siltstones, sandstones and gravelly sandstones). Based on our down-hole observations in the bucket auger borings located in the general area of the substation sites, bedding planes are poorly to moderately-well developed, and can constitute significant planes of weakness, particularly where sandstone/conglomerate beds are in contact with siltstone beds. Where bedding is adversely oriented, or "daylighted", with respect to natural or cut slopes, potential for bedding plane, or "block-glide", failure exists. The existing ground surface, proposed grading scheme, and subsurface geologic structure are shown on the Geotechnical Sections (Plate 2). The locations of the sections are shown on the Geotechnical Map, Plate 1.

8.3 Rippability Study

Previous preliminary rippability studies have been performed in the general area of the proposed substation sites (Advanced Geoscience, 2005). The results of seismic survey lines SL-14a, SL-14b, and SL-15 located along the same ridge line of the proposed Substation Alternative 2 indicate that the proposed deep cuts for Substation Alternative 2 are anticipated to be rippable for D9R-D11R dozers. However, localized marginal rippable bedrock zones may be encountered at the core of the proposed excavation. The seismic refraction profiles are attached in Appendix F.

9. GEOLOGIC AND GEOTECHNICAL CONCLUSIONS

9.1 General

Based on the geologic and geotechnical data developed during this study and our review of other relevant published and unpublished geologic and geotechnical reports for the proposed substation sites and vicinity, it is our opinion that the off-site grading and proposed development for VTTM No. 61105 is feasible provided that our recommendations are incorporated into the design of the planned development

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9.2 Faulting

No active or potentially active faults have been mapped or are known to cross the project site and the project site does not lie within an Alquist-Priolo Earthquake Fault Zone (APEFZ). The nearest APEFZ is located approximately 2 miles to the east of the project site.

9.3 Peak Ground Acceleration

The anticipated peak ground acceleration at the proposed substation sites corresponding to the Design Basis Earthquake (DBE) with a 10 percent probability of exceedance in 50 years ranges from approximately 0.8g to 1.0g depending the underlying materials and location of the substation sites.

9.4 Liquefaction Potential

Portions of the proposed substation alternatives will be located within bedrock. The alluvium and other unsuitable surficial soils under planned fills for the proposed substation alternatives are recommended to be removed and replaced with engineered fill. By implementing this recommendation, the potential for liquefaction impacting the proposed development is considered to be low.

9.5 Landslides

No deep-seated landslides are known to exist at the within the limits of the proposed substation sites or immediate vicinity. The small landslide mapped within the grading areas of SCE Substation Alternative 2 will be removed by the planned cuts.

9.6 Debris Flow Hazard

Based on our review of the proposed off-site grading for VTTM No. 61105, the natural swales north of the proposed Substation Alternative 1 may have the potential for debris flow hazards.

The areas prone to debris flows identified above are based on field mapping and our review of the available 100-scale plans and, as such, are preliminary. A more definitive determination of potential debris flow hazard should be performed at future design stages of the proposed project development.

Mitigation measures for areas with potential for debris flows may include construction of debris basins or debris walls designed to contain the anticipated volume of debris, or establishing setbacks from ascending slopes.

9.7 Slopes

The results of the slope stability analysis for the natural slopes and the proposed manufactured slopes for the two substation alternatives will have at least the minimum required factors of safety against static and seismic instability (Appendix D).

9.8 Oil Wells

Two abandoned oil wells are located within the limits and near the porosed of Substation Alternative 2 and the fill disposal site. These oil wells should be field checked and reviewed by the California Division of Oil, Gas, and Geothermal Resources (DOGGR) and may require re-abandonment as per current DOGGR requirements. If during grading any previously unknown well is discovered, DOGGR must be notified immediately to determine plugging and abandonment requirements. If contents of former field facilities (pipe lines, sumps, and other related structures) associated with this well are encountered during grading, they should be removed and legally disposed off-site.

9.9 Expansive Bedrock

Based on our site knowledge, the expansion potential for the bedrock of Pico Formation ranges from low to very high. Recommendations to reduce the potential for differential expansion should be developed as part of the review of the rough grading plans for the project. The expansion potential of the future substation pad should be determined at the completion of rough grading.

9.10 Rippability

In general, the planned grading operations for most of the proposed development can be performed using conventional grading equipment. However, localized marginal rippable bedrock zones may be encountered at the core of the proposed excavation for Substation Alternative 2.

10. RECOMMENDATIONS

10.1 General

The planned off-site grading is intended to accommodate a future SCE substation facility and associated improvements. Cut and fill grading techniques will be required to create the necessary structural pad for the future substation facility. Prior to placing the proposed compacted fill, the existing alluvium, undocumented fill and other unsuitable surficial soils should be removed. The future SCE substation facilities may be supported on shallow footings founded into the compacted fill or undisturbed bedrock. The floor slabs may also be supported on grade founded into compacted fill and undisturbed bedrock. Both the footings and the floor slabs should be reinforced.

10.2 Additional Explorations and Laboratory Testing

Once a substation site has been selected, additional explorations and laboratory tests should be expected to be required as part of the review of the rough grading plan (40-Scale). The tests should supplement the current explorations and laboratory tests to allow additional evaluation of the proposed slopes and recommended removal depths.

10.3 Grading

Site grading, including the removal and replacement of existing alluvium, uncertified fill soils and the upper on-site soils, the excavation of bedrock, and the placement of on-site and possibly imported materials, will be required to bring the site to the desired grades. Specific removal depths are shown on the attached Geotechnical Map (Plate 1).

Final rough grades should be sloped so as to minimize sheet flow over the faces of slopes and erosion of completed slopes.

Site Preparation

Site preparation will consist of removal of unsuitable materials and should include the following:

- Removal of existing vegetation and debris from the site.
- Removal of underground structures from prior uses of the site.
- Removal, relocation, or protection of existing utility lines that are to remain.

- Complete removal of alluvium, undocumented fills, topsoil, colluvium/slopewash, debris flow, and landslide debris prior to fill placement. Estimated removal depths are shown on Plate 1.

Proof-rolling of the exposed soils with a heavy vehicle and further excavation to remove pumping or other soils that are found to be unsuitable to support compacted fill or structures. Proof rolling of the exposed soils at the bottom of the excavation prior to placing fill should be observed by Leighton.

Leighton should also observe and approve the subgrade at the bottom of the excavation prior to placing fill. After the bottom of the excavation has been approved, the bottom should be surveyed and the results submitted to the owner and to Leighton for use in preparation of a report of observation and testing for the site.

10.4 Compaction

Required fill soils should be placed in accordance with the following recommendations:

- The exposed subgrade soils should be scarified to a depth of about 8 inches, brought to about optimum moisture content, and then compacted to least 90% of the maximum dry density of the soils as determined by the ASTM Designation D1557-02 Method of Soil Compaction.

- The fill soils should be placed in layers that do not exceed 8 inches in thickness per layer when compacted. Each layer should be spread evenly and thoroughly mixed during spreading to promote uniformity of the materials and moisture content.

- The moisture content of the fill soils should be adjusted by moistening or drying as necessary to bring the moisture content of the soils at the time of compaction to approximately 110% to 120% of optimum moisture content. The moisture content should be uniform throughout the soils. Where expansive materials are predominant, the moisture content of the fill soils prior to placement may need to be somewhat higher; this should be evaluated by Leighton during grading.

- Fill soils, except where specifically designated, should be compacted to at least the following densities:

  - Unless other wise explicitly recommended, fill soils should be compacted to at least 90% of their maximum dry density.

  - Soils that contain less that 5% particles passing the No. 200 Standard Sieve should be compacted to at least 95% percent of their maximum dry density.

- Soils that will be overlain by more than 30 feet of fill should be compacted to at least 93% percent of their maximum dry density.

- The placement and compaction of fill materials should be under Leighton's continuous observation.

10.5 Materials for Fill

Both on-site and imported materials may be used in the required compacted fills and backfills. The materials should be relatively free of debris or organic matter and have an expansion index of less than 30. Materials with an expansion index greater than 30 should not be used within 8 feet of proposed building pad surfaces or within 10 feet of slope faces. Within fills, the materials should be free of cobbles and boulders greater than 8 inches in size with no more than 25% of the materials being larger than 4 inches in size. Larger materials should be reduced in size prior to placement in fills or placed in accordance with the recommendations for "Oversize Materials" given in the following section. Within backfills, the materials should be free of cobbles and boulders greater than 4 inches in size.

Prior to the placement of compacted fill in slopes, the fill material should be tested after compaction to 90% of its maximum dry density to confirm that it has at least the shear strength parameters used in the analyses of the slopes.

A bulk sample of potential import material, weighing at least 50 pounds, should be submitted to Leighton at least 48 hours before fill operations. All proposed import materials should be approved by the Geotechnical Consultant prior to being placed at the site.

10.6 Oversize Materials

Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 8 inches, should not be buried or placed in fill unless the locations, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations should be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material should not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction. Additional specific recommendations for the placement of oversize materials should be developed and included in the 40-scale rough grading plan review.

10.7 Temporary Slopes

All temporary slopes and excavations, including utility and footing trenches, retaining wall excavations and other excavations should be performed in accordance with project plans, specifications, all OSHA and Cal-OSHA requirements, and the current edition of the California Construction Safety Orders, found on the following website:

http://www.dir.ca.gov/title8/sb4a6.html

Contractors should be advised that site bedrock soils with favorable bedding and unfavorable bedding should be classified as Type B and Type C soils, respectively. All safety precautions should be properly implemented at all times. Site safety is the responsibility of the contractor. Leighton Consulting, Inc. does not consult in the area of safety engineering.

The contractor must be responsible for providing a "competent person" as defined in Article 6 of the California Construction Safety Orders. During construction, exposed soil conditions should be regularly evaluated to verify that conditions are as anticipated. Close coordination between their competent person and Leighton Consulting, Inc. should be maintained to facilitate construction while providing safe excavations.

Spoil piles from the excavation(s) and construction equipment should be kept away from the sides of the trenches. Surcharge loads should not be permitted within a horizontal distance equal to the height of cut or 5 feet, whichever is greater, measured from the top of the cut, unless the cut is shored appropriately. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of any adjacent existing site foundation should be properly protected to maintain support of the adjacent structures.

10.8 Permanent Slopes

Compacted fill slopes should be constructed at 2:1 or flatter. Drainage benches and terraces in accordance with the Los Angeles County Building Code should be provided.

Cut slopes are expected to be entirely within bedrock materials. Where the bedding in the bedrock is neutral to favorable, permanent cut slopes may be made at 2:1 or flatter. Where the bedding is adverse, the allowable inclination should be evaluated for each slope. Where there is insufficient room to flatten slopes that will expose adversely oriented bedding, stability fills or buttresses may be required. Stability fills may also be required where friable beds are exposed.

Stability fills should also be placed as required to control seepage along daylighted bedding planes and to mitigate erosion even though the slopes are grossly stable. The need for stability fills should be evaluated during the rough grading plan review.

10.9 Overexcavation

In addition to the removals recommended in the Site Preparation section, overexcavation should be performed to mitigate conditions that will occur at the proposed pad grades of the substation alternatives. For preliminary planning purposes, the following remedial grading recommendations should be anticipated:

Cut and Transition Area: In order to mitigate the impact of underlying cut/fill transition conditions if encountered, we recommend overexcavation of the cut portion of the transition under the building pad. Overexcavation should extend to a minimum depth of 5 feet below the bottom of the proposed footings or one-third of the maximum fill thickness within a 1:1 projection of the building footprint, whichever is deeper.

10.10 Geotechnical Observation

The grading operations should be observed by Leighton's representative, who should have at least the following duties:

- Observe the excavation so that any necessary modifications based on variations in the soil/rock conditions encountered can be made.
- Observe the exposed subgrade in areas to receive fill and in areas where excavation has resulted in the desired finished subgrade. The representative should also observe proof-rolling and delineation of areas requiring overexcavation.
- Evaluate the suitability of on-site and import soils for fill placement; collect and submit soil samples for required or recommended laboratory testing where necessary.
- Observe the fill and backfill for uniformity during placement.
- Test fill for field density and compaction to determine the percentage of compaction achieved during fill placement.
- Geologic observation of the cut slopes and geologic exposures during grading to confirm with the conditions anticipated in the report and to make adjustments to the grading based on the directly observed conditions.
- Observe removal of all landslide debris where specified.
- Observe the recommended removals of the alluvium and other unsuitable surficial soils.

The governmental agencies having jurisdiction over the project should be notified before commencement of grading so that the necessary grading permits can be obtained and arrangements can be made for required inspection(s). The contractor should be familiar with the inspection requirements of the reviewing agencies.

10.11 Foundations

We anticipate that the future SCE substation facility structures will be constructed with concrete masonry unit (CMU) walls and slab-on-grade floor with the wall loads anticipated not to exceed 2 kips per lineal foot. Significant building loads should be forwarded to us, to re-evaluate and possibly modify our foundation and earthwork recommendations, as needed, to accommodate the new design.

Bearing Capacity: For preliminary design purposes, an allowable bearing capacity of 2,000 pounds per square foot (psf) may be used when footings are founded into properly compacted fill soils or undisturbed bedrock. The footings should be at least 12 inches in width and should extend at least 18 inches of embedment. This allowable bearing value may be increased by 500 psf per foot increase in embedment-depth or width to a maximum allowable bearing pressure of 3,000 psf. These allowable bearing pressures are for total dead load and sustained live loads, and can be increased by one-third when considering short-duration wind or seismic loads. Also, these bearing pressures are "net" bearing pressures. The weight of foundation elements below lowest adjacent grade need not be added to the foundation load. Footing reinforcement should be designed by the structural engineer.

While the actual bearing value of the fill placed at the site will depend on the materials used and the compaction methods employed, the quoted bearing value will be applicable if acceptable soils are used and are compacted as recommended. The bearing value of the fill should be confirmed during grading.

Settlement: The above recommended allowable bearing capacity is generally based on a total allowable, post-construction static settlement of ½ inch for bearing wall loads not exceeding 2 kips-per-lineal–foot of wall. Differential settlement due to static loading is estimated at ¼ inch over a horizontal distance of 30 feet. The estimated settlements should be reevaluated by Leighton when foundation plans become available or if anticipated loading varies from loads described above.

Lateral Resistance: Lateral loads may be resisted by soil friction and by the passive resistance of the soils. A coefficient of friction of 0.35 may be used between the footings and the floor slabs and the supporting soils. The passive resistance of compacted fill soils may be assumed to be equal to the pressure developed by a fluid with a density of 250 pcf foot to a maximum of 2,000 psf. A one-third increase in the passive value may be used for wind or seismic loads. The frictional resistance and the passive resistance of the soils may be combined without reduction in determining the total lateral resistance.

Foundation Observation: To verify the presence of satisfactory soils at foundation design elevations, the foundation excavations should be observed by the Geotechnical Consultant. The excavations should be deepened as necessary to extend into satisfactory soils.

Inspection of foundation excavations may also be required by the appropriate reviewing governmental agencies. The contractor should be familiar with the inspection requirements of the reviewing agencies.

10.12 Site Coefficient

Under the Earthquake Design regulations of Chapter 16, Divisions IV and V of the 2001 and 2007 CBC, the following coefficients and factors apply to lateral-force design for structures at the site.

SEISMIC ZONE	**Z = 0.4**	**Z = 0.4**
SOIL PROFILE TYPE	S_C, Soft Rock	S_D, Stiff Soil
Near-Source Factor N_a	1.3	1.3
Near-Source Factor N_v	1.6	1.6
Seismic Coefficient C_a	0.52	0.57
Seismic Coefficient C_v	0.90	1.02
Period, T_o*	0.14	0.14
Period, T_s*	0.69	0.72
* Use with Figure 16-3 of 1997 UBC.		
Site Class (2007 CBC, Table 1613A.5.2	C	D
S_S (2007 CBC, Figure 1613A.5(3)	2.05	2.05
S_1(2007 CBC, Figure 1613A.5(4))	0.71	0.71
F_a (2007 CBC, Table 1613A.5.3(1))	1.0	1.0
F_v (2007 CBC, Table 1613A.5.3(2))	1.3	1.5
S_{MS} (2007 CBC Equation 16A-37)	2.05	2.05
S_{M1} (2007 CBC Equation 16A-38)	0.92	1.07
S_{DS} (2007 CBC Equation 16A-39)	1.37	1.37
S_{D1} (2007 CBC Equation 16A-40)	0.62	0.71

Fault Type	**Nearest Fault**	**Distance (km)**	**Magnitude**
A	San Andreas (1857 Rupture)	35	7.8
B	Santa Susana	< 1.0	6.6

10.13 Soil Corrosivity

Concrete structures in contact with the onsite soil should be designed in accordance with Table 19A-A-4 of the 2001 CBC. Corrosivity testing of the finish pad grade for the planned SCE substation facilities should be performed at the completion of rough grading. If buried ferrous pipes are planned for construction, further testing and specific recommendations for corrosion protection may need to be provided by a qualified corrosion engineer.

11. 111 STATEMENT

Provided that the recommendations in this report and the provisions of the Los Angeles County Code are implemented, it is Leighton's opinion that the off-site grading for the proposed substation alternatives as shown on the TTM No 61105 will be safe from the hazards of landslide, settlement, or slippage, and that the completed grading and proposed development will not adversely affect the stability of adjacent properties.

12. LIMITATIONS

Leighton's professional observations and recommendations presented in this report are based on the review of available geotechnical reports and other published geologic and seismic literature, field observations, and engineering analyses. Leighton's work was performed using the degree of care and skill ordinarily exercised by the geotechnical profession at this time and locality. No other warranty, either expressed or implied, is made as to the conclusions and professional opinions presented in this report.

The conclusions and recommendations in this report are based in part upon data that were obtained from a necessarily limited number of observations, site visits, excavations, samples, and tests. Such information can be obtained only with respect to the specific locations explored, and therefore may not completely define all subsurface conditions throughout the site. The nature of many sites is that differing geotechnical or geological conditions can occur within small distances and under varying climatic conditions. Furthermore, changes in subsurface conditions can and do occur over time, whether they be due to natural processes and events, or to human activities on this, or adjacent, sites.

Additional explorations, testing, and analyses should be performed prior to finalizing the design for the proposed development. Conditions revealed in future investigations and during grading excavations may be at variance with preliminary findings. If this occurs, the changed conditions should be evaluated by the geotechnical consultant and additional recommendations obtained, as warranted. Changes in applicable or appropriate codes and standards of practice may occur, whether they result from legislation or the broadening of knowledge. Accordingly, this report may become wholly or partially invalid by changes outside Leighton's control.

This report is issued with the understanding that it is the responsibility of the owner, or of his representative, to ensure that the information and recommendations contained herein are brought to the attention of the necessary design consultants for the project and incorporated into the project plans and specifications for the planned development.

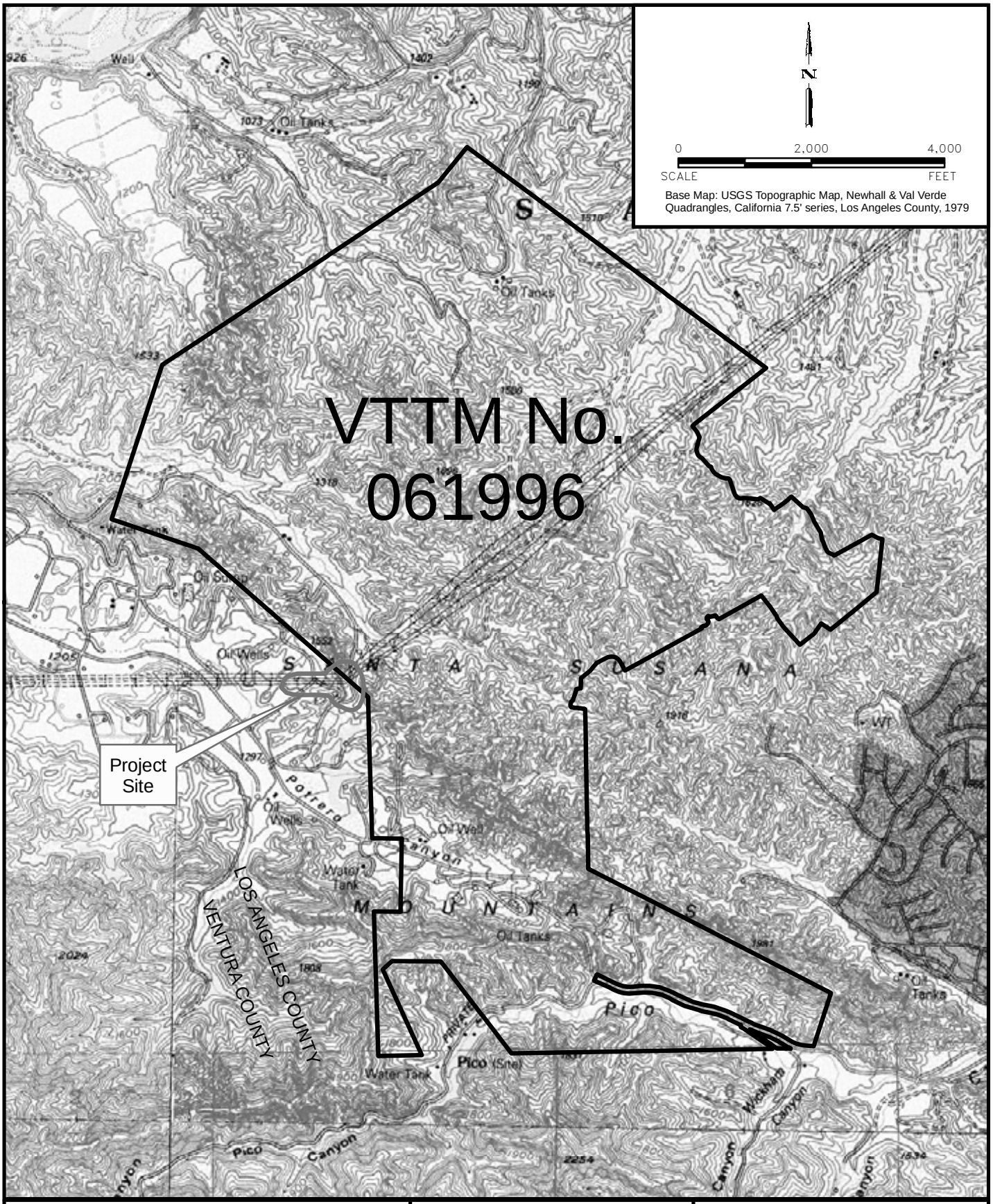
The identification and testing of hazardous, toxic or contaminated materials were outside the scope of Leighton's work. Should such materials be encountered at any time, or their existence be suspected, all measures stipulated in Local, County, State and Federal regulations, as applicable, should be implemented.

This report is intended only for the use of the Newhall Land and Farming Company and their design consultants in the planning and preliminary design of the subject development.

13. CLOSURE

If parties other than Leighton are engaged to provide construction geotechnical services, they must be notified that they will be required to assume complete responsibility for the geotechnical phase of the project by concurring with the findings and recommendations in this report or by providing alternative recommendations.

Any persons using this report for bidding or construction purposes should perform such independent investigations as they deem necessary to satisfy themselves as to the surface and subsurface conditions to be encountered and the procedures to be used in the performance of work on the subject site.



Offsite Grading Proposed SCE Substation Alternatives
Tentative Tract Map No. 61105
Newhall Ranch, California

SITE LOCATION MAP

Project No.
062273-001

Engr./Geol.
RM/JGS

Date
November 2007

Figure 1

\\GIS\project\062273_SR_VTTM_61105\001\062273-001_SiteLocationMap.mxd

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

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APPENDIX B

COUNTY OF LOS ANGELES REVIEW SHEETS

County of Los Angeles Department of Public Works
GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION
GEOLOGIC REVIEW SHEET
900 So. Fremont Ave., Alhambra, CA 91803
TEL. (626) 458-4925

DISTRIBUTION
1 Geologist
__ Soils Engineer
1 GMED File
1 Subdivision

TENTATIVE TRACT MAP 61105
SUBDIVIDER Newhall Land
ENGINEER Psomas
GEOLOGIST & SOILS ENGINEER A.E. Seward Eng. Geol., Inc.

TENTATIVE MAP DATED 8/9/07 (Revised)
LOCATION Castaic Junction
GRADING BY SUBDIVIDER [Y] (Y or N)
REPORT DATE 6/13/05, 12/22/04, 7/22/04, 7/20/04

The Regional Planning Commission, developer, and engineer are advised that:

PRIOR TO RECOMMENDING APPROVAL OF THE TENTATIVE TRACT OR PARCEL MAP:

1. An updated engineering geology report is required to evaluate the changes to the Tentative Map. (Note: Proposed off-site grading for SCE substation shown on sheet 9 on the Tentative Map).

2. The Soils Engineering review dated 9/19/07 is attached.

Prepared by _____ Reviewed by _____ Date 9/17/07
Geir Mathisen

Please complete a Customer Service Survey at http://dpw.lacounty.gov/go/gmedsurvey
P:\gmepub\Geology_Review\Geir\Review Sheets\District 8.2 (Santa Clarita)\Tracts\61105, TM9 NA.doc

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION

SOILS ENGINEERING REVIEW SHEET

Address: 900 S. Fremont Ave., Alhambra, CA 91803
Telephone: (626) 458-4925
Fax: (626) 458-4913

District Office 8.2
PCA LX001129
Sheet 1 of 1

DISTRIBUTION:
___ Drainage
___ Grading
___ Geo/Soils Central File
___ District Engineer
___ Geologist
___ Soils Engineer
___ Engineer/Architect

Tentative Tract Map	61105
Location	Castaic Junction
Developer/Owner	Newhall Land & Farming Co.
Engineer/Architect	Psomas
Soils Engineer	Allan E. Seward Engineering Geology, Inc. (04-2023-4)
Geologist	Allan E. Seward Engineering Geology, Inc.

Review of:

Tentative Map and Exhibit Dated by Regional Planning 8/9/07 (rev.)
Soils Engineering and Geologic Report and Addenda Dated 6/13/05, 12/22/04, 7/22/04
Previous Review Sheet Dated 2/22/07

ACTION:

Tentative Map feasibility is not recommended for approval.

REMARKS:

1. Provide static, seismic and surficial slope stability analyses for all slopes steeper than 2:1 gradient or subject to adverse bedding conditions at the proposed SCE substation alternatives shown on Sheet No. 9 of the tentative tract map. Also, provide a geotechnical cross-section, for each section analyzed, showing the critical failure plane used in the analyses. Indicate the various shear strength parameters used in the analyses, in the appropriate segments of each failure plane. Show locations of the cross sections used in slope stability analyses on the geotechnical map. Recommend mitigation if factors of safety are below County minimum standards.

2. Show the following on the geotechnical map:
   a. Approximate limits and depth of removal and recompaction of unsuitable soils, as necessary.
   b. Grading required for construction of buttress/stabilization fills, as necessary.
   c. All recommended mitigation measures, as necessary.

3. Requirements of the Geology Section are attached.

4. Include a copy of this review sheet with your response.

NOTE(S) TO THE PLAN CHECKER/BUILDING AND SAFETY ENGINEER:
A. ONSITE SOILS ARE CORROSIVE TO FERROUS MATERIALS.
B. ONSITE SOILS HAVE A MEDIUM EXPANSION POTENTIAL.
C. PER THE SOILS ENGINEER, DEWATERING SHALL BE PERFORMED FOR REMOVALS IN THE VICINITY OF BORINGS B-72E AND B-73E.

PROFESSIONAL ENGINEER JEREMY WAN NO. C67563 EXP. 6/30/09 STATE OF CALIFORNIA

Prepared by Jeremy Wan Date 9/19/07

Please complete a Customer Service Survey at http://dpw.lacounty.gov/go/gmedsurvey.
NOTICE: Public safety, relative to geotechnical subsurface exploration, shall be provided in accordance with current codes for excavations, inclusive of the Los Angeles County Code, Chapter 11.48, and the State of California, Title 8, Construction Safety Orders.
P:\gmepub\Soils Review\Jeremy\TR 61105, Castaic Junction, TTM-NA_9.doc

APPENDIX C

LABORATORY TEST RESULTS

APPENDIX C

LABORATORY TEST RESULTS

General

Pertinent laboratory tests performed for Vesting Tentative Tract Map (VTTM) No. 061996 (Leighton, 2005) was used during this study. The following laboratory tests were used for this study:

In-Situ Dry Density and Moisture Content (ASTM D 2937, 2216)

The in-situ dry density provides a measure of the degree of densification of a material, while the moisture content serves to establish a correlation between the properties and behavior of a soil. The in-situ dry density (in lb/ft3) and moisture content (as a percentage of dry weight of soil) were determined for relatively undisturbed specimens. The test results are presented on the logs of the borings and test pits (Appendix B).

Direct Shear Test (Modified from ASTM D 3080)

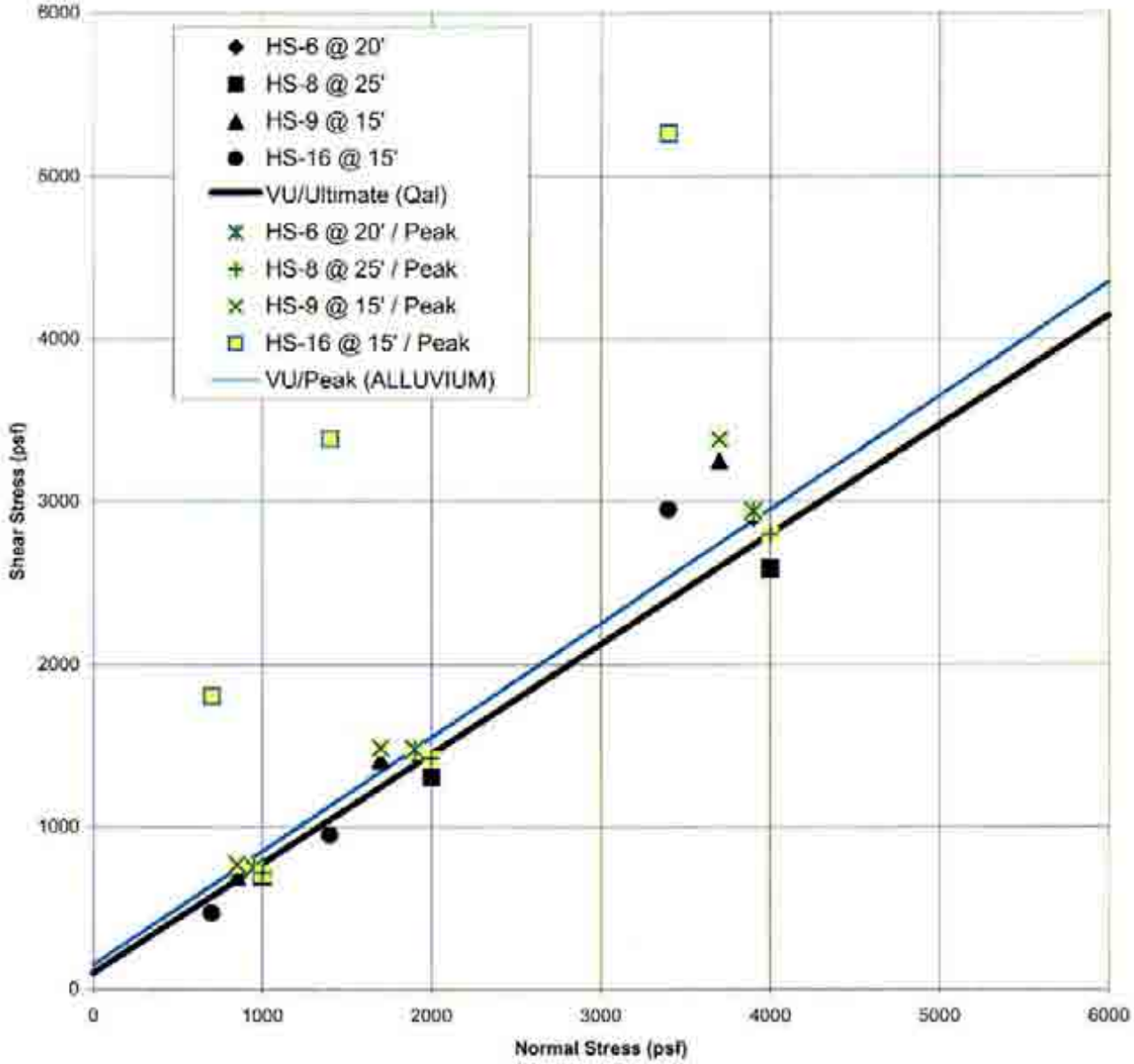
The shear strength of the on-site earth materials was obtained by successively shearing separate specimens partially contained within rings utilizing a direct-shear machine. Varying normal pressures are applied, and the shear stress applied to the specimen is recorded. The cohesion (c, in lb/ft2) and angle of internal friction (ϕ, in degrees) were then calculated and these represent the shear strength characteristics of the material.

The specimens were sheared at a constant rate of strain. To simulate possibly adverse moisture conditions, each specimen was soaked prior to the test, and sheared underwater. The test results and test summaries are presented herewith. The shear strengths used in the slope stability analyses are tabulated in Appendix D.

FIGURES

Direct Shear Tests and Test Summaries
Expansion Index

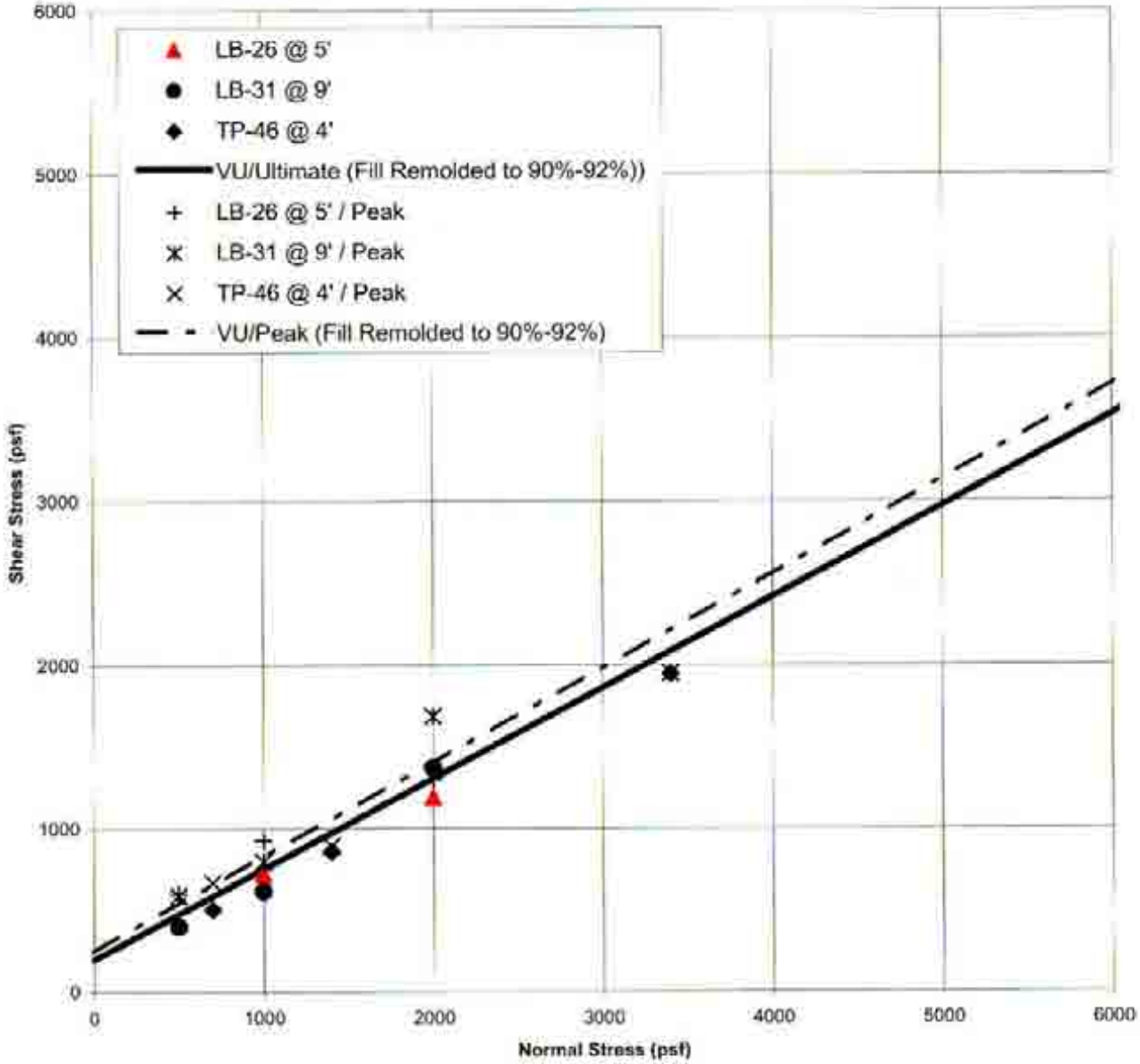
Alluvium (Qal)



ULTIMATE STRENGTH- Values Used
phi = 34 deg, Cohesion =100 psf
PEAK STRENGTH- Values Used
phi = 35 deg, Cohesion =150 psf

Leighton	**DIRECT SHEAR TEST SUMMARY DATA**	STEVENSON RANCH, PHASE V Project No.: 061277-002 Date: 07/2005

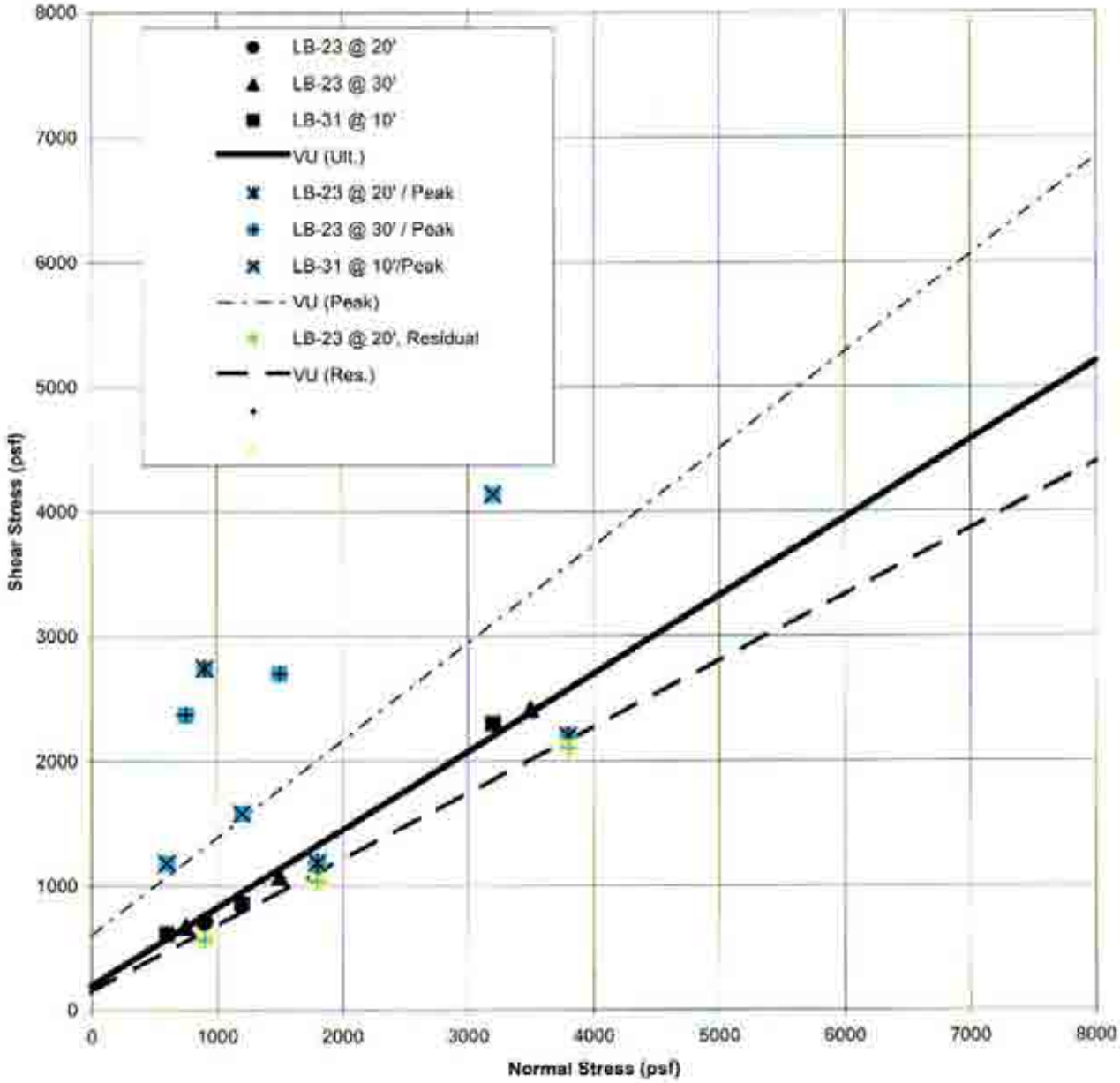
Compacted Fill



ULTIMATE STRENGTH-Values Used
phi = 29 deg, Cohesion = 200 psf
PEAK STRENGTH-Values Used
phi = 30 deg, Cohesion = 250 psf

Leighton	**DIRECT SHEAR TEST SUMMARY DATA**	STEVENSON RANCH, PHASE V Project No.: 061277-002 Date: 05/2005

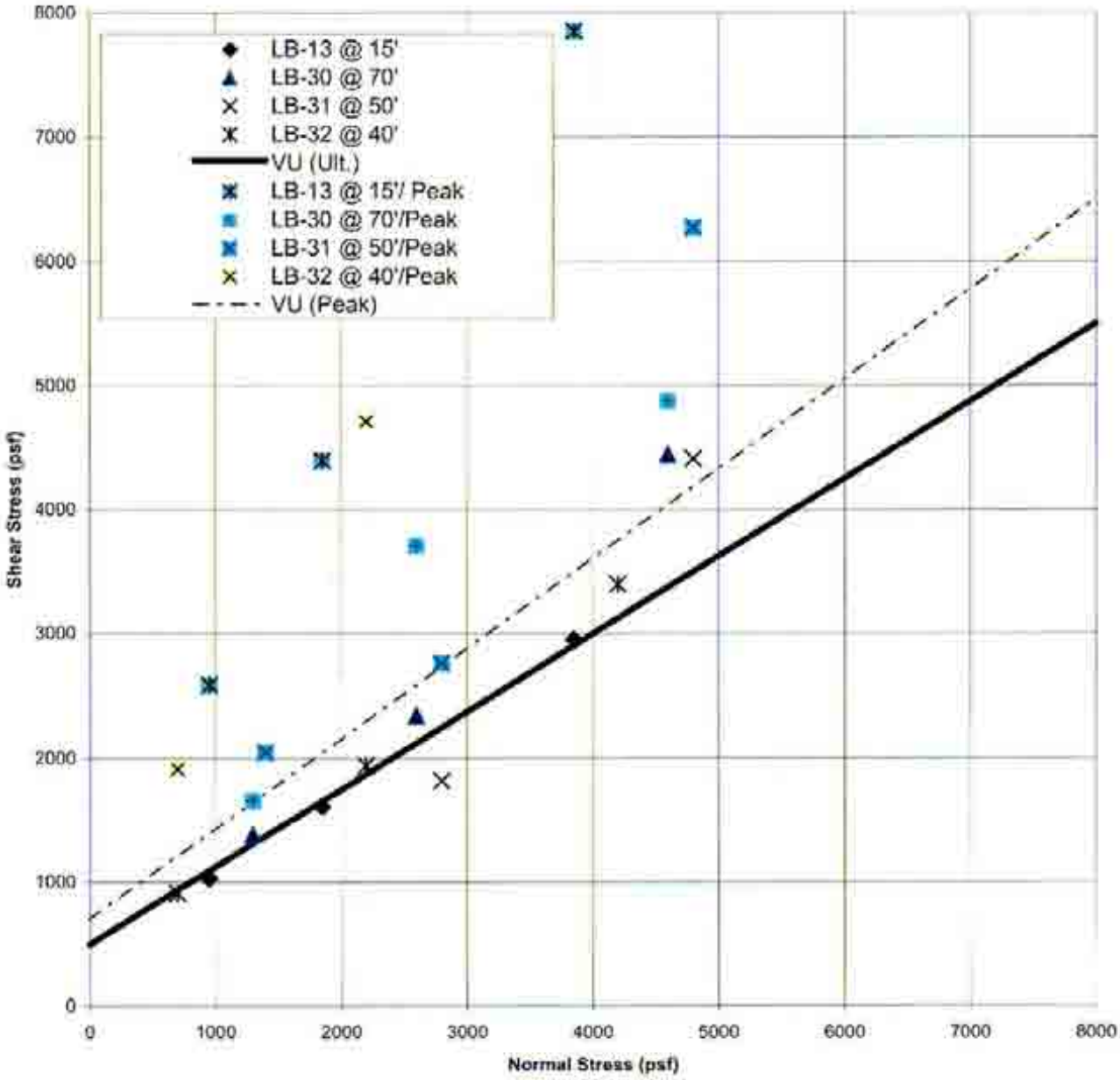
Pico Formation(Tp, SandStone)



ULTIMATE STRENGTH- Values Used
phi = 32 deg, Cohesion =200 psf
PEAK STRENGTH- Values Used
phi = 38 deg, Cohesion = 600 psf
RESIDUAL STRENGTH- Values Used
phi = 28 deg, Cohesion = 150 psf

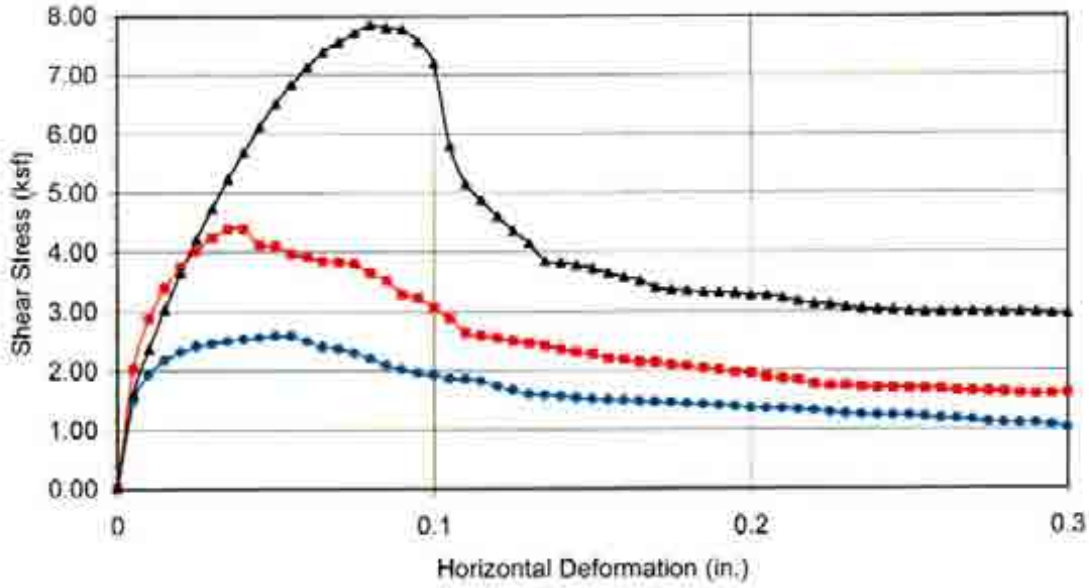
Leighton	**DIRECT SHEAR TEST SUMMARY DATA**	STEVENSON RANCH, PHASE V Project No.: 061277-002 Date: 07/2005

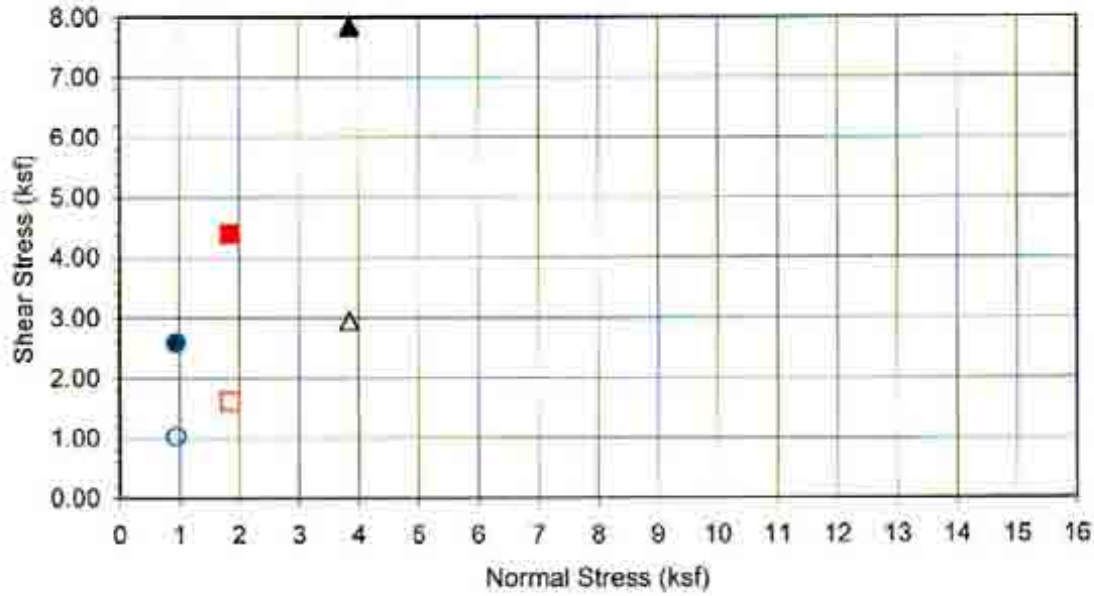
Pico Formation (Tp, Siltstone)



ULTIMATE STRENGTH- Values Used
phi = 32 deg, Cohesion =500 psf
PEAK STRENGTH- Values Used
phi = 36 deg, Cohesion = 700 psf

Leighton	**DIRECT SHEAR TEST SUMMARY DATA**	STEVENSON RANCH, PHASE V Project No.: 061277-002 Date: 07/2005





Boring No.	**LB-13**
Sample No.	**R-2**
Depth (ft)	**15**
Sample Type:	
Drive	
Soil Identification:	
Dark Olive Brown Siltstone (ML)	

Normal Stress (kip/ft²)	0.950	1.850	3.850
Peak Shear Stress (kip/ft²)	● 2.591	■ 4.393	▲ 7.848
Shear Stress @ End of Test (ksf)	○ 1.029	□ 1.612	△ 2.953
Deformation Rate (in./min.)	0.0500	0.0500	0.0500
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	11.34	11.34	11.34
Dry Density (pcf)	119.7	120.0	121.3
Saturation (%)	74.9	75.7	78.5
Soil Height Before Shearing (in.)	1.0058	0.9973	0.9834
Final Moisture Content (%)	20.6	20.7	16.8

Leighton

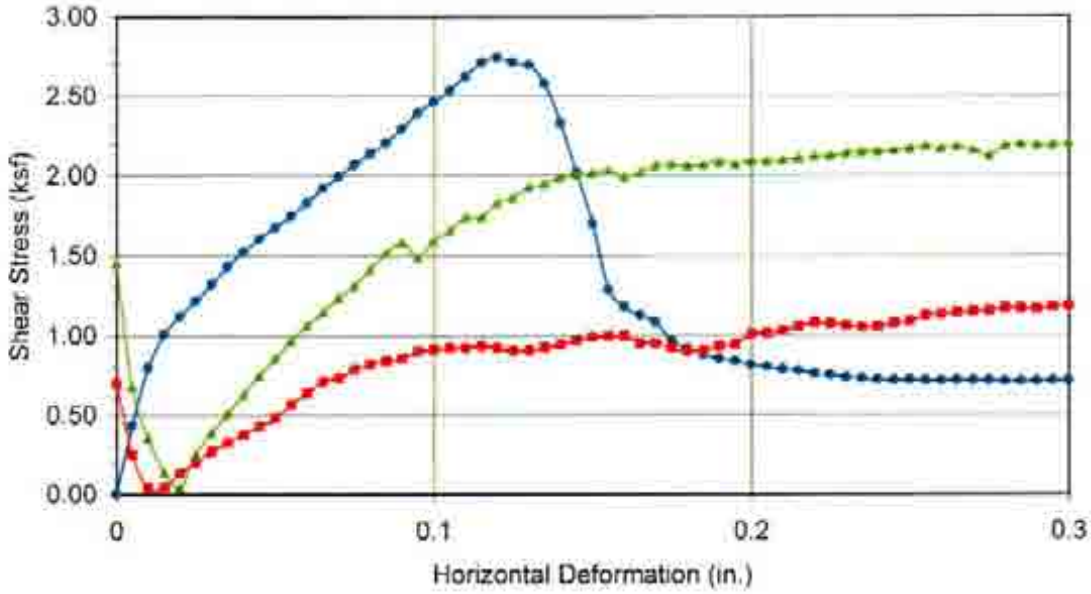
DIRECT SHEAR TEST RESULTS

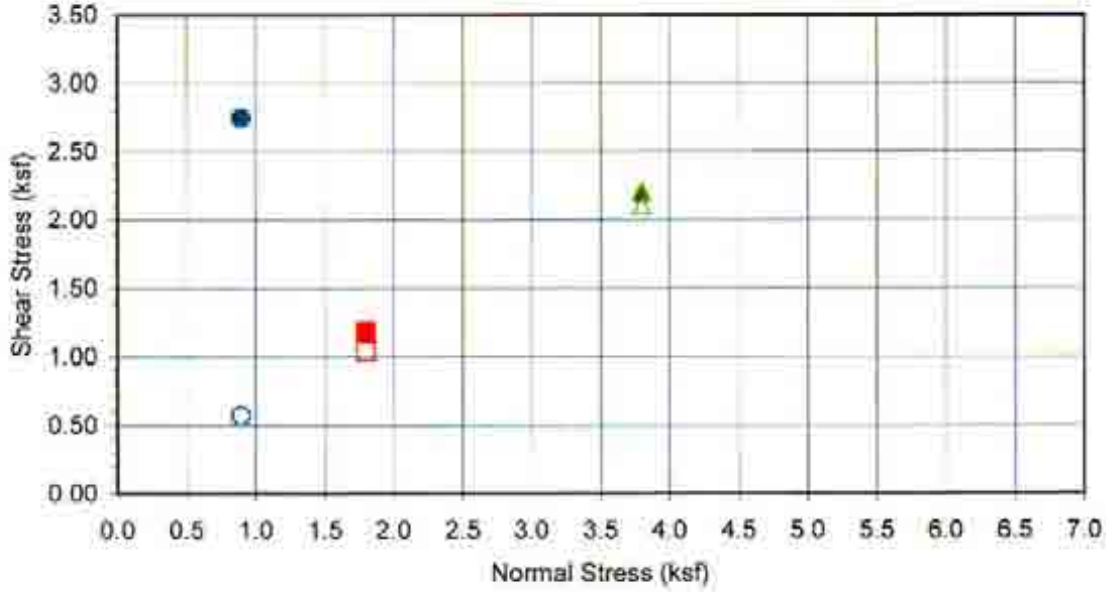
Consolidated Undrained

Project No.: 061277-001

Stevenson Ranch

08-04





Normal Stress (kip/ft²)	0.900	1.800	3.800
Peak Shear Stress (kip/ft²)	● 2.744	■ 1.185	▲ 2.201
Shear Stress @ End of Pass 7 (ksf)	○ 0.567	□ 1.038	△ 2.105
Deformation Rate (in./min.)	0.05, 0.0017	0.05, 0.0017	0.05, 0.0017
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	8.00	N/A	N/A
Dry Density (pcf)	133.2	N/A	N/A
Saturation (%)	81.3	N/A	N/A
Soil Height Before Shearing (in.)	1.0008	N/A	N/A
Final Moisture Content (%)	N/A	N/A	15.5

DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

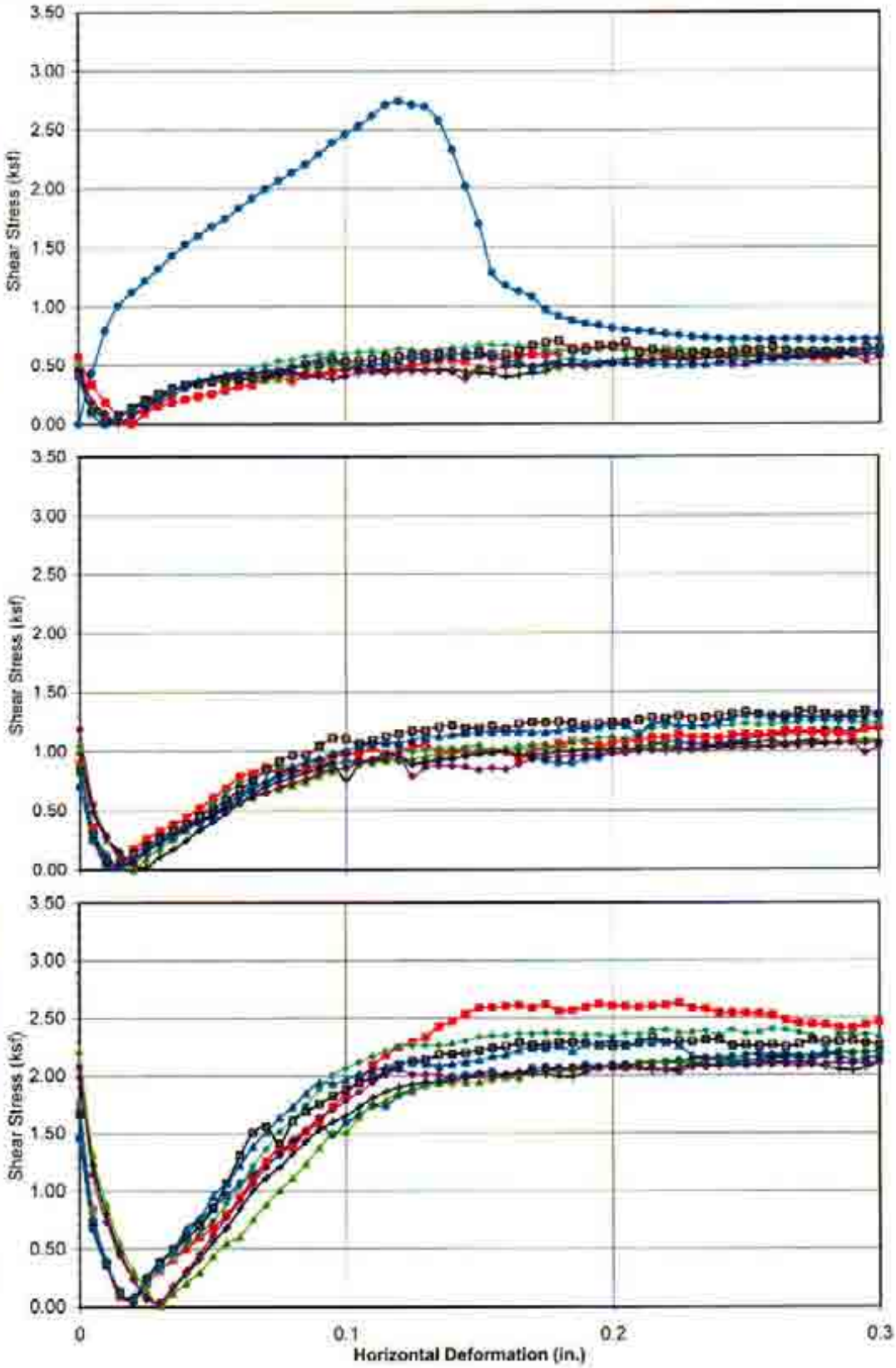
Leighton

Boring No.:	LB-23
Sample No.:	R-2
Depth (ft)	20
Sample Type:	Drive
Soil Description:	Lt Brn (SM) / (SP-SM)

Project No.: 061277-002

Legacy Village

08-05



Normal Stress (ksf) 0.90	
Shear Stress @ End of Pass (ksf)	
Pass No.	Shear Stress (ksf)
1	0.714
2	0.592
3	0.630
4	0.627
5	0.589
6	0.642
7	0.567
8	0.611

Pass 1-2 0.05"/min
Pass 3-8 0.0017"/min

Normal Stress (ksf) 1.80	
Shear Stress @ End of Pass (ksf)	
Pass No.	Shear Stress (ksf)
1	1.185
2	1.194
3	1.082
4	1.238
5	1.076
6	1.303
7	1.038
8	1.303

Pass 1-2 0.05"/min
Pass 3-8 0.0017"/min

Normal Stress (ksf) 3.80	
Shear Stress @ End of Pass (ksf)	
Pass No.	Shear Stress (ksf)
1	2.201
2	2.460
3	2.195
4	2.338
5	2.098
6	2.264
7	2.105
8	2.161

Pass 1-2 0.05"/min
Pass 3-8 0.0017"/min

DIRECT SHEAR TEST RESULTS
Consolidated Drained - ASTM D 3080

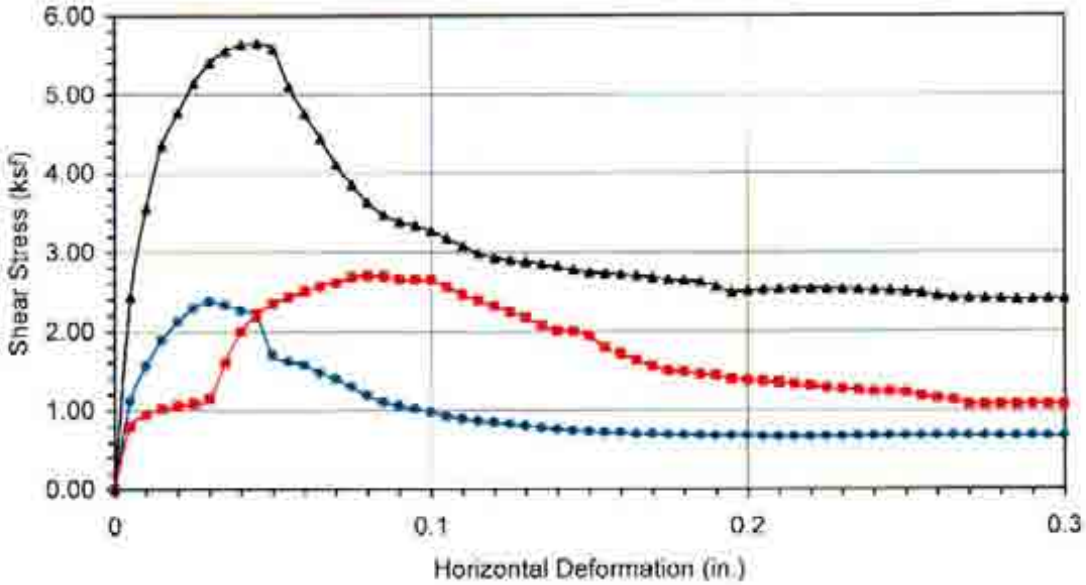
Leighton

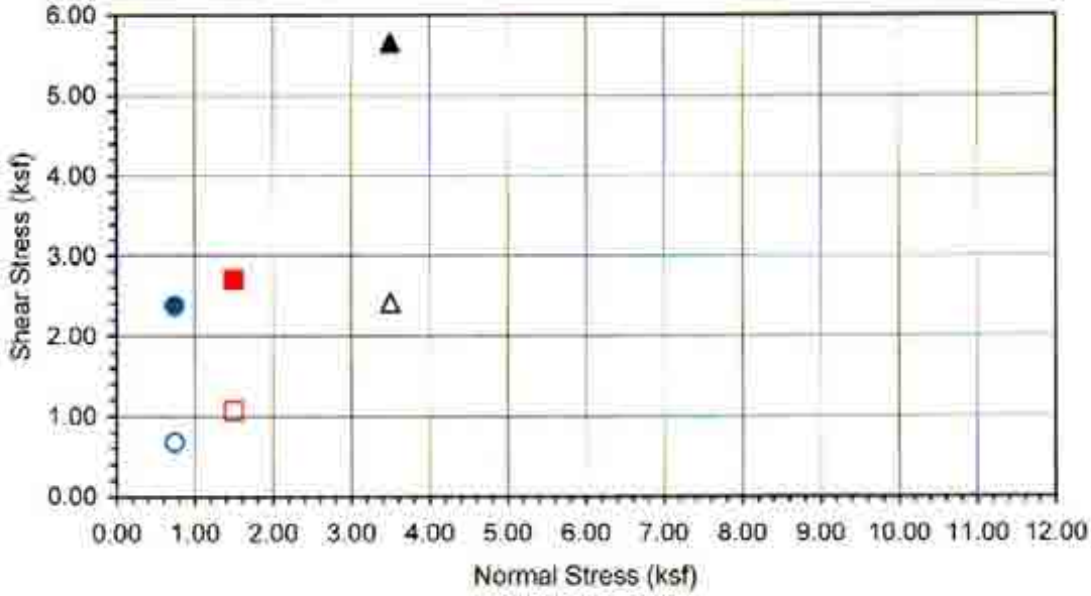
Boring No.:	LB-23
Sample No.:	R-2
Depth (ft)	20
Soil Type:	Drive
Soil Description:	Lt Brn (SM) / (SP-SM)

Project No. 061277-002

Legacy Village

08-05





Boring No.	**LB-23**
Sample No.	**R-3**
Depth (ft)	**30**

Sample Type:

Drive

Soil Identification:
Olive Lean Clay (CL)

Normal Stress (kip/ft²)	0.750	1.500	3.500
Peak Shear Stress (kip/ft²)	● 2.376	■ 2.700	▲ 5.653
Shear Stress @ End of Test (ksf)	○ 0.673	□ 1.069	△ 2.413
Deformation Rate (in./min.)	0.0500	0.0500	0.0500
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	10.59	10.59	10.59
Dry Density (pcf)	127.8	128.4	128.5
Saturation (%)	89.7	91.4	91.7
Soil Height Before Shearing (in.)	0.9755	1.0051	0.9946
Final Moisture Content (%)	18.0	16.7	15.3

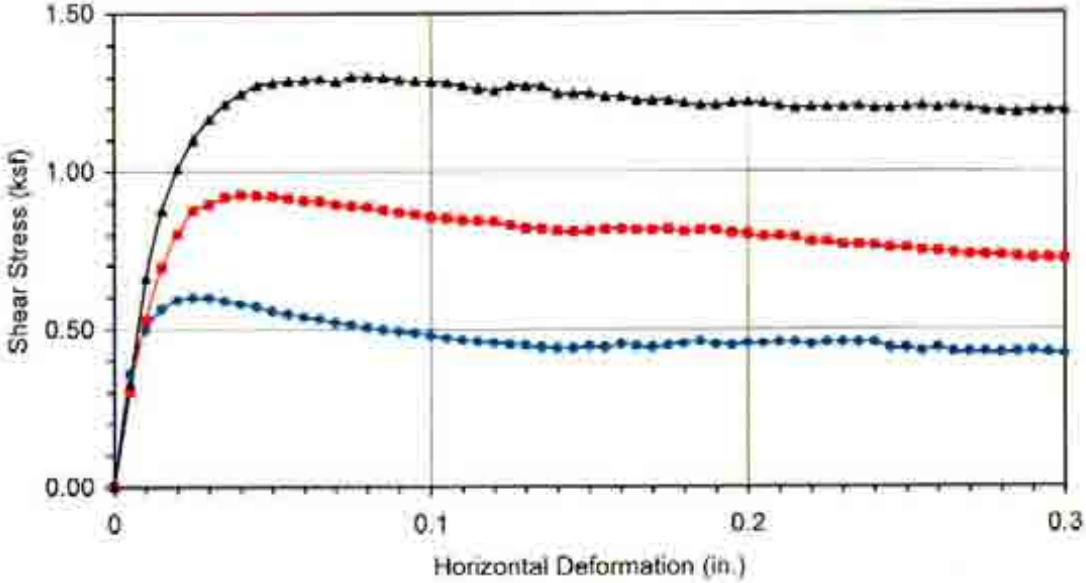
Leighton

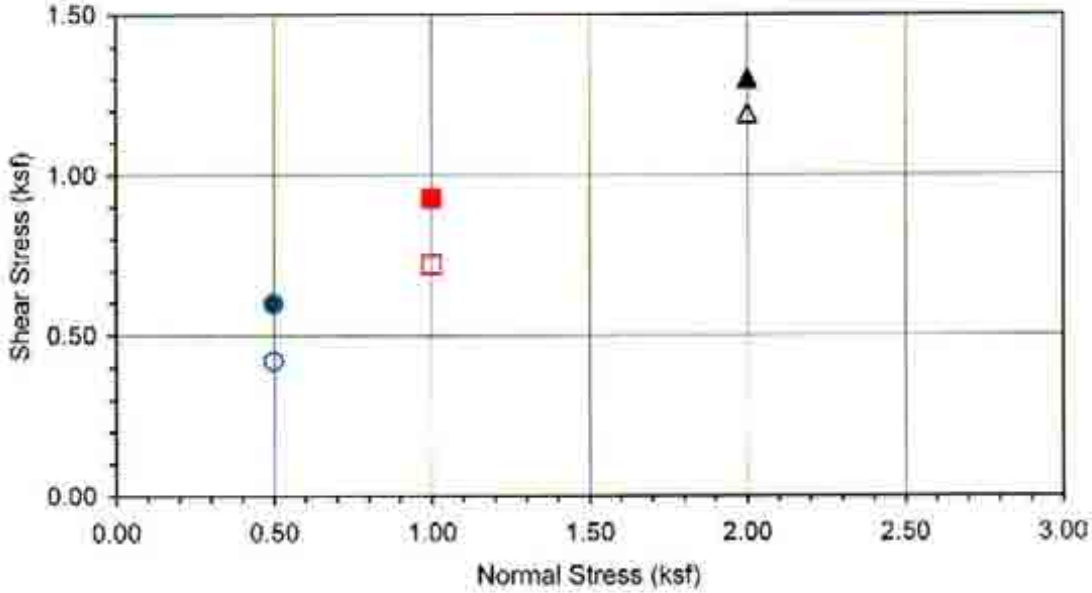
DIRECT SHEAR TEST RESULTS
Consolidated Undrained

Project No.: 061277-001

Newhall Land / Phase V / SR

03-05





Boring No.	**LB-26**
Sample No.	**B-1**
Depth (ft)	**5**

Sample Type:
Remolded to 92% Max. @ Opt. M. C.

Soil Identification:
Brown Sandy Silt s(ML)

Normal Stress (kip/ft²)	0.500	1.000	2.000
Peak Shear Stress (kip/ft²)	● 0.599	■ 0.926	▲ 1.300
Shear Stress @ End of Test (ksf)	○ 0.421	□ 0.720	△ 1.191
Deformation Rate (in./min.)	0.0500	0.0500	0.0500
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	14.00	14.00	14.00
Dry Density (pcf)	106.8	106.8	106.8
Saturation (%)	65.4	65.4	65.4
Soil Height Before Shearing (in.)	1.0197	1.0116	0.9999
Final Moisture Content (%)	23.3	22.7	22.3

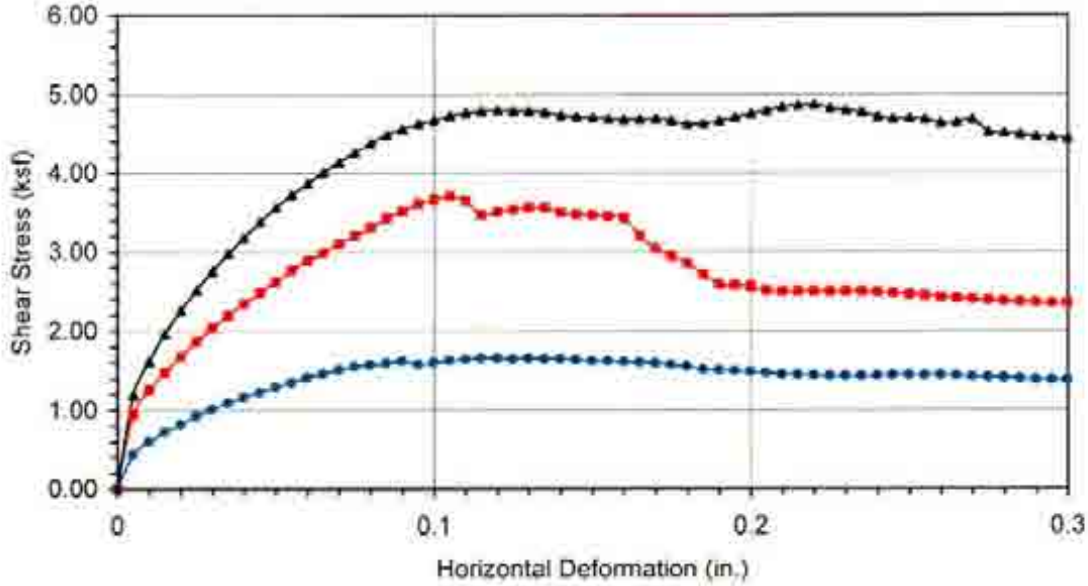
Leighton

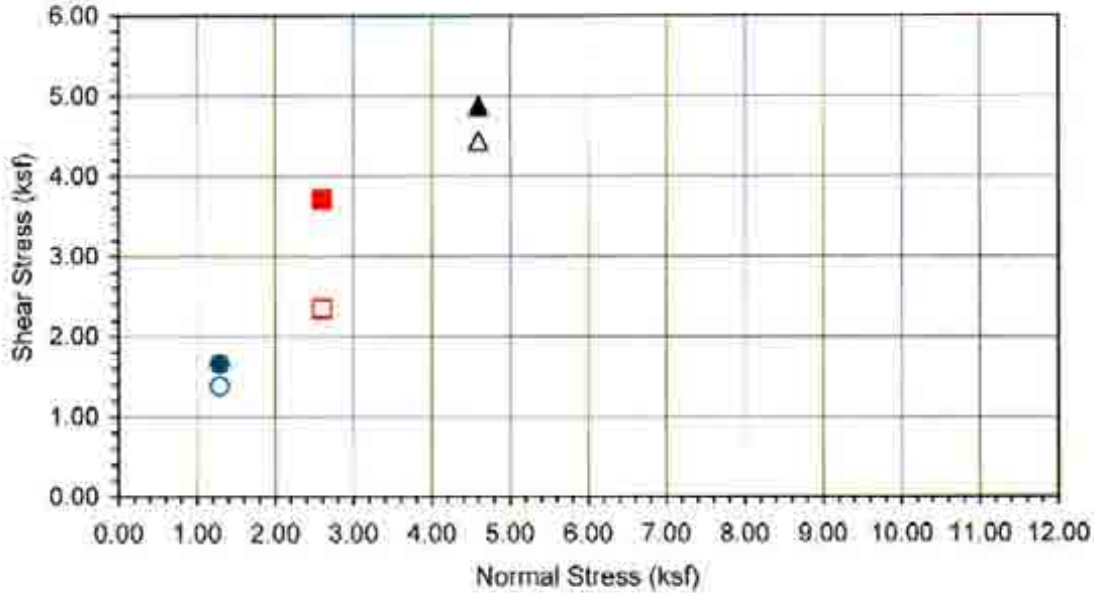
DIRECT SHEAR TEST RESULTS
Consolidated Undrained

Project No.: 061277-002

SRV / Phase V

06-05





Boring No.	**LB-30**
Sample No.	**R-7**
Depth (ft)	**70**

Sample Type:

Drive

Soil Identification:
Olive Brown Sandy Silty Clay (Claystone) s(CL-ML)

Normal Stress (kip/ft²)	1.300	2.600	4.600
Peak Shear Stress (kip/ft²)	● 1.656	■ 3.707	▲ 4.873
Shear Stress @ End of Test (ksf)	○ 1.381	□ 2.345	△ 4.443
Deformation Rate (in./min.)	0.0500	0.0500	0.0500
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	10.65	10.65	10.65
Dry Density (pcf)	109.4	116.0	119.6
Saturation (%)	53.2	63.4	70.3
Soil Height Before Shearing (in.)	0.9914	0.9804	0.9752
Final Moisture Content (%)	20.3	18.2	16.9

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DIRECT SHEAR TEST RESULTS
Consolidated Undrained

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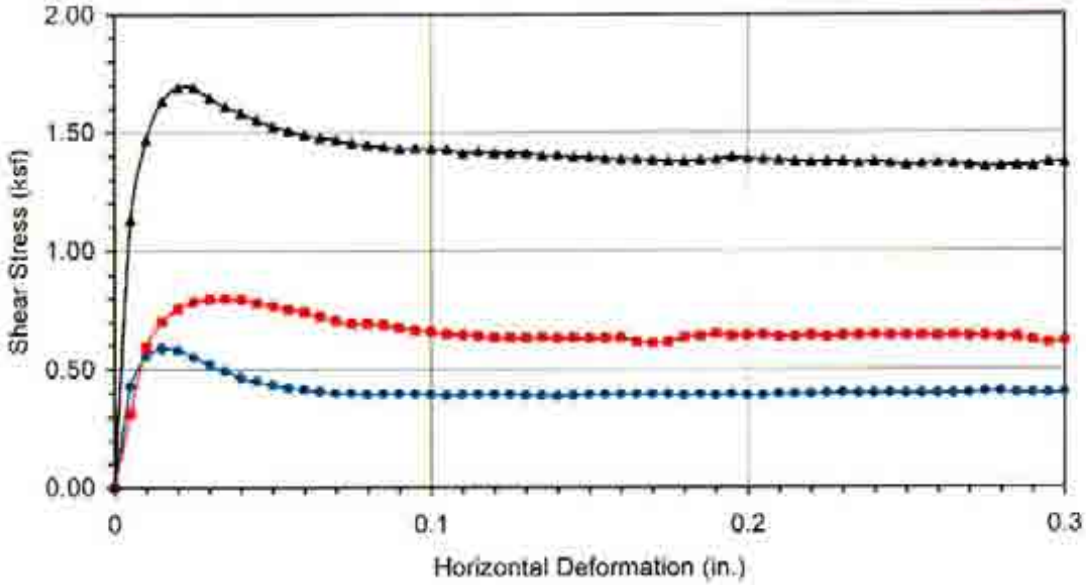
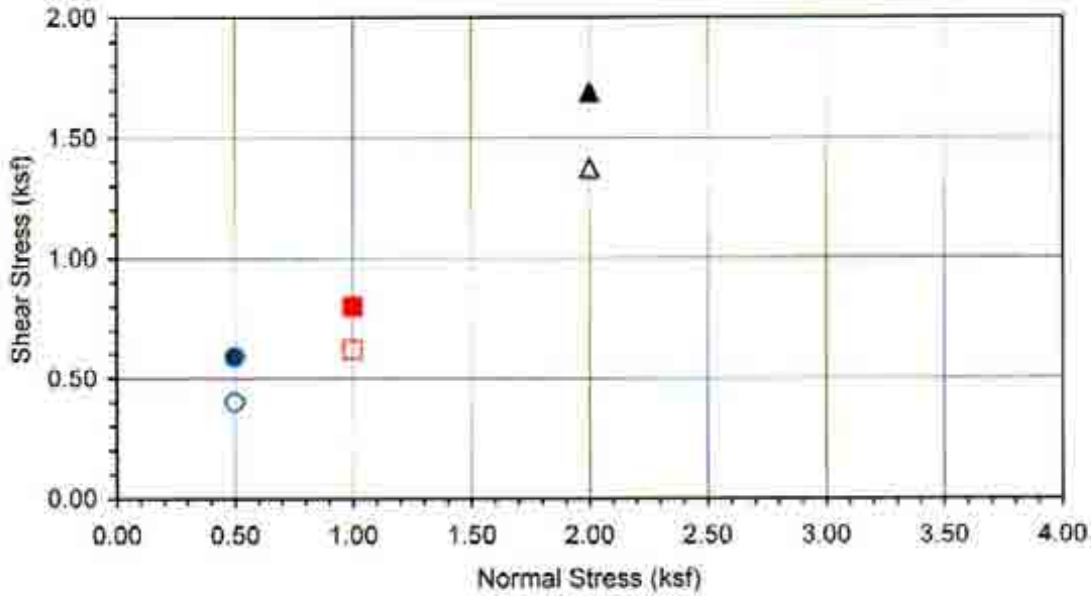
Phase V

06-05





Boring No.	**LB-31**
Sample No.	**B-1**
Depth (ft)	**9**

Sample Type:
Remolded to 92% Max. @ Opt. M. C.

Soil Identification:
Yellowish Brown Silty Sand (SM)

Normal Stress (kip/ft²)	0.500	1.000	2.000
Peak Shear Stress (kip/ft²)	● 0.589	■ 0.798	▲ 1.687
Shear Stress @ End of Test (ksf)	○ 0.402	□ 0.617	△ 1.372
Deformation Rate (in./min.)	0.0500	0.0500	0.0500
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	7.50	7.50	7.50
Dry Density (pcf)	115.6	115.6	115.6
Saturation (%)	44.1	44.1	44.1
Soil Height Before Shearing (in.)	1.0036	0.9938	0.9914
Final Moisture Content (%)	15.1	15.2	14.9

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DIRECT SHEAR TEST RESULTS
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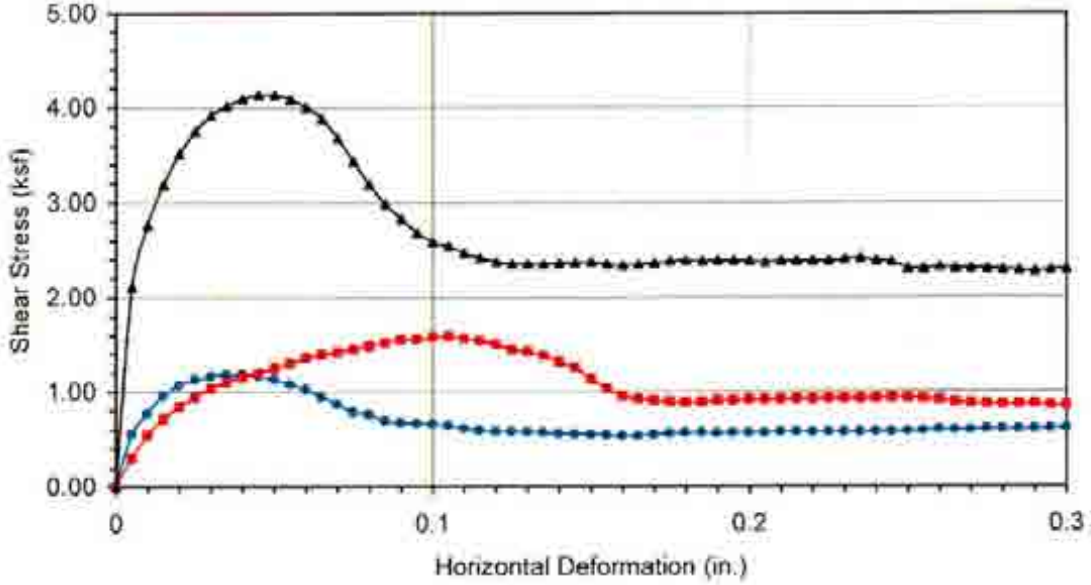
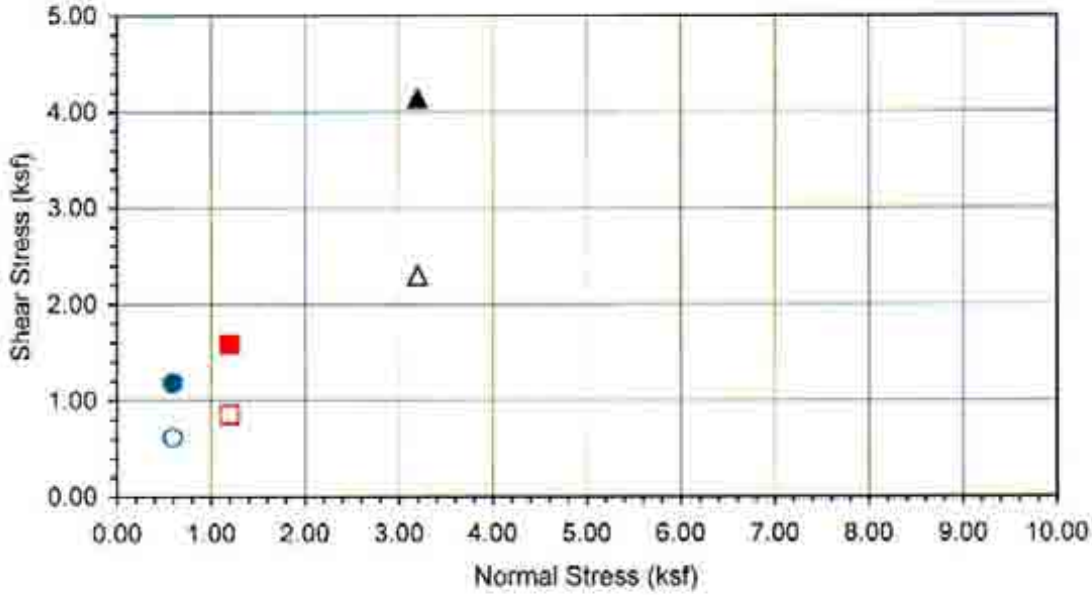
SRV / Phase V

06-05





Boring No.	**LB-31**
Sample No.	**R-1**
Depth (ft)	**10**

Sample Type:

Drive

Soil Identification:
Light Brown Silty Sand with a piece of Clay (SM) / (SC-SM)

Normal Stress (kip/ft²)	0.600	1.200	3.200
Peak Shear Stress (kip/ft²)	● 1.182	■ 1.581	▲ 4.137
Shear Stress @ End of Test (ksf)	○ 0.617	□ 0.854	△ 2.301
Deformation Rate (in./min.)	0.0500	0.0500	0.0500
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	5.77	5.77	5.77
Dry Density (pcf)	123.7	122.9	126.3
Saturation (%)	42.9	41.9	46.5
Soil Height Before Shearing (in.)	0.9974	0.9942	0.9870
Final Moisture Content (%)	13.9	15.3	13.2

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DIRECT SHEAR TEST RESULTS
Consolidated Undrained

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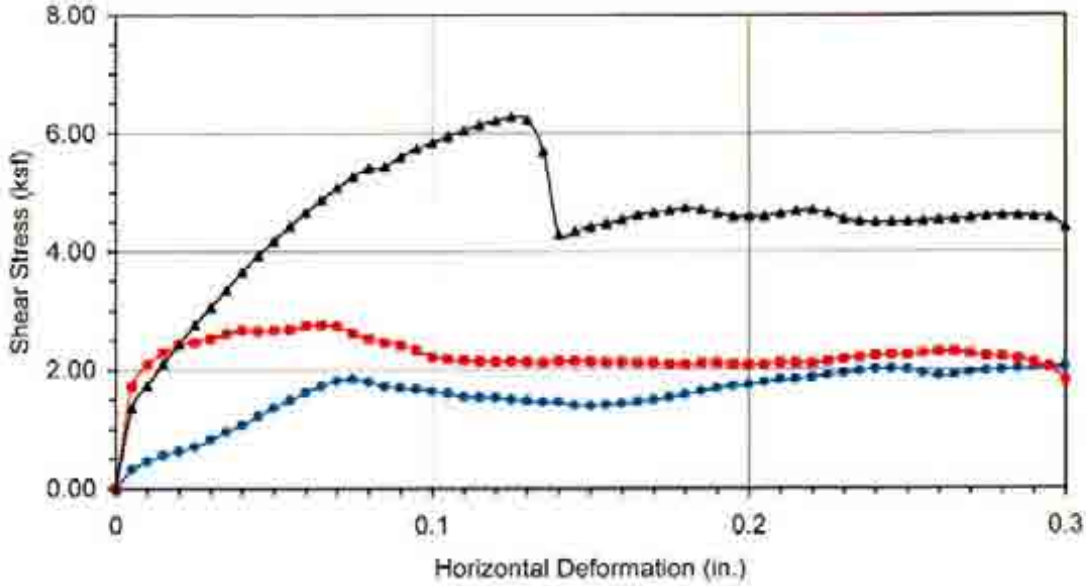
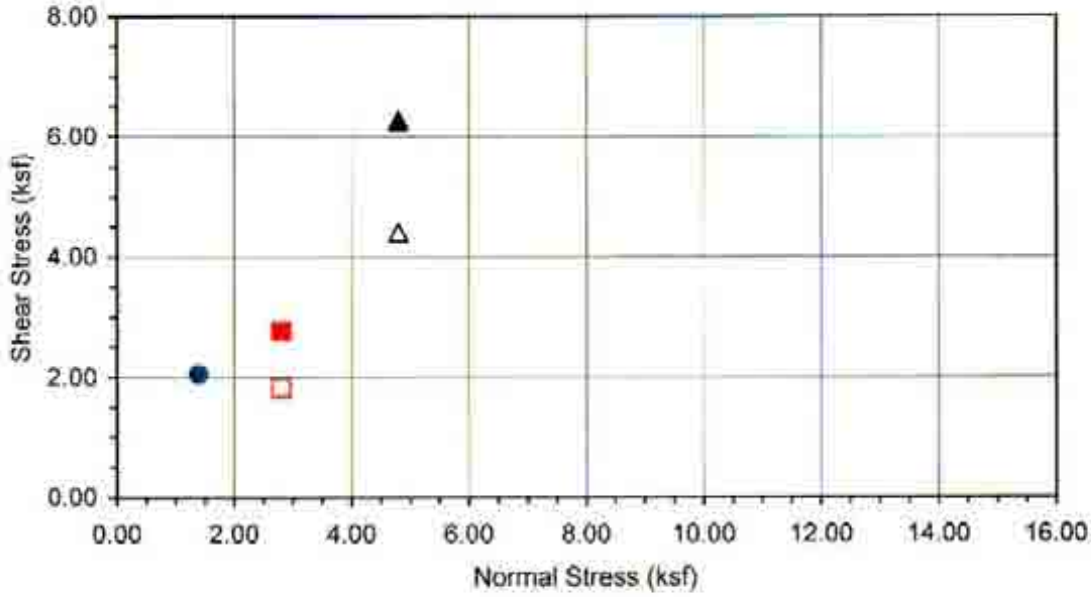
Phase V

06-05





Boring No.	**LB-31**
Sample No.	**R-5**
Depth (ft)	**50**
Sample Type:	
Drive	
Soil Identification: Olive Brown Silty Sand (Sandstone) (SM)	

Normal Stress (kip/ft²)	1.400	2.800	4.800
Peak Shear Stress (kip/ft²)	● 2.048	■ 2.762	▲ 6.270
Shear Stress @ End of Test (ksf)	○ 2.048	□ 1.821	△ 4.409
Deformation Rate (in./min.)	0.0500	0.0500	0.0500
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	13.13	13.13	13.13
Dry Density (pcf)	117.6	123.3	123.8
Saturation (%)	81.9	96.7	98.0
Soil Height Before Shearing (in.)	0.9935	0.9925	0.9818
Final Moisture Content (%)	16.4	14.8	15.7

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DIRECT SHEAR TEST RESULTS

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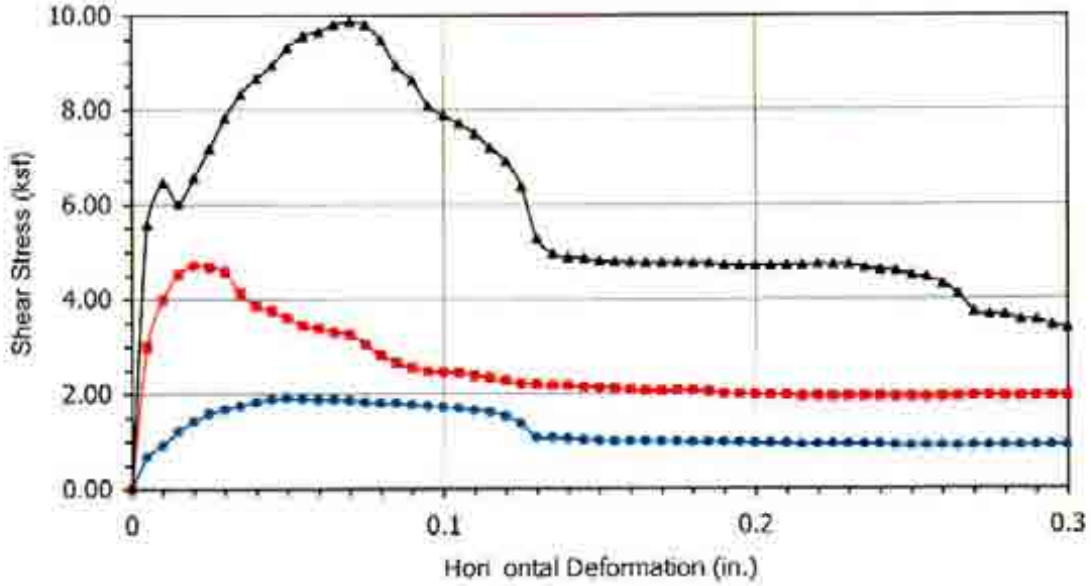

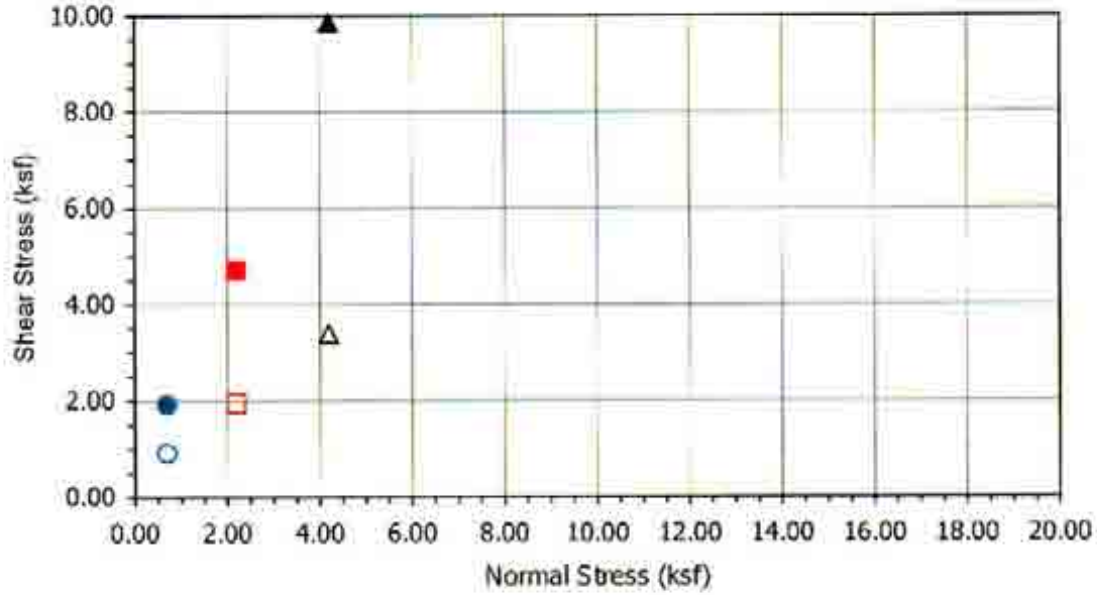

Boring No.	**LB-32**
Sample No.	**R-5**
Depth (ft)	**40**

Sample Type:

Drive

Soil Identification:
Gray Silty Clay (Claystone) (CL-ML)

Normal Stress (kip/ft²)	0.700	2.200	4.200
Peak Shear Stress (kip/ft²)	● 1.914	■ 4.711	▲ 9.865
Shear Stress @ End of Test (ksf)	○ 0.907	□ 1.942	△ 3.395
Deformation Rate (in./min.)	0.0500	0.0500	0.0500
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	11.13	11.13	11.13
Dry Density (pcf)	124.6	132.3	133.6
Saturation (%)	85.2	109.5	115.0
Soil Height Before Shearing (in.)	1.0101	1.0018	0.9984
Final Moisture Content (%)	17.9	15.0	14.4

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DIRECT SHEAR TEST RESULTS
Consolidated Undrained

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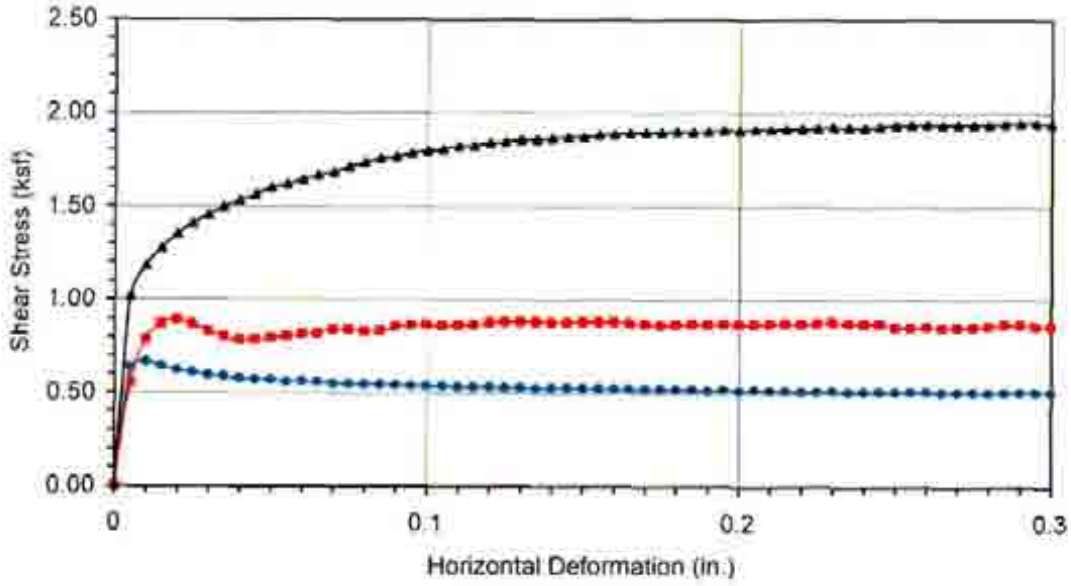

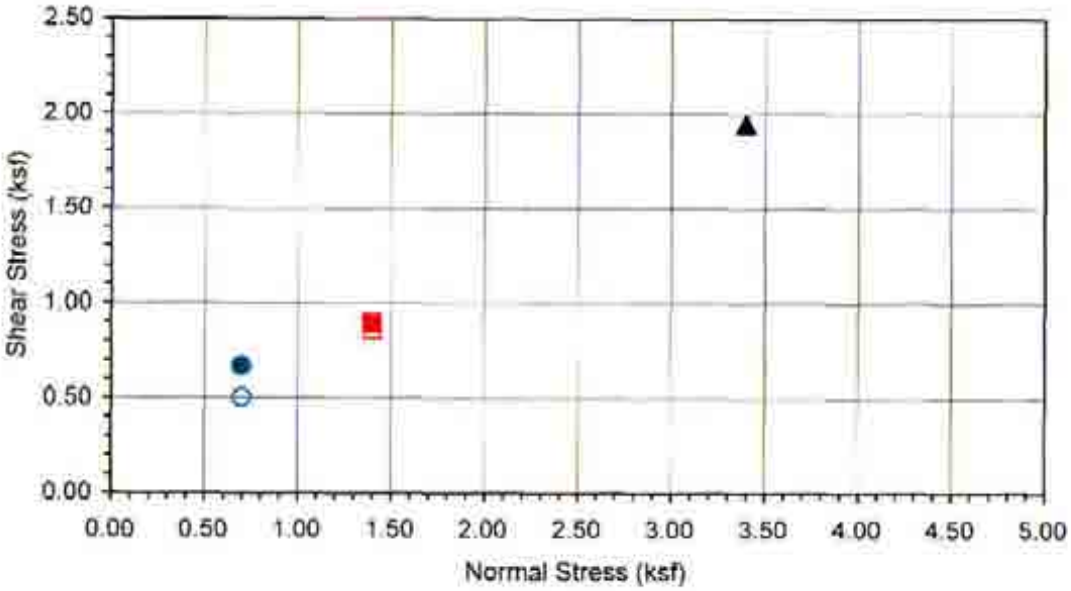

Boring No.	**TP-46**
Sample No.	**B-1**
Depth (ft)	**4**

Sample Type:
Remolded to 90% Max. @ Opt. M. C.

Soil Identification:
Brown Silty Clayey Sand (SC-SM)

Normal Stress (kip/ft²)	0.700	1.400	3.400
Peak Shear Stress (kip/ft²)	● 0.670	■ 0.895	▲ 1.949
Shear Stress @ End of Test (ksf)	○ 0.505	□ 0.861	△ 1.946
Deformation Rate (in./min.)	0.0500	0.0500	0.0500
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	10.50	10.50	10.50
Dry Density (pcf)	107.2	107.2	107.2
Saturation (%)	49.5	49.5	49.5
Soil Height Before Shearing (in.)	0.9822	0.9985	0.9700
Final Moisture Content (%)	21.2	20.8	18.5

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DIRECT SHEAR TEST RESULTS
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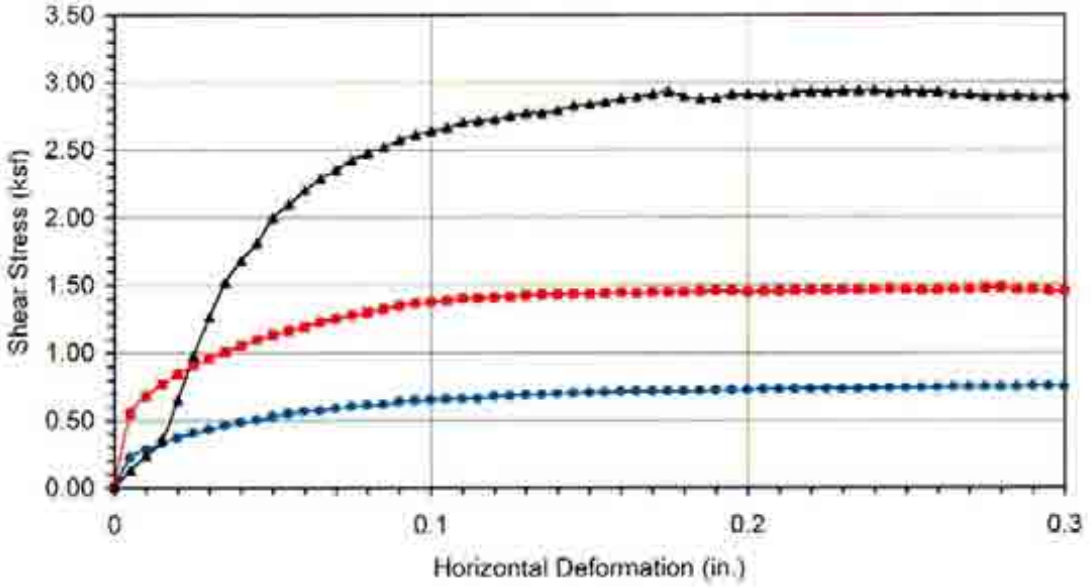

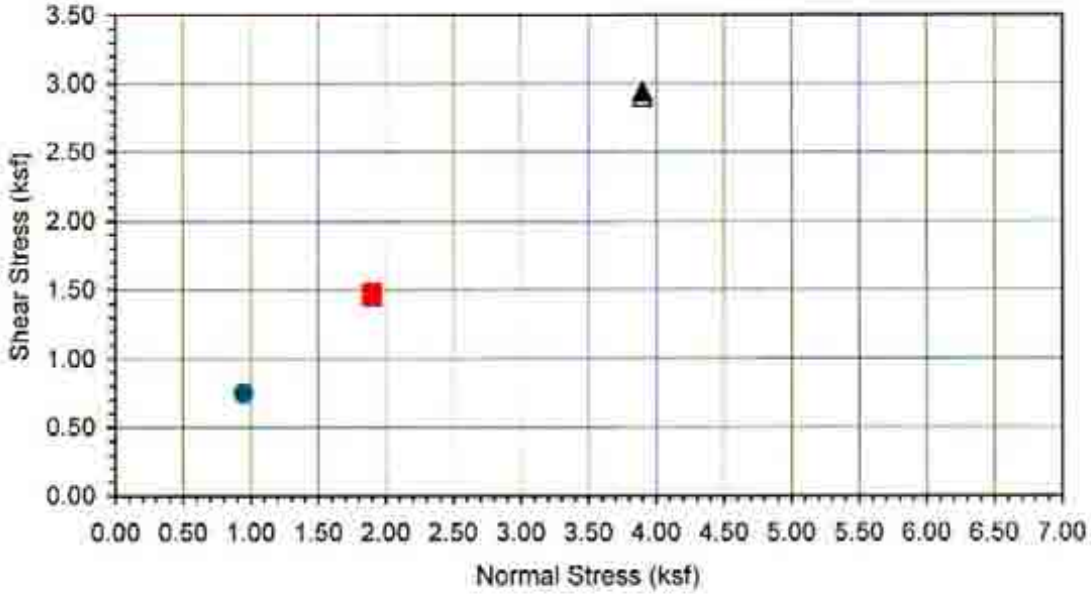

Boring No.	**HS-6**
Sample No.	**R-4**
Depth (ft)	**20**

Sample Type:

Ring

Soil Identification:
Olive brown silty sand (SM)

Normal Stress (kip/ft²)	0.950	1.900	3.900
Peak Shear Stress (kip/ft²)	● 0.751	■ 1.478	▲ 2.940
Shear Stress @ End of Test (ksf)	○ 0.748	□ 1.453	△ 2.900
Deformation Rate (in./min.)	0.0500	0.0500	0.0500
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	7.72	7.72	7.72
Dry Density (pcf)	105.1	109.7	111.8
Saturation (%)	34.5	38.9	41.0
Soil Height Before Shearing (in.)	0.9949	0.9766	0.9800
Final Moisture Content (%)	15.9	14.2	13.3

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DIRECT SHEAR TEST RESULTS
Consolidated Undrained

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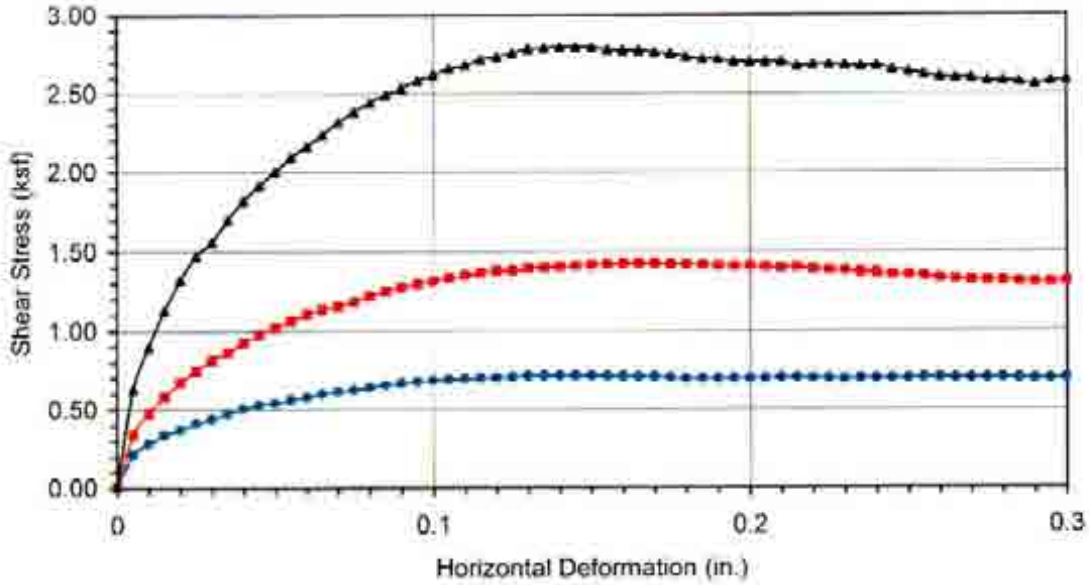
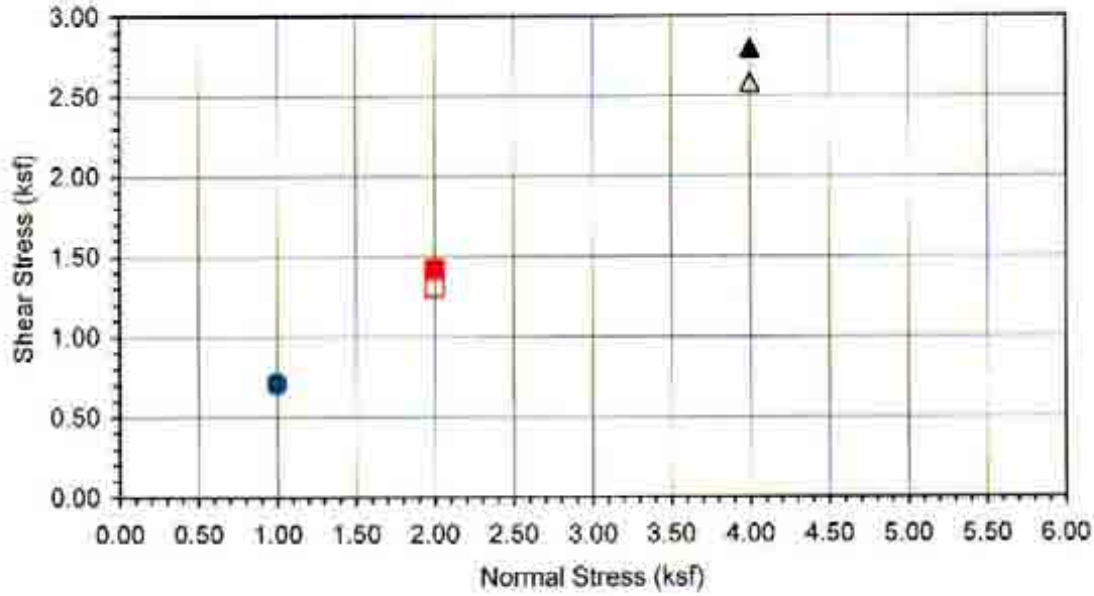
Newhall Land / Ph 5

02-05





Boring No.	**HS-8**
Sample No.	**R-3**
Depth (ft)	**25**

Sample Type:

Ring

Soil Identification:

Brown silty sand (SM) LOOSE

Normal Stress (kip/ft²)	1.000	2.000	4.000
Peak Shear Stress (kip/ft²)	● 0.717	■ 1.422	▲ 2.797
Shear Stress @ End of Test (ksf)	○ 0.698	□ 1.306	△ 2.585
Deformation Rate (in./min.)	0.0500	0.0500	0.0500
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	5.70	5.70	5.70
Dry Density (pcf)	95.0	96.6	99.7
Saturation (%)	19.9	20.6	22.3
Soil Height Before Shearing (in.)	0.9903	0.9691	0.9578
Final Moisture Content (%)	23.3	20.4	18.4

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DIRECT SHEAR TEST RESULTS

Consolidated Undrained

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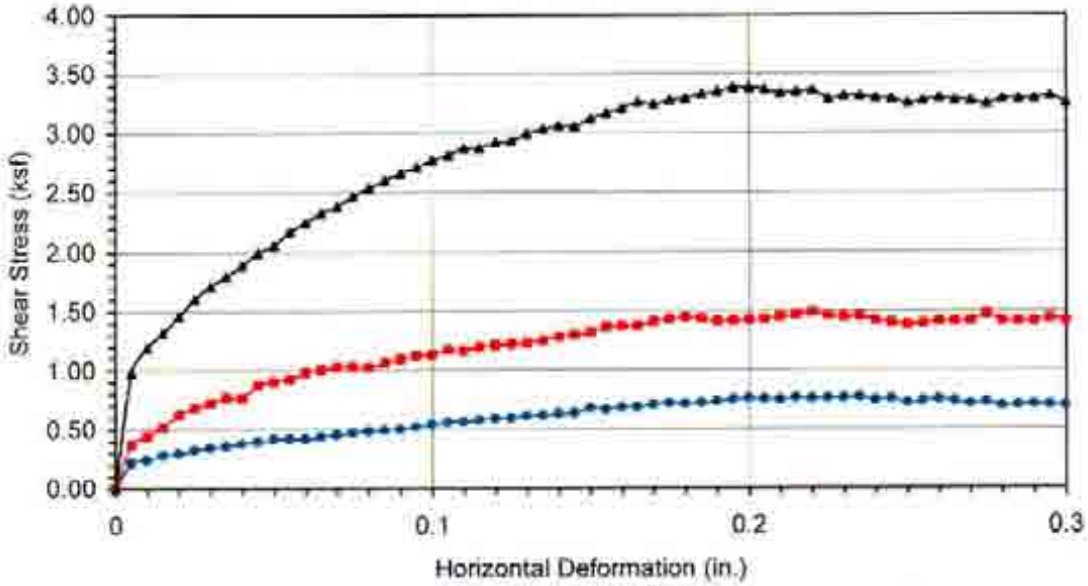
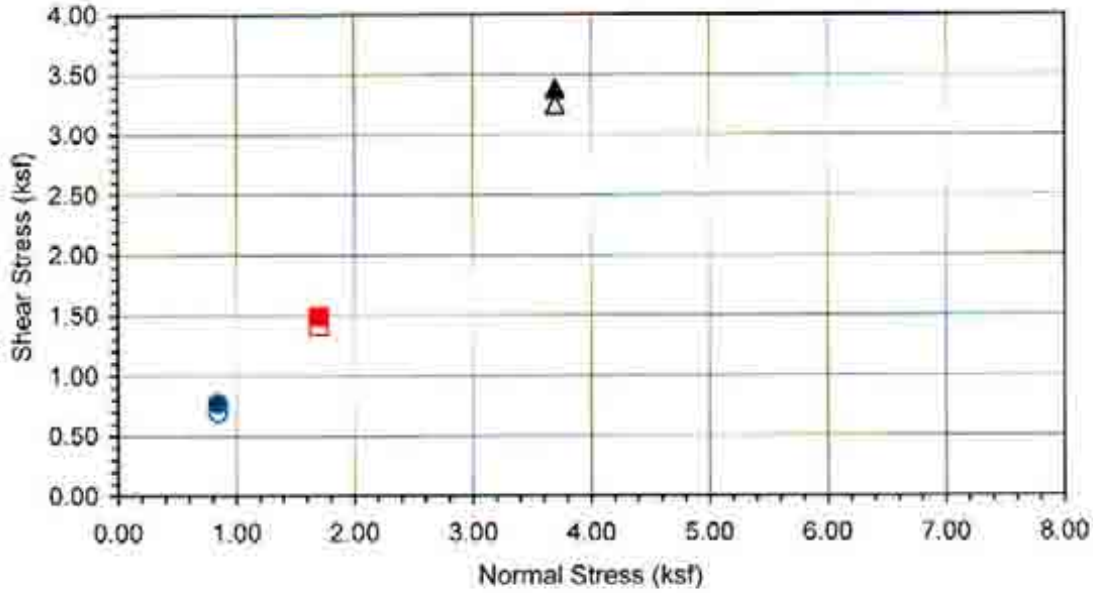
Newhall Land / Ph 5

02-05





Boring No.	**HS-9**
Sample No.	**R-3**
Depth (ft)	**15**

Sample Type:

Ring

Soil Identification:
Olive brown poorly graded sand with gravel (SP)g
LOOSE

Normal Stress (kip/ft²)	0.850	1.700	3.700
Peak Shear Stress (kip/ft²)	● 0.770	■ 1.487	▲ 3.383
Shear Stress @ End of Test (ksf)	○ 0.695	□ 1.412	△ 3.249
Deformation Rate (in./min.)	0.0050	0.0050	0.0050
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	3.67	3.67	3.67
Dry Density (pcf)	107.4	108.1	110.2
Saturation (%)	17.4	17.7	18.7
Soil Height Before Shearing (in.)	0.9955	0.9776	0.9687
Final Moisture Content (%)	13.9	14.6	13.2

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DIRECT SHEAR TEST RESULTS
Consolidated Drained - ASTM D 3080

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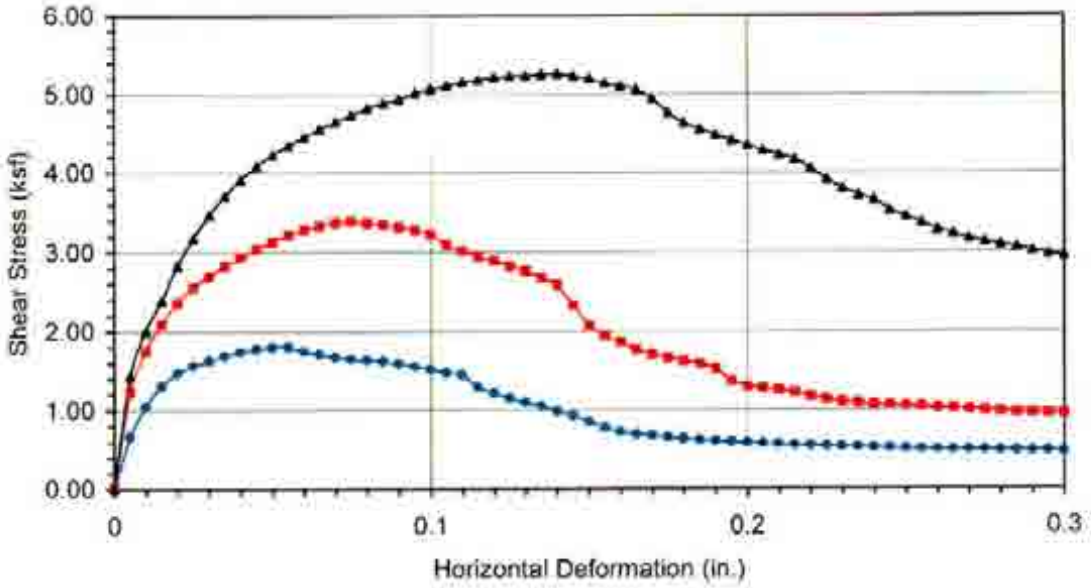
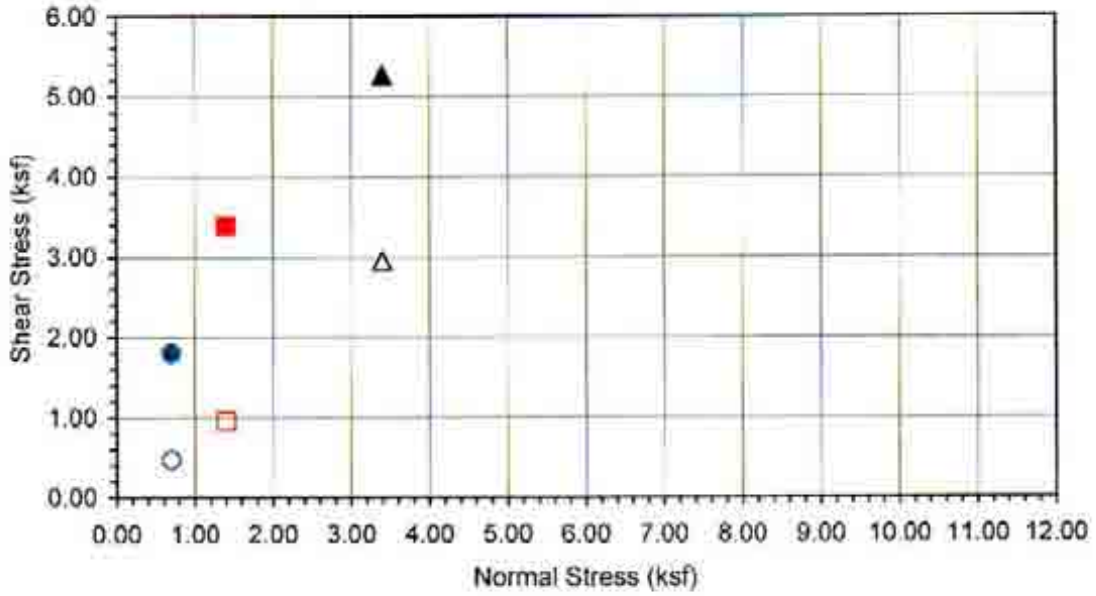
Newhall Land / Ph 5

02-05





Boring No.	**HS-16**
Sample No.	**R-2**
Depth (ft)	**15**
Sample Type:	
Drive	
Soil Identification:	
Olive Brown Lean Clay (CL)	

Normal Stress (kip/ft²)	0.700	1.400	3.400
Peak Shear Stress (kip/ft²)	● 1.805	■ 3.386	▲ 5.263
Shear Stress @ End of Test (ksf)	○ 0.471	□ 0.951	△ 2.949
Deformation Rate (in./min.)	0.0500	0.0500	0.0500
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	21.21	21.21	21.21
Dry Density (pcf)	108.0	109.8	110.7
Saturation (%)	102.2	106.9	109.5
Soil Height Before Shearing (in.)	1.0092	1.0019	0.9934
Final Moisture Content (%)	23.4	20.8	18.7

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DIRECT SHEAR TEST RESULTS

Consolidated Undrained

Project No.: 061277-002

NLF / Phase V / SR

02-05

APPENDIX D

SLOPE STABILITY ANALYSES

APPENDIX D

SLOPE STABILITY ANALYSES

General

Four geotechnical cross-sections were drawn through representative slopes (SA 1-1, SA 1-2, SA 2-1, and SA 2-2). The sections were drawn to reflect the anticipated geologic conditions such as bedding structure, clay seams, and other potentially adverse conditions. The shear strengths of the materials were determined and the critical sections were analyzed.

Shear Strength Parameters

The design shear strength parameters used in the analyses were developed based on our shear tests performed in our laboratory on representative samples. Details and results of the tests are presented in Appendix C. In general, peak shear strength values were used in the pseudostatic analyses. The shear strength parameters used for the slope stability analyses are shown in Table D-1. The shear strength values used for the fill materials should be verified during construction.

Stability Analysis

Static and pseudostatic stability analyses were performed on the four cross sections. The slope stability analyses were performed using the computer program GSTABL7 with STEDwin version 2. The calculation of the factor of safety against instability of a slope was performed using the Modified Bishop Method. Under static conditions, the minimum factor of safety of 1.5 was used. Under pseudostatic conditions, the minimum factor of safety of 1.1 and a horizontal seismic coefficient of 0.27 g, which is equivalent to one-third of the PGA, was used.

A summary of the results are shown in Table D-2. The most critical failure surface at each slope is shown in Figures D-1 through D-12. Based on our analyses, all slopes are stable under static and pseudostatic conditions.

TABLE D-1

Design Shear Strength Parameters for Slope Stability Analyses

	Static		Pseudostatic		Saturated Bulk Density (pcf)
Material	Cohesion (psf)	Angle of Internal Friction (degrees)	Cohesion (psf)	Angle of Internal Friction (degrees)	
Alluvium (Qal)	100	34	150	35	125
Fill (assumed for analyses)	200	29	250	30	125
Bedrock **Pico Formation (Tp)** Sandstone Along Bedding Cross Bedding	150 200	28 32	150 600	28 38	130
Siltstone Along Bedding Cross Bedding	150 500	28 32	150 700	28 36	130

TABLE D-2

Summary of Slope Stability Analyses

Cross-Section	Figure Set	Condition	Factor of Safety			Remarks
			Static	Pseudo-Static	Surficial	
SA1-1′	D-1 D-2	Overall Slope – Natural and Proposed Cut (Siltstone)	2.1	1.4	3.6	No Mitigation Needed
SA1-2′	D-3 D-4	Natural Slope (Sandstone)	1.7	1.6	1.6	No Mitigation Needed
SA1-2′	D-5 D-6	Natural Slope (Siltstone)	1.9	1.3	2.7	No Mitigation Needed
SA1-2′	D-7 D-8	Fill Slope	2.2	1.4	1.6	No Mitigation Needed
SA2-1′	D-9 D-10	Cut Slope (Sandstone)	1.8	1.5	1.6	No Mitigation Needed
SA2-2′	D-11 D-12	Natural Slope (Siltstone)	2.0	1.5	3.0	No Mitigation Needed

Tract 61105 X-Section SA1-1'; Natural & Proposed Cut Slope Static

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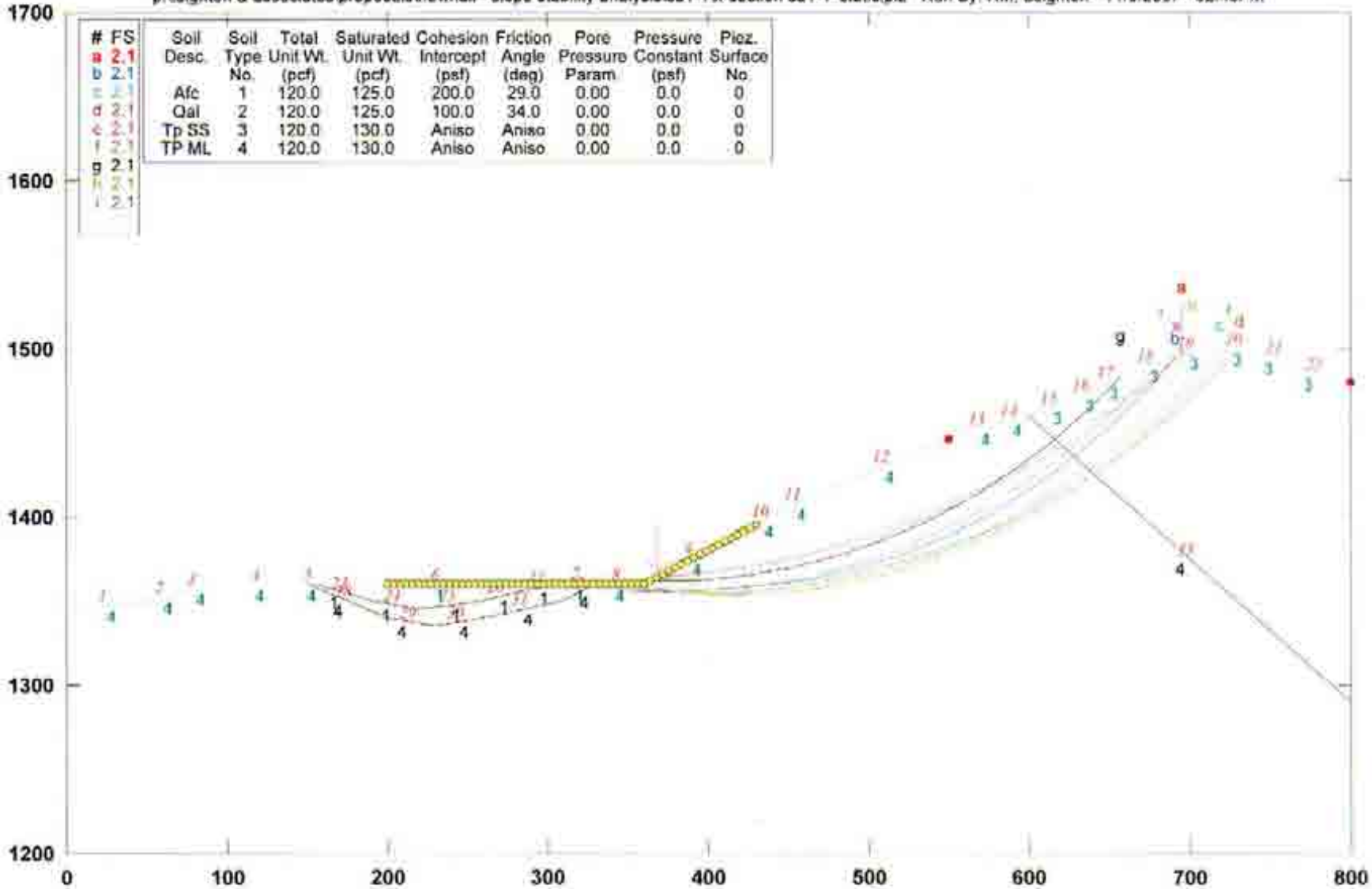

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param	Pressure Constant (psf)	Piez. Surface No.
Afc	1	120.0	125.0	200.0	29.0	0.00	0.0	0
Qal	2	120.0	125.0	100.0	34.0	0.00	0.0	0
Tp SS	3	120.0	130.0	Aniso	Aniso	0.00	0.0	0
TP ML	4	120.0	130.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=2.1

Safety Factors Are Calculated By The Modified Bishop Method

Tract 61105 X-Section SA1-1'; Natural & Proposed Cut Slope PsuedoStatic

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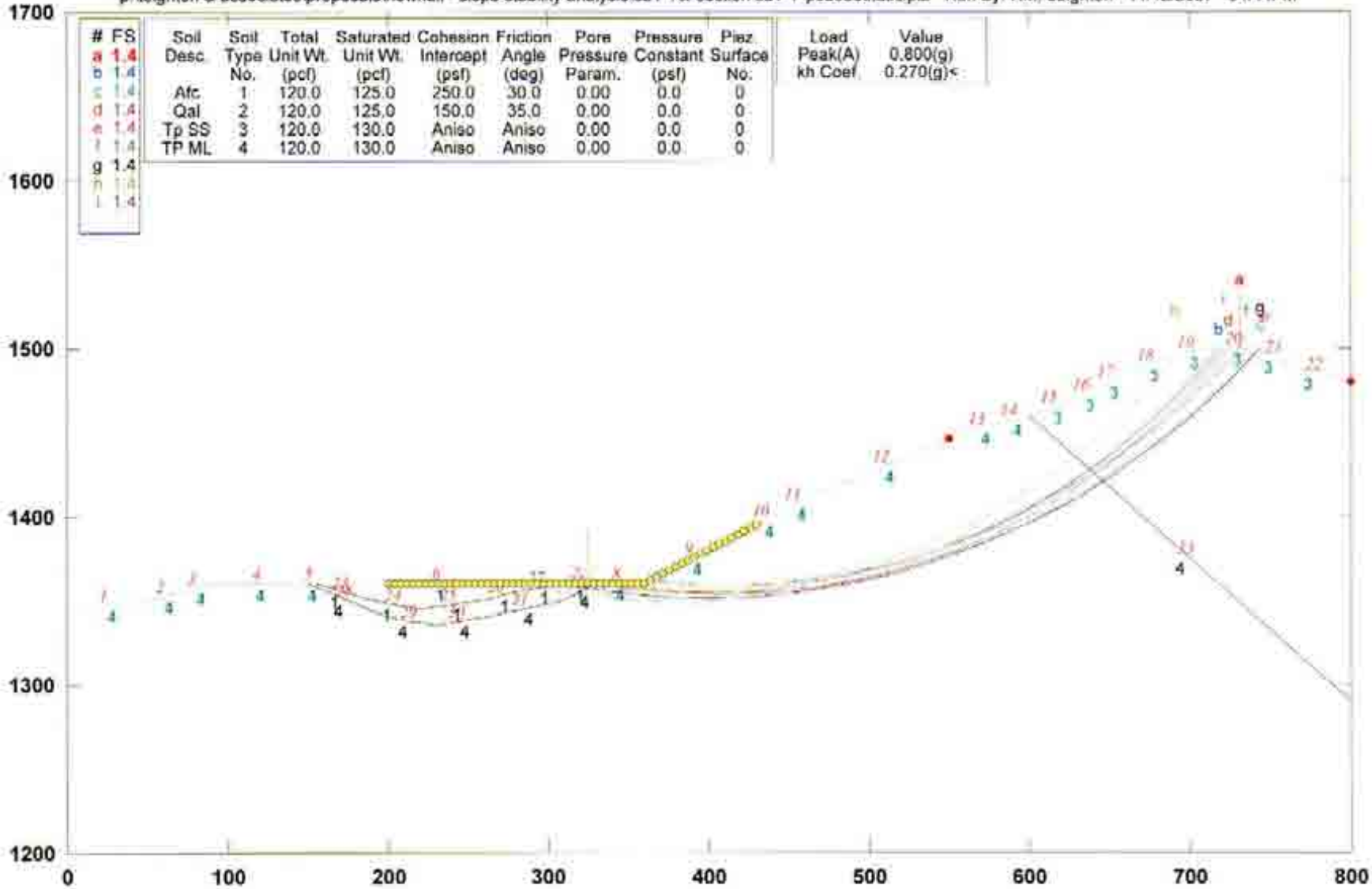
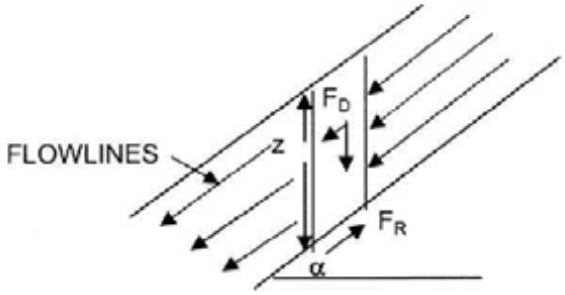


GSTABL7 v.2 FSmin=1.4

Safety Factors Are Calculated By The Modified Bishop Method

Existing slope: assuming 4 feet deep saturation

SURFICIAL SLOPE STABILITY ANALYSIS



Project No.: 062273-001

Case: Overall Slope @ 2.5:1 Section 1-1
Pico Formation - SILTSTONE

Depth of Saturation (ft), Z	=	**4**
Buoyant Unit Weight of Soil (pcf), γ_b	=	**67.6**
Total Unit Weight of Soil (pcf), γ_t	=	**130**
Slope Angle, α	=	**22**
Angle of Internal Friction, ϕ	=	**32**
Cohesion (psf), c	=	**500**

Force Tending To Cause Movement:

$$F_D = Z\gamma_t \sin 2\alpha / 2 = \mathbf{180.61} \text{ lb/ft}$$

Force Tending To Resist Movement:

$$F_R = Z\gamma_b \cos^2\alpha \tan\phi + (c) = \mathbf{645.25} \text{ lb/ft}$$

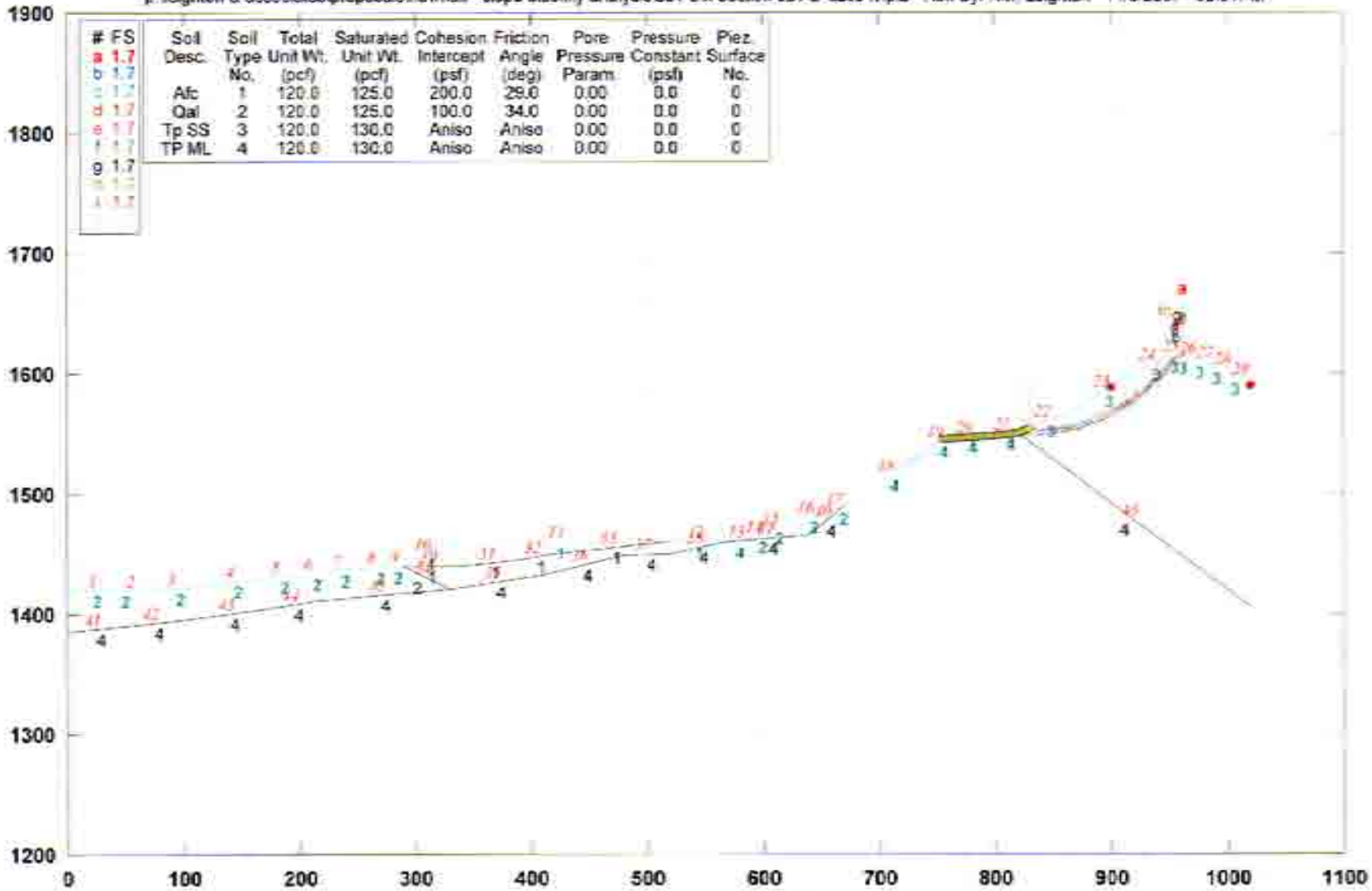
$$F.S. = \frac{2Z\gamma_b \cos^2\alpha \tan\phi + 2c}{Z\gamma_t \sin 2\alpha}$$

F.S. = 3.6

SURFICIAL STABILITY	Project Name : Offsite Grading TTM 61105 Project Number : 062273-001 Designed/Checked : RM Figure No.

Tract 61105 X-Section SA1-2'; Natural Slope (Sandstone) Static

p:\leighton & associates\proposals\newhall - slope stability analysis\sa1-2\x-section sa1-2' case iv.pl2 Run By: RM, Leighton 11/9/2007 02:51PM



#	FS
a	1.7
b	1.7
c	1.7
d	1.7
e	1.7
f	1.7
g	1.7
h	1.7
i	1.7

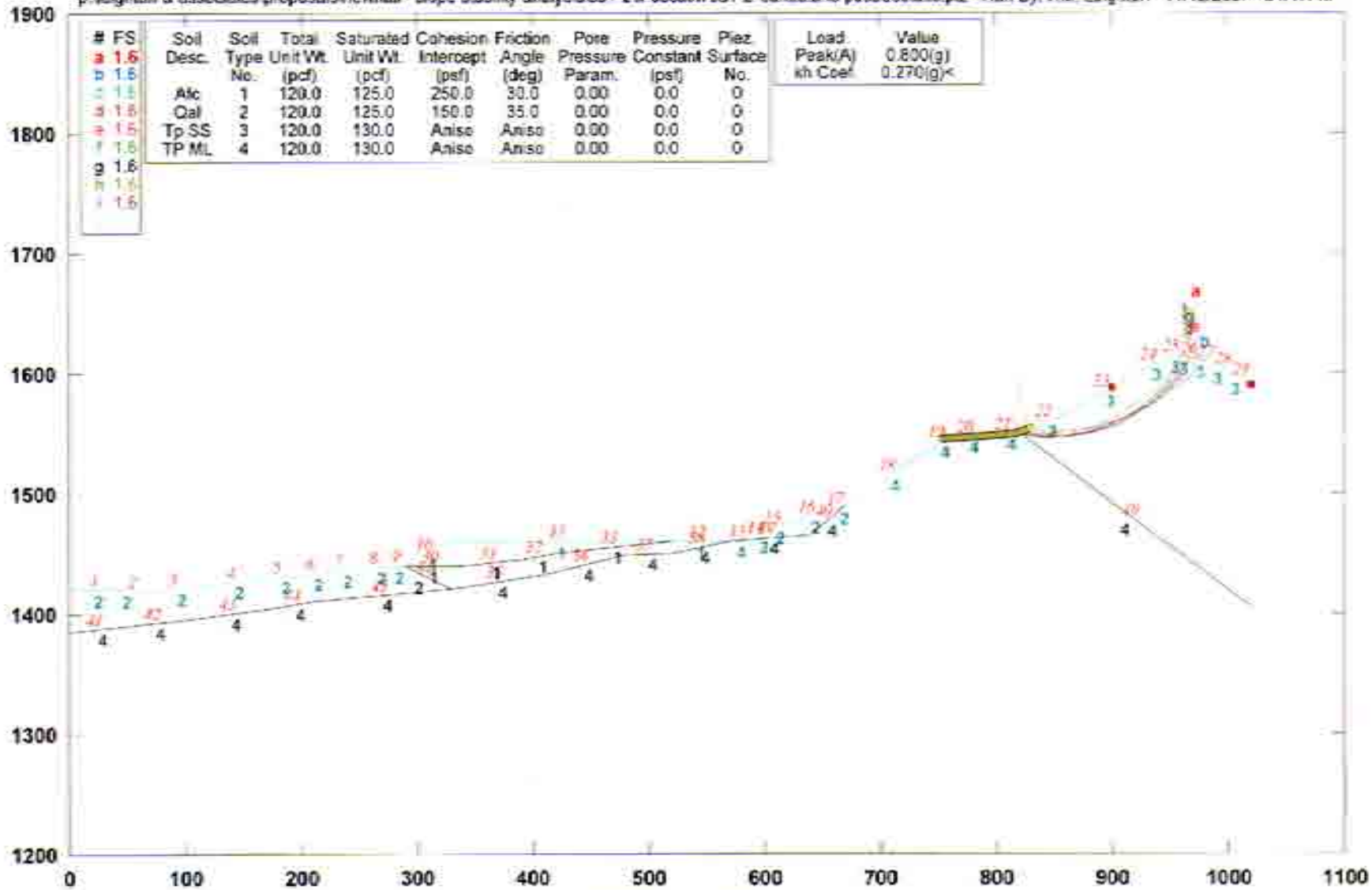
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param	Pressure Constant (psf)	Piez. Surface No.
Afc	1	120.0	125.0	200.0	29.0	0.00	0.0	0
Qal	2	120.0	125.0	100.0	34.0	0.00	0.0	0
Tp SS	3	120.0	130.0	Aniso	Aniso	0.00	0.0	0
TP ML	4	120.0	130.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=1.7

Safety Factors Are Calculated By The Modified Bishop Method

Tract 61105 X-Section SA1-2'; Natural Slope (Sandstone) Psuedostatic

p:\leighton & associates\proposals\newhall - slope stability analysis\sa1-2\x-section sa1-2' sandstone psuedostatic.pl2 Run By: RM. Leighton 11/12/2007 04:47PM



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Afc	1	120.0	125.0	250.0	30.0	0.00	0.0	0
Qal	2	120.0	125.0	150.0	35.0	0.00	0.0	0
Tp SS	3	120.0	130.0	Aniso	Aniso	0.00	0.0	0
TP ML	4	120.0	130.0	Aniso	Aniso	0.00	0.0	0

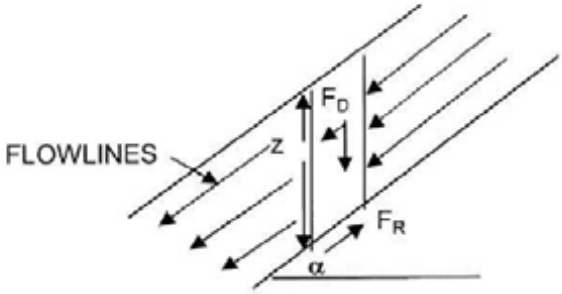
Load	Value
Peak(A)	0.800(g)
kh Coef	0.270(g)<

GSTABL7 v.2 FSmin=1.6

Safety Factors Are Calculated By The Modified Bishop Method

Existing slope: assuming 4 feet deep saturation

SURFICIAL SLOPE STABILITY ANALYSIS



Project No.: 062273-001

Case: Natural Slope @ 2:1
Pico Formation - Sandstone

Depth of Saturation (ft), Z	=	4
Buoyant Unit Weight of Soil (pcf), γ_b	=	**67.6**
Total Unit Weight of Soil (pcf), γ_t	=	130
Slope Angle, α	=	26.7
Angle of Internal Friction, ϕ	=	32
Cohesion (psf), c	=	200

Force Tending To Cause Movement:

$$F_D = Z\gamma_t \sin 2\alpha / 2 = \mathbf{208.73} \text{ lb/ft}$$

Force Tending To Resist Movement:

$$F_R = Z\gamma_b \cos^2\alpha \tan\phi + (c) = \mathbf{334.85} \text{ lb/ft}$$

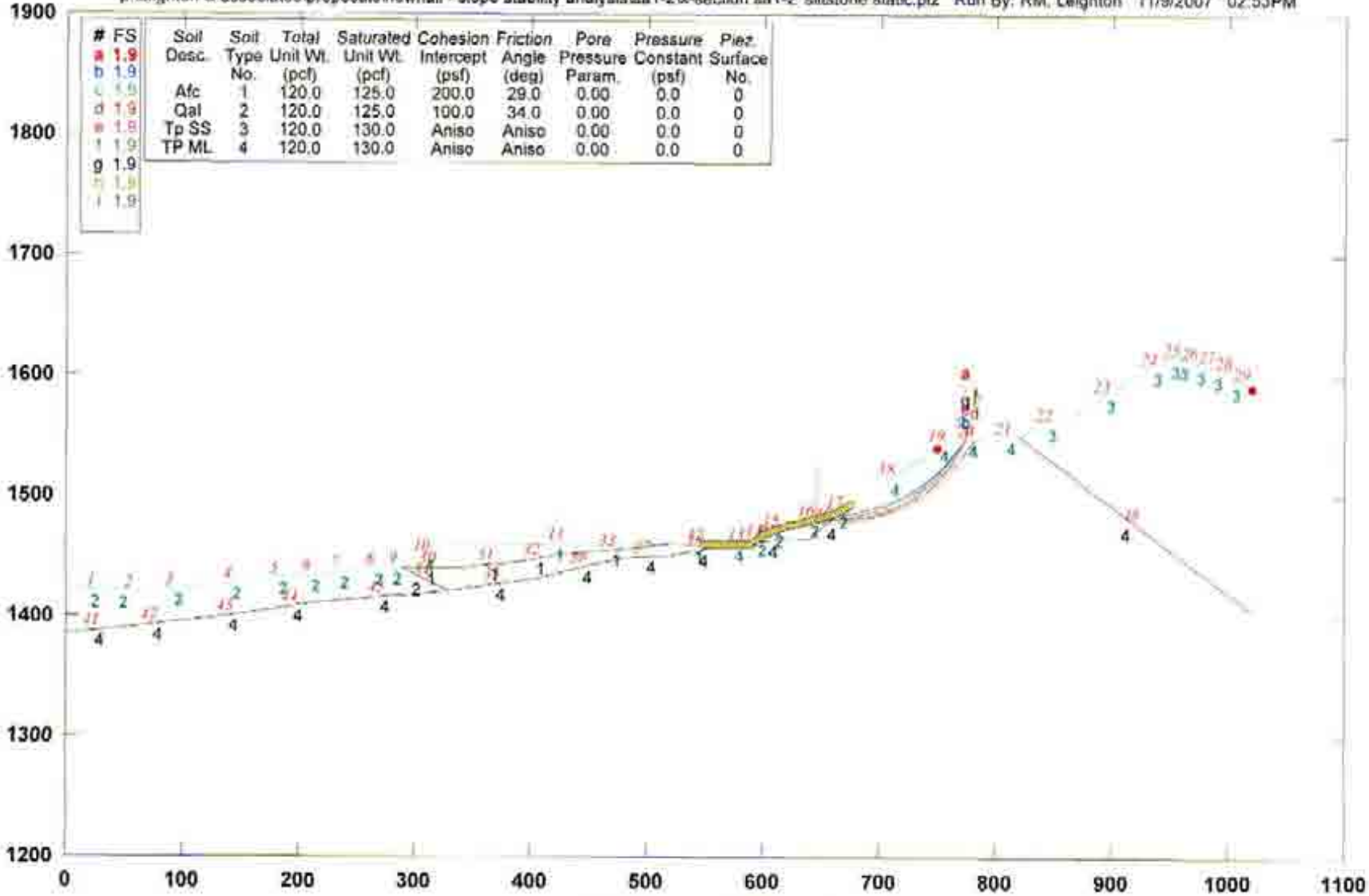
$$F.S. = \frac{2Z\gamma_b \cos^2\alpha \tan\phi + 2c}{Z\gamma_t \sin 2\alpha}$$

F.S. = 1.60

SURFICIAL STABILITY	Project Name : Offsite Grading TTM 61105 Project Number : 062273-001 Designed/Checked : RM Figure No.

Tract 61105 X-Section SA1-2'; Natural Slope (Siltstone) Static

p:\leighton & associates\proposals\newhall - slope stability analysis\sa1-2\x-section sa1-2' siltstone static.pl2 Run By: RM. Leighton 11/9/2007 02:53PM



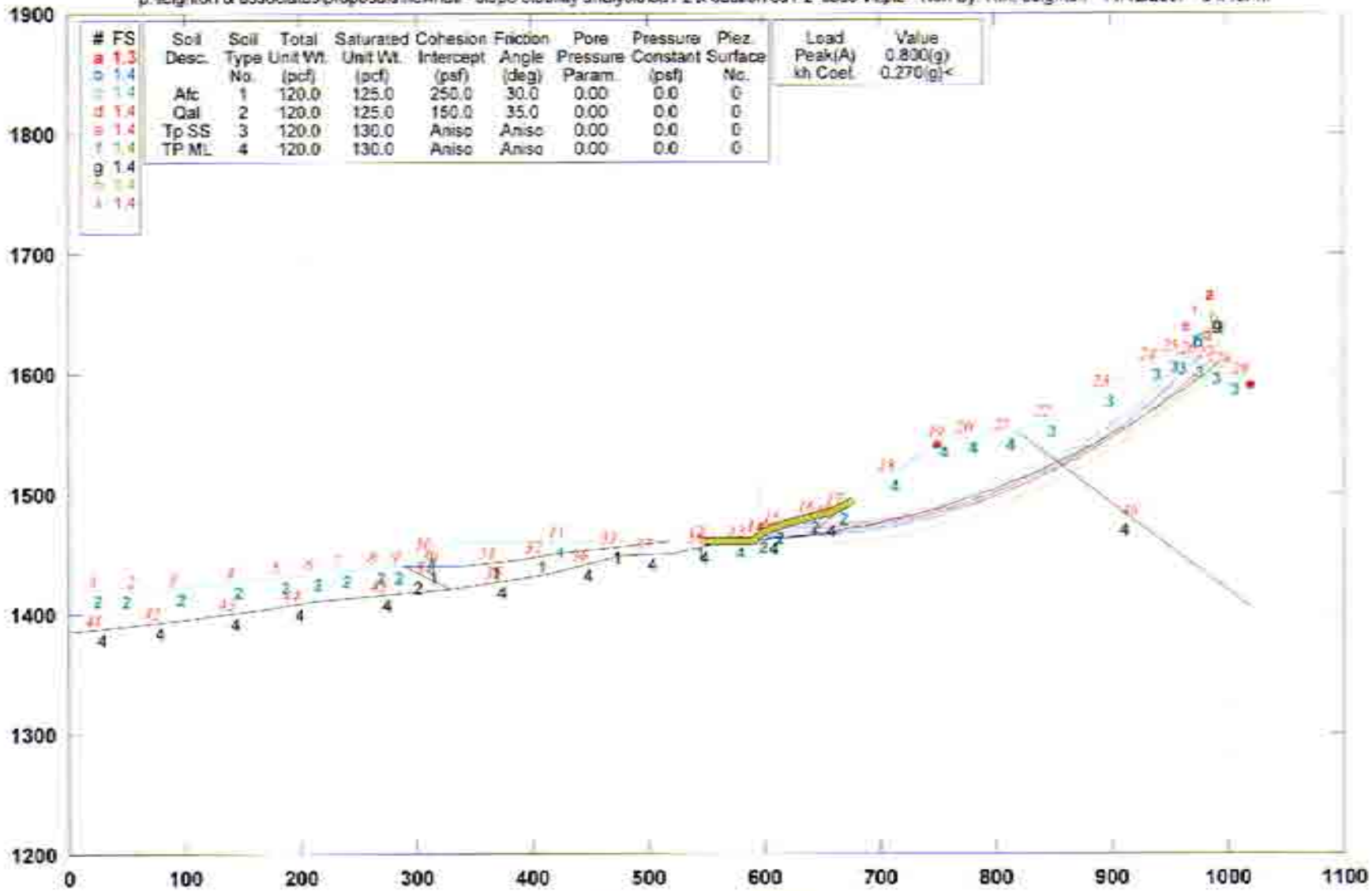
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Afc	1	120.0	125.0	200.0	29.0	0.00	0.0	0
Qal	2	120.0	125.0	100.0	34.0	0.00	0.0	0
Tp SS	3	120.0	130.0	Aniso	Aniso	0.00	0.0	0
TP ML	4	120.0	130.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=1.9

Safety Factors Are Calculated By The Modified Bishop Method

Tract 61105 X-Section SA1-2'; Natural Slope (Siltstone) Psuedostatic

p:\leighton & associates\proposals\newhall - slope stability analysis\sa1-2\x-section sa1-2' case vii.pl2 Run By: RM, Leighton 11/12/2007 04:48PM



#	FS
a	1.3
b	1.4
c	1.4
d	1.4
e	1.4
f	1.4
g	1.4
h	1.4
i	1.4

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Afc	1	120.0	125.0	250.0	30.0	0.00	0.0	0
Qal	2	120.0	125.0	150.0	35.0	0.00	0.0	0
Tp SS	3	120.0	130.0	Aniso	Aniso	0.00	0.0	0
TP Mt.	4	120.0	130.0	Aniso	Aniso	0.00	0.0	0

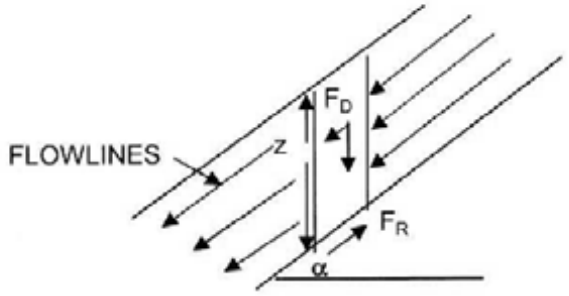
Load	Value
Peak(A)	0.800(g)
kh Coef.	0.270(g)<

GSTABL7 v.2 FSmin=1.3

Safety Factors Are Calculated By The Modified Bishop Method

Existing slope: assuming 4 feet deep saturation

SURFICIAL SLOPE STABILITY ANALYSIS



Project No.: 062273-001

Case: Natural Slope @ 1.6:1 Section 1-2
Pico Formation - SILTSTONE

Depth of Saturation (ft), Z	=	4
Buoyant Unit Weight of Soil (pcf), γ_b	=	**67.6**
Total Unit Weight of Soil (pcf), γ_t	=	130
Slope Angle, α	=	32
Angle of Internal Friction, ϕ	=	32
Cohesion (psf), c	=	500

Force Tending To Cause Movement:

$$F_D = Z\gamma_t \sin 2\alpha / 2 = \mathbf{233.69} \text{ lb/ft}$$

Force Tending To Resist Movement:

$$F_R = Z\gamma_b \cos^2\alpha \tan\phi + (c) = \mathbf{621.52} \text{ lb/ft}$$

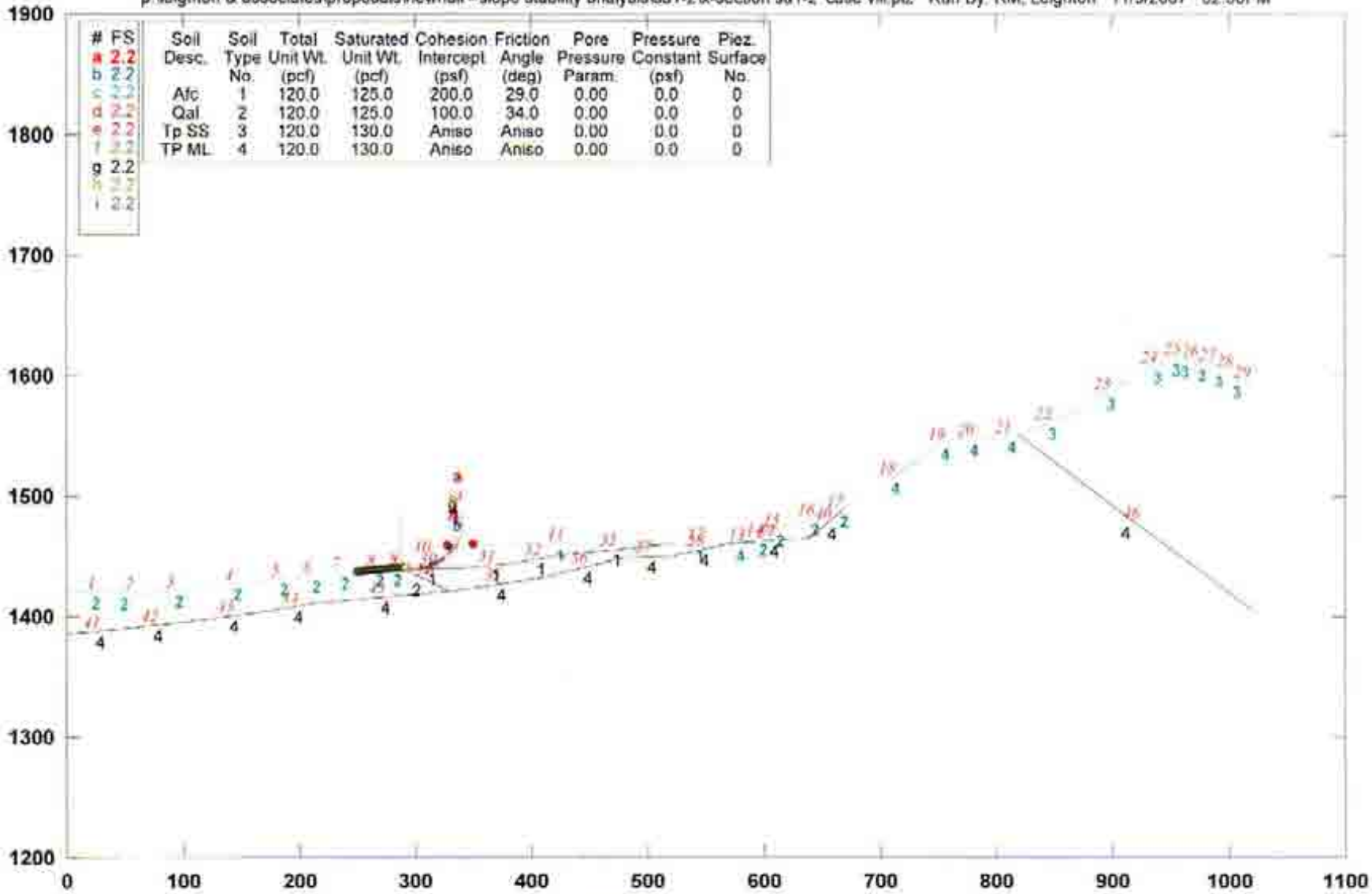
$$F.S. = \frac{2Z\gamma_b \cos^2\alpha \tan\phi + 2c}{Z\gamma_t \sin 2\alpha}$$

F.S. = 2.7

SURFICIAL STABILITY	Project Name : Offsite Grading TTM 61105 Project Number : 062273-001 Designed/Checked : RM Figure No.

Tract 61105 X-Section SA1-2'; Fill Slope Static

p:\leighton & associates\proposals\newhall - slope stability analysis\sa1-2\x-section sa1-2' case viii.pl2 Run By: RM, Leighton 11/9/2007 02:56PM



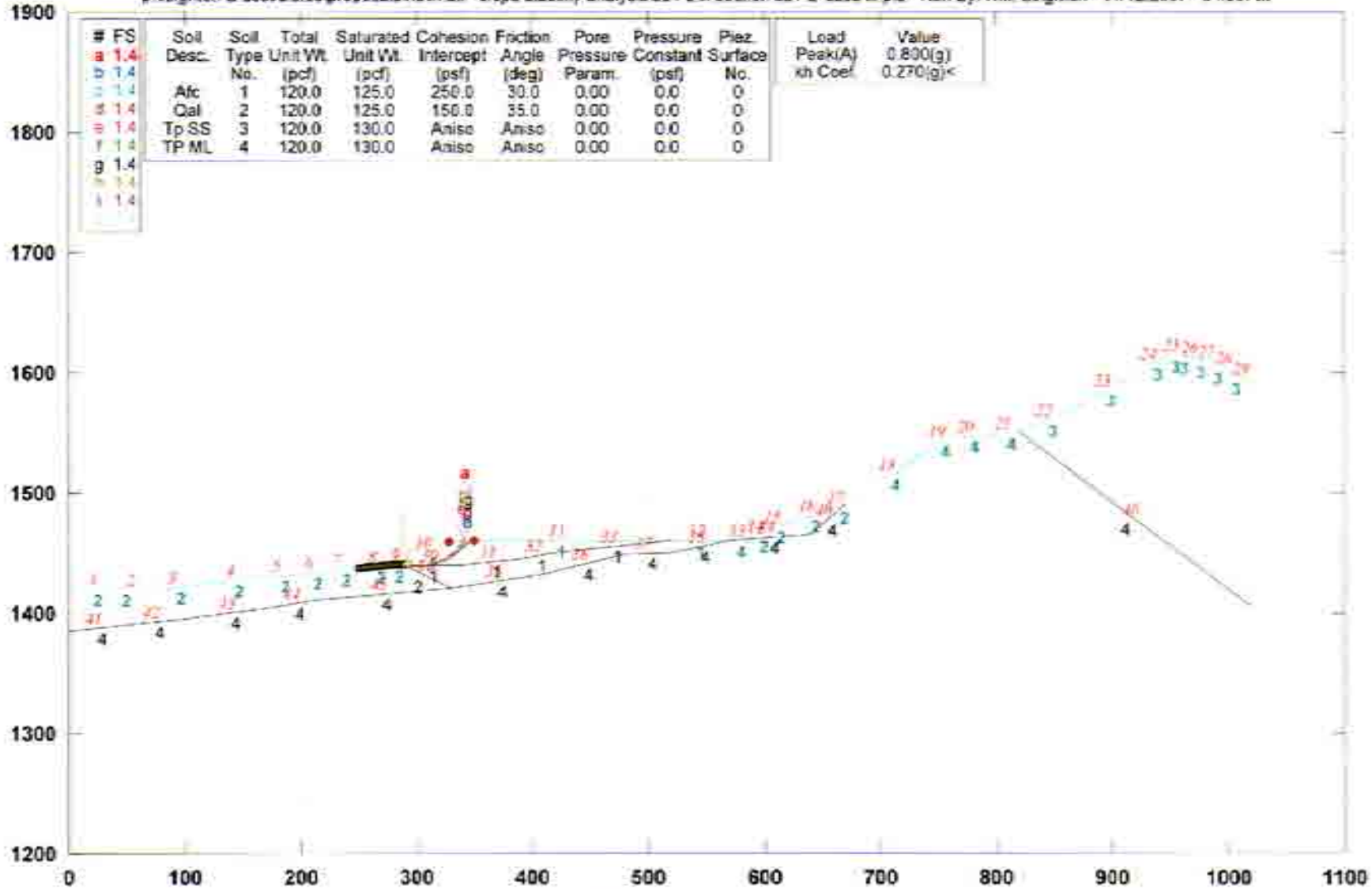
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Afc	1	120.0	125.0	200.0	29.0	0.00	0.0	0
Qal	2	120.0	125.0	100.0	34.0	0.00	0.0	0
Tp SS	3	120.0	130.0	Aniso	Aniso	0.00	0.0	0
TP ML	4	120.0	130.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=2.2

Safety Factors Are Calculated By The Modified Bishop Method

Tract 61105 X-Section SA1-2'; Fill Slope Psuedostatic

p:\leighton & associates\proposals\newhall - slope stability analysis\sa1-2\x-section sa1-2' case ix.pl2 Run By: RM. Leighton 11/12/2007 04:50PM



#	FS
a	1.4
b	1.4
c	1.4
d	1.4
e	1.4
f	1.4
g	1.4
h	1.4
i	1.4

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Afc	1	120.0	125.0	250.0	30.0	0.00	0.0	0
Qal	2	120.0	125.0	150.0	35.0	0.00	0.0	0
Tp SS	3	120.0	130.0	Aniso	Aniso	0.00	0.0	0
TP ML	4	120.0	130.0	Aniso	Aniso	0.00	0.0	0

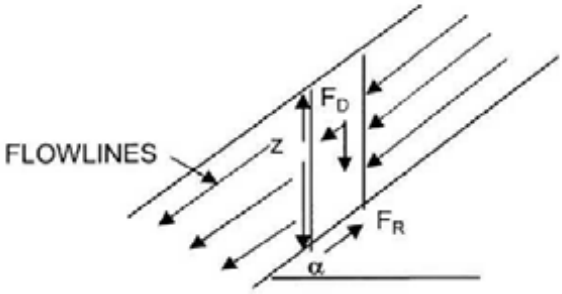
Load	Value
Peak(A)	0.800(g)
kh Coef.	0.270(g)<

GSTABL7 v.2 FSmin=1.4

Safety Factors Are Calculated By The Modified Bishop Method

Existing slope: assuming 4 feet deep saturation

SURFICIAL SLOPE STABILITY ANALYSIS



Project No.: 062273-001

Case: Fill Slope @ 2:1

Depth of Saturation (ft), Z	=	4
Buoyant Unit Weight of Soil (pcf), γ_b	=	**62.6**
Total Unit Weight of Soil (pcf), γ_t	=	**125**
Slope Angle, α	=	**26.7**
Angle of Internal Friction, ϕ	=	**29**
Cohesion (psf), c	=	**200**

Force Tending To Cause Movement:

$$F_D = Z\gamma_t \sin 2\alpha / 2 = \mathbf{200.70} \text{ lb/ft}$$

Force Tending To Resist Movement:

$$F_R = Z\gamma_b \cos^2\alpha \tan\phi + (c) = \mathbf{310.78} \text{ lb/ft}$$

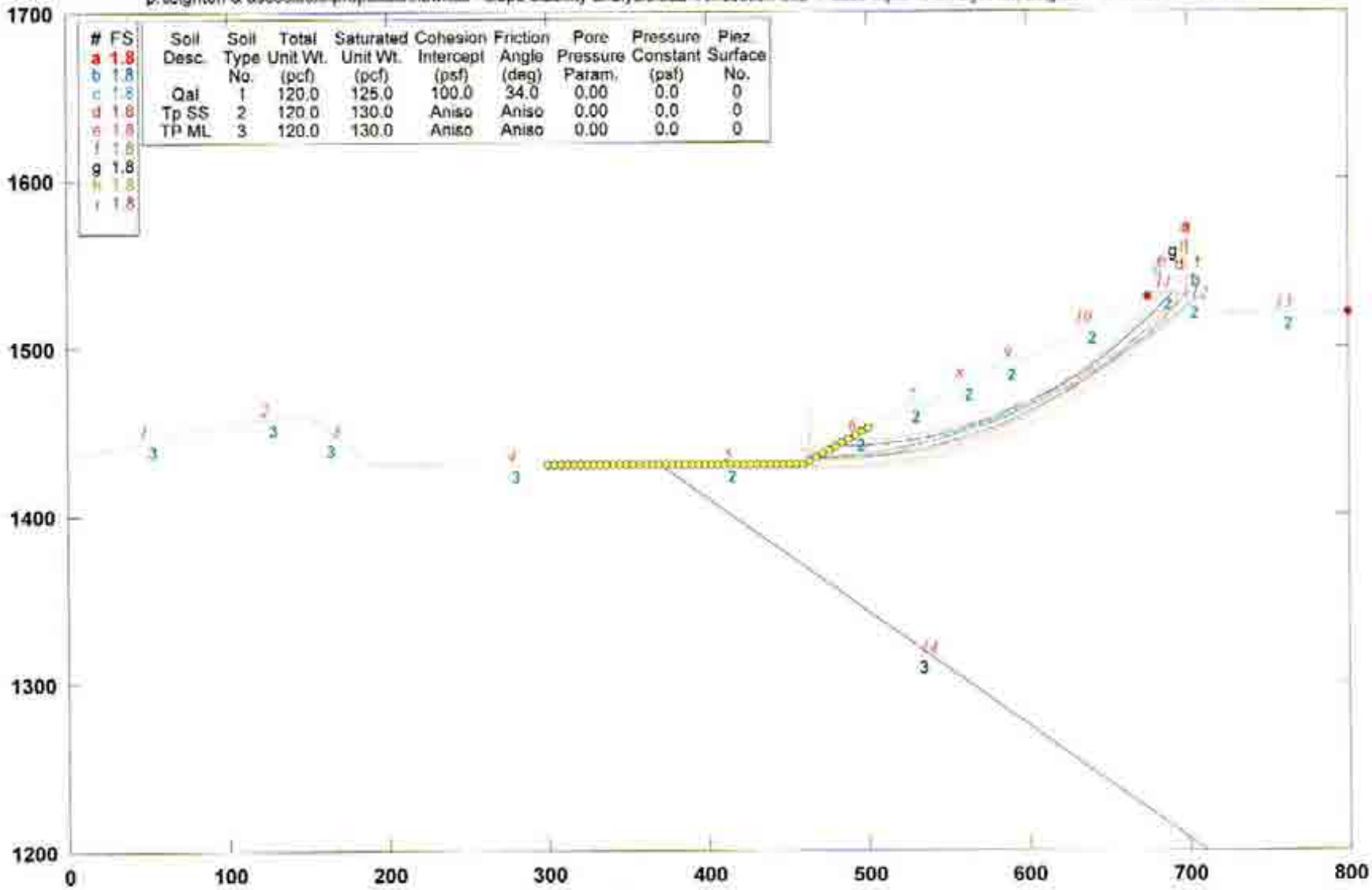
$$F.S. = \frac{2Z\gamma_b \cos^2\alpha \tan\phi + 2c}{Z\gamma_t \sin 2\alpha}$$

F.S. = 1.55

SURFICIAL STABILITY	Project Name : Offsite Grading TTM 61105 Project Number : 062273-001 Designed/Checked : RM Figure No.

Tract 61105 X-Section SA2-1'; Cut Slope (Sandstone) Static

p:\leighton & associates\proposals\newhall - slope stability analysis\sa2-1\x-section sa2-1' case x.pl2 Run By: RM, Leighton 11/9/2007 03:00PM



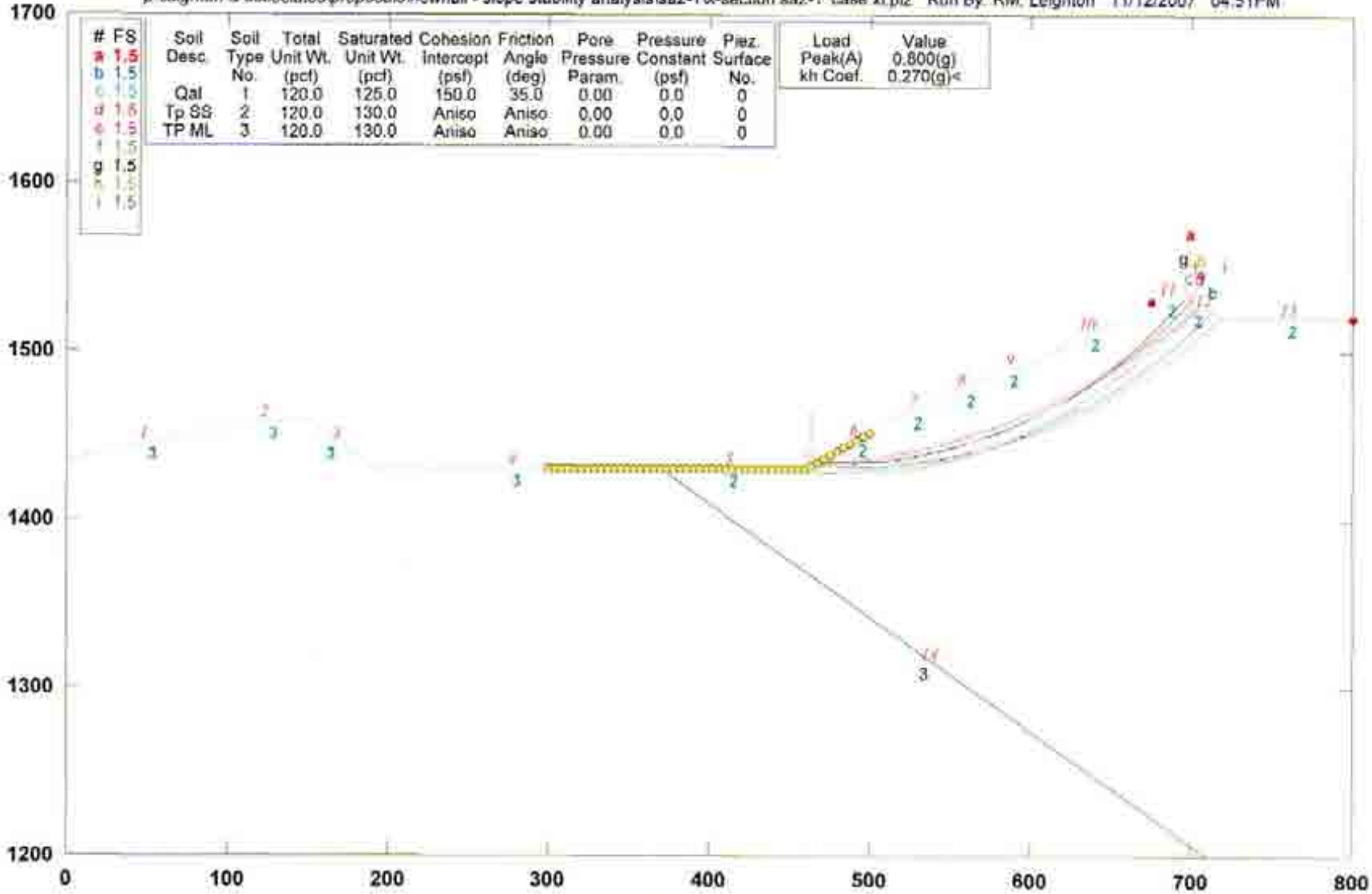
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez Surface No.
Qal	1	120.0	125.0	100.0	34.0	0.00	0.0	0
Tp SS	2	120.0	130.0	Aniso	Aniso	0.00	0.0	0
TP ML	3	120.0	130.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=1.8

Safety Factors Are Calculated By The Modified Bishop Method

Tract 61105 X-Section SA2-1'; Cut Slope (Sandstone) Psuedostatic

p:\leighton & associates\proposals\newhall - slope stability analysis\sa2-1\x-section sa2-1' case xi.pl2 Run By: RM. Leighton 11/12/2007 04:51PM

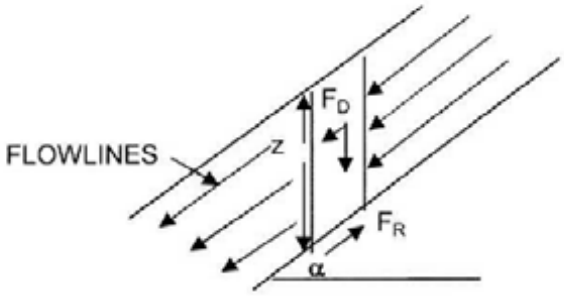


GSTABL7 v.2 FSmin=1.5

Safety Factors Are Calculated By The Modified Bishop Method

Existing slope: assuming 4 feet deep saturation

SURFICIAL SLOPE STABILITY ANALYSIS



Project No.: 062273-001

Case: Cut Slope @ 2:1
Pico Formation - Sandstone

Depth of Saturation (ft), Z	=	4
Buoyant Unit Weight of Soil (pcf), γ_b	=	**67.6**
Total Unit Weight of Soil (pcf), γ_t	=	130
Slope Angle, α	=	26.7
Angle of Internal Friction, ϕ	=	32
Cohesion (psf), c	=	200

Force Tending To Cause Movement:

$$F_D = Z\gamma_t \sin 2\alpha / 2 = \mathbf{208.73} \text{ lb/ft}$$

Force Tending To Resist Movement:

$$F_R = Z\gamma_b \cos^2\alpha \tan\phi + (c) = \mathbf{334.85} \text{ lb/ft}$$

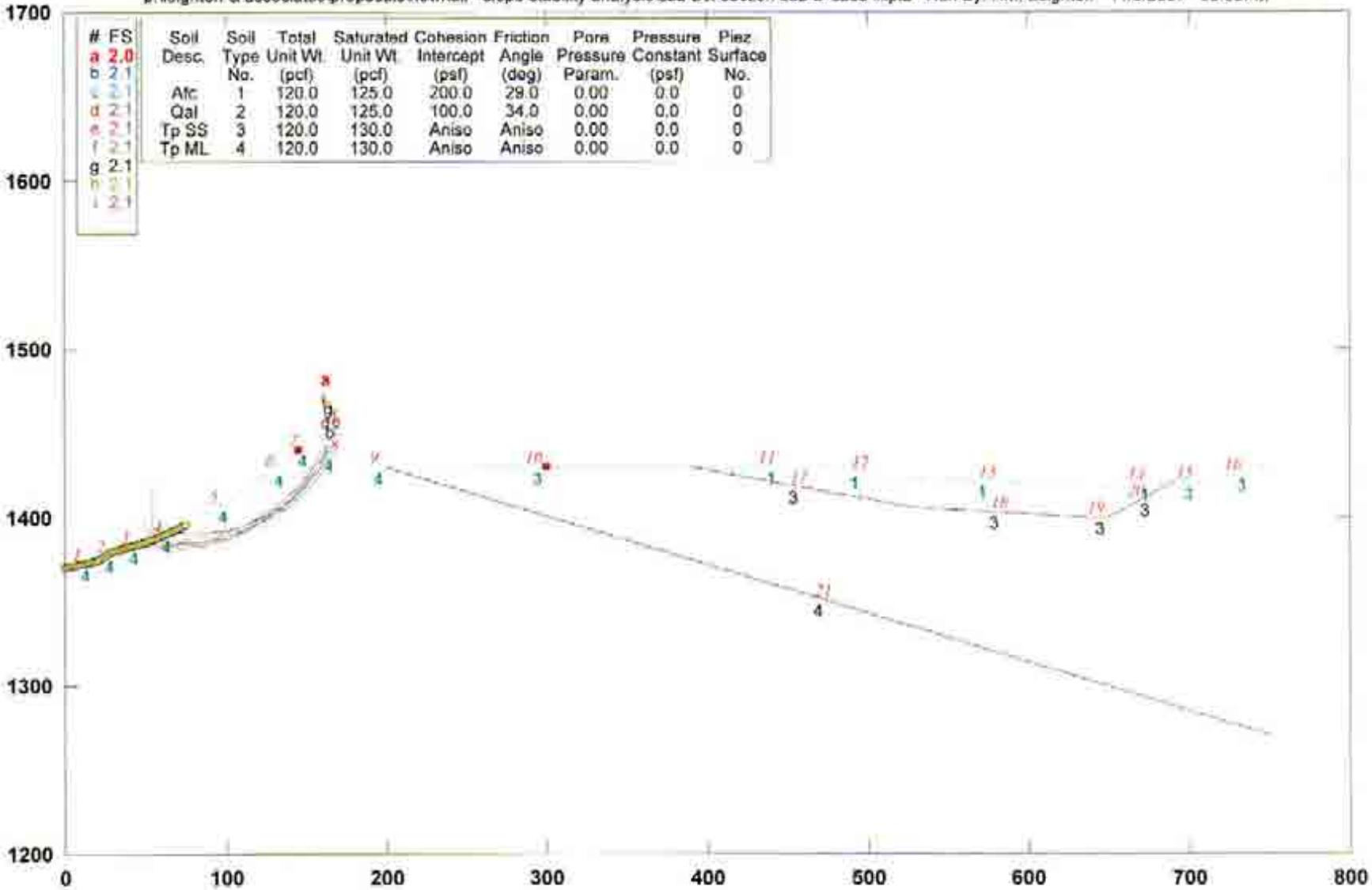
$$F.S. = \frac{2Z\gamma_b \cos^2\alpha \tan\phi + 2c}{Z\gamma_t \sin 2\alpha}$$

F.S. = 1.60

SURFICIAL STABILITY	Project Name : Offsite Grading TTM 61105 Project Number : 062273-001 Designed/Checked : RM Figure No.

Tract 61105 X-Section SA2-2'; Natural Slope (Siltstone) Static

p:\leighton & associates\proposals\newhall - slope stability analysis\sa2-2\x-section sa2-2' case iii.pl2 Run By: RM, Leighton 11/9/2007 03:03PM



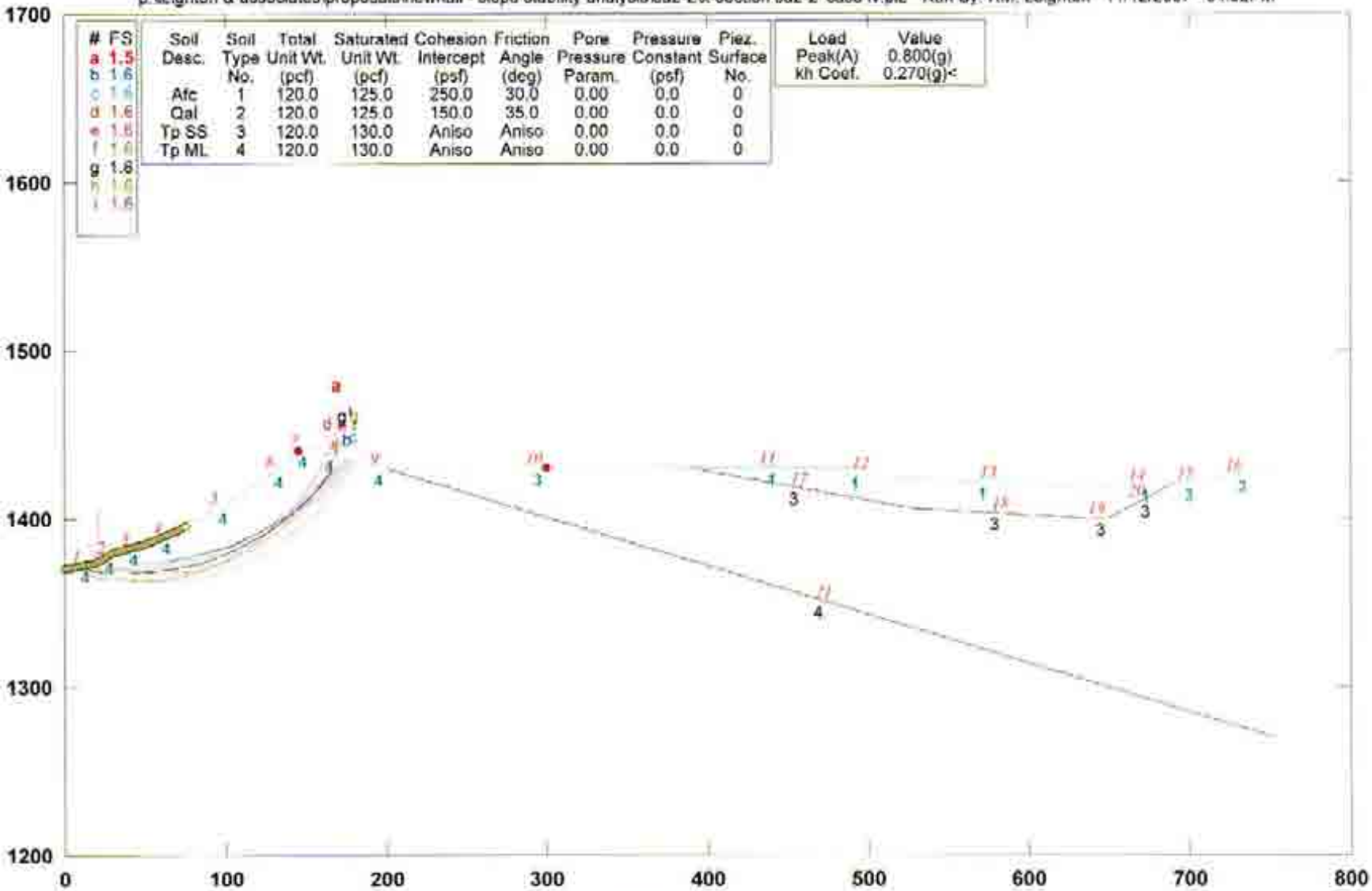
Soil Desc.	Soil Type No.	Total Unit Wt (pcf)	Saturated Unit Wt (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez Surface No.
Afc	1	120.0	125.0	200.0	29.0	0.00	0.0	0
Qal	2	120.0	125.0	100.0	34.0	0.00	0.0	0
Tp SS	3	120.0	130.0	Aniso	Aniso	0.00	0.0	0
Tp ML	4	120.0	130.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=2.0

Safety Factors Are Calculated By The Modified Bishop Method

Tract 61105 X-Section SA2-2'; Natural Slope (Siltstone) Psuedostatic

p:\leighton & associates\proposals\newhall - slope stability analysis\sa2-2\x-section sa2-2' case iv.pl2 Run By: RM. Leighton 11/12/2007 04:52PM



#	FS
a	1.5
b	1.6
c	1.6
d	1.6
e	1.6
f	1.6
g	1.6
h	1.6
i	1.6

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Afc	1	120.0	125.0	250.0	30.0	0.00	0.0	0
Qal	2	120.0	125.0	150.0	35.0	0.00	0.0	0
Tp SS	3	120.0	130.0	Aniso	Aniso	0.00	0.0	0
Tp ML	4	120.0	130.0	Aniso	Aniso	0.00	0.0	0

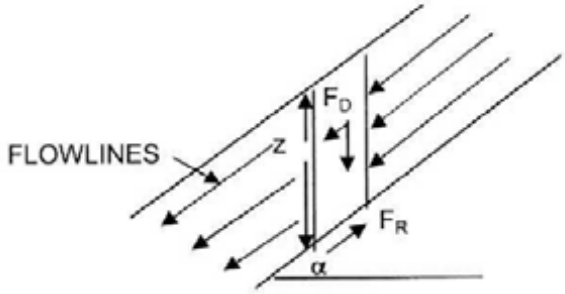
Load	Value
Peak(A)	0.800(g)
kh Coef.	0.270(g)<

GSTABL7 v.2 FSmin=1.5

Safety Factors Are Calculated By The Modified Bishop Method

Existing slope: assuming 4 feet deep saturation

SURFICIAL SLOPE STABILITY ANALYSIS



Project No.: 062273-001

Case: Natural Slope @ 2:1
Pico Formation - SILTSTONE

Depth of Saturation (ft), Z	=	**4**
Buoyant Unit Weight of Soil (pcf), γ_b	=	**67.6**
Total Unit Weight of Soil (pcf), γ_t	=	**130**
Slope Angle, α	=	**26.7**
Angle of Internal Friction, ϕ	=	**32**
Cohesion (psf), c	=	**500**

Force Tending To Cause Movement:

$$F_D = Z\gamma_t \sin 2\alpha / 2 = \mathbf{208.73} \text{ lb/ft}$$

Force Tending To Resist Movement:

$$F_R = Z\gamma_b \cos^2\alpha \tan\phi + (c) = \mathbf{634.85} \text{ lb/ft}$$

$$F.S. = \frac{2Z\gamma_b \cos^2\alpha \tan\phi + 2c}{Z\gamma_t \sin 2\alpha}$$

F.S. = 3.0

SURFICIAL STABILITY	Project Name : Offsite Grading TTM 61105 Project Number : 062273-001 Designed/Checked : RM Figure No.

APPENDIX E

EXPLORATION LOGS

Logs of Exploratory Excavations By Leighton (2005)
Bucket-Auger Borings LB-23 and LB-25
Backhoe Test Pit TP-8
Cone Penetration Test (CPT) Soundings CPT-22 and CPT-23ab

Logs of Exploratory Excavations By Allan E. Seward Engineering Geology, Inc. (2004)
Rotary Wash Boring RW-12P
Backhoe Test Pit T-129PO and T-130PO
Cone Penetration Test (CPT) Soundings CPT-48P and CPT-80P

Logs of Exploratory Excavations By GeoSoils (1991)
Backhoe Test Pit T-16

GEOTECHNICAL BORING LOG LB-23

Date 2-14-05 **Sheet** 1 **of** 3

Project Stevenson Ranch Venture / VTTM No. 061996, Legacy Village, Phase V, SR **Project No.** 061277-002-

Drilling Co. Tri-Valley Drilling **Type of Rig** Bucket Auger

Hole Diameter 24 inches **Drive Weight** Refer to Kelley Weight Table (Rig #8) **Drop** 12"

Elevation Top of Hole 1470' **Location** See Geotechnical Map

Logged By JGS/AR

Sampled By AR

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
1470	0								**PICO FORMATION (Tp):** silty SANDSTONE: light reddish brown, moist, hard, medium grained sand with localized gravel and cobble clasts	
1465	5								@ 6.5' slight water seepage on southwest side of hole	
			AB: N75W, 45NE						@ 9' slight water seepage	
1460	10			R-1	18	137.3	4.9		@ 10' grades to gravelly silty SANDSTONE: light brown, slightly moist, hard massive to crudely bedded, localized SANDSTONE and SILTSTONE interbeds	
1455	15		B: N48W, 45NE	B-1						
1450	20		B: N45W, 45NE	R-2	26	131.0	9.3			
									silty SANDSTONE: grayish to orange brown, slightly moist, hard, moderately bedded, reddish brown laminations, 2-3" thick SILTSTONE interbeds	
1445	25		B: N50W, 40NE	B-2						
1440	30		B: N55W, 54NE							

SAMPLE TYPES:

- SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- SH SHELBY TUBE

TYPE OF TESTS:

- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- CU TRIAXIAL SHEAR
- EI EXPANSION INDEX
- RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

GEOTECHNICAL BORING LOG LB-23

Date 2-14-05 **Sheet** 2 **of** 3
Project Stevenson Ranch Venture / VTTM No. 061996, Legacy Village, Phase V, SR **Project No.** 061277-002-
Drilling Co. Tri-Valley Drilling **Type of Rig** Bucket Auger
Hole Diameter 24 inches **Drive Weight** Refer to Kelley Weight Table (Rig #8) **Drop** 12"
Elevation Top of Hole 1470' **Location** See Geotechnical Map

Logged By JGS/AR
Sampled By AR

Elevation Feet	Depth Feet	Graphic Log (N–S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
1440	30			R-3	41	131.1	10.6			
			B: N48W, 42NE							
1435	35									
			SB: N65W, 53NE						@ 37' a 6"-thick clayey SILTSTONE bed, reddish brown, sheared, with polished surfaces, iron oxide staining, with discontinous 1/4"-thick gypsum veins	
1430	40			R-4	38/7"	123.9	10.6			
			B: N57W, 50NE							
			B: N54W, 46NE							
1425	45		SB: N62W, 40NE	B-4			19.9		@ 46' a 3-4"-thick clayey SILTSTONE bed, brown to orange brown with gray, sheared with polished surfaces, localized gypsum veins	
									sandy and clayey SILTSTONE: light brown to light greenish gray, hard, massive to crudely bedded	
1420	50			B-3 R-5	46/9"	133.7	8.5			
			B: N60W, 45NE						gravelly SANDSTONE and silty SANDSTONE, light gray, slightly moist, hard, massive to crudely bedded, SANDSTONES are well laminated	
1415	55		AB: N65W, 42NE							
1410	60									

SAMPLE TYPES:
- SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- SH SHELBY TUBE

TYPE OF TESTS:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- CU TRIAXIAL SHEAR
- EI EXPANSION INDEX
- RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

GEOTECHNICAL BORING LOG LB-23

Date 2-14-05 **Sheet** 3 **of** 3

Project Stevenson Ranch Venture / VTTM No. 061996, Legacy Village, Phase V, SR **Project No.** 061277-002

Drilling Co. Tri-Valley Drilling **Type of Rig** Bucket Auger

Hole Diameter 24 inches **Drive Weight** Refer to Kelley Weight Table (Rig #8) **Drop** 12"

Elevation Top of Hole 1470' **Location** See Geotechnical Map

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION (Logged By JGS/AR; Sampled By AR)	Type of Tests
1410	60								Total Depth Drilled 60' Total Depth Sampled 50.8' Down Hole Logged to Total Depth No Groundwater, Slight Seepage @ 6.5' and 9' Boring Backfilled With Drilled Cuttings	
1405	65									
1400	70									
1395	75									
1390	80									
1385	85									
1380	90									

SAMPLE TYPES:

- SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- SH SHELBY TUBE

TYPE OF TESTS:

- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- CU TRIAXIAL SHEAR
- EI EXPANSION INDEX
- RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

GEOTECHNICAL BORING LOG LB-25

Date 4-1-05 **Sheet** 1 **of** 4

Project Stevenson Ranch Venture / VTTM No. 061996, Legacy Village, Phase V, SR **Project No.** 061277-002-

Drilling Co. Tri-Valley Drilling **Type of Rig** Bucket Auger

Hole Diameter 24 inches **Drive Weight** Refer to Kelley Weight Table ((Rig #7) to 70') 70'-T.D. Rig #4 **Drop** 12"

Elevation Top of Hole 1600' **Location** See Geotechnical Map

Logged By ARH

Sampled By ARH

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
1600	0								**PICO FORMATION (TP):** interbedded silty SANDSTONE and gravelly silty SANDSTONE: damp, hard to very hard, friable, fine- to medium-grained, massive to crudely bedded with some well-bedded intervals	
1595	5		AB: N80W, 38NE						@ 7' discontinuous dark brown SANDSTONE bed/ elongate dark brown SANDSTONE lenses; distinct color	
1590	10		CB: N72W, 54NE	R-1	19	119.8	7.9		(Sample disturbed)	
				B-1					@10.5' CLAYSTONE: dark gray and orange, damp, hard, sandy, low plasticity; interrupted or cross cut by water escape structures; ~0.1 to 1"-thick	
1585	15		F: N45W, 54NE						@ 14' CLAYSTONE seam/ shear enters boring on north side; paper thin to 1/4"-thick; cross cuts sandstone beds; appears to be a soft sediment deformation structure	
1580	20			R-2	22/9"	104.9	6.7			
1575	25									
1570	30		S: N30W, 55SW F: N53E, 72NW						@ 27.7' fault enters boring on southeast side; characterized by a reddish brown CLAY bed, approximately 1/2"- to 2"-thick, damp, hard, low plasticity; some broken clasts, very tight	

SAMPLE TYPES:

- SPLIT SPOON
- RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- SH SHELBY TUBE

TYPE OF TESTS:

- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- CU TRIAXIAL SHEAR
- EI EXPANSION INDEX
- RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

GEOTECHNICAL BORING LOG LB-25

Date 4-1-05 **Sheet** 2 **of** 4

Project Stevenson Ranch Venture / VTTM No. 061996, Legacy Village, Phase V, SR **Project No.** 061277-002

Drilling Co. Tri-Valley Drilling **Type of Rig** Bucket Auger

Hole Diameter 24 inches **Drive Weight** Refer to Kelley Weight Table ((Rig #7) to 70') 70'-T.D. Rig #4 **Drop** 12"

Elevation Top of Hole 1600' **Location** See Geotechnical Map

Logged By ARH

Sampled By ARH

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
1570	30			R-3	60/11"	120.2	3.9		gravelly silty SANDSTONE: light gray, damp, very hard, fine- to medium- grained, friable	
				B-2						
1565	35									
1560	40			R-4	37	114.4	3.6			
1555	45									
1550	50		AB: N60W, 51NE	R-5	77/9"				SANDSTONE is very hard	
1545	55									
1540	60									

SAMPLE TYPES:

- SPLIT SPOON
- RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- SH SHELBY TUBE

TYPE OF TESTS:

- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- CU TRIAXIAL SHEAR
- EI EXPANSION INDEX
- RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

GEOTECHNICAL BORING LOG LB-25

Date 4-1-05 **Sheet** 3 **of** 4

Project Stevenson Ranch Venture / VTTM No. 061996, Legacy Village, Phase V, SR **Project No.** 061277-002

Drilling Co. Tri-Valley Drilling **Type of Rig** Bucket Auger

Hole Diameter 24 inches **Drive Weight** Refer to Kelley Weight Table ((Rig #7) to 70') 70'-T.D. Rig #4 **Drop** 12"

Elevation Top of Hole 1600' **Location** See Geotechnical Map

Logged By ARH

Sampled By ARH

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
1540	60			R-6	85/8"	134.1	4.9		silty SANDSTONE: light brown, damp, very hard, friable, medium-grained, sample disturbed	
				B-3	21/6"					
1535	65		AB: N64W, 43NE							
1530	70			R-7a	28/6"	120.6	4.0		(Sampled with Rig #4) silty SANDSTONE: light brown, moist, hard, friable, sampler bouncing	
1525	75								@ 78' well-cemented zone, calcium carbonate cemented SANDSTONE, approximately 1.5'-thick	
1520	80			R-8	28/6"	123.0	3.0			
1515	85									
1510	90									

SAMPLE TYPES:

- SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- SH SHELBY TUBE

TYPE OF TESTS:

- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
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LEIGHTON AND ASSOCIATES, INC.

GEOTECHNICAL BORING LOG LB-25

Date 4-1-05 **Sheet** 4 **of** 4

Project Stevenson Ranch Venture / VTTM No. 061996, Legacy Village, Phase V, SR **Project No.** 061277-002

Drilling Co. Tri-Valley Drilling **Type of Rig** Bucket Auger

Hole Diameter 24 inches **Drive Weight** Refer to Kelley Weight Table ((Rig #7) to 70') 70'-T.D. Rig #4 **Drop** 12"

Elevation Top of Hole 1600' **Location** See Geotechnical Map

Logged By ARH

Sampled By ARH

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
1510	90			R-9	45/6"	113.7	3.5		low sample recovery	
			AB: N70W, 47NE						@ 93' a ~4"-thick calcium cemented bed, very hard	
1505	95		B: N75W, 37NE							
1500	100			R-10	28/6"	119.0	2.5		low sample recovery	
1495	105								below 107' well cemented medium-grained silty SANDSTONE	
				R-11	42/8"				Core bucket and bucket auger refusal @110'	
1490	110								**Total Depth Drilled 110'** **Total Depth Sampled 100'** **Down Hole Logged to Total Depth** **No Ground Water or Seepage** **Boring Backfilled With Drilled Cuttings**	
1485	115									
1480	120									

SAMPLE TYPES:

- SPLIT SPOON
- RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- SH SHELBY TUBE

TYPE OF TESTS:

- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- CU TRIAXIAL SHEAR
- EI EXPANSION INDEX
- RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

CPT INTERPRETATIONS

SOUNDING : CPT-22 PROJECT No.: 061277-001
PROJECT : Stevenson Ranch CONE/RIG : DSA0408
DATE/TIME: 7/23/2004 4:11

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	63.62	.90	SAND to SILTY SAND	16	25	63		
.300	.98	107.27	1.78	SILTY SAND to SANDY SILT	36	57	78		
.450	1.48	113.39	.63	SAND to SILTY SAND	28	45	80		
.600	1.97	88.11	.78	SAND to SILTY SAND	22	35	73		49.0
.750	2.46	152.00	1.34	SAND to SILTY SAND	38	61	88		
.900	2.95	152.64	.95	SAND to SILTY SAND	38	61	88		49.5
1.050	3.44	313.31	1.16	SAND	63	100	100		
1.200	3.94	327.75	.62	SAND	66	100	100		
1.350	4.43	577.46	1.21	SAND	100	100	100		
1.500	4.92	347.73	.97	SAND	70	100	100		
1.650	5.41	567.40	2.10	SAND to SILTY SAND	100	100	100		
1.800	5.91	253.98	.91	SAND	51	81	100		48.5
1.950	6.40	218.13	.83	SAND	44	70	99		48.0
2.100	6.89	208.20	.51	SAND	42	65	97		47.5
2.250	7.38	233.90	1.46	SAND to SILTY SAND	58	88	100		47.5
2.400	7.87	213.67	1.15	SAND	43	62	98		47.0
2.550	8.37	172.07	.46	SAND	34	49	92		46.0
2.700	8.86	207.72	.45	SAND	42	57	97		46.5
2.850	9.35	248.54	.77	SAND	50	66	100		47.0
3.000	9.84	391.27	.71	SAND	78	100	100		48.5
3.150	10.33	376.48	1.55	SAND to SILTY SAND	94	100	100		48.0
3.300	10.83	402.33	1.51	SAND	80	100	100		48.0
3.450	11.32	260.14	.81	SAND	52	63	100		46.5
3.600	11.81	200.64	.35	SAND	40	48	92		45.0
3.750	12.30	318.16	.69	SAND	64	74	100		46.5
3.900	12.80	626.65	*****		0	0			.0

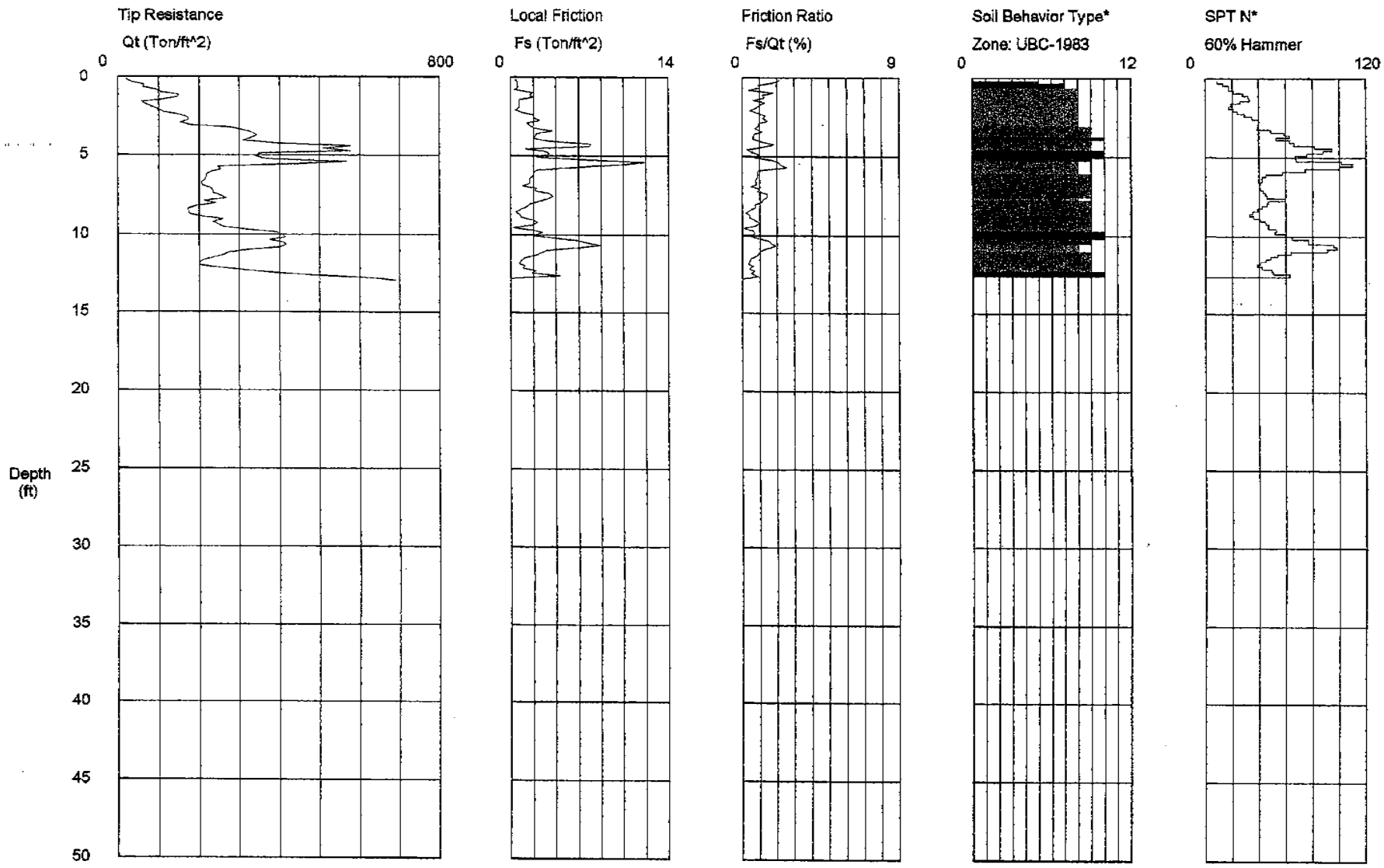
*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 60.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.
Interpretations based on ROBERTSON and CAMPANELLA, 1989

Leighton & Associates

Operator: ML-VO
Sounding: CPT-22
Cone Used: DSA0408

CPT Date/Time: 7/23/2004 4:11:
Location: Stevenson Ranch
Job Number: 061277-001



Maximum Depth = 12.96 feet

Depth Increment = 0.164 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

il behavior type and SPT based on data from UBC-1983

CPT INTERPRETATIONS

SOUNDING : CPT-23 PROJECT No.: 061277-001
PROJECT : Stevenson Ranch CONE/RIG : DSA0408
DATE/TIME: 7/23/2004 4:33

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	156.38	1.37	SAND to SILTY SAND	39	63	89		
.300	.98	102.62	1.06	SAND to SILTY SAND	26	41	77		
.450	1.48	139.85	1.41	SAND to SILTY SAND	35	56	86		
.600	1.97	134.93	1.25	SAND to SILTY SAND	34	54	85		
.750	2.46	207.75	.57	SAND	42	66	97		
.900	2.95	165.97	.87	SAND	33	53	91		
1.050	3.44	255.97	1.70	SAND to SILTY SAND	64	100	100		
1.200	3.94	232.30	1.00	SAND	46	74	100		
1.350	4.43	177.01	.88	SAND	35	57	93		48.5
1.500	4.92	211.21	.70	SAND	42	68	98		48.5
1.650	5.41	243.07	.72	SAND	49	78	100		49.0
1.800	5.91	214.37	.68	SAND	43	69	98		48.0
1.950	6.40	184.71	.76	SAND	37	59	94		47.0
2.100	6.89	147.45	.74	SAND	29	46	87		46.0
2.250	7.38	148.54	.53	SAND	30	45	88		46.0
2.400	7.87	128.92	.72	SAND	26	38	84		45.0
2.550	8.37	212.55	.45	SAND	43	60	98		46.5
2.700	8.86	339.32	.81	SAND	68	93	100		48.5
2.850	9.35	190.99	1.64	SAND to SILTY SAND	48	64	94		46.0
3.000	9.84	281.41	.79	SAND	56	73	100		47.0
3.150	10.33	381.99	1.11	SAND	76	97	100		48.0
3.300	10.83	398.77	.72	SAND	80	99	100		48.0

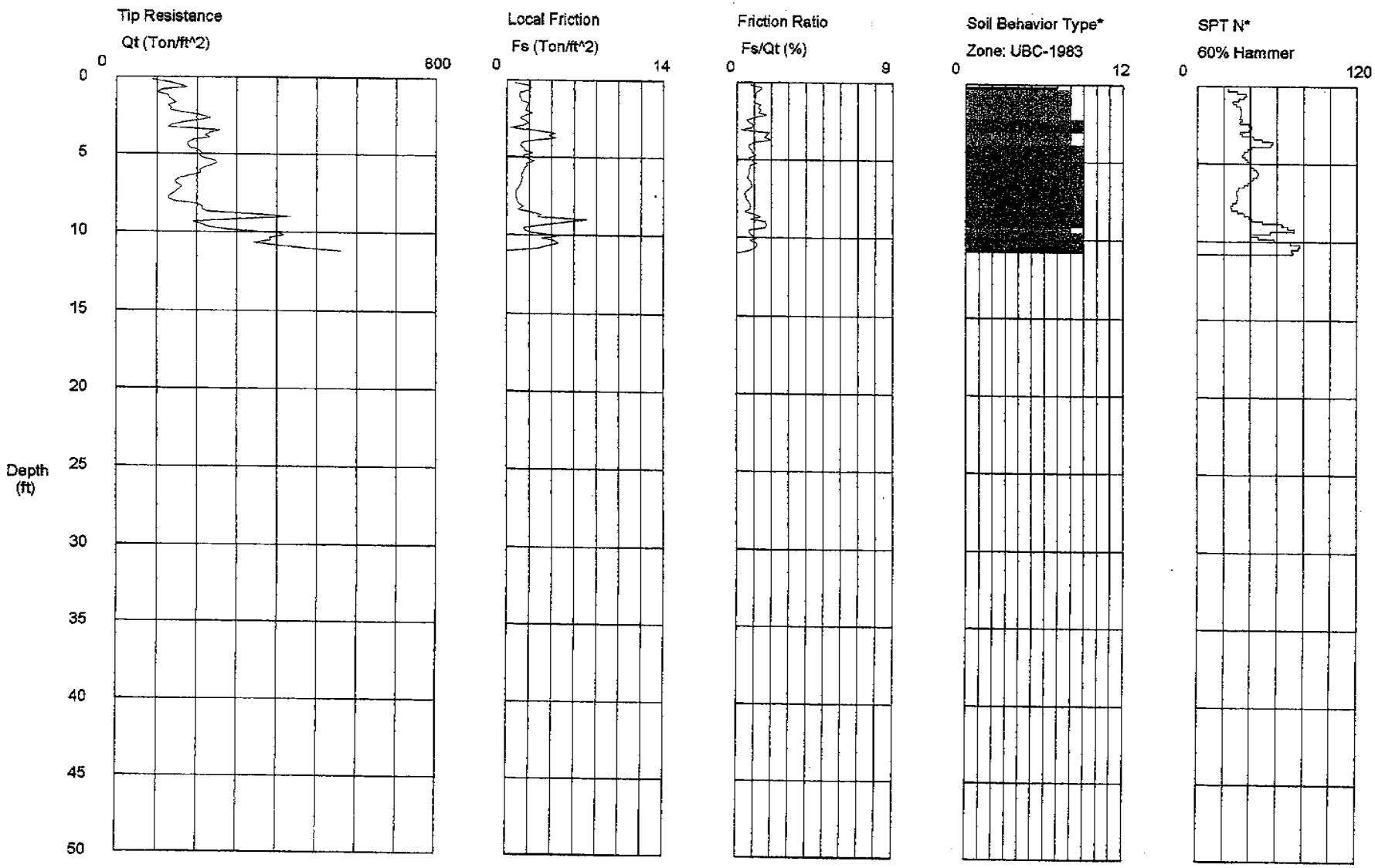
*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 60.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.
Interpretations based on ROBERTSON and CAMPANELLA, 1989

Leighton & Associates

Operator: ML-VO
Sounding: CPT-23
Cone Used: DSA0408

CPT Date/Time: 7/23/2004 4:33:
Location: Stevenson Ranch
Job Number: 061277-001



Maximum Depth = 11.15 feet

Depth Increment = 0.164 feet

- 1 sensitive fine grained
- 2 organic material
- 3 clay
- 4 silty clay to clay
- 5 clayey silt to silty clay
- 6 sandy silt to clayey silt
- 7 silty sand to sandy silt
- 8 sand to silty sand
- 9 sand
- 10 gravelly sand to sand
- 11 very stiff fine grained (*)
- 12 sand to clayey sand (*)

I behavior type and SPT based on data from UBC-1983

CPT INTERPRETATIONS

SOUNDING : CPT23A
PROJECT : Stevenson Ranch
DATE/TIME: 7/23/2004 4:49

PROJECT No.: 061277-001
CONE/RIG : DSA0408

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.090	.30	71.55	.76	SAND to SILTY SAND	18	29	67		

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 60.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

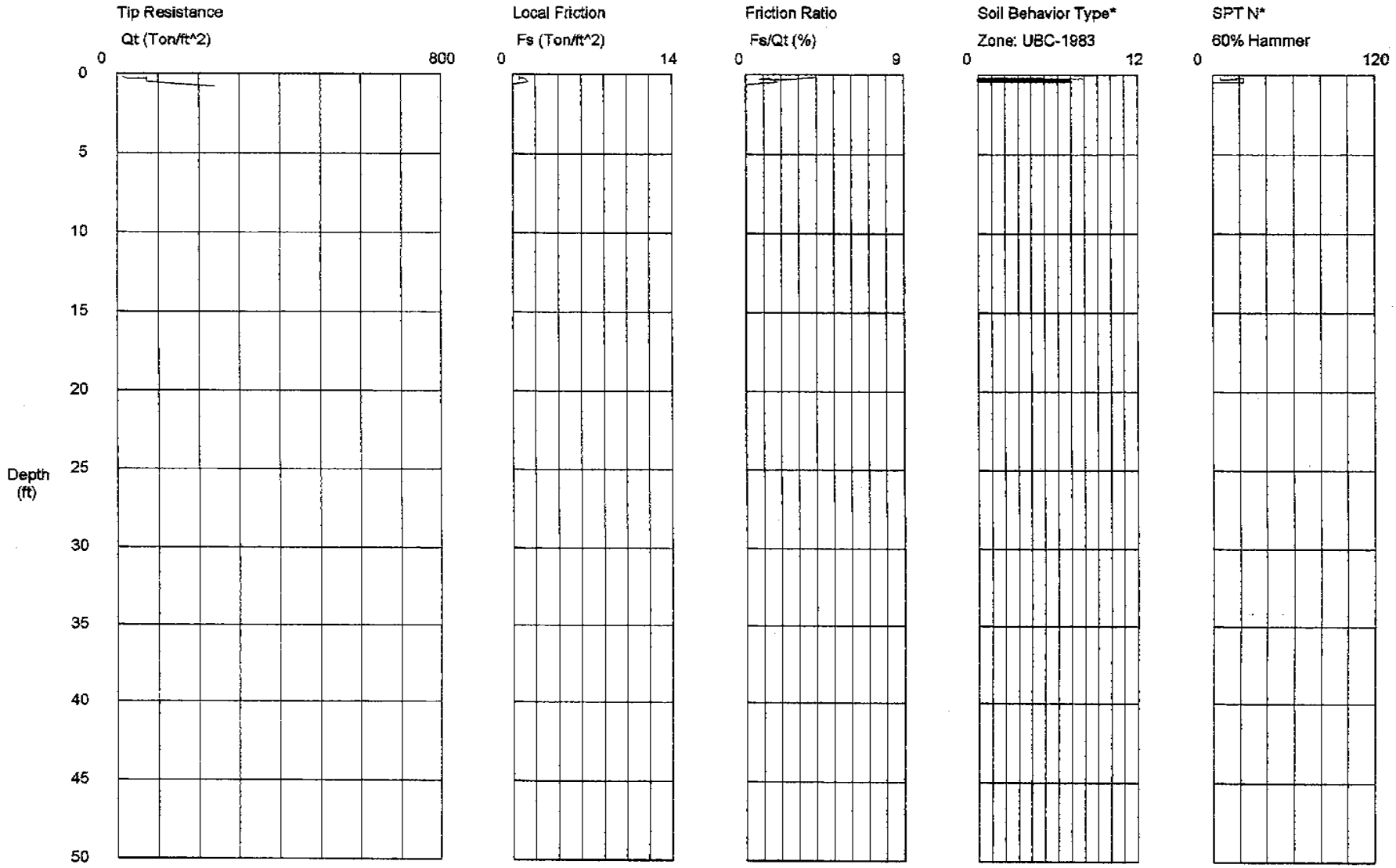
HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on ROBERTSON and CAMPANELLA, 1989

Leighton & Associates

Operator: ML-VO
Sounding: CPT23A
Cone Used: DSA0408

CPT Date/Time: 7/23/2004 4:49:
Location: Stevenson Ranch
Job Number: 061277-001



Maximum Depth = 0.82 feet

Depth Increment = 0.164 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

I behavior type and SPT based on data from UBC-1983

CPT INTERPRETATIONS

SOUNDING : CPT23B
PROJECT : Stevenson Ranch
DATE/TIME: 7/23/2004 4:55

PROJECT No.: 061277-001
CONE/RIG : DSA0408

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	120.19	1.53	SAND to SILTY SAND	30	48	82		
.300	.98	73.71	1.73	SILTY SAND to SANDY SILT	25	39	68		
.450	1.48	72.14	1.59	SILTY SAND to SANDY SILT	24	38	67		49.5
.600	1.97	62.06	1.55	SILTY SAND to SANDY SILT	21	33	63		47.5
.750	2.46	75.12	1.68	SILTY SAND to SANDY SILT	25	40	68		47.5
.900	2.95	90.39	1.65	SILTY SAND to SANDY SILT	30	48	73		47.5
1.050	3.44	192.88	3.04	SILTY SAND to SANDY SILT	64	100	95		
1.200	3.94	304.66	1.46	SAND to SILTY SAND	76	100	100		
1.350	4.43	168.60	1.26	SAND to SILTY SAND	42	67	91		48.0
1.500	4.92	157.82	.55	SAND	32	50	89		47.5
1.650	5.41	203.69	.85	SAND	41	65	97		48.0
1.800	5.91	269.11	.72	SAND	54	86	100		49.0
1.950	6.40	282.51	.54	SAND	57	90	100		49.0
2.100	6.89	220.26	.52	SAND	44	69	99		47.5
2.250	7.38	217.63	1.28	SAND to SILTY SAND	54	82	99		47.0
2.400	7.87	317.55	.82	SAND	64	92	100		48.5
2.550	8.37	307.73	1.17	SAND	62	87	100		48.0
2.700	8.86	350.60	1.98	SAND to SILTY SAND	88	100	100		48.5
2.850	9.35	379.91	1.10	SAND	76	100	100		48.5
3.000	9.84	445.18	1.16	SAND	89	100	100		49.0
3.150	10.33	437.64	.90	SAND	88	100	100		48.5
3.300	10.83	562.13	.96	GRAVELLY SAND to SAND	94	100	100		
3.450	11.32	715.34	.80	GRAVELLY SAND to SAND	100	100	100		
3.600	11.81	585.71	.86	GRAVELLY SAND to SAND	98	100	100		
3.750	12.30	608.90	1.11	SAND	100	100	100		
3.900	12.80	530.44	1.43	SAND	100	100	100		
4.050	13.29	689.98	1.18	SAND	100	100	100		

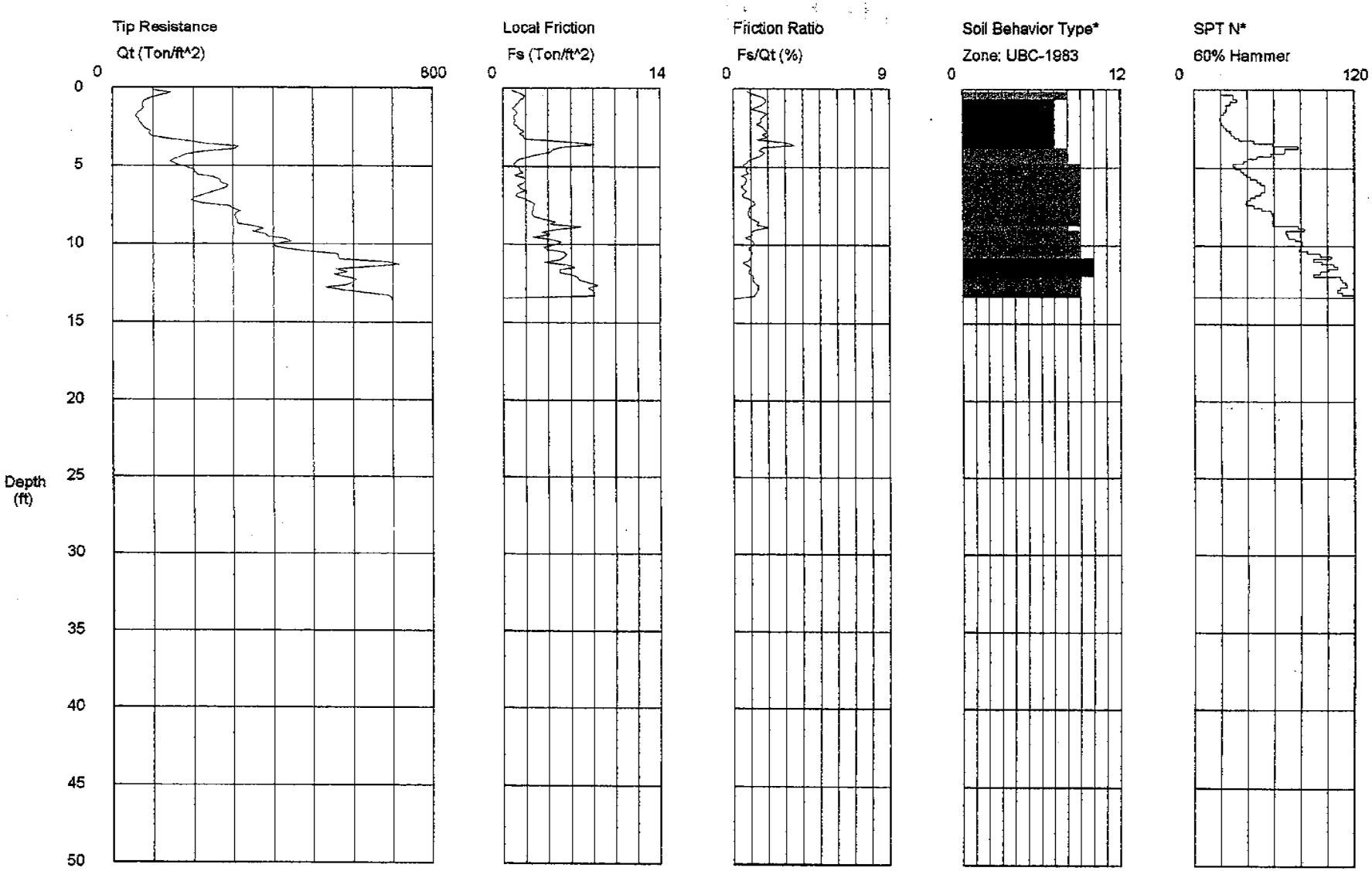
*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 60.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.
Interpretations based on ROBERTSON and CAMPANELLA, 1989

Leighton & . .ssociates

Operator: ML-VO
Sounding: CPT23B
Cone Used: DSA0408

CPT Date/Time: 7/23/2004 4:55:
Location: Stevenson Ranch
Job Number: 061277-001



Maximum Depth = 13.62 feet

Depth increment = 0.164 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

il behavior type and SPT based on data from UBC-1983

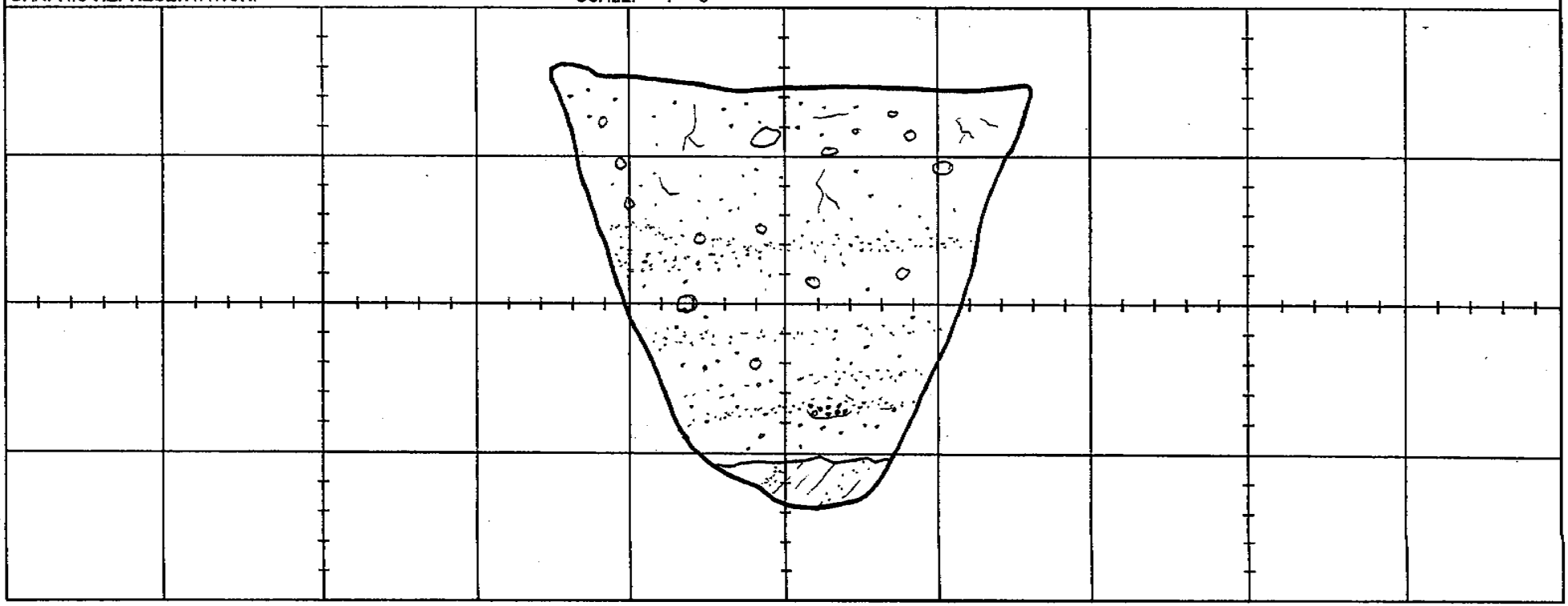
TRENCH NO: TP-8

Project No: 061277-001 | Logged by : NM | Location: Refer to Geotechnical Maps

Project Name: Stevenson Ranch/ VTTM No. 061996, Legacy Village, Phase V | Equipment: Backhoe | Elevation: 1400' | Date: 7/22/04

GEOLOGIC ATTITUDES		GEOLOGIC UNIT	ENGINEERING PROPERTIES: USCS Class	Sample No.	Moist. (%)	Density (pcf)
	Alluvium: 0 - 12.5' silty SAND with gravel: light brown, dry, medium dense, fine-grained, very porous, some roots, localized cobbles up to 4", localized sand layers	Qal	ML	B1@ 4', R1@ 6'	3.4	99.5
	Saugus Formation: 12.5' - 14.5' SANDSTONE: light grey, moist, hard	TQs				
	T.D. = 14.5' No groundwater encountered					

GRAPHIC REPRESENTATION: SCALE: 1" = 5'



LEIGHTON

DRILL HOLE LOG

CLIENT: Newhall Ranch Co.	JOB NO.: 01-1155PL-1
PROJECT: Potrero Canyon - Phase I Geological Evaluation	DATE: 4/7/04
	LOGGED BY: PDK
DRILLING COMPANY: Valley Well Drilling	DRILLED: 6/5/00
DRILLING METHOD: Rotary Wash	HOLE DIA: 5 1/4"
HAMMER TYPE: Safety Hammer	AVERAGE DROP (in.): 30"
DRIVING WEIGHTS: 140 lbs.	ELEVATION 1252'

BORING NO. RW-12P

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	% fines	Other Tests
0					**QUATERNARY ALLUVIUM; Qal (0-50')**				
		5 5 8		CL	@ 3' Lean CLAY; firm; moist; light brown	8.6	104		
5		9 6 9			@ 6' -firm to stiff; dark brown	10.6	112		
10		7 10 15			@ 10' -stiff; light brownish gray	15.6	100		
15		10 20 23			@ 14' -trace of gravel; hard				
		19 36 50		SP-SM	@ 18' Poorly graded SAND with silt and gravel; very dense; moist; light gray	8.1	128		
20		24 36 26							
25		19 25 32							
30		3 6 5		SC	@ 31' Clayey SAND; medium dense; moist; medium light brown			46	LL= 28 PI= 10 % -5 micron= 1
35		30 30 31			@ 35' -trace of gravel; very dense; grayish brown				

DRILL HOLE LOG

CLIENT: Newhall Ranch Co.	JOB NO.: 01-1155PL-1
PROJECT: Potrero Canyon - Phase I Geological Evaluation	DATE: 4/7/04
	LOGGED BY: PDK
DRILLING COMPANY: Valley Well Drilling	DRILLED: 6/5/00
DRILLING METHOD: Rotary Wash	HOLE DIA: 5 1/4"
HAMMER TYPE: Safety Hammer	AVERAGE DROP (in.): 30"
DRIVING WEIGHTS: 140 lbs.	ELEVATION 1252'

BORING NO. RW-12P

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	% fines	Other Tests
40		7 8 12			@ 40' -medium dense; wet; medium brown			41	
45		19 22 33			@ 45' -very dense				
50		22 37 36			Total Depth 50' (Elev. 1202') Ground Water @ 36.5'				
55									
60									
65									
70									
75									

CPT INTERPRETATIONS

SOUNDING : CPT-48P SEIS
PROJECT : AES/POTRERO CYN
DATE/TIME: 05-09-00 08:47

PROJECT No.: 1155PL
CONE/RIG : 471/BH,VO/R#3

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	22.16	4.68	CLAY	22	35		1.5	
.300	.98	19.04	4.10	CLAY to SILTY CLAY	13	20		1.3	
.450	1.48	13.41	3.86	CLAY	13	21		.9	
.600	1.97	15.32	3.38	CLAY to SILTY CLAY	10	16		1.0	
.750	2.46	12.36	3.65	CLAY	12	20		.8	
.900	2.95	13.11	3.46	CLAY to SILTY CLAY	9	14		.9	
1.050	3.44	25.96	1.92	SANDY SILT to CLAYEY SILT	10	17		2.1	
1.200	3.94	.21	7.90	ORGANIC MATERIAL	0	0		.0	
1.350	4.43	1.53	7.44	ORGANIC MATERIAL	2	2		.1	
1.500	4.92	29.83	3.53	CLAYEY SILT to SILTY CLAY	15	24		2.0	
1.650	5.41	29.47	2.97	CLAYEY SILT to SILTY CLAY	15	24		1.9	
1.800	5.91	18.33	4.01	CLAY to SILTY CLAY	12	20		1.2	
1.950	6.40	21.48	3.72	CLAY to SILTY CLAY	14	23		1.4	
2.100	6.89	21.58	3.38	CLAYEY SILT to SILTY CLAY	11	17		1.4	
2.250	7.38	25.92	2.83	CLAYEY SILT to SILTY CLAY	13	19		1.7	
2.400	7.87	26.34	2.81	CLAYEY SILT to SILTY CLAY	13	19		1.7	
2.550	8.37	30.68	2.53	SANDY SILT to CLAYEY SILT	12	17		2.0	
2.700	8.86	33.69	2.60	SANDY SILT to CLAYEY SILT	13	18		2.2	
2.850	9.35	38.33	2.93	CLAYEY SILT to SILTY CLAY	19	26		2.5	
3.000	9.84	25.73	3.69	CLAY to SILTY CLAY	17	22		1.7	
3.150	10.33	27.34	3.45	CLAYEY SILT to SILTY CLAY	14	17		1.8	
3.300	10.83	15.76	4.40	CLAY	16	20		1.0	
3.450	11.32	7.92	6.04	CLAY	8	10		.5	
3.600	11.81	21.14	4.03	CLAY to SILTY CLAY	14	17		1.4	
3.750	12.30	18.76	4.56	CLAY	19	22		1.2	
3.900	12.80	15.57	4.90	CLAY	16	18		1.0	
4.050	13.29	18.57	4.54	CLAY	19	21		1.2	
4.200	13.78	20.67	4.00	CLAY to SILTY CLAY	14	15		1.3	
4.350	14.27	19.93	4.31	CLAY	20	22		1.3	
4.500	14.76	25.32	3.41	CLAYEY SILT to SILTY CLAY	13	13		1.6	
4.650	15.26	39.60	2.85	SANDY SILT to CLAYEY SILT	16	17		2.6	
4.800	15.75	49.65	2.76	SANDY SILT to CLAYEY SILT	20	20		3.2	
4.950	16.24	70.13	2.35	SANDY SILT to CLAYEY SILT	28	28		4.6	
5.100	16.73	36.56	3.80	CLAYEY SILT to SILTY CLAY	18	18		2.1	
5.250	17.22	38.56	2.70	SANDY SILT to CLAYEY SILT	15	15		2.5	
5.400	17.72	91.84	1.75	SILTY SAND to SANDY SILT	31	30	64		39.0
5.550	18.21	115.85	1.59	SILTY SAND to SANDY SILT	39	37	70		40.5
5.700	18.70	151.67	1.52	SAND to SILTY SAND	38	36	77		42.0
5.850	19.19	146.31	1.55	SAND to SILTY SAND	37	34	76		42.0
6.000	19.69	210.75	1.47	SAND to SILTY SAND	53	48	86		43.0
6.150	20.18	171.98	1.53	SAND to SILTY SAND	43	39	80		42.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 37.4 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : CPT-48P SEIS

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	130.74	1.42	SAND to SILTY SAND	33	29	72		40.5
6.450	21.16	153.20	1.48	SAND to SILTY SAND	38	34	76		41.5
6.600	21.65	211.77	1.28	SAND to SILTY SAND	53	46	85		42.5
6.750	22.15	264.54	1.92	SAND to SILTY SAND	66	57	91		43.5
6.900	22.64	305.84	2.38	SILTY SAND to SANDY SILT	100	87	95		44.0
7.050	23.13	295.35	.87	SAND	59	50	93		44.0
7.200	23.62	290.48	1.07	SAND	58	49	93		44.0
7.350	24.11	194.64	1.82	SAND to SILTY SAND	49	40	81		42.0
7.500	24.61	137.75	1.59	SAND to SILTY SAND	34	28	71		39.5
7.650	25.10	160.59	1.09	SAND to SILTY SAND	40	33	75		40.5
7.800	25.59	272.32	1.14	SAND	54	44	90		43.0
7.950	26.08	229.59	1.76	SAND to SILTY SAND	57	46	84		42.5
8.100	26.57	211.85	1.63	SAND to SILTY SAND	53	42	82		42.0
8.250	27.07	316.42	1.56	SAND to SILTY SAND	79	62	93		43.5
8.400	27.56	192.86	.95	SAND	39	30	79		41.0
8.550	28.05	41.11	2.31	SANDY SILT to CLAYEY SILT	16	13		2.6	
8.700	28.54	23.86	4.40	CLAY to SILTY CLAY	16	12		1.5	
8.850	29.04	82.66	2.17	SILTY SAND to SANDY SILT	28	21	54		37.0
9.000	29.53	152.58	2.52	SILTY SAND to SANDY SILT	51	38	71		39.0
9.150	30.02	203.57	1.31	SAND to SILTY SAND	51	38	79		41.0
9.300	30.51	242.23	1.01	SAND	48	36	84		42.0
9.450	31.00	203.78	1.92	SAND to SILTY SAND	51	37	78		40.5
9.600	31.50	189.16	1.26	SAND to SILTY SAND	47	34	76		40.0
9.750	31.99	116.12	1.81	SILTY SAND to SANDY SILT	39	28	62		38.0
9.900	32.48	44.59	4.12	CLAYEY SILT to SILTY CLAY	22	16		2.5	
10.050	32.97	17.04	1.35	SANDY SILT to CLAYEY SILT	7	5		1.2	
10.200	33.46	40.58	2.13	SANDY SILT to CLAYEY SILT	16	11		2.6	
10.350	33.96	77.08	2.61	SANDY SILT to CLAYEY SILT	31	22		5.0	
10.500	34.45	138.13	2.22	SILTY SAND to SANDY SILT	46	32	66		38.5
10.650	34.94	135.67	2.31	SILTY SAND to SANDY SILT	45	31	65		38.0
10.800	35.43	42.60	3.34	CLAYEY SILT to SILTY CLAY	21	15		2.7	
10.950	35.93	23.77	4.37	CLAY to SILTY CLAY	16	11		1.4	
11.100	36.42	22.16	5.04	CLAY	22	15		1.2	
11.250	36.91	61.61	4.78	CLAY to SILTY CLAY	41	28		3.5	
11.400	37.40	43.40	5.69	CLAY	43	29		2.4	
11.550	37.89	73.04	4.70	*VERY STIFF FINE GRAINED	73	49			
11.700	38.39	52.43	5.40	CLAY	52	35		2.9	
11.850	38.88	77.03	4.78	*VERY STIFF FINE GRAINED	77	51			
12.000	39.37	216.31	2.40	SILTY SAND to SANDY SILT	72	48	77		39.5
12.150	39.86	277.44	1.29	SAND	55	36	84		41.5
12.300	40.35	200.04	1.15	SAND	40	26	75		39.0
12.450	40.85	114.85	3.78	CLAYEY SILT to SILTY CLAY	57	38		6.6	
12.600	41.34	50.41	4.67	CLAY to SILTY CLAY	34	22		2.8	
12.750	41.83	31.65	4.76	CLAY	32	21		1.7	
12.900	42.32	36.46	3.29	CLAYEY SILT to SILTY CLAY	18	12		2.3	
13.050	42.81	96.11	4.22	CLAYEY SILT to SILTY CLAY	48	31		5.5	
13.200	43.31	153.09	3.08	SANDY SILT to CLAYEY SILT	61	39		8.9	
13.350	43.80	103.42	5.09	*VERY STIFF FINE GRAINED	100	66			
13.500	44.29	225.77	1.75	SAND to SILTY SAND	56	36	78		39.5
13.650	44.78	187.12	1.61	SAND to SILTY SAND	47	30	72		39.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 37.4 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : CPT-48P SEIS

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	119.14	3.84	CLAYEY SILT to SILTY CLAY	60	38		6.8	
13.950	45.77	170.70	2.06	SILTY SAND to SANDY SILT	57	36	69		38.5
14.100	46.26	182.88	1.60	SAND to SILTY SAND	46	29	71		38.5
14.250	46.75	97.51	4.58	*VERY STIFF FINE GRAINED	98	62			
14.400	47.24	110.86	3.06	SANDY SILT to CLAYEY SILT	44	28		6.4	
14.550	47.74	65.65	3.53	CLAYEY SILT to SILTY CLAY	33	21		3.7	
14.700	48.23	67.94	5.42	*VERY STIFF FINE GRAINED	68	42			
14.850	48.72	96.81	5.17	*VERY STIFF FINE GRAINED	97	60			
15.000	49.21	173.06	2.71	SILTY SAND to SANDY SILT	58	36	69		38.5
15.150	49.70	78.63	4.63	*VERY STIFF FINE GRAINED	79	49			
15.300	50.20	31.57	5.15	CLAY	32	20		1.7	
15.450	50.69	33.12	4.46	CLAY to SILTY CLAY	22	14		1.8	
15.600	51.18	118.21	3.92	CLAYEY SILT to SILTY CLAY	59	36		6.8	
15.750	51.67	145.93	3.90	*SAND to CLAYEY SAND	73	45			
15.900	52.17	51.71	3.56	CLAYEY SILT to SILTY CLAY	26	16		2.9	
16.050	52.66	122.33	*****		0	0			.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 37.4 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

CPT INTERPRETATIONS

SOUNDING : CPT-80P
PROJECT : AES-POTRERO CNYN
DATE/TIME: 12-11-00 17:06

PROJECT No.: 1155-PL
CONE/RIG : 748/#1 GO-JH

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	8.71	2.41	CLAY to SILTY CLAY	6	9		.7	
.300	.98	28.51	1.93	SANDY SILT to CLAYEY SILT	11	18		2.3	
.450	1.48	30.51	2.72	CLAYEY SILT to SILTY CLAY	15	24		2.0	
.600	1.97	25.05	2.55	CLAYEY SILT to SILTY CLAY	13	20		1.7	
.750	2.46	22.05	2.95	CLAYEY SILT to SILTY CLAY	11	18		1.5	
.900	2.95	16.19	2.66	CLAYEY SILT to SILTY CLAY	8	13		1.1	
1.050	3.44	29.15	2.09	SANDY SILT to CLAYEY SILT	12	19		1.9	
1.200	3.94	18.61	2.79	CLAYEY SILT to SILTY CLAY	9	15		1.2	
1.350	4.43	9.39	3.94	CLAY	9	15		.6	
1.500	4.92	29.96	2.34	SANDY SILT to CLAYEY SILT	12	19		2.0	
1.650	5.41	44.81	2.16	SANDY SILT to CLAYEY SILT	18	29		3.0	
1.800	5.91	32.57	2.76	CLAYEY SILT to SILTY CLAY	16	26		2.1	
1.950	6.40	43.64	2.20	SANDY SILT to CLAYEY SILT	17	28		2.9	
2.100	6.89	55.32	2.26	SANDY SILT to CLAYEY SILT	22	34		3.7	
2.250	7.38	44.98	2.47	SANDY SILT to CLAYEY SILT	18	27		3.0	
2.400	7.87	47.57	1.85	SANDY SILT to CLAYEY SILT	19	28		3.1	
2.550	8.37	52.86	1.74	SILTY SAND to SANDY SILT	18	25	58		40.5
2.700	8.86	31.27	3.42	CLAYEY SILT to SILTY CLAY	16	21		2.0	
2.850	9.35	29.55	3.32	CLAYEY SILT to SILTY CLAY	15	20		1.9	
3.000	9.84	36.03	3.33	CLAYEY SILT to SILTY CLAY	18	23		2.4	
3.150	10.33	54.17	2.38	SANDY SILT to CLAYEY SILT	22	28		3.6	
3.300	10.83	139.54	1.86	SILTY SAND to SANDY SILT	47	58	83		44.0
3.450	11.32	115.25	2.83	SANDY SILT to CLAYEY SILT	46	56		6.7	
3.600	11.81	138.66	.80	SAND	28	33	81		43.5
3.750	12.30	80.56	2.06	SILTY SAND to SANDY SILT	27	31	65		40.5
3.900	12.80	57.87	2.40	SANDY SILT to CLAYEY SILT	23	26		3.8	
4.050	13.29	58.49	2.39	SANDY SILT to CLAYEY SILT	23	26		3.8	
4.200	13.78	56.30	2.86	SANDY SILT to CLAYEY SILT	23	25		3.7	
4.350	14.27	60.61	3.22	SANDY SILT to CLAYEY SILT	24	26		3.5	
4.500	14.76	47.76	3.37	CLAYEY SILT to SILTY CLAY	24	25		2.8	
4.650	15.26	58.40	3.42	CLAYEY SILT to SILTY CLAY	29	31		3.4	
4.800	15.75	77.84	1.54	SILTY SAND to SANDY SILT	26	27	61		39.0
4.950	16.24	61.99	1.68	SILTY SAND to SANDY SILT	21	21	54		38.0
5.100	16.73	70.81	1.85	SILTY SAND to SANDY SILT	24	24	57		38.5
5.250	17.22	74.02	2.09	SILTY SAND to SANDY SILT	25	24	58		38.5
5.400	17.72	83.00	2.00	SILTY SAND to SANDY SILT	28	27	61		39.0
5.550	18.21	93.54	2.26	SILTY SAND to SANDY SILT	31	30	64		39.0
5.700	18.70	67.54	2.74	SANDY SILT to CLAYEY SILT	27	26		4.4	
5.850	19.19	88.72	1.76	SILTY SAND to SANDY SILT	30	28	62		39.0
6.000	19.69	86.89	2.67	SANDY SILT to CLAYEY SILT	35	32		5.7	
6.150	20.18	99.15	2.47	SILTY SAND to SANDY SILT	33	30	64		39.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 33.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

SOUNDING : CPT-80P

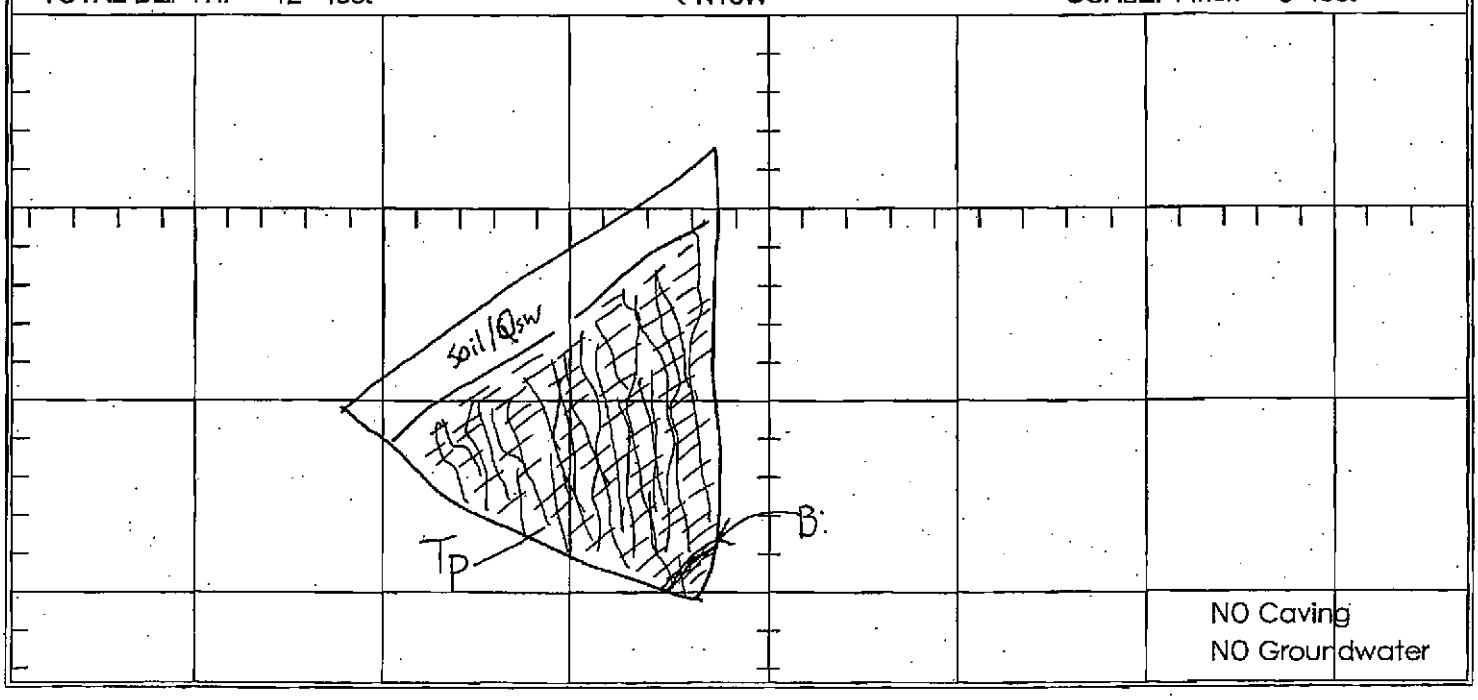
DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	108.07	2.36	SILTY SAND to SANDY SILT	36	32	66		39.5
6.450	21.16	92.56	3.11	SANDY SILT to CLAYEY SILT	37	33		5.4	
6.600	21.65	70.92	3.38	SANDY SILT to CLAYEY SILT	28	25		4.1	
6.750	22.15	90.91	3.09	SANDY SILT to CLAYEY SILT	36	32		5.3	
6.900	22.64	136.75	2.05	SILTY SAND to SANDY SILT	46	39	72		40.0
7.050	23.13	106.01	2.83	SANDY SILT to CLAYEY SILT	42	36		6.2	
7.200	23.62	109.86	2.96	SANDY SILT to CLAYEY SILT	44	37		6.4	
7.350	24.11	130.15	2.60	SILTY SAND to SANDY SILT	43	36	69		39.5
7.500	24.61	106.18	2.83	SANDY SILT to CLAYEY SILT	42	35		6.2	
7.650	25.10	94.79	2.94	SANDY SILT to CLAYEY SILT	38	31		5.5	
7.800	25.59	171.08	1.51	SAND to SILTY SAND	43	35	76		40.5
7.950	26.08	109.22	2.62	SILTY SAND to SANDY SILT	36	29	63		38.5
8.100	26.57	121.31	3.02	SANDY SILT to CLAYEY SILT	49	38		7.0	
8.250	27.07	143.23	2.86	SILTY SAND to SANDY SILT	48	37	70		39.5
8.400	27.56	92.88	3.42	SANDY SILT to CLAYEY SILT	37	29		5.4	
8.550	28.05	102.63	3.25	SANDY SILT to CLAYEY SILT	41	32		5.9	
8.700	28.54	66.31	3.97	CLAYEY SILT to SILTY CLAY	33	25		3.8	
8.850	29.04	34.48	5.80	CLAY	34	26		1.9	
9.000	29.53	35.88	5.10	CLAY	36	27		2.0	
9.150	30.02	26.47	6.80	CLAY	26	20		1.5	
9.300	30.51	48.82	5.59	CLAY	49	36		2.8	
9.450	31.00	48.54	5.19	CLAY	49	36		2.7	
9.600	31.50	52.86	5.11	CLAY	53	38		3.0	
9.750	31.99	22.48	6.14	CLAY	22	16		1.2	
9.900	32.48	25.26	8.23	CLAY	25	18		1.6	
10.050	32.97	19.50	5.54	CLAY	20	14		1.0	
10.200	33.46	15.70	6.31	CLAY	16	11		.9	
10.350	33.96	19.57	7.97	CLAY	20	14		1.2	
10.500	34.45	18.44	7.00	CLAY	18	13		1.1	
10.650	34.94	16.21	4.32	CLAY	16	11		.9	
10.800	35.43	21.22	5.70	CLAY	21	15		1.1	
10.950	35.93	22.48	6.18	CLAY	22	16		1.2	
11.100	36.42	15.89	5.10	CLAY	16	11		.9	
11.250	36.91	20.01	8.40	CLAY	20	14		1.2	
11.400	37.40	65.58	6.50	*VERY STIFF FINE GRAINED	66	45			
11.550	37.89	25.49	5.26	CLAY	25	18		1.4	
11.700	38.39	13.98	3.58	CLAY to SILTY CLAY	9	6		.8	
11.850	38.88	14.66	3.48	CLAY to SILTY CLAY	10	7		.8	
12.000	39.37	16.76	4.12	CLAY	17	11		1.0	
12.150	39.86	14.83	3.98	CLAY	15	10		.8	
12.300	40.35	15.40	4.03	CLAY	15	10		.9	
12.450	40.85	17.76	4.50	CLAY	18	12		1.0	
12.600	41.34	22.24	6.03	CLAY	22	15		1.2	
12.750	41.83	23.50	5.49	CLAY	24	16		1.2	
12.900	42.32	41.92	6.30	CLAY	42	28		2.3	
13.050	42.81	87.91	3.44	SANDY SILT to CLAYEY SILT	35	23		5.0	
13.200	43.31	174.84	3.89	*SAND to CLAYEY SAND	87	58			
13.350	43.80	319.56	4.25	*SAND to CLAYEY SAND	100	100			
13.500	44.29	307.01	5.37	*VERY STIFF FINE GRAINED	100	100			

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 33.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

CLIENT: Newhall Ranch Co.	JOB NO: 02-1155P0-1	**TRENCH LOG NO. T-129PO**	
PROJECT: Phase I Landslide Investigation Potrero and Oak Valleys	DATE: 4/7/04		
	LOGGED BY: MJD		
	EXCAVATED: 4/1/02		
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket	ELEVATION: 1278		

DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	Other Tests
0					**SOIL/SLOPEWASH; Soil/Qsw, (0-2 ft.)** @ 0' Light grayish-brown silt; loose; dry to slightly damp; voids/roots; caliche **BEDROCK; Tp, (2-12 ft.)** @ 2' Grayish-brown siltstone; loose to moderately dense; dry to damp; thin 1/4" clay bed at 11 ft.; highly to moderately fractured; orange staining; caliche-lined fractures	B:N72W,41NE			
5									
10									
15					COMMENTS: -Highly fractured/weathered to 10 ft.				
20									

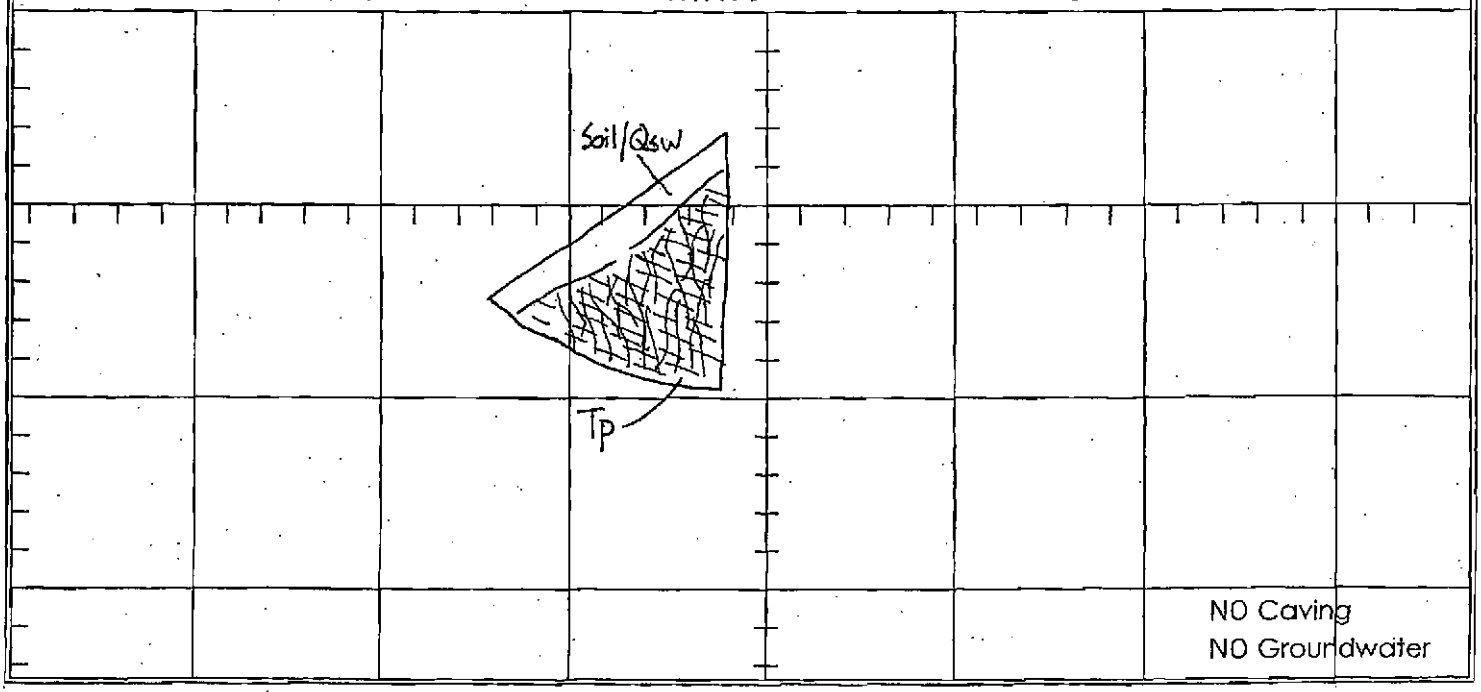
TOTAL DEPTH: 12 feet ←N18W SCALE: 1 inch = 5 feet



CLIENT: Newhall Ranch Co.	JOB NO: 02-1155P0-1	**TRENCH LOG**	
PROJECT: Phase I Landslide Investigation Potrero and Oak Valleys	DATE: 4/7/04	**NO.** T-130PO	
	LOGGED BY: MJD		
	EXCAVATED: 4/1/02		
EXCAVATION METHOD: Rubber-Tired Backhoe w/24" Bucket	ELEVATION: 1266		

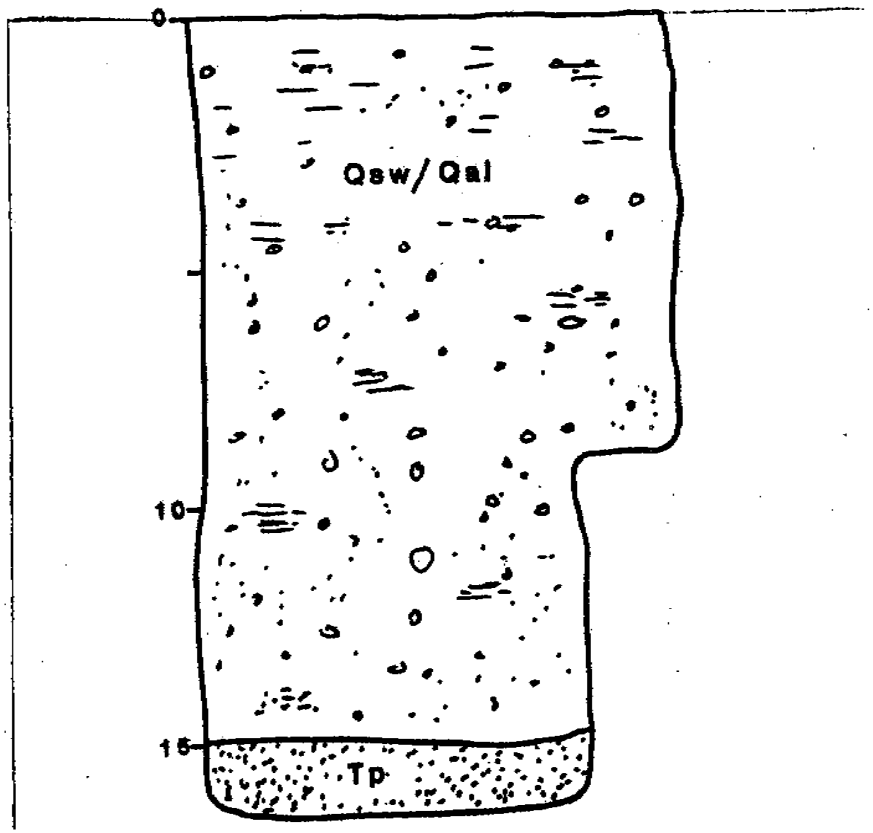
DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	GRAPHIC LOG	USCS SYMBOL	DESCRIPTION	ATTITUDES	LABORATORY TESTS: Moisture Content (%)	Dry Density (pcf)	Other Tests
0					**SOIL/SLOPEWASH; Soil/Qsw, (0-1 ft.)** @ 0' Light grayish-brown silt; loose; dry to slightly damp; voids/roots; caliche **BEDROCK; Tp, (1-7 ft.)** @ 1' Grayish-brown siltstone; loose to dense; dry to damp; highly to moderately fractured; orange staining; caliche-lined fractures; laminations parallel to orange staining	B:N42W,38NE			
5									
10					COMMENTS: -Highly weathered/fractured to 5 ft.				
15									
20									

TOTAL DEPTH: 7 feet N17W→ SCALE: 1 inch = 5 feet



TEST PIT LOGS W.O. 3022-VN

Test Pit No.	Depth Below Surface (FT.)	Material Type	Material Description	Comments
T-16	0-5'	SLOPEWASH/ ALLUVIUM/ (QSW/QAL)	Light brown silty fine SAND with scattered gravel, moist, porous, loose.	
	5'-15'		Light brown fine to medium SAND with varying amounts of silt, gravel and pebbles, moist, porous, permeable, moderately dense.	
	15'-16'	BEDROCK (TP)	Pico Fm. Brown, yellowish brown medium SAND-STONE moist, weathered, friable, dense.	



APPENDIX F

SEISMIC REFRACTION PROFILES

Seismic Survey Lines SL-14a, SL-14b, and SL-15
(Advanced Geoscience, 2005)

Table 1

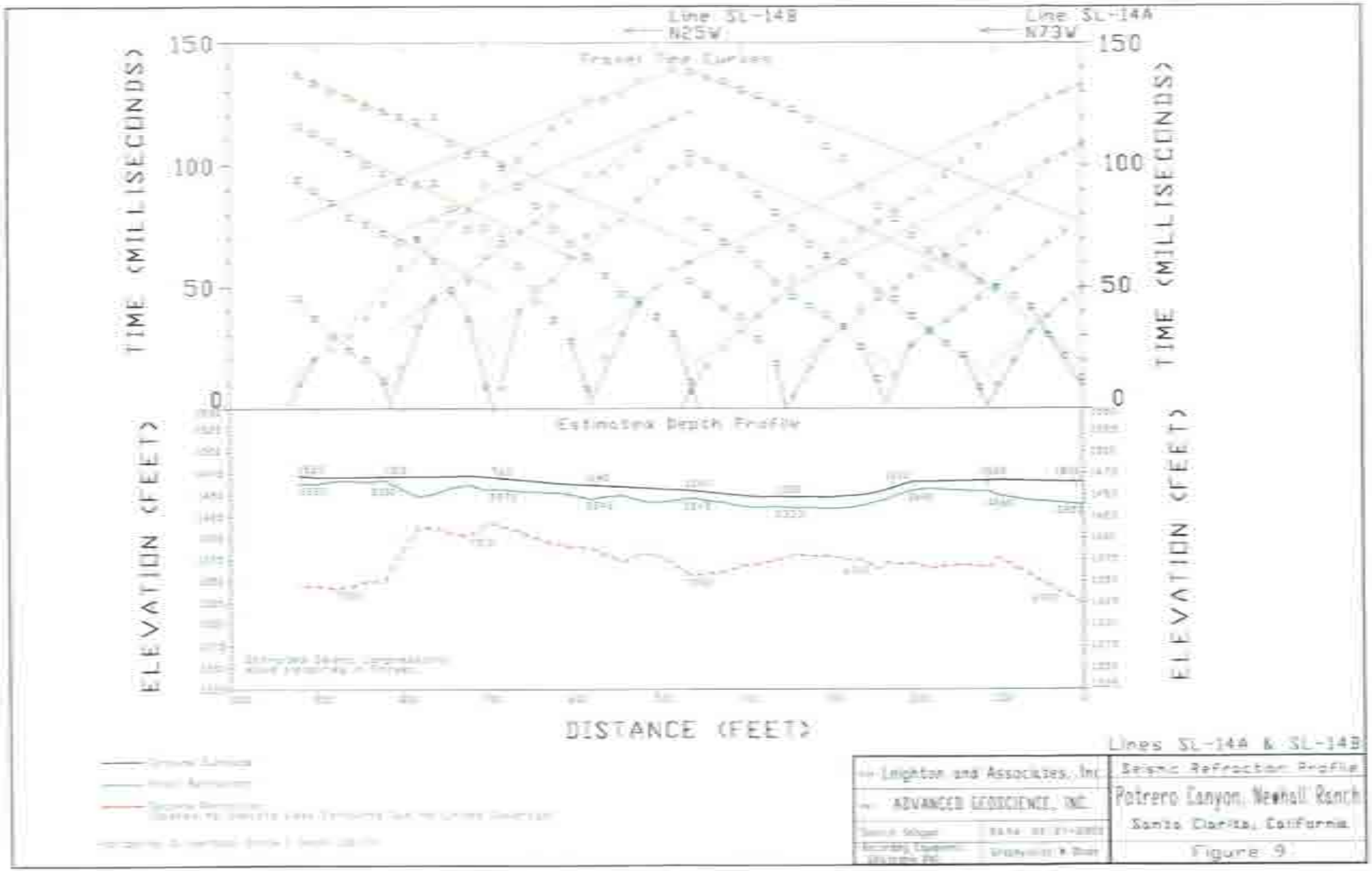
Seismic Velocity Range and Rippability of Refracting Layers
Detected on Seismic Refraction Profiles
At Potrero Canyon Newhall Ranch Development
May, 2005

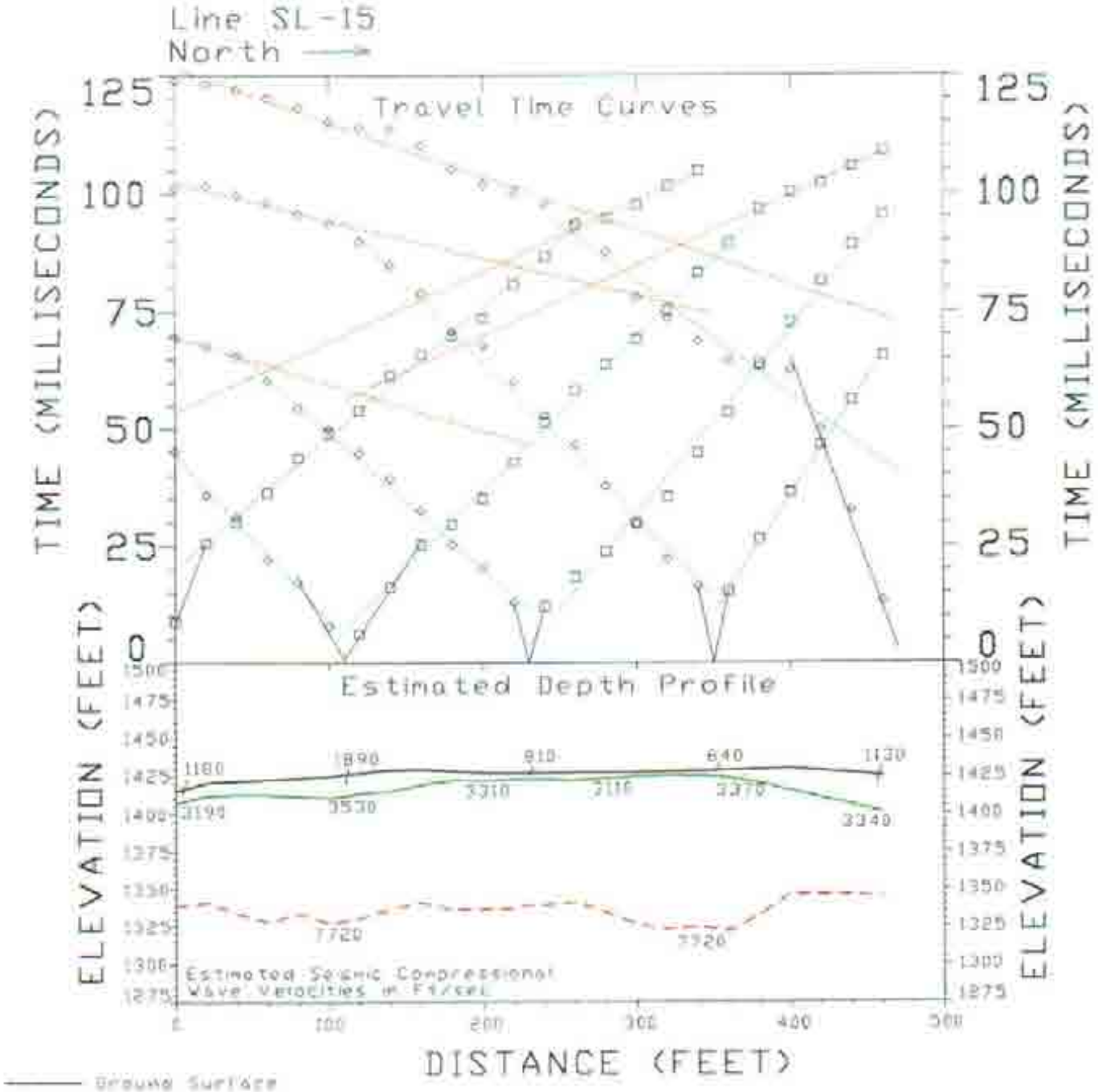
Velocity Range:	Refracting Layers:	Rippability:
1,200 - 2,600 Feet/sec	Purple Layer	Rippable for D8R - D11R
2,500 - 5,200 Feet/sec	Green Layer	Rippable for D8R - D11R
5,000 - 7,500 Feet/sec	Brown Layer	Rippable for D9R - D11R Marginal for D8R Above 6,500 Ft/sec
7,700 - 10,800 Feet/sec	Blue Layer	Rippable for D11R Below 9,700 Ft/sec Marginal for D11R from 9,700 - 12,000 Ft/sec Rippable for D10R Below 8,500 Ft/sec Marginal for D10R from 8,500 to 10,800 Ft/sec Marginal for D9R from 7,500 to 9,600 Ft/sec Marginal for D8R from 6,500 to 8,300 Ft/sec

Rippability evaluation based on charts of rippability versus seismic velocity for Caterpillar D8R through D11R rippers as published in Hanbook of Ripping by Caterpillar, Inc.

Estimated refracting layer velocities were compared to the velocities shown on these charts for sedimentary rocks consisting of sandstone and siltstone

Advanced Geoscience, Inc.


Line SL-14B
N25W
Line SL-14A
N73W
Travel Time Curves
TIME (MILLISECONDS)
150
100
50
0
Estimated Depth Profile
ELEVATION (FEET)
DISTANCE (FEET)
Lines SL-14A & SL-14B
Leighton and Associates, Inc.
ADVANCED GEOSCIENCE, INC.
Seismic Refraction Profile
Potrero Canyon, Newhall Ranch
Santa Clarita, California
Figure 9



Ground Surface

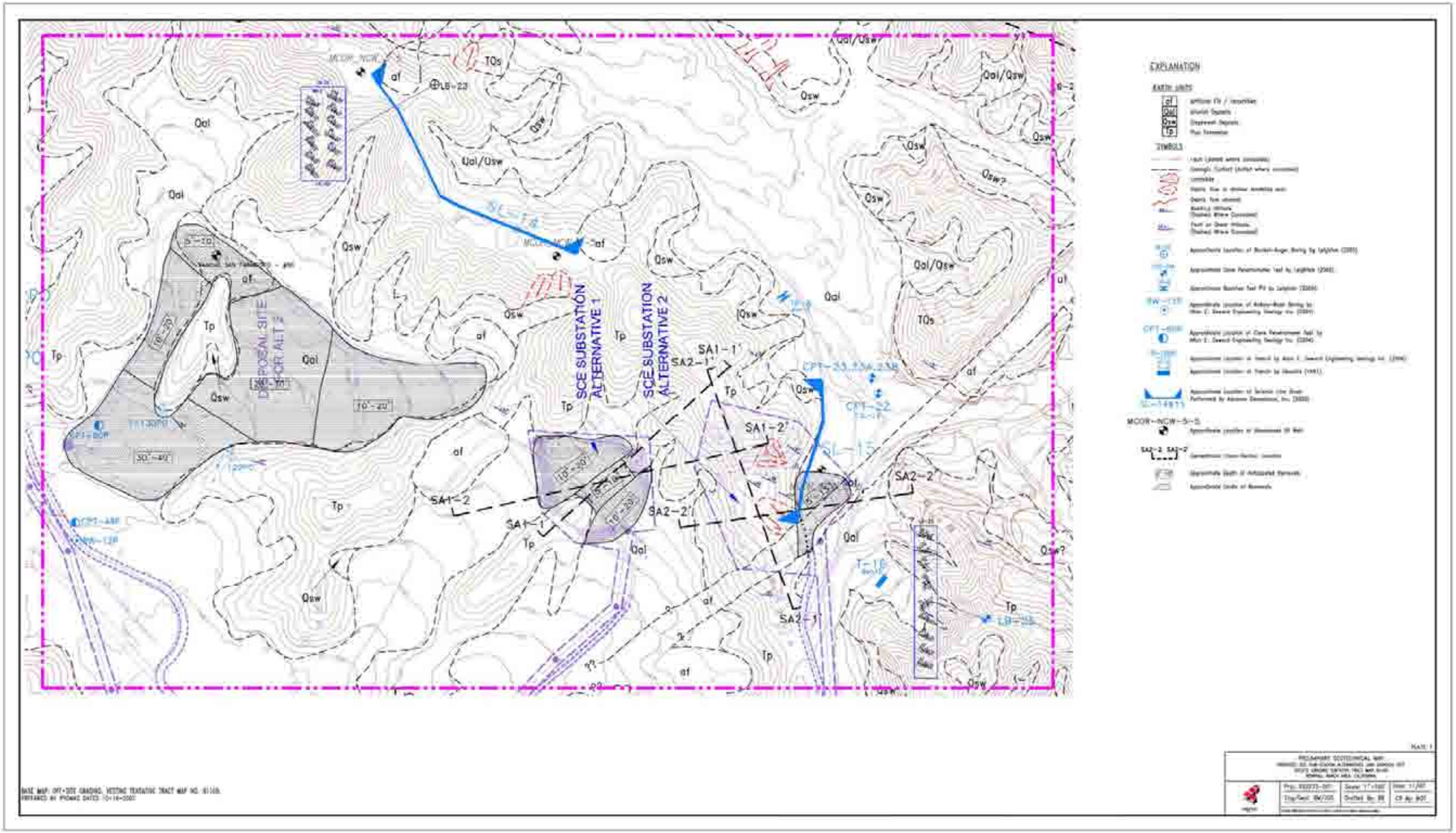
First Refractor

Second Refractor (Dashed to Indicate Less Certainty Due to Limited Coverage)

Horizontal & Vertical Scale 1 Inch= 100 Ft

Line SL-15

for: Leighton and Associates, Inc.	Seismic Refraction Profile
by: ADVANCED GEOSCIENCE, INC.	Potrero Canyon, Newhall Ranch
Source: Sledgehammer / Date: 04-27-2005	Santa Clarita, California
Recording Equipment: Seistronix RAS / Geophysicist: M. Olson	Figure 10



A full-size reproduction of this figure can be found at Impact Sciences.

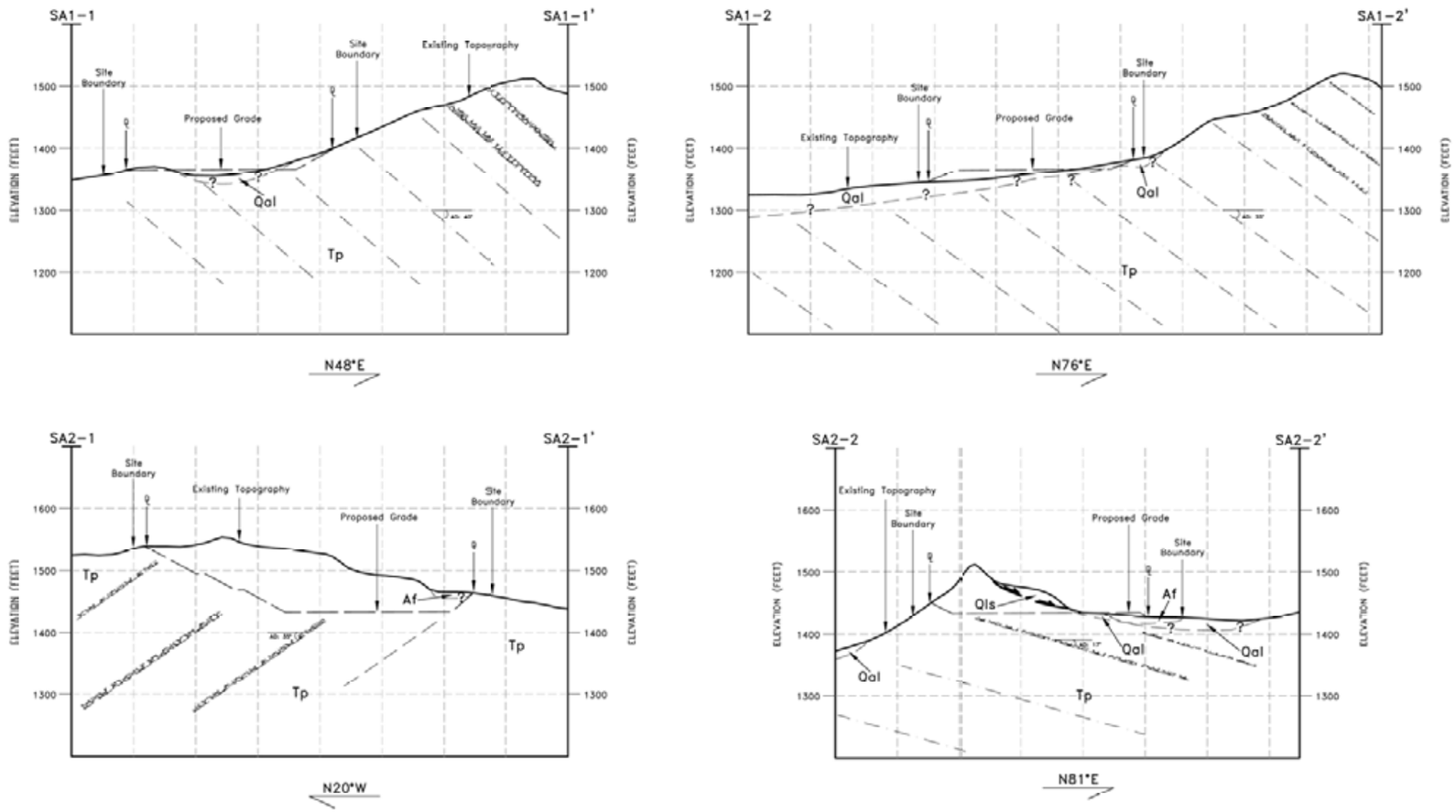


PLATE 2

GEOTECHNICAL CROSS-SECTIONS

SA1-1-SA1-1', SA1-2-SA1-2', SA2-1-SA2-1' AND SA2-2-SA2-2'
PROPOSED S.C.E. SUBSTATION ALTERNATIVES OFFSITE GRADING T.T.M. 61105
NEWHALL RANCH AREA, CALIFORNIA

Leighton	Proj: 062273-001	Scale: 1"=10'	Date: 11/07
	Eng/Geol: RM/JGS	Drafted By: RS	CP By: BDT

A full-size reproduction of this figure can be found at Impact Sciences.

Leighton and Associates, Inc., Responses to County of Los Angeles, Department of Public Works Geologic and Soils Engineering Review Sheets for Leighton's Geotechnical Report Off-Site Grading for Proposed Southern California Edison Substation Alternatives, March 11, 2008

RESPONSES TO COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
GEOLOGIC AND SOILS ENGINEERING REVIEW SHEETS FOR
LEIGHTON'S GEOTECHNICAL REPORT DATED NOVEMBER 26, 2007
OFF-SITE GRADING FOR PROPOSED SOUTHERN CALIFORNIA EDISON
SUBSTATION ALTERNATIVES
TENTATIVE TRACT MAP No. 61105 (MISSION VILLAGE PROJECT)
COUNTY OF LOS ANGELES, CALIFORNIA

Prepared For:

Newhall Land and Farming Company
23823 Valencia Boulevard
Valencia, California 91355

Project Number 062273-001

March 11, 2008

Leighton and Associates, Inc.
A LEIGHTON GROUP COMPANY

Leighton and Associates, Inc.
A LEIGHTON GROUP COMPANY

March 11, 2008

Project Number 062273-001

To: Newhall Land and Farming Company
23823 Valencia Boulevard
Valencia, California 91355

Attention: Mr. Corey Harpole

Subject: Responses to County of Los Angeles, Department Of Public Works, Geologic and Soils Engineering Review Sheets for Leighton's Geotechnical Report dated November 26, 2007, Off-site Grading for Proposed Southern California Edison Substation Alternatives, Tentative Tract Map No. 61105 (Mission Village Project), County of Los Angeles, California.

References: County of Los Angeles Department of Public Works (LADPW), Geotechnical and Materials Engineering Division, 2006, Geologic and Soils Engineering Review Sheets, dated 1/16/07 and 1/17/07, respectively.

Leighton and Associates, Inc., 2007, Geotechnical Report, Off-site Grading for Proposed Southern California Edison Substation Alternatives, Responses to the County of Los Angeles Department of Public Works Geologic and Soils Engineering Review Sheets dated September 17 and September 19, 2007 for Tentative Tract Map No. 61105 (Mission Village Project), County of Los Angeles, California, Project Number 062273-001, dated November 26, 2007.

Introduction

Per your request, Leighton and Associates, Inc. (Leighton) has prepared this response to review sheets prepared by the Los Angeles County Department of Public Works (LADPW) for Leighton's referenced geotechnical report dated November 26, 2007, Off-site Grading for the proposed Southern California Edison (SCE) Substation Alternatives, Tentative Tract Map (TTM) No. 61105. The Geologic Review Sheet is dated January 16, 2007 and the Soils Engineering Review Sheet is dated January 17, 2007 Copies of the review sheets are attached in Appendix A. Each response is numbered to correspond to the review remark number.

26074 Avenue Hall, Suite 1 ▪ Santa Clarita, CA 91355
661.257.7434 ▪ Fax 661.257.7430 ▪ www.leightongeo.com

Responses to Geologic Review Remarks

Remark No. 1

According to the Leighton report dated 11/26/07, the natural swales north of Substation Alternative 1 may have the potential for debris flow hazards. Provide mitigation recommendations as necessary. If grading is required to mitigate a potential hazard, then the required grading must be depicted on the Tentative Map. If catchment areas are required, the volume of debris required for containment must be determined, and the containment area must be sown on the Tentative Map.

Response to Remark No. 1

Leighton has performed detailed field mapping in the drainage areas to the north of the proposed Substation Alternative 1. The existing slope profiles in these drainages range from a 5:1 (horizontal:vertical) at toe of the natural slope, 3:1 in middle portion , and 1:1 in the upper slope areas. Due to the recent rains, a deeply incised gully in the middle and upper portion of the natural slopes exposed the entire column of colluvium/alluvium and bedrock at the bottom of the gully. Based on the exposed conditions, the middle portion of the slope has an alluvium thickness of approximately 5 feet and the upper portion of the slope has colluvium/alluvium thickness of approximately 3 feet. The lower portion of the slope has an alluvium thickness in excess of 5 feet. The surficial soils were manually probed with a metal rod and the upper 1.5 to 2 feet exhibited easy to moderate probing resistance. The metal probe could not be advanced deeper than 2 feet.

Two additional cross-sections (SA1-3 and SA1-4) were prepared through the drainage areas north of the proposed Substation Alternative 1 (see revised Plate 2). These cross-sections show the existing slope gradients and the alluvium profiles and were used to evaluate the global and surficial stability of these drainage areas.

The results of the slope stability analysis on Cross-Section SA1-3 indicate that the factors of safety (FOS) of the upper portion of the natural slope with the 1:1 slope gradient were less than 1.5 (ranging between 0.7 to 1.3). The FOS of the middle and lower portion of the slope are at or in excess of 1.5. The global and surficial stability analysis on Cross-Section SA1-4 has FOS in excess of 1.5.

Additional slope stability analysis was performed on Cross-Section SA1-3 to determine the 1.5 FOS in the upper and steeper portion of the slope and to establish a structural setback. Based on the results of the additional slope stability analysis, the structural setback (1.5 FOS) was established and is shown on Cross-Section SA1-3 and on the revised Geotechnical Map (Plate 1). The proposed Substation Alternative 1 as shown on the current TTM 61105 is approximately 180 feet away from the structural setback. Therefore, the hazard of debris flow impacting this substation alternative is considered low. If during future planning stages for this project this substation alternative is selected, the recommended structural setback should be considered to accommodate the proposed substation improvements.

Remark No. 2

The Soils Engineering review dated 1/17/08 is attached.

Response to Remark No. 2

Our responses to the Soils Engineering Review Sheet dated 1/17/07 are presented in the following section.

Responses to Soils Engineering Review Remarks

Remark No. 1

Page 12 of the Leighton and Associates soils report dated 11/26/07 states that the natural swales north of Substation Alternative 1 may have the potential for debris flow hazards. Therefore, provide surficial slope stability analyses for the natural swales north of Substation Alternative 1. Recommend mitigation if factors of safety are below County minimum standards.

Response to Remark No. 1

See our response to Geologic Remark No.1.

Additional global and surficial slope stability analyses were performed on Cross-Sections SA1-3 and SA1-4 to evaluate the potential for debris flow on the natural drainages areas to the north of the proposed Substation Alternative 1. The results of our additional slope stability analysis are attached in Appendix B.

Remark No. 2

Show all recommended mitigation measures on the geotechnical map, as necessary.

Response to Remark No. 2

Based on the results of our additional slope stability analysis, a structural setback was established and is shown on the revised Geotechnical Map (Plate 1).

Remark No. 3

Requirements of the Geology Section are attached.

Response to Remark No. 3

Responses to the Geology Section review remarks are presented in the preceding section of this submittal.

Remark No. 4

Include a copy of this review sheet with your response.

Response to Remark No. 4

Copies of the Geologic and Soils Engineering Review Sheets are presented in Appendix A.

Limitations

Leighton's work was performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, express or implied, is made as to the services, conclusions, and professional opinions that are included in this report.

Closure

If you have any questions regarding the contents of this response submittal, please contact us at your convenience.

Respectfully submitted,

LEIGHTON AND ASSOCIATES, INC.

Roderick Marcia, PE 70150
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
RODERICK MARCIA
NO. 70150
Exp. 9-30-8
CIVIL
STATE OF CALIFORNIA

PROFESSIONAL GEOLOGIST
JOSE GUILLERMO SANCHEZ
NO. 2221
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Exp 07/31/09

Jose G. Sanchez, PG, CEG 2221
Associate Geologist

Carl C. Kim, GE 2620
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
CARL C. KIM
No. 2620
Exp. 6/30/08
GEOTECHNICAL
STATE OF CALIFORNIA

RM/JGS/CCK/dlj

Attachments: Appendix A – County of Los Angeles Review Sheets
Appendix B – Slope Stability Analyses

Plate 1 – Revised Geotechnical Map
Plate 2 – Revised Geotechnical Cross-Sections SA1-1, SA1-2, SA1-3, SA1-4, SA2-1, and SA2-2.

Distribution: (2) Addressee
(3) Allan E. Seward Engineering Geology, Inc.
Attention: Mr. Stuart Mayes (including 2 wet signature copies for submittal to County of Los Angeles Department of Public Works)
(1) Psomas
Attention: Mr. Matthew Heideman

APPENDIX A

COUNTY OF LOS ANGELES REVIEW SHEETS

County of Los Angeles Department of Public Works
GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION
GEOLOGIC REVIEW SHEET
900 So. Fremont Ave., Alhambra, CA 91803
TEL. (626) 458-4925

DISTRIBUTION
1 Geologist
__ Soils Engineer
1 GMED File
1 Subdivision

TENTATIVE TRACT MAP 61105
SUBDIVIDER Newhall Land
ENGINEER Psomas
GEOLOGIST & SOILS ENGINEER A.E. Seward Eng. Geol., Inc.

TENTATIVE MAP DATED 10/16/07 (Revised)
LOCATION Castaic Junction
GRADING BY SUBDIVIDER [Y] (Y or N)
REPORT DATE 12/4/07, 6/13/05, 12/22/04, 7/22/04, 7/20/04

Other report(s) reviewed: 11/26/07 (Leighton & Associates, Inc.)

The Regional Planning Commission, developer, and engineer are advised that:

PRIOR TO RECOMMENDING APPROVAL OF THE TENTATIVE TRACT OR PARCEL MAP:

1. According to the Leighton report dated 11/26/07, the natural swales north of Substation Alternative 1 may have the potential for debris flow hazards. Provide mitigation recommendations as necessary. If grading is required to mitigate a potential hazard, then the required grading must be depicted on the Tentative Map. If catchment areas are required, the volume of debris required for containment must be determined, and the containment area must be shown on the Tentative Map.

2. The Soils Engineering review dated 1/17/08 is attached.

Prepared by _____ Reviewed by _____ Date 1/16/08
Geir Mathisen

Please complete a Customer Service Survey at http://dpw.lacounty.gov/go/gmedsurvey
P:\gmepub\Geology_Review\Geir\Review Sheets\District 8.2 (Santa Clarita)\Tracts\61105, TM11 NA.doc

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION

SOILS ENGINEERING REVIEW SHEET

Address:	900 S. Fremont Ave., Alhambra, CA 91803	District Office	8.2
Telephone:	(626) 458-4925	PCA	GMPH
Fax:	(626) 458-4913	Sheet 1 of 1	

Tentative Tract Map	61105
Location	Castaic Junction
Developer/Owner	Newhall Land & Farming Co.
Engineer/Architect	Psomas
Soils Engineer	Allan E. Seward Engineering Geology, Inc. (04-2023-4)
Geologist	Allan E. Seward Engineering Geology, Inc.

DISTRIBUTION:
___ Drainage
___ Grading
___ Geo/Soils Central File
___ District Engineer
___ Geologist
___ Soils Engineer
___ Engineer/Architect

Review of:

Tentative Map and Exhibit Dated by Regional Planning 10/16/07 (rev.)
Soils Engineering and Geologic Report Dated 7/22/04
Soils Engineering and Geologic Addenda Dated **12/4/07**, 6/13/05, 12/22/04
Additional Soils Engineering and Geologic Report by Leighton & Associates, Inc. Dated **11/26/07**
Previous Review Sheet Dated 11/15/07

ACTION:

Tentative Map feasibility is not recommended for approval.

REMARKS:

1. Page 12 of the Leighton & Associates soils report dated 11/26/07 states that the natural swales north of Substation Alternative 1 may have the potential for debris flow hazards. Therefore, provide surficial slope stability analyses for the natural swales north of Substation Alternative 1. Recommend mitigation if factors of safety are below County minimum standards.

2. Show all recommended mitigation measures on the geotechnical map, as necessary.

3. Requirements of the Geology Section are attached.

4. Include a copy of this review sheet with your response.

NOTE(S) TO THE PLAN CHECKER/BUILDING AND SAFETY ENGINEER:
A. ONSITE SOILS ARE CORROSIVE TO FERROUS MATERIALS.
B. PER THE SOILS ENGINEER, ON-SITE SOILS HAVE A LOW TO VERY HIGH EXPANSION POTENTIAL.
C. PER THE SOILS ENGINEER, DEWATERING SHALL BE PERFORMED FOR REMOVALS IN THE VICINITY OF BORINGS B-72E AND B-73E.
D. THE SOILS REPORT BY LEIGHTON & ASSOCIATES DATED 11/26/07 INDICATES THERE MAY BE ENVIRONMENTAL CONCERNS REGARDING THE ABANDONED OIL WELLS LOCATED WITHIN THE LIMITS AND NEAR THE PROPOSED SUBSTATION ALTERNATIVE 2 AND FILL DISPOSAL SITE.

REGISTERED PROFESSIONAL ENGINEER
JEREMY WAN
NO. C67563
EXP. 6/30/09
CIVIL
STATE OF CALIFORNIA

Prepared by Jeremy Wan Date 1/17/08

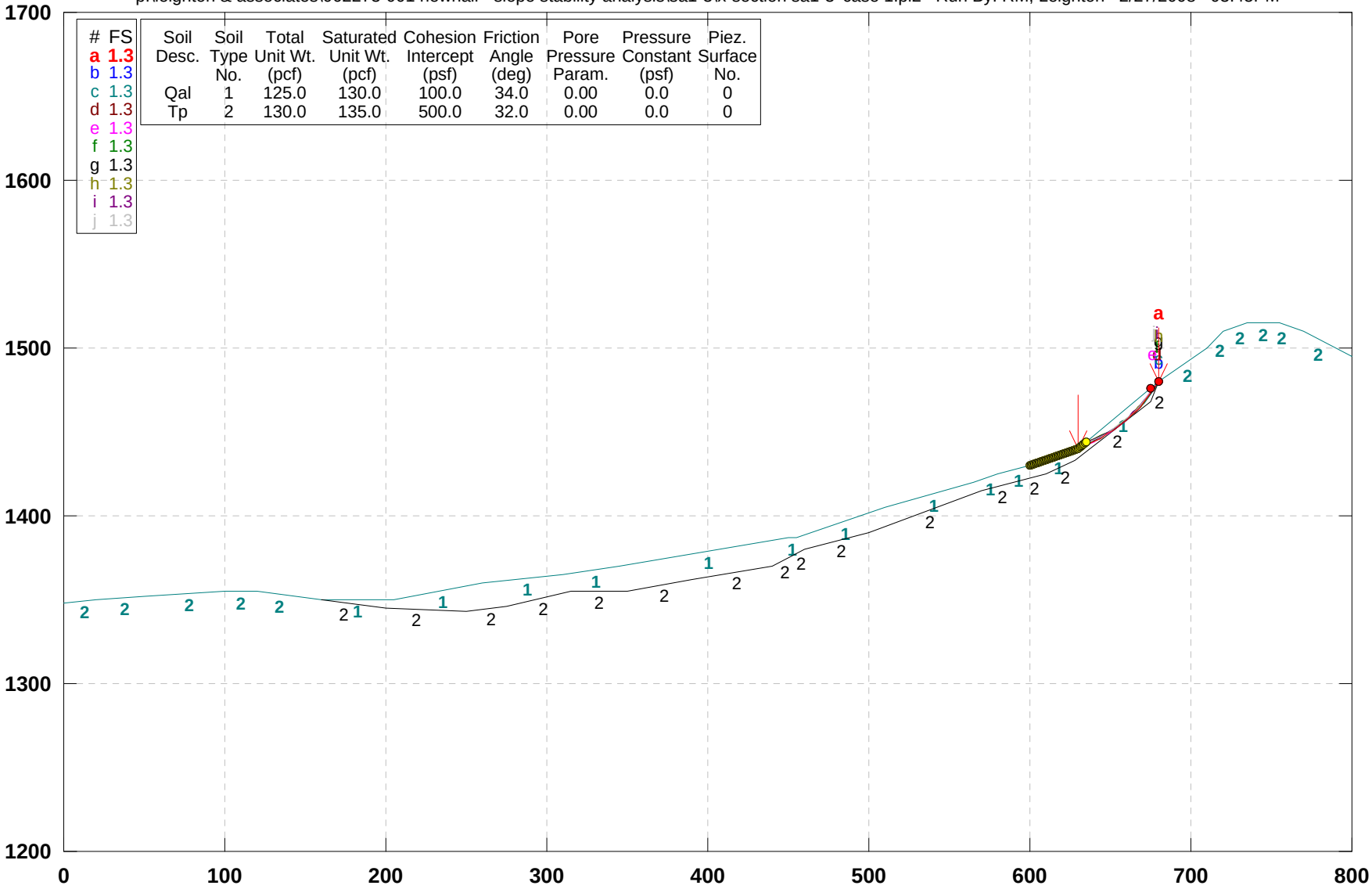
Please complete a Customer Service Survey at http://dpw.lacounty.gov/gmd/gmedsurvey.
NOTICE: Public safety, relative to geotechnical subsurface exploration, shall be provided in accordance with current codes for excavations, inclusive of the Los Angeles County Code, Chapter 11.48, and the State of California, Title 8, Construction Safety Orders.
P:\gmepub\Soils Review\Jeremy\TR 61105, Castaic Junction, TTM-NA_11.doc

APPENDIX B

SLOPE STABILITY ANALYSES

Mission Village Tract 61105 Cross Section SA1-3' Case 1

p:\leighton & associates\062273-001 newhall - slope stability analysis\sa1-3\x-section sa1-3' case 1.pl2 Run By: RM, Leighton 2/27/2008 03:45PM



GSTABL7 v.2 FSmin=1.3

Safety Factors Are Calculated By The Modified Bishop Method

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **
** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **
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****

SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 2/27/2008
Time of Run: 03:45PM
Run By: RM, Leighton
Input Data Filename: P:\Leighton & Associates\062273-001 Newhall - Slope Stabilit
y Analysis\SA1-3\x-section sa1-3' case 1.in
Output Filename: P:\Leighton & Associates\062273-001 Newhall - Slope Stabilit
y Analysis\SA1-3\x-section sa1-3' case 1.OUT
Unit System: English
Plotted Output Filename: P:\Leighton & Associates\062273-001 Newhall - Slope Stabilit
y Analysis\SA1-3\x-section sa1-3' case 1.PLT
PROBLEM DESCRIPTION: Mission Village Tract 61105
Cross Section SA1-3' Case 1
BOUNDARY COORDINATES
23 Top Boundaries
39 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	1348.00	20.00	1350.00	2
2	20.00	1350.00	50.00	1352.00	2
3	50.00	1352.00	100.00	1355.00	2
4	100.00	1355.00	120.00	1355.00	2
5	120.00	1355.00	160.00	1350.00	2
6	160.00	1350.00	205.00	1350.00	1
7	205.00	1350.00	260.00	1360.00	1
8	260.00	1360.00	310.00	1365.00	1
9	310.00	1365.00	345.00	1370.00	1
10	345.00	1370.00	450.00	1387.00	1
11	450.00	1387.00	455.00	1387.00	1
12	455.00	1387.00	510.00	1405.00	1
13	510.00	1405.00	565.00	1420.00	1
14	565.00	1420.00	580.00	1425.00	1
15	580.00	1425.00	600.00	1430.00	1
16	600.00	1430.00	630.00	1440.00	1
17	630.00	1440.00	680.00	1480.00	1
18	680.00	1480.00	710.00	1500.00	2
19	710.00	1500.00	720.00	1510.00	2
20	720.00	1510.00	735.00	1515.00	2
21	735.00	1515.00	755.00	1515.00	2
22	755.00	1515.00	770.00	1510.00	2
23	770.00	1510.00	800.00	1495.00	2
24	160.00	1350.00	200.00	1345.00	2
25	200.00	1345.00	250.00	1343.00	2
26	250.00	1343.00	275.00	1346.00	2
27	275.00	1346.00	315.00	1355.00	2
28	315.00	1355.00	350.00	1355.00	2
29	350.00	1355.00	390.00	1362.00	2
30	390.00	1362.00	440.00	1370.00	2
31	440.00	1370.00	450.00	1375.00	2
32	450.00	1375.00	460.00	1380.00	2
33	460.00	1380.00	500.00	1390.00	2
34	500.00	1390.00	570.00	1415.00	2
35	570.00	1415.00	590.00	1420.00	2
36	590.00	1420.00	610.00	1425.00	2
37	610.00	1425.00	628.00	1433.00	2
38	628.00	1433.00	675.00	1468.00	2
39	675.00	1468.00	680.00	1480.00	2

User Specified Y-Origin = 1200.00(ft)

```
 Default X-Plus Value = 0.00(ft)
 Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
  2 Type(s) of Soil
 Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
 Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
  No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
   1   125.0    130.0     100.0     34.0    0.00       0.0      0
   2   130.0    135.0     500.0     32.0    0.00       0.0      0
ANISOTROPIC STRENGTH PARAMETERS
     1 soil type(s)
 Soil Type  2 Is Anisotropic
 Number Of Direction Ranges Specified =  4
 Direction    Counterclockwise     Cohesion     Friction
   Range       Direction Limit    Intercept       Angle
    No.            (deg)            (psf)         (deg)
     1            -90.0             500.00         32.00
     2            -42.0             500.00         32.00
     3            -38.0             150.00         28.00
     4             90.0             500.00         32.00
 ANISOTROPIC SOIL NOTES:
    (1) An input value of 0.01 for C and/or Phi will cause Aniso
        C and/or Phi to be ignored in that range.
    (2) An input value of 0.02 for Phi will set both Phi and
        C equal to zero, with no water weight in the tension crack.
    (3) An input value of 0.03 for Phi will set both Phi and
        C equal to zero, with water weight in the tension crack.
 ANISOTROPIC STRENGTH DATA HAS BEEN SUPPRESSED
 Specified Peak Ground Acceleration Coefficient (A) =   0.500(g)
 Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
 Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
 Specified Seismic Pore-Pressure Factor =   0.000
 EARTHQUAKE DATA HAS BEEN SUPPRESSED
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
 1500 Trial Surfaces Have Been Generated.
   30 Surface(s) Initiate(s) From Each Of    50 Points Equally Spaced
 Along The Ground Surface Between  X = 600.00(ft)
                              and  X = 635.00(ft)
 Each Surface Terminates Between   X = 675.00(ft)
                              and   X = 680.00(ft)
 Unless Further Limitations Were Imposed, The Minimum Elevation
 At Which A Surface Extends Is  Y =      0.00(ft)
  5.00(ft) Line Segments Define Each Trial Failure Surface.
 Following Are Displayed The Ten Most Critical Of The Trial
       Failure Surfaces Evaluated. They Are
       Ordered - Most Critical First.
       * * Safety Factors Are Calculated By The Modified Bishop Method * *
       Total Number of Trial Surfaces Attempted =  1500
       Number of Trial Surfaces With Valid FS = 1500
       Statistical Data On All Valid FS Values:
          FS Max =   2.172   FS Min =   1.277   FS Ave =   1.884
          Standard Deviation =    0.131   Coefficient of Variation =    6.97 %
       Failure Surface Specified By 15 Coordinate Points
         Point      X-Surf      Y-Surf
          No.        (ft)        (ft)
           1        630.000     1440.000
           2        634.672     1441.782
           3        639.246     1443.803
           4        643.709     1446.056
           5        648.051     1448.536
           6        652.259     1451.237
           7        656.322     1454.150
           8        660.230     1457.269
           9        663.972     1460.585
          10        667.539     1464.090
          11        670.920     1467.773
          12        674.107     1471.626
          13        677.091     1475.638
          14        679.865     1479.798
```

15	679.972	1479.978

Circle Center At X = 597.754 ; Y = 1531.542 ; and Radius = 97.055

Factor of Safety

*** 1.277 ***

Individual data on the 14 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.7	570.8	0.0	0.0	0.	0.	0.0	0.0	0.0
2	4.6	1586.1	0.0	0.0	0.	0.	0.0	0.0	0.0
3	4.5	2372.6	0.0	0.0	0.	0.	0.0	0.0	0.0
4	4.3	2934.7	0.0	0.0	0.	0.	0.0	0.0	0.0
5	4.2	3280.9	0.0	0.0	0.	0.	0.0	0.0	0.0
6	4.1	3422.9	0.0	0.0	0.	0.	0.0	0.0	0.0
7	3.9	3376.1	0.0	0.0	0.	0.	0.0	0.0	0.0
8	3.7	3159.1	0.0	0.0	0.	0.	0.0	0.0	0.0
9	3.6	2793.8	0.0	0.0	0.	0.	0.0	0.0	0.0
10	3.4	2304.2	0.0	0.0	0.	0.	0.0	0.0	0.0
11	3.2	1717.5	0.0	0.0	0.	0.	0.0	0.0	0.0
12	3.0	1062.3	0.0	0.0	0.	0.	0.0	0.0	0.0
13	2.8	369.2	0.0	0.0	0.	0.	0.0	0.0	0.0
14	0.1	0.6	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	630.000	1440.000
2	634.670	1441.786
3	639.242	1443.811
4	643.703	1446.070
5	648.041	1448.556
6	652.245	1451.263
7	656.303	1454.183
8	660.205	1457.310
9	663.941	1460.634
10	667.499	1464.146
11	670.871	1467.838
12	674.048	1471.699
13	677.022	1475.719
14	679.698	1479.759

Circle Center At X = 597.812 ; Y = 1531.176 ; and Radius = 96.691

Factor of Safety

*** 1.279 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	633.572	1442.857
2	638.283	1444.533
3	642.885	1446.487
4	647.362	1448.714
5	651.698	1451.204
6	655.876	1453.949
7	659.883	1456.940
8	663.704	1460.165
9	667.325	1463.614
10	670.733	1467.272
11	673.915	1471.129
12	676.862	1475.168
13	679.561	1479.377
14	679.835	1479.868

Circle Center At X = 608.021 ; Y = 1522.216 ; and Radius = 83.370

Factor of Safety

*** 1.289 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	635.000	1444.000
2	639.737	1445.601
3	644.360	1447.508
4	648.847	1449.712

```
    5        653.181     1452.206
    6        657.343     1454.977
    7        661.314     1458.015
    8        665.079     1461.305
    9        668.620     1464.835
   10        671.924     1468.588
   11        674.974     1472.550
   12        677.760     1476.702
   13        679.388     1479.510
Circle Center At X =   612.910 ; Y =  1517.190 ; and Radius =    76.451
       Factor of Safety
      ***    1.294   ***
Failure Surface Specified By 13 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        630.715     1440.572
    2        635.411     1442.289
    3        639.997     1444.280
    4        644.458     1446.539
    5        648.777     1449.058
    6        652.940     1451.827
    7        656.932     1454.837
    8        660.740     1458.078
    9        664.349     1461.538
   10        667.748     1465.205
   11        670.924     1469.067
   12        673.867     1473.109
   13        676.479     1477.183
Circle Center At X =   604.019 ; Y =  1520.860 ; and Radius =    84.610
       Factor of Safety
      ***    1.299   ***
Failure Surface Specified By 13 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        635.000     1444.000
    2        639.717     1445.659
    3        644.320     1447.613
    4        648.788     1449.856
    5        653.105     1452.379
    6        657.254     1455.170
    7        661.216     1458.219
    8        664.977     1461.514
    9        668.521     1465.042
   10        671.833     1468.787
   11        674.901     1472.735
   12        677.712     1476.870
   13        679.167     1479.333
Circle Center At X =   611.283 ; Y =  1519.005 ; and Radius =    78.665
       Factor of Safety
      ***    1.303   ***
Failure Surface Specified By 14 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        630.715     1440.572
    2        635.336     1442.479
    3        639.861     1444.608
    4        644.277     1446.953
    5        648.574     1449.508
    6        652.744     1452.268
    7        656.775     1455.226
    8        660.659     1458.375
    9        664.386     1461.708
   10        667.947     1465.218
   11        671.335     1468.895
   12        674.542     1472.731
   13        677.559     1476.718
   14        679.565     1479.652
Circle Center At X =   593.669 ; Y =  1536.950 ; and Radius =   103.253
       Factor of Safety
      ***    1.307   ***
```

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	630.000	1440.000
2	634.605	1441.950
3	639.115	1444.108
4	643.521	1446.471
5	647.814	1449.034
6	651.986	1451.791
7	656.026	1454.736
8	659.927	1457.864
9	663.681	1461.167
10	667.279	1464.639
11	670.714	1468.272
12	673.979	1472.058
13	677.067	1475.991
14	679.833	1479.866

Circle Center At X = 589.839 ; Y = 1541.280 ; and Radius = 108.952

Factor of Safety

*** 1.309 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	633.572	1442.857
2	638.233	1444.668
3	642.785	1446.735
4	647.216	1449.052
5	651.511	1451.612
6	655.656	1454.408
7	659.640	1457.430
8	663.449	1460.669
9	667.072	1464.115
10	670.497	1467.757
11	673.715	1471.584
12	676.714	1475.584
13	679.264	1479.411

Circle Center At X = 603.403 ; Y = 1527.428 ; and Radius = 89.790

Factor of Safety

*** 1.314 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	634.286	1443.429
2	638.994	1445.113
3	643.582	1447.101
4	648.030	1449.384
5	652.319	1451.953
6	656.432	1454.797
7	660.349	1457.904
8	664.056	1461.260
9	667.535	1464.851
10	670.772	1468.662
11	673.753	1472.676
12	676.465	1476.877
13	676.762	1477.410

Circle Center At X = 610.899 ; Y = 1516.240 ; and Radius = 76.475

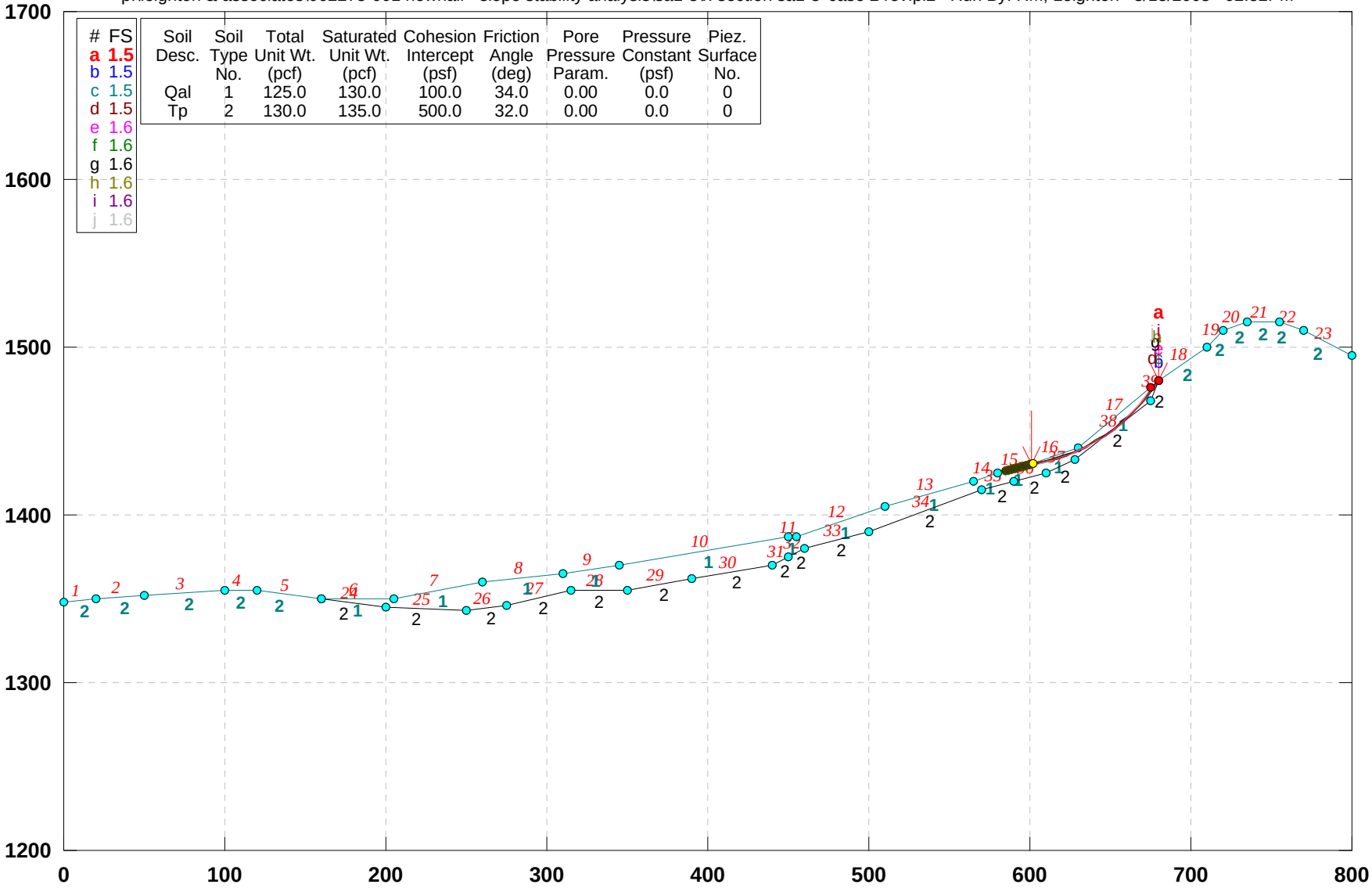
Factor of Safety

*** 1.322 ***

**** END OF GSTABL7 OUTPUT ****

Mission Village Tract 61105 Cross Section SA1-3' Case 2

p:\leighton & associates\062273-001 newhall - slope stability analysis\sa1-3\x-section sa1-3' case 2 rev.pl2 Run By: RM, Leighton 3/13/2008 02:52PM



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Qal	1	125.0	130.0	100.0	34.0	0.00	0.0	0
Tp	2	130.0	135.0	500.0	32.0	0.00	0.0	0

GSTABL7 v.2 FSmin=1.5

Safety Factors Are Calculated By The Modified Bishop Method

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

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****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 3/13/2008
Time of Run: 02:52PM
Run By: RM, Leighton
Input Data Filename: P:\Leighton & Associates\062273-001 Newhall - Slope Stabilit
y Analysis\SA1-3\x-section sa1-3' case 2 rev.in
Output Filename: P:\Leighton & Associates\062273-001 Newhall - Slope Stabilit
y Analysis\SA1-3\x-section sa1-3' case 2 rev.OUT
Unit System: English
Plotted Output Filename: P:\Leighton & Associates\062273-001 Newhall - Slope Stabilit
y Analysis\SA1-3\x-section sa1-3' case 2 rev.PLT
PROBLEM DESCRIPTION: Mission Village Tract 61105
Cross Section SA1-3' Case 2

BOUNDARY COORDINATES
23 Top Boundaries
39 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	1348.00	20.00	1350.00	2
2	20.00	1350.00	50.00	1352.00	2
3	50.00	1352.00	100.00	1355.00	2
4	100.00	1355.00	120.00	1355.00	2
5	120.00	1355.00	160.00	1350.00	2
6	160.00	1350.00	205.00	1350.00	1
7	205.00	1350.00	260.00	1360.00	1
8	260.00	1360.00	310.00	1365.00	1
9	310.00	1365.00	345.00	1370.00	1
10	345.00	1370.00	450.00	1387.00	1
11	450.00	1387.00	455.00	1387.00	1
12	455.00	1387.00	510.00	1405.00	1
13	510.00	1405.00	565.00	1420.00	1
14	565.00	1420.00	580.00	1425.00	1
15	580.00	1425.00	600.00	1430.00	1
16	600.00	1430.00	630.00	1440.00	1
17	630.00	1440.00	680.00	1480.00	1
18	680.00	1480.00	710.00	1500.00	2
19	710.00	1500.00	720.00	1510.00	2
20	720.00	1510.00	735.00	1515.00	2
21	735.00	1515.00	755.00	1515.00	2
22	755.00	1515.00	770.00	1510.00	2
23	770.00	1510.00	800.00	1495.00	2
24	160.00	1350.00	200.00	1345.00	2
25	200.00	1345.00	250.00	1343.00	2
26	250.00	1343.00	275.00	1346.00	2
27	275.00	1346.00	315.00	1355.00	2
28	315.00	1355.00	350.00	1355.00	2
29	350.00	1355.00	390.00	1362.00	2
30	390.00	1362.00	440.00	1370.00	2
31	440.00	1370.00	450.00	1375.00	2
32	450.00	1375.00	460.00	1380.00	2
33	460.00	1380.00	500.00	1390.00	2
34	500.00	1390.00	570.00	1415.00	2
35	570.00	1415.00	590.00	1420.00	2
36	590.00	1420.00	610.00	1425.00	2
37	610.00	1425.00	628.00	1433.00	2
38	628.00	1433.00	675.00	1468.00	2
39	675.00	1468.00	680.00	1480.00	2

User Specified Y-Origin = 1200.00(ft)

```
 Default X-Plus Value = 0.00(ft)
 Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
  2 Type(s) of Soil
 Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
 Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
  No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
   1   125.0    130.0     100.0     34.0    0.00       0.0      0
   2   130.0    135.0     500.0     32.0    0.00       0.0      0
ANISOTROPIC STRENGTH PARAMETERS
     1 soil type(s)
 Soil Type  2 Is Anisotropic
 Number Of Direction Ranges Specified =  4
 Direction    Counterclockwise     Cohesion     Friction
   Range       Direction Limit    Intercept       Angle
    No.            (deg)            (psf)         (deg)
     1            -90.0             500.00         32.00
     2            -42.0             500.00         32.00
     3            -38.0             150.00         28.00
     4             90.0             500.00         32.00
 ANISOTROPIC SOIL NOTES:
    (1) An input value of 0.01 for C and/or Phi will cause Aniso
        C and/or Phi to be ignored in that range.
    (2) An input value of 0.02 for Phi will set both Phi and
        C equal to zero, with no water weight in the tension crack.
    (3) An input value of 0.03 for Phi will set both Phi and
        C equal to zero, with water weight in the tension crack.
 ANISOTROPIC STRENGTH DATA HAS BEEN SUPPRESSED
 Specified Peak Ground Acceleration Coefficient (A) =   0.500(g)
 Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
 Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
 Specified Seismic Pore-Pressure Factor =   0.000
 EARTHQUAKE DATA HAS BEEN SUPPRESSED
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
 1500 Trial Surfaces Have Been Generated.
   30 Surface(s) Initiate(s) From Each Of    50 Points Equally Spaced
 Along The Ground Surface Between  X = 585.00(ft)
                              and  X = 602.00(ft)
 Each Surface Terminates Between   X = 675.00(ft)
                             and   X = 680.00(ft)
 Unless Further Limitations Were Imposed, The Minimum Elevation
 At Which A Surface Extends Is  Y =      0.00(ft)
  7.00(ft) Line Segments Define Each Trial Failure Surface.
 Following Are Displayed The Ten Most Critical Of The Trial
       Failure Surfaces Evaluated. They Are
       Ordered - Most Critical First.
       * * Safety Factors Are Calculated By The Modified Bishop Method * *
       Total Number of Trial Surfaces Attempted =  1500
       Number of Trial Surfaces With Valid FS = 1500
       Statistical Data On All Valid FS Values:
          FS Max =   2.399   FS Min =   1.507   FS Ave =   2.063
          Standard Deviation =    0.129   Coefficient of Variation =    6.24 %
       Failure Surface Specified By 15 Coordinate Points
         Point      X-Surf      Y-Surf
          No.        (ft)        (ft)
           1        601.305     1430.435
           2        608.203     1431.627
           3        615.014     1433.242
           4        621.713     1435.273
           5        628.274     1437.712
           6        634.673     1440.552
           7        640.884     1443.780
           8        646.885     1447.384
           9        652.652     1451.352
          10        658.164     1455.667
          11        663.399     1460.313
          12        668.339     1465.273
          13        672.963     1470.528
          14        677.255     1476.058
```

15	679.875	1479.900

Circle Center At X = 585.423 ; Y = 1542.904 ; and Radius = 113.585

Factor of Safety

*** 1.507 ***

Individual data on the 17 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	6.9	477.3	0.0	0.0	0.	0.	0.0	0.0	0.0
2	6.8	1222.0	0.0	0.0	0.	0.	0.0	0.0	0.0
3	6.7	1561.0	0.0	0.0	0.	0.	0.0	0.0	0.0
4	6.6	1508.1	0.0	0.0	0.	0.	0.0	0.0	0.0
5	1.7	348.8	0.0	0.0	0.	0.	0.0	0.0	0.0
6	4.7	1374.9	0.0	0.0	0.	0.	0.0	0.0	0.0
7	6.2	3149.8	0.0	0.0	0.	0.	0.0	0.0	0.0
8	6.0	4144.5	0.0	0.0	0.	0.	0.0	0.0	0.0
9	5.7	4556.9	0.0	0.0	0.	0.	0.0	0.0	0.0
10	0.1	90.4	0.0	0.0	0.	0.	0.0	0.0	0.0
11	0.2	134.4	0.0	0.0	0.	0.	0.0	0.0	0.0
12	5.4	4562.4	0.0	0.0	0.	0.	0.0	0.0	0.0
13	5.2	4342.4	0.0	0.0	0.	0.	0.0	0.0	0.0
14	4.9	3644.1	0.0	0.0	0.	0.	0.0	0.0	0.0
15	4.6	2670.7	0.0	0.0	0.	0.	0.0	0.0	0.0
16	4.3	1499.2	0.0	0.0	0.	0.	0.0	0.0	0.0
17	2.6	285.9	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	600.958	1430.319
2	607.853	1431.531
3	614.661	1433.159
4	621.357	1435.199
5	627.917	1437.642
6	634.316	1440.480
7	640.530	1443.702
8	646.537	1447.297
9	652.313	1451.250
10	657.839	1455.547
11	663.093	1460.173
12	668.056	1465.109
13	672.709	1470.339
14	677.035	1475.842
15	679.803	1479.843

Circle Center At X = 584.520 ; Y = 1544.120 ; and Radius = 114.982

Factor of Safety

*** 1.513 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	601.652	1430.551
2	608.527	1431.869
3	615.312	1433.593
4	621.982	1435.715
5	628.515	1438.229
6	634.888	1441.126
7	641.077	1444.396
8	647.062	1448.026
9	652.821	1452.005
10	658.335	1456.318
11	663.583	1460.950
12	668.547	1465.885
13	673.210	1471.106
14	677.556	1476.594
15	679.860	1479.888

Circle Center At X = 582.864 ; Y = 1547.110 ; and Radius = 118.064

Factor of Safety

*** 1.530 ***

Failure Surface Specified By 15 Coordinate Points

Point	X-Surf	Y-Surf

```
   No.        (ft)        (ft)
    1        601.305     1430.435
    2        608.224     1431.499
    3        615.056     1433.023
    4        621.770     1435.003
    5        628.337     1437.427
    6        634.727     1440.286
    7        640.910     1443.568
    8        646.860     1447.255
    9        652.549     1451.334
   10        657.952     1455.785
   11        663.044     1460.587
   12        667.804     1465.720
   13        672.208     1471.161
   14        676.239     1476.884
   15        676.365     1477.092
Circle Center At X =   588.913 ; Y =  1534.094 ; and Radius =   104.397
       Factor of Safety
      ***    1.541   ***
Failure Surface Specified By 16 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        596.448     1429.112
    2        603.371     1430.150
    3        610.220     1431.598
    4        616.970     1433.449
    5        623.599     1435.698
    6        630.083     1438.336
    7        636.399     1441.355
    8        642.524     1444.743
    9        648.438     1448.489
   10        654.119     1452.579
   11        659.547     1456.999
   12        664.703     1461.733
   13        669.569     1466.765
   14        674.128     1472.077
   15        678.363     1477.650
   16        679.866     1479.893
Circle Center At X =   582.518 ; Y =  1545.901 ; and Radius =   117.616
       Factor of Safety
      ***    1.551   ***
Failure Surface Specified By 16 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        597.142     1429.286
    2        604.057     1430.378
    3        610.894     1431.876
    4        617.632     1433.776
    5        624.245     1436.070
    6        630.712     1438.750
    7        637.008     1441.808
    8        643.114     1445.232
    9        649.007     1449.010
   10        654.666     1453.130
   11        660.072     1457.577
   12        665.207     1462.334
   13        670.051     1467.387
   14        674.589     1472.717
   15        678.804     1478.306
   16        679.853     1479.883
Circle Center At X =   582.190 ; Y =  1546.630 ; and Radius =   118.293
       Factor of Safety
      ***    1.553   ***
Failure Surface Specified By 15 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        601.999     1430.666
    2        608.874     1431.982
    3        615.657     1433.714
    4        622.321     1435.856
```

5	628.843	1438.399
6	635.198	1441.333
7	641.363	1444.650
8	647.314	1448.335
9	653.030	1452.375
10	658.490	1456.756
11	663.673	1461.460
12	668.561	1466.472
13	673.134	1471.771
14	677.377	1477.339
15	678.189	1478.551

Circle Center At X = 583.826 ; Y = 1544.222 ; and Radius = 115.000

Factor of Safety

*** 1.559 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	599.571	1429.893
2	606.487	1430.974
3	613.321	1432.487
4	620.047	1434.427
5	626.638	1436.786
6	633.067	1439.554
7	639.310	1442.721
8	645.341	1446.273
9	651.138	1450.198
10	656.676	1454.479
11	661.934	1459.100
12	666.891	1464.042
13	671.529	1469.286
14	675.827	1474.810
15	678.603	1478.882

Circle Center At X = 585.843 ; Y = 1540.388 ; and Radius = 111.344

Factor of Safety

*** 1.565 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	595.408	1428.852
2	602.329	1429.896
3	609.179	1431.341
4	615.932	1433.182
5	622.567	1435.412
6	629.062	1438.025
7	635.393	1441.011
8	641.539	1444.360
9	647.481	1448.061
10	653.197	1452.102
11	658.669	1456.468
12	663.877	1461.145
13	668.804	1466.117
14	673.434	1471.367
15	677.750	1476.878
16	679.809	1479.847

Circle Center At X = 581.027 ; Y = 1547.996 ; and Radius = 120.009

Factor of Safety

*** 1.574 ***

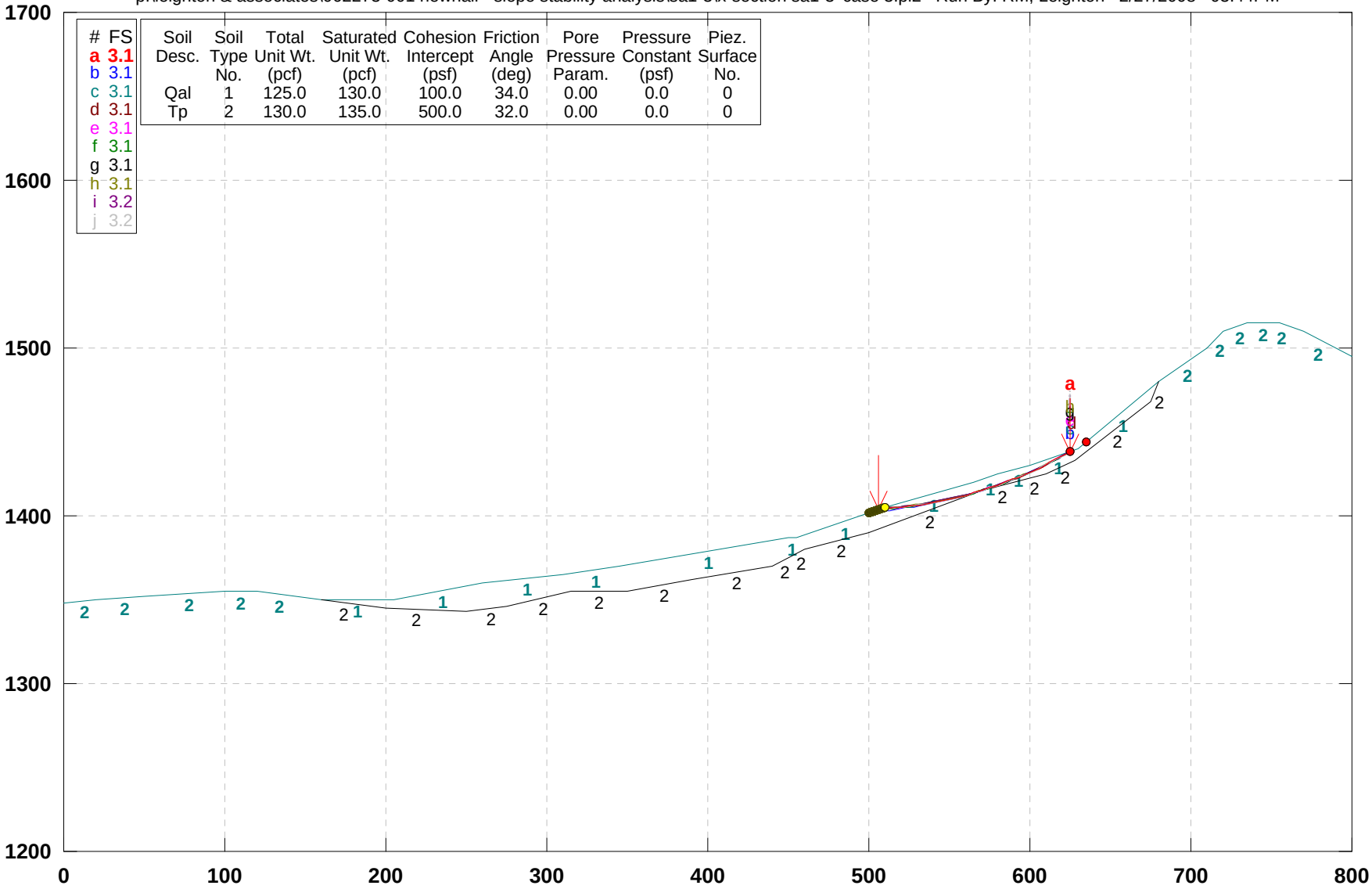
Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	597.836	1429.459
2	604.775	1430.380
3	611.638	1431.757
4	618.396	1433.584
5	625.018	1435.852
6	631.477	1438.552
7	637.743	1441.672
8	643.790	1445.199
9	649.591	1449.116
10	655.121	1453.408

```
   11        660.356     1458.055
   12        665.273     1463.037
   13        669.851     1468.333
   14        674.069     1473.919
   15        675.916     1476.733
Circle Center At X =   587.351 ; Y =  1535.023 ; and Radius =   106.084
       Factor of Safety
      ***    1.576   ***
          **** END OF GSTABL7 OUTPUT ****
```

Mission Village Tract 61105 Cross Section SA1-3' Case 3

p:\leighton & associates\062273-001 newhall - slope stability analysis\sa1-3\x-section sa1-3' case 3.pl2 Run By: RM, Leighton 2/27/2008 03:44PM



GSTABL7 v.2 FSmin=3.1

Safety Factors Are Calculated By The Modified Bishop Method

```
                    ***  GSTABL7  ***
              ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **
          (All Rights Reserved-Unauthorized Use Prohibited)
*******************************************************************************
                 SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*******************************************************************************
Analysis Run Date:        2/27/2008
Time of Run:              03:44PM
Run By:                   RM, Leighton
Input Data Filename:      P:\Leighton & Associates\062273-001 Newhall - Slope Stabilit
y Analysis\SA1-3\x-section sa1-3' case 3.in
Output Filename:          P:\Leighton & Associates\062273-001 Newhall - Slope Stabilit
y Analysis\SA1-3\x-section sa1-3' case 3.OUT
Unit System:              English
Plotted Output Filename:  P:\Leighton & Associates\062273-001 Newhall - Slope Stabilit
y Analysis\SA1-3\x-section sa1-3' case 3.PLT
PROBLEM DESCRIPTION:  Mission Village Tract 61105
                      Cross Section SA1-3' Case 3
BOUNDARY COORDINATES
   23 Top   Boundaries
   39 Total Boundaries
```

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	1348.00	20.00	1350.00	2
2	20.00	1350.00	50.00	1352.00	2
3	50.00	1352.00	100.00	1355.00	2
4	100.00	1355.00	120.00	1355.00	2
5	120.00	1355.00	160.00	1350.00	2
6	160.00	1350.00	205.00	1350.00	1
7	205.00	1350.00	260.00	1360.00	1
8	260.00	1360.00	310.00	1365.00	1
9	310.00	1365.00	345.00	1370.00	1
10	345.00	1370.00	450.00	1387.00	1
11	450.00	1387.00	455.00	1387.00	1
12	455.00	1387.00	510.00	1405.00	1
13	510.00	1405.00	565.00	1420.00	1
14	565.00	1420.00	580.00	1425.00	1
15	580.00	1425.00	600.00	1430.00	1
16	600.00	1430.00	630.00	1440.00	1
17	630.00	1440.00	680.00	1480.00	1
18	680.00	1480.00	710.00	1500.00	2
19	710.00	1500.00	720.00	1510.00	2
20	720.00	1510.00	735.00	1515.00	2
21	735.00	1515.00	755.00	1515.00	2
22	755.00	1515.00	770.00	1510.00	2
23	770.00	1510.00	800.00	1495.00	2
24	160.00	1350.00	200.00	1345.00	2
25	200.00	1345.00	250.00	1343.00	2
26	250.00	1343.00	275.00	1346.00	2
27	275.00	1346.00	315.00	1355.00	2
28	315.00	1355.00	350.00	1355.00	2
29	350.00	1355.00	390.00	1362.00	2
30	390.00	1362.00	440.00	1370.00	2
31	440.00	1370.00	450.00	1375.00	2
32	450.00	1375.00	460.00	1380.00	2
33	460.00	1380.00	500.00	1390.00	2
34	500.00	1390.00	570.00	1415.00	2
35	570.00	1415.00	590.00	1420.00	2
36	590.00	1420.00	610.00	1425.00	2
37	610.00	1425.00	628.00	1433.00	2
38	628.00	1433.00	675.00	1468.00	2
39	675.00	1468.00	680.00	1480.00	2

```
User Specified Y-Origin =      1200.00(ft)
```

```
 Default X-Plus Value = 0.00(ft)
 Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
  2 Type(s) of Soil
 Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
 Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
  No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
   1   125.0    130.0     100.0     34.0    0.00       0.0      0
   2   130.0    135.0     500.0     32.0    0.00       0.0      0
ANISOTROPIC STRENGTH PARAMETERS
     1 soil type(s)
 Soil Type  2 Is Anisotropic
 Number Of Direction Ranges Specified =  4
 Direction    Counterclockwise     Cohesion     Friction
   Range       Direction Limit    Intercept       Angle
    No.            (deg)            (psf)         (deg)
     1            -90.0             500.00         32.00
     2            -42.0             500.00         32.00
     3            -38.0             150.00         28.00
     4             90.0             500.00         32.00
 ANISOTROPIC SOIL NOTES:
    (1) An input value of 0.01 for C and/or Phi will cause Aniso
        C and/or Phi to be ignored in that range.
    (2) An input value of 0.02 for Phi will set both Phi and
        C equal to zero, with no water weight in the tension crack.
    (3) An input value of 0.03 for Phi will set both Phi and
        C equal to zero, with water weight in the tension crack.
 ANISOTROPIC STRENGTH DATA HAS BEEN SUPPRESSED
 Specified Peak Ground Acceleration Coefficient (A) =   0.500(g)
 Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
 Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
 Specified Seismic Pore-Pressure Factor =   0.000
 EARTHQUAKE DATA HAS BEEN SUPPRESSED
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
 1500 Trial Surfaces Have Been Generated.
   30 Surface(s) Initiate(s) From Each Of    50 Points Equally Spaced
 Along The Ground Surface Between  X = 500.00(ft)
                              and  X = 510.00(ft)
 Each Surface Terminates Between   X = 625.00(ft)
                             and   X = 635.00(ft)
 Unless Further Limitations Were Imposed, The Minimum Elevation
 At Which A Surface Extends Is  Y =      0.00(ft)
  5.00(ft) Line Segments Define Each Trial Failure Surface.
 Following Are Displayed The Ten Most Critical Of The Trial
       Failure Surfaces Evaluated. They Are
       Ordered - Most Critical First.
       * * Safety Factors Are Calculated By The Modified Bishop Method * *
       Total Number of Trial Surfaces Attempted =  1500
       Number of Trial Surfaces With Valid FS = 1500
       Statistical Data On All Valid FS Values:
          FS Max =   4.540   FS Min =   3.108   FS Ave =   3.937
          Standard Deviation =    0.355   Coefficient of Variation =    9.01 %
       Failure Surface Specified By 26 Coordinate Points
         Point      X-Surf      Y-Surf
          No.        (ft)        (ft)
           1        506.326     1403.798
           2        511.315     1404.126
           3        516.298     1404.544
           4        521.272     1405.054
           5        526.236     1405.653
           6        531.188     1406.343
           7        536.127     1407.122
           8        541.051     1407.991
           9        545.958     1408.949
          10        550.847     1409.997
          11        555.716     1411.133
          12        560.564     1412.357
          13        565.389     1413.669
          14        570.189     1415.069
```

15	574.963	1416.555
16	579.709	1418.128
17	584.426	1419.787
18	589.112	1421.531
19	593.765	1423.361
20	598.384	1425.274
21	602.968	1427.271
22	607.515	1429.351
23	612.023	1431.514
24	616.492	1433.758
25	620.918	1436.082
26	625.056	1438.352

Circle Center At X = 490.768 ; Y = 1678.512 ; and Radius = 275.154

Factor of Safety

*** 3.108 ***

Individual data on the 29 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	3.7	220.6	0.0	0.0	0.	0.	0.0	0.0	0.0
2	1.3	180.3	0.0	0.0	0.	0.	0.0	0.0	0.0
3	5.0	1060.7	0.0	0.0	0.	0.	0.0	0.0	0.0
4	5.0	1614.6	0.0	0.0	0.	0.	0.0	0.0	0.0
5	5.0	2108.2	0.0	0.0	0.	0.	0.0	0.0	0.0
6	5.0	2541.3	0.0	0.0	0.	0.	0.0	0.0	0.0
7	4.9	2913.7	0.0	0.0	0.	0.	0.0	0.0	0.0
8	4.9	3225.4	0.0	0.0	0.	0.	0.0	0.0	0.0
9	4.9	3476.4	0.0	0.0	0.	0.	0.0	0.0	0.0
10	4.9	3667.0	0.0	0.0	0.	0.	0.0	0.0	0.0
11	4.9	3797.6	0.0	0.0	0.	0.	0.0	0.0	0.0
12	4.8	3868.7	0.0	0.0	0.	0.	0.0	0.0	0.0
13	4.4	3568.1	0.0	0.0	0.	0.	0.0	0.0	0.0
14	0.4	313.5	0.0	0.0	0.	0.	0.0	0.0	0.0
15	4.8	3936.6	0.0	0.0	0.	0.	0.0	0.0	0.0
16	4.8	4006.2	0.0	0.0	0.	0.	0.0	0.0	0.0
17	4.7	4016.6	0.0	0.0	0.	0.	0.0	0.0	0.0
18	0.3	246.2	0.0	0.0	0.	0.	0.0	0.0	0.0
19	4.4	3620.6	0.0	0.0	0.	0.	0.0	0.0	0.0
20	4.7	3533.6	0.0	0.0	0.	0.	0.0	0.0	0.0
21	4.7	3148.9	0.0	0.0	0.	0.	0.0	0.0	0.0
22	4.6	2714.6	0.0	0.0	0.	0.	0.0	0.0	0.0
23	1.6	842.5	0.0	0.0	0.	0.	0.0	0.0	0.0
24	3.0	1436.0	0.0	0.0	0.	0.	0.0	0.0	0.0
25	4.5	1952.8	0.0	0.0	0.	0.	0.0	0.0	0.0
26	4.5	1591.4	0.0	0.0	0.	0.	0.0	0.0	0.0
27	4.5	1182.3	0.0	0.0	0.	0.	0.0	0.0	0.0
28	4.4	727.7	0.0	0.0	0.	0.	0.0	0.0	0.0
29	4.1	230.3	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	502.653	1402.595
2	507.639	1402.962
3	512.619	1403.414
4	517.590	1403.950
5	522.552	1404.571
6	527.502	1405.276
7	532.439	1406.065
8	537.362	1406.938
9	542.270	1407.895
10	547.160	1408.936
11	552.032	1410.059
12	556.885	1411.266
13	561.716	1412.554
14	566.524	1413.925
15	571.308	1415.377
16	576.067	1416.911
17	580.800	1418.525
18	585.504	1420.220

19	590.178	1421.995
20	594.822	1423.849
21	599.433	1425.781
22	604.011	1427.792
23	608.554	1429.881
24	613.060	1432.047
25	617.530	1434.289
26	621.960	1436.607
27	625.330	1438.443

Circle Center At X = 483.609 ; Y = 1695.663 ; and Radius = 293.686

Factor of Safety

*** 3.108 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	506.530	1403.865
2	511.520	1404.188
3	516.503	1404.603
4	521.477	1405.108
5	526.441	1405.704
6	531.394	1406.391
7	536.333	1407.167
8	541.258	1408.034
9	546.165	1408.990
10	551.055	1410.036
11	555.924	1411.171
12	560.772	1412.395
13	565.597	1413.706
14	570.397	1415.106
15	575.171	1416.593
16	579.917	1418.166
17	584.633	1419.826
18	589.319	1421.572
19	593.971	1423.403
20	598.590	1425.318
21	603.173	1427.318
22	607.718	1429.401
23	612.225	1431.566
24	616.692	1433.813
25	621.116	1436.141
26	625.264	1438.422

Circle Center At X = 491.297 ; Y = 1677.463 ; and Radius = 274.023

Factor of Safety

*** 3.114 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	508.979	1404.666
2	513.969	1404.976
3	518.953	1405.380
4	523.928	1405.877
5	528.893	1406.467
6	533.847	1407.150
7	538.786	1407.925
8	543.710	1408.793
9	548.617	1409.754
10	553.505	1410.806
11	558.373	1411.949
12	563.218	1413.183
13	568.039	1414.508
14	572.835	1415.923
15	577.603	1417.428
16	582.342	1419.022
17	587.051	1420.704
18	591.727	1422.474
19	596.369	1424.332
20	600.976	1426.276
21	605.545	1428.306
22	610.075	1430.421
23	614.565	1432.621

24	619.014	1434.904
25	623.418	1437.271
26	625.761	1438.587

Circle Center At X = 494.956 ; Y = 1670.931 ; and Radius = 266.634

Factor of Safety

*** 3.116 ***

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	505.714	1403.597
2	510.701	1403.962
3	515.680	1404.415
4	520.651	1404.954
5	525.612	1405.579
6	530.561	1406.292
7	535.497	1407.090
8	540.418	1407.975
9	545.323	1408.945
10	550.210	1410.001
11	555.078	1411.142
12	559.925	1412.368
13	564.751	1413.679
14	569.552	1415.073
15	574.329	1416.551
16	579.079	1418.112
17	583.801	1419.756
18	588.493	1421.482
19	593.155	1423.290
20	597.785	1425.179
21	602.380	1427.148
22	606.941	1429.198
23	611.465	1431.327
24	615.952	1433.534
25	620.399	1435.819
26	624.805	1438.182
27	625.188	1438.396

Circle Center At X = 487.296 ; Y = 1689.355 ; and Radius = 286.350

Factor of Safety

*** 3.124 ***

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	505.510	1403.531
2	510.499	1403.862
3	515.481	1404.284
4	520.455	1404.794
5	525.419	1405.395
6	530.371	1406.084
7	535.310	1406.862
8	540.234	1407.728
9	545.142	1408.683
10	550.033	1409.726
11	554.903	1410.856
12	559.753	1412.074
13	564.579	1413.379
14	569.382	1414.770
15	574.159	1416.247
16	578.908	1417.810
17	583.629	1419.457
18	588.319	1421.190
19	592.978	1423.006
20	597.603	1424.906
21	602.193	1426.888
22	606.747	1428.952
23	611.263	1431.098
24	615.740	1433.325
25	620.176	1435.632
26	624.570	1438.018
27	625.308	1438.436

Circle Center At X = 489.529 ; Y = 1681.460 ; and Radius = 278.388

Factor of Safety
*** 3.130 ***
Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	507.551	1404.198
2	512.538	1404.552
3	517.518	1404.995
4	522.490	1405.527
5	527.451	1406.147
6	532.401	1406.856
7	537.337	1407.654
8	542.258	1408.539
9	547.162	1409.512
10	552.048	1410.573
11	556.915	1411.721
12	561.760	1412.956
13	566.582	1414.276
14	571.380	1415.683
15	576.152	1417.176
16	580.897	1418.753
17	585.613	1420.415
18	590.298	1422.161
19	594.951	1423.991
20	599.571	1425.903
21	604.156	1427.898
22	608.705	1429.974
23	613.216	1432.131
24	617.687	1434.368
25	622.118	1436.685
26	625.353	1438.451

Circle Center At X = 490.275 ; Y = 1683.312 ; and Radius = 279.647

Factor of Safety
*** 3.133 ***
Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	508.979	1404.666
2	513.967	1405.011
3	518.948	1405.448
4	523.920	1405.974
5	528.882	1406.592
6	533.832	1407.299
7	538.768	1408.097
8	543.688	1408.984
9	548.592	1409.960
10	553.477	1411.026
11	558.342	1412.180
12	563.185	1413.423
13	568.005	1414.754
14	572.800	1416.172
15	577.568	1417.677
16	582.307	1419.269
17	587.018	1420.947
18	591.696	1422.710
19	596.342	1424.558
20	600.954	1426.490
21	605.529	1428.506
22	610.068	1430.605
23	614.567	1432.786
24	619.025	1435.049
25	623.442	1437.392
26	625.352	1438.451

Circle Center At X = 492.530 ; Y = 1678.642 ; and Radius = 274.470

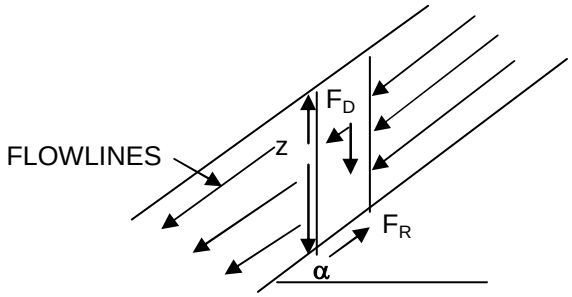
Factor of Safety
*** 3.142 ***
Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	507.755	1404.265

```
    2        512.741     1404.638
    3        517.720     1405.098
    4        522.689     1405.646
    5        527.649     1406.281
    6        532.596     1407.003
    7        537.530     1407.813
    8        542.449     1408.709
    9        547.352     1409.692
   10        552.236     1410.760
   11        557.101     1411.915
   12        561.945     1413.155
   13        566.766     1414.480
   14        571.563     1415.890
   15        576.335     1417.384
   16        581.079     1418.962
   17        585.795     1420.623
   18        590.481     1422.367
   19        595.136     1424.193
   20        599.758     1426.101
   21        604.345     1428.090
   22        608.897     1430.159
   23        613.411     1432.308
   24        617.887     1434.537
   25        622.323     1436.844
   26        625.180     1438.393
Circle Center At X =   489.127 ; Y =  1687.435 ; and Radius =   283.781
       Factor of Safety
      ***    3.150   ***
Failure Surface Specified By 26 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        507.142     1404.065
    2        512.133     1404.369
    3        517.117     1404.766
    4        522.093     1405.256
    5        527.059     1405.838
    6        532.014     1406.513
    7        536.955     1407.280
    8        541.880     1408.138
    9        546.789     1409.089
   10        551.679     1410.130
   11        556.550     1411.262
   12        561.398     1412.485
   13        566.222     1413.798
   14        571.022     1415.200
   15        575.794     1416.692
   16        580.538     1418.272
   17        585.251     1419.940
   18        589.933     1421.696
   19        594.581     1423.539
   20        599.194     1425.468
   21        603.770     1427.482
   22        608.308     1429.581
   23        612.806     1431.765
   24        617.263     1434.031
   25        621.677     1436.381
   26        625.464     1438.488
Circle Center At X =   493.320 ; Y =  1672.139 ; and Radius =   268.431
       Factor of Safety
      ***    3.170   ***
          **** END OF GSTABL7 OUTPUT ****
```

Existing slope: assuming 4 feet deep saturation

SURFICIAL SLOPE STABILITY ANALYSIS



Project No.: 062273-001

Case: Slope @ 1:1 Section 1-3
Qal

Depth of Saturation (ft), Z	=	**4**
Buoyant Unit Weight of Soil (pcf), γ_b	=	**62.6**
Total Unit Weight of Soil (pcf), γ_t	=	**125**
Slope Angle, α	=	**45**
Angle of Internal Friction, ϕ	=	**34**
Cohesion (psf), c	=	**100**

Force Tending To Cause Movement:

$F_D = Z\gamma_t \sin 2\alpha / 2$ = **250.00** lb/ft

Force Tending To Resist Movement:

$F_R = Z\gamma_b \cos^2 \alpha \tan \phi + (c)$

= **184.45** lb/ft

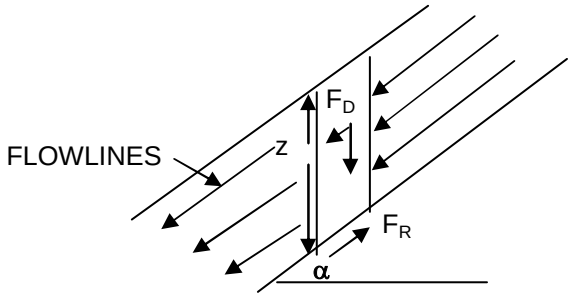
$$F.S. = \frac{2Z\gamma_b \cos^2 \alpha \tan \phi + 2c}{Z\gamma_t \sin 2\alpha}$$

F.S. = 0.74

SURFICIAL STABILITY	Project Name : Offsite Grading TTM 61105 Project Number : 062273-001 Designed/Checked : RM Figure No.

Existing slope: assuming 4 feet deep saturation

SURFICIAL SLOPE STABILITY ANALYSIS



Project No.: 062273-001

Case: Slope @ 3:1 Section 1-3
Qal

Depth of Saturation (ft), Z	=	**4**
Buoyant Unit Weight of Soil (pcf), γ_b	=	**62.6**
Total Unit Weight of Soil (pcf), γ_t	=	**125**
Slope Angle, α	=	**18.4**
Angle of Internal Friction, ϕ	=	**34**
Cohesion (psf), c	=	**100**

Force Tending To Cause Movement:

$F_D = Z\gamma_t \sin 2\alpha / 2$ = **149.76** lb/ft

Force Tending To Resist Movement:

$F_R = Z\gamma_b \cos^2 \alpha \tan \phi + (c)$

= **252.07** lb/ft

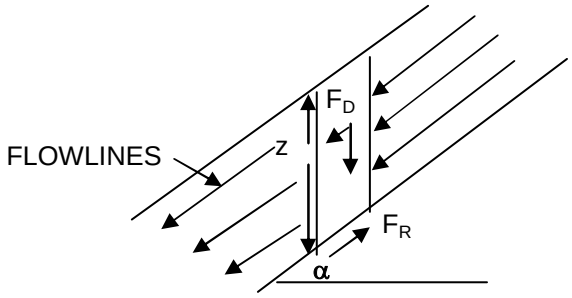
$$F.S. = \frac{2Z\gamma_b \cos^2 \alpha \tan \phi + 2c}{Z\gamma_t \sin 2\alpha}$$

F.S. = 1.68

SURFICIAL STABILITY	Project Name : Offsite Grading TTM 61105 Project Number : 062273-001 Designed/Checked : RM Figure No.

Existing slope: assuming 4 feet deep saturation

SURFICIAL SLOPE STABILITY ANALYSIS



Project No.: 062273-001

Case: Slope @ 6:1 Section 1-3
Qal

Depth of Saturation (ft), Z	=	**4**
Buoyant Unit Weight of Soil (pcf), γ_b	=	**62.6**
Total Unit Weight of Soil (pcf), γ_t	=	**125**
Slope Angle, α	=	**9.5**
Angle of Internal Friction, ϕ	=	**34**
Cohesion (psf), c	=	**100**

Force Tending To Cause Movement:

$F_D = Z\gamma_t \sin 2\alpha / 2$ = **81.39** lb/ft

Force Tending To Resist Movement:

$F_R = Z\gamma_b \cos^2 \alpha \tan \phi + (c)$

= **264.30** lb/ft

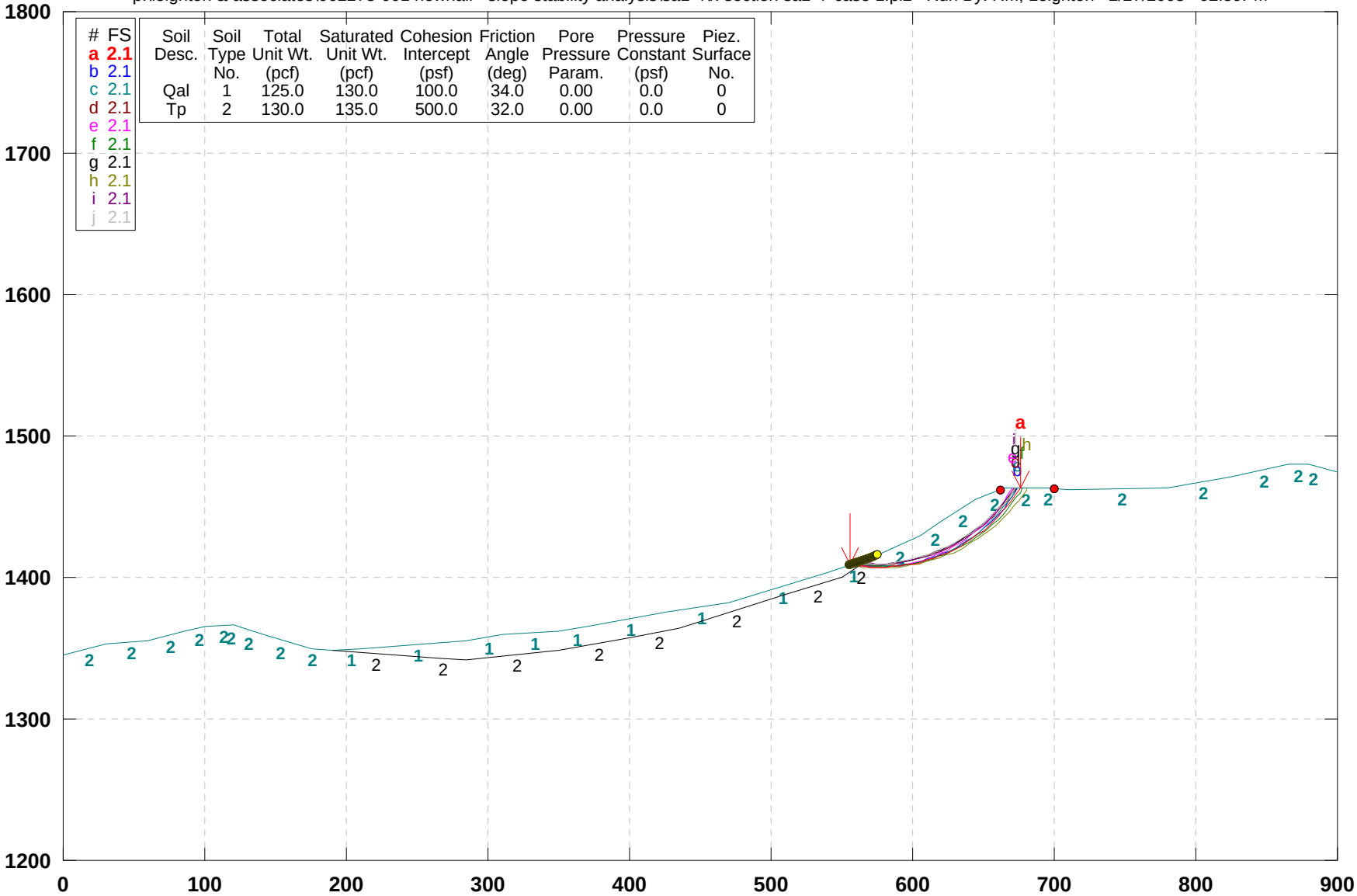
$$F.S. = \frac{2Z\gamma_b \cos^2 \alpha \tan \phi + 2c}{Z\gamma_t \sin 2\alpha}$$

F.S. = 3.25

SURFICIAL STABILITY	Project Name : Offsite Grading TTM 61105 Project Number : 062273-001 Designed/Checked : RM Figure No.

Mission Village Tract 61105 Cross Section SA1-4' Case 1

p:\leighton & associates\062273-001 newhall - slope stability analysis\sa1-4\x-section sa1-4' case 1.pl2 Run By: RM, Leighton 2/27/2008 02:59PM



GSTABL7 v.2 FSmin=2.1

Safety Factors Are Calculated By The Modified Bishop Method

```
                    ***  GSTABL7  ***
              ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **
          (All Rights Reserved-Unauthorized Use Prohibited)
*******************************************************************************
                 SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*******************************************************************************
Analysis Run Date:        2/27/2008
Time of Run:              02:59PM
Run By:                   RM, Leighton
Input Data Filename:      P:\Leighton & Associates\062273-001 Newhall - Slope Stabilit
y Analysis\SA1-4\x-section sa1-4' case 1.in
Output Filename:          P:\Leighton & Associates\062273-001 Newhall - Slope Stabilit
y Analysis\SA1-4\x-section sa1-4' case 1.OUT
Unit System:              English
Plotted Output Filename:  P:\Leighton & Associates\062273-001 Newhall - Slope Stabilit
y Analysis\SA1-4\x-section sa1-4' case 1.PLT
PROBLEM DESCRIPTION:  Mission Village Tract 61105
                      Cross Section SA1-4' Case 1
BOUNDARY COORDINATES
   29 Top   Boundaries
   37 Total Boundaries
```

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	1345.00	30.00	1353.00	2
2	30.00	1353.00	60.00	1355.00	2
3	60.00	1355.00	85.00	1362.00	2
4	85.00	1362.00	100.00	1365.00	2
5	100.00	1365.00	120.00	1366.00	2
6	120.00	1366.00	130.00	1363.00	2
7	130.00	1363.00	145.00	1359.00	2
8	145.00	1359.00	175.00	1350.00	2
9	175.00	1350.00	190.00	1348.00	2
10	190.00	1348.00	210.00	1350.00	1
11	210.00	1350.00	285.00	1355.00	1
12	285.00	1355.00	310.00	1360.00	1
13	310.00	1360.00	350.00	1362.00	1
14	350.00	1362.00	370.00	1365.00	1
15	370.00	1365.00	425.00	1375.00	1
16	425.00	1375.00	470.00	1382.00	1
17	470.00	1382.00	540.00	1404.00	1
18	540.00	1404.00	570.00	1414.00	1
19	570.00	1414.00	605.00	1430.00	2
20	605.00	1430.00	620.00	1440.00	2
21	620.00	1440.00	645.00	1455.00	2
22	645.00	1455.00	665.00	1463.00	2
23	665.00	1463.00	695.00	1463.00	2
24	695.00	1463.00	710.00	1462.00	2
25	710.00	1462.00	780.00	1463.00	2
26	780.00	1463.00	825.00	1471.00	2
27	825.00	1471.00	865.00	1480.00	2
28	865.00	1480.00	880.00	1480.00	2
29	880.00	1480.00	900.00	1475.00	2
30	190.00	1348.00	265.00	1343.00	2
31	265.00	1343.00	285.00	1342.00	2
32	285.00	1342.00	350.00	1348.00	2
33	350.00	1348.00	400.00	1358.00	2
34	400.00	1358.00	435.00	1364.00	2
35	435.00	1364.00	510.00	1388.00	2
36	510.00	1388.00	550.00	1400.00	2
37	550.00	1400.00	570.00	1414.00	2

```
User Specified Y-Origin =      1200.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
```

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	130.0	100.0	34.0	0.00	0.0	0
2	130.0	135.0	500.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 4

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-90.0	500.00	32.00
2	-42.0	500.00	32.00
3	-38.0	150.00	28.00
4	90.0	500.00	32.00

ANISOTROPIC SOIL NOTES:
(1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
(2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
(3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

ANISOTROPIC STRENGTH DATA HAS BEEN SUPPRESSED
Specified Peak Ground Acceleration Coefficient (A) = 0.500(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
EARTHQUAKE DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.
1500 Trial Surfaces Have Been Generated.
30 Surface(s) Initiate(s) From Each Of 50 Points Equally Spaced
Along The Ground Surface Between X = 555.00(ft)
and X = 575.00(ft)
Each Surface Terminates Between X = 662.00(ft)
and X = 700.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00(ft)
5.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Evaluated. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 1500
Number of Trial Surfaces With Valid FS = 1500
Statistical Data On All Valid FS Values:
FS Max = 3.483 FS Min = 2.117 FS Ave = 2.705
Standard Deviation = 0.398 Coefficient of Variation = 14.71 %
Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	555.816	1409.272
2	560.752	1408.470
3	565.717	1407.882
4	570.703	1407.509
5	575.700	1407.351
6	580.700	1407.409
7	585.693	1407.683
8	590.669	1408.172
9	595.619	1408.875
10	600.534	1409.791
11	605.406	1410.918
12	610.224	1412.254
13	614.979	1413.797
14	619.664	1415.544
15	624.270	1417.492
16	628.786	1419.636

17	633.207	1421.973
18	637.522	1424.499
19	641.724	1427.209
20	645.805	1430.097
21	649.758	1433.159
22	653.575	1436.389
23	657.249	1439.780
24	660.773	1443.327
25	664.141	1447.022
26	667.347	1450.859
27	670.384	1454.831
28	673.246	1458.931
29	675.834	1463.000

Circle Center At X = 576.857 ; Y = 1523.191 ; and Radius = 115.846

Factor of Safety

*** 2.117 ***

Individual data on the 34 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.9	754.8	0.0	0.0	0.	0.	0.0	0.0	0.0
2	1.2	390.4	0.0	0.0	0.	0.	0.0	0.0	0.0
3	3.8	1854.2	0.0	0.0	0.	0.	0.0	0.0	0.0
4	4.3	3081.4	0.0	0.0	0.	0.	0.0	0.0	0.0
5	0.7	605.4	0.0	0.0	0.	0.	0.0	0.0	0.0
6	5.0	5219.4	0.0	0.0	0.	0.	0.0	0.0	0.0
7	5.0	6739.2	0.0	0.0	0.	0.	0.0	0.0	0.0
8	5.0	8104.2	0.0	0.0	0.	0.	0.0	0.0	0.0
9	5.0	9305.0	0.0	0.0	0.	0.	0.0	0.0	0.0
10	5.0	10333.3	0.0	0.0	0.	0.	0.0	0.0	0.0
11	4.9	11183.9	0.0	0.0	0.	0.	0.0	0.0	0.0
12	4.5	10839.9	0.0	0.0	0.	0.	0.0	0.0	0.0
13	0.4	1015.5	0.0	0.0	0.	0.	0.0	0.0	0.0
14	4.8	12708.7	0.0	0.0	0.	0.	0.0	0.0	0.0
15	4.8	13627.7	0.0	0.0	0.	0.	0.0	0.0	0.0
16	4.7	14339.1	0.0	0.0	0.	0.	0.0	0.0	0.0
17	0.3	1058.9	0.0	0.0	0.	0.	0.0	0.0	0.0
18	4.3	13705.1	0.0	0.0	0.	0.	0.0	0.0	0.0
19	4.5	14886.9	0.0	0.0	0.	0.	0.0	0.0	0.0
20	4.4	14821.1	0.0	0.0	0.	0.	0.0	0.0	0.0
21	4.3	14575.1	0.0	0.0	0.	0.	0.0	0.0	0.0
22	4.2	14159.4	0.0	0.0	0.	0.	0.0	0.0	0.0
23	3.3	10924.1	0.0	0.0	0.	0.	0.0	0.0	0.0
24	0.8	2653.1	0.0	0.0	0.	0.	0.0	0.0	0.0
25	4.0	12581.8	0.0	0.0	0.	0.	0.0	0.0	0.0
26	3.8	11359.6	0.0	0.0	0.	0.	0.0	0.0	0.0
27	3.7	10068.9	0.0	0.0	0.	0.	0.0	0.0	0.0
28	3.5	8728.6	0.0	0.0	0.	0.	0.0	0.0	0.0
29	3.4	7359.6	0.0	0.0	0.	0.	0.0	0.0	0.0
30	0.9	1706.7	0.0	0.0	0.	0.	0.0	0.0	0.0
31	2.3	4132.7	0.0	0.0	0.	0.	0.0	0.0	0.0
32	3.0	4009.0	0.0	0.0	0.	0.	0.0	0.0	0.0
33	2.9	2277.2	0.0	0.0	0.	0.	0.0	0.0	0.0
34	2.6	684.5	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	557.041	1409.680
2	561.980	1408.906
3	566.949	1408.349
4	571.938	1408.013
5	576.937	1407.897
6	581.935	1408.001
7	586.925	1408.327
8	591.895	1408.871
9	596.836	1409.635
10	601.739	1410.616
11	606.594	1411.812
12	611.391	1413.221

13	616.122	1414.840
14	620.776	1416.667
15	625.346	1418.697
16	629.821	1420.927
17	634.194	1423.352
18	638.455	1425.967
19	642.597	1428.768
20	646.611	1431.749
21	650.490	1434.904
22	654.226	1438.227
23	657.812	1441.712
24	661.240	1445.351
25	664.505	1449.138
26	667.599	1453.066
27	670.517	1457.126
28	673.253	1461.311
29	674.254	1463.000

Circle Center At X = 577.066 ; Y = 1521.210 ; and Radius = 113.313

Factor of Safety

*** 2.118 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	557.041	1409.680
2	561.972	1408.854
3	566.935	1408.251
4	571.921	1407.873
5	576.919	1407.722
6	581.918	1407.797
7	586.909	1408.098
8	591.881	1408.625
9	596.825	1409.376
10	601.729	1410.351
11	606.584	1411.546
12	611.380	1412.960
13	616.107	1414.589
14	620.755	1416.431
15	625.316	1418.482
16	629.778	1420.736
17	634.135	1423.191
18	638.375	1425.839
19	642.492	1428.678
20	646.475	1431.699
21	650.318	1434.898
22	654.012	1438.268
23	657.550	1441.801
24	660.924	1445.491
25	664.128	1449.329
26	667.155	1453.309
27	669.998	1457.422
28	672.653	1461.659
29	673.411	1463.000

Circle Center At X = 577.762 ; Y = 1518.154 ; and Radius = 110.435

Factor of Safety

*** 2.120 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	555.816	1409.272
2	560.794	1408.795
3	565.786	1408.519
4	570.785	1408.443
5	575.784	1408.569
6	580.773	1408.895
7	585.745	1409.421
8	590.692	1410.147
9	595.606	1411.072
10	600.479	1412.193
11	605.303	1413.508
12	610.070	1415.017

13	614.772	1416.716
14	619.402	1418.603
15	623.953	1420.674
16	628.417	1422.927
17	632.787	1425.357
18	637.055	1427.961
19	641.215	1430.734
20	645.261	1433.673
21	649.185	1436.771
22	652.982	1440.025
23	656.644	1443.429
24	660.167	1446.977
25	663.544	1450.664
26	666.771	1454.484
27	669.841	1458.430
28	672.750	1462.496
29	673.081	1463.000

Circle Center At X = 570.165 ; Y = 1532.812 ; and Radius = 124.370

Factor of Safety

*** 2.120 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	555.408	1409.136
2	560.348	1408.363
3	565.318	1407.816
4	570.308	1407.495
5	575.307	1407.402
6	580.305	1407.536
7	585.292	1407.898
8	590.257	1408.486
9	595.190	1409.300
10	600.082	1410.337
11	604.921	1411.596
12	609.697	1413.074
13	614.402	1414.767
14	619.024	1416.673
15	623.555	1418.787
16	627.985	1421.106
17	632.305	1423.623
18	636.506	1426.334
19	640.580	1429.234
20	644.517	1432.316
21	648.310	1435.574
22	651.950	1439.002
23	655.431	1442.591
24	658.745	1446.335
25	661.885	1450.226
26	664.845	1454.256
27	667.618	1458.417
28	670.199	1462.699
29	670.362	1463.000

Circle Center At X = 574.854 ; Y = 1517.248 ; and Radius = 109.846

Factor of Safety

*** 2.123 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	558.673	1410.224
2	563.604	1409.396
3	568.567	1408.785
4	573.551	1408.392
5	578.548	1408.219
6	583.548	1408.265
7	588.541	1408.531
8	593.517	1409.017
9	598.468	1409.720
10	603.382	1410.640
11	608.252	1411.776
12	613.066	1413.124

13	617.817	1414.682
14	622.495	1416.448
15	627.091	1418.417
16	631.596	1420.587
17	636.001	1422.952
18	640.298	1425.508
19	644.478	1428.251
20	648.534	1431.175
21	652.458	1434.274
22	656.242	1437.543
23	659.878	1440.975
24	663.360	1444.563
25	666.681	1448.301
26	669.835	1452.181
27	672.815	1456.196
28	675.615	1460.338
29	677.250	1463.000

Circle Center At X = 579.990 ; Y = 1521.982 ; and Radius = 113.772

Factor of Safety

*** 2.126 ***

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	556.633	1409.544
2	561.617	1409.151
3	566.613	1408.957
4	571.613	1408.961
5	576.609	1409.164
6	581.593	1409.565
7	586.557	1410.163
8	591.494	1410.958
9	596.394	1411.949
10	601.252	1413.134
11	606.059	1414.510
12	610.807	1416.076
13	615.490	1417.830
14	620.099	1419.768
15	624.627	1421.888
16	629.068	1424.186
17	633.414	1426.659
18	637.658	1429.302
19	641.794	1432.111
20	645.815	1435.083
21	649.715	1438.212
22	653.487	1441.494
23	657.126	1444.922
24	660.627	1448.493
25	663.982	1452.200
26	667.188	1456.037
27	670.239	1459.998
28	672.366	1463.000

Circle Center At X = 569.022 ; Y = 1534.733 ; and Radius = 125.800

Factor of Safety

*** 2.128 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	555.000	1409.000
2	559.931	1408.169
3	564.891	1407.540
4	569.872	1407.113
5	574.867	1406.888
6	579.867	1406.867
7	584.864	1407.049
8	589.849	1407.434
9	594.815	1408.021
10	599.752	1408.810
11	604.653	1409.798
12	609.510	1410.985
13	614.315	1412.369

14	619.060	1413.946
15	623.736	1415.715
16	628.337	1417.673
17	632.854	1419.816
18	637.281	1422.141
19	641.609	1424.645
20	645.832	1427.321
21	649.943	1430.168
22	653.935	1433.179
23	657.801	1436.350
24	661.535	1439.675
25	665.130	1443.150
26	668.582	1446.767
27	671.883	1450.522
28	675.029	1454.408
29	678.015	1458.419
30	680.835	1462.548
31	681.118	1463.000

Circle Center At X = 577.891 ; Y = 1529.835 ; and Radius = 122.984

Factor of Safety

*** 2.129 ***

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	560.306	1410.769
2	565.271	1410.183
3	570.258	1409.819
4	575.256	1409.678
5	580.255	1409.761
6	585.246	1410.066
7	590.218	1410.594
8	595.162	1411.344
9	600.067	1412.313
10	604.924	1413.500
11	609.723	1414.903
12	614.455	1416.519
13	619.110	1418.344
14	623.678	1420.375
15	628.152	1422.609
16	632.521	1425.039
17	636.778	1427.663
18	640.913	1430.473
19	644.919	1433.466
20	648.787	1436.634
21	652.510	1439.972
22	656.080	1443.472
23	659.490	1447.129
24	662.734	1450.934
25	665.804	1454.880
26	668.695	1458.959
27	671.297	1463.000

Circle Center At X = 575.910 ; Y = 1521.662 ; and Radius = 111.986

Factor of Safety

*** 2.129 ***

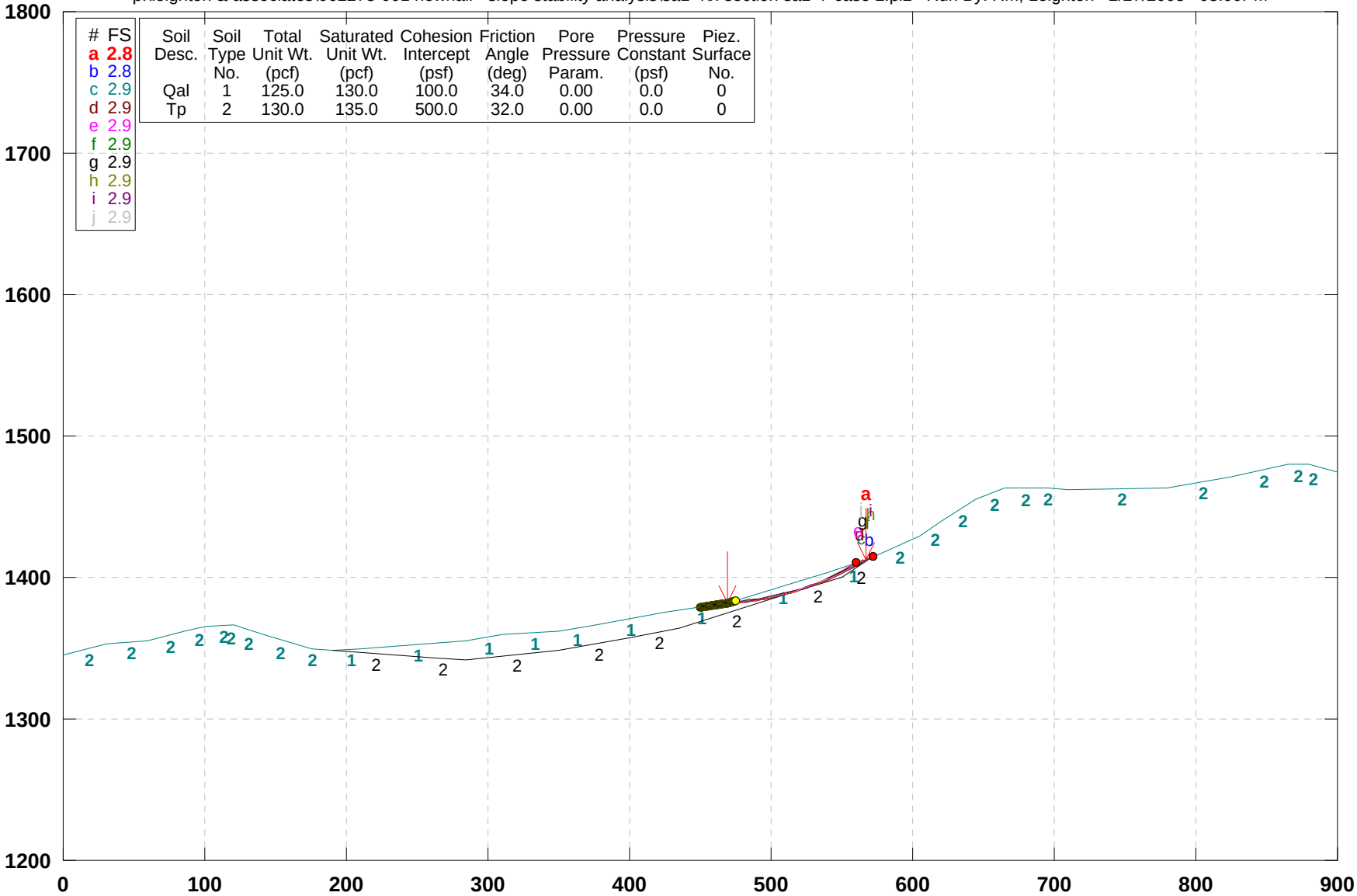
Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	556.633	1409.544
2	561.621	1409.208
3	566.619	1409.063
4	571.619	1409.111
5	576.613	1409.352
6	581.594	1409.784
7	586.555	1410.408
8	591.489	1411.223
9	596.387	1412.226
10	601.243	1413.418
11	606.049	1414.795
12	610.799	1416.357
13	615.485	1418.100

```
   14        620.101     1420.023
   15        624.639     1422.121
   16        629.093     1424.393
   17        633.457     1426.834
   18        637.723     1429.442
   19        641.886     1432.212
   20        645.939     1435.140
   21        649.876     1438.222
   22        653.691     1441.453
   23        657.380     1444.829
   24        660.936     1448.344
   25        664.354     1451.994
   26        667.628     1455.772
   27        670.755     1459.673
   28        673.217     1463.000
Circle Center At X =   567.880 ; Y =  1538.876 ; and Radius =   129.820
       Factor of Safety
      ***    2.129   ***
          **** END OF GSTABL7 OUTPUT ****
```

Mission Village Tract 61105 Cross Section SA1-4' Case 2

p:\leighton & associates\062273-001 newhall - slope stability analysis\sa1-4\x-section sa1-4' case 2.pl2 Run By: RM, Leighton 2/27/2008 03:00PM



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Qal	1	125.0	130.0	100.0	34.0	0.00	0.0	0
Tp	2	130.0	135.0	500.0	32.0	0.00	0.0	0

GSTABL7 v.2 FSmin=2.8

Safety Factors Are Calculated By The Modified Bishop Method

```
                    ***  GSTABL7  ***
              ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **
          (All Rights Reserved-Unauthorized Use Prohibited)
*******************************************************************************
                 SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*******************************************************************************
Analysis Run Date:        2/27/2008
Time of Run:              03:00PM
Run By:                   RM, Leighton
Input Data Filename:      P:\Leighton & Associates\062273-001 Newhall - Slope Stabilit
y Analysis\SA1-4\x-section sa1-4' case 2.in
Output Filename:          P:\Leighton & Associates\062273-001 Newhall - Slope Stabilit
y Analysis\SA1-4\x-section sa1-4' case 2.OUT
Unit System:              English
Plotted Output Filename:  P:\Leighton & Associates\062273-001 Newhall - Slope Stabilit
y Analysis\SA1-4\x-section sa1-4' case 2.PLT
PROBLEM DESCRIPTION:  Mission Village Tract 61105
                      Cross Section SA1-4' Case 2
BOUNDARY COORDINATES
   29 Top   Boundaries
   37 Total Boundaries
```

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	1345.00	30.00	1353.00	2
2	30.00	1353.00	60.00	1355.00	2
3	60.00	1355.00	85.00	1362.00	2
4	85.00	1362.00	100.00	1365.00	2
5	100.00	1365.00	120.00	1366.00	2
6	120.00	1366.00	130.00	1363.00	2
7	130.00	1363.00	145.00	1359.00	2
8	145.00	1359.00	175.00	1350.00	2
9	175.00	1350.00	190.00	1348.00	2
10	190.00	1348.00	210.00	1350.00	1
11	210.00	1350.00	285.00	1355.00	1
12	285.00	1355.00	310.00	1360.00	1
13	310.00	1360.00	350.00	1362.00	1
14	350.00	1362.00	370.00	1365.00	1
15	370.00	1365.00	425.00	1375.00	1
16	425.00	1375.00	470.00	1382.00	1
17	470.00	1382.00	540.00	1404.00	1
18	540.00	1404.00	570.00	1414.00	1
19	570.00	1414.00	605.00	1430.00	2
20	605.00	1430.00	620.00	1440.00	2
21	620.00	1440.00	645.00	1455.00	2
22	645.00	1455.00	665.00	1463.00	2
23	665.00	1463.00	695.00	1463.00	2
24	695.00	1463.00	710.00	1462.00	2
25	710.00	1462.00	780.00	1463.00	2
26	780.00	1463.00	825.00	1471.00	2
27	825.00	1471.00	865.00	1480.00	2
28	865.00	1480.00	880.00	1480.00	2
29	880.00	1480.00	900.00	1475.00	2
30	190.00	1348.00	265.00	1343.00	2
31	265.00	1343.00	285.00	1342.00	2
32	285.00	1342.00	350.00	1348.00	2
33	350.00	1348.00	400.00	1358.00	2
34	400.00	1358.00	435.00	1364.00	2
35	435.00	1364.00	510.00	1388.00	2
36	510.00	1388.00	550.00	1400.00	2
37	550.00	1400.00	570.00	1414.00	2

```
User Specified Y-Origin =      1200.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
```

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	130.0	100.0	34.0	0.00	0.0	0
2	130.0	135.0	500.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 4

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-90.0	500.00	32.00
2	-42.0	500.00	32.00
3	-38.0	150.00	28.00
4	90.0	500.00	32.00

ANISOTROPIC SOIL NOTES:
(1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
(2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
(3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

ANISOTROPIC STRENGTH DATA HAS BEEN SUPPRESSED
Specified Peak Ground Acceleration Coefficient (A) = 0.500(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
EARTHQUAKE DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.
1500 Trial Surfaces Have Been Generated.
30 Surface(s) Initiate(s) From Each Of 50 Points Equally Spaced
Along The Ground Surface Between X = 450.00(ft)
and X = 475.00(ft)
Each Surface Terminates Between X = 560.00(ft)
and X = 572.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00(ft)
5.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Evaluated. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 1500
Number of Trial Surfaces With Valid FS = 1500
Statistical Data On All Valid FS Values:
FS Max = 4.543 FS Min = 2.828 FS Ave = 3.863
Standard Deviation = 0.334 Coefficient of Variation = 8.63 %
Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	469.387	1381.905
2	474.377	1382.220
3	479.358	1382.660
4	484.326	1383.223
5	489.279	1383.909
6	494.213	1384.717
7	499.126	1385.648
8	504.014	1386.700
9	508.874	1387.873
10	513.704	1389.167
11	518.500	1390.579
12	523.260	1392.111
13	527.980	1393.759
14	532.658	1395.525
15	537.291	1397.406
16	541.876	1399.401

17	546.410	1401.509
18	550.890	1403.729
19	555.313	1406.060
20	559.678	1408.499
21	563.980	1411.046
22	567.217	1413.072

Circle Center At X = 459.180 ; Y = 1583.061 ; and Radius = 201.415

Factor of Safety

*** 2.828 ***

Individual data on the 23 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	0.6	2.2	0.0	0.0	0.	0.	0.0	0.0	0.0
2	4.4	331.6	0.0	0.0	0.	0.	0.0	0.0	0.0
3	5.0	1069.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	5.0	1726.7	0.0	0.0	0.	0.	0.0	0.0	0.0
5	5.0	2300.0	0.0	0.0	0.	0.	0.0	0.0	0.0
6	4.9	2788.7	0.0	0.0	0.	0.	0.0	0.0	0.0
7	4.9	3192.7	0.0	0.0	0.	0.	0.0	0.0	0.0
8	4.9	3511.9	0.0	0.0	0.	0.	0.0	0.0	0.0
9	4.9	3746.8	0.0	0.0	0.	0.	0.0	0.0	0.0
10	4.8	3898.0	0.0	0.0	0.	0.	0.0	0.0	0.0
11	4.8	3966.6	0.0	0.0	0.	0.	0.0	0.0	0.0
12	4.8	3954.2	0.0	0.0	0.	0.	0.0	0.0	0.0
13	4.7	3862.1	0.0	0.0	0.	0.	0.0	0.0	0.0
14	4.7	3692.9	0.0	0.0	0.	0.	0.0	0.0	0.0
15	4.6	3448.8	0.0	0.0	0.	0.	0.0	0.0	0.0
16	2.7	1889.2	0.0	0.0	0.	0.	0.0	0.0	0.0
17	1.9	1247.4	0.0	0.0	0.	0.	0.0	0.0	0.0
18	4.5	2791.5	0.0	0.0	0.	0.	0.0	0.0	0.0
19	4.5	2387.9	0.0	0.0	0.	0.	0.0	0.0	0.0
20	4.4	1920.2	0.0	0.0	0.	0.	0.0	0.0	0.0
21	4.4	1392.4	0.0	0.0	0.	0.	0.0	0.0	0.0
22	4.3	808.6	0.0	0.0	0.	0.	0.0	0.0	0.0
23	3.2	191.6	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	466.836	1381.508
2	471.827	1381.820
3	476.808	1382.248
4	481.778	1382.794
5	486.734	1383.457
6	491.673	1384.235
7	496.593	1385.130
8	501.490	1386.139
9	506.361	1387.264
10	511.206	1388.503
11	516.019	1389.855
12	520.800	1391.320
13	525.545	1392.896
14	530.251	1394.584
15	534.917	1396.382
16	539.539	1398.289
17	544.115	1400.304
18	548.642	1402.427
19	553.118	1404.654
20	557.541	1406.987
21	561.908	1409.422
22	566.216	1411.960
23	568.921	1413.640

Circle Center At X = 456.068 ; Y = 1594.036 ; and Radius = 212.801

Factor of Safety

*** 2.835 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	465.816	1381.349

2	470.809	1381.615
3	475.793	1382.008
4	480.767	1382.526
5	485.725	1383.169
6	490.666	1383.938
7	495.585	1384.831
8	500.481	1385.848
9	505.349	1386.989
10	510.187	1388.252
11	514.991	1389.637
12	519.759	1391.143
13	524.487	1392.769
14	529.173	1394.513
15	533.813	1396.376
16	538.404	1398.355
17	542.945	1400.450
18	547.430	1402.658
19	551.859	1404.980
20	556.227	1407.412
21	560.533	1409.954
22	563.585	1411.862

Circle Center At X = 457.806 ; Y = 1578.908 ; and Radius = 197.721

Factor of Safety

*** 2.867 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	469.387	1381.905
2	474.377	1382.229
3	479.356	1382.682
4	484.322	1383.264
5	489.272	1383.974
6	494.201	1384.812
7	499.107	1385.777
8	503.986	1386.868
9	508.836	1388.086
10	513.652	1389.429
11	518.432	1390.895
12	523.173	1392.485
13	527.870	1394.197
14	532.522	1396.030
15	537.125	1397.983
16	541.676	1400.054
17	546.172	1402.243
18	550.609	1404.546
19	554.986	1406.964
20	559.298	1409.495
21	562.548	1411.516

Circle Center At X = 459.356 ; Y = 1574.894 ; and Radius = 193.250

Factor of Safety

*** 2.870 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	467.857	1381.667
2	472.849	1381.937
3	477.833	1382.341
4	482.804	1382.878
5	487.759	1383.548
6	492.694	1384.351
7	497.606	1385.286
8	502.491	1386.351
9	507.346	1387.547
10	512.167	1388.873
11	516.951	1390.328
12	521.694	1391.910
13	526.393	1393.618
14	531.044	1395.452
15	535.645	1397.410
16	540.192	1399.490

```
   17        544.682     1401.691
   18        549.110     1404.011
   19        553.476     1406.450
   20        557.774     1409.004
   21        560.865     1410.955
Circle Center At X =   460.260 ; Y =  1568.197 ; and Radius =   186.685
       Factor of Safety
      ***    2.873   ***
Failure Surface Specified By 22 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        470.918     1382.288
    2        475.898     1382.737
    3        480.866     1383.296
    4        485.821     1383.966
    5        490.760     1384.747
    6        495.680     1385.638
    7        500.579     1386.639
    8        505.454     1387.749
    9        510.303     1388.968
   10        515.124     1390.294
   11        519.914     1391.729
   12        524.670     1393.270
   13        529.391     1394.916
   14        534.074     1396.668
   15        538.717     1398.525
   16        543.317     1400.484
   17        547.872     1402.546
   18        552.380     1404.709
   19        556.839     1406.972
   20        561.245     1409.334
   21        565.598     1411.795
   22        568.418     1413.473
Circle Center At X =   453.401 ; Y =  1605.069 ; and Radius =   223.468
       Factor of Safety
      ***    2.884   ***
Failure Surface Specified By 23 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        464.796     1381.190
    2        469.785     1381.510
    3        474.766     1381.947
    4        479.735     1382.501
    5        484.690     1383.171
    6        489.628     1383.957
    7        494.546     1384.859
    8        499.442     1385.876
    9        504.312     1387.008
   10        509.154     1388.253
   11        513.966     1389.612
   12        518.745     1391.083
   13        523.488     1392.666
   14        528.192     1394.360
   15        532.855     1396.164
   16        537.475     1398.077
   17        542.048     1400.097
   18        546.573     1402.224
   19        551.047     1404.457
   20        555.467     1406.794
   21        559.831     1409.235
   22        564.137     1411.777
   23        565.067     1412.356
Circle Center At X =   453.655 ; Y =  1593.992 ; and Radius =   213.093
       Factor of Safety
      ***    2.892   ***
Failure Surface Specified By 25 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        459.694     1380.397
    2        464.684     1380.704
```

3	469.667	1381.116
4	474.640	1381.633
5	479.602	1382.254
6	484.549	1382.979
7	489.480	1383.807
8	494.392	1384.739
9	499.284	1385.773
10	504.153	1386.910
11	508.997	1388.149
12	513.814	1389.489
13	518.602	1390.930
14	523.359	1392.470
15	528.082	1394.111
16	532.770	1395.850
17	537.420	1397.687
18	542.031	1399.621
19	546.600	1401.652
20	551.126	1403.778
21	555.606	1405.998
22	560.038	1408.312
23	564.421	1410.718
24	568.752	1413.216
25	570.199	1414.091

Circle Center At X = 447.529 ; Y = 1618.432 ; and Radius = 238.345

Factor of Safety

*** 2.909 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	473.979	1383.251
2	478.957	1383.724
3	483.922	1384.308
4	488.874	1385.001
5	493.809	1385.805
6	498.725	1386.718
7	503.619	1387.740
8	508.490	1388.871
9	513.334	1390.109
10	518.150	1391.455
11	522.934	1392.908
12	527.685	1394.466
13	532.400	1396.130
14	537.077	1397.897
15	541.714	1399.769
16	546.308	1401.742
17	550.857	1403.818
18	555.358	1405.994
19	559.811	1408.269
20	564.211	1410.643
21	568.558	1413.113
22	570.171	1414.078

Circle Center At X = 455.212 ; Y = 1607.297 ; and Radius = 224.831

Factor of Safety

*** 2.918 ***

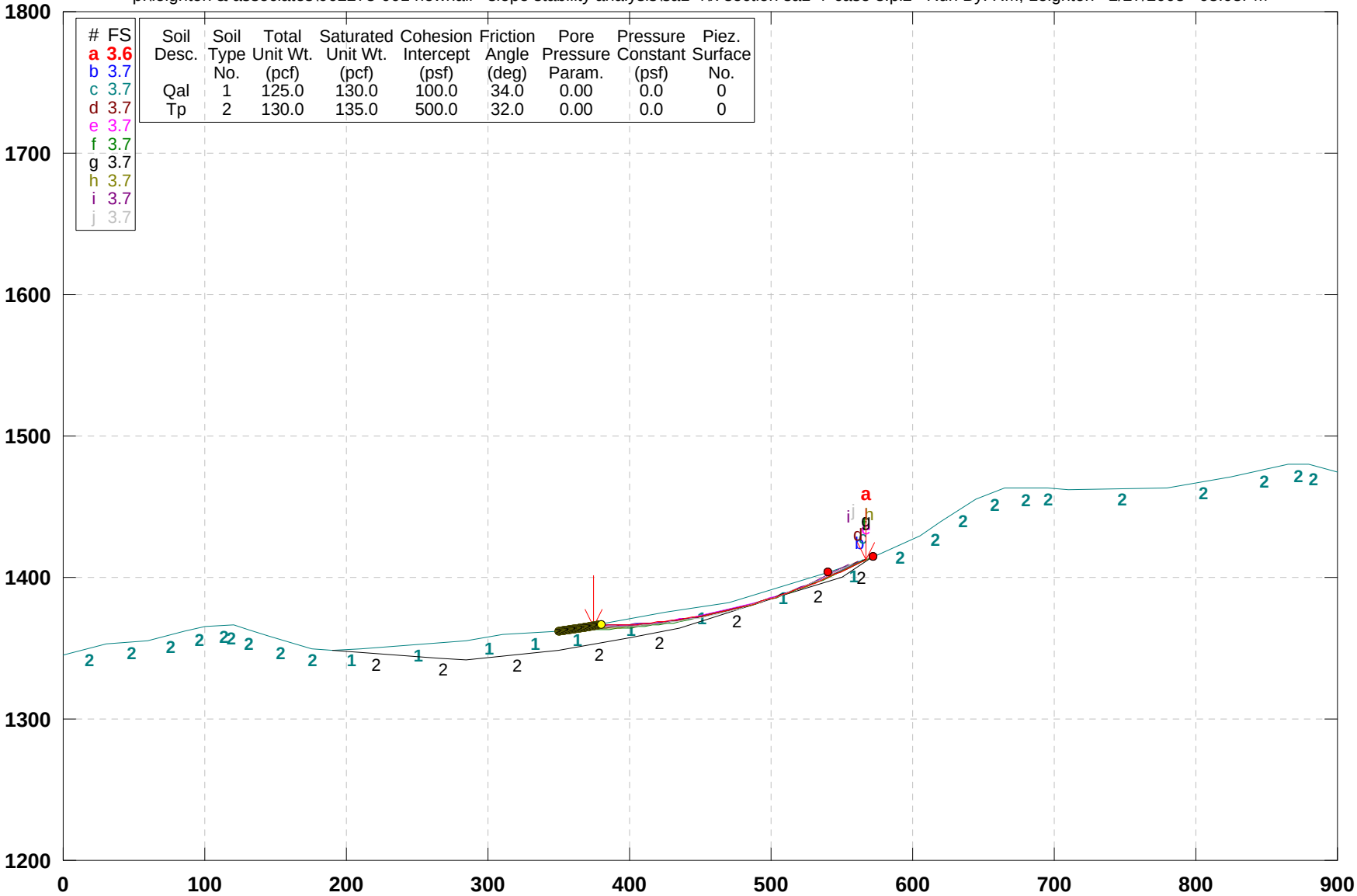
Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	458.673	1380.238
2	463.668	1380.475
3	468.655	1380.828
4	473.633	1381.296
5	478.599	1381.878
6	483.550	1382.574
7	488.484	1383.385
8	493.398	1384.309
9	498.289	1385.347
10	503.155	1386.497
11	507.993	1387.758
12	512.801	1389.132
13	517.576	1390.615

```
   14        522.315     1392.209
   15        527.017     1393.911
   16        531.677     1395.721
   17        536.295     1397.639
   18        540.868     1399.662
   19        545.392     1401.790
   20        549.866     1404.022
   21        554.288     1406.357
   22        558.654     1408.793
   23        562.963     1411.329
   24        564.097     1412.032
Circle Center At X =   450.907 ; Y =  1596.670 ; and Radius =   216.571
       Factor of Safety
      ***    2.921   ***
          **** END OF GSTABL7 OUTPUT ****
```

Mission Village Tract 61105 Cross Section SA1-4' Case 3

p:\leighton & associates\062273-001 newhall - slope stability analysis\sa1-4\x-section sa1-4' case 3.pl2 Run By: RM, Leighton 2/27/2008 03:03PM



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Qal	1	125.0	130.0	100.0	34.0	0.00	0.0	0
Tp	2	130.0	135.0	500.0	32.0	0.00	0.0	0

GSTABL7 v.2 FSmin=3.6

Safety Factors Are Calculated By The Modified Bishop Method

```
                    ***  GSTABL7  ***
              ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **
           (All Rights Reserved-Unauthorized Use Prohibited)
*******************************************************************************
                  SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*******************************************************************************
Analysis Run Date:        2/27/2008
Time of Run:              03:03PM
Run By:                   RM, Leighton
Input Data Filename:      P:\Leighton & Associates\062273-001 Newhall - Slope Stabilit
y Analysis\SA1-4\x-section sa1-4' case 3.in
Output Filename:          P:\Leighton & Associates\062273-001 Newhall - Slope Stabilit
y Analysis\SA1-4\x-section sa1-4' case 3.OUT
Unit System:              English
Plotted Output Filename:  P:\Leighton & Associates\062273-001 Newhall - Slope Stabilit
y Analysis\SA1-4\x-section sa1-4' case 3.PLT
PROBLEM DESCRIPTION:  Mission Village Tract 61105
                      Cross Section SA1-4' Case 3
BOUNDARY COORDINATES
   29 Top   Boundaries
   37 Total Boundaries
```

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	1345.00	30.00	1353.00	2
2	30.00	1353.00	60.00	1355.00	2
3	60.00	1355.00	85.00	1362.00	2
4	85.00	1362.00	100.00	1365.00	2
5	100.00	1365.00	120.00	1366.00	2
6	120.00	1366.00	130.00	1363.00	2
7	130.00	1363.00	145.00	1359.00	2
8	145.00	1359.00	175.00	1350.00	2
9	175.00	1350.00	190.00	1348.00	2
10	190.00	1348.00	210.00	1350.00	1
11	210.00	1350.00	285.00	1355.00	1
12	285.00	1355.00	310.00	1360.00	1
13	310.00	1360.00	350.00	1362.00	1
14	350.00	1362.00	370.00	1365.00	1
15	370.00	1365.00	425.00	1375.00	1
16	425.00	1375.00	470.00	1382.00	1
17	470.00	1382.00	540.00	1404.00	1
18	540.00	1404.00	570.00	1414.00	1
19	570.00	1414.00	605.00	1430.00	2
20	605.00	1430.00	620.00	1440.00	2
21	620.00	1440.00	645.00	1455.00	2
22	645.00	1455.00	665.00	1463.00	2
23	665.00	1463.00	695.00	1463.00	2
24	695.00	1463.00	710.00	1462.00	2
25	710.00	1462.00	780.00	1463.00	2
26	780.00	1463.00	825.00	1471.00	2
27	825.00	1471.00	865.00	1480.00	2
28	865.00	1480.00	880.00	1480.00	2
29	880.00	1480.00	900.00	1475.00	2
30	190.00	1348.00	265.00	1343.00	2
31	265.00	1343.00	285.00	1342.00	2
32	285.00	1342.00	350.00	1348.00	2
33	350.00	1348.00	400.00	1358.00	2
34	400.00	1358.00	435.00	1364.00	2
35	435.00	1364.00	510.00	1388.00	2
36	510.00	1388.00	550.00	1400.00	2
37	550.00	1400.00	570.00	1414.00	2

```
User Specified Y-Origin =      1200.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
```

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	130.0	100.0	34.0	0.00	0.0	0
2	130.0	135.0	500.0	32.0	0.00	0.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 4

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	-90.0	500.00	32.00
2	-42.0	500.00	32.00
3	-38.0	150.00	28.00
4	90.0	500.00	32.00

ANISOTROPIC SOIL NOTES:
(1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
(2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
(3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

ANISOTROPIC STRENGTH DATA HAS BEEN SUPPRESSED
Specified Peak Ground Acceleration Coefficient (A) = 0.500(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
EARTHQUAKE DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.
1500 Trial Surfaces Have Been Generated.
30 Surface(s) Initiate(s) From Each Of 50 Points Equally Spaced
Along The Ground Surface Between X = 350.00(ft)
and X = 380.00(ft)
Each Surface Terminates Between X = 540.00(ft)
and X = 572.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00(ft)
5.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Evaluated. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 1500
Number of Trial Surfaces With Valid FS = 1500
Statistical Data On All Valid FS Values:
FS Max = 5.929 FS Min = 3.645 FS Ave = 4.405
Standard Deviation = 0.328 Coefficient of Variation = 7.44 %
Failure Surface Specified By 42 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	374.490	1365.816
2	379.490	1365.854
3	384.489	1365.952
4	389.486	1366.109
5	394.481	1366.326
6	399.474	1366.602
7	404.463	1366.938
8	409.447	1367.332
9	414.426	1367.787
10	419.400	1368.300
11	424.367	1368.873
12	429.327	1369.505
13	434.279	1370.196
14	439.222	1370.945
15	444.157	1371.754
16	449.081	1372.621

17	453.994	1373.547
18	458.896	1374.532
19	463.786	1375.574
20	468.664	1376.675
21	473.528	1377.834
22	478.377	1379.051
23	483.212	1380.325
24	488.032	1381.657
25	492.835	1383.046
26	497.621	1384.492
27	502.390	1385.995
28	507.140	1387.555
29	511.872	1389.172
30	516.584	1390.844
31	521.275	1392.573
32	525.946	1394.357
33	530.595	1396.197
34	535.222	1398.092
35	539.826	1400.042
36	544.407	1402.046
37	548.963	1404.105
38	553.495	1406.218
39	558.001	1408.385
40	562.481	1410.606
41	566.934	1412.880
42	567.446	1413.149

Circle Center At X = 373.799 ; Y = 1785.601 ; and Radius = 419.785

Factor of Safety

*** 3.645 ***

Individual data on the 44 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	5.0	272.2	0.0	0.0	0.	0.	0.0	0.0	0.0
2	5.0	797.7	0.0	0.0	0.	0.	0.0	0.0	0.0
3	5.0	1285.6	0.0	0.0	0.	0.	0.0	0.0	0.0
4	5.0	1735.6	0.0	0.0	0.	0.	0.0	0.0	0.0
5	5.0	2147.4	0.0	0.0	0.	0.	0.0	0.0	0.0
6	5.0	2521.0	0.0	0.0	0.	0.	0.0	0.0	0.0
7	5.0	2856.0	0.0	0.0	0.	0.	0.0	0.0	0.0
8	5.0	3152.7	0.0	0.0	0.	0.	0.0	0.0	0.0
9	5.0	3410.8	0.0	0.0	0.	0.	0.0	0.0	0.0
10	5.0	3630.2	0.0	0.0	0.	0.	0.0	0.0	0.0
11	0.6	477.1	0.0	0.0	0.	0.	0.0	0.0	0.0
12	4.3	3303.3	0.0	0.0	0.	0.	0.0	0.0	0.0
13	5.0	3842.8	0.0	0.0	0.	0.	0.0	0.0	0.0
14	4.9	3866.6	0.0	0.0	0.	0.	0.0	0.0	0.0
15	4.9	3852.6	0.0	0.0	0.	0.	0.0	0.0	0.0
16	4.9	3801.0	0.0	0.0	0.	0.	0.0	0.0	0.0
17	4.9	3712.1	0.0	0.0	0.	0.	0.0	0.0	0.0
18	4.9	3586.0	0.0	0.0	0.	0.	0.0	0.0	0.0
19	4.9	3423.1	0.0	0.0	0.	0.	0.0	0.0	0.0
20	4.9	3224.0	0.0	0.0	0.	0.	0.0	0.0	0.0
21	1.3	845.4	0.0	0.0	0.	0.	0.0	0.0	0.0
22	3.5	2266.8	0.0	0.0	0.	0.	0.0	0.0	0.0
23	4.8	3290.8	0.0	0.0	0.	0.	0.0	0.0	0.0
24	4.8	3447.8	0.0	0.0	0.	0.	0.0	0.0	0.0
25	4.8	3565.7	0.0	0.0	0.	0.	0.0	0.0	0.0
26	4.8	3644.7	0.0	0.0	0.	0.	0.0	0.0	0.0
27	4.8	3685.2	0.0	0.0	0.	0.	0.0	0.0	0.0
28	4.8	3687.7	0.0	0.0	0.	0.	0.0	0.0	0.0
29	4.8	3652.4	0.0	0.0	0.	0.	0.0	0.0	0.0
30	4.7	3579.9	0.0	0.0	0.	0.	0.0	0.0	0.0
31	4.7	3470.6	0.0	0.0	0.	0.	0.0	0.0	0.0
32	4.7	3325.0	0.0	0.0	0.	0.	0.0	0.0	0.0
33	4.7	3143.7	0.0	0.0	0.	0.	0.0	0.0	0.0
34	4.6	2927.3	0.0	0.0	0.	0.	0.0	0.0	0.0
35	4.6	2676.3	0.0	0.0	0.	0.	0.0	0.0	0.0
36	4.6	2391.5	0.0	0.0	0.	0.	0.0	0.0	0.0

37	0.2	84.4	0.0	0.0	0.	0.	0.0	0.0	0.0
38	4.4	2012.2	0.0	0.0	0.	0.	0.0	0.0	0.0
39	4.6	1795.6	0.0	0.0	0.	0.	0.0	0.0	0.0
40	4.5	1462.1	0.0	0.0	0.	0.	0.0	0.0	0.0
41	4.5	1096.9	0.0	0.0	0.	0.	0.0	0.0	0.0
42	4.5	700.7	0.0	0.0	0.	0.	0.0	0.0	0.0
43	4.5	274.4	0.0	0.0	0.	0.	0.0	0.0	0.0
44	0.5	3.1	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	376.939	1366.262
2	381.939	1366.277
3	386.938	1366.356
4	391.936	1366.497
5	396.932	1366.701
6	401.925	1366.968
7	406.914	1367.298
8	411.898	1367.690
9	416.878	1368.145
10	421.851	1368.662
11	426.817	1369.242
12	431.776	1369.884
13	436.726	1370.589
14	441.667	1371.355
15	446.598	1372.184
16	451.518	1373.074
17	456.426	1374.027
18	461.322	1375.041
19	466.205	1376.116
20	471.074	1377.252
21	475.929	1378.450
22	480.768	1379.709
23	485.591	1381.028
24	490.397	1382.408
25	495.185	1383.848
26	499.954	1385.348
27	504.705	1386.908
28	509.435	1388.527
29	514.145	1390.206
30	518.833	1391.944
31	523.499	1393.740
32	528.142	1395.596
33	532.762	1397.509
34	537.357	1399.480
35	541.927	1401.509
36	546.471	1403.595
37	550.988	1405.738
38	555.479	1407.938
39	559.941	1410.193
40	562.353	1411.451

Circle Center At X = 378.205 ; Y = 1764.040 ; and Radius = 397.781

Factor of Safety

*** 3.689 ***

Failure Surface Specified By 42 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	368.367	1364.755
2	373.367	1364.764
3	378.367	1364.832
4	383.365	1364.960
5	388.362	1365.146
6	393.356	1365.392
7	398.346	1365.697
8	403.333	1366.060
9	408.315	1366.483
10	413.292	1366.965
11	418.263	1367.505
12	423.227	1368.105
13	428.183	1368.763

14	433.132	1369.479
15	438.071	1370.254
16	443.001	1371.088
17	447.921	1371.980
18	452.830	1372.930
19	457.727	1373.938
20	462.612	1375.003
21	467.484	1376.127
22	472.343	1377.308
23	477.187	1378.547
24	482.016	1379.842
25	486.830	1381.195
26	491.627	1382.605
27	496.407	1384.071
28	501.170	1385.594
29	505.914	1387.173
30	510.639	1388.808
31	515.344	1390.499
32	520.029	1392.246
33	524.693	1394.047
34	529.336	1395.904
35	533.956	1397.816
36	538.553	1399.782
37	543.127	1401.802
38	547.676	1403.877
39	552.201	1406.005
40	556.700	1408.186
41	561.172	1410.421
42	564.686	1412.229

Circle Center At X = 370.110 ; Y = 1787.208 ; and Radius = 422.456

Factor of Safety

*** 3.702 ***

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	373.878	1365.705
2	378.878	1365.694
3	383.877	1365.747
4	388.876	1365.863
5	393.873	1366.042
6	398.867	1366.284
7	403.857	1366.589
8	408.844	1366.958
9	413.825	1367.390
10	418.801	1367.884
11	423.770	1368.442
12	428.731	1369.062
13	433.684	1369.745
14	438.628	1370.490
15	443.562	1371.298
16	448.486	1372.169
17	453.398	1373.101
18	458.298	1374.096
19	463.185	1375.153
20	468.059	1376.271
21	472.918	1377.451
22	477.761	1378.692
23	482.588	1379.994
24	487.399	1381.358
25	492.192	1382.782
26	496.966	1384.266
27	501.722	1385.811
28	506.457	1387.416
29	511.172	1389.081
30	515.865	1390.805
31	520.536	1392.589
32	525.184	1394.431
33	529.809	1396.332
34	534.409	1398.292
35	538.984	1400.309

36	543.533	1402.384
37	548.055	1404.517
38	552.550	1406.706
39	557.018	1408.953
40	560.899	1410.966

Circle Center At X = 377.227 ; Y = 1760.886 ; and Radius = 395.195
Factor of Safety
*** 3.707 ***

Failure Surface Specified By 42 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	370.816	1365.148
2	375.816	1365.215
3	380.814	1365.339
4	385.811	1365.519
5	390.805	1365.756
6	395.797	1366.050
7	400.784	1366.401
8	405.768	1366.808
9	410.746	1367.272
10	415.719	1367.793
11	420.686	1368.370
12	425.645	1369.004
13	430.597	1369.694
14	435.541	1370.440
15	440.477	1371.243
16	445.402	1372.101
17	450.318	1373.016
18	455.223	1373.986
19	460.117	1375.012
20	464.998	1376.094
21	469.867	1377.231
22	474.723	1378.423
23	479.565	1379.671
24	484.392	1380.974
25	489.204	1382.331
26	494.001	1383.743
27	498.781	1385.210
28	503.544	1386.730
29	508.289	1388.305
30	513.017	1389.934
31	517.725	1391.616
32	522.414	1393.352
33	527.083	1395.141
34	531.732	1396.983
35	536.359	1398.878
36	540.964	1400.825
37	545.547	1402.825
38	550.106	1404.876
39	554.642	1406.980
40	559.154	1409.135
41	563.641	1411.340
42	566.772	1412.924

Circle Center At X = 367.470 ; Y = 1804.628 ; and Radius = 439.493
Factor of Safety
*** 3.715 ***

Failure Surface Specified By 45 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	356.122	1362.918
2	361.122	1362.872
3	366.122	1362.882
4	371.122	1362.949
5	376.120	1363.073
6	381.117	1363.254
7	386.111	1363.491
8	391.103	1363.785
9	396.090	1364.136
10	401.074	1364.543
11	406.052	1365.007

12	411.025	1365.528
13	415.992	1366.104
14	420.951	1366.738
15	425.904	1367.427
16	430.848	1368.173
17	435.783	1368.975
18	440.709	1369.833
19	445.624	1370.747
20	450.530	1371.716
21	455.423	1372.742
22	460.305	1373.823
23	465.174	1374.959
24	470.030	1376.150
25	474.872	1377.397
26	479.700	1378.698
27	484.513	1380.054
28	489.309	1381.465
29	494.090	1382.930
30	498.854	1384.450
31	503.600	1386.023
32	508.327	1387.650
33	513.036	1389.331
34	517.726	1391.065
35	522.396	1392.852
36	527.045	1394.693
37	531.672	1396.586
38	536.279	1398.531
39	540.862	1400.529
40	545.423	1402.578
41	549.960	1404.679
42	554.473	1406.832
43	558.961	1409.036
44	563.424	1411.290
45	566.205	1412.735

Circle Center At X = 362.720 ; Y = 1803.032 ; and Radius = 440.163

Factor of Safety

*** 3.717 ***

Failure Surface Specified By 44 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	364.082	1364.112
2	369.081	1364.145
3	374.081	1364.234
4	379.079	1364.379
5	384.075	1364.579
6	389.068	1364.835
7	394.058	1365.147
8	399.045	1365.514
9	404.027	1365.937
10	409.004	1366.416
11	413.975	1366.950
12	418.940	1367.539
13	423.899	1368.184
14	428.849	1368.884
15	433.792	1369.639
16	438.726	1370.450
17	443.651	1371.315
18	448.565	1372.235
19	453.469	1373.210
20	458.362	1374.240
21	463.243	1375.324
22	468.112	1376.463
23	472.967	1377.655
24	477.809	1378.902
25	482.637	1380.203
26	487.450	1381.557
27	492.248	1382.966
28	497.029	1384.427
29	501.794	1385.942
30	506.542	1387.510

31	511.272	1389.131
32	515.984	1390.804
33	520.677	1392.530
34	525.350	1394.308
35	530.003	1396.138
36	534.635	1398.020
37	539.246	1399.954
38	543.835	1401.938
39	548.402	1403.974
40	552.946	1406.061
41	557.466	1408.198
42	561.962	1410.386
43	566.433	1412.623
44	567.471	1413.157

Circle Center At X = 363.628 ; Y = 1812.245 ; and Radius = 448.133
Factor of Safety
*** 3.719 ***

Failure Surface Specified By 45 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	358.571	1363.286
2	363.571	1363.315
3	368.571	1363.397
4	373.569	1363.534
5	378.565	1363.723
6	383.559	1363.967
7	388.550	1364.263
8	393.538	1364.614
9	398.522	1365.017
10	403.501	1365.474
11	408.475	1365.985
12	413.443	1366.548
13	418.405	1367.165
14	423.360	1367.835
15	428.307	1368.558
16	433.246	1369.334
17	438.177	1370.163
18	443.099	1371.045
19	448.011	1371.979
20	452.912	1372.966
21	457.803	1374.006
22	462.683	1375.098
23	467.550	1376.242
24	472.405	1377.438
25	477.246	1378.686
26	482.075	1379.986
27	486.888	1381.337
28	491.688	1382.740
29	496.471	1384.195
30	501.239	1385.701
31	505.991	1387.257
32	510.725	1388.865
33	515.442	1390.523
34	520.141	1392.231
35	524.822	1393.990
36	529.483	1395.799
37	534.125	1397.657
38	538.746	1399.566
39	543.347	1401.524
40	547.927	1403.531
41	552.485	1405.586
42	557.020	1407.691
43	561.533	1409.844
44	566.022	1412.045
45	569.712	1413.904

Circle Center At X = 358.362 ; Y = 1829.863 ; and Radius = 466.577
Factor of Safety
*** 3.724 ***

Failure Surface Specified By 38 Coordinate Points

Point	X-Surf	Y-Surf

No.	(ft)	(ft)
1	379.388	1366.707
2	384.387	1366.646
3	389.387	1366.655
4	394.387	1366.734
5	399.384	1366.883
6	404.380	1367.103
7	409.371	1367.392
8	414.358	1367.751
9	419.340	1368.180
10	424.315	1368.679
11	429.282	1369.248
12	434.242	1369.887
13	439.191	1370.594
14	444.130	1371.372
15	449.058	1372.218
16	453.974	1373.134
17	458.876	1374.118
18	463.764	1375.171
19	468.636	1376.292
20	473.493	1377.482
21	478.332	1378.739
22	483.153	1380.065
23	487.955	1381.457
24	492.737	1382.917
25	497.499	1384.444
26	502.238	1386.038
27	506.954	1387.698
28	511.647	1389.424
29	516.315	1391.215
30	520.957	1393.072
31	525.573	1394.994
32	530.162	1396.980
33	534.722	1399.031
34	539.253	1401.145
35	543.754	1403.322
36	548.224	1405.563
37	552.662	1407.866
38	554.407	1408.802

Circle Center At X = 386.259 ; Y = 1723.026 ; and Radius = 356.385

Factor of Safety

*** 3.734 ***

Failure Surface Specified By 41 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	368.980	1364.847
2	373.979	1364.781
3	378.979	1364.779
4	383.979	1364.842
5	388.977	1364.970
6	393.973	1365.163
7	398.967	1365.421
8	403.956	1365.743
9	408.941	1366.129
10	413.921	1366.581
11	418.894	1367.096
12	423.861	1367.677
13	428.819	1368.321
14	433.768	1369.029
15	438.708	1369.802
16	443.638	1370.639
17	448.556	1371.539
18	453.462	1372.503
19	458.356	1373.530
20	463.235	1374.621
21	468.100	1375.775
22	472.950	1376.992
23	477.784	1378.271
24	482.600	1379.613
25	487.399	1381.017

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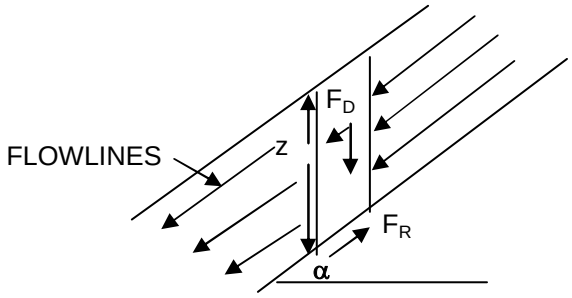
   26        492.179     1382.484
   27        496.940     1384.012
   28        501.680     1385.601
   29        506.400     1387.252
   30        511.098     1388.964
   31        515.773     1390.737
   32        520.425     1392.570
   33        525.053     1394.463
   34        529.655     1396.416
   35        534.233     1398.428
   36        538.783     1400.500
   37        543.307     1402.630
   38        547.802     1404.818
   39        552.269     1407.065
   40        556.706     1409.370
   41        557.690     1409.896
Circle Center At X =   376.596 ; Y =  1750.764 ; and Radius =   385.992
       Factor of Safety
      ***    3.739   ***
          **** END OF GSTABL7 OUTPUT ****
```

Existing slope: assuming 4 feet deep saturation

SURFICIAL SLOPE STABILITY ANALYSIS



Project No.: 062273-001

Case: Slope @ 2:1 Section 1-4
Tp

Depth of Saturation (ft), Z	=	**4**
Buoyant Unit Weight of Soil (pcf), γ_b	=	**62.6**
Total Unit Weight of Soil (pcf), γ_t	=	**125**
Slope Angle, α	=	**26.6**
Angle of Internal Friction, ϕ	=	**32**
Cohesion (psf), c	=	**500**

Force Tending To Cause Movement:

$F_D = Z\gamma_t \sin 2\alpha / 2$ = **200.18** lb/ft

Force Tending To Resist Movement:

$F_R = Z\gamma_b \cos^2 \alpha \tan \phi + (c)$

= **625.10** lb/ft

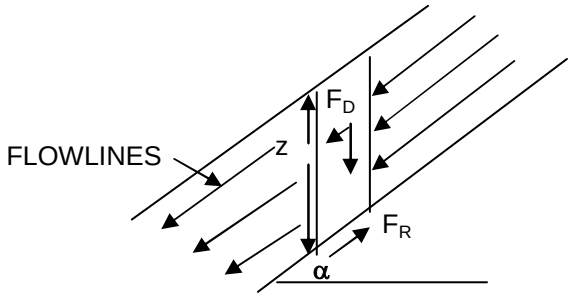
$$F.S. = \frac{2Z\gamma_b \cos^2 \alpha \tan \phi + 2c}{Z\gamma_t \sin 2\alpha}$$

F.S. = 3.12

SURFICIAL STABILITY	Project Name : Offsite Grading TTM 61105 Project Number : 062273-001 Designed/Checked : RM Figure No.

Existing slope: assuming 4 feet deep saturation

SURFICIAL SLOPE STABILITY ANALYSIS



Project No.: 062273-001

Case: Slope @ 3:1 Section 1-4
Qal

Depth of Saturation (ft), Z	=	**4**
Buoyant Unit Weight of Soil (pcf), γ_b	=	**62.6**
Total Unit Weight of Soil (pcf), γ_t	=	**125**
Slope Angle, α	=	**18.4**
Angle of Internal Friction, ϕ	=	**34**
Cohesion (psf), c	=	**100**

Force Tending To Cause Movement:

$F_D = Z\gamma_t \sin 2\alpha / 2$ = **149.76** lb/ft

Force Tending To Resist Movement:

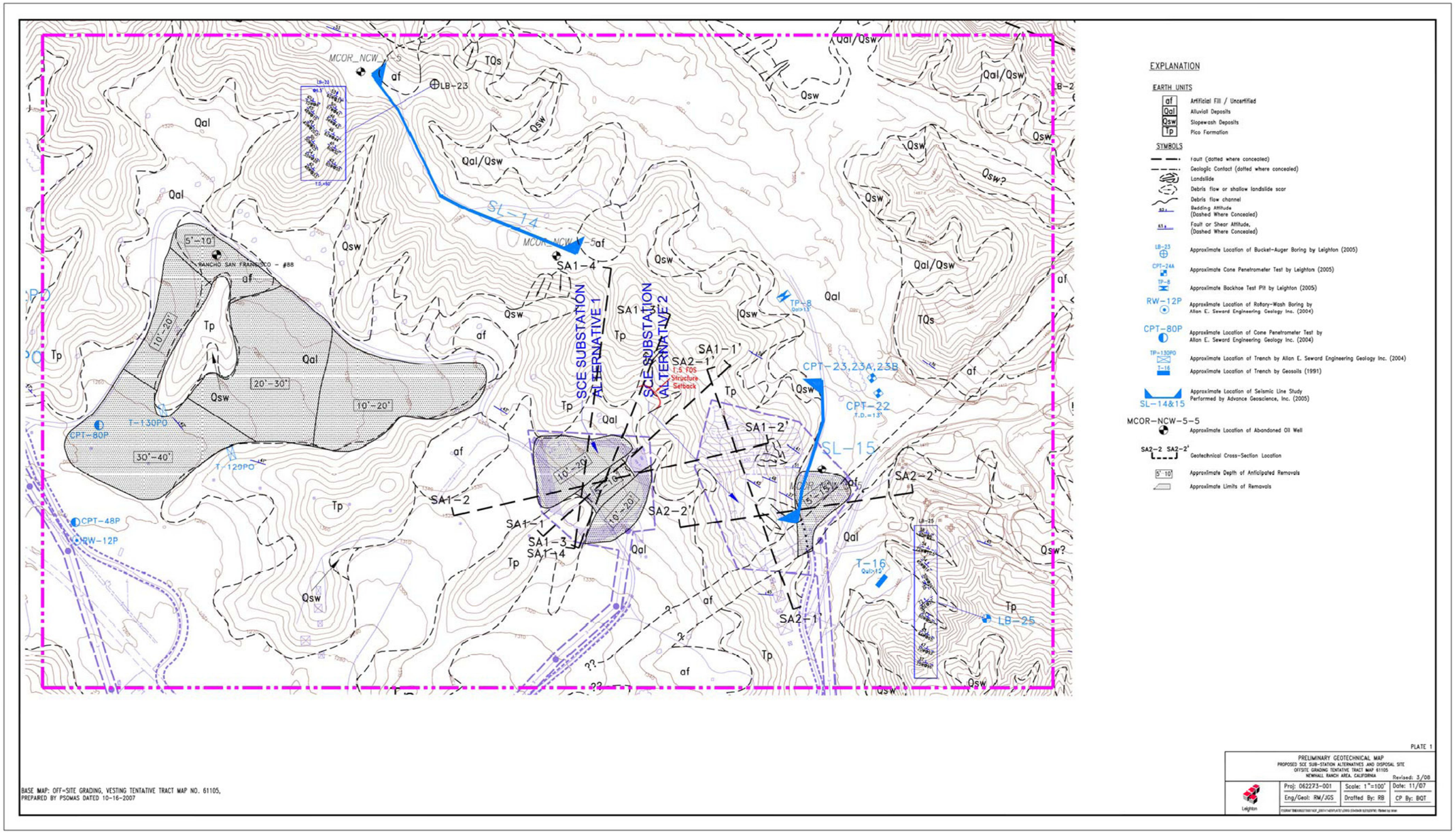
$F_R = Z\gamma_b \cos^2 \alpha \tan \phi + (c)$

= **252.07** lb/ft

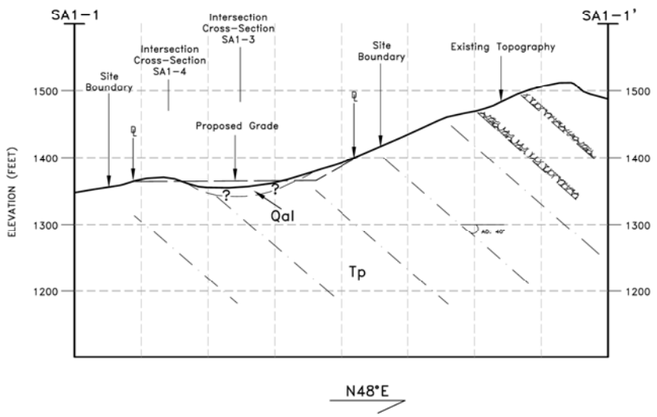
$$F.S. = \frac{2Z\gamma_b \cos^2 \alpha \tan \phi + 2c}{Z\gamma_t \sin 2\alpha}$$

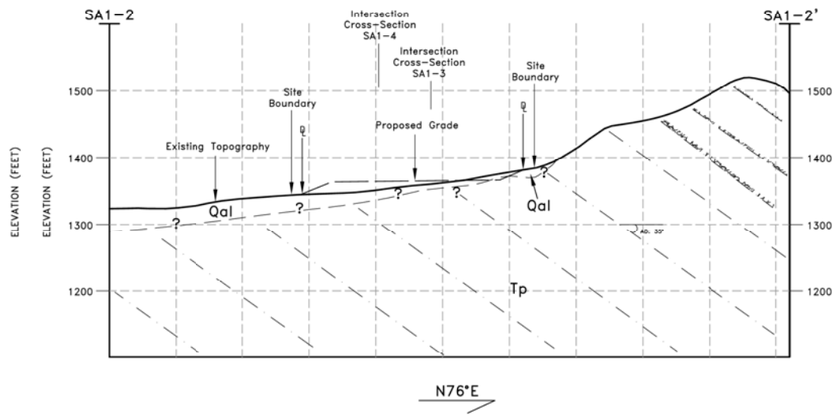
F.S. = 1.68

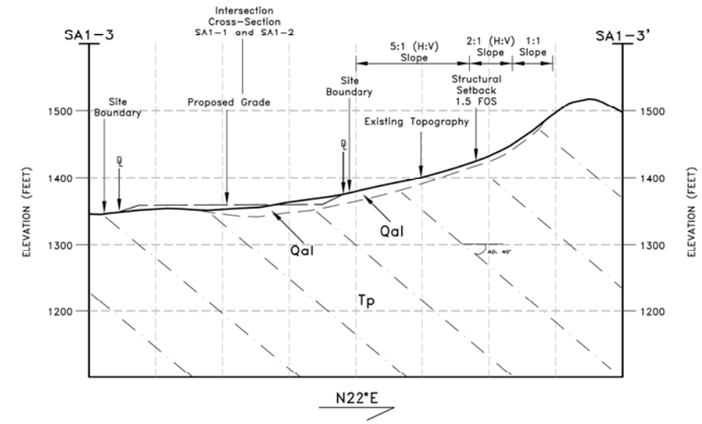
SURFICIAL STABILITY	Project Name : Offsite Grading TTM 61105 Project Number : 062273-001 Designed/Checked : RM Figure No.

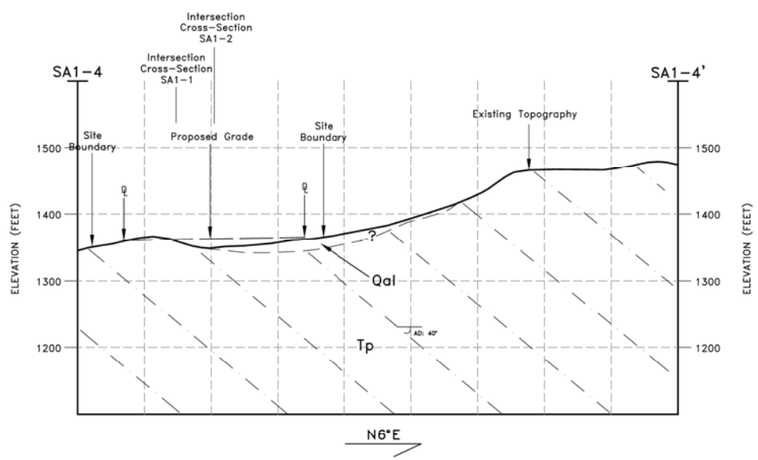


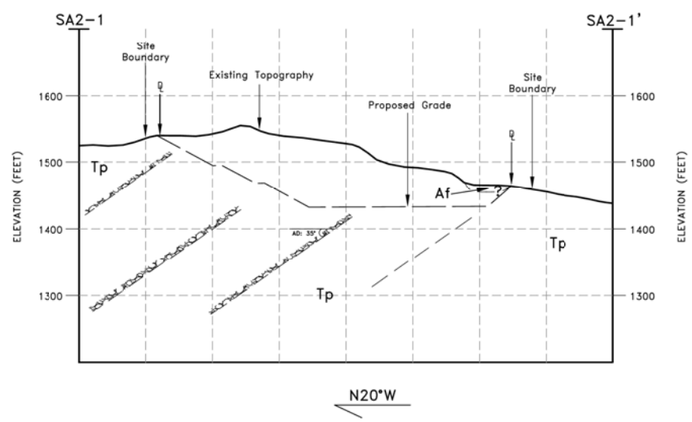
A full-size reproduction of this figure can be found at Impact Sciences.











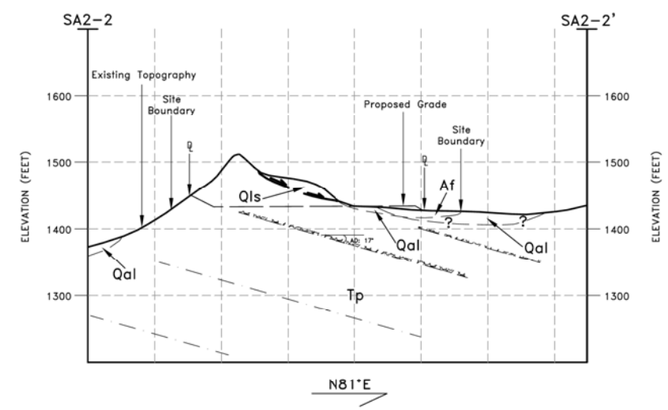


PLATE 2

GEOTECHNICAL CROSS-SECTIONS

SA1-1–SA1-1' THROUGH SA1-4–SA1-4', SA2-1–SA2-1' AND SA2-2–SA2-2'
PROPOSED S.C.E. SUBSTATION ALTERNATIVES OFFSITE GRADING T.T.M. 61105
NEWHALL RANCH AREA, CALIFORNIA

Revised: 3/08

Leighton	Proj: 062273-001	Scale: 1"=100'	Date: 11/07
	Eng/Geol: RM/JGS	Drafted By: RB	CP By: BQT

P:\DRAFTING\062273\001\DF_2007-11-20\PLATE 2.DWG (03-05-08 5:31:38PM) Plotted by: bran

A full-size reproduction of this figure can be found at Impact Sciences.

Leighton and Associates, Inc., 100-Scale Grading Plan Review of Offsite Grading for Proposed Southern California Edison Substation Alternatives 1 and 2 March 2010, Vesting Tentative Tract Map 61105, County of Los Angeles, March 16, 2010

100-SCALE GRADING PLAN REVIEW OF OFFSITE GRADING FOR PROPOSED SOUTHERN CALIFORNIA EDISON SUBSTATION ALTERNATIVES 1 AND 2 DATED MARCH 2010, VESTING TENTATIVE TRACT MAP NO. 61105 COUNTY OF LOS ANGELES, CALIFORNIA

Prepared For:

NEWHALL LAND AND FARMING COMPANY

25124 Springfield Court, Suite 300
Valencia, California 91355

Project No. 062273-002

March 16, 2010

Leighton and Associates, Inc.
A LEIGHTON GROUP COMPANY

Leighton and Associates, Inc.
A LEIGHTON GROUP COMPANY

March 16, 2010

Project No. 062273-002

To: Newhall Land and Farming Company
25124 Springfield Court, Suite 300
Valencia, California 91355

Attention: Mr. Corey Harpole

Subject: 100-Scale Grading Plan Review of Offsite Grading for Proposed Southern California Edison Substation Alternatives 1 and 2 Dated March 2010, Vesting Tentative Tract Map No. 61105, County of Los Angeles, California

In accordance with your request and authorization, Leighton and Associates, Inc. (Leighton) has prepared a 100-Scale Grading Plan Review for revised Southern California Edison (SCE) Substation Alternatives. Alternatives 1, and Alternative 2, dated March 2010, are revisions to previously proposed substation alternatives reviewed in Leighton (2007, 2008) and approved by the County of Los Angeles (LACDPW, 2008). The sections from our previous reports (Leighton, 2007, 2008) that have been updated are included herein. All other sections from our previous reports (Leighton, 2007, 2008) that have not been revised remain applicable.

This report summarizes the findings of our geotechnical investigation and presents preliminary geotechnical data and recommendations for the proposed development of SCE Substation Alternatives 1 and 2. Pertinent geologic and geotechnical data collected by Leighton and others during previous site investigations have been evaluated and are included in this study.

Based on the findings summarized in this report, it is our professional opinion that the planned development of the SCE Substation Alternatives 1 and 2 are feasible from the geologic and geotechnical points of view. With proper grading and implementation of the

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geotechnical recommendations, the planned development will be safe from hazards of landslide, settlement, or slippage. Furthermore, development of the proposed project will not adversely affect adjacent properties provided our recommendations concerning the proposed construction are followed.

If you have any questions regarding the contents of this response submittal, please contact us at your convenience.

Respectfully submitted,

LEIGHTON AND ASSOCIATES, INC.

Michelle Wickers, PG 8630
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MAW/CKK/ELB/gv

Distribution: (2) Addressee
(4) R.T. Franklin and Associates; (3 Hardcopies and 1 CD for submittal to Los Angeles Department of Public Works)
(1) Psomas; Attention: Mr. Matt Heideman

Leighton

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Leighton

1.0 INTRODUCTION

1.1 General

Leighton and Associates, Inc. (Leighton) performed a 100-scale grading plan review for the updated proposed offsite grading for SCE Substation Alternatives - 1 and - 2, within the Mission Village Project area, County of Los Angeles, California. Alternatives – 1 and 2 (Plates 1 and 2) are revisions to previously proposed substation alternatives reviewed in Leighton (2007, 2008) and approved by the County of Los Angeles (LACDPW, 2008). References are listed in Appendix A. Copies of previous County of Los Angeles review sheets for this project are presented in Appendix B.

This updated report contains only the pertinent sections that have been revised. All other sections including site description, geologic setting, faulting, secondary seismic hazards, oil wells, geologic factors, and rippability study remain unchanged, and can be found in our previous reports (Leighton 2007, 2008).

Our recommendations are based on the results of our review of available data and appropriate engineering and geologic analyses. The results of our slope stability analyses are presented in Appendix C.

1.2 Objective

The purpose of our study is to evaluate the existing geologic and geotechnical conditions of the site with respect to the planned development as shown on the updated SCE Substation Alternatives – 1 and – 2 plans and to provide preliminary geotechnical recommendations and design parameters.

1.3 Scope of Work

The scope of work performed during our study consisted of the following:

- Performing geologic and engineering analyses. The analyses performed include the following:
  - Review and evaluation of the available geologic and geotechnical data obtained during previous explorations in the vicinity of the site;
  - Review the updated SCE Substation Alternatives -1 and – 2 plans;
  - Preparation of an updated Geotechnical Map;
  - Preparation of updated geotechnical cross-sections,;
  - Performing slope stability analyses on selected critical geotechnical cross-sections and providing preliminary mitigation, as warranted;
  - Estimating the settlements of the proposed deep fills; and
  - Characterization of the bedrock for construction uses.
- Preparation of this report summarizing the findings and conclusions of our study and providing preliminary geotechnical recommendations for earthwork and construction for the planned development.

2.0 PROPOSED DEVELOPMENT

Review of the updated VTTM No. 61105 SCE Substation Alternatives – 1 and – 2 plans indicate the following proposed development alternatives:

- **Alternative 1:** Cut and fill grading to accommodate a transitional pad of approximately 67,500 square feet. The proposed cut and fill slopes will be constructed at gradients of 2:1 (horizontal:vertical). The maximum cut slope is 150 feet in height and the maximum fill slope is 40 feet in height. The maximum thickness of fill beneath the planned substation is about 55 feet (accounting for anticipated removals).

- **Alternative 2:** Cut and fill grading to accommodate a transitional pad of approximately 67,500 square feet. The proposed cut and fill slopes will be constructed at gradients of 2:1 (horizontal:vertical). The maximum cut slope is 130 feet in height and the maximum fill slope is 60 feet in height. The maximum thickness of fill beneath the planned substation is about 65 feet (accounting for anticipated removals).

Disposal Site: A fill disposal area is proposed to accommodate excess soils generated by the proposed cuts. This disposal site is located to the west of the proposed SCE Substation alternatives. The excess soils will be placed as engineered fill with an approximate fill thickness of 20 feet.

3.0 GROUND MOTION ANALYSIS

3.1 Earthquake Ground Motion

Seismic hazards that could affect the proposed SCE Substation Alternatives include ground shaking resulting from an earthquake occurring along one of several major active faults in the region. The magnitude of ground shaking is generally characterized by using the peak horizontal ground acceleration (PHGA). To take into consideration the impact of regional faults and geologic conditions, Leighton has performed an updated probabilistic ground motion analysis using the computer program EZ-FRISK Version 7.37 Build 002 (Risk Engineering, Inc., 2009) to estimate future ground motions at the SCE Substation Alternatives. Three Next Generation Attenuation (NGA) relationships (Boore and Atkinson, 2008; Campbell and Bozorgnia, 2008; Chiou and Youngs, 2008) were used in the analysis.

The subsurface conditions beneath the proposed alternatives will range from soft bedrock in cut areas to deep soil in fill areas. Accordingly, County of Los Angeles Building Code (LACBC) Site Class C for soft rock and Site Class D for stiff soil were considered in the analyses. Areas underlain by bedrock or by less than 20 feet of fill are considered Site Class C. Areas underlain by deeper fill are considered Site Class D. The results of the analyses suggest that the PGHA with a 10 percent probability of exceedance in 50 years (approximate recurrence interval of 475 years) is estimated range between 0.65g for Site Class D to 0.72g for Site Class C.

The PHGA with a 2 percent probability of exceedance in 50 years (approximate recurrence interval of 2,475 years) ranges from approximately 1.11g for Site Class D to 1.29g for Site Class C. This level of ground motion corresponds to the Maximum Considered Earthquake (MCE). Results of the analyses are included in Appendix D.

3.2 Seismic Design Parameters

The seismic design parameters (S_{DS}, S_{D1}, S_{MS}, S_{M1}) were determined from the procedure outlined in Chapter 16 of the 2009 County of Los Angeles Building Code (LACBC). This method should be considered as the minimum for the seismic analysis. Additional seismic analyses may be necessary based on structural requirements.

Table 1. 2008 LACBC Seismic Coefficients

LACBC Categorization/Coefficient	Site Class C	Site Class D
Site Longitude (decimal degrees)	118.618936° W	118.618936° W
Site Latitude (decimal degrees)	34.393983° N	34.393983° N
Site Class Definition (Table 1613.5.2)	C	D
Mapped Spectral Response Acceleration at 0.2s Period, S_s (Figure 1613.5(3))	2.052	2.052
Mapped Spectral Response Acceleration at 1s Period, S_1 (Figure 1613.5(4))	0.726	0.726
Short Period Site Coefficient at 0.2s Period, F_a (Table 1613.5.3(1))	1.0	1.0
Long Period Site Coefficient at 1s Period, F_v (Table 1613.5.3(2))	1.3	1.5
Adjusted Spectral Response Acceleration at 0.2s Period, S_{MS} (Eq. 16-37)	2.052	2.052
Adjusted Spectral Response Acceleration at 1s Period, S_{M1} (Eq. 16-38)	0.943	1.088
Design Spectral Response Acceleration at 0.2s Period, S_{DS} (Eq. 16-39)	1.368	1.368
Design Spectral Response Acceleration at 1s Period, S_{D1} (Eq. 16-40)	0.629	0.726

4.0 SLOPES

4.1 Slope Stability

To evaluate slope stability, three new cross sections representative of proposed revised cut and fill slopes have been drawn and analyzed. Design slopes are planned to be 2:1 (horizontal:vertical). The cross-sections are presented on Plate 3, Geotechnical Cross-Sections. The results of our slope stability analyses are presented in Appendix C.

Cross sections SA 1-3 and SA 1-4, which were previously presented in Leighton (2008) to evaluate debris flow hazards, have been updated to show proposed grading for the revised alternatives.

4.2 Geologic Factors

Cut slopes are planned within a prominent ridge comprised of bedrock material of the Pico Formation (Tp). Proposed fill slopes overlie alluvial soils within a valley bottom of one of the tributaries draining south and southwest to Potrero Canyon. Two material types within the Tp bedrock have been distinguished in Leighton (2007, 2008), Tp Sandstone and Tp Siltstone. The shear strength parameters for the Tp Sandstone unit, which are lower than those for the Tp Siltstone unit, have been used to model Tp bedrock to simplify our stability analysis. Alluvium within the footprint of the proposed project is undetermined at this time; depths have been estimated based on previous mapping and geotechnical cross sections.

5.0 GEOLOGIC AND GEOTECHNICAL CONCLUSIONS

5.1 General

Based on the geologic and geotechnical data analyzed in this report and our review of our previous geotechnical reports for the project site and vicinity, it is our opinion that the proposed SCE Substation Alternatives are feasible provided that our recommendations are incorporated into the design of the project.

All geologic and geotechnical conclusions that are contained in our previous reports (Leighton, 2007; 2008) remain applicable, except where superseded herein.

5.2 Peak Ground Acceleration

The design peak ground acceleration (PGA) for the SCE Substation Alternatives may be taken as 0.55g for both Site Class C and Site Class D; the Maximum Considered Earthquake (MCE) PGA may be taken as 0.82g for both Site Class C and Site Class D.

The probabilistic peak horizontal ground acceleration (PHGA) with a 10 percent probability of exceedance in 50 years ranges from 0.65g for Site Class D to 0.72g for Site Class C.

5.3 Slope Stability

The proposed cut and fill slopes are anticipated to be grossly stable. Natural slopes to the north of the proposed substation indicate a potential for instability in areas where slope gradient exceeds 2:1 (horizontal to vertical). Accordingly, a structural setback was established to delineate areas with factors of safety of at least 1.5 against instability. The structural setback line is shown on Plates 1, 2, and 3.

6.0 RECOMMENDATIONS

Cut and fill slopes should be constructed at 2:1 (horizontal:vertical) or flatter, as currently planned. Existing alluvium and any other unsuitable surficial soils should be removed prior to placement of proposed fills. The proposed slopes should be reevaluated and additional field exploration should be performed to better define the site conditions during the 40-scale rough grading plan review.

All recommendations that are contained in our previous reports (Leighton, 2007, 2008) remain applicable.

7.0 111 STATEMENT

Provided that the recommendations in this report are implemented, it is Leighton's opinion that the planned alternatives used as the base of the attached Preliminary Geotechnical Map (Plates 1 and 2), will be safe from the hazards of landslide, settlement, or slippage, and that the completed grading and proposed development will not adversely affect the stability of adjacent properties.

8.0 LIMITATIONS

Leighton's professional observations and recommendations presented in this report are based on the review of previously issued reports and available geotechnical literature and hazard mapping, and engineering analyses. Leighton's work was performed using the degree of care and skill ordinarily exercised by the geotechnical profession at this time and locality. No other warranty, either expressed or implied, is made as to the conclusions and professional opinions presented in this report.

The conclusions and recommendations in this report are based in part upon necessarily limited data . Such information can be obtained only with respect to the specific locations explored, and therefore may not completely define all subsurface conditions throughout the site. The nature of many sites is that differing geotechnical or geological conditions can occur within small distances and under varying climatic conditions. Furthermore, changes in subsurface conditions can and do occur over time, whether they be due to natural processes and events, or to human activities on this, or adjacent, sites.

Considering the limited scope of the investigation, the presented conclusions and recommendations should be considered preliminary and subject to revision. Additional explorations, testing, and analyses should be performed prior to finalizing the design for the development. Conditions revealed in future investigations and during grading excavations may be at variance with preliminary findings. If this occurs, the changed conditions should be evaluated by the geotechnical consultant and additional recommendations obtained, as warranted. Changes in applicable or appropriate codes and standards of practice may occur, whether they result from legislation or the broadening of knowledge. Accordingly, this report may become wholly or partially invalid by changes outside Leighton's control.

This report is issued with the understanding that it is the responsibility of the owner, or of his representative, to ensure that the information and recommendations contained herein are brought to the attention of the necessary design consultants for the project and incorporated into the project plans and specifications for the planned development.

The identification and testing of hazardous, toxic or contaminated materials were outside the scope of Leighton's work. Should such materials be encountered at any time, or their existence be suspected, all measures stipulated in Local, County, State and Federal regulations, as applicable, should be implemented.

This report is intended only for the use of the Newhall Land and Farming Company and their design consultants in the planning and preliminary design of the subject development.

9.0 CLOSURE

If parties other than Leighton are engaged to provide construction geotechnical services, they must be notified that they will be required to assume complete responsibility for the geotechnical phase of the project by concurring with the findings and recommendations in this report or by providing alternative recommendations.

Any persons using this report for bidding or construction purposes should perform such independent investigations as they deem necessary to satisfy themselves as to the surface and subsurface conditions to be encountered and the procedures to be used in the performance of work on the subject site.

APPENDIX A

REFERENCES

APPENDIX A

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APPENDIX B

LOS ANGELES COUNTY REVIEW SHEETS

County of Los Angeles Department of Public Works
GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION
GEOLOGIC REVIEW SHEET
900 So. Fremont Ave., Alhambra, CA 91803
TEL. (626) 458-4925

DISTRIBUTION
1 Geologist
__ Soils Engineer
1 GMED File
1 Subdivision

TENTATIVE TRACT MAP 61105
SUBDIVIDER Newhall Land & Farming Company
ENGINEER Psomas
GEOLOGIST & SOILS ENGINEER A.E. Seward Eng. Geol., Inc.

TENTATIVE MAP DATED 10/16/07 (Revised)
LOCATION Castaic Junction
GRADING BY SUBDIVIDER [Y] (Y or N)
REPORT DATE 3/13/08, 12/4/07, 6/13/05, 12/22/04, 7/22/04, 7/20/04

Other report(s) reviewed: 3/11/08, 11/26/07 (Leighton & Associates, Inc.)

TENTATIVE MAP FEASIBILITY IS RECOMMENDED FOR APPROVAL FROM A GEOLOGIC STANDPOINT

THE FOLLOWING CONDITIONS MUST BE FULFILLED:

1. The final map must be approved by the Geotechnical and Materials Engineering Division (GMED) to assure that all geotechnical requirements have been properly depicted. For Final Map clearance guidelines refer to GS051.0 in the Manual for Preparation of Geotechnical Reports (http://www.dpw.lacounty.gov/gmed/manual.pdf).

2. A grading plan must be geotechnically approved by the GMED prior to Final Map approval. The grading depicted on the plan must agree with the grading depicted on the tentative tract or parcel map and the conditions approved by the Planning Commission. If the subdivision is to be recorded prior to the completion and acceptance of grading, corrective geologic bonds may be required.

3. Prior to grading plan approval a detailed engineering geology and soils engineering report must be submitted that addresses the proposed grading. All recommendations of the geotechnical consultants must be incorporated into the plan (Refer to the Manual for Preparation of Geotechnical Reports at http://www.dpw.lacounty.gov/gmed/manual.pdf).

4. All geologic hazards associated with this proposed development must be eliminated. Alternatively, the geologic hazards may be designated as restricted use areas (RUA), and their boundaries delineated on the Final Map. These RUAs must be approved by the GMED, and the subdivider must dedicate to the County the right to prohibit the erection of buildings or other structures within the restricted use areas (refer to GS063.0 in the manual for preparation of Geotechnical Reports).

5. The Soils Engineering review dated 4/4/08 is attached.

Prepared by _____ Reviewed by _____ Date 3/31/08
Geir Mathisen

Please complete a Customer Service Survey at http://dpw.lacounty.gov/go/gmedsurvey
P:\gmepub\Geology_Review\Geir\Review Sheets\District 8.2 (Santa Clarita)\Tracts\61105, TM12 APP.doc

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION

SOILS ENGINEERING REVIEW SHEET

Address: 900 S. Fremont Ave., Alhambra, CA 91803
Telephone: (626) 458-4925
Fax: (626) 458-4913

District Office 8.2
PCA GMPH
Sheet 1 of 1

DISTRIBUTION:
____ Drainage
____ Grading
____ Geo/Soils Central File
____ District Engineer
____ Geologist
____ Soils Engineer
____ Engineer/Architect

Tentative Tract Map	61105
Location	Castaic Junction
Developer/Owner	Newhall Land & Farming Co.
Engineer/Architect	Psomas
Soils Engineer	Allan E. Seward Engineering Geology, Inc. (04-2023-4)
Geologist	Allan E. Seward Engineering Geology, Inc.

Review of:

Tentative Map and Exhibit Dated by Regional Planning 10/16/07 (rev.)
Soils Engineering and Geologic Report Dated 7/22/04
Soils Engineering and Geologic Addenda Dated **3/13/08**, 12/4/07, 6/13/05, 12/22/04
Additional Soils Engineering and Geologic Reports by Leighton & Associates, Inc. Dated **3/11/08**, 11/26/07
Previous Review Sheet Dated 1/17/08

ACTION:

Tentative Map feasibility is recommended for approval, subject to condition below:

REMARKS:

At the grading plan stage, submit two sets of grading plans to the Soils Section for verification of compliance with County codes and policies.

NOTE(S) TO THE PLAN CHECKER/BUILDING AND SAFETY ENGINEER:

A. ON-SITE SOILS ARE CORROSIVE TO FERROUS MATERIALS.
B. PER THE SOILS ENGINEER, ON-SITE SOILS HAVE A LOW TO VERY HIGH EXPANSION POTENTIAL.
C. PER THE SOILS ENGINEER, DEWATERING SHALL BE PERFORMED FOR REMOVALS IN THE VICINITY OF BORINGS B-72E AND B-73E.
D. THE SOILS REPORT BY LEIGHTON & ASSOCIATES DATED 11/26/07 INDICATES THERE MAY BE ENVIRONMENTAL CONCERNS REGARDING THE ABANDONED OIL WELLS LOCATED WITHIN THE LIMITS AND NEAR THE PROPOSED SUBSTATION ALTERNATIVE 2 AND FILL DISPOSAL SITE.

REGISTERED PROFESSIONAL ENGINEER
JEREMY WAN
NO. C67563
EXP. 6/30/09
CIVIL
STATE OF CALIFORNIA

Prepared by _____ Date 4/4/08

Please complete a Customer Service Survey at http://dpw.lacounty.gov/go/gmedsurvey.

NOTICE: Public safety, relative to geotechnical subsurface exploration, shall be provided in accordance with current codes for excavations, inclusive of the Los Angeles County Code, Chapter 11.48, and the State of California, Title 8, Construction Safety Orders.

County of Los Angeles Department of Public Works
GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION
GEOLOGIC REVIEW SHEET
900 So. Fremont Ave., Alhambra, CA 91803
TEL. (626) 458-4925

DISTRIBUTION
1 Geologist
__ Soils Engineer
1 GMED File
1 Subdivision

TENTATIVE TRACT MAP 61105
SUBDIVIDER Newhall Land
ENGINEER Psomas
GEOLOGIST & SOILS ENGINEER A.E. Seward Eng. Geol., Inc.

TENTATIVE MAP DATED 10/16/07 (Revised)
LOCATION Castaic Junction
GRADING BY SUBDIVIDER [Y] (Y or N)
REPORT DATE 12/4/07, 6/13/05, 12/22/04, 7/22/04, 7/20/04

Other report(s) reviewed: 11/26/07 (Leighton & Associates, Inc.)

The Regional Planning Commission, developer, and engineer are advised that:

PRIOR TO RECOMMENDING APPROVAL OF THE TENTATIVE TRACT OR PARCEL MAP:

1. According to the Leighton report dated 11/26/07, the natural swales north of Substation Alternative 1 may have the potential for debris flow hazards. Provide mitigation recommendations as necessary. If grading is required to mitigate a potential hazard, then the required grading must be depicted on the Tentative Map. If catchment areas are required, the volume of debris required for containment must be determined, and the containment area must be shown on the Tentative Map.

2. The Soils Engineering review dated 1/17/08 is attached.

Prepared by _____ Reviewed by _____ Date 1/16/08
Geir Mathisen

Please complete a Customer Service Survey at http://dpw.lacounty.gov/go/gmedsurvey
P:\gmepub\Geology_Review\Geir\Review Sheets\District 8.2 (Santa Clarita)\Tracts\61105, TM11 NA.doc

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION

SOILS ENGINEERING REVIEW SHEET

Address:	900 S. Fremont Ave., Alhambra, CA 91803	District Office	8.2
Telephone:	(626) 458-4925	PCA	GMPH
Fax:	(626) 458-4913	Sheet 1 of 1	

Tentative Tract Map	61105
Location	Castaic Junction
Developer/Owner	Newhall Land & Farming Co.
Engineer/Architect	Psomas
Soils Engineer	Allan E. Seward Engineering Geology, Inc. (04-2023-4)
Geologist	Allan E. Seward Engineering Geology, Inc.

DISTRIBUTION:
___ Drainage
___ Grading
___ Geo/Soils Central File
___ District Engineer
___ Geologist
___ Soils Engineer
___ Engineer/Architect

Review of:

Tentative Map and Exhibit Dated by Regional Planning 10/16/07 (rev.)
Soils Engineering and Geologic Report Dated 7/22/04
Soils Engineering and Geologic Addenda Dated **12/4/07**, 6/13/05, 12/22/04
Additional Soils Engineering and Geologic Report by Leighton & Associates, Inc. Dated **11/26/07**
Previous Review Sheet Dated 11/15/07

ACTION:

Tentative Map feasibility is not recommended for approval.

REMARKS:

1. Page 12 of the Leighton & Associates soils report dated 11/26/07 states that the natural swales north of Substation Alternative 1 may have the potential for debris flow hazards. Therefore, provide surficial slope stability analyses for the natural swales north of Substation Alternative 1. Recommend mitigation if factors of safety are below County minimum standards.

2. Show all recommended mitigation measures on the geotechnical map, as necessary.

3. Requirements of the Geology Section are attached.

4. Include a copy of this review sheet with your response.

NOTE(S) TO THE PLAN CHECKER/BUILDING AND SAFETY ENGINEER:
A. ONSITE SOILS ARE CORROSIVE TO FERROUS MATERIALS.
B. PER THE SOILS ENGINEER, ON-SITE SOILS HAVE A LOW TO VERY HIGH EXPANSION POTENTIAL.
C. PER THE SOILS ENGINEER, DEWATERING SHALL BE PERFORMED FOR REMOVALS IN THE VICINITY OF BORINGS B-72E AND B-73E.
D. THE SOILS REPORT BY LEIGHTON & ASSOCIATES DATED 11/26/07 INDICATES THERE MAY BE ENVIRONMENTAL CONCERNS REGARDING THE ABANDONED OIL WELLS LOCATED WITHIN THE LIMITS AND NEAR THE PROPOSED SUBSTATION ALTERNATIVE 2 AND FILL DISPOSAL SITE.

REGISTERED PROFESSIONAL ENGINEER
JEREMY WAN
NO. C67563
EXP. 6/30/09
CIVIL
STATE OF CALIFORNIA

Prepared by Jeremy Wan Date 1/17/08

Please complete a Customer Service Survey at http://dpw.lacounty.gov/dpw/gmedsurvey.
NOTICE: Public safety, relative to geotechnical subsurface exploration, shall be provided in accordance with current codes for excavations, inclusive of the Los Angeles County Code, Chapter 11.48, and the State of California, Title 8, Construction Safety Orders.
P:\gmepub\Soils Review\Jeremy\TR 61105, Castaic Junction, TTM-NA_11.doc

APPENDIX C

SLOPE STABILITY ANALYSIS

APPENDIX C

Slope Stability Analyses

General

Five geotechnical cross-sections drawn through representative slopes (SA 1-3, SA 1-4, SA1-5, SA 2-3, and SA 2-4) were analyzed. The sections were drawn to reflect the anticipated geologic conditions and other potentially adverse conditions. The shear strengths of the materials were based on the design strength parameters presented by Leighton (2007).

Shear Strength Parameters

The shear strengths of the materials were based on the design strength parameters presented by Leighton (2007). Details and results of the tests are presented in Appendix C. The shear strength parameters used for the slope stability analyses are shown in Table C-1. Ultimate and peak shear strength values were used for static and pseudo-static condition, respectively. The shear strength values used for the fill materials should be verified during construction.

Stability Analysis

The slope stability analyses were performed using the computer program GSTABL7 with STEDwin version 2. The calculation of the factor of safety against instability of a slope was performed using the Modified Bishop Method. Under static conditions, the minimum factor of safety of 1.5 was used. Under pseudo-static conditions, the minimum factor of safety of 1.1 and a horizontal seismic coefficient of 0.15g.

Results are summarized in Table C-2 and attached at the end of this appendix. The most critical failure surface at each slope is illustrated on Plate 3. Based on our analyses, all design slopes are stable under static and pseudo-static conditions. The natural slope along the north side of the alternatives requires a structural setback.

TABLE C-1

Design Shear Strength Parameters for Slope Stability Analyses*

Material	Static		Pseudo-static		Saturated Bulk Density (pcf)
	Cohesion (psf)	Angle of Internal Friction (degrees)	Cohesion (psf)	Angle of Internal Friction (degrees)	
Alluvium (Qal)	100	34	150	35	125
Fill (assumed for analyses)	200	29	250	30	125
Bedrock					
Pico Formation (Tp)					
Sandstone					
Along Bedding	150	28	150	28	130
Cross Bedding	200	32	600	38	
Siltstone					
Along Bedding	150	28	150	28	130
Cross Bedding	500	32	700	36	

*from Leighton, 2007

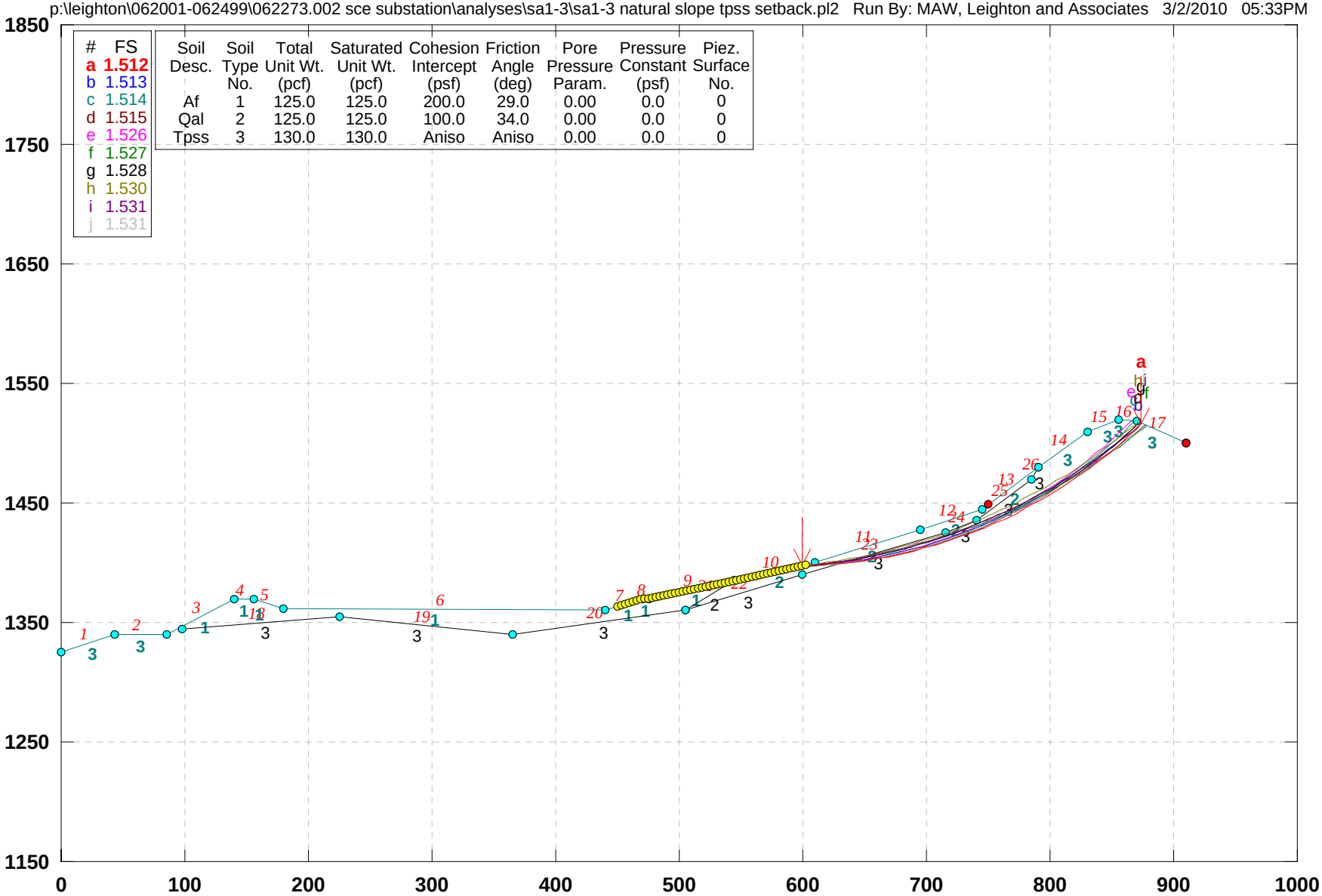
TABLE C-2

Slope Stability Analysis Summary

Cross-Section	Condition	Factor of Safety		Remarks
		Static	Pseudo-static	
SA1-3	Cut Slope Tp-Sandstone	1.51	1.61	Structural Setback Recommended
SA1-4	Natural Slope Tp-Sandstone	1.50	1.69	Structural Setback Recommended
SA1-5	Cut Slope Tp-Sandstone	1.78	1.76	Stable as Proposed
SA2-3	Fill Slope	1.83	1.41	Stable as Proposed
	Cut Slope Tp-Sandstone	1.90	1.88	Stable as Proposed
SA2-4	Cut Slope Tp-Sandstone	1.81	1.78	Stable as Proposed

SCE Substation, Mission Village 062273002 SA1-3 Natural Slope Tpss Setback

p:\leighton\062001-062499\062273.002 sce substation\analyses\sa1-3\sa1-3 natural slope tpss setback.pl2 Run By: MAW, Leighton and Associates 3/2/2010 05:33PM



#	FS
a	1.512
b	1.513
c	1.514
d	1.515
e	1.526
f	1.527
g	1.528
h	1.530
i	1.531
j	1.531

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Af	1	125.0	125.0	200.0	29.0	0.00	0.0	0
Qal	2	125.0	125.0	100.0	34.0	0.00	0.0	0
Tpss	3	130.0	130.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=1.512

Safety Factors Are Calculated By The Modified Bishop Method

```
                                  ***  GSTABL7  ***
                            ** GSTABL7 by Garry H. Gregory, P.E. **
      ** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **
                   (All Rights Reserved-Unauthorized Use Prohibited)
    ******************************************************************************
                          SLOPE STABILITY ANALYSIS SYSTEM
           Modified Bishop, Simplified Janbu, or GLE Method of Slices.
           (Includes Spencer & Morgenstern-Price Type Analysis)
           Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
           Nonlinear Undrained Shear Strength, Curved Phi Envelope,
           Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
           Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
    ******************************************************************************
    Analysis Run Date:        3/2/2010
    Time of Run:              05:33PM
    Run By:                   MAW, Leighton and Associates
    Input Data Filename:      P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA1-3\sa1-3 natural slope tpss setback.in
    Output Filename:          P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA1-3\sa1-3 natural slope tpss setback.OUT
    Unit System:              English
    Plotted Output Filename:  P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA1-3\sa1-3 natural slope tpss setback.PLT
    PROBLEM DESCRIPTION:  SCE Substation, Mission Village 06227300
                          2 SA1-3 Natural Slope Tpss Setback
    BOUNDARY COORDINATES
       17 Top   Boundaries
       26 Total Boundaries
    Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
       No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
        1          0.00    1325.00      43.00    1340.00        3
        2         43.00    1340.00      85.00    1340.00        3
        3         85.00    1340.00     140.00    1370.00        1
        4        140.00    1370.00     156.00    1370.00        1
        5        156.00    1370.00     180.00    1362.00        1
        6        180.00    1362.00     440.00    1360.00        1
        7        440.00    1360.00     470.00    1370.00        1
        8        470.00    1370.00     475.00    1370.00        1
        9        475.00    1370.00     545.00    1385.00        1
       10        545.00    1385.00     610.10    1400.00        2
       11        610.10    1400.00     695.00    1428.00        2
       12        695.00    1428.00     745.00    1445.00        2
       13        745.00    1445.00     790.00    1480.00        2
       14        790.00    1480.00     830.00    1510.00        3
       15        830.00    1510.00     855.00    1520.00        3
       16        855.00    1520.00     870.00    1518.00        3
       17        870.00    1518.00     910.00    1500.00        3
       18         98.00    1345.00     225.00    1355.00        3
       19        225.00    1355.00     365.00    1340.00        3
       20        365.00    1340.00     505.00    1360.00        3
       21        505.00    1360.00     545.00    1385.00        2
       22        505.00    1360.00     600.00    1390.00        3
       23        600.00    1390.00     715.00    1425.00        3
       24        715.00    1425.00     740.00    1435.00        3
       25        740.00    1435.00     785.00    1470.00        3
       26        785.00    1470.00     790.00    1480.00        3
    User Specified Y-Origin =      1150.00(ft)
    Default X-Plus Value = 0.00(ft)
    Default Y-Plus Value = 0.00(ft)
   ISOTROPIC SOIL PARAMETERS
     3 Type(s) of Soil
    Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
    Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
     No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
      1   125.0    125.0     200.0     29.0    0.00       0.0      0
      2   125.0    125.0     100.0     34.0    0.00       0.0      0
      3   130.0    130.0     200.0     32.0    0.00       0.0      0
```



```
ANISOTROPIC STRENGTH PARAMETERS
     1 soil type(s)
 Soil Type  3 Is Anisotropic
 Number Of Direction Ranges Specified =  4
 Direction    Counterclockwise     Cohesion     Friction
   Range       Direction Limit    Intercept       Angle
    No.            (deg)            (psf)         (deg)
     1            -90.0             200.00         32.00
     2            -45.0             200.00         32.00
     3            -35.0             150.00         28.00
     4             90.0             200.00         32.00
 ANISOTROPIC SOIL NOTES:
    (1) An input value of 0.01 for C and/or Phi will cause Aniso
        C and/or Phi to be ignored in that range.
    (2) An input value of 0.02 for Phi will set both Phi and
        C equal to zero, with no water weight in the tension crack.
    (3) An input value of 0.03 for Phi will set both Phi and
        C equal to zero, with water weight in the tension crack.
 Specified Peak Ground Acceleration Coefficient (A) =   0.700(g)
 Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
 Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
 Specified Seismic Pore-Pressure Factor =   0.000
 EARTHQUAKE DATA HAS BEEN SUPPRESSED
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
 5000 Trial Surfaces Have Been Generated.
   10 Surface(s) Initiate(s) From Each Of   500 Points Equally Spaced
 Along The Ground Surface Between  X = 450.00(ft)
                                 and  X = 605.00(ft)
 Each Surface Terminates Between   X = 750.00(ft)
                                 and   X = 910.00(ft)
 Unless Further Limitations Were Imposed, The Minimum Elevation
 At Which A Surface Extends Is  Y =      0.00(ft)
 10.00(ft) Line Segments Define Each Trial Failure Surface.
 Following Are Displayed The Ten Most Critical Of The Trial
       Failure Surfaces Evaluated. They Are
       Ordered - Most Critical First.
       * * Safety Factors Are Calculated By The Modified Bishop Method * *
       Total Number of Trial Surfaces Attempted =  5000
       Number of Trial Surfaces With Valid FS = 5000
       Statistical Data On All Valid FS Values:
          FS Max =   3.850   FS Min =   1.512   FS Ave =   2.409
          Standard Deviation =    0.489   Coefficient of Variation =   20.28 %
       Failure Surface Specified By 32 Coordinate Points
         Point      X-Surf      Y-Surf
          No.        (ft)        (ft)
           1        600.024     1397.678
           2        610.018     1398.017
           3        620.000     1398.609
           4        629.965     1399.453
           5        639.905     1400.548
           6        649.813     1401.895
           7        659.685     1403.492
           8        669.513     1405.337
           9        679.292     1407.431
          10        689.014     1409.771
          11        698.674     1412.357
          12        708.266     1415.185
          13        717.783     1418.256
          14        727.219     1421.566
          15        736.568     1425.113
          16        745.825     1428.896
          17        754.984     1432.912
          18        764.038     1437.158
          19        772.981     1441.631
          20        781.809     1446.329
          21        790.515     1451.249
```

22	799.094	1456.388
23	807.540	1461.742
24	815.848	1467.307
25	824.012	1473.081
26	832.028	1479.060
27	839.891	1485.239
28	847.594	1491.615
29	855.134	1498.184
30	862.506	1504.941
31	869.704	1511.883
32	873.972	1516.213

Circle Center At X = 591.656 ; Y = 1792.850 ; and Radius = 395.261

Factor of Safety

*** 1.512 ***

Individual data on the 42 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	10.0	1226.7	0.0	0.0	0.	0.	0.0	0.0	0.0
2	0.1	20.2	0.0	0.0	0.	0.	0.0	0.0	0.0
3	9.9	4105.0	0.0	0.0	0.	0.	0.0	0.0	0.0
4	10.0	7320.5	0.0	0.0	0.	0.	0.0	0.0	0.0
5	1.7	1563.3	0.0	0.0	0.	0.	0.0	0.0	0.0
6	8.2	8645.2	0.0	0.0	0.	0.	0.0	0.0	0.0
7	9.9	12806.1	0.0	0.0	0.	0.	0.0	0.0	0.0
8	9.9	15042.9	0.0	0.0	0.	0.	0.0	0.0	0.0
9	9.8	16915.7	0.0	0.0	0.	0.	0.0	0.0	0.0
10	9.8	18423.9	0.0	0.0	0.	0.	0.0	0.0	0.0
11	9.7	19568.5	0.0	0.0	0.	0.	0.0	0.0	0.0
12	6.0	12524.0	0.0	0.0	0.	0.	0.0	0.0	0.0
13	3.7	7836.8	0.0	0.0	0.	0.	0.0	0.0	0.0
14	9.6	20882.7	0.0	0.0	0.	0.	0.0	0.0	0.0
15	6.7	14892.8	0.0	0.0	0.	0.	0.0	0.0	0.0
16	2.8	6183.0	0.0	0.0	0.	0.	0.0	0.0	0.0
17	9.4	20952.3	0.0	0.0	0.	0.	0.0	0.0	0.0
18	9.3	20500.3	0.0	0.0	0.	0.	0.0	0.0	0.0
19	3.4	7395.9	0.0	0.0	0.	0.	0.0	0.0	0.0
20	5.0	10618.2	0.0	0.0	0.	0.	0.0	0.0	0.0
21	0.8	1755.2	0.0	0.0	0.	0.	0.0	0.0	0.0
22	9.2	21507.3	0.0	0.0	0.	0.	0.0	0.0	0.0
23	9.1	24736.2	0.0	0.0	0.	0.	0.0	0.0	0.0
24	8.9	27503.5	0.0	0.0	0.	0.	0.0	0.0	0.0
25	8.8	29815.0	0.0	0.0	0.	0.	0.0	0.0	0.0
26	3.2	11369.0	0.0	0.0	0.	0.	0.0	0.0	0.0
27	5.0	18455.0	0.0	0.0	0.	0.	0.0	0.0	0.0
28	0.5	1946.4	0.0	0.0	0.	0.	0.0	0.0	0.0
29	8.6	33216.9	0.0	0.0	0.	0.	0.0	0.0	0.0
30	8.4	33952.8	0.0	0.0	0.	0.	0.0	0.0	0.0
31	8.3	34287.0	0.0	0.0	0.	0.	0.0	0.0	0.0
32	8.2	34233.9	0.0	0.0	0.	0.	0.0	0.0	0.0
33	6.0	25251.6	0.0	0.0	0.	0.	0.0	0.0	0.0
34	2.0	8465.1	0.0	0.0	0.	0.	0.0	0.0	0.0
35	7.9	30902.8	0.0	0.0	0.	0.	0.0	0.0	0.0
36	7.7	27109.9	0.0	0.0	0.	0.	0.0	0.0	0.0
37	7.4	22795.5	0.0	0.0	0.	0.	0.0	0.0	0.0
38	0.1	381.7	0.0	0.0	0.	0.	0.0	0.0	0.0
39	7.4	17180.2	0.0	0.0	0.	0.	0.0	0.0	0.0
40	7.2	9457.9	0.0	0.0	0.	0.	0.0	0.0	0.0
41	0.3	230.5	0.0	0.0	0.	0.	0.0	0.0	0.0
42	4.0	1501.7	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	599.713	1397.607
2	609.697	1398.181
3	619.663	1398.997

4	629.607	1400.055
5	639.522	1401.353
6	649.403	1402.892
7	659.244	1404.670
8	669.039	1406.686
9	678.782	1408.939
10	688.467	1411.427
11	698.089	1414.150
12	707.642	1417.106
13	717.121	1420.292
14	726.520	1423.707
15	735.833	1427.349
16	745.055	1431.216
17	754.181	1435.306
18	763.204	1439.615
19	772.121	1444.142
20	780.925	1448.885
21	789.612	1453.839
22	798.175	1459.003
23	806.611	1464.372
24	814.915	1469.945
25	823.080	1475.718
26	831.104	1481.686
27	838.980	1487.848
28	846.704	1494.199
29	854.272	1500.735
30	861.679	1507.453
31	868.922	1514.349
32	871.775	1517.201

Circle Center At X = 581.083 ; Y = 1809.237 ; and Radius = 412.052

Factor of Safety

*** 1.513 ***

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	601.577	1398.036
2	611.566	1398.495
3	621.540	1399.213
4	631.492	1400.191
5	641.416	1401.428
6	651.303	1402.922
7	661.149	1404.674
8	670.945	1406.682
9	680.686	1408.944
10	690.364	1411.459
11	699.974	1414.226
12	709.508	1417.241
13	718.961	1420.505
14	728.326	1424.013
15	737.595	1427.763
16	746.765	1431.754
17	755.827	1435.983
18	764.775	1440.446
19	773.605	1445.140
20	782.309	1450.063
21	790.882	1455.211
22	799.318	1460.581
23	807.612	1466.168
24	815.757	1471.970
25	823.748	1477.981
26	831.580	1484.199
27	839.247	1490.619
28	846.745	1497.236
29	854.067	1504.046
30	861.210	1511.045
31	868.168	1518.227
32	868.182	1518.242

Circle Center At X = 588.975 ; Y = 1781.740 ; and Radius = 383.911
Factor of Safety
*** 1.514 ***
Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	598.160	1397.249
2	608.152	1397.648
3	618.131	1398.298
4	628.090	1399.199
5	638.024	1400.351
6	647.925	1401.752
7	657.788	1403.403
8	667.606	1405.301
9	677.373	1407.447
10	687.083	1409.837
11	696.730	1412.471
12	706.307	1415.347
13	715.809	1418.464
14	725.230	1421.819
15	734.563	1425.410
16	743.802	1429.235
17	752.942	1433.292
18	761.978	1437.577
19	770.902	1442.089
20	779.710	1446.824
21	788.396	1451.779
22	796.954	1456.952
23	805.380	1462.338
24	813.667	1467.935
25	821.810	1473.739
26	829.805	1479.746
27	837.646	1485.953
28	845.328	1492.355
29	852.846	1498.948
30	860.196	1505.729
31	867.373	1512.693
32	871.786	1517.196

Circle Center At X = 587.373 ; Y = 1793.929 ; and Radius = 396.827
Factor of Safety
*** 1.515 ***
Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	599.092	1397.464
2	609.078	1397.982
3	619.048	1398.758
4	628.995	1399.791
5	638.911	1401.080
6	648.791	1402.625
7	658.628	1404.424
8	668.415	1406.476
9	678.146	1408.781
10	687.814	1411.335
11	697.413	1414.139
12	706.937	1417.189
13	716.378	1420.484
14	725.732	1424.021
15	734.991	1427.799
16	744.149	1431.814
17	753.201	1436.064
18	762.140	1440.547
19	770.961	1445.258
20	779.656	1450.196
21	788.222	1455.356
22	796.652	1460.736
23	804.940	1466.332

24	813.080	1472.139
25	821.069	1478.155
26	828.899	1484.375
27	836.566	1490.795
28	844.065	1497.410
29	851.391	1504.217
30	858.538	1511.211
31	865.503	1518.387
32	865.678	1518.576

Circle Center At X = 584.007 ; Y = 1784.620 ; and Radius = 387.450
Factor of Safety
*** 1.526 ***
Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	598.160	1397.249
2	608.111	1398.236
3	618.041	1399.422
4	627.944	1400.806
5	637.819	1402.386
6	647.659	1404.164
7	657.463	1406.137
8	667.225	1408.306
9	676.942	1410.668
10	686.609	1413.225
11	696.224	1415.973
12	705.782	1418.913
13	715.280	1422.043
14	724.713	1425.361
15	734.079	1428.867
16	743.372	1432.560
17	752.590	1436.436
18	761.729	1440.496
19	770.785	1444.738
20	779.754	1449.159
21	788.634	1453.758
22	797.420	1458.534
23	806.109	1463.483
24	814.697	1468.605
25	823.182	1473.898
26	831.560	1479.358
27	839.827	1484.985
28	847.980	1490.775
29	856.016	1496.727
30	863.931	1502.838
31	871.723	1509.106
32	878.028	1514.387

Circle Center At X = 553.674 ; Y = 1896.436 ; and Radius = 501.165
Factor of Safety
*** 1.527 ***
Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	594.122	1396.318
2	604.079	1397.249
3	614.014	1398.386
4	623.923	1399.729
5	633.803	1401.277
6	643.648	1403.031
7	653.454	1404.988
8	663.218	1407.149
9	672.935	1409.512
10	682.601	1412.076
11	692.211	1414.841
12	701.762	1417.804
13	711.249	1420.966
14	720.668	1424.323

15	730.016	1427.876
16	739.288	1431.622
17	748.480	1435.559
18	757.588	1439.687
19	766.609	1444.003
20	775.538	1448.505
21	784.372	1453.192
22	793.106	1458.061
23	801.738	1463.111
24	810.263	1468.339
25	818.677	1473.742
26	826.977	1479.319
27	835.160	1485.068
28	843.221	1490.985
29	851.158	1497.068
30	858.967	1503.315
31	866.644	1509.723
32	874.056	1516.175

Circle Center At X = 554.311 ; Y = 1876.133 ; and Radius = 481.464

Factor of Safety

*** 1.528 ***

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	598.160	1397.249
2	608.089	1398.439
3	617.992	1399.829
4	627.865	1401.419
5	637.704	1403.206
6	647.504	1405.192
7	657.263	1407.375
8	666.976	1409.753
9	676.640	1412.327
10	686.249	1415.094
11	695.801	1418.055
12	705.291	1421.208
13	714.715	1424.551
14	724.071	1428.083
15	733.353	1431.802
16	742.559	1435.708
17	751.684	1439.799
18	760.725	1444.072
19	769.678	1448.527
20	778.539	1453.161
21	787.306	1457.972
22	795.974	1462.959
23	804.539	1468.120
24	812.999	1473.452
25	821.350	1478.953
26	829.588	1484.621
27	837.711	1490.454
28	845.714	1496.450
29	853.595	1502.605
30	861.351	1508.918
31	868.977	1515.386
32	871.283	1517.423

Circle Center At X = 544.075 ; Y = 1890.624 ; and Radius = 496.331

Factor of Safety

*** 1.530 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	595.054	1396.533
2	604.999	1397.582
3	614.921	1398.825
4	624.817	1400.262
5	634.684	1401.891

6	644.516	1403.713
7	654.312	1405.727
8	664.066	1407.931
9	673.775	1410.325
10	683.435	1412.909
11	693.043	1415.681
12	702.596	1418.640
13	712.088	1421.784
14	721.518	1425.114
15	730.880	1428.627
16	740.173	1432.322
17	749.391	1436.198
18	758.532	1440.254
19	767.592	1444.486
20	776.567	1448.896
21	785.455	1453.479
22	794.251	1458.235
23	802.953	1463.162
24	811.557	1468.258
25	820.060	1473.521
26	828.459	1478.949
27	836.750	1484.541
28	844.930	1490.292
29	852.996	1496.203
30	860.946	1502.270
31	868.775	1508.491
32	876.481	1514.864
33	876.649	1515.008

Circle Center At X = 546.312 ; Y = 1906.284 ; and Radius = 512.076

Factor of Safety

*** 1.531 ***

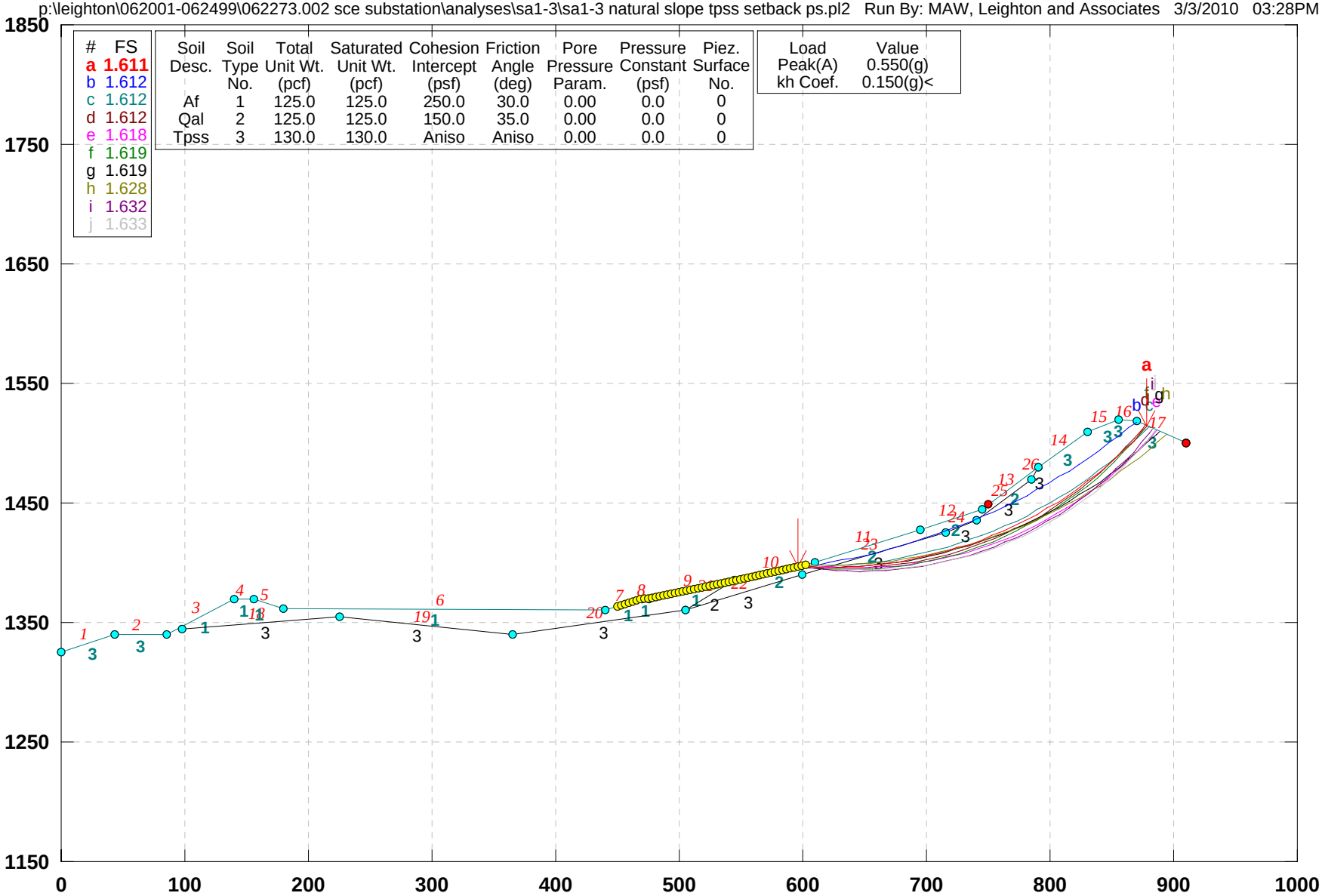
Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	590.084	1395.388
2	600.071	1395.902
3	610.044	1396.641
4	619.997	1397.605
5	629.926	1398.793
6	639.826	1400.204
7	649.692	1401.839
8	659.518	1403.695
9	669.300	1405.772
10	679.032	1408.070
11	688.711	1410.586
12	698.330	1413.320
13	707.885	1416.270
14	717.371	1419.434
15	726.783	1422.812
16	736.117	1426.401
17	745.367	1430.199
18	754.530	1434.205
19	763.599	1438.417
20	772.572	1442.832
21	781.443	1447.448
22	790.207	1452.263
23	798.861	1457.275
24	807.400	1462.480
25	815.818	1467.876
26	824.114	1473.461
27	832.281	1479.232
28	840.316	1485.185
29	848.214	1491.317
30	855.973	1497.627
31	863.587	1504.109
32	871.053	1510.762
33	875.947	1515.324

```
Circle Center At X =   572.277 ; Y =  1838.562 ; and Radius =   443.532
       Factor of Safety
      ***    1.531   ***
          **** END OF GSTABL7 OUTPUT ****
```

SCE Substation, Mission Village 062273002 SA1-3 Natural Slope Tpss Pseudostatic

p:\leighton\062001-062499\062273.002 sce substation\analyses\sa1-3\sa1-3 natural slope tpss setback ps.pl2 Run By: MAW, Leighton and Associates 3/3/2010 03:28PM



#	FS
a	1.611
b	1.612
c	1.612
d	1.612
e	1.618
f	1.619
g	1.619
h	1.628
i	1.632
j	1.633

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Af	1	125.0	125.0	250.0	30.0	0.00	0.0	0
Qal	2	125.0	125.0	150.0	35.0	0.00	0.0	0
Tpss	3	130.0	130.0	Aniso	Aniso	0.00	0.0	0

Load	Value
Peak(A)	0.550(g)
kh Coef.	0.150(g)<

GSTABL7 v.2 FSmin=1.611

Safety Factors Are Calculated By The Modified Bishop Method

```
                                  ***  GSTABL7  ***
                          ** GSTABL7 by Garry H. Gregory, P.E. **
      ** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **
                 (All Rights Reserved-Unauthorized Use Prohibited)
    ******************************************************************************
                         SLOPE STABILITY ANALYSIS SYSTEM
           Modified Bishop, Simplified Janbu, or GLE Method of Slices.
           (Includes Spencer & Morgenstern-Price Type Analysis)
           Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
           Nonlinear Undrained Shear Strength, Curved Phi Envelope,
           Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
           Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
    ******************************************************************************
    Analysis Run Date:        3/3/2010
    Time of Run:              03:28PM
    Run By:                   MAW, Leighton and Associates
    Input Data Filename:      P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA1-3\sa1-3 natural slope tpss setback ps.in
    Output Filename:          P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA1-3\sa1-3 natural slope tpss setback ps.OUT
    Unit System:              English
    Plotted Output Filename:  P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA1-3\sa1-3 natural slope tpss setback ps.PLT
    PROBLEM DESCRIPTION:  SCE Substation, Mission Village 06227300
                          2 SA1-3 Natural Slope Tpss Pseudostatic
    BOUNDARY COORDINATES
       17 Top   Boundaries
       26 Total Boundaries
    Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
       No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
        1          0.00    1325.00      43.00    1340.00        3
        2         43.00    1340.00      85.00    1340.00        3
        3         85.00    1340.00     140.00    1370.00        1
        4        140.00    1370.00     156.00    1370.00        1
        5        156.00    1370.00     180.00    1362.00        1
        6        180.00    1362.00     440.00    1360.00        1
        7        440.00    1360.00     470.00    1370.00        1
        8        470.00    1370.00     475.00    1370.00        1
        9        475.00    1370.00     545.00    1385.00        1
       10        545.00    1385.00     610.10    1400.00        2
       11        610.10    1400.00     695.00    1428.00        2
       12        695.00    1428.00     745.00    1445.00        2
       13        745.00    1445.00     790.00    1480.00        2
       14        790.00    1480.00     830.00    1510.00        3
       15        830.00    1510.00     855.00    1520.00        3
       16        855.00    1520.00     870.00    1518.00        3
       17        870.00    1518.00     910.00    1500.00        3
       18         98.00    1345.00     225.00    1355.00        3
       19        225.00    1355.00     365.00    1340.00        3
       20        365.00    1340.00     505.00    1360.00        3
       21        505.00    1360.00     545.00    1385.00        2
       22        505.00    1360.00     600.00    1390.00        3
       23        600.00    1390.00     715.00    1425.00        3
       24        715.00    1425.00     740.00    1435.00        3
       25        740.00    1435.00     785.00    1470.00        3
       26        785.00    1470.00     790.00    1480.00        3
    User Specified Y-Origin =      1150.00(ft)
    Default X-Plus Value = 0.00(ft)
    Default Y-Plus Value = 0.00(ft)
   ISOTROPIC SOIL PARAMETERS
     3 Type(s) of Soil
    Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
    Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
     No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
      1   125.0    125.0     250.0     30.0    0.00       0.0      0
      2   125.0    125.0     150.0     35.0    0.00       0.0      0
      3   130.0    130.0     600.0     38.0    0.00       0.0      0
```



```
ANISOTROPIC STRENGTH PARAMETERS
     1 soil type(s)
 Soil Type  3 Is Anisotropic
 Number Of Direction Ranges Specified =  4
 Direction    Counterclockwise     Cohesion     Friction
   Range       Direction Limit    Intercept       Angle
    No.            (deg)            (psf)         (deg)
     1            -90.0             600.00         38.00
     2            -45.0             600.00         38.00
     3            -35.0             150.00         28.00
     4             90.0             600.00         38.00
 ANISOTROPIC SOIL NOTES:
    (1) An input value of 0.01 for C and/or Phi will cause Aniso
        C and/or Phi to be ignored in that range.
    (2) An input value of 0.02 for Phi will set both Phi and
        C equal to zero, with no water weight in the tension crack.
    (3) An input value of 0.03 for Phi will set both Phi and
        C equal to zero, with water weight in the tension crack.
 Specified Peak Ground Acceleration Coefficient (A) =   0.550(g)
 Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
 Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
 Specified Seismic Pore-Pressure Factor =   0.000
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
 5000 Trial Surfaces Have Been Generated.
   10 Surface(s) Initiate(s) From Each Of   500 Points Equally Spaced
 Along The Ground Surface Between  X = 450.00(ft)
                                  and  X = 605.00(ft)
 Each Surface Terminates Between   X = 750.00(ft)
                                  and   X = 910.00(ft)
 Unless Further Limitations Were Imposed, The Minimum Elevation
 At Which A Surface Extends Is  Y =      0.00(ft)
 10.00(ft) Line Segments Define Each Trial Failure Surface.
 Following Are Displayed The Ten Most Critical Of The Trial
       Failure Surfaces Evaluated. They Are
       Ordered - Most Critical First.
       * * Safety Factors Are Calculated By The Modified Bishop Method * *
       Total Number of Trial Surfaces Attempted =  5000
       Number of Trial Surfaces With Valid FS = 5000
       Statistical Data On All Valid FS Values:
          FS Max =   3.251   FS Min =   1.611   FS Ave =   2.261
          Standard Deviation =    0.377   Coefficient of Variation =   16.67 %
       Failure Surface Specified By 33 Coordinate Points
         Point      X-Surf      Y-Surf
          No.        (ft)        (ft)
           1        596.607     1396.891
           2        606.591     1396.326
           3        616.587     1396.055
           4        626.587     1396.078
           5        636.582     1396.394
           6        646.564     1397.004
           7        656.523     1397.907
           8        666.451     1399.103
           9        676.340     1400.589
          10        686.181     1402.366
          11        695.965     1404.431
          12        705.685     1406.782
          13        715.331     1409.419
          14        724.896     1412.337
          15        734.370     1415.536
          16        743.747     1419.011
          17        753.018     1422.760
          18        762.174     1426.781
          19        771.208     1431.068
          20        780.112     1435.619
          21        788.879     1440.430
          22        797.501     1445.497
```

23	805.970	1450.814
24	814.279	1456.378
25	822.421	1462.184
26	830.389	1468.227
27	838.175	1474.501
28	845.774	1481.001
29	853.179	1487.722
30	860.383	1494.658
31	867.381	1501.802
32	874.165	1509.148
33	878.529	1514.162

Circle Center At X = 620.816 ; Y = 1736.294 ; and Radius = 340.266

Factor of Safety

*** 1.611 ***

Individual data on the 43 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	10.0	1787.9	0.0	0.0	0.	0.	268.2	0.0	0.0
2	3.5	1455.0	0.0	0.0	0.	0.	218.2	0.0	0.0
3	6.5	3995.2	0.0	0.0	0.	0.	599.3	0.0	0.0
4	3.3	2761.8	0.0	0.0	0.	0.	414.3	0.0	0.0
5	6.7	6924.6	0.0	0.0	0.	0.	1038.7	0.0	0.0
6	10.0	13724.3	0.0	0.0	0.	0.	2058.6	0.0	0.0
7	10.0	17366.0	0.0	0.0	0.	0.	2604.9	0.0	0.0
8	10.0	20592.2	0.0	0.0	0.	0.	3088.8	0.0	0.0
9	9.9	23394.3	0.0	0.0	0.	0.	3509.1	0.0	0.0
10	9.9	25766.0	0.0	0.0	0.	0.	3864.9	0.0	0.0
11	9.8	27703.6	0.0	0.0	0.	0.	4155.5	0.0	0.0
12	8.8	26259.2	0.0	0.0	0.	0.	3938.9	0.0	0.0
13	1.0	2947.2	0.0	0.0	0.	0.	442.1	0.0	0.0
14	9.7	30345.6	0.0	0.0	0.	0.	4551.8	0.0	0.0
15	9.3	30020.6	0.0	0.0	0.	0.	4503.1	0.0	0.0
16	0.3	1080.7	0.0	0.0	0.	0.	162.1	0.0	0.0
17	9.6	31452.5	0.0	0.0	0.	0.	4717.9	0.0	0.0
18	9.5	31403.3	0.0	0.0	0.	0.	4710.5	0.0	0.0
19	5.6	18616.8	0.0	0.0	0.	0.	2792.5	0.0	0.0
20	3.7	12340.3	0.0	0.0	0.	0.	1851.0	0.0	0.0
21	1.3	4117.0	0.0	0.0	0.	0.	617.5	0.0	0.0
22	8.0	27874.9	0.0	0.0	0.	0.	4181.2	0.0	0.0
23	9.2	35461.1	0.0	0.0	0.	0.	5319.2	0.0	0.0
24	9.0	38417.6	0.0	0.0	0.	0.	5762.6	0.0	0.0
25	8.9	40824.9	0.0	0.0	0.	0.	6123.7	0.0	0.0
26	4.9	23518.7	0.0	0.0	0.	0.	3527.8	0.0	0.0
27	3.9	19218.4	0.0	0.0	0.	0.	2882.8	0.0	0.0
28	1.1	5650.4	0.0	0.0	0.	0.	847.6	0.0	0.0
29	7.5	38535.7	0.0	0.0	0.	0.	5780.3	0.0	0.0
30	8.5	44749.9	0.0	0.0	0.	0.	6712.5	0.0	0.0
31	8.3	44824.1	0.0	0.0	0.	0.	6723.6	0.0	0.0
32	8.1	44435.0	0.0	0.0	0.	0.	6665.2	0.0	0.0
33	7.6	41480.7	0.0	0.0	0.	0.	6222.1	0.0	0.0
34	0.4	2121.7	0.0	0.0	0.	0.	318.3	0.0	0.0
35	7.8	40844.4	0.0	0.0	0.	0.	6126.7	0.0	0.0
36	7.6	36589.8	0.0	0.0	0.	0.	5488.5	0.0	0.0
37	7.4	32179.4	0.0	0.0	0.	0.	4826.9	0.0	0.0
38	1.8	7346.4	0.0	0.0	0.	0.	1102.0	0.0	0.0
39	5.4	19297.9	0.0	0.0	0.	0.	2894.7	0.0	0.0
40	7.0	18725.8	0.0	0.0	0.	0.	2808.9	0.0	0.0
41	2.6	5092.5	0.0	0.0	0.	0.	763.9	0.0	0.0
42	4.2	5506.0	0.0	0.0	0.	0.	825.9	0.0	0.0
43	4.4	1979.2	0.0	0.0	0.	0.	296.9	0.0	0.0

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	591.637	1395.746
2	601.553	1397.043

3	611.442	1398.528
4	621.301	1400.201
5	631.127	1402.061
6	640.915	1404.107
7	650.663	1406.338
8	660.367	1408.754
9	670.023	1411.354
10	679.628	1414.138
11	689.178	1417.103
12	698.670	1420.248
13	708.101	1423.574
14	717.467	1427.078
15	726.765	1430.759
16	735.991	1434.616
17	745.142	1438.648
18	754.215	1442.853
19	763.207	1447.229
20	772.113	1451.776
21	780.932	1456.490
22	789.660	1461.372
23	798.293	1466.418
24	806.829	1471.627
25	815.265	1476.998
26	823.597	1482.527
27	831.822	1488.214
28	839.938	1494.057
29	847.942	1500.052
30	855.830	1506.198
31	863.600	1512.493
32	870.091	1517.959

Circle Center At X = 528.342 ; Y = 1918.283 ; and Radius = 526.356

Factor of Safety

*** 1.612 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	597.849	1397.177
2	607.849	1397.056
3	617.848	1397.199
4	627.839	1397.608
5	637.817	1398.282
6	647.772	1399.220
7	657.700	1400.422
8	667.592	1401.887
9	677.442	1403.614
10	687.242	1405.602
11	696.987	1407.849
12	706.668	1410.353
13	716.279	1413.114
14	725.814	1416.129
15	735.265	1419.395
16	744.627	1422.911
17	753.892	1426.674
18	763.054	1430.682
19	772.106	1434.931
20	781.042	1439.419
21	789.856	1444.143
22	798.542	1449.099
23	807.093	1454.283
24	815.504	1459.692
25	823.768	1465.323
26	831.880	1471.171
27	839.834	1477.232
28	847.624	1483.502
29	855.245	1489.976
30	862.692	1496.651
31	869.959	1503.520

32	877.041	1510.580
33	879.873	1513.557

Circle Center At X = 607.435 ; Y = 1773.958 ; and Radius = 376.902

Factor of Safety

*** 1.612 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	600.334	1397.750
2	610.285	1396.756
3	620.263	1396.090
4	630.257	1395.753
5	640.257	1395.745
6	650.252	1396.066
7	660.231	1396.716
8	670.183	1397.693
9	680.097	1398.998
10	689.963	1400.629
11	699.771	1402.583
12	709.508	1404.859
13	719.166	1407.454
14	728.732	1410.365
15	738.198	1413.590
16	747.553	1417.125
17	756.786	1420.965
18	765.888	1425.107
19	774.848	1429.547
20	783.658	1434.279
21	792.307	1439.298
22	800.786	1444.599
23	809.086	1450.177
24	817.198	1456.024
25	825.113	1462.135
26	832.823	1468.504
27	840.320	1475.123
28	847.594	1481.984
29	854.638	1489.082
30	861.445	1496.408
31	868.008	1503.953
32	874.318	1511.711
33	876.780	1514.949

Circle Center At X = 635.502 ; Y = 1699.536 ; and Radius = 303.828

Factor of Safety

*** 1.612 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	603.751	1398.537
2	613.684	1397.382
3	623.649	1396.547
4	633.636	1396.035
5	643.634	1395.844
6	653.633	1395.976
7	663.623	1396.430
8	673.593	1397.206
9	683.532	1398.303
10	693.432	1399.719
11	703.280	1401.455
12	713.067	1403.506
13	722.783	1405.873
14	732.418	1408.551
15	741.961	1411.538
16	751.403	1414.832
17	760.734	1418.428
18	769.944	1422.323
19	779.024	1426.513
20	787.964	1430.994

21	796.755	1435.760
22	805.388	1440.807
23	813.854	1446.130
24	822.143	1451.723
25	830.248	1457.581
26	838.160	1463.697
27	845.871	1470.064
28	853.372	1476.677
29	860.656	1483.528
30	867.716	1490.611
31	874.544	1497.917
32	881.132	1505.440
33	885.657	1510.955

Circle Center At X = 644.545 ; Y = 1706.002 ; and Radius = 310.160

Factor of Safety

*** 1.618 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	596.918	1396.963
2	606.851	1395.811
3	616.817	1394.988
4	626.805	1394.495
5	636.804	1394.333
6	646.802	1394.500
7	656.790	1394.998
8	666.756	1395.826
9	676.688	1396.982
10	686.578	1398.466
11	696.413	1400.276
12	706.182	1402.410
13	715.876	1404.865
14	725.484	1407.639
15	734.994	1410.729
16	744.398	1414.132
17	753.683	1417.844
18	762.841	1421.860
19	771.862	1426.176
20	780.735	1430.788
21	789.450	1435.691
22	797.999	1440.879
23	806.372	1446.347
24	814.560	1452.088
25	822.553	1458.097
26	830.344	1464.366
27	837.923	1470.890
28	845.283	1477.660
29	852.415	1484.670
30	859.311	1491.911
31	865.965	1499.376
32	872.368	1507.057
33	878.066	1514.370

Circle Center At X = 636.728 ; Y = 1696.985 ; and Radius = 302.653

Factor of Safety

*** 1.619 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	595.365	1396.605
2	605.354	1396.144
3	615.352	1395.947
4	625.352	1396.014
5	635.346	1396.344
6	645.329	1396.938
7	655.292	1397.795
8	665.229	1398.914
9	675.133	1400.294

10	684.998	1401.935
11	694.815	1403.836
12	704.580	1405.995
13	714.284	1408.410
14	723.920	1411.081
15	733.483	1414.004
16	742.966	1417.179
17	752.362	1420.602
18	761.664	1424.272
19	770.866	1428.186
20	779.962	1432.341
21	788.945	1436.734
22	797.810	1441.363
23	806.549	1446.224
24	815.157	1451.314
25	823.628	1456.628
26	831.955	1462.164
27	840.134	1467.918
28	848.159	1473.886
29	856.023	1480.062
30	863.721	1486.444
31	871.249	1493.027
32	878.601	1499.806
33	885.771	1506.776
34	888.570	1509.644

Circle Center At X = 617.849 ; Y = 1775.068 ; and Radius = 379.130

Factor of Safety

*** 1.619 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	603.440	1398.465
2	613.436	1398.167
3	623.436	1398.121
4	633.434	1398.325
5	643.423	1398.781
6	653.398	1399.488
7	663.352	1400.446
8	673.279	1401.654
9	683.172	1403.110
10	693.026	1404.816
11	702.834	1406.768
12	712.589	1408.966
13	722.286	1411.409
14	731.918	1414.095
15	741.480	1417.022
16	750.966	1420.189
17	760.368	1423.593
18	769.683	1427.233
19	778.902	1431.105
20	788.022	1435.209
21	797.035	1439.540
22	805.937	1444.096
23	814.721	1448.875
24	823.382	1453.873
25	831.915	1459.088
26	840.314	1464.515
27	848.574	1470.152
28	856.690	1475.994
29	864.656	1482.039
30	872.468	1488.283
31	880.120	1494.720
32	887.608	1501.348
33	893.928	1507.233

Circle Center At X = 620.295 ; Y = 1795.796 ; and Radius = 397.688

Factor of Safety

*** 1.628 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	596.607	1396.891
2	606.492	1395.379
3	616.423	1394.203
4	626.387	1393.365
5	636.375	1392.865
6	646.374	1392.705
7	656.372	1392.884
8	666.359	1393.401
9	676.322	1394.258
10	686.250	1395.452
11	696.133	1396.982
12	705.957	1398.847
13	715.713	1401.043
14	725.388	1403.570
15	734.973	1406.423
16	744.455	1409.600
17	753.824	1413.097
18	763.068	1416.909
19	772.178	1421.033
20	781.143	1425.464
21	789.953	1430.196
22	798.596	1435.224
23	807.065	1440.543
24	815.348	1446.146
25	823.436	1452.027
26	831.319	1458.179
27	838.990	1464.594
28	846.439	1471.267
29	853.656	1478.188
30	860.635	1485.350
31	867.367	1492.745
32	873.844	1500.363
33	880.059	1508.198
34	882.986	1512.156

Circle Center At X = 646.119 ; Y = 1687.269 ; and Radius = 294.569

Factor of Safety

*** 1.632 ***

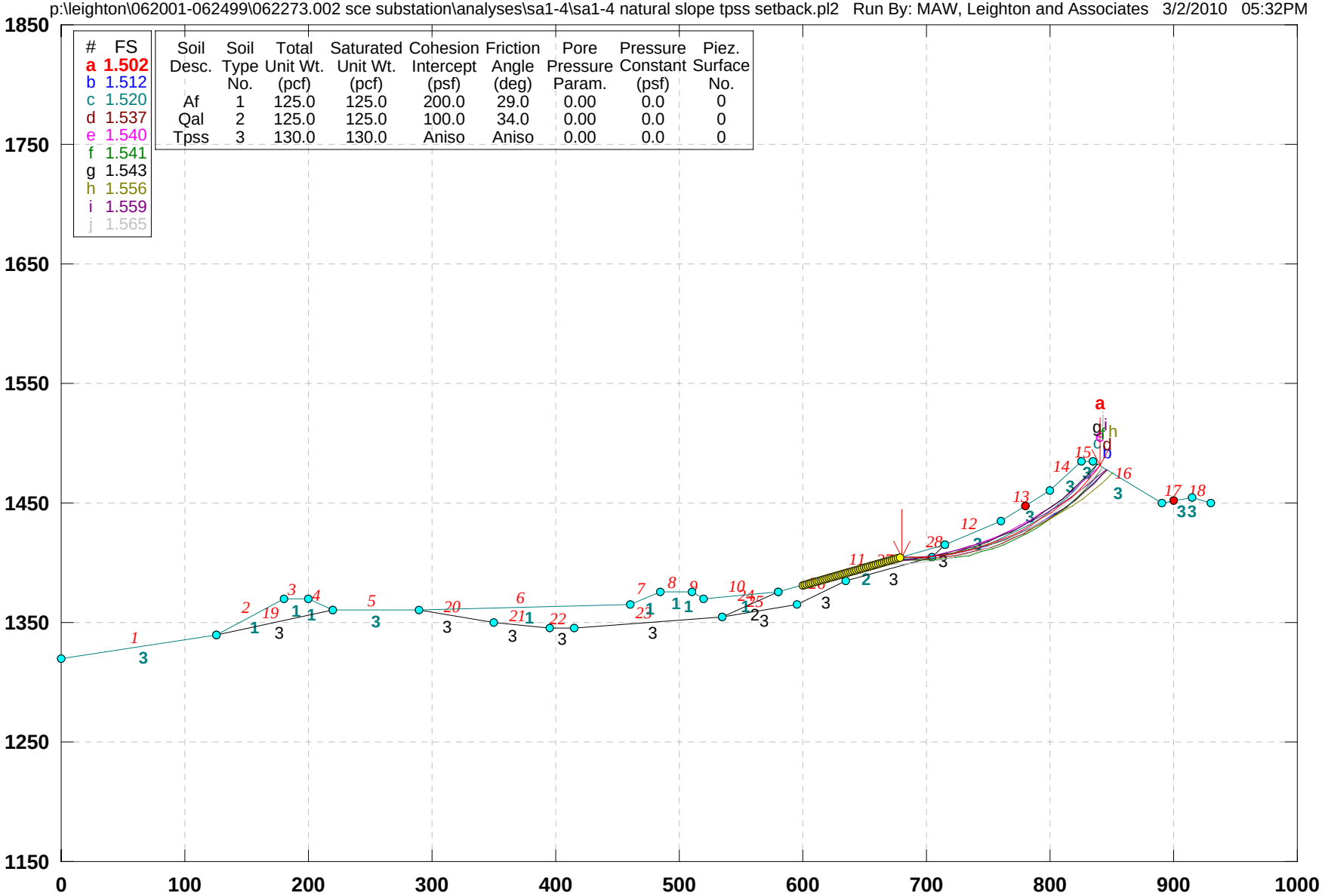
Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	602.508	1398.251
2	612.385	1396.687
3	622.311	1395.465
4	632.272	1394.587
5	642.258	1394.052
6	652.256	1393.863
7	662.255	1394.018
8	672.242	1394.519
9	682.206	1395.364
10	692.135	1396.552
11	702.018	1398.083
12	711.841	1399.953
13	721.594	1402.161
14	731.265	1404.705
15	740.843	1407.581
16	750.316	1410.785
17	759.672	1414.315
18	768.901	1418.165
19	777.992	1422.332
20	786.933	1426.809
21	795.715	1431.593
22	804.326	1436.677
23	812.757	1442.054
24	820.997	1447.720

```
   25        829.037     1453.667
   26        836.867     1459.887
   27        844.477     1466.374
   28        851.859     1473.120
   29        859.004     1480.117
   30        865.903     1487.356
   31        872.548     1494.828
   32        878.932     1502.526
   33        885.046     1510.439
   34        885.475     1511.036
Circle Center At X =   652.749 ; Y =  1683.561 ; and Radius =   289.700
       Factor of Safety
      ***    1.633   ***
          **** END OF GSTABL7 OUTPUT ****
```

SCE Substation, Mission Village 062273002 SA1-4 Natural Slope Tpss Setback

p:\leighton\062001-062499\062273.002 sce substation\analyses\sa1-4\sa1-4 natural slope tpss setback.pl2 Run By: MAW, Leighton and Associates 3/2/2010 05:32PM



#	FS
a	1.502
b	1.512
c	1.520
d	1.537
e	1.540
f	1.541
g	1.543
h	1.556
i	1.559
j	1.565

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Af	1	125.0	125.0	200.0	29.0	0.00	0.0	0
Qal	2	125.0	125.0	100.0	34.0	0.00	0.0	0
Tpss	3	130.0	130.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=1.502

Safety Factors Are Calculated By The Modified Bishop Method

```
                              ***  GSTABL7  ***
                         ** GSTABL7 by Garry H. Gregory, P.E. **
      ** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **
                 (All Rights Reserved-Unauthorized Use Prohibited)
    ******************************************************************************
                        SLOPE STABILITY ANALYSIS SYSTEM
           Modified Bishop, Simplified Janbu, or GLE Method of Slices.
           (Includes Spencer & Morgenstern-Price Type Analysis)
           Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
           Nonlinear Undrained Shear Strength, Curved Phi Envelope,
           Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
           Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
    ******************************************************************************
    Analysis Run Date:        3/2/2010
    Time of Run:              05:32PM
    Run By:                   MAW, Leighton and Associates
    Input Data Filename:      P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA1-4\sa1-4 natural slope tpss setback.in
    Output Filename:          P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA1-4\sa1-4 natural slope tpss setback.OUT
    Unit System:              English
    Plotted Output Filename:  P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA1-4\sa1-4 natural slope tpss setback.PLT
    PROBLEM DESCRIPTION:  SCE Substation, Mission Village 06227300
                          2 SA1-4 Natural Slope Tpss Setback
    BOUNDARY COORDINATES
       18 Top   Boundaries
       28 Total Boundaries
    Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
       No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
        1          0.00    1320.00     125.00    1340.00        3
        2        125.00    1340.00     180.00    1370.00        1
        3        180.00    1370.00     200.00    1370.00        1
        4        200.00    1370.00     220.00    1360.00        1
        5        220.00    1360.00     290.00    1360.00        3
        6        290.00    1360.00     460.00    1365.00        1
        7        460.00    1365.00     485.00    1375.00        1
        8        485.00    1375.00     510.00    1375.00        1
        9        510.00    1375.00     520.00    1370.00        1
       10        520.00    1370.00     580.00    1375.00        1
       11        580.00    1375.00     715.00    1415.00        2
       12        715.00    1415.00     760.00    1435.00        3
       13        760.00    1435.00     800.00    1460.00        3
       14        800.00    1460.00     825.00    1485.00        3
       15        825.00    1485.00     835.00    1485.00        3
       16        835.00    1485.00     890.00    1450.00        3
       17        890.00    1450.00     915.00    1455.00        3
       18        915.00    1455.00     930.00    1450.00        3
       19        125.00    1340.00     220.00    1360.00        3
       20        290.00    1360.00     350.00    1350.00        3
       21        350.00    1350.00     395.00    1345.00        3
       22        395.00    1345.00     415.00    1345.00        3
       23        415.00    1345.00     535.00    1355.00        3
       24        535.00    1355.00     580.00    1375.00        2
       25        535.00    1355.00     595.00    1365.00        3
       26        595.00    1365.00     635.00    1385.00        3
       27        635.00    1385.00     705.00    1405.00        3
       28        705.00    1405.00     715.00    1415.00        3
    User Specified Y-Origin =      1150.00(ft)
    Default X-Plus Value = 0.00(ft)
    Default Y-Plus Value = 0.00(ft)
   ISOTROPIC SOIL PARAMETERS
     3 Type(s) of Soil
    Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
    Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
     No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
      1   125.0    125.0     200.0     29.0    0.00       0.0      0
```



```
      2   125.0    125.0     100.0     34.0    0.00       0.0      0
      3   130.0    130.0     200.0     32.0    0.00       0.0      0
   ANISOTROPIC STRENGTH PARAMETERS
       1 soil type(s)
    Soil Type  3 Is Anisotropic
    Number Of Direction Ranges Specified =  4
    Direction    Counterclockwise     Cohesion     Friction
      Range       Direction Limit    Intercept       Angle
       No.            (deg)            (psf)         (deg)
        1            -90.0             200.00         32.00
        2            -45.0             200.00         32.00
        3            -35.0             150.00         28.00
        4             90.0             200.00         32.00
    ANISOTROPIC SOIL NOTES:
       (1) An input value of 0.01 for C and/or Phi will cause Aniso
           C and/or Phi to be ignored in that range.
       (2) An input value of 0.02 for Phi will set both Phi and
           C equal to zero, with no water weight in the tension crack.
       (3) An input value of 0.03 for Phi will set both Phi and
           C equal to zero, with water weight in the tension crack.
    Specified Peak Ground Acceleration Coefficient (A) =   0.700(g)
    Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
    Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
    Specified Seismic Pore-Pressure Factor =   0.000
    EARTHQUAKE DATA HAS BEEN SUPPRESSED
    A Critical Failure Surface Searching Method, Using A Random
    Technique For Generating Circular Surfaces, Has Been Specified.
    4000 Trial Surfaces Have Been Generated.
      10 Surface(s) Initiate(s) From Each Of   400 Points Equally Spaced
    Along The Ground Surface Between  X = 600.00(ft)
                                   and  X = 680.00(ft)
    Each Surface Terminates Between   X = 780.00(ft)
                                  and   X = 900.00(ft)
    Unless Further Limitations Were Imposed, The Minimum Elevation
    At Which A Surface Extends Is  Y =      0.00(ft)
    10.00(ft) Line Segments Define Each Trial Failure Surface.
    Following Are Displayed The Ten Most Critical Of The Trial
          Failure Surfaces Evaluated. They Are
          Ordered - Most Critical First.
          * * Safety Factors Are Calculated By The Modified Bishop Method * *
          Total Number of Trial Surfaces Attempted =  4000
          Number of Trial Surfaces With Valid FS = 4000
          Statistical Data On All Valid FS Values:
             FS Max =   4.438   FS Min =   1.502   FS Ave =   2.532
             Standard Deviation =    0.476   Coefficient of Variation =   18.78 %
          Failure Surface Specified By 20 Coordinate Points
            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)
              1        679.599     1404.511
              2        689.598     1404.444
              3        699.589     1404.890
              4        709.543     1405.847
              5        719.435     1407.312
              6        729.239     1409.283
              7        738.929     1411.753
              8        748.479     1414.717
              9        757.866     1418.166
             10        767.063     1422.091
             11        776.047     1426.483
             12        784.795     1431.329
             13        793.282     1436.617
             14        801.488     1442.332
             15        809.389     1448.461
             16        816.967     1454.987
             17        824.200     1461.892
             18        831.070     1469.158
             19        837.558     1476.768
```

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      20        840.965     1481.204
   Circle Center At X =   685.957 ; Y =  1599.240 ; and Radius =   194.833
         Factor of Safety
        ***    1.502   ***
      Individual data on the    25  slices
                 Water  Water     Tie     Tie     Earthquake
                 Force  Force    Force   Force       Force   Surcharge
Slice  Width   Weight    Top    Bot     Norm     Tan     Hor     Ver    Load
 No.    (ft)    (lbs)   (lbs)  (lbs)    (lbs)   (lbs)   (lbs)   (lbs)   (lbs)
  1     10.0    1893.6     0.0     0.0       0.      0.     0.0     0.0      0.0
  2     10.0    5353.1     0.0     0.0       0.      0.     0.0     0.0      0.0
  3      5.9    4494.7     0.0     0.0       0.      0.     0.0     0.0      0.0
  4      4.1    3680.8     0.0     0.0       0.      0.     0.0     0.0      0.0
  5      5.5    5581.2     0.0     0.0       0.      0.     0.0     0.0      0.0
  6      4.4    5189.5     0.0     0.0       0.      0.     0.0     0.0      0.0
  7      9.8   13831.0     0.0     0.0       0.      0.     0.0     0.0      0.0
  8      9.7   16330.2     0.0     0.0       0.      0.     0.0     0.0      0.0
  9      9.6   18031.0     0.0     0.0       0.      0.     0.0     0.0      0.0
 10      9.4   18943.3     0.0     0.0       0.      0.     0.0     0.0      0.0
 11      2.1    4412.7     0.0     0.0       0.      0.     0.0     0.0      0.0
 12      7.1   15263.7     0.0     0.0       0.      0.     0.0     0.0      0.0
 13      9.0   20947.0     0.0     0.0       0.      0.     0.0     0.0      0.0
 14      8.7   21443.6     0.0     0.0       0.      0.     0.0     0.0      0.0
 15      8.5   21158.7     0.0     0.0       0.      0.     0.0     0.0      0.0
 16      6.7   16544.5     0.0     0.0       0.      0.     0.0     0.0      0.0
 17      1.5    3660.6     0.0     0.0       0.      0.     0.0     0.0      0.0
 18      7.9   20587.7     0.0     0.0       0.      0.     0.0     0.0      0.0
 19      7.6   21134.0     0.0     0.0       0.      0.     0.0     0.0      0.0
 20      7.2   20822.5     0.0     0.0       0.      0.     0.0     0.0      0.0
 21      0.8    2317.6     0.0     0.0       0.      0.     0.0     0.0      0.0
 22      6.1   15033.6     0.0     0.0       0.      0.     0.0     0.0      0.0
 23      3.9    6916.3     0.0     0.0       0.      0.     0.0     0.0      0.0
 24      2.6    2966.3     0.0     0.0       0.      0.     0.0     0.0      0.0
 25      3.4    1462.4     0.0     0.0       0.      0.     0.0     0.0      0.0
   Failure Surface Specified By 20 Coordinate Points
     Point      X-Surf      Y-Surf
      No.        (ft)        (ft)
       1       680.000     1404.630
       2       690.000     1404.619
       3       699.989     1405.077
       4       709.946     1406.005
       5       719.848     1407.399
       6       729.674     1409.257
       7       739.402     1411.574
       8       749.010     1414.346
       9       758.478     1417.566
      10       767.783     1421.228
      11       776.907     1425.322
      12       785.828     1429.841
      13       794.526     1434.773
      14       802.984     1440.109
      15       811.181     1445.836
      16       819.101     1451.942
      17       826.725     1458.413
      18       834.036     1465.236
      19       841.019     1472.394
      20       845.997     1478.002
   Circle Center At X =   685.276 ; Y =  1617.155 ; and Radius =   212.591
         Factor of Safety
        ***    1.512   ***
   Failure Surface Specified By 20 Coordinate Points
     Point      X-Surf      Y-Surf
      No.        (ft)        (ft)
       1       676.792     1403.679
       2       686.792     1403.672
       3       696.779     1404.179
       4       706.727     1405.196
```



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       5       716.610     1406.723
       6       726.401     1408.755
       7       736.075     1411.286
       8       745.607     1414.310
       9       754.971     1417.819
      10       764.143     1421.804
      11       773.098     1426.254
      12       781.813     1431.158
      13       790.266     1436.502
      14       798.433     1442.273
      15       806.293     1448.455
      16       813.826     1455.032
      17       821.011     1461.987
      18       827.830     1469.301
      19       834.266     1476.955
      20       838.613     1482.701
   Circle Center At X =   681.969 ; Y =  1598.277 ; and Radius =   194.667
         Factor of Safety
        ***    1.520   ***
   Failure Surface Specified By 21 Coordinate Points
     Point      X-Surf      Y-Surf
      No.        (ft)        (ft)
       1       672.782     1402.491
       2       682.777     1402.191
       3       692.776     1402.365
       4       702.755     1403.013
       5       712.692     1404.133
       6       722.564     1405.724
       7       732.350     1407.781
       8       742.028     1410.300
       9       751.575     1413.275
      10       760.971     1416.700
      11       770.193     1420.566
      12       779.222     1424.865
      13       788.036     1429.588
      14       796.617     1434.723
      15       804.944     1440.260
      16       813.000     1446.185
      17       820.765     1452.486
      18       828.223     1459.148
      19       835.357     1466.156
      20       842.150     1473.494
      21       845.961     1478.025
   Circle Center At X =   684.107 ; Y =  1612.979 ; and Radius =   210.792
         Factor of Safety
        ***    1.537   ***
   Failure Surface Specified By 21 Coordinate Points
     Point      X-Surf      Y-Surf
      No.        (ft)        (ft)
       1       670.777     1401.897
       2       680.755     1402.547
       3       690.699     1403.606
       4       700.591     1405.071
       5       710.415     1406.941
       6       720.154     1409.212
       7       729.791     1411.880
       8       739.312     1414.940
       9       748.698     1418.388
      10       757.936     1422.218
      11       767.008     1426.424
      12       775.901     1430.997
      13       784.599     1435.932
      14       793.087     1441.218
      15       801.352     1446.848
      16       809.379     1452.812
      17       817.155     1459.100
      18       824.666     1465.701
```

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   19        831.901     1472.605
   20        838.846     1479.799
   21        840.409     1481.558
Circle Center At X =   659.904 ; Y =  1645.604 ; and Radius =   243.950
       Factor of Safety
      ***    1.540   ***
Failure Surface Specified By 21 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        674.787     1403.085
    2        684.750     1402.223
    3        694.745     1401.919
    4        704.742     1402.174
    5        714.709     1402.985
    6        724.615     1404.352
    7        734.429     1406.270
    8        744.121     1408.732
    9        753.661     1411.732
   10        763.018     1415.259
   11        772.164     1419.303
   12        781.070     1423.851
   13        789.708     1428.889
   14        798.051     1434.401
   15        806.074     1440.371
   16        813.751     1446.779
   17        821.059     1453.605
   18        827.974     1460.829
   19        834.475     1468.427
   20        840.542     1476.377
   21        842.957     1479.937
Circle Center At X =   695.191 ; Y =  1581.018 ; and Radius =   179.100
       Factor of Safety
      ***    1.541   ***
Failure Surface Specified By 21 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        671.980     1402.253
    2        681.974     1402.603
    3        691.941     1403.411
    4        701.861     1404.676
    5        711.712     1406.395
    6        721.473     1408.565
    7        731.125     1411.181
    8        740.647     1414.237
    9        750.018     1417.728
   10        759.218     1421.645
   11        768.230     1425.981
   12        777.032     1430.726
   13        785.607     1435.871
   14        793.937     1441.403
   15        802.004     1447.313
   16        809.791     1453.587
   17        817.282     1460.212
   18        824.461     1467.174
   19        831.312     1474.458
   20        837.821     1482.049
   21        838.424     1482.821
Circle Center At X =   669.374 ; Y =  1619.903 ; and Radius =   217.666
       Factor of Safety
      ***    1.543   ***
Failure Surface Specified By 21 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        677.193     1403.798
    2        687.190     1404.020
    3        697.171     1404.645
    4        707.118     1405.672
```



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    5        717.016     1407.098
    6        726.848     1408.921
    7        736.599     1411.139
    8        746.253     1413.748
    9        755.793     1416.744
   10        765.206     1420.121
   11        774.475     1423.875
   12        783.585     1427.998
   13        792.521     1432.486
   14        801.270     1437.329
   15        809.817     1442.521
   16        818.147     1448.053
   17        826.248     1453.916
   18        834.107     1460.100
   19        841.709     1466.596
   20        849.045     1473.393
   21        850.672     1475.027
Circle Center At X =   676.667 ; Y =  1652.072 ; and Radius =   248.274
       Factor of Safety
      ***    1.556   ***
Failure Surface Specified By 21 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        665.564     1400.352
    2        675.524     1401.245
    3        685.448     1402.472
    4        695.326     1404.031
    5        705.146     1405.920
    6        714.897     1408.138
    7        724.568     1410.682
    8        734.148     1413.550
    9        743.626     1416.737
   10        752.992     1420.241
   11        762.236     1424.057
   12        771.346     1428.181
   13        780.312     1432.608
   14        789.125     1437.334
   15        797.774     1442.354
   16        806.250     1447.660
   17        814.543     1453.248
   18        822.643     1459.112
   19        830.543     1465.243
   20        838.232     1471.637
   21        845.640     1478.229
Circle Center At X =   643.952 ; Y =  1697.464 ; and Radius =   297.897
       Factor of Safety
      ***    1.559   ***
Failure Surface Specified By 22 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        662.155     1399.342
    2        672.149     1398.987
    3        682.148     1399.099
    4        692.132     1399.677
    5        702.077     1400.721
    6        711.963     1402.228
    7        721.768     1404.194
    8        731.470     1406.616
    9        741.049     1409.488
   10        750.483     1412.804
   11        759.752     1416.557
   12        768.836     1420.738
   13        777.715     1425.338
   14        786.370     1430.348
   15        794.781     1435.756
   16        802.931     1441.551
   17        810.801     1447.720
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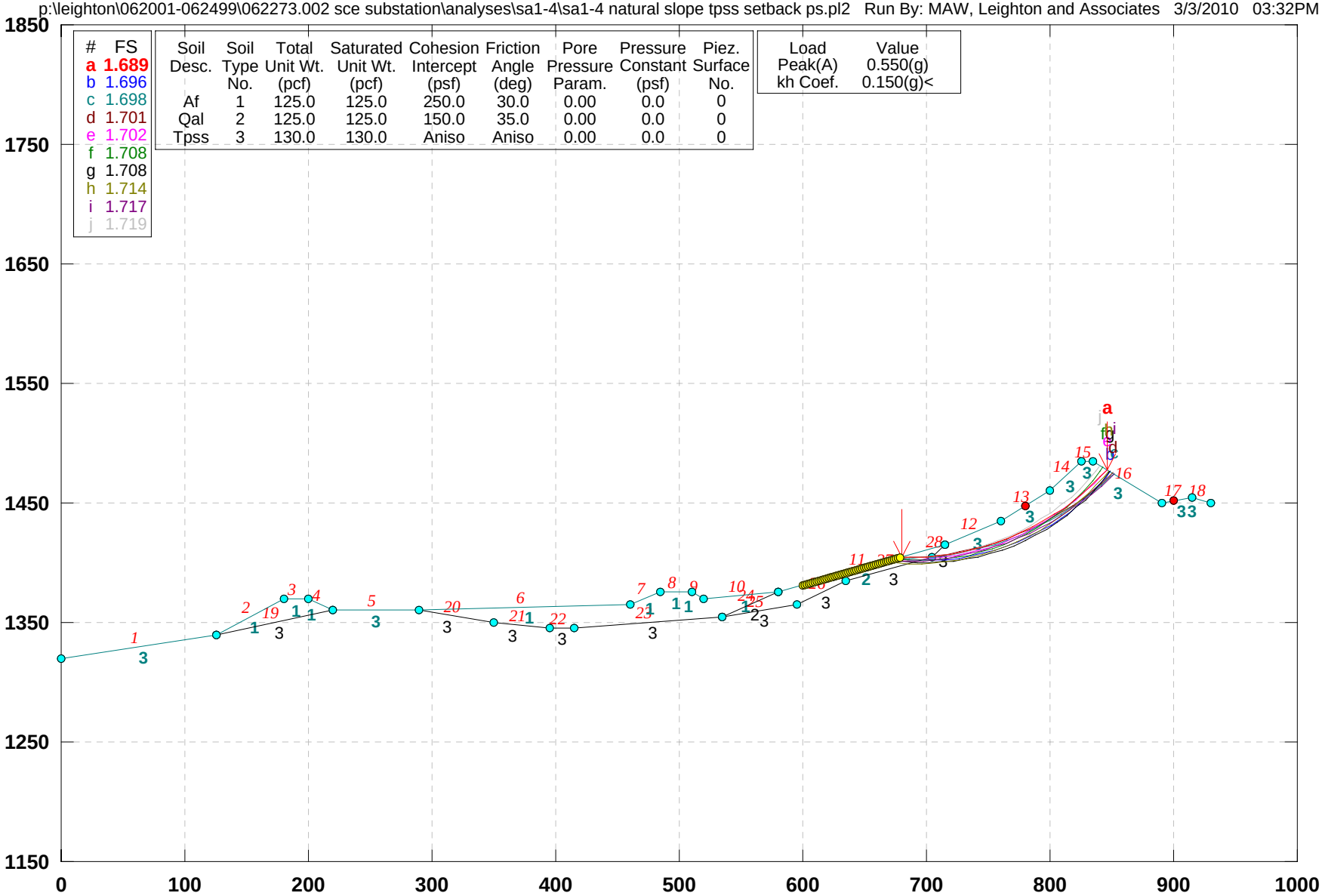
   18        818.375     1454.250
   19        825.636     1461.125
   20        832.568     1468.333
   21        839.157     1475.856
   22        842.592     1480.169
Circle Center At X =   674.798 ; Y =  1612.934 ; and Radius =   213.966
       Factor of Safety
      ***    1.565   ***
          **** END OF GSTABL7 OUTPUT ****
```

SCE Substation, Mission Village 062273002 SA1-4 Natural Slope Tpss Setback

p:\leighton\062001-062499\062273.002 sce substation\analyses\sa1-4\sa1-4 natural slope tpss setback ps.pl2 Run By: MAW, Leighton and Associates 3/3/2010 03:32PM



#	FS
a	1.689
b	1.696
c	1.698
d	1.701
e	1.702
f	1.708
g	1.708
h	1.714
i	1.717
j	1.719

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Af	1	125.0	125.0	250.0	30.0	0.00	0.0	0
Qal	2	125.0	125.0	150.0	35.0	0.00	0.0	0
Tpss	3	130.0	130.0	Aniso	Aniso	0.00	0.0	0

Load	Value
Peak(A)	0.550(g)
kh Coef.	0.150(g)<

GSTABL7 v.2 FSmin=1.689

Safety Factors Are Calculated By The Modified Bishop Method

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                                  ***  GSTABL7  ***
                            ** GSTABL7 by Garry H. Gregory, P.E. **
      ** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **
                   (All Rights Reserved-Unauthorized Use Prohibited)
    ******************************************************************************
                         SLOPE STABILITY ANALYSIS SYSTEM
           Modified Bishop, Simplified Janbu, or GLE Method of Slices.
           (Includes Spencer & Morgenstern-Price Type Analysis)
           Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
           Nonlinear Undrained Shear Strength, Curved Phi Envelope,
           Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
           Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
    ******************************************************************************
    Analysis Run Date:        3/3/2010
    Time of Run:              03:32PM
    Run By:                   MAW, Leighton and Associates
    Input Data Filename:      P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA1-4\sa1-4 natural slope tpss setback ps.in
    Output Filename:          P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA1-4\sa1-4 natural slope tpss setback ps.OUT
    Unit System:              English
    Plotted Output Filename:  P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA1-4\sa1-4 natural slope tpss setback ps.PLT
    PROBLEM DESCRIPTION:  SCE Substation, Mission Village 06227300
                          2 SA1-4 Natural Slope Tpss Setback
    BOUNDARY COORDINATES
       18 Top   Boundaries
       28 Total Boundaries
    Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
       No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
        1          0.00    1320.00     125.00    1340.00        3
        2        125.00    1340.00     180.00    1370.00        1
        3        180.00    1370.00     200.00    1370.00        1
        4        200.00    1370.00     220.00    1360.00        1
        5        220.00    1360.00     290.00    1360.00        3
        6        290.00    1360.00     460.00    1365.00        1
        7        460.00    1365.00     485.00    1375.00        1
        8        485.00    1375.00     510.00    1375.00        1
        9        510.00    1375.00     520.00    1370.00        1
       10        520.00    1370.00     580.00    1375.00        1
       11        580.00    1375.00     715.00    1415.00        2
       12        715.00    1415.00     760.00    1435.00        3
       13        760.00    1435.00     800.00    1460.00        3
       14        800.00    1460.00     825.00    1485.00        3
       15        825.00    1485.00     835.00    1485.00        3
       16        835.00    1485.00     890.00    1450.00        3
       17        890.00    1450.00     915.00    1455.00        3
       18        915.00    1455.00     930.00    1450.00        3
       19        125.00    1340.00     220.00    1360.00        3
       20        290.00    1360.00     350.00    1350.00        3
       21        350.00    1350.00     395.00    1345.00        3
       22        395.00    1345.00     415.00    1345.00        3
       23        415.00    1345.00     535.00    1355.00        3
       24        535.00    1355.00     580.00    1375.00        2
       25        535.00    1355.00     595.00    1365.00        3
       26        595.00    1365.00     635.00    1385.00        3
       27        635.00    1385.00     705.00    1405.00        3
       28        705.00    1405.00     715.00    1415.00        3
    User Specified Y-Origin =      1150.00(ft)
    Default X-Plus Value = 0.00(ft)
    Default Y-Plus Value = 0.00(ft)
   ISOTROPIC SOIL PARAMETERS
     3 Type(s) of Soil
    Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
    Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
     No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
      1   125.0    125.0     250.0     30.0    0.00       0.0      0
```



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      2   125.0    125.0     150.0     35.0    0.00       0.0      0
      3   130.0    130.0     600.0     38.0    0.00       0.0      0
   ANISOTROPIC STRENGTH PARAMETERS
       1 soil type(s)
    Soil Type  3 Is Anisotropic
    Number Of Direction Ranges Specified =  4
    Direction    Counterclockwise     Cohesion     Friction
      Range       Direction Limit    Intercept       Angle
       No.            (deg)            (psf)         (deg)
        1            -90.0             600.00         38.00
        2            -45.0             600.00         38.00
        3            -35.0             150.00         28.00
        4             90.0             600.00         38.00
    ANISOTROPIC SOIL NOTES:
       (1) An input value of 0.01 for C and/or Phi will cause Aniso
           C and/or Phi to be ignored in that range.
       (2) An input value of 0.02 for Phi will set both Phi and
           C equal to zero, with no water weight in the tension crack.
       (3) An input value of 0.03 for Phi will set both Phi and
           C equal to zero, with water weight in the tension crack.
    Specified Peak Ground Acceleration Coefficient (A) =   0.550(g)
    Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
    Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
    Specified Seismic Pore-Pressure Factor =   0.000
    A Critical Failure Surface Searching Method, Using A Random
    Technique For Generating Circular Surfaces, Has Been Specified.
    4000 Trial Surfaces Have Been Generated.
      10 Surface(s) Initiate(s) From Each Of   400 Points Equally Spaced
    Along The Ground Surface Between  X = 600.00(ft)
                                  and  X = 680.00(ft)
    Each Surface Terminates Between   X = 780.00(ft)
                                  and   X = 900.00(ft)
    Unless Further Limitations Were Imposed, The Minimum Elevation
    At Which A Surface Extends Is  Y =      0.00(ft)
    10.00(ft) Line Segments Define Each Trial Failure Surface.
    Following Are Displayed The Ten Most Critical Of The Trial
          Failure Surfaces Evaluated. They Are
          Ordered - Most Critical First.
          * * Safety Factors Are Calculated By The Modified Bishop Method * *
          Total Number of Trial Surfaces Attempted =  4000
          Number of Trial Surfaces With Valid FS = 4000
          Statistical Data On All Valid FS Values:
             FS Max =   6.136   FS Min =   1.689   FS Ave =   2.409
             Standard Deviation =    0.364   Coefficient of Variation =   15.09 %
          Failure Surface Specified By 20 Coordinate Points
            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)
              1       680.000     1404.630
              2       690.000     1404.619
              3       699.989     1405.077
              4       709.946     1406.005
              5       719.848     1407.399
              6       729.674     1409.257
              7       739.402     1411.574
              8       749.010     1414.346
              9       758.478     1417.566
             10       767.783     1421.228
             11       776.907     1425.322
             12       785.828     1429.841
             13       794.526     1434.773
             14       802.984     1440.109
             15       811.181     1445.836
             16       819.101     1451.942
             17       826.725     1458.413
             18       834.036     1465.236
             19       841.019     1472.394
             20       845.997     1478.002
```

Circle Center At X = 685.276 ; Y = 1617.155 ; and Radius = 212.591
Factor of Safety
*** 1.689 ***
Individual data on the 25 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	10.0	1858.7	0.0	0.0	0.	0.	278.8	0.0	0.0
2	10.0	5275.1	0.0	0.0	0.	0.	791.3	0.0	0.0
3	5.6	4239.5	0.0	0.0	0.	0.	635.9	0.0	0.0
4	4.3	3876.3	0.0	0.0	0.	0.	581.4	0.0	0.0
5	5.1	5139.3	0.0	0.0	0.	0.	770.9	0.0	0.0
6	4.8	5685.1	0.0	0.0	0.	0.	852.8	0.0	0.0
7	9.8	14064.3	0.0	0.0	0.	0.	2109.6	0.0	0.0
8	9.7	16779.0	0.0	0.0	0.	0.	2516.8	0.0	0.0
9	9.6	18761.4	0.0	0.0	0.	0.	2814.2	0.0	0.0
10	9.5	20016.1	0.0	0.0	0.	0.	3002.4	0.0	0.0
11	1.5	3324.0	0.0	0.0	0.	0.	498.6	0.0	0.0
12	7.8	17945.6	0.0	0.0	0.	0.	2691.8	0.0	0.0
13	9.1	23057.3	0.0	0.0	0.	0.	3458.6	0.0	0.0
14	8.9	24091.0	0.0	0.0	0.	0.	3613.7	0.0	0.0
15	8.7	24374.0	0.0	0.0	0.	0.	3656.1	0.0	0.0
16	5.5	15504.8	0.0	0.0	0.	0.	2325.7	0.0	0.0
17	3.0	8659.9	0.0	0.0	0.	0.	1299.0	0.0	0.0
18	8.2	25693.6	0.0	0.0	0.	0.	3854.0	0.0	0.0
19	7.9	27027.1	0.0	0.0	0.	0.	4054.1	0.0	0.0
20	5.9	21169.6	0.0	0.0	0.	0.	3175.4	0.0	0.0
21	1.7	6125.2	0.0	0.0	0.	0.	918.8	0.0	0.0
22	7.3	22027.9	0.0	0.0	0.	0.	3304.2	0.0	0.0
23	1.0	2414.6	0.0	0.0	0.	0.	362.2	0.0	0.0
24	6.0	10779.4	0.0	0.0	0.	0.	1616.9	0.0	0.0
25	5.0	2839.9	0.0	0.0	0.	0.	426.0	0.0	0.0

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	676.190	1403.501
2	686.143	1402.527
3	696.133	1402.083
4	706.132	1402.170
5	716.113	1402.789
6	726.047	1403.937
7	735.906	1405.611
8	745.662	1407.807
9	755.287	1410.518
10	764.755	1413.737
11	774.039	1417.454
12	783.112	1421.659
13	791.948	1426.340
14	800.524	1431.484
15	808.814	1437.077
16	816.795	1443.102
17	824.444	1449.543
18	831.741	1456.381
19	838.664	1463.597
20	845.194	1471.171
21	849.000	1476.091

Circle Center At X = 699.487 ; Y = 1590.194 ; and Radius = 188.141
Factor of Safety
*** 1.696 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	676.391	1403.560
2	686.391	1403.605
3	696.380	1404.062
4	706.342	1404.931

Point No.	X-Surf (ft)	Y-Surf (ft)
5	716.260	1406.211
6	726.117	1407.898
7	735.895	1409.990
8	745.579	1412.484
9	755.152	1415.375
10	764.598	1418.659
11	773.900	1422.329
12	783.043	1426.380
13	792.010	1430.805
14	800.788	1435.596
15	809.361	1440.745
16	817.714	1446.243
17	825.833	1452.081
18	833.704	1458.248
19	841.314	1464.736
20	848.650	1471.531
21	851.562	1474.461

Circle Center At X = 680.303 ; Y = 1645.909 ; and Radius = 242.381
Factor of Safety
*** 1.698 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	677.193	1403.798
2	687.190	1404.020
3	697.171	1404.645
4	707.118	1405.672
5	717.016	1407.098
6	726.848	1408.921
7	736.599	1411.139
8	746.253	1413.748
9	755.793	1416.744
10	765.206	1420.121
11	774.475	1423.875
12	783.585	1427.998
13	792.521	1432.486
14	801.270	1437.329
15	809.817	1442.521
16	818.147	1448.053
17	826.248	1453.916
18	834.107	1460.100
19	841.709	1466.596
20	849.045	1473.393
21	850.672	1475.027

Circle Center At X = 676.667 ; Y = 1652.072 ; and Radius = 248.274
Factor of Safety
*** 1.701 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	672.782	1402.491
2	682.777	1402.191
3	692.776	1402.365
4	702.755	1403.013
5	712.692	1404.133
6	722.564	1405.724
7	732.350	1407.781
8	742.028	1410.300
9	751.575	1413.275
10	760.971	1416.700
11	770.193	1420.566
12	779.222	1424.865
13	788.036	1429.588
14	796.617	1434.723
15	804.944	1440.260
16	813.000	1446.185
17	820.765	1452.486

18	828.223	1459.148
19	835.357	1466.156
20	842.150	1473.494
21	845.961	1478.025

Circle Center At X = 684.107 ; Y = 1612.979 ; and Radius = 210.792

Factor of Safety

*** 1.702 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	674.787	1403.085
2	684.750	1402.223
3	694.745	1401.919
4	704.742	1402.174
5	714.709	1402.985
6	724.615	1404.352
7	734.429	1406.270
8	744.121	1408.732
9	753.661	1411.732
10	763.018	1415.259
11	772.164	1419.303
12	781.070	1423.851
13	789.708	1428.889
14	798.051	1434.401
15	806.074	1440.371
16	813.751	1446.779
17	821.059	1453.605
18	827.974	1460.829
19	834.475	1468.427
20	840.542	1476.377
21	842.957	1479.937

Circle Center At X = 695.191 ; Y = 1581.018 ; and Radius = 179.100

Factor of Safety

*** 1.708 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	672.381	1402.372
2	682.303	1401.129
3	692.279	1400.430
4	702.277	1400.276
5	712.270	1400.669
6	722.226	1401.608
7	732.115	1403.089
8	741.909	1405.107
9	751.579	1407.658
10	761.094	1410.733
11	770.427	1414.324
12	779.551	1418.419
13	788.436	1423.006
14	797.058	1428.071
15	805.391	1433.600
16	813.409	1439.576
17	821.088	1445.981
18	828.406	1452.797
19	835.341	1460.001
20	841.872	1467.574
21	847.980	1475.492
22	848.577	1476.360

Circle Center At X = 700.094 ; Y = 1583.168 ; and Radius = 182.908

Factor of Safety

*** 1.708 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	666.366	1400.590
2	676.323	1399.672

3	686.315	1399.255
4	696.314	1399.339
5	706.297	1399.925
6	716.238	1401.012
7	726.112	1402.595
8	735.894	1404.672
9	745.559	1407.238
10	755.083	1410.285
11	764.443	1413.806
12	773.614	1417.792
13	782.574	1422.233
14	791.299	1427.118
15	799.769	1432.435
16	807.961	1438.170
17	815.855	1444.309
18	823.431	1450.836
19	830.670	1457.735
20	837.554	1464.988
21	844.065	1472.578
22	847.516	1477.035

Circle Center At X = 689.661 ; Y = 1598.243 ; and Radius = 199.021

Factor of Safety

*** 1.714 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	666.967	1400.768
2	676.964	1400.523
3	686.963	1400.690
4	696.946	1401.270
5	706.897	1402.262
6	716.798	1403.664
7	726.633	1405.473
8	736.385	1407.687
9	746.037	1410.301
10	755.573	1413.312
11	764.977	1416.713
12	774.232	1420.500
13	783.323	1424.666
14	792.234	1429.204
15	800.950	1434.105
16	809.457	1439.363
17	817.739	1444.967
18	825.783	1450.908
19	833.575	1457.176
20	841.101	1463.760
21	848.349	1470.650
22	851.858	1474.272

Circle Center At X = 677.954 ; Y = 1642.419 ; and Radius = 241.901

Factor of Safety

*** 1.717 ***

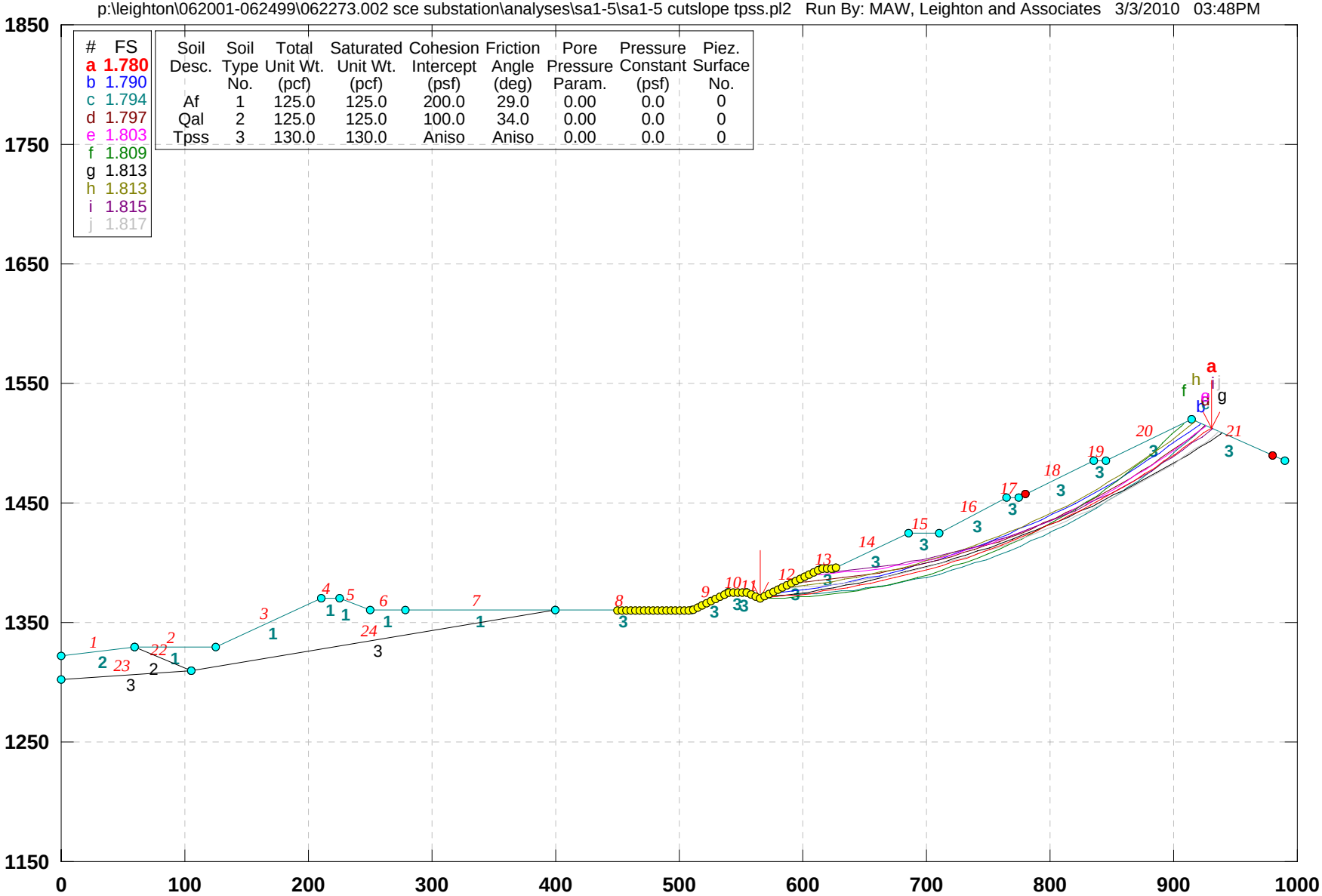
Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	679.599	1404.511
2	689.598	1404.444
3	699.589	1404.890
4	709.543	1405.847
5	719.435	1407.312
6	729.239	1409.283
7	738.929	1411.753
8	748.479	1414.717
9	757.866	1418.166
10	767.063	1422.091
11	776.047	1426.483
12	784.795	1431.329
13	793.282	1436.617

```
   14        801.488     1442.332
   15        809.389     1448.461
   16        816.967     1454.987
   17        824.200     1461.892
   18        831.070     1469.158
   19        837.558     1476.768
   20        840.965     1481.204
Circle Center At X =   685.957 ; Y =  1599.240 ; and Radius =   194.833
       Factor of Safety
      ***    1.719   ***
          **** END OF GSTABL7 OUTPUT ****
```

SCE Substation, Mission Village 062273002 SA1-5 Cut Slope Tpss Static

p:\leighton\062001-062499\062273.002 sce substation\analyses\sa1-5\sa1-5 cutslope tpss.pl2 Run By: MAW, Leighton and Associates 3/3/2010 03:48PM



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Af	1	125.0	125.0	200.0	29.0	0.00	0.0	0
Qal	2	125.0	125.0	100.0	34.0	0.00	0.0	0
Tpss	3	130.0	130.0	Aniso	Aniso	0.00	0.0	0

GSTABL7 v.2 FSmin=1.780

Safety Factors Are Calculated By The Modified Bishop Method

```
                    ***  GSTABL7  ***
            ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **
          (All Rights Reserved-Unauthorized Use Prohibited)
*******************************************************************************
                  SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*******************************************************************************
   Analysis Run Date:        3/3/2010
   Time of Run:              03:48PM
   Run By:                   MAW, Leighton and Associates
   Input Data Filename:      P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA1-5\sa1-5 cutslope tpss.in
   Output Filename:          P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA1-5\sa1-5 cutslope tpss.OUT
   Unit System:              English
   Plotted Output Filename:  P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA1-5\sa1-5 cutslope tpss.PLT
   PROBLEM DESCRIPTION:  SCE Substation, Mission Village 06227300
                         2 SA1-5 Cut Slope Tpss Static
   BOUNDARY COORDINATES
      21 Top   Boundaries
      24 Total Boundaries
   Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
      No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
       1          0.00    1322.00      60.00    1330.00        2
       2         60.00    1330.00     125.00    1330.00        1
       3        125.00    1330.00     210.00    1370.00        1
       4        210.00    1370.00     225.00    1370.00        1
       5        225.00    1370.00     250.00    1360.00        1
       6        250.00    1360.00     278.00    1360.00        1
       7        278.00    1360.00     400.00    1360.00        1
       8        400.00    1360.00     510.00    1360.00        3
       9        510.00    1360.00     540.00    1375.00        3
      10        540.00    1375.00     555.00    1375.00        3
      11        555.00    1375.00     565.00    1370.00        3
      12        565.00    1370.00     615.00    1395.00        3
      13        615.00    1395.00     625.00    1395.00        3
      14        625.00    1395.00     685.00    1425.00        3
      15        685.00    1425.00     710.00    1425.00        3
      16        710.00    1425.00     765.00    1455.00        3
      17        765.00    1455.00     775.00    1455.00        3
      18        775.00    1455.00     835.00    1485.00        3
      19        835.00    1485.00     845.00    1485.00        3
      20        845.00    1485.00     915.00    1520.00        3
      21        915.00    1520.00     990.00    1485.00        3
      22         60.00    1330.00     105.00    1310.00        2
      23          0.00    1302.00     105.00    1310.00        3
      24        105.00    1310.00     400.00    1360.00        3
   User Specified Y-Origin =      1150.00(ft)
   Default X-Plus Value = 0.00(ft)
   Default Y-Plus Value = 0.00(ft)
  ISOTROPIC SOIL PARAMETERS
    3 Type(s) of Soil
   Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
   Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
    No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
     1   125.0    125.0     200.0     29.0    0.00       0.0      0
     2   125.0    125.0     100.0     34.0    0.00       0.0      0
     3   130.0    130.0     200.0     32.0    0.00       0.0      0
  ANISOTROPIC STRENGTH PARAMETERS
      1 soil type(s)
```



```
Soil Type  3 Is Anisotropic
Number Of Direction Ranges Specified =  4
Direction    Counterclockwise     Cohesion     Friction
  Range       Direction Limit    Intercept       Angle
   No.            (deg)            (psf)         (deg)
    1             -90.0             200.00         32.00
    2             -41.0             200.00         32.00
    3             -31.0             150.00         28.00
    4              90.0             200.00         32.00
ANISOTROPIC SOIL NOTES:
   (1) An input value of 0.01 for C and/or Phi will cause Aniso
       C and/or Phi to be ignored in that range.
   (2) An input value of 0.02 for Phi will set both Phi and
       C equal to zero, with no water weight in the tension crack.
   (3) An input value of 0.03 for Phi will set both Phi and
       C equal to zero, with water weight in the tension crack.
Specified Peak Ground Acceleration Coefficient (A) =   0.700(g)
Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
Specified Seismic Pore-Pressure Factor =   0.000
EARTHQUAKE DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
5000 Trial Surfaces Have Been Generated.
  10 Surface(s) Initiate(s) From Each Of   500 Points Equally Spaced
Along The Ground Surface Between  X = 450.00(ft)
                                 and  X = 630.00(ft)
Each Surface Terminates Between   X = 780.00(ft)
                                 and   X = 980.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =      0.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
      Failure Surfaces Evaluated. They Are
      Ordered - Most Critical First.
      * * Safety Factors Are Calculated By The Modified Bishop Method * *
      Total Number of Trial Surfaces Attempted =  5000
      Number of Trial Surfaces With Valid FS = 5000
      Statistical Data On All Valid FS Values:
         FS Max =   3.398   FS Min =   1.780   FS Ave =   2.566
         Standard Deviation =    0.385   Coefficient of Variation =   14.99 %
      Failure Surface Specified By 41 Coordinate Points
        Point      X-Surf      Y-Surf
         No.        (ft)        (ft)
          1       566.151     1370.576
          2       576.122     1371.344
          3       586.079     1372.264
          4       596.021     1373.337
          5       605.946     1374.562
          6       615.851     1375.939
          7       625.733     1377.467
          8       635.591     1379.146
          9       645.422     1380.976
         10       655.224     1382.956
         11       664.995     1385.086
         12       674.732     1387.366
         13       684.432     1389.794
         14       694.095     1392.370
         15       703.717     1395.094
         16       713.296     1397.965
         17       722.830     1400.982
         18       732.317     1404.145
         19       741.754     1407.452
         20       751.139     1410.904
         21       760.471     1414.499
         22       769.746     1418.236
         23       778.963     1422.115
```

24	788.120	1426.135
25	797.214	1430.294
26	806.243	1434.592
27	815.205	1439.028
28	824.099	1443.600
29	832.921	1448.308
30	841.670	1453.151
31	850.345	1458.126
32	858.942	1463.234
33	867.459	1468.473
34	875.896	1473.842
35	884.249	1479.339
36	892.518	1484.964
37	900.699	1490.714
38	908.791	1496.589
39	916.793	1502.588
40	924.701	1508.708
41	930.048	1512.978

Circle Center At X = 520.968 ; Y = 2022.270 ; and Radius = 653.259

Factor of Safety

*** 1.780 ***

Individual data on the 49 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	10.0	2733.0	0.0	0.0	0.	0.	0.0	0.0	0.0
2	10.0	8085.6	0.0	0.0	0.	0.	0.0	0.0	0.0
3	9.9	13215.2	0.0	0.0	0.	0.	0.0	0.0	0.0
4	9.9	18117.6	0.0	0.0	0.	0.	0.0	0.0	0.0
5	9.1	20651.1	0.0	0.0	0.	0.	0.0	0.0	0.0
6	0.9	2114.9	0.0	0.0	0.	0.	0.0	0.0	0.0
7	9.1	21830.0	0.0	0.0	0.	0.	0.0	0.0	0.0
8	0.7	1694.5	0.0	0.0	0.	0.	0.0	0.0	0.0
9	9.9	25021.6	0.0	0.0	0.	0.	0.0	0.0	0.0
10	9.8	29001.7	0.0	0.0	0.	0.	0.0	0.0	0.0
11	9.8	32742.8	0.0	0.0	0.	0.	0.0	0.0	0.0
12	9.8	36242.5	0.0	0.0	0.	0.	0.0	0.0	0.0
13	9.7	39499.5	0.0	0.0	0.	0.	0.0	0.0	0.0
14	9.7	42513.2	0.0	0.0	0.	0.	0.0	0.0	0.0
15	0.6	2581.3	0.0	0.0	0.	0.	0.0	0.0	0.0
16	9.1	40013.3	0.0	0.0	0.	0.	0.0	0.0	0.0
17	9.6	39111.5	0.0	0.0	0.	0.	0.0	0.0	0.0
18	6.3	23658.8	0.0	0.0	0.	0.	0.0	0.0	0.0
19	3.3	12180.3	0.0	0.0	0.	0.	0.0	0.0	0.0
20	9.5	37089.1	0.0	0.0	0.	0.	0.0	0.0	0.0
21	9.5	39491.7	0.0	0.0	0.	0.	0.0	0.0	0.0
22	9.4	41648.2	0.0	0.0	0.	0.	0.0	0.0	0.0
23	9.4	43559.6	0.0	0.0	0.	0.	0.0	0.0	0.0
24	9.3	45227.7	0.0	0.0	0.	0.	0.0	0.0	0.0
25	4.5	22583.5	0.0	0.0	0.	0.	0.0	0.0	0.0
26	4.7	23271.6	0.0	0.0	0.	0.	0.0	0.0	0.0
27	5.3	24355.8	0.0	0.0	0.	0.	0.0	0.0	0.0
28	4.0	17881.4	0.0	0.0	0.	0.	0.0	0.0	0.0
29	9.2	41835.8	0.0	0.0	0.	0.	0.0	0.0	0.0
30	9.1	42109.1	0.0	0.0	0.	0.	0.0	0.0	0.0
31	9.0	42163.8	0.0	0.0	0.	0.	0.0	0.0	0.0
32	9.0	42004.5	0.0	0.0	0.	0.	0.0	0.0	0.0
33	8.9	41635.1	0.0	0.0	0.	0.	0.0	0.0	0.0
34	8.8	41060.6	0.0	0.0	0.	0.	0.0	0.0	0.0
35	2.1	9620.7	0.0	0.0	0.	0.	0.0	0.0	0.0
36	6.7	29218.7	0.0	0.0	0.	0.	0.0	0.0	0.0
37	3.3	13372.8	0.0	0.0	0.	0.	0.0	0.0	0.0
38	5.3	20665.0	0.0	0.0	0.	0.	0.0	0.0	0.0
39	8.6	32568.3	0.0	0.0	0.	0.	0.0	0.0	0.0
40	8.5	31277.6	0.0	0.0	0.	0.	0.0	0.0	0.0
41	8.4	29811.1	0.0	0.0	0.	0.	0.0	0.0	0.0

42	8.4	28175.6	0.0	0.0	0.	0.	0.0	0.0	0.0
43	8.3	26377.6	0.0	0.0	0.	0.	0.0	0.0	0.0
44	8.2	24424.7	0.0	0.0	0.	0.	0.0	0.0	0.0
45	8.1	22324.1	0.0	0.0	0.	0.	0.0	0.0	0.0
46	6.2	15764.5	0.0	0.0	0.	0.	0.0	0.0	0.0
47	1.8	4116.9	0.0	0.0	0.	0.	0.0	0.0	0.0
48	7.9	11998.7	0.0	0.0	0.	0.	0.0	0.0	0.0
49	5.3	2351.2	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	573.005	1374.002
2	582.943	1375.109
3	592.864	1376.365
4	602.765	1377.768
5	612.644	1379.320
6	622.499	1381.018
7	632.327	1382.864
8	642.127	1384.857
9	651.895	1386.995
10	661.631	1389.280
11	671.331	1391.709
12	680.994	1394.283
13	690.617	1397.002
14	700.199	1399.864
15	709.737	1402.868
16	719.229	1406.015
17	728.673	1409.303
18	738.067	1412.732
19	747.408	1416.302
20	756.695	1420.010
21	765.926	1423.856
22	775.098	1427.840
23	784.209	1431.961
24	793.258	1436.218
25	802.242	1440.609
26	811.160	1445.134
27	820.009	1449.791
28	828.788	1454.580
29	837.494	1459.500
30	846.125	1464.550
31	854.680	1469.728
32	863.157	1475.033
33	871.554	1480.464
34	879.868	1486.021
35	888.099	1491.700
36	896.243	1497.502
37	904.300	1503.425
38	912.268	1509.468
39	920.145	1515.629
40	921.692	1516.877

Circle Center At X = 503.928 ; Y = 2039.510 ; and Radius = 669.083

Factor of Safety

*** 1.790 ***

Failure Surface Specified By 41 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	571.562	1373.281
2	581.562	1373.206
3	591.561	1373.335
4	601.555	1373.668
5	611.541	1374.203
6	621.514	1374.942
7	631.469	1375.883
8	641.404	1377.027
9	651.313	1378.372
10	661.192	1379.919

11	671.038	1381.667
12	680.847	1383.614
13	690.614	1385.761
14	700.335	1388.106
15	710.007	1390.648
16	719.624	1393.386
17	729.184	1396.320
18	738.683	1399.447
19	748.116	1402.767
20	757.479	1406.278
21	766.769	1409.979
22	775.981	1413.868
23	785.113	1417.944
24	794.160	1422.205
25	803.118	1426.649
26	811.984	1431.274
27	820.755	1436.079
28	829.425	1441.061
29	837.993	1446.218
30	846.453	1451.549
31	854.804	1457.051
32	863.041	1462.721
33	871.161	1468.558
34	879.160	1474.559
35	887.036	1480.721
36	894.784	1487.042
37	902.403	1493.520
38	909.888	1500.151
39	917.236	1506.933
40	924.445	1513.864
41	925.623	1515.043

Circle Center At X = 580.227 ; Y = 1864.718 ; and Radius = 491.513
Factor of Safety
*** 1.794 ***

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	592.123	1383.561
2	602.102	1384.198
3	612.069	1385.010
4	622.021	1385.997
5	631.953	1387.158
6	641.863	1388.494
7	651.749	1390.003
8	661.606	1391.686
9	671.433	1393.541
10	681.225	1395.569
11	690.980	1397.768
12	700.695	1400.138
13	710.367	1402.679
14	719.993	1405.388
15	729.570	1408.267
16	739.095	1411.312
17	748.564	1414.525
18	757.977	1417.904
19	767.328	1421.447
20	776.615	1425.154
21	785.836	1429.023
22	794.988	1433.053
23	804.068	1437.244
24	813.073	1441.593
25	821.999	1446.100
26	830.846	1450.763
27	839.609	1455.580
28	848.286	1460.550
29	856.875	1465.672
30	865.372	1470.944

31	873.776	1476.365
32	882.083	1481.932
33	890.291	1487.644
34	898.398	1493.499
35	906.400	1499.495
36	914.296	1505.632
37	922.083	1511.905
38	925.763	1514.978

Circle Center At X = 560.882 ; Y = 1952.105 ; and Radius = 569.402
Factor of Safety
*** 1.797 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	605.109	1390.054
2	615.099	1390.494
3	625.079	1391.125
4	635.045	1391.948
5	644.994	1392.962
6	654.921	1394.167
7	664.823	1395.563
8	674.696	1397.148
9	684.538	1398.923
10	694.343	1400.887
11	704.109	1403.038
12	713.831	1405.377
13	723.507	1407.902
14	733.133	1410.612
15	742.705	1413.507
16	752.219	1416.585
17	761.673	1419.846
18	771.062	1423.287
19	780.383	1426.908
20	789.634	1430.708
21	798.809	1434.684
22	807.906	1438.836
23	816.922	1443.162
24	825.853	1447.660
25	834.696	1452.329
26	843.448	1457.167
27	852.105	1462.172
28	860.665	1467.343
29	869.124	1472.677
30	877.478	1478.173
31	885.726	1483.828
32	893.863	1489.640
33	901.887	1495.608
34	909.795	1501.729
35	917.584	1508.000
36	925.251	1514.420
37	925.847	1514.938

Circle Center At X = 587.227 ; Y = 1910.326 ; and Radius = 520.578
Factor of Safety
*** 1.803 ***

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	565.069	1370.034
2	575.068	1370.156
3	585.063	1370.487
4	595.048	1371.028
5	605.020	1371.778
6	614.974	1372.738
7	624.905	1373.906
8	634.810	1375.281
9	644.684	1376.865
10	654.523	1378.655

11	664.321	1380.651
12	674.076	1382.852
13	683.783	1385.257
14	693.436	1387.866
15	703.033	1390.676
16	712.569	1393.687
17	722.040	1396.897
18	731.441	1400.306
19	740.769	1403.910
20	750.019	1407.710
21	759.187	1411.703
22	768.270	1415.887
23	777.263	1420.261
24	786.162	1424.822
25	794.963	1429.569
26	803.663	1434.500
27	812.258	1439.612
28	820.743	1444.903
29	829.116	1450.371
30	837.372	1456.014
31	845.508	1461.828
32	853.520	1467.812
33	861.405	1473.962
34	869.159	1480.277
35	876.779	1486.753
36	884.261	1493.387
37	891.603	1500.177
38	898.801	1507.119
39	905.851	1514.211
40	908.064	1516.532

Circle Center At X = 564.300 ; Y = 1846.612 ; and Radius = 476.578
Factor of Safety
*** 1.809 ***

Failure Surface Specified By 42 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	565.790	1370.395
2	575.722	1371.562
3	585.639	1372.848
4	595.540	1374.254
5	605.423	1375.780
6	615.286	1377.425
7	625.130	1379.189
8	634.951	1381.072
9	644.748	1383.073
10	654.521	1385.193
11	664.268	1387.431
12	673.986	1389.786
13	683.676	1392.259
14	693.335	1394.848
15	702.962	1397.554
16	712.555	1400.376
17	722.114	1403.314
18	731.636	1406.367
19	741.121	1409.535
20	750.567	1412.817
21	759.973	1416.213
22	769.337	1419.723
23	778.658	1423.345
24	787.934	1427.080
25	797.165	1430.927
26	806.348	1434.885
27	815.483	1438.953
28	824.568	1443.132
29	833.602	1447.420
30	842.583	1451.818
31	851.511	1456.323

32	860.384	1460.936
33	869.200	1465.655
34	877.958	1470.481
35	886.658	1475.412
36	895.297	1480.449
37	903.875	1485.589
38	912.390	1490.832
39	920.841	1496.178
40	929.227	1501.626
41	937.546	1507.174
42	939.548	1508.544

Circle Center At X = 474.268 ; Y = 2192.673 ; and Radius = 827.355
Factor of Safety
*** 1.813 ***

Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	584.187	1379.594
2	594.139	1380.567
3	604.074	1381.707
4	613.989	1383.011
5	623.880	1384.481
6	633.746	1386.116
7	643.583	1387.915
8	653.388	1389.877
9	663.160	1392.002
10	672.894	1394.291
11	682.590	1396.740
12	692.243	1399.352
13	701.851	1402.123
14	711.412	1405.055
15	720.922	1408.145
16	730.380	1411.394
17	739.782	1414.799
18	749.126	1418.361
19	758.410	1422.078
20	767.630	1425.950
21	776.784	1429.974
22	785.871	1434.151
23	794.886	1438.478
24	803.828	1442.955
25	812.694	1447.580
26	821.481	1452.352
27	830.188	1457.271
28	838.812	1462.333
29	847.350	1467.539
30	855.801	1472.886
31	864.161	1478.373
32	872.428	1483.999
33	880.601	1489.762
34	888.676	1495.660
35	896.652	1501.692
36	904.526	1507.856
37	912.297	1514.151
38	917.747	1518.718

Circle Center At X = 530.785 ; Y = 1977.055 ; and Radius = 599.844
Factor of Safety
*** 1.813 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	607.994	1391.497
2	617.978	1392.063
3	627.951	1392.805
4	637.909	1393.723
5	647.849	1394.816
6	657.768	1396.084

7	667.663	1397.527
8	677.532	1399.144
9	687.370	1400.934
10	697.175	1402.898
11	706.944	1405.035
12	716.674	1407.343
13	726.362	1409.823
14	736.005	1412.472
15	745.599	1415.292
16	755.142	1418.280
17	764.631	1421.436
18	774.063	1424.759
19	783.435	1428.247
20	792.743	1431.901
21	801.986	1435.717
22	811.161	1439.696
23	820.263	1443.837
24	829.292	1448.137
25	838.243	1452.595
26	847.114	1457.211
27	855.902	1461.982
28	864.605	1466.908
29	873.219	1471.986
30	881.743	1477.215
31	890.173	1482.594
32	898.507	1488.121
33	906.743	1493.793
34	914.877	1499.610
35	922.907	1505.570
36	930.831	1511.670
37	931.576	1512.265

Circle Center At X = 580.885 ; Y = 1958.053 ; and Radius = 567.204
Factor of Safety
*** 1.815 ***

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	581.301	1378.151
2	591.281	1378.783
3	601.250	1379.569
4	611.206	1380.510
5	621.146	1381.604
6	631.068	1382.853
7	640.969	1384.255
8	650.847	1385.810
9	660.700	1387.517
10	670.526	1389.377
11	680.321	1391.389
12	690.085	1393.552
13	699.813	1395.866
14	709.505	1398.331
15	719.157	1400.945
16	728.768	1403.708
17	738.334	1406.620
18	747.855	1409.679
19	757.327	1412.886
20	766.748	1416.238
21	776.116	1419.736
22	785.429	1423.379
23	794.685	1427.165
24	803.880	1431.095
25	813.014	1435.166
26	822.084	1439.378
27	831.087	1443.729
28	840.022	1448.220
29	848.887	1452.849
30	857.678	1457.614

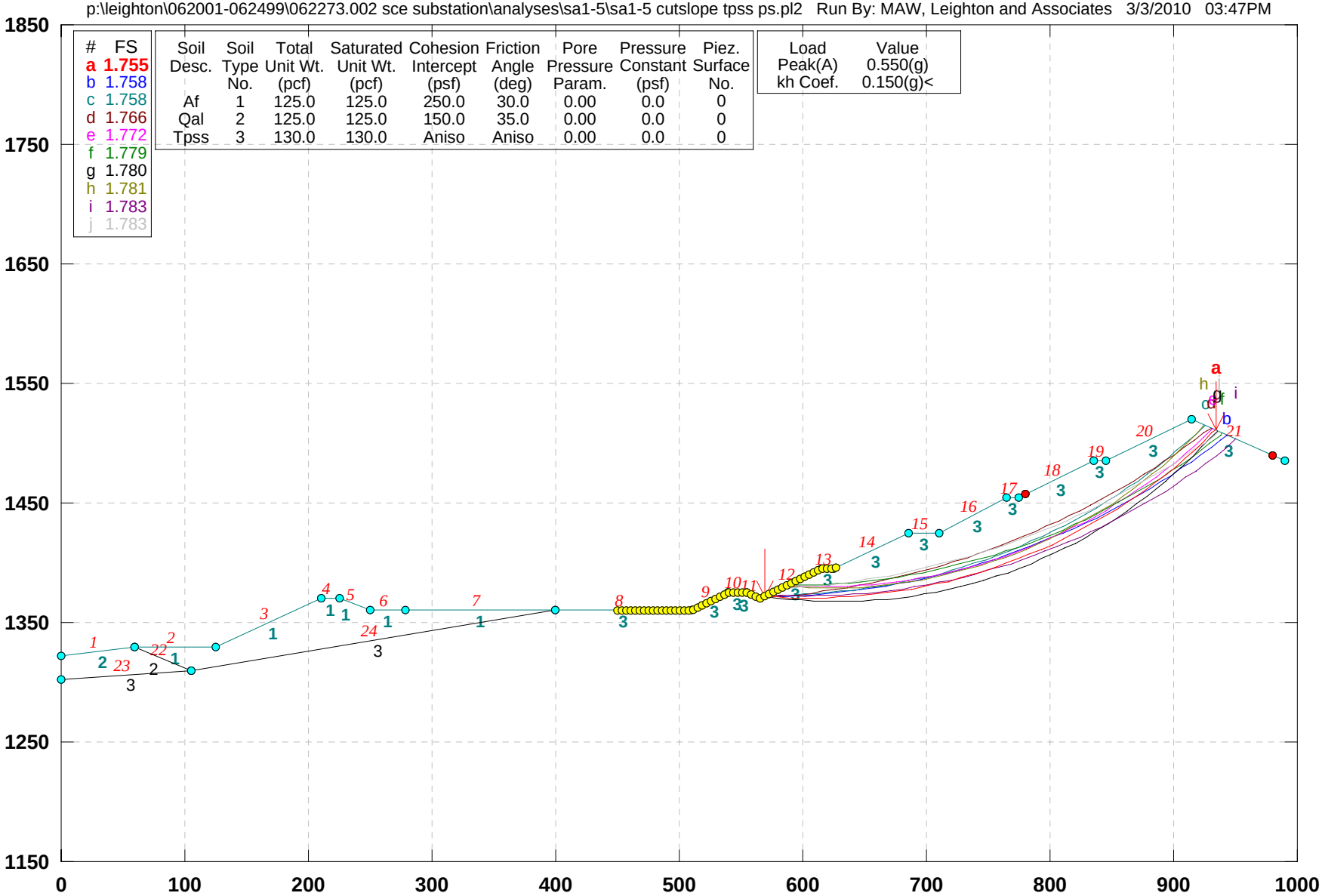
31	866.395	1462.514
32	875.035	1467.549
33	883.596	1472.717
34	892.076	1478.017
35	900.473	1483.448
36	908.785	1489.008
37	917.010	1494.696
38	925.145	1500.511
39	933.190	1506.450
40	937.307	1509.590

Circle Center At X = 545.505 ; Y = 2022.948 ; and Radius = 645.791
Factor of Safety
*** 1.817 ***

**** END OF GSTABL7 OUTPUT ****

SCE Substation, Mission Village 062273002 SA1-5 Cut Slope Tpss Pseudostatic

p:\leighton\062001-062499\062273.002 sce substation\analyses\sa1-5\sa1-5 cutslope tpss ps.pl2 Run By: MAW, Leighton and Associates 3/3/2010 03:47PM



#	FS
a	1.755
b	1.758
c	1.758
d	1.766
e	1.772
f	1.779
g	1.780
h	1.781
i	1.783
j	1.783

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Af	1	125.0	125.0	250.0	30.0	0.00	0.0	0
Qal	2	125.0	125.0	150.0	35.0	0.00	0.0	0
Tpss	3	130.0	130.0	Aniso	Aniso	0.00	0.0	0

Load	Value
Peak(A)	0.550(g)
kh Coef.	0.150(g)<

GSTABL7 v.2 FSmin=1.755

Safety Factors Are Calculated By The Modified Bishop Method

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                          ***  GSTABL7  ***
                     ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **
                (All Rights Reserved-Unauthorized Use Prohibited)
*******************************************************************************
                      SLOPE STABILITY ANALYSIS SYSTEM
          Modified Bishop, Simplified Janbu, or GLE Method of Slices.
          (Includes Spencer & Morgenstern-Price Type Analysis)
          Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
          Nonlinear Undrained Shear Strength, Curved Phi Envelope,
          Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
          Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*******************************************************************************
   Analysis Run Date:        3/3/2010
   Time of Run:              03:47PM
   Run By:                   MAW, Leighton and Associates
   Input Data Filename:      P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA1-5\sa1-5 cutslope tpss ps.in
   Output Filename:          P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA1-5\sa1-5 cutslope tpss ps.OUT
   Unit System:              English
   Plotted Output Filename:  P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA1-5\sa1-5 cutslope tpss ps.PLT
   PROBLEM DESCRIPTION:  SCE Substation, Mission Village 06227300
                         2 SA1-5 Cut Slope Tpss Pseudostatic
   BOUNDARY COORDINATES
      21 Top   Boundaries
      24 Total Boundaries
   Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
      No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
       1          0.00    1322.00      60.00    1330.00        2
       2         60.00    1330.00     125.00    1330.00        1
       3        125.00    1330.00     210.00    1370.00        1
       4        210.00    1370.00     225.00    1370.00        1
       5        225.00    1370.00     250.00    1360.00        1
       6        250.00    1360.00     278.00    1360.00        1
       7        278.00    1360.00     400.00    1360.00        1
       8        400.00    1360.00     510.00    1360.00        3
       9        510.00    1360.00     540.00    1375.00        3
      10        540.00    1375.00     555.00    1375.00        3
      11        555.00    1375.00     565.00    1370.00        3
      12        565.00    1370.00     615.00    1395.00        3
      13        615.00    1395.00     625.00    1395.00        3
      14        625.00    1395.00     685.00    1425.00        3
      15        685.00    1425.00     710.00    1425.00        3
      16        710.00    1425.00     765.00    1455.00        3
      17        765.00    1455.00     775.00    1455.00        3
      18        775.00    1455.00     835.00    1485.00        3
      19        835.00    1485.00     845.00    1485.00        3
      20        845.00    1485.00     915.00    1520.00        3
      21        915.00    1520.00     990.00    1485.00        3
      22         60.00    1330.00     105.00    1310.00        2
      23          0.00    1302.00     105.00    1310.00        3
      24        105.00    1310.00     400.00    1360.00        3
   User Specified Y-Origin =      1150.00(ft)
   Default X-Plus Value = 0.00(ft)
   Default Y-Plus Value = 0.00(ft)
  ISOTROPIC SOIL PARAMETERS
    3 Type(s) of Soil
   Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
   Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
    No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
     1   125.0    125.0     250.0     30.0    0.00       0.0      0
     2   125.0    125.0     150.0     35.0    0.00       0.0      0
     3   130.0    130.0     600.0     38.0    0.00       0.0      0
  ANISOTROPIC STRENGTH PARAMETERS
      1 soil type(s)
```



```
Soil Type  3 Is Anisotropic
Number Of Direction Ranges Specified =  4
Direction    Counterclockwise     Cohesion     Friction
  Range       Direction Limit    Intercept       Angle
   No.            (deg)            (psf)         (deg)
    1             -90.0             600.00         38.00
    2             -44.0             600.00         38.00
    3             -34.0             150.00         28.00
    4              90.0             600.00         38.00
ANISOTROPIC SOIL NOTES:
   (1) An input value of 0.01 for C and/or Phi will cause Aniso
       C and/or Phi to be ignored in that range.
   (2) An input value of 0.02 for Phi will set both Phi and
       C equal to zero, with no water weight in the tension crack.
   (3) An input value of 0.03 for Phi will set both Phi and
       C equal to zero, with water weight in the tension crack.
Specified Peak Ground Acceleration Coefficient (A) =   0.550(g)
Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
Specified Seismic Pore-Pressure Factor =   0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
5000 Trial Surfaces Have Been Generated.
  10 Surface(s) Initiate(s) From Each Of   500 Points Equally Spaced
Along The Ground Surface Between  X = 450.00(ft)
                                 and  X = 630.00(ft)
Each Surface Terminates Between   X = 780.00(ft)
                                 and   X = 980.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =      0.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
      Failure Surfaces Evaluated. They Are
      Ordered - Most Critical First.
      * * Safety Factors Are Calculated By The Modified Bishop Method * *
      Total Number of Trial Surfaces Attempted =  5000
      Number of Trial Surfaces With Valid FS = 5000
      Statistical Data On All Valid FS Values:
         FS Max =   3.998   FS Min =   1.755   FS Ave =   2.364
         Standard Deviation =    0.317   Coefficient of Variation =   13.40 %
      Failure Surface Specified By 42 Coordinate Points
        Point      X-Surf      Y-Surf
         No.        (ft)        (ft)
          1        568.676     1371.838
          2        578.652     1371.141
          3        588.641     1370.664
          4        598.637     1370.408
          5        608.637     1370.372
          6        618.635     1370.556
          7        628.627     1370.960
          8        638.608     1371.585
          9        648.572     1372.430
         10        658.515     1373.494
         11        668.433     1374.777
         12        678.319     1376.278
         13        688.170     1377.997
         14        697.981     1379.932
         15        707.747     1382.083
         16        717.463     1384.450
         17        727.125     1387.029
         18        736.727     1389.821
         19        746.266     1392.824
         20        755.736     1396.037
         21        765.133     1399.457
         22        774.452     1403.084
         23        783.689     1406.915
         24        792.839     1410.949
```

25	801.898	1415.184
26	810.862	1419.617
27	819.725	1424.247
28	828.485	1429.071
29	837.136	1434.087
30	845.674	1439.293
31	854.095	1444.685
32	862.396	1450.262
33	870.572	1456.020
34	878.618	1461.958
35	886.532	1468.071
36	894.310	1474.357
37	901.946	1480.813
38	909.439	1487.436
39	916.784	1494.222
40	923.977	1501.168
41	931.016	1508.272
42	933.812	1511.221

Circle Center At X = 605.298 ; Y = 1823.858 ; and Radius = 453.501

Factor of Safety

*** 1.755 ***

Individual data on the 50 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	10.0	3686.0	0.0	0.0	0.	0.	552.9	0.0	0.0
2	10.0	10933.9	0.0	0.0	0.	0.	1640.1	0.0	0.0
3	10.0	17912.6	0.0	0.0	0.	0.	2686.9	0.0	0.0
4	10.0	24607.5	0.0	0.0	0.	0.	3691.1	0.0	0.0
5	6.4	19007.7	0.0	0.0	0.	0.	2851.2	0.0	0.0
6	3.6	11568.3	0.0	0.0	0.	0.	1735.2	0.0	0.0
7	6.4	20118.4	0.0	0.0	0.	0.	3017.8	0.0	0.0
8	3.6	11798.0	0.0	0.0	0.	0.	1769.7	0.0	0.0
9	10.0	36375.6	0.0	0.0	0.	0.	5456.3	0.0	0.0
10	10.0	41824.0	0.0	0.0	0.	0.	6273.6	0.0	0.0
11	9.9	46935.3	0.0	0.0	0.	0.	7040.3	0.0	0.0
12	9.9	51701.5	0.0	0.0	0.	0.	7755.2	0.0	0.0
13	9.9	56115.7	0.0	0.0	0.	0.	8417.4	0.0	0.0
14	6.7	40358.3	0.0	0.0	0.	0.	6053.7	0.0	0.0
15	3.2	19487.0	0.0	0.0	0.	0.	2923.0	0.0	0.0
16	9.8	58714.7	0.0	0.0	0.	0.	8807.2	0.0	0.0
17	9.8	55850.9	0.0	0.0	0.	0.	8377.6	0.0	0.0
18	2.3	12488.1	0.0	0.0	0.	0.	1873.2	0.0	0.0
19	7.5	42199.9	0.0	0.0	0.	0.	6330.0	0.0	0.0
20	9.7	57734.0	0.0	0.0	0.	0.	8660.1	0.0	0.0
21	9.6	60585.7	0.0	0.0	0.	0.	9087.9	0.0	0.0
22	9.5	63062.8	0.0	0.0	0.	0.	9459.4	0.0	0.0
23	9.5	65166.3	0.0	0.0	0.	0.	9775.0	0.0	0.0
24	9.3	65939.7	0.0	0.0	0.	0.	9891.0	0.0	0.0
25	0.1	957.2	0.0	0.0	0.	0.	143.6	0.0	0.0
26	9.3	65092.6	0.0	0.0	0.	0.	9763.9	0.0	0.0
27	0.5	3692.7	0.0	0.0	0.	0.	553.9	0.0	0.0
28	8.7	58801.2	0.0	0.0	0.	0.	8820.2	0.0	0.0
29	9.2	62688.0	0.0	0.0	0.	0.	9403.2	0.0	0.0
30	9.1	62555.5	0.0	0.0	0.	0.	9383.3	0.0	0.0
31	9.0	62096.1	0.0	0.0	0.	0.	9314.4	0.0	0.0
32	8.9	61317.7	0.0	0.0	0.	0.	9197.7	0.0	0.0
33	8.8	60231.2	0.0	0.0	0.	0.	9034.7	0.0	0.0
34	6.5	44392.0	0.0	0.0	0.	0.	6658.8	0.0	0.0
35	2.1	14306.8	0.0	0.0	0.	0.	2146.0	0.0	0.0
36	7.9	49600.6	0.0	0.0	0.	0.	7440.1	0.0	0.0
37	0.7	4037.3	0.0	0.0	0.	0.	605.6	0.0	0.0
38	8.4	49762.2	0.0	0.0	0.	0.	7464.3	0.0	0.0
39	8.3	47640.5	0.0	0.0	0.	0.	7146.1	0.0	0.0
40	8.2	45277.7	0.0	0.0	0.	0.	6791.7	0.0	0.0
41	8.0	42688.6	0.0	0.0	0.	0.	6403.3	0.0	0.0

42	7.9	39890.3	0.0	0.0	0.	0.	5983.5	0.0	0.0
43	7.8	36899.5	0.0	0.0	0.	0.	5534.9	0.0	0.0
44	7.6	33733.7	0.0	0.0	0.	0.	5060.1	0.0	0.0
45	7.5	30411.5	0.0	0.0	0.	0.	4561.7	0.0	0.0
46	5.6	20679.8	0.0	0.0	0.	0.	3102.0	0.0	0.0
47	1.8	6072.0	0.0	0.0	0.	0.	910.8	0.0	0.0
48	7.2	18510.2	0.0	0.0	0.	0.	2776.5	0.0	0.0
49	7.0	8645.2	0.0	0.0	0.	0.	1296.8	0.0	0.0
50	2.8	773.2	0.0	0.0	0.	0.	116.0	0.0	0.0

Failure Surface Specified By 42 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	567.955	1371.477
2	577.953	1371.651
3	587.947	1371.989
4	597.935	1372.494
5	607.912	1373.163
6	617.878	1373.997
7	627.827	1374.996
8	637.760	1376.160
9	647.671	1377.487
10	657.559	1378.979
11	667.421	1380.633
12	677.255	1382.451
13	687.057	1384.431
14	696.825	1386.573
15	706.556	1388.877
16	716.247	1391.341
17	725.897	1393.965
18	735.502	1396.748
19	745.059	1399.690
20	754.567	1402.790
21	764.022	1406.046
22	773.421	1409.459
23	782.763	1413.026
24	792.045	1416.748
25	801.264	1420.622
26	810.417	1424.649
27	819.503	1428.827
28	828.518	1433.154
29	837.461	1437.630
30	846.328	1442.253
31	855.117	1447.022
32	863.827	1451.936
33	872.454	1456.993
34	880.996	1462.193
35	889.451	1467.533
36	897.816	1473.012
37	906.089	1478.629
38	914.269	1484.382
39	922.352	1490.269
40	930.337	1496.289
41	938.221	1502.441
42	943.498	1506.701

Circle Center At X = 562.502 ; Y = 1975.713 ; and Radius = 604.260

Factor of Safety

*** 1.758 ***

Failure Surface Specified By 41 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	571.562	1373.281
2	581.562	1373.206
3	591.561	1373.335
4	601.555	1373.668
5	611.541	1374.203
6	621.514	1374.942
7	631.469	1375.883

8	641.404	1377.027
9	651.313	1378.372
10	661.192	1379.919
11	671.038	1381.667
12	680.847	1383.614
13	690.614	1385.761
14	700.335	1388.106
15	710.007	1390.648
16	719.624	1393.386
17	729.184	1396.320
18	738.683	1399.447
19	748.116	1402.767
20	757.479	1406.278
21	766.769	1409.979
22	775.981	1413.868
23	785.113	1417.944
24	794.160	1422.205
25	803.118	1426.649
26	811.984	1431.274
27	820.755	1436.079
28	829.425	1441.061
29	837.993	1446.218
30	846.453	1451.549
31	854.804	1457.051
32	863.041	1462.721
33	871.161	1468.558
34	879.160	1474.559
35	887.036	1480.721
36	894.784	1487.042
37	902.403	1493.520
38	909.888	1500.151
39	917.236	1506.933
40	924.445	1513.864
41	925.623	1515.043

Circle Center At X = 580.227 ; Y = 1864.718 ; and Radius = 491.513
Factor of Safety
*** 1.758 ***

Failure Surface Specified By 41 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	566.151	1370.576
2	576.122	1371.344
3	586.079	1372.264
4	596.021	1373.337
5	605.946	1374.562
6	615.851	1375.939
7	625.733	1377.467
8	635.591	1379.146
9	645.422	1380.976
10	655.224	1382.956
11	664.995	1385.086
12	674.732	1387.366
13	684.432	1389.794
14	694.095	1392.370
15	703.717	1395.094
16	713.296	1397.965
17	722.830	1400.982
18	732.317	1404.145
19	741.754	1407.452
20	751.139	1410.904
21	760.471	1414.499
22	769.746	1418.236
23	778.963	1422.115
24	788.120	1426.135
25	797.214	1430.294
26	806.243	1434.592
27	815.205	1439.028

28	824.099	1443.600
29	832.921	1448.308
30	841.670	1453.151
31	850.345	1458.126
32	858.942	1463.234
33	867.459	1468.473
34	875.896	1473.842
35	884.249	1479.339
36	892.518	1484.964
37	900.699	1490.714
38	908.791	1496.589
39	916.793	1502.588
40	924.701	1508.708
41	930.048	1512.978

Circle Center At X = 520.968 ; Y = 2022.270 ; and Radius = 653.259
Factor of Safety
*** 1.766 ***

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	586.351	1380.676
2	596.338	1380.162
3	606.334	1379.872
4	616.334	1379.807
5	626.332	1379.965
6	636.325	1380.347
7	646.307	1380.953
8	656.272	1381.782
9	666.217	1382.834
10	676.135	1384.109
11	686.023	1385.605
12	695.874	1387.323
13	705.685	1389.260
14	715.449	1391.417
15	725.163	1393.792
16	734.821	1396.385
17	744.419	1399.192
18	753.951	1402.214
19	763.414	1405.449
20	772.801	1408.895
21	782.109	1412.550
22	791.333	1416.413
23	800.468	1420.482
24	809.510	1424.754
25	818.453	1429.227
26	827.294	1433.900
27	836.029	1438.769
28	844.652	1443.833
29	853.159	1449.089
30	861.547	1454.534
31	869.810	1460.166
32	877.946	1465.981
33	885.949	1471.977
34	893.815	1478.150
35	901.542	1484.499
36	909.124	1491.018
37	916.559	1497.706
38	923.842	1504.559
39	930.969	1511.573
40	931.621	1512.244

Circle Center At X = 614.281 ; Y = 1826.204 ; and Radius = 446.403
Factor of Safety
*** 1.772 ***

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	587.073	1381.036

2	597.073	1381.083
3	607.070	1381.313
4	617.061	1381.726
5	627.044	1382.323
6	637.013	1383.102
7	646.967	1384.064
8	656.901	1385.208
9	666.813	1386.534
10	676.699	1388.042
11	686.555	1389.731
12	696.379	1391.600
13	706.167	1393.649
14	715.915	1395.877
15	725.621	1398.283
16	735.282	1400.867
17	744.893	1403.628
18	754.452	1406.565
19	763.956	1409.676
20	773.401	1412.961
21	782.784	1416.418
22	792.102	1420.047
23	801.352	1423.847
24	810.531	1427.815
25	819.636	1431.951
26	828.663	1436.253
27	837.610	1440.720
28	846.474	1445.350
29	855.251	1450.142
30	863.938	1455.094
31	872.534	1460.205
32	881.034	1465.472
33	889.436	1470.895
34	897.738	1476.470
35	905.936	1482.197
36	914.027	1488.073
37	922.010	1494.096
38	929.880	1500.265
39	937.636	1506.577
40	939.817	1508.419

Circle Center At X = 589.558 ; Y = 1926.250 ; and Radius = 545.219
Factor of Safety
*** 1.779 ***

Failure Surface Specified By 42 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	568.676	1371.838
2	578.585	1370.492
3	588.525	1369.394
4	598.488	1368.543
5	608.470	1367.941
6	618.464	1367.588
7	628.464	1367.483
8	638.463	1367.628
9	648.455	1368.022
10	658.434	1368.664
11	668.394	1369.555
12	678.329	1370.694
13	688.233	1372.080
14	698.099	1373.712
15	707.921	1375.589
16	717.694	1377.710
17	727.410	1380.074
18	737.065	1382.679
19	746.652	1385.524
20	756.165	1388.607
21	765.598	1391.925
22	774.945	1395.478

23	784.202	1399.262
24	793.361	1403.276
25	802.417	1407.517
26	811.365	1411.981
27	820.199	1416.668
28	828.914	1421.573
29	837.503	1426.693
30	845.963	1432.026
31	854.287	1437.568
32	862.470	1443.315
33	870.508	1449.264
34	878.395	1455.412
35	886.126	1461.754
36	893.697	1468.287
37	901.103	1475.007
38	908.340	1481.908
39	915.402	1488.988
40	922.286	1496.242
41	928.987	1503.664
42	934.999	1510.667

Circle Center At X = 627.656 ; Y = 1768.925 ; and Radius = 401.443
Factor of Safety
*** 1.780 ***

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	585.630	1380.315
2	595.601	1379.560
3	605.588	1379.052
4	615.585	1378.789
5	625.585	1378.773
6	635.582	1379.003
7	645.571	1379.479
8	655.545	1380.201
9	665.498	1381.169
10	675.424	1382.381
11	685.318	1383.838
12	695.172	1385.538
13	704.982	1387.480
14	714.740	1389.663
15	724.443	1392.086
16	734.082	1394.747
17	743.653	1397.644
18	753.150	1400.777
19	762.566	1404.142
20	771.897	1407.739
21	781.137	1411.564
22	790.279	1415.615
23	799.319	1419.891
24	808.251	1424.387
25	817.069	1429.103
26	825.769	1434.034
27	834.344	1439.178
28	842.791	1444.532
29	851.102	1450.092
30	859.275	1455.855
31	867.302	1461.818
32	875.181	1467.977
33	882.905	1474.328
34	890.471	1480.867
35	897.873	1487.590
36	905.108	1494.494
37	912.170	1501.574
38	919.055	1508.826
39	924.955	1515.354

Circle Center At X = 621.245 ; Y = 1784.708 ; and Radius = 405.958
Factor of Safety

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      ***    1.781   ***
Failure Surface Specified By 43 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1       570.840     1372.920
    2       580.830     1372.461
    3       590.826     1372.188
    4       600.826     1372.104
    5       610.825     1372.206
    6       620.821     1372.496
    7       630.810     1372.974
    8       640.788     1373.638
    9       650.751     1374.490
   10       660.697     1375.527
   11       670.622     1376.751
   12       680.522     1378.161
   13       690.394     1379.756
   14       700.234     1381.536
   15       710.040     1383.500
   16       719.806     1385.648
   17       729.531     1387.978
   18       739.211     1390.490
   19       748.841     1393.182
   20       758.420     1396.055
   21       767.943     1399.107
   22       777.407     1402.337
   23       786.808     1405.744
   24       796.145     1409.326
   25       805.412     1413.082
   26       814.608     1417.012
   27       823.728     1421.113
   28       832.770     1425.384
   29       841.730     1429.824
   30       850.606     1434.432
   31       859.393     1439.204
   32       868.090     1444.141
   33       876.692     1449.240
   34       885.198     1454.499
   35       893.603     1459.916
   36       901.906     1465.490
   37       910.102     1471.219
   38       918.190     1477.100
   39       926.166     1483.132
   40       934.027     1489.312
   41       941.772     1495.639
   42       949.396     1502.109
   43       950.760     1503.312
Circle Center At X =   600.349 ; Y =  1905.678 ; and Radius =   533.574
       Factor of Safety
      ***    1.783   ***
Failure Surface Specified By 40 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1       581.301     1378.151
    2       591.281     1378.783
    3       601.250     1379.569
    4       611.206     1380.510
    5       621.146     1381.604
    6       631.068     1382.853
    7       640.969     1384.255
    8       650.847     1385.810
    9       660.700     1387.517
   10       670.526     1389.377
   11       680.321     1391.389
   12       690.085     1393.552
   13       699.813     1395.866
   14       709.505     1398.331
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   15       719.157     1400.945
   16       728.768     1403.708
   17       738.334     1406.620
   18       747.855     1409.679
   19       757.327     1412.886
   20       766.748     1416.238
   21       776.116     1419.736
   22       785.429     1423.379
   23       794.685     1427.165
   24       803.880     1431.095
   25       813.014     1435.166
   26       822.084     1439.378
   27       831.087     1443.729
   28       840.022     1448.220
   29       848.887     1452.849
   30       857.678     1457.614
   31       866.395     1462.514
   32       875.035     1467.549
   33       883.596     1472.717
   34       892.076     1478.017
   35       900.473     1483.448
   36       908.785     1489.008
   37       917.010     1494.696
   38       925.145     1500.511
   39       933.190     1506.450
   40       937.307     1509.590
Circle Center At X =   545.505 ; Y =  2022.948 ; and Radius =   645.791
       Factor of Safety
      ***    1.783   ***
          **** END OF GSTABL7 OUTPUT ****
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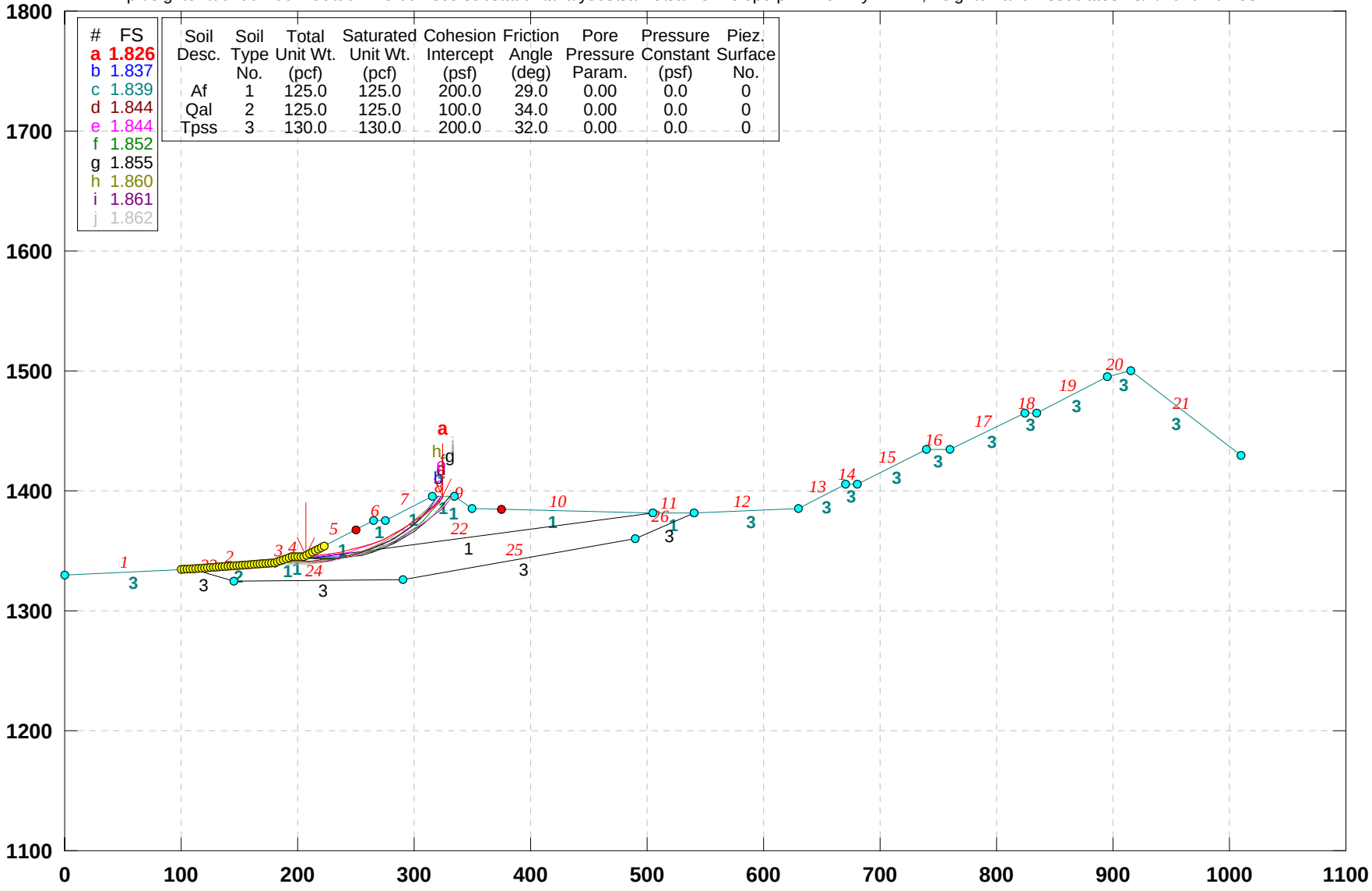
SCE Substation, Mission Village 062273002 SA2-3 Fill Slope

p:\leighton\062001-062499\062273.002 sce substation\analyses\sa2-3\sa2-3 fillslope.pl2 Run By: MAW, Leighton and Associates 3/2/2010 04:53PM



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Af	1	125.0	125.0	200.0	29.0	0.00	0.0	0
Qal	2	125.0	125.0	100.0	34.0	0.00	0.0	0
Tpss	3	130.0	130.0	200.0	32.0	0.00	0.0	0

GSTABL7 v.2 FSmin=1.826

Safety Factors Are Calculated By The Modified Bishop Method

```
                    ***  GSTABL7  ***
              ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **
          (All Rights Reserved-Unauthorized Use Prohibited)
*******************************************************************************
                  SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*******************************************************************************
   Analysis Run Date:        3/2/2010
   Time of Run:              04:53PM
   Run By:                   MAW, Leighton and Associates
   Input Data Filename:      P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA2-3\sa2-3 fillslope.in
   Output Filename:          P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA2-3\sa2-3 fillslope.OUT
   Unit System:              English
   Plotted Output Filename:  P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA2-3\sa2-3 fillslope.PLT
   PROBLEM DESCRIPTION:  SCE Substation, Mission Village 06227300
                         2 SA2-3 Fill Slope
   BOUNDARY COORDINATES
      21 Top   Boundaries
      26 Total Boundaries
   Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
      No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
       1          0.00    1330.00     110.00    1335.00        3
       2        110.00    1335.00     180.00    1340.00        2
       3        180.00    1340.00     195.00    1345.00        1
       4        195.00    1345.00     205.00    1345.00        1
       5        205.00    1345.00     265.00    1375.00        1
       6        265.00    1375.00     275.00    1375.00        1
       7        275.00    1375.00     315.00    1395.00        1
       8        315.00    1395.00     335.00    1395.00        1
       9        335.00    1395.00     350.00    1385.00        1
      10        350.00    1385.00     505.00    1382.00        1
      11        505.00    1382.00     540.00    1382.00        1
      12        540.00    1382.00     630.00    1385.00        3
      13        630.00    1385.00     670.00    1405.00        3
      14        670.00    1405.00     680.00    1405.00        3
      15        680.00    1405.00     740.00    1435.00        3
      16        740.00    1435.00     760.00    1435.00        3
      17        760.00    1435.00     825.00    1465.00        3
      18        825.00    1465.00     835.00    1465.00        3
      19        835.00    1465.00     895.00    1495.00        3
      20        895.00    1495.00     915.00    1500.00        3
      21        915.00    1500.00    1010.00    1430.00        3
      22        180.00    1340.00     505.00    1382.00        1
      23        110.00    1335.00     145.00    1325.00        3
      24        145.00    1325.00     290.00    1326.00        3
      25        290.00    1326.00     490.00    1360.00        3
      26        490.00    1360.00     540.00    1382.00        3
   User Specified Y-Origin =      1100.00(ft)
   Default X-Plus Value = 0.00(ft)
   Default Y-Plus Value = 0.00(ft)
  ISOTROPIC SOIL PARAMETERS
    3 Type(s) of Soil
   Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
   Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
    No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
     1   125.0    125.0     200.0     29.0    0.00       0.0      0
     2   125.0    125.0     100.0     34.0    0.00       0.0      0
     3   130.0    130.0     200.0     32.0    0.00       0.0      0
```



```
   A Critical Failure Surface Searching Method, Using A Random
   Technique For Generating Circular Surfaces, Has Been Specified.
   5000 Trial Surfaces Have Been Generated.
     10 Surface(s) Initiate(s) From Each Of   500 Points Equally Spaced
   Along The Ground Surface Between  X = 100.00(ft)
                                  and  X = 225.00(ft)
   Each Surface Terminates Between   X = 250.00(ft)
                                  and   X = 375.00(ft)
   Unless Further Limitations Were Imposed, The Minimum Elevation
   At Which A Surface Extends Is  Y =      0.00(ft)
   10.00(ft) Line Segments Define Each Trial Failure Surface.
   Following Are Displayed The Ten Most Critical Of The Trial
         Failure Surfaces Evaluated. They Are
         Ordered - Most Critical First.
         * * Safety Factors Are Calculated By The Modified Bishop Method * *
         Total Number of Trial Surfaces Attempted =  5000
         Number of Trial Surfaces With Valid FS = 5000
         Statistical Data On All Valid FS Values:
            FS Max =   6.646   FS Min =   1.826   FS Ave =   2.913
            Standard Deviation =    0.619   Coefficient of Variation =   21.24 %
         Failure Surface Specified By 15 Coordinate Points
           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)
             1        206.715     1345.857
             2        216.710     1346.158
             3        226.669     1347.058
             4        236.557     1348.552
             5        246.338     1350.635
             6        255.976     1353.300
             7        265.437     1356.538
             8        274.688     1360.337
             9        283.694     1364.682
            10        292.424     1369.559
            11        300.847     1374.951
            12        308.931     1380.837
            13        316.648     1387.196
            14        323.971     1394.006
            15        324.919     1395.000
         Circle Center At X =   206.687 ; Y =  1512.776 ; and Radius =   166.918
               Factor of Safety
              ***    1.826   ***
            Individual data on the    17  slices
                          Water  Water     Tie     Tie     Earthquake
                          Force  Force    Force   Force       Force   Surcharge
Slice  Width   Weight    Top    Bot     Norm     Tan     Hor     Ver    Load
 No.    (ft)    (lbs)   (lbs)  (lbs)    (lbs)   (lbs)   (lbs)   (lbs)   (lbs)
  1     10.0    2933.9     0.0     0.0       0.      0.     0.0     0.0      0.0
  2     10.0    8386.9     0.0     0.0       0.      0.     0.0     0.0      0.0
  3      9.9   12980.3     0.0     0.0       0.      0.     0.0     0.0      0.0
  4      9.8   16664.2     0.0     0.0       0.      0.     0.0     0.0      0.0
  5      9.6   19409.9     0.0     0.0       0.      0.     0.0     0.0      0.0
  6      9.0   20190.6     0.0     0.0       0.      0.     0.0     0.0      0.0
  7      0.4    1013.4     0.0     0.0       0.      0.     0.0     0.0      0.0
  8      9.3   19151.4     0.0     0.0       0.      0.     0.0     0.0      0.0
  9      0.3     569.2     0.0     0.0       0.      0.     0.0     0.0      0.0
 10      8.7   15855.0     0.0     0.0       0.      0.     0.0     0.0      0.0
 11      8.7   15723.7     0.0     0.0       0.      0.     0.0     0.0      0.0
 12      8.4   14278.6     0.0     0.0       0.      0.     0.0     0.0      0.0
 13      8.1   12177.8     0.0     0.0       0.      0.     0.0     0.0      0.0
 14      6.1    7696.9     0.0     0.0       0.      0.     0.0     0.0      0.0
 15      1.6    1747.9     0.0     0.0       0.      0.     0.0     0.0      0.0
 16      7.3    4026.6     0.0     0.0       0.      0.     0.0     0.0      0.0
 17      0.9      58.9     0.0     0.0       0.      0.     0.0     0.0      0.0
         Failure Surface Specified By 15 Coordinate Points
           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)
             1        205.712     1345.356
```

```
     2        215.668     1344.417
     3        225.668     1344.300
     4        235.643     1345.005
     5        245.526     1346.528
     6        255.251     1348.859
     7        264.751     1351.980
     8        273.962     1355.873
     9        282.822     1360.510
    10        291.271     1365.859
    11        299.252     1371.885
    12        306.710     1378.546
    13        313.595     1385.798
    14        319.861     1393.592
    15        320.813     1395.000
Circle Center At X =   222.092 ; Y =  1465.777 ; and Radius =   121.530
       Factor of Safety
      ***    1.837   ***
Failure Surface Specified By 16 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        194.189     1344.730
    2        204.117     1343.532
    3        214.106     1343.057
    4        224.103     1343.305
    5        234.056     1344.277
    6        243.912     1345.966
    7        253.620     1348.365
    8        263.129     1351.460
    9        272.389     1355.235
   10        281.351     1359.671
   11        289.969     1364.744
   12        298.197     1370.427
   13        305.992     1376.691
   14        313.313     1383.503
   15        320.122     1390.827
   16        323.472     1395.000
Circle Center At X =   215.706 ; Y =  1480.770 ; and Radius =   137.731
       Factor of Safety
      ***    1.839   ***
Failure Surface Specified By 16 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        189.931     1343.310
    2        199.866     1342.174
    3        209.856     1341.733
    4        219.853     1341.989
    5        229.808     1342.940
    6        239.672     1344.582
    7        249.398     1346.907
    8        258.938     1349.904
    9        268.247     1353.558
   10        277.278     1357.852
   11        285.989     1362.764
   12        294.336     1368.271
   13        302.279     1374.345
   14        309.780     1380.958
   15        316.803     1388.078
   16        322.738     1395.000
Circle Center At X =   211.199 ; Y =  1485.124 ; and Radius =   143.400
       Factor of Safety
      ***    1.844   ***
Failure Surface Specified By 16 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        194.440     1344.813
    2        204.434     1344.484
    3        214.431     1344.761
```

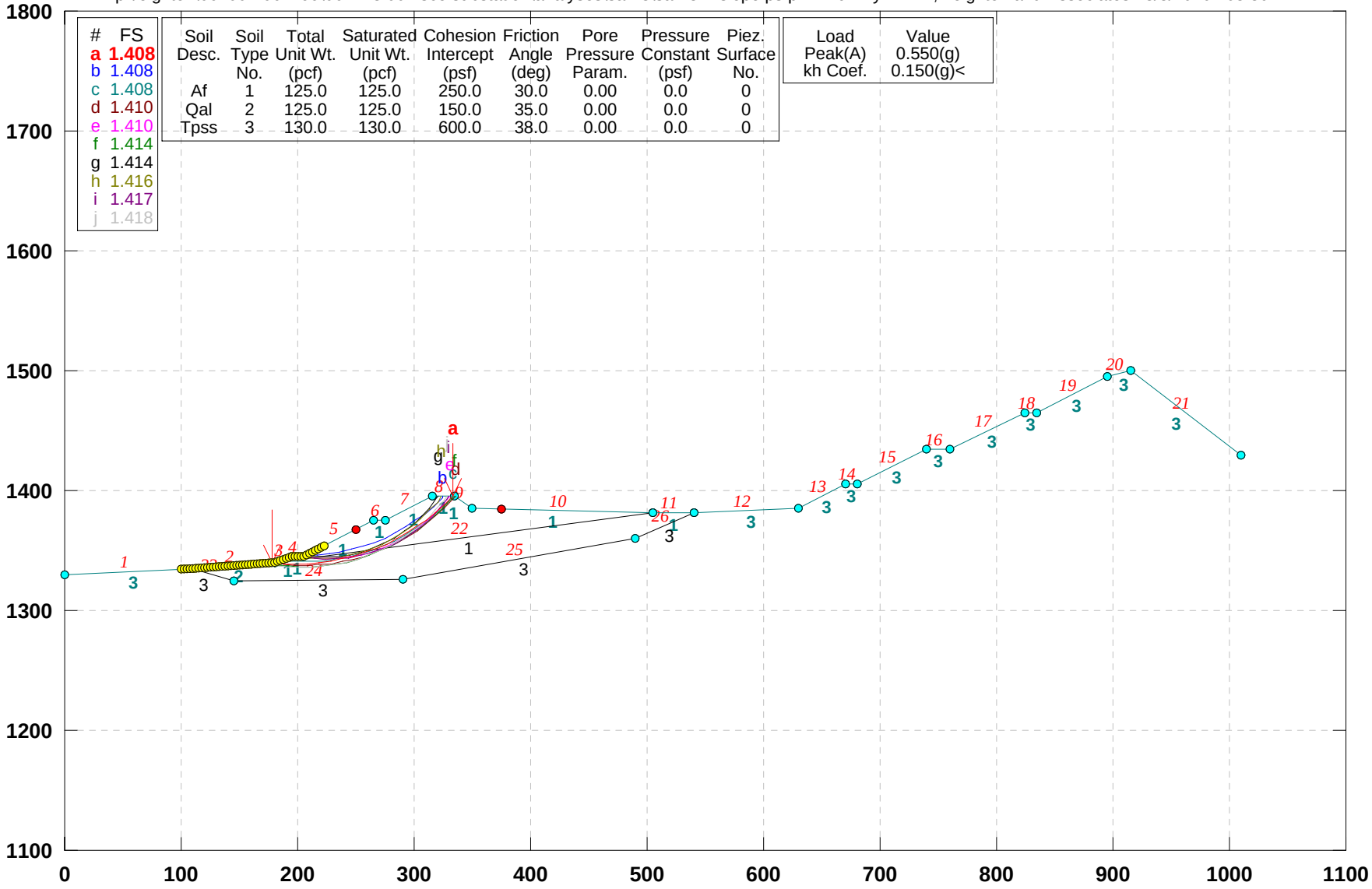


```
    4        224.392     1345.642
    5        234.281     1347.125
    6        244.063     1349.203
    7        253.701     1351.870
    8        263.159     1355.116
    9        272.404     1358.928
   10        281.401     1363.293
   11        290.117     1368.195
   12        298.521     1373.615
   13        306.581     1379.534
   14        314.268     1385.930
   15        321.553     1392.780
   16        323.645     1395.000
Circle Center At X =   204.920 ; Y =  1509.243 ; and Radius =   164.764
       Factor of Safety
      ***    1.844   ***
Failure Surface Specified By 15 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        205.963     1345.481
    2        215.879     1344.191
    3        225.869     1343.730
    4        235.862     1344.103
    5        245.789     1345.307
    6        255.582     1347.333
    7        265.171     1350.167
    8        274.492     1353.791
    9        283.478     1358.178
   10        292.068     1363.298
   11        300.202     1369.116
   12        307.823     1375.590
   13        314.878     1382.677
   14        321.318     1390.327
   15        324.629     1395.000
Circle Center At X =   226.396 ; Y =  1463.709 ; and Radius =   119.981
       Factor of Safety
      ***    1.852   ***
Failure Surface Specified By 16 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        204.961     1345.000
    2        214.891     1343.816
    3        224.881     1343.387
    4        234.876     1343.716
    5        244.817     1344.800
    6        254.647     1346.634
    7        264.311     1349.208
    8        273.751     1352.505
    9        282.915     1356.508
   10        291.750     1361.193
   11        300.204     1366.533
   12        308.230     1372.499
   13        315.781     1379.054
   14        322.815     1386.163
   15        329.289     1393.784
   16        330.173     1395.000
Circle Center At X =   225.562 ; Y =  1475.191 ; and Radius =   131.811
       Factor of Safety
      ***    1.855   ***
Failure Surface Specified By 17 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        183.668     1341.223
    2        193.626     1340.310
    3        203.623     1340.053
    4        213.615     1340.455
    5        223.559     1341.512
```

```
    6        233.412     1343.221
    7        243.131     1345.574
    8        252.675     1348.561
    9        262.001     1352.169
   10        271.070     1356.383
   11        279.843     1361.183
   12        288.280     1366.550
   13        296.347     1372.460
   14        304.008     1378.887
   15        311.230     1385.804
   16        317.981     1393.182
   17        319.437     1395.000
Circle Center At X =   202.519 ; Y =  1492.070 ; and Radius =   152.021
       Factor of Safety
      ***    1.860   ***
Failure Surface Specified By 18 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        184.921     1341.640
    2        194.888     1340.834
    3        204.885     1340.579
    4        214.880     1340.877
    5        224.844     1341.726
    6        234.746     1343.124
    7        244.556     1345.066
    8        254.243     1347.547
    9        263.779     1350.559
   10        273.134     1354.093
   11        282.279     1358.138
   12        291.187     1362.682
   13        299.831     1367.710
   14        308.184     1373.208
   15        316.221     1379.159
   16        323.916     1385.544
   17        331.248     1392.345
   18        333.811     1395.000
Circle Center At X =   204.531 ; Y =  1521.325 ; and Radius =   180.752
       Factor of Safety
      ***    1.861   ***
Failure Surface Specified By 18 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        178.408     1339.886
    2        188.380     1339.137
    3        198.377     1338.908
    4        208.373     1339.201
    5        218.339     1340.014
    6        228.250     1341.345
    7        238.079     1343.191
    8        247.797     1345.547
    9        257.380     1348.405
   10        266.801     1351.759
   11        276.034     1355.600
   12        285.055     1359.916
   13        293.838     1364.696
   14        302.360     1369.927
   15        310.599     1375.596
   16        318.530     1381.686
   17        326.134     1388.181
   18        333.322     1395.000
Circle Center At X =   197.764 ; Y =  1530.755 ; and Radius =   191.848
       Factor of Safety
      ***    1.862   ***
          **** END OF GSTABL7 OUTPUT ****
```

SCE Substation, Mission Village 062273002 SA2-3 Fill Slope Pseudostatic

p:\leighton\062001-062499\062273.002 sce substation\analyses\sa2-3\sa2-3 fillslope ps.pl2 Run By: MAW, Leighton and Associates 3/3/2010 03:36PM



GSTABL7 v.2 FSmin=1.408

Safety Factors Are Calculated By The Modified Bishop Method

```
                    ***  GSTABL7  ***
              ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **
          (All Rights Reserved-Unauthorized Use Prohibited)
*******************************************************************************
                  SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*******************************************************************************
   Analysis Run Date:        3/3/2010
   Time of Run:              03:36PM
   Run By:                   MAW, Leighton and Associates
   Input Data Filename:      P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA2-3\sa2-3 fillslope ps.in
   Output Filename:          P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA2-3\sa2-3 fillslope ps.OUT
   Unit System:              English
   Plotted Output Filename:  P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA2-3\sa2-3 fillslope ps.PLT
   PROBLEM DESCRIPTION:  SCE Substation, Mission Village 06227300
                         2 SA2-3 Fill Slope Pseudostatic
   BOUNDARY COORDINATES
      21 Top   Boundaries
      26 Total Boundaries
   Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
      No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
       1          0.00    1330.00     110.00    1335.00        3
       2        110.00    1335.00     180.00    1340.00        2
       3        180.00    1340.00     195.00    1345.00        1
       4        195.00    1345.00     205.00    1345.00        1
       5        205.00    1345.00     265.00    1375.00        1
       6        265.00    1375.00     275.00    1375.00        1
       7        275.00    1375.00     315.00    1395.00        1
       8        315.00    1395.00     335.00    1395.00        1
       9        335.00    1395.00     350.00    1385.00        1
      10        350.00    1385.00     505.00    1382.00        1
      11        505.00    1382.00     540.00    1382.00        1
      12        540.00    1382.00     630.00    1385.00        3
      13        630.00    1385.00     670.00    1405.00        3
      14        670.00    1405.00     680.00    1405.00        3
      15        680.00    1405.00     740.00    1435.00        3
      16        740.00    1435.00     760.00    1435.00        3
      17        760.00    1435.00     825.00    1465.00        3
      18        825.00    1465.00     835.00    1465.00        3
      19        835.00    1465.00     895.00    1495.00        3
      20        895.00    1495.00     915.00    1500.00        3
      21        915.00    1500.00    1010.00    1430.00        3
      22        180.00    1340.00     505.00    1382.00        1
      23        110.00    1335.00     145.00    1325.00        3
      24        145.00    1325.00     290.00    1326.00        3
      25        290.00    1326.00     490.00    1360.00        3
      26        490.00    1360.00     540.00    1382.00        3
   User Specified Y-Origin =      1100.00(ft)
   Default X-Plus Value = 0.00(ft)
   Default Y-Plus Value = 0.00(ft)
  ISOTROPIC SOIL PARAMETERS
    3 Type(s) of Soil
   Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
   Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
    No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
     1   125.0    125.0     250.0     30.0    0.00       0.0      0
     2   125.0    125.0     150.0     35.0    0.00       0.0      0
     3   130.0    130.0     600.0     38.0    0.00       0.0      0
```



```
   Specified Peak Ground Acceleration Coefficient (A) =   0.550(g)
   Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
   Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
   Specified Seismic Pore-Pressure Factor =   0.000
   A Critical Failure Surface Searching Method, Using A Random
   Technique For Generating Circular Surfaces, Has Been Specified.
   5000 Trial Surfaces Have Been Generated.
     10 Surface(s) Initiate(s) From Each Of   500 Points Equally Spaced
   Along The Ground Surface Between  X = 100.00(ft)
                                  and  X = 225.00(ft)
   Each Surface Terminates Between   X = 250.00(ft)
                                  and   X = 375.00(ft)
   Unless Further Limitations Were Imposed, The Minimum Elevation
   At Which A Surface Extends Is  Y =      0.00(ft)
   10.00(ft) Line Segments Define Each Trial Failure Surface.
   Following Are Displayed The Ten Most Critical Of The Trial
         Failure Surfaces Evaluated. They Are
         Ordered - Most Critical First.
         * * Safety Factors Are Calculated By The Modified Bishop Method * *
         Total Number of Trial Surfaces Attempted =  5000
         Number of Trial Surfaces With Valid FS = 5000
         Statistical Data On All Valid FS Values:
            FS Max =   4.316   FS Min =   1.408   FS Ave =   2.346
            Standard Deviation =    0.574   Coefficient of Variation =   24.47 %
         Failure Surface Specified By 18 Coordinate Points
           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)
             1        178.408     1339.886
             2        188.380     1339.137
             3        198.377     1338.908
             4        208.373     1339.201
             5        218.339     1340.014
             6        228.250     1341.345
             7        238.079     1343.191
             8        247.797     1345.547
             9        257.380     1348.405
            10        266.801     1351.759
            11        276.034     1355.600
            12        285.055     1359.916
            13        293.838     1364.696
            14        302.360     1369.927
            15        310.599     1375.596
            16        318.530     1381.686
            17        326.134     1388.181
            18        333.322     1395.000
         Circle Center At X =   197.764 ; Y =  1530.755 ; and Radius =   191.848
                Factor of Safety
               ***    1.408   ***
             Individual data on the    24  slices
                                Water  Water     Tie     Tie     Earthquake
                                Force  Force    Force   Force       Force   Surcharge
Slice  Width   Weight    Top    Bot     Norm     Tan     Hor     Ver    Load
 No.    (ft)    (lbs)   (lbs)  (lbs)    (lbs)   (lbs)   (lbs)   (lbs)   (lbs)
  1      1.6      23.2     0.0     0.0       0.      0.     3.5     0.0      0.0
  2      8.4    2037.1     0.0     0.0       0.      0.   305.6     0.0      0.0
  3      6.6    4001.4     0.0     0.0       0.      0.   600.2     0.0      0.0
  4      3.4    2555.0     0.0     0.0       0.      0.   383.3     0.0      0.0
  5      6.6    4962.9     0.0     0.0       0.      0.   744.4     0.0      0.0
  6      3.4    2820.9     0.0     0.0       0.      0.   423.1     0.0      0.0
  7     10.0   11923.4     0.0     0.0       0.      0.  1788.5     0.0      0.0
  8      9.9   16684.9     0.0     0.0       0.      0.  2502.7     0.0      0.0
  9      9.8   20656.3     0.0     0.0       0.      0.  3098.4     0.0      0.0
 10      9.7   23810.8     0.0     0.0       0.      0.  3571.6     0.0      0.0
 11      9.6   26134.9     0.0     0.0       0.      0.  3920.2     0.0      0.0
 12      7.0   20470.2     0.0     0.0       0.      0.  3070.5     0.0      0.0
 13      0.6    1754.8     0.0     0.0       0.      0.   263.2     0.0      0.0
 14      1.8    5303.5     0.0     0.0       0.      0.   795.5     0.0      0.0
```

15	8.2	22071.9	0.0	0.0	0.	0.	3310.8	0.0	0.0
16	1.0	2568.6	0.0	0.0	0.	0.	385.3	0.0	0.0
17	9.0	22567.7	0.0	0.0	0.	0.	3385.1	0.0	0.0
18	8.8	21867.7	0.0	0.0	0.	0.	3280.2	0.0	0.0
19	8.5	20494.1	0.0	0.0	0.	0.	3074.1	0.0	0.0
20	8.2	18513.4	0.0	0.0	0.	0.	2777.0	0.0	0.0
21	4.4	9140.5	0.0	0.0	0.	0.	1371.1	0.0	0.0
22	3.5	6473.6	0.0	0.0	0.	0.	971.0	0.0	0.0
23	7.6	9567.9	0.0	0.0	0.	0.	1435.2	0.0	0.0
24	7.2	3063.6	0.0	0.0	0.	0.	459.5	0.0	0.0

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	206.715	1345.857
2	216.710	1346.158
3	226.669	1347.058
4	236.557	1348.552
5	246.338	1350.635
6	255.976	1353.300
7	265.437	1356.538
8	274.688	1360.337
9	283.694	1364.682
10	292.424	1369.559
11	300.847	1374.951
12	308.931	1380.837
13	316.648	1387.196
14	323.971	1394.006
15	324.919	1395.000

Circle Center At X = 206.687 ; Y = 1512.776 ; and Radius = 166.918

Factor of Safety

*** 1.408 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	184.921	1341.640
2	194.888	1340.834
3	204.885	1340.579
4	214.880	1340.877
5	224.844	1341.726
6	234.746	1343.124
7	244.556	1345.066
8	254.243	1347.547
9	263.779	1350.559
10	273.134	1354.093
11	282.279	1358.138
12	291.187	1362.682
13	299.831	1367.710
14	308.184	1373.208
15	316.221	1379.159
16	323.916	1385.544
17	331.248	1392.345
18	333.811	1395.000

Circle Center At X = 204.531 ; Y = 1521.325 ; and Radius = 180.752

Factor of Safety

*** 1.408 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	178.408	1339.886
2	188.326	1338.609
3	198.300	1337.898
4	208.299	1337.756
5	218.290	1338.184
6	228.240	1339.181
7	238.118	1340.742
8	247.890	1342.863
9	257.526	1345.537

10	266.994	1348.755
11	276.263	1352.508
12	285.304	1356.782
13	294.086	1361.564
14	302.582	1366.838
15	310.764	1372.588
16	318.605	1378.794
17	326.080	1385.437
18	333.165	1392.494
19	335.256	1394.829

Circle Center At X = 205.785 ; Y = 1513.282 ; and Radius = 175.543

Factor of Safety

*** 1.410 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	204.961	1345.000
2	214.891	1343.816
3	224.881	1343.387
4	234.876	1343.716
5	244.817	1344.800
6	254.647	1346.634
7	264.311	1349.208
8	273.751	1352.505
9	282.915	1356.508
10	291.750	1361.193
11	300.204	1366.533
12	308.230	1372.499
13	315.781	1379.054
14	322.815	1386.163
15	329.289	1393.784
16	330.173	1395.000

Circle Center At X = 225.562 ; Y = 1475.191 ; and Radius = 131.811

Factor of Safety

*** 1.410 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	172.646	1339.475
2	182.517	1337.875
3	192.465	1336.853
4	202.455	1336.413
5	212.454	1336.556
6	222.428	1337.282
7	232.342	1338.588
8	242.164	1340.469
9	251.859	1342.920
10	261.394	1345.932
11	270.738	1349.495
12	279.858	1353.596
13	288.724	1358.222
14	297.305	1363.357
15	305.572	1368.983
16	313.497	1375.082
17	321.053	1381.632
18	328.214	1388.612
19	334.046	1395.000

Circle Center At X = 205.003 ; Y = 1507.866 ; and Radius = 171.471

Factor of Safety

*** 1.414 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	205.712	1345.356
2	215.668	1344.417
3	225.668	1344.300
4	235.643	1345.005

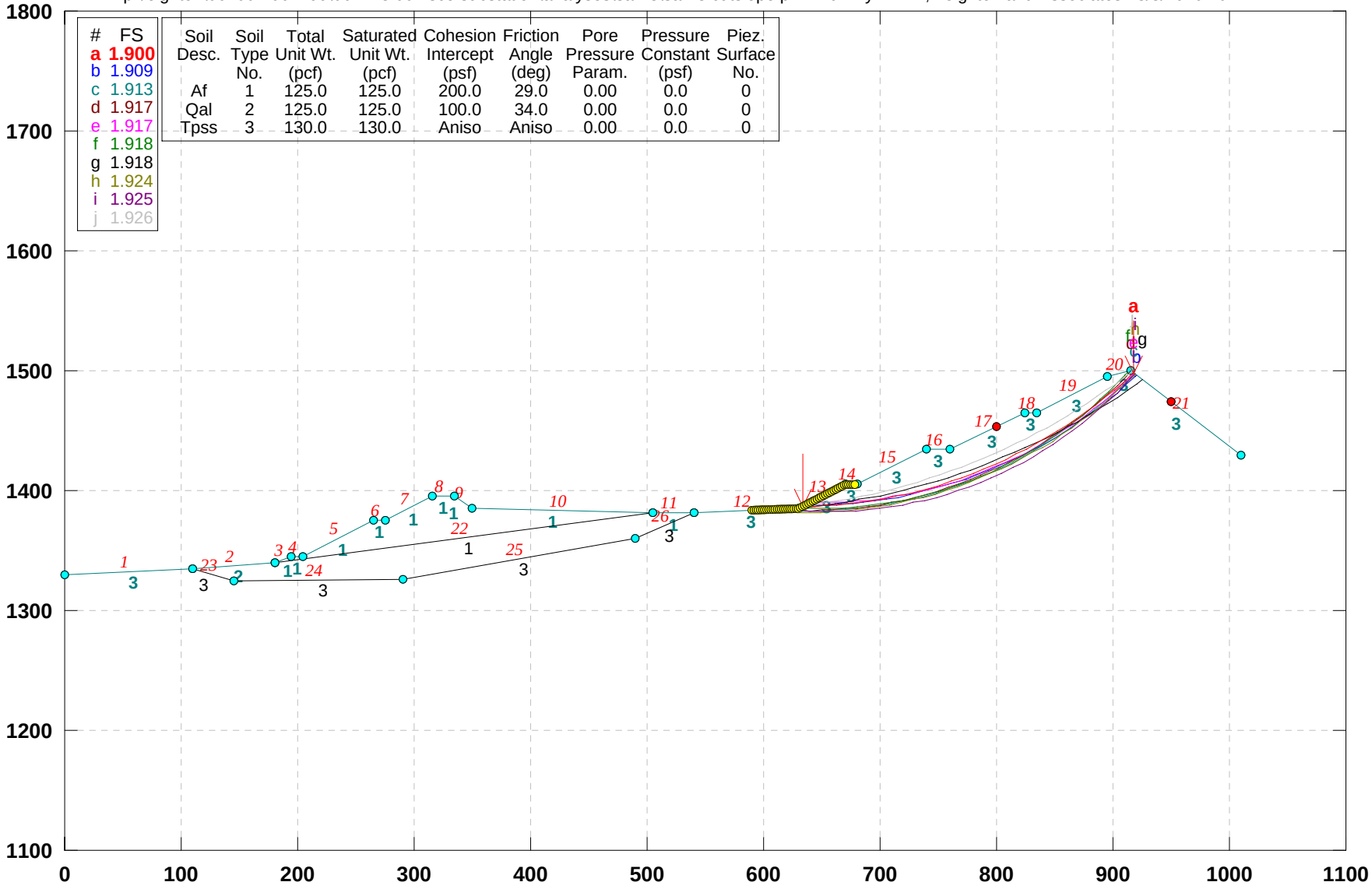
```
    5        245.526     1346.528
    6        255.251     1348.859
    7        264.751     1351.980
    8        273.962     1355.873
    9        282.822     1360.510
   10        291.271     1365.859
   11        299.252     1371.885
   12        306.710     1378.546
   13        313.595     1385.798
   14        319.861     1393.592
   15        320.813     1395.000
Circle Center At X =   222.092 ; Y =  1465.777 ; and Radius =   121.530
       Factor of Safety
      ***    1.414   ***
Failure Surface Specified By 16 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        194.189     1344.730
    2        204.117     1343.532
    3        214.106     1343.057
    4        224.103     1343.305
    5        234.056     1344.277
    6        243.912     1345.966
    7        253.620     1348.365
    8        263.129     1351.460
    9        272.389     1355.235
   10        281.351     1359.671
   11        289.969     1364.744
   12        298.197     1370.427
   13        305.992     1376.691
   14        313.313     1383.503
   15        320.122     1390.827
   16        323.472     1395.000
Circle Center At X =   215.706 ; Y =  1480.770 ; and Radius =   137.731
       Factor of Safety
      ***    1.416   ***
Failure Surface Specified By 16 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        204.209     1345.000
    2        214.110     1343.593
    3        224.090     1342.966
    4        234.089     1343.123
    5        244.045     1344.062
    6        253.897     1345.778
    7        263.584     1348.260
    8        273.046     1351.494
    9        282.227     1355.459
   10        291.068     1360.130
   11        299.517     1365.480
   12        307.521     1371.475
   13        315.030     1378.079
   14        322.000     1385.250
   15        328.386     1392.946
   16        329.835     1395.000
Circle Center At X =   227.117 ; Y =  1470.261 ; and Radius =   127.338
       Factor of Safety
      ***    1.417   ***
Failure Surface Specified By 19 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        171.895     1339.421
    2        181.735     1337.642
    3        191.668     1336.486
    4        201.654     1335.956
    5        211.653     1336.055
    6        221.627     1336.783
```



```
    7        231.535     1338.137
    8        241.338     1340.111
    9        250.998     1342.697
   10        260.476     1345.886
   11        269.735     1349.664
   12        278.737     1354.017
   13        287.449     1358.928
   14        295.834     1364.376
   15        303.860     1370.341
   16        311.495     1376.799
   17        318.709     1383.724
   18        325.474     1391.089
   19        328.636     1395.000
Circle Center At X =   205.076 ; Y =  1494.877 ; and Radius =   158.958
       Factor of Safety
      ***    1.418   ***
          **** END OF GSTABL7 OUTPUT ****
```

SCE Substation, Mission Village 062273002 SA2-3 Cut Slope Tpss

p:\leighton\062001-062499\062273.002 sce substation\analyses\sa2-3\sa2-3 cutslope.pl2 Run By: MAW, Leighton and Associates 3/3/2010 02:47PM



GSTABL7 v.2 FSmin=1.900

Safety Factors Are Calculated By The Modified Bishop Method

```
                    ***  GSTABL7  ***
            ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **
          (All Rights Reserved-Unauthorized Use Prohibited)
*******************************************************************************
                  SLOPE STABILITY ANALYSIS SYSTEM
        Modified Bishop, Simplified Janbu, or GLE Method of Slices.
        (Includes Spencer & Morgenstern-Price Type Analysis)
        Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
        Nonlinear Undrained Shear Strength, Curved Phi Envelope,
        Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
        Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*******************************************************************************
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   Time of Run:              02:47PM
   Run By:                   MAW, Leighton and Associates
   Input Data Filename:      P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA2-3\sa2-3 cutslope.in
   Output Filename:          P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA2-3\sa2-3 cutslope.OUT
   Unit System:              English
   Plotted Output Filename:  P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA2-3\sa2-3 cutslope.PLT
   PROBLEM DESCRIPTION:  SCE Substation, Mission Village 06227300
                         2 SA2-3 Cut Slope Tpss
   BOUNDARY COORDINATES
      21 Top   Boundaries
      26 Total Boundaries
   Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
      No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
       1          0.00    1330.00     110.00    1335.00        3
       2        110.00    1335.00     180.00    1340.00        2
       3        180.00    1340.00     195.00    1345.00        1
       4        195.00    1345.00     205.00    1345.00        1
       5        205.00    1345.00     265.00    1375.00        1
       6        265.00    1375.00     275.00    1375.00        1
       7        275.00    1375.00     315.00    1395.00        1
       8        315.00    1395.00     335.00    1395.00        1
       9        335.00    1395.00     350.00    1385.00        1
      10        350.00    1385.00     505.00    1382.00        1
      11        505.00    1382.00     540.00    1382.00        1
      12        540.00    1382.00     630.00    1385.00        3
      13        630.00    1385.00     670.00    1405.00        3
      14        670.00    1405.00     680.00    1405.00        3
      15        680.00    1405.00     740.00    1435.00        3
      16        740.00    1435.00     760.00    1435.00        3
      17        760.00    1435.00     825.00    1465.00        3
      18        825.00    1465.00     835.00    1465.00        3
      19        835.00    1465.00     895.00    1495.00        3
      20        895.00    1495.00     915.00    1500.00        3
      21        915.00    1500.00    1010.00    1430.00        3
      22        180.00    1340.00     505.00    1382.00        1
      23        110.00    1335.00     145.00    1325.00        3
      24        145.00    1325.00     290.00    1326.00        3
      25        290.00    1326.00     490.00    1360.00        3
      26        490.00    1360.00     540.00    1382.00        3
   User Specified Y-Origin =      1100.00(ft)
   Default X-Plus Value = 0.00(ft)
   Default Y-Plus Value = 0.00(ft)
  ISOTROPIC SOIL PARAMETERS
    3 Type(s) of Soil
   Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
   Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
    No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
     1   125.0    125.0     200.0     29.0    0.00       0.0      0
     2   125.0    125.0     100.0     34.0    0.00       0.0      0
     3   130.0    130.0     200.0     32.0    0.00       0.0      0
```



```
ANISOTROPIC STRENGTH PARAMETERS
     1 soil type(s)
 Soil Type  3 Is Anisotropic
 Number Of Direction Ranges Specified =  4
 Direction    Counterclockwise     Cohesion     Friction
   Range       Direction Limit    Intercept       Angle
    No.            (deg)            (psf)         (deg)
     1            -90.0             200.00         32.00
     2            -41.0             200.00         32.00
     3            -31.0             150.00         28.00
     4             90.0             200.00         32.00
 ANISOTROPIC SOIL NOTES:
    (1) An input value of 0.01 for C and/or Phi will cause Aniso
        C and/or Phi to be ignored in that range.
    (2) An input value of 0.02 for Phi will set both Phi and
        C equal to zero, with no water weight in the tension crack.
    (3) An input value of 0.03 for Phi will set both Phi and
        C equal to zero, with water weight in the tension crack.
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
 5000 Trial Surfaces Have Been Generated.
   10 Surface(s) Initiate(s) From Each Of   500 Points Equally Spaced
 Along The Ground Surface Between  X = 590.00(ft)
                                 and  X = 680.00(ft)
 Each Surface Terminates Between   X = 800.00(ft)
                                 and   X = 950.00(ft)
 Unless Further Limitations Were Imposed, The Minimum Elevation
 At Which A Surface Extends Is  Y =      0.00(ft)
 10.00(ft) Line Segments Define Each Trial Failure Surface.
 Following Are Displayed The Ten Most Critical Of The Trial
       Failure Surfaces Evaluated. They Are
       Ordered - Most Critical First.
       * * Safety Factors Are Calculated By The Modified Bishop Method * *
       Total Number of Trial Surfaces Attempted =  5000
       Number of Trial Surfaces With Valid FS = 5000
       Statistical Data On All Valid FS Values:
          FS Max =   3.538   FS Min =   1.900   FS Ave =   2.648
          Standard Deviation =    0.405   Coefficient of Variation =   15.30 %
       Failure Surface Specified By 33 Coordinate Points
         Point      X-Surf      Y-Surf
          No.        (ft)        (ft)
           1        633.466     1386.733
           2        643.464     1386.978
           3        653.452     1387.453
           4        663.427     1388.161
           5        673.383     1389.099
           6        683.314     1390.268
           7        693.216     1391.667
           8        703.083     1393.296
           9        712.909     1395.152
          10        722.689     1397.236
          11        732.419     1399.546
          12        742.092     1402.081
          13        751.704     1404.839
          14        761.250     1407.820
          15        770.724     1411.021
          16        780.121     1414.441
          17        789.436     1418.078
          18        798.664     1421.930
          19        807.801     1425.994
          20        816.841     1430.270
          21        825.779     1434.754
          22        834.611     1439.444
          23        843.332     1444.337
          24        851.937     1449.431
          25        860.422     1454.724
          26        868.781     1460.212
```

27	877.012	1465.892
28	885.108	1471.761
29	893.066	1477.817
30	900.882	1484.055
31	908.550	1490.473
32	916.068	1497.067
33	917.364	1498.258

Circle Center At X = 627.931 ; Y = 1817.997 ; and Radius = 431.299

Factor of Safety

*** 1.900 ***

Individual data on the 40 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	10.0	3089.3	0.0	0.0	0.	0.	0.0	0.0	0.0
2	10.0	9106.9	0.0	0.0	0.	0.	0.0	0.0	0.0
3	10.0	14799.4	0.0	0.0	0.	0.	0.0	0.0	0.0
4	6.6	12719.8	0.0	0.0	0.	0.	0.0	0.0	0.0
5	3.4	7063.0	0.0	0.0	0.	0.	0.0	0.0	0.0
6	6.6	13342.9	0.0	0.0	0.	0.	0.0	0.0	0.0
7	3.3	6788.6	0.0	0.0	0.	0.	0.0	0.0	0.0
8	9.9	23381.9	0.0	0.0	0.	0.	0.0	0.0	0.0
9	9.9	27696.5	0.0	0.0	0.	0.	0.0	0.0	0.0
10	9.8	31646.4	0.0	0.0	0.	0.	0.0	0.0	0.0
11	9.8	35226.5	0.0	0.0	0.	0.	0.0	0.0	0.0
12	9.7	38433.9	0.0	0.0	0.	0.	0.0	0.0	0.0
13	7.6	32094.9	0.0	0.0	0.	0.	0.0	0.0	0.0
14	2.1	9028.3	0.0	0.0	0.	0.	0.0	0.0	0.0
15	9.6	39411.2	0.0	0.0	0.	0.	0.0	0.0	0.0
16	8.3	31130.1	0.0	0.0	0.	0.	0.0	0.0	0.0
17	1.2	4494.3	0.0	0.0	0.	0.	0.0	0.0	0.0
18	9.5	34906.7	0.0	0.0	0.	0.	0.0	0.0	0.0
19	9.4	35899.4	0.0	0.0	0.	0.	0.0	0.0	0.0
20	9.3	36543.4	0.0	0.0	0.	0.	0.0	0.0	0.0
21	9.2	36844.5	0.0	0.0	0.	0.	0.0	0.0	0.0
22	9.1	36810.5	0.0	0.0	0.	0.	0.0	0.0	0.0
23	9.0	36449.7	0.0	0.0	0.	0.	0.0	0.0	0.0
24	8.2	32670.7	0.0	0.0	0.	0.	0.0	0.0	0.0
25	0.8	3083.0	0.0	0.0	0.	0.	0.0	0.0	0.0
26	8.8	32035.3	0.0	0.0	0.	0.	0.0	0.0	0.0
27	0.4	1286.6	0.0	0.0	0.	0.	0.0	0.0	0.0
28	8.3	27169.5	0.0	0.0	0.	0.	0.0	0.0	0.0
29	8.6	27332.3	0.0	0.0	0.	0.	0.0	0.0	0.0
30	8.5	25934.0	0.0	0.0	0.	0.	0.0	0.0	0.0
31	8.4	24270.8	0.0	0.0	0.	0.	0.0	0.0	0.0
32	8.2	22357.8	0.0	0.0	0.	0.	0.0	0.0	0.0
33	8.1	20212.1	0.0	0.0	0.	0.	0.0	0.0	0.0
34	8.0	17850.8	0.0	0.0	0.	0.	0.0	0.0	0.0
35	1.9	4004.4	0.0	0.0	0.	0.	0.0	0.0	0.0
36	5.9	10725.7	0.0	0.0	0.	0.	0.0	0.0	0.0
37	7.7	10134.0	0.0	0.0	0.	0.	0.0	0.0	0.0
38	6.4	4940.5	0.0	0.0	0.	0.	0.0	0.0	0.0
39	1.1	417.8	0.0	0.0	0.	0.	0.0	0.0	0.0
40	1.3	180.8	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	636.172	1388.086
2	646.172	1388.072
3	656.169	1388.299
4	666.158	1388.767
5	676.133	1389.476
6	686.088	1390.426
7	696.017	1391.616
8	705.914	1393.044
9	715.774	1394.712

10	725.591	1396.616
11	735.359	1398.757
12	745.073	1401.133
13	754.727	1403.743
14	764.314	1406.584
15	773.831	1409.657
16	783.270	1412.958
17	792.627	1416.485
18	801.896	1420.238
19	811.073	1424.213
20	820.150	1428.408
21	829.124	1432.821
22	837.988	1437.449
23	846.738	1442.290
24	855.369	1447.341
25	863.876	1452.598
26	872.253	1458.059
27	880.496	1463.720
28	888.600	1469.579
29	896.560	1475.632
30	904.372	1481.875
31	912.031	1488.304
32	919.533	1494.917
33	920.582	1495.887

Circle Center At X = 641.756 ; Y = 1802.487 ; and Radius = 414.439

Factor of Safety

*** 1.909 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	610.381	1384.346
2	620.361	1383.724
3	630.354	1383.354
4	640.354	1383.236
5	650.353	1383.371
6	660.345	1383.757
7	670.325	1384.396
8	680.285	1385.286
9	690.220	1386.427
10	700.123	1387.818
11	709.987	1389.458
12	719.807	1391.347
13	729.577	1393.482
14	739.289	1395.864
15	748.938	1398.489
16	758.518	1401.357
17	768.023	1404.466
18	777.446	1407.814
19	786.781	1411.398
20	796.024	1415.216
21	805.167	1419.266
22	814.205	1423.546
23	823.132	1428.052
24	831.942	1432.782
25	840.631	1437.732
26	849.192	1442.901
27	857.620	1448.283
28	865.909	1453.876
29	874.055	1459.677
30	882.052	1465.681
31	889.895	1471.885
32	897.579	1478.284
33	905.099	1484.876
34	912.451	1491.655
35	918.441	1497.465

Circle Center At X = 640.025 ; Y = 1779.711 ; and Radius = 396.475

Factor of Safety

*** 1.913 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	610.561	1384.352
2	620.545	1383.780
3	630.540	1383.464
4	640.539	1383.405
5	650.537	1383.602
6	660.527	1384.055
7	670.502	1384.765
8	680.455	1385.730
9	690.380	1386.951
10	700.271	1388.425
11	710.121	1390.153
12	719.923	1392.133
13	729.671	1394.364
14	739.359	1396.843
15	748.979	1399.571
16	758.527	1402.545
17	767.995	1405.762
18	777.378	1409.221
19	786.669	1412.920
20	795.862	1416.856
21	804.950	1421.026
22	813.929	1425.428
23	822.792	1430.060
24	831.534	1434.917
25	840.148	1439.996
26	848.628	1445.295
27	856.970	1450.809
28	865.168	1456.536
29	873.216	1462.471
30	881.110	1468.611
31	888.843	1474.951
32	896.411	1481.488
33	903.809	1488.216
34	911.032	1495.132
35	915.498	1499.633

Circle Center At X = 637.853 ; Y = 1773.204 ; and Radius = 389.809

Factor of Safety

*** 1.917 ***

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	640.681	1390.340
2	650.680	1390.201
3	660.679	1390.321
4	670.672	1390.699
5	680.652	1391.337
6	690.612	1392.232
7	700.545	1393.386
8	710.445	1394.796
9	720.305	1396.462
10	730.119	1398.383
11	739.880	1400.557
12	749.581	1402.984
13	759.216	1405.661
14	768.778	1408.587
15	778.261	1411.760
16	787.659	1415.177
17	796.966	1418.836
18	806.174	1422.736
19	815.279	1426.872
20	824.273	1431.243
21	833.151	1435.845
22	841.906	1440.676

23	850.534	1445.732
24	859.028	1451.010
25	867.382	1456.506
26	875.591	1462.217
27	883.650	1468.138
28	891.552	1474.266
29	899.293	1480.597
30	906.867	1487.126
31	914.270	1493.849
32	918.220	1497.628

Circle Center At X = 651.097 ; Y = 1776.019 ; and Radius = 385.819

Factor of Safety

*** 1.917 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	630.761	1385.381
2	640.754	1384.994
3	650.753	1384.885
4	660.752	1385.055
5	670.742	1385.502
6	680.715	1386.228
7	690.665	1387.231
8	700.583	1388.510
9	710.461	1390.065
10	720.292	1391.895
11	730.069	1393.997
12	739.783	1396.370
13	749.428	1399.013
14	758.995	1401.923
15	768.477	1405.098
16	777.868	1408.536
17	787.159	1412.234
18	796.343	1416.189
19	805.414	1420.398
20	814.365	1424.858
21	823.188	1429.565
22	831.876	1434.516
23	840.423	1439.707
24	848.823	1445.134
25	857.068	1450.792
26	865.152	1456.678
27	873.070	1462.786
28	880.815	1469.112
29	888.380	1475.652
30	895.761	1482.399
31	902.951	1489.349
32	909.944	1496.497
33	912.641	1499.410

Circle Center At X = 649.658 ; Y = 1744.188 ; and Radius = 359.305

Factor of Safety

*** 1.918 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	631.663	1385.831
2	641.616	1386.795
3	651.553	1387.922
4	661.469	1389.212
5	671.363	1390.664
6	681.232	1392.279
7	691.073	1394.055
8	700.883	1395.992
9	710.661	1398.090
10	720.403	1400.348
11	730.106	1402.766
12	739.768	1405.342

13	749.387	1408.077
14	758.960	1410.969
15	768.484	1414.017
16	777.957	1417.222
17	787.375	1420.581
18	796.738	1424.094
19	806.041	1427.761
20	815.284	1431.579
21	824.462	1435.549
22	833.574	1439.669
23	842.617	1443.938
24	851.589	1448.354
25	860.487	1452.917
26	869.309	1457.625
27	878.053	1462.478
28	886.716	1467.473
29	895.296	1472.610
30	903.791	1477.886
31	912.197	1483.302
32	920.514	1488.854
33	925.473	1492.283

Circle Center At X = 577.885 ; Y = 1993.059 ; and Radius = 609.604

Factor of Safety

*** 1.918 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	599.018	1383.967
2	608.981	1383.107
3	618.962	1382.496
4	628.956	1382.135
5	638.955	1382.026
6	648.954	1382.166
7	658.946	1382.558
8	668.926	1383.199
9	678.886	1384.091
10	688.821	1385.232
11	698.724	1386.621
12	708.589	1388.258
13	718.410	1390.142
14	728.180	1392.272
15	737.895	1394.645
16	747.546	1397.262
17	757.129	1400.119
18	766.638	1403.216
19	776.066	1406.550
20	785.407	1410.119
21	794.656	1413.921
22	803.807	1417.954
23	812.854	1422.215
24	821.791	1426.701
25	830.613	1431.410
26	839.314	1436.338
27	847.889	1441.483
28	856.332	1446.841
29	864.639	1452.409
30	872.803	1458.184
31	880.820	1464.161
32	888.685	1470.337
33	896.392	1476.709
34	903.938	1483.271
35	911.316	1490.021
36	918.523	1496.953
37	918.781	1497.214

Circle Center At X = 638.338 ; Y = 1781.024 ; and Radius = 398.999

Factor of Safety

*** 1.924 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	619.398	1384.647
2	629.357	1383.737
3	639.337	1383.107
4	649.331	1382.757
5	659.331	1382.688
6	669.329	1382.898
7	679.317	1383.388
8	689.287	1384.159
9	699.232	1385.208
10	709.143	1386.535
11	719.014	1388.140
12	728.835	1390.020
13	738.600	1392.175
14	748.301	1394.603
15	757.930	1397.302
16	767.480	1400.269
17	776.943	1403.503
18	786.311	1407.000
19	795.578	1410.759
20	804.735	1414.776
21	813.777	1419.047
22	822.695	1423.571
23	831.484	1428.343
24	840.135	1433.359
25	848.642	1438.615
26	856.998	1444.108
27	865.197	1449.833
28	873.233	1455.785
29	881.098	1461.960
30	888.788	1468.353
31	896.295	1474.959
32	903.615	1481.773
33	910.740	1488.789
34	917.667	1496.002
35	918.773	1497.220

Circle Center At X = 656.823 ; Y = 1739.542 ; and Radius = 356.864

Factor of Safety

*** 1.925 ***

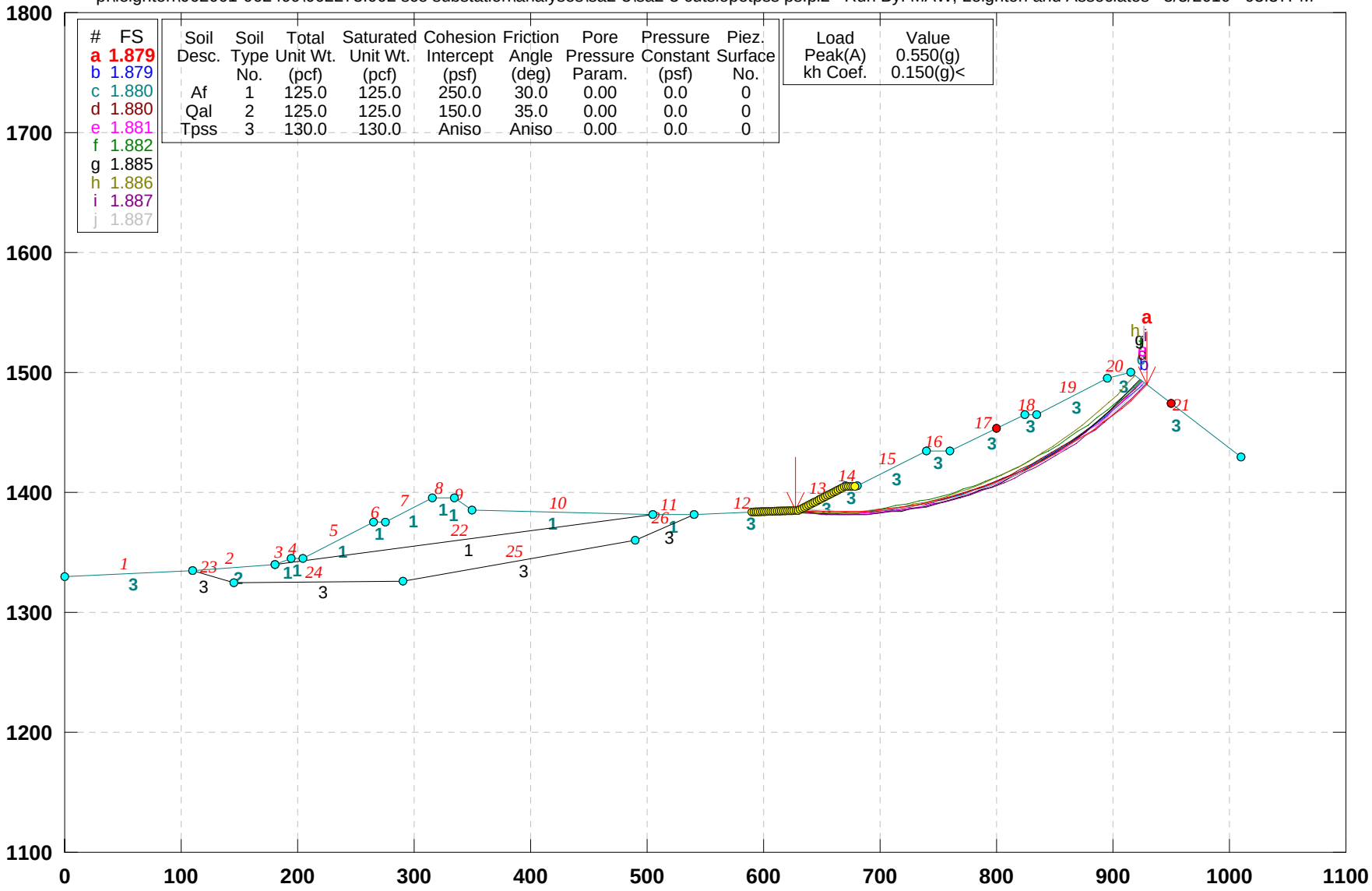
Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	634.368	1387.184
2	644.291	1388.425
3	654.191	1389.836
4	664.065	1391.416
5	673.911	1393.165
6	683.726	1395.082
7	693.506	1397.167
8	703.249	1399.419
9	712.952	1401.838
10	722.612	1404.422
11	732.227	1407.172
12	741.793	1410.086
13	751.308	1413.163
14	760.769	1416.402
15	770.173	1419.803
16	779.517	1423.365
17	788.799	1427.086
18	798.016	1430.965
19	807.165	1435.001
20	816.244	1439.194
21	825.249	1443.541
22	834.179	1448.042
23	843.030	1452.696

```
   24        851.801     1457.500
   25        860.488     1462.453
   26        869.089     1467.555
   27        877.601     1472.803
   28        886.022     1478.196
   29        894.349     1483.732
   30        902.581     1489.410
   31        910.714     1495.229
   32        916.077     1499.206
Circle Center At X =   566.911 ; Y =  1967.050 ; and Radius =   583.776
       Factor of Safety
      ***    1.926   ***
          **** END OF GSTABL7 OUTPUT ****
```

SCE Substation, Mission Village 062273002 SA2-3 Cut Slope Tpss Pseudostatic

p:\leighton\062001-062499\062273.002 sce substation\analyses\sa2-3\sa2-3 cutslopetpss ps.pl2 Run By: MAW, Leighton and Associates 3/3/2010 03:37PM



GSTABL7 v.2 FSmin=1.879

Safety Factors Are Calculated By The Modified Bishop Method

```
                          ***  GSTABL7  ***
                     ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **
              (All Rights Reserved-Unauthorized Use Prohibited)
*******************************************************************************
                      SLOPE STABILITY ANALYSIS SYSTEM
          Modified Bishop, Simplified Janbu, or GLE Method of Slices.
          (Includes Spencer & Morgenstern-Price Type Analysis)
          Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
          Nonlinear Undrained Shear Strength, Curved Phi Envelope,
          Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
          Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*******************************************************************************
   Analysis Run Date:        3/3/2010
   Time of Run:              03:37PM
   Run By:                   MAW, Leighton and Associates
   Input Data Filename:      P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA2-3\sa2-3 cutslopetpss ps.in
   Output Filename:          P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA2-3\sa2-3 cutslopetpss ps.OUT
   Unit System:              English
   Plotted Output Filename:  P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA2-3\sa2-3 cutslopetpss ps.PLT
   PROBLEM DESCRIPTION:  SCE Substation, Mission Village 06227300
                         2 SA2-3 Cut Slope Tpss Pseudostatic
   BOUNDARY COORDINATES
      21 Top   Boundaries
      26 Total Boundaries
   Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
      No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
       1          0.00    1330.00     110.00    1335.00        3
       2        110.00    1335.00     180.00    1340.00        2
       3        180.00    1340.00     195.00    1345.00        1
       4        195.00    1345.00     205.00    1345.00        1
       5        205.00    1345.00     265.00    1375.00        1
       6        265.00    1375.00     275.00    1375.00        1
       7        275.00    1375.00     315.00    1395.00        1
       8        315.00    1395.00     335.00    1395.00        1
       9        335.00    1395.00     350.00    1385.00        1
      10        350.00    1385.00     505.00    1382.00        1
      11        505.00    1382.00     540.00    1382.00        1
      12        540.00    1382.00     630.00    1385.00        3
      13        630.00    1385.00     670.00    1405.00        3
      14        670.00    1405.00     680.00    1405.00        3
      15        680.00    1405.00     740.00    1435.00        3
      16        740.00    1435.00     760.00    1435.00        3
      17        760.00    1435.00     825.00    1465.00        3
      18        825.00    1465.00     835.00    1465.00        3
      19        835.00    1465.00     895.00    1495.00        3
      20        895.00    1495.00     915.00    1500.00        3
      21        915.00    1500.00    1010.00    1430.00        3
      22        180.00    1340.00     505.00    1382.00        1
      23        110.00    1335.00     145.00    1325.00        3
      24        145.00    1325.00     290.00    1326.00        3
      25        290.00    1326.00     490.00    1360.00        3
      26        490.00    1360.00     540.00    1382.00        3
   User Specified Y-Origin =      1100.00(ft)
   Default X-Plus Value = 0.00(ft)
   Default Y-Plus Value = 0.00(ft)
  ISOTROPIC SOIL PARAMETERS
    3 Type(s) of Soil
   Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
   Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
    No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
     1   125.0    125.0     250.0     30.0    0.00       0.0      0
     2   125.0    125.0     150.0     35.0    0.00       0.0      0
     3   130.0    130.0     600.0     38.0    0.00       0.0      0
```



```
ANISOTROPIC STRENGTH PARAMETERS
     1 soil type(s)
 Soil Type  3 Is Anisotropic
 Number Of Direction Ranges Specified =  3
 Direction    Counterclockwise     Cohesion     Friction
   Range       Direction Limit    Intercept       Angle
    No.            (deg)            (psf)         (deg)
     1            -41.0             600.00         38.00
     2            -31.0             150.00         28.00
     3             90.0             600.00         38.00
 ANISOTROPIC SOIL NOTES:
    (1) An input value of 0.01 for C and/or Phi will cause Aniso
        C and/or Phi to be ignored in that range.
    (2) An input value of 0.02 for Phi will set both Phi and
        C equal to zero, with no water weight in the tension crack.
    (3) An input value of 0.03 for Phi will set both Phi and
        C equal to zero, with water weight in the tension crack.
 Specified Peak Ground Acceleration Coefficient (A) =   0.550(g)
 Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
 Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
 Specified Seismic Pore-Pressure Factor =   0.000
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
 5000 Trial Surfaces Have Been Generated.
   10 Surface(s) Initiate(s) From Each Of   500 Points Equally Spaced
 Along The Ground Surface Between  X = 590.00(ft)
                                 and  X = 680.00(ft)
 Each Surface Terminates Between   X = 800.00(ft)
                                 and   X = 950.00(ft)
 Unless Further Limitations Were Imposed, The Minimum Elevation
 At Which A Surface Extends Is  Y =      0.00(ft)
 10.00(ft) Line Segments Define Each Trial Failure Surface.
 Following Are Displayed The Ten Most Critical Of The Trial
       Failure Surfaces Evaluated. They Are
       Ordered - Most Critical First.
       * * Safety Factors Are Calculated By The Modified Bishop Method * *
       Total Number of Trial Surfaces Attempted =  5000
       Number of Trial Surfaces With Valid FS = 5000
       Statistical Data On All Valid FS Values:
          FS Max =   4.078   FS Min =   1.879   FS Ave =   2.479
          Standard Deviation =    0.333   Coefficient of Variation =   13.44 %
       Failure Surface Specified By 34 Coordinate Points
         Point      X-Surf      Y-Surf
          No.        (ft)        (ft)
           1       627.154     1384.905
           2       637.128     1384.181
           3       647.117     1383.710
           4       657.114     1383.494
           5       667.114     1383.532
           6       677.110     1383.824
           7       687.095     1384.371
           8       697.063     1385.171
           9       707.007     1386.224
          10       716.922     1387.530
          11       726.800     1389.087
          12       736.635     1390.895
          13       746.421     1392.952
          14       756.152     1395.258
          15       765.820     1397.810
          16       775.421     1400.608
          17       784.948     1403.648
          18       794.394     1406.930
          19       803.754     1410.451
          20       813.021     1414.209
          21       822.189     1418.201
          22       831.253     1422.425
          23       840.207     1426.878
```

24	849.045	1431.557
25	857.761	1436.460
26	866.349	1441.583
27	874.804	1446.922
28	883.121	1452.474
29	891.294	1458.236
30	899.318	1464.205
31	907.187	1470.375
32	914.897	1476.743
33	922.443	1483.305
34	929.228	1489.516

Circle Center At X = 660.627 ; Y = 1776.687 ; and Radius = 393.209

Factor of Safety

*** 1.879 ***

Individual data on the 42 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	2.8	55.8	0.0	0.0	0.	0.	8.4	0.0	0.0
2	7.1	2170.4	0.0	0.0	0.	0.	325.6	0.0	0.0
3	10.0	9239.7	0.0	0.0	0.	0.	1386.0	0.0	0.0
4	10.0	16188.3	0.0	0.0	0.	0.	2428.2	0.0	0.0
5	10.0	22807.1	0.0	0.0	0.	0.	3421.1	0.0	0.0
6	2.9	7767.1	0.0	0.0	0.	0.	1165.1	0.0	0.0
7	7.1	19668.6	0.0	0.0	0.	0.	2950.3	0.0	0.0
8	2.9	7926.0	0.0	0.0	0.	0.	1188.9	0.0	0.0
9	7.1	20842.6	0.0	0.0	0.	0.	3126.4	0.0	0.0
10	10.0	34040.2	0.0	0.0	0.	0.	5106.0	0.0	0.0
11	9.9	39197.2	0.0	0.0	0.	0.	5879.6	0.0	0.0
12	9.9	43957.6	0.0	0.0	0.	0.	6593.6	0.0	0.0
13	9.9	48312.1	0.0	0.0	0.	0.	7246.8	0.0	0.0
14	9.8	52252.5	0.0	0.0	0.	0.	7837.9	0.0	0.0
15	3.4	18771.3	0.0	0.0	0.	0.	2815.7	0.0	0.0
16	6.4	35662.0	0.0	0.0	0.	0.	5349.3	0.0	0.0
17	9.7	51730.9	0.0	0.0	0.	0.	7759.6	0.0	0.0
18	3.8	19628.4	0.0	0.0	0.	0.	2944.3	0.0	0.0
19	5.8	29737.3	0.0	0.0	0.	0.	4460.6	0.0	0.0
20	9.6	50788.8	0.0	0.0	0.	0.	7618.3	0.0	0.0
21	9.5	52247.6	0.0	0.0	0.	0.	7837.1	0.0	0.0
22	9.4	53301.3	0.0	0.0	0.	0.	7995.2	0.0	0.0
23	9.4	53955.3	0.0	0.0	0.	0.	8093.3	0.0	0.0
24	9.3	54215.6	0.0	0.0	0.	0.	8132.3	0.0	0.0
25	9.2	54091.4	0.0	0.0	0.	0.	8113.7	0.0	0.0
26	2.8	16623.8	0.0	0.0	0.	0.	2493.6	0.0	0.0
27	6.3	35795.2	0.0	0.0	0.	0.	5369.3	0.0	0.0
28	3.7	20282.9	0.0	0.0	0.	0.	3042.4	0.0	0.0
29	5.2	27563.3	0.0	0.0	0.	0.	4134.5	0.0	0.0
30	8.8	46639.6	0.0	0.0	0.	0.	6995.9	0.0	0.0
31	8.7	45540.4	0.0	0.0	0.	0.	6831.1	0.0	0.0
32	8.6	44107.8	0.0	0.0	0.	0.	6616.2	0.0	0.0
33	8.5	42358.6	0.0	0.0	0.	0.	6353.8	0.0	0.0
34	8.3	40310.3	0.0	0.0	0.	0.	6046.5	0.0	0.0
35	8.2	37982.2	0.0	0.0	0.	0.	5697.3	0.0	0.0
36	3.7	16601.5	0.0	0.0	0.	0.	2490.2	0.0	0.0
37	4.3	18490.3	0.0	0.0	0.	0.	2773.5	0.0	0.0
38	7.9	30459.1	0.0	0.0	0.	0.	4568.9	0.0	0.0
39	7.7	25510.3	0.0	0.0	0.	0.	3826.5	0.0	0.0
40	0.1	309.8	0.0	0.0	0.	0.	46.5	0.0	0.0
41	7.4	16631.7	0.0	0.0	0.	0.	2494.8	0.0	0.0
42	6.8	4944.2	0.0	0.0	0.	0.	741.6	0.0	0.0

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	619.940	1384.665
2	629.898	1383.752
3	639.877	1383.101

4	649.869	1382.712
5	659.868	1382.585
6	669.867	1382.721
7	679.859	1383.119
8	689.838	1383.780
9	699.795	1384.701
10	709.725	1385.884
11	719.620	1387.327
12	729.474	1389.030
13	739.280	1390.990
14	749.031	1393.207
15	758.721	1395.679
16	768.342	1398.404
17	777.889	1401.381
18	787.354	1404.608
19	796.731	1408.082
20	806.014	1411.801
21	815.196	1415.762
22	824.271	1419.962
23	833.233	1424.400
24	842.075	1429.071
25	850.791	1433.972
26	859.376	1439.101
27	867.823	1444.453
28	876.127	1450.025
29	884.282	1455.812
30	892.282	1461.812
31	900.122	1468.020
32	907.796	1474.432
33	915.300	1481.042
34	922.627	1487.847
35	926.435	1491.574

Circle Center At X = 659.693 ; Y = 1763.607 ; and Radius = 381.022

Factor of Safety

*** 1.879 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	631.843	1385.922
2	641.799	1384.983
3	651.778	1384.327
4	661.771	1383.956
5	671.770	1383.870
6	681.768	1384.068
7	691.757	1384.550
8	701.727	1385.316
9	711.672	1386.365
10	721.583	1387.697
11	731.452	1389.311
12	741.271	1391.204
13	751.032	1393.376
14	760.728	1395.825
15	770.350	1398.549
16	779.890	1401.546
17	789.342	1404.812
18	798.696	1408.347
19	807.946	1412.146
20	817.085	1416.206
21	826.104	1420.525
22	834.997	1425.099
23	843.756	1429.924
24	852.374	1434.996
25	860.844	1440.311
26	869.160	1445.865
27	877.315	1451.654
28	885.301	1457.672
29	893.113	1463.915

30	900.744	1470.377
31	908.188	1477.055
32	915.440	1483.941
33	922.492	1491.030
34	924.407	1493.068

Circle Center At X = 669.833 ; Y = 1735.185 ; and Radius = 351.323

Factor of Safety

*** 1.880 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	616.513	1384.550
2	626.462	1383.545
3	636.435	1382.804
4	646.423	1382.330
5	656.421	1382.123
6	666.421	1382.182
7	676.416	1382.509
8	686.398	1383.101
9	696.361	1383.960
10	706.298	1385.084
11	716.201	1386.472
12	726.064	1388.125
13	735.879	1390.040
14	745.639	1392.215
15	755.338	1394.651
16	764.968	1397.344
17	774.524	1400.293
18	783.997	1403.496
19	793.381	1406.951
20	802.670	1410.654
21	811.857	1414.604
22	820.935	1418.798
23	829.898	1423.232
24	838.740	1427.904
25	847.453	1432.810
26	856.033	1437.947
27	864.473	1443.310
28	872.767	1448.897
29	880.909	1454.703
30	888.893	1460.724
31	896.714	1466.956
32	904.365	1473.395
33	911.842	1480.035
34	919.140	1486.872
35	924.981	1492.645

Circle Center At X = 659.194 ; Y = 1757.002 ; and Radius = 374.889

Factor of Safety

*** 1.880 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	624.629	1384.821
2	634.563	1383.675
3	644.526	1382.813
4	654.509	1382.237
5	664.505	1381.947
6	674.505	1381.943
7	684.501	1382.224
8	694.485	1382.792
9	704.449	1383.645
10	714.384	1384.782
11	724.282	1386.203
12	734.136	1387.907
13	743.937	1389.892
14	753.677	1392.156
15	763.349	1394.698

16	772.944	1397.516
17	782.454	1400.607
18	791.872	1403.968
19	801.190	1407.598
20	810.400	1411.493
21	819.496	1415.649
22	828.468	1420.064
23	837.311	1424.734
24	846.017	1429.655
25	854.578	1434.822
26	862.988	1440.233
27	871.239	1445.882
28	879.326	1451.764
29	887.241	1457.876
30	894.979	1464.211
31	902.531	1470.765
32	909.894	1477.532
33	917.059	1484.508
34	924.023	1491.685
35	924.934	1492.680

Circle Center At X = 669.656 ; Y = 1731.500 ; and Radius = 349.591

Factor of Safety

*** 1.881 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	613.807	1384.460
2	623.781	1383.740
3	633.770	1383.269
4	643.768	1383.048
5	653.768	1383.077
6	663.764	1383.357
7	673.750	1383.886
8	683.719	1384.666
9	693.666	1385.694
10	703.584	1386.971
11	713.468	1388.496
12	723.309	1390.268
13	733.104	1392.285
14	742.845	1394.547
15	752.526	1397.052
16	762.141	1399.798
17	771.685	1402.785
18	781.151	1406.009
19	790.534	1409.468
20	799.826	1413.162
21	809.024	1417.087
22	818.120	1421.240
23	827.110	1425.620
24	835.988	1430.224
25	844.747	1435.048
26	853.383	1440.090
27	861.890	1445.347
28	870.263	1450.815
29	878.496	1456.490
30	886.585	1462.370
31	894.524	1468.450
32	902.308	1474.727
33	909.933	1481.197
34	917.394	1487.856
35	923.590	1493.670

Circle Center At X = 647.593 ; Y = 1782.648 ; and Radius = 399.619

Factor of Safety

*** 1.882 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	628.056	1384.935
2	637.979	1383.698
3	647.935	1382.761
4	657.915	1382.126
5	667.909	1381.793
6	677.909	1381.763
7	687.905	1382.035
8	697.889	1382.609
9	707.850	1383.485
10	717.781	1384.662
11	727.671	1386.139
12	737.512	1387.915
13	747.295	1389.987
14	757.011	1392.354
15	766.651	1395.015
16	776.206	1397.965
17	785.667	1401.203
18	795.026	1404.726
19	804.274	1408.531
20	813.402	1412.613
21	822.403	1416.970
22	831.269	1421.597
23	839.990	1426.490
24	848.559	1431.645
25	856.968	1437.056
26	865.210	1442.719
27	873.276	1448.630
28	881.161	1454.781
29	888.855	1461.168
30	896.353	1467.785
31	903.647	1474.626
32	910.731	1481.684
33	917.598	1488.953
34	922.503	1494.471

Circle Center At X = 673.926 ; Y = 1712.155 ; and Radius = 330.419
Factor of Safety
*** 1.885 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	619.398	1384.647
2	629.357	1383.737
3	639.337	1383.107
4	649.331	1382.757
5	659.331	1382.688
6	669.329	1382.898
7	679.317	1383.388
8	689.287	1384.159
9	699.232	1385.208
10	709.143	1386.535
11	719.014	1388.140
12	728.835	1390.020
13	738.600	1392.175
14	748.301	1394.603
15	757.930	1397.302
16	767.480	1400.269
17	776.943	1403.503
18	786.311	1407.000
19	795.578	1410.759
20	804.735	1414.776
21	813.777	1419.047
22	822.695	1423.571
23	831.484	1428.343
24	840.135	1433.359
25	848.642	1438.615
26	856.998	1444.108
27	865.197	1449.833

28	873.233	1455.785
29	881.098	1461.960
30	888.788	1468.353
31	896.295	1474.959
32	903.615	1481.773
33	910.740	1488.789
34	917.667	1496.002
35	918.773	1497.220

Circle Center At X = 656.823 ; Y = 1739.542 ; and Radius = 356.864
Factor of Safety
*** 1.886 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	619.940	1384.665
2	629.868	1383.471
3	639.826	1382.550
4	649.805	1381.903
5	659.798	1381.529
6	669.797	1381.429
7	679.796	1381.604
8	689.786	1382.052
9	699.759	1382.775
10	709.710	1383.770
11	719.629	1385.038
12	729.510	1386.577
13	739.345	1388.386
14	749.126	1390.465
15	758.847	1392.811
16	768.500	1395.422
17	778.078	1398.297
18	787.574	1401.434
19	796.979	1404.830
20	806.289	1408.482
21	815.494	1412.388
22	824.589	1416.545
23	833.567	1420.950
24	842.420	1425.599
25	851.143	1430.489
26	859.729	1435.616
27	868.170	1440.977
28	876.462	1446.568
29	884.597	1452.383
30	892.570	1458.419
31	900.374	1464.672
32	908.004	1471.136
33	915.453	1477.807
34	922.717	1484.680
35	928.266	1490.225

Circle Center At X = 668.432 ; Y = 1746.174 ; and Radius = 364.747
Factor of Safety
*** 1.887 ***

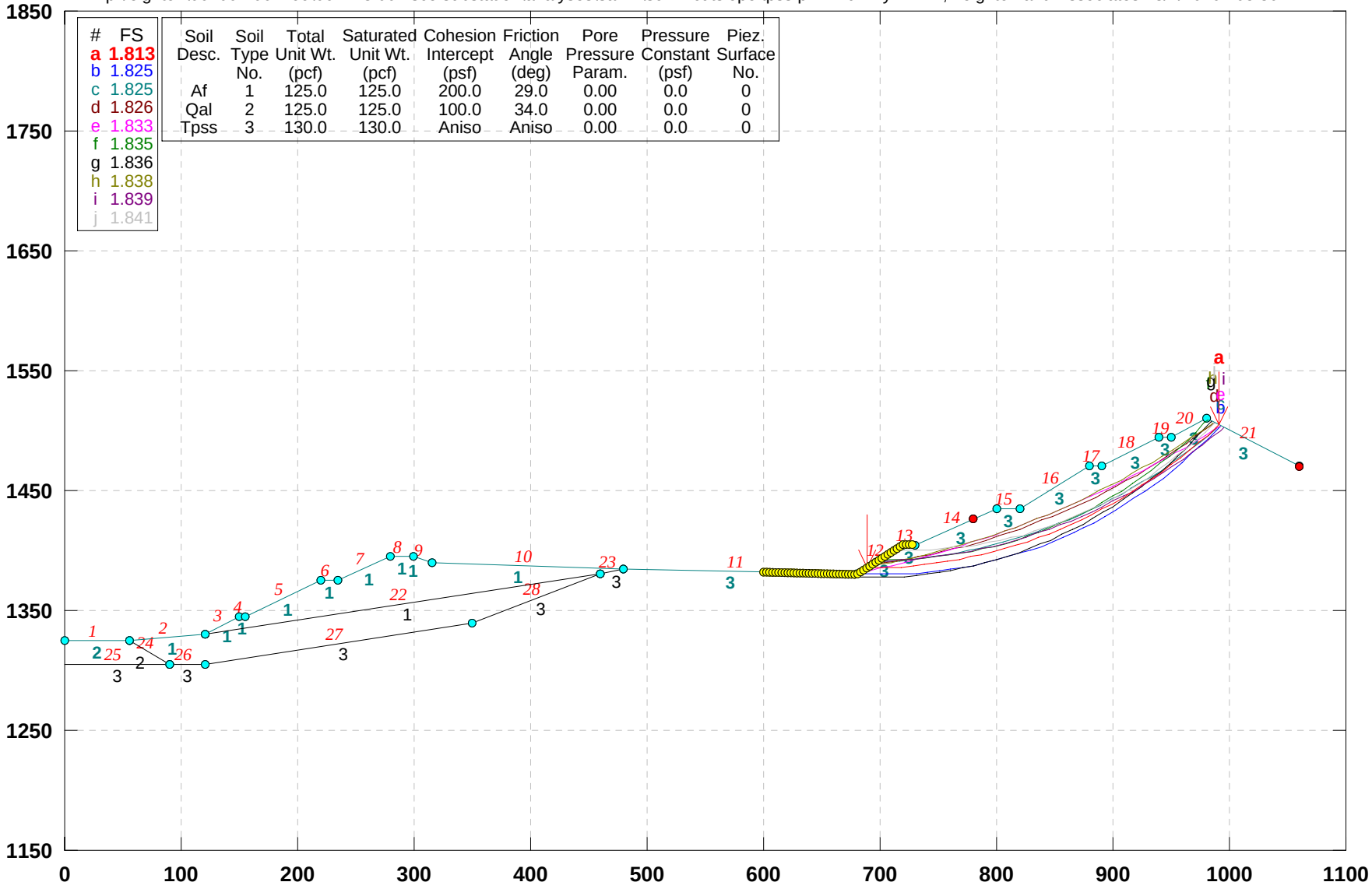
Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	633.466	1386.733
2	643.416	1385.734
3	653.391	1385.015
4	663.381	1384.578
5	673.380	1384.423
6	683.379	1384.551
7	693.371	1384.960
8	703.347	1385.651
9	713.299	1386.624
10	723.221	1387.876
11	733.102	1389.409
12	742.937	1391.219

```
   13        752.717     1393.306
   14        762.434     1395.669
   15        772.080     1398.304
   16        781.648     1401.211
   17        791.131     1404.387
   18        800.520     1407.829
   19        809.808     1411.534
   20        818.988     1415.500
   21        828.052     1419.723
   22        836.994     1424.201
   23        845.806     1428.929
   24        854.480     1433.904
   25        863.011     1439.121
   26        871.392     1444.577
   27        879.615     1450.268
   28        887.674     1456.188
   29        895.563     1462.333
   30        903.275     1468.699
   31        910.805     1475.279
   32        918.146     1482.070
   33        925.293     1489.064
   34        927.184     1491.023
Circle Center At X =   673.882 ; Y =  1738.660 ; and Radius =   354.239
       Factor of Safety
      ***    1.887   ***
          **** END OF GSTABL7 OUTPUT ****
```

SCE Substation, Mission Village 062273002 SA2-4 Cut Slope Tpss Static

p:\leighton\062001-062499\062273.002 sce substation\analyses\sa2-4\sc2-4 cutslope tpss.pl2 Run By: MAW, Leighton and Associates 3/2/2010 05:30PM



GSTABL7 v.2 FSmin=1.813

Safety Factors Are Calculated By The Modified Bishop Method

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                    ***  GSTABL7  ***
              ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **
          (All Rights Reserved-Unauthorized Use Prohibited)
*******************************************************************************
                 SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*******************************************************************************
   Analysis Run Date:        3/2/2010
   Time of Run:              05:30PM
   Run By:                   MAW, Leighton and Associates
   Input Data Filename:      P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA2-4\sc2-4 cutslope tpss.in
   Output Filename:          P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA2-4\sc2-4 cutslope tpss.OUT
   Unit System:              English
   Plotted Output Filename:  P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA2-4\sc2-4 cutslope tpss.PLT
   PROBLEM DESCRIPTION:  SCE Substation, Mission Village 06227300
                         2 SA2-4 Cut Slope Tpss Static
   BOUNDARY COORDINATES
      21 Top   Boundaries
      28 Total Boundaries
   Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
      No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
       1          0.00    1325.00      55.00    1325.00        2
       2         55.00    1325.00     120.00    1330.00        1
       3        120.00    1330.00     150.00    1345.00        1
       4        150.00    1345.00     155.00    1345.00        1
       5        155.00    1345.00     220.00    1375.00        1
       6        220.00    1375.00     235.00    1375.00        1
       7        235.00    1375.00     280.00    1395.00        1
       8        280.00    1395.00     300.00    1395.00        1
       9        300.00    1395.00     315.00    1390.00        1
      10        315.00    1390.00     480.00    1385.00        1
      11        480.00    1385.00     680.00    1380.00        3
      12        680.00    1380.00     720.00    1405.00        3
      13        720.00    1405.00     730.00    1405.00        3
      14        730.00    1405.00     800.00    1435.00        3
      15        800.00    1435.00     820.00    1435.00        3
      16        820.00    1435.00     880.00    1470.00        3
      17        880.00    1470.00     890.00    1470.00        3
      18        890.00    1470.00     940.00    1495.00        3
      19        940.00    1495.00     950.00    1495.00        3
      20        950.00    1495.00     980.00    1510.00        3
      21        980.00    1510.00    1060.00    1470.00        3
      22        120.00    1330.00     460.00    1380.00        1
      23        460.00    1380.00     480.00    1385.00        3
      24         55.00    1325.00      90.00    1305.00        2
      25          0.00    1305.00      90.00    1305.00        3
      26         90.00    1305.00     120.00    1305.00        3
      27        120.00    1305.00     350.00    1340.00        3
      28        350.00    1340.00     460.00    1380.00        3
   User Specified Y-Origin =      1150.00(ft)
   Default X-Plus Value = 0.00(ft)
   Default Y-Plus Value = 0.00(ft)
  ISOTROPIC SOIL PARAMETERS
    3 Type(s) of Soil
   Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
   Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
    No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
     1   125.0    125.0     200.0     29.0    0.00       0.0      0
```



```
     2   125.0    125.0     100.0     34.0    0.00       0.0      0
     3   130.0    130.0     200.0     32.0    0.00       0.0      0
  ANISOTROPIC STRENGTH PARAMETERS
      1 soil type(s)
   Soil Type  3 Is Anisotropic
   Number Of Direction Ranges Specified =  3
   Direction    Counterclockwise     Cohesion     Friction
     Range       Direction Limit    Intercept      Angle
      No.            (deg)            (psf)         (deg)
       1            -43.0             200.00         32.00
       2            -33.0             150.00         28.00
       3             90.0             200.00         32.00
   ANISOTROPIC SOIL NOTES:
      (1) An input value of 0.01 for C and/or Phi will cause Aniso
          C and/or Phi to be ignored in that range.
      (2) An input value of 0.02 for Phi will set both Phi and
          C equal to zero, with no water weight in the tension crack.
      (3) An input value of 0.03 for Phi will set both Phi and
          C equal to zero, with water weight in the tension crack.
   A Critical Failure Surface Searching Method, Using A Random
   Technique For Generating Circular Surfaces, Has Been Specified.
   5000 Trial Surfaces Have Been Generated.
     10 Surface(s) Initiate(s) From Each Of   500 Points Equally Spaced
   Along The Ground Surface Between  X = 600.00(ft)
                                  and  X = 730.00(ft)
   Each Surface Terminates Between   X = 780.00(ft)
                                  and   X =1060.00(ft)
   Unless Further Limitations Were Imposed, The Minimum Elevation
   At Which A Surface Extends Is  Y =      0.00(ft)
   10.00(ft) Line Segments Define Each Trial Failure Surface.
   Following Are Displayed The Ten Most Critical Of The Trial
         Failure Surfaces Evaluated. They Are
         Ordered - Most Critical First.
         * * Safety Factors Are Calculated By The Modified Bishop Method * *
         Total Number of Trial Surfaces Attempted =  5000
         Number of Trial Surfaces With Valid FS = 5000
         Statistical Data On All Valid FS Values:
            FS Max =   7.112   FS Min =   1.813   FS Ave =   2.708
            Standard Deviation =    0.455   Coefficient of Variation =   16.82 %
         Failure Surface Specified By 35 Coordinate Points
           Point      X-Surf      Y-Surf
            No.        (ft)        (ft)
             1       688.569     1385.356
             2       698.568     1385.501
             3       708.561     1385.870
             4       718.544     1386.463
             5       728.510     1387.280
             6       738.456     1388.321
             7       748.376     1389.585
             8       758.265     1391.071
             9       768.118     1392.779
            10       777.930     1394.707
            11       787.697     1396.855
            12       797.413     1399.222
            13       807.073     1401.807
            14       816.673     1404.607
            15       826.207     1407.622
            16       835.672     1410.851
            17       845.061     1414.291
            18       854.372     1417.941
            19       863.597     1421.799
            20       872.734     1425.864
            21       881.777     1430.132
            22       890.723     1434.602
            23       899.565     1439.272
            24       908.301     1444.139
            25       916.925     1449.201
```

26	925.433	1454.456
27	933.822	1459.900
28	942.086	1465.531
29	950.221	1471.346
30	958.224	1477.342
31	966.090	1483.516
32	973.816	1489.865
33	981.397	1496.386
34	988.830	1503.076
35	990.571	1504.715

Circle Center At X = 687.122 ; Y = 1830.834 ; and Radius = 445.480

Factor of Safety

*** 1.813 ***

Individual data on the 43 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	10.0	3967.5	0.0	0.0	0.	0.	0.0	0.0	0.0
2	10.0	11747.7	0.0	0.0	0.	0.	0.0	0.0	0.0
3	10.0	19211.2	0.0	0.0	0.	0.	0.0	0.0	0.0
4	1.5	3411.6	0.0	0.0	0.	0.	0.0	0.0	0.0
5	8.5	19990.0	0.0	0.0	0.	0.	0.0	0.0	0.0
6	1.5	3416.3	0.0	0.0	0.	0.	0.0	0.0	0.0
7	8.5	20813.2	0.0	0.0	0.	0.	0.0	0.0	0.0
8	9.9	28108.4	0.0	0.0	0.	0.	0.0	0.0	0.0
9	9.9	31710.3	0.0	0.0	0.	0.	0.0	0.0	0.0
10	9.9	34968.5	0.0	0.0	0.	0.	0.0	0.0	0.0
11	9.8	37880.2	0.0	0.0	0.	0.	0.0	0.0	0.0
12	9.8	40442.4	0.0	0.0	0.	0.	0.0	0.0	0.0
13	9.7	42654.3	0.0	0.0	0.	0.	0.0	0.0	0.0
14	2.6	11731.1	0.0	0.0	0.	0.	0.0	0.0	0.0
15	7.1	31390.7	0.0	0.0	0.	0.	0.0	0.0	0.0
16	9.6	39677.3	0.0	0.0	0.	0.	0.0	0.0	0.0
17	3.3	12918.5	0.0	0.0	0.	0.	0.0	0.0	0.0
18	6.2	24345.5	0.0	0.0	0.	0.	0.0	0.0	0.0
19	9.5	39550.5	0.0	0.0	0.	0.	0.0	0.0	0.0
20	9.4	41880.1	0.0	0.0	0.	0.	0.0	0.0	0.0
21	9.3	43835.5	0.0	0.0	0.	0.	0.0	0.0	0.0
22	9.2	45420.1	0.0	0.0	0.	0.	0.0	0.0	0.0
23	9.1	46638.9	0.0	0.0	0.	0.	0.0	0.0	0.0
24	7.3	38068.2	0.0	0.0	0.	0.	0.0	0.0	0.0
25	1.8	9309.3	0.0	0.0	0.	0.	0.0	0.0	0.0
26	8.2	40420.1	0.0	0.0	0.	0.	0.0	0.0	0.0
27	0.7	3359.4	0.0	0.0	0.	0.	0.0	0.0	0.0
28	8.8	40964.0	0.0	0.0	0.	0.	0.0	0.0	0.0
29	8.7	40043.3	0.0	0.0	0.	0.	0.0	0.0	0.0
30	8.6	38832.2	0.0	0.0	0.	0.	0.0	0.0	0.0
31	8.5	37342.6	0.0	0.0	0.	0.	0.0	0.0	0.0
32	8.4	35588.9	0.0	0.0	0.	0.	0.0	0.0	0.0
33	6.2	25261.1	0.0	0.0	0.	0.	0.0	0.0	0.0
34	2.1	8182.3	0.0	0.0	0.	0.	0.0	0.0	0.0
35	7.9	27410.5	0.0	0.0	0.	0.	0.0	0.0	0.0
36	0.2	683.3	0.0	0.0	0.	0.	0.0	0.0	0.0
37	8.0	23686.6	0.0	0.0	0.	0.	0.0	0.0	0.0
38	7.9	21116.5	0.0	0.0	0.	0.	0.0	0.0	0.0
39	7.7	18365.2	0.0	0.0	0.	0.	0.0	0.0	0.0
40	6.2	12806.0	0.0	0.0	0.	0.	0.0	0.0	0.0
41	1.4	2518.1	0.0	0.0	0.	0.	0.0	0.0	0.0
42	7.4	7451.9	0.0	0.0	0.	0.	0.0	0.0	0.0
43	1.7	283.9	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 36 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	681.015	1380.634
2	691.006	1380.203
3	701.004	1380.022

4	711.004	1380.094
5	720.998	1380.416
6	730.982	1380.990
7	740.948	1381.814
8	750.890	1382.889
9	760.802	1384.214
10	770.677	1385.787
11	780.510	1387.608
12	790.294	1389.675
13	800.023	1391.988
14	809.691	1394.545
15	819.291	1397.344
16	828.818	1400.383
17	838.265	1403.661
18	847.627	1407.176
19	856.898	1410.924
20	866.072	1414.905
21	875.142	1419.115
22	884.104	1423.552
23	892.952	1428.212
24	901.679	1433.094
25	910.281	1438.193
26	918.753	1443.507
27	927.088	1449.032
28	935.281	1454.766
29	943.328	1460.703
30	951.222	1466.841
31	958.960	1473.175
32	966.537	1479.702
33	973.947	1486.417
34	981.185	1493.316
35	988.248	1500.395
36	991.775	1504.112

Circle Center At X = 703.201 ; Y = 1777.587 ; and Radius = 397.572

Factor of Safety

*** 1.825 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	696.645	1390.403
2	706.633	1390.884
3	716.610	1391.569
4	726.570	1392.459
5	736.510	1393.552
6	746.426	1394.848
7	756.313	1396.348
8	766.167	1398.049
9	775.984	1399.952
10	785.760	1402.055
11	795.492	1404.359
12	805.174	1406.860
13	814.802	1409.560
14	824.374	1412.456
15	833.884	1415.548
16	843.328	1418.834
17	852.704	1422.312
18	862.006	1425.982
19	871.232	1429.841
20	880.376	1433.889
21	889.435	1438.123
22	898.406	1442.541
23	907.285	1447.142
24	916.067	1451.924
25	924.750	1456.885
26	933.329	1462.023
27	941.802	1467.335
28	950.164	1472.820

29	958.411	1478.474
30	966.542	1484.297
31	974.551	1490.284
32	982.436	1496.434
33	990.193	1502.745
34	991.795	1504.103

Circle Center At X = 678.186 ; Y = 1878.255 ; and Radius = 488.201
Factor of Safety
*** 1.825 ***
Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	693.779	1388.612
2	703.692	1389.929
3	713.582	1391.406
4	723.448	1393.044
5	733.285	1394.841
6	743.092	1396.797
7	752.865	1398.911
8	762.604	1401.184
9	772.304	1403.614
10	781.964	1406.200
11	791.580	1408.943
12	801.151	1411.841
13	810.674	1414.894
14	820.145	1418.101
15	829.564	1421.460
16	838.927	1424.972
17	848.232	1428.635
18	857.477	1432.448
19	866.658	1436.411
20	875.774	1440.521
21	884.823	1444.779
22	893.801	1449.183
23	902.707	1453.731
24	911.537	1458.423
25	920.291	1463.258
26	928.965	1468.233
27	937.558	1473.349
28	946.066	1478.603
29	954.489	1483.994
30	962.823	1489.521
31	971.066	1495.182
32	979.217	1500.976
33	986.838	1506.581

Circle Center At X = 617.426 ; Y = 2001.302 ; and Radius = 617.429
Factor of Safety
*** 1.826 ***
Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	681.536	1380.960
2	691.311	1383.068
3	701.065	1385.274
4	710.796	1387.578
5	720.503	1389.978
6	730.186	1392.476
7	739.844	1395.071
8	749.475	1397.762
9	759.079	1400.549
10	768.654	1403.433
11	778.200	1406.412
12	787.716	1409.486
13	797.200	1412.656
14	806.652	1415.921
15	816.071	1419.279
16	825.456	1422.732

17	834.806	1426.279
18	844.120	1429.919
19	853.397	1433.653
20	862.636	1437.479
21	871.836	1441.397
22	880.997	1445.407
23	890.117	1449.509
24	899.196	1453.701
25	908.232	1457.985
26	917.225	1462.358
27	926.173	1466.822
28	935.077	1471.375
29	943.934	1476.016
30	952.745	1480.746
31	961.508	1485.564
32	970.222	1490.470
33	978.886	1495.463
34	987.500	1500.542
35	992.675	1503.663

Circle Center At X = 475.828 ; Y = 2358.505 ; and Radius = 998.954
Factor of Safety
*** 1.833 ***
Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	698.989	1391.868
2	708.989	1391.881
3	718.986	1392.152
4	728.972	1392.679
5	738.941	1393.464
6	748.887	1394.505
7	758.802	1395.801
8	768.681	1397.352
9	778.517	1399.157
10	788.303	1401.214
11	798.033	1403.523
12	807.700	1406.081
13	817.298	1408.887
14	826.821	1411.940
15	836.262	1415.236
16	845.615	1418.774
17	854.874	1422.552
18	864.033	1426.567
19	873.085	1430.816
20	882.025	1435.296
21	890.847	1440.006
22	899.545	1444.940
23	908.112	1450.097
24	916.545	1455.473
25	924.836	1461.064
26	932.980	1466.866
27	940.972	1472.877
28	948.807	1479.090
29	956.480	1485.504
30	963.985	1492.113
31	971.317	1498.912
32	978.472	1505.899
33	981.656	1509.172

Circle Center At X = 703.480 ; Y = 1780.378 ; and Radius = 388.535
Factor of Safety
*** 1.835 ***
Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	641.159	1380.971
2	651.087	1379.772
3	661.042	1378.827

4	671.018	1378.137
5	681.009	1377.703
6	691.007	1377.524
7	701.007	1377.602
8	711.001	1377.935
9	720.984	1378.523
10	730.948	1379.367
11	740.888	1380.466
12	750.796	1381.818
13	760.666	1383.423
14	770.492	1385.281
15	780.267	1387.389
16	789.985	1389.747
17	799.640	1392.352
18	809.225	1395.204
19	818.733	1398.300
20	828.160	1401.638
21	837.498	1405.216
22	846.741	1409.032
23	855.884	1413.083
24	864.920	1417.367
25	873.843	1421.881
26	882.648	1426.621
27	891.329	1431.585
28	899.880	1436.770
29	908.296	1442.171
30	916.570	1447.786
31	924.699	1453.611
32	932.675	1459.642
33	940.495	1465.876
34	948.153	1472.307
35	955.643	1478.932
36	962.962	1485.746
37	970.104	1492.746
38	977.064	1499.926
39	983.839	1507.281
40	984.325	1507.837

Circle Center At X = 692.992 ; Y = 1768.322 ; and Radius = 390.804
Factor of Safety
*** 1.836 ***
Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	690.132	1386.333
2	699.979	1388.080
3	709.800	1389.959
4	719.596	1391.971
5	729.363	1394.116
6	739.101	1396.392
7	748.807	1398.799
8	758.479	1401.338
9	768.116	1404.007
10	777.717	1406.806
11	787.278	1409.734
12	796.799	1412.791
13	806.279	1415.977
14	815.714	1419.290
15	825.103	1422.731
16	834.445	1426.298
17	843.738	1429.991
18	852.981	1433.809
19	862.171	1437.752
20	871.306	1441.818
21	880.386	1446.008
22	889.409	1450.320
23	898.372	1454.754
24	907.275	1459.308

25	916.116	1463.982
26	924.892	1468.775
27	933.603	1473.686
28	942.247	1478.715
29	950.822	1483.859
30	959.327	1489.120
31	967.759	1494.494
32	976.119	1499.982
33	984.403	1505.583
34	986.256	1506.872

Circle Center At X = 565.850 ; Y = 2115.658 ; and Radius = 739.839
Factor of Safety
*** 1.838 ***
Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	697.687	1391.054
2	707.681	1391.391
3	717.666	1391.934
4	727.638	1392.685
5	737.592	1393.643
6	747.524	1394.808
7	757.430	1396.179
8	767.305	1397.755
9	777.145	1399.536
10	786.946	1401.520
11	796.703	1403.708
12	806.414	1406.099
13	816.072	1408.690
14	825.674	1411.481
15	835.217	1414.471
16	844.695	1417.659
17	854.105	1421.043
18	863.443	1424.622
19	872.704	1428.394
20	881.885	1432.357
21	890.982	1436.511
22	899.990	1440.852
23	908.907	1445.380
24	917.727	1450.091
25	926.448	1454.985
26	935.065	1460.059
27	943.575	1465.311
28	951.974	1470.739
29	960.258	1476.340
30	968.424	1482.111
31	976.469	1488.051
32	984.388	1494.157
33	992.179	1500.426
34	994.780	1502.610

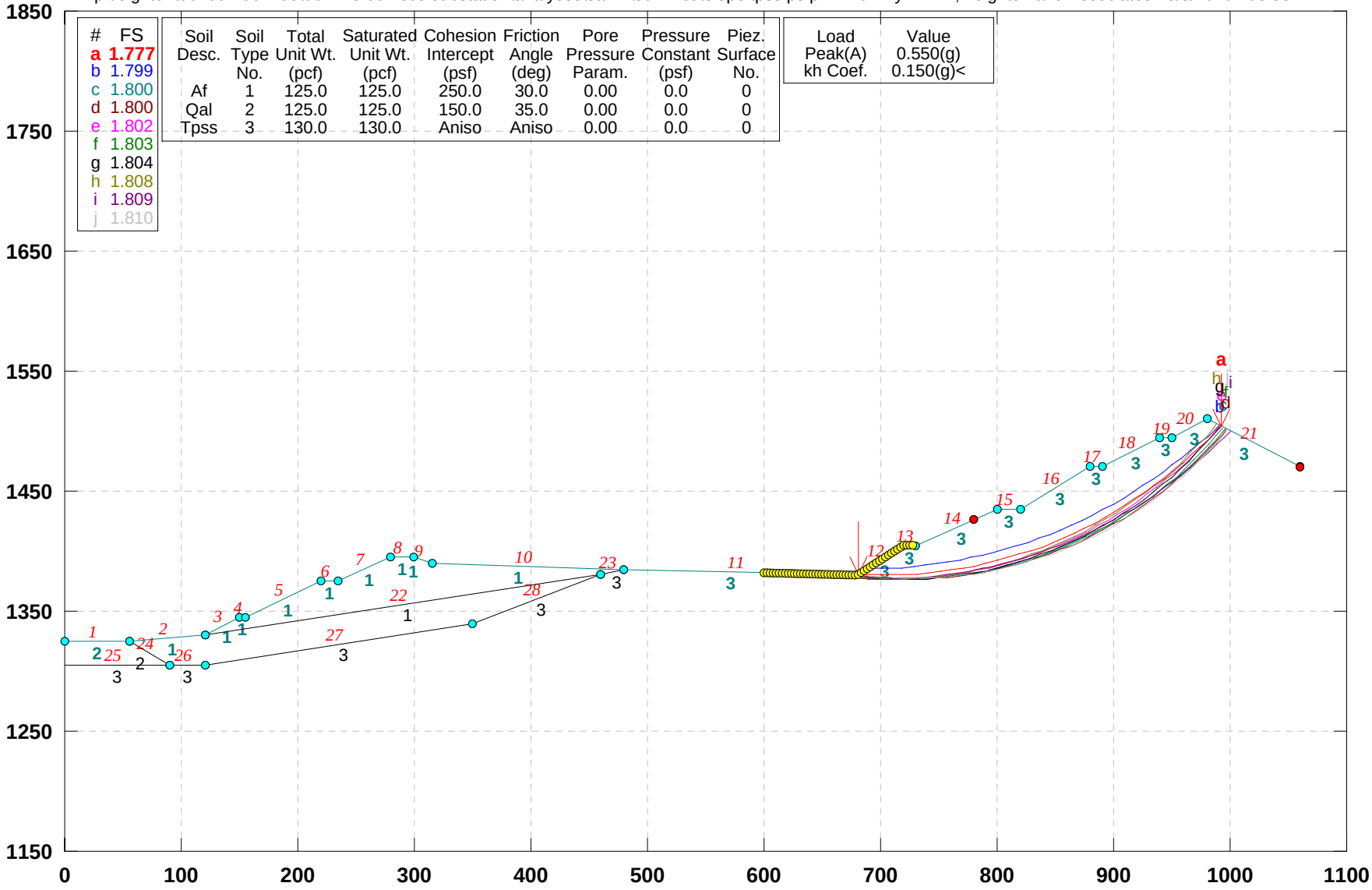
Circle Center At X = 686.536 ; Y = 1872.139 ; and Radius = 481.214
Factor of Safety
*** 1.839 ***
Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	713.577	1400.986
2	723.574	1400.734
3	733.574	1400.753
4	743.570	1401.041
5	753.554	1401.600
6	763.520	1402.428
7	773.459	1403.525
8	783.366	1404.890
9	793.232	1406.522
10	803.050	1408.421
11	812.813	1410.583

```
   12        822.515     1413.009
   13        832.147     1415.696
   14        841.703     1418.642
   15        851.176     1421.845
   16        860.559     1425.303
   17        869.845     1429.013
   18        879.028     1432.973
   19        888.100     1437.179
   20        897.056     1441.629
   21        905.888     1446.319
   22        914.590     1451.246
   23        923.156     1456.406
   24        931.579     1461.796
   25        939.853     1467.411
   26        947.973     1473.248
   27        955.932     1479.302
   28        963.725     1485.569
   29        971.346     1492.044
   30        978.788     1498.723
   31        986.048     1505.600
   32        986.966     1506.517
Circle Center At X =   727.904 ; Y =  1770.756 ; and Radius =   370.048
       Factor of Safety
      ***    1.841   ***
          **** END OF GSTABL7 OUTPUT ****
```

SCE Substation, Mission Village 062273002 SA2-4 Cut Slope Tpss Pseudostatic

p:\leighton\062001-062499\062273.002 sce substation\analyses\sa2-4\sc2-4 cutslope tpss ps.pl2 Run By: MAW, Leighton and Associates 3/3/2010 03:38PM



#	FS
a	1.777
b	1.799
c	1.800
d	1.800
e	1.802
f	1.803
g	1.804
h	1.808
i	1.809
j	1.810

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Af	1	125.0	125.0	250.0	30.0	0.00	0.0	0
Qal	2	125.0	125.0	150.0	35.0	0.00	0.0	0
Tpss	3	130.0	130.0	Aniso	Aniso	0.00	0.0	0

Load	Value
Peak(A)	0.550(g)
kh Coef.	0.150(g)<

GSTABL7 v.2 FSmin=1.777

Safety Factors Are Calculated By The Modified Bishop Method

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                                  ***  GSTABL7  ***
                           ** GSTABL7 by Garry H. Gregory, P.E. **
      ** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **
                   (All Rights Reserved-Unauthorized Use Prohibited)
    ******************************************************************************
                         SLOPE STABILITY ANALYSIS SYSTEM
            Modified Bishop, Simplified Janbu, or GLE Method of Slices.
            (Includes Spencer & Morgenstern-Price Type Analysis)
            Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
            Nonlinear Undrained Shear Strength, Curved Phi Envelope,
            Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
            Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
    ******************************************************************************
    Analysis Run Date:        3/3/2010
    Time of Run:              03:38PM
    Run By:                   MAW, Leighton and Associates
    Input Data Filename:      P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA2-4\sc2-4 cutslope tpss ps.in
    Output Filename:          P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA2-4\sc2-4 cutslope tpss ps.OUT
    Unit System:              English
    Plotted Output Filename:  P:\Leighton\062001-062499\062273.002 SCE
Substation\Analyses\SA2-4\sc2-4 cutslope tpss ps.PLT
    PROBLEM DESCRIPTION:  SCE Substation, Mission Village 06227300
                          2 SA2-4 Cut Slope Tpss Pseudostatic
    BOUNDARY COORDINATES
       21 Top   Boundaries
       28 Total Boundaries
    Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
       No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
        1          0.00    1325.00      55.00    1325.00        2
        2         55.00    1325.00     120.00    1330.00        1
        3        120.00    1330.00     150.00    1345.00        1
        4        150.00    1345.00     155.00    1345.00        1
        5        155.00    1345.00     220.00    1375.00        1
        6        220.00    1375.00     235.00    1375.00        1
        7        235.00    1375.00     280.00    1395.00        1
        8        280.00    1395.00     300.00    1395.00        1
        9        300.00    1395.00     315.00    1390.00        1
       10        315.00    1390.00     480.00    1385.00        1
       11        480.00    1385.00     680.00    1380.00        3
       12        680.00    1380.00     720.00    1405.00        3
       13        720.00    1405.00     730.00    1405.00        3
       14        730.00    1405.00     800.00    1435.00        3
       15        800.00    1435.00     820.00    1435.00        3
       16        820.00    1435.00     880.00    1470.00        3
       17        880.00    1470.00     890.00    1470.00        3
       18        890.00    1470.00     940.00    1495.00        3
       19        940.00    1495.00     950.00    1495.00        3
       20        950.00    1495.00     980.00    1510.00        3
       21        980.00    1510.00    1060.00    1470.00        3
       22        120.00    1330.00     460.00    1380.00        1
       23        460.00    1380.00     480.00    1385.00        3
       24         55.00    1325.00      90.00    1305.00        2
       25          0.00    1305.00      90.00    1305.00        3
       26         90.00    1305.00     120.00    1305.00        3
       27        120.00    1305.00     350.00    1340.00        3
       28        350.00    1340.00     460.00    1380.00        3
    User Specified Y-Origin =      1150.00(ft)
    Default X-Plus Value = 0.00(ft)
    Default Y-Plus Value = 0.00(ft)
   ISOTROPIC SOIL PARAMETERS
     3 Type(s) of Soil
    Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
    Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
     No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
      1   125.0    125.0     250.0     30.0    0.00       0.0      0
```



```
      2   125.0    125.0     150.0     35.0    0.00       0.0      0
      3   130.0    130.0     600.0     38.0    0.00       0.0      0
   ANISOTROPIC STRENGTH PARAMETERS
       1 soil type(s)
    Soil Type  3 Is Anisotropic
    Number Of Direction Ranges Specified =  3
    Direction    Counterclockwise     Cohesion     Friction
      Range       Direction Limit    Intercept       Angle
       No.            (deg)            (psf)         (deg)
        1            -43.0             600.00         38.00
        2            -33.0             150.00         28.00
        3             90.0             600.00         38.00
    ANISOTROPIC SOIL NOTES:
       (1) An input value of 0.01 for C and/or Phi will cause Aniso
           C and/or Phi to be ignored in that range.
       (2) An input value of 0.02 for Phi will set both Phi and
           C equal to zero, with no water weight in the tension crack.
       (3) An input value of 0.03 for Phi will set both Phi and
           C equal to zero, with water weight in the tension crack.
    Specified Peak Ground Acceleration Coefficient (A) =   0.550(g)
    Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
    Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
    Specified Seismic Pore-Pressure Factor =   0.000
    A Critical Failure Surface Searching Method, Using A Random
    Technique For Generating Circular Surfaces, Has Been Specified.
    5000 Trial Surfaces Have Been Generated.
      10 Surface(s) Initiate(s) From Each Of   500 Points Equally Spaced
    Along The Ground Surface Between  X = 600.00(ft)
                                  and  X = 730.00(ft)
    Each Surface Terminates Between   X = 780.00(ft)
                                  and   X =1060.00(ft)
    Unless Further Limitations Were Imposed, The Minimum Elevation
    At Which A Surface Extends Is  Y =      0.00(ft)
    10.00(ft) Line Segments Define Each Trial Failure Surface.
    Following Are Displayed The Ten Most Critical Of The Trial
          Failure Surfaces Evaluated. They Are
          Ordered - Most Critical First.
          * * Safety Factors Are Calculated By The Modified Bishop Method * *
          Total Number of Trial Surfaces Attempted =  5000
          Number of Trial Surfaces With Valid FS = 5000
          Statistical Data On All Valid FS Values:
             FS Max =  13.750   FS Min =   1.777   FS Ave =   2.567
             Standard Deviation =    0.510   Coefficient of Variation =   19.86 %
          Failure Surface Specified By 36 Coordinate Points
            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)
              1       681.015     1380.634
              2       691.006     1380.203
              3       701.004     1380.022
              4       711.004     1380.094
              5       720.998     1380.416
              6       730.982     1380.990
              7       740.948     1381.814
              8       750.890     1382.889
              9       760.802     1384.214
             10       770.677     1385.787
             11       780.510     1387.608
             12       790.294     1389.675
             13       800.023     1391.988
             14       809.691     1394.545
             15       819.291     1397.344
             16       828.818     1400.383
             17       838.265     1403.661
             18       847.627     1407.176
             19       856.898     1410.924
             20       866.072     1414.905
             21       875.142     1419.115
```

22	884.104	1423.552
23	892.952	1428.212
24	901.679	1433.094
25	910.281	1438.193
26	918.753	1443.507
27	927.088	1449.032
28	935.281	1454.766
29	943.328	1460.703
30	951.222	1466.841
31	958.960	1473.175
32	966.537	1479.702
33	973.947	1486.417
34	981.185	1493.316
35	988.248	1500.395
36	991.775	1504.112

Circle Center At X = 703.201 ; Y = 1777.587 ; and Radius = 397.572

Factor of Safety

*** 1.777 ***

Individual data on the 44 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	10.0	4335.2	0.0	0.0	0.	0.	650.3	0.0	0.0
2	10.0	12855.4	0.0	0.0	0.	0.	1928.3	0.0	0.0
3	10.0	21052.0	0.0	0.0	0.	0.	3157.8	0.0	0.0
4	9.0	25670.8	0.0	0.0	0.	0.	3850.6	0.0	0.0
5	1.0	3193.1	0.0	0.0	0.	0.	479.0	0.0	0.0
6	9.0	28465.3	0.0	0.0	0.	0.	4269.8	0.0	0.0
7	1.0	3095.6	0.0	0.0	0.	0.	464.3	0.0	0.0
8	10.0	33884.8	0.0	0.0	0.	0.	5082.7	0.0	0.0
9	9.9	38090.0	0.0	0.0	0.	0.	5713.5	0.0	0.0
10	9.9	41910.6	0.0	0.0	0.	0.	6286.6	0.0	0.0
11	9.9	45340.1	0.0	0.0	0.	0.	6801.0	0.0	0.0
12	9.8	48373.5	0.0	0.0	0.	0.	7256.0	0.0	0.0
13	9.8	51006.6	0.0	0.0	0.	0.	7651.0	0.0	0.0
14	9.7	53108.8	0.0	0.0	0.	0.	7966.3	0.0	0.0
15	0.0	129.0	0.0	0.0	0.	0.	19.4	0.0	0.0
16	9.7	52450.0	0.0	0.0	0.	0.	7867.5	0.0	0.0
17	9.6	48742.7	0.0	0.0	0.	0.	7311.4	0.0	0.0
18	0.7	3460.6	0.0	0.0	0.	0.	519.1	0.0	0.0
19	8.8	44242.6	0.0	0.0	0.	0.	6636.4	0.0	0.0
20	9.4	50203.8	0.0	0.0	0.	0.	7530.6	0.0	0.0
21	9.4	52293.7	0.0	0.0	0.	0.	7844.0	0.0	0.0
22	9.3	53956.6	0.0	0.0	0.	0.	8093.5	0.0	0.0
23	9.2	55198.0	0.0	0.0	0.	0.	8279.7	0.0	0.0
24	9.1	56023.9	0.0	0.0	0.	0.	8403.6	0.0	0.0
25	4.9	30479.7	0.0	0.0	0.	0.	4572.0	0.0	0.0
26	4.1	25324.7	0.0	0.0	0.	0.	3798.7	0.0	0.0
27	5.9	34410.2	0.0	0.0	0.	0.	5161.5	0.0	0.0
28	3.0	16616.9	0.0	0.0	0.	0.	2492.5	0.0	0.0
29	8.7	48792.8	0.0	0.0	0.	0.	7318.9	0.0	0.0
30	8.6	47355.5	0.0	0.0	0.	0.	7103.3	0.0	0.0
31	8.5	45601.3	0.0	0.0	0.	0.	6840.2	0.0	0.0
32	8.3	43547.7	0.0	0.0	0.	0.	6532.2	0.0	0.0
33	8.2	41213.5	0.0	0.0	0.	0.	6182.0	0.0	0.0
34	4.7	22891.1	0.0	0.0	0.	0.	3433.7	0.0	0.0
35	3.3	15367.5	0.0	0.0	0.	0.	2305.1	0.0	0.0
36	6.7	27500.0	0.0	0.0	0.	0.	4125.0	0.0	0.0
37	1.2	4599.0	0.0	0.0	0.	0.	689.9	0.0	0.0
38	7.7	27701.7	0.0	0.0	0.	0.	4155.3	0.0	0.0
39	7.6	24560.2	0.0	0.0	0.	0.	3684.0	0.0	0.0
40	7.4	21251.7	0.0	0.0	0.	0.	3187.8	0.0	0.0
41	6.1	15097.5	0.0	0.0	0.	0.	2264.6	0.0	0.0
42	1.2	2612.3	0.0	0.0	0.	0.	391.8	0.0	0.0
43	7.1	9903.5	0.0	0.0	0.	0.	1485.5	0.0	0.0
44	3.5	1256.3	0.0	0.0	0.	0.	188.4	0.0	0.0

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	688.569	1385.356
2	698.568	1385.501
3	708.561	1385.870
4	718.544	1386.463
5	728.510	1387.280
6	738.456	1388.321
7	748.376	1389.585
8	758.265	1391.071
9	768.118	1392.779
10	777.930	1394.707
11	787.697	1396.855
12	797.413	1399.222
13	807.073	1401.807
14	816.673	1404.607
15	826.207	1407.622
16	835.672	1410.851
17	845.061	1414.291
18	854.372	1417.941
19	863.597	1421.799
20	872.734	1425.864
21	881.777	1430.132
22	890.723	1434.602
23	899.565	1439.272
24	908.301	1444.139
25	916.925	1449.201
26	925.433	1454.456
27	933.822	1459.900
28	942.086	1465.531
29	950.221	1471.346
30	958.224	1477.342
31	966.090	1483.516
32	973.816	1489.865
33	981.397	1496.386
34	988.830	1503.076
35	990.571	1504.715

Circle Center At X = 687.122 ; Y = 1830.834 ; and Radius = 445.480

Factor of Safety

*** 1.799 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	673.981	1380.151
2	683.903	1378.903
3	693.857	1377.936
4	703.833	1377.251
5	713.825	1376.848
6	723.824	1376.728
7	733.823	1376.890
8	743.813	1377.335
9	753.786	1378.063
10	763.735	1379.072
11	773.652	1380.361
12	783.528	1381.931
13	793.356	1383.779
14	803.127	1385.904
15	812.835	1388.304
16	822.471	1390.978
17	832.027	1393.924
18	841.497	1397.138
19	850.871	1400.618
20	860.144	1404.362
21	869.307	1408.367
22	878.353	1412.629
23	887.275	1417.146

24	896.066	1421.912
25	904.719	1426.925
26	913.227	1432.181
27	921.582	1437.675
28	929.779	1443.403
29	937.811	1449.361
30	945.671	1455.543
31	953.353	1461.945
32	960.851	1468.561
33	968.159	1475.387
34	975.272	1482.416
35	982.182	1489.644
36	988.886	1497.064
37	993.966	1503.017

Circle Center At X = 723.076 ; Y = 1730.467 ; and Radius = 353.740
Factor of Safety
*** 1.800 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	677.628	1380.059
2	687.561	1378.899
3	697.522	1378.015
4	707.503	1377.407
5	717.498	1377.076
6	727.498	1377.022
7	737.495	1377.245
8	747.483	1377.745
9	757.452	1378.522
10	767.397	1379.576
11	777.308	1380.904
12	787.179	1382.506
13	797.001	1384.382
14	806.768	1386.529
15	816.472	1388.946
16	826.104	1391.631
17	835.659	1394.582
18	845.128	1397.797
19	854.505	1401.273
20	863.781	1405.007
21	872.951	1408.998
22	882.006	1413.241
23	890.940	1417.733
24	899.746	1422.471
25	908.418	1427.452
26	916.948	1432.671
27	925.330	1438.124
28	933.558	1443.808
29	941.625	1449.717
30	949.525	1455.848
31	957.252	1462.196
32	964.800	1468.755
33	972.164	1475.521
34	979.337	1482.488
35	986.314	1489.652
36	993.090	1497.006
37	997.004	1501.498

Circle Center At X = 724.442 ; Y = 1737.730 ; and Radius = 360.722
Factor of Safety
*** 1.800 ***

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	654.184	1380.645
2	664.100	1379.356
3	674.047	1378.327
4	684.018	1377.560

5	694.005	1377.056
6	704.002	1376.814
7	714.002	1376.835
8	723.998	1377.119
9	733.983	1377.665
10	743.950	1378.474
11	753.893	1379.544
12	763.804	1380.875
13	773.676	1382.466
14	783.504	1384.317
15	793.279	1386.424
16	802.996	1388.788
17	812.647	1391.407
18	822.226	1394.278
19	831.726	1397.400
20	841.141	1400.771
21	850.464	1404.388
22	859.688	1408.248
23	868.808	1412.350
24	877.817	1416.690
25	886.709	1421.265
26	895.478	1426.073
27	904.117	1431.109
28	912.621	1436.370
29	920.984	1441.854
30	929.200	1447.555
31	937.263	1453.470
32	945.167	1459.594
33	952.909	1465.925
34	960.481	1472.457
35	967.878	1479.185
36	975.097	1486.106
37	982.131	1493.214
38	988.975	1500.504
39	992.061	1503.969

Circle Center At X = 708.204 ; Y = 1757.257 ; and Radius = 380.466
Factor of Safety
*** 1.802 ***

Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	660.696	1380.483
2	670.607	1379.148
3	680.549	1378.077
4	690.517	1377.271
5	700.502	1376.730
6	710.498	1376.454
7	720.498	1376.445
8	730.495	1376.701
9	740.481	1377.222
10	750.450	1378.009
11	760.395	1379.061
12	770.308	1380.376
13	780.182	1381.954
14	790.012	1383.795
15	799.789	1385.895
16	809.506	1388.255
17	819.158	1390.872
18	828.736	1393.745
19	838.235	1396.872
20	847.647	1400.249
21	856.966	1403.876
22	866.186	1407.749
23	875.299	1411.865
24	884.300	1416.223
25	893.182	1420.818
26	901.938	1425.647

27	910.563	1430.707
28	919.051	1435.995
29	927.395	1441.507
30	935.590	1447.238
31	943.629	1453.185
32	951.508	1459.344
33	959.220	1465.709
34	966.760	1472.278
35	974.123	1479.045
36	981.303	1486.004
37	988.297	1493.153
38	995.097	1500.484
39	996.299	1501.851

Circle Center At X = 715.863 ; Y = 1752.679 ; and Radius = 376.263
Factor of Safety
*** 1.803 ***
Failure Surface Specified By 38 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	660.175	1380.496
2	670.074	1379.075
3	680.008	1377.930
4	689.970	1377.061
5	699.952	1376.469
6	709.948	1376.155
7	719.947	1376.118
8	729.945	1376.359
9	739.931	1376.878
10	749.899	1377.674
11	759.842	1378.747
12	769.750	1380.095
13	779.618	1381.719
14	789.436	1383.615
15	799.198	1385.784
16	808.896	1388.223
17	818.523	1390.930
18	828.070	1393.904
19	837.532	1397.142
20	846.899	1400.641
21	856.166	1404.400
22	865.325	1408.414
23	874.369	1412.681
24	883.291	1417.198
25	892.084	1421.960
26	900.741	1426.966
27	909.256	1432.209
28	917.622	1437.688
29	925.832	1443.396
30	933.881	1449.331
31	941.762	1455.486
32	949.469	1461.859
33	956.995	1468.443
34	964.336	1475.233
35	971.486	1482.225
36	978.439	1489.412
37	985.189	1496.790
38	991.600	1504.200

Circle Center At X = 716.263 ; Y = 1736.048 ; and Radius = 359.949
Factor of Safety
*** 1.804 ***
Failure Surface Specified By 39 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	652.100	1380.698
2	662.004	1379.321
3	671.943	1378.214
4	681.908	1377.377

5	691.892	1376.811
6	701.888	1376.515
7	711.888	1376.491
8	721.884	1376.738
9	731.871	1377.256
10	741.840	1378.045
11	751.784	1379.104
12	761.695	1380.433
13	771.567	1382.029
14	781.391	1383.893
15	791.162	1386.023
16	800.871	1388.417
17	810.512	1391.073
18	820.077	1393.990
19	829.560	1397.165
20	838.953	1400.597
21	848.249	1404.281
22	857.442	1408.217
23	866.525	1412.401
24	875.491	1416.829
25	884.333	1421.499
26	893.046	1426.407
27	901.622	1431.550
28	910.056	1436.923
29	918.341	1442.524
30	926.470	1448.347
31	934.439	1454.388
32	942.242	1460.643
33	949.871	1467.107
34	957.323	1473.776
35	964.590	1480.645
36	971.669	1487.709
37	978.554	1494.961
38	985.239	1502.398
39	988.214	1505.893

Circle Center At X = 707.779 ; Y = 1745.097 ; and Radius = 368.629
Factor of Safety
*** 1.808 ***
Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	647.411	1380.815
2	657.338	1379.612
3	667.291	1378.646
4	677.265	1377.916
5	687.252	1377.423
6	697.249	1377.168
7	707.249	1377.150
8	717.247	1377.369
9	727.236	1377.826
10	737.212	1378.520
11	747.169	1379.450
12	757.101	1380.616
13	767.002	1382.018
14	776.867	1383.655
15	786.690	1385.526
16	796.467	1387.629
17	806.190	1389.964
18	815.856	1392.528
19	825.458	1395.322
20	834.991	1398.343
21	844.449	1401.589
22	853.828	1405.059
23	863.121	1408.751
24	872.325	1412.662
25	881.433	1416.791
26	890.440	1421.135

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   27        899.341     1425.691
   28        908.132     1430.458
   29        916.808     1435.432
   30        925.362     1440.610
   31        933.792     1445.990
   32        942.091     1451.569
   33        950.255     1457.343
   34        958.280     1463.310
   35        966.162     1469.465
   36        973.894     1475.806
   37        981.474     1482.328
   38        988.897     1489.029
   39        996.159     1495.904
   40       1000.190     1499.905
Circle Center At X =   703.023 ; Y =  1798.134 ; and Radius =   421.009
       Factor of Safety
      ***    1.809   ***
Failure Surface Specified By 37 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        681.536     1380.960
    2        691.457     1379.707
    3        701.410     1378.736
    4        711.386     1378.050
    5        721.378     1377.647
    6        731.377     1377.529
    7        741.376     1377.696
    8        751.366     1378.146
    9        761.339     1378.882
   10        771.287     1379.900
   11        781.202     1381.201
   12        791.076     1382.784
   13        800.901     1384.647
   14        810.669     1386.790
   15        820.372     1389.209
   16        830.002     1391.903
   17        839.551     1394.870
   18        849.013     1398.108
   19        858.378     1401.614
   20        867.640     1405.384
   21        876.791     1409.417
   22        885.823     1413.709
   23        894.729     1418.256
   24        903.503     1423.054
   25        912.136     1428.100
   26        920.623     1433.390
   27        928.955     1438.919
   28        937.127     1444.683
   29        945.131     1450.678
   30        952.961     1456.897
   31        960.612     1463.337
   32        968.076     1469.992
   33        975.347     1476.857
   34        982.420     1483.926
   35        989.290     1491.193
   36        995.949     1498.653
   37        997.949     1501.026
Circle Center At X =   730.526 ; Y =  1728.903 ; and Radius =   351.375
       Factor of Safety
      ***    1.810   ***
          **** END OF GSTABL7 OUTPUT ****
```

APPENDIX D

GROUND MOTION STUDY

APPENDIX D

Ground Motion Study

Background

Leighton performed a probabilistic ground motion analysis (PGMA) to evaluate the likelihood of future earthquake ground motions at the project site. The analysis incorporate the results of three different attenuation relationships by Boore and Atkinson (2008), Campbell and Bozorgnia (2008), and Chiou and Youngs (2008).

The SCE Substation Alternatives are located relatively close together, thus one site coordinate was used for the analysis of both sites. The site coordinates used are 34° 23′ 38.34″ W 118° 37′ 08.17″. Since the subsurface conditions beneath the proposed alternatives will range from soft bedrock in cut areas to deep soil in fill in areas, both soft rock (CBC Site Class C) and stiff soil (CBC Site Class D) sites were considered in the analyses.

Design Criteria

Shear wave velocities for the location was obtained from the Southern California Earthquake Center's (SCEC's) Community Velocity Model (CVM), Version 4 (Magistrale et al, 2000; Magistrale, 2005). Based on the CVM, an average shear wave velocity (V_{S30}) for the upper 30 meters (100 feet) for Site Class C was chosen to be 390 meters-per-second (1,280 feet-per-second). A V_{S30} of 265 meters-per-second (869 feet-per-second) was selected for Site Class D. For both Site Class C and Site Class D, $z_{v=1,000m/s}$ was selected to be 305 meters (1,001 feet) and $z_{v=2,500m/s}$ was selected to be 3.32 kilometers (2.06 miles).

Two levels of earthquake ground motions were considered for the analysis. The first level corresponds to an earthquake event having an exceedance probability of 10 percent in 50 years. This even has an average return period of about 475 years. The second level corresponds to the probabilistic Maximum Considered Earthquake (MCE), defined as an earthquake event having a 2 percent probability of being exceeded in 50 years. This event has an average return period of about 2,475 years.

Methodology

A PGMA is a mathematical process based on probability and statistics that is used to estimate the mean number of events per year in which the level of some ground motion parameter, Z (peak ground acceleration and/or spectral acceleration in this study), exceeds a specified value z at the locations analyzed. This mean number of events per year, also referred to as "annual frequency

of exceedance," is designated as "$\nu(Z \geq z)$." The inverse of this number is called the "average return period" (ARP), which is expressed in terms of years. Having the annual frequency of exceedance of a certain level of acceleration, $\nu(Z \geq z)$, the probability of exceeding that level, $\Pr(Z \geq z)$, within any time period of interest, t, is then obtained assuming a Poisson Distribution as follows:

$$\Pr(Z \geq z) = 1 - e^{-\nu(Z \geq z)t} \qquad \text{(Equation D-1)}$$

This procedure was originally proposed by Cornell (1968), which has been significantly improved during the recent years and is described in more detail by National Research Council (1988) and Earthquake Engineering Research Institute (1989).

PGMA procedures require the specification of probability functions to describe the uncertainty in both the time and location of future earthquake occurrences and the uncertainty in the ground motion level that will be produced at the site. The basic key elements of a PGMA are:

- Defining the location, geometry, and characteristics of earthquake sources relative to the site;
- Specifying an earthquake recurrence relationship for various magnitudes on each source up to the maximum magnitude;
- Selecting appropriate attenuation relationships, which relate the variation of the earthquake ground motion parameter with earthquake distance, directivity, magnitude, site geology, and subsurface characterization; and
- Determining the probability of exceedence of peak ground accelerations and/or response spectral levels (i.e., seismic hazards) utilizing the above input parameters.

The frequencies of exceedence of different values of peak ground and spectral accelerations at the site were calculated by combining the following probability functions:

- The annual frequency of earthquakes of various magnitudes on a fault obtained from the fault recurrence relationships;
- Given an earthquake of a certain magnitude on a certain fault, the probability distribution of the location of the earthquake on the fault was obtained using the selected rupture area versus magnitude relationship and assuming equal likelihood of rupture along the length and some prescribed probabilities along the depth of the fault; and
- Given an earthquake of a certain magnitude occurring at a certain distance from the site, the probability distribution of ground motion at the site was obtained from the selected attenuation relationships.

The above process is repeated a sufficient number of times to cover all the sources, then summed to obtain the total seismic hazard at the site. This process results in a relationship between ground motion level and the probability of being exceeded.

The computer program EZ-FRISK Version 7.37 Build 002 (Risk Engineering, Inc., 2009) for earthquake hazard analysis was utilized to perform the PGMA.

Attenuation Relationships:

Attenuation relationships describe the relation of ground motion levels with earthquake magnitude and distance (distance between the site and seismic source), seismic source characteristics, site geology, and subsurface characterization. These relationships can be used to describe the variation of peak ground and response spectral acceleration with earthquake magnitude and distance, and to also incorporate the location geological conditions and near-source effects. Based upon the results of subsurface characterization at the site, attenuation relationships by Boore and Atkinson (2008), Campbell and Bozorgnia (2008), and Chiou and Youngs (2008) were used in the ground motion hazard analyses.

These attenuation relationships are based on the geometric mean of the rotated horizontal components. The selected attenuation relationships also provide an implicit measure of the near-field effects on ground motions.

Peak Ground Acceleration:

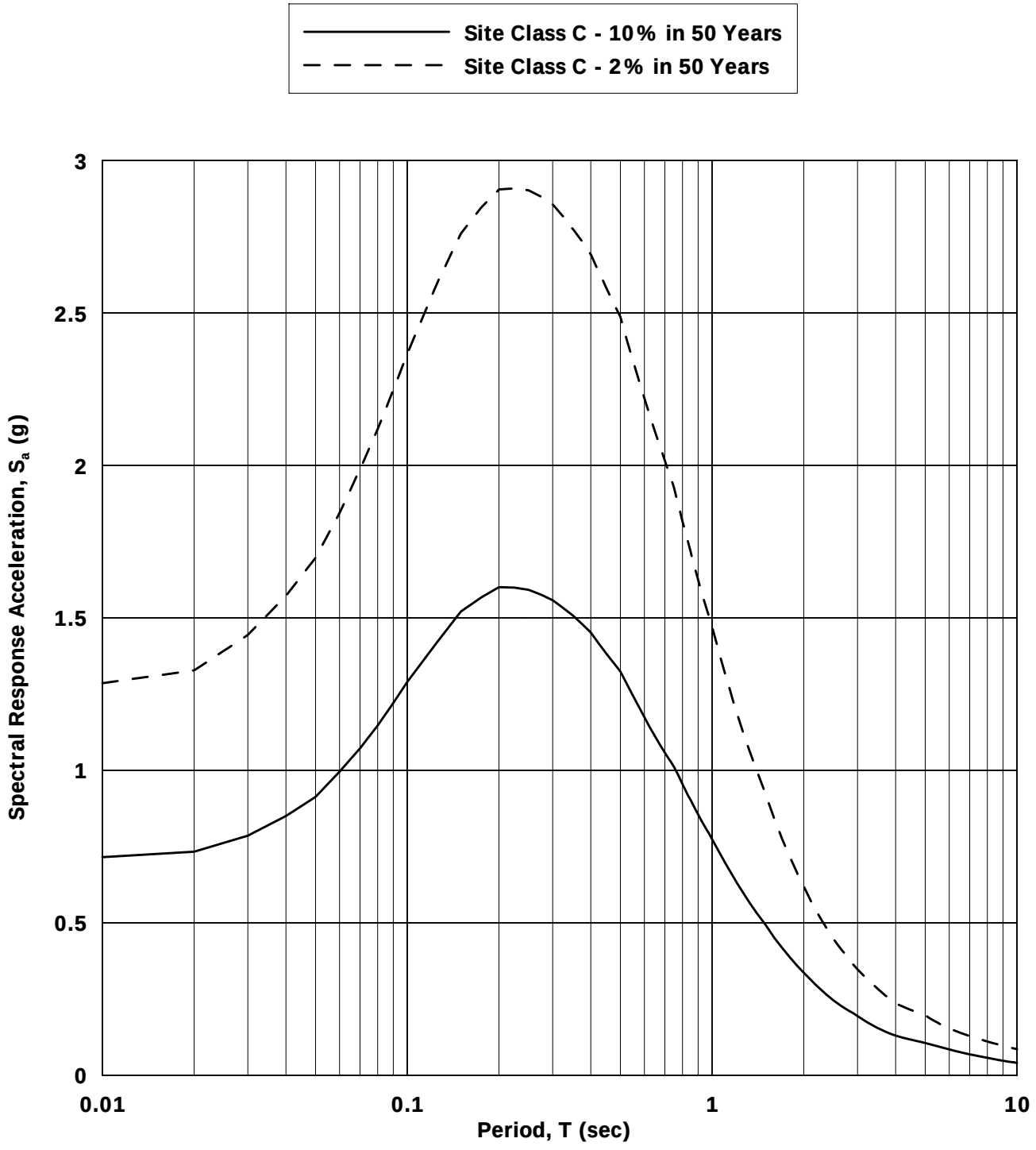
Plots and tables resulting from the analyses are provided at the rear of this appendix. The contributions of the above mentioned attenuation relationships were averaged to determine both the probabilistic total shaking hazard at the location analyzed as described in this appendix.

The probabilistic peak horizontal ground acceleration (PHGA) values determined from this analysis are presented in the following table:

Level of Ground Motion	Site Class C	Site Class D
10 Percent Exceedance in 50 Years	0.72g	0.65g
2 Percent Exceedance in 50 Years	1.29g	1.11g

Uniform Hazard Spectra:

The digitized values of the uniform hazard spectra for the two levels of ground motion analyzed are provided in this appendix.



Proposed Southern California Edison Substation Alternatives Tentative Tract Map No. 61105 (Mission Village Project) County of Los Angeles, California	**Uniform Hazard Spectra** **Site Class C**	**Project No.** **062273-002** **Date:** **February 2010** Leighton **Figure D-1**

Probabilistic Spectra results for EZ-FRISK 7.37 Build 002

ANNUAL FREQUENCY OF EXCEEDANCE: 4.041e-004
RETURN PERIOD: 2474.9
PROBABILITY OF EXCEEDENCE: 2.0% IN 50.0 YEARS
Column 1: Spectral Period
Column 2: Acceleration (g) for: Mean
Column 3: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008

1	2	3	4	5
PGA	1.286e+000	1.241e+000	1.072e+000	1.510e+000
2.e-002	1.328e+000	1.286e+000	1.083e+000	1.571e+000
3.e-002	1.444e+000	1.400e+000	1.149e+000	1.729e+000
4.e-002	1.572e+000	1.530e+000	1.253e+000	1.881e+000
5.e-002	1.697e+000	1.635e+000	1.334e+000	2.050e+000
6.e-002	1.844e+000	1.798e+000	1.468e+000	2.201e+000
7.e-002	1.987e+000	1.948e+000	1.590e+000	2.349e+000
8.e-002	2.119e+000	2.083e+000	1.707e+000	2.497e+000
9.e-002	2.247e+000	2.207e+000	1.817e+000	2.638e+000
0.1	2.366e+000	2.323e+000	1.922e+000	2.778e+000
0.125	2.595e+000	2.516e+000	2.104e+000	3.071e+000
0.15	2.760e+000	2.684e+000	2.267e+000	3.242e+000
0.175	2.846e+000	2.775e+000	2.370e+000	3.316e+000
0.2	2.905e+000	2.858e+000	2.468e+000	3.333e+000
0.225	2.908e+000	2.867e+000	2.488e+000	3.318e+000
0.25	2.902e+000	2.875e+000	2.507e+000	3.279e+000
0.275	2.881e+000	2.875e+000	2.515e+000	3.218e+000
0.3	2.856e+000	2.875e+000	2.524e+000	3.143e+000
0.325	2.815e+000	2.835e+000	2.530e+000	3.061e+000
0.35	2.774e+000	2.800e+000	2.536e+000	2.974e+000
0.375	2.733e+000	2.768e+000	2.543e+000	2.880e+000
0.4	2.692e+000	2.737e+000	2.549e+000	2.789e+000
0.425	2.635e+000	2.667e+000	2.541e+000	2.699e+000
0.45	2.582e+000	2.604e+000	2.533e+000	2.610e+000
0.475	2.533e+000	2.546e+000	2.526e+000	2.526e+000
0.5	2.487e+000	2.493e+000	2.520e+000	2.446e+000
0.525	2.412e+000	2.421e+000	2.447e+000	2.366e+000
0.55	2.343e+000	2.355e+000	2.380e+000	2.293e+000
0.575	2.280e+000	2.295e+000	2.319e+000	2.223e+000
0.6	2.220e+000	2.240e+000	2.262e+000	2.157e+000
0.625	2.163e+000	2.186e+000	2.208e+000	2.094e+000
0.65	2.110e+000	2.135e+000	2.157e+000	2.037e+000
0.675	2.062e+000	2.089e+000	2.109e+000	1.983e+000
0.7	2.016e+000	2.046e+000	2.065e+000	1.929e+000
0.725	1.970e+000	2.006e+000	2.024e+000	1.877e+000
0.75	1.927e+000	1.966e+000	1.985e+000	1.829e+000
0.775	1.869e+000	1.898e+000	1.926e+000	1.781e+000
0.8	1.816e+000	1.836e+000	1.871e+000	1.736e+000
0.825	1.766e+000	1.778e+000	1.821e+000	1.690e+000
0.85	1.717e+000	1.724e+000	1.775e+000	1.646e+000
0.875	1.669e+000	1.670e+000	1.729e+000	1.604e+000
0.9	1.625e+000	1.621e+000	1.685e+000	1.564e+000
0.925	1.583e+000	1.576e+000	1.644e+000	1.526e+000
0.95	1.544e+000	1.533e+000	1.606e+000	1.489e+000
0.975	1.507e+000	1.493e+000	1.570e+000	1.450e+000
1.	1.470e+000	1.452e+000	1.536e+000	1.413e+000
1.1	1.320e+000	1.304e+000	1.377e+000	1.274e+000
1.2	1.195e+000	1.182e+000	1.252e+000	1.146e+000
1.3	1.088e+000	1.082e+000	1.142e+000	1.036e+000
1.4	1.001e+000	1.000e+000	1.054e+000	9.373e-001
1.5	9.215e-001	9.277e-001	9.799e-001	8.479e-001

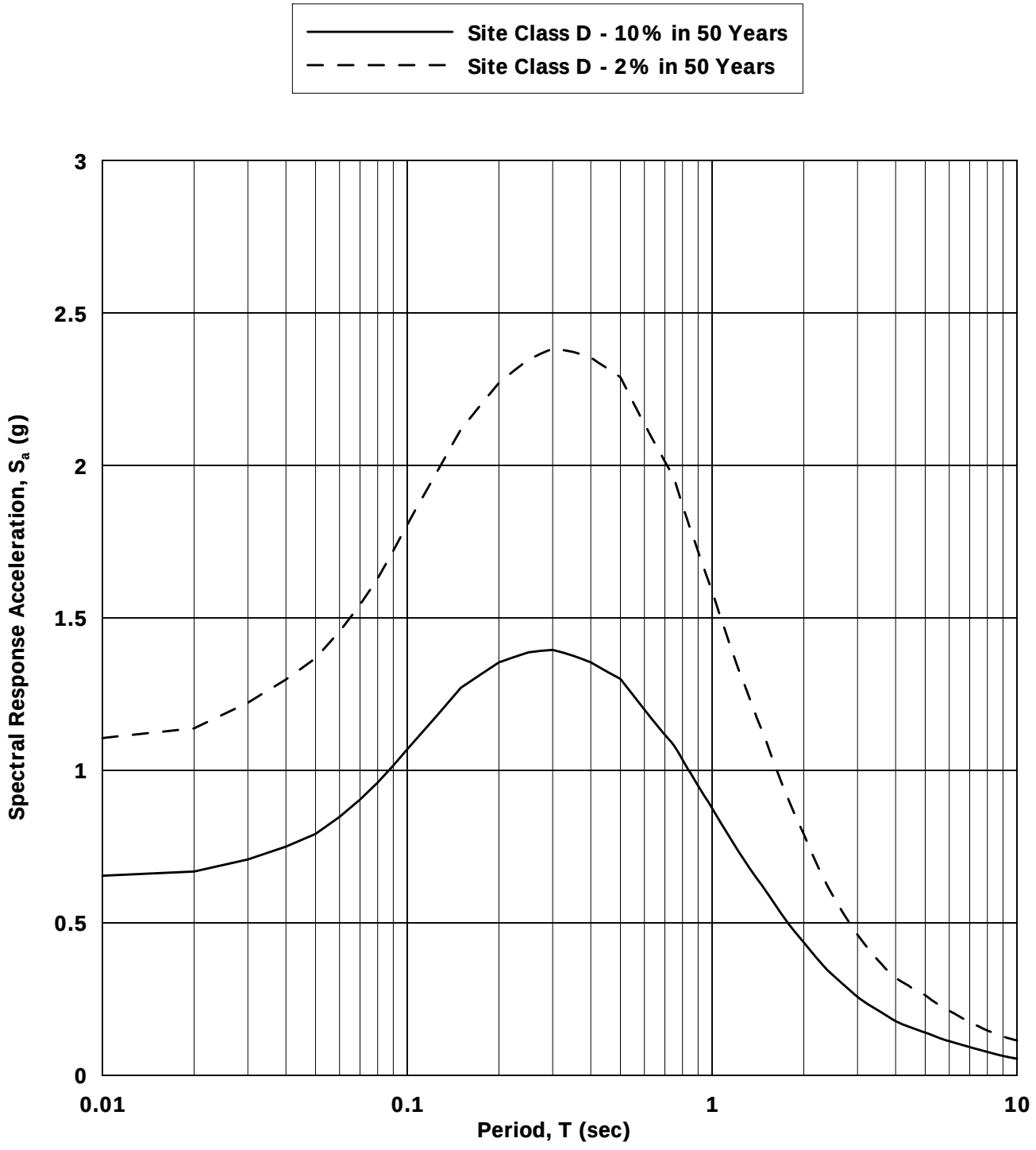
1.6	8.417e-001	8.560e-001	8.918e-001	7.695e-001
1.7	7.737e-001	7.948e-001	8.169e-001	7.021e-001
1.8	7.150e-001	7.403e-001	7.527e-001	6.416e-001
1.9	6.634e-001	6.937e-001	6.986e-001	5.906e-001
2.	6.193e-001	6.511e-001	6.498e-001	5.455e-001
2.1	5.759e-001	6.079e-001	6.048e-001	5.067e-001
2.2	5.376e-001	5.684e-001	5.634e-001	4.708e-001
2.3	5.051e-001	5.341e-001	5.279e-001	4.399e-001
2.4	4.743e-001	5.044e-001	4.973e-001	4.134e-001
2.5	4.475e-001	4.762e-001	4.677e-001	3.902e-001
2.6	4.242e-001	4.512e-001	4.420e-001	3.684e-001
2.7	4.035e-001	4.293e-001	4.196e-001	3.479e-001
2.8	3.829e-001	4.099e-001	4.000e-001	3.300e-001
2.9	3.642e-001	3.916e-001	3.797e-001	3.142e-001
3.	3.477e-001	3.740e-001	3.617e-001	3.001e-001
3.1	3.326e-001	3.562e-001	3.471e-001	2.847e-001
3.2	3.191e-001	3.403e-001	3.339e-001	2.710e-001
3.3	3.070e-001	3.260e-001	3.220e-001	2.587e-001
3.4	2.951e-001	3.130e-001	3.112e-001	2.476e-001
3.5	2.831e-001	3.013e-001	3.014e-001	2.385e-001
3.6	2.722e-001	2.886e-001	2.905e-001	2.302e-001
3.7	2.620e-001	2.767e-001	2.802e-001	2.218e-001
3.8	2.527e-001	2.659e-001	2.708e-001	2.141e-001
3.9	2.442e-001	2.560e-001	2.622e-001	2.071e-001
4.	2.363e-001	2.469e-001	2.542e-001	2.006e-001
4.1	2.312e-001	2.400e-001	2.512e-001	1.927e-001
4.2	2.265e-001	2.336e-001	2.484e-001	1.852e-001
4.3	2.220e-001	2.277e-001	2.456e-001	1.781e-001
4.4	2.179e-001	2.223e-001	2.430e-001	1.716e-001
4.5	2.140e-001	2.172e-001	2.405e-001	1.654e-001
4.6	2.104e-001	2.125e-001	2.381e-001	1.598e-001
4.7	2.070e-001	2.081e-001	2.358e-001	1.544e-001
4.8	2.038e-001	2.040e-001	2.336e-001	1.494e-001
4.9	2.007e-001	2.002e-001	2.315e-001	1.446e-001
5.	1.971e-001	1.954e-001	2.294e-001	1.402e-001
5.25	1.837e-001	1.819e-001	2.182e-001	1.293e-001
5.5	1.723e-001	1.705e-001	2.085e-001	1.201e-001
5.75	1.624e-001	1.607e-001	2.001e-001	1.119e-001
6.	1.539e-001	1.521e-001	1.900e-001	1.049e-001
6.25	1.465e-001	1.447e-001	1.812e-001	9.832e-002
6.5	1.399e-001	1.382e-001	1.733e-001	9.142e-002
6.75	1.340e-001	1.324e-001	1.664e-001	8.489e-002
7.	1.288e-001	1.272e-001	1.601e-001	7.914e-002
7.25	1.242e-001	1.226e-001	1.545e-001	7.368e-002
7.5	1.200e-001	1.185e-001	1.494e-001	6.886e-002
7.75	1.152e-001	1.112e-001	1.455e-001	6.427e-002
8.	1.109e-001	1.050e-001	1.420e-001	6.026e-002
8.25	1.071e-001	9.946e-002	1.387e-001	5.633e-002
8.5	1.037e-001	9.336e-002	1.356e-001	5.286e-002
8.75	1.005e-001	8.790e-002	1.328e-001	4.971e-002
9.	9.720e-002	8.290e-002	1.302e-001	4.663e-002
9.25	9.407e-002	7.838e-002	1.278e-001	4.383e-002
9.5	9.123e-002	7.419e-002	1.254e-001	4.135e-002
9.75	8.855e-002	7.046e-002	1.233e-001	3.889e-002
10.	8.605e-002	6.690e-002	1.212e-001	3.652e-002

ANNUAL FREQUENCY OF EXCEEDANCE: 2.107e-003
RETURN PERIOD: 474.6
PROBABILITY OF EXCEEDENCE: 10.0% IN 50.0 YEARS
Column 1: Spectral Period
Column 2: Acceleration (g) for: Mean
Column 3: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008

Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008

1	2	3	4	5
PGA	7.154e-001	6.947e-001	6.443e-001	8.172e-001
2.e-002	7.335e-001	7.176e-001	6.520e-001	8.437e-001
3.e-002	7.862e-001	7.710e-001	6.903e-001	9.136e-001
4.e-002	8.503e-001	8.323e-001	7.496e-001	9.883e-001
5.e-002	9.132e-001	8.838e-001	8.016e-001	1.072e+000
6.e-002	9.961e-001	9.672e-001	8.804e-001	1.157e+000
7.e-002	1.072e+000	1.043e+000	9.543e-001	1.245e+000
8.e-002	1.147e+000	1.112e+000	1.025e+000	1.326e+000
9.e-002	1.221e+000	1.178e+000	1.091e+000	1.408e+000
0.1	1.290e+000	1.243e+000	1.157e+000	1.490e+000
0.125	1.419e+000	1.355e+000	1.273e+000	1.653e+000
0.15	1.521e+000	1.458e+000	1.370e+000	1.753e+000
0.175	1.567e+000	1.501e+000	1.425e+000	1.795e+000
0.2	1.601e+000	1.540e+000	1.476e+000	1.805e+000
0.225	1.599e+000	1.542e+000	1.471e+000	1.797e+000
0.25	1.592e+000	1.545e+000	1.468e+000	1.776e+000
0.275	1.576e+000	1.536e+000	1.459e+000	1.743e+000
0.3	1.558e+000	1.528e+000	1.452e+000	1.700e+000
0.325	1.532e+000	1.504e+000	1.440e+000	1.654e+000
0.35	1.507e+000	1.480e+000	1.430e+000	1.604e+000
0.375	1.479e+000	1.458e+000	1.421e+000	1.554e+000
0.4	1.452e+000	1.438e+000	1.413e+000	1.504e+000
0.425	1.416e+000	1.398e+000	1.400e+000	1.451e+000
0.45	1.383e+000	1.361e+000	1.387e+000	1.401e+000
0.475	1.353e+000	1.328e+000	1.376e+000	1.353e+000
0.5	1.324e+000	1.297e+000	1.365e+000	1.309e+000
0.525	1.284e+000	1.260e+000	1.323e+000	1.267e+000
0.55	1.246e+000	1.224e+000	1.284e+000	1.225e+000
0.575	1.208e+000	1.189e+000	1.250e+000	1.185e+000
0.6	1.173e+000	1.158e+000	1.213e+000	1.148e+000
0.625	1.141e+000	1.129e+000	1.181e+000	1.113e+000
0.65	1.111e+000	1.102e+000	1.150e+000	1.081e+000
0.675	1.084e+000	1.077e+000	1.123e+000	1.052e+000
0.7	1.058e+000	1.054e+000	1.097e+000	1.024e+000
0.725	1.034e+000	1.033e+000	1.073e+000	9.971e-001
0.75	1.012e+000	1.013e+000	1.051e+000	9.700e-001
0.775	9.825e-001	9.797e-001	1.022e+000	9.436e-001
0.8	9.541e-001	9.483e-001	9.951e-001	9.191e-001
0.825	9.276e-001	9.192e-001	9.679e-001	8.952e-001
0.85	9.030e-001	8.920e-001	9.427e-001	8.718e-001
0.875	8.784e-001	8.656e-001	9.193e-001	8.488e-001
0.9	8.554e-001	8.411e-001	8.973e-001	8.275e-001
0.925	8.337e-001	8.184e-001	8.755e-001	8.069e-001
0.95	8.135e-001	7.969e-001	8.552e-001	7.869e-001
0.975	7.939e-001	7.757e-001	8.361e-001	7.665e-001
1.	7.745e-001	7.559e-001	8.183e-001	7.475e-001
1.1	6.990e-001	6.814e-001	7.370e-001	6.748e-001
1.2	6.342e-001	6.203e-001	6.709e-001	6.108e-001
1.3	5.799e-001	5.694e-001	6.162e-001	5.520e-001
1.4	5.328e-001	5.266e-001	5.692e-001	5.017e-001
1.5	4.928e-001	4.905e-001	5.295e-001	4.539e-001
1.6	4.512e-001	4.529e-001	4.859e-001	4.139e-001
1.7	4.169e-001	4.214e-001	4.474e-001	3.776e-001
1.8	3.865e-001	3.942e-001	4.157e-001	3.457e-001
1.9	3.590e-001	3.686e-001	3.875e-001	3.191e-001
2.	3.358e-001	3.466e-001	3.617e-001	2.966e-001
2.1	3.145e-001	3.253e-001	3.377e-001	2.739e-001
2.2	2.954e-001	3.070e-001	3.172e-001	2.546e-001
2.3	2.765e-001	2.894e-001	2.996e-001	2.384e-001

2.4	2.601e-001	2.730e-001	2.809e-001	2.244e-001
2.5	2.460e-001	2.586e-001	2.647e-001	2.126e-001
2.6	2.337e-001	2.459e-001	2.505e-001	2.022e-001
2.7	2.226e-001	2.346e-001	2.381e-001	1.901e-001
2.8	2.128e-001	2.246e-001	2.271e-001	1.788e-001
2.9	2.040e-001	2.156e-001	2.173e-001	1.689e-001
3.	1.948e-001	2.076e-001	2.086e-001	1.601e-001
3.1	1.850e-001	1.988e-001	2.014e-001	1.521e-001
3.2	1.762e-001	1.887e-001	1.928e-001	1.450e-001
3.3	1.683e-001	1.795e-001	1.845e-001	1.386e-001
3.4	1.612e-001	1.713e-001	1.771e-001	1.328e-001
3.5	1.549e-001	1.639e-001	1.703e-001	1.279e-001
3.6	1.491e-001	1.571e-001	1.641e-001	1.234e-001
3.7	1.437e-001	1.509e-001	1.584e-001	1.189e-001
3.8	1.387e-001	1.453e-001	1.532e-001	1.148e-001
3.9	1.342e-001	1.401e-001	1.484e-001	1.111e-001
4.	1.300e-001	1.353e-001	1.439e-001	1.076e-001
4.1	1.269e-001	1.315e-001	1.418e-001	1.044e-001
4.2	1.241e-001	1.279e-001	1.397e-001	1.014e-001
4.3	1.214e-001	1.246e-001	1.378e-001	9.810e-002
4.4	1.189e-001	1.215e-001	1.359e-001	9.477e-002
4.5	1.166e-001	1.187e-001	1.342e-001	9.166e-002
4.6	1.144e-001	1.160e-001	1.325e-001	8.869e-002
4.7	1.123e-001	1.135e-001	1.308e-001	8.579e-002
4.8	1.103e-001	1.111e-001	1.293e-001	8.308e-002
4.9	1.084e-001	1.089e-001	1.278e-001	8.050e-002
5.	1.066e-001	1.068e-001	1.263e-001	7.797e-002
5.25	1.009e-001	1.012e-001	1.197e-001	7.182e-002
5.5	9.500e-002	9.549e-002	1.139e-001	6.637e-002
5.75	8.962e-002	9.029e-002	1.088e-001	6.135e-002
6.	8.468e-002	8.552e-002	1.043e-001	5.681e-002
6.25	8.031e-002	8.130e-002	1.003e-001	5.262e-002
6.5	7.624e-002	7.742e-002	9.587e-002	4.892e-002
6.75	7.258e-002	7.390e-002	9.188e-002	4.532e-002
7.	6.927e-002	7.075e-002	8.819e-002	4.222e-002
7.25	6.613e-002	6.778e-002	8.477e-002	3.936e-002
7.5	6.332e-002	6.504e-002	8.167e-002	3.661e-002
7.75	6.023e-002	6.080e-002	7.906e-002	3.415e-002
8.	5.727e-002	5.686e-002	7.657e-002	3.200e-002
8.25	5.461e-002	5.336e-002	7.428e-002	3.005e-002
8.5	5.221e-002	5.028e-002	7.217e-002	2.802e-002
8.75	5.003e-002	4.731e-002	7.021e-002	2.619e-002
9.	4.789e-002	4.467e-002	6.828e-002	2.458e-002
9.25	4.593e-002	4.231e-002	6.647e-002	2.312e-002
9.5	4.415e-002	4.020e-002	6.478e-002	2.181e-002
9.75	4.251e-002	3.810e-002	6.321e-002	2.058e-002
10.	4.101e-002	3.619e-002	6.173e-002	1.933e-002



Proposed Southern California Edison Substation Alternatives Tentative Tract Map No. 61105 (Mission Village Project) County of Los Angeles, California	**Uniform Hazard Spectra** **Site Class D**	**Project No.** **062273-002** **Date:** **February 2010** Leighton **Figure D-2**

Probabilistic Spectra results for EZ-FRISK 7.37 Build 002

ANNUAL FREQUENCY OF EXCEEDANCE: 4.041e-004
RETURN PERIOD: 2474.9
PROBABILITY OF EXCEEDENCE: 2.0% IN 50.0 YEARS
Column 1: Spectral Period
Column 2: Acceleration (g) for: Mean
Column 3: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008

1	2	3	4	5
PGA	1.106e+000	1.120e+000	9.212e-001	1.253e+000
2.e-002	1.138e+000	1.158e+000	9.226e-001	1.297e+000
3.e-002	1.222e+000	1.263e+000	9.567e-001	1.391e+000
4.e-002	1.298e+000	1.357e+000	1.015e+000	1.467e+000
5.e-002	1.367e+000	1.438e+000	1.061e+000	1.542e+000
6.e-002	1.456e+000	1.565e+000	1.149e+000	1.595e+000
7.e-002	1.543e+000	1.682e+000	1.236e+000	1.660e+000
8.e-002	1.629e+000	1.802e+000	1.313e+000	1.730e+000
9.e-002	1.720e+000	1.925e+000	1.389e+000	1.798e+000
0.1	1.806e+000	2.043e+000	1.464e+000	1.868e+000
0.125	1.978e+000	2.255e+000	1.590e+000	2.034e+000
0.15	2.118e+000	2.443e+000	1.705e+000	2.150e+000
0.175	2.201e+000	2.542e+000	1.776e+000	2.230e+000
0.2	2.271e+000	2.635e+000	1.840e+000	2.283e+000
0.225	2.312e+000	2.688e+000	1.873e+000	2.319e+000
0.25	2.347e+000	2.737e+000	1.905e+000	2.340e+000
0.275	2.367e+000	2.768e+000	1.932e+000	2.349e+000
0.3	2.383e+000	2.796e+000	1.958e+000	2.348e+000
0.325	2.378e+000	2.778e+000	1.980e+000	2.338e+000
0.35	2.372e+000	2.761e+000	2.002e+000	2.321e+000
0.375	2.363e+000	2.746e+000	2.021e+000	2.296e+000
0.4	2.354e+000	2.732e+000	2.040e+000	2.268e+000
0.425	2.336e+000	2.695e+000	2.061e+000	2.238e+000
0.45	2.320e+000	2.661e+000	2.080e+000	2.205e+000
0.475	2.304e+000	2.630e+000	2.099e+000	2.172e+000
0.5	2.289e+000	2.601e+000	2.118e+000	2.139e+000
0.525	2.249e+000	2.544e+000	2.087e+000	2.104e+000
0.55	2.208e+000	2.491e+000	2.057e+000	2.072e+000
0.575	2.171e+000	2.440e+000	2.030e+000	2.040e+000
0.6	2.136e+000	2.393e+000	2.005e+000	2.010e+000
0.625	2.102e+000	2.349e+000	1.980e+000	1.978e+000
0.65	2.071e+000	2.308e+000	1.955e+000	1.948e+000
0.675	2.041e+000	2.269e+000	1.933e+000	1.919e+000
0.7	2.013e+000	2.232e+000	1.911e+000	1.890e+000
0.725	1.985e+000	2.196e+000	1.891e+000	1.861e+000
0.75	1.958e+000	2.162e+000	1.872e+000	1.833e+000
0.775	1.912e+000	2.093e+000	1.837e+000	1.805e+000
0.8	1.869e+000	2.029e+000	1.804e+000	1.778e+000
0.825	1.828e+000	1.967e+000	1.773e+000	1.750e+000
0.85	1.790e+000	1.909e+000	1.744e+000	1.721e+000
0.875	1.754e+000	1.854e+000	1.714e+000	1.691e+000
0.9	1.718e+000	1.804e+000	1.686e+000	1.662e+000
0.925	1.683e+000	1.757e+000	1.659e+000	1.634e+000
0.95	1.650e+000	1.710e+000	1.634e+000	1.607e+000
0.975	1.618e+000	1.666e+000	1.610e+000	1.580e+000
1.	1.588e+000	1.624e+000	1.587e+000	1.553e+000
1.1	1.462e+000	1.470e+000	1.481e+000	1.435e+000
1.2	1.352e+000	1.342e+000	1.387e+000	1.325e+000
1.3	1.260e+000	1.238e+000	1.309e+000	1.224e+000
1.4	1.174e+000	1.145e+000	1.244e+000	1.128e+000
1.5	1.100e+000	1.069e+000	1.181e+000	1.042e+000

1.6	1.022e+000	9.933e-001	1.097e+000	9.646e-001
1.7	9.531e-001	9.249e-001	1.028e+000	8.946e-001
1.8	8.924e-001	8.653e-001	9.658e-001	8.319e-001
1.9	8.380e-001	8.132e-001	9.109e-001	7.778e-001
2.	7.909e-001	7.663e-001	8.612e-001	7.299e-001
2.1	7.395e-001	7.177e-001	8.050e-001	6.845e-001
2.2	6.952e-001	6.743e-001	7.540e-001	6.433e-001
2.3	6.539e-001	6.357e-001	7.100e-001	6.063e-001
2.4	6.181e-001	6.024e-001	6.695e-001	5.717e-001
2.5	5.859e-001	5.707e-001	6.336e-001	5.418e-001
2.6	5.561e-001	5.428e-001	6.023e-001	5.154e-001
2.7	5.292e-001	5.182e-001	5.720e-001	4.889e-001
2.8	5.055e-001	4.961e-001	5.450e-001	4.639e-001
2.9	4.824e-001	4.743e-001	5.211e-001	4.416e-001
3.	4.612e-001	4.549e-001	4.997e-001	4.218e-001
3.1	4.415e-001	4.349e-001	4.788e-001	4.037e-001
3.2	4.239e-001	4.170e-001	4.599e-001	3.855e-001
3.3	4.080e-001	4.008e-001	4.429e-001	3.686e-001
3.4	3.924e-001	3.839e-001	4.274e-001	3.533e-001
3.5	3.775e-001	3.684e-001	4.133e-001	3.408e-001
3.6	3.639e-001	3.543e-001	4.004e-001	3.293e-001
3.7	3.511e-001	3.414e-001	3.866e-001	3.176e-001
3.8	3.393e-001	3.296e-001	3.738e-001	3.068e-001
3.9	3.285e-001	3.187e-001	3.621e-001	2.964e-001
4.	3.186e-001	3.088e-001	3.512e-001	2.854e-001
4.1	3.122e-001	3.013e-001	3.472e-001	2.751e-001
4.2	3.063e-001	2.930e-001	3.433e-001	2.656e-001
4.3	3.006e-001	2.851e-001	3.396e-001	2.564e-001
4.4	2.943e-001	2.778e-001	3.361e-001	2.479e-001
4.5	2.882e-001	2.710e-001	3.327e-001	2.398e-001
4.6	2.826e-001	2.647e-001	3.294e-001	2.324e-001
4.7	2.772e-001	2.588e-001	3.263e-001	2.253e-001
4.8	2.722e-001	2.533e-001	3.232e-001	2.187e-001
4.9	2.674e-001	2.481e-001	3.203e-001	2.123e-001
5.	2.630e-001	2.432e-001	3.175e-001	2.064e-001
5.25	2.471e-001	2.290e-001	3.023e-001	1.890e-001
5.5	2.335e-001	2.169e-001	2.867e-001	1.727e-001
5.75	2.216e-001	2.065e-001	2.727e-001	1.579e-001
6.	2.113e-001	1.966e-001	2.604e-001	1.454e-001
6.25	2.022e-001	1.859e-001	2.496e-001	1.341e-001
6.5	1.922e-001	1.765e-001	2.401e-001	1.245e-001
6.75	1.827e-001	1.682e-001	2.315e-001	1.158e-001
7.	1.743e-001	1.608e-001	2.238e-001	1.084e-001
7.25	1.669e-001	1.541e-001	2.168e-001	1.019e-001
7.5	1.603e-001	1.482e-001	2.105e-001	9.511e-002
7.75	1.531e-001	1.376e-001	2.057e-001	8.850e-002
8.	1.468e-001	1.285e-001	2.012e-001	8.249e-002
8.25	1.411e-001	1.206e-001	1.961e-001	7.692e-002
8.5	1.361e-001	1.137e-001	1.910e-001	7.190e-002
8.75	1.316e-001	1.078e-001	1.863e-001	6.720e-002
9.	1.275e-001	1.026e-001	1.820e-001	6.295e-002
9.25	1.237e-001	9.742e-002	1.779e-001	5.901e-002
9.5	1.203e-001	9.217e-002	1.741e-001	5.530e-002
9.75	1.171e-001	8.735e-002	1.706e-001	5.185e-002
10.	1.142e-001	8.293e-002	1.673e-001	4.867e-002

ANNUAL FREQUENCY OF EXCEEDANCE: 2.107e-003
RETURN PERIOD: 474.6
PROBABILITY OF EXCEEDENCE: 10.0% IN 50.0 YEARS
Column 1: Spectral Period
Column 2: Acceleration (g) for: Mean
Column 3: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008

Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008

1	2	3	4	5
PGA	6.544e-001	6.622e-001	5.789e-001	7.273e-001
2.e-002	6.685e-001	6.813e-001	5.811e-001	7.492e-001
3.e-002	7.081e-001	7.301e-001	6.034e-001	7.979e-001
4.e-002	7.500e-001	7.782e-001	6.404e-001	8.399e-001
5.e-002	7.913e-001	8.179e-001	6.729e-001	8.902e-001
6.e-002	8.476e-001	8.874e-001	7.304e-001	9.332e-001
7.e-002	9.040e-001	9.506e-001	7.842e-001	9.834e-001
8.e-002	9.599e-001	1.016e+000	8.366e-001	1.033e+000
9.e-002	1.016e+000	1.081e+000	8.898e-001	1.082e+000
0.1	1.069e+000	1.145e+000	9.394e-001	1.134e+000
0.125	1.179e+000	1.273e+000	1.027e+000	1.254e+000
0.15	1.271e+000	1.385e+000	1.103e+000	1.330e+000
0.175	1.316e+000	1.434e+000	1.147e+000	1.378e+000
0.2	1.354e+000	1.483e+000	1.188e+000	1.408e+000
0.225	1.372e+000	1.509e+000	1.201e+000	1.425e+000
0.25	1.387e+000	1.533e+000	1.214e+000	1.432e+000
0.275	1.392e+000	1.541e+000	1.223e+000	1.431e+000
0.3	1.395e+000	1.549e+000	1.233e+000	1.423e+000
0.325	1.386e+000	1.533e+000	1.234e+000	1.409e+000
0.35	1.376e+000	1.518e+000	1.235e+000	1.391e+000
0.375	1.365e+000	1.506e+000	1.237e+000	1.369e+000
0.4	1.354e+000	1.493e+000	1.239e+000	1.346e+000
0.425	1.339e+000	1.469e+000	1.243e+000	1.322e+000
0.45	1.325e+000	1.446e+000	1.247e+000	1.297e+000
0.475	1.312e+000	1.425e+000	1.251e+000	1.273e+000
0.5	1.300e+000	1.406e+000	1.255e+000	1.250e+000
0.525	1.273e+000	1.372e+000	1.229e+000	1.223e+000
0.55	1.248e+000	1.341e+000	1.205e+000	1.197e+000
0.575	1.223e+000	1.312e+000	1.183e+000	1.173e+000
0.6	1.199e+000	1.286e+000	1.163e+000	1.150e+000
0.625	1.176e+000	1.262e+000	1.144e+000	1.128e+000
0.65	1.155e+000	1.238e+000	1.127e+000	1.107e+000
0.675	1.136e+000	1.214e+000	1.110e+000	1.087e+000
0.7	1.117e+000	1.192e+000	1.095e+000	1.068e+000
0.725	1.099e+000	1.172e+000	1.081e+000	1.049e+000
0.75	1.082e+000	1.153e+000	1.067e+000	1.032e+000
0.775	1.058e+000	1.116e+000	1.046e+000	1.014e+000
0.8	1.034e+000	1.083e+000	1.026e+000	9.964e-001
0.825	1.012e+000	1.052e+000	1.008e+000	9.774e-001
0.85	9.910e-001	1.023e+000	9.896e-001	9.596e-001
0.875	9.694e-001	9.959e-001	9.716e-001	9.414e-001
0.9	9.491e-001	9.688e-001	9.546e-001	9.242e-001
0.925	9.299e-001	9.435e-001	9.385e-001	9.075e-001
0.95	9.118e-001	9.198e-001	9.234e-001	8.912e-001
0.975	8.939e-001	8.975e-001	9.091e-001	8.738e-001
1.	8.763e-001	8.756e-001	8.952e-001	8.575e-001
1.1	8.064e-001	7.948e-001	8.310e-001	7.913e-001
1.2	7.452e-001	7.277e-001	7.776e-001	7.292e-001
1.3	6.934e-001	6.719e-001	7.316e-001	6.725e-001
1.4	6.465e-001	6.247e-001	6.926e-001	6.208e-001
1.5	6.064e-001	5.843e-001	6.571e-001	5.723e-001
1.6	5.623e-001	5.419e-001	6.133e-001	5.287e-001
1.7	5.247e-001	5.062e-001	5.743e-001	4.905e-001
1.8	4.920e-001	4.735e-001	5.401e-001	4.551e-001
1.9	4.617e-001	4.450e-001	5.109e-001	4.254e-001
2.	4.357e-001	4.203e-001	4.838e-001	4.002e-001
2.1	4.098e-001	3.959e-001	4.529e-001	3.738e-001
2.2	3.856e-001	3.724e-001	4.264e-001	3.512e-001
2.3	3.632e-001	3.520e-001	4.035e-001	3.310e-001

2.4	3.437e-001	3.342e-001	3.809e-001	3.134e-001
2.5	3.267e-001	3.185e-001	3.606e-001	2.977e-001
2.6	3.116e-001	3.046e-001	3.427e-001	2.814e-001
2.7	2.976e-001	2.906e-001	3.270e-001	2.661e-001
2.8	2.829e-001	2.774e-001	3.130e-001	2.526e-001
2.9	2.697e-001	2.655e-001	3.004e-001	2.405e-001
3.	2.580e-001	2.548e-001	2.865e-001	2.297e-001
3.1	2.470e-001	2.437e-001	2.746e-001	2.198e-001
3.2	2.371e-001	2.336e-001	2.637e-001	2.109e-001
3.3	2.281e-001	2.245e-001	2.539e-001	2.027e-001
3.4	2.199e-001	2.161e-001	2.450e-001	1.937e-001
3.5	2.126e-001	2.085e-001	2.368e-001	1.853e-001
3.6	2.058e-001	2.016e-001	2.293e-001	1.777e-001
3.7	1.993e-001	1.935e-001	2.223e-001	1.701e-001
3.8	1.913e-001	1.856e-001	2.159e-001	1.633e-001
3.9	1.840e-001	1.784e-001	2.100e-001	1.570e-001
4.	1.773e-001	1.718e-001	2.045e-001	1.512e-001
4.1	1.725e-001	1.665e-001	2.018e-001	1.458e-001
4.2	1.681e-001	1.616e-001	1.989e-001	1.408e-001
4.3	1.639e-001	1.571e-001	1.954e-001	1.360e-001
4.4	1.599e-001	1.529e-001	1.922e-001	1.316e-001
4.5	1.563e-001	1.490e-001	1.891e-001	1.274e-001
4.6	1.528e-001	1.454e-001	1.861e-001	1.235e-001
4.7	1.496e-001	1.420e-001	1.833e-001	1.197e-001
4.8	1.465e-001	1.388e-001	1.807e-001	1.162e-001
4.9	1.436e-001	1.358e-001	1.781e-001	1.129e-001
5.	1.409e-001	1.330e-001	1.757e-001	1.097e-001
5.25	1.320e-001	1.251e-001	1.646e-001	1.021e-001
5.5	1.244e-001	1.183e-001	1.552e-001	9.458e-002
5.75	1.177e-001	1.123e-001	1.470e-001	8.711e-002
6.	1.118e-001	1.071e-001	1.398e-001	8.056e-002
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6.5	1.019e-001	9.791e-002	1.279e-001	6.879e-002
6.75	9.713e-002	9.340e-002	1.229e-001	6.353e-002
7.	9.255e-002	8.933e-002	1.183e-001	5.894e-002
7.25	8.835e-002	8.552e-002	1.142e-001	5.455e-002
7.5	8.446e-002	8.207e-002	1.104e-001	5.077e-002
7.75	8.027e-002	7.652e-002	1.073e-001	4.710e-002
8.	7.634e-002	7.159e-002	1.045e-001	4.386e-002
8.25	7.279e-002	6.709e-002	1.018e-001	4.094e-002
8.5	6.958e-002	6.304e-002	9.919e-002	3.817e-002
8.75	6.652e-002	5.943e-002	9.639e-002	3.559e-002
9.	6.375e-002	5.601e-002	9.380e-002	3.332e-002
9.25	6.123e-002	5.297e-002	9.139e-002	3.126e-002
9.5	5.885e-002	5.026e-002	8.909e-002	2.933e-002
9.75	5.660e-002	4.762e-002	8.687e-002	2.732e-002
10.	5.453e-002	4.524e-002	8.480e-002	2.555e-002

```
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2005 ASCE 7 Standard
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Longitude = -118.618936111111
Spectral Response Accelerations Ss and S1
Ss and S1 = Mapped Spectral Acceleration Values
Site Class B -  Fa = 1.0 ,Fv = 1.0
Data are based on a 0.009999999776482582 deg grid spacing
  Period    Sa
  (sec)    (g)
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   1.0    0.726 (S1, Site Class B)

Conterminous 48 States
2005 ASCE 7 Standard
Latitude = 34.3939833333333
Longitude = -118.618936111111
Spectral Response Accelerations SMs and SM1
SMs = Fa x Ss and SM1 = Fv x S1
Site Class C -  Fa = 1.0 ,Fv = 1.3

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Conterminous 48 States
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Longitude = -118.618936111111
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Site Class C -  Fa = 1.0 ,Fv = 1.3

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Conterminous 48 States
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Site Class D -  Fa = 1.0 ,Fv = 1.5

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Conterminous 48 States
2005 ASCE 7 Standard
Latitude = 34.3939833333333
Longitude = -118.618936111111
Design Spectral Response Accelerations SDs and SD1
SDs = 2/3 x SMs and SD1 = 2/3 x SM1
Site Class D -  Fa = 1.0 ,Fv = 1.5

  Period    Sa
  (sec)    (g)
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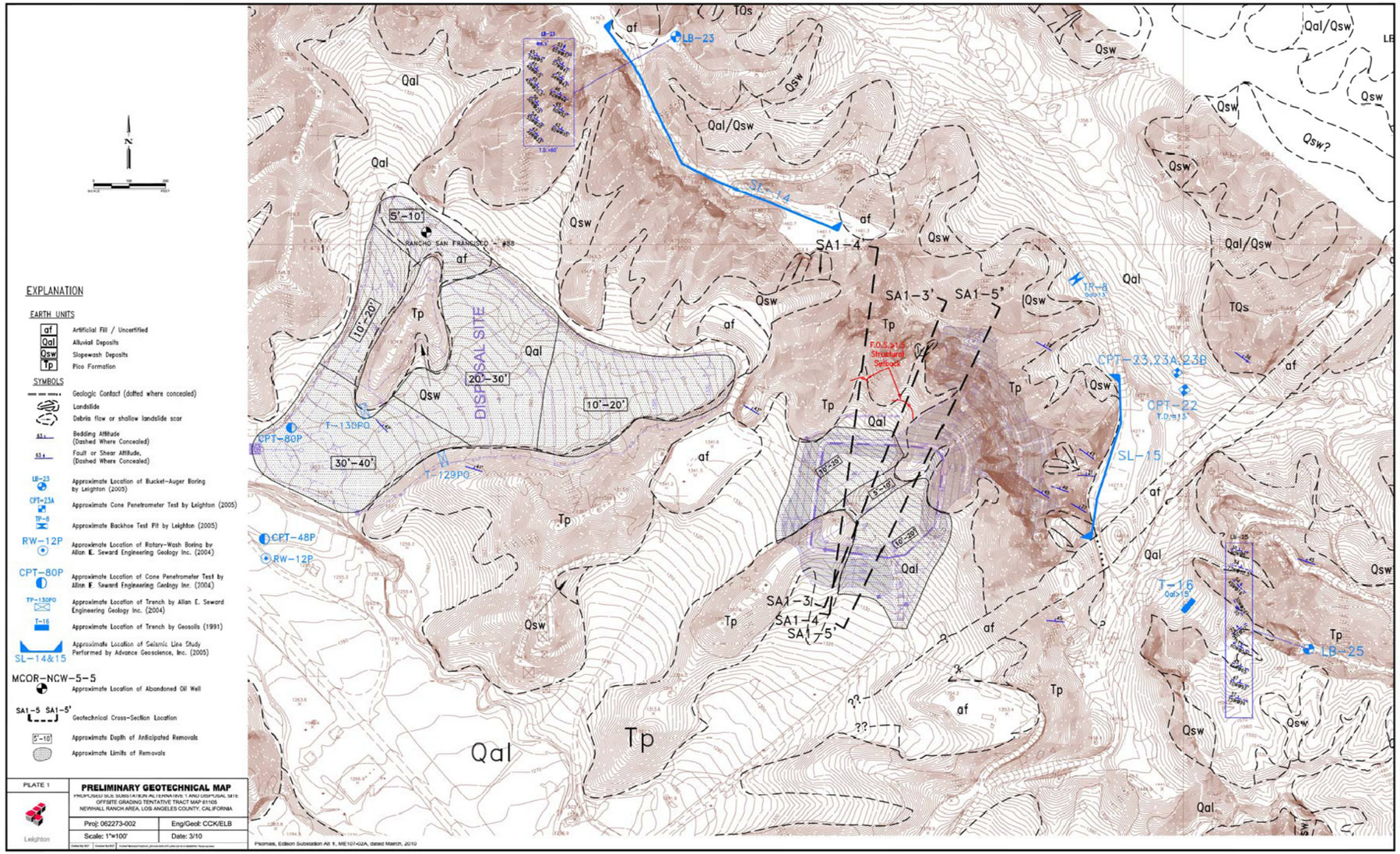

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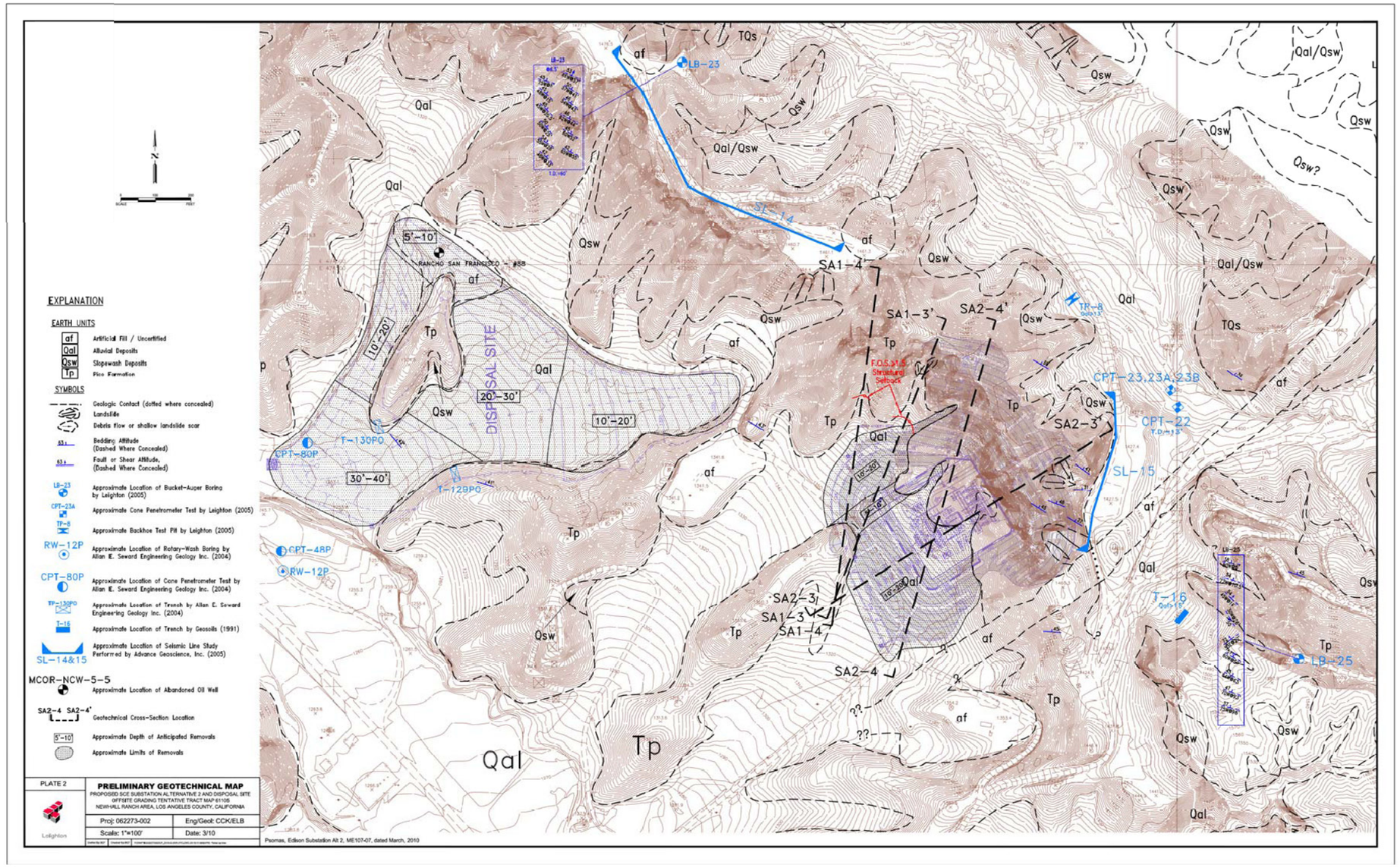

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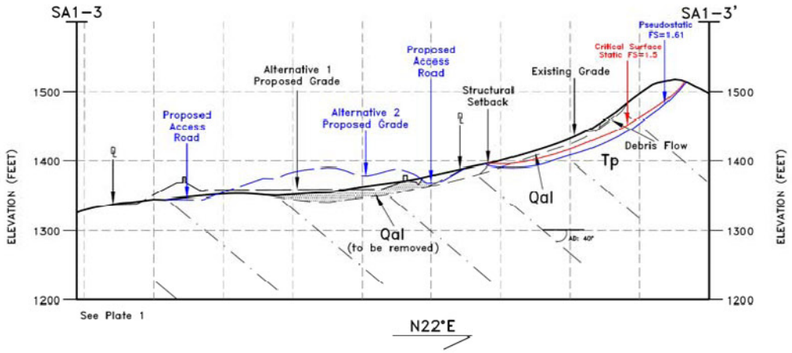

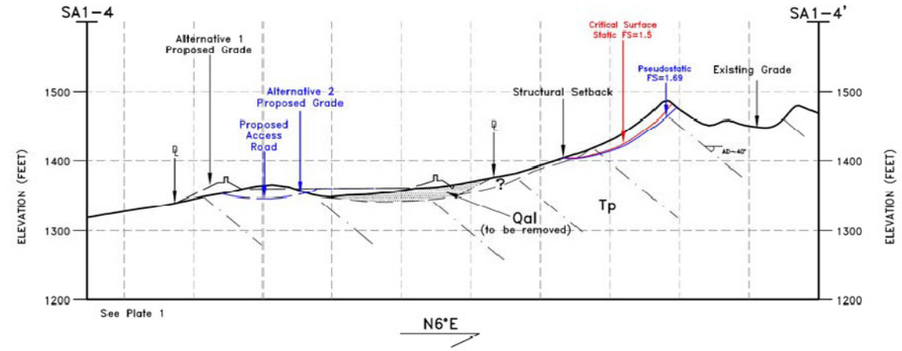

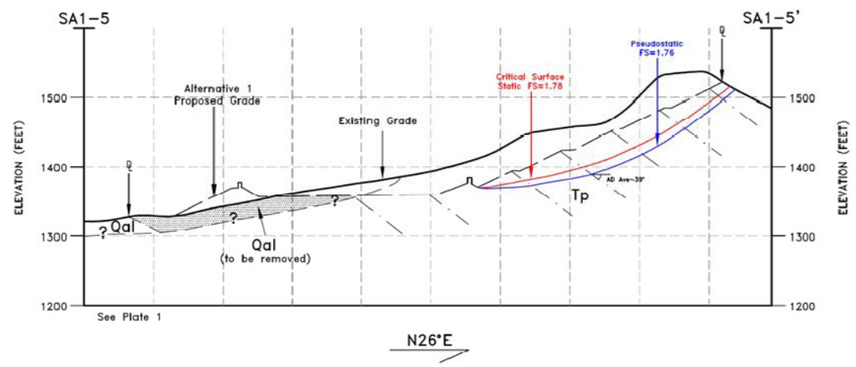

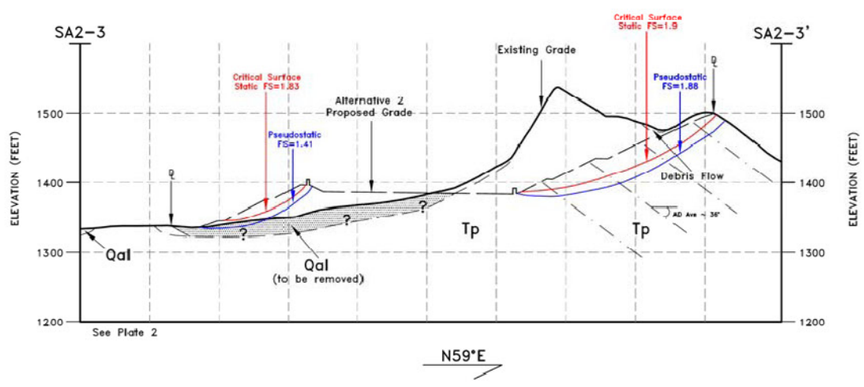

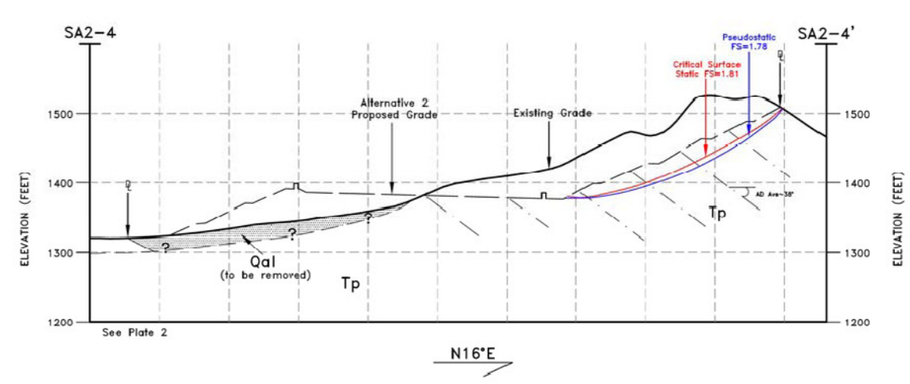

SEE PLATES 1 AND 2 FOR EXPLANATION

GEOTECHNICAL CROSS-SECTIONS SA1-3-SA1-3' THROUGH SA1-5-SA1-', SA2-3-SA2-3' AND SA2-4-SA2-4' PROPOSED S.C.E. SUBSTATION ALTERNATIVES OFFSITE GRADING T.T.M. 61105 NEWHALL RANCH AREA, LOS ANGELES COUNTY, CALIFORNIA		PLATE 3
Proj: 062273-002	Eng/Geol: CCK/ELB	Leighton
Scale: 1"=100'	Date: 3/10	

A full-size reproduction of this figure can be found at Impact Sciences.

GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

October 14, 2009

Newhall Land and Farming Company
23823 West Valencia Boulevard
Valencia, California 91355

Job No. 94-502-60

Attention: Mr. Corey Harpole

Subject: Evaluation of Building Setbacks
Airport Mesa (Area E1)
Vesting Tentative Tract 61105
Newhall Ranch
Los Angeles County, California

Ladies and Gentlemen:

This report summarizes R.T. Frankian & Associates' (RTF&A) findings and conclusions from our evaluation of the Building Setbacks recommended by Allan E. Seward Engineering Geology, Inc. (AES) for the Airport Mesa area (Area E1) of Vesting Tentative Tract (VTT) 61105 in Los Angeles County, California. AES recommended certain building restrictions and setbacks from three structural geologic features. Their recommendation was based on their interpretation of the potential fault rupture hazard associated with these features. Two of the geologic features were previously mapped as potentially active faults, and the third feature is a fold in the underlying rock that may be related to a potentially active fault at great depth.

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Our evaluation was performed to: (1) review the AES findings and compare their findings and setback recommendations to current regulatory standards; (2) evaluate the AES interpretations with more recent findings of investigations on the nearby Holser fault, performed by Geolabs-Westlake Village (Geolabs) in 2007; and (3) determine if "Building Setbacks" and "Zones of Restricted Development" established by AES for the features they designated as the "Airport Mesa Lineament", "Saddle Lineament", and "Airport Mesa anticline" may be modified or eliminated. This evaluation has been performed in consultation with Mr. Corey Harpole of Newhall Land and Farming Company (NLF) in accordance with Task 1 of our August 28, 2009 proposal [Proposal No. 001(R2)-2009-60].

SCOPE OF SERVICES

The scope of our services for the project consisted of reviewing and evaluating the following AES reports, relative to recommended building setbacks:

- "Geologic Report, Fault Investigation for Airport Mesa Area, Portion of Mesas East, TT61105, Newhall Ranch, Castaic, California", dated July 20, 2004; and

- "Geologic and Geotechnical Report, Review of Vesting Tentative Tract Map (Dated June 14, 2004), Vesting Tentative Tract 61105, Mesas East, Newhall Ranch, California", dated July 22, 2004.

Other documents reviewed for this evaluation included:

- California Geological Survey (CGS) (formerly California Division of Mines and Geology) Fault Evaluation Reports for the Holser, San Gabriel, Oakridge, and San Cayetano faults;

- CGS Fault Evaluation Reports for flexural slip faulting in Pico Canyon;
- CGS reports pertaining to the geology and geomorphology of the San Gabriel fault zone;
- CGS Special Publication 42 (Alquist-Priolo Earthquake Zoning Act);
- the U.S. Geological Survey's (USGS) "Quaternary Fault and Fold Database of the United States";
- Technical Appendix to the Los Angeles County Safety Element (LACSE);
- Geolabs 2007 surface fault rupture assessment of the Holser fault.

A complete list of documents, technical reports, and geologic maps reviewed for this evaluation are presented in the "References" section of this report.

BACKGROUND

AIRPORT MESA GEOLOGIC CONDITIONS

Airport Mesa is located in the northeastern portion of VTT 61105 and consists of a broad, elevated mesa situated directly south of the Santa Clara River. The mesa is underlain by sedimentary rock units of the Plio-Pleistocene age Saugus Formation, and capped by late Pleistocene age terrace deposits. Previous geologic mapping by Weber (1979 and 1982) identified two faults as extending east-west across Airport Mesa, with the northerly fault situated approximately 800 feet from the fault on the south. According to Weber (1979), the two faults constitute the southern limit of the Holser fault "structural zone". The main trace of the Holser

fault lies approximately 0.5 mile north of Airport Mesa. The two faults passing through the site are not currently mapped or considered active faults by any public agency.

SUMMARY OF AES SURFACE RUPTURE HAZARD EVALUATION

The intent of the AES fault investigation (2004a) was to evaluate the existence of any fault-related features or "lineaments" in the Airport Mesa area. They investigated three "lineaments" that correspond to the two known faults, and one fold. Their purpose was to determine the significance, lateral extent, and activity of these structural geologic features from a standpoint of potential surface fault rupture hazard on future development. This type of investigation is typically performed for faults that fall within an established Alquist-Priolo Earthquake Fault Zone or are suspected of having geologically recent activity (activity within the Holocene epoch, or last 11,000 years).

Field exploration for the AES study was undertaken in 1999 and 2000, and included the logging of numerous exploratory trenches and borings. Additionally, Dr. Roy Shlemon was retained to review critical trench exposures and render an opinion on the age of soil development on the surface of the terrace deposits. The findings from the AES investigation were presented in their July 22, 2004 fault investigation report.

For the purposes of our evaluation, and to eliminate any confusion, it is important to clarify and clearly define the geologic terms used in the AES report. Specifically, we are clarifying the use of the terms "fault", "fold", and "lineaments". A **fault** is a fracture or a zone of closely associated fractures along which rocks on

one side have been displaced with respect to rocks on the other side (Hart and Bryant, 1999). A **fold** is a bend in strata that includes both an **anticline** (folded stratified rocks in which the rocks dip in two directions away from a crest) and **syncline** (folded stratified rocks in which the rocks dip downward from opposite directions to come together in a trough) (Leet & Judson, 1971). A **lineament** is a linear or relatively straight topographic feature or features, such as fault, depression, line of dense vegetation, or a chain of aligned volcanoes (American Geological Institute, 1976). Some lineaments certainly express valid structural features such as faults, aligned volcanoes, and zones of intense jointing, but the meaning of other lineaments is ambiguous and do not necessarily describe or define a structural geologic feature. For this report, RTF&A has discontinued use of the vague term "lineament" for the preferable and correct structural geologic terms of fault and fold.

In summary, the AES conclusions were:

- Saugus Formation sedimentary rock units beneath Airport Mesa have been tectonically deformed to produce several east-plunging folds (including the Airport Mesa anticline) and two faults, designated the Airport Mesa fault (on the north) and the Saddle fault (on the south);

- the area between the two faults has been uplifted as a block at least 40 feet as a result of folding and reverse faulting within the last 100,000 ± years;

- the terrace deposits overlying the Saugus Formation have also been deformed along the Airport Mesa fault and the Saddle fault;

- the terrace deposits are at least 100,000 years old based on the well-developed soil horizons, and possibly as old as 200,000 years or more;

- subsurface exploration in the area of the Airport Mesa anticline indicate that the observed structural changes are primarily the result of folding, not faulting;

- a zone of normal faults is present in the terrace deposits above the Airport Mesa anticline; and

- no "unequivocal evidence" (i.e. clear evidence) of Holocene (last 11,000 years) fault movement or activity was found for the Airport Mesa fault, Saddle fault, or Airport Mesa anticline.

Regardless, AES recommended building setbacks for the Airport Mesa fault, the Saddle fault, and the Airport Mesa anticline based on the observed geologic conditions, the age of materials cut by faulting, and the style of deformation. Specifically, AES stated that "the presence of strong aerial photo lineaments, a distinct fault scarp preserved on the terrace surface, deformed colluvial wedge deposits, and the 'flowering' of faults near ground surface all strongly suggest the presence of Holocene activity" along the Airport Mesa fault, the Saddle fault, and the Airport Mesa anticline. As delineated by AES (2004a and 2004b), the Building Setbacks for the Airport Mesa fault and the Saddle fault each measure approximately 200 feet wide; the Airport Mesa anticline setback measures approximately 250 feet wide. Furthermore, AES recommended zones of restricted development and structural mitigation for the area between the two faults, in the area between the Airport Mesa fault and the Airport Mesa anticline, and for 100 feet beyond the recommended Building Setbacks "because of the potential for

sympathetic movement." AES defines a "Building Setback" as a Restricted Use Area and prohibits structures for human occupancy (structures where human occupancy exceeds 2,000 person hours/year), as would be normally be required for areas of known active faulting. The AES "Zone of Restricted Development" recommended against construction of critical facilities or essential service buildings (i.e., schools, fire stations, hospitals, etc.) within this larger zone. The overall width of the Building Setbacks and "Zones of Restricted Development" measures approximately 500 to 1200 feet.

DISCUSSION

ALQUIST-PRIOLO EARTHQUAKE FAULT ZONING ACT

AES performed a fault investigation of Airport Mesa to evaluate the potential for surface fault rupture on future site development. The AES investigation was conducted, in part, to assess the two faults mapped by Weber (1979 and 1982). This type of investigation is typically performed in accordance with, and to satisfy the requirements of, the Alquist-Priolo Earthquake Fault Zoning Act for any suspected seismically active faults.

The Alquist-Priolo Earthquake Fault Zoning Act (herein referred to as "the A-P Act") was passed in 1972 by the California Legislature for the purpose of prohibiting "the location of most structures for human occupancy across the traces of active faults and to mitigate the hazard of fault rupture." The A-P Act is codified in the Public Resources Code as Division 2, Chapter 7.5, and has been amended 11 times (Hart and Bryant, 1999). Under the Act, the State Geologist is

required to delineate "Earthquake Fault Zones" (herein referred to as "A-P Zones") along known active faults in California. Cities and counties affected by the zones must regulate certain development projects within the zones; they must withhold development permits for sites within the zones until geologic investigations demonstrate that the sites are not threatened by surface displacement along seismically active faults.

Alquist-Priolo Fault Activity Definitions: For purposes of zoning the faults, the State Geologist developed a set of definitions. The A-P Act defines a **fault** as a fracture or zone of closely associated fractures along which rocks on one side have been displaced with respect to those on the other side. An **active fault** is a fault that has "had surface displacement within Holocene time (about the last 11,000 years)." A fault which has shown evidence of surface displacement during Quaternary time (last 1.6 million years), is defined as a **potentially active fault**. Beginning in 1977, evidence of Quaternary surface displacement (i.e., potentially active fault) was no longer used as a criterion for establishing an A-P Zone.

In 1975, the State Geologist made a policy decision to zone only potentially active faults that have a relatively high potential for ground rupture (Hart and Bryant, 1999). To that end, the terms "sufficiently active" and "well-defined" were developed. A fault is deemed **sufficiently active** if there is evidence of Holocene surface displacement along one or more of its segments or branches. Holocene surface displacement may be directly observable or inferred; it need not be present everywhere along the fault to qualify the fault for zoning. A fault is considered **well-defined** if its trace is clearly detectable by a trained geologist as a physical feature at, or just below, the ground surface. This fault may be identified

by direct observation or by indirect methods (e.g. geomorphic evidence, structural distortion of near-surface Holocene deposits).

The linear features identified by AES as the Airport Mesa fault, Saddle fault, and Airport Mesa anticline are not within an established A-P Zone. The closest A-P Zone to the site has been established for the San Gabriel fault, and it is located approximately two miles to the northeast. No portion of the nearby Holser fault or any of its related subsidiary faults has been designated as an A-P Zone.

CGS Fault Evaluation (FER) Reports: A Fault Evaluation and Zoning Program was initiated by CGS in 1976 in accordance with the A-P Act for the purpose of evaluating faults identified as "sufficiently active and well-defined" by the State Geologist. The CGS fault evaluation work included interpretation of aerial photographs and limited field work, as well as the use of other geologists' work. The list of faults evaluated by CGS included potentially active faults not yet zoned, as well as previously zoned faults or fault-segments that warranted zone revisions (Hart and Bryant, 1999). For each fault evaluated, a Fault Evaluation Report (FER) was prepared, summarizing the data on location, recency of activity, and sense and magnitude of displacement. Each FER contained a recommendation for or against establishment of an A-P Zone.

Under Section 2622 of the A-P Act, the State Geologist has an ongoing responsibility to review new geologic and seismic data with the intent of revising or delineating new A-P Zones when warranted by new information. According to Hart and Bryant (1999), since 1991 fault evaluations and zoning have continued selectively and "focused on the more populated and developing areas" of the state. FERs have been conducted for the Holser fault (1977), San Gabriel fault (1978

and 1986), as well as the nearby Oakridge (1999) and San Cayetano faults (1986). These faults are situated approximately 0.5 mile north, 2.0 miles northeast, 6.6 miles west-northwest, and 8.4 miles west, respectively, of Airport Mesa.

More recently, FERs were conducted in 1994 and 1995 for secondary ground rupture features identified in Stevenson Ranch following the 1994 Northridge earthquake (Treiman, 1994 and 1995). A subsequent A-P Zone was established for the ground rupture features in Stevenson Ranch.

The FER prepared in 1986 for the San Gabriel fault (Kahle, 1986) is of significance to the Airport Mesa site. This FER post-dates and references the mapping by Weber (1979 and 1982) in which Weber identified the Airport Mesa and Saddle faults. Although Kahle made a recommendation for zoning a portion of the San Gabriel fault, there was no recommendation for zoning the fault features identified by Weber (and investigated by AES) as the Airport Mesa fault and Saddle fault. Furthermore, the State Geologist conducted extensive field studies in the Santa Clarita Valley following the 1994 Northridge earthquake searching for any evidence of ground rupture, either primary or secondary, associated with the earthquake. These field studies led to identification and eventual A-P zoning of the surface rupture in Stevenson Ranch. To our knowledge, ground rupture within Airport Mesa was not identified or reported in 1994 and, consequently, no A-P zones have been established.

LOS ANGELES COUNTY SAFETY ELEMENT

The Los Angeles County Safety Element (LACSE), prepared for the Department Regional Planning by Leighton (1990), contains its own guidelines for

classifying the activity of faults within Los Angeles County. As defined in the LACSE, a fault is considered active if it meets the following criteria:

- the fault is within an A-P Zone;
- the fault is suspected or proven to displace Holocene age alluvium, as noted in literature or reported in available unpublished geotechnical reports;
- a fault segment lies interposed between two A-P Zone faults, adjoins and appears to extend an A-P Zone fault, or a mechanically distinct fault segment includes a A-P Zone fault;
- an adjacent potentially active fault parallels an active fault, the fault overlaps or intersects an existing or proposed special study area, and the fault displays the same tectonic character (i.e., geometry, slip mechanism, etc.); or
- the fault is not well studied, but is covered by one of the above criteria.

The LACSE defines a potentially active fault as a fault with proven or probable late Quaternary (11,000 to 750,000 years before present) movement as cited in literature or unpublished reports. According to the LACSE, potentially active faults require special studies, but not setbacks.

The Holser fault, situated approximately 0.5 mile north of Airport Mesa, has been classified as "active" on the LACSE *Fault Rupture Hazards and Historic Seismicity* map (Plate 1 in Leighton, 1990). The "active" zone delineated around the Holser fault on the map stops at approximately the toe, or northern limit, of Airport Mesa. As such, the Airport Mesa fault and Saddle fault mapped by Weber, and the corresponding "Lineaments" and associated folds described by AES, are

not included in designated active zones established for the Holser fault for the LACSE.

FINDINGS

GENERAL

The AES fault investigation concluded that the features they refer to as the Airport Mesa "Lineament", Saddle "Lineament", and Airport Mesa anticline do not exhibit "unequivocal" evidence of Holocene activity. They contend that the features have been active "within the last 100,000 (±) years" and, therefore, warrant Building Setbacks, prohibiting construction of habitable structures, as well as "Zones of Restricted Development", prohibiting construction of critical facilities or essential service buildings. The overall combined width of the Building Setbacks and "Zones of Restricted Development" measures approximately 500 to 1,200 feet.

RTF&A has evaluated the AES reports, as well as pertinent geologic and seismic data/literature relative to local and regional faulting in the Airport Mesa area. Of particular significance to Airport Mesa are the recent Geolabs findings (2007) relative to the age of faulting of the nearby Holser fault. The primary emphasis of our evaluation was to assess the AES data regarding the age of faulting on Airport Mesa as a means of determining if the AES-recommended setbacks are reasonable and consistent with the applicable professional standards-of-care. The findings from our review are summarized below.

AIRPORT MESA STRUCUTRAL ZONE

Within Airport Mesa, the geologic features that have been identified, as depicted on the AES Geologic Cross Sections, consist of two significant faults (the Airport Mesa fault and the Saddle fault) and another lineament designated the Airport Mesa anticline. In addition, the AES Geologic Cross Sections show at least two relatively through-going synclines, including one syncline situated south of the Saddle fault and included by AES as part of the Saddle fault "lineament". For this report, RTF&A designates the faults and folds identified by AES beneath Airport Mesa as the "Airport Mesa structural zone."

The AES fault investigation included a geomorphic soil-stratigraphic assessment of the relative age of materials affected by faulting and folding within the Airport Mesa structural zone. To that end, AES retained Dr. Shlemon of Roy J. Shlemon & Assoc., Inc. Dr. Shlemon's findings were included as Appendix A of the AES fault investigation report (AES, 2004a). In summary, Dr. Shlemon determined that terrace deposits capping Airport Mesa exhibit a minimum age of approximately 100,000 years, but states that conceivably, the soil could be as old as 200,000 years (approximately) due to the extent of weathering. Dr Shlemon explained that soils older than 100,000 years tend to be mature and look similar, so no definitive age could be given other than at least 100,000 years. AES determined that the base of the upper terrace deposits were faulted along the Airport Mesa fault and the Saddle fault. With regard to the Airport Mesa anticline, although no substantial offsets of the upper terrace deposits were observed, four minor faults with up to one foot of offset were described in these 100,000- to 200,000-year old soils during trenching.

Based on the AES observations, and evaluation by Dr. Shlemon, AES did not find any clear or direct evidence of any Holocene movement. They concluded that there is no "unequivocal evidence" of Holocene fault movement, but described substantial evidence for at least 40 feet of vertical uplift during the "the last 100,000 years along both fold/fault zones" based on offset of the upper terrace deposits. The statement appears to contradict Dr. Shlemon conclusions that the upper terrace deposits may represent 200,000 years of weathering and, therefore, the 40 feet of uplift could have occurred over the last 200,000 years.

AES further states that an uplift rate of 40 feet in the last 100,000 years corresponds to 4.4 feet of uplift in Holocene time, or the last 11,000 years. This is a misleading statement that implies Holocene (active) fault movement without any proof. The uplift or slip rate of a fault is determined by dividing the amount of total fault offset by the number of years over which the offset occurred; therefore, the resultant number reflects only the <u>average</u> slip (uplift) rate for a given fault, over the given time period. In the case of the Airport Mesa structural zone, the uplift rate is 40 feet divided by 100,000 years, or 0.0004 feet/year. This does not mean that the Airport Mesa structural zone has experienced 0.0004 feet of movement every year, or that <u>any</u> fault movement has occurred in the last 11,000 years. AES conclusions regarding the Holocene uplift rate along the Airport Mesa structural zone is not substantiated by their exhaustive field exploration. Further, their statement regarding 4.4 feet of uplift in Holocene time is not substantiated and no more accurate than a conclusion that the Airport Mesa structural zone has experienced 0.002 feet of movement since issuance of the AES report five years ago.

AES argues recommended building setbacks for the Airport Mesa fault, the Saddle fault, and the Airport Mesa anticline are warranted based on the observed geologic conditions, the age of materials cut by faulting, and the style of deformation. They contend that "the presence of strong aerial photo lineaments, a distinct fault scarp preserved on the terrace surface, deformed colluvial wedge deposits, and the 'flowering' of faults near ground surface all strongly suggest the presence of Holocene activity." Our review of aerial photos dating as far back as 1928 suggests a strong photo lineament that appears to coincide only with the Airport Mesa fault. However, based on a review of the current topographic site survey, the USGS 7.5 Minute Newhall Quadrangle (1952, 1969, and 1988), and AES' own topographic profiles shown on the Geologic Cross Sections, we disagree that a distinct fault scarp is apparent. Based on discussions with Newhall Ranch personnel, it is our understanding that Airport Mesa was farmed beginning about 1996-1997. From 1996 through 2005, the mesa was plowed an/or disked three times a year. Before 1996 the area was used for cattle grazing. Considering that past plowing and agricultural uses would likely destroy any evidence of a scarp, it seems doubtful that a "distinct fault scarp" would still be reflected at ground surface. Furthermore, the deformed colluvial wedge, with no age date for the colluvial deposits, and fault flowering near ground surface do not prove that the Airport Mesa structural zone has been active in the last 11,000 years.

The extensive AES trenching failed to find rupture of Holocene age (last 11,000 years old) units. Even when trenching across young alluvium or slope wash (AES Trench T-76H), AES acknowledges that no evidence of faulting was observed (AES, 2004a). Additionally, a Holocene landslide is present at the site that covers

one of the investigated faults. AES trench T-42H encountered the landslide (Qls XXXIX) overlying the Airport Mesa fault. Based on the reviewed report, there was no evidence that the mapped fault extends upward into the landslide deposit, indicating that no surface rupture/faulting has occurred since the date of the landsliding. In their July 22, 2004 Vesting Tentative Tract Map report (AES, 2004b), AES states that radiocarbon dating of a landslide near Newhall Ranch with similar geomorphology indicates that most of the large landslides within VTT 61105 are probably pre-Holocene in age (i.e., greater than 11,000 years old). Although the term "large landslide" is not specific for a given size, and Qls XXXIX may not meet AES' criteria for a "large landslide", the lack of geomorphic expression of the Qls XXXIX slide mass would suggest that it may be a pre-Holocene landslide. The fact that the landslide has buried the Airport Mesa fault and has not been cut by it, indicates that this fault has not moved in recent times and may be indicative that faults within the Airport Mesa structural zone do not exhibit Holocene offset.

HOLSER FAULT/AIRPORT MESA STRUCUTRAL ZONE RELATIONSHIP

Weber (1979) identified the Airport Mesa structural zone and suggested that it constitutes the southern limit of the Holser fault zone. The Holser fault is considered a late Quaternary fault (USGS, 2006; Jennings, 1994) and would be considered potentially active, as defined by the State Geologist for the A-P Act. The Holser fault is not within an established A-P Zone. However, the Holser fault has been classified as an active fault in the LACSE (Leighton, 1990).

AES contends that the Airport Mesa structural zone was included as part of the Holser fault zone as depicted on the LACSE *Fault Rupture Hazards and Historic Seismicity* map. However, based on our review of the map, it is our opinion that the ½-mile wide zone encompassing the Holser fault stops at the toe, or northern limit of Airport Mesa, and neither depicts the Airport Mesa structural zone or includes it in the Holser fault zone. As such, it is incorrect to associate the Airport Mesa structural zone with the LACSE zone established for the Holser fault.

The relationship of the Airport Mesa structural zone to the Holser fault is important when discussing fault activity. If the Holser fault is considered active, then an argument can be made that faults associated with the Holser fault (i.e., the Airport Mesa structural zone) may also be active. A 1986 fault study of the Holser fault was conducted by AES within the Hasley Commerce Center. At that time, AES did not establish clear evidence of Holocene fault rupture along the fault and reported that the lack of Holocene rupture may be due to an earthquake recurrence interval of greater than 11,000 years. By definition, a fault with a recurrence interval greater than 11,000 is not active.

Geolabs (2007) recently conducted a surface fault rupture hazard assessment for the Holser fault within Parcel Map 18108 (PM 18108), located northeast of Airport Mesa. Geolabs concluded that the Holser fault does not displace an approximately 40,000- to 100,000-year old Pleistocene terrace deposit and is not active.

The Pleistocene terrace deposit within PM 18108 caps a mesa bordering on the north side of the Santa Clara River. This mesa is located directly across, and approximately 3000 feet, from Airport Mesa, which borders the south side of the

Santa Clara River. It is likely that the PM 18108 mesa, and overlying terrace deposit, are age equivalent with the terrace deposit capping Airport Mesa. Considering the mapping of Weber (1979 and 1982) depicting the Airport Mesa structural zone as constituting the southern portion of the Holser fault zone, and the fact that the terrace deposits present on both the PM 18108 and Airport Mesa may be age equivalent, it can be hypothesized that the age of faulting encountered within Airport Mesa may fall within the 40,000 to 100,000 before present age range (Geolabs, 2007), similar to the estimated age of faulting for the Holser fault.

CONCLUSIONS AND RECOMMENDATIONS

The potential for surface rupture hazard due to active faulting within the Airport Mesa structural zone was previously investigated by AES (2004a), and included extensive field exploration. Although not establishing Holocene activity, at the conclusion of their report AES recommended Building Setbacks for the geologic features designated by RTF&A as the Airport Mesa fault, the Saddle fault, and the Airport Mesa anticline. They contend that the Building Setbacks are needed based on observed geologic conditions, the age of materials cut by faulting, and the style of deformation. The Building Setbacks measure approximately 200 feet for the Airport Mesa fault, 200 feet for Saddle fault, and 250 feet for the Airport Mesa anticline. Based on our review of the AES data and reports, we conclude the following:

- the Airport Mesa structural zone is not located within an A-P Zone or designated as active by the LACSE;

- unlike ground rupture identified in Stevenson Ranch following the Northridge earthquake, there is no data or reports of earthquake ground rupture features occurring on Airport Mesa following the 1971 San Fernando or 1994 Northridge earthquakes;

- the Airport Mesa structural zone may be age equivalent with the nearby Holser fault, which has been determined by Geolabs (2007) as falling within the 40,000 to 100,000 before present age range;

- the AES exploration failed to identify any evidence of surface fault rupture or fault activity younger than 11,000 years. Therefore, by criteria established for the A-P Act by the State Geologist, and the LACSE, the faults and folds comprising the Airport Mesa structural zone are <u>not</u> active geologic structures and no building setbacks are required;

- the Airport Mesa structural zone has demonstrated movement in late Quaternary time, but not Holocene time, and by definition is considered potentially active. There is no requirement or precedent in the A-P Act or the LASCE for establishing building setbacks from potentially active faults; and

- the Airport Mesa anticline is a fold, not a fault. There is no requirement, nor precedent in either the A-P Act or the LACSE for building setbacks for folds.

It is RTF&A's recommendation that the Building Setbacks delineated by AES for Airport Mesa be eliminated for all proposed residential, commercial, or industrial developments. If critical facilities or essential service buildings are planned for the site, the need for setbacks should be determined once building plans have been prepared.

-oOo-

Should you have any questions regarding this report, please do not hesitate to call our office.

Respectfully submitted,

R. T. FRANKIAN & ASSOCIATES

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RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

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December 21, 2009

100-SCALE PLAN REVIEW

REVISED VESTING TENTATIVE TRACT MAP NO. 61105

MISSION VILLAGE, NEWHALL RANCH

LOS ANGELES COUNTY, CALIFORNIA

FOR

NEWHALL LAND AND FARMING COMPANY

DECEMBER 21, 2009

JOB NO. 94-502-21

RTF&A

GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

100-SCALE PLAN REVIEW

REVISED VESTING TENTATIVE TRACT MAP NO. 61105

MISSION VILLAGE, NEWHALL RANCH

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GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

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GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

December 21, 2009

Newhall Land and Farming Company
23823 West Valencia Boulevard
Valencia, California 91355

Job No. 94-502-21

Attention: Mr. Corey Harpole

Subject: 100-Scale Plan Review
Revised Vesting Tentative Tract Map No. 61105
Mission Village, Newhall Ranch
Los Angeles County, California

References: See attached References

We are pleased to present this 100-scale plan review for revisions to Vesting Tentative Tract Map No. 61105 (VTTM 61105) for the Mission Village project, Newhall Ranch, Los Angeles County, California. The revised vesting tentative tract map was prepared by Psomas and is dated November 24, 2009. This map was used as a base for our Geotechnical Map, attached as Figures 2.1 through 2.12. The purpose of this report is to evaluate proposed revisions to VTTM 61105 and provide geotechnical recommendations as required.

This review supplements and updates the previous vesting tentative tract map reports prepared by Allan E. Seward Engineering Geology, Inc. (AES) in 2004 and 2005 (AES, 2004b; 2004d; and 2005b). R.T. Frankian & Associates (RTF&A) assumed responsibilities as "Consultant of Record" for the project and notified Los Angeles County Department of Public Works Geotechnical and Materials

Engineering Division (GMED) of the change of consultant in October, 2009 (RTF&A, 2009a). Accordingly, RTF&A has reviewed the pertinent AES VTTM 61105 reports, listed in the attached References. The geologic and geotechnical conditions described in the AES reports have not changed. The conclusions and recommendations presented by AES, where not revised by this report, remain applicable to the proposed VTTM 61105 grading, and are incorporated into our VTTM 61105 conclusions and recommendations. The geologic units mapped by AES within VTTM 61105 are depicted on our Geotechnical Map (Figures 2.1 through 2.12).

PROPOSED DEVELOPMENT

VTTM 61105 covers a total area of approximately 1,253 acres and includes 658 lots. The site is bounded by the Santa Clara River on the north and northwest, Magic Mountain Theme Park (Parcel Map 12337) and VTTM 53295 on the west, VTTM 061996 on the south, and VTTM 060678 on the southwest. VTTM 61105 is divided into 44 planning "Areas" designated as Areas A1 through A10, Areas B1 and B2, Areas C1 through C9, Area E1, and Areas F1 through F22. The Area boundaries are shown on Figures 2.1 through 2.12. The uses for the various Areas include residential, mixed use/commercial, an elementary school and park site, a water tank site, water quality basins, a fire station, and a spineflower preserve.

Development will include extensions to Magic Mountain Parkway, Westridge Parkway, and Commerce Center Drive, as well as construction of numerous interior streets and associated utilities.

VESTING TENTATIVE TRACT MAP REVISIONS

The majority of the revisions to the vesting tentative tract map for VTTM 61105 are related to the realignment of Westridge Parkway and Commerce Center Drive, and associated grade adjustments in adjacent areas. The revisions to VTTM 61105 include, but are not limited to, the following:

Sheet 3 (Figure 2.3)

- Commerce Center Drive and "GG" Street realigned;
- cut slope along northeast side of Commerce Center Drive (designated as Cut Slope CS-20) reconfigured;
- new cut slope (Cut Slope CS-55) added along northeast side of Commerce Center Drive;
- Water Quality Basin added along southwest side of Commerce Center Drive;
- former Cut Slope CS-17 eliminated;
- Cut Slopes CS-18 and -19 reconfigured; and
- bottom elevation of the Regional Water Quality Basin in northwest portion of the site raised approximately 10 feet.

Sheet 4 (Figure 2.4)

- Cut Slopes CS-22, -25, and -26b eliminated.
- lot lines for Open Space Lots 151 through 155 adjusted;
- "Q" Street realigned and redesignated as "Q1" Street;
- "H" Street, "I" Street, and "Q3" Street added in Area A3; and
- Area A3 now planned for "Single Family Detached" dwellings.

Sheet 5 (Figure 2.5)

- Commerce Center Drive realigned;
- Cut Slope CS-53 added along west side of tract;
- interior streets bounded by Commerce Center Drive, Magic Mountain Parkway and "A' Street realigned;

- building pads within Areas F1 through F22 lowered approximately 1 foot to 15 feet; and
- building pads within Areas A1 and A4 reconfigured.

Sheet 6 (Figure 2.6)

- potential grade control structures and slope toe protection added along southwest tract boundary.

Sheet 7 (Figure 2.7)

- Cut Slope CS-12b eliminated;
- Cut Slope CS-12c relocated and reconfigured;
- Westridge Parkway realigned and adjacent slopes reconfigured;
- private drives within Areas C4 through C6 realigned an associated slopes reconfigured;
- building pads within Areas C4 and C5 lowered approximately 8 to 25 feet;
- building pad within Area C6 raised approximately 20 to 24 feet;
- Private Drive "NN" eliminated in Area C3 and building pad grades lowered approximately 2 feet;
- "RR" and "QQ" Streets added to Areas C7 through C9 and building pads lowered approximately 2 to 10 feet; and
- Fire Station (Lot 448) added northeast of Westridge Parkway and "QQ" Street intersection.

Sheet 8 (Figure 2.8)

- Commerce Center Drive realigned and adjacent slopes reconfigured; and
- slopes at Commerce Center Drive and Magic Mountain Parkway intersection reconfigured.

SCOPE OF WORK

The scope of work for this plan review included:

- site reconnaissance of VTTM 61105;
- review and analysis of AES reports covering previous versions of the VTTM 61105;
- reviewing aerial photographs of the site;
- preparation of a revised Geotechnical Map attached as Figure 2.1 through 2.12;
- construction of new Geologic Sections attached as Figure 3;
- evaluation of proposed revisions to the grading plan with respect to slope stability; and
- preparation of this report and accompanying illustrations.

SLOPE STABILITY

GENERAL

The revised vesting tentative tract map for VTTM 61105 will include grading of 58 cut slopes, as listed on Table 1. Four of the cut slopes (Cut Slopes CS-53 through CS-56) represent new cut slopes not indicated on previous plans or not previously addressed by AES. Twelve of the cut slopes (CS-7, CS-10, CS-11, CS12a, CS-12c, CS-13, CS-14, CS-18 through CS-20, CS-24, and CS-26) have been reconfigured, moved, or altered such that it was necessary to re-evaluate the stability of the slopes. Slopes previously designated by AES as Cut Slopes CS-12b, CS-17, CS-22, CS-25, and CS-26b have been eliminated, based on the map revisions. A discussion of the new and revised cut slopes is presented below. The approximate locations of all of the cut slopes are depicted on Figures 2.3 through 2.8. Details

specific to the 58 cut slopes, including anticipated geologic conditions and recommended mitigation of potential slope instability, are presented on Table 1.

The shear strength parameters for the geologic units onsite are based on the parameters presented in the applicable AES reports (2004b, 2004d, and 2005b). Slope stability analyses for new or previously unaddressed cut slopes were performed using the program Slope/W by GEO-SLOPE International Ltd., which utilized Bishop's Simplified Method or Spencer's Method.

The analyses were based on subsurface conditions as depicted on the Geologic Sections, Figure 3. The existing ground surface, proposed grading scheme, and subsurface geologic structure are shown on the geologic sections. For analyses, where the location of weak bedding planes is unknown or uncertain, one is assumed to be located exactly at the critical location, typically near the toe of the slope. Although groundwater was not indicated on the Geologic Sections, the analyses generally assumed a phreatic surface above the critical failure surface for bedding plane failures. The Slope Stability Analyses results are presented in the Appendix.

CUT SLOPE CS-7

Cut slope CS-7 (see Figure 2.7) is planned as a north-northeast-facing 2:1 (horizontal:vertical) slope that will attain a height of approximately 30 feet. The revised cut slope is located approximately 150 to 300 feet northeast of its previous location (AES, 2005b). The slope will expose slope wash deposits and sedimentary rock units of the lower Saugus Formation. Grading of the slope will remove the slope wash deposits. Bedding within the underlying Saugus Formation strikes northwest and dips 15 to 20 degrees towards the northeast. As depicted on Geologic Section C-

C' (Figure 3), an 11-degree bedding component is adversely oriented, or "daylighted" with respect to Cut Slope CS-7. Stability analyses performed for potential failure along the adversely oriented bedding indicate that proposed cut slope is grossly stable. A 20 feet wide by 3 feet deep stability fill is recommended for Cut Slope CS-7 to control potential seepage along the daylighted bedding planes.

CUT SLOPE 10

Cut Slope CS-10 (Figure 2.7) will consist of 140-foot high, northeast-facing 2:1 slope. The slope will encounter lower Saugus Formation units and landslides Qls VIII and Qls IX. The slope height is approximately 30 feet higher than the slope evaluated by AES (2005b), but the slope direction and underlying geologic conditions remain as described by AES. As discussed by AES, the slope is considered grossly stable. Both landslides will need to be removed during grading. A 30 feet wide by 5 feet deep stability fill will need to be constructed to eliminate a "sliver" cut and restore slope grades following landslide removals. The estimated landslide removal depths are indicated on Figure 2.7.

CUT SLOPE CS-11

Cut Slope CS-11 (Figure 2.7) will be graded as a 55-foot high, east-facing, 2:1 slope that will encounter lower Saugus Formation units and landslide Qls III. The cut slope is approximately 7 feet higher than the cut slope addressed by AES (2005b), but the footprint of the cut slope has increased substantially. As depicted on Geologic Section E-E' (Figure 3), a 36 degree easterly-dipping bedding component will be exposed in the cut slope. As the bedding is steeper than the 2:1 (or 26

degrees) cut slope, the slope is considered grossly stable. Landslide Qls III will need to be completely removed and a 30 feet wide by 5 feet deep stability fill will need to be constructed to restore slope grades in the area of the landslide removal. The estimated landslide removal depths are indicated on Figure 2.7.

CUT SLOPE CS-12a

Cut Slope CS-12a (Figure 2.7) will consist of a 90-foot high, northeast-facing 2:1 slope. The cut slope will encounter sedimentary rock units of both the lower and upper Saugus Formation, Qls III, and Qls VIII. The slope is approximately 5 feet higher than the slope addressed by AES (2005b); all other conditions, including the geologic units and underlying geologic structure, remain the same. Consequently, AES' previous conclusions and recommendations remain applicable to Cut Slope CS-12a.

CUT SLOPE CS-12c

Cut Slope CS-12c (Figure 2.7) will consist of a northeast-facing, 2:1 slope that will attain a maximum height of approximately 25 feet. The revised cut slope height is approximately 25 feet less than the slope previously addressed by AES (2005b), and the northerly-facing segment of the slope has been eliminated. The slope will encounter upper Saugus Formation units in which the underlying bedding strikes northwest and dips 15 to 17 degrees towards the northeast. This bedding orientation is daylighted with respect to the proposed cut slope (see Geologic Section D-D', Figure 3). Stability analyses performed for potential failure along the adversely

oriented bedding indicate that proposed cut slope is grossly stable, and no further mitigation is recommended at this time.

CUT SLOPE CS-13

Cut Slope CS-13 (Figure 2.7) will consist of a north-northeast-facing, 2:1 slope that will attain a maximum height of approximately 50 feet. The revised cut slope height is approximately 10 feet less than the slope previously addressed by AES (2005b). The slope will encounter upper Saugus Formation units, landslide Qls I, and a surficial failure. Bedding within the underlying Saugus Formation strikes northwest and dips 16 to 24 degrees towards the northeast. This bedding orientation is daylighted with respect to the proposed cut slope (see Geologic Section F-F', Figure 3). Stability analyses performed for potential failure along the adversely oriented bedding indicate that proposed cut slope is grossly stable, from a geologic standpoint.

The recommended partial removal of Qls I (AES, 2005b) will likely undercut the proposed cut slope. A 30 feet wide by 5 feet deep stability fill will need to be constructed to restore slope grades in the area of the landslide removal. The recommended landslide removal depths are indicated on Figure 2.7. The stability fill will also effectively buttress the portion of the surficial failure left in place at conclusion the of the cut slope grading.

CUT SLOPE CS-14

Cut Slope CS-14 (Figure 2.7) will consist of a northeast-facing, 2:1 slope that will attain a maximum height of approximately 75 feet. The revised cut slope height is approximately 50 feet higher than the slope previously addressed by AES (2005b),

and the easterly-facing segment of the slope has been eliminated. The slope will encounter upper Saugus Formation units, landslide Qls VI, and artificial fill. The underlying bedding within the Saugus Formation strikes northwest and dips 15 to 19 degrees towards the northeast. This bedding orientation is daylighted with respect to the proposed cut slope (see Geologic Section D-D', Figure 3). Stability analyses performed for potential failure along the adversely oriented bedding indicate that proposed cut slope is grossly stable.

The cut slope will remove all of the artificial fill and most of Qls VI. Any landslide left in the finished cut slope will need to be removed, and slope grades restored by construction of a 30 feet wide by 5 feet deep stability fill. The stability fill, with backdrains, will also provide a means of controlling seepage along the daylighted bedding. The recommended landslide removal depths are indicated on Figure 2.7. with certified engineered fill.

CUT SLOPE CS-18

Cut slope CS-18 (Figure 2.3) is planned as a 110-foot high, north-, northwest-, and west-facing 2:1 slope. The cut slopes height and footprint have changed substantially from the cut slope described by AES (2005b). The cut slope will expose terrace deposits overlying undifferentiated Saugus Formation units. Bedding within the Saugus Formation is steeply dipping and favorably oriented. The terrace deposits are relatively flat-lying and the bedding is favorably oriented. Accordingly, the cut slope is considered grossly stable, from a geologic standpoint. However, the terrace deposits are weakly cemented and subject to erosion and/or surficial failures. It is recommended that a 35 feet wide by 5 feet deep stability fill be constructed for the

west-facing segment of the cut slope; a 30 feet by 5 feet deep stability fill is recommended for the north- and northwest-facing segment.

The cut slope should be observed and mapped by a geologist at the time of grading. If the terrace deposits are located above the highest drainage terrace, it may be feasible to construct the stability fill from the upper bench to the top of the cut slope, thereby reducing the width (and possibly depth) of the stability fill keyway.

CUT SLOPE CS-19

Cut Slope CS-19 (Figure 2.3) will consist of a northwest-, southwest-, and southeast-facing variable 2:1 to 3:1 slope constructed for a proposed Water Quality Basin. The slope will attain a maximum height of approximately 25 feet, and will encounter terrace deposits overlying undifferentiated Saugus Formation units. The footprint for the cut slope is significantly different from the slope addressed by AES (2005b). However, the AES conclusions and recommendations remain the same; the cut slope is grossly stable and no mitigation is anticipated at this time for the basin slope.

CUT SLOPE CS-20

Cut Slope CS-20 (Figure 2.3) will consist of a 140 -foot high, 2:1 southwest-facing slope. The revised cut slope height is approximately 90 feet higher than previously proposed (AES. 2005b). The cut slope will expose undifferentiated Saugus Formation units. Bedding within the underlying Saugus Formation strikes west-northwest, with dips ranging from 70 degrees to near-vertical towards the southwest.

The slope is considered grossly stable from a geologic standpoint, due to the steeply dipping beds.

CUT SLOPE CS-24

Cut Slope CS-24 (Figure2.4) will be graded as a 25-foot high, northwest-facing 2:1 slope. The revised cut slope height is approximately 20 feet lower than the slope previously addressed by AES (2005b) and the cut slope, formerly facing north and northeast, now faces northwest. The cut slope will expose upper Saugus Formation units and landslide Qls XLII. Bedding within the underlying Saugus Formation strikes northwest and dips 25 to 30 degrees towards the northeast. The bedding orientation is neutral, striking essentially parallel to the slope face direction. Accordingly, the cut slope is considered grossly stable. It is anticipated that the proposed cut slope grading will remove the entire landslide, and no further mitigation is recommended at this time.

CUT SLOPE CS-26

Cut slope CS-26 (Figures 2.4 and 2.5) is planned as a 40-foot high, 2:1 northwest-facing slope. This cut slope was formerly designated as CS-26a by AES (2005b), and was previously 5 feet higher with northwest- and northeast-facing segments. Cut Slope CS-26 is underlain by upper Saugus Formation units in which the underlying bedding strikes northwest and dips approximately 30 degrees to the northeast. This bedding orientation is neutral, relative to the northwest-facing cut slope. The slope is considered grossly stable.

CUT SLOPE CS-53

Cut Slope CS-53 (Figure 2.5) will consist of a east-facing 2:1 slope that will attain a maximum height of approximately 105 feet. The slope will encounter upper Saugus Formation units capped by terrace deposits. The underlying bedding within the Saugus Formation strikes northwest and dips 10 to 15 degrees towards the northeast. This bedding orientation is daylighted with respect to the proposed cut slope (see Geologic Section B-B', Figure 3). Stability analyses performed for potential failure along the adversely oriented bedding indicate that proposed cut slope is grossly stable, from a geologic standpoint. As currently proposed, there are no terrace drains below elevation 1,200 feet (above mean sea level) in the central portion of Cut Slope CS-53. The proposed terrace drains along the north and south limits of the cut slope should be extended across the entire face of the cut slope to control surface drainage. No further mitigation is recommended at this time.

CUT SLOPE CS-54

Cut slope CS-54 (Figure 2.7) will consist of a 40-foot high, 2:1 southwest-facing slope that will expose lower Saugus Formation units. Bedding within the Saugus Formation strikes northwest and dips approximately 30 to 40 degrees towards the northeast. This bedding is favorably oriented, relative to the southwest-facing cut slope, and the slope is considered grossly stable.

CUT SLOPE CS-55

Cut Slope CS-55 (Figure 2.3) will consist of a 130-foot high, southwest-facing 2:1 slope. The cut slope will expose undifferentiated Saugus Formation units.

Bedding within the underlying Saugus Formation strikes west-northwest, with dips ranging from 60 degrees to near-vertical towards the southwest. The slope is considered grossly stable due to the steeply dipping beds.

CUT SLOPE CS-56

Cut slope CS-56 (Figure 2.3) will be graded as a 25-foot high, northwest- and west-facing 2:1 slope. The cut slope will expose terrace deposits. The terrace deposits are relatively flat-lying and the bedding favorably oriented. Accordingly, the cut slope is considered grossly stable, from a geologic standpoint. However, the terrace deposits are weakly cemented and subject to erosion and/or surficial failures. It is recommended that a 20 feet wide by 3 feet deep stability fill be constructed for Cut Slope CS-56.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

Based on our review the previous AES plan review reports, and additional analyses completed as part of this work, revisions to VTTM 61105 are feasible and may be graded as proposed. Except as modified herein, conclusions and recommendations from the AES reports (AES, 2004b; 2004d; and 2005b) are applicable and should be implemented during the design and construction phases of this project.

AIRPORT MESA BUILDING SETBACKS

The potential for surface rupture hazard due to active faulting beneath Airport Mesa (Area E1) was previously investigated by AES (2004a), and included extensive field exploration. Although not establishing Holocene activity, at the conclusion of their report AES recommended Building Setbacks for the geologic features designated on Figure 2.3 as the Airport Mesa fault, the Saddle fault, the Airport Mesa anticline, and the Saddle syncline (collectively designated by RTF&A as the "Airport Mesa structural zone"). AES stated that the Building Setbacks were needed based on observed geologic conditions, the age of materials cut by faulting, and the style of deformation. The AES Building Setbacks measured approximately 200 feet for the Airport Mesa fault, 200 feet for Saddle fault, and 250 feet for the Airport Mesa anticline. Our office evaluated the AES Building Setbacks and presented our findings and conclusions in our October 14, 2009 report (RTF&A, 2009b). Based on our review of the AES data and reports, we concluded the following:

- the Airport Mesa structural zone is not located within an Alquist-Priolo Earthquake Fault Zone or designated as active by the Los Angeles County Safety Element (LACSE);

- unlike ground rupture identified in Stevenson Ranch following the Northridge earthquake, there is no data or reports of earthquake ground rupture features occurring on Airport Mesa following the 1971 San Fernando or 1994 Northridge earthquakes;

- the Airport Mesa structural zone may be age equivalent with the nearby Holser fault, which has been determined by Geolabs (2007) as falling within the 40,000 to 100,000 before present age range;

- the AES exploration failed to identify any evidence of surface fault rupture or fault activity younger than 11,000 years. Therefore, by criteria established for the A-P Act by the State Geologist, and the LACSE, the faults and folds comprising the Airport Mesa structural zone are not active geologic structures and no building setbacks are required;

- the Airport Mesa structural zone has demonstrated movement in late Quaternary time, but not Holocene time, and by definition is considered potentially active. There is no requirement or precedent in the A-P Act or the LACSE for establishing building setbacks from potentially active faults; and

- the Airport Mesa anticline is a fold, not a fault. There is no requirement, nor precedent in either the A-P Act or the LACSE for building setbacks for folds.

Consequently, RTF&A's recommended that the Building Setbacks delineated by AES for Airport Mesa be eliminated for all proposed residential, commercial, or industrial developments. If critical facilities or essential service buildings are planned for the site, the need for setbacks should be determined once building plans have been prepared.

RESTRICTED USE AREAS

AES (2005b) previously established Restricted Use Areas (RUAs) for the features designated as the Airport Mesa fault, Airport Mesa anticline, and Saddle "lineament". As discussed above, it is RTF&A's recommendation that these RUAs be eliminated from the revised VTTM 61105.

All other RUAs established by AES should remain. The RUAs are delineated on Figures 2.3 through 2.8.

SECTION 111 STATEMENT

Based on the findings summarized in this submittal, it is our professional opinion that the proposed grading, as depicted on revised VTTM 61105, and any future structures at the site, will be safe from the hazards of landslide, settlement, or slippage. Furthermore, the proposed site grading will not adversely affect adjacent properties. This statement assumes that the recommendations contained herein and in the Los Angeles County Building Code are followed during design and construction.

LIMITATIONS

Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers and engineering geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report has been prepared for Newhall Land and Farming Company and their design consultants to be used solely for planning and design of VTTM 61105. The report has not been prepared for use by other parties and may not contain sufficient information for purposes of other parties or other uses.

We appreciate the opportunity to be of service. Please call if you have questions or would like to discuss this report in more detail.

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The following are attached and complete this report:

- References
- Summary of Cut Slopes - Table 1
- Geotechnical Map Explanation - Figure 1 (in pocket)
- Geotechnical Map - Figure 2.1 through 2.12 (in pocket)
- Geologic Sections - Figures 3 (in pocket)
- Appendix - Slope Stability Analyses (9 pages)

Respectfully submitted,

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TABLE 1

SUMMARY OF CUT SLOPES
Mission Village/Vesting Tentative Tract No. 61105

CUT SLOPE	FIGURE NO.	SLOPE GRADIENT	SLOPE HEIGHT (feet)	SLOPE FACE DIRECTION	GEOLOGIC MATERIALS	GEOLOGIC SECTION	GEOLOGIC STABILITY	MITIGATION
CS-1a	2.6	2:1	65	W	TQsl	6-6'	Steeply dipping bedding; stable geologic structure	Construct 30' wide by 5' deep stability fill
CS-1b	2.6	2:1	75	W	TQsl	---	Steeply dipping and favorable bedding; stable geologic structure	Construct 30' wide by 5' deep stability fill
CS-2	2.6	2:1	70	N to W	TQsl, Qal, af	34-34'	Steeply dipping and neutral bedding; stable geologic structure	Grading will remove Qal & af, construct 25' wide by 3' deep stability fill along north facing segment to eliminate"sliver" fill
CS-3a	2.5 & 2.6	2:1	35	S	TQsu & af	---	Neutral bedding, stable geologic structure	Grading will remove af
CS-3b	2.5 & 2.6	2:1	35	E	TQsu & af	---	Daylighted bedding, grossly stable by inspection	Construct 20' wide by 3' deep stability fill to control erosion and seepage along daylighted bedding
CS-3c	2.6	2:1	35	N	TQsu, Qls, af	---	Daylighted bedding; grossly stable by inspection	Grading will remove Qls & af, construct 20' wide by 3' deep stability fill to control erosion and seepage along daylighted bedding
CS-4	2.6 & 2.7	2:1	40	N	TQsl, TQsu, Qls, af	32-32' & 33-33'	Daylighted bedding, grossly stable by analyses	Remove Qls & af; construct 20' wide by 3' deep stability fill to control erosion and restore slope grades in Qls removal area
CS-5	2.6	2:1	130	NW	TQsl & Qls	48-48' & 8E-8E'	Neutral bedding; stable geologic structure	Grading will remove Qls
CS-6	2.7	2:1	110	N & E	TQsl & three Qls	49-49' & 8E-8E'	Daylighted bedding to steeply dipping bedding; stable by analyses	Remove landslides; construct 100' wide by 10' deep buttress for daylighted bedding and to restore slope grades in Qls removal areas
CS-7	2.7	2:1	30	NNE	TQsl & Qsw	C-C'	Daylighted bedding, grossly stable by analyses	Construct 20' wide by 3' deep stability fill to control erosion and seepage along daylighted bedding
CS-8	2.7	2:1	95	N, NW & W	TQsl & Qsw	47-47'	Neutral (stable) bedding for NW facing segment; N facing unstable	Grading will remove Qsw; construct 110' wide by 5' deep buttress w/1.5:1 backcut for N facing segment
CS-9	2.7	2:1	80	NNE	TQsl, Qls & Qsw	46-46'	Steeply dipping bedding; grossly stable by analyses	None
CS-10	2.7	2:1	140	NE	TQsl & Qls	18-18' & 19-19'	Steeply dipping and favorable bedding; stable geologic structure	Remove Qls; construct 30' wide by 5' deep stability fill to eliminate "sliver" cut and restore slope grades in Qls removal area
CS-11	2.7	2:1	55	E	TQsl & Qls	E-E'	Steeply dipping bedding; grossly stable by inspection	Remove Qls; construct 30' wide by 5' deep stability fill to restore slope grades in Qls removal area
CS-12a	2.7	2:1	90	NE	TQsl, TQsu & Qls	44-44' & 11E-11E'	Daylighted bedding lower portion of slope; stable by analyses	Remove Qls, construct 30' wide by 5' deep stability fill to restore slope grades in Qls removal areas
CS-12c	2.7	2:1	25	NE	TQsu	D-D'	Daylighted bedding, grossly stable by analyses	None
CS-13	2.7	2:1	50	NNE	TQsu, Qls & Qsf	F-F'	Daylighted bedding, grossly stable by analyses	Remove Qls, construct 30' wide by 5' deep stability fill to restore slope grades in Qls removal area
CS-14	2.7	2:1	75	NE	TQsu, Qls & af	D-D'	Daylighted bedding, grossly stable by analyses	Remove Qls; construct 30' wide by 5' deep stability fill to restore slope grades in Qls removal areas and control seepage along bedding
CS-15	2.5 & 2.7	2:1	70	N	TQsu, Qls, Qsw & af	22-22' & 45-45'	Daylighted bedding; unstable	Construct 85' wide by 10' deep buttress w/1.5:1 backcut (eastern half); 85' wide by 15' deep buttress w/ 1.5:1 backcut (western half)
CS-16	2.3	2:1	30	N	TQsu, Qls & af	41-41'	Unstable due to landslide	Remove landslide beneath slope and upper pad; construct buttress to support slope and pad above landslide

Newhall Land and Farming Company
December 21, 2009
94-502-21

TABLE 1

SUMMARY OF CUT SLOPES
Mission Village/Vesting Tentative Tract No. 61105

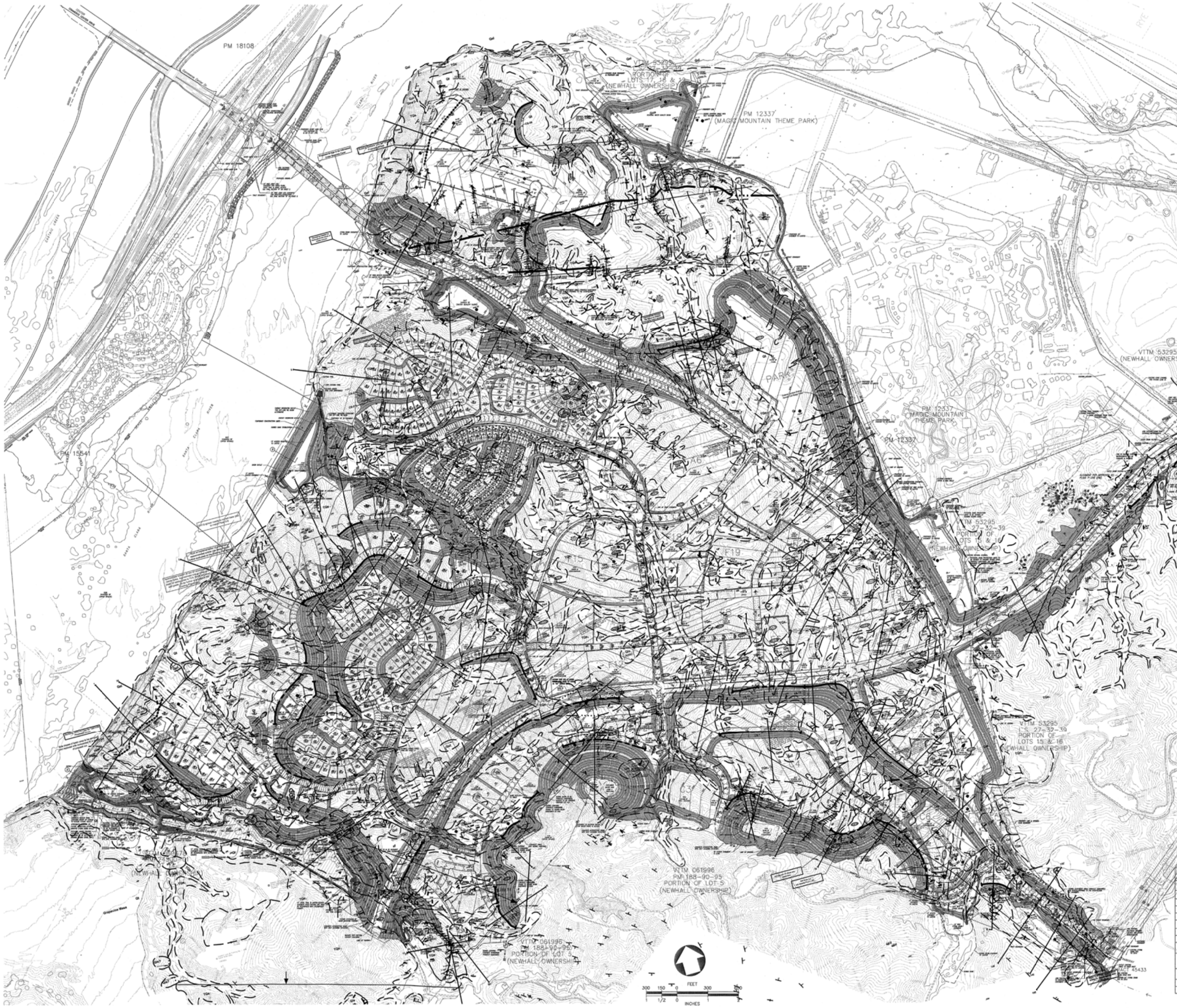
CUT SLOPE	FIGURE NO.	SLOPE GRADIENT	SLOPE HEIGHT (feet)	SLOPE FACE DIRECTION	GEOLOGIC MATERIALS	GEOLOGIC SECTION	GEOLOGIC STABILITY	MITIGATION
CS-18	2.3	2:1	110	W, N & NW	TQs & Qt	----	Favorable bedding; Qt susceptible to erosion	Construct 35' by 5' stability fill (west-facing segment); construct 20' by 3' stability fill (north- and northwest-facing segment)
CS-19	2.3	2:1 to 3:1	25	NW, SW & SE	Qt over TQs	----	Stable geologic structure	None
CS-20	2.3	2:1	140	SW	TQs	----	Steeply dipping and favorable bedding; stable geologic structure	None
CS-21a	2.4	2:1	30	E	TQsu	----	Favorable bedding; stable geologic structure	None
CS-21b	2.4	2:1	55	S	TQsu	----	Favorable bedding; stable geologic structure	None
CS-23	2.4	2:1	40	NW	TQsu & Qls	----	Favorable bedding; stable geologic structure	Grading will remove landslide
CS-24	2.4	2:1	25	NW	TQsu & Qls	----	Neutral bedding; stable geologic structure	Grading will remove landslide
CS-26	2.4 & 2.5	2:1	40	NW	TQsu	----	Neutral bedding; stable geologic structure	None
CS-27	2.4	2:1	50	N	TQsu	23-23'	Daylighted bedding, grossly stable by analyses	Construct 30' wide by 3' deep stability fill to control erosion and seepage along daylighted bedding
CS-28a	2.4	2:1	115	W	TQsl & af	----	Favorable bedding; stable geologic structure	None
CS-28b	2.4	2:1	85	N & NW	TQsl, TQsu, Qls, af	23-23', 24-24', 31-31', 2E-2E'	Daylighted bedding, western portion stable, eastern portion unstable	Grading will remove landslide; construct stability/buttress fill 30' wide by 5' deep for full slope length
CS-29	2.4	2:1	90	NE	TQsu	15-15'	Daylighted bedding, unstable	Construct 75' wide by 10' deep buttress w/2.75:1 backcut
CS-30	2.4	2:1	25	N	TQsl & Qsw	----	Neutral to shallow daylighted component; stable geologic structure	Grading will remove Qsw
CS-31	2.4 & 2.6	2:1	30	N	TQsl & af	----	Neutral to shallow daylighted component; stable geologic structure	Grading will remove af
CS-32	2.4 & 2.6	2:1	40	E	TQsl	----	Neutral to shallow daylighted component; stable geologic structure	None
CS-33	2.6	2:1	35	W	Qt	----	Favorable bedding; Qt susceptible to erosion	Construct 25' wide by 3' deep stability fill to eliminate fill over cut condition and control ersosion of Qt
CS-34	2.6	2:1	65	NW & W	QT & af	----	Favorable bedding; Qt susceptible to erosion	Grading will remove af. Construct 30' wide by 5' deep stability fill to control erosion of Qt
CS-35	2.4 & 2.6	2:1	130	W	TQsl & Qt	----	Favorable bedding; stable geologic structure	Construct 45' wide by 5' deep stability fill to eliminate fill over cut condition and control ersosion of Qt
CS-37	2.6	2:1	25	NW	Qt & af	----	Favorable bedding; stable geologic structure	Grading will remove af. Construct 20' wide by 3' deep stability fill to control erosion of Qt
CS-38	2.6	2:1	50	SW	TQsl	----	Stable geologic structure; "sliver" cut	Construct 20' wide by 3' deep stability fill to eliminate "sliver" cut

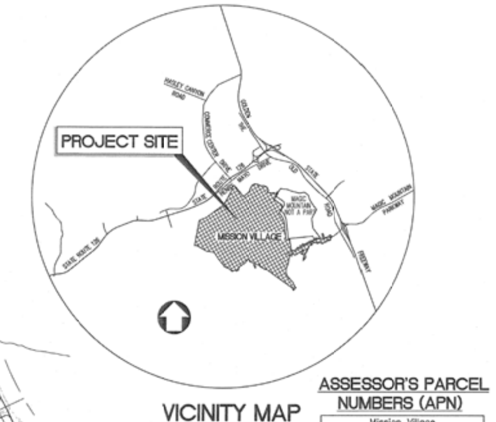
Newhall Land and Farming Company
December 21, 2009
94-502-21

TABLE 1

SUMMARY OF CUT SLOPES
Mission Village/Vesting Tentative Tract No. 61105

CUT SLOPE	FIGURE NO.	SLOPE GRADIENT	SLOPE HEIGHT (feet)	SLOPE FACE DIRECTION	GEOLOGIC MATERIALS	GEOLOGIC SECTION	GEOLOGIC STABILITY	MITIGATION
CS-39	2.6	2:1	65	SW	Qt	---	Favorable bedding; Qt susceptible to erosion	Construct 30' wide by 5' deep stability fill to eliminate fill over cut condition and control erosion of Qt
CS-40	2.6	2:1	50	SW	Qt & af	---	Favorable bedding; Qt susceptible to erosion	Grading will remove af. Construct 30' wide by 5' deep stability fill to control erosion of Qt
CS-41	2.6	2:1	25	SW	Qt & af	---	Favorable bedding; Qt susceptible to erosion	Grading will remove af. Construct 20' wide by 3' deep stability fill to control erosion of Qt
CS-42	2.6	2:1	35	W	TQsl & af	---	Favorable bedding; stable geologic structure	Grading will remove af
CS-43	2.6	2:1	30	SE	TQsl & af	---	Favorable bedding; stable geologic structure	Grading will remove af
CS-44	2.6	2:1	40	NW	TQsl	---	Favorable bedding; stable geologic structure	None
CS-45	2.6	2:1	40	NW	TQsl	---	Favorable bedding; slope traversed by anticline	Construct 25' wide by 3' deep stability fill to control potential erosion of TQsl along anticlinal axis
CS-46	2.8	2:1 to 3:1	100	N	TQsu & Qt	42-42' & 43-43'	Favorable bedding; stable geologic structure	None
CS-47	2.8	2:1 to 3:1	55	S	TQsu	---	Favorable bedding; stable geologic structure	None
CS-48	2.8	2:1	50	N	TQsu & Qt	---	Favorable bedding; stable geologic structure	Construct 30' wide by 5' deep stability fill to control erosion of Qt
CS-49	2.8	2:1	45	N	Qt	---	Favorable bedding; Qt susceptible to erosion	Construct 25' wide by 3' deep stability fill to control erosion of Qt
CS-50	2.8	2:1 to 3:1	75	N	Qt & af/Qal	---	Favorable bedding; Qt susceptible to erosion	Construct 30' wide by 5' deep stability fill to control erosion of Qt
CS-51	2.8		75	N	Qt	51-51'	Favorable bedding; Qt susceptible to erosion	Construct 30' wide by 5' deep stability fill to control erosion of Qt
CS-52	2.8	3:1	30	S & E	Qt	---	Favorable bedding; Qt susceptible to erosion	Construct 25' wide by 3' deep stability fill to control erosion of Qt
CS-53	2.5	2:1	105	E	TQsu & Qt	B-B'	Daylighted bedding, grossly stable by analyses	Extend terrace drains across the entire slope face to control surface drainage
CS-54	2.7	2:1	40	SW	TQsl	---	Favorable bedding; stable geologic structure	None
CS-55	2.3	2:1	130	SW	TQs	A-A'	Steeply dipping and favorable bedding; stable geologic structure	None
CS-56	2.3	2:1	25	NW & W	Qt	---	Favorable bedding; Qt susceptible to erosion	Grading will remove af. Construct 20' wide by 3' deep stability fill to control erosion of Qt





VICINITY MAP

NOT TO SCALE

ASSESSOR'S PARCEL NUMBERS (APN)

Mission Village	
2826-002-022	2826-003-028
2826-003-021	2826-003-029
2826-003-022	2826-003-030
2826-003-023	2826-003-031
2826-003-024	2826-007-019
2826-003-025	2826-008-030
2826-003-026	2826-009-081
2826-003-027	
Off-Site Improvements	
Easterly Extension of Magic Mountain Parkway	
2826-008-030	2826-008-020
2826-007-016	
Water Quality Basin	
2826-007-019	
Utility Corridor	
2826-003-031	2826-002-021
2826-004-040	2826-002-023
Electrical Substation -Alt 1	
2826-123-002	
Electrical Substation Alt 2	
2826-009-104	

EARTHWORK:

Area	Adjusted Cut Volume (CY)	Adjusted Fill Volume (CY)
Mission Village On-site	28,000,000	28,400,000
Magic Mountain Parkway Off-site	900,000	500,000
Off-site Utility Corridor	618,000	618,000
Total	29,518,000	29,518,000
Off-site SCE Substation (Alt 1)	7,000	7,000
Off-site SCE Substation (Alt 2)	139,000	3,000
Disposal Site For Alt 2	0	136,000

PROJECT SUMMARY:

GROSS AREA – 1252.8 Acres
TOTAL LOTS – 658
TOTAL D.U. – 4,412
EXISTING ZONING – SP (NEWHALL RANCH SPECIFIC PLAN)
PROPOSED ZONING – SP (NEWHALL RANCH SPECIFIC PLAN)
GENERAL PLAN LAND USE – SP (NEWHALL RANCH SPECIFIC PLAN)

Lot Numbers	No. of Lots	Type (Use)	Dwelling Units	Total Acres
Area A1				
157	1	Elementary School		9.5
Area A2				
1–123	123	55'x110' SFD (6,050 sf) min.	123	26.7
124–139	16	Open Space		12.8
140–149	10	Private & Future Street		8.2
Area A3				
550–640	91	50'x80' SFD (4,000 sf) min.	91	10.2
641–645	5	Open Space		6.7
Area A4				
158	1	Condominiums	60	5.1
159–160	2	Open Space		0.9
Area A5				
161	1	Condominiums	153	13.1
Area A6				
162	1	Condominiums	201	12.6
Area A7				
163–176,178–258	95	65'x110' SFD (7,150 sf) min.	95	22.5
177	1	Recreation		0.3
259–273	15	Open Space		6.3
274–278	5	Private & Future Street		6.4
Area A8				
279–351	73	Toc/lot avg. SFD*	73	73.0
352	1	Water Quality Basin		2.8
353–356,360,362–366	10	Open Space		34.6
368–370	3	Private & Future Street		11.5
371–375	5	Private Drive		2.8
Area A9, A10, B1 and B2				
361	1	Area A9 Condominiums	60	6.7
376	1	Area A10 Condominiums	80	9.4
377–379	3	Open Space (LDZ)		0.7
380	1	B1 Condominiums	92	12.7
381	1	B2 Condominiums	186	14.2
382–383	2	Open Space (LDZ)		1.8
Area C1				
384–387	4	Age Qualified Condominiums	63	9.7
388–390	3	Private Drive		1.8
391–395	5	Open Space		6.3
396	1	Fire Access Road		0.5
Area C2				
397–407, 411	12	Age Qualified Condominiums	113	17.7
408–410, 412	4	Private Drive		1.7
414–422	9	Open Space		30.3
423	1	Water Tanks		1.4
Area C3				
424	1	Recreation Center		4.6
425	1	Open Space		1.6
426	1	Open Space (LDZ)		0.4
Area C4				
427	1	Age Qualified Condominiums	129	21.3
428–431	4	Open Space		18.3
Area C5				
434	1	Age Qualified Condominiums	88	16.3
435–437	3	Open Space		12.9
438	1	Open Space (LDZ)		< 0.1
Area C6				
439	1	Age Qualified Condominiums	34	7.3
440	1	Open Space		1.9
441–442	2	Open Space (LDZ)		0.1
Area C7				
443	2	Apartment/Condominium	96	4.6
444	2	Open Space (LDZ)		0.1
Area C8				
445		Apartment/Condominium	179	6.7
446		Open Space (LDZ)		0.6
Area C9		Mixed Use Commercial		
447	1	154,000 sf		6.6
449, 451–452	3	Open Space		11.7
453–454	2	Open Space (LDZ)		1.0
455–459	5	Private Drive		13.1
460–467	8	Open Space (LDZ)		3.8
Area D1				
468	1	Apartment/Condominium	326	10.3
470–475	6	Open Space		37.0
476–479	4	Open Space (LDZ)		0.6
Area E1		Mixed Use Commercial		
480–484	5	697,000 sf		36.1
485	1	Private Drive		1.5
486	1	Water Quality Basin		1.8
487–495, 498–499	11	Open Space		45.4
502–507	6	Open Space (LDZ)		4.0
Village Center				
F1 508	1	Mixed Use Commercial 337,170 sf		6.9
F2 530	1	Mixed Use Commercial 35,000 sf		2.4
F3 509, 510	2	Mixed Use Commercial 139,100 sf		5.2
F4 511	1	Mixed Use Residential/Commercial 48,100 sf	264	5.1
F5 512	1	Mixed Use Residential/Commercial 18,300 sf	272	4.5
F6 513	1	Apartment/Condominium	96	3.2
F7 514	1	Apartment/Condominium	216	7.8
F8 515	1	Library		4.0
F9 516	1	Transit		1.2
F10 517	1	Condominiums	99	3.8
F11 518	1	Condominiums	96	4.4
F12 519	1	Condominiums	128	5.1
F13 520	1	Condominiums	96	5.1
F14 521	1	Condominiums	105	6.7
F15 522	1	Condominiums	126	7.8
F16 523	1	Condominiums	114	5.3
F17 524	1	Condominiums	87	3.5
F18 525	1	Condominiums	120	6.5
F19 526	1	Recreation Center		6.9
F20 527	1	Private Park		2.9
F21 528	1	Continued Care Retirement Community	351	13.6
F22 529	1	Mixed Use Commercial 126,430 sf		2.4
531–532	2	Open Space		3.0
533–540	8	Private Drive		13.8
541–549	9	Open Space (LDZ)		3.7
Miscellaneous				
150–156	7	Open Space		12.6
357, 646, 654	3	Sewer Lift Station		0.5
358–359	2	Open Space (Lyon Cyn)		17.3
367, 655	2	Open Space (River Adjacent)		27.2
413, 432, 450, 497	4	Debris Basin		3.6
433	1	Water Facilities		1.4
448	1	Fire Station		1.5
469	1	Park		21.0
496, 647, 656	3	Water Quality Basin		13.7
500–501	2	Spineflower Preserve		65.7
648	1	Open Space		1.8
649	1	CCD Bridge		3.7
650–651, 657–658	4	Open Space (River)		218.0
652	1	Open Space		4.5
653	1	Park		5.2
		Public R/W		67.7
		CALTRANS R/W		2.2
Total	658		4412	1252.8

* ALLOWS 73 SECONDARY UNITS (1/LOT)

ABBREVIATIONS:
MMP = MAGIC MOUNTAIN PARKWAY
SFD = SINGLE FAMILY DWELLING UNIT
CCD = COMMERCE CENTER DRIVE
LDZ = LANDSCAPE DEVELOPMENT ZONE

GENERAL NOTES:

1. GRADE ELEVATIONS ON THE VTTM ARE APPROXIMATE. CHANGES IN THE ELEVATIONS DEPICTED ON THE TENTATIVE MAP WHICH WILL NOT SUBSTANTIALLY ALTER THE APPROVED GRADING PLAN OR RESULT IN PAD ELEVATION CHANGES OF MORE THAN 10 FEET ARE PERMITTED SUBJECT TO THE PROVISIONS OF SECTION 5.2 OF THE NEWHALL RANCH SPECIFIC PLAN.
2. PERMISSION IS REQUESTED FOR LOT LINES TO BE ADJUSTED TO THE SATISFACTION OF DRP AND DPW PROVIDED NO ADDITIONAL DEVELOPABLE LOTS ARE CREATED. THE DEGREE OF ADJUSTMENT SHALL BE CONSISTENT WITH THE INTENT OF THE SUBDIVISION MAP APPROVAL AND THE SUBDIVISION MAP ACT.
3. ALIGNMENT AND GEOMETRICS OF STREETS AND TRAILS ARE APPROXIMATE. PERMISSION IS REQUESTED FOR ADJUSTMENTS TO STREETS TO BE MADE PROVIDED THE DEPARTMENT OF PUBLIC WORKS AND DRP DETERMINE THAT THE ADJUSTMENTS ARE CONSISTENT WITH THE INTENT OF THE SUBDIVISION APPROVAL. ADJUSTMENTS TO TRAILS CAN BE MADE WITH APPROVAL BY DRP AND THE DEPARTMENT OF PARKS AND RECREATION.
4. BUILDING FOOTPRINTS SHOWN ON THE TENTATIVE MAP OR ACCOMPANYING SITE PLAN EXHIBIT MAPS ARE ONLY FOR ILLUSTRATIVE PURPOSES. RELOCATION OF BUILDINGS, OR ADJUSTMENTS IN BUILDING SQUARE FOOTAGE, NUMBER OF BUILDINGS, PARKING REQUIREMENTS AND OTHER FEATURES WHICH WILL NOT RESULT IN AN INCREASE IN TOTAL SQUARE FOOTAGE OR THE NUMBER OF DWELLING UNITS ARE PERMITTED SUBJECT TO THE PROVISIONS OF SECTION 5.2 OF THE NEWHALL RANCH SPECIFIC PLAN.
5. PERMISSION IS REQUESTED TO FILE "LARGE LOT" PARCEL MAPS OF 20 ACRES OR MORE (WITHOUT IMPROVEMENTS) OR 5 ACRES OR MORE (WITH IMPROVEMENTS) AS THE FIRST UNIT FINAL MAP. RECORDATION OF A LARGE LOT PARCEL MAP SHALL BE CONSIDERED THE FILING OF THE FIRST UNIT MAP FOR THE PURPOSES OF TIME EXTENSIONS PURSUANT TO THE SUBDIVISION MAP ACT BUT SHALL NOT REQUIRE THE OBLIGATION OF FEES, DEDICATIONS (EG. RIGHTS OF WAY OR PARKS) EXACTIONS OR INFRASTRUCTURE EXCEPT AS MAY BE REQUIRED BY CHAPTER 21.32 OF THE SUBDIVISION MAP ACT.
6. PERMISSION IS REQUESTED FOR UNIT MAP PHASING.
7. PERMISSION IS REQUESTED TO COMBINE LOTS.
8. PERMISSION IS REQUESTED TO RECORD ADDITIONAL OPEN SPACE LOTS.
9. THE LOCATIONS OF APPURTENANT STRUCTURES (E.G., PASEOS, PEDESTRIAN BRIDGES, TRANSIT SHELTERS) MAY BE RELOCATED IF DETERMINED TO BE CONSISTENT WITH THE APPROVED TENTATIVE MAP BY DRP AND DPW.
10. PROPOSED RETAIL AND OFFICE FLOOR AREA ARE INTERCHANGEABLE IF THE REQUIRED PARKING IS PROVIDED.
11. REQUEST PERMISSION TO PHASE MASS GRADE TO THE SATISFACTION OF DRP AND DPW AND THE PROVISIONS OF THE COUNTY CODE, APPROVED PROJECT CONDITIONS AND MITIGATION MEASURES.
12. PROPOSED STREET GRADES ARE APPROXIMATE AND SUBJECT TO ADJUSTMENTS PENDING DETERMINATION OF FINAL DEVELOPMENT LAYOUT AND PLANS. ANY CHANGES SHALL BE TO THE SATISFACTION OF DPW.
13. PROVIDE PROPERTY LINE RETURN RADII OF 13 FEET AT ALL LOCAL STREET AND PRIVATE DRIVE INTERSECTIONS, AND 27 FT AT THE INTERSECTION OF LOCAL STREETS OR PRIVATE DRIVES WITH PLANNED HIGHWAYS (THOSE ON THE COUNTY HIGHWAY PLAN) AND WHERE ALL PLANNED HIGHWAYS INTERSECT OR WHERE ONE OF THE ROADS SERVES A COMMERCIAL OR INDUSTRIAL DEVELOPMENT PLUS ADDITIONAL RIGHT OF WAY FOR CORNER CUT OFF TO MEET CURRENT GUIDELINES OF THE AMERICANS WITH DISABILITIES ACT (ADA) TO THE SATISFACTION OF PUBLIC WORKS.
14. ALL DIMENSIONS SHOWN ARE APPROXIMATE.
15. TOPO COMPILED ON 11/13/06 BY HUNSAKER FROM DATA FLOWN 3/24/06.
16. REQUEST MODIFICATION OF STREET FRONTAGE REQUIREMENTS PER SECTION 21.24.040 OF THE L.A. COUNTY CODE
17. SHARED AND RECIPROCAL PARKING IS DEPICTED PER THE PROVISIONS OF THE NEWHALL RANCH SPECIFIC PLANS SUBJECT TO CONFORMANCE REVIEW OR APPROVAL OF A PARKING PROGRAM.
18. NOT ALL RETAINING WALL ARE DEPICTED ON THE TENTATIVE MAP. ADDITIONAL RETAINING WALLS MAY BE NECESSARY.

LEGEND:

Lot 1 — LOT NO.
1,000 SF — LOT AREA (SQUARE FEET)
1010.0 — PAD ELEVATION
PROJECT BOUNDARY
PROPOSED RIGHT OF WAY
PROPOSED UTILITY EASEMENT
EXISTING EASEMENT
FUTURE RIGHT OF WAY
1000 — PROPOSED CONTOUR
DAYLIGHT LINE
R — RIDGE LINE
SD — STORM DRAIN
SS — SANITARY SEWER
W — WATER
STORM DRAIN INLET
CATCH BASIN
EXISTING POWER POLE
SEA — SEA, RIVER CORRIDOR
FEMA — FEMA
050 — EXISTING COUNTY FLOODPLAIN
404_1603
BURIED BANK STABILIZATION
LINE OF SIGHT EASEMENT
ACCESS ROAD
SLOPE TOE PROTECTION
ABANDONED OIL WELL
EXISTING OAK TREE WITH NUMBER

SURVEY NOTES:

VERTICAL DATUM:
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS BENCHMARK DESCRIBED AS FOLLOWS: LACDPW L5402 RND HD SPK IN LOWER CONC HDWL @ N END 24 FT W/O C/L THE OLD RD (W RDWY) AND 0.6 MI S/O HENRY MAYO DR @ MI MKR #6.25 NEWHALL QUAD. 1995 ADJUSTMENT (NAVD 1988) ELEVATION = 1031.951

THERE IS APPROXIMATELY 2.3 FEET DIFFERENCE BETWEEN PREVIOUS COUNTY OF LOS ANGELES DATUMS BASED UPON NAVD 1929 AND NAVD 1988 (NAVD 1988 IS 2.3 FEET HIGHER THAN NAVD 1929).

AERIAL PLANIMETRY:
THIS SURVEY WAS PREPARED BY PHOTOGRAMMETRIC PROCESSES, UTILIZING AERIAL PHOTOGRAPHY DATED NOVEMBER 15, 2006. THE OUTLINE OF BUILDINGS AND OTHER ROOFED IMPROVEMENTS, MAY INCLUDE EAVES, CANOPIES AND BALCONIES, SINCE BUILDINGS BELOW THESE ITEMS ARE NOT VISIBLE TO THE CAMERA.

TOPOGRAPHY:
BY PHOTOGRAMMETRIC PROCESSES FROM LIDAR IMAGING DATED NOVEMBER 15, 2006, AND COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS.

CONTOUR INTERVAL:
10 FOOT, UNLESS OTHERWISE NOTED.

SHEET INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	SECTIONS & EASEMENTS
3	ONSITE VTTM
4	ONSITE VTTM
5	ONSITE VTTM
6	ONSITE VTTM
7	ONSITE VTTM
8	MAGIC MOUNTAIN PKWY EXTENSION
9	SEWER – INTERIM & ULTIMATE CONDITIONS & SCE SUBSTATION ALTERNATIVES
10	LARGE LOT PARCEL MAP AND PHASING MAP
11	OFFSITE UTILITY CORRIDOR
12	OFFSITE UTILITY CORRIDOR

OFF-SITE IMPROVEMENTS:

1. REGIONAL WATER QUALITY BASIN IS PROPOSED WITHIN THE PROJECT BOUNDARY OF VTTM 53295/ENTRADA.
2. THE UTILITY CORRIDOR WILL GENERALLY RUN ALONG SEA 23 (SANTA CLARA RIVER) INCLUDING THE CONNECTION FROM THE WATER RECLAMATION PLANT LOCATED WEST OF PROPOSED NEIGHBORING LANDMARK VILLAGE/VTTM 53108, AND WILL ALSO INCLUDE COMMERCE CENTER DRIVE BRIDGE.
3. MAGIC MOUNTAIN PARKWAY WILL BE EXTENDED FROM ITS EXISTING TERMINUS JUST EAST OF THE PROJECT BOUNDARY AND WILL PROVIDE A WESTWARD THOROUGHFARE THROUGH THE PROJECT AND INCLUDE IMPROVEMENTS OF THE EXISTING ROADWAY FROM THE OLD ROAD WITHIN VTTM 53295.
4. AN ELECTRICAL SUBSTATION IS PROPOSED TO BE LOCATED SOUTH OF THE PROJECT BOUNDARY IN POTRERO VALLEY. THE TENTATIVE MAP DEPICTS TWO POTENTIAL LOCATIONS FOR THIS SUBSTATION WITHIN VTTM 61996.
5. WATER TANKS PARTIALLY LOCATED WITHIN THE PROJECT AND WITHIN VTTM 61996.
6. GRADING ASSOCIATED WITH THE SOUTHERLY EXTENSION OF WESTRIDGE PARKWAY, INCLUDES IMPORT OF MATERIALS FROM THE EXTENSION OF MAGIC MOUNTAIN PARKWAY.

NOTE: SPECIFIC DETAILS OF OFFSITE IMPROVEMENTS MAY BE FOUND IN THE APPLICATIONS (I.E. CUP BURDENS OF PROOF), PLANNER'S NOTEBOOK AND/OR NEWHALL RANCH SPECIFIC PLAN.

SPECIAL NOTES:

1. WATER QUALITY BASINS AND CATCH BASIN FILTERS WILL PROVIDE FOR TREATMENT OF STORM WATER RUN OFF.
2. THE WATER QUALITY BASINS SHALL BE DEDICATED TO THE COUNTY WHEN COMPLETED AND ACCEPTED.
3. PROPOSED RECLAIMED WATER LINES WILL BE LOCATED IN PUBLIC STREETS AND TRAILS.

UTILITY PROVIDERS:

SEWER: L.A. COUNTY SANITATION DIST. 32 AND NEWHALL RANCH WRP
WATER: VALENCIA WATER COMPANY
ELECTRICAL: SOUTHERN CALIFORNIA EDISON
GAS: SOUTHERN CALIFORNIA GAS CO.
TELEPHONE: AT&T
CABLE TV: TIME WARNER CABLE

EX	EXISTING	SF	SQUARE FOOT	RW	RECLAIMED WATER
FM	FORCE MAIN	SD	STORM DRAIN	CLWA	CASTAIC LAKE WATER AGENCY
HP	HIGH POINT	SS	SANITARY SEWER	PVT	PRIVATE DRIVE
L	LENGTH	STD	STANDARD	P & F	PRIVATE AND FUTURE STREET
MIN	MINIMUM	R/W	RIGHT OF WAY	REC	RECREATION
GB	GRADE BREAK	W1	WATER ZONE - 1	O.S.	OPEN SPACE
PROP	PROPOSED	W2	WATER ZONE - 2	RUA	RESTRICTED USE AREA
R	RADIUS	W3	WATER ZONE - 3		

KEY MAP
NOT TO SCALE

LEGAL DESCRIPTION:
PARCELS 11, 12, 13, 22 AND A PORTION OF PARCEL 14 OF PARCEL MAP 24500-01, IN THE UNINCORPORATED TERRITORY OF THE COUNTY OF LOS ANGELES, AS SHOWN ON MAP FILED IN BOOK 293 PAGES 34 TO 67 INCLUSIVE, OF PARCEL MAPS, RECORDS OF LOS ANGELES COUNTY.

REGISTERED PROFESSIONAL ENGINEER MATTHEW G. HEIDEMAN No. 55639 Exp. 12-31-10 CIVIL STATE OF CALIFORNIA

PSOMAS
28470 Avenue Stanford, Suite 300
Santa Clarita, CA 91355
(661) 219-6000 (661) 775-2718 (FAX)
MATTHEW G. HEIDEMAN R.C.E. NO. 55639 DATE

DESIGNED : MGH/DE
DRAFTED : DE/MS
CHECKED : MGH

OWNER/DEVELOPER :
NEWHALL LAND
23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVE : COREY HARPOLE

MAJOR LAND DIVISION VESTING TENTATIVE TRACT MAP NO. 61105

COUNTY CASE NO. ________
LOCATED IN THE UNINCORPORATED AREA OF THE COUNTY OF LOS ANGELES STATE OF CALIFORNIA

REV: ________
DATE: 11/24/09
PROJECT NO. 1NRC0120.00
SHEET 1 OF 12

See Explanation on Figure 1

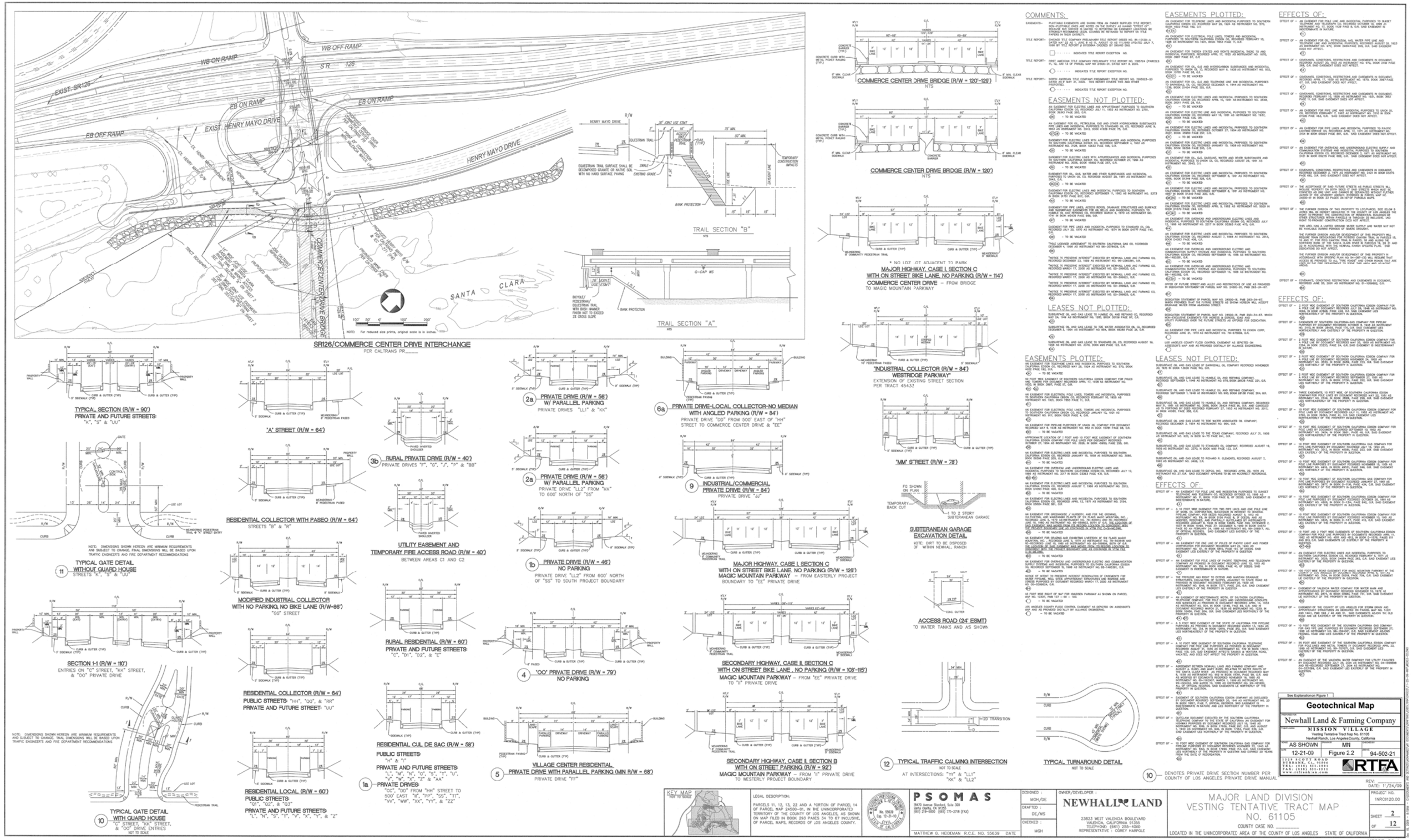
Geotechnical Map

PREPARED FOR
Newhall Land & Farming Company
PROJECT LOCATION
MISSION VILLAGE
Vesting Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California
SCALE AS SHOWN | DRAWN BY MN | CHECKED BY
DATE 12-21-09 | Figure 2.1 | JOB NO. 94-502-21

1329 SCOTT ROAD
BURBANK, CA, 91504
TEL: (818) 531-1501
FAX: (818) 531-1511
www.rtfrankian.com
RTFA

ME003-01.dwg

A full-size reproduction of this figure can be found at Impact Sciences.



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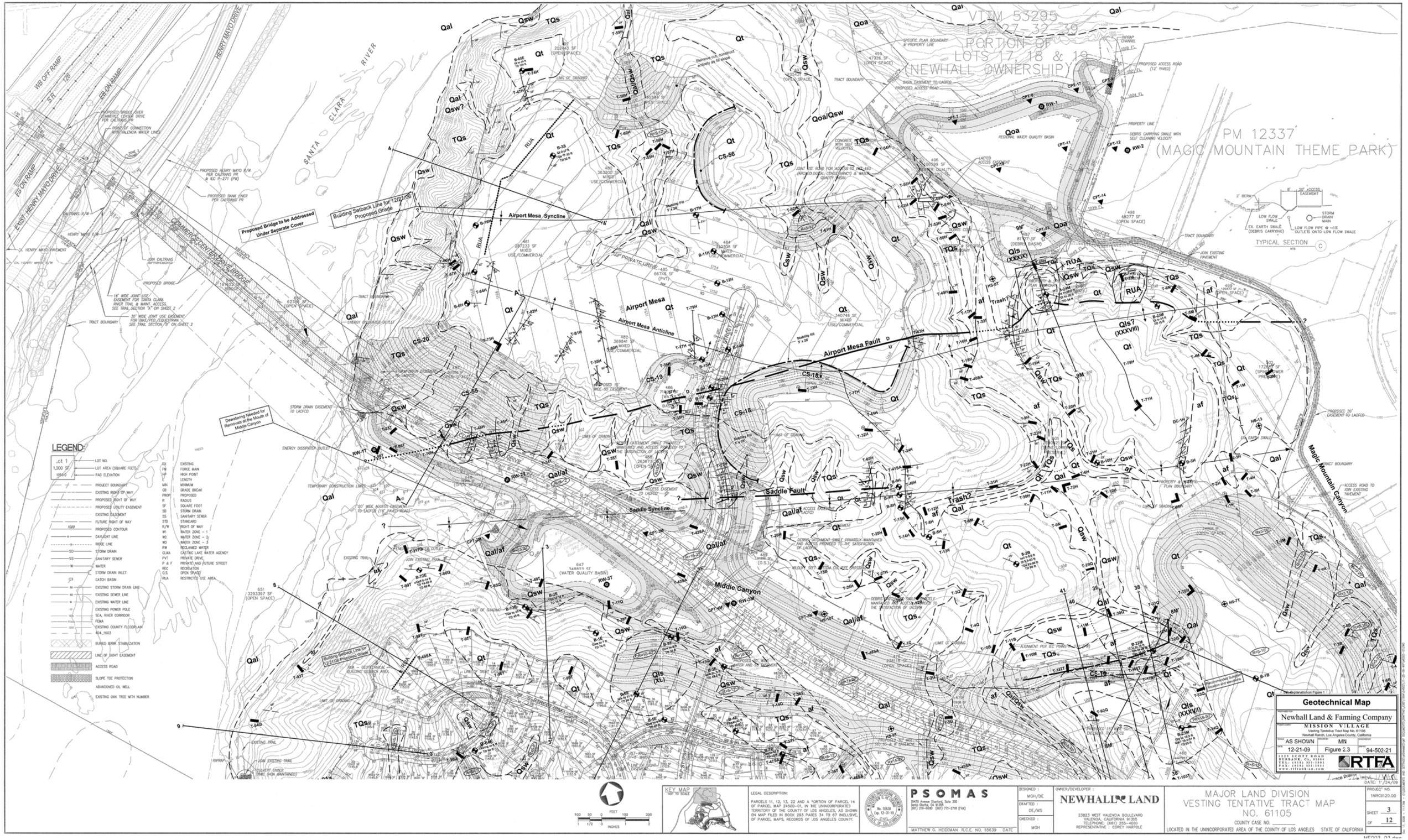

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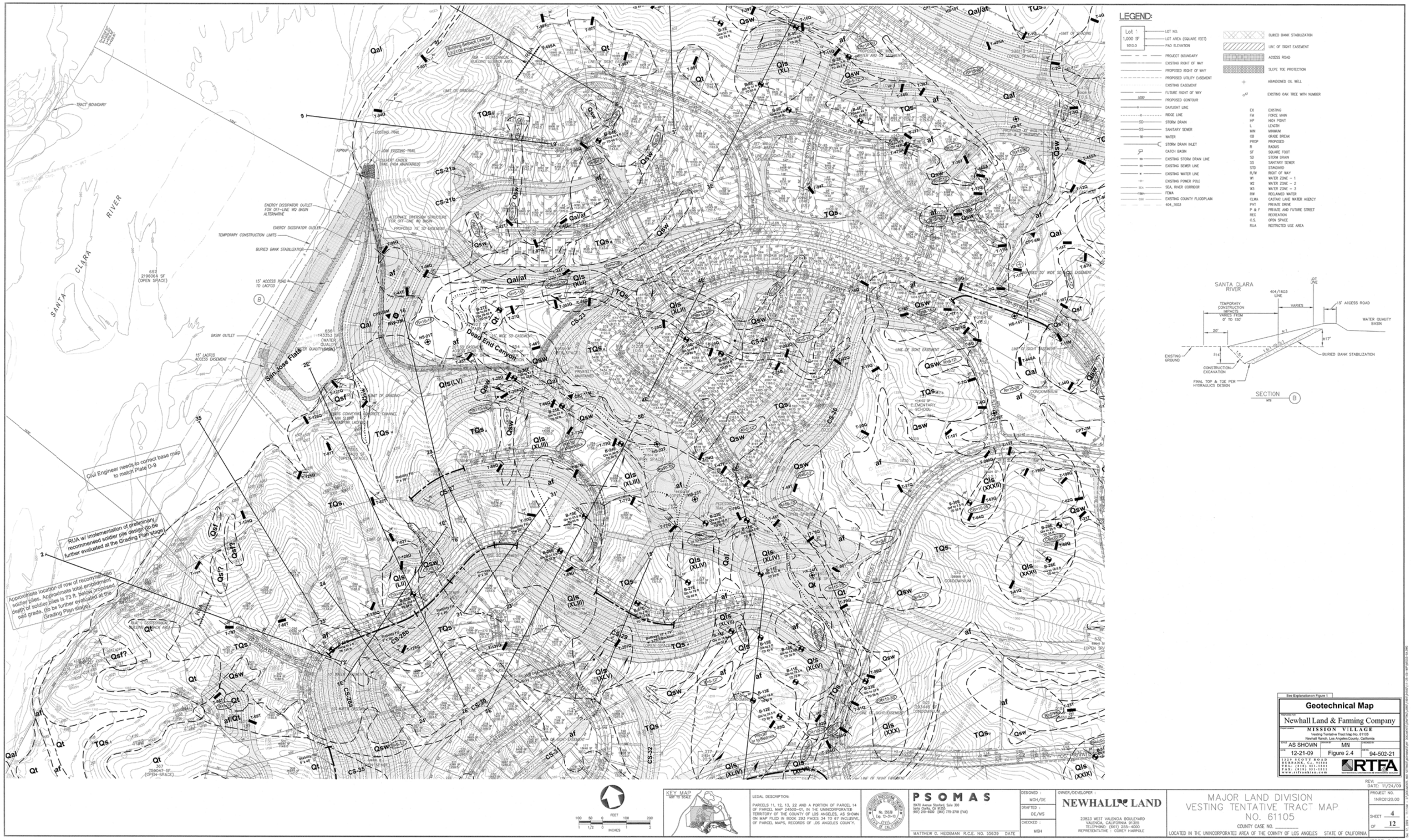

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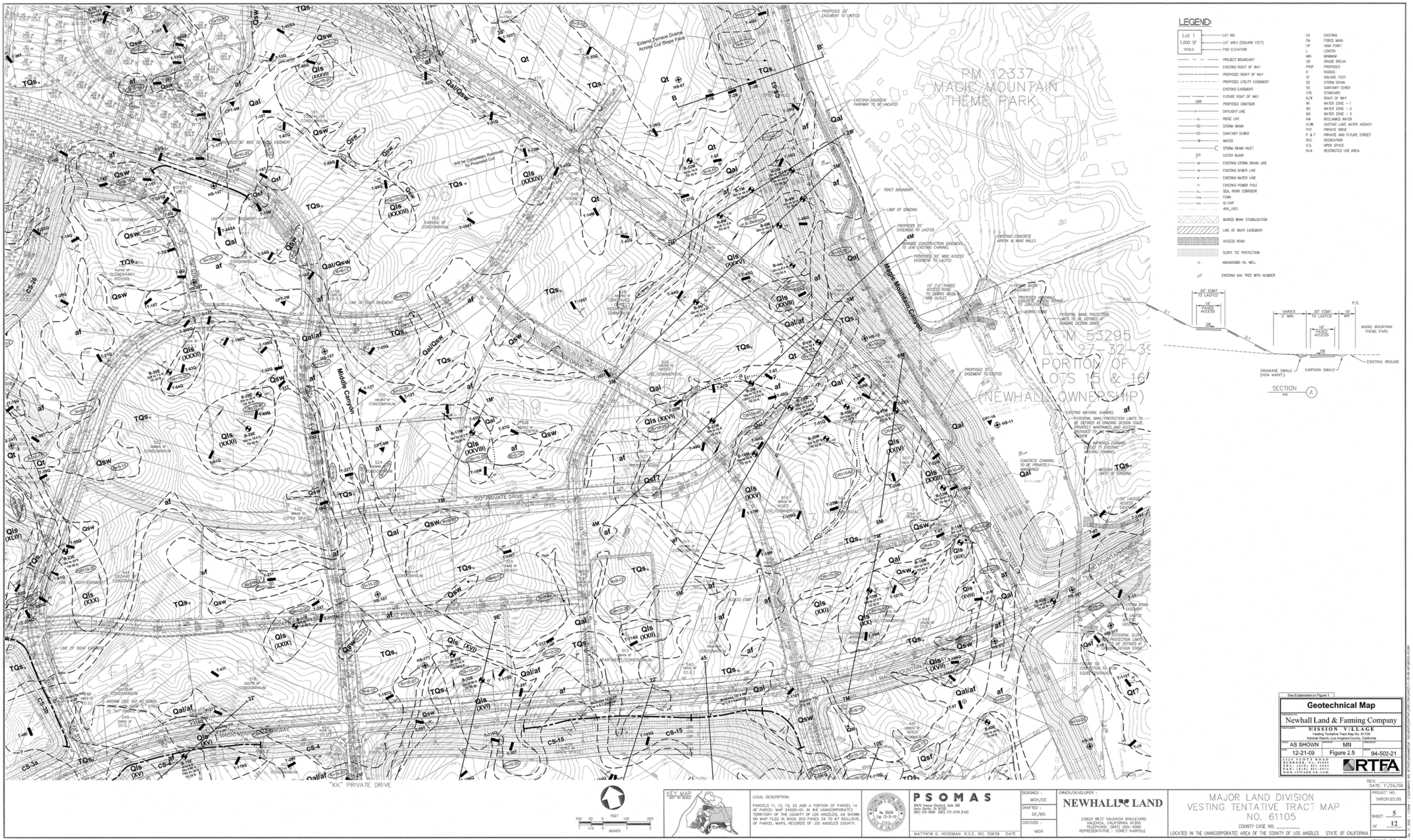

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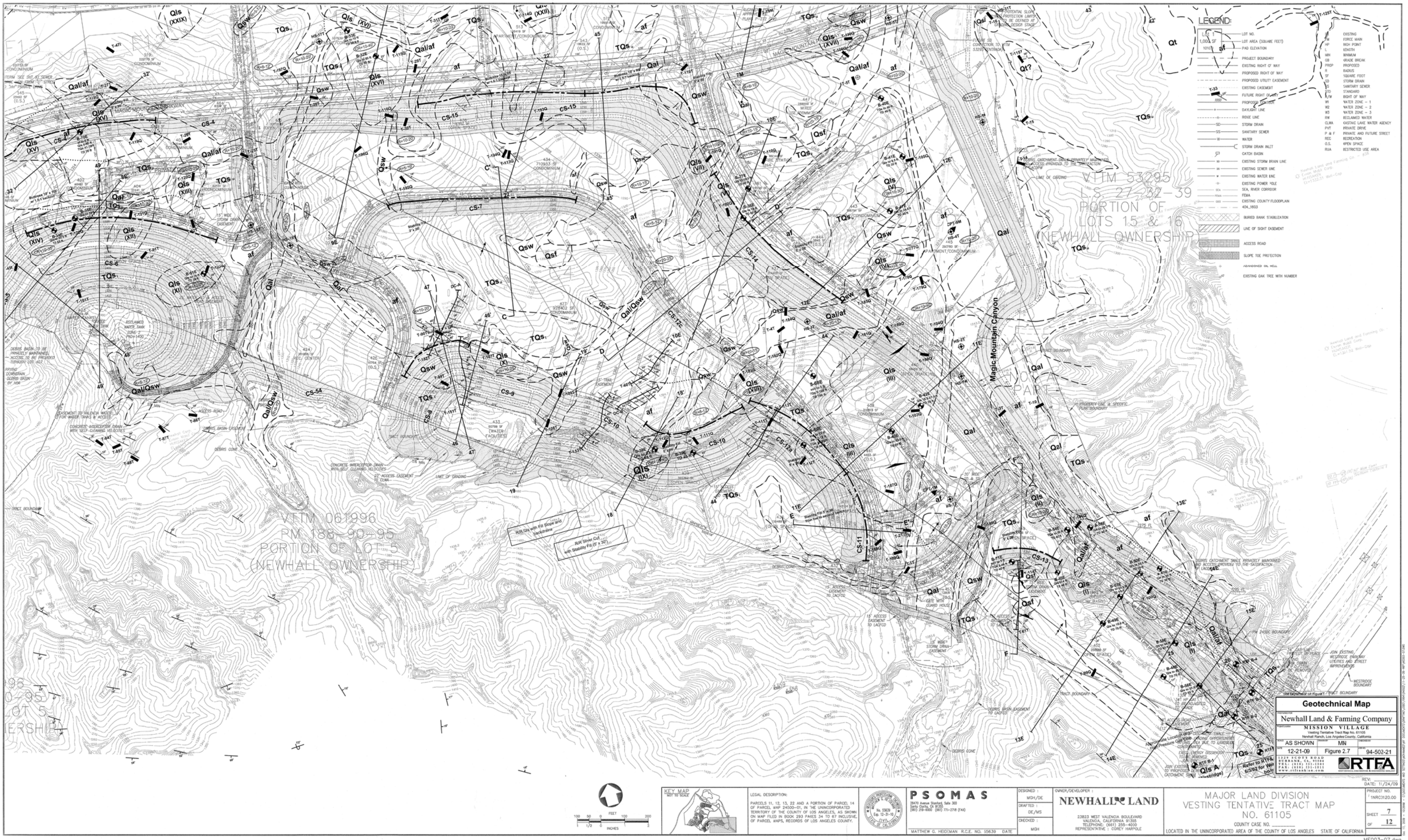

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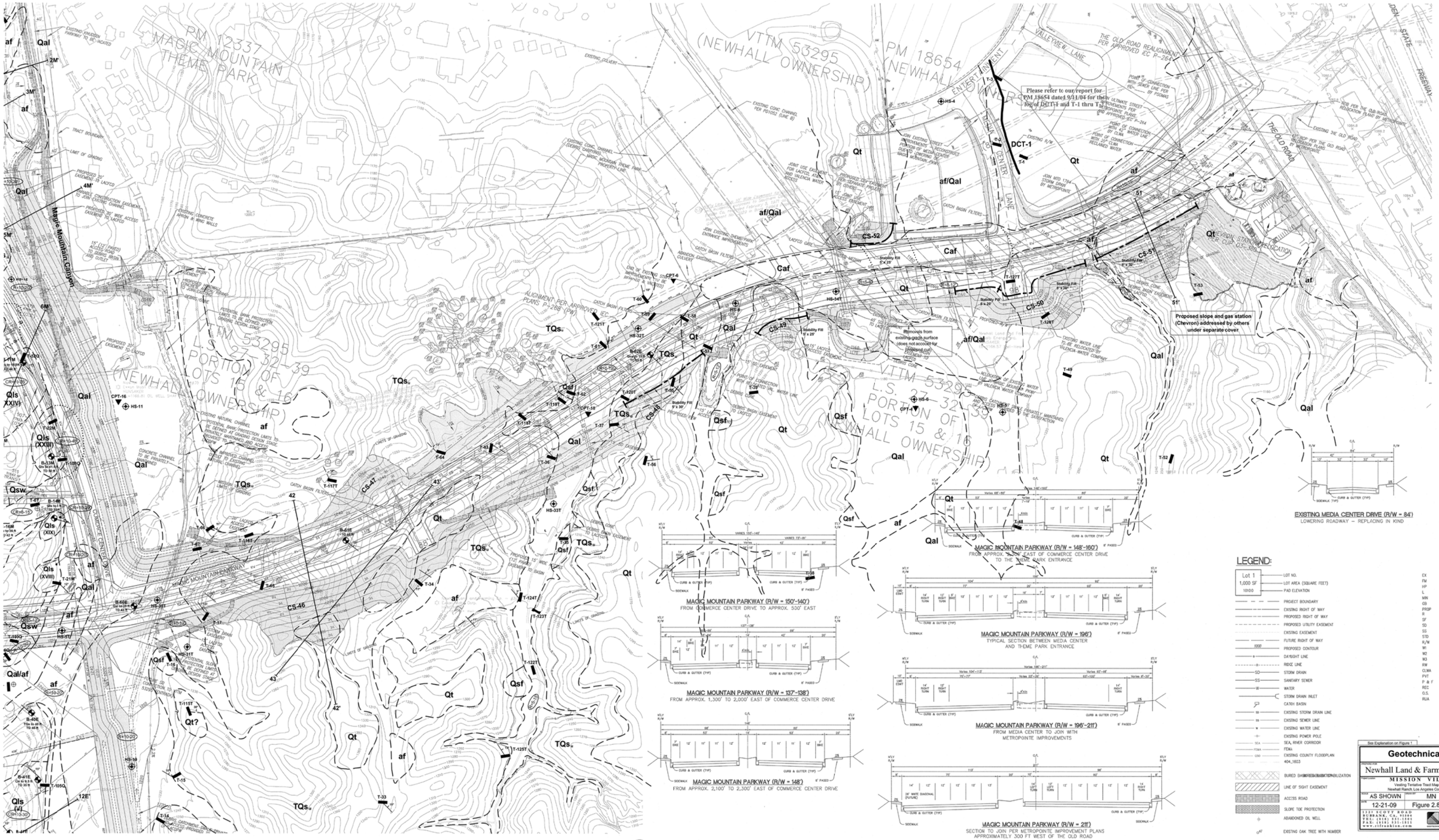

LEGEND:

Lot 1 / 1,000 SF / 10100	LOT NO. / LOT AREA (SQUARE FEET) / PAD ELEVATION
	PROJECT BOUNDARY
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	PROPOSED UTILITY EASEMENT
	EXISTING EASEMENT
	FUTURE RIGHT OF WAY
1000'	PROPOSED CONTOUR
	DAYLIGHT LINE
	RIDGE LINE
SD	STORM DRAIN
SS	SANITARY SEWER
W	WATER
	STORM DRAIN INLET
	CATCH BASIN
SS	EXISTING STORM DRAIN LINE
SS	EXISTING SEWER LINE
W	EXISTING WATER LINE
	EXISTING POWER POLE
SEA	SEA, RIVER CORRIDOR
FEMA	FEMA
CSO	EXISTING COUNTY FLOODPLAIN 404,1603
	BURIED DAMPROOFING/MARKER/STABILIZATION
	LINE OF SIGHT EASEMENT
	ACCESS ROAD
	SLOPE TOE PROTECTION
	ABANDONED OIL WELL
42'	EXISTING OAK TREE WITH NUMBER

EX	EXISTING
FM	FORCE MAIN
HP	HIGH POINT
L	LENGTH
MIN	MINIMUM
GB	GRADE BREAK
PROP	PROPOSED
R	RADIUS
SF	SQUARE FOOT
SD	STORM DRAIN
SS	SANITARY SEWER
STD	STANDARD
R/W	RIGHT OF WAY
W1	WATER ZONE – 1
W2	WATER ZONE – 2
W3	WATER ZONE – 3
RW	RECLAIMED WATER
CLWA	CASTAIC LAKE WATER AGENCY
PVT	PRIVATE DRIVE
P & F	PRIVATE AND FUTURE STREET
REC	RECREATION
O.S.	OPEN SPACE
RUA	RESTRICTED USE AREA

See Explanation on Figure 1

Geotechnical Map

OWNER/DEVELOPER: Newhall Land & Farming Company

PROJECT NAME: MISSION VILLAGE
Vesting Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California

SCALE: AS SHOWN | DESIGNED BY: MN | DRAWN BY: | JOB NO.: 94-502-21
DATE: 12-21-09 | Figure 2.8

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FAX: (818) 841-1604
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DATE: 11/24/09

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REGISTERED PROFESSIONAL ENGINEER No. 55639 Exp. 12-31-10 CIVIL STATE OF CALIFORNIA

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28470 Avenue Stanford, Suite 300
Santa Clarita, CA 91355
(661) 259-8400 (661) 775-2718 (FAX)

MATTHEW G. HEIDEMAN R.C.E. NO. 55639 DATE

DESIGNED: MGH/DE
DRAFTED: DE/VS
CHECKED: MGH

OWNER/DEVELOPER:
NEWHALL LAND
23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVE: COREY HARPOLE

MAJOR LAND DIVISION
VESTING TENTATIVE TRACT MAP
NO. 61105
COUNTY CASE NO. _____
LOCATED IN THE UNINCORPORATED AREA OF THE COUNTY OF LOS ANGELES STATE OF CALIFORNIA

PROJECT NO. 1NRC0120.00
SHEET ____ OF 12

ME003-08.dwg

A full-size reproduction of this figure can be found at Impact Sciences.

SEWER LIFT STATION SUMMARIES

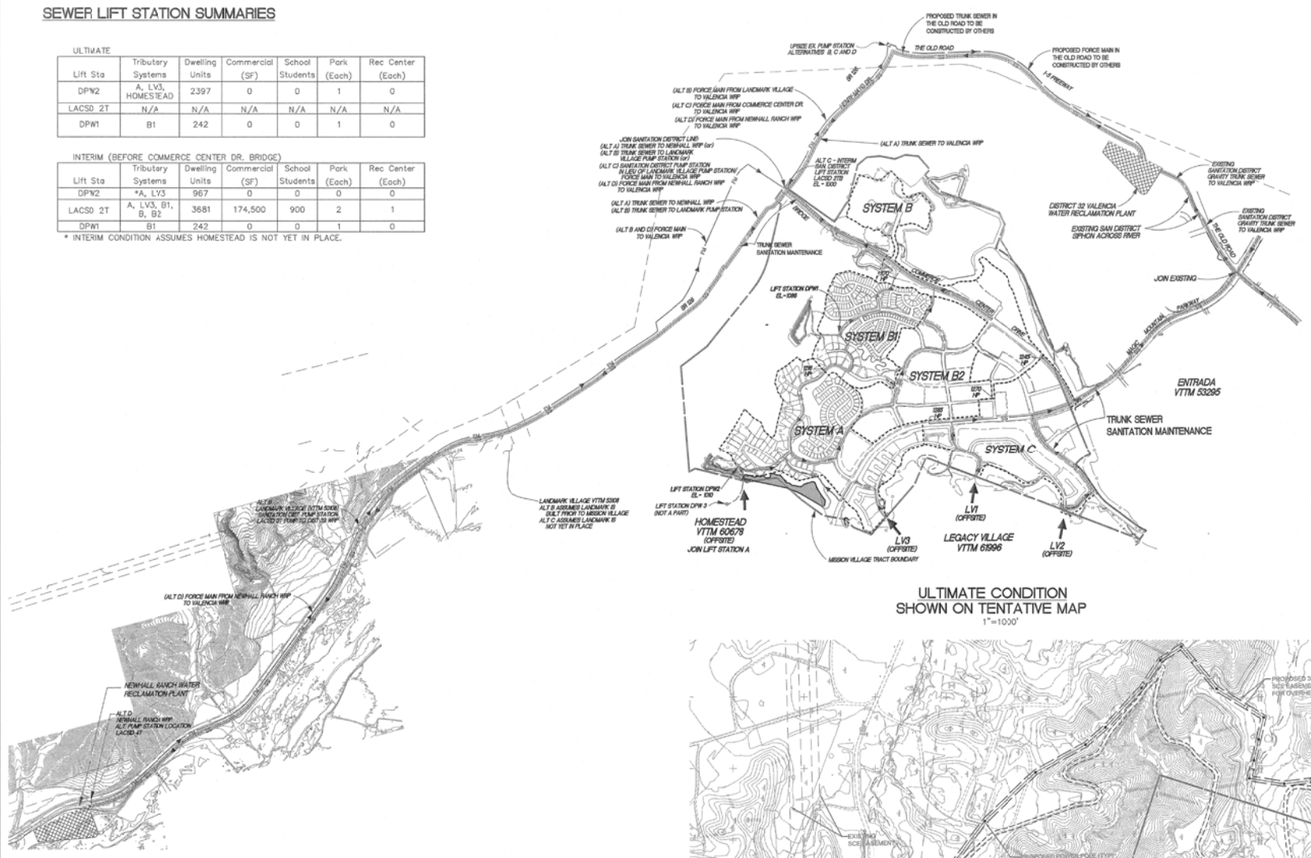
ULTIMATE

Lift Sta	Tributary Systems	Dwelling Units	Commercial (SF)	School Students	Park (Each)	Rec Center (Each)
DPW2	A, LV3, HOMESTEAD	2397	0	0	1	0
LACSD 2T	N/A	N/A	N/A	N/A	N/A	N/A
DPW1	B1	242	0	0	1	0

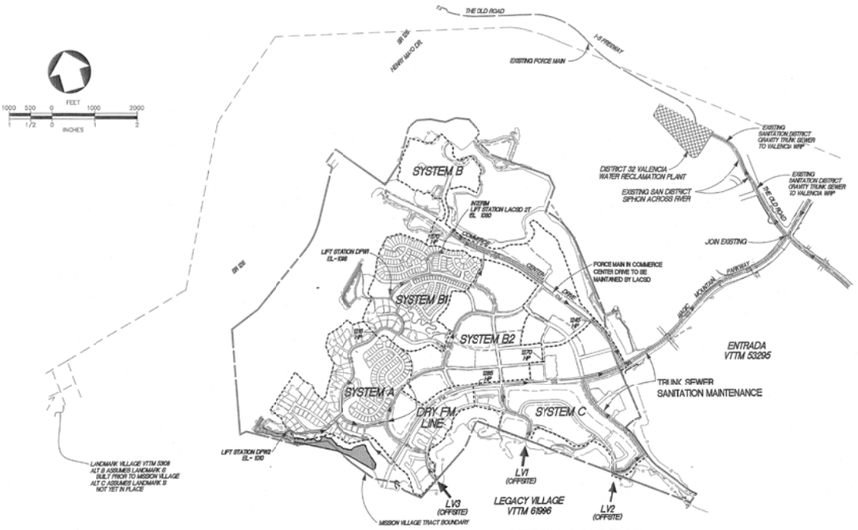
INTERIM (BEFORE COMMERCE CENTER DR. BRIDGE)

Lift Sta	Tributary Systems	Dwelling Units	Commercial (SF)	School Students	Park (Each)	Rec Center (Each)
DPW2	*A, LV3	967	0	0	0	0
LACSD 2T	A, LV3, B1, B, B2	3681	174,500	900	2	1
DPW1	B1	242	0	0	1	0

* INTERIM CONDITION ASSUMES HOMESTEAD IS NOT YET IN PLACE.



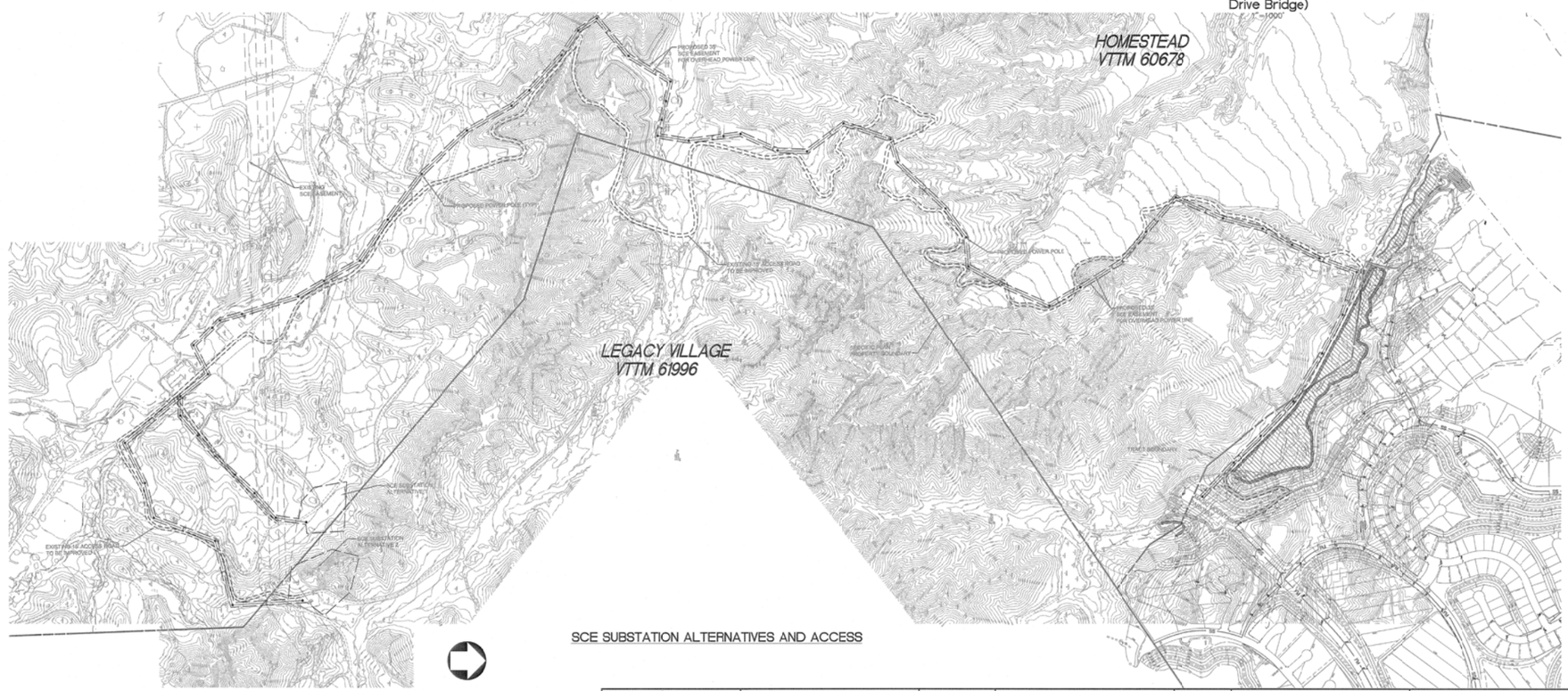
ULTIMATE CONDITION
SHOWN ON TENTATIVE MAP
1"=1000'



INTERIM CONDITION
(before Commerce Center Drive Bridge)
1"=1000'

LEGEND:

- GRAVITY SEWER MAIN
- SEWER FORCE MAIN
- OFF-SITE SEWER MAIN PER SEPARATE PROJECT
- EXISTING SEWER
- TRUNK GRAVITY SEWER MAINTAINED BY SANITATION DISTRICT
- SEWER BOUNDARIES
- SEWER LIFT STATION
- HP HIGH POINT
- WRP WATER RECLAMATION PLANT
- (ALT.A) OFF-SITE ALTERNATIVES



SCE SUBSTATION ALTERNATIVES AND ACCESS

See Explanation on Figure 1

Geotechnical Map

Newhall Land & Farming Company

MISSION VILLAGE
Vesting Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California

AS SHOWN | MN | 94-502-21
12-21-09 | Figure 2.9

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MATTHEW G. HEIDEMAN R.C.E. NO. 55639 DATE

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DRAFTED : DE/MS
CHECKED : MGH

OWNER/DEVELOPER :
NEWHALL LAND
23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVE : COREY HARPOLE

MAJOR LAND DIVISION
VESTING TENTATIVE TRACT MAP
NO. 61105

COUNTY CASE NO. _____

LOCATED IN THE UNINCORPORATED AREA OF THE COUNTY OF LOS ANGELES STATE OF CALIFORNIA

PROJECT NO. 1NRC0120.00

SHEET 9 OF 12

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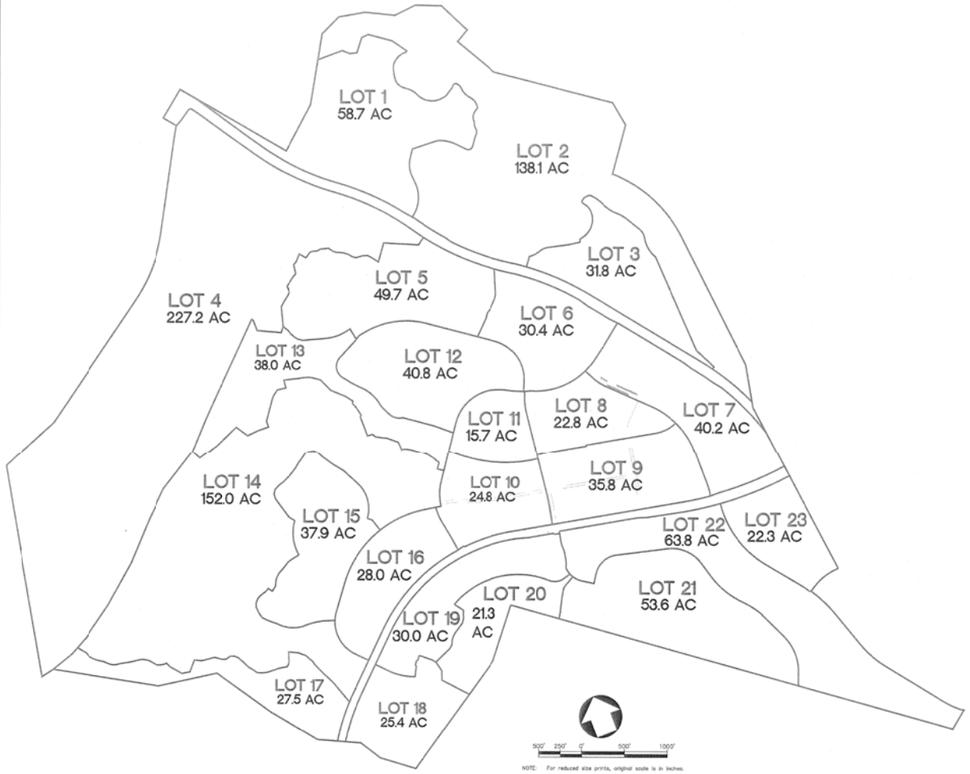
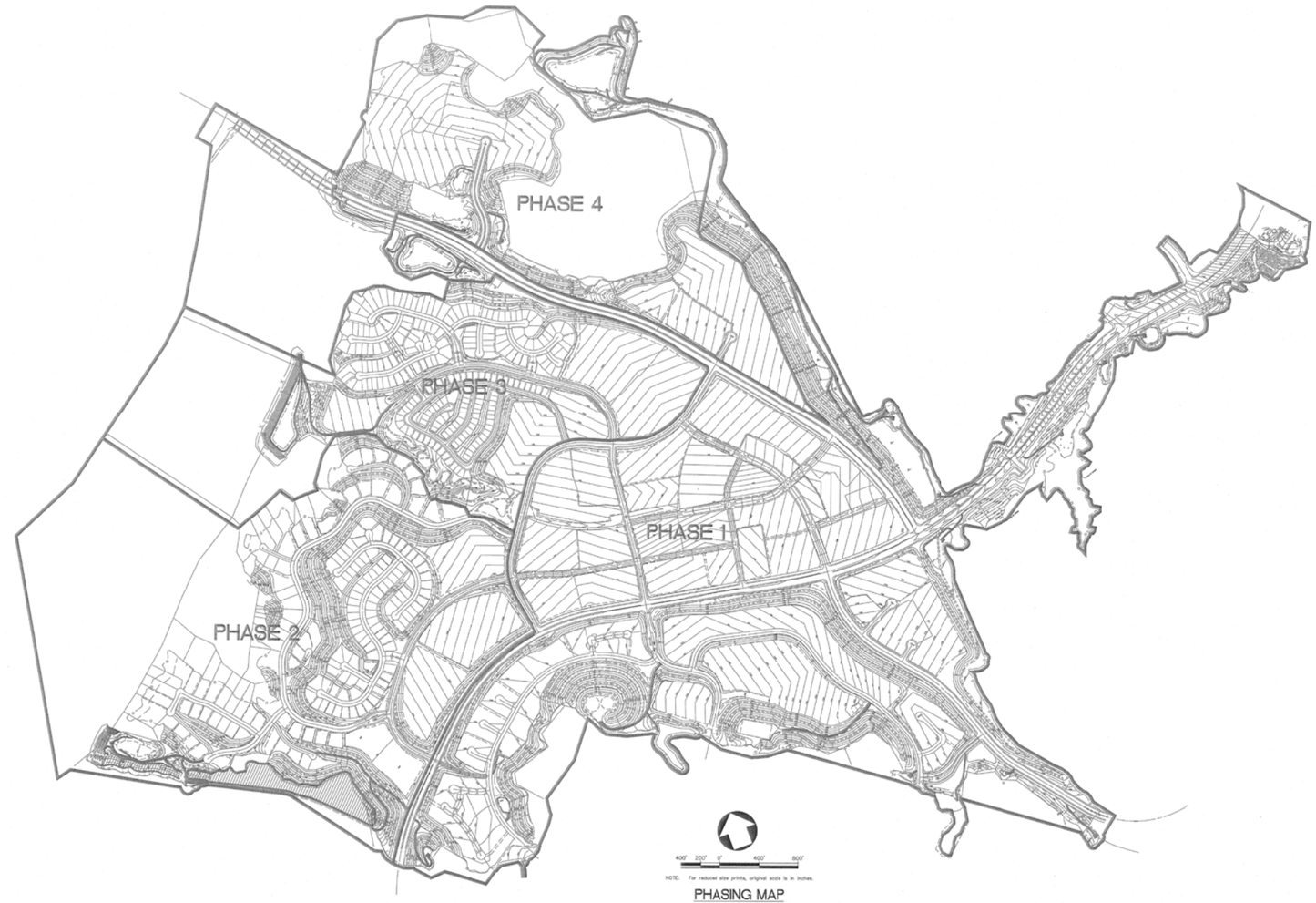


LARGE LOT PARCEL MAP

LEGEND:

LOT 1 — LOT NO.
100.0 AC — LOT AREA (ACRE)
LOT LINE



PHASING MAP

PHASE 1	
Total Ac	553.0 AC
Total Du	2,896 DU
SFD	0 DU
Condo's	2,896 DU
Total Commercial Sf	858,100 SF
Total Open Space	144.5 AC

PHASE 2	
Total Ac	341.1 AC
Total Du	586 DU
SFD	168 DU
Condo's	418 DU
Total Commercial Sf	0 SF
Total Open Space	171.5 AC

PHASE 3	
Total Ac	213.0 AC
Total Du	628 DU
SFD	214 DU
Condo's	414 DU
Total Commercial Sf	0 SF
Total Open Space	108.5 AC

PHASE 4	
Total Ac	278.9 AC
Total Du	326 DU
SFD	0 DU
Concio's	326 DU
Total Commercial Sf	697,000 SF
Total Open Space	220.7 AC

NOTE: WATER QUALITY BASIN, DEBRIS BASIN, SPINEFLOWER RESERVE AND PARKS ARE INCLUDED IN TOTAL OPEN SPACE CALCULATION

See Explanation on Figure 1

Geotechnical Map

Newhall Land & Farming Company

MISSION VILLAGE
Vesting Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California

SCALE	DESIGNED BY	DRAWN BY
AS SHOWN	MN	
DATE 12-21-09	Figure 2.10	DWG NO. 94-502-21

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LEGAL DESCRIPTION:

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STATE OF CALIFORNIA

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PROJECT NO. 1NRC0120.00
SHEET 10 OF 12
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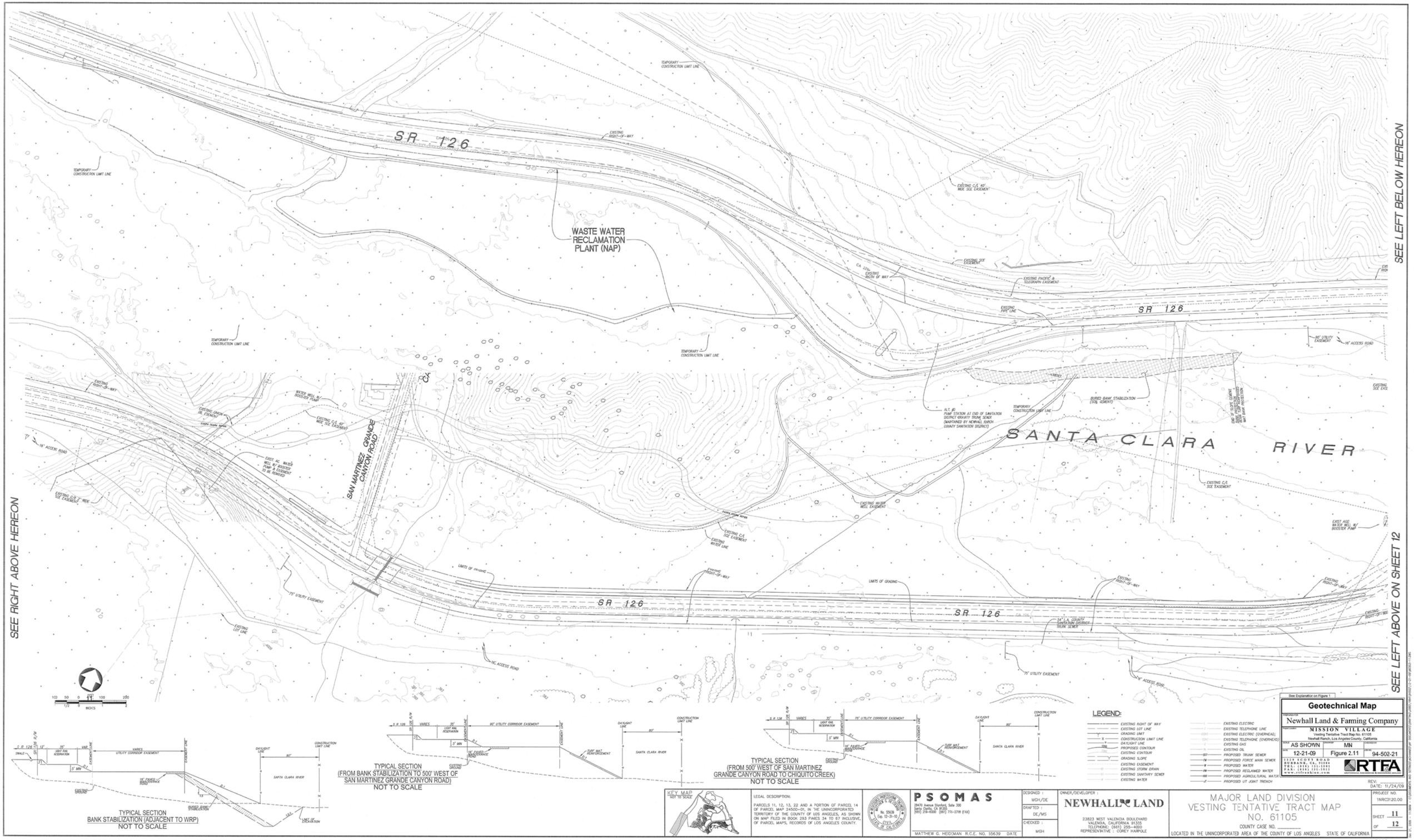

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SEE RIGHT BELOW ON SHEET 11

SEE LEFT BELOW HEREON

SEE RIGHT ABOVE HEREON

SR 126

CHIQUITO CANYON ROAD

CHIQUITO CREEK

LANDFILL ACCESS

BORROW SITE

WOLCOTT WAY

CASTAIC CREEK

TRAVEL VILLAGE (Not A Part)

LIMITS OF GRADING

TEMPORARY CONSTRUCTION LIMIT LINE

EXISTING RIGHT OF WAY

25' UTILITY EASEMENT

CONSTRUCT SEWER WITHIN EXISTING EASEMENT

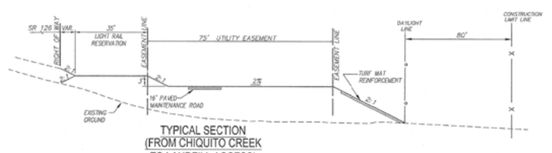
DRILL SEWER UNDER CREEK BED

PACIFIC BELL C/L OF UNDISCLOSED WIDTH EASEMENT

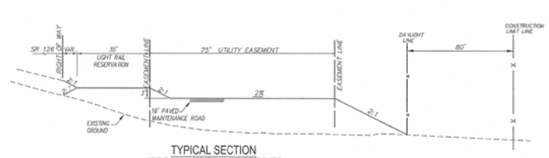
SOUTHERN CALIFORNIA GAS COMPANY

MONUMENTATION
4 #108 SPIKES FOUND
PER LS 7025 - SURVEY
PER LS 4445 - SURVEY 8
SURVEY 90-109 PAGE 8

FEET 100 50 0 100 200
INCHES 1/2 0 1



TYPICAL SECTION
(FROM CHIQUITO CREEK
TO LANDFILL ACCESS)
NOT TO SCALE



TYPICAL SECTION
(FROM LANDFILL ACCESS TO
CASTAIC CREEK)
NOT TO SCALE

FEET 100 50 0 100 200
INCHES 1/2 0 1

LEGEND:

- EXISTING RIGHT OF WAY
- EXISTING LOT LINE
- GRADING LIMIT
- CONSTRUCTION LIMIT LINE
- DAYLIGHT LINE
- PROPOSED CONTOUR
- EXISTING CONTOUR
- GRADING SLOPE
- EXISTING EASEMENT
- EXISTING STORM DRAIN
- EXISTING SANITARY SEWER
- EXISTING WATER
- EXISTING ELECTRIC
- EXISTING TELEPHONE LINE
- EXISTING ELECTRIC (OVERHEAD)
- EXISTING TELEPHONE (OVERHEAD)
- EXISTING GAS
- EXISTING OIL
- PROPOSED TRUNK SEWER
- PROPOSED FORCE MAIN SEWER
- PROPOSED WATER
- PROPOSED RECLAIMED WATER
- PROPOSED AGRICULTURAL WATER
- PROPOSED UT JOINT TRENCH

See Explanation on Figure 1

Geotechnical Map

Newhall Land & Farming Company

MISSION VILLAGE
Vesting Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California

SCALE	DESIGNED	DRAWN BY
AS SHOWN	MN	
DATE		JOB NO.
12-21-09	Figure 2.12	94-502-21

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MAJOR LAND DIVISION
VESTING TENTATIVE TRACT MAP
NO. 61105
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PROJECT NO. 1NRC0120.00
SHEET 12 OF 12

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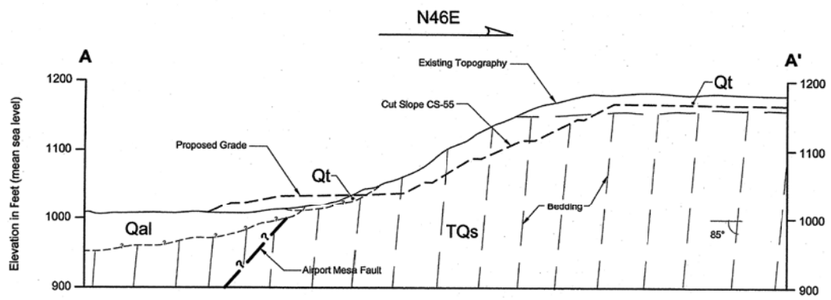

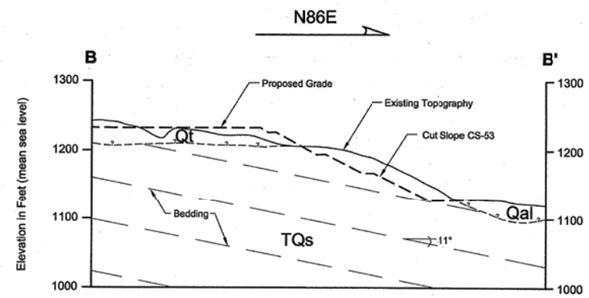

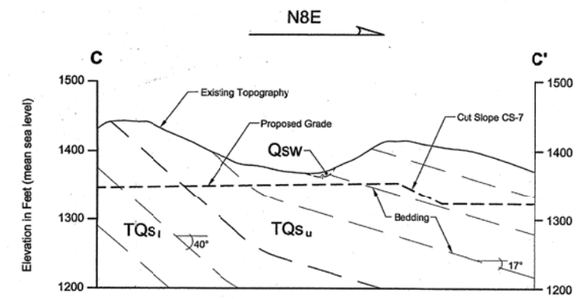

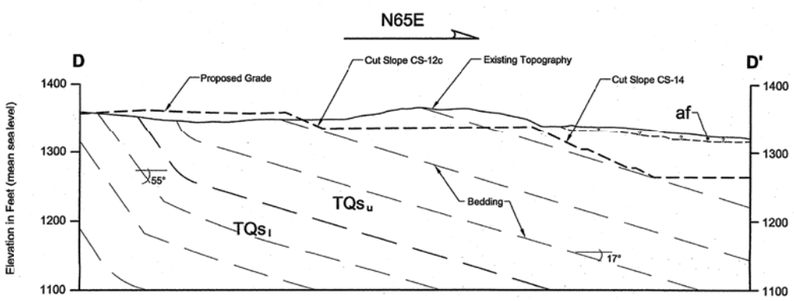

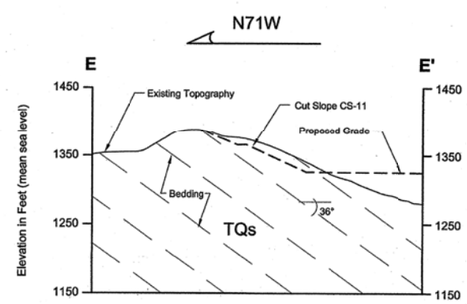

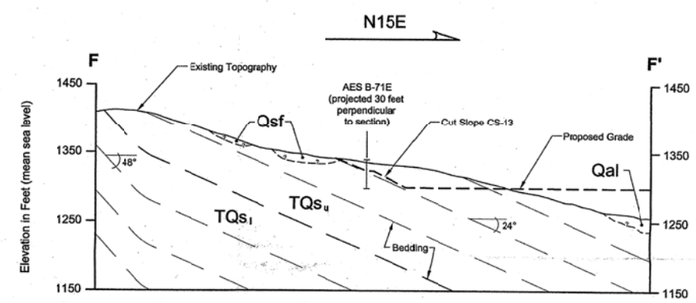

See Explanation on Figure 1

Geologic Sections

PREPARED FOR
Newhall Land & Farming Company

Project Location
MISSION VILLAGE
Vesting Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California

SCALE	DRAWN BY	CHECKED BY
1" = 100'	MN	
DATE 12-21-09	FIGURE 3	JOB NO. 94-502-21

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C:\Documents and Settings\administrator\My Documents\JOBS\1 FINAL\0200\19\94\94\2011-26-09 WP-Sections\Geology-sec.dwg, 12/17/2009 8:22:56 AM, 30x24, 1:1

Newhall Land and Farming Company
December 21, 2009
94-502-21

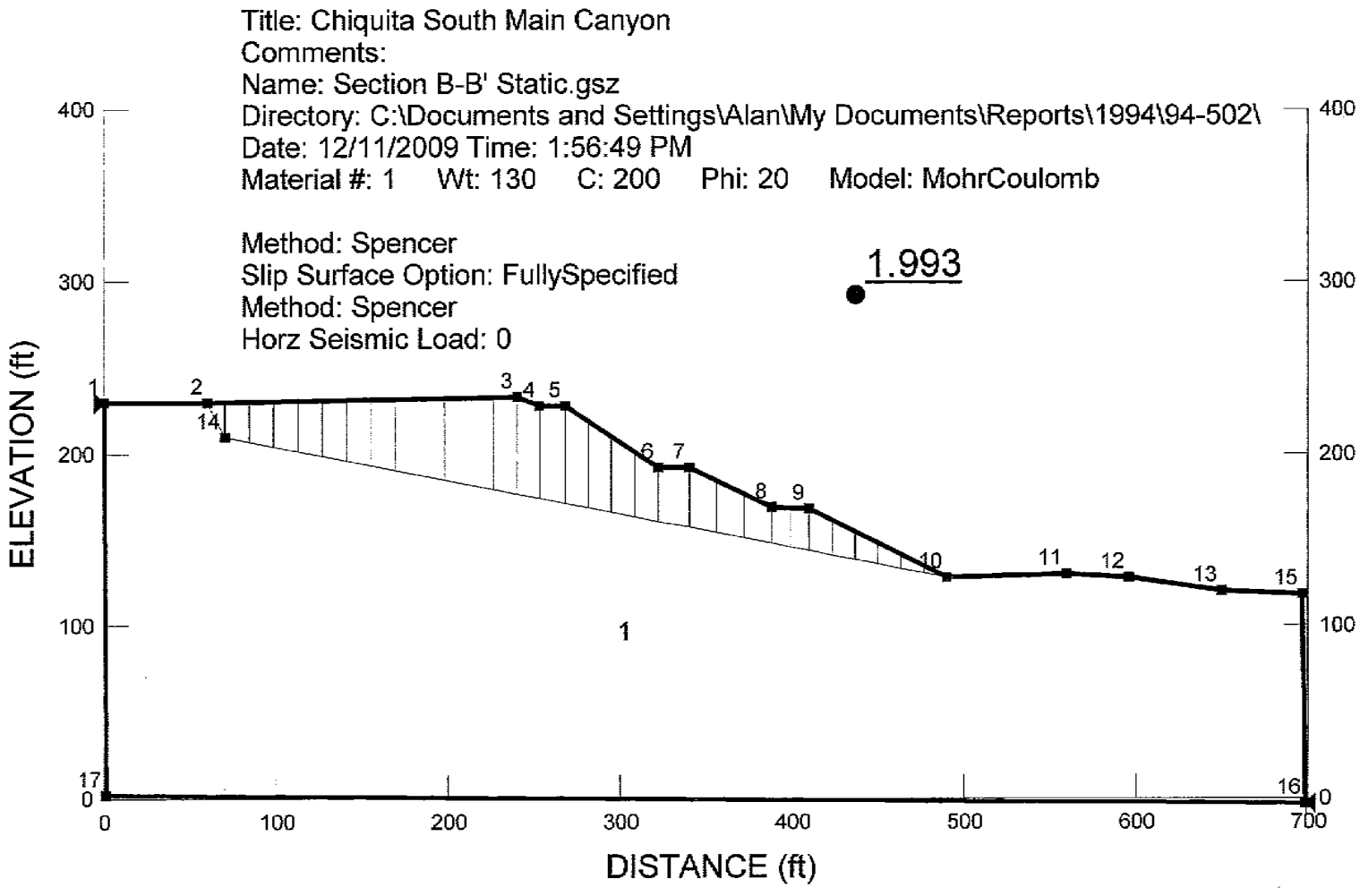
APPENDIX

SLOPE STABILITY ANALYSES

RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

Summary of Slope Stability Calculations

Section	Case	File	Factor of Safety	Condition
B-B'	Static	Section B-B' Static.gsz	1.993	Bedding through toe
B-B'	Seismic	Section B-B' Seismic.gsz	1.223	Bedding through toe
C-C'	Static	Section C-C' Static.gsz	2.133	Bedding through toe
C-C'	Seismic	Section C-C' Seismic.gsz	1.385	Bedding through toe
D-D'	Static	Section D-D' Static.gsz	1.7	Bedding through toe
D-D'	Seismic	Section D-D' Seismic.gsz	1.103	Bedding through toe
B-B'	Static	Section F-F' Static.gsz	2.785	Bedding breaking to toe
B-B'	Seismic	Section F-F' Seismic.gsz	2.021	Bedding breaking to toe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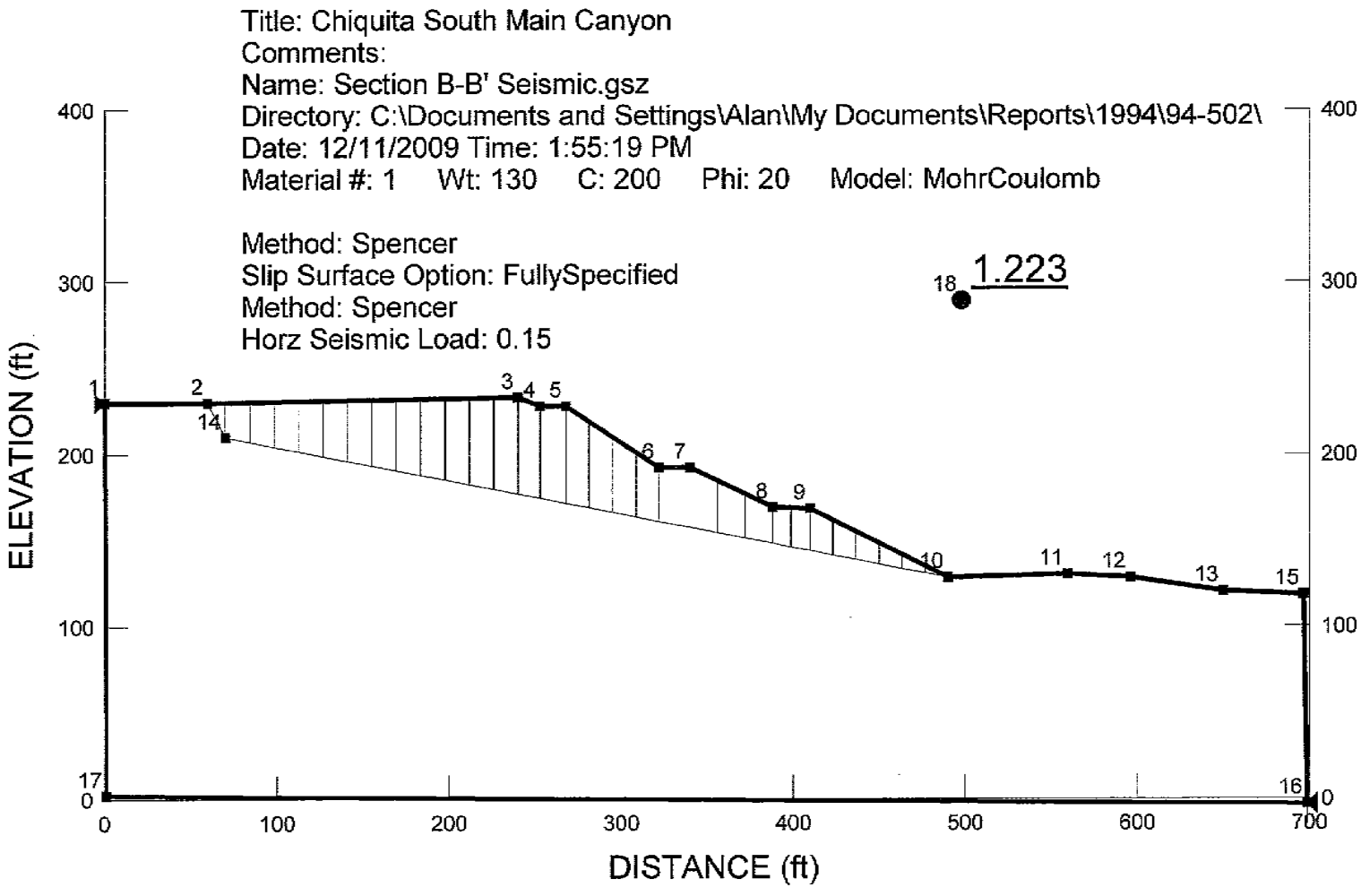
Comments:
Name: Section B-B' Static.gsz
Directory: C:\Documents and Settings\Alan\My Documents\Reports\1994\94-502\
Date: 12/11/2009 Time: 1:56:49 PM
Material #: 1 Wt: 130 C: 200 Phi: 20 Model: MohrCoulomb
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0
1.993
ELEVATION (ft)
DISTANCE (ft)
0
100
200
300
400
500
600
700
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17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Comments:
Name: Section B-B' Seismic.gsz
Directory: C:\Documents and Settings\Alan\My Documents\Reports\1994\94-502\
Date: 12/11/2009 Time: 1:55:19 PM
Material #: 1 Wt: 130 C: 200 Phi: 20 Model: MohrCoulomb
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0.15
18 1.223
ELEVATION (ft)
DISTANCE (ft)
400
300
200
100
0
0
100
200
300
400
500
600
700
1
2
3
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5
6
7
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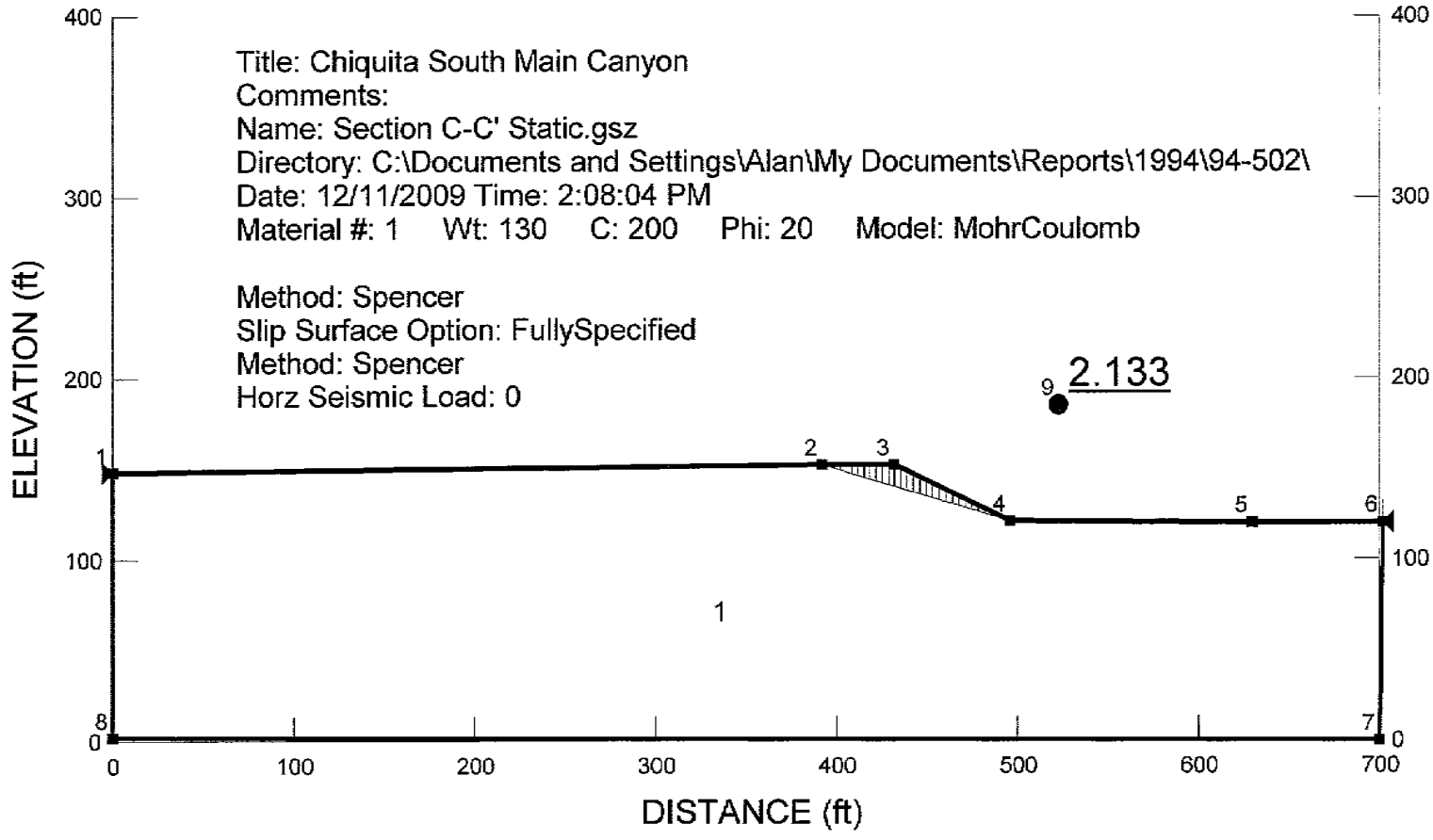
12
13
14
15
16
17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Comments:
Name: Section C-C' Static.gsz
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Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0
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ELEVATION (ft)
DISTANCE (ft)
400
300
200
100
0
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600
700
1
2
3
4
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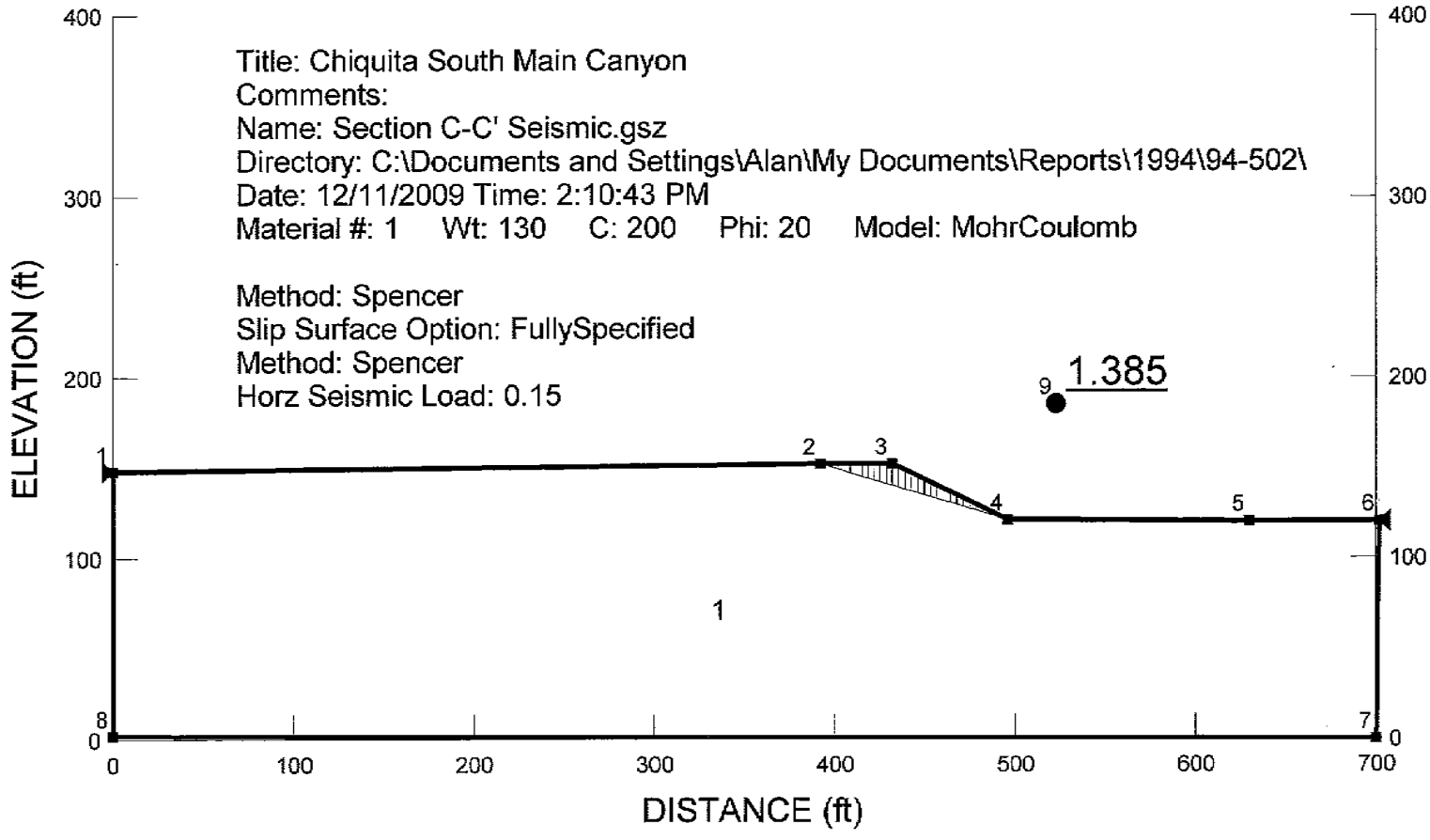
6
7
8
9
1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8
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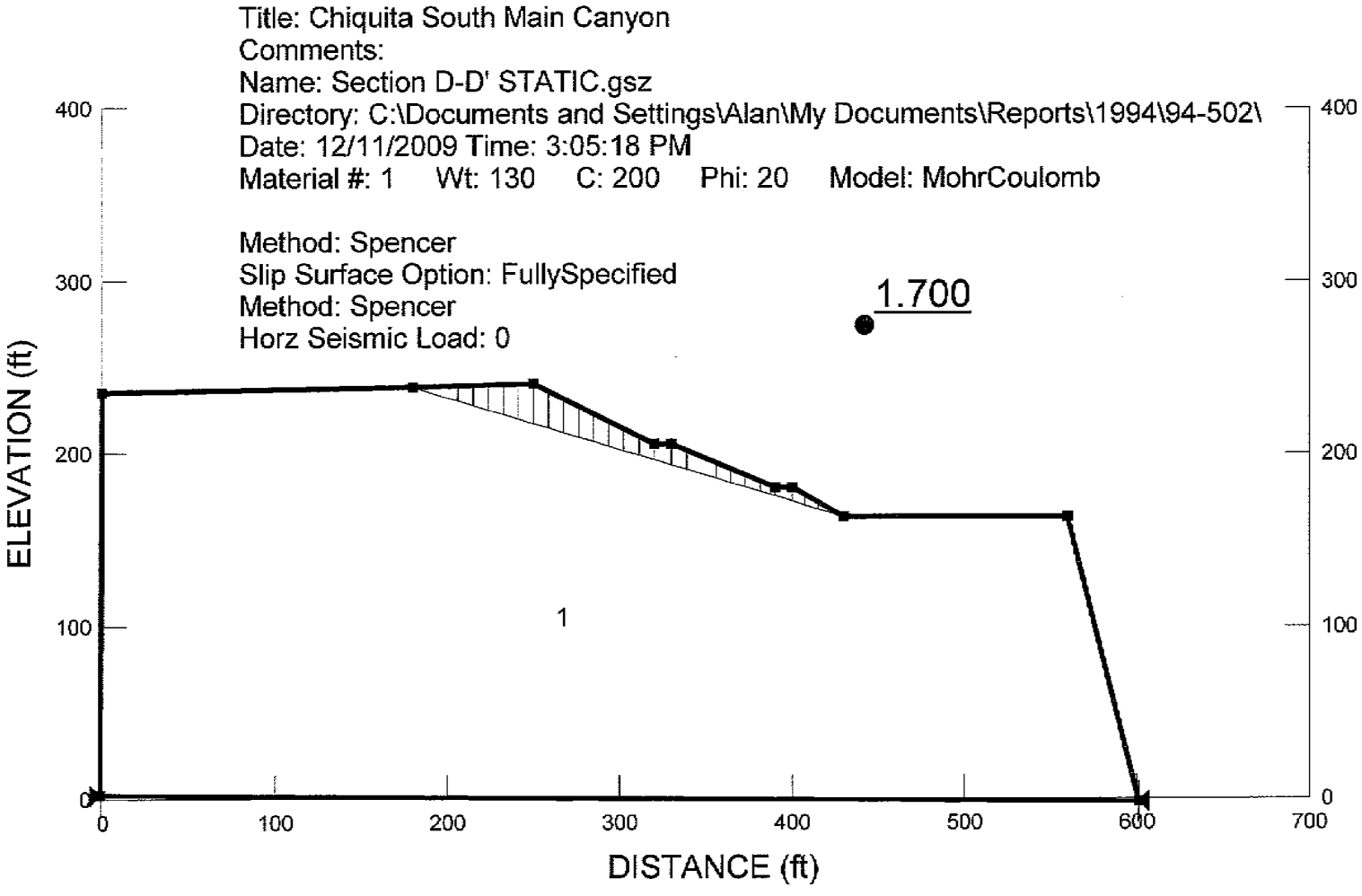
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Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0
1.700
1
ELEVATION (ft)
DISTANCE (ft)
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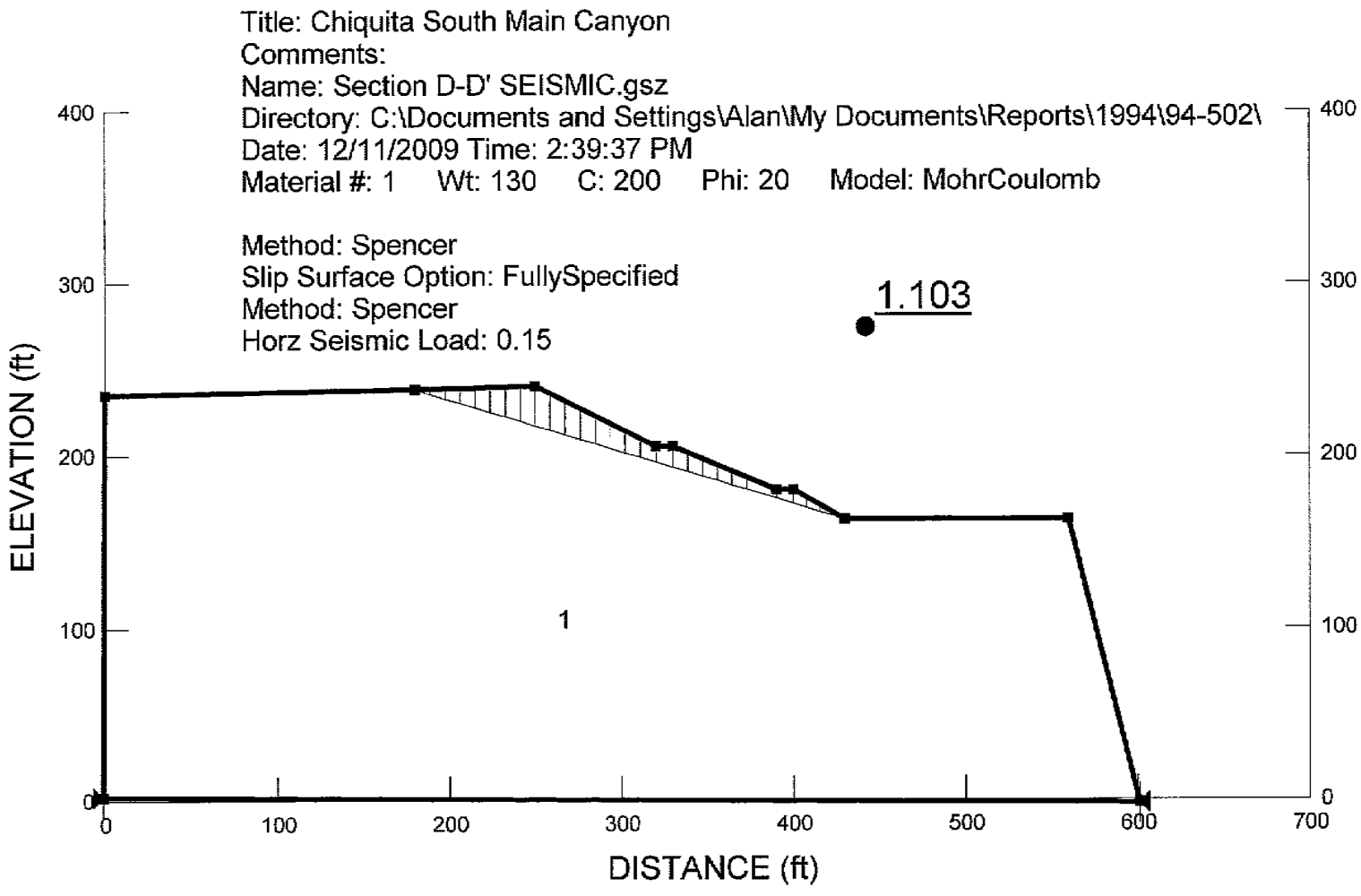
200
300
400
500
600
700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Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0.15
1.103
1
ELEVATION (ft)
DISTANCE (ft)
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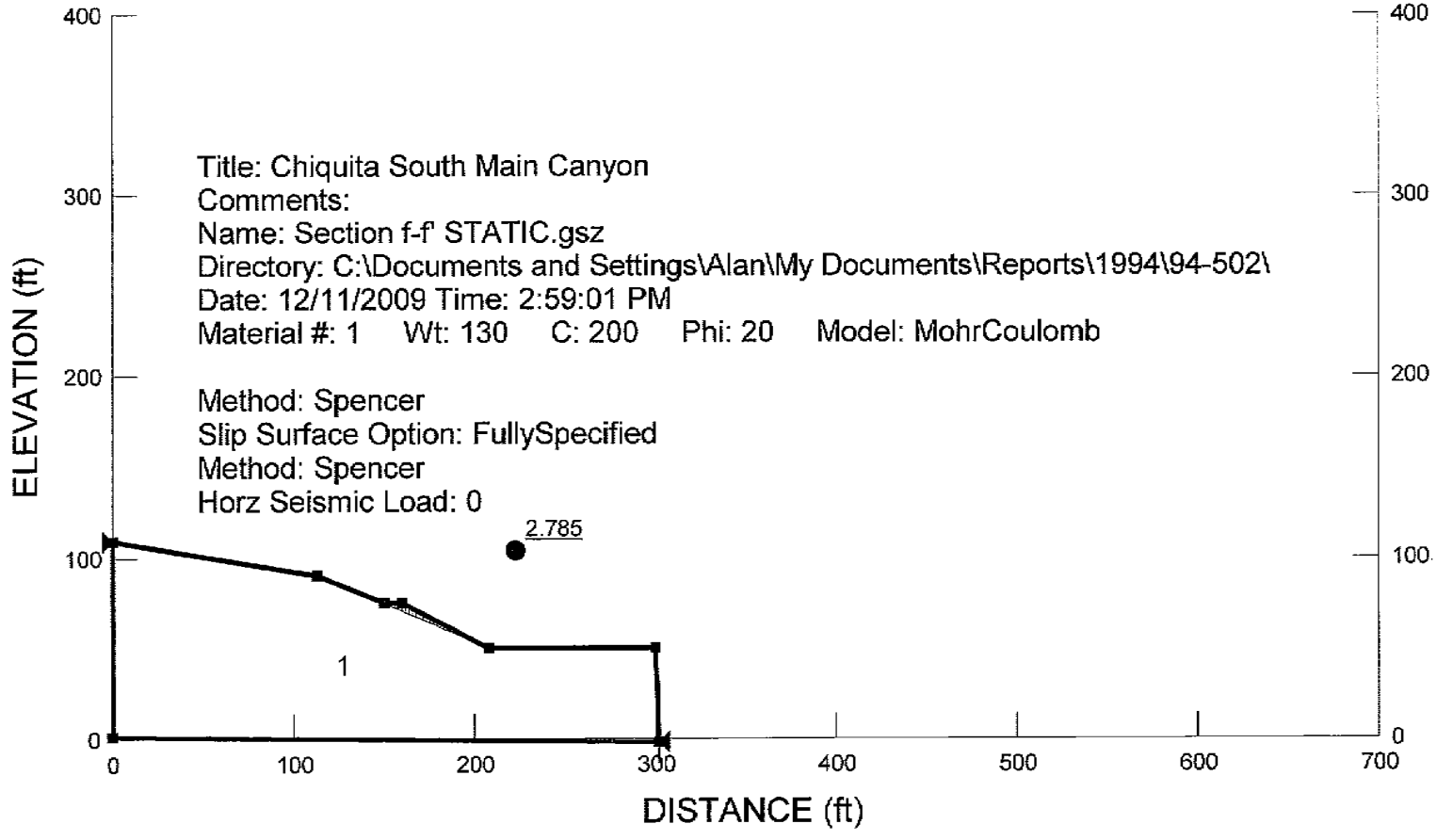
200
300
400
500
600
700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Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0
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ELEVATION (ft)
DISTANCE (ft)
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600
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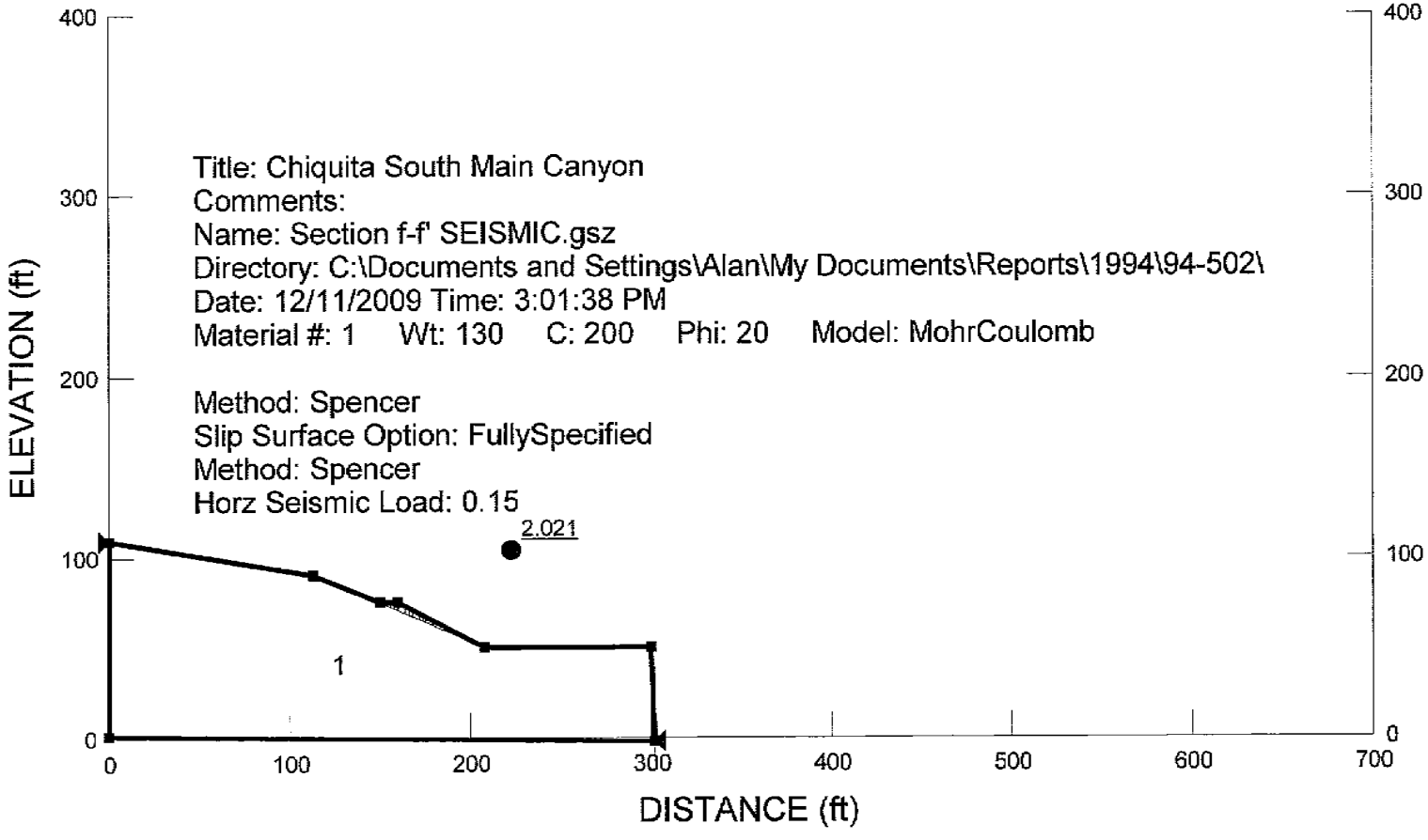
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Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0.15
2.021
1
ELEVATION (ft)
DISTANCE (ft)
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100
200
300
400
500
600
700

GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

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GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

April 29, 2010

Newhall Land and Farming Company
23823 West Valencia Boulevard
Valencia, California 91355

Job No. 94-502-022

Attention: Mr. Corey Harpole

Subject: Response to County of Los Angeles Review Sheets and Geotechnical Plan Review
Revised Vesting Tentative Tract Map No. 61105
Mission Village, Newhall Ranch
Los Angeles County, California

Reference: See Attached References

Ladies and Gentlemen:

This submittal provides information requested by the County of Los Angeles Department of Public Works (County), Geotechnical and Materials Engineering Division (GMED), Geologic and Soils Engineering Sections. The information provided is in answer to a Soils Engineering Review Sheet dated February 5, 2010, and a Geologic Review Sheet dated February 8, 2010. The GMED comments on the review sheets are shown below in bold type. Our response follows each comment in regular type.

Included in this letter is a geotechnical plan review of revised Vesting Tentative Tract Map (VTTM) No. 61105. The revised vesting tentative tract map was prepared by Psomas and is dated April 19, 2010.

R. T. FRANKIAN & ASSOCIATES
1329 SCOTT ROAD BURBANK CALIFORNIA 91504
TEL. (818) 531-1501 FAX (818) 531-1511 WWW.RTFRANKIAN.COM

RESPONSE TO GMED REVIEW SHEETS

SOILS ENGINEERING REVIEW SHEET

1. **The submitted geotechnical map sheets 11 and 12 do not show the off-site grading shown on the latest Tentative Tract Map. Verify and provide discussion, conclusions, and recommendations for the off-site grading shown on the Tentative Map. Provide geotechnical maps and Tentative Tract Map that conform.**

   <u>Note:</u> The Soils Engineering report must include conclusions and recommendations for all grading shown on the Tentative Tract Map including off-site grading. If the off-site grading is not part of the tract development it must be removed from the Tentative Tract Map.

The off-site grading reflected on Sheets 11 and 12 is for a utility corridor. The geologic and geotechnical conditions relative to the utility corridor grading were addressed by Allan E. Seward, Engineering Geology, Inc. (AES) in their May 25, 2007 and December 21, 2009 reports (AES, 2007b and 2009). R. T. Frankian & Associates (RTF&A) has reviewed the referenced AES reports and agree with their conclusions and recommendations for the off-site utility corridor grading.

The off-site grading shown on Sheet 9 for the Southern California Edison (SCE) substation alternatives was addressed by Leighton and Associates, Inc. (Leighton). We have reviewed the pertinent Leighton reports (2007, 2008, and 2010) and concur with their geologic and geotechnical findings and recommendations for the off-site grading of the proposed SCE substation.

2. **Provide revised slope stability analyses as requested by the Geology Section. Verify and revise the represented geology of the slope stability analyses as necessary.**

Revised geologic sections were prepared as requested in the geology comments. Revised slope stability calculations are presented in the Appendix. The slope

stability factor of safety results are indicated on the Geotechnical Sections, Figures 4.1 and 4.2.

3. **Provide slope stability analyses that utilize an iterative process to determine the critical failure plane. Verify the presented slope stability analyses represent the calculated critical failure plane. Provide revised analyses and recommendations as necessary.**

The previously presented slope stability calculations were for daylighted bedding conditions where the critical failure plane is defined by the geologic geometry and the failure surface with the lowest factor of safety was presented. For this response, we performed several slope stability calculations for circular failures. For each grid point presented on the slope stability calculations, a factor of safety was determined for at least 10 different circle radiuses, resulting in the evaluation of at least 2,000 individual failure surfaces. For the calculations that were utilized to determine the Restricted Use Areas (RUAs) limits, the critical failure surface for a factor of safety just above 1.5 that extends farthest from the top of the slope is presented.

4. **Provide all input data and calculated output from all slope stability analyses. Indicate the various shear strength parameters used in the analyses, in the appropriate segments of the represented slope. Include the output sheets that show the calculated factor of safety.**

For the program Slope W, the calculations presented in the Appendix are the input and output files which show the calculated factor of safety, material strengths, and failure surface. As discussed during our GMED meeting, we will take the results of the slope stability calculations and put then on the attached Geotechnical Sections that clearly show the failure surface and strength parameters.

5. **Provide a table of all shear strength parameters utilized in the slope stability analyses. Specify material represented by the shear parameters.**

As part of the evaluation of shear strength parameters to be used in slope stability calculations, the referenced reports concerning the subject site were reviewed. A discussion of the geologic factors affecting slope stability, the shear strength parameters, and the stability methods used in the analyses were previously presented in RTF&A reports (2009c, 2010) and by AES (2004d) for VTTM 61105. Shear strength parameters were summarized by AES on page F2 of Appendix F (AES, 2004d). Presented below are the recommended shear strengths for use at the subject site based on review of the referenced reports.

SUMMARY OF SHEAR STRENGTH PARAMETERS

Material	Static Cohesion (psf)	Static Ø (degrees)
Landslide Failure Plane Material	200	15
Landslide Mass	140	25
Terrace Deposit Material	200	30
Cross-Bedding	500	35
Saugus Along Bedding (static)	200	20
Saugus Along Bedding (pseudostatic)	300	30
Compacted Fill (coarse-grained)	300	30
Compacted Fill (fine-grained)	350	24
Alluvium	200	29

6. **Provide rotational static and seismic slope stability analyses for the newly proposed cut slopes presented in the Geologic Sections, Figure 3. Provide revised geotechnical cross section, for each section analyzed, showing the critical failure plane used in the analyses. Indicate the various shear strength parameters used in the analyses, in the appropriate segments of each failure plane. Show locations of the cross sections used in slope stability analyses on the geotechnical map. Recommend mitigation if factors of safety are below County minimum standards. Revise maps to show mitigation measures, as necessary.**

The requested calculations meet the County minimum requirements for stable slopes and are presented in the Appendix. The slope stability results are indicated on the attached Geotechnical Sections, Figures 4.1 and 4.2.

7. **Provide slope stability analyses for Qls XXXIX (Cross Section 9M-9M') located south of the newly proposed debris basin shown on Sheet 3. Verify the toe of the landslide in relation to the proposed debris basin. If the proposed debris basin will be utilized to mitigate the landslide, provide volume calculations that clearly show that 100 percent of the predicted landslide material will be accommodated by the debris basin. Per County policy, the catchment area must be designed for 100 percent of the predicted debris volume. Provide mitigation measures as necessary.**

As discussed in our GMED meeting, we have prepared a Geologic Section K-K at a scale of 1" = 40 feet and performed static slope stability calculations. Due to the shallow landslide failure surface, it was determined with GMED that it will not be necessary to provide seismic calculations. The slope stability calculations meet the County minimum static gross stability requirements. The slope stability calculations are presented in the Appendix and the results are indicated on the attached Geotechnical Sections, Figure 4.2.

8. **Requirements of the Geology Section are attached.**

Our responses to the Geologic Review Sheet are presented below.

9. **Include a copy of this review sheet with your response.**

The Soils Engineering and Geologic Review Sheets are included at the end of this report.

GEOLOGIC REVIEW SHEET

1. Apparent dips shown on geologic cross sections E and F appear to be 10-15° higher than supported by the data provided. Verify and revise sections and analyses as needed.

RTF&A has revised Geologic Section E-E' (shown on Figure 3.1) utilizing the bedding attitude obtained by AES in their exploratory trench, designated T-188Q, and located approximately 30 feet south of the section line. The trench, projected to the section line along the strike of bedding, is depicted on Geologic Section E-E'. The bedding measured in the trench strikes N42W and dips 48 degrees to the northeast, with an apparent easterly dip of 28 degrees, relative to Geologic Section E-E' and proposed cut slope CS-11. The 28-degree apparent dip is steeper than the 2:1 (horizontal:vertical), or 26-degree, cut slope. Accordingly, the cut slope is considered grossly stable from a geologic standpoint. RTF&A's previous recommendations regarding a 30 feet wide by 5 feet deep stability fill slope for CS-11, to restore slope grades after removal of landslide Qls III, remain applicable (RTF&A, 2009c).

Geologic Section F-F' (Figure 3.1) was revised using an apparent dip based on averaging all of the bedding attitudes measured in AES boring B-71E. The resultant average bedding attitude strikes N39W and dips 21 degrees northeast, with a resultant apparent dip of 18 degrees to the north, relative to Geologic Section F-F'. The proposed grading of Cut Slopes CS-13a and CS-13b, depicted on Geologic Section F-F,' has been revised on the April 19, 2010 Vesting Tentative Tract Map. The stability of Cut Slope CS-13a, indicated on the section line, is addressed in this report as part of our geotechnical plan review of revised Vesting Tentative Tract Map No. 61105.

2. Plot subsurface data on Sections A – F as applicable.

Geologic Sections A-A' through F-F' have been revised, where applicable, to reflect subsurface data such as bedding, or borings and test pits.

3. No grading is permitted in areas subject to geologic hazard (County of Los Angeles Building Code §110.2.2). Revise grading on lot 481 (sheet 3) to exclude grading within the proposed RUA.

Based on discussions with GMED, it is our understanding that grading within the RUAs that were established for the steep natural slopes will be permitted by the County, provided that RUAs are established and placed within lots that are not permitted to be developed. Accordingly, the lot lines for Lot 481 have been adjusted and the designated RUA, formerly established within a portion of Lot 481, is located entirely within Open Space Lot 487 (see Figure 2.3). Additionally, the RUAs previously established for Lots 19 and 20, Lot 300, and Lots 322 through 325 have now been designated as Open Space Lots 130 (Figure 2.3) , 367 (Figure 2.4) , and 358 (Figure 2.6), respectively.

Section 110.2.2 of the Los Angles County Building Code has an exception as provided in Section 110.2.3, subject to the approval of the building official. The proposed grading improves the slope stability along the natural slopes by removing driving force and provides favorable drainage.

RTF&A met with GMED on March 11, 2010 to discuss our slope stability calculations and procedure that justify a reduction to the previously recommended RUA. Presented below is a discussion of the procedures used to reduce and/or eliminate the RUA established by AES.

The RUA on Lot 481 is related to not obtaining a factor of safety in excess of 1.5 within the proposed grading limits outside of the County required building setback distance of H/3, up to a maximum of 40 feet. AES had established a failure surface where a static factor of safety of 1.55 was obtained and then applied an additional setback where an RUA was established. Our procedure was to evaluate the existing geologic sections and new geologic sections and establish a revised RUA where the factor of safety of 1.5 was obtained. The RUA was eliminated from graded areas where a factor of safety of 1.5 is obtained. The current recommended RUAs are shown on the Geotechnical Map, Figures 2.1 to 2.12.

The slope stability calculations presented for Geologic Sections G-G' and J-J' indicated that a factor of safety of at least 1.5 is obtained within the limits of proposed grading. An RUA is not required and it has been removed from the plan in this area. The slope stability calculation for Geologic Section H-H' indicates that the factor of safety for the graded area is greater than 1.5. Accordingly, the RUA has been removed from the area represented by Geologic Section H-H'. Geologic Section I-I' was constructed near AES Section 4-4'. Slope stability calculations for Geologic Section I-I' and AES Section 4-4' indicate that a factor of safety of 1.5 is not obtained until a horizontal distance of 68 feet and 72 feet respectively, from the proposed daylight line. A setback of 72 feet measured from the graded top of slope is recommended at Geologic Section I-I' and AES Section 4-4'. This RUA has been added to Figure 2.3, which encompasses the area where a static factor of safety of less than 1.5 is obtained.

A similar procedure was used for the other revised RUA areas related to slope stability. At some locations, the previously presented AES Geologic Sections (AES, 2004d) were utilized for updated slope stability calculations. These geologic sections should be reviewed within the referenced AES report (AES, 2004d). The calculations are presented in the Appendix. The slope stability calculations are presented in the Geotechnical Sections, Figure 4.1 through 4.2.

4. **Some of the subsurface data provided in Seward (7/20/04) indicates faulting through quaternary deposits and into younger deposits along the Airport Mesa and Saddle faults. Other subsurface work identified quaternary deposits with no Holocene cover. In these areas Holocene displacement cannot be proved or disproved. Building setbacks (Restricted Use Area) must be established where Holocene displacement cannot be ruled out.**

RTF&A has established "Fault Building Setbacks" for the Airport Mesa and Saddle faults (as shown on Figure 2.3 of the Geotechnical Map) for all areas of the two faults where Holocene displacement cannot be ruled out, due to a lack of datable soil horizons. In general, the fault setbacks measure approximately 50 feet on each side of the mapped fault traces. After reviewing the AES trench logs for the Airport Mesa fault, we noted several subsidiary faults in the terrace

deposits extending to ground surface. Accordingly, the Fault Building Setback for the Airport Mesa fault encompasses, and extends 50 feet beyond, these subsidiary faults. The expanded setback width is located in the vicinity of "GG Street" and Cut Slope CS-18, and measures approximately 200 feet wide.

5. The Soils Engineering review dated 2/5/10 is attached.

Our responses to the Soils Engineering review sheet were presented in the previous section of this report.

GEOTECHNICAL PLAN REVIEW
REVISED VESTING TENTATIVE TRACT MAP NO. 61105

This report presents the results of our Geotechnical Plan Review of Revised Vesting Tentative Tract Map No. 61105 (VTTM 61105) , Mission Village, Newhall Ranch, California. Previous geotechnical and geologic reports for VTTM 61105 were preformed by AES (2004a, 2004b, 2004d, 2005b, 2005, 2007d, and 2008a) and RTF&A (2009b and 2009c).

The purpose of this geotechnical plan review is to evaluate the revisions to proposed VTTM 61105, as shown on the Geotechnical Map, Figures 2.1 through 2.12. The review is based on the 1" = 100' *Major Land Division, Vesting Tentative Tract Map No. 61105*, prepared by Psomas, and dated April 19, 2010.

We have performed numerous prior geotechnical investigations within, and in the vicinity of, the site. Data from these reports were utilized in developing the VTTM 61105 conclusions and recommendations. Additionally, we have reviewed and incorporated pertinent geologic data previously developed by AES for VTTM 61105 and adjacent tracts/parcels. A list of the applicable

RTF&A and AES reports is included in the "References" section following the report text.

Our recommendations are based on the results of our review of previous data, field explorations, laboratory tests, and appropriate engineering and geologic analyses. The assessment of general site environmental conditions for the presence of contaminants in the soils and groundwater at the site was beyond the scope of this investigation. The geologic conditions on site have been previously addressed in the referenced RTF&A and AES reports, and are consistent with current conditions. The conclusions and recommendations presented in the referenced reports remain applicable, except where superseded by this report.

Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report has been prepared for Newhall Land and Farming Company and their design consultants, to be used solely for planning and design of VTTM 61105 and its associated grading. The report has not been prepared for use by other parties and may not contain sufficient information for purposes of other parties or other uses.

SUMMARY OF VESTING TENTATIVE TRACT MAP REVISIONS

The revisions to VTTM 61105 include:

Sheet 3 (Figure 2.3)

- cut slopes along east side of Commerce Center Drive (designated as Cut Slopes CS-20 and CS-55) slightly reconfigured; and
- RUAs formerly within Lots 19, 20, and 481 now designated as "Open Space Lots".

Sheet 4 (Figure 2.4)

- RUAs formerly within Lot 300 now designated as "Open Space Lot".

Sheet 6 (Figure 2.6)

- RUAs formerly within Lots 322 through 325 now designated as "Open Space Lots".

Sheet 7 (Figure 2.7)

- Westridge Parkway realigned and adjacent slopes reconfigured;
- grading in area of Cut Slope CS-13 has been revised, resulting in two cut slopes (designated Cut Slopes CS-13a and CS-13b) on each side of a private street; and
- three new cut slopes (designated Cut Slopes CS-57, CS-58, and CS-59) proposed along the eastern property line, east of Lot 661 and Westridge Parkway within VTTM 53295.

Sheet 8 (Figure 2.8)

- two new cut slopes (designated Cut Slopes CS-60 and CS-61) proposed for each side of Media Center Lane.

SCOPE OF WORK

The scope of work for the geotechnical review of the revised VTTM 61105 included:

- review of the referenced reports;

- revision of Geologic Sections A-A' and F-F,' depicting the revised grading conditions, relative to the proposed cut slopes;
- evaluation of the revised grading, relative to slope stability;
- evaluation of natural slope stability within RUAs;
- preparation of conclusions and recommendations based on existing site conditions and future intended use; and
- preparation of a Geotechnical Map, presented as Figures 2.1 through 2.12.

SLOPE STABILITY – CUT SLOPES

General: Three previously proposed cut slopes (Cut Slopes CS-13, CS-20, and CS-55) have been reconfigured from the previous vesting tentative tract map (dated November 24, 2009). Six new cut slopes (Cut Slopes CS-13b, CS-57 through CS-61) are proposed for revised VTTM 61105. A discussion of the new and revised cut slopes is presented below. The approximate locations of all of the cut slopes proposed for VTTM 61105 are depicted on Figures 2.3 through 2.8. Details specific to all proposed 61 cut slopes, including anticipated geologic conditions and recommended mitigation of potential slope instability, are presented on Table 1.

Slope stability analyses for new or revised cut slopes were performed using the program Slope/W by GEO-SLOPE International Ltd., which utilized Bishop's Simplified Method or Spencer's Method.

The analyses were based on subsurface conditions, as depicted on the Geologic Sections, presented as Figure 3.1 and 3.2. The existing ground surface, proposed grading scheme, and subsurface geologic structure are shown on the geologic sections. For analyses, where the location of weak bedding planes is

unknown or uncertain, one is assumed to be located exactly at the critical location, typically near the toe of the slope. The critical failure surface, material properties, and factors of safety are added to the geotechnical sections for presentation in this report. The geotechnical sections are presented as Figure 4.1 and 4.2.

As part of the evaluation of shear strength parameters to be used in slope stability calculations, the referenced reports concerning the subject site were reviewed. A discussion of the geologic factors affecting slope stability, the shear strength parameters, and the stability methods used in the analyses were previously presented in RTF&A reports (2009c, 2010) and by AES (2004d) for VTTM 61105. Shear strength parameters were summarized by AES on page F2 of Appendix F (AES, 2004d). Presented below are the recommended shear strengths for use at the subject site based on review of the referenced reports.

SUMMARY OF SHEAR STRENGTH PARAMETERS

Material	Static Cohesion (psf)	Static Ø (degrees)
Landslide Failure Plane Material	200	15
Landslide Mass	140	25
Terrace Deposit Material	200	30
Cross-Bedding	500	35
Saugus Along Bedding (static)	200	20
Saugus Along Bedding (pseudostatic)	300	30
Compacted Fill (coarse-grained)	300	30
Compacted Fill (fine-grained)	350	24
Alluvium	200	29

Cut Slope CS-13a: Cut Slope CS-13a (Figure 2.7), formerly CS-13, will consist of a north-northeast-facing, 2:1 slope that will attain a maximum height of approximately 60 feet. The revised cut slope height is approximately 10 feet more than the slope previously addressed by RTF&A (2009c). The slope will encounter upper Saugus Formation units, landslide Qls I, and a surficial failure. Bedding within the underlying Saugus Formation strikes northwest and dips 16 to 24 degrees towards the northeast. This bedding orientation is daylighted with respect to the proposed cut slope (see Geologic Section F-F', Figure 3). Stability analyses performed for potential failure along the adversely oriented bedding indicate that proposed cut slope meets the County minimum requirements for stable slopes and is grossly stable.

The recommended partial removal of Qls I (AES, 2005b) will likely undercut the proposed cut slope. A 30 feet wide by 5 feet deep stability fill will need to be constructed to restore slope grades in the area of the landslide removal. The recommended landslide removal depths are indicated on Figure 2.7. The stability fill will also effectively buttress any portion of the surficial failure that may remain at the conclusion of the cut slope grading.

Cut Slope CS-13b: Cut Slope CS-13b (Figure 2.7) is planned as a south-facing, 10 ± -foot high, 2:1 slope. As depicted on Geologic Section F-F', the cut slope will expose upper Saugus Formation units in which the underlying bedding strikes north-northwest and dips approximately 12 degrees towards the east. The easterly dip is favorably oriented with respect to the south-facing cut slope, and the cut slope is considered grossly stable from a geologic standpoint.

Cut Slope CS-20: Cut Slope CS-20 (Figure 2.3) will consist of a 170-foot high, 2:1, southwest-facing slope. The revised cut slope height is approximately 30 feet higher than previously proposed (RTF&A, 2009c). The cut slope will expose undifferentiated Saugus Formation units. Bedding within the underlying Saugus Formation strikes west-northwest, with dips ranging from 70 degrees to near-vertical towards the southwest. The slope is considered grossly stable from a geologic standpoint, due to the steeply dipping beds.

Cut Slope CS-55: Cut Slope CS-55 (Figure 2.3) will consist of a 130-foot high, southwest-facing, 2:1 slope. The revision to this cut slope is limited to reconfiguring the slope face appearance from relatively straight to undulatory. As addressed in our previous vesting tentative map plan review (RTF&A, 2009c), the cut slope will expose undifferentiated Saugus Formation units in which the underlying bedding strikes west-northwest, with dips ranging from 60 degrees to near-vertical towards the southwest. The bedding orientation is favorable with respect to the proposed cut slope (see Geologic Section A-A', Figure 3.1). Stability calculations for Section A-A' are presented in the Appendix, and the results are indicated on the Geotechnical Section, Figure 4.1.

Cut Slope CS-57: Cut Slope CS-57 (Figure 2.7) will be graded as a 70-foot high, west-facing, 2:1 slope. The cut slope will expose upper Saugus Formation units. Bedding within the underlying Saugus Formation strikes northwest, with dips ranging from 10 to 15 degrees towards the northeast. This bedding is favorably oriented, relative to the west-facing cut slope, and the slope is considered grossly stable.

Cut Slope CS-58: Cut Slope CS-58 (Figure 2.7) will consist of a north-, west-, and south-facing slope that will be graded at 2:1 and attain a maximum height of approximately 30 feet. The proposed cut slope is underlain by upper Saugus Formation units. Bedding within the underlying Saugus Formation strikes northwest and dips 10 to 15 degrees towards the northeast and is favorably oriented with respect to the proposed cut slope. Accordingly, CS-58 is considered grossly stable, from a geologic standpoint

Cut Slope CS-59: Cut Slope CS-59 (Figure 2.7) will consist of a north-, west-, and south-facing slope that will be graded at 2:1 and attain a maximum height of approximately 60 feet. The cut slope will expose upper Saugus Formation units in which the underlying bedding strikes northwest and dips 10 to 15 degrees towards the northeast. The northeasterly dip is favorably oriented with respect to the proposed cut slope, and the cut slope is considered grossly stable from a geologic standpoint.

Cut Slope CS-60: Cut Slope CS-60 (Figure 2.8) will consist of an east-northeast-facing, 2:1 cut slope that will be graded to a height of approximately 10 feet. The cut slope will expose engineered fill placed during the grading of Parcel Map 18654 (AES, 2007a). The engineered fill slope is considered grossly stable.

Cut Slope CS-61: Cut Slope CS-61 (Figure 2.8) is planned as a 10 ±-foot high, west-southwest-facing, 2:1 cut slope that will expose a combination of terrace deposits and engineered fill. The engineered fill was placed during Parcel Map 18654 grading (AES, 2007a), and is considered grossly stable.

Bedding within the terrace deposits strikes northwest and dips three degrees towards the northeast. This bedding orientation is considered grossly stable, relative to the west-southwest-facing cut slope.

The exposure of terrace deposits in the area of proposed Cut Slope CS-61 is limited. There is the potential that the future cut slope will encounter engineered fill overlying the terrace deposits. Therefore, it is recommended that CS-61 be observed during grading by a geologist. If an adverse fill-over-cut condition or potential seepage problem is indicated, it may be necessary to construct a stability fill against the cut slope.

CONCLUSIONS AND RECOMMENDATIONS

General: Based on the geotechnical data presented in the previous geotechnical reports by AES (2004a, 2004b, 2004d, 2005b, 2005, 2007d, and 2008a) and RTF&A (2009b and 2009c), and our review of the revised VTTM 61105 plan, it is our opinion that the proposed development of VTTM 61105 is feasible from a geotechnical standpoint. All conclusions and recommendations presented in the referenced reports remain applicable, unless superseded by this report.

Restricted Use Areas (RUAs): RUAs have been modified and eliminated in some areas, as discussed in this report and indicated on the attached Geotechnical Map, Figures 2.1 through 2.12. Furthermore, RTF&A has established a "Fault Building Setback" for both the Airport Mesa and Saddle faults, as depicted on Figure 2.3. The Fault Building Setbacks constitute RUAs. Habitable structures (i.e., structures exceeding 2,000 person-hours per year)

should not be permitted within these Fault Building Setbacks. RUAs, by definition, are excluded from our regulatory statement.

SECTION 111 STATEMENT

Based on our review of the revised vesting tentative tract map and the referenced reports, it is our professional opinion that the proposed development will be safe from hazard of landslide, settlement, or slippage, and will not adversely affect the geotechnical conditions of off-site properties, provided our recommendations and the requirements of the Los Angeles County Building Code are followed.

-oOo-

The following are attached and complete this report.

- References
- LACDPW Soils Engineering Review Sheet dated February 5, 2010
- LACDPW Geologic Review Sheet dated February 8, 2010
- Summary of Cut Slopes - Table 1
- Geotechnical Map Explanation - Figure 1 (in pocket)
- Geotechnical Map - Figure 2.1 through 2.12 (in pocket)
- Geologic Sections - Figures 3.1 and 3.2 (in pocket)
- Geotechnical Sections - Figures 4.1 and 4.2 (in pocket)
- Appendix - Slope Stability Analyses (32 pages)

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STATE OF CALIFORNIA

Respectfully submitted,

R. T. FRANKIAN & ASSOCIATES

by: Timothy P. Latiolait
Principal Engineering Geologist

REGISTERED PROFESSIONAL ENGINEER
ALAN W. RASPLICKA
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and: Alan W. Rasplicka
Principal Geotechnical Engineer

Distribution: (4) Newhall Land and Farming Company
Attn: Mr. Corey Harpole
(3 "wet-signed", stamped copies and 1 CD of pdf file for submittal to the LACDPW; 1 "wet-signed", stamped copy and 1 CD with pdf file for client files)
(1) Psomas
Attn: Mr. Matt Heideman

RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

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COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION

SOILS ENGINEERING REVIEW SHEET

Address: 900 S. Fremont Ave., Alhambra, CA 91803
Telephone: (626) 458-4925
Fax: (626) 458-4913

District Office 8.2
Job Number GMTR
Sheet 1 of 1

DISTRIBUTION:
___ Drainage
___ Grading
___ Geo/Soils Central File
___ District Engineer
___ Geologist
___ Soils Engineer
___ Engineer/Architect

Tentative Tract Map	61105
Location	Castaic
Developer/Owner	Newhall Land and Farming Company
Engineer/Architect	Psomas
Soils Engineer	R.T. Franklan & Associates (94-502-60)
Geologist	Same as above

Review of:
Revised Tentative Tract Map Dated By Regional Planning 11/24/09
Geology Report Dated 10/14/09
Soils Engineering and Geologic Report Dated **12/21/09**, 10/13/09 (Change of Consultant), 6/13/05, 12/22/04, 7/22/04
Previous Review Sheet Dated 12/8/09

ACTION:

Tentative Map feasibility is not recommended for approval.

REMARKS:

1. The submitted geotechnical maps Sheets 11 and 12 do not show the off-site grading shown on the latest Tentative Tract Map. Verify and provide discussion, conclusions, and recommendations for the off-site grading shown on the Tentative Map. Provide geotechnical maps and Tentative Tract Map that conform.

   Note: The Soils Engineering report must include conclusions and recommendations for all grading shown on the Tentative Tract Map including off-site grading. If the off-site grading is not a part this tract development it must be removed from the Tentative Tract Map.

2. Provide revised slope stability analyses as requested by the Geology Section. Verify and revise the represented geology of the slope stability analyses as necessary.

3. Provide slope stability analyses that utilize an iterative process to determine the critical failure plane. Verify the presented slope stability analyses represent the calculated critical failure plane. Provide revised analyses and recommendations as necessary.

4. Provide all input data and calculated output from all slope stability analyses. Indicate the various shear strength parameters used in the analyses, in the appropriate segments of the represented slope. Include the output sheets that show the calculated factor of safety.

5. Provide a table of all shear strength parameters utilized in the slope stability analyses. Specify material represented by the shear parameters.

6. Provide rotational static and seismic slope stability analyses for the newly proposed cut slopes presented in the Geologic Sections, Figure 3. Provide revised geotechnical cross section, for each section analyzed, showing the critical failure plane used in the analyses. Indicate the various shear strength parameters used in the analyses, in the appropriate segments of each failure plane. Show locations of the cross sections used in slope stability analyses on the geotechnical map. Recommend mitigation if factors of safety are below County minimum standards. Revise maps to show mitigation measures, as necessary.

7. Provide slope stability analyses for Qls XXXIX (Cross Section 9M-9M') located south of the newly proposed debris basin shown on Sheet 3. Verify the toe of the landslide in relation to the proposed debris basin. If the proposed debris basin will be utilized to mitigate the landslide, provide volume calculations that clearly show that 100 percent of the predicted landslide material will be accommodated by the debris basin. Per County policy, the catchment area must be designed for 100 percent of the predicted debris volume. Provide mitigation measures as necessary.

8. Requirements of the Geology Section are attached.

9. Include a copy of this review sheet with your response.

NOTE TO THE PLAN CHECKER/BUILDING AND SAFETY DISTRICT ENGINEER:
A. THE ON-SITE SOILS ARE MODERATELY TO SEVERELY CORROSIVE TO FERROUS METALS.
B. THE ON-SITE SOILS HAVE A MEDIUM EXPANSION POTENTIAL.
C. PER THE SOILS ENGINEER, DEWATERING SHALL BE REQUIRED FOR REMOVALS IN THE VICINITY OF BORINGS B-72E AND B-73E.

REGISTERED PROFESSIONAL ENGINEER YOSHIYA MORITSUGU No. 67587 Exp. 6/30/11 CIVIL STATE OF CALIFORNIA

Prepared by Yoshiya Moritsugu, GE Date 2/5/10

NOTICE: Public safety, relative to geotechnical subsurface exploration, shall be provided in accordance with current codes for excavations, inclusive of the Los Angeles County Code, Chapter 11.48, and the State of California, Title 8, Construction Safety Orders.
P:\Yosh\61105TentTh (revision)

County of Los Angeles Department of Public Works
GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION
GEOLOGIC REVIEW SHEET
900 So. Fremont Ave., Alhambra, CA 91803
TEL. (626) 458-4925

DISTRIBUTION
1 Geologist
__ Soils Engineer
1 GMED File
1 Subdivision

TENTATIVE TRACT MAP 61105
SUBDIVIDER Newhall Land and Farming Co.
ENGINEER Psomas
GEOLOGIST & SOILS ENGINEER R.T. F & A

TENTATIVE MAP DATED 11/24/09 (Rev)
LOCATION Newhall Ranch
REPORT DATE 12/21/09, 10/14/09, 10/13/09

Additional Reports Reviewed Allan Seward: 7/20/04

The Regional Planning Commission, developer, and engineer are advised that:

PRIOR TO RECOMMENDING APPROVAL OF THE TENTATIVE TRACT OR PARCEL MAP:

1. Apparent dips shown on geologic cross sections E and F appear to be 10-15° higher than supported by the data provided. Verify and revise sections and analyses as needed.

2. Plot subsurface data on sections A – F as applicable.

3. No grading is permitted in areas subject to geologic hazard (County of Los Angeles Building Code §110.2.2). Revise grading on lot 481 (sheet 3) to exclude grading within the proposed RUA.

4. Some of the subsurface data provided in Seward (7/20/04) indicates faulting through quaternary deposits and into younger deposits along the Airport Mesa and Saddle faults. Other subsurface work identified quaternary deposits with no Holocene cover. In these areas Holocene displacement cannot be proved or disproved. Building setbacks (Restricted Use Area) must be established where Holocene displacement cannot be ruled out.

5. The Soils Engineering review dated 2/5/10 is attached.

Note: For grading plan review, continuous stratigraphy will be required for all slopes where out of slope (daylighted) bedding will, or may be, exposed. Determine the weakest materials identified in the borings and provide, or revise, stability analyses and recommended mitigation based on these data.

NOTE Provide a copy of this review with your resubmittal

Prepared by _____ Reviewed by _____ Date 2/8/10
Charles Nestle

Please complete a Customer Service Survey at http://dpw.lacounty.gov/go/gmedsurvey
P:\Gmepub\Geology Review\Forms\Form01.doc
6/30/07

TABLE 1

SUMMARY OF CUT SLOPES
Mission Village/Vesting Tentative Tract No. 61105

CUT SLOPE	FIGURE NO.	SLOPE GRADIENT	SLOPE HEIGHT (feet)	SLOPE FACE DIRECTION	GEOLOGIC MATERIALS	GEOLOGIC SECTION	GEOLOGIC STABILITY	MITIGATION
CS-1a	2.6	2:1	65	W	TQsl	6-6'	Steeply dipping bedding; stable geologic structure	Construct 30' wide by 5' deep stability fill
CS-1b	2.6	2:1	75	W	TQsl	----	Steeply dipping and favorable bedding; stable geologic structure	Construct 30' wide by 5' deep stability fill
CS-2	2.6	2:1	70	N to W	TQsl, Qal, af	34-34'	Steeply dipping and neutral bedding; stable geologic structure	Grading will remove Qal & af; construct 25' wide by 3' deep stability fill along north facing segment to eliminate"sliver" fill
CS-3a	2.5 & 2.6	2:1	35	S	TQsu & af	----	Neutral bedding; stable geologic structure	Grading will remove af
CS-3b	2.5 & 2.6	2:1	35	E	TQsu & af	----	Daylighted bedding, grossly stable by inspection	Construct 20' wide by 3' deep stability fill to control erosion and seepage along daylighted bedding
CS-3c	2.6	2:1	35	N	TQsu, Qls, af	----	Daylighted bedding; grossly stable by inspection	Grading will remove Qls & af; construct 20' wide by 3' deep stability fill to control erosion and seepage along daylighted bedding
CS-4	2.6 & 2.7	2:1	40	N	TQsl, TQsu, Qls, af	32-32' & 33-33'	Daylighted bedding, grossly stable by analyses	Remove Qls & af; construct 20' wide by 3' deep stability fill to control erosion and restore slope grades in Qls removal area
CS-5	2.6	2:1	130	NW	TQsl & Qls	48-48' & 8E-8E'	Neutral bedding; stable geologic structure	Grading will remove Qls
CS-6	2.7	2:1	110	N & E	TQsl & three Qls	49-49' & 8E-8E'	Daylighted bedding to steeply dipping bedding; stable by analyses	Remove landslides; construct 100' wide by 10' deep buttress for daylighted bedding and to restore slope grades in Qls removal areas
CS-7	2.7	2:1	30	NNE	TQsl & Qsw	C-C'	Daylighted bedding, grossly stable by evaluation	Construct 20' wide by 3' deep stability fill to control erosion and seepage along daylighted bedding
CS-8	2.7	2:1	95	N, NW & W	TQsl & Qsw	47-47'	Neutral (stable) bedding for NW facing segment; N facing unstable	Grading will remove Qsw; construct 110' wide by 5' deep buttress w/1.5:1 backcut for N facing segment
CS-9	2.7	2:1	80	NNE	TQsl, Qls & Qsw	46-46'	Steeply dipping bedding; grossly stable by analyses	None
CS-10	2.7	2:1	140	NE	TQsl & Qls	18-18' & 19-19'	Steeply dipping and favorable bedding; stable geologic structure	Remove Qls; construct 30' wide by 5' deep stability fill to eliminate "sliver" cut and restore slope grades in Qls removal area
CS-11	2.7	2:1	55	E	TQsl & Qls	E-E'	Steeply dipping bedding; grossly stable by inspection	Remove Qls; construct 30' wide by 5' deep stability fill to restore slope grades in Qls removal area
CS-12a	2.7	2:1	90	NE	TQsl, TQsu & Qls	44-44' & 11E-11E'	Daylighted bedding lower portion of slope; stable by analyses	Remove Qls; construct 30' wide by 5' deep stability fill to restore slope grades in Qls removal areas
CS-12c	2.7	2:1	25	NE	TQsu	D-D'	Daylighted bedding, grossly stable by analyses	None
CS-13a	2.7	2:1	50	NNE	TQsu, Qls & Qsf	F-F'	Daylighted bedding, grossly stable by analyses	Remove Qls; construct 30' wide by 5' deep stability fill to restore slope grades in Qls removal area
CS-13b	2.7	2:1	10	S	TQsu	F-F'	Stable geologic structure	None
CS-14	2.7	2:1	75	NE	TQsu, Qls & af	D-D'	Daylighted bedding, grossly stable by analyses	Remove Qls; construct 30' wide by 5' deep stability fill to restore slope grades in Qls removal areas and control seepage along bedding
CS-15	2.5 & 2.7	2:1	70	N	TQsu, Qls, Qsw & af	22-22' & 45-45'	Daylighted bedding; unstable	Construct 85' wide by 10' deep buttress w/1.5:1 backcut (eastern half); 85' wide by 15' deep buttress w/ 1.5:1 backcut (western half)

TABLE 1

SUMMARY OF CUT SLOPES
Mission Village/Vesting Tentative Tract No. 61105

CUT SLOPE	FIGURE NO.	SLOPE GRADIENT	SLOPE HEIGHT (feet)	SLOPE FACE DIRECTION	GEOLOGIC MATERIALS	GEOLOGIC SECTION	GEOLOGIC STABILITY	MITIGATION
CS-16	2.3	2:1	30	N	TQsu, Qls & af	41-41'	Unstable due to landslide	Remove landslide beneath slope and upper pad; construct buttress to support slope and pad above landslide
CS-18	2.3	2:1	110	W, N & NW	TQs & Qt	----	Favorable bedding; Qt susceptible to erosion	Construct 35' by 5' stability fill (west-facing segment); construct 20' by 3' stability fill (north- and northwest-facing segment)
CS-19	2.3	2:1 to 3:1	25	NW, SW & SE	Qt over TQs	----	Stable geologic structure	None
CS-20	2.3	2:1	170	SW	TQs	----	Steeply dipping and favorable bedding; stable geologic structure	None
CS-21a	2.4	2:1	30	E	TQsu	----	Favorable bedding; stable geologic structure	None
CS-21b	2.4	2:1	55	S	TQsu	----	Favorable bedding; stable geologic structure	None
CS-23	2.4	2:1	40	NW	TQsu & Qls	----	Favorable bedding; stable geologic structure	Grading will remove landslide
CS-24	2.4	2:1	25	NW	TQsu & Qls	----	Neutral bedding; stable geologic structure	Grading will remove landslide
CS-26	2.4 & 2.5	2:1	40	NW	TQsu	----	Neutral bedding; stable geologic structure	None
CS-27	2.4	2:1	50	N	TQsu	23-23'	Daylighted bedding, grossly stable by analyses	Construct 30' wide by 3' deep stability fill to control erosion and seepage along daylighted bedding
CS-28a	2.4	2:1	115	W	TQsl & af	----	Favorable bedding; stable geologic structure	None
CS-28b	2.4	2:1	85	N & NW	TQsl, TQsu, Qls, af	23-23', 24-24', 31-31', 2E-2E'	Daylighted bedding; western portion stable, eastern portion unstable	Grading will remove landslide; construct stability/buttress fill 30' wide by 5' deep for full slope length
CS-29	2.4	2:1	90	NE	TQsu	15-15'	Daylighted bedding; unstable	Construct 75' wide by 10' deep buttress w/2.75:1 backcut
CS-30	2.4	2:1	25	N	TQsl & Qsw	----	Neutral to shallow daylighted component; stable geologic structure	Grading will remove Qsw
CS-31	2.4 & 2.6	2:1	30	N	TQsl & af	----	Neutral to shallow daylighted component; stable geologic structure	Grading will remove af
CS-32	2.4 & 2.6	2:1	40	E	TQsl	----	Neutral to shallow daylighted component; stable geologic structure	None
CS-33	2.6	2:1	35	W	Qt	----	Favorable bedding; Qt susceptible to erosion	Construct 25' wide by 3' deep stability fill to eliminate fill over cut condition and control ersosion of Qt
CS-34	2.6	2:1	65	NW & W	QT & af	----	Favorable bedding; Qt susceptible to erosion	Grading will remove af. Construct 30' wide by 5' deep stability fill to control erosion of Qt
CS-35	2.4 & 2.6	2:1	130	W	TQsl & Qt	----	Favorable bedding; stable geologic structure	Construct 45' wide by 5' deep stability fill to eliminate fill over cut condition and control ersosion of Qt
CS-37	2.6	2:1	25	NW	Qt & af	----	Favorable bedding; stable geologic structure	Grading will remove af. Construct 20' wide by 3' deep stability fill to control erosion of Qt

TABLE 1

SUMMARY OF CUT SLOPES
Mission Village/Vesting Tentative Tract No. 61105

CUT SLOPE	FIGURE NO.	SLOPE GRADIENT	SLOPE HEIGHT (feet)	SLOPE FACE DIRECTION	GEOLOGIC MATERIALS	GEOLOGIC SECTION	GEOLOGIC STABILITY	MITIGATION
CS-38	2.6	2:1	50	SW	TQsl	----	Stable geologic structure; "sliver" cut	Construct 20' wide by 3' deep stability fill to eliminate "sliver" cut
CS-39	2.6	2:1	65	SW	Qt	----	Favorable bedding; Qt susceptible to erosion	Construct 30' wide by 5' deep stability fill to eliminate fill over cut condition and control erosion of Qt
CS-40	2.6	2:1	50	SW	Qt & af	----	Favorable bedding; Qt susceptible to erosion	Grading will remove af. Construct 30' wide by 5' deep stability fill to control erosion of Qt
CS-41	2.6	2:1	25	SW	Qt & af	----	Favorable bedding; Qt susceptible to erosion	Grading will remove af. Construct 20' wide by 3' deep stability fill to control erosion of Qt
CS-42	2.6	2:1	35	W	TQsl & af	----	Favorable bedding; stable geologic structure	Grading will remove af
CS-43	2.6	2:1	30	SE	TQsl & af	----	Favorable bedding; stable geologic structure	Grading will remove af
CS-44	2.6	2:1	40	NW	TQsl	----	Favorable bedding; stable geologic structure	None
CS-45	2.6	2:1	40	NW	TQsl	----	Favorable bedding; slope traversed by anticline	Construct 25' wide by 3' deep stability fill to control potential erosion of TQsl along anticlinal axis
CS-46	2.8	2:1 to 3:1	100	N	TQsu & Qt	42-42' & 43-43'	Favorable bedding; stable geologic structure	None
CS-47	2.8	2:1 to 3:1	55	S	TQsu	----	Favorable bedding; stable geologic structure	None
CS-48	2.8	2:1	50	N	TQsu & Qt	----	Favorable bedding; stable geologic structure	Construct 30' wide by 5' deep stability fill to control erosion of Qt
CS-49	2.8	2:1	45	N	Qt	----	Favorable bedding; Qt susceptible to erosion	Construct 25' wide by 3' deep stability fill to control erosion of Qt
CS-50	2.8	2:1 to 3:1	75	N	Qt & af/Qal	----	Favorable bedding; Qt susceptible to erosion	Construct 30' wide by 5' deep stability fill to control erosion of Qt
CS-51	2.8	2:1	75	N	Qt	51-51'	Favorable bedding; Qt susceptible to erosion	Construct 30' wide by 5' deep stability fill to control erosion of Qt
CS-52	2.8	3:1	30	S & E	Qt	----	Favorable bedding; Qt susceptible to erosion	Construct 25' wide by 3' deep stability fill to control erosion of Qt
CS-53	2.5	2:1	105	E	TQsu & Qt	B-B'	Daylighted bedding, grossly stable by analyses	Extend terrace drains across the entire slope face to control surface drainage
CS-54	2.7	2:1	40	SW	TQsl	----	Favorable bedding; stable geologic structure	None
CS-55	2.3	2:1	130	SW	TQs	A-A'	Favorable bedding; stable geologic structure by analyses	None
CS-56	2.3	2:1	25	NW & W	Qt	----	Favorable bedding; Qt susceptible to erosion	Grading will remove af. Construct 20' wide by 3' deep stability fill to control erosion of Qt
CS-57	2.7	2:1	70	W	TQsu & Qal	----	Favorable bedding; stable geologic structure	None

TABLE 1

SUMMARY OF CUT SLOPES
Mission Village/Vesting Tentative Tract No. 61105

CUT SLOPE	FIGURE NO.	SLOPE GRADIENT	SLOPE HEIGHT (feet)	SLOPE FACE DIRECTION	GEOLOGIC MATERIALS	GEOLOGIC SECTION	GEOLOGIC STABILITY	MITIGATION
CS-58	2.7	2:1	30	N, W & S	TQsu	----	Favorable bedding; stable geologic structure	None
CS-59	2.7	2:1	60	N, W & S	TQsu	----	Favorable bedding; stable geologic structure	None
CS-60	2.8	2:1	10	ENE	cef	----	Grossly stable engineered fill	None
CS-61	2.8	2:1	10	WSW	Qt & cef	----	Favorable bedding in Qt; grossly stable engineered fill	None

GEOTECHNICAL EXPLANATION

af Artificial Fill

Qsw Slope wash; only selected, large deposits are shown

Qal Alluvium

Qsf Surficial failure; queried where uncertain

Qls Landslide deposits; queried where uncertain

Qt Terrace deposits

TQsu Saugus Formation (upper unit)

TQsl Saugus Formation (lower unit)

TQs Saugus Formation (undefferentiated)

Geologic contact; queried where inferred; dotted where concealed

Fault trace; queried where inferred; dotted where concealed; indicates up (U) or down (D) where known

Trace of syncline, showing direction of plunge; the trace is concealed where it is mapped across units younger than TQs

Trace of anticline, showing direction of plunge; the trace is concealed where it is mapped across units younger than TQs

Trace of monoclinal warp hinge line; the trace is concealed where it is mapped across units younger than TQs

33° Strike and dip of bedding

5° Approximate Strike and dip of bedding

Horizontal bedding

17° Strike and dip of slide plane

76° Strike and dip of shear

21° Strike and dip of fracture

30° Strike and dip of fault

44° Strike and dip of minor fault

CS-56 Cut-slope designation

Recommended buttress

Recommended stability fill

Recommended building setback for slopes (where greater than h/3)

Removal boundary

Recommended Location of Subdrain

R=8-12' Recommended removal depth; "CR" indicates complete removal of landslide

PR=30' or to Bedrock Partial Removal of landslide with removal depth of upper 30' of landslide material or to bedrock where landslide is less than 30' deep

A — A' Geologic Section by RTF&A

51 — 51' Geologic Section by AES

T-217Q Location of exploratory backhoe trench for Phase I Landslide Investigation (T-1Q thru T-141Q, T-146Q thru T-160Q, T-177Q thru T-214Q, & T-217Q)

T-25M Location of exploratory backhoe trench for Mesas Entertainment Landslide Investigation (T-1M thru T-25M)

T-182T Location of exploratory backhoe trench for Mesas East Tentative Map Investigation (T-1T thru T-59T, T-62T thru T-112T, T-114T, T-128T thru T-150T, T-158T, T-178T thru T-182T)

T-157T Location of long exploratory backhoe trench for Mesas East Tentative Map Investigation (T-60T, T-61T, T-113T & T-151T thru T-157T)

ET-1T Location of exploratory excavation trench for Mesas East

T-32B Location of exploratory backhoe trench for Boulder Assessment Investigation (T-1B thru T-32B)

T-74H Location of exploratory backhoe trench for Holser Investigation (T-1H thru T-74H)

T-82H Location of exploratory backhoe fault trench for Holser Investigation (T-75H thru T-82H)

DC-1H Location of exploratory dozer cut for Holser Investigation

DC-B Location of exploratory dozer cut for Mesas East

T-47I Location of exploratory backhoe trench for Phase I Feasibility Evaluation Infrastructure (T-42I thru T-47I)

T-55SA Location of exploratory backhoe trench for Sand Aggregate Investigation (T-40SA thru T-55SA)

T-67 Location of exploratory backhoe trench for Magic Mountain (T-14 thru T-17, T-33 thru T-39, T-48, T-49, T-53, and T-55 thru T-67)

T-5MW Location of exploratory backhoe trench for Phase II Landslide Evaluation Measas West (T-7MW and T-12MW thru T-14MW)

B-73E Location of exploratory bucket-auger boring for Measas East (B-1E thru B-73E)

B-25M Location of exploratory bucket-auger boring for Measas Entertainment Landslide Investigation (B-1M-thru B-25M)

B-8B Location of exploratory bucket-auger boring for Boulder Assessment Investigation (B-1B thru B-25B)

B-16W Location of exploratory bucket-auger boring for Phase II Landslide Investigation - Measas West

RTF B-5 Location of exploratory bucket-auger boring by RTF&A; see Westridge Tract 45433-04 report dated 6/3/02 (RTF B-1 thru RTF B-5)

RW-3M Location of rotary-wash boring for Geotechnical Evaluation - Measas area (RW-1M thru RW-3M)

RW-3T Location of rotary-wash boring for Measas East Tentative Map Investigation (RW-1T thru RW-3T)

HS-34T Location of hollow-stem-auger boring for Measas East Tentative Map Investigation (HS-1T thru HS-34T)

HS-13 Location of hollow-stem-auger boring for Magic Mountain Entertainment (HS-4 thru HS-6, HS-8, and HS-10 thru HS-13)

HS-14I Location of hollow-stem-auger boring for Phase I Feasibility Evaluation Infrastructure (HS-12I thru HS-14I)

CPT-18 Location of cone penetration test for Magic Mountain Entertainment (CPT-4, CPT-6, CPT-16 and CPT-18)

CPT-18M Location of cone penetration test for Preliminary Geotechnical Evaluation Measas Area (CPT-1M thru CPT-15M and CPT-18M)

Lots potentially affected by additional overexcavation requirements in the vicinity of the monoclinal warp and Lion Canyon Anticline (8-ft-minimum overexcavation)

RUA Restricted Use Area

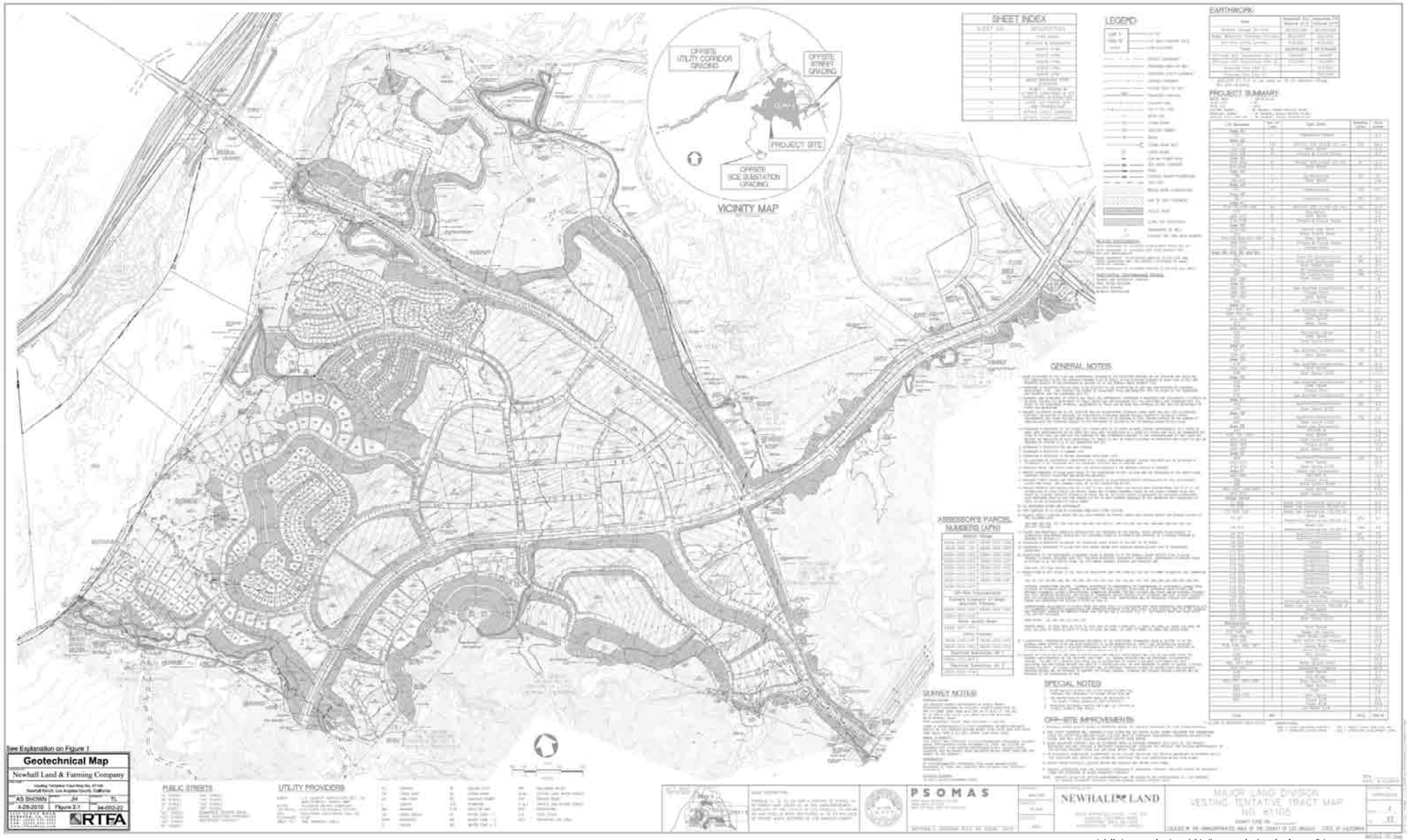
Geotechnical Map Explanation

PREPARED FOR
Newhall Land & Farming Company

Project Location
MISSION VILLAGE
Vesting Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California

SCALE	DRAWN BY	CHECKED BY
NTS	JH	
DATE 4-29-2010	Figure 1	JOB NO. 94-502-22

1329 SCOTT ROAD
BURBANK, CA, 91504
TEL: (818) 531-1501
FAX: (818) 531-1511
www.rtfrankian.com
RTFA



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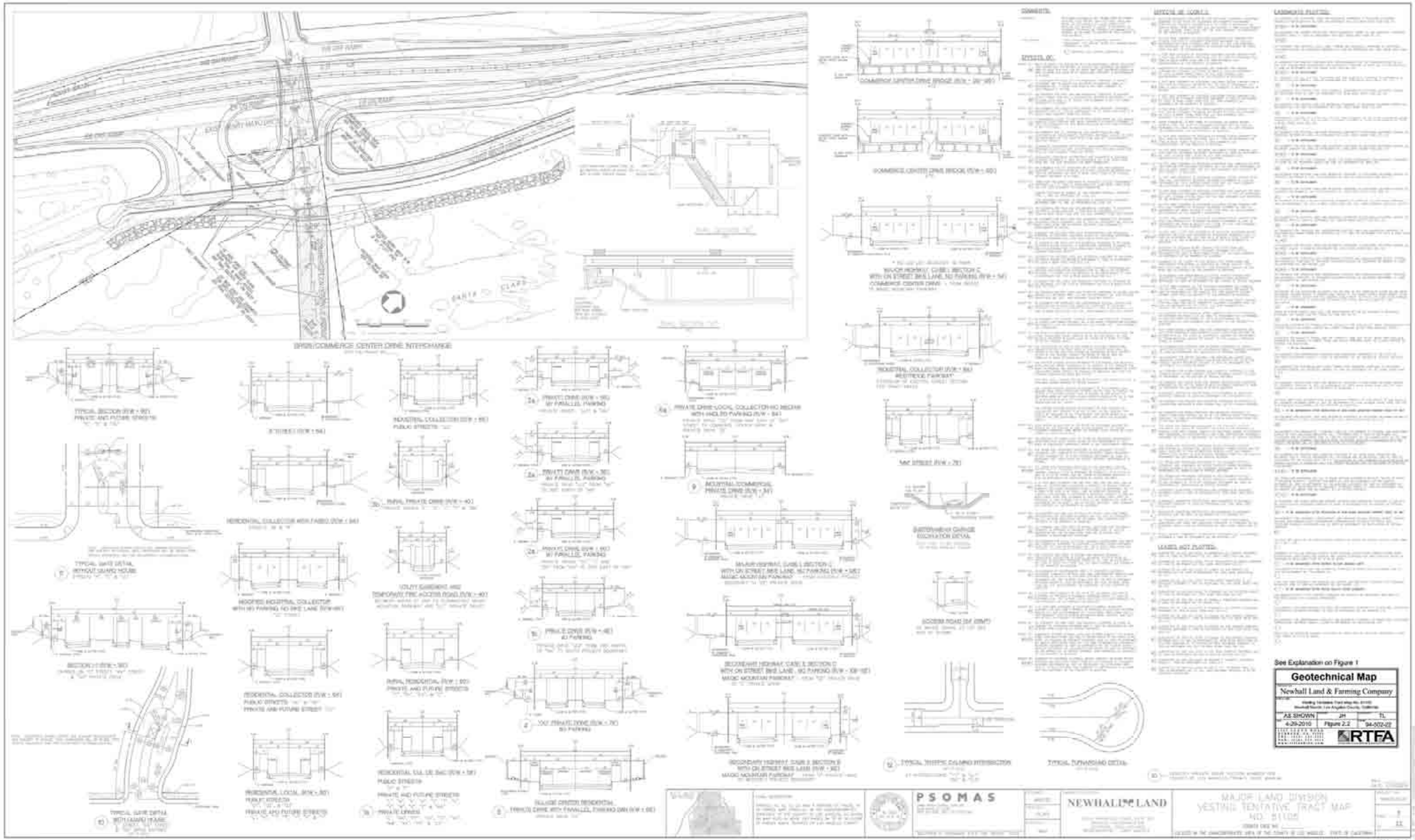

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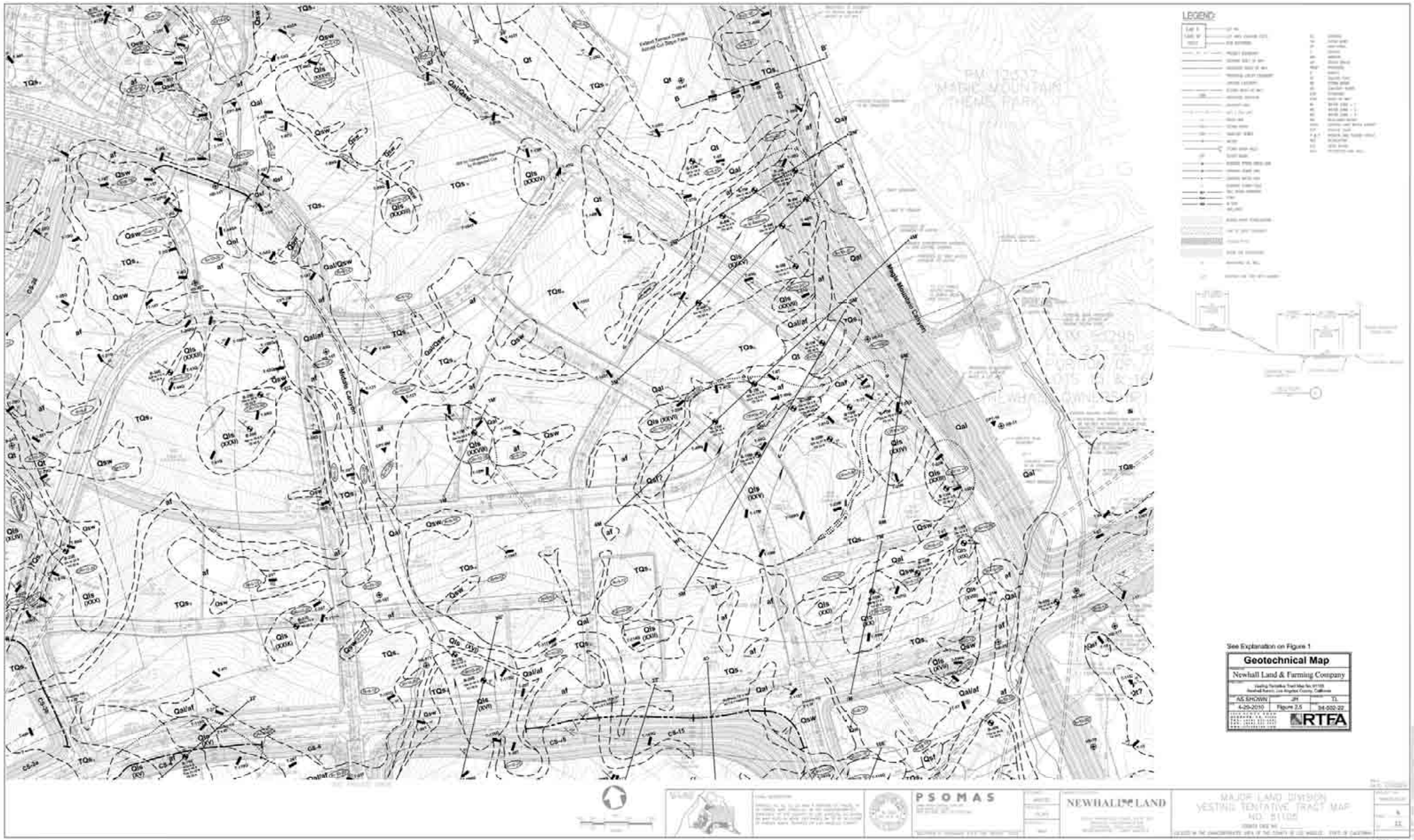
LEGEND
See Explanation on Figure 1
Geotechnical Map
Newhall Land & Farming Company
AS SHOWN
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TL
4-29-2010
Figure 2.5
34-000-22
RTFA
PSOMAS
NEWHALL LAND
MAJOR LAND DIVISION
VESTING TENTATIVE TRACT MAP
NO. 61105
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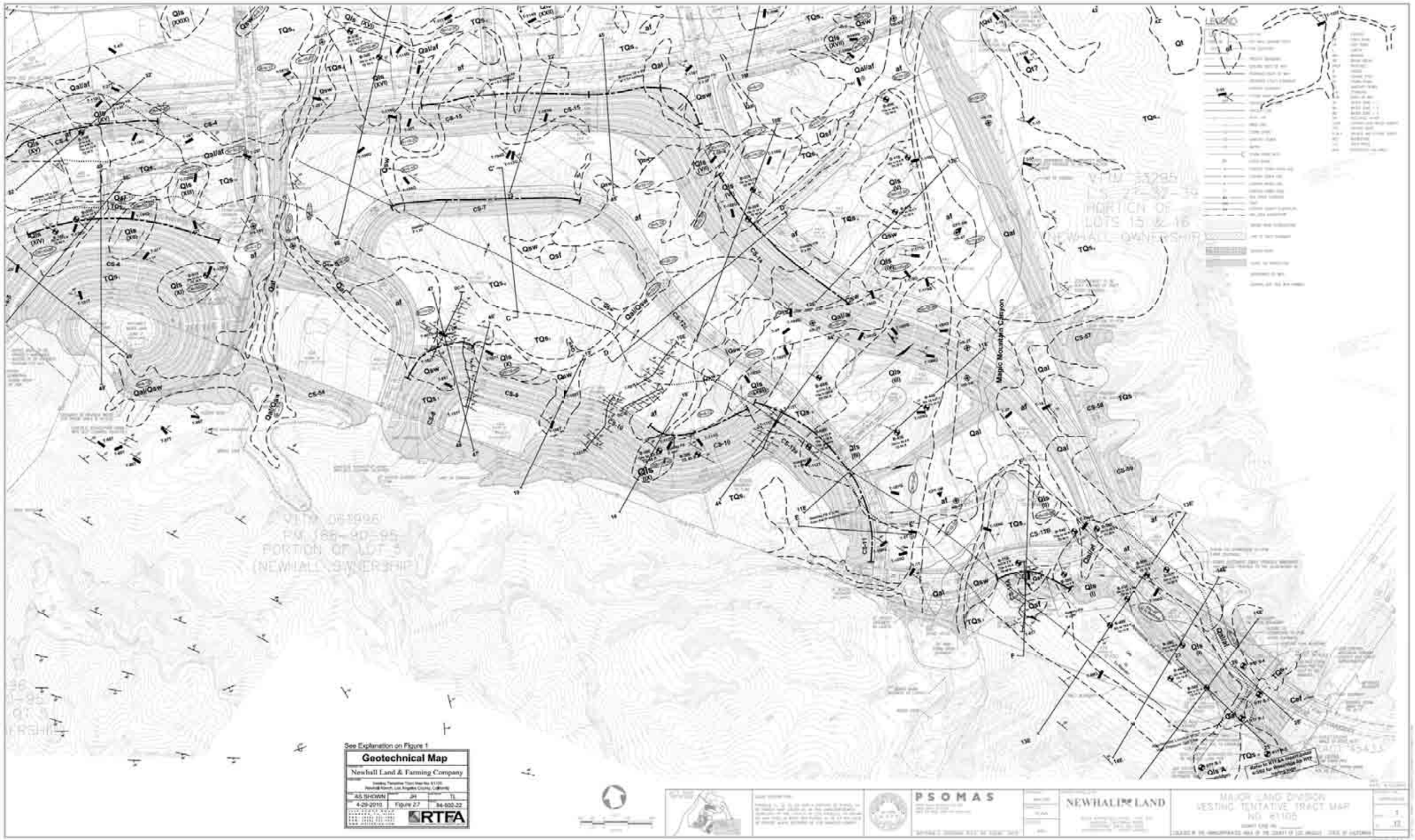
A full-size reproduction of this figure can be found at Impact Sciences.



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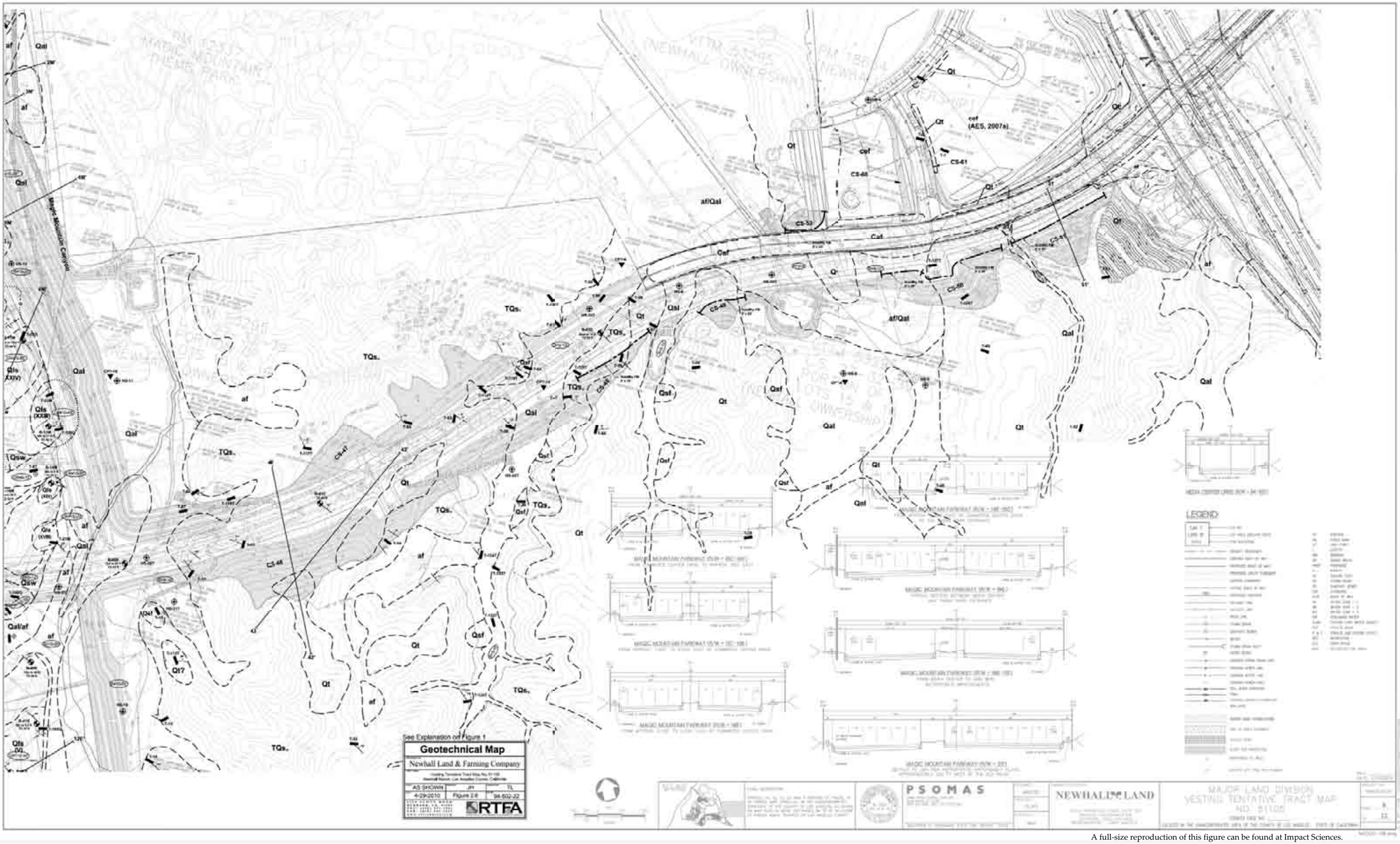


A full-size reproduction of this figure can be found at Impact Sciences.

SEWER LIFT STATION SUMMARIES

ULTIMATE CONDITION
SHOWN ON TENTATIVE MAP

INTERIM CONDITION
(before Commerce Center
Drive Bridge)

LEGEND

GEOTECHNICAL CONDITIONS OF
SCE SUBSTATION ADDRESSED
BY LEIGHTON & ASSOCIATES INC.
(2007, 2008, 2010)

HOMESTEAD
VTTM 60678

LEGACY VILLAGE
VTTM 61996

SCE SUBSTATION ALTERNATIVES AND ACCESS

SCE SUBSTATION ALTERNATE 2

SCE SUBSTATION ALTERNATE 1

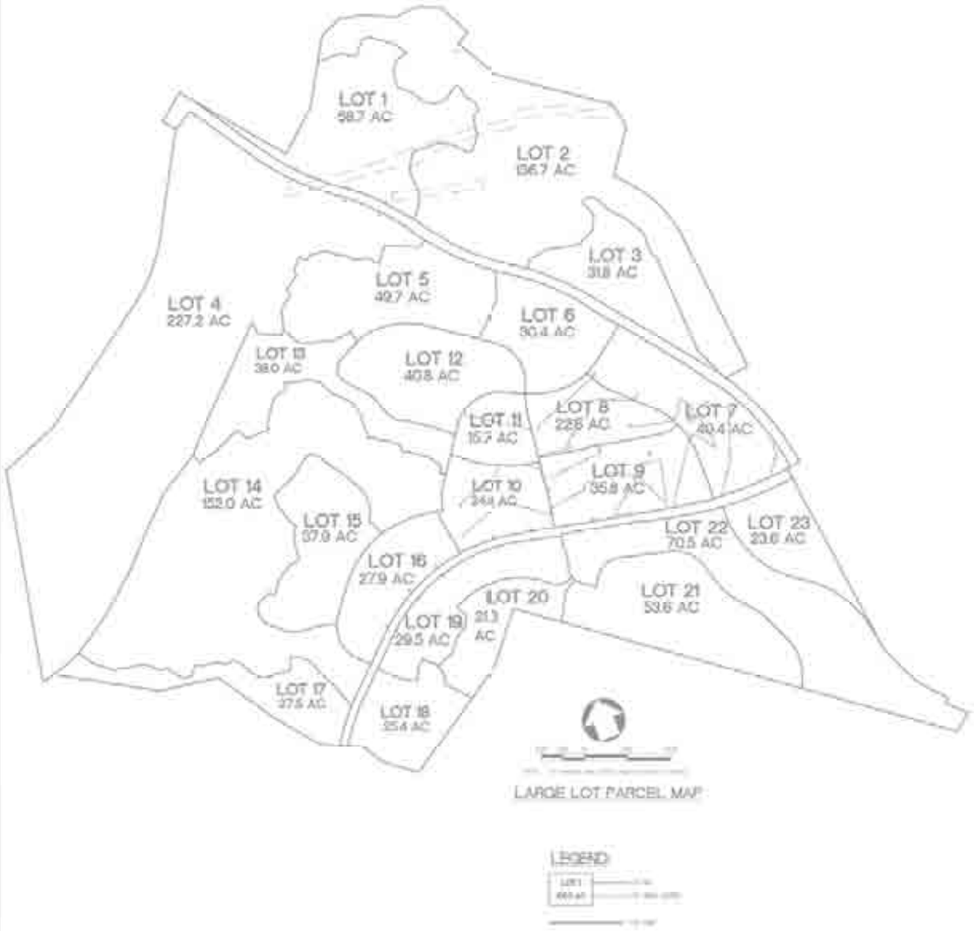
PSOMAS

NEWHALL LAND

MAJOR LAND DIVISION
VESTING TENTATIVE TRACT MAP
NO. 61105

For Use With Report Dated 4/29/2010, RTF& A Job Number 99-802-22

A full-size reproduction of this figure can be found at Impact Sciences.



PHASE 1	
Total Ac	567.6 AC [1]
Total On-Site Ac	441.0 AC
Total Du	2,872 DU
SFD	0 DU
Condo's	2,872 DU
Total Commercial St	858,100 SF
Total Open Space	112.4 AC

[1] INCLUDES OFFSITE GRADING SHOWN ON SHEETS 9, 7, AND 8.

PHASE 2	
Total Ac	337.8 AC [2]
Total On-Site Ac	335.3 AC
Total Du	586 DU
SFD	168 DU
Condo's	418 DU
Total Commercial St	0 SF
Total Open Space	171.0 AC

[2] INCLUDES OFFSITE GRADING SHOWN ON SHEET 6.

PHASE 3	
Total Ac	207.0 AC
Total On-Site Ac	207.0 AC
Total Du	628 DU
SFD	214 DU
Condo's	414 DU
Total Commercial St	0 SF
Total Open Space	108.6 AC

PHASE 4	
Total Ac	742.1 AC [3]
Total On-Site Ac	278.5 AC
Total Du	326 DU
SFD	0 DU
Condo's	326 DU
Total Commercial St	697,000 SF
Total Open Space	224.3 AC

[3] INCLUDES OFFSITE GRADING OF UTILITY CORRIDOR AND SCE SUBSTATION SHOWN ON SHEETS 9, 11, AND 12.

NOTE: WATER QUALITY BASIN, DEBRIS BASIN, SPINEFLOWER PRESERVE AND PARKS ARE INCLUDED IN TOTAL OPEN SPACE CALCULATION

See Explanation on Figure 1

Geotechnical Map

Newhall Land & Farming Company

AS SHOWN	JH	TL
4-29-2010	Figure 2.10	94-503-22

RTFA

PSOMAS

NEWHALL LAND

MAJOR LAND DIVISION
VESTING TENTATIVE TRACT MAP
NO. 61105

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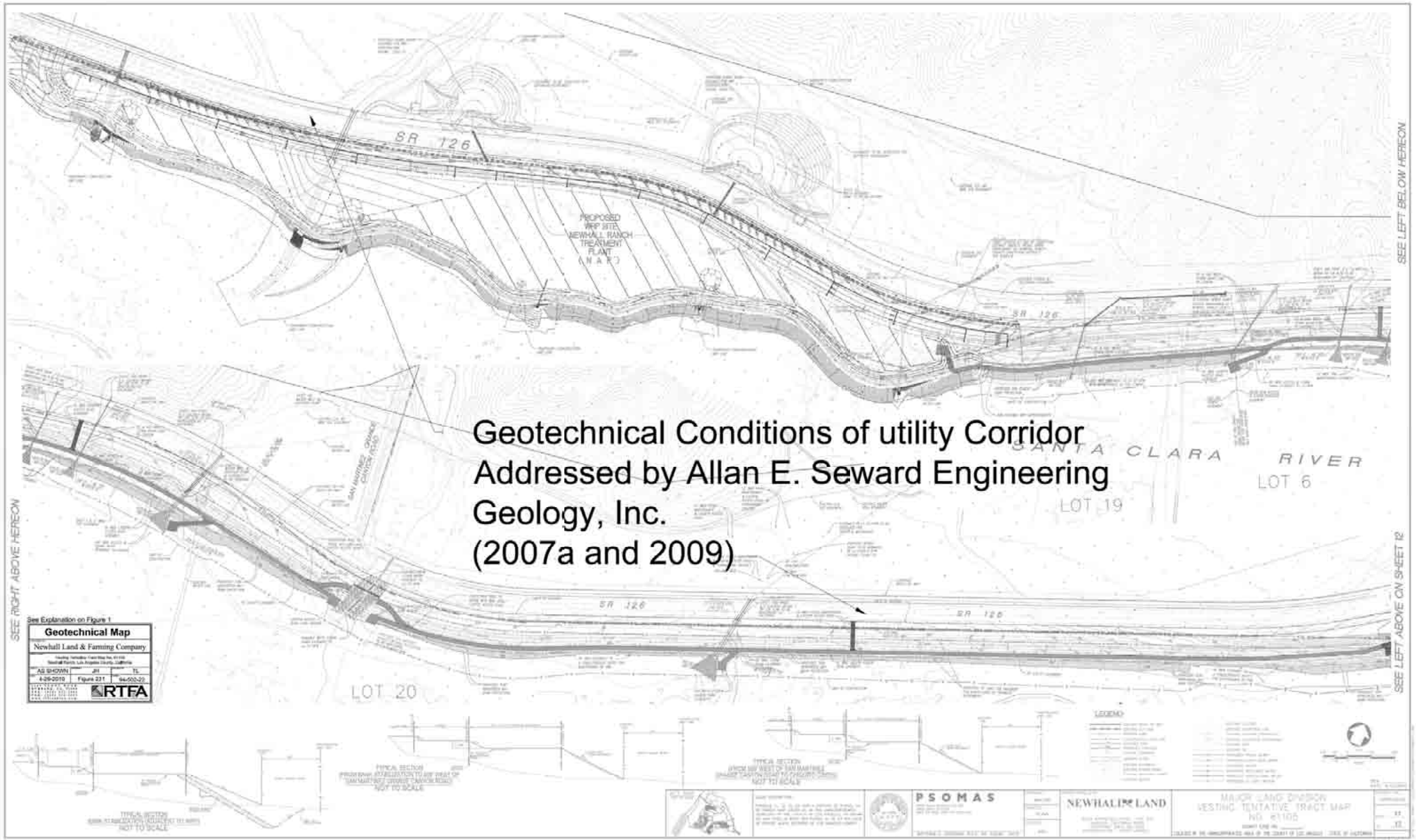
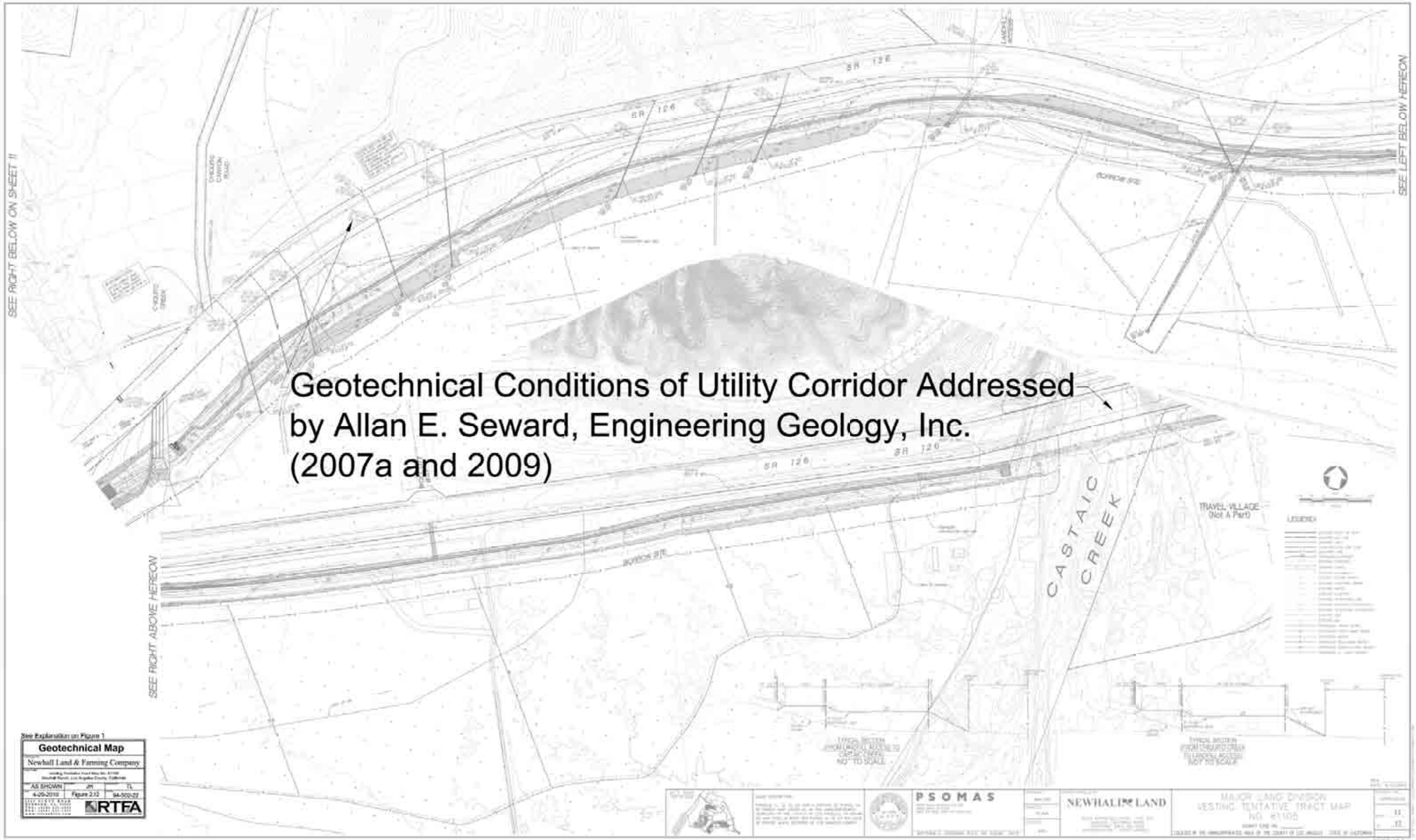


Geotechnical Conditions of utility Corridor Addressed by Allan E. Seward Engineering Geology, Inc. (2007a and 2009)

A full-size reproduction of this figure can be found at Impact Sciences.



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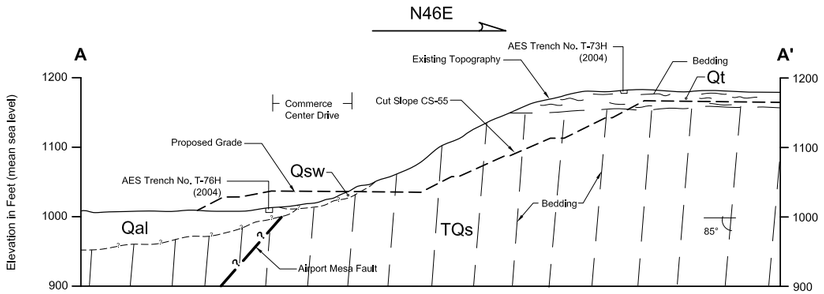

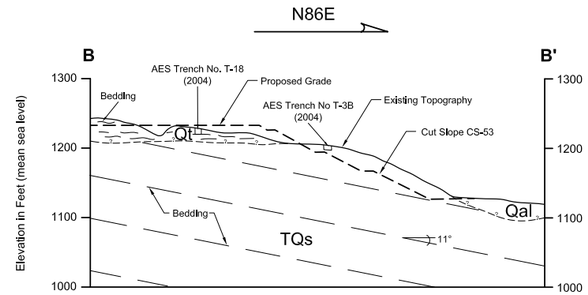

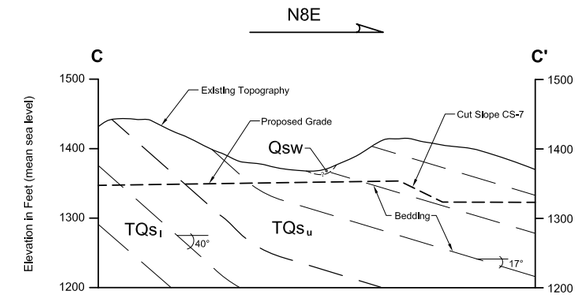

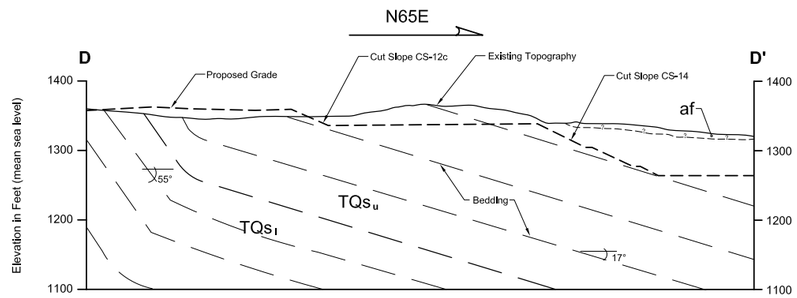

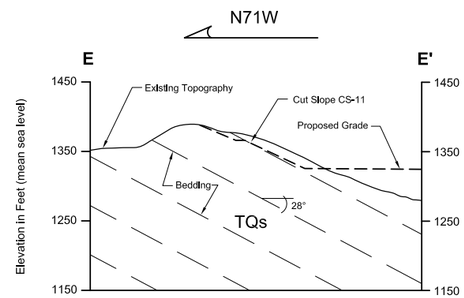

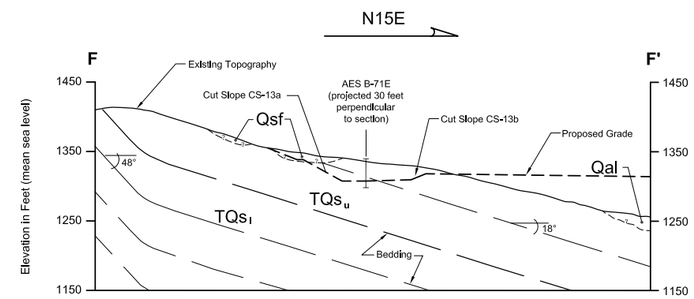

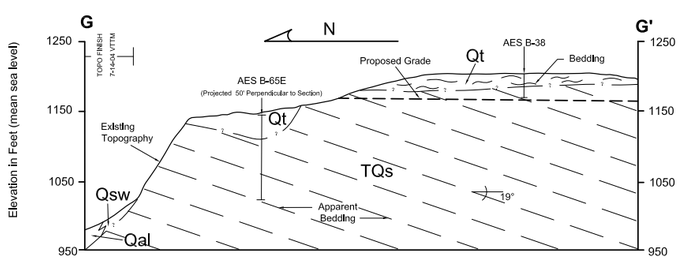

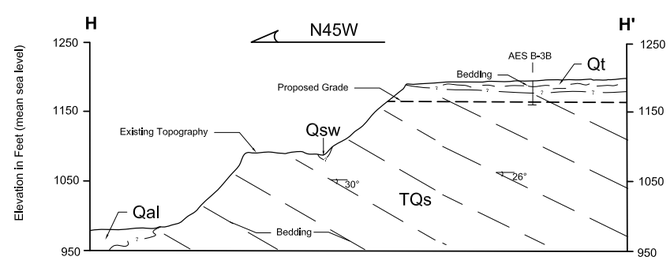

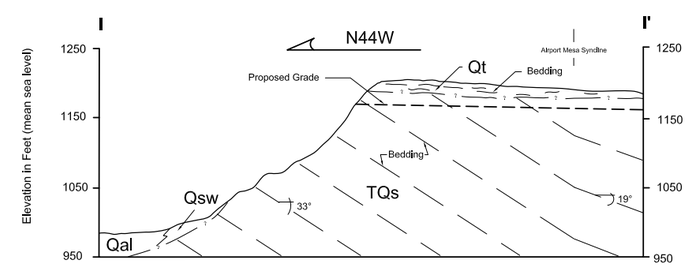

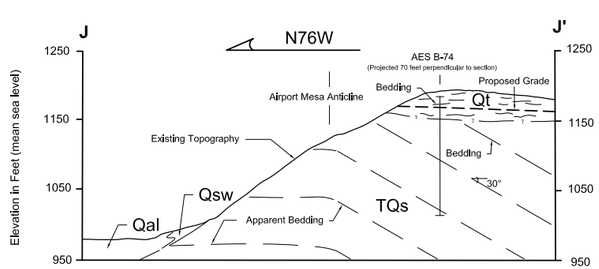

See Explanation on Figure 1

Geologic Sections

PREPARED FOR
Newhall Land & Farming Company

Project Location
MISSION VILLAGE
Vesting Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California

SCALE	DRAWN BY	CHECKED BY
1" = 100'	JH	
DATE 4-29-2010	FIGURE 3.1	JOB NO. 94-502-22

1329 SCOTT ROAD
BURBANK, CA. 91504
TEL: (818) 531-1501
FAX: (818) 531-1511
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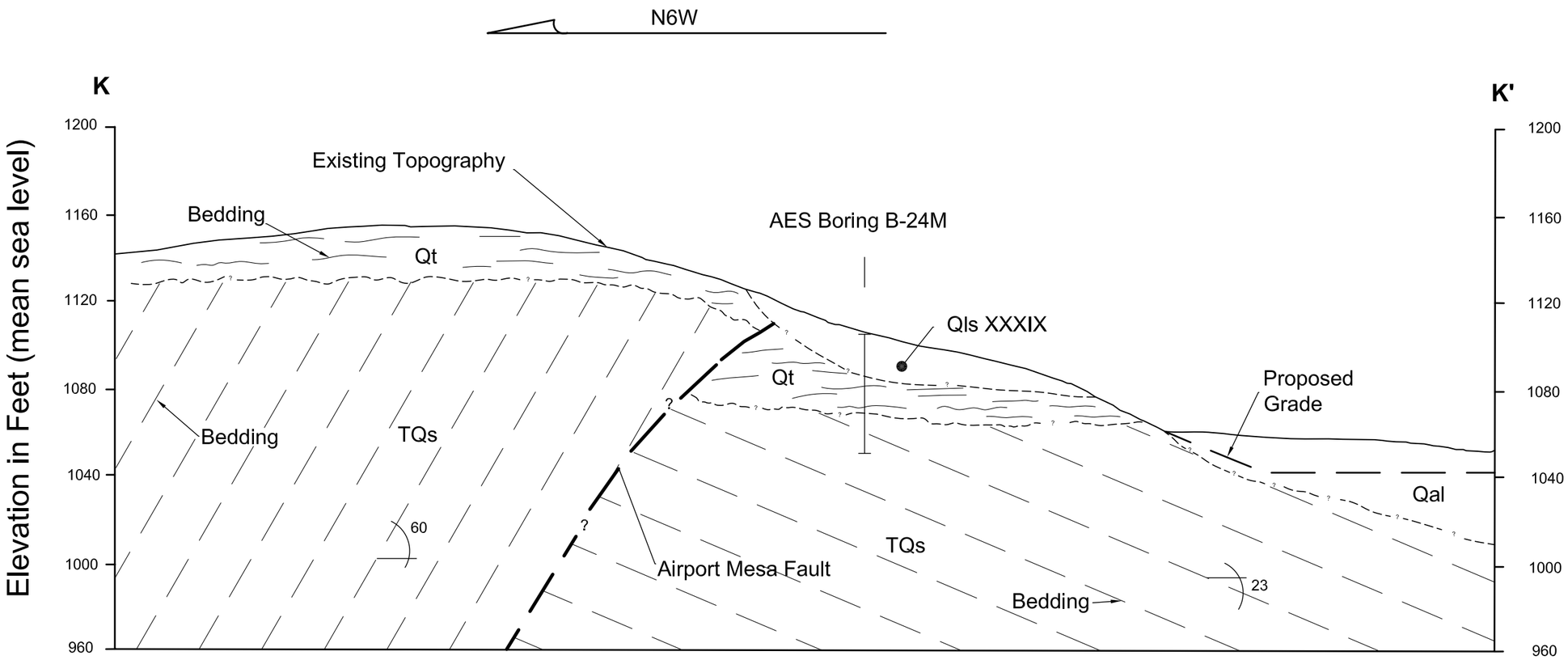

See Explanation on Figure 1

Geologic Sections

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Project Location
MISSION VILLAGE
Vesting Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California

SCALE	DRAWN BY	CHECKED BY
1" = 40'	JH	
DATE 4-29-2010	FIGURE 3.2	JOB NO. 94-502-22

1329 SCOTT ROAD
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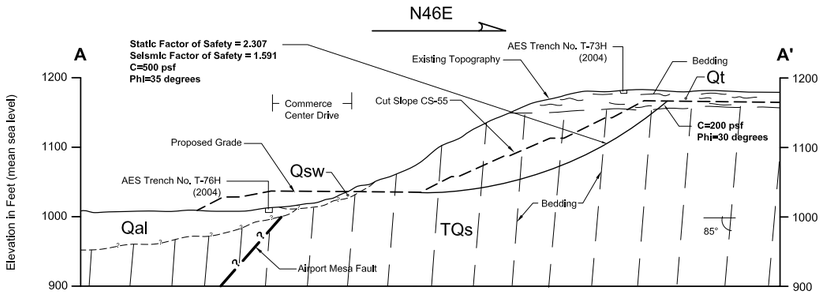

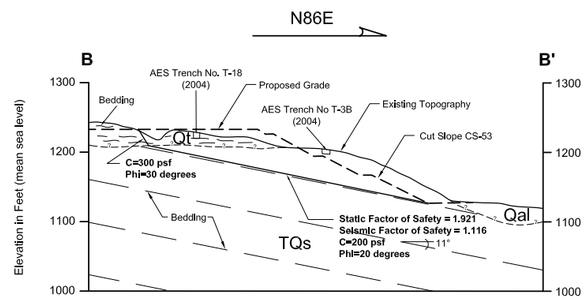

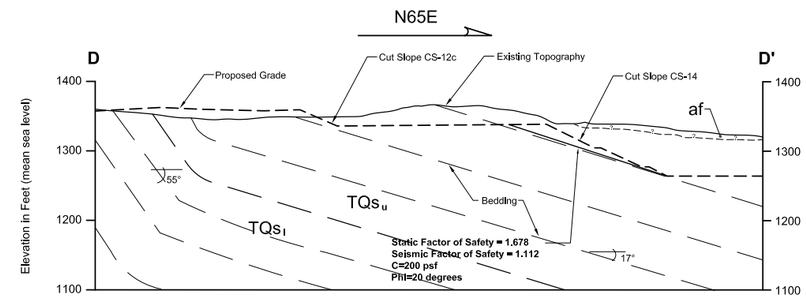

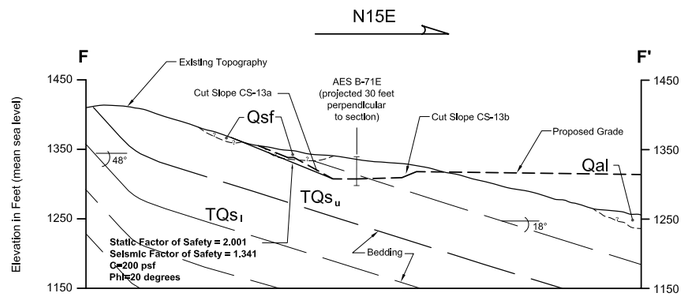

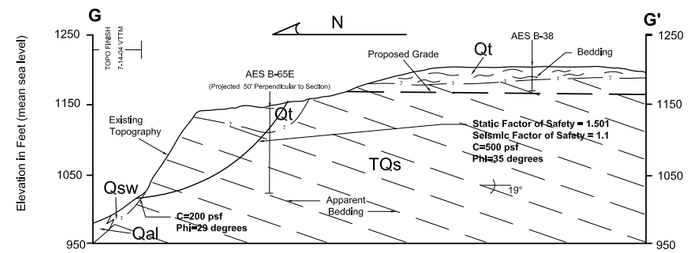

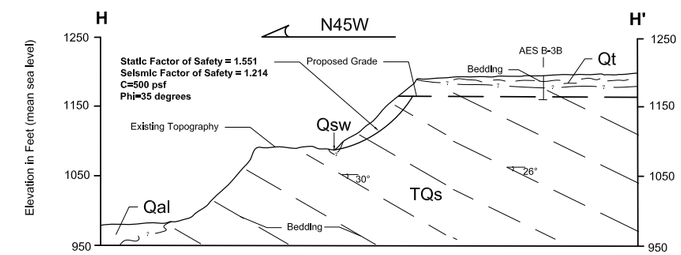

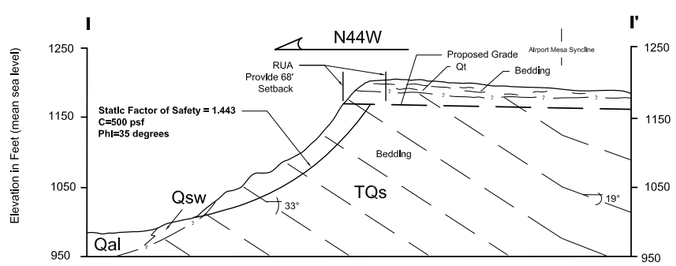

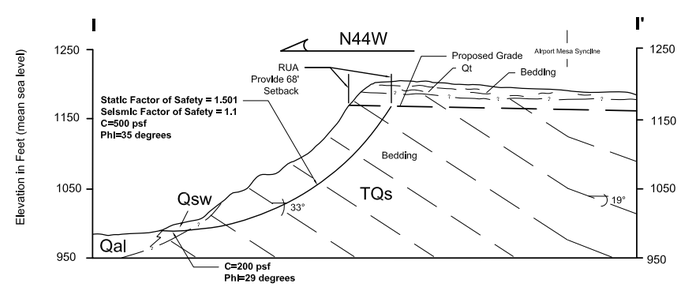

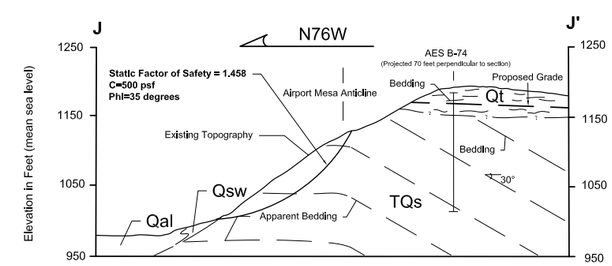

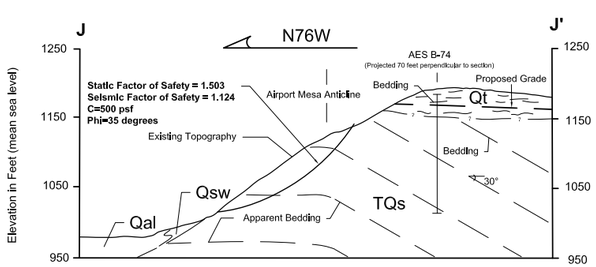

Geotechnical Sections

PREPARED FOR
Newhall Land & Farming Company

Project Location
MISSION VILLAGE
Vesting Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California

SCALE	DRAWN BY	CHECKED BY
1" = 100'	JH	
DATE 4-29-2010	Figure 4.1	JOB NO. 94-502-22

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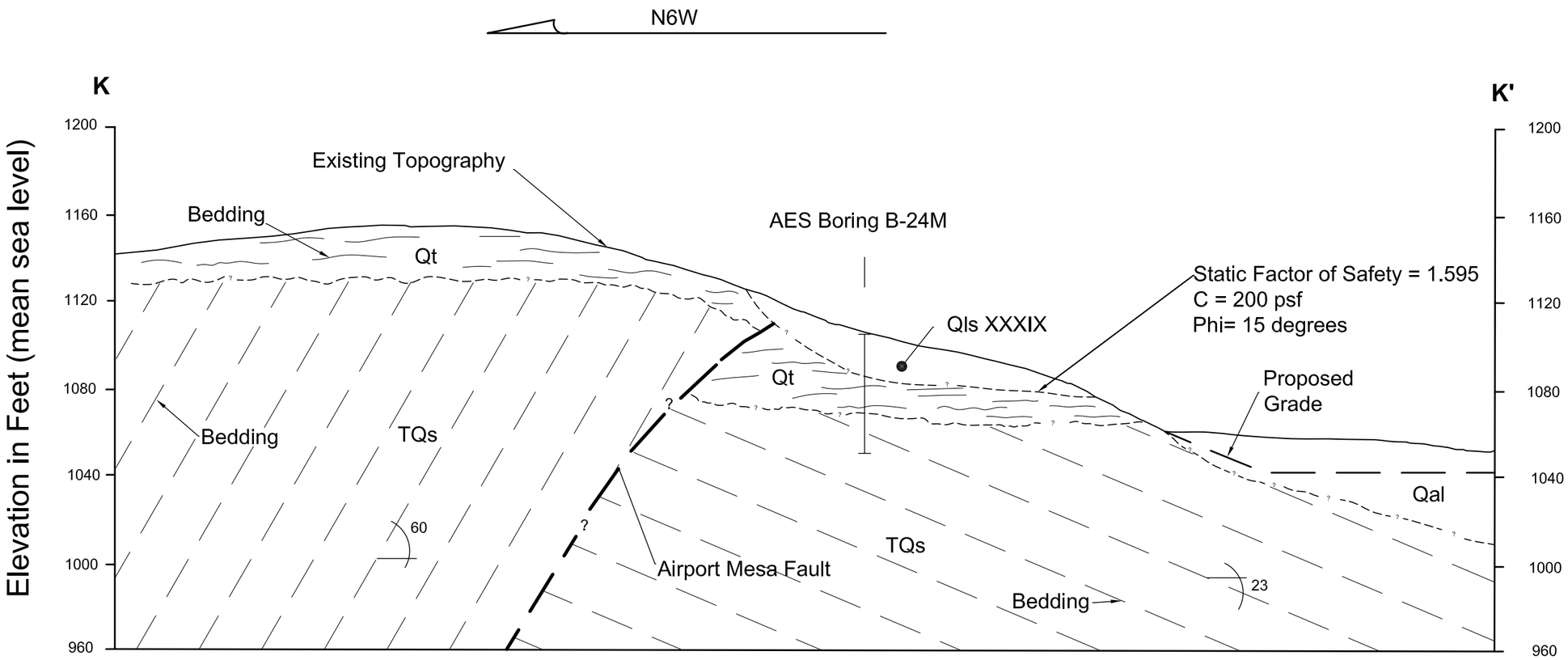

See Explanation on Figure 1

Geotechnical Sections

PREPARED FOR
Newhall Land & Farming Company

Project Location
MISSION VILLAGE
Vesting Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California

SCALE	DRAWN BY	CHECKED BY
1" = 40'	JH	
DATE 4-29-2010	FIGURE 4.2	JOB NO. 94-502-22

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Newhall Land & Farming Company
April 29, 2010
94-502-022

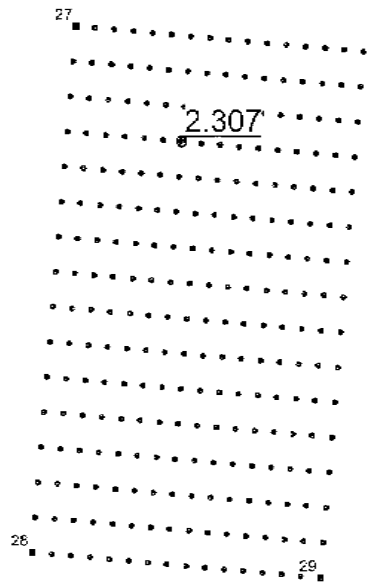
APPENDIX – SLOPE STABILITY ANALYSES

RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

Summary of Slope Stability Calculations

Section	Case	File	Factor of Safety	Condition
A-A'	Static	Section A-A' Static.gsz	2.307	Circular failure through toe
A-A'	Seismic	Section A-A' Seismic.gsz	1.591	Circular failure through toe
B-B'	Static	Section B-B' Static.gsz	1.921	Bedding through toe
B-B'	Seismic	Section B-B' Seismic.gsz	1.116	Bedding through toe
D-D'	Static	Section D-D' Static.gsz	1.678	Bedding through toe
D-D'	Seismic	Section D-D' Seismic.gsz	1.112	Bedding through toe
F-F'	Static	Section F-F' Static.gsz	2.001	Bedding through toe
F-F'	Seismic	Section F-F' Seismic.gsz	1.341	Bedding through toe
G-G'	Static	Section G-G' Static A.gsz	1.501	Furthest failure does not extend to pad (No RUA)
G-G'	Seismic	Section G-G' Seismic.gsz	1.1	Seismic with furthest failure (No RUA)
H-H'	Static	Section h-h' Static.gsz	1.551	Pad grossly stable (No RUA)
H-H'	Seismic	Section h-h' Seismic.gsz	1.214	Pad grossly stable (No RUA)
I-I'	Static	Section I-I' Static.gsz	1.443	Static S.F. < 1.5 (Provide RUA)
I-I'	Static	Section I-I' Static.gsz	1.501	Furthest failure (Setback = 68 feet)
I-I'	Seismic	Section I-I' Seismic.gsz	1.1	Seismic furthest failure (Setback < 68 feet)
J-J'	Static	Section J-J' Static.gsz	1.458	Static S.F. < 1.5
J-J'	Static	Section J-J' Static 1.gsz	1.503	Furthest failure does not extend to pad (No RUA)
J-J'	Seismic	Section J-J' Seismic.gsz	1.124	Seismic with furthest failure (No RUA)
K-K'	Static	Section K-K' Static.gsz	1.595	Failure along Existing Qls
AES 1-1'	Static	AES 1-1' Static.gsz	1.475	Static S.F. < 1.5 (Provide RUA)
AES 1-1'	Static	AES 1-1' Static.gsz	1.507	Furthest failure (Setback = 42 feet)
AES 1-1'	Seismic	AES 1-1' Seismic.gsz	1.129	Seismic furthest failure (Setback < 42 feet)
AES 2-2'	Static	AES 2-2' Static.gsz	1.446	Static S.F. < 1.5 (Provide RUA)
AES 2-2'	Static	AES 2-2' Static.gsz	1.501	Furthest failure (Setback = 80 feet)
AES 2-2'	Seismic	AES 2-2' Seismic.gsz	1.11	Seismic furthest failure (Setback < 80 feet)
AES 4-4'	Static	Section 4-4' Static.gsz	1.388	Static S.F. < 1.5 (Provide RUA)
AES 4-4'	Static	Section 4-4' Static.gsz	1.511	Furthest failure (Setback = 70 feet)
AES 4-4'	Seismic	Section 4-4' Seismic.gsz	1.104	Seismic furthest failure (Setback < 70 feet)
AES 8-8'	Static	AES 8-8' Static.gsz	1.276	Static S.F. < 1.5 (Provide RUA)
AES 8-8'	Static	AES 8-8" Static.gsz	1.502	Furthest failure (Setback = 78 feet)
AES 8-8'	Seismic	AES 8-8' Seismic.gsz	1.101	Seismic furthest failure (Setback < 78 feet)

94-502-22
April 29, 2010



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Comments: TQs Cross Bedding
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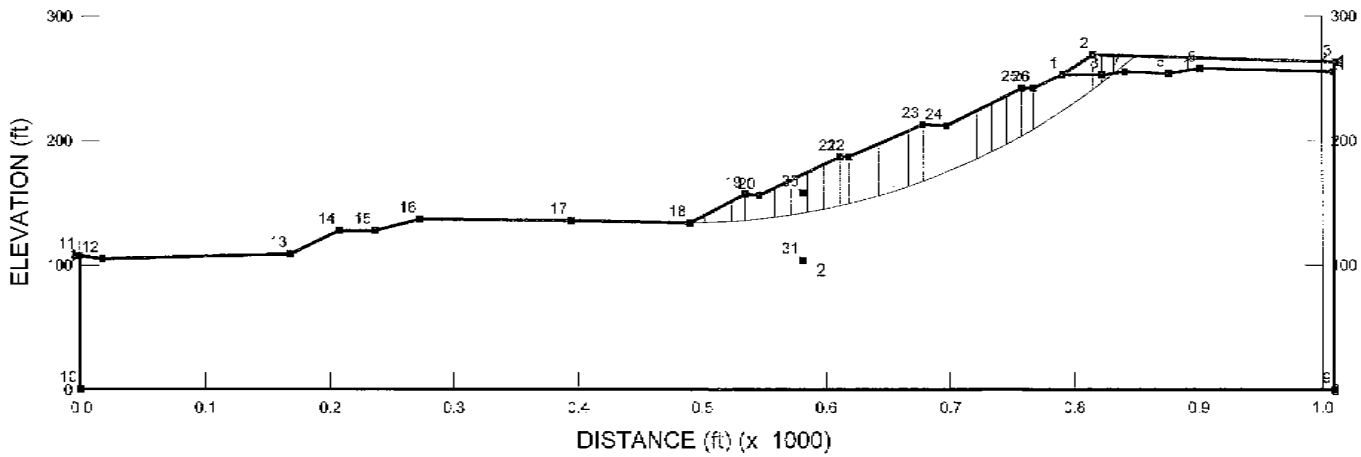
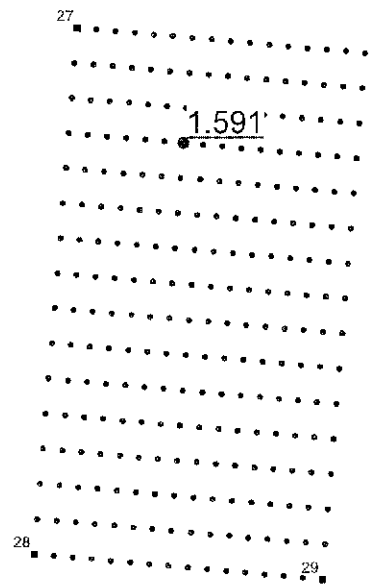
Date: 3/19/2010Time: 2:37:32 PM
Material #: 1 Wt: 125 C: 500 Phi: 35
Material #: 2 Wt: 125 C: 200 Phi: 30

Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0





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Date: 3/19/2010Time: 2:40:01 PM
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Material #: 2 Wt: 125 C: 200 Phi: 30

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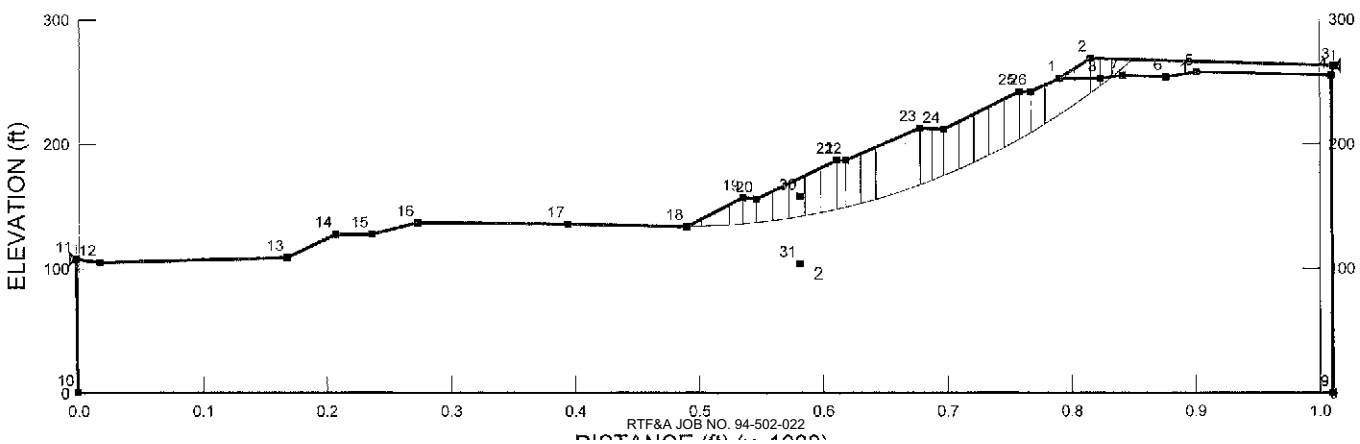
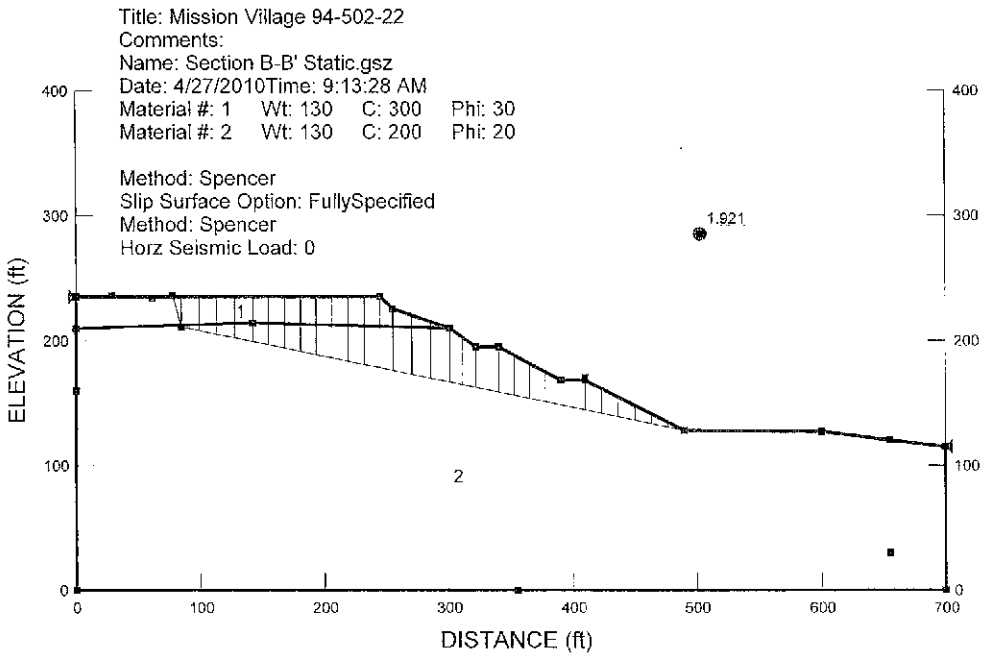
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0.15

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Comments:
Name: Section B-B' Static.gsz
Date: 4/27/2010Time: 9:13:28 AM
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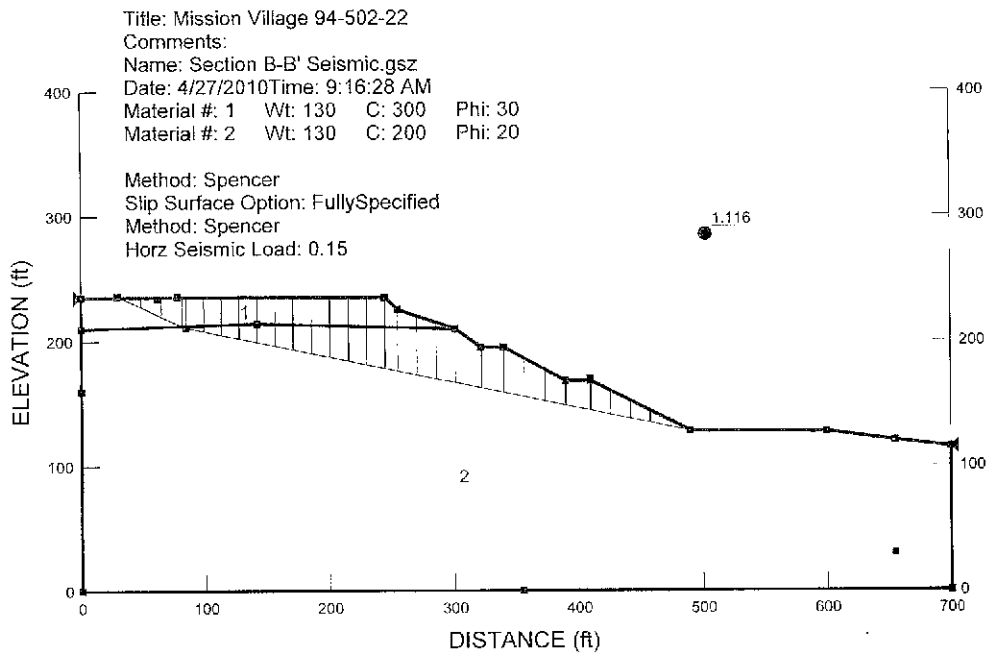
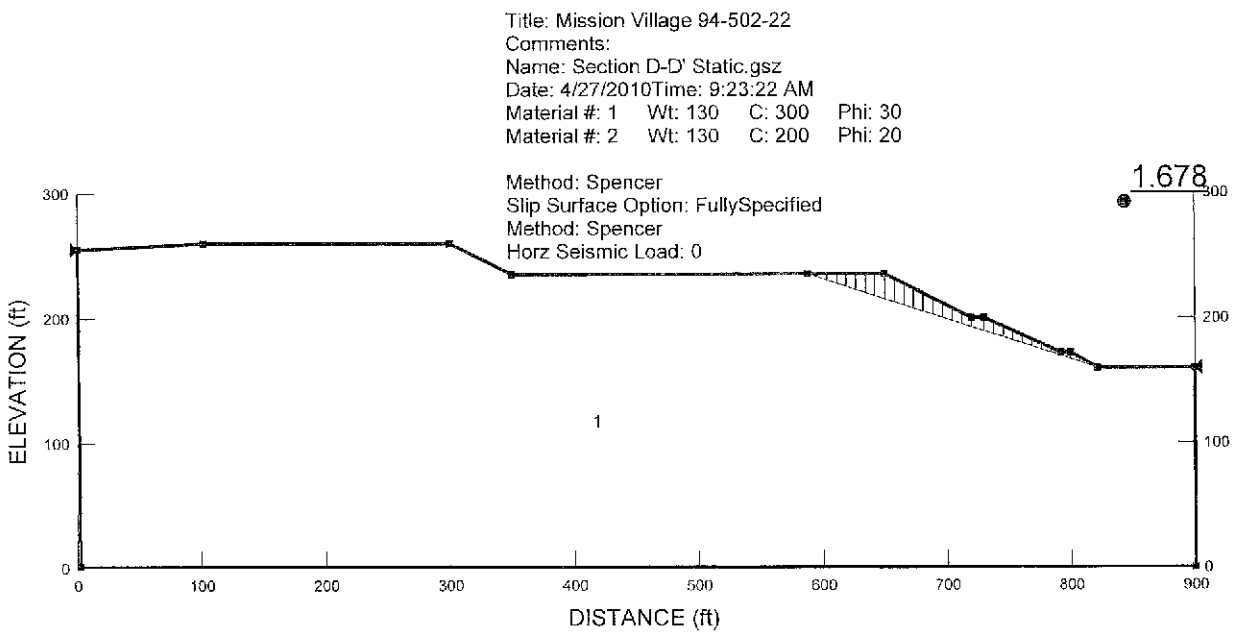
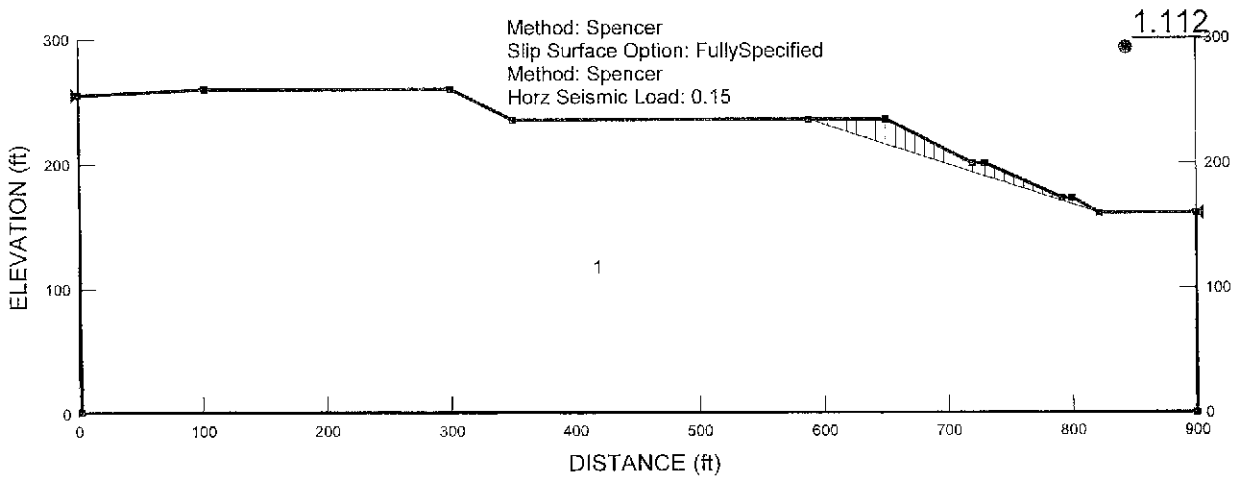
Material #: 2 Wt: 130 C: 200 Phi: 20
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0
1.921
1
2
ELEVATION (ft)
DISTANCE (ft)
0
100
200
300
400
500
600
700

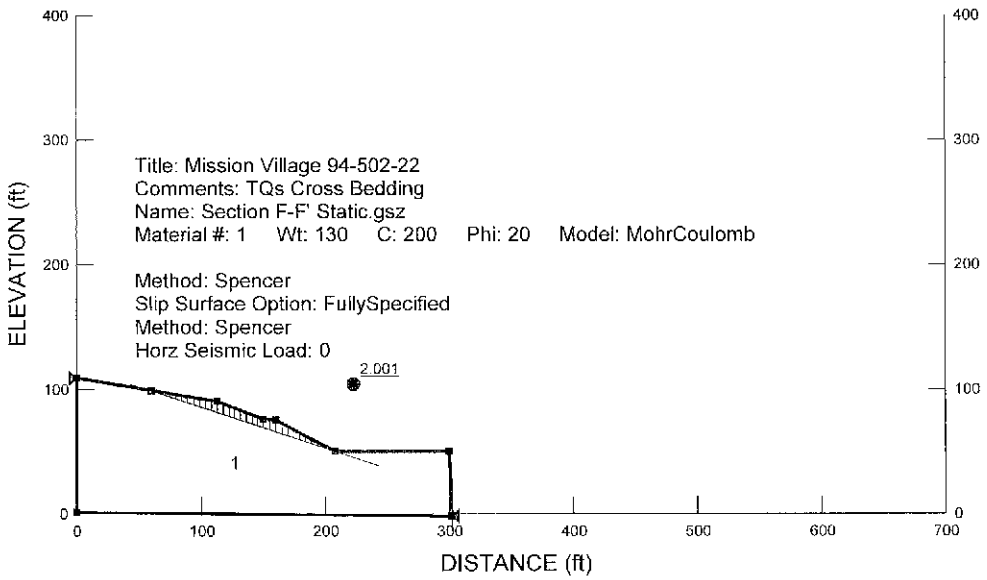

Title: Mission Village 94-502-22
Comments:
Name: Section B-B' Seismic.gsz
Date: 4/27/2010Time: 9:16:28 AM
Material #: 1 Wt: 130 C: 300 Phi: 30
Material #: 2 Wt: 130 C: 200 Phi: 20
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0.15
1.116
1
2
ELEVATION (ft)
DISTANCE (ft)
0
100
200
300
400
500
600
700

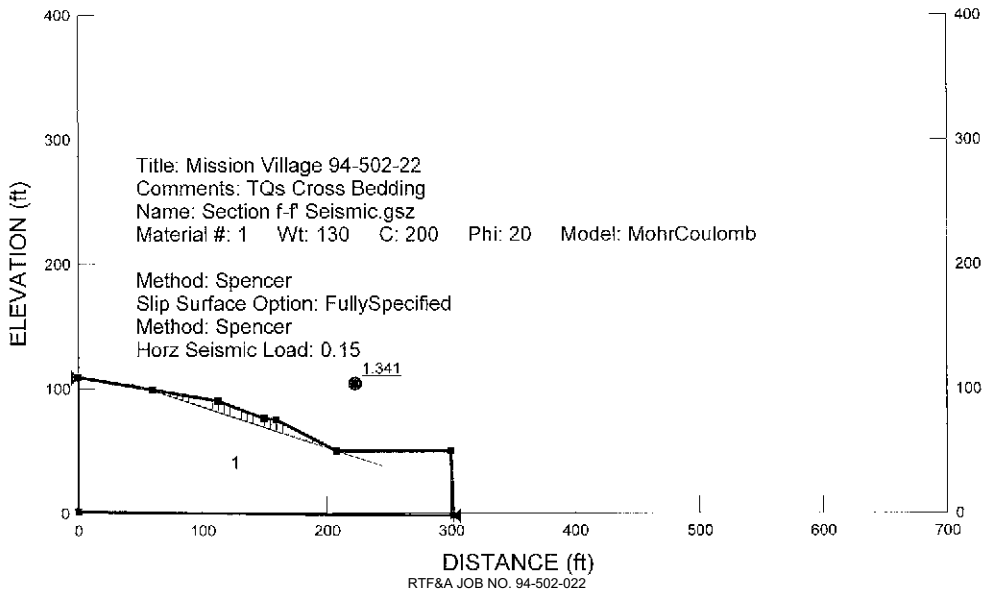

Title: Mission Village 94-502-22
Comments:
Name: Section D-D' Static.gsz
Date: 4/27/2010Time: 9:23:22 AM
Material #: 1 Wt: 130 C: 300 Phi: 30
Material #: 2 Wt: 130 C: 200 Phi: 20
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0
1.678
1
ELEVATION (ft)
DISTANCE (ft)
0
100
200
300
400
500
600
700
800
900

Title: Mission Village 94-502-22
Comments:
Name: Section D-D' Seismic.gsz
Date: 4/27/2010Time: 9:24:56 AM
Material #: 1 Wt: 130 C: 300 Phi: 30
Material #: 2 Wt: 130 C: 200 Phi: 20

Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0.15

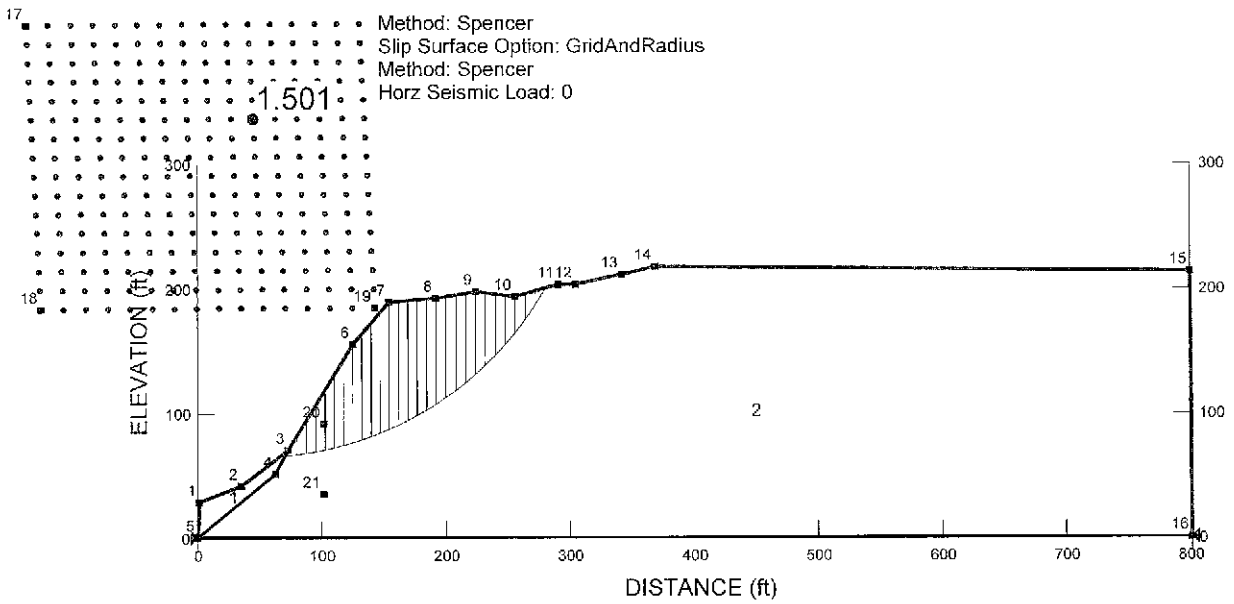



Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section F-F' Static.gsz
Material #: 1 Wt: 130 C: 200 Phi: 20 Model: MohrCoulomb
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0
2.001
1
ELEVATION (ft)
DISTANCE (ft)
0
100
200
300
400
500
600
700


Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section f-f' Seismic.gsz
Material #: 1 Wt: 130 C: 200 Phi: 20 Model: MohrCoulomb
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0.15
1.341
1
ELEVATION (ft)
DISTANCE (ft)
0
100
200
300
400
500
600
700

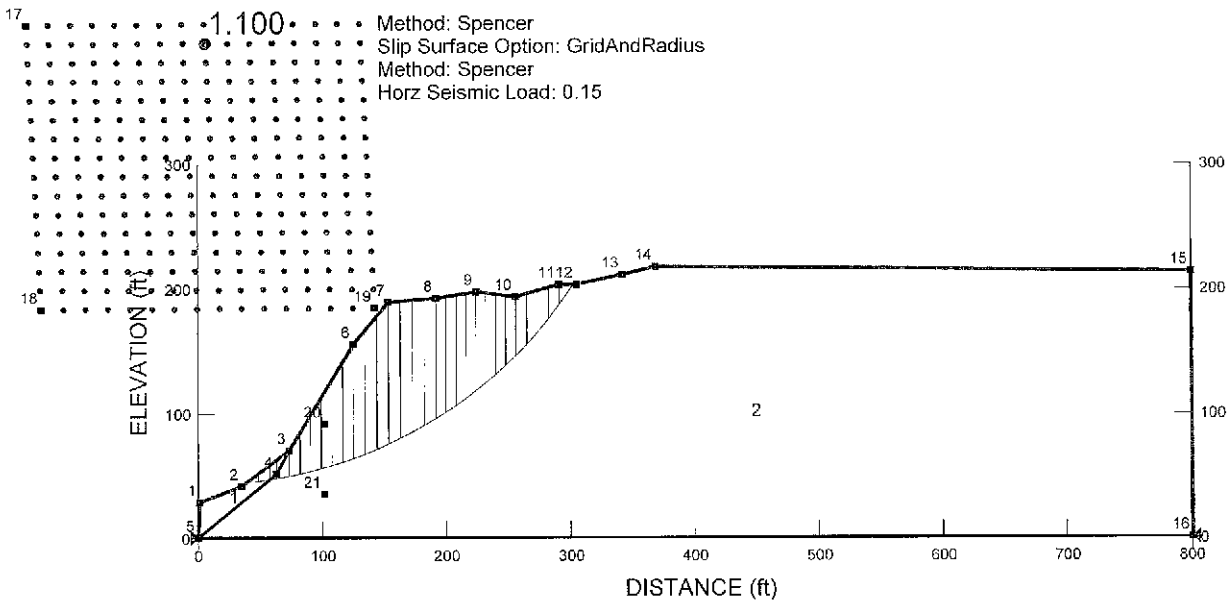
Title: Mission Village 2004-502-22
Comments: TQs Cross Bedding
Name: Section G-G' Static A.gsz
Date: 3/11/2010Time: 9:35:29 AM
Material #: 1 Wt: 125 C: 500 Phi: 35 Model: MohrCoulomb
Material #: 2 Wt: 125 C: 200 Phi: 29 Model: MohrCoulomb

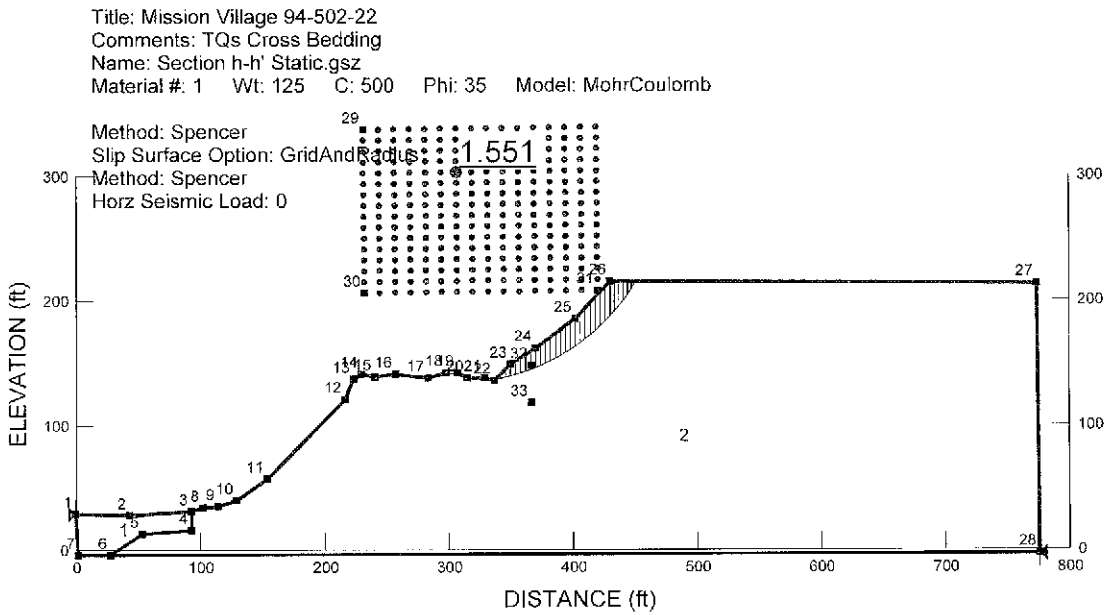
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0



Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section G-G' Seismic.gsz
Date: 4/26/2010Time: 3:46:53 PM
Material #: 1 Wt: 125 C: 500 Phi: 35 Model: MohrCoulomb
Material #: 2 Wt: 125 C: 200 Phi: 29 Model: MohrCoulomb

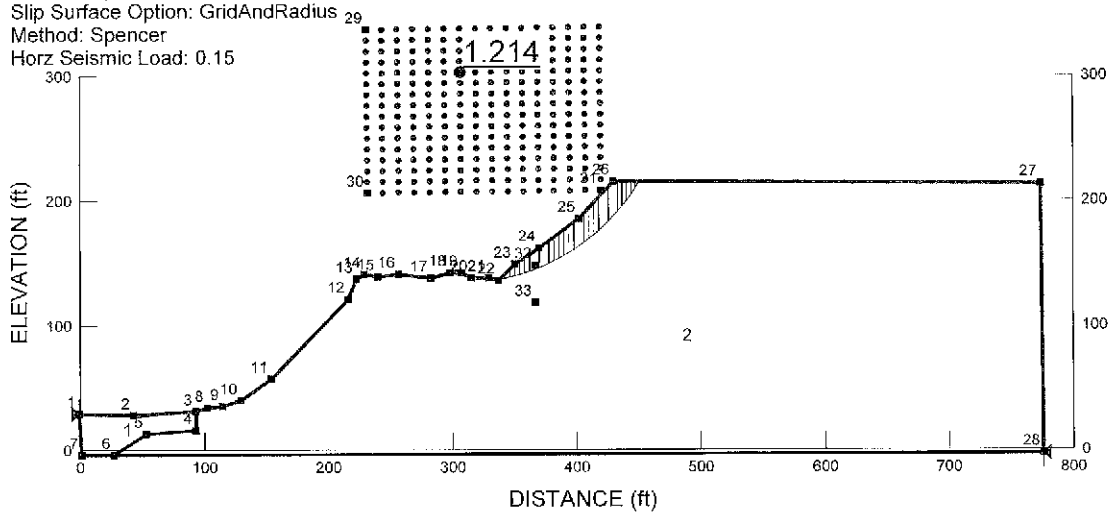
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0.15

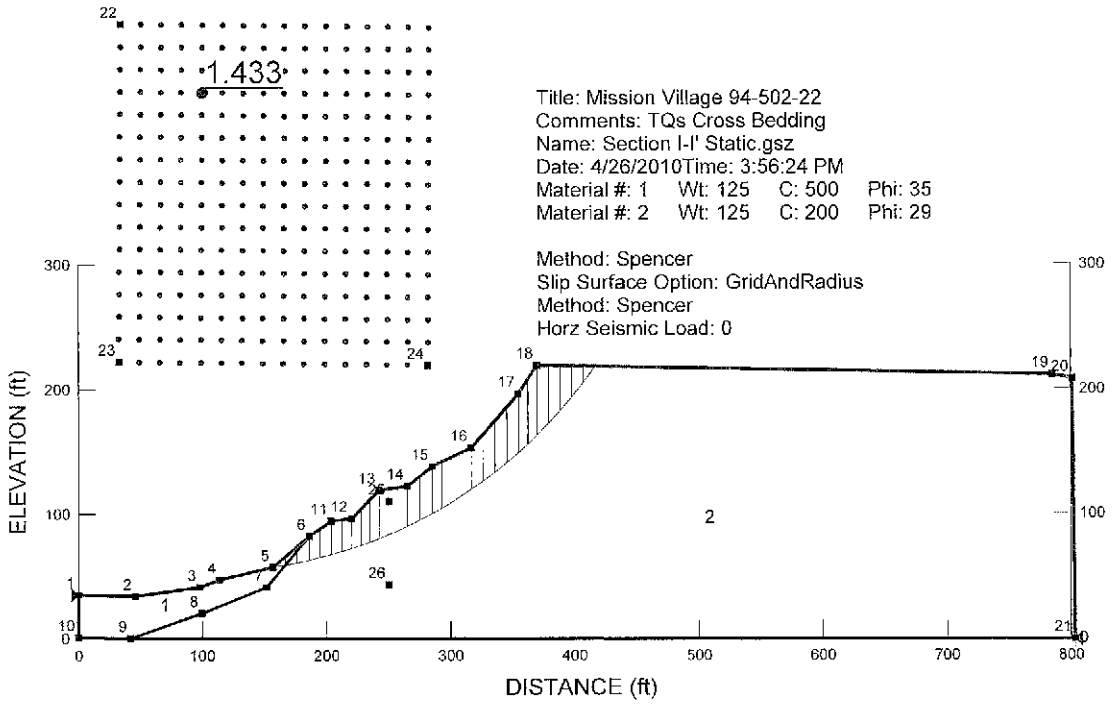


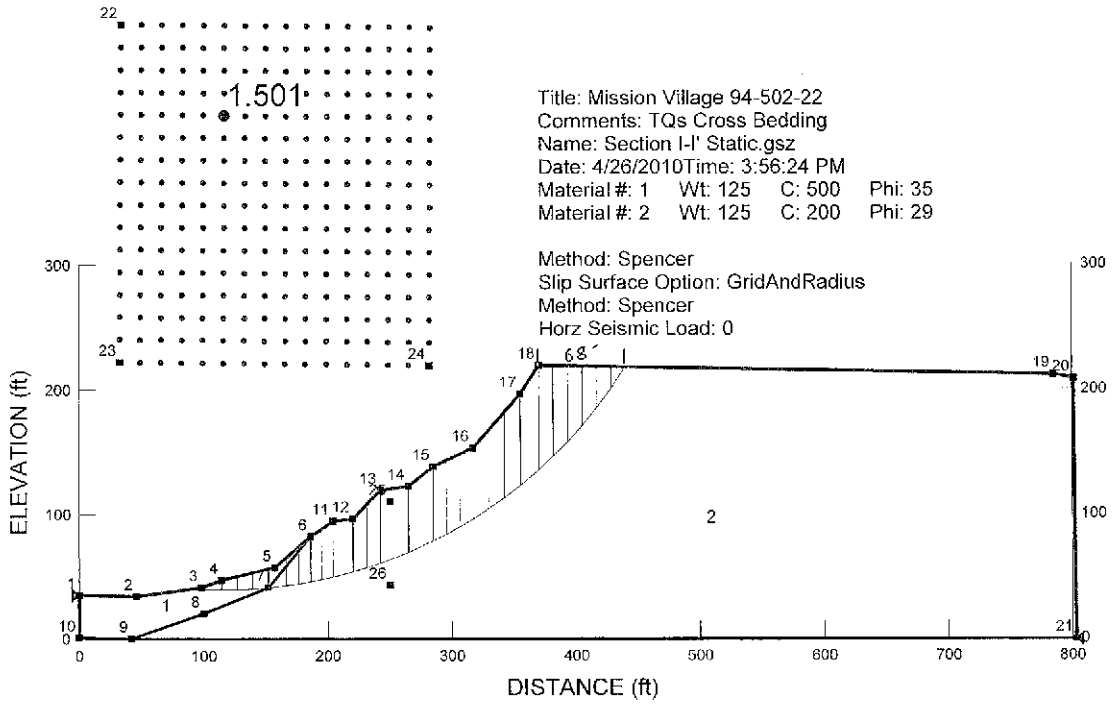

Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section h-h' Static.gsz
Material #: 1 Wt: 125 C: 500 Phi: 35 Model: MohrCoulomb
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0
1.551
ELEVATION (ft)
DISTANCE (ft)
2

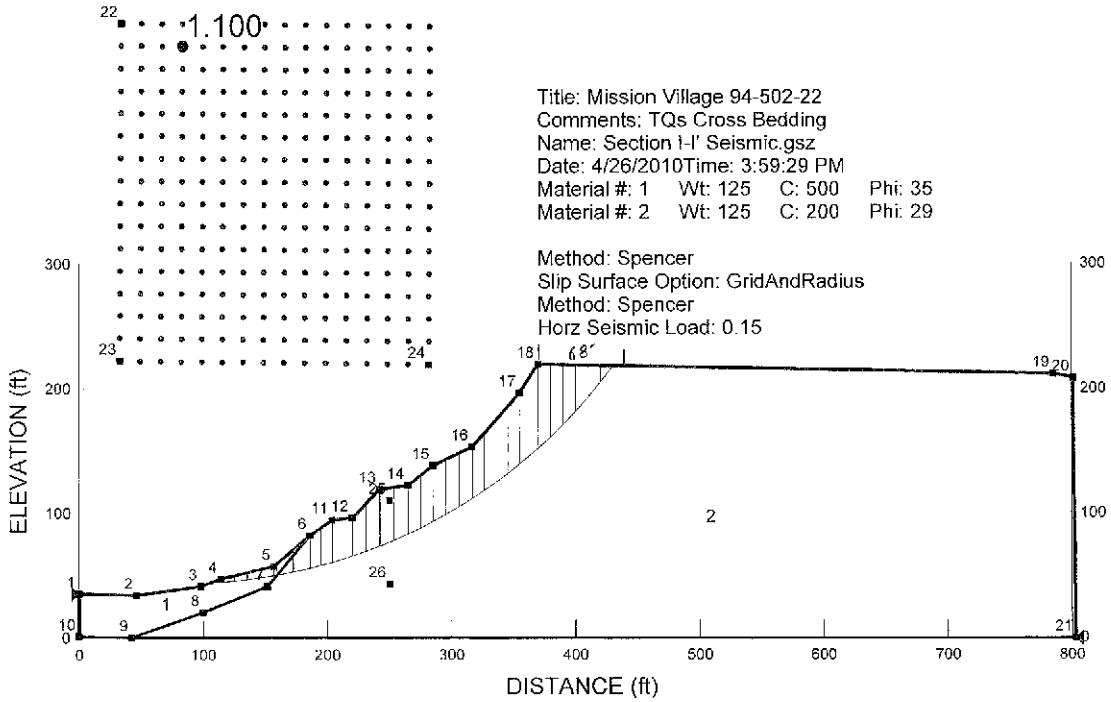
Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section h-h' Seismic.gsz
Material #: 1 Wt: 125 C: 500 Phi: 35 Model: MohrCoulomb

Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0.15



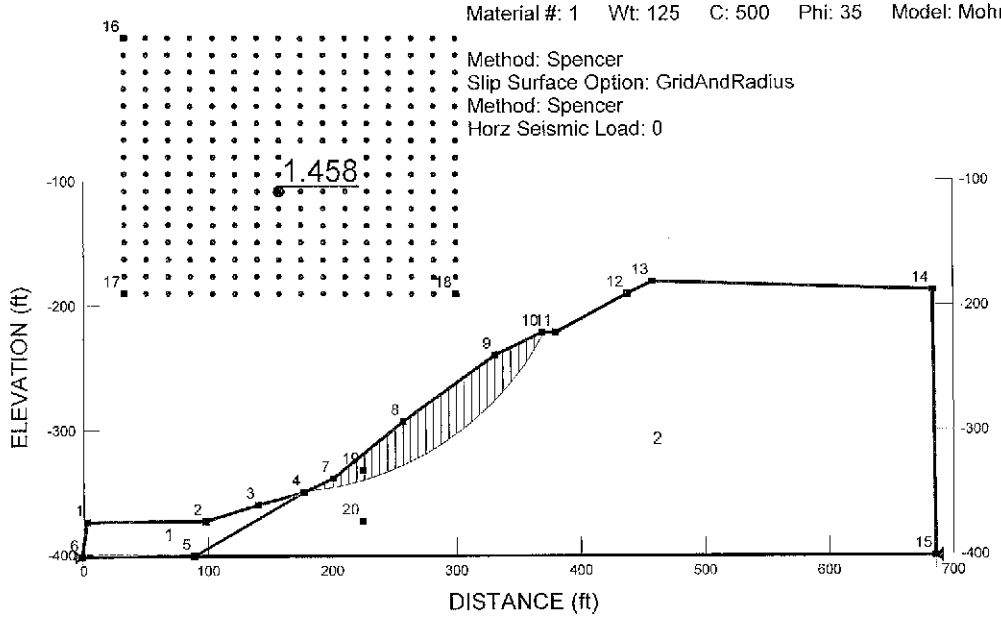

1.433
Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section I-I' Static.gsz
Date: 4/26/2010Time: 3:56:24 PM
Material #: 1 Wt: 125 C: 500 Phi: 35
Material #: 2 Wt: 125 C: 200 Phi: 29
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0
ELEVATION (ft)
DISTANCE (ft)
0
100
200
300
400
500
600
700
800
1
2

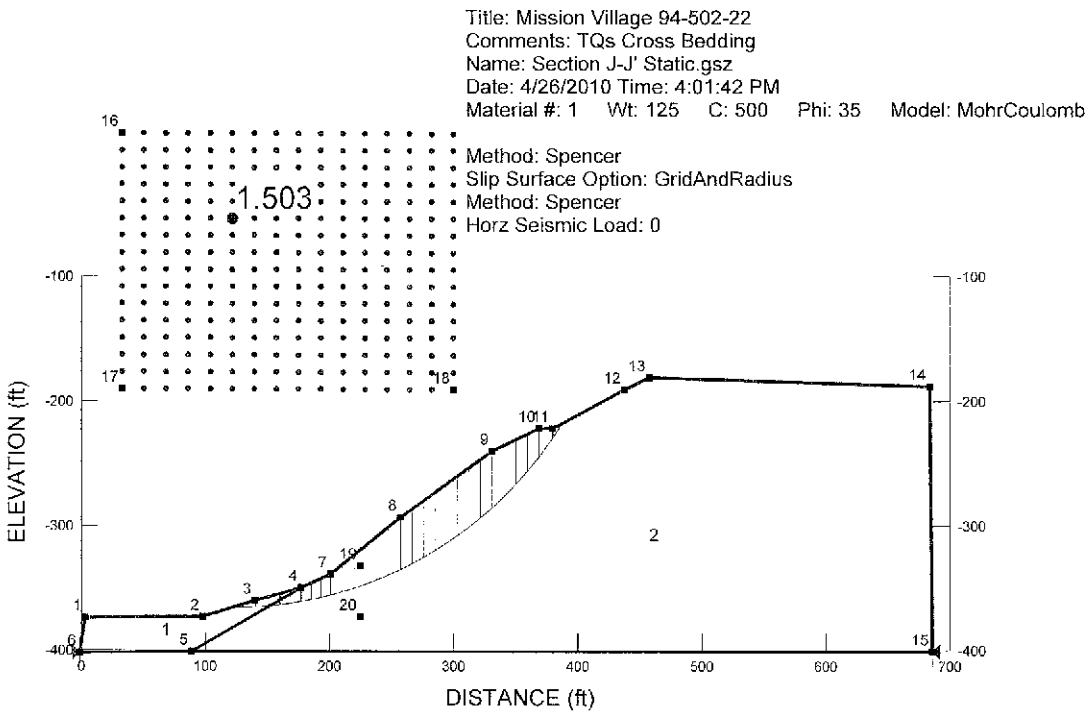

1.501
Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section I-I' Static.gsz
Date: 4/26/2010Time: 3:56:24 PM
Material #: 1 Wt: 125 C: 500 Phi: 35
Material #: 2 Wt: 125 C: 200 Phi: 29
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0
ELEVATION (ft)
DISTANCE (ft)
0
100
200
300
400
500
600
700
800
2


1.100
Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section I-I' Seismic.gsz
Date: 4/26/2010Time: 3:59:29 PM
Material #: 1 Wt: 125 C: 500 Phi: 35
Material #: 2 Wt: 125 C: 200 Phi: 29
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0.15
ELEVATION (ft)
DISTANCE (ft)
0
100
200
300
400
500
600
700
800

Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section J-J' Static.gsz
Date: 4/26/2010 Time: 4:01:42 PM
Material #: 1 Wt: 125 C: 500 Phi: 35 Model: MohrCoulomb

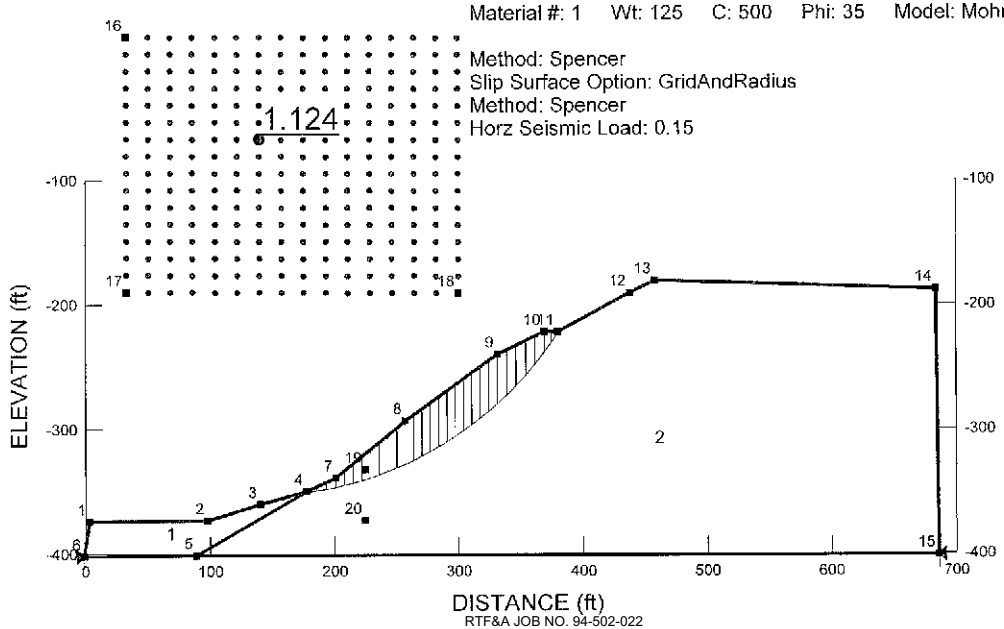
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0




Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section J-J' Static.gsz
Date: 4/26/2010 Time: 4:01:42 PM
Material #: 1 Wt: 125 C: 500 Phi: 35 Model: MohrCoulomb
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0
1.503
ELEVATION (ft)
DISTANCE (ft)
-100
-200
-300
-400
0
100
200
300
400
500
600
700
1
2

Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section J-J' Seismic.gsz
Date: 4/26/2010 Time: 4:04:34 PM
Material #: 1 Wt: 125 C: 500 Phi: 35 Model: MohrCoulomb

Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0.15

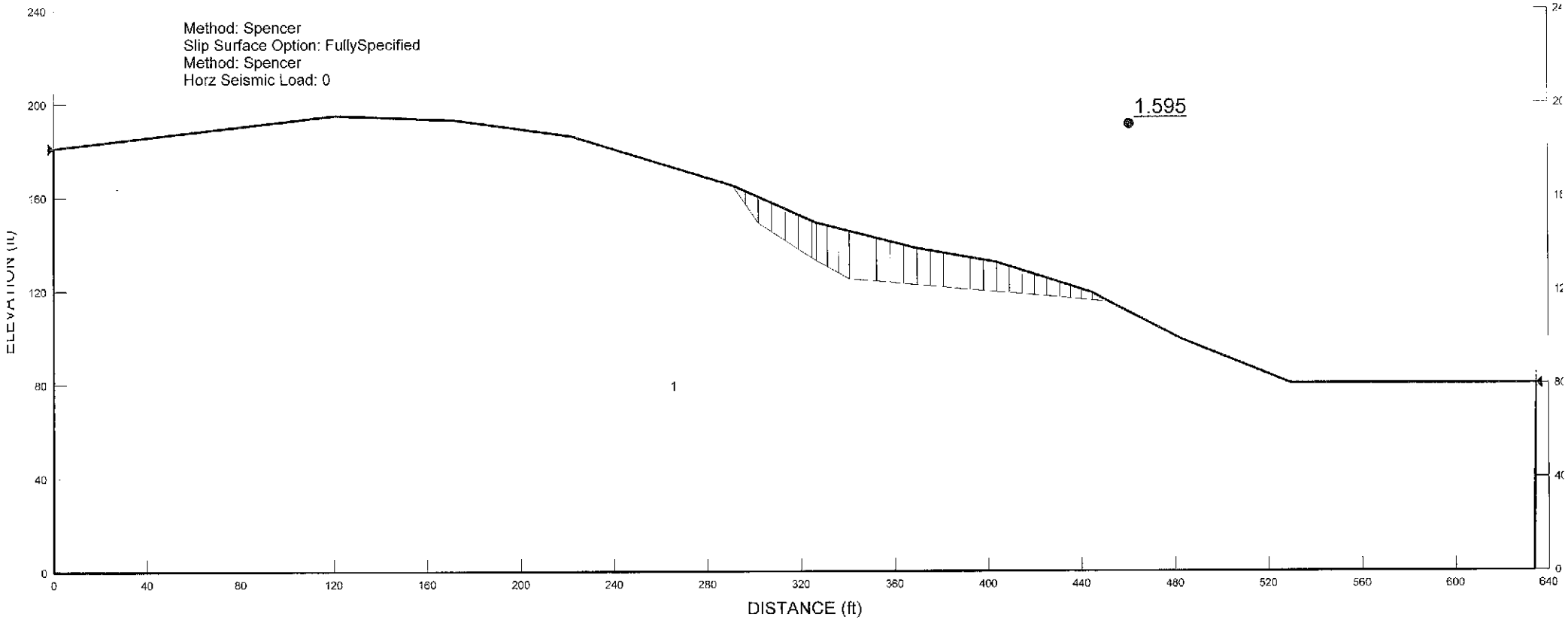


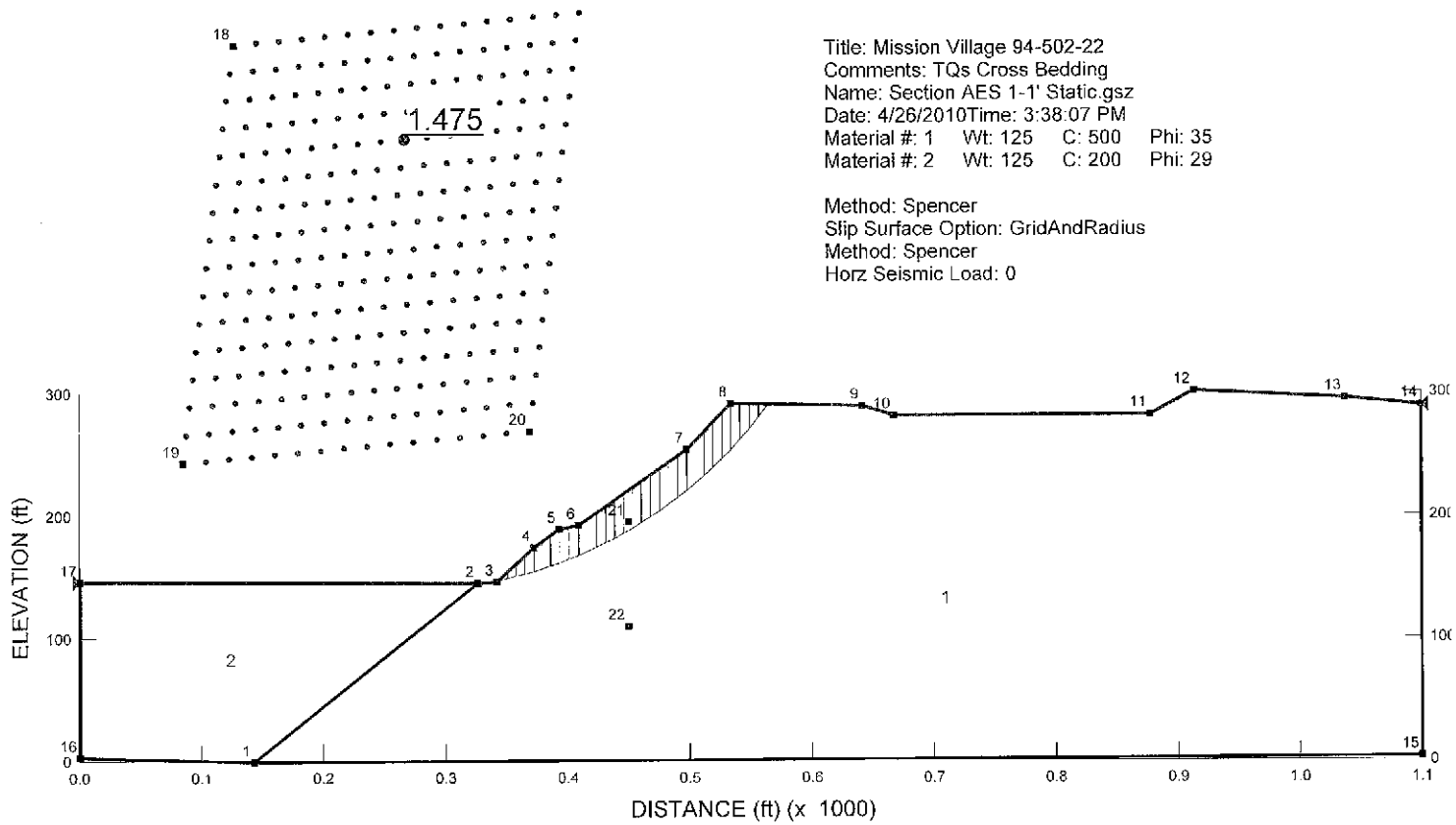
REPORT DATED APRIL 29, 2010

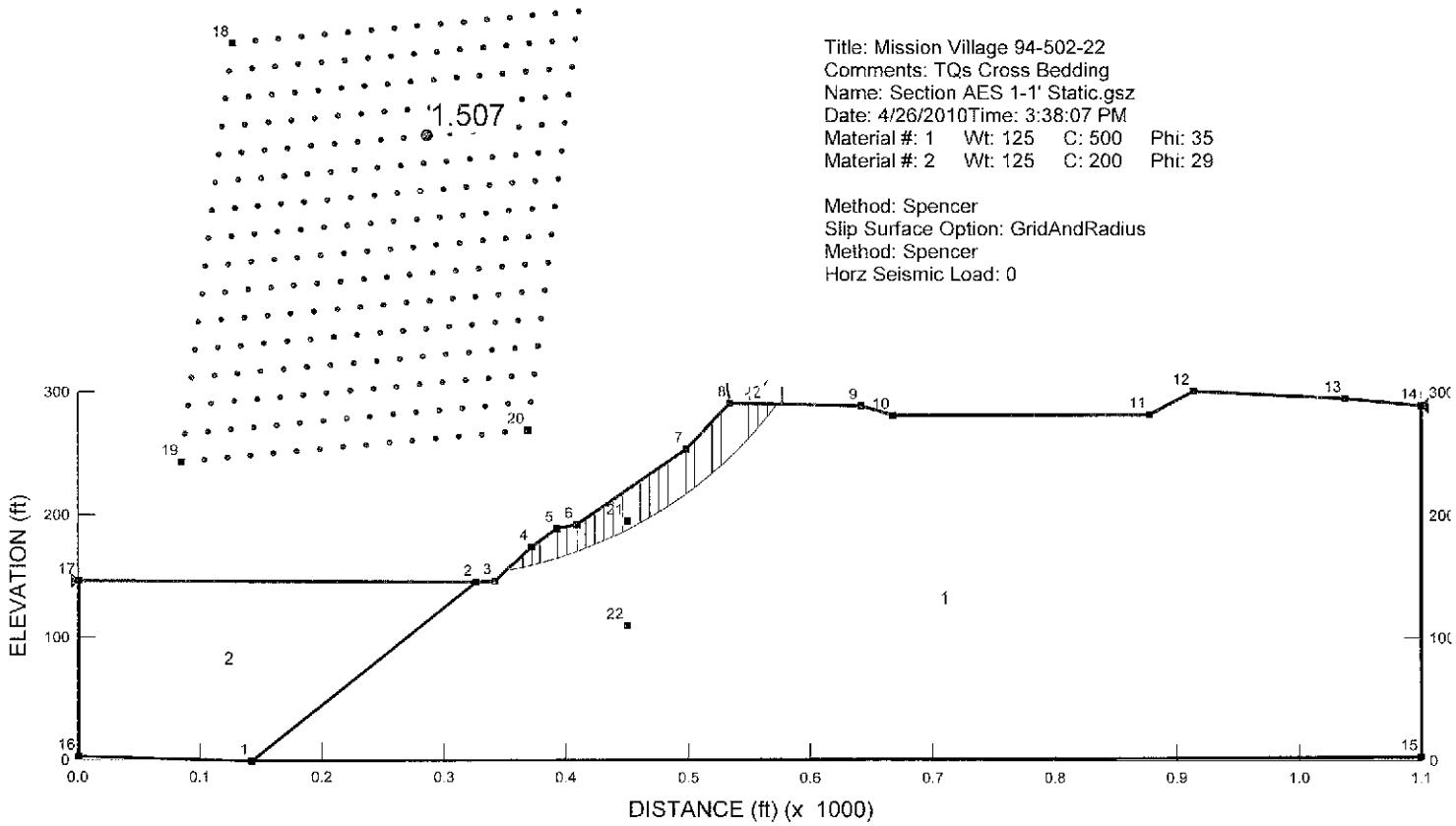
RTF&A JOB NO. 94-502-022

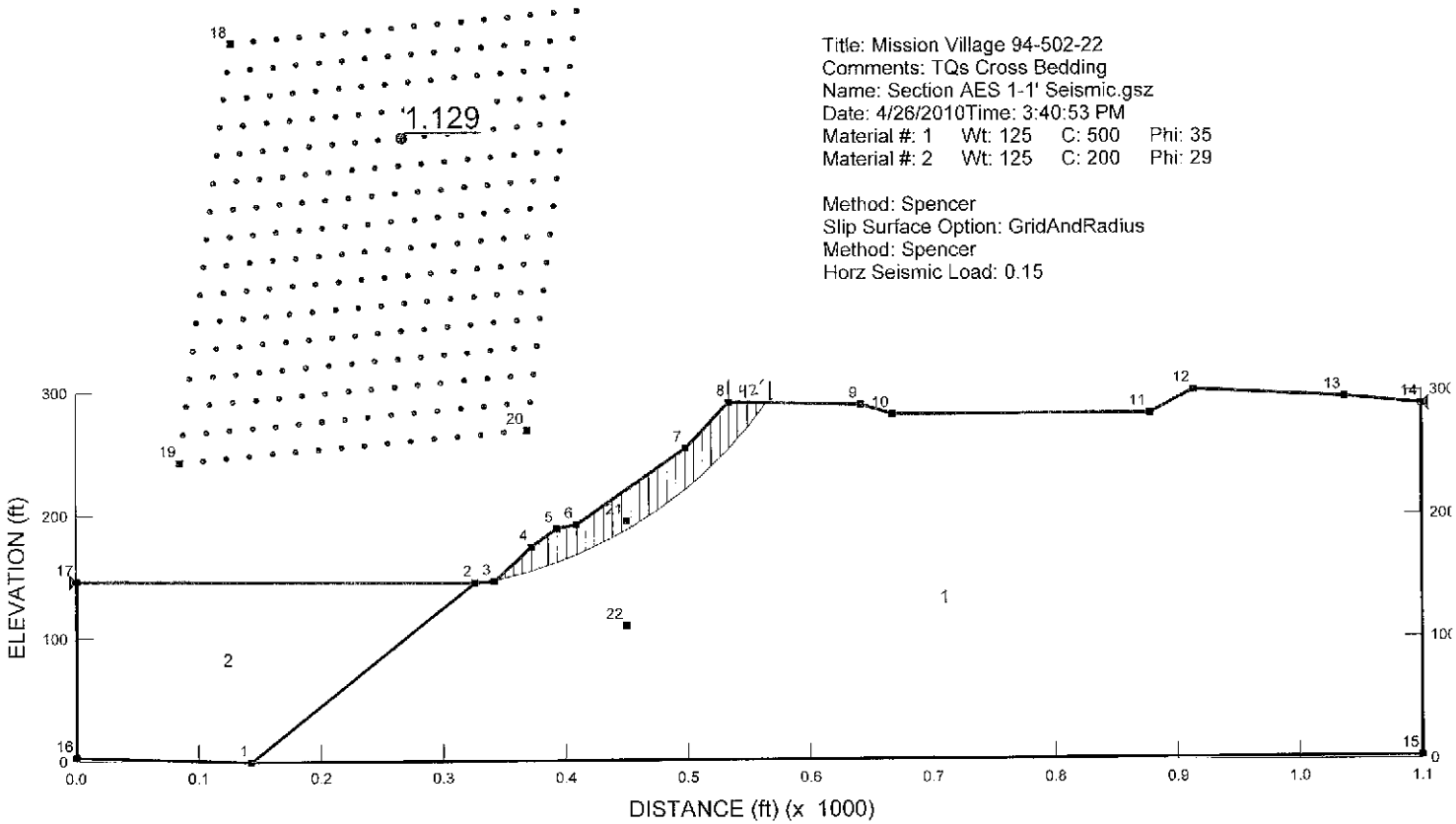
Title: Section 9M-9M'
Comments:
Name: Section K-K' Static.gsz
Directory: C:\Documents and Settings\Alan\My Documents\Reports\1994\94-502\
Date: 3/19/2010 Time: 4:08:33 PM
Material #: 1 Wt: 130 C: 200 Phi: 15 Model: MohrCoulomb

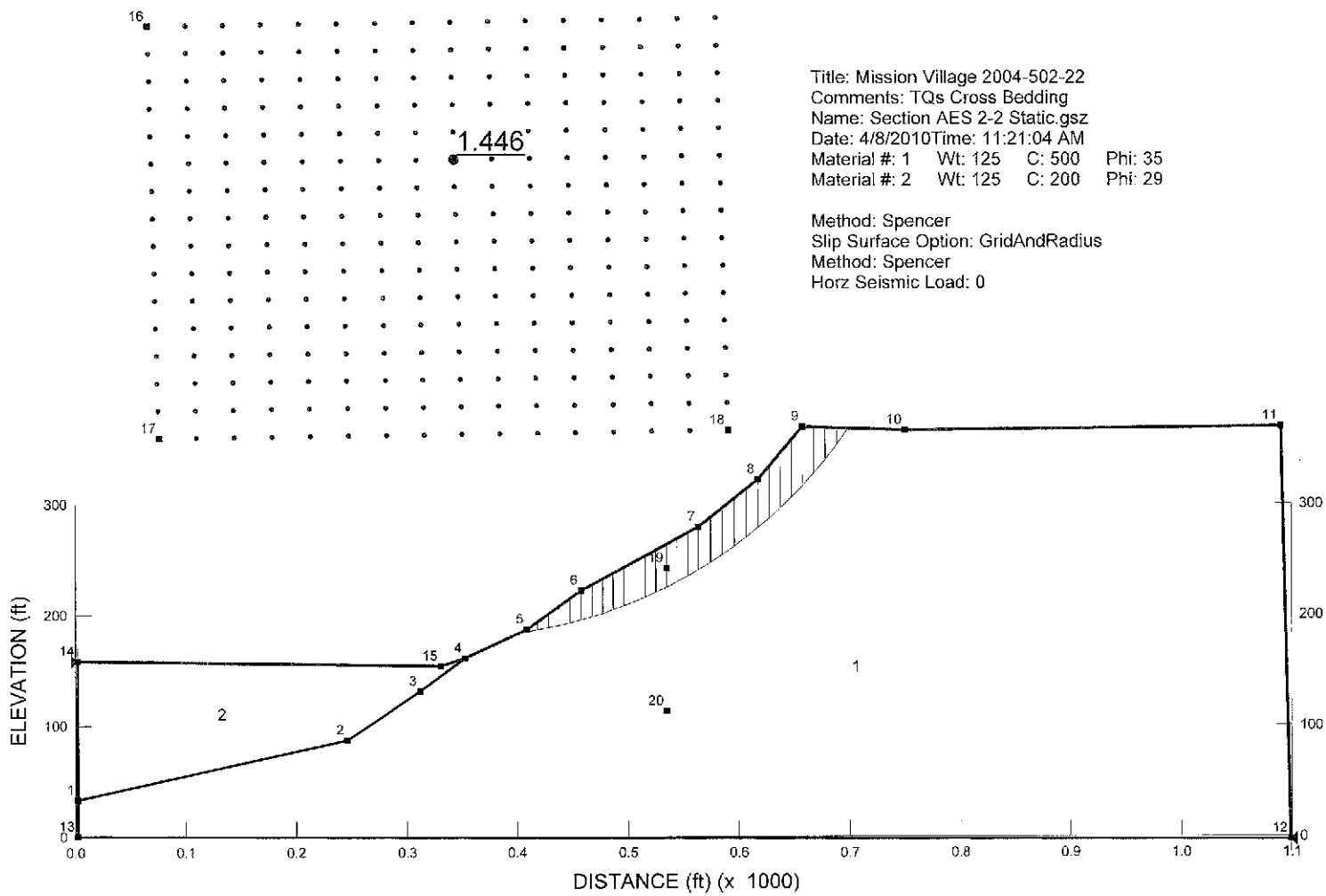
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0

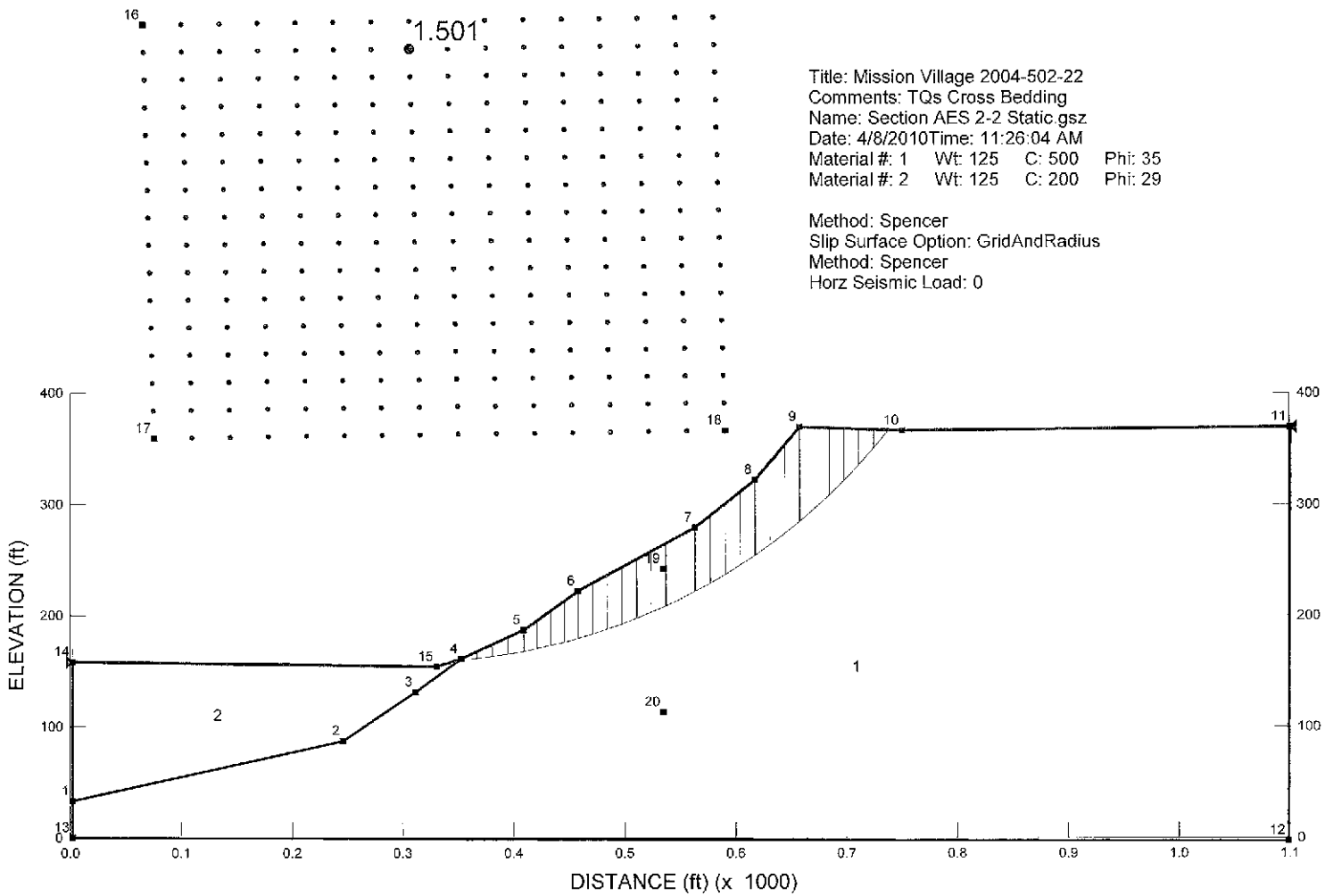


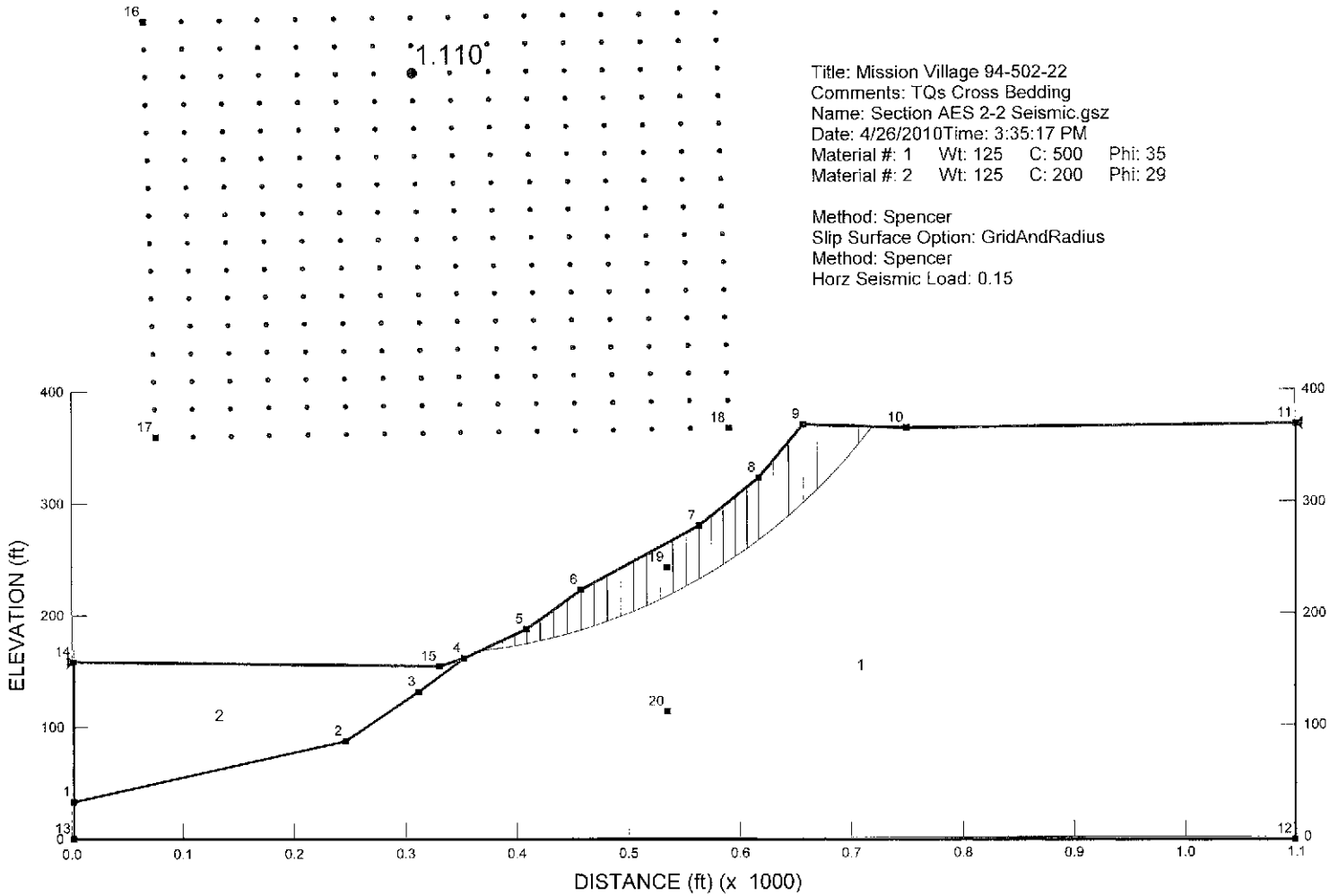

Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section AES 1-1' Static.gsz
Date: 4/26/2010Time: 3:38:07 PM
Material #: 1 Wt: 125 C: 500 Phi: 35
Material #: 2 Wt: 125 C: 200 Phi: 29
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0
1.475
ELEVATION (ft)
DISTANCE (ft) (x 1000)

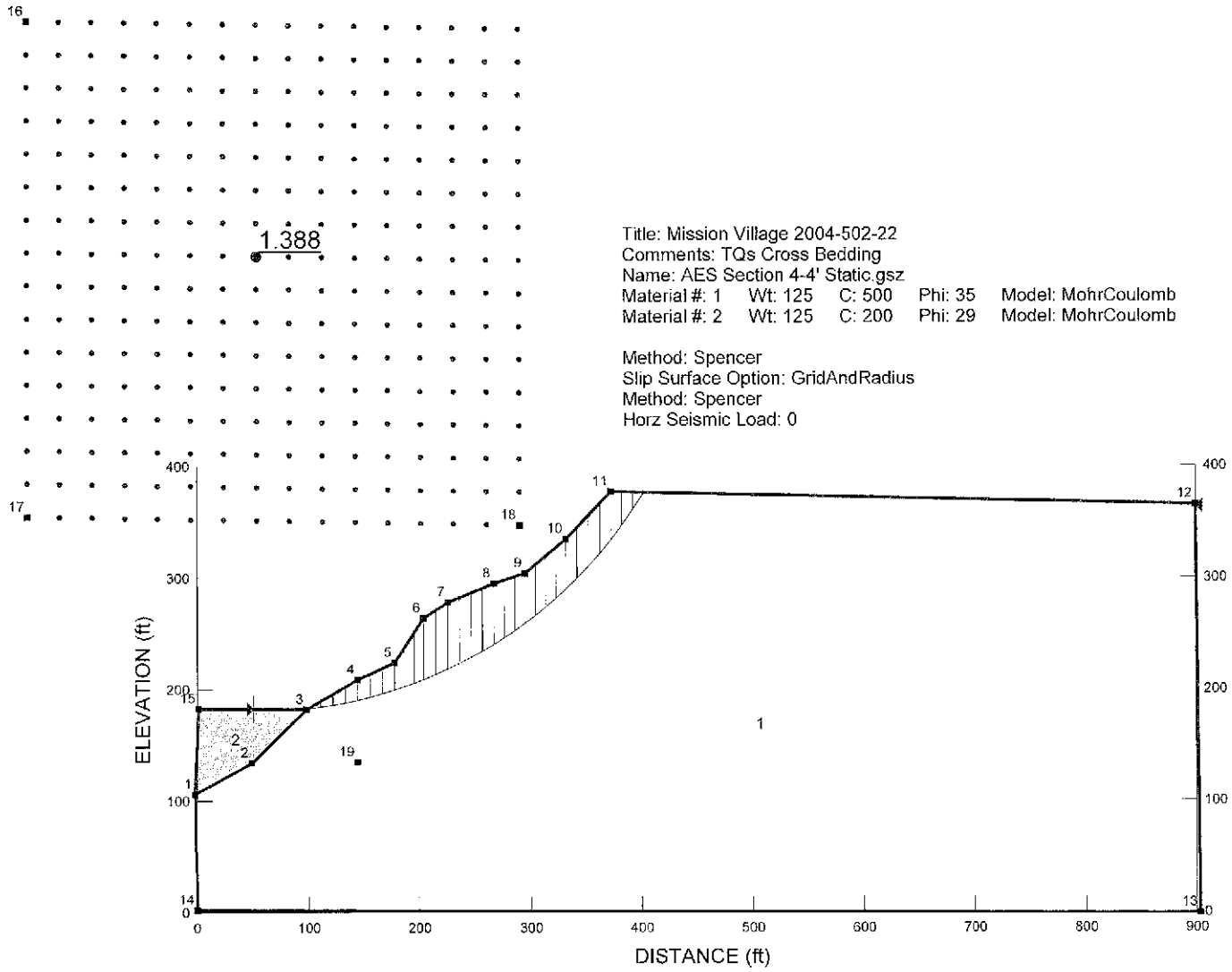

Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section AES 1-1' Static.gsz
Date: 4/26/2010Time: 3:38:07 PM
Material #: 1 Wt: 125 C: 500 Phi: 35
Material #: 2 Wt: 125 C: 200 Phi: 29
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0
1.507
ELEVATION (ft)
DISTANCE (ft) (x 1000)

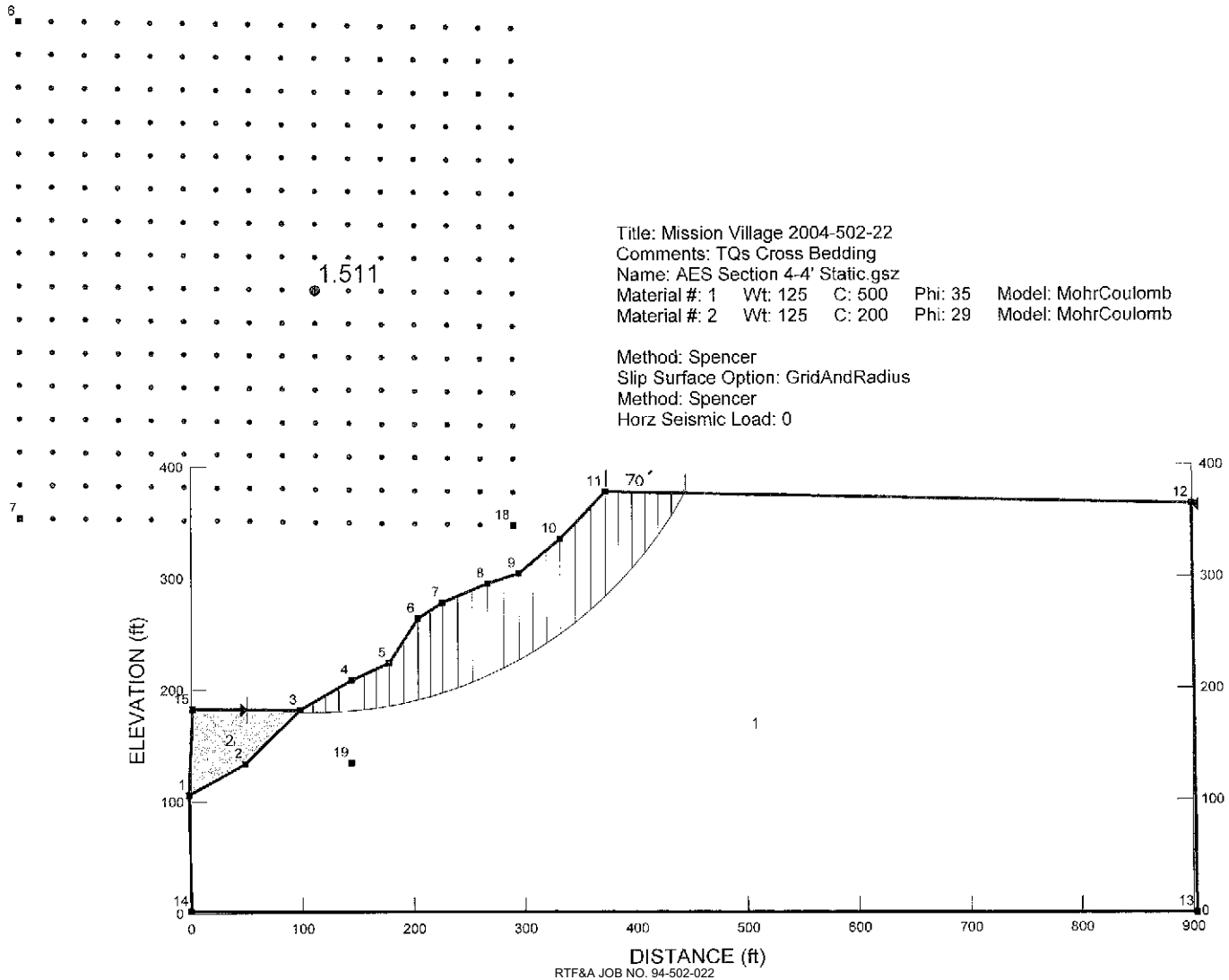

Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section AES 1-1' Seismic.gsz
Date: 4/26/2010Time: 3:40:53 PM
Material #: 1 Wt: 125 C: 500 Phi: 35
Material #: 2 Wt: 125 C: 200 Phi: 29
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0.15
1.129
ELEVATION (ft)
DISTANCE (ft) (x 1000)

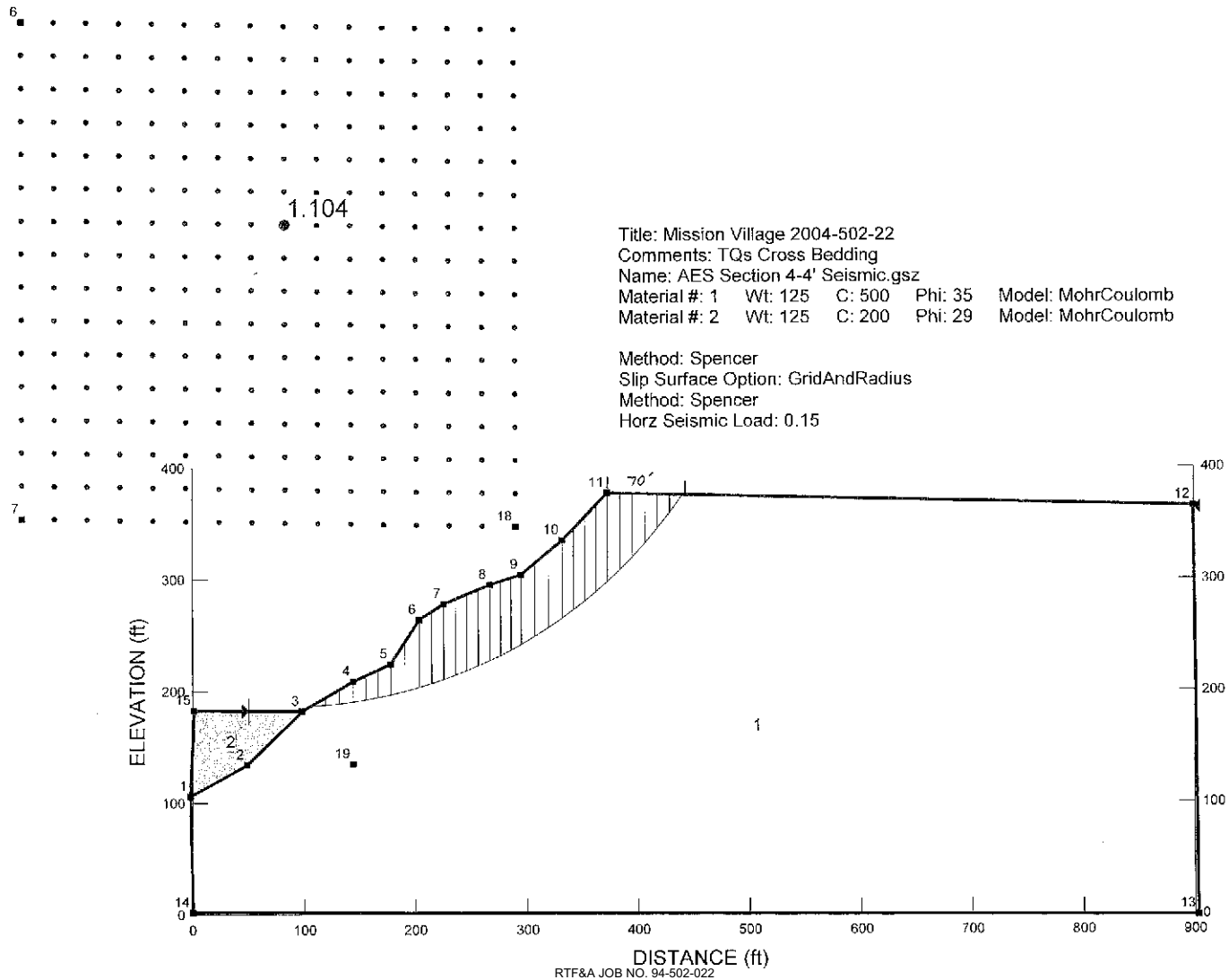

1.446
Title: Mission Village 2004-502-22
Comments: TQs Cross Bedding
Name: Section AES 2-2 Static.gsz
Date: 4/8/2010Time: 11:21:04 AM
Material #: 1 Wt: 125 C: 500 Phi: 35
Material #: 2 Wt: 125 C: 200 Phi: 29
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0
ELEVATION (ft)
DISTANCE (ft) (x 1000)

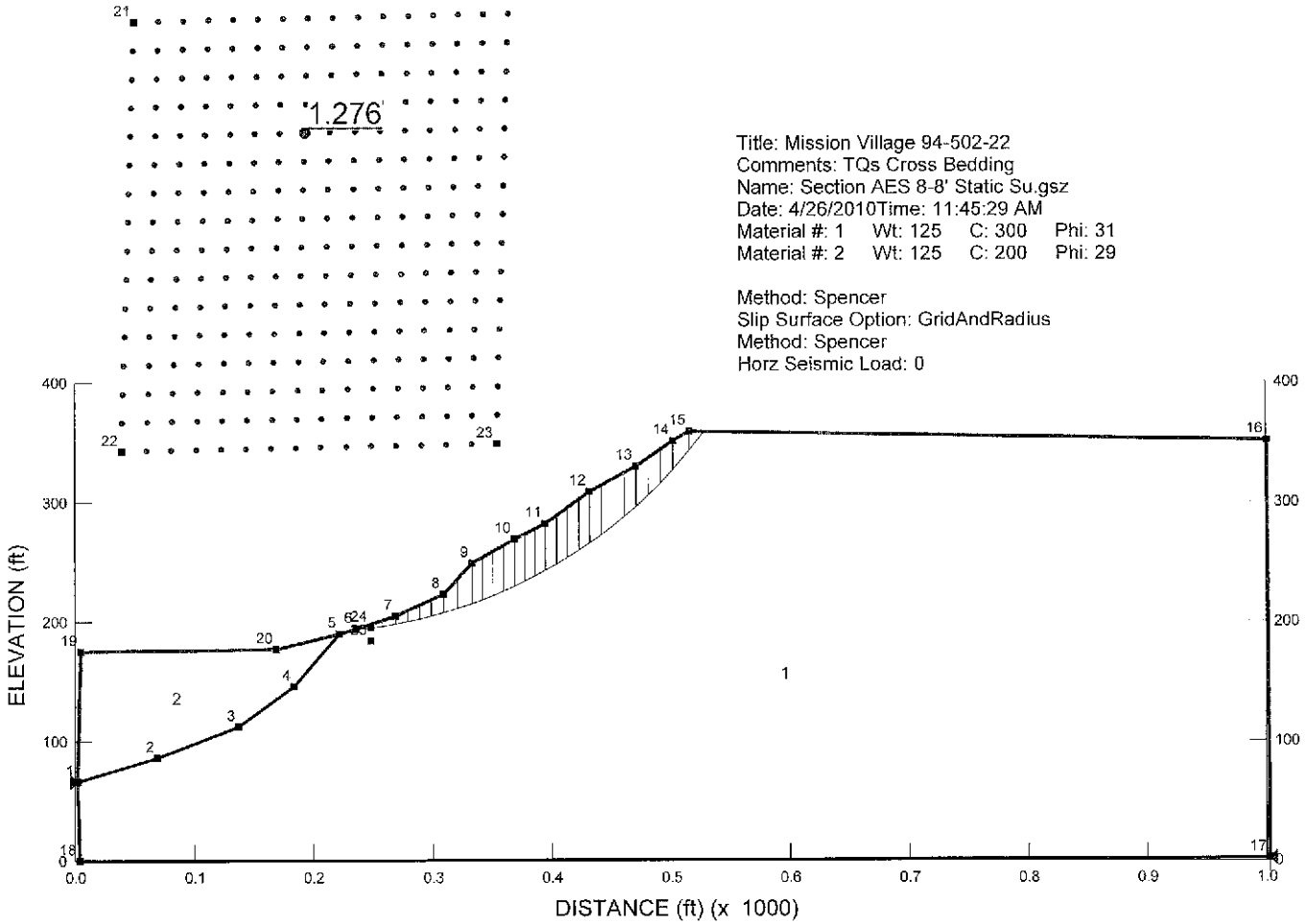

1.501
Title: Mission Village 2004-502-22
Comments: TQs Cross Bedding
Name: Section AES 2-2 Static.gsz
Date: 4/8/2010Time: 11:26:04 AM
Material #: 1 Wt: 125 C: 500 Phi: 35
Material #: 2 Wt: 125 C: 200 Phi: 29
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0
ELEVATION (ft)
DISTANCE (ft) (x 1000)

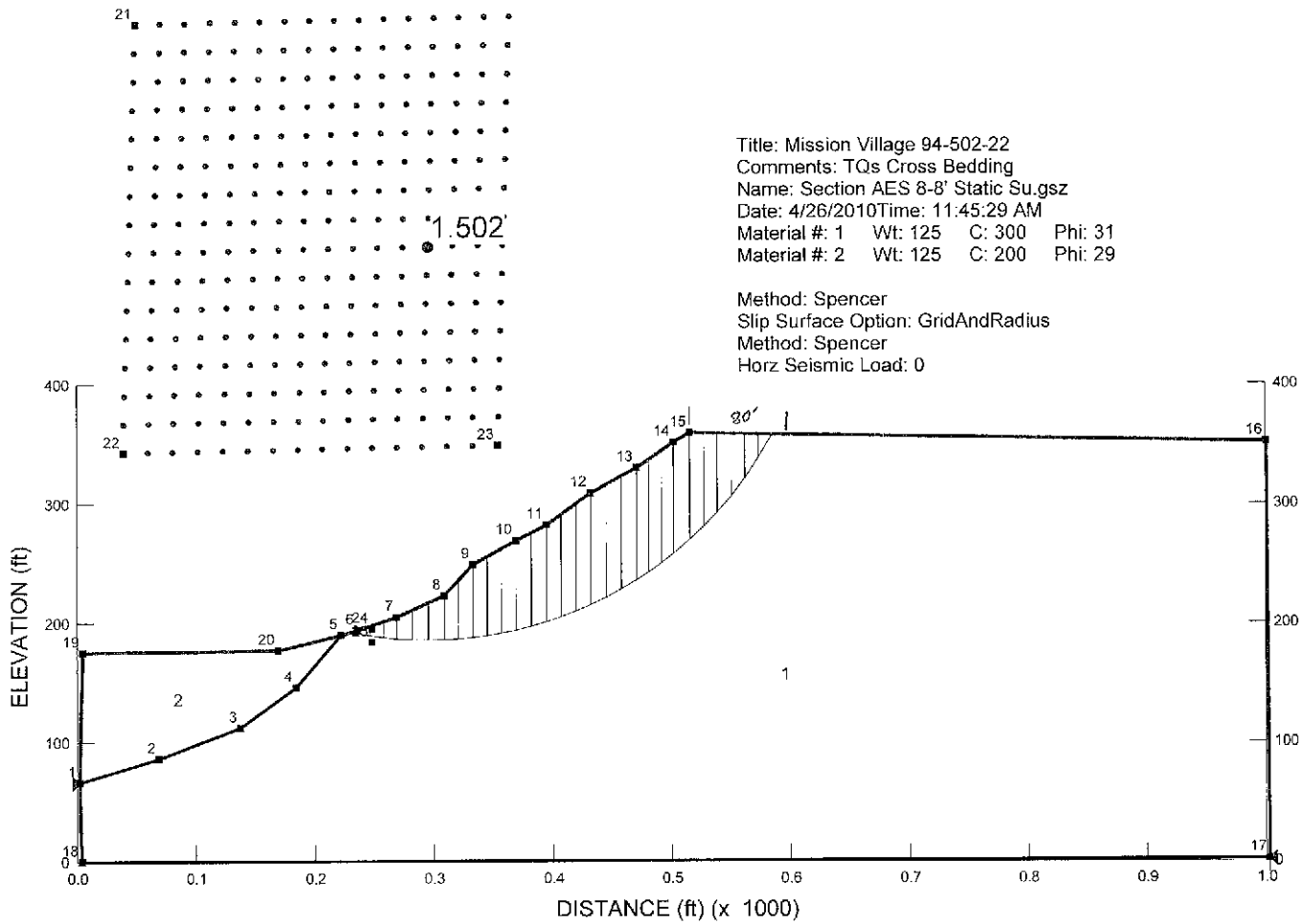

1.110
Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section AES 2-2 Seismic.gsz
Date: 4/26/2010Time: 3:35:17 PM
Material #: 1 Wt: 125 C: 500 Phi: 35
Material #: 2 Wt: 125 C: 200 Phi: 29
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0.15
ELEVATION (ft)
DISTANCE (ft) (x 1000)

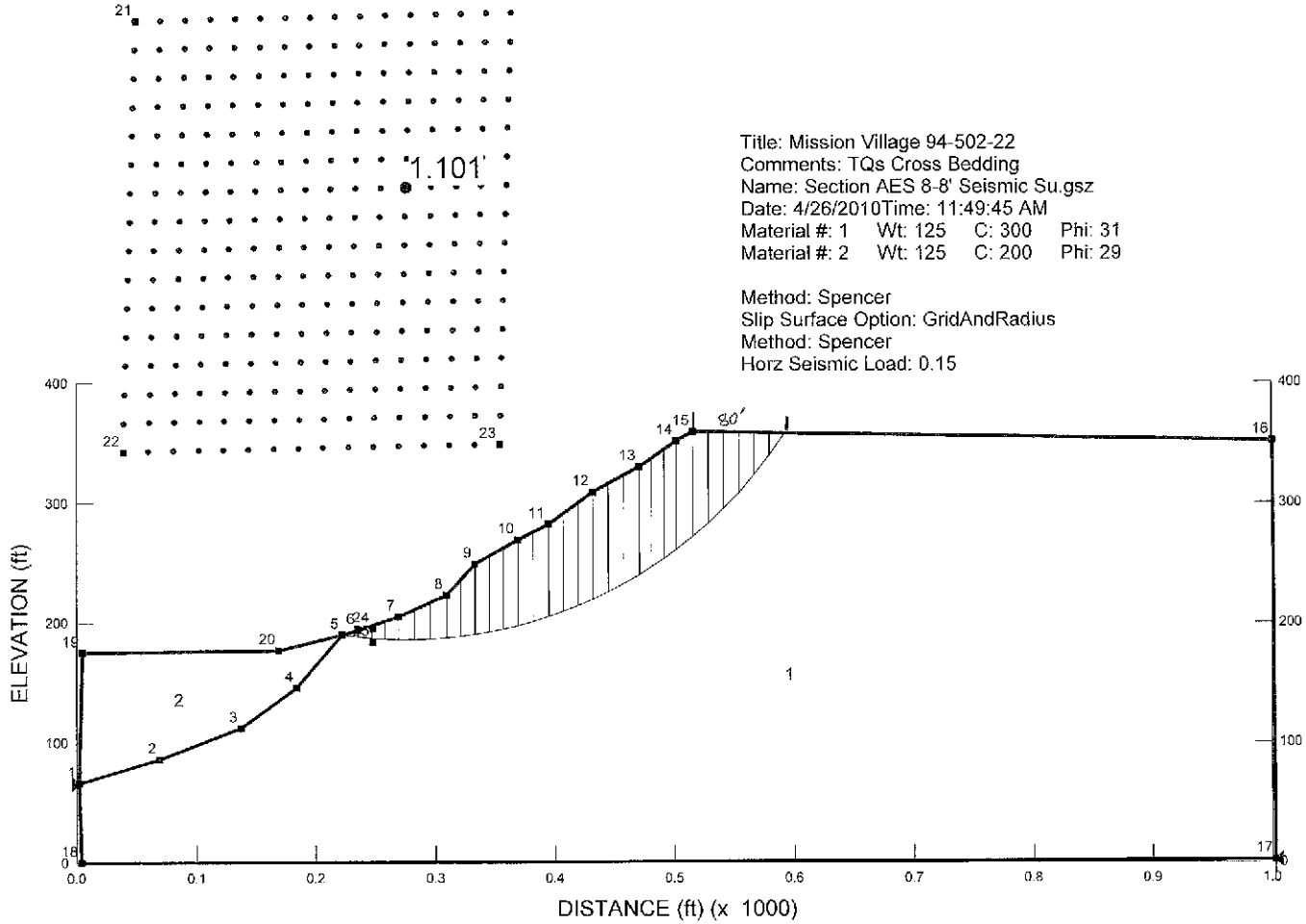

1.388
Title: Mission Village 2004-502-22
Comments: TQs Cross Bedding
Name: AES Section 4-4' Static.gsz
Material #: 1 Wt: 125 C: 500 Phi: 35 Model: MohrCoulomb
Material #: 2 Wt: 125 C: 200 Phi: 29 Model: MohrCoulomb
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0
ELEVATION (ft)
DISTANCE (ft)


1.511
Title: Mission Village 2004-502-22
Comments: TQs Cross Bedding
Name: AES Section 4-4' Static.gsz
Material #: 1 Wt: 125 C: 500 Phi: 35 Model: MohrCoulomb
Material #: 2 Wt: 125 C: 200 Phi: 29 Model: MohrCoulomb
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0
70'
ELEVATION (ft)
DISTANCE (ft)


1.104
Title: Mission Village 2004-502-22
Comments: TQs Cross Bedding
Name: AES Section 4-4' Seismic.gsz
Material #: 1 Wt: 125 C: 500 Phi: 35 Model: MohrCoulomb
Material #: 2 Wt: 125 C: 200 Phi: 29 Model: MohrCoulomb
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0.15
70'
ELEVATION (ft)
DISTANCE (ft)


1.276
Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section AES 8-8' Static Su.gsz
Date: 4/26/2010Time: 11:45:29 AM
Material #: 1 Wt: 125 C: 300 Phi: 31
Material #: 2 Wt: 125 C: 200 Phi: 29
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0
ELEVATION (ft)
DISTANCE (ft) (x 1000)


Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section AES 8-8' Static Su.gsz
Date: 4/26/2010Time: 11:45:29 AM
Material #: 1 Wt: 125 C: 300 Phi: 31
Material #: 2 Wt: 125 C: 200 Phi: 29
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0
1.502
ELEVATION (ft)
DISTANCE (ft) (x 1000)


Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section AES 8-8' Seismic Su.gsz
Date: 4/26/2010Time: 11:49:45 AM
Material #: 1 Wt: 125 C: 300 Phi: 31
Material #: 2 Wt: 125 C: 200 Phi: 29
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0.15
1.101
80'
ELEVATION (ft)
DISTANCE (ft) (x 1000)

Geologic/Geotechnical Report – EIR-Level Review of Preliminary Grading Study for Western Access Roads to Proposed Mission Village Development (VTTM 61105)

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants

GEOLOGIC/GEOTECHNICAL REPORT

EIR-Level Review of Preliminary Grading Study for Western Access Roads to Proposed Mission Village Development (VTTM 61105)

Newhall Ranch

Castaic, California

Prepared for:

The Newhall Land and Farming Company
23823 Valencia Boulevard
Valencia, California 91355

Job No: 05-2023C-9
Dated January 17, 2005

27825 Smyth Drive, Valencia, California 91355 661-294-0065 FAX 661-294-0833

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ALLAN E. SEWARD
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Geological And Geotechnical Consultants

January 17, 2005 Job No.: 05-2023C-9

The Newhall Land and Farming Company
23823 Valencia Boulevard
Valencia, California 91355

Attention: Mr. Corey Harpole

Subject: **GEOLOGIC/GEOTECHNICAL SUMMARY REPORT**
EIR Level Review of Preliminary Grading Study for Western Access Roads to Proposed Mission Village Development (VTTM 61105)

Project: Mission Village – VTTM 61105 (Formerly referred to as "Mesas East")
Newhall Ranch
Castaic, California

Dear Mr. Harpole:

This geologic and geotechnical evaluation of the Preliminary Grading Study is provided for incorporation into an Environmental Impact Report (EIR). The Preliminary Grading Study consists of three proposed road segments; 1) Magic Mountain Parkway; 2) Valencia Boulevard; and 3) Long Canyon Road; which provide further access to the proposed Mission Village Development (VTTM 61105). This summary report presents our opinions regarding the existing geologic and geotechnical conditions and their effects on the future development of the site.

1.0 SCOPE OF INVESTIGATION

The purpose of this report is to summarize the Geologic and Geotechnical conditions in the immediate vicinity of the three proposed road segments and provide general recommendations for the proposed use for submittal with an Environmental Impact Report. Some additional subsurface explorations and detailed Geologic and Geotechnical analyses will be required to address specific items covered in this report prior to submittal at the Tentative Tract Map stage. Recommendations for future potential development of these areas for residential or commercial use are not a part of this investigation. Geologic and

Geotechnical constraints that would apply to such future development will require additional review and analysis.

Our study included the following:

1. Review of in-house data compiled by this office.

2. Review of the published references listed in **Appendix A**.

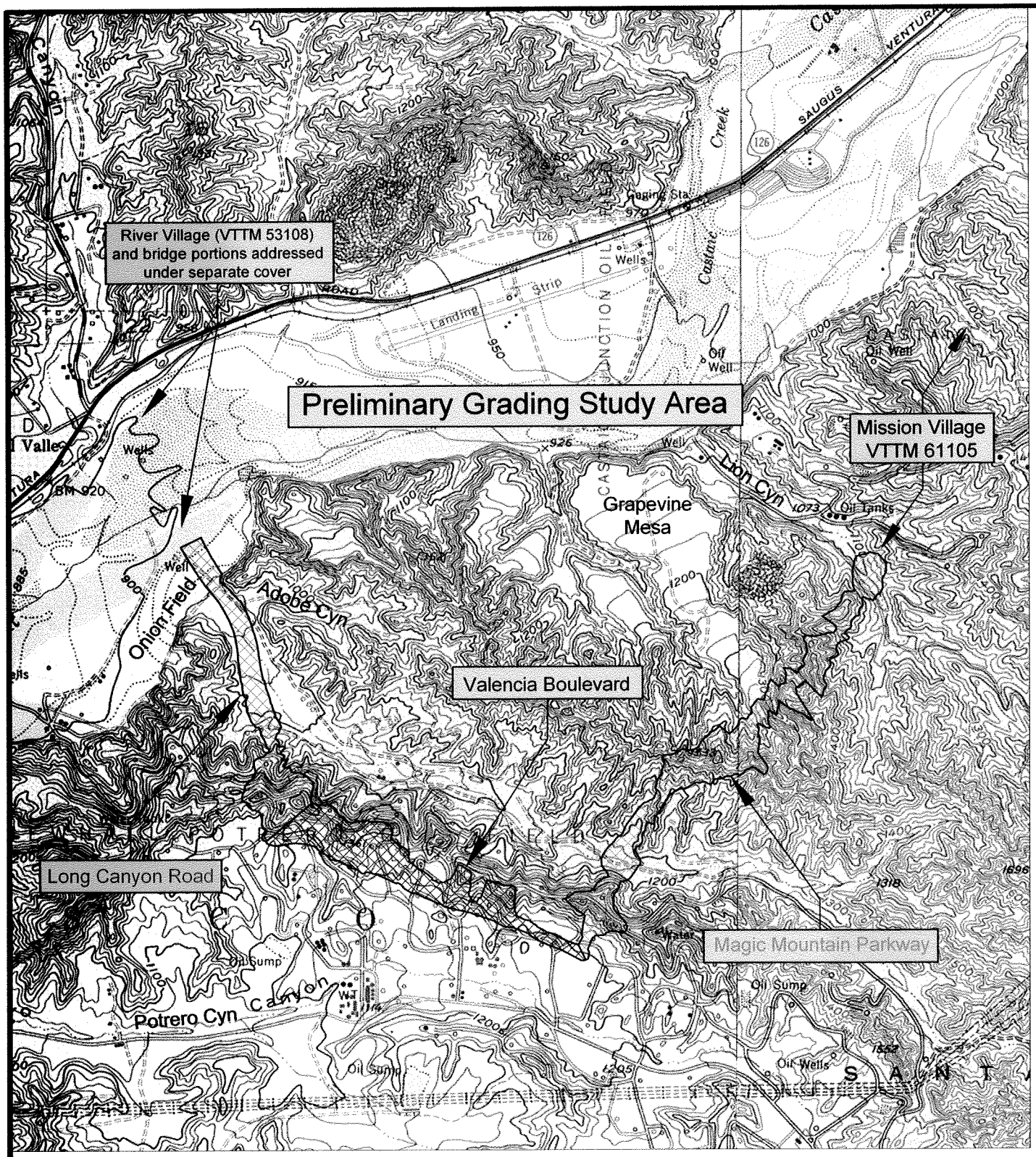
3. Review of the Munger Map Book, California-Alaska, Oil and Gas Fields, 2003.

4. Review of the following aerial photographs.

YEAR	PHOTOS	SCALE	AGENCY
1928	E- 51, E-52, E-71, E-72	±1"=2,000'	Fairchild
1930	A45, A46, A90 & A91	±1"= 1,300'	Fairchild
1946	3:301 & 3: 302	±1"= 800'	Fairchild
1952	2K-26, 2K-27 & 2K-28	±1"= 1,667'	U. S. Dept. of Agriculture
1959	10W 39 & 10W 40	±1"= 1,667'	U.S. Dept. of Agriculture
1963	4 & 5	±1"=1,200'	Mark Hurd Aerial Survey
1968	6-21 & 6-22	±1"=2,000'	Teledyne Geotronics
1977	2-47	±1"=1,500'	Continental
2004	2008, 2009, 2010 & 2011	±1"=1,000'	McElhanney

5. Review of the Newhall Ranch Mesas East "Offsite Backbone Road Excavation Volumes" proposed grades plan prepared by Hunsaker & Associates dated August 6, 2004; Revised November 24, 2004, sheet 1 of 1. The proposed grades by Hunsaker for the pertinent portions addressed herein were utilized in conjunction with the topographic maps for Newhall Ranch prepared by PSOMAS as the base maps for our Geologic Maps. We make no representations regarding the accuracy of these base maps.

6. Delineation of landslides present on the site based on topographic and aerial photo analysis, review of the published maps listed in the references, reconnaissance field mapping, and limited subsurface exploration completed during our previous geologic investigations.



Sources:
U.S. Geological Survey Val Verde Quadrangle, Dated 1952, Photorevised 1988
U.S. Geological Survey Newhall Quadrangle, Dated 1952, Photorevised 1988

Approximate Scale: 1"=2,000'

NOTE: THIS IS NOT A SURVEY OF THE PROPERTY

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ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

LOCATION MAP

Job No.: 05-2023C-9 | *Date: 1/17/05*

7. Performance of a probabilistic seismic hazard assessment for the subject sites.

8. Preparation of a Location Map, Geologic Maps and this Report.

2.0 BACKGROUND

This office previously performed limited geologic and geotechnical investigations in the areas encompassing the three proposed road segments. The proposed bridge across the Santa Clara River at Long Canyon Road will be addressed in the future under separate cover. The segment of road north of the bridge to connect to SR-HWY 126 was covered previously in our tentative map review report dated September 27, 2000 for River Village (VTTM 53108). The location of our exploratory test pits and borings are not shown on the Geologic Maps at this time. However, bedding attitudes and geologic contacts obtained from our field mapping and subsurface explorations of each site are shown on the Geologic Maps.

3.0 SITE DESCRIPTION

The site is located in the northeastern portion of the Santa Susana Mountains just south of the Santa Clara River, west of Lion Canyon and easterly and adjacent to Potrero Canyon within the unincorporated portion of Los Angeles County. The site is generally in an undeveloped state with the exception of an access roads and drill pads for oil wells. The site is covered with natural grasses, chaparral and scattered oak trees. Portions of Long Canyon and the lower portion of Adobe Canyon have been used for agricultural purposes. Dumped fill associated with past oil well drilling activities exists at various locations within the site. Elevations range from approximately 900 feet in the vicinity of the Santa Clara River to approximately 1570 feet at the ridgeline near the central portion of the Magic Mountain Parkway segment. The detailed topography of the site is shown on the attached **Location Map** and base maps for the Geologic Maps.

4.0 PRELIMINARY GRADING STUDIES

4.1 Introduction

The preliminary grading study addressed herein is intended to show feasibility of a western access to the Mission Village Development (VTTM 61105), formerly referred to as Mesas East. We utilized the pertinent portions of the offsite road excavation volumes

map prepared by Hunsaker (rev. 11/24/04) for our study of the three road segments which indicated that a total of 5,767,000 cubic yards of cut will be generated and 1,610,000 cubic yards of fill will be placed, leaving 4,157,000 cubic yards for export.

For our purposes the road segment divisions occur at their intersections and are marked on our Geologic Map. Hunsaker's map utilized topographic divisions for volume estimation purposes. Specific details for each road segment are described below.

4.2 Magic Mountain Parkway Segment

This proposed segment extends from the southern side of Lion Canyon across very rugged terrain to the northern side of Potrero Canyon and consists of a series of twelve (12) cut slopes and five (5) fill slopes directly adjacent to the roadway to achieve the road grades. The cut slopes face to the southeast on the north side of the road and northwest on the south side, and all of the slopes are proposed at 2:1 (horizontal:vertical) gradients with terrace benches every 25 vertical feet.

The highest proposed cut slope is approximately 245 feet high. The maximum vertical cut to proposed grade is 210 feet near the central portion of this segment. The highest fill slope is approximately 90 feet and the maximum proposed fill is approximately 80 feet thick, located where the proposed roadway crosses Long Canyon.

4.3 Valencia Boulevard Segment

This proposed segment extends along the northern margin of Potrero Canyon from the intersection with Magic Mountain Parkway and across a ridgeline spur where it connects to proposed Long Canyon Road. This segment consist nearly completely of proposed cut slopes with only minor fill proposed at the intersection with Magic Mountain Parkway to achieve the roadway grades. Essentially four (4) major cut slopes are proposed, two of which continue to the north for the Long Canyon Road segment. The cut slopes face south-southwest on the north side of the road and north-northeast on the south side of the road. All of the slopes are proposed at 2:1 (horizontal:vertical) gradients with terrace benches every 25 vertical feet. The highest proposed cut slope is approximately 180 feet. The maximum vertical cut to proposed grade is 220 feet on the steep knob just east of the intersection with the Long Canyon Road segment. The highest fill slope is approximately 15 feet and the maximum proposed fill is approximately 15 feet both at the intersection with Magic Mountain Parkway segment.

4.4 Long Canyon Road Segment

This proposed segment extends from Valencia Boulevard across a steep ridgeline and then follows the bottom of Long Canyon out to The Onion Field area to its connection with the future proposed bridge.

This segment consists of the continuation of the two large cut slopes through the ridgeline from the Valencia Boulevard segment and two long fill slopes over Long Canyon with another minor fill slope (transitioning from the cut portion to fill portion) to achieve the roadway grades.

The cut slope on the west side of the road faces east and the cut slope on the east side of the road faces west. All of these slopes are proposed at 2:1 (horizontal:vertical) gradients with terrace benches every 25 vertical feet. The highest proposed cut slope is approximately 210 feet and the maximum vertical cut to proposed grade is approximately 225 feet located just north of the intersection with the Valencia Boulevard segment. The highest fill slope is approximately 60 feet and the maximum proposed fill is approximately 50 feet located in Long Canyon.

5.0 GEOLOGY

5.1 Regional Geology

The subject site is located along the northeastern margin of the Ventura Basin within the Transverse Ranges geologic province of California. The Ventura Basin consists of an elongated sedimentary trough extending from the Santa Barbara Channel on the west to the San Gabriel fault on the east. The axis of the trough trends east west, reflecting the overall east-west trend of the Transverse Ranges, and generally coincides with the Santa Clara River Valley. This sedimentary basin contains a thick sequence of marine and non-marine sediments that have been uplifted and deformed by past tectonic forces. Bedrock of the Pico Formation and Saugus Formation has been mapped on the site.

5.2 Geomorphology

The site topography is dominated by generally northeasterly trending spur ridges descending longitudinally towards the Santa Clara River and laterally to Long Canyon, Potrero Canyon and Lion Canyon. Potrero and Long Canyons are the most prominent

canyons with significantly greater widths than the other surrounding secondary canyon drainages. Many other smaller secondary and tertiary drainages occur in the vicinity of the subject site.

The overall terrain is fairly steep and rugged owing to the large percentage of sandstone outcrops in this area.

The elevated subdued topography ("Mesas") present north and west of the proposed roads consists of Quaternary Terrace Deposits. Subdued morphology associated with known and suspected landslides is evident on the reviewed aerial photographs.

5.3 Geologic Units

5.3.1 Pico Formation (Tp)

The Pliocene Pico Formation underlies the southern portion of the Valencia Boulevard segment and the southern most portion of the Magic Mountain Parkway and Long Canyon Road segments. This formation is gradational and interfingering with the overlying Saugus Formation (see Geologic Maps). The Pico Formation observed at the site consists of moderately hard, light gray to light greenish-gray sandstone and pebbly sandstone with local interbeds of light greenish-gray to olive-gray siltstone, sandy siltstone and rare moderate-brown mudstone. The sandstones are generally well sorted and massive to locally well bedded with common low angle cross bedding. Pebbles are generally well rounded and commonly crystalline in composition. The siltstone and mudstone units are potentially expansive. Thin, low strength clay seams are present within this formation and can be problematic relative to slope stability.

5.3.2 Saugus Formation (TQs)

The lower portion of the Plio-Pleistocene Saugus Formation is exposed and underlies the majority of the Magic Mountain Parkway segment (north of Long Canyon) and the northern portion of the Long Canyon Road segment. This formation is gradational and interfingering with the underlying Pico Formation. The Saugus Formation was deposited in a fluvial environment between 0.7 and 2.5 Ma (Levi et al., 1986). The observed bedrock is dominated by moderately hard, light gray to yellowish-gray sandstone and conglomerate with local interbeds of greenish-gray siltstone and sandy siltstone, and uncommon reddish-brown mudstone in this area. Pebbles within this

formation are typically less rounded and more variable in composition than in the Pico Formation. Siltstone and mudstone units of the Saugus Formation are potentially expansive. Thin, low-strength clay seams occur in the reddish-brown mudstone units both as a result of original deposition and due to flexural slip along bedding during tectonic folding subsequent to deposition. These low strength clay layers may be fairly rare; however where they occur locally they have proven problematic relative to slope stability.

5.3.3 Quaternary Terrace Deposits (Qt)

Large, uplifted, stream terrace deposits are present to the north of the Magic Mountain Parkway segment with only a small portion occurring within the area of proposed grading. The terraced surface is informally known as Grapevine Mesa. As indicated by our explorations, these deposits consist primarily of silty sand and sandy silt with minor pebbly interbeds and a cobble- to locally boulder-rich layer at the base, to depths of greater than 100 feet. A well-developed soil is common in the upper 5 to 10 feet of the terrace deposits. The southern lateral margin of this large deposit occurs near the centerline of proposed Magic Mountain Parkway and will likely be undercut by the proposed grades.

5.3.4 Quaternary Alluvium (Qal)

Significant deposits of alluvium are present in Potrero Canyon, Long Canyon, the Onion Field area and the adjacent Santa Clara River Valley.

Quaternary alluvium in **Potrero Canyon** up to approximately 100 feet. in thickness underlies the main canyon and numerous tributaries of Potrero Canyon. Our subsurface investigations indicate that in the vicinity of proposed Valencia Boulevard, the upper 30 to 40 feet of this materials consists predominately of silt and clay, with local interbeded sand, silty sand and rare pebbly sand and the material greater than 60 feet in depth is predominantly sandy.

Quaternary alluvium in **Long Canyon**, the **Onion Field** and the Santa Clara River Valley consist of moderately consolidated to unconsolidated poorly graded sand with gravel lenses, fine silty sand, sandy silt and clay. The upper 1 to 3 feet of this material has generally been disturbed by agricultural activities in the areas where the roads are proposed. In general the alluvial deposits are on the order of 30 to 50 feet thick in Long

Canyon and greater than 50 feet in the Onion Field area in the vicinity of the proposed development.

5.3.5 Slopewash (Qsw)

Slopewash is a non-bedded, heterogeneous accumulation of sand, silt and weathered bedrock fragments deposited by gravity on nearly all of the slopes at both of the sites. This material has accumulated via gradual surface wash and periodic debris flows. The thickest accumulations occur at the toe of slopes and where broad swales join the main drainage areas. This material is generally poorly consolidated and commonly interfingers with the alluvium. The slopewash is designated as Qsw on the Geologic Maps.

5.3.6 Soil

A surficial soil horizon has developed to varying degrees over much of the site. Soils are best developed on old stable geomorphic surfaces such as Grapevine Mesa. Soil horizons are generally poorly developed or lacking on steep slopes and cliffs. Soil is not shown on the geologic maps.

5.3.7 Artificial Fill (af)

Artificial fill exists at various locations on both sites and ranges from minor spill fills to large dumped fill pads associated with oil well activities. Only the larger artificial fill areas are illustrated on the Geologic Maps.

5.4 Landslides

Numerous landslides have been mapped on the subject sites. These landslides are primarily translational failures controlled by the underlying bedding orientation. The landslides vary from small shallow failures to large landslides.

The mapped landslides were identified based on review of previously published and unpublished geologic data, geomorphic features observed on the aerial photos, review of the site topography illustrated on the attached Geologic Maps, reconnaissance field mapping and subsurface explorations. Additional subsurface exploration will be required

to confirm the existence of landslides and to accurately delineate the lateral extent and depth of the landslide material where impacted by the proposed grades.

The landslides mapped at the site have been divided into the two following categories:

- (Qls) Landslides that are mapped with moderate to great certainty are designated with a standard boundary and direction of movement arrows on the Geologic Map.

- (Qls?) Where the existence or lateral extent of the landslide is uncertain or inferred, the landslide is queried with a question mark. These landslides will require subsurface exploration to confirm their existence.

5.5 Surficial Failures

Shallow surficial failures involving soil, slopewash and weathered bedrock have not been delineated on the maps at this time. These smaller features will be shown where applicable when the site is evaluated in more detail on larger scale maps. Numerous shallow failures and rock falls/debris flows were activated on the steeper slopes of the site by strong ground motion from the 1994 Northridge Earthquake. Areas underlain by weathered siltstones, which are generally highly fractured, are prone to failure during intense rainfall and/or earthquake generated ground motions.

5.6 Geologic Structure

The subject sites lie within the tectonically active Transverse Ranges of southern California. North-south compression has produced a series of east west to northwest-trending folds in the vicinity of the site. The geologic structure is described below.

The bedrock beneath much of the subject road alignments have been uplifted and deformed by past tectonic forces into a northwest-trending syncline (downfold). The axial trace of this fold is located only at the extreme northeastern portion of the site where it traverses the northern most portion of the Magic Mountain Parkway segment. The geologic structure of the Saugus and the underlying Pico Formation bedrock exposed over much of the site (southern limb of the syncline) strikes northwest and is dipping at angles ranging between 32 and 48 degrees towards the northeast. The geologic structure of the bedding exposed along the northern limb of the syncline is striking towards the northeast

and is dipping at angles ranging between 9 and 38 degrees southwest. Faulting has not been observed within the proposed road alignment area.

5.7 Ground Water

Ground water beneath the site can be generally grouped in to two categories: 1) ground water contained in the alluvial deposits; 2) groundwater contained in the bedrock (very deep >1000 feet).

Historic high ground water levels for the alluvial areas were interpolated based on records from ground water contours by Robson (1972), water levels observed in exploratory excavations by Allan E. Seward Engineering Geology, Inc., and nearby piezometer measurements. Due to the elevated nature of the subject site, ground water in the deep bedrock aquifer is not expected to be adversely affected by the project or affect the project. Ground water in the alluvial deposits is not expected to adversely affect the majority of the project however, local portions of Potrero Canyon and the Onion Field area may require remedial measures in order to perform removals or achieve proposed grades which could be in close proximity to or within the interpolated historic high ground water levels. Specific details are discussed below.

The historic high ground water level in Long Canyon is generally 30 feet below the ground surface except at the confluence with Adobe Canyon where it is between 20 to 25 feet below the ground surface and 10 to 15 feet below the ground surface at the mouth of Long Canyon and in the Onion Field area. Removal operations in the vicinity of The Onion Field and the mouth of Long Canyon may encounter groundwater.

The historic high ground water level in the alluvial portions of Potrero Canyon directly adjacent to the proposed Valencia Boulevard segment are 20 to 25 feet below the existing ground surface. Some of the proposed cut depths in alluvium are greater than 20 to 25 feet and deep removals greater than 20 feet will also be likely, due to the soft alluvial materials in this portion of Potrero Canyon and hence ground water will likely be encountered where these conditions occur. Possible mitigation consists of dewatering prior to removal and cut operations and placement of subdrainage systems designed to drain positively down the proposed road alignment.

Perched groundwater within elevated bedrock areas has not been observed on the site. Natural springs or seeps were not observed on the site during our previous investigations.

6.0 POTENTIAL GEOLOGIC AND GEOTECHNICAL HAZARDS, CONSTRAINTS AND POSSIBLE MITIGATION MEASURES

6.1 Seismicity

6.1.1 Introduction

The subject site lies within the seismically active southern California region. Earthquake-related hazards typically include ground rupture, ground shaking and ground failure.

6.1.2 Ground Rupture

The subject road alignments do not lie within any of the State's Alquist-Priolo Earthquake Fault Zones. The L.A. County Seismic Safety Element does not show any faults at the subject road alignments. Regional geologic maps do not show any **active** faults (i.e. faults demonstrated to be active in the last 11,000 years) located on or trending towards the site. No evidence of active faulting or ground rupture was observed on either of the sites during our reconnaissance field mapping and limited subsurface explorations. The closest known active fault (surface trace) to the road alignments is the San Gabriel fault located approximately 4.2 miles towards the northeast.

6.1.3 Ground Shaking

The site is located in southern California, which is an **active** seismic area where large numbers of earthquakes are recorded each year. Historically, the eastern portion of the Santa Susana Mountains area experienced strong ground motion from the 1971 San Fernando earthquake, which was generated on the Sierra Madre-San Fernando fault, and more recently from the 1994 Northridge earthquake. **Table I**, below, summarizes the significant historical earthquakes that have occurred near the site. **Figure 1** shows the most prominent faults and locations of earthquake epicenters within the southern California region.

Figure 1 shows the most prominent faults and locations of earthquake epicenters within the southern California region.

TABLE I
SIGNIFICANT HISTORICAL EARTHQUAKES

EARTHQUAKE	DISTANCE TO EPICENTER (MILES)	EARTHQUAKE MAGNITUDE*	DATE
Fort Tejon	91	7.9	1857
Kern Co.	46	7.7	1952
Santa Barbara	56	7.0	1812
San Fernando	13	6.4	1971
Northridge	14.7	6.7	1994

*Moment Magnitude after 1933 or above 6, or Local Magnitude prior to 1933 or below 6 (S.C.E.C.)

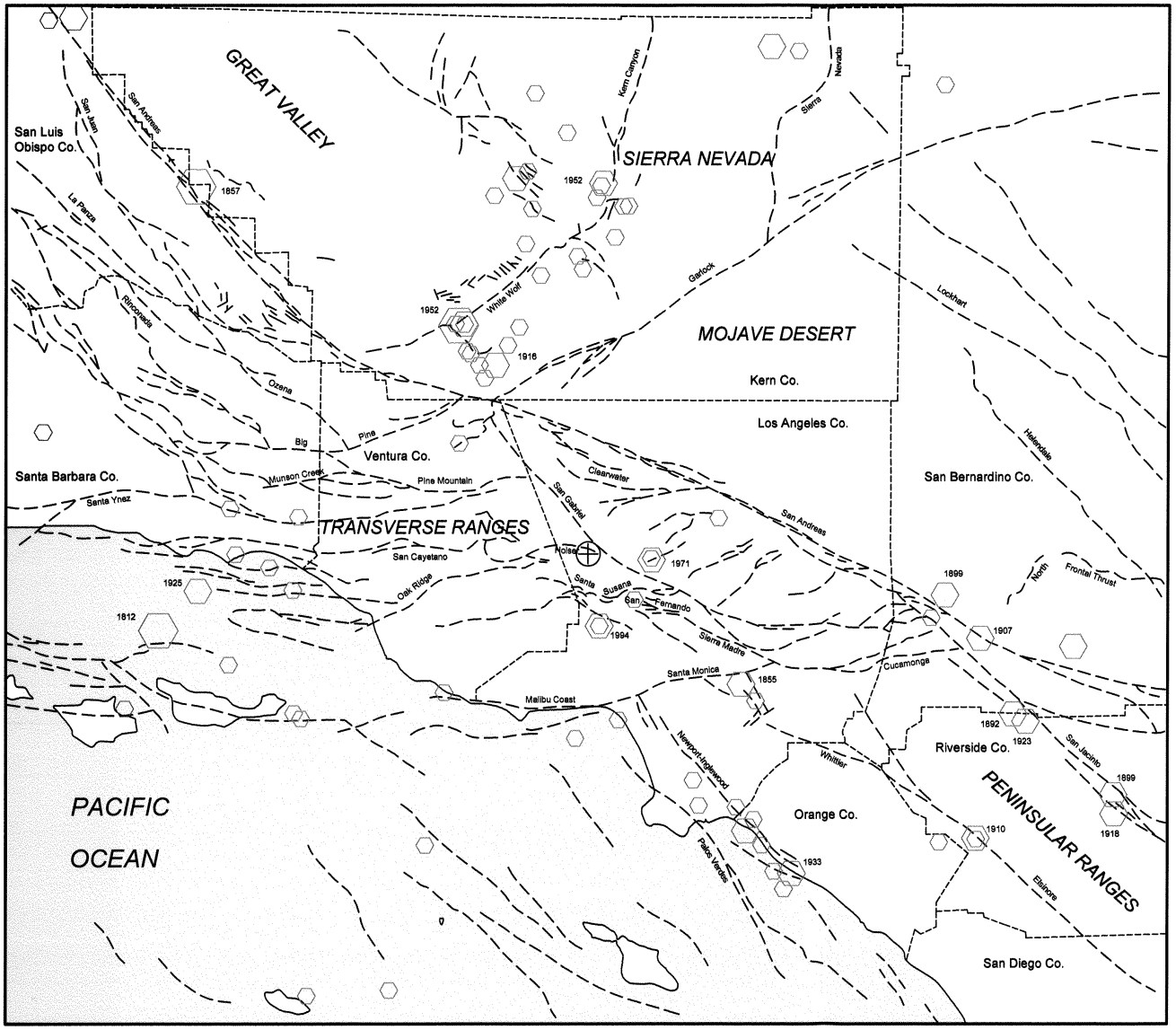
Table II summarizes the more significant potential earthquake sources near the site with estimated maximum moment magnitudes.

TABLE II
SIGNIFICANT REGIONAL FAULTS

FAULT	MAXIMUM MOMENT MAGNITUDE	APPROXIMATE DISTANCE TO SITE
Santa Susana	6.6	5
Sierra Madre-San Fernando	6.7	12
San Gabriel	7.0	4.2
Holser	6.5	1.5
San Andreas	7.8	21
Northridge (E. Oak Ridge)	6.9	2.6

*Approximate closest distance to surface trace in miles.

Based upon our probabilistic seismic hazard assessment (PSHA) using the computer program FRISKSP by Thomas F. Blake for site adjacent to the road alignments, the estimated peak horizontal ground acceleration with a 10% chance of exceedance in 50 years will range between 0.88g to 0.98g for the alluvial portions of the site. The estimated accelerations increase toward the southwest over the span of the proposed road alignments.



EXPLANATION

APPROXIMATE LOCATION OF MAJOR KNOWN FAULTS

San Andreas

EARTHQUAKE EPICENTERS

Location	Magnitude
⬡	5.0 - 5.9
⬢	6.0 - 6.9
⬢	7.0 - 7.9

APPROXIMATE LOCATION OF SUBJECT SITE

⊕

Compiled and modified from: Jennings (1994), Real et al. (1978), Yerkes (1985), Ziony and Jones (1989), and Shakal et al. (1994)

40 30 20 10 0 40 KILOMETERS

Approximate Scale 1 : 1,250,000

30 20 10 0 30 MILES

N

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FAULT AND EARTHQUAKE EPICENTER LOCATION MAP

Job No.: 05-2023C-9

Date: 1/17/05 | *Figure:* 1

6.1.4 Ground Failure

Ground failure is a general term describing seismically induced secondary permanent ground deformation caused by strong ground motion. This includes liquefaction of granular deposits or fine-grained soils with low plasticity below ground water, lateral spreading, seismic settlement of poorly consolidated materials (dynamic densification), differential materials response, slope failures, sympathetic movement on weak bedding planes or non-causative faults, shattered ridge effects and ground lurching. The most significant types of ground failure are discussed below.

Large portions of the road alignments are underlain by bedrock that is not susceptible to liquefaction. The alluvium present in the canyon areas (see Geologic Maps) may be subject to liquefaction. These alluvial areas are designated as potential liquefiable areas on the State of California Seismic Hazard Zones Maps (Val Verde and Newhall Quadrangles). Detailed liquefaction assessments will be required for the alluvial areas prior to any future development of these areas.

Earthquake-induced slope failures include activation and reactivation of landslides, rock falls, debris flows and surficial failures. The potential for earthquake-induced slope failures is moderate to high on the steep canyon slopes. Most of the hillside areas in the vicinity of the subject road alignment sites are designated on the State of California Seismic Hazard Zones Map (Val Verde and Newhall Quadrangles) to have potential for earthquake-induced slope instability. The proposed cut and fill grading for each site eliminates most of these areas. Slope stability issues are addressed in the following section.

6.2 Slope Stability

6.2.1 Landslides

Four known landslides and one suspected landslide have been mapped within the proposed grading limits for the proposed road segments and have been color-coded orange on the attached Geologic Maps. These landslides are primarily translational failures controlled by the bedding orientation. The occurrence of these landslides relative to the proposed grading design is shown on the Geologic Maps. Cut slopes and/or grading is proposed in landslide material and or landslides are located in areas where they potentially affect the proposed roadway grading. The proposed grading

consists of many deep cuts, which will probably result in the removal of a large amount of the affected portions of these landslides. However, these landslides need to be investigated and evaluated in detail via subsurface explorations and slope stability analyses and appropriately mitigated. These landslides can be mitigated by removing the landslide affected bedrock where it occurs in the proposed cut and fill areas, and replacing the areas affected by the removals with compacted fill to the proposed grades with keyways and backdrains where warranted, buttressing, avoidance and building setbacks. Any remaining landslide debris shall be designated as Restricted Use Areas on the Final Maps. These landslides shall be investigated and addressed in more detail at the Tentative Tract Map stage.

6.2.2 Cut Slopes

The proposed cut slopes shown on the attached Geologic Maps are designed at gradients of 2:1 (h:v) with terrace drains every 25 feet. The highest proposed cut slope is approximately 245 feet and the deepest proposed cut area is approximately 225 feet.

Most of the site consists of steeply northeast dipping bedrock and hence most of the proposed cut slopes in bedrock will have antidip (into-slope) to neutral to steeper than the slope face bedding conditions, which are favorable with respect to gross stability.

However, proposed cut slopes with potential unfavorable stability conditions are discussed briefly below, and have been color-coded RED on the attached Geologic Maps.

1. Potentially daylighted bedding conditions occur on the proposed cut-slope located north of the Magic Mountain Parkway segment in the vicinity of proposed road elevations 1210 feet to 1230 feet. The syncline axis traverses the southern edge of this slope and potentially plunges out-of-slope.

2. Potentially daylighted bedding conditions may also occur in the bedrock portions of the proposed northeast facing cut slope located south of the Valencia Boulevard segment.

3. Many of the proposed cut slopes located along the Valencia Boulevard segment will expose alluvium or artificial fill and may also encounter groundwater in the deeper cuts proposed in the alluvium.

4. Five of the proposed cut slopes will partially expose landslide debris.

Proposed cut slopes that will potentially expose weak daylighted bedding planes, alluvium, landslide debris, artificial fill or groundwater will require detailed evaluation and where warranted corrective measures in the form of avoidance, buttresses/stability fills, or be redesigned at shallower (e.g. 3:1) angles or different orientations so that they will be grossly and surfically stable.

6.2.3 Natural Slopes and Debris Flows

Nearly all of the existing natural slopes in close proximity to the area of proposed grading for the road segments are proposed as cut slopes or fill slopes. One ascending natural slope is proposed directly adjacent to the proposed roadway and two descending natural slopes with potentially unfavorable geologic conditions just downhill and "behind" small proposed cut slopes occur on the subject site and are discussed briefly below and have been color-coded PINK on the attached Geologic Maps.

1) South side of the Magic Mountain Parkway segment at proposed road elevation 1290 feet. Portions of this 150 to 200 feet high ascending natural slope are steeper than 2:1 (h:v), but it does not exhibit a daylighted bedding condition. A slope failure on this ascending slope could pose a hazard to the proposed roadway.

2) South side of the Magic Mountain Parkway segment at proposed elevations 1230 feet to 1210 feet where the natural slopes descending to the south "behind" the small proposed cut slopes may exhibit daylighted bedding conditions and a landslide occurs. A slope failure on this descending slope could extend up toward the proposed roadway and adversely affect the stability of the road.

3) East side of Long Canyon Road segment at proposed road elevation 1070 feet to 1090 feet where descending natural "behind" proposed slopes may exhibit a daylighted bedding component condition. A slope failure on this descending slope could extend up toward the proposed roadway and adversely affect the stability of the road.

Due to the steepness or underlying geometry of the bedrock these three natural slopes shall be evaluated in more detail at the tentative tract map stage. If they do not comply with the jurisdictional agency's required minimum factors of safety for static and

pseudostatic analyses they will require corrective measures. Corrective measures consist of avoidance, cutting back to a shallower angle or buttressing with compacted fill.

Owing to the proposed design grades, the potential for debris flow hazard is limited to the ascending natural slope located south of Magic Mountain Parkway at proposed road elevation 1290 feet. Colluvial soils (slopewash) in the swale areas of this slope need to be evaluated for debris flow potential. Corrective measures consist of avoidance, construction of appropriately sized impact or debris walls, and/or debris basins, removal of material susceptible to debris flow or stabilization of potential debris flow material with a stability fill.

6.2.4 Fill Slopes

Proposed fill slopes are designed at 2 to 1 (h:v) gradients or shallower with terrace drains every 25 feet. Review of the preliminary Grading Study indicates that the highest proposed fill slope on the site is approximately 90 feet and the deepest proposed fill area is approximately 80 feet. The fill slopes will be suitable for the intended use.

6.2.5 Deep Fill Areas

Proposed fill to be placed in areas of deep fills (greater than 40 feet) may experience more settlement than shallow fills. The current compaction requirement for fills greater than 40 feet below proposed grade is 93 percent of the maximum dry density per ASTM D1557 (1998 California Building Code).

6.3 Hydroconsolidation

The phenomenon of collapsing soils is the result of water interacting with void-bearing sediments. Water in the sediments reorganizes sediment particles into a more compact arrangement, causing reduction of the void space. This causes settlement (hydroconsolidation) of the material, which is potentially hazardous to future overlying structures. Rapidly buried silty sediments such as thick slopewash and alluvium commonly contain void space and are subject to hydroconsolidation. The underlying alluvial and slopewash materials shall be evaluated relative to hydroconsolidation potential where they occur in areas of proposed fill or cut. Soils subject to hydroconsolidation can be mitigated by removal and recompaction or other densification measures of collapsible soils.

6.4 Erosion Potential and Drainage

Some evidence of erosion was observed within the soil of the subject sites. Bedrock is not expected to be as susceptible to erosion as the overlying soil material. However the future fill, bedrock and soil material at the site will be susceptible to erosion if sheet flow drainage is not provided. Water should not be allowed to stand or pond on the future graded areas nor should it be allowed to flow over natural or constructed slopes, but should be directed to designed debris basins where applicable. Debris material generated from the site erosion should be contained within the site boundaries. Debris and erosion of the site materials is referred to the supervising civil engineer relative to providing site drainage containment of material generated during surficial erosion.

6.5 Dam Inundation

Review of the technical appendix to the safety element of the Los Angeles County General Plan (Flood and Inundation Hazards - Plate 6) indicates that The Onion Field Area may be subject to dam inundation hazard.

6.6 Construction Considerations

6.6.1 Rippability

The bedrock at the site is moderately consolidated, and grading operations should be able to be performed with conventional equipment. Heavy single shank ripping will probably be required if massive conglomerate units of the Pico and Saugus Formations are encountered.

6.6.2 Oversize Material

Cobbles and small boulders are commonly present within the alluvium, Quaternary Terrace deposits and the Pico and Saugus Formation present on the site. This oversize material may present some difficulties during cutting operations with some types of equipment; however, it is not considered to be a significant detriment to the development. Oversized material will require special handling during fill construction typical of all grading operations.

6.6.3 Expansive Materials

The fine-grained units of the Saugus Formation and Pico Formation are known to be expansive in nature. The clayey artificial fill, slopewash and alluvium deposits present at the site may contain potentially expansive material. The expansive material shall be evaluated by the Project Geotechnical Engineer during later stages of development. Special foundation designs and reinforcement can be utilized to mitigate expansive material.

6.6.4 Shrinking and Bulking Characteristics of Earth Materials

Typically, landslide materials, slopewash, fill and alluvial deposits shrink in volume when removed and recompacted, and the Saugus Formation and Pico Formation bedrock bulks. Determination of the shrinking or bulking factors of the on-site materials should be performed during the future stages of development to properly assess the cut-fill balance of the proposed grading and verify quantities of fill for export.

6.6.5 Corrosion Potential

Soils on site may have some degree of corrosive characteristics to concrete and ferrous metals. Soil moisture, chemistry, and other physical characteristics all have important effects on corrosivity. Testing shall be performed to determine the corrosion potential of the material. These tests will indicate what special measures, such as cement type or corrosion protection for underground utility pipes will be required for the future site construction.

6.7 Oil Wells

Review of the 2003 Munger Map book and the California Department of Conservation Division of Oil, Gas and Geothermal Resources (DOGGR) data indicate there are fifty-nine (59) documented oil wells present in the vicinity of the proposed grading limits for the site. We limited the oil well search to be within 750 feet of the centerline of the proposed road segments. The approximate locations of these oil wells are shown on the Geologic Maps. If any undocumented oil or gas wells are encountered during the grading operations, their locations should be surveyed and the current well conditions evaluated immediately.

Soils in the vicinity of oil wells could be contaminated with petroleum products spilled during past operations of the wells. Wells may have associated mud pits, which could also contain materials considered to be hazardous under current environmental regulations. The abandonment status and conditions of the nearby soils of each oil well should be addressed during the future stages of the development. The names of the oil wells for each site are provided below.

1. Medallion Calif. Prpts Co. – "Rancho San Francisco #10"
2. Medallion Calif. Prpts Co. – "Rancho San Francisco #13"
3. Medallion Calif. Prpts Co. – "Rancho San Francisco #18"
4. Medallion Calif. Prpts Co. – "Rancho San Francisco #20"
5. Medallion Calif. Prpts Co. – "Rancho San Francisco #21"
6. Medallion Calif. Prpts Co. – "Rancho San Francisco #28"
7. Medallion Calif. Prpts Co. – "Rancho San Francisco #44"
8. Medallion Calif. Prpts Co. – "Rancho San Francisco #45"
9. Medallion Calif. Prpts Co. – "Rancho San Francisco #47"
10. Medallion Calif. Prpts Co. – "Rancho San Francisco #50"
11. Medallion Calif. Prpts Co. – "Rancho San Francisco #51"
12. Medallion Calif. Prpts Co. – "Rancho San Francisco #52"
13. Medallion Calif. Prpts Co. – "Rancho San Francisco #53"
14. Medallion Calif. Prpts Co. – "Rancho San Francisco #54"
15. Medallion Calif. Prpts Co. – "Rancho San Francisco #55"
16. Medallion Calif. Prpts Co. – "Rancho San Francisco #58"
17. Medallion Calif. Prpts Co. – "Rancho San Francisco #69"
18. Medallion Calif. Prpts Co. – "Rancho San Francisco #71"
19. Medallion Calif. Prpts Co. – "Rancho San Francisco #72"
20. Medallion Calif. Prpts Co. – "Rancho San Francisco #80"
21. Medallion Calif. Prpts Co. – "Rancho San Francisco #101"
22. Medallion Calif. Prpts Co. – "Rancho San Francisco #102"
23. Medallion Calif. Prpts Co. – "Rancho San Francisco #105"
24. Medallion Calif. Prpts Co. – "Rancho San Francisco #108"
25. Medallion Calif. Prpts Co. – "Rancho San Francisco #112"
26. Medallion Calif. Prpts Co. – "Rancho San Francisco #113"
27. Medallion Calif. Prpts Co. – "Rancho San Francisco #114"
28. Medallion Calif. Prpts Co. – "Rancho San Francisco #115"
29. Medallion Calif. Prpts Co. – "Rancho San Francisco #118"
30. Medallion Calif. Prpts Co. – "Rancho San Francisco #120"

31. Medallion Calif. Prpts Co. – "Rancho San Francisco #124"
32. Medallion Calif. Prpts Co. – "Rancho San Francisco #126"
33. Medallion Calif. Prpts Co. – "Rancho San Francisco #127"
34. Medallion Calif. Prpts Co. – "Rancho San Francisco #128"
35. Medallion Calif. Prpts Co. – "Rancho San Francisco #129"
36. Medallion Calif. Prpts Co. – "Rancho San Francisco #137"
37. Medallion Calif. Prpts Co. – "Rancho San Francisco #142"
38. Medallion Calif. Prpts Co. – "Rancho San Francisco #143"
39. Medallion Calif. Prpts Co. – "Rancho San Francisco #145"
40. Medallion Calif. Prpts Co. – "Rancho San Francisco #147"
41. Medallion Calif. Prpts Co. – "Rancho San Francisco #150"
42. Medallion Calif. Prpts Co. – "Rancho San Francisco #1A"
43. Oryx Energy Co. – "Rancho San Francisco #5"
44. Oryx Energy Co. – "Rancho San Francisco #8"
45. Oryx Energy Co. – "Rancho San Francisco #11"
46. Oryx Energy Co. – "Rancho San Francisco #15"
47. Oryx Energy Co. – "Rancho San Francisco #17"
48. Oryx Energy Co. – "Rancho San Francisco #46"
49. Oryx Energy Co. – "Rancho San Francisco #48"
50. Oryx Energy Co. – "Rancho San Francisco #57"
51. Oryx Energy Co. – "Rancho San Francisco #61"
52. Oryx Energy Co. – "Rancho San Francisco #75"
53. Oryx Energy Co. – "Rancho San Francisco #79"
54. Oryx Energy Co. – "Rancho San Francisco #85"
55. Oryx Energy Co. – "Rancho San Francisco #123"
56. Oryx Energy Co. – "Rancho San Francisco #131"
57. Oryx Energy Co. – "Rancho San Francisco #138"
58. Oryx Energy Co. – "Rancho San Francisco #155"
59. Exxon Mobile Corp. – "NL & F #22"

7.0 PROJECT FEASIBILITY

The proposed development is feasible from the geologic and geotechnical standpoint and will be safe from geologic hazards provided that the geologic and geotechnical recommendations outlined in this report, along with appropriate building and grading codes, are taken into account during the planning, design and construction phases of the project.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions summarize the primary geologic/geotechnical issues that impact the proposed development.

1. The potential for primary ground rupture to occur on a fault on the site is considered to be **very low to non-existent**.

2. Based upon our probabilistic seismic hazard assessment, the peak horizontal ground acceleration for an earthquake with a 10% chance of exceedance in 50 years is expected to be between 0.88g and 0.98g for the alluvial portions of the site.

3. The alluvial areas within the site are designated as potential liquefiable areas on the State of California Seismic Hazard Zones Map (Val Verde and Newhall Quadrangles). The proposed fills over alluvium and slopewash are to be considered as "structural fill", and hence subsurface studies need to be performed to determine actual liquefaction and seismic settlement (dynamic densification) potential of these soils. In many cases, liquefaction and cyclic settlement potential can be mitigated by removal and recompaction of the alluvium above groundwater, to provide a cap to bridge effects from liquefaction at depth.

4. Four known landslides and one suspected landslide have been mapped within the area of proposed grading on the subject site and are color-coded ORANGE on the attached Geologic Maps. The proposed grading consists of many deep cuts, which will probably result in the removal of a large amount of the affected portions of these landslides. However, these landslides need to be investigated and evaluated in detail via subsurface explorations and slope stability analyses and appropriately mitigated. Mitigation measures consist of complete or partial removal, buttressing, avoidance, and building setbacks. Restricted Use Areas will need to be established around any unmitigated landslides in open space areas.

5. The majority of the cut slopes shown on the proposed grading study will be grossly stable as designed. However, the proposed cut slopes color-coded RED on the attached Geologic Maps may be potentially unstable and require investigation and slope stability analyses. Proposed cut slopes that will expose weak daylighted bedding planes, alluvium, landslide debris, artificial fill or groundwater will most likely require corrective measures in the form of avoidance, buttress/stability fills, redesign at

shallower angles or different orientations so that they will be grossly and surficially stable.

6. Based on our review of the preliminary grading study virtually all of the natural slopes directly adjacent to the proposed roadways will be eliminated as a result of the proposed grading and hence potentially unfavorable stability issues with respect to natural slopes occurs only in the following areas (color-coded PINK on the Geologic Maps). The steep ascending natural slope located at proposed road elevation 1290 feet on the south side of the Magic Mountain Parkway segment. The two descending natural slopes with potentially unfavorable geologic conditions located south of the Magic Mountain Parkway segment between proposed road elevations 1210 feet and 1230 feet and east of the Long Canyon Road segment at proposed road elevations 1070 feet to 1090 feet. These three natural slopes shall be evaluated in more detail at the tentative map stage and if they do not comply with the jurisdictional agency's required minimum factors of safety for static and pseudostatic analyses will require corrective measures. Corrective measures consist of avoidance, cutting back to a shallower angle or buttressing with compacted fill.

7. A study shall be conducted during the tentative tract map stage to evaluate the potential debris flow hazard in the vicinity of the natural slope located at road elevation 1290 feet on the south side of the Magic Mountain Parkway segment. Debris flow hazards can be generally mitigated by avoidance, the construction of impact or debris walls and/or debris basins, control of run-off or removal of loose surficial materials or construction of a stability fill.

8. Rapidly buried silty and sandy sediments such as thick slopewash and alluvium are subject to hydroconsolidation. The fill material proposed within the alluvial canyon and swale areas is intended to support the future the roadways and hence the underlying alluvial and slopewash materials should be evaluated relative to hydroconsolidation potential. Soils subject to hydroconsolidation can be mitigated by removal and recompaction or other densification measures of collapsible soils.

9. The existing provisions in the Grading Ordinance for planting and irrigation of cut slopes and fill slopes will reduce the potential for erosion

10. The bedrock is moderately consolidated, which indicates that grading operations can be performed with conventional equipment. Heavy single-shank ripping will probably be required if massive conglomerate units are encountered.

11. Cobbles and small boulders are present within the alluvium, Quaternary Terrace Deposits and the Pico and Saugus Formations on the site. This oversize material may present difficulties during cutting operations with some types of equipment. In addition, oversize material will require special handling during fill construction.

12. Groundwater may be encountered during the grading operations in the Onion Field Area and Potrero Canyon Area and dewatering or subdrain systems may be needed. Prior to grading operations these areas should be investigated and recommendations provided where necessary.

13. A study should be conducted to evaluate the expansive potential of the earth materials. If the material is determined to be expansive, it can be mitigated by mixing with soil with low expansive potential or by designing special foundations system.

14. Determination of the shrinking or bulking factors of the on-site materials should be performed during the future stages of development to properly assess the cut-fill balance of the proposed grading and verify quantities of fill for export.

15. Corrosion testing should be performed to determine the corrosion potential of the upper material. These tests will indicate what special measures, such as cement type or corrosion protection for underground utility pipes, will be required for the future site construction/development.

16. Review of the technical appendix to the safety element of the Los Angeles County General Plan (Flood and Inundation Hazards - Plate 6) indicates that the Onion Field area is subject to dam inundation hazard.

9.0 LIMITATIONS

This report has been prepared for the exclusive use of The Newhall Land and Farming Company and their design consultants for the specific site discussed herein. This report should not be considered transferable. Prior to use by others, we should be notified, as additional work may be required to update this report.

In the event that any modifications in the design or location of the proposed development, as discussed herein, are planned, the conclusions and recommendations contained in this report will require a written review by this firm with respect to the planned modifications.

The proposed development is located in southern California, which is in a geologically and seismically active region where large magnitude, potentially destructive earthquakes are common. Therefore, it is reasonable to assume that ground motions from moderate or large magnitude earthquakes could affect the site during the life of a given structure in southern California.

It should be noted that faulting is normally confined to the area immediately adjacent to a known fault, or within a few feet of the last fault movement. Regardless of what criteria is used however, absolute assurance against future fault displacement or strong ground motion cannot be obtained in tectonically active areas. New faults can form, as the orientation and magnitude of deformational forces in the earth's crust change with time. Therefore, the location of new breaks or ground motions during a seismic event cannot be located or anticipated.

In performing these professional services, we have used the degree of care and skill ordinarily exercised, under similar circumstances, by reputable engineering geologists and geotechnical engineers practicing in this or similar localities.

The analyses and interpretations presented in this report have been based on the results of field reconnaissance and review of the referenced reports. It should be recognized that subsurface conditions can vary in time and laterally and with depth at a given site. Our conclusions and recommendations are based on the data available and our interpretation of the data based on our experience and background. Hence, our **conclusions** and **recommendations** are **professional opinions** and are **not meant** to be a control of nature; therefore, **no warranty** is herein **expressed** or **implied**.

This report may not be duplicated without the written consent of this firm.

This opportunity to be of service is appreciated. If you have any questions regarding this report please give us a call.

Respectfully submitted,

Eric J. Seward, CEG 2110
Principal Engineering Geologist
Vice President

Dharmesh P. Amin, M.S., P.E., GE 2553
Principal Geotechnical Engineer

The following attachments complete this report.

References		
Location Map		following page 2
Fault and Earthquake Epicenter Location Map	**Figure 1**	following page 12
Geologic Maps	**Plates I & II**	(In Pocket)
Offsite Backbone Road Excavation Volume Map	**Sheet 1 of 1**	(In Pocket)

Distribution: (1) The Newhall Land and Farming Company
Attn: Addressee
(1) Hunsaker
Attn: Mr. Jason Fukumitsu
(1) Impact Sciences
Attn: Ms. Susan Tebo
(1) Psomas
Attn: Mr. Matt Heideman

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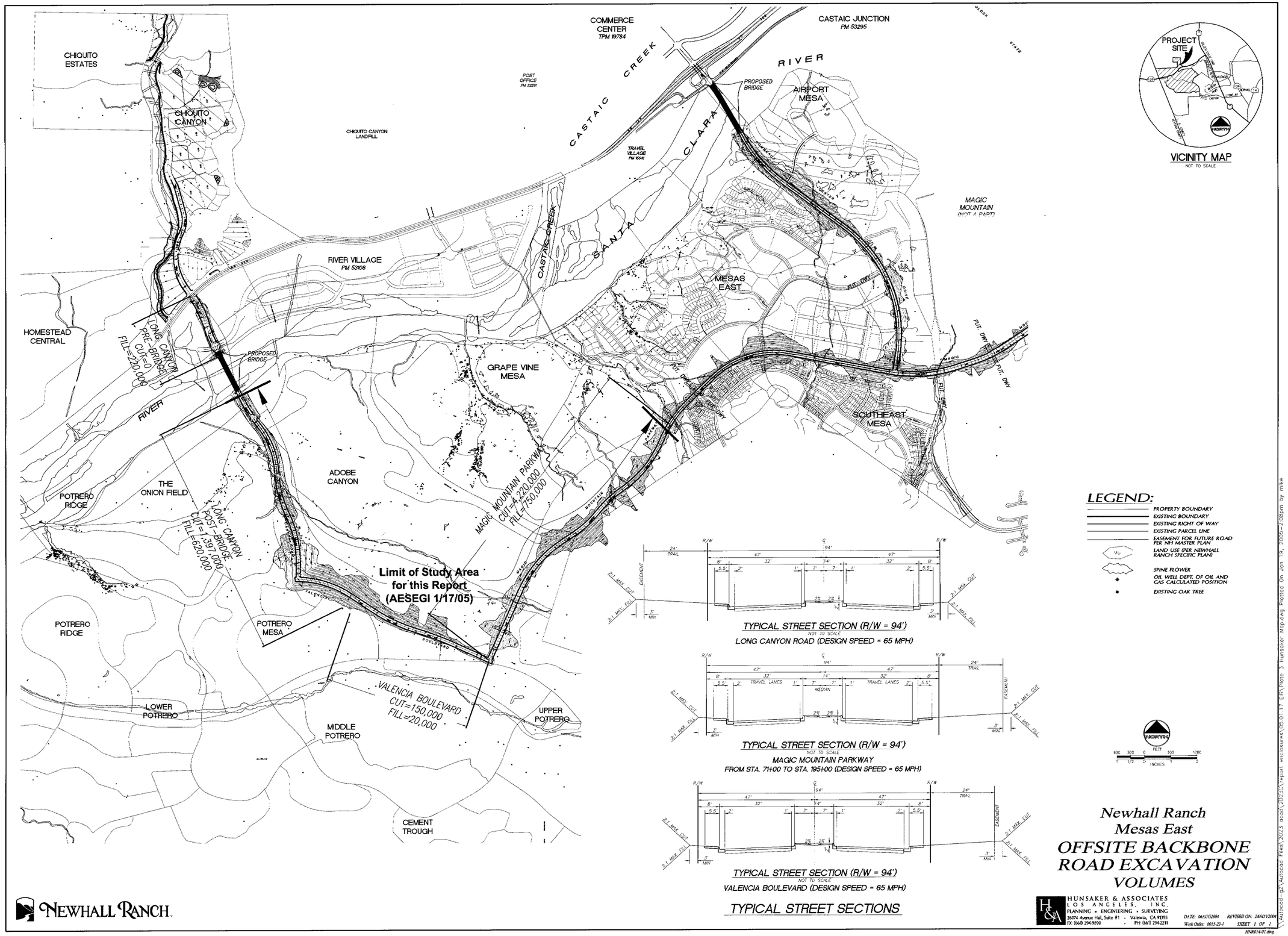
Reports by Allan E. Seward Engineering Geology, Inc.

1) **Geologic and Geotechnical Report**
Review of Vesting Tentative Tract Map 61105 (dated 6/14/04)
Mesas East
Newhall Ranch, California
Dated July 22, 2004 – JN: 04-2023-4

2) **Geologic and Geotechnical Report- Addendum No. 1**
Response to Los Angeles County Geologic Review Sheet dated 10/24/04
And Soils Engineering Review Sheet dated 10/26/04
Geologic and Geotechnical Report
Review of Vesting Tentative Tract 61105
Mission Village
Newhall Ranch, California
Dated December 22, 1994 – JN: 04-2023-4

3) **Geologic and Geotechnical Report**
Vesting Tentative Tract 53108 (dated 6/11/00)
River Village, Newhall Ranch
Castaic, California
Dated July 27, 2000 – JN: 00-1702R-4

4) **Geologic and Geotechnical Report – Addendum No. 1**
Response to County Comments (Review sheets dated 12/12/00 and 1/2/01)
Vesting Tentative Tract 53108 (dated 6/11/00)
River Village, Newhall Ranch
Castaic, California
Dated February 10, 2001 – JN: 01-1702R-4



A full-size reproduction of this figure can be found at Impact Sciences.

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

Geologic Map

Date: 1/17/05		Job No.: 05-2023C-5
Scale: 1" = 200'		CAD File: Geologic Map Lion to Potrero Map
PLATE I	Geology By: NA	Revised:
	Drawn by: GSD/MBW	

LEGEND

af	Artificial Fill
Qsw	Quaternary slopewash
Qal	Quaternary alluvium
Qls	Quaternary landslide; queried where uncertain
Qt	Quaternary terrace deposits
TQs	Saugus Formation
Tp	Pico Formation
	Geologic contact; queried where uncertain; dotted where concealed
	Trace of synclines showing plunge direction
	Strike and dip of bedding
	Approximate strike and dip of bedding
	Approximate location of oil well (within 750 ft of centerline of road)

A full-size reproduction of this figure can be found at Impact Sciences.

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

Geologic Map

Date: 1/17/05		Job No.: 05-2023C-5
Scale: 1" = 200'		CAD File: Geologic Map Potrero to Long Map
PLATE II	Geology by: NIA / Drawn by: GS/MBW	Revised:

A full-size reproduction of this figure can be found at Impact Sciences.

Geologic and Geotechnical Report – Review of Revised VTTM 61105 (Dated 12/21/05) for Screencheck Purposes

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants

March 13, 2007 Job No: 07-2023-4

The Newhall Land and Farming Company
23823 West Valencia Boulevard
Valencia, California 91355

Attention: Mr. Corey Harpole

Subject: **GEOLOGIC AND GEOTECHNICAL REPORT**
Review of Revised Vesting Tentative Tract Map (dated 12/21/05) for EIR Screen Check Purposes

Project: Vesting Tentative Tract 61105
Mission Village
Newhall Ranch, California

References: At end of text

Dear Mr. Harpole:

This report presents our opinions regarding existing geologic and geotechnical conditions in the area covered by revised Vesting Tentative Tract Map (VTTM) No. 61105 (dated 12/21/06) and their effects on the proposed development. This report supplements our previous reports for VTTM 61105 (dated 7/22/04, 12/22/04, and 6/13/05). The conclusions and recommendations presented in these previous reports are still applicable, except where they are superseded in this report.

The Revised Vesting Tentative Tract Map was approved by the Geology and Soils department of the County of Los Angeles, per their review sheets dated February 12, 2007 and February 22, 2007, respectively. This report has been written in order to document the revisions to the VTTM for use in performing "in-house" EIR level planning. Portions of this report may need to be supplemented with additional work prior to submittal to the County.

1.0 SCOPE OF WORK

The scope of work completed during the preparation of this report included the following tasks:

1. Geologic/Geotechnical review of revised Vesting Tentative Tract Map No. 61105 (12/21/06).

2. Coordination with the Supervising Civil Engineer, Psomas.

3. Geologic and geotechnical engineering analyses and preparation of conclusions and recommendations based on the existing site conditions and future use intended. Analyses included static, pseudostatic, and surficial stability analyses and evaluation of revised proposed grades and slopes.

4. Preparation of this report and associated revisions and additions to the Geologic/Geotechnical Maps, Cross Sections, Appendices, and Legend.

2.0 BACKGROUND

Geologic and geotechnical aspects of Vesting Tentative Tract Map No. 61105 (dated 12/21/06) were previously addressed in our reports dated July 22, 2004, December 22, 2004, and June 13, 2005. This report has been prepared in order to document the revisions made to VTTM 61105 for the EIR screen check.

3.0 REVISIONS VTTM 61105

3.1 General

Most of the revisions to the proposed development within and directly adjacent to the property consist of the addition, reconfiguration, or relocation of water quality basins and debris basins and addition of a building pad for a proposed fire station. Minor changes to proposed grades has occurred on portions of the site, including street and lot re-alignments where tops and toes of slopes have been shifted to accommodate the re-alignments. The most significant changes to previously proposed grades include:

- The building pad for the proposed fire station at the northeast intersection of proposed Westridge Parkway and Magic Mountain Parkway,

- The natural slope east of Park Site Lot No. 495 has been changed to a cut slope,

- The natural slope between proposed cut-slopes CS-12a and CS-11 has been changed to a cut slope.

- Proposed cut-slope CS-20 has increased from 60 ft to 110 ft in height.

Pertinent cross sections have been updated to illustrate and evaluate the revised grades. One new cross section (52-52') was prepared for use in evaluation of the revised grades.

Three map sheets (Sheets 10, 11, and 12) have been added to the VTTM by Psomas, increasing the total number of map sheets from 9 to 12. Sheet 10 illustrates the large lot conveyance layout. Sheets 11 and 12 illustrate proposed grading associated with the offsite sewage system and utility corridor.

3.2 Cut Slopes (Revisions and Additions)

3.2.1 Old and Revised Cut-Slopes CS-53 and CS-54

Previously proposed cut-slopes CS-53 and CS-54 located at the northwestern intersection of The Old Road and Magic Mountain Parkway have been omitted due to the grading operations that occurred at these locations for Parcel Map 18654. The manufactured slope that now exists in this area was addressed in our Observation and Testing report for PM 18654.

The new proposed 2:1 (h:v) cut-slopes CS-53 and CS-54 occur on Sheets 5 and 7, of 12 respectively. The area of these two cut slopes was previously proposed to be natural slopes.

New cut-slope CS-53 is located east of Park Lot No. 495 and has been integrated into the surrounding east facing 2:1 (h:v) fill slopes. Cut-slope CS-53, which is proposed to have a gradient of 2:1 (h:v) and a maximum height of 70 ft, is considered to be grossly stable. Due to its fill over cut configuration, a stability fill is recommended for cut-slope CS-53, as shown on the attached Geologic/Geotechnical Remediation Maps.

New cut-slope CS-54 is located south of Condominium Lot No. 424 at the southern property line. Cut-slope CS-54, which is proposed to have a gradient of 2:1 (h:v) and a maximum height of 40 ft, is considered to be grossly stable. Bedding of the lower

Saugus Formation is expected to be dip steeply (45°) into the slope face. The lower portion of cut-slope CS-54 will form a side wall of one of the proposed debris basins. Shear strength of the lower Saugus Formation bedrock (TQs_l) is expected to be greater than the shear strength of Certified Fill. Certified Fill was used in our stability analysis of the critical debris basin configuration in our previous reports.

3.2.2 Revised Cut-slopes CS-11 and CS-12a

Proposed 2:1 (h:v) cut-slopes CS-11 and CS-12a which occur on Sheet 7 of 12 have been revised so that they now join in an area previously designated as a natural slope. Removal operations for landslide Qls-III will undercut portions of CS-11 and CS-12a and necessitate a stability fill. We have revised the Geologic/Geotechnical Remediation Maps to show the recommended stability fill at this location. Cut-slopes CS-11 and CS-12a are considered to be grossly stable.

3.2.3 Revised Cut-slope CS-20

Proposed 2:1 (h:v) cut-slope CS-20 located east of commerce Center Drive/Bridge (see Sheet 3 of 12) has been increased from 60 ft to 110 ft in height with a 20-ft wide mid-height bench. This slope is expected to expose steeply dipping Saugus Formation bedrock (80°) that strikes oblique to nearly perpendicular to the proposed cut slope face. Revised cut-slope CS-20 is considered to be grossly stable.

3.3 Water Quality and Debris Basins (Additions and Revisions)

Two of the Water Quality Basins have been significantly revised and/or relocated in the revised VTTM. Four debris basins have been added to Revised VTTM 61105.

The proposed Water Quality Basin in Lot 352 (see Sheet 6 of 12 of the VTTM) has been expanded and a portion of the basin is located adjacent to a natural slope that will have building pads above it. Cross section 52-52’ was constructed in order to illustrate the revised condition. Based on stability calculations performed for cross section 52-52’, the natural slope will be grossly stable following construction of the Water Quality Basin.

The Water Quality Basin, previously proposed north of the intersection of Westridge Parkway and Magic Mountain Parkway, has been omitted and “replaced” with a basin

between Magic Mountain Theme Park and Open Space Lot 575 (see Sheet 3 of 12 of the VTTM). This area is located within VTTM 53295 and has been irrigated in the past for agriculture purposes. Ground water levels at the proposed basin site are currently being investigated. If ground water exists above the proposed elevation of the bottom of this basin, the impact of ground water on the proposed basin will have to be evaluated and mitigations developed, as required. Potential measures for mitigating potential impacts of groundwater on the basin include construction of a gravel blanket or a subdrain system beneath the basin.

Two proposed debris basins have been added within the property line of VTTM 61105, on Lot Numbers 607 and 413 on Sheets 3 and 6 of 12, respectively. Two proposed debris basins have been added south of the proposed Magic Mountain Parkway Extension as shown on Sheet 8 of 12 of the VTTM.

For planning purposes, it should be assumed that all of the basin side slopes will be removed and replaced with compacted fill, except at proposed new cut-slope CS-54. The rapid drawdown analyses presented in our report dated 7/22/04 represent a more critical condition than the six basin configurations proposed in the revised VTTM and exceed the minimum slope stability requirements of the County of Los Angeles.

3.4 Proposed Grading Shown on Sheets 11 and 12 of 12 of the Revised VTTM

The proposed grading shown on the northwestern most portion of Sheet 11 of 12 of the VTTM is associated with the Water Reclamation Plant and is addressed under separate cover. The remainder of the proposed grading shown on Sheets 11 and 12 of 12 of the VTTM consists of minor cutting and filling (predominately within Quaternary Alluvium deposits, Qal and Qoa), needed to provide a graded easement for the sewage lines and utility corridor. This portion of the corridor runs south of State Route Highway 126 (SR-126) from near the Ventura County line at its west end to Castaic Creek at its east end. Geologic contacts and units along this corridor are shown on the attached “Geologic Maps for EIR Screen Check Purposes” (Plates B-14 and B-15). Detailed geologic descriptions of these units are provided in our report for VTTM 53108. A feasibility investigation for the utility corridor is currently being performed by our firm.

Most of the proposed slopes for the proposed utility corridor are fill slopes, all of which are less than 30 ft in height and have a gradient of 2:1 (h:v) or flatter. Most of the fill for these slopes is expected to be granular soil obtained from the proposed borrow site shown

on the attached maps, which is located within the area of VTTM 53108. It is anticipated that gross and surficial stability of 2:1 (h:v) fill slopes composed of compacted fill obtained from the borrow site will be satisfactory. However, if surficial stability of these slopes is later determined to not be satisfactory, stability of the slopes can be mitigated using stability fills, flattening of the slopes, or by use of mechanically stabilized earth.

Two cut slopes are proposed within the referenced portion of the utility corridor and are shown on Sheet 12 of 12, on the upper part of the sheet. The proposed cut slope located at the upper left of the sheet has a gradient of 2:1 (h:v) and is about 50 ft in height. The proposed cut slope located to the east of this slope has a gradient of 2:1 (h:v) and is about 10 ft in height. Both cut slopes are proposed adjacent to State Route SR-126. Stability of these cut slopes, which will expose potentially unstable, daylighted bedding of Pico Formation bedrock that dips 16° to the south, will need to be evaluated in order to decide if the slopes can be stabilized by means of buttressing. If it is not practical to stabilize the slopes using a buttress, remedial measures such as flattening of the gradient of the cut slopes or avoidance will be required. These remedial measures, if required, will need to be compatible with the support of adjacent State Route SR-126. If portions of these two cut slopes expose alluvial soils that are prone to erosion and/or surficial instability, stability of the slopes will need to be mitigated by removal and replacement with stability fills, mechanically stabilized earth, or redesigned to flatter gradients. Locations of these proposed cut slopes are shown on the attached Geologic Maps (**Plate B-15**). The remainder of the slopes shown for the referenced portion of the utility corridor are planned to be fill slopes.

3.5 Removals Within Proposed Utility Corridor

This section of the report presents our preliminary evaluation of grading required for the proposed utility corridor, but does not address design level aspects associated with the specific utilities. Recommendations related to the utility pipelines will be addressed in a later phase of project planning/design.

Coarse-grained alluvial deposits underlie substantial portions of sites located adjacent to the proposed utility corridor that have been previously explored by this firm. Removals previously recommended at these sites for mitigation of hydroconsolidation and liquefaction potentials ranged from about 5 ft to 25 ft beneath existing grade and extended as much as 5 ft beneath the groundwater surface.

A liquefaction potential assessment was not performed for preparation of this report. However, based on our experience at sites adjacent to the proposed utility corridor, required removals in the proposed utility corridor are also anticipated to vary between 5 ft and 25 ft beneath existing ground surface and may locally intercept the groundwater surface. However, if flexible conduits that can withstand the settlement associated with potential liquefaction are used, it may be possible to use shallower removals.

3.6 Del Valle Fault

The concealed Del Valle fault projects under the proposed utility corridor and is oriented perpendicular to it. Evidence for late Quaternary offset was observed along this fault on the adjacent Homestead site (VTTM 060678). Therefore, a building setback was established for this fault by our firm during our evaluation of VTTM 060678. The Del Valle fault and the associated building setback are shown on the attached Geologic Map **Plate B-14**. Pipelines that will cross this setback zone should be designed to accommodate some flexure. It would be prudent to deepen removals at locations where pipelines will cross the setback zone. Likewise, shut-off valves should be incorporated in pertinent pipelines at locations outside of the setback zone. Special design considerations for gravity flow utilities should be evaluated at the design phase.

4.0 OIL WELL INVENTORY

4.1 Sheets 3 to 8 of 12 of the Revised VTTM

Subsequent to our prior reports, the oil well locations within and immediately adjacent to VTTM 61105 and proposed grading shown on Sheets 3 to 8 of 12 of the VTTM were physically located in the field by others and surveyed by PSOMAS. The surveyed locations of these oil wells are shown on Sheets 3 to 8 of the revised VTTM. For reference, 47 oil wells have been verified and surveyed within the property line of VTTM 61105 and four oil wells have been verified and surveyed in close proximity to the grading footprint for VTTM 61105 shown on Sheets 3 to 8 of 12 of the VTTM.

4.2 Sheets 11 and 12 of 12 of the Revised VTTM

We have shown the approximate locations of six oil wells in the area of topographic coverage shown on Sheets 11 and 12 of 12 (utility corridor). These preliminary locations were obtained from the Division of Oil, Gas, and Geothermal Resources (DOGGR) Map

No. 253. Four of these wells appear to be outside of the area that will be impacted by proposed grading for the utility corridor. Two of these wells appear to be within or very near the area of the proposed borrow site for the utility corridor. The locations and abandonment status of these oil wells need to be verified.

A complete inventory of the oil wells discussed above is attached in Appendix C. This revised inventory supercedes our previous oil well inventories.

5.0 GENERAL CONCLUSIONS AND RECOMMENDATIONS

5.1 Feasibility of Development

The proposed development shown on Revised Tentative Tract Map No. 61105 (dated 12/21/06) is feasible from the standpoint of geologic/geotechnical conditions, provided that our recommendations are incorporated in design and implemented during construction. The conclusions and recommendations presented in our previous reports are still applicable, except where they are superseded in this report.

6.0 GEOLOGIST/GEOTECHNICAL ENGINEER OF RECORD

This report has been prepared assuming that Allan E. Seward Engineering Geology, Inc. will refine all geologic and geotechnical data for the Grading Plan stage. If these tasks are performed by another party, that party must review this report, assume full responsibility for recommendations contained herein, and assume the title and responsibility of "Geologist/Geotechnical Engineer of Record" for the specific work.

A representative of the Geologist/Geotechnical Engineer of Record shall be present to observe all grading operations. A report that presents results of these observations and related testing shall be issued at the end of grading operations using an As-Built Map as a base.

7.0 LIMITATIONS

This report has been prepared by Allan E. Seward Engineering Geology, Inc. for the exclusive use of The Newhall Land and Farming Company and its design consultants for the specific site discussed herein. This report should not be considered transferable. Prior to use

by others, this firm must be notified, as additional work may be required to update this report.

In the event that any modification in the location or design of the proposed development is planned, the conclusions and recommendations contained in this report will require a written review by this firm with respect to the planned modifications.

The proposed development is located in southern California, a geologically and tectonically active region, where large magnitude, potentially destructive earthquakes are common. Therefore, ground motions from moderate or large magnitude earthquakes could affect the project site during the design life of the proposed structure(s).

Typically, faulting is confined to the area adjacent to a known fault. However, absolute assurance against future fault displacement is not possible in tectonically active regions because new faults can form over time as the orientation and magnitude of deformational forces change in the earth's crust. Therefore, the location and magnitude of new ground surface ruptures during a seismic event cannot be anticipated.

In performing these professional services, this firm has used the degree of care and skill ordinarily exercised under similar circumstances by reputable geologists and geotechnical engineers practicing in this or similar localities. The data presented in this report are based on results of pertinent field and laboratory testing. It should be recognized that subsurface conditions can vary in time, and laterally, and with depth at a given site. Since the conclusions and recommendations presented in this report are based on our observations and testing, our **conclusions** and **recommendations** are **professional opinions** and are **not meant** to be a control of nature. Therefore, we make no other **warranty** either **expressed** or **implied**.

This report may not be duplicated without the written consent of this firm.

This opportunity to be of service is appreciated. Please contact us if you would like to discuss this report further.

Respectfully submitted,

Stuart Mayes, CEG 2169
Senior Associate Geologist

Martin J. Goodman, GE 2146
Principal Geotechnical Engineer

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The following attachments and appendices complete this report.

References

APPENDIX A – SLOPE STABILITY

Slope Stability Analyses Results	**Table A1**
Slope Stability Calculation Sheets	

APPENDIX B - MAPS AND CROSS SECTIONS

- **Maps** (In pockets)

Overview Map (1"=300')	**Plate**	**B-1**
Geologic/Geotechnical Maps (1"=100')	**Plates**	**B-2 through B-7**
Geologic/Geotechnical Remediation Maps (1"=100')	**Plates**	**B-8 through B-13**
Geologic Map for EIR Purposes (Sheets 11 and 12)	**Plates**	**B 14 and B15**
Geologic/Geotechnical Maps Legend	**Plate**	**B-16**

- **Cross Sections** (In pockets)

Revised Geologic Cross Sections 18-18', 19-19', 25-25', 34-34', 38-38', 39-39', 10E-10E', 11E-11E', 12E-12E', 14E-14E', 15E-15E', 4M-4M', 6M-6M', and 7M-7M'		
New Geologic Cross Section 52-52' (in Pocket)	**Plate**	**B-17**

APPENDIX C – OIL WELL INVENTORY

Distribution: (1) The Newhall Land and Farming Company
Attn: Mr. Corey Harpole
(1) Psomas
Attn: Mr. Matt Heideman
(1) Impact Sciences
Attn: Ms. Susan Tebo
(1) Getzke, Dillon & Ballance, LLP
Attn: Ms. Rachel C. Cook

REFERENCES

Reports by Allan E. Seward Engineering Geology, Inc.

1. **Geologic and Geotechnical Report**
Review of Vesting Tentative Tract Map (Dated June 14, 2004)
Vesting Tentative Tract 61105
Mesas East
Newhall Ranch, California
Dated July 22, 2004 - JN: 04-2023-4

2. **Geologic and Geotechnical Report – Addendum No. 1**
Response to Los Angeles County Geologic Review Sheet Dated October 21, 2004 and Soils Engineering Review Sheet Dated October 26, 2004
Geologic and Geotechnical Report
Review of Revised Vesting Tentative Tract Map (November 15, 2004)
Vesting Tentative Tract 61105
Mission Village
Newhall Ranch, California
Dated December 22, 2004 - JN: 04-2023-4

3. **Geologic and Geotechnical Report – Addendum No. 2**
Response to Los Angeles County Geologic Review Sheet dated January 26, 2005 And Soils Engineering Review Sheet dated February 22, 2005
Geologic and Geotechnical Report
Review of Revised Vesting Tentative Tract Map (dated 6/1/05)
Vesting Tentative Tract 61105
Mission Village
Newhall Ranch, California
Dated: June 13, 2005 – JN: 05-2023-4

APPENDIX A

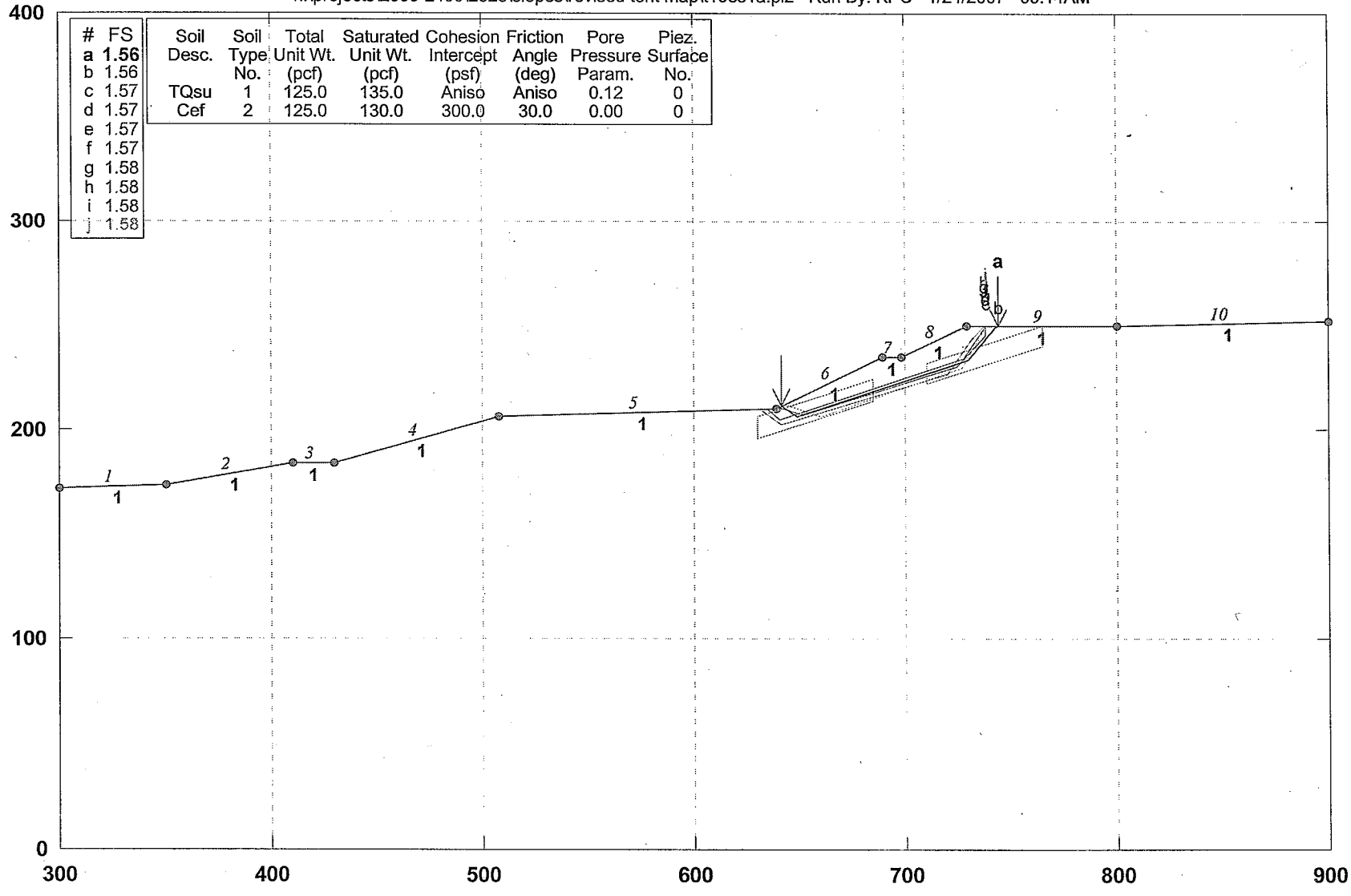
SLOPE STABILITY ANALYSES RESULTS

Cross Section	File Name	Slope Designation	Analyzed Plane	Method	Factor of Safety[1]		Comments	Run No.
					Static	Pseudostatic (Coeff = 0.15g)		
10E-10E′	T10ES1A T10EPS1A	CS-12c	Bedding plane	Janbu	1.56	1.14	Minimum factor of safety. Stability fill recommended for daylighted bedding conditions.	1 2
34-34′	T34S1A T34PS1A	Natural	Circular	Modified Bishop	1.52	1.34	Minimum factor of safety.	3 4
52-52′	T52S1A	Natural	Circular	Modified Bishop	2.01	-	Minimum factor of safety. Pseudostatic is not critical and therefore not performed.	5

[1] Residual shear strength values used for static loading and peak shear strength values were used for pseudo-static earthquake loadings.

Mesas East, x-sec 10E-10E'; CS-12c; bedding plane; static

n:\projects\2000-2499\2023\slopes\revised tent map\t10es1a.pl2 Run By: KPC 1/24/2007 09:14AM



GSTABL7 v.2 FSmin=1.56

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

GSTABL7

Run No. 1

```
                    ***  GSTABL7  ***
              ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.003, June 2002 **
              (All Rights Reserved-Unauthorized Use Prohibited)
*******************************************************************************
                    SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
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Time of Run:              09:14AM
Run By:                   KPC
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Unit System:              English
Plotted Output Filename:  N:\Projects\2000-2499\2023\Slopevised Tent Map\t10es1a.PLT
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                      bedding plane; static
BOUNDARY COORDINATES
     Note: User origin value specified.
     Add 300.00 to X-values and 0.00 to Y-values listed.

   10 Top   Boundaries
   10 Total Boundaries
Boundary     X-Left     Y-Left     X-Right    Y-Right    Soil Type
   No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
    1        300.00     172.00     350.00     173.00        1
    2        350.00     173.00     410.00     184.00        1
    3        410.00     184.00     430.00     184.00        1
    4        430.00     184.00     508.00     206.00        1
    5        508.00     206.00     639.00     210.00        1
    6        639.00     210.00     689.00     235.00        1
    7        689.00     235.00     698.00     235.00        1
    8        698.00     235.00     729.00     250.00        1
    9        729.00     250.00     800.00     250.00        1
   10        800.00     250.00     900.00     252.00        1
Default Y-Origin = 0.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
  2 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
 No.  (pcf)    (pcf)     (psf)     (deg)   Param.   (psf)     No.
  1   125.0    135.0     300.0     31.0    0.12      0.0      0
  2   125.0    130.0     300.0     30.0    0.00      0.0      0
ANISOTROPIC STRENGTH PARAMETERS
     1 soil type(s)
Soil Type  1 Is Anisotropic
Number Of Direction Ranges Specified =  3
Direction    Counterclockwise     Cohesion     Friction
  Range       Direction Limit    Intercept      Angle
   No.            (deg)            (psf)        (deg)
    1             16.5             300.00       31.00
    2             19.5             200.00       20.00
    3             90.0             300.00       31.00
ANISOTROPIC SOIL NOTES:
   (1) An input value of 0.01 for C and/or Phi will cause Aniso
       C and/or Phi to be ignored in that range.
   (2) An input value of 0.02 for Phi will set both Phi and
       C equal to zero, with no water weight in the tension crack.
   (3) An input value of 0.03 for Phi will set both Phi and
       C equal to zero, with water weight in the tension crack.
```

Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.
1000 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 20.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	630.00	201.00	685.00	219.00	10.00
2	710.00	227.00	765.00	245.00	10.00

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Simplified Janbu Method * *
Total Number of Trial Surfaces Evaluated = 1000
Statistical Data On All Valid FS Values:
FS Max = 5.345 FS Min = 1.555 FS Ave = 2.362
Standard Deviation = 0.482 Coefficient of Variation = 20.41 %
Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	641.27	211.13
2	648.49	206.27
3	729.96	233.59
4	742.80	248.93
5	743.81	250.00

Factor of Safety
*** 1.555 ***
Individual data on the 7 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	7.2	3821.0	0.0	552.8	0.	0.	0.0	0.0	0.0
2	40.5	59790.7	0.0	7567.4	0.	0.	0.0	0.0	0.0
3	9.0	15338.6	0.0	1941.3	0.	0.	0.0	0.0	0.0
4	31.0	55910.6	0.0	7076.4	0.	0.	0.0	0.0	0.0
5	1.0	1996.0	0.0	252.6	0.	0.	0.0	0.0	0.0
6	12.8	14028.6	0.0	2622.3	0.	0.	0.0	0.0	0.0
7	1.0	67.6	0.0	11.9	0.	0.	0.0	0.0	0.0

Mesas East, x-sec 10E-10E'; CS-12c; bedding plane; pseudo

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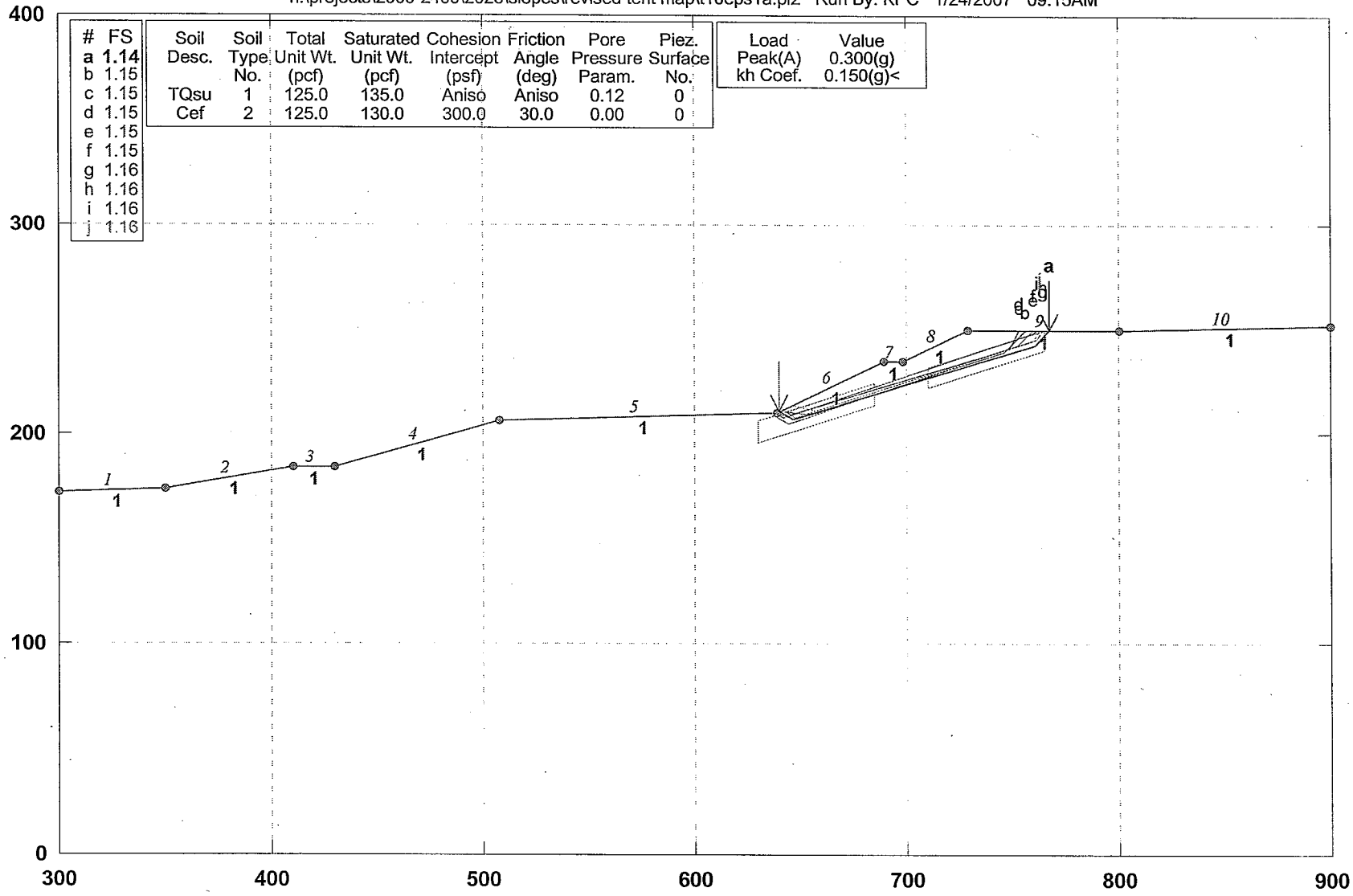

GSTABL7 v.2 FSmin=1.14

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

GSTABL7

Run No. 2

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                    ***  GSTABL7  ***
              ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.003, June 2002 **
              (All Rights Reserved-Unauthorized Use Prohibited)
*******************************************************************************
                    SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
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Time of Run:              09:15AM
Run By:                   KPC
Input Data Filename:      N:\Projects\2000-2499\2023\Slopes\Revised Tent Map\t10epsla.in
Output Filename:          N:\Projects\2000-2499\2023\Slopes\Revised Tent Map\t10epsla.OUT
Unit System:              English
Plotted Output Filename:  N:\Projects\2000-2499\2023\Slopevised Tent Map\t10epsla.PLT
PROBLEM DESCRIPTION:  Mesas East, x-sec 10E-10E'; CS-12c;
                      bedding plane; pseudo
BOUNDARY COORDINATES
   10 Top   Boundaries
   10 Total Boundaries
Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
   No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
    1        300.00     172.00     350.00     173.00        1
    2        350.00     173.00     410.00     184.00        1
    3        410.00     184.00     430.00     184.00        1
    4        430.00     184.00     508.00     206.00        1
    5        508.00     206.00     639.00     210.00        1
    6        639.00     210.00     689.00     235.00        1
    7        689.00     235.00     698.00     235.00        1
    8        698.00     235.00     729.00     250.00        1
    9        729.00     250.00     800.00     250.00        1
   10        800.00     250.00     900.00     252.00        1
Default Y-Origin = 0.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
  2 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
 No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
  1   125.0    135.0     400.0     38.0     0.12      0.0      0
  2   125.0    130.0     300.0     30.0     0.00      0.0      0
ANISOTROPIC STRENGTH PARAMETERS
     1 soil type(s)
Soil Type  1 Is Anisotropic
Number Of Direction Ranges Specified =  3
Direction    Counterclockwise     Cohesion     Friction
  Range       Direction Limit    Intercept      Angle
   No.            (deg)            (psf)        (deg)
    1             16.5             400.00        38.00
    2             19.5             200.00        20.00
    3             90.0             400.00        38.00
ANISOTROPIC SOIL NOTES:
   (1) An input value of 0.01 for C and/or Phi will cause Aniso
       C and/or Phi to be ignored in that range.
   (2) An input value of 0.02 for Phi will set both Phi and
       C equal to zero, with no water weight in the tension crack.
   (3) An input value of 0.03 for Phi will set both Phi and
       C equal to zero, with water weight in the tension crack.
Specified Peak Ground Acceleration Coefficient (A) =   0.300(g)
Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
```

Specified Seismic Pore-Pressure Factor = 0.000
Janbus Empirical Coef is being used for the case of c & phi both > 0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.
1000 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 20.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	630.00	201.00	685.00	219.00	10.00
2	710.00	227.00	765.00	245.00	10.00

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Simplified Janbu Method * *
Total Number of Trial Surfaces Evaluated = 1000
Statistical Data On All Valid FS Values:
FS Max = 3.816 FS Min = 1.136 FS Ave = 1.994
Standard Deviation = 0.501 Coefficient of Variation = 25.15 %
Failure Surface Specified By 4 Coordinate Points

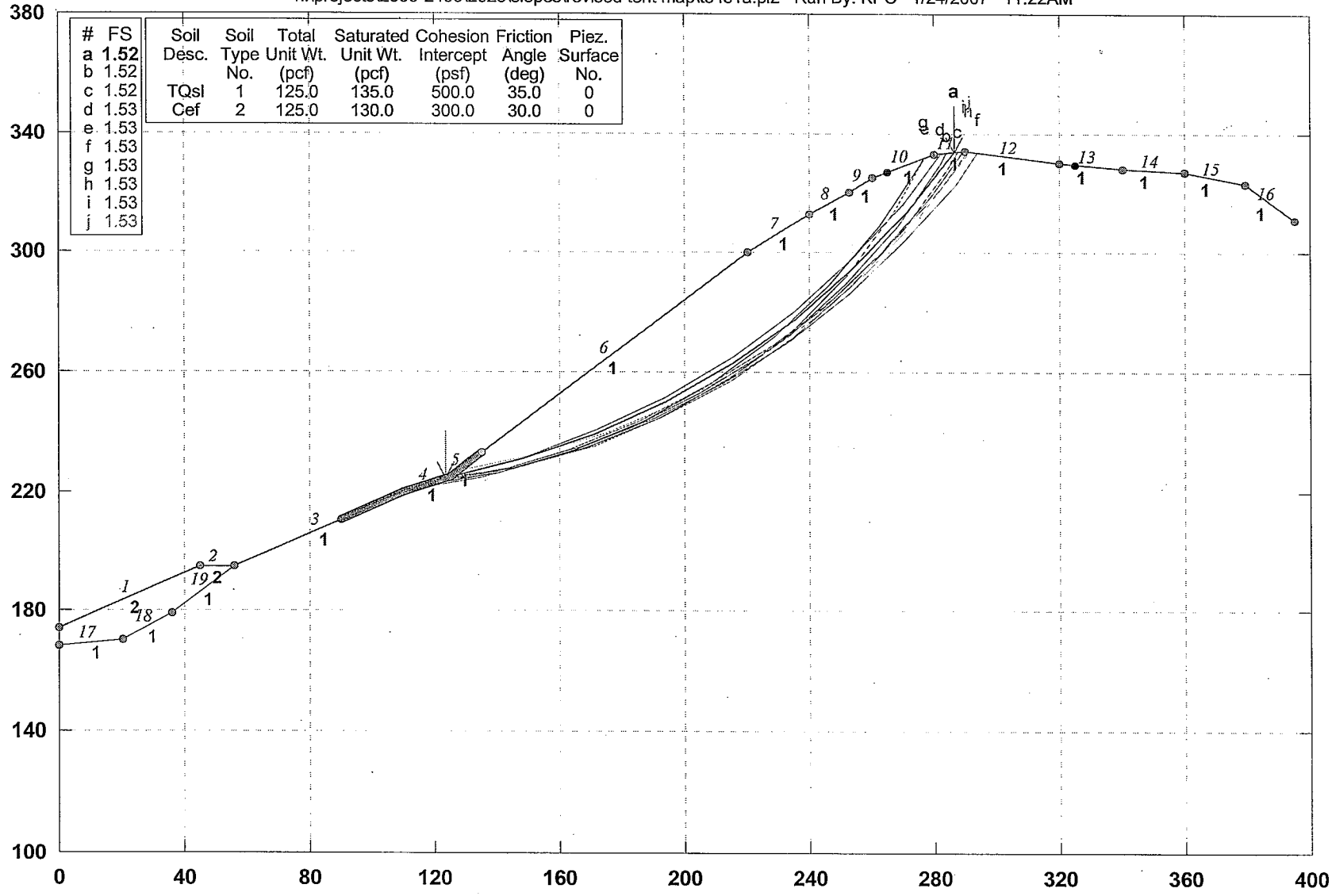
Point No.	X-Surf (ft)	Y-Surf (ft)
1	639.94	210.47
2	646.86	206.82
3	760.46	242.45
4	767.02	250.00

Factor of Safety
*** 1.136 ***
Individual data on the 6 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	6.9	3073.4	0.0	417.0	0.	0.	461.0	0.0	0.0
2	42.1	58126.1	0.0	7310.1	0.	0.	8718.9	0.0	0.0
3	9.0	15245.5	0.0	1917.3	0.	0.	2286.8	0.0	0.0
4	31.0	57271.4	0.0	7202.6	0.	0.	8590.7	0.0	0.0
5	31.5	49100.1	0.0	6174.9	0.	0.	7365.0	0.0	0.0
6	6.6	3097.7	0.0	566.9	0.	0.	464.7	0.0	0.0

Mesas East, x-sec 34-34' ; static; circular; natural slope

n:\projects\2000-2499\2023\slopes\revised tent map\t34s1a.pl2 Run By: KPC 1/24/2007 11:22AM



#	FS
a	1.52
b	1.52
c	1.52
d	1.53
e	1.53
f	1.53
g	1.53
h	1.53
i	1.53
j	1.53

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
TQsl	1	125.0	135.0	500.0	35.0	0
Cef	2	125.0	130.0	300.0	30.0	0

GSTABL7 v.2 FSmin=1.52

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Run No. 3

```
                    ***  GSTABL7  ***
              ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.003, June 2002 **
              (All Rights Reserved-Unauthorized Use Prohibited)
*****************************************************************************
                    SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*****************************************************************************
Analysis Run Date:        1/24/2007
Time of Run:              11:22AM
Run By:                   KPC
Input Data Filename:      N:\Projects\2000-2499\2023\Slopes\Revised Tent Map\t34s1a.in
Output Filename:          N:\Projects\2000-2499\2023\Slopes\Revised Tent Map\t34s1a.OUT
Unit System:              English
Plotted Output Filename:  N:\Projects\2000-2499\2023\Slopevised Tent Map\t34s1a.PLT
PROBLEM DESCRIPTION:  Mesas East, x-sec 34-34' ; static;
                      circular; natural slope
BOUNDARY COORDINATES
   16 Top   Boundaries
   19 Total Boundaries
Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
   No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
    1         0.00     174.00      45.00     195.00        2
    2        45.00     195.00      56.00     195.00        2
    3        56.00     195.00     110.00     220.00        1
    4       110.00     220.00     125.00     225.00        1
    5       125.00     225.00     131.00     230.00        1
    6       131.00     230.00     220.00     300.00        1
    7       220.00     300.00     240.00     313.00        1
    8       240.00     313.00     253.00     320.00        1
    9       253.00     320.00     260.00     325.00        1
   10       260.00     325.00     280.00     333.00        1
   11       280.00     333.00     290.00     334.00        1
   12       290.00     334.00     320.00     330.00        1
   13       320.00     330.00     340.00     328.00        1
   14       340.00     328.00     360.00     327.00        1
   15       360.00     327.00     379.00     323.00        1
   16       379.00     323.00     395.00     311.00        1
   17         0.00     168.00      20.00     170.00        1
   18        20.00     170.00      36.00     179.00        1
   19        36.00     179.00      56.00     195.00        1
User Specified Y-Origin =       100.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
 2 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
 No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
  1   125.0    135.0     500.0     35.0    0.00       0.0      0
  2   125.0    130.0     300.0     30.0    0.00       0.0      0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
1000 Trial Surfaces Have Been Generated.
  10 Surface(s) Initiate(s) From Each Of   100 Points Equally Spaced
Along The Ground Surface Between  X =  90.00(ft)
                              and  X = 135.00(ft)
Each Surface Terminates Between   X = 265.00(ft)
                              and  X = 325.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =      0.00(ft)
25.00(ft) Line Segments Define Each Trial Failure Surface.
```

Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -45.0
And 25.0 deg.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Evaluated = 1000
Statistical Data On All Valid FS Values:
FS Max = 2.789 FS Min = 1.523 FS Ave = 1.904
Standard Deviation = 0.277 Coefficient of Variation = 14.55 %
Failure Surface Specified By 10 Coordinate Points

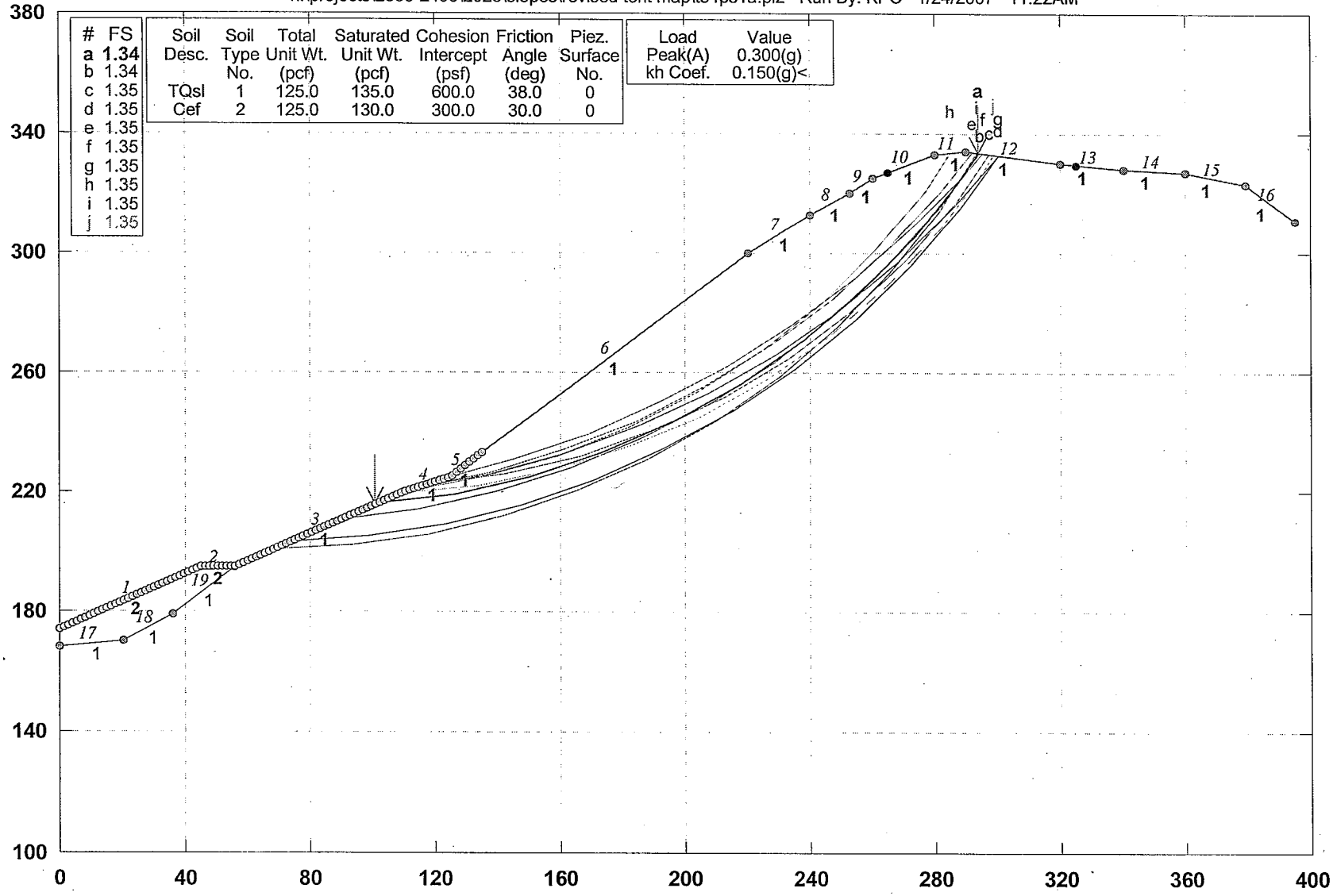
Point No.	X-Surf (ft)	Y-Surf (ft)
1	123.64	224.55
2	147.84	230.81
3	171.33	239.37
4	193.89	250.14
5	215.31	263.02
6	235.40	277.90
7	253.97	294.64
8	270.85	313.08
9	285.89	333.06
10	286.23	333.62

Circle Center At X = 70.64 ; Y = 479.27 ; and Radius = 260.18
Factor of Safety
*** 1.523 ***
Individual data on the 16 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	1.4	8.7	0.0	0.0	0.	0.	0.0	0.0	0.0
2	6.0	1368.7	0.0	0.0	0.	0.	0.0	0.0	0.0
3	16.8	16819.1	0.0	0.0	0.	0.	0.0	0.0	0.0
4	23.5	51067.4	0.0	0.0	0.	0.	0.0	0.0	0.0
5	22.6	72866.9	0.0	0.0	0.	0.	0.0	0.0	0.0
6	21.4	83844.1	0.0	0.0	0.	0.	0.0	0.0	0.0
7	4.7	19565.6	0.0	0.0	0.	0.	0.0	0.0	0.0
8	15.4	63169.1	0.0	0.0	0.	0.	0.0	0.0	0.0
9	4.6	18118.3	0.0	0.0	0.	0.	0.0	0.0	0.0
10	13.0	46469.0	0.0	0.0	0.	0.	0.0	0.0	0.0
11	1.0	3181.9	0.0	0.0	0.	0.	0.0	0.0	0.0
12	6.0	18769.4	0.0	0.0	0.	0.	0.0	0.0	0.0
13	10.9	27157.6	0.0	0.0	0.	0.	0.0	0.0	0.0
14	9.1	13735.1	0.0	0.0	0.	0.	0.0	0.0	0.0
15	5.9	3052.9	0.0	0.0	0.	0.	0.0	0.0	0.0
16	0.3	11.6	0.0	0.0	0.	0.	0.0	0.0	0.0

Mesas East, x-sec 34-34' ; pseudo; circular; natural slope

n:\projects\2000-2499\2023\slopes\revised tent map\t34ps1a.pl2 Run By: KPC 1/24/2007 11:22AM



#	FS
a	**1.34**
b	1.34
c	1.35
d	1.35
e	1.35
f	1.35
g	1.35
h	1.35
i	1.35
j	1.35

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
TQsl	1	125.0	135.0	600.0	38.0	0
Cef	2	125.0	130.0	300.0	30.0	0

Load	Value
Peak(A)	0.300(g)
kh Coef.	0.150(g)<

GSTABL7 v.2 FSmin=1.34

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Run No. 4

```
                    ***  GSTABL7  ***
              ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.003, June 2002 **
              (All Rights Reserved-Unauthorized Use Prohibited)
*******************************************************************************
                    SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*******************************************************************************
Analysis Run Date:        1/24/2007
Time of Run:              11:22AM
Run By:                   KPC
Input Data Filename:      N:\Projects\2000-2499\2023\Slopes\Revised Tent Map\t34ps1a.in
Output Filename:          N:\Projects\2000-2499\2023\Slopes\Revised Tent Map\t34ps1a.OUT
Unit System:              English
Plotted Output Filename:  N:\Projects\2000-2499\2023\Slopevised Tent Map\t34ps1a.PLT
PROBLEM DESCRIPTION:  Mesas East, x-sec 34-34' ; pseudo;
                      circular; natural slope
BOUNDARY COORDINATES
   16 Top   Boundaries
   19 Total Boundaries
Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
   No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
    1         0.00     174.00      45.00     195.00        2
    2        45.00     195.00      56.00     195.00        2
    3        56.00     195.00     110.00     220.00        1
    4       110.00     220.00     125.00     225.00        1
    5       125.00     225.00     131.00     230.00        1
    6       131.00     230.00     220.00     300.00        1
    7       220.00     300.00     240.00     313.00        1
    8       240.00     313.00     253.00     320.00        1
    9       253.00     320.00     260.00     325.00        1
   10       260.00     325.00     280.00     333.00        1
   11       280.00     333.00     290.00     334.00        1
   12       290.00     334.00     320.00     330.00        1
   13       320.00     330.00     340.00     328.00        1
   14       340.00     328.00     360.00     327.00        1
   15       360.00     327.00     379.00     323.00        1
   16       379.00     323.00     395.00     311.00        1
   17         0.00     168.00      20.00     170.00        1
   18        20.00     170.00      36.00     179.00        1
   19        36.00     179.00      56.00     195.00        1
User Specified Y-Origin =       100.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
 2 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
 No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
  1   125.0    135.0     600.0     38.0    0.00       0.0      0
  2   125.0    130.0     300.0     30.0    0.00       0.0      0
Specified Peak Ground Acceleration Coefficient (A) =   0.300(g)
Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
Specified Seismic Pore-Pressure Factor =   0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
1000 Trial Surfaces Have Been Generated.
  10 Surface(s) Initiate(s) From Each Of   100 Points Equally Spaced
Along The Ground Surface Between  X =   0.00(ft)
                              and  X = 135.00(ft)
Each Surface Terminates Between   X = 265.00(ft)
```

and X = 325.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
25.00(ft) Line Segments Define Each Trial Failure Surface.
Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -45.0
And 25.0 deg.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Evaluated = 1000
Statistical Data On All Valid FS Values:
FS Max = 2.452 FS Min = 1.342 FS Ave = 1.654
Standard Deviation = 0.233 Coefficient of Variation = 14.07 %
Failure Surface Specified By 11 Coordinate Points

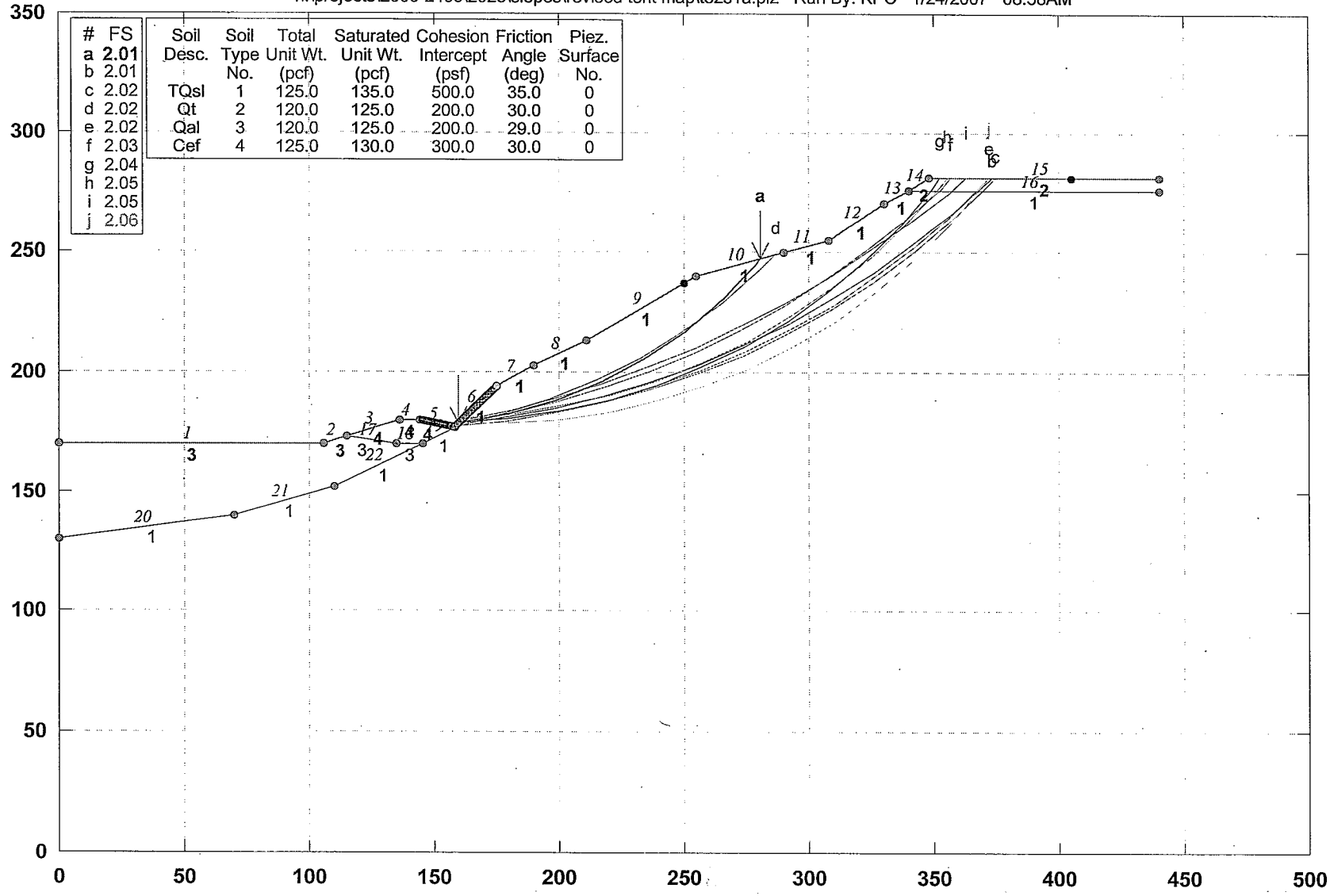
Point No.	X-Surf (ft)	Y-Surf (ft)
1	100.91	215.79
2	125.68	219.19
3	149.99	224.99
4	173.63	233.15
5	196.35	243.58
6	217.94	256.18
7	238.19	270.84
8	256.91	287.41
9	273.92	305.73
10	289.06	325.62
11	293.90	333.48

Circle Center At X = 78.65 ; Y = 469.99 ; and Radius = 255.17
Factor of Safety
*** 1.342 ***
Individual data on the 19 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	9.1	1682.7	0.0	0.0	0.	0.	252.4	0.0	0.0
2	15.0	8311.2	0.0	0.0	0.	0.	1246.7	0.0	0.0
3	0.7	519.7	0.0	0.0	0.	0.	78.0	0.0	0.0
4	5.3	5294.6	0.0	0.0	0.	0.	794.2	0.0	0.0
5	19.0	35001.6	0.0	0.0	0.	0.	5250.2	0.0	0.0
6	23.6	74320.9	0.0	0.0	0.	0.	11148.1	0.0	0.0
7	22.7	96829.2	0.0	0.0	0.	0.	14524.4	0.0	0.0
8	21.6	107961.5	0.0	0.0	0.	0.	16194.2	0.0	0.0
9	2.1	10899.3	0.0	0.0	0.	0.	1634.9	0.0	0.0
10	18.2	94708.6	0.0	0.0	0.	0.	14206.3	0.0	0.0
11	1.8	9223.1	0.0	0.0	0.	0.	1383.5	0.0	0.0
12	13.0	62247.5	0.0	0.0	0.	0.	9337.1	0.0	0.0
13	3.9	17469.9	0.0	0.0	0.	0.	2620.5	0.0	0.0
14	3.1	13440.8	0.0	0.0	0.	0.	2016.1	0.0	0.0
15	13.9	51439.3	0.0	0.0	0.	0.	7715.9	0.0	0.0
16	6.1	16757.8	0.0	0.0	0.	0.	2513.7	0.0	0.0
17	9.1	15611.7	0.0	0.0	0.	0.	2341.7	0.0	0.0
18	0.9	888.3	0.0	0.0	0.	0.	133.2	0.0	0.0
19	3.9	1671.4	0.0	0.0	0.	0.	250.7	0.0	0.0

Mesas East, x-sec 52-52' ; static; circular

n:\projects\2000-2499\2023\slopes\revised tent map\t52s1a.pl2 Run By: KPC 1/24/2007 08:58AM



#	FS
a	2.01
b	2.01
c	2.02
d	2.02
e	2.02
f	2.03
g	2.04
h	2.05
i	2.05
j	2.06

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
TQsl	1	125.0	135.0	500.0	35.0	0
Qt	2	120.0	125.0	200.0	30.0	0
Qal	3	120.0	125.0	200.0	29.0	0
Cef	4	125.0	130.0	300.0	30.0	0

GSTABL7 v.2 FSmin=2.01

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Run No. 5

```
                    ***  GSTABL7  ***
              ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.003, June 2002 **
            (All Rights Reserved-Unauthorized Use Prohibited)
*****************************************************************************
                    SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*****************************************************************************
Analysis Run Date:        1/24/2007
Time of Run:              08:58AM
Run By:                   KPC
Input Data Filename:      N:\Projects\2000-2499\2023\Slopes\Revised Tent Map\t52s1a.in
Output Filename:          N:\Projects\2000-2499\2023\Slopes\Revised Tent Map\t52s1a.OUT
Unit System:              English
Plotted Output Filename:  N:\Projects\2000-2499\2023\Slopevised Tent Map\t52s1a.PLT
PROBLEM DESCRIPTION:  Mesas East, x-sec 52-52' ; static;
                      circular
BOUNDARY COORDINATES
   15 Top   Boundaries
   22 Total Boundaries
```

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	170.00	106.00	170.00	3
2	106.00	170.00	115.00	173.00	3
3	115.00	173.00	136.00	180.00	4
4	136.00	180.00	144.00	180.00	4
5	144.00	180.00	158.00	177.00	4
6	158.00	177.00	175.00	194.00	1
7	175.00	194.00	190.00	203.00	1
8	190.00	203.00	211.00	213.00	1
9	211.00	213.00	255.00	240.00	1
10	255.00	240.00	290.00	250.00	1
11	290.00	250.00	308.00	255.00	1
12	308.00	255.00	330.00	270.00	1
13	330.00	270.00	340.00	276.00	1
14	340.00	276.00	348.00	281.00	2
15	348.00	281.00	440.00	281.00	2
16	340.00	276.00	440.00	276.00	1
17	115.00	173.00	135.00	170.00	3
18	135.00	170.00	145.00	170.00	3
19	145.00	170.00	158.00	177.00	1
20	0.00	130.00	70.00	140.00	1
21	70.00	140.00	110.00	152.00	1
22	110.00	152.00	145.00	170.00	1

```
Default Y-Origin = 0.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
 4 Type(s) of Soil
```

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	135.0	500.0	35.0	0.00	0.0	0
2	120.0	125.0	200.0	30.0	0.00	0.0	0
3	120.0	125.0	200.0	29.0	0.00	0.0	0
4	125.0	130.0	300.0	30.0	0.00	0.0	0

```
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
1000 Trial Surfaces Have Been Generated.
  10 Surface(s) Initiate(s) From Each Of   100 Points Equally Spaced
Along The Ground Surface Between  X = 145.00(ft)
                                  and  X = 175.00(ft)
```

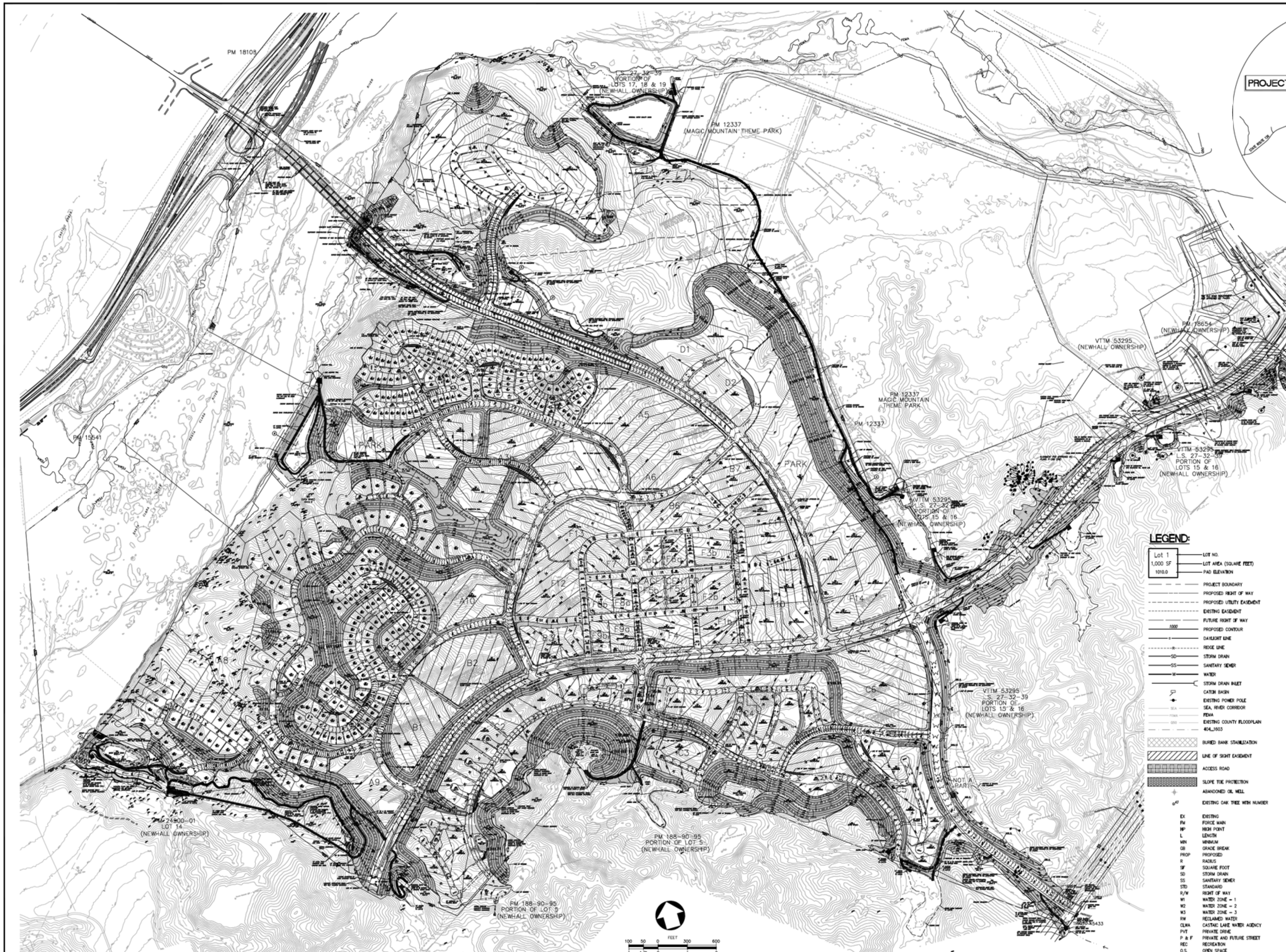
Each Surface Terminates Between X = 250.00(ft)
and X = 405.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
20.00(ft) Line Segments Define Each Trial Failure Surface.
Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -45.0
And 25.0 deg.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Evaluated = 1000
Statistical Data On All Valid FS Values:
FS Max = 4.351 FS Min = 2.008 FS Ave = 2.746
Standard Deviation = 0.423 Coefficient of Variation = 15.39 %
Failure Surface Specified By 9 Coordinate Points

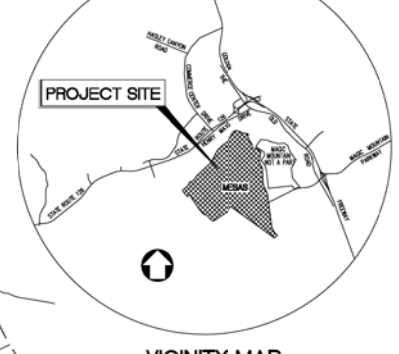
Point No.	X-Surf (ft)	Y-Surf (ft)
1	159.55	178.55
2	179.20	182.24
3	198.35	188.02
4	216.76	195.82
5	234.24	205.55
6	250.57	217.10
7	265.56	230.33
8	279.06	245.09
9	280.71	247.34

Circle Center At X = 135.01 ; Y = 363.18 ; and Radius = 186.26
Factor of Safety
*** 2.008 ***
Individual data on the 12 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	15.5	12122.1	0.0	0.0	0.	0.	0.0	0.0	0.0
2	4.2	7044.5	0.0	0.0	0.	0.	0.0	0.0	0.0
3	10.8	21449.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	8.3	19017.8	0.0	0.0	0.	0.	0.0	0.0	0.0
5	12.7	30504.1	0.0	0.0	0.	0.	0.0	0.0	0.0
6	5.8	14528.9	0.0	0.0	0.	0.	0.0	0.0	0.0
7	17.5	46329.4	0.0	0.0	0.	0.	0.0	0.0	0.0
8	16.3	42750.1	0.0	0.0	0.	0.	0.0	0.0	0.0
9	4.4	10854.0	0.0	0.0	0.	0.	0.0	0.0	0.0
10	10.6	20913.0	0.0	0.0	0.	0.	0.0	0.0	0.0
11	13.5	12197.7	0.0	0.0	0.	0.	0.0	0.0	0.0
12	1.7	183.4	0.0	0.0	0.	0.	0.0	0.0	0.0

PLATE B-1





VICINITY MAP
NOT TO SCALE

PROJECT SUMMARY:

GROSS AREA = 1252.2 Acres
TOTAL LOTS = 607
TOTAL D.U. = 5,331
EXISTING ZONING = SP (NEWHALL RANCH SPECIFIC PLAN)
PROPOSED ZONING = SP (NEWHALL RANCH SPECIFIC PLAN)
GENERAL PLAN LAND USE = SP (NEWHALL RANCH SPECIFIC PLAN)
ESTIMATED EARTHWORK = 27,000,000 CY

Lot Numbers	No. of Lots	Type (Use)	Dwelling Units	Total Acres
Area A2				
1–123	123	55'x110' SFD (6,050 sf) min.	123	26.8
124–139	16	Open Space		12.2
140–149	10	Private & Future Street		8.2
Area A3–A6				
153–154	2	A3a Condominiums	80	9.7
155–156	2	A3b Condominiums	168	13.6
157–158	2	A4 Condominiums	264	13.5
159–160	2	Open Space (LDZ)		0.9
161	1	A5 Condominiums	153	13.1
162	1	A6 Condominiums	216	12.9
Area A7				
163–176,178–258	95	65'x110' SFD (7,150 sf) min.	95	22.5
177	1	Recreation		0.3
259–273	15	Open Space		6.4
274–278	5	Private & Future Street		6.4
Area A8				
279–351	73	1ac/lot avg. SFD*	73	73.0
352	1	Water Quality Basin		2.8
353–356, 360, 362–366	10	Open Space		34.6
368–370	3	Private & Future Street		11.5
371–375	5	Private Drive		2.8
Area A9, A10, B1 and B2				
361	1	Area A9 Condominiums	50	6.7
376	1	Area A10 Condominiums	80	9.4
377–379	3	Open Space (LDZ)		0.7
380	1	B1 Condominiums	92	12.7
381	1	B2 Condominiums	186	14.2
382–383	2	Open Space (LDZ)		1.8
Area C1				
384–387	4	Age Qualified Condominiums	63	9.6
388–390	3	Private Drive		1.8
391–395	5	Open Space		6.3
396	1	Fire Access Road		0.5
Area C2				
397–407, 411	12	Age Qualified Condominiums	113	17.1
408–410, 412	4	Private Drive		1.7
414–422	9	Open Space		30.1
423	1	Water Tanks		1.4
Area C3				
424–425	2	Age Qualified Condominiums	31	4.4
426	1	Private Drive		0.7
427–430	4	Open Space		2.2
Area C4				
431–443	13	Age Qualified Condominiums	139	21.0
444–446	3	Private Drive		4.5
447–455, 457	10	Open Space		21.4
458, 459	2	Recreation		5.2
Area C5 & C6				
463–468	6	Age Qualified Condominiums	60	9.3
469–470	2	Private Drive		2.6
471–479	9	Open Space		10.0
480	1	Age Qualified Condominiums	440	22.0
481–483, 487	4	Open Space (LDZ)		1.8
588–591	4	Private Drive		15.2
Area D1, D2				
497	1	D2 Condominiums	140	6.4
498	1	D1 Apartment/Condominium	326	11.4
Village Center				
F14 492–494, 523	4	Mixed Use Commercial 243,000 sf		13.5
522	1	60,000 sf Library		2.9
F10 & F11 525–530	6	Mixed Use Commercial 342,300 sf		17.2
F1a 531	1	Condominiums (Live/Work)	15	0.4
F1b 532	1	Apartment/Condominium	145	3.2
F2a 533	1	Condominiums (Live/Work)	15	0.4
F2b 534	1	Condominiums	242	3.2
F3a 535	1	Condominiums (Live/Work)	15	0.4
F3b 536	1	Condominiums	217	3.6
F4 537	1	Apartment/Condominium	214	4.1
F5a 538	1	Condominiums	140	2.0
F5b 539	1	Condominiums with 8,000 sf Retail	171	2.1
F6a 540	1	Condominiums	76	2.0
F6b 541	1	Condominiums with 8,000 sf Retail	81	2.1
F9a 542	1	Apartment/Condominium	114	2.1
F9b 543	1	Apartment/Condominium	74	1.6
F8a 544	1	Condominiums	74	1.6
F8b 545	1	Condominiums	114	2.1
F7 546	1	Condominiums	138	3.5
B3 547	1	Apartment/Condominium	215	5.6
F12 548	1	Community Center		8.5
F13 549	1	Elementary School		9.0
B6 550	1	Condominiums	152	6.4
B7 551	1	Condominiums	217	4.8
552–565	14	Private Drive		19.6
Area E1 & E2				
566–571	6	E1 Mixed Use/Commercial 691,500 sf Business Park		47.7
572–573	2	Private Drive		3.8
574–577	4	Open Space		27.6
504	1	E2 Mixed Use/Commercial 6,200 sf Service Station		2.8
Miscellaneous				
150–152	3	Open Space		12.0
358–359	2	Open Space (Lyon Cyn)		17.2
367	1	Open Space (River Adjacent)		17.2
456	1	Water Facilities		1.5
460, 461	2	Open Space (along LL st.)		6.9
413, 462	2	Debris Basin		1.1
484, 486	3	Open Space (along Westridge)		8.7
488–491	4	Open Space (LDZ)		2.2
495	1	Park		20.3
496, 499–501, 506–507, 606	7	Open Space (LDZ)		3.3
502–503, 508–511, 514	7	Open Space (along CCD)		11.3
485, 513, 607	1	Debris Basin		2.0
505	1	Water Quality/Debris Basin		7.0
512	1	CCD Bridge		3.4
515	1	Open Space–Connectivity Buffer		8.0
516	1	Spineflower Preserve		44.8
517–521	5	Open Space		49.8
524, 595–605	12	Open Space (LDZ)		4.3
578–581	4	Open Space (River)		215.5
582	1	Open Space (River Adjacent)		9.8
583	1	Water Quality Basin		3.3
584	1	Open Space		4.6
585	1	Park		5.2
357, 586	2	Sewer Lift Station		0.2
587	1	Open Space (LDZ)		0.1
592–594	3	Open Space (LDZ)		0.5
		Public Street R/W		62.2
		CALTRANS R/W		2.2
Total	607		5331	1252.2

* ALLOWS 73 SECONDARY UNITS (1/LOT)
ABBREVIATIONS:
MMP = MAGIC MOUNTAIN PARKWAY
CCD = COMMERCE CENTER DRIVE
SFD = SINGLE FAMILY DWELLING UNIT
LDZ = LANDSCAPE DEVELOPMENT ZONE

GENERAL NOTES:

1. GRADE ELEVATIONS SHOWN ON THE VTTM ARE APPROXIMATE. THE ELEVATIONS MAY CHANGE BY 3 FEET. ELEVATION CHANGES MAY BE GREATER THAN 3 FEET BUT ONLY IF DETERMINED BY DPW AND DRP THAT THE REVISIONS ARE CONSISTENT WITH THE INTENT OF THE SUBDIVISION MAP APPROVAL.
2. PERMISSION IS REQUESTED FOR LOT LINES TO BE ADJUSTED PROVIDED NO ADDITIONAL LOTS ARE CREATED. THE DEGREE OF ADJUSTMENT SHALL BE CONSISTENT WITH THE INTENT OF THE SUBDIVISION MAP APPROVAL AND THE SUBDIVISION MAP ACT.
3. ALIGNMENT AND GEOMETRICS OF STREETS AND TRAILS ARE APPROXIMATE. PERMISSION IS REQUESTED FOR ADJUSTMENTS TO STREETS TO BE MADE PROVIDED THE DEPARTMENT OF PUBLIC WORKS AND DRP DETERMINE THAT THE ADJUSTMENTS ARE CONSISTENT WITH THE INTENT OF THE SUBDIVISION APPROVAL. ADJUSTMENTS TO TRAILS CAN BE MADE WITH APPROVAL BY DRP AND THE PARKS AND RECREATION DEPARTMENT.
4. BUILDING FOOTPRINTS SHOWN ON THE TENTATIVE MAP OR ACCOMPANYING SITE PLAN ARE ONLY FOR ILLUSTRATIVE PURPOSES. ACTUAL BUILDING LOCATIONS AND FOOTPRINTS MAY VARY AND WILL BE REVIEWED FOR CONSISTENCY WITH THE APPROVED TENTATIVE MAP. IF DETERMINED TO BE CONSISTENT WITH THE APPROVED TENTATIVE MAP, A CHANGE IN DESIGN SHALL BE APPROVED, PROVIDED THE PROPOSED BUILDING COMPLIES WITH THE PROVISIONS OF THE NEWHALL RANCH SPECIFIC PLAN AND ANY OTHER APPLICABLE CODES AND ORDINANCES.
5. PERMISSION IS REQUESTED TO FILE "LARGE LOT" PARCEL MAPS OF 20 ACRES OR MORE (WITHOUT IMPROVEMENTS) OR 5 ACRES OR MORE (WITH IMPROVEMENTS) AS SPECIFIED IN THE COUNTY SUBDIVISION CODE.
6. THE RECORDATION OF A "LARGE LOT" PARCEL MAP SHALL NOT REQUIRE THE OBLIGATION OF FEES, DEDICATIONS (E.G., RIGHTS-OF-WAY OR PARKS), EXACTIONS, OR INFRASTRUCTURE AS MAY BE OTHERWISE REQUIRED FOR THE SUBDIVISION, EXCEPT AS MAY BE REQUIRED BY SHAPTER 21.32 OF THE SUBDIVISION CODE.
7. THE RECORDATION OF A "LARGE LOT" PARCEL MAP SHALL BE CONSIDERED THE FILING OF THE FIRST UNIT FOR THE PURPOSE OF TIME EXTENSIONS PURSUANT TO THE SUBDIVISION MAP ACT. HOWEVER, THE RECORDATION OF A "LARGE LOT" PARCEL MAP SHALL NOT REQUIRE FULFILLMENT OF INFRASTRUCTURE REQUIREMENTS—IF CONSISTENT WITH THE COUNTY SUBDIVISION ORDINANCE—NOR THE DEDICATION OF PARKLAND OR IN LIEU PARK FEES.
8. PERMISSION IS REQUESTED FOR UNIT PHASING.
9. PERMISSION IS REQUESTED TO COMBINE LOTS.
10. PERMISSION IS REQUESTED TO RECORD ADDITIONAL OPEN SPACE LOTS.
11. PERMISSION IS REQUESTED TO RECORD ADDITIONAL UTILITY LOTS PROVIDED MAINTENANCE EASEMENTS ARE GRANTED TO THE SATISFACTION OF THE DRP.
12. THE LOCATIONS OF APPURTENANT STRUCTURES (E.G., PASEOS, PEDESTRIAN BRIDGES, TRANSIT SHELTERS, WATER QUALITY BASINS, WATER TANKS, ETC.) MAY BE RELOCATED TO THE SATISFACTION OF DPW AND DRP.
13. PROPOSED RETAIL AND OFFICE FLOOR ARE INTERCHANGEABLE IF THE REQUIRED PARKING IS PROVIDED.
13. PERMISSION TO RECORD JOINT ACCESS EASEMENTS (20' WIDE) AS LOTS REQUESTED.
14. REQUEST PERMISSION TO MASS GRADE.
15. PROPOSED STREET GRADING IS APPROXIMATE ONLY AND SUBJECT TO ADJUSTMENTS PENDING DETERMINATION OF FINAL DEVELOPMENT LAYOUT AND PLANS.
16. RIGHT OF WAY RETURN RADII OF 13 FT. AT ALL LOCAL STREET INTERSECTIONS AND 27 FT WHERE ALL PLANNED HIGHWAYS INTERSECT OR WHERE ONE OF THE ROADS SERVES A COMMERCIAL OR INDUSTRIAL DEVELOPMENT.
17. MODIFIED STREET CROSS-SECTIONS AS SHOWN ON VESTING TENTATIVE TRACT MAP ARE REQUESTED. HOWEVER, PERMISSION IS SOUGHT TO CONSTRUCT STANDARD AND ALTERNATE STREET CROSS-SECTIONS AT THE DISCRETION OF THE SUBDIVIDER.
18. ALL DIMENSIONS SHOWN ARE APPROXIMATE.
19. TOPO COMPILED 6/26/98 FROM DATA FLOWN 6/26/98.
20. REQUEST MODIFICATION OF STREET FRONTAGE REQUIREMENTS PER SECTION 21.24.040
21. SHARED AND RECIPROCAL PARKING IS DEPICTED PER THE PROVISIONS OF THE NEWHALL RANCH SPECIFIC PLANS

SURVEY NOTES:

VERTICAL DATUM:
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS BENCHMARK DESCRIBED AS FOLLOWS: LACDPW L5402 RND MD SPK IN LOWER CONC HDWL @ N END 24 FT W/O C/L THE OLD RD (W RDWY) AND 0.6 MI S/O HENRY MAYO DR @ MI MKR #6.25 NEWHALL QUAD. 1995 ADJUSTMENT (NAVD 1988) ELEVATION = 1031.951

THERE IS APPROXIMATELY 2.3 FEET DIFFERENCE BETWEEN PREVIOUS COUNTY OF LOS ANGELES DATUMS BASED UPON NAVD 1929 AND NAVD 1988 (NAVD 1988 IS 2.3 FEET HIGHER THAN NAVD 1929).

AERIAL PLANIMETRY:
THIS SURVEY WAS PREPARED BY PHOTOGRAMMETRIC PROCESSES, UTILIZING AERIAL PHOTOGRAPHY DATED SEPTEMBER 10, 1999. THE OUTLINE OF BUILDINGS AND OTHER ROOFED IMPROVEMENTS, MAY INCLUDE EAVES, CANOPIES AND BALCONIES, SINCE BUILDINGS BELOW THESE ITEMS ARE NOT VISIBLE TO THE CAMERA.

TOPOGRAPHY:
BY PHOTOGRAMMETRIC PROCESSES FROM LIDAR IMAGING DATED JUNE 24–26, 1998, AND COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS.

CONTOUR INTERVAL:
10 FOOT, UNLESS OTHERWISE NOTED.

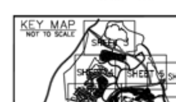
SPECIAL NOTES:

1. WATER QUALITY BASINS AND CDS UNITS WILL PROVIDE FOR TREATMENT OF STORM WATER RUN OFF.
2. THE WATER QUALITY BASINS SHALL BE DEDICATED TO THE COUNTY WHEN COMPLETED AND ACCEPTED.
3. PROPOSED RECLAIMED WATER LINES WILL BE LOCATED IN PUBLIC STREETS AND TRAILS.

REV:
DATE: 12/21/06

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants
GEOLOGIC/GEOTECHNICAL MAP
Date: 12/22/04 | Job No.: 01-2023-4
Scale: 1" = 100' | CAD File: Plate B-1
PLATE B-1 | Geology by: SKM/BJS | Drawn by: MBW/GSD | Revised: 5/13/05 3/15/07

KEY MAP
NOT TO SCALE



LEGAL DESCRIPTION:
PARCELS 11, 12, 13, 22 AND A PORTION OF PARCEL 14 OF PARCEL MAP 24500-01, IN THE UNINCORPORATED TERRITORY OF THE COUNTY OF LOS ANGELES, AS SHOWN ON MAP FILED IN BOOK 293 PAGES 34 TO 67 INCLUSIVE, OF PARCEL MAPS, RECORDS OF LOS ANGELES COUNTY.

REGISTERED PROFESSIONAL ENGINEER MATTHEW G. HEIDEMAN No. 55639 Exp. 12-31-08 CIVIL STATE OF CALIFORNIA

PSOMAS
28470 Avenue Stanford, Suite 300
Santa Clarita, CA 91355
(661) 219-6000 (661) 775-2718 (FAX)
MATTHEW G. HEIDEMAN R.C.E. NO. 55639 DATE

DESIGNED : MGH/TD
DRAFTED : TD
CHECKED : RB

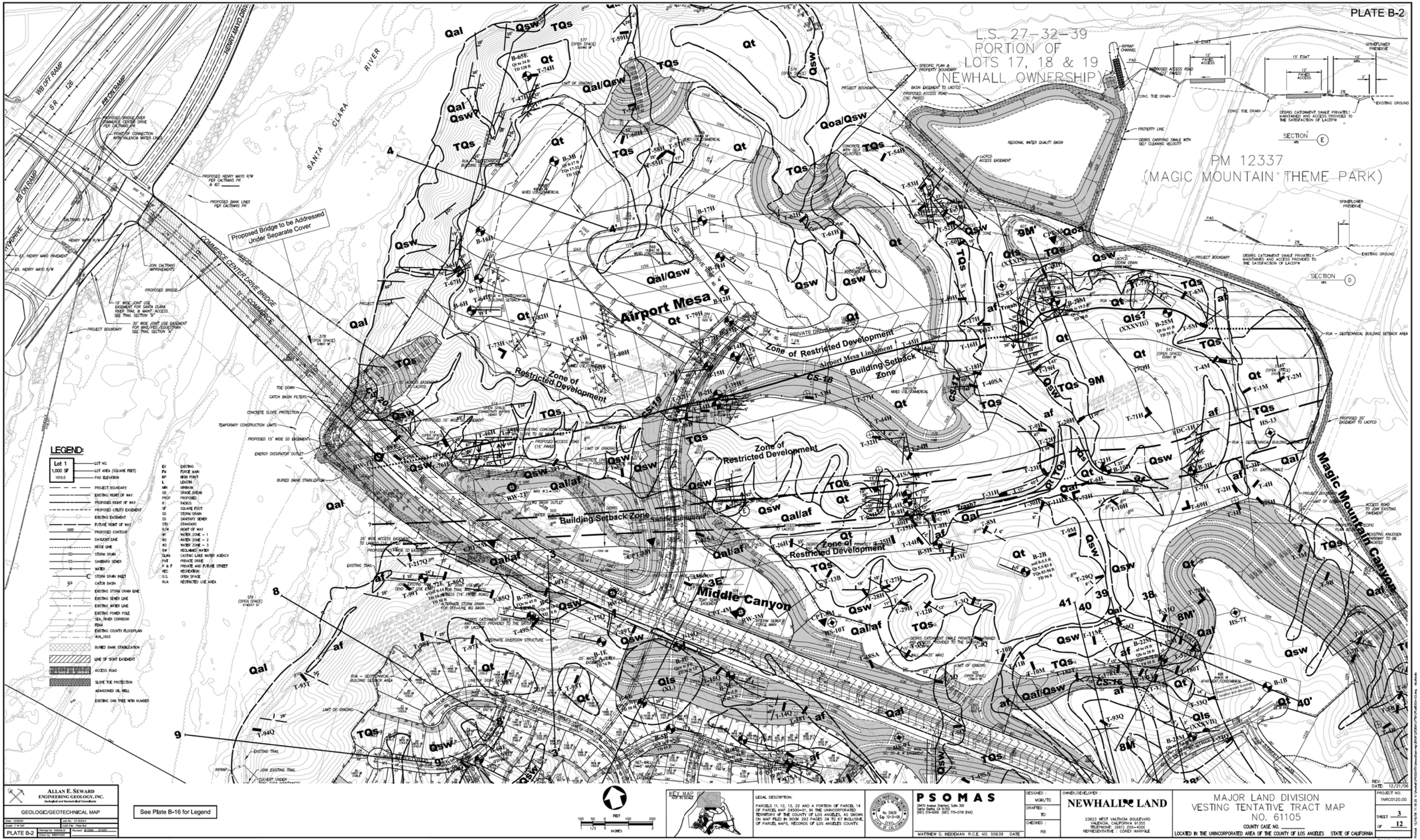
OWNER/DEVELOPER :
NEWHALL LAND
23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVE : COREY HARPOLE

MAJOR LAND DIVISION
VESTING TENTATIVE TRACT MAP
NO. 61105
COUNTY CASE NO. ________
LOCATED IN THE UNINCORPORATED AREA OF THE COUNTY OF LOS ANGELES STATE OF CALIFORNIA

PROJECT NO. 1NRC0120.00
SHEET 1 OF 12

ME003-01.dwg

A full-size reproduction of this figure can be found at Impact Sciences.



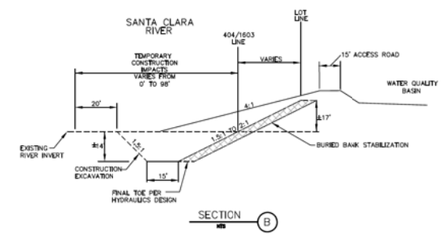
A full-size reproduction of this figure can be found at Impact Sciences.

PLATE B-3

LEGEND:

Lot 1 / 1,000 SF / 1010.0	LOT NO. / LOT AREA (SQUARE FEET) / PAD ELEVATION
	PROJECT BOUNDARY
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	PROPOSED UTILITY EASEMENT
	EXISTING EASEMENT
	FUTURE RIGHT OF WAY
1000	PROPOSED CONTOUR
	DAYLIGHT LINE
	RIDGE LINE
SD	STORM DRAIN
SS	SANITARY SEWER
W	WATER
	STORM DRAIN INLET
	CATCH BASIN
SD	EXISTING STORM DRAIN LINE
SS	EXISTING SEWER LINE
W	EXISTING WATER LINE
	EXISTING POWER POLE
	SEA, RIVER CORRIDOR
	FEMA
	EXISTING COUNTY FLOODPLAIN
	404_1603
	BURIED BANK STABILIZATION
	LINE OF SIGHT EASEMENT
	ACCESS ROAD
	SLOPE TOE PROTECTION
	ABANDONED OIL WELL
af	EXISTING OAK TREE WITH NUMBER

EX	EXISTING
FM	FORCE MAIN
HP	HIGH POINT
L	LENGTH
MIN	MINIMUM
GB	GRADE BREAK
PROP	PROPOSED
R	RADIUS
SF	SQUARE FOOT
SD	STORM DRAIN
SS	SANITARY SEWER
STD	STANDARD
R/W	RIGHT OF WAY
W1	WATER ZONE – 1
W2	WATER ZONE – 2
W3	WATER ZONE – 3
RW	RECLAIMED WATER
CLWA	CASTAIC LAKE WATER AGENCY
PVT	PRIVATE DRIVE
P & F	PRIVATE AND FUTURE STREET
REC	RECREATION
O.S.	OPEN SPACE
RUA	RESTRICTED USE AREA



ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

GEOLOGIC/GEOTECHNICAL MAP

Date: 12/22/04 | Job No.: 01-202S-4
Scale: 1" = 100' | CAD File: Plate B-6C
PLATE B-3 | Drawn by: MBR/RDD | Checked by: MBR/JS | Revised: 3/13/06, 9/13/07

See Plate B-16 for Legend

KEY MAP
NOT TO SCALE

LEGAL DESCRIPTION:
PARCELS 11, 12, 13, 22 AND A PORTION OF PARCEL 14 OF PARCEL MAP 24500-01, IN THE UNINCORPORATED TERRITORY OF THE COUNTY OF LOS ANGELES, AS SHOWN ON MAP FILED IN BOOK 293 PAGES 34 TO 67 INCLUSIVE, OF PARCEL MAPS, RECORDS OF LOS ANGELES COUNTY.

No. 55639 Exp. 12-31-08 CIVIL STATE OF CALIFORNIA

PSOMAS
25410 Avenue Stanford, Suite 300
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MATTHEW G. HEIDEMAN R.C.E. NO. 55639 DATE

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CHECKED: RB

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NEWHALL LAND
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VALENCIA, CALIFORNIA 91355
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REPRESENTATIVE: COREY HARPALE

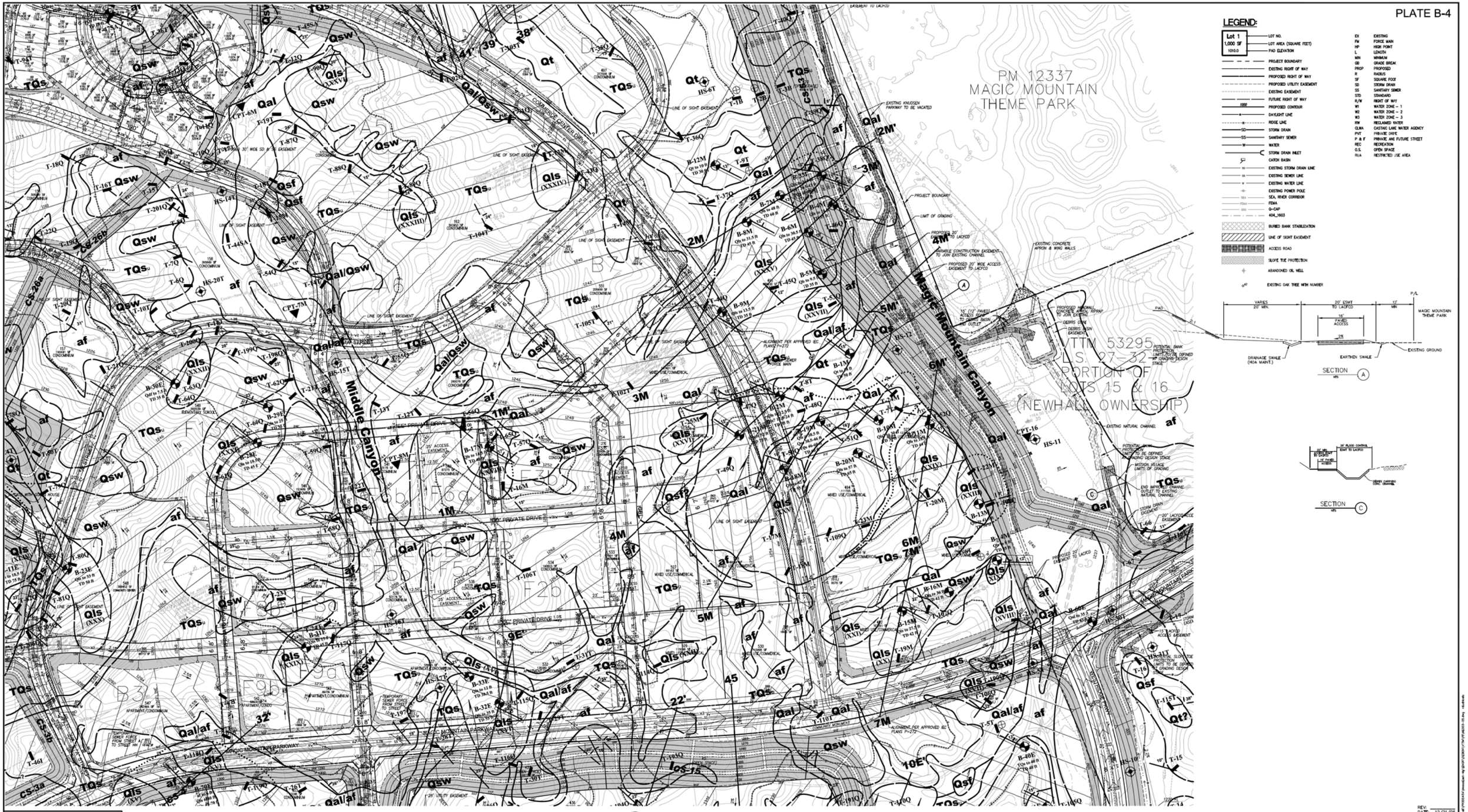
MAJOR LAND DIVISION
VESTING TENTATIVE TRACT MAP
NO. 61105
COUNTY CASE NO. _____
LOCATED IN THE UNINCORPORATED AREA OF THE COUNTY OF LOS ANGELES STATE OF CALIFORNIA

REV: DATE: 12/21/06
PROJECT NO. 1NRC0120.00
SHEET 4 OF 12

ME003-04.dwg

A full-size reproduction of this figure can be found at Impact Sciences.

PLATE B-4



ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

GEOLOGIC/GEOTECHNICAL MAP

See Plate B-16 for Legend

PLATE B-4

KEY MAP
NOT TO SCALE

LEGAL DESCRIPTION:
PARCELS 11, 12, 13, 22 AND A PORTION OF PARCEL 14 OF PARCEL MAP 24500-01, IN THE UNINCORPORATED TERRITORY OF THE COUNTY OF LOS ANGELES, AS SHOWN ON MAP FILED IN BOOK 293 PAGES 34 TO 67 INCLUSIVE, OF PARCEL MAPS, RECORDS OF LOS ANGELES COUNTY.

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3940 Avenue Stanford, Suite 300
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MATTHEW G. HEDEMAN R.C.E. NO. 55639 DATE

DESIGNED : MGH/TD
DRAFTED : TD
CHECKED : RB

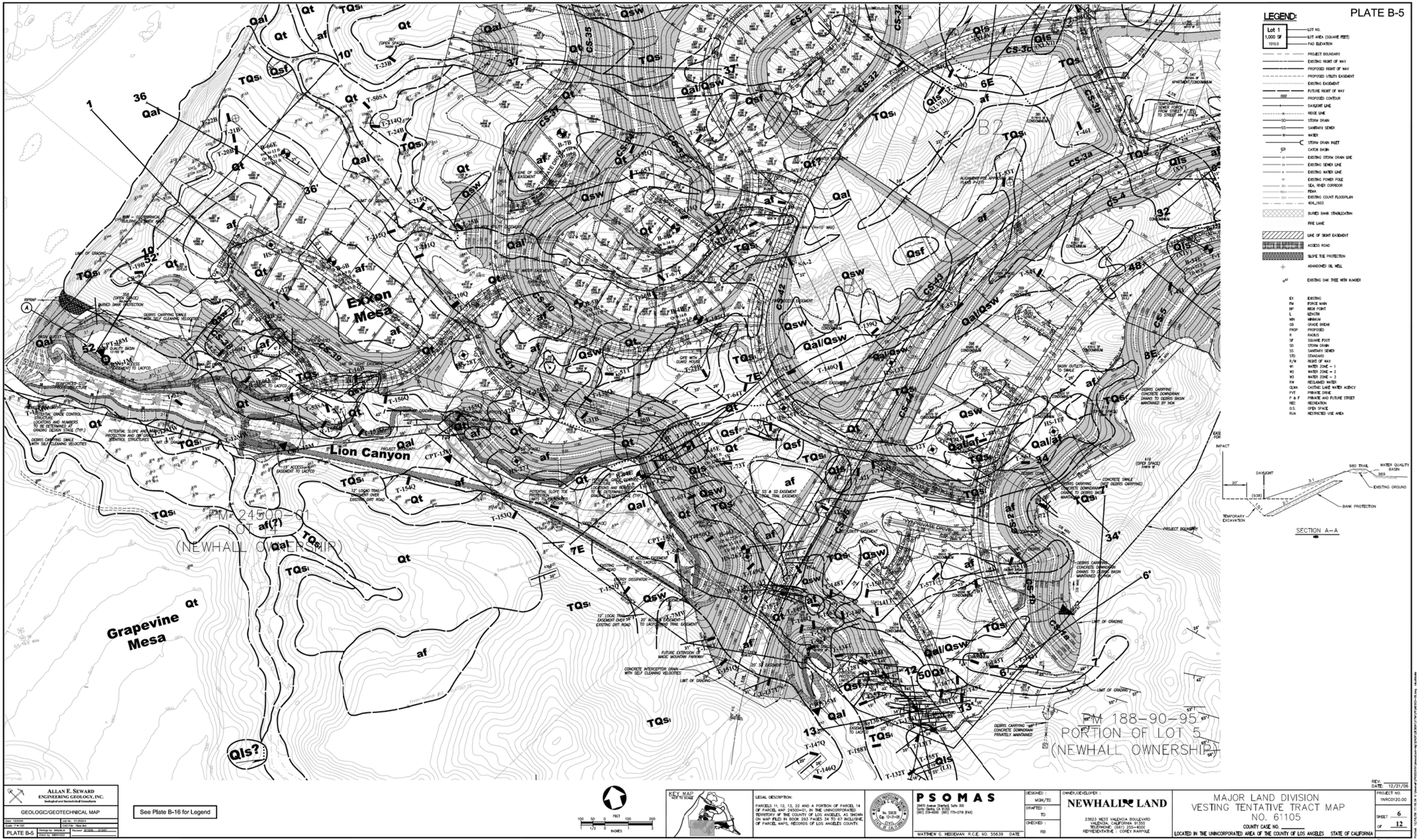
OWNER/DEVELOPER :
NEWHALL LAND
23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVE : COREY HARPALE

MAJOR LAND DIVISION
VESTING TENTATIVE TRACT MAP
NO. 61105
COUNTY CASE NO. _____
LOCATED IN THE UNINCORPORATED AREA OF THE COUNTY OF LOS ANGELES STATE OF CALIFORNIA

REV.
DATE: 12/21/06
PROJECT NO. 1NRC0120.00
SHEET 5 OF 12

ME003-05.dwg

A full-size reproduction of this figure can be found at Impact Sciences.



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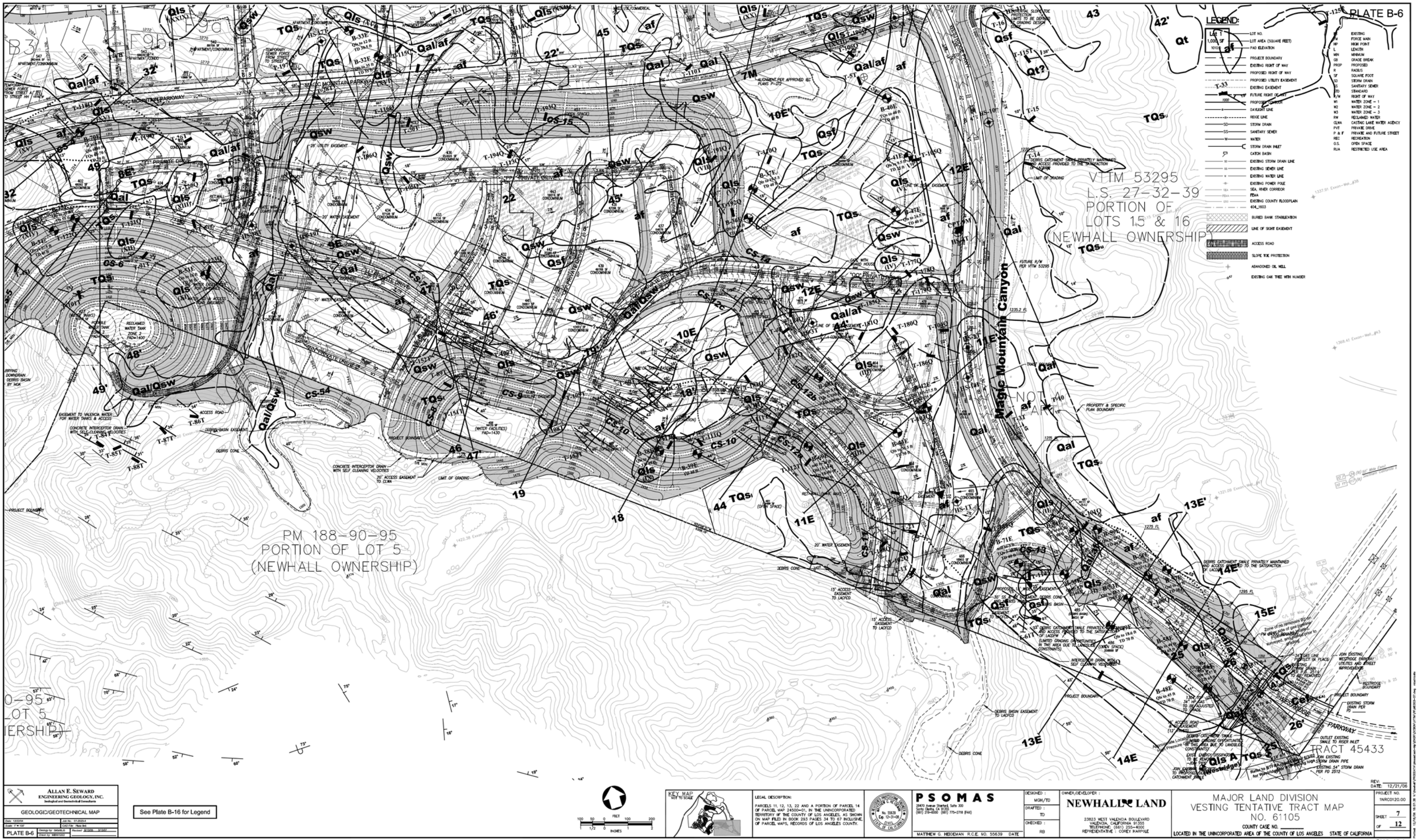
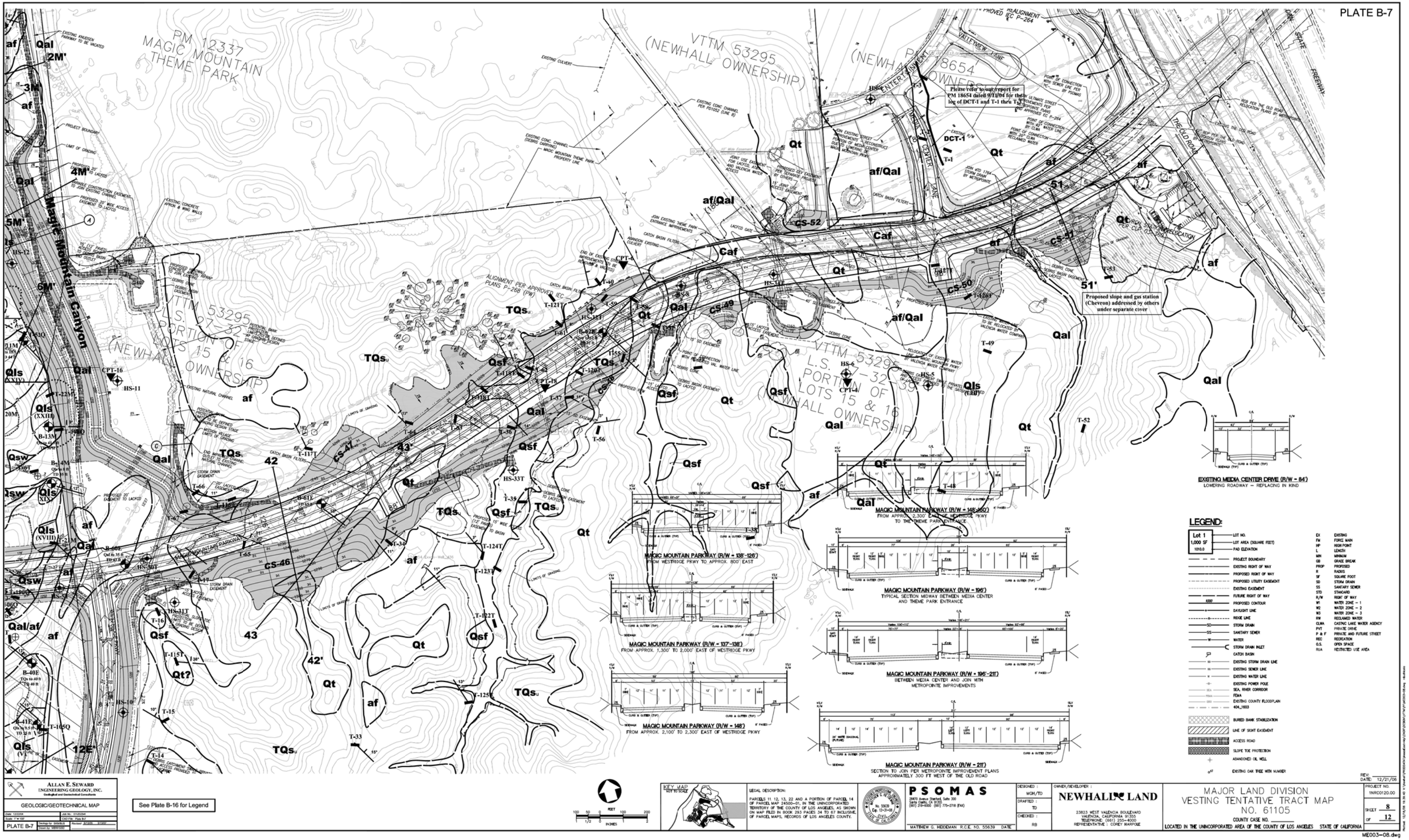


A full-size reproduction of this figure can be found at Impact Sciences.

PLATE B-7



A full-size reproduction of this figure can be found at Impact Sciences.

PLATE B-8

L.S. 27-32-39
PORTION OF
LOTS 17, 18 & 19
(NEWHALL OWNERSHIP)

PM 12337
(MAGIC MOUNTAIN THEME PARK)

Airport Mesa

Middle Canyon

Magic Mountain Canyon

Zone of Restricted Development

Airport Mesa Linesment

Building Setback Zone

Saddle Linesment

Side slopes of basin area to be removed and replaced with compacted fill in areas of proposed cut.

Proposed Bridge to be Addressed Under Separate Cover

Building Setback Line for 12/21/06 Proposed Grade

Dewatering Needed for Removals at the Mouth of Middle Canyon

Approximate Keyway/ Qls Removal Bottom showing key footer elevations

Qls (XL)

Qls (XXXVII)

Qls (XXXVIII)

Qls? (XXXVII)

CS-16

CS-17

CS-18

CS-19

CS-20

LEGEND:

Lot 1 / 1,000 SF / 1010.0	LOT NO. / LOT AREA (SQUARE FEET) / PAD ELEVATION
	PROJECT BOUNDARY
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	PROPOSED UTILITY EASEMENT
	EXISTING EASEMENT
	FUTURE RIGHT OF WAY
1000	PROPOSED CONTOUR
	DAYLIGHT LINE
	RIDGE LINE
SD	STORM DRAIN
SS	SANITARY SEWER
W	WATER
	STORM DRAIN INLET
	CATCH BASIN
	EXISTING STORM DRAIN LINE
	EXISTING SEWER LINE
	EXISTING WATER LINE
	EXISTING POWER POLE
	SEA, RNDI CORRIDOR
FEMA 404_1603	EXISTING COUNTY FLOODPLAIN
	BURIED BANK STABILIZATION
	LINE OF SIGHT EASEMENT
	ACCESS ROAD
	SLOPE TOE PROTECTION
	ABANDONED OIL WELL
	EXISTING OAK TREE WITH NUMBER

EX	EXISTING
FM	FORCE MAIN
HP	HIGH POINT
L	LENGTH
MIN	MINIMUM
GB	GRADE BREAK
PROP	PROPOSED
R	RADIUS
SF	SQUARE FOOT
SD	STORM DRAIN
SS	SANITARY SEWER
STD	STANDARD
R/W	RIGHT OF WAY
W1	WATER ZONE – 1
W2	WATER ZONE – 2
W3	WATER ZONE – 3
RW	RECLAIMED WATER
CLWA	CASTAIC LAKE WATER AGENCY
PVT	PRIVATE DRIVE
P & F	PRIVATE AND FUTURE STREET
REC	RECREATION
O.S.	OPEN SPACE
RUA	RESTRICTED USE AREA

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

GEOLOGIC/GEOTECHNICAL MAP

Date: 12/22/06 | Job No. 01-023-4
Scale: 1" = 100' | CAD File: Plate B-8
Design by: MWH/JD | Revised: 8/13/06, 9/13/07
Draw by: MWH/GD

PLATE B-8

See Plate B-16 for Legend

FEET 100 50 0 100 200
1/2 0 1

KEY MAP
NOT TO SCALE

LEGAL DESCRIPTION:

PARCELS 11, 12, 13, 22 AND A PORTION OF PARCEL 14 OF PARCEL MAP 24500-01, IN THE UNINCORPORATED TERRITORY OF THE COUNTY OF LOS ANGELES, AS SHOWN ON MAP FILED IN BOOK 293 PAGES 34 TO 67 INCLUSIVE, OF PARCEL MAPS, RECORDS OF LOS ANGELES COUNTY.

REGISTERED PROFESSIONAL ENGINEER MATTHEW G. HEIDEMAN No. 55639 Exp. 12-31-08 CIVIL STATE OF CALIFORNIA

PSOMAS
28470 Avenue Stanford, Suite 300
Santa Clarita, CA 91355
(661) 259-6000 (661) 775-2718 (FAX)

MATTHEW G. HEIDEMAN R.C.E. NO. 55639 DATE:

DESIGNED: MGH/TD
DRAFTED: TD
CHECKED: RB

OWNER/DEVELOPER:
NEWHALL LAND
23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVE: COREY HARPALE

MAJOR LAND DIVISION
VESTING TENTATIVE TRACT MAP
NO. 61105

COUNTY CASE NO. _____

LOCATED IN THE UNINCORPORATED AREA OF THE COUNTY OF LOS ANGELES STATE OF CALIFORNIA

REV. DATE: 12/21/06

PROJECT NO. TNRC0120.00

SHEET 3 OF 12

ME003-03.dwg

A full-size reproduction of this figure can be found at Impact Sciences.

PLATE B-9

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC. Geological and Geotechnical Consultants	
GEOLOGIC/GEOTECHNICAL MAP	
Date: 12/2/04	Job No.: 01-0029-4
Scale: 1" = 100'	CAD File: Plate B-4
PLATE B-9	Drawn by: MMR/RJD Revised: 8/12/05, 3/13/07
	Drawn by: MMR/RJD

See Plate B-16 for Legend

FEET 100 50 0 100 200
INCHES 1 1/2 0 1 2

KEY MAP NOT TO SCALE

LEGAL DESCRIPTION:

PARCELS 11, 12, 13, 22 AND A PORTION OF PARCEL 14 OF PARCEL MAP 24500-01, IN THE UNINCORPORATED TERRITORY OF THE COUNTY OF LOS ANGELES, AS SHOWN ON MAP FILED IN BOOK 293 PAGES 34 TO 67 INCLUSIVE, OF PARCEL MAPS, RECORDS OF LOS ANGELES COUNTY.

REGISTERED PROFESSIONAL ENGINEER No. 55639 Exp. 12-31-08 CIVIL STATE OF CALIFORNIA

PSOMAS
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MATTHEW G. HEIDEMAN R.C.E. NO. 55639 DATE

DESIGNED :	MGH/TD
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23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255-4000
REPRESENTATIVE : COREY HARPOLE

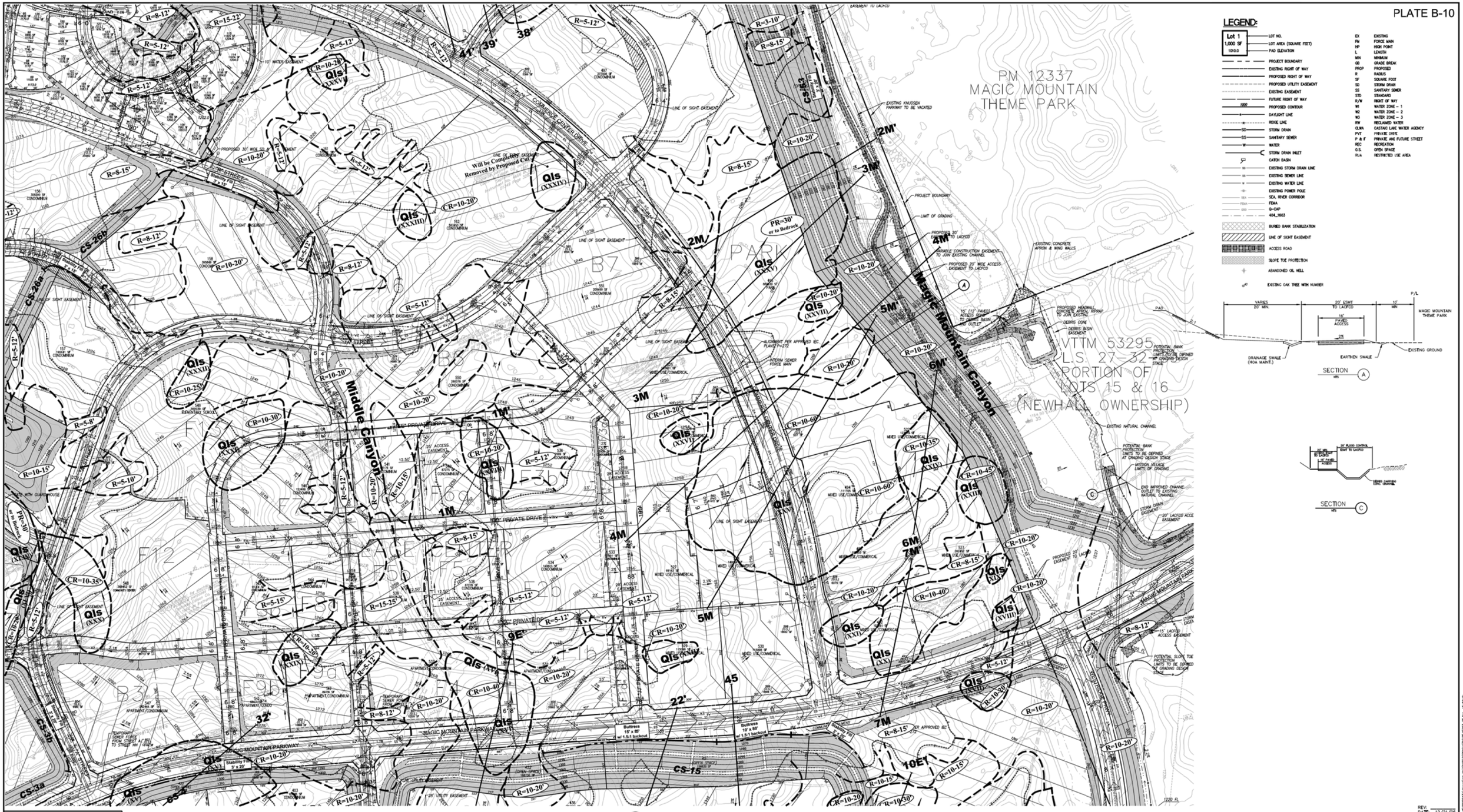
MAJOR LAND DIVISION
VESTING TENTATIVE TRACT MAP
NO. 61105
COUNTY CASE NO. _____
LOCATED IN THE UNINCORPORATED AREA OF THE COUNTY OF LOS ANGELES STATE OF CALIFORNIA

REV:
DATE: 12/21/06
PROJECT NO. 1NRC0120.00
SHEET 4 OF 12

ME003-04.dwg

A full-size reproduction of this figure can be found at Impact Sciences.

PLATE B-10

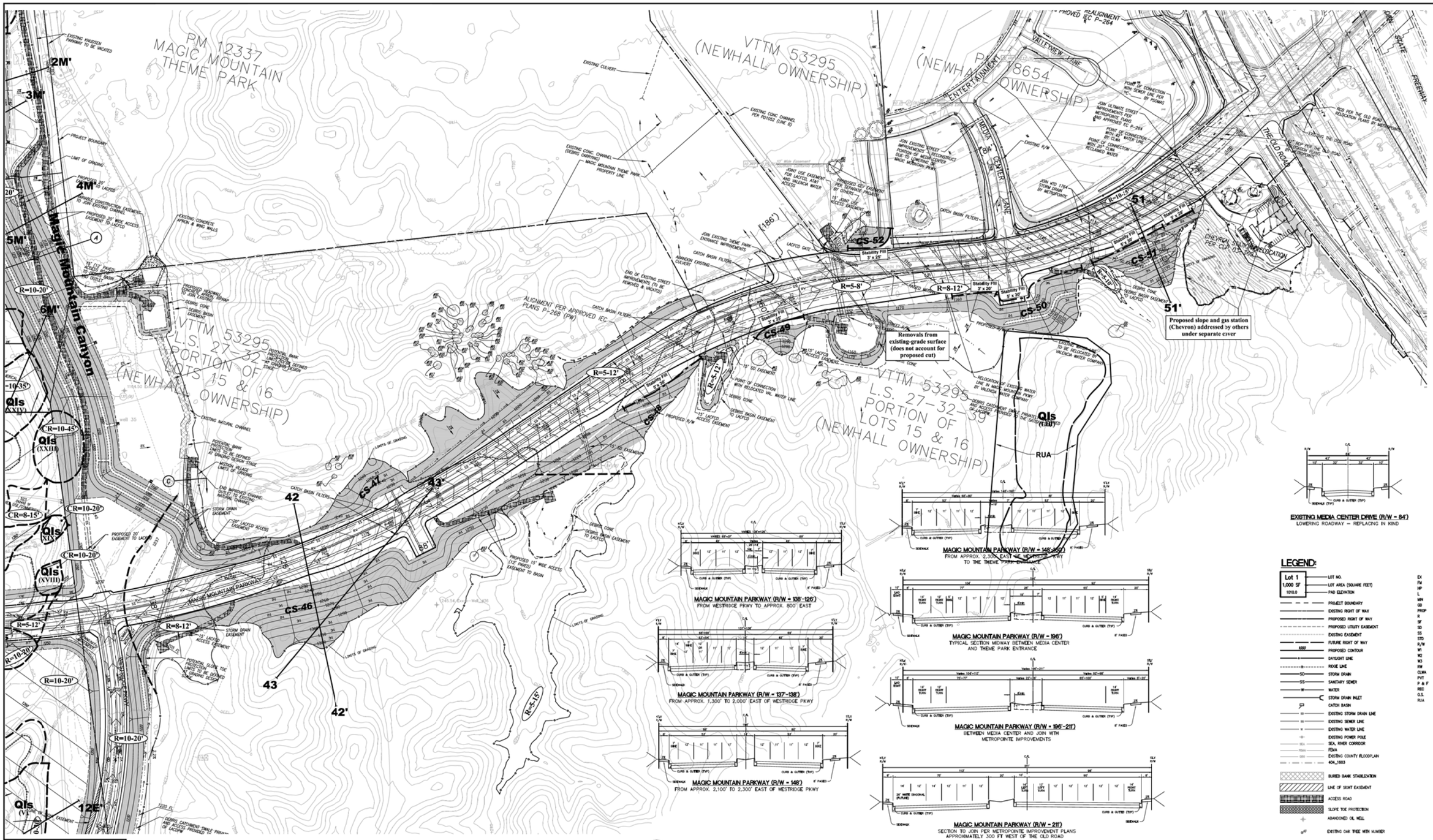


A full-size reproduction of this figure can be found at Impact Sciences.

A full-size reproduction of this figure can be found at Impact Sciences.

A full-size reproduction of this figure can be found at Impact Sciences.

PLATE B-13



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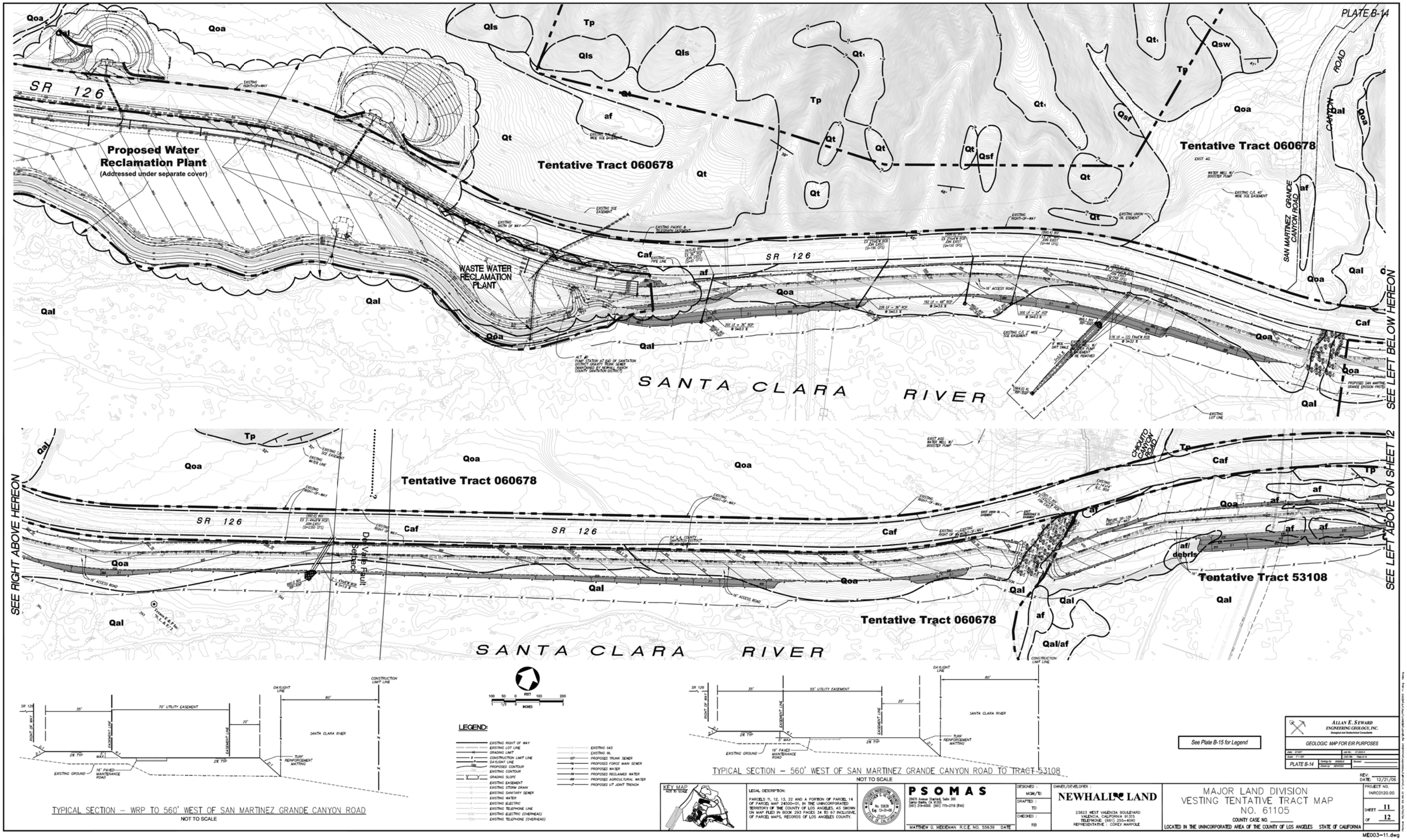

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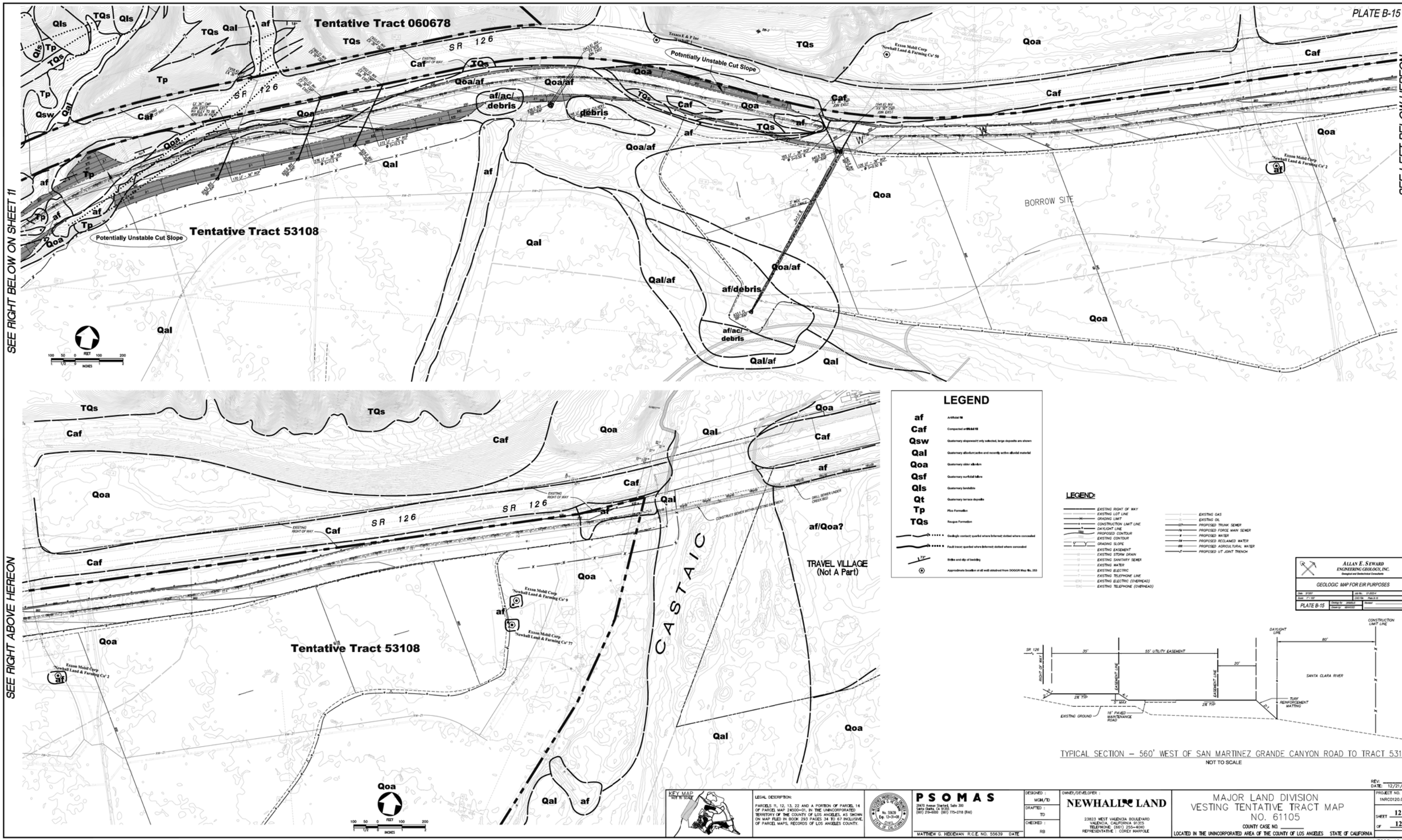


A full-size reproduction of this figure can be found at Impact Sciences.

GEOLOGIC/GEOTECHNICAL MAPS AND REMEDIATION MAPS LEGEND

af	Artificial fill
Qsw	Quaternary slopewash; only selected, large deposits are shown
Qal	Quaternary alluvium;active and recently active alluvial material
Qoa	Quaternary older alluvium
Qsf	Quaternary surficial failure; queried where uncertain
Qls (LIII)	Quaternary landslide and roman-numeral designation; queried where uncertain
Qt	Quaternary terrace deposits
TQs_u	Saugus Formation (upper unit)
TQs_l	Saugus Formation (lower unit)
TQs	Saugus Formation (undifferentiated)
?	Geologic contact; queried where inferred; dotted where concealed
?	Fault trace; queried where inferred; dotted where concealed
	Trace of syncline, showing direction of plunge; the trace is concealed where it is mapped across units younger than TQs
	Trace of anticline, showing direction of plunge; the trace is concealed where it is mapped across units younger than TQs
	Trace of monoclinal warp hinge line; the trace is concealed where it is mapped across units younger than TQs
73°	Strike and dip of bedding
50°	Approximate strike and dip of bedding
12°	Average strike and dip of bedding measured in bucket-auger borings within the bedrock
	Horizontal bedding
19°	Strike and dip of slide plane
47°	Strike and dip of shear
87°	Strike and dip of fracture
60°	Strike and dip of fault
75°	Strike and dip of minor fault
CS-54	Cut-slope designation
	Geotechnically recommended buttress
	Geotechnically recommended stability fill
	Cut/Fill line
	Geotechnically recommended building setback for slopes (where greater than h/3)
	Removal boundary
	Recommended Location of Subdrain
R=5-12'	Recommended removal depth; "CR" indicates complete removal of landslide
PR=30' or to Bedrock	Partial Removal of landslide with removal depth of upper 30' of landslide material or to bedrock where landslide is less than 30' deep

52 — 52'	Geologic cross section
A(RTF&A) — A'(RTF&A)	Geologic cross section by RTF&A
T-217Q	Location of exploratory backhoe trench for Phase I Landslide Investigation (T-1Q thru T-141Q, T-146Q thru T-160Q, T-177Q thru T-214Q, & T-217Q)
T-25M	Location of exploratory backhoe trench for Mesas Entertainment Landslide Investigation (T-1M thru T-25M)
T-182T	Location of exploratory backhoe trench for Mesas East Tentative Map Investigation (T-1T thru T-59T, T-62T thru T-112T, T-114T, T-128T thru T-150T, & T-158T, T-178T thru T-182T)
T-157T	Location of long exploratory backhoe trench for Mesas East Tentative Map Investigation (T-60T thru T-61T, T-113T, & T-151T thru T-157T)
ET-1T	Location of exploratory excavator trench for Mesas East
T-32B	Location of exploratory backhoe trench for Boulder Assessment Investigation (T-1B thru T-32B)
T-74H	Location of exploratory backhoe trench for Holser Investigation (T-1 thru T-74H)
T-82H	Location of exploratory backhoe fault trench for Holser Investigation (T-75H thru T-82H)
DC-1H	Location of exploratory dozer cut for Holser Investigation (T-75H thru T-82H)
DC-B	Location of exploratory dozer cut for Mesas East
T-47I	Location of exploratory backhoe trench for Phase I Feasibility Evaluation - Infrastructure (T-42 I thru T-47 I)
T-55SA	Location of exploratory backhoe trench for Sand Aggregate Investigation (T-40SA thru T-55SA)
T-67	Location of exploratory backhoe trench for Magic Mountain Entertainment (T-14 thru T-17, T-33 thru T-39, T-48, T-49, T-52, T-53, and T-55 thru T-67)
T-14MW	Location of exploratory backhoe trench for Phase II Landslide Evauation - Mesas West (T-7MW and T-12MW thru T-14MW)
B-73E	Location of exploratory bucket-auger boring for Mesas East (B-1E thru B-73E)
B-25M	Location of exploratory bucket-auger boring for Mesas Entertainment Landslide Investigation (B-1M thru B-25M)
B-8B	Location of exploratory bucket-auger boring for Boulder Assessment Investigation (B-1M thru B-25M)
B-16W	Location of exploratory bucket-auger boring for Phase II Landslide Investigation - Mesas West
RTF B-5	Location of exploratory bucket-auger boring by RTF&A; see Westridge Tract 45433-04 report dated 6/3/02 (RTF B-1 thru RTF B-5)
RW-3M	Location of rotary-wash boring for Geotechnical Evaluation - Mesas area (RW-1M thru RW-3M)
RW-3T	Location of rotary-wash boring for Mesas East Tentative Map Investigation (RW-1T thru RW-3T)
HS-34T	Location of hollow-stem-auger boring for Mesas East Tentative Map Investigation (HS-1T thru HS-34T)
HS-13	Location of hollow-stem-auger boring for Magic Mountain Entertainment (HS-4 thru HS-6, HS-8, and HS-10 thru HS-13)
HS-14I	Location of hollow-stem-auger boring for Phase I Feasibility Evaluation - Infrastructure (HS-12 I thru HS-14 I)
CPT-18	Location of cone penetration test for Magic Mountain Entertainment (CPT-4, CPT-6, CPT-16, and CPT-18)
CPT-18M	Location of cone penetration test for Preliminary Geotechnical Evaluation - Mesas area (CPT-1M thru CPT-15M and CPT-18M)
	Building Setback Zone for faulting; subject to revision based on additional work and final grades
	Zone of Restricted Development; critical and essential facilities are not recommended in this zone and additional structural and/or geotechnical measures are recommended for any other structures in this zone
	Lots potentially affected by additional overexcavation requirements in the vicinity of the monoclinal warp and Lion Canyon Anticline (8-ft-minimum overexcavation)
RUA	Restricted Use Area

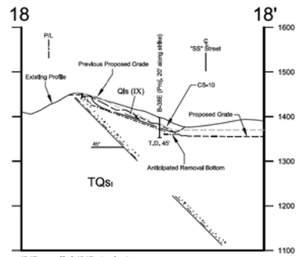
ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

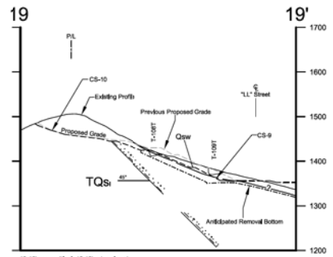
GEOLOGIC/GEOTECHNICAL MAPS AND REMEDIATION MAPS LEGEND

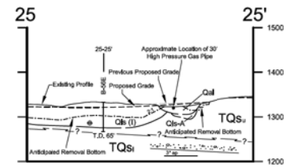
Date: 12/22/04		Job No.: 07-2023-4	
Scale: 1" = 100'		CAD File: Plate B-16	
PLATE B-16	Geology by: SKM/BJS	Revised: 6/13/05 3/13/07	
	Drawn by: MBW/GSD		

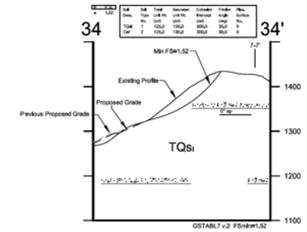
A full-size reproduction of this figure can be found at Impact Sciences.

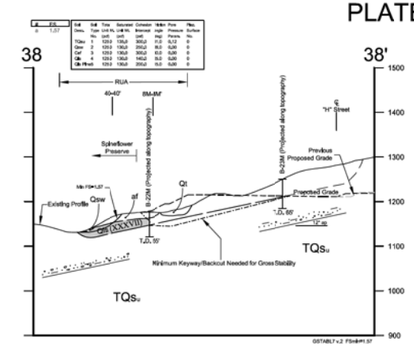
PLATE B-17

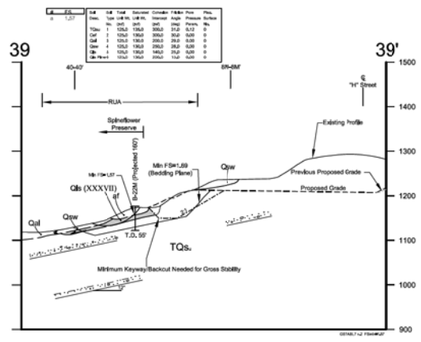


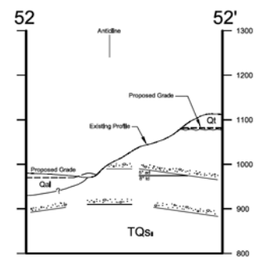


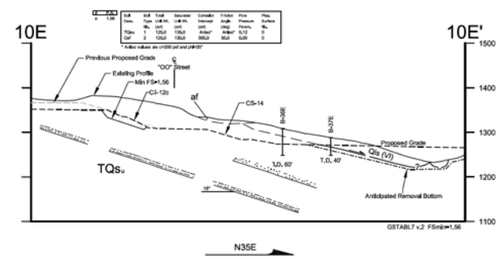


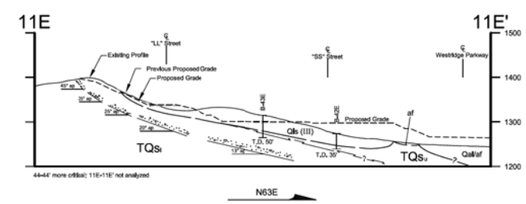


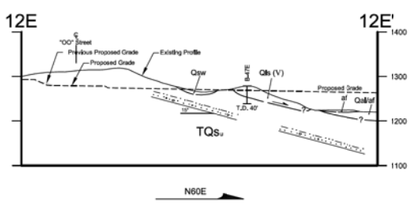


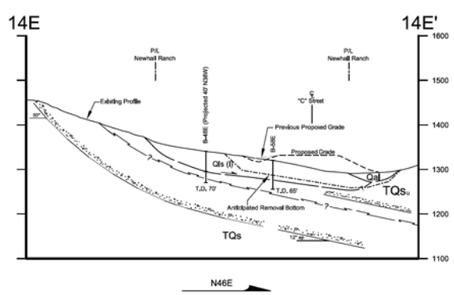


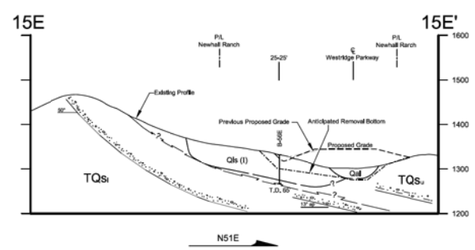


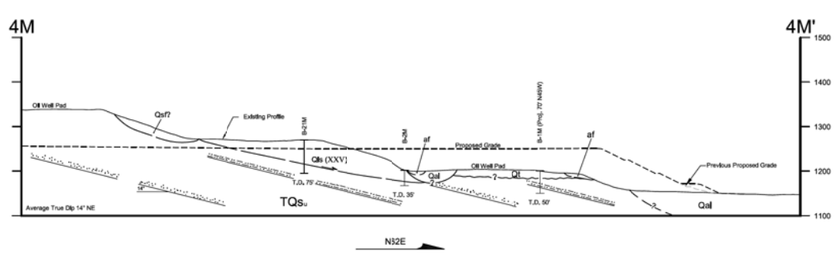


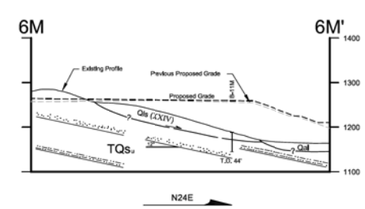


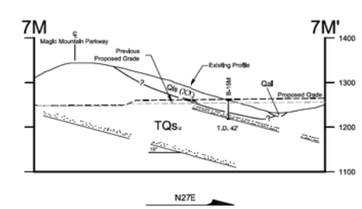












ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological and Geotechnical Consultants

Cross Sections
for Revised VTTM 61105 (12/21/06)

Date: 3/13/07	Job No.: 07-2023
Scale: 1" = 100	CAD File: Plate B-17
PLATE B-17	Geology by: Staff / Drawn by: GSD / Revised:

A full-size reproduction of this figure can be found at Impact Sciences.

APPENDIX C

Oil Well Inventory

Sheets 3 to 8 of 12 of the VTTM

Subsequent to our prior reports, the oil well locations within and immediately adjacent to VTTM 61105 and proposed grading shown on Sheets 3 to 8 of 12 were physically located in the field by others and surveyed by PSOMAS. The surveyed locations of these oil wells are shown on Sheets 3 to 8 of 12 of the revised VTTM. For reference, 47 oil wells have been verified and surveyed within the property line of VTTM 61105 and four oil wells have been verified and surveyed in close proximity to the grading footprint for VTTM 61105 shown on Sheets 3 to 8 of 12 of the VTTM.

Based upon the latest data provided to our office by Rachel Cook of Gatzke, Dillon and Ballace, LLP, the following 47 oil wells are located within the property boundary, and their surveyed locations are shown on Sheets 3 through 8 of 12 of the VTTM.

	Oil Wells	Identification Status
1	Exxon Mobil Corp. -- "NL&F Co. #1"	ID: On-site
2	Exxon Mobil Corp. -- "NL&F Co. #3"	ID: On-site
3	Exxon Mobil Corp. -- "NL&F Co. #4"	ID: On-site
4	Exxon Mobil Corp. -- "NL&F Co. #5"	ID: On-site
5	Exxon Mobil Corp. -- "NL&F Co. #6"	ID: On-site
6	Exxon Mobil Corp. -- "NL&F Co. #7"	ID: On-site
7	Exxon Mobil Corp. -- "NL&F Co. #8"	ID: On-site
8	Exxon Mobil Corp. -- "NL&F Co. #10"	ID: On-site
9	Exxon Mobil Corp. -- "NL&F Co. #11"	ID: On-site
10	Exxon Mobil Corp. -- "NL&F Co. #12"	ID: On-site
11	Exxon Mobil Corp. -- "NL&F Co. #13"	ID: On-site
12	Exxon Mobil Corp. -- "NL&F Co. #14"	ID: On-site
13	Exxon Mobil Corp. -- "NL&F Co. #15"	ID: On-site
14	Exxon Mobil Corp. -- "NL&F Co. #16"	ID: On-site
15	Exxon Mobil Corp. -- "NL&F Co. #17"	ID: On-site
16	Exxon Mobil Corp. -- "NL&F Co. #19"	ID: On-site
17	Exxon Mobil Corp. -- "NL&F Co. #20"	ID: On-site
18	Exxon Mobil Corp. -- "NL&F Co. #21"	ID: On-site
19	Exxon Mobil Corp. -- "NL&F Co. #22"	ID: On-site
20	Exxon Mobil Corp. -- "NL&F Co. #23"	ID: On-site
21	Exxon Mobil Corp. -- "NL&F Co. #24"	ID: On-site
22	Exxon Mobil Corp. -- "NL&F Co. #25"	ID: On-site

APPENDIX C

	OIL WELLS	IDENTIFICATION STATUS
23	Exxon Mobil Corp. -- "NL&F Co. #26"	ID: On-site
24	Exxon Mobil Corp. -- "NL&F Co. #27"	ID: On-site
25	Exxon Mobil Corp. -- "NL&F Co. #28"	ID: On-site
26	Exxon Mobil Corp. -- "NL&F Co. #29"	ID: On-site
27	Exxon Mobil Corp. -- "NL&F Co. #30"	ID: On-site
28	Exxon Mobil Corp. -- "NL&F Co. #32"	ID: On-site
29	Exxon Mobil Corp. -- "NL&F Co. #33"	ID: On-site
30	Exxon Mobil Corp. -- "NL&F Co. #34"	ID: On-site
31	Exxon Mobil Corp. -- "NL&F Co. #39"	ID: On-site
32	Exxon Mobil Corp. -- "NL&F Co. #40"	ID: On-site
33	Exxon Mobil Corp. -- "NL&F Co. #41"	ID: On-site
34	Exxon Mobil Corp. -- "NL&F Co. #42"	ID: On-site
35	Exxon Mobil Corp. -- "NL&F Co. #46"	ID: On-site
36	Exxon Mobil Corp. -- "NL&F Co. #49"	ID: On-site
37	Exxon Mobil Corp. -- "NL&F Co. #56"	ID: On-site
38	Exxon Mobil Corp. -- "NL&F Co. #58"	ID: On-site
39	Exxon Mobil Corp. -- "NL&F Co. #59"	ID: On-site
40	Exxon Mobil Corp. -- "NL&F Co. #63"	ID: On-site
41	Exxon Mobil Corp. -- "NL&F Co. #64"	ID: On-site
42	Exxon Mobil Corp. -- "NL&F Co. #65"	ID: On-site
43	Exxon Mobil Corp. -- "NL&F Co. #66"	ID: On-site
44	Exxon Mobil Corp. -- "NL&F Co. #67"	ID: On-site
45	Exxon Mobil Corp. -- "NL&F Co. #71"	ID: On-site
46	Exxon Mobil Corp. -- "NL&F Co. #72"	ID: On-site
47	Exxon Mobil Corp. -- "NL&F Co. #76"	ID: On-site

The following oil well is located within the proposed grading footprint, but is not within the property boundary. The surveyed location of the oil well is shown on Sheet 5 of 12 of the VTTM.

	OIL WELLS	IDENTIFICATION STATUS
	Exxon Mobil Corp. -- "NL&F Co. #31"	Within proposed Magic Mountain Parkway, just east of intersection with proposed Westridge Parkway (Sheet 5 of 12).

APPENDIX C

The following three oil wells are located outside of the property boundary and the proposed grading footprint, but are near the proposed grading footprint. The surveyed locations are shown on Sheets 3, 5 and 7 of 12 of the VTTM.

	OIL WELLS	IDENTIFICATION STATUS
	Exxon Mobil Corp. -- "NL&F Co. #35"	Located 50 ft from toe of fill slope on Sheet 5 of 12. Probably will not be impacted by proposed grading operations.
	Exxon Mobil Corp. -- "NL&F Co. #48"	Located 15 ft from debris catchment swale and 30 ft from toe of proposed fill slope (Sheet 7 of 12) east of Westridge Parkway in an area of recommended alluvial removals 10-20 ft deep. May be impacted by grading operations.
	Exxon Mobil Corp. -- "NL&F Co. #69"	Located 55 ft from access road to Water Quality Basin on Sheet 3 of 12. Probably will not be impacted by proposed grading operations.

Sheets 11 and 12 of 12 (Utility Corridor)

We have preliminarily shown six oil wells in the area of topographic coverage shown on Sheets 11 and 12 of 12 (utility corridor). These approximate locations were obtained from the Division of Oil, Gas and Geothermal Resources (DOGGR) Map No. 253. Four of these wells appear to be outside of the area that will be impacted by proposed grading for the proposed borrow site for the utility corridor. The locations and abandonment status of these oil wells needs to be verified.

	OIL WELLS	APPROXIMATE LOCATION AND REMARKS
	Texaco E & P Inc. 'Newhall' 1	100 ft outside of proposed grading area.
	Texaco E & P Inc. 'NL & F' 2	130 ft outside of proposed grading area.
	Exxon Mobile Corp. 'Newhall Land and Farming Co.' 2	Within proposed borrow site grading area
	Exxon Mobile Corp. 'Newhall Land and Farming Co.' 9	50' outside of proposed borrow site grading area
	Exxon Mobile Corp. 'Newhall Land and Farming Co.' 50	300' outside of proposed grading area.
	Exxon Mobile Corp. 'Newhall Land and Farming Co.' 77	Directly adjacent to proposed borrow site grading area.

Geologic/Geotechnical Evaluation for Environmental Impact Report,
Vesting Tentative Tract Map No. 61105, March 31, 2010

GEOLOGIC/GEOTECHNICAL EVALUATION FOR

ENVIRONMENTAL IMPACT REPORT

VESTING TENTATIVE TRACT MAP NO. 61105

MISSION VILLAGE, NEWHALL RANCH

LOS ANGELES COUNTY, CALIFORNIA

FOR

NEWHALL LAND AND FARMING COMPANY

MARCH 31, 2010

JOB NO. 94-502-52

RTF&A

GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

March 31, 2010

Newhall Land and Farming Company
23823 West Valencia Boulevard
Valencia, California 91355

Job No. 94-502-52

Attention: Mr. Corey Harpole

Ladies/Gentlemen:

We are pleased to submit our "Geologic/Geotechnical Evaluation for Environmental Impact Report, Vesting Tentative Tract Map No. 61105, Mission Village, Newhall Ranch, Los Angeles County, California." The location of the site is shown on the Site Location Map, Figure 1. The scope of our services was planned in consultation with Mr. Corey Harpole of Newhall Land and Farming Company, in accordance with our proposal dated December 14, 2009 (Proposal No. P112(A)-2009-52).

Our evaluation is provided for incorporation into an Environmental Impact Report for the Mission Village project and includes a discussion of the site geologic and geotechnical conditions, and their impact, on future site development.

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Should you have any questions regarding this project, please do not hesitate to call our office.

Respectfully submitted,

R. T. FRANKIAN & ASSOCIATES

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Principal Geotechnical Engineer

and: Timothy P. Latiolait
Principal Engineering Geologist

TPL/AWR/cma

Distribution: (1) Newhall Land & Farming Company
Attn: Mr. Corey Harpole
("wet-signed", stamped copy with 1 CD of pdf file)
(1) Impact Sciences, Inc.
Attn: Ms. Susan Tebo

RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

Newhall Land and Farming Company
March 31, 2010
94-502-52

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GEOLOGIC/GEOTECHNICAL EVALUATION FOR

ENVIRONMENTAL IMPACT REPORT

VESTING TENTATIVE TRACT MAP NO. 61105

MISSION VILLAGE, NEWHALL RANCH

LOS ANGELES COUNTY, CALIFORNIA

MARCH 31, 2010

JOB NO. 94-502-52

INTRODUCTION

This report presents the results of R.T. Frankian & Associates' (RTF&A) evaluation of the geologic and geotechnical conditions within Vesting Tentative Tract Map No. 61105 (VTTM 61105), Mission Village, Newhall Ranch, Los Angeles County, California. The purpose of the evaluation is to assess the impact of the geologic/geotechnical conditions on future site development. This data is provided for incorporation into an Environmental Impact Report (EIR).

RTF&A performed a geotechnical plan review of the 100-scale revised Vesting Tentative Tract Map (RTF&A, 2009c). The RTF&A review was based on the November 24, 2009 *Vesting Tentative Tract Map No. 61105*, prepared by Psomas. Previous geotechnical plan reviews were conducted by Allan E. Seward Engineering Geology, Inc. (AES) (AES, 2004b, 2004d, 2005b, 2007c, and 2008a). .

The findings, conclusions, and recommendations presented in this report are based on previous geotechnical plan reviews, results of a review of published data, and appropriate engineering and geologic analyses. The assessment of general site

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conditions for the presence of contaminants in the soils and groundwater was beyond the scope of this investigation. A previous environmental site assessment was performed by BA Environmental (2005).

Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report has been prepared for Newhall Land and Farming Company and their design consultants, to be used solely for planning and design of VTTM 61105.

SITE DESCRIPTION

VTTM 61105 (herein referred to as "the tract map site") and the immediately adjacent off-site improvement areas (Magic Mountain Parkway extension; Media Center Drive re-alignment; Westridge Parkway and Commerce Center Drive grading, debris basins, water quality basin; and Lion Canyon drainage, miscellaneous off-site grading, and water tanks), are located in the eastern portion of Newhall Ranch, Los Angeles County, California. The tract map site, covering approximately 1,262 acres, is bounded by the Santa Clara River on the north and northwest, Magic Mountain Theme Park (Parcel Map 12337) and VTTM 53295 on the west, VTTM 061996 on the south, and VTTM 060678 on the southwest. Tract map site elevations range from 940 feet above mean sea level (msl), along the Santa Clara River, to 1,510 feet msl in the southern portion of the tract map site. The topography in the northern and western portions of the tract map site, along the Santa Clara River, is dominated by gently sloping mesas bordered by steep bluffs (including Airport Mesa and Exxon

Mesa), and northwesterly-draining canyons (see the Site Location Map, Figure 1). The central and eastern portions of the tract map site are characterized by moderate to moderately steep, north- to northeast-trending bedrock ridges and intervening canyons (including the northerly-draining Magic Mountain Canyon along the eastern site boundary).

The site is largely undeveloped with the exception of roads and pads associated with past site usages that have included cattle grazing, agricultural activities, and petroleum exploration. Near-vertical or very steep cut slopes are commonly associated with several of the former oil well drilling pads. Vegetation within the tract map site includes native grasses, scrub, and chaparral, as well as oak trees.

PROPOSED DEVELOPMENT

The tract map site will be developed for residential and commercial use, with associated infrastructure. Included in the development will be an elementary school, library, park sites, a water tank site, water quality basins, a fire station, and a spineflower preserve. Major roadways will include the extensions of Magic Mountain Parkway, Westridge Parkway, and Commerce Center Drive through the tract map site. Portions of these roadways extend off site and will be graded as part of the tract map site development. Development of the tract map site will include off-site improvements. These will consist of improvements that are immediately adjacent to the tract map site, such as debris basins, water quality basin, Lion Canyon drainage, water tanks, and miscellaneous off-site grading.

Other improvements associated with the tract map site development will be a Utility Corridor and a Southern California Edison (SCE) Substation. The proposed

Utility Corridor will be located within VTTM 53108 (Landmark Village), along the south side of Highway 126, and extend approximately four miles from Chiquito Canyon on the west to Travel Village on the east. The Utility Corridor development will include cut-and-fill slopes on the order of 30 feet high. The SCE Substation will be located southwest of the VTTM 61105 tract map site boundaries. Two substation alternatives are being considered, both of which will consist of a building pad encompassing approximately 67,500 square feet. Cut slopes up to 150 feet high and fill slopes on the order of 40 feet are proposed for Alternative 1. The maximum proposed cut slope for Alternative 2 will be approximately 130 feet in height; the maximum fill slope is proposed to a height of 60 feet.

Conventional cut-and-fill grading will be used to develop level building pads. The maximum anticipated cut slope is approximately 140 feet high; the highest proposed fill slope is approximately 130 feet high.

GEOLOGY

REGIONAL GEOLOGY

The tract map site is located in the eastern Ventura basin within the Transverse Ranges geomorphic province of California. The Ventura basin consists of a narrow, elongate sedimentary trough extending from the Santa Barbara Channel on the west, to the San Gabriel fault on the east. The axis of the trough trends east-west, reflecting the overall east-west trend of the Transverse Ranges, and generally coincides with the Santa Clara River Valley and the Santa Barbara Channel. The Ventura basin has been an area of subsidence and sediment accumulation since the

beginning of the Tertiary period, with the present trough-like form developing near the beginning of the Miocene epoch (Winterer and Durham, 1962).

The structure of the basin is defined as a highly folded "synclinorium" formed by north-south compressional forces (Kew, 1924) and containing a maximum 50,000± feet of marine and nonmarine Tertiary through Quaternary age sediments (Bailey and Jahns, 1954). Two main periods of general deformation of the Ventura basin are indicated by the regional geologic structure: one in middle to late Miocene (represented by deposition of the Modelo Formation), and the other during the Pleistocene epoch, after deposition of the Plio-Pleistocene Saugus Formation (Kew, 1924; Winterer and Durham, 1962; Yeats et al., 1994). The flanks of the Ventura basin synclinorium are broken by a series of large reverse/thrust faults including the Santa Susana and Oak Ridge faults on the southern flank, and the Red Mountain and San Cayetano faults on the northern flank (Bailey and Jahns, 1954; Yeats et al., 1994). The San Gabriel fault, the dominant geologic feature in the Santa Clarita Valley, forms the eastern Ventura basin boundary, and separates the Ventura basin from the structurally similar Soledad basin.

Sedimentary rock units comprising the eastern Ventura basin include approximately 2,000 feet of undifferentiated middle to late Eocene age rocks; 1,000± feet of the middle Miocene age Topanga Formation; 5,000± feet of the late Miocene age Modelo Formation; 4,000± feet of the late Miocene to early Pliocene age Towsley Formation; 5,000± feet of the Pliocene age Pico Formation; and 7,000± feet of the Plio-Pleistocene Saugus Formation (Winterer and Durham, 1962). The undifferentiated Eocene units and the Topanga, Modelo, Towsley, and Pico Formations are composed of marine sediments; the Saugus Formation is composed of

interfingering shallow-water marine, brackish water, and nonmarine units (Kew, 1924; Winterer and Durham, 1962). These Tertiary period rock units rest unconformably on pre-Cretaceous age metamorphic and igneous basement rocks of the San Gabriel Mountains.

Within the Santa Clarita Valley, the primary sedimentary rock formations are the Pico and Saugus Formations. The Pico Formation outcrops along the northern flanks of the Santa Susana Mountains and in the Chiquita Canyon-Val Verde area. The Saugus Formation overlies the Pico Formation and comprises most of the hills of the valley between Newhall and Castaic. These two formations have been deformed into a series of closely spaced anticlines and synclines whose moderately- to steeply-dipping flanks are broken by the Holser fault and cut off diagonally by the San Gabriel fault (Bailey and Jahns, 1954). Other geologic materials exposed within the valley include Pleistocene fanglomerate deposits exposed in the southern portion of the valley, sporadic remnant terrace deposits of Pleistocene age, and Holocene alluvium mantling the valley floor.

The regional geologic conditions are indicated on the Regional Geologic Map, modified from Dibblee (1993 and 1996), and presented as Figure 2.

SITE GEOLOGY

General: Geologic conditions within the Mission Village tract map site boundaries have been previously evaluated by AES (2004b, 2004d, 2005b, 2007b, and 2008a). Additional geologic data was collected by RTF&A (2009b and 2010). Representative structural geologic data (i.e. bedding, faults, etc.), presented in the AES boring logs and maps are included on the Geologic Map (Figure 3).

The geologic conditions along the off-site Utility Corridor were addressed by AES in their reports dated May 25, 2007 and December 21, 2009 (AES, 2007a and 2009). The geologic conditions for both SCE off-site substation alternatives were evaluated by Leighton and Associates, Inc. (Leighton) and addressed in their March 16, 2010 report (Leighton, 2010).

A listing of the technical reports reviewed as part of this EIR evaluation is presented in the "References" section of the report.

Geologic Units: The geologic units within the tract map site have been previously explored and described by AES. The geologic materials consist of bedrock of the Saugus Formation, terrace deposits, landslide deposits, slope wash deposits, alluvium, and man-made fill. The geologic units are depicted on the Geologic Map, Figure 3. A description of each unit is presented as follows:

Saugus Formation (TQs): The tract map site is underlain by the Plio-Pleistocene age Saugus Formation. This formation is comprised of sedimentary rock units deposited in a fluvial environment approximately 700,000 to 2.5 million years before present (Levi et al., 1986). Saugus Formation units consist of poorly to moderately well bedded, light gray to yellowish gray, very fine- to coarse-grained sandstone, silty sandstone, and pebbly sandstone with moderate brown to reddish brown siltstone, mudstone, and, to a lesser extent, claystone. Sandstone units range from thinly laminated to thickly bedded. The siltstone units are typically massive. The hardness of the Saugus Formation ranges from friable to moderately hard.

Terrace Deposits (Qt): Late Pleistocene age terrace deposits are present within the tract map site and include the mesa-forming deposits bordering the Santa Clara River (Airport Mesa and Exxon Mesa), as well as the extensive terrace deposits

located along the future Magic Mountain Parkway extension. The terrace deposits capping Airport Mesa are believed to have been deposited in a fluvial environment; the terrace deposits exposed on Exxon Mesa and in the area of future Magic Mountain Parkway were deposited as alluvial fans emanating from the Santa Susana Mountains (AES, 2004b). The terrace deposits are composed of light brown to yellowish brown sand and silty sand/sandy silt with minor pebbly sand interbeds and a cobble- to locally boulder-rich layer near the base of the deposits.

Landslide Deposits (Qls): AES (2004b) identified 52 landslides within the tract map site. The landslides, for the most part, consist of translational slides that failed along a weak, unsupported bedding surface within Saugus Formation units. As such, the landslide deposits are typically composed of disturbed Saugus Formation units (i.e., sandstone, siltstone, and mudstone) that can range from highly weathered/altered rock to relatively competent materials. According to AES (2004b), most of the landslides within the site are believed to be pre-Holocene age (greater than 11,000 years old).

Slope Wash Deposits(Qsw): Slope wash deposits consist of generally structureless and incoherent deposits of soil and rock material that accumulate at the base of the slopes and at the head of tributary canyons. Within the tract map site, these deposits are composed of unconsolidated silty sand/sandy silt with gravel and some cobbles.

Alluvium (Qal): Holocene age alluvium, including recent river channel deposits of the active Santa Clara River stream course and adjacent flood plain deposits, are present within the confines of the Santa Clara River bed, and in the

tributary drainages that feed the river. The alluvial deposits are composed of interbeds of sand, silt, and gravel.

Residual Soil: Residual soil (not shown on the Geologic Map) has developed as a mantle over much of the natural, moderate to gentle slopes within the site. The residual soil generally consists of silty sand/sandy silt to sandy and silty clay deposits.

Man-made Fill (af & cef): Man-made fill includes both uncompacted artificial fill (af) associated with past agricultural and petroleum activities on site, and engineered fill in the southeast corner of the tract map site, placed as part of the Westridge development (Tract No. 45433). The man-made fill is composed primarily of reworked Saugus Formation materials and terrace deposits.

Geologic Structure: The tract map site lies within the tectonically active Transverse Ranges of southern California. North-south compressional forces acting within the Santa Clarita Valley and Ventura basin have produced a series of east-west to northwest trending faults and folds within the tract map site and adjacent areas. Specifically, the Saugus Formation on site has been deformed into a series of east- to southeast-plunging folds with local faulting. The folding and faulting is evident in the Airport Mesa area, in the northern portion of the tract map site, where two faults (designated the Airport Mesa and Saddle faults) and a series of folds (including the Airport Mesa anticline, Airport Mesa syncline, and Saddle syncline) transect the mesa. The approximate location of the faults and fold axes, are shown on the Geologic Map, presented as Figure 3.

GROUNDWATER

The site is located in Township 4 North, Range 16 West, Sections 18 and 19; and Township 4 North, Range 17 West, Sections 13 and 24, within the Eastern Hydrologic Subarea of the Upper Santa Clara River watershed of Los Angeles County. Within the tract map site, groundwater occurs in the alluvial deposits within the Santa Clara River and major tributary canyons, and within the aquifers of the Saugus Formation.

The Water Resources Division of Los Angeles County Department of Public Works (LACDPW) has periodically measured groundwater levels in water wells within the vicinity of the site. Specifically, four water wells, established within the alluvial aquifer, have been monitored by LACDPW since 1942. The wells are designated by LACDPW as Well Nos. 6995D, 6986, 6976A, and 6977C. These four wells are or were located north of the tract map site, within the confines of the Santa Clara River/Castaic Creek flood plain, from Castaic Junction on the east to the confluence of the Santa Clara River with Castaic Creek on the west.

LACDPW water level measurement records for Well No. 6995D, established at a ground surface elevation of 1,013.4 feet msl, date back to February, 1970. The highest observed water level in the well was 6.6 feet below ground surface (corresponding to a water surface elevation of 1,006.8 feet msl), measured on March 17, 1978. The most recent recorded water level from the well was 13.0 feet (water surface elevation of 1,000.4 feet msl), measured on November 22, 2005. Well No 6995D, formerly located near the intersection of The Old Road and Henry Mayo Drive, was destroyed in 2006.

Well No. 6986, established at a ground surface elevation of 985.8 feet msl, is located along the north side of Henry Mayo Drive, between The Old Road and Commerce Center Drive. LACDPW water level measurement records for this well date back to November, 1942. The highest observed water level in the well was 8.1 feet below ground surface (corresponding to a water surface elevation of 977.9 feet msl), measured on April 20, 1945. The most recent recorded water level from the well was 23.3 feet (water surface elevation of 962.5 feet msl), measured on February 26, 2007.

Well No. 6976A is located along Henry Mayo Drive, approximately ¼-mile west of Commerce Center Drive. The well was established at a ground surface elevation of 982.0 feet msl and has been monitored by LACDPW since June, 1966. The highest observed water level in the well was 9.0 feet below ground surface (corresponding to a water surface elevation of 973.0 feet msl), measured on December 15, 1966. The most recent recorded water level from the well was 24.6 feet (water surface elevation of 957.4 feet msl), measured on November 13, 2006.

Well No. 6977C, established at a ground surface elevation of 957.4 feet, is located approximately 100 feet south of Henry Mayo Drive within the Castaic Creek flood plain. LACDPW water level measurement records for this well date back to November, 1971. The highest observed water level in the well was 15.3 feet below ground surface (corresponding to a water surface elevation of 942.1 feet msl), measured on April 19, 1978. The most recent recorded water level from the well was 25.9 feet (water surface elevation of 931.5 feet msl), measured on December 1, 2005.

A spring exists near the mouth of Middle Canyon, where shallow groundwater occurs in the alluvium and at greater depths in the bedrock (AES, 2004b).

Piezometers installed within Middle Canyon encountered groundwater approximately 15 feet below ground surface near the canyon mouth, and at 35 feet approximately 1,500 feet upstream from the mouth in 2004 (AES, 2004b). Groundwater was also encountered in bedrock at depths of 40 and 49 feet in two borings excavated near the mouth of Middle Canyon. AES (2004b) attributes the spring and elevated water table in Middle Canyon to a groundwater barrier created by the juxtaposition of coarse-grained alluvium and bedrock against lower permeability materials along the Airport Mesa and/or Saddle faults.

No significant groundwater was encountered in other borings or test pits located within the remaining areas of the tract map site.

GEOLOGIC AND GEOTECHNICAL HAZARDS

GENERAL

Potential geologic and geotechnical hazards include, but are not limited to, primary earthquake hazards (ground shaking and ground rupture), secondary earthquake hazards from earthquake ground shaking (such as liquefaction, tsunamis, and seiches), and landslides/slope instability. Earthquakes have the potential to inflict the greatest loss of life and property damage. Consequently, the location of a site to active or potentially active faults is a key element in assessing the potential for earthquake damage.

The major cause of damage from earthquakes is generally the result of strong ground shaking from movement along a fault or fault zone. Ground shaking could occur not only immediately adjacent to the earthquake epicenter, but within areas for many miles in all directions. Damage due to actual fault displacement or ground

rupture beneath a structure may also occur; however, fault ground rupture is much less common, and typically confined to areas along, or immediately adjacent to, the fault surface trace.

Landslides are common hazards in southern California, particularly in hillside areas underlain by sedimentary rock units. Landslides can occur in terrain ranging from vertical cliffs to slopes as gentle as one or two degrees. Materials on slopes that are subject to landsliding include rock, soil, artificial fill, or combinations of these.

FAULTS

Earthquakes result from movement along faults or volcanic activity. In California, earthquakes are more commonly associated with faults or fault zones; the southern California region is historically seismically active. The numerous faults in California include both active and potentially active faults. In accordance with criteria established by the California Geological Survey (CGS), formerly known as California Division of Mines and Geology (CDMG), for the Alquist-Priolo Earthquake Fault Zoning program (Hart and Bryant, 1999), a fault can be considered active if it has demonstrated movement within the Holocene epoch, or approximately the last 11,000 years. Faults that have demonstrated Quaternary movement (last 1.6 million years), but lack strong evidence of Holocene movement, are classified as potentially active. Faults that have not moved since the beginning of the Quaternary period are deemed inactive.

No known active faults underlie the site, and the site is not within an Alquist-Priolo Earthquake Fault Zone, as established by CGS. The closest active (and zoned) fault to the site is the San Gabriel fault, located approximately two miles to the

northeast. In our opinion, there is little probability of surface rupture due to faulting occurring on site during the design life of the project.

A discussion of nearby active and potentially active faults is presented in the following sections. The location of the site, relative to nearby active and potentially active faults, is illustrated on the Regional Fault Map (Figure 4).

Active Faults: The site is located within an area potentially susceptible to severe ground shaking, due to the close proximity of several active faults, including the San Gabriel, Oak Ridge, Santa Susana, and San Cayetano faults.

San Gabriel Fault: The nearest active fault is the San Gabriel fault, located approximately two miles northeast of the tract map site. The San Gabriel fault extends approximately 90 miles through the Transverse Ranges of southern California. The San Gabriel fault consists of a zone of imbricate steeply north-dipping faults. Throughout most of its extent, the fault has strong geomorphic expression, with the faults comprising the zone characterized by displaced geologic units, deflected drainages, strike valleys, notched ridges, subparallel faulting, fracturing, and folding (Oakeshott, 1958; Wentworth and Yerkes, 1971).

Within the Santa Clarita Valley, from Castaic Creek to the San Gabriel Mountains, the fault crosses the Castaic lowlands and the Santa Clara River, where its course is marked by a belt of braided small faults and steep dips in Pliocene and Pleistocene beds. Since most of the displacement within the fault zone took place before deposition of these geologically young beds, the fault's trend through this area is not nearly as conspicuous as within the rocks along the southwestern margin of the Ridge basin or in the basement rocks of the San Gabriel Mountains (Crowell, 1982). The location of the fault, however, is somewhat defined by the steeply-dipping and

folded beds of the Plio-Pleistocene Saugus Formation, and the fault is exposed in cut slopes, roadcuts, and trenches.

Prior to 1979, most geologists studying the San Gabriel fault acknowledged that late Pleistocene (approximately the past 100,000 years) activity along the fault zone was probable, but evidence for possible Holocene activity was judged to be very questionable (Kahle, 1986). However, after completing a geologic and geomorphic investigation of the San Gabriel fault, Weber (1979) concluded that some evidence strongly suggested Holocene activity. Subsequently, Cotton and Seward (1984) conducted exploratory trenching along segments of the fault zone in the Santa Clarita Valley. Although no surface evidence of faulting was recognized, at least two trenches revealed displacement of Holocene age alluvial deposits. Radiocarbon analyses of detrital charcoal from faulted alluvial materials in a trench excavated in Rye Canyon yielded an age of 3,500±250 years before present. Alluvium dated as 1,550±190 years before present was shown to be unfaulted in the same trench, establishing limits of latest movement on the Castaic-Bouquet Junction segment of the San Gabriel fault.

Based on the findings of Weber (1979), Cotton and Seward (1984), and the recommendations of Kahle (1986) for a CDMG Fault Evaluation Report for the fault, the State Geologist established an Alquist-Priolo Earthquake Fault Zone within the Newhall Quadrangle for the San Gabriel fault in 1987.

Oak Ridge Fault: The Oak Ridge fault is a south-dipping reverse fault that forms a ridge to the south of its trace. The fault extends for a distance of approximately 56 miles from Piru on the east to offshore, at a point about 20 miles south of Santa Barbara. The onshore segment of the Oak Ridge fault is roughly

parallel to both the Santa Clara River and State Highway 126. The offshore segment is associated with a definite zone of active seismicity (Southern California Earthquake Data Center [SCEDC], 2010); the only known Holocene surface rupture is found onshore, between the towns of Bardsdale and Fillmore (Yeats et al., 1986; Powell, 1991).

At its eastern end, the Oak Ridge fault appears to be overthrust by the Santa Susana fault, becoming a "blind thrust fault" (SCEDC, 2010). The fault associated with the 1994 Northridge earthquake is probably associated with the Oak Ridge fault system. At its closest point, the Oak Ridge fault is situated approximately five miles west of the tract map site.

Santa Susana Fault: The Santa Susana fault, located approximately 5.2 miles south-southwest of the tract map site, consists of a complex zone of primarily north-dipping thrust faults. The fault zone extends northeastward from the Santa Susana Mountains across San Fernando Pass, and into the San Gabriel Mountains. A short segment of the Santa Susana fault ruptured during the 1971 San Fernando earthquake (SCEDC, 2010); however, the remainder of the fault zone has not demonstrated displacement since late Pleistocene time (Slosson and Barnhart, 1967).

San Cayetano Fault: The San Cayetano fault is an east-west trending, north-dipping thrust fault that extends approximately 28 miles from the foothills north of Piru to the southeastern edge of Ojai Valley. Weber et al. (1973) and Kahle (1985) suggest that Holocene fault activity is indicated by well-defined fault scarps and off-set Holocene alluvial and colluvial sediments. The San Cayetano fault is located approximately 8.4 miles west-northwest of the tract map site.

Other Active Faults: Other more distant, but significantly active, faults include the San Fernando fault zone, located approximately 9.5 miles southeast of the site, and the San Andreas fault zone, located approximately 20 miles to the northeast.

Potentially Active Faults: Potentially active faults on or near the site include the Airport Mesa and Saddle faults, located beneath Airport Mesa, and the Holser fault, which is approximately ½-mile north of the site.

Airport Mesa and Saddle Faults: Previous geologic mapping by Weber (1979 and 1982) identified two faults as extending east-west across Airport Mesa within the tract map site. AES conducted a site-specific fault rupture hazard investigation for the tract map site with the intent of evaluating the existence of any fault-related features or "lineaments" in the Airport Mesa area. They investigated three "lineaments" that correspond to the two known faults (the Airport Mesa and Saddle faults), and one fold (the Airport Mesa anticline). Their purpose was to determine the significance, lateral extent, and activity of these structural geologic features from a standpoint of potential surface fault rupture hazard on future development. AES determined that the area between the two faults has been uplifted as a block at least 40 feet as a result of folding and reverse faulting; the Pleistocene age terrace deposits overlying the Saugus Formation have also been deformed along the Airport Mesa and Saddle faults. AES concluded that the faults have demonstrated movement within at least the last 100,000 years but, due to a lack of datable soil horizons, failed to unequivocally establish that the faults have moved in the last 11,000 years. By definitions established by CDMG, the Airport Mesa and Saddle faults are considered potentially active.

Although AES could not definitively conclude that the faults were active, they recommended building setbacks from the Airport Mesa and Saddle faults. Furthermore, they also recommended a building setback from the Airport Mesa anticline, based on the identification of faults in terrace deposits overlying the anticline. AES also recommended zones of restricted development and structural mitigation for the area between the two faults, in the area between the Airport Mesa fault and the Airport Mesa anticline, and for 100 feet beyond the recommended building setbacks "because of the potential for sympathetic movement." These zones were delineated to restrict construction of critical facilities or essential services buildings (i.e., schools, fire stations, hospitals, etc.). The overall width of the AES proposed building setbacks and zones of restricted development measures approximately 500 to 1,200 feet.

RTF&A (2009b) evaluated the building setbacks recommended by AES to compare their findings and setback recommendations to current regulatory standards, assess the AES interpretations with more recent findings of investigations on the nearby Holser fault, and determine if setbacks established by AES for the features they designated as the "Airport Mesa Lineament", "Saddle Lineament", and "Airport Mesa anticline" may be modified or eliminated. RTF&A concluded that:

- the Airport Mesa fault, Saddle fault, and Airport Mesa anticline (herein collectively referred to as the Airport Mesa structural zone) are not located within an Alquist-Priolo Earthquake Fault Zone or designated as active by the Los Angeles County Safety Element (LASCE);

- unlike ground rupture identified in Stevenson Ranch following the 1994 Northridge earthquake, there is no data or reports of earthquake ground

rupture features occurring on the Airport Mesa structural zone following the 1971 San Fernando or 1994 Northridge earthquakes;

- the Airport Mesa structural zone may be age equivalent with the nearby Holser fault, which has been determined by Geolabs (2007b) as falling within the 40,000 to 100,000 before present age range;

- the AES exploration failed to identify any evidence of surface fault rupture or fault activity younger than 11,000 years. Therefore, by criteria established for the Alquist-Priolo Earthquake Fault Zoning Act (A-P Act) by the State Geologist, and the LACSE, the faults and folds comprising the Airport Mesa structural zone are not active geologic structures;

- the Airport Mesa structural zone has demonstrated movement in late Quaternary time, but not Holocene time, and by definition is considered potentially active. There is no requirement or precedent in the A-P Act or the LASCE for establishing building setbacks from potentially active faults; and

- the Airport Mesa anticline is a fold, not a fault. There is no requirement, nor precedent, in either the A-P Act or the LACSE for building setbacks for folds.

The potential for ground rupture occurring along the Airport Mesa and Saddle faults, and the Airport Mesa anticline, is considered unlikely during the design life of the project. There is no requirement for establishing building setbacks from potentially active faults for residential, commercial, or industrial structures. However, since Holocene displacement (fault movement within the last 11,000 years) cannot be entirely ruled out for the Airport Mesa and Saddle faults, due to a lack of datable soil horizons, RTF&A has conservatively established "Fault Building Setbacks" for the Airport Mesa and Saddle faults. The setbacks are depicted on the Geologic Map, Figure 3. In general, the fault setbacks measure approximately 50 feet on each side of the mapped fault traces, or any subsidiary faults, that have disrupted

the Pleistocene age terrace deposits. The fault setback distance of 50 feet is considered appropriate, based on a lack of demonstrative Holocene fault movement, and in consideration of the extensive subsurface investigation that defined the accurate locations of the faults.

The potential for fault surface rupture occurring on the Airport Mesa anticline is considered remote, as the anticline is not associated with Holocene or active faulting. Accordingly, no setback has been established for the Airport Mesa anticline.

Holser Fault: The potentially active Holser fault is situated approximately ½-mile north of the site. The Holser fault consists of a south-dipping, sharply folded reverse fault (Winterer and Durham, 1962) that trends east-southeast from near Piru Creek to at least Castaic Junction. The Holser fault post-dates deposition of the Pico Formation and is believed to be a "backthrust" of a subsurface thrust fault that represents the intersection of the San Cayetano and Santa Susana faults at depth (Yeats et al., 1994). Weber (1979) states that there is no clear evidence of Holocene activity along the Holser fault, but "plentiful evidence" that activity has occurred in the past 100,000 years. Geolabs (2007) recently conducted a surface fault rupture hazard assessment for the Holser fault within Parcel Map 18108, located northeast of Airport Mesa. Geolabs concluded that the last known movement on the Holser fault was approximately 40,000 to 100,000 years ago. Consequently, the fault is considered potentially active.

Blind-Thrust Faults: A growing body of geologic and seismologic data, supplemented by regional structural interpretations, suggests Pliocene to modern deformation in the Los Angeles basin is partly accommodated by developing basement-involved fold and thrust belts (Davis et al., 1989; Hauksson, 1990; Shaw

and Suppe, 1996). The fold and thrust belts are expressed at the ground surface by elongate, low-lying anticlinal ridges. At the core of these anticlinal ridges are low-angle, blind-thrust faults rising off a basal detachment surface. Recognized blind-thrust faults in the Los Angeles and Ventura basins include the Elysian Park, Compton-Los Alamitos, Oak Ridge, and Northridge blind-thrust faults.

The closest known blind-thrust to the site is the Northridge blind-thrust fault. The site, however, is not underlain by any known blind-thrust fault.

SEISMICITY

Historic Seismicity: The historic occurrence of earthquakes within the region of the site was determined using the program EQSEARCH for Windows (Blake, 2000a). This program computes and prints the epicentral distance from a selected site to each of the earthquakes within a specified search radius (100 miles). From the computed distances, the program also estimates the peak horizontal ground acceleration that may have occurred at the site, due to each earthquake, utilizing the Bozorgnia Campbell Niazi (1999) attenuation relation. The EQSEARCH output is presented in Appendix A.

We used a combined earthquake catalog for magnitude 4.0 or larger events between the years 1800 and 2005. The earthquake catalog for events prior to about 1932 is limited to the higher magnitude events. Using this catalog for probabilistic calculations would skew the results. A listing of historic earthquakes within 100 miles of the site is presented in Appendix A. An earthquake epicenter map for magnitude 5.0 or larger events between the years 1800 and 2005 is presented in Appendix A, which was obtained from the EQSEARCH output.

The closest recorded earthquake epicenter was located 1.7 miles from the site. This earthquake event occurred on July 22, 1999, with a measured magnitude (M) of 4.0. The calculated site-specific ground motion associated with this event was 0.108g. At least 17 events of M5 or greater have occurred within 15 miles of the site during the period of 1800 and 2008. These 17 events included the February 9, 1971 M6.4 San Fernando earthquake and the M6 Northridge earthquake. The San Fernando earthquake resulted in the largest recorded ground motion at the site, with the calculated site-specific ground motion measured at 0.207g. Ground motion at the site from the Northridge earthquake was 0.198g. The largest known earthquake event occurring within 100 miles of the site was the M7.9 Fort Tejon earthquake of January 9, 1857. The epicenter of this earthquake was approximately 91 miles from the site. The estimated site-specific ground motion from the Fort Tejon earthquake was 0.056g.

Published Geotechnical Reports: Accelerations for the site were previously determined by AES, as presented in their Review of Vesting Tentative Tract Map report (AES, 2004b) and utilized in their liquefaction evaluation. The ground accelerations were based on a 10 percent probability of exceedance in 50 years, in accordance with the 1998 California Building Code and LACDPW guidelines. The recommended average unweighted acceleration based on three attenuation relations is 0.88g. The recommended average acceleration weighted for a M7.5 earthquake based on the three attenuation relationships is 0.59g. The AES Calculated Accelerations obtained from Appendix D of the AES Review of Tentative Tract Map (AES, 2004b) is summarized in Figure 5.

Seismic Hazard Zone Mapped Accelerations: The CGS has prepared Seismic Hazard Zone (SHZ) Reports for the Newhall (CGS, 1997) and the Val Verde (CGS, 2002) Quadrangle. These reports include maps showing Peak Ground Accelerations (PGA) for a 10 percent probability of exceedance in 50 years for alluvial soil conditions. The reports also include an earthquake opportunity map with ground accelerations of 10 percent exceedance in 50 years magnitude weighted Pseudo-Peak Acceleration which are presented in Figures 6.1 and 6.2, respectively. Due to the relatively large size of the site, the acceleration varies for specific locations. For the subject site, the average PGA for alluvial conditions can be taken as approximately 0.76g. The average magnitude weighted Pseudo-Peak Acceleration can be taken as approximately 0.57.

The current 2007 California Building Code (CBC) and 2008 Los Angeles County Building Code prescribes different probability and return periods to be utilized in determining ground accelerations from what was used in developing the SHZ mapped accelerations. CGS Special Publication 117A recommends that the SHZ reports not be used to estimate ground shaking in the evaluation of ground failure hazards. However, the LACDPW letter titled "Review of Geotechnical Reports Addressing Liquefaction" dated February 24, 2009 (LACDPW, 2009) recommends the use of the CGS SHZ Reports to determine site accelerations.

California Building Code Seismic Design: Under Section 1613 Earthquake Loads of the CBC, the following coefficients and factors apply to seismic force design at the subject site. The ground motion parameters were determined using the Ground Motion Parameter Calculator at the United States Geological Survey (USGS) website. The PGA was determined in accordance with Section 1802.2.7 of the CBC.

Latitude	34.4301
Longitude	-118.5062
Site Class	D
Ss	2.236
S1	0.709
SMs	2.326
SM1	1.064
SDs	1.551
SD1	0.709
PGA = SDs/2.5	0.6204

Seismic Spectrum: The Design Response Spectrum from the USGS website is presented in Figure 7. The MCE Spectrum from the USGS website is presented in Figure 8. The Uniform Hazard Spectrum from the USGS website for a two percent probability of exceedance in 50 years is presented in Figure 9.

Deaggregation Seismic Source Parameters: The USGS website was used to determine the Probability Seismic Hazard Deaggregation for a 2,475-year return period for a site with Vs = 600 m/s. The graph from the USGS website is presented in Figure 10.

FRISK Site-Specific Ground Motion Analysis: The probabilistic MCE was determined in accordance with Section 21.2.1 of ASCE Standard 7-05 for five percent damped acceleration response spectrum having a two percent probability of exceedance within a 50-year period. The probabilistic MCE was determined with the program FRISK, using the Boz et al. (1999) and Campbell (1997 rev) H Qal attenuation relationships. The factors from Boz et al. (1999) and Campbell (1997) are summarized below and, where determined, based on the response spectrum curves presented in Appendix B.

Method	Boz et al.	Campbell
Sds	1.9	1.85
Sd1	1.25	0.93
Sms	2.85	2.78
Sm1	2.15	1.40

LIQUEFACTION

General: The State of California Seismic Hazard Maps for the Newhall and Val Verde Quadrangles (1997 and 2002, respectively) indicate that, within the site boundaries, the Santa Clara River and the major tributary canyons to the river are considered potential liquefaction areas.

Liquefaction may occur when saturated, loose to medium dense, cohesionless soils are densified by ground vibrations. The densification results in increased pore water pressures if the soils are not sufficiently permeable to dissipate these pressures during, and immediately following, an earthquake. When the pore water pressure is equal to or exceeds the overburden pressure, liquefaction of the affected soil layers occurs. For liquefaction to occur, three conditions are required:

- ground shaking of sufficient magnitude and duration;
- soils that are susceptible to liquefaction; and
- a groundwater level at or above the level of the susceptible soils during the ground shaking.

For a site to be considered susceptible to liquefaction using the criteria and methodology initially developed by Seed and Idriss (1982), liquefaction of underlying soil layers must result in an observed surface effect such as sand boils, mud-spouts, surface water seepage, ground cracking, or quicksand-like conditions.

Lateral spreading can result in ground cracking, and may occur when a site is sloped or is near a free-face and there is a sufficiently continuous liquefiable layer on which the overlying soils can move laterally.

Ground settlement may occur during seismic shaking of an area. The settlement can be caused by liquefaction of loose granular soils and by compaction of loose, but not necessarily liquefiable, soils.

Conclusions: The liquefaction potential of the site was evaluated by AES as presented in their Review of Vesting Tentative Tract Map report (AES, 2004b). The accelerations utilized by AES for their liquefaction analysis meet, or are in excess of, the values that are required to comply with the CBC, 2008 Los Angeles County Code, CGS SP 117a (2008), and LACDPW letter (LACDPW, 2009).

The liquefaction evaluation analysis by AES concluded that some relatively thin liquefaction-prone zones locally exist at the site at isolated depth intervals. Even though some thin deposits appear to be liquefiable, the potential seismically-induced settlements are small at most locations. The maximum cumulative calculated settlement after removals is 0.39 inches, and differential settlements due to liquefaction are not expected to be greater than 0.26 inches within a horizontal distance of 30 feet. Minimal lateral spreading due to liquefaction is expected at the subject site. The liquefaction evaluation of the site by AES was accepted in our referenced reports (RTF&A, 2009a and 2009c).

SLOPE STABILITY

General: Slope stability considerations include existing landslides, future cut-and-fill slopes, slopes that will remain natural at the completion of grading, and debris flows associated with natural slopes and rockfall hazard.

Landslides: AES (2004b) previously identified 52 landslides within the tract map site. 48 of the landslides will be completely removed as part of the site grading. Where necessary, engineered fill will be placed in the landslide removal areas to restore proposed slope and/or pad grades.

Of the remaining four landslides (designated by AES as Qls-XXXV, Qls-XXXVII, Qls-XLIII, and Qls-XLIV), three will be partially removed (Qls-XXXV, Qls-XLIII, and Qls-XLIV) until a competent, stable landslide configuration is achieved. It is estimated that at least 30 feet of the upper materials of these three landslides will need to be removed and replaced with engineered fill.

The southern portion of the fourth landslide (Qls-XXXVII) will be completely removed below the proposed building pad. Due to environmental constraints associated with the spineflower preserve, the northern portion of Qls-XXXVII will remain in place and be stabilized by a shear key and buttress fill slope. The remaining portion of this landslide will be placed within a Restricted Use Area.

Cut Slopes: Proposed site development will include the grading of 58 cut slopes. The cut slopes will be graded at inclinations of 2:1 (horizontal to vertical) to 3:1. All cut slopes exceeding 30 feet in height will be designed with terrace drains every 25 vertical feet. The maximum proposed cut slope is approximately 140 feet in height. 35 of the cut slopes will encounter adverse geologic conditions (i.e., unsupported geologic structure, landslides, weakly consolidated alluvial, and/or

artificial fill, etc.) requiring construction of buttresses or stabilization fills. Stabilization fills are also recommended to restore slope grades in areas of landslide removals.

Existing cut slopes associated with past petroleum and agricultural activities are present within the tract map site. These slopes, typically steeper than 1½:1, will be removed or re-graded as part of the site grading.

The proposed cut slopes will be grossly stable if graded in accordance with the recommendations of our Vesting Tentative Tract Map plan review (RTF&A, 2009c) and the project grading plan.

Fill Slopes: Proposed fill slopes will be graded at inclinations of 2:1 or flatter. All fill slopes exceeding 30 feet in height will be designed with terrace drains every 25 vertical feet. The maximum proposed fill slope height is approximately 130 feet. The proposed fill slopes will be grossly stable if graded in accordance with the recommendations of our Vesting Tentative Tract Map plan review (RTF&A, 2009c) and the project grading plan.

Natural Slopes: The natural slopes proposed for the tract map site have gradients ranging from ½:1 to 5:1, with the steepest slopes consisting of the bluffs along to the Santa Clara River. Natural slopes adjacent to future building pads were evaluated by AES (2004b). Where warranted for gross stability, building setbacks have been recommended that exceed the setback standards set forth in the Los Angeles County/California Building Code. The standard setbacks from grossly stable ascending and descending natural slopes provided in the Los Angeles County/California Building Code shall also be followed, where not superseded by the recommended building setbacks.

Debris Flow: Potential debris flow hazard exists anywhere that a moderate to thick accumulation of residual soil, slope wash, or weathered bedrock materials occur on moderate to steep descending slopes that border future building pads. Potential debris flow may be mitigated by one or a combination of the following measures:

- remove loose surficial material;
- construct diverter slough walls;
- construct an impact wall;
- construct debris basins;
- construct stabilization fill slopes;
- control run-off water; and
- plant selective deep-rooting vegetation.

The southerly portion of the tract map site, where steep natural slopes descend to the tract boundary, is the most susceptible to debris flow hazard. Previously, AES (2004b) identified five proposed lots along the southerly tract boundary as being susceptible to debris flow. The five lots were Lots 511, 512, 657, 658, and 659. Impact walls were recommended for Lots 511 and 512; a stability fill slope was recommended for Lots 657 through 659. The Vesting Tentative Tract Map has been revised since the 2004 AES investigation. The proposed grading within the area of the five lots has significantly changed, and the debris flow hazard eliminated by the proposed revised grading.

Potential debris flow should be further evaluated once a 40-scale rough grading plan has been developed for the tract map site. Appropriate mitigation measures can be provided for any additional debris flow areas identified on the rough grading plan.

Rockfalls: The tract map site is not located directly downslope of any potential rockfalls.

FLOODING

The Federal Emergency Management Agency (FEMA) Flood Insurance Maps for Los Angeles County (FEMA, 2008) identified three Special Flood Hazard Areas (SFHAs) within the tract map site. A SFHA is defined by FEMA as an area "subject to inundation by the 1% annual chance flood", or stated another way, an area susceptible to a 100-year flood. The three SFHAs are the Santa Clara River (designated as "Zone AE"), Middle Canyon ("Zone A"), and the remaining upland area of the tract map site ("Zone D"). Zone AE is an area in which the base flood elevation is determined, which in the case of the Santa Clara River is elevations 961 feet msl to 1,013 feet msl, from west to east. Zone A is an area of undetermined base flood elevation. Zone D is defined as "areas in which flood hazards are undetermined, but possible."

Development of the tract map site will be above the Santa Clara River, including the Commerce Center Drive bridge, which will be above the base flood elevations; consequently, flooding within the river will not impact the development.

Grading within Middle Canyon will include construction of the Commerce Center Drive extension and a water quality basin. The elevation of Commerce Center Drive will be at least 30 feet above Middle Canyon and will not be impacted by potential flooding. The water quality basin will be protected by a downstream berm and will not be impacted by potential flooding.

Development of the remaining upland areas of the tract map site will include improvements to control and direct site drainage to a storm drain/flood control system.

In our opinion, the potential for flooding occurring within the tract map site is judged to be low.

DAM INUNDATION

The technical appendix to the Los Angeles County General Plan and Safety Element (Leighton, 1990) indicates that the Santa Clara River in the vicinity of the tract map site may be susceptible to inundation as a result of catastrophic failure of Castaic Dam. However, as addressed above under the "Flooding" section, the majority of the tract map site development lies well above potential flooding elevations. In the remote chance of dam failure, there may be some impact to Commerce Center Drive, the proposed bridge, and the infrastructure along the street. It is unlikely that inundation levels would impact the proposed structures in the upland areas. Accordingly, the potential impact from dam inundation is judged to be very low.

TSUNAMIS AND SEICHES

The site is not in a coastal zone and, therefore, not susceptible to tsunamis (seismic sea waves).

The tract map site is not located downslope of any large impounded bodies of water that would adversely impact the site as a result of seiches (oscillations in a body

of water due to earthquake shaking). Therefore, the site is considered safe from hazards associated with tsunamis or seiches.

SUBSIDENCE AND HYDROCONSOLIDATION

The site is not within an area of known subsidence associated with petroleum or groundwater withdrawal. Furthermore, the site is not in an area of known peat deposits; therefore, the site will not be impacted by subsidence associated with peat oxidation. The potential for ground subsidence in response to fluid withdrawal or peat oxidation within the tract map site is judged to be remote.

Hydroconsolidation is the process by which dry alluvial soils, with high void-ratio, collapse under structural load in response to the application or introduction of water into the soils. Areas of potentially collapsible or compressible soils were investigated by AES (2004b). AES recommended that all susceptible soils be removed to competent natural material. The estimated removal depths ranged from 5 to 22 feet below existing grade. According to AES, no significant hydroconsolidation effects due to water incursion are expected at the site after the recommended removals are completed. Consequently, hydroconsolidation of natural soils on site is considered unlikely upon the completion of grading.

EROSION POTENTIAL AND DRAINAGE

The bedrock, soil/alluvial material, and future fill material are susceptible to erosion if sheet flow drainage is not provided. The degree of erosion is controlled by the degree of cementation or consolidation of the various materials; accordingly, the bedrock materials are less susceptible to erosion than the other materials. Water

should not be allowed to pond on future graded areas, or allowed to flow uncontrolled over natural or graded slopes. Surface drainage should be directed to terrace drains or debris basins. Debris material generated from erosion should be contained within site boundaries. All slope terrace drains should be kept clear of all debris to limit impounding or surface water. Graded slopes should be seeded with a deep-rooting, drought-resistant vegetation to minimize erosion.

CONCLUSIONS

On the basis of our geologic/geotechnical evaluation, we conclude that the project is feasible from a geologic and geotechnical standpoint and will be safe from geologic hazards, provided that the geologic and geotechnical recommendations outlined in this report, past tentative plan review reports (AES, 2004b, 2004d, and 2005a), and appropriate building and grading codes, are taken into consideration during the planning, design, and construction phases of the project. In our opinion, the tract map site is suitable for the proposed development.

GEOLOGIC AND GEOTECHNICAL HAZARDS

Potential geologic and geotechnical hazards include, but are not limited to, primary earthquake hazards (ground shaking and ground rupture associated with active or potentially active faults), secondary earthquake hazards from earthquake ground shaking (such as liquefaction, tsunamis, and seiches), and landslides/slope instability.

Faults: Earthquakes result from movement along faults or volcanic activity. In California, earthquakes are more commonly associated with faults or fault zones,

and the southern California region is historically seismically active. The numerous faults in California include both active and potentially active faults.

Active Faults: No known active faults underlie the site, and the site is not within an Alquist-Priolo Earthquake Fault Zone, as established by CGS. The closest active (and zoned) fault to the site is the San Gabriel fault, located approximately two miles to the northeast. No evidence of active faulting or ground rupture associated with active faulting has been identified within the tract map site. In our opinion, the probability of ground rupture due to active faulting occurring on site during the design life of the project is considered to be very low to non-existent.

- **Mitigation:** No mitigation is required.

Potentially Active Faults: Two potentially active faults, the Airport Mesa and Saddle faults, transect Airport Mesa (the northern portion of the tract map site). These faults have demonstrated movement in the last 100,000 ± years. Although the potential for ground rupture along these two faults during the design life of the project is judged to be very low, it cannot be ruled out.

- **Mitigation:** A "Fault Building Setback" has been established for both the Airport Mesa and Saddle faults, as delineated on the Geologic Map (Figure 3). The setbacks measure approximately 50 feet on each side of the mapped traces of the Airport Mesa and Saddle faults, or any subsidiary faults that have disrupted the Pleistocene age terrace deposits.

Seismicity: The site is located within a region of southern California that is subject to strong ground motion from movement along a fault or fault zone. Ground

shaking could occur not only immediately adjacent to the earthquake epicenter, but within areas for many miles in all directions.

- **Mitigation:** Projects should be designed in accordance will all applicable current codes and standards utilizing the appropriate geotechnical parameters presented in the "Seismicity" section of this report to reduce seismic risk to an acceptable level as defined by CGS in Chapter 2 of SP 117a (CGS, 2008).

Liquefaction: The site is subject to liquefaction as some relatively thin liquefaction-prone zones locally exist at the site at isolated depth intervals. Liquefaction can result in ground failure and excessive settlement.

- **Mitigation**: The mitigation for liquefaction at the site will consist of a combination of ground modification and structural mitigation in areas subject to liquefaction to reduce the risk to an acceptable level as defined by CGS in Chapter 2 of SP 117a (CGS, 2008). The ground modification will consist of the removal of some of the soil material subject to liquefaction and elevating the site grades over the material subject to liquefaction. The recommended depth of removal to mitigate liquefaction is presented in our Tentative Plan Review report (RTF&A, 2003b). Structures will be designed to resist the anticipated static and seismic total and differential settlements.

Slope Stability: Slope stability considerations include existing landslides, future cut-and-fill slopes, slopes that will remain natural at the completion of grading, debris flows associated with natural slopes, and rockfall hazard.

Landslides: 52 landslides have been identified within the tract map site.

- **Mitigation**: 48 of the landslides will be completely removed as part of the site grading. Of the remaining four landslides (Qls-XXXV, Qls-XXXVII, Qls-XLIII, and Qls-XLIV), three of the landslides (Qls-XXXV, Qls-XLIII, and Qls-XLIV) will be partially removed until a stable configuration is achieved. The southern portion of the fourth landslide (Qls-XXXVII) will be completely removed below the proposed building pad, and the northern portion (within the spineflower preserve) remain in place and be stabilized by a shear key and buttress fill slope. The remaining portion of this landslide will be placed within a Restricted Use Area.

Cut Slopes: Proposed site development will include the grading of 58 cut slopes. The cut slopes will be graded at inclinations of 2:1 to 3:1. All cut slopes exceeding 30 feet in height will be designed with terrace drains every 25 vertical feet. 35 of the cut slopes will encounter adverse geologic conditions requiring construction of buttresses or stabilization fills during grading.

- **Mitigation**: All cut slopes will be grossly stable if graded in accordance with the recommendations of the Project Geotechnical Consultant, as described in the Vesting Tentative Tract Map plan review reports.

Fill Slopes: Proposed fill slopes will be graded at inclinations of 2:1 or flatter. All fill slopes exceeding 30 feet in height will be designed with terrace drains every 25 vertical feet. The maximum proposed fill slope height is approximately 130 feet.

- **Mitigation**: The proposed fill slopes will be grossly stable if graded in accordance with the recommendations of Project Geotechnical Consultant, as described in the Vesting Tentative Tract Map plan review reports.

Natural Slopes: The natural slopes proposed for the tract map site have gradients ranging from ½:1 to 5:1, with the steepest slopes consisting of the bluffs along to the Santa Clara River.

- **Mitigation**: The stability of natural slopes will be improved and/or natural slopes will be grossly stable if the grading adjacent to natural slopes is performed in accordance with the recommendations of the Project Geotechnical Consultant, as described in the Vesting Tentative Tract Map plan review reports. Where warranted for gross stability, building setbacks have been recommended that exceed the setback standards set forth in the Los Angeles County/California Building Code. The standard setbacks from grossly stable ascending and descending natural slopes provided in the Los Angeles County/California Building Code shall also be followed, where not superseded by the recommended building setbacks.

Debris Flow: Potential debris flow hazard exists anywhere that a moderate to thick accumulation of residual soil, slope wash, or weathered bedrock materials occur on moderate to steep descending slopes that border future building pads.

- **Mitigation**: The proposed grading for the tract map site appears to have eliminated potential debris flow hazard, as indicated in the 100-scale Vesting Tentative Tract Map. However, the debris flow hazard should be further evaluated once a 40-scale rough grading plan has been developed for the tract map site. Appropriate mitigation measures, such as avoidance, debris basins, impact walls, etc., can be provided for any additional debris flow areas identified on the rough grading plan.

Rockfalls: The tract map site is not located directly downslope of any potential rockfalls.

- **Mitigation**: No mitigation is required.

Flooding: Development of the tract map site will be above the Santa Clara River, including the Commerce Center Drive bridge which will be above the base flood elevations; consequently, flooding within the river will not impact the development. Development of the remaining upland areas of the tract map site will include improvements to control and direct site drainage to a storm drain/flood control system. In our opinion, the potential for flooding occurring within the tract map site is judged to be low.

- **Mitigation**: No mitigation is required.

Dam Inundation: In the remote chance of dam failure, there may be some impact to Commerce Center Drive, the proposed bridge, and the infrastructure along the street. It is unlikely that inundation levels would impact the proposed structures in the upland areas. Accordingly, the potential impact from dam inundation is judged to be very low.

Mitigation: No mitigation is required.

Tsunamis and Seiches: The site is not in a coastal zone and, therefore, not susceptible to tsunamis (seismic sea waves). The site is not located downslope of any large impounded bodies of water that would adversely impact the site as a result of seiches (oscillations in a body of water due to earthquake shaking). Therefore, the tract map site is considered safe from hazards associated with tsunamis or seiches.

- **Mitigation**: No mitigation is required.

Subsidence: The site is not within an area of known subsidence associated with petroleum or groundwater withdrawal. Furthermore, the site is not in an area of known peat deposits; therefore, the site will not be impacted by subsidence associated with peat oxidation. The potential for ground subsidence in response to fluid withdrawal or peat oxidation within the tract map site is judged to be remote.

- **Mitigation**: No mitigation is required.

Hydroconsolidation: Loose, dry alluvial soils, susceptible to hydroconsolidation, have been identified within the existing drainage courses on the tract map site.

- **Mitigation**: Alluvial soils susceptible to hydroconsolidation will be removed to competent natural material during tract map site grading, as recommended by the Project Geotechnical Consultant.

Volcanic Hazard: The site is not in an area of active volcanism. Therefore, the site is considered safe from hazards associated with volcanic activity (volcanic eruptions, volcanic debris flows, volcanic ash, etc.).

- **Mitigation**: No mitigation is required.

Erosion Potential and Drainage: The bedrock, soil/alluvial material, and future fill material are susceptible to erosion if sheet flow drainage is not provided.

- **Mitigation**: Water should not be allowed to pond on future graded areas, or allowed to flow uncontrolled over natural or graded slopes. Surface drainage should be directed to terrace drains or debris basins. Debris

material generated from erosion should be contained within site boundaries. All slope terrace drains should be kept clear of all debris to limit impounding or surface water. Graded slopes should be seeded with a deep-rooting, drought-resistant vegetation to minimize erosion.

CONSTRUCTION CONSIDERATIONS

Oil Wells: 47 oil wells are present within the tract map site boundaries. An additional 8 oil wells lie outside of the tract map boundaries, but may be encountered during the overall project development, including the extension of Magic Mountain Parkway, Commerce Center Drive grading, water quality basin grading, and the grading of the Utility Corridor and SCE Substation.

According to Division of Oil, Gas and Geothermal Resources (DOGGR), all of the oil wells have been abandoned. However, prior to grading, DOGGR will require review of the original abandonment files, relative to the proposed development. There is a possibility that DOGGR may require re-abandonment of some or all of the wells to current DOGGR requirements.

Rippability: The bedrock at the site is moderately cemented and can likely be excavated with conventional grading equipment. Heavy single shank ripping may be needed for massive conglomerate or well-cemented sandstone units.

Oversized Material: Cobbles and small boulders are common within the alluvium and in the terrace deposits, particularly near the base of the terrace deposits. Oversized material (material larger than eight inches in diameter) may present some difficulty during excavation with some types of equipment, but is not considered a significant detriment to development of the tract map site. Oversized material may be incorporated into the engineered fill as rockfill windrows.

Where fill depths are too shallow to allow large rock disposal on site, special handling or removal during grading may be required. On-site rock disposal or removal of oversized material off site is typical to all grading operations.

Expansive Material: Fine-grained units (i.e., siltstone, mudstone, claystone units) within the Saugus Formation may be expansive in nature. The clayey alluvial, slope wash, and artificial fill deposits could also be expansive. Data developed by AES (2004b) indicate that engineered fills created from on-site earth materials will have a low to medium expansion potential. The expansion characteristics of engineered fill exposed at rough grade should be evaluated by the Project Geotechnical Consultant at the completion of the tract map site grading; the final foundation design should be based on those expansion test results. Expansive materials could be mitigated by utilizing special foundation and reinforcement.

Shrinking and Bulking: The weakly consolidated materials on site, such as the artificial fill, slope wash deposits, alluvium, and terrace deposits, shrink in volume when excavated then placed as engineered fill. Conversely, Saugus Formation units are likely to bulk. Determination of shrinking or bulking of the on-site materials was evaluated by AES (2004b). The AES findings are presented below:

- artificial fill: 12 percent to 18 percent shrinkage;
- alluvium: 20 percent shrinkage;
- slope wash: 4 percent to 14 percent;
- terrace deposits (upper 8 feet): 10 percent to 16 percent shrinkage;
- terrace deposits (below 8 feet): 10 percent
- Saugus Formation (upper 3 feet): 4 percent shrinkage; and
- Saugus Formation (below 3 feet): 0 to 6 percent bulking.

Corrosion: Earth materials within the tract map site may be corrosive to concrete and ferrous metals. Soil moisture, chemistry, and other physical characteristics all affect corrosion potential of the earth materials. Corrosivity testing was performed by AES (2004b). Based on the AES findings, the on-site soils are moderately to severely corrosive to buried metal pipes (per Los Angeles County classification). According to UBC (1997) classification, sulfate concentrations were negligible, and pH was near-neutral (ranging from 6.5 to 8.2). Chloride concentrations were low. Additional corrosivity testing should be performed at the completion of the tract map site grading. Pending the additional tests, either Type I or II cement may be considered for use in concrete placed in contact with the ground. The soil corrosivity mitigation recommendations may be revised based on the additional confirmatory testing. Final recommendations for concrete will be in accordance with the latest CBC requirements; a corrosion specialist should provide mitigation recommendations for potential corrosion of metals in contact with on-site soils.

-oOo-

Should you have any questions regarding this report, please contact our office.

The following are attached and complete this report.

- References
- Site Location Map - Figure 1
- Regional Geologic Map - Figure 2
- Geologic Map - Figure 3 (in pocket)
- Regional Fault Map - Figure 4
- AES Summary of Calculated Accelerations – Figure 5
- Seismic Hazard Zone Mapped Accelerations - Figures 6.1 and 6.2
- USGS Design Spectrum - Figure 7
- USGS MCE Spectrum - Figure 8
- USGS Uniform Hazard Spectrum - Figure 9
- Probabilistic Seismic Hazard Deaggregation - Figure 10
- Appendix A - Historic Earthquake Search Results (30 pages)
- Appendix B- Probabilistic Earthquake Hazard Analyses (2 pages)

Respectfully submitted,

R. T. FRANKIAN & ASSOCIATES

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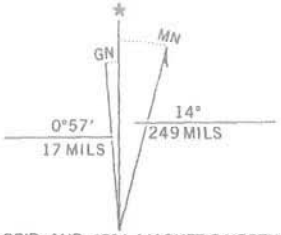
U.S.G.S 7.5 MINUTE
VAL VERDE, CA
34118-D6-TF-024
1991

NEWHALL, CA
1995
NIMA 2252 I NE - SERIES V895



UTM GRID AND 1994 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Site Location Map

Prepared for
Newhall Land and Farming Company
Mission Village
Vesting Tentative Tract Map No. 61105
Newhall Ranch
Los Angeles County, California

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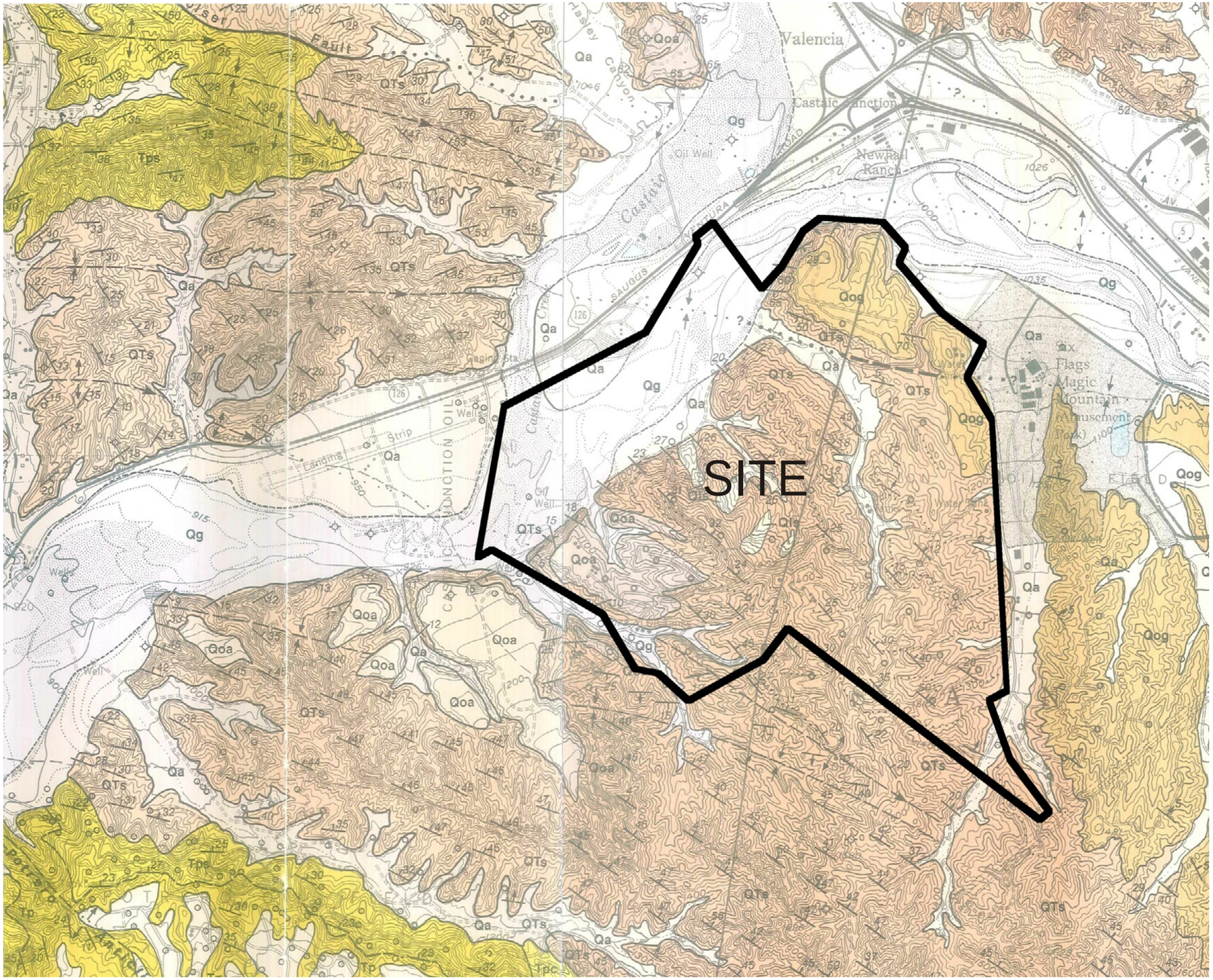

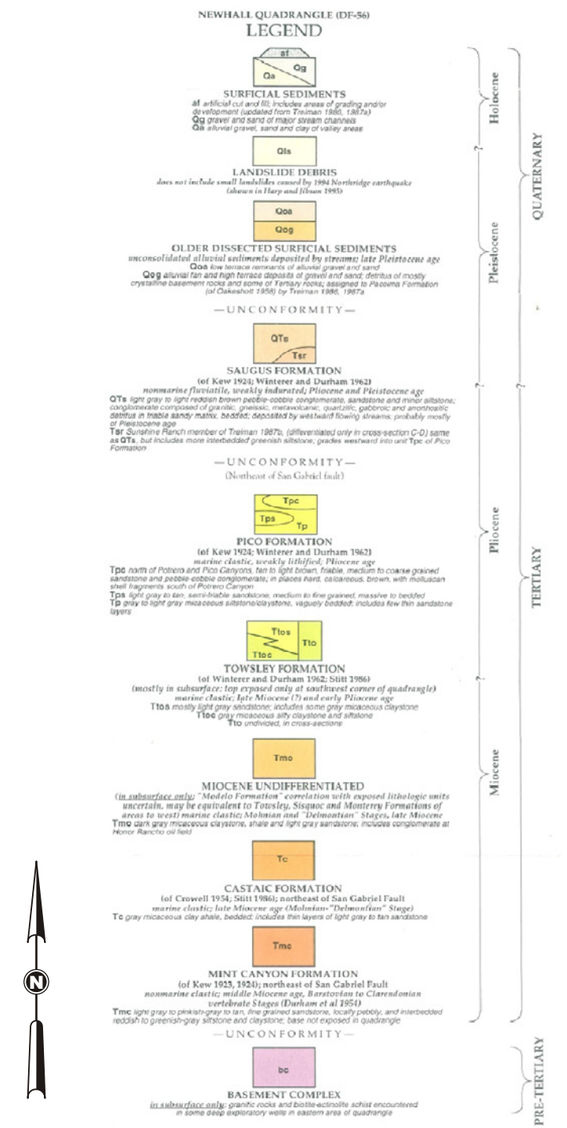

Regional Geologic Map

PREPARED FOR
Newhall Land and Farming Company

PROJECT LOCATION
Mission Village
Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California

SCALE	DRAWN BY	CHECKED BY
NTS	JH	TL
DATE	FIGURE NO.	JOB NO.
3-31-10	Figure 2	94-502-52

1329 SCOTT ROAD
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Reference: Modified from Dibblee 1993 and 1996

VICINITY MAP

NOT TO SCALE

ASSESSOR'S PARCEL NUMBERS (APN)

Mission Village	
2826–002–022	2826–003–028
2826–003–021	2826–003–029
2826–003–022	2826–003–030
2826–003–023	2826–003–031
2826–003–024	2826–007–019
2826–003–025	2826–008–030
2826–003–026	2826–009–081
2826–003–027	
Off–Site Improvements	
Easterly Extension of Magic Mountain Parkway	
2826–008–030	2826–008–020
2826–007–016	
Water Quality Basin	
2826–007–019	
Utility Corridor	
2826–003–031	2826–002–021
2826–004–040	2826–002–023
Electrical Substation Alt 1	
2826–123–002	
Electrical Substation Alt 2	
2826–009–104	

EARTHWORK:

Area	Adjusted Cut Volume (CY)	Adjusted Fill Volume (CY)
Mission Village On–site	28,000,000	28,400,000
Magic Mountain Parkway Off–site	900,000	500,000
Off–site Utility Corridor	618,000	618,000
Total	29,518,000	29,518,000
Off–site SCE Substation (Alt 1)	7,000	7,000
Off–site SCE Substation (Alt 2)	139,000	3,000
Disposal Site For Alt 2	0	136,000

PROJECT SUMMARY:

GROSS AREA – 1252.8 Acres
TOTAL LOTS – 658
TOTAL D.U. – 4,412
EXISTING ZONING – SP (NEWHALL RANCH SPECIFIC PLAN)
PROPOSED ZONING – SP (NEWHALL RANCH SPECIFIC PLAN)
GENERAL PLAN LAND USE – SP (NEWHALL RANCH SPECIFIC PLAN)

Lot Numbers	No. of Lots	Type (Use)	Dwelling Units	Total Acres
Area A1				
157	1	Elementary School		9.5
Area A2				
1–123	123	55'x110' SFD (6,050 sf) min.	123	26.7
124–139	16	Open Space		12.8
140–149	10	Private & Future Street		8.2
Area A3				
550–640	91	50'x80' SFD (4,000 sf) min.	91	10.2
641–645	5	Open Space		6.7
Area A4				
158	1	Condominiums	60	5.1
159–160	2	Open Space		0.9
Area A5				
161	1	Condominiums	153	13.1
Area A6				
162	1	Condominiums	201	12.6
Area A7				
163–176,178–258	95	65'x110' SFD (7,150 sf) min.	95	22.5
177	1	Recreation		0.3
259–273	15	Open Space		6.3
274–278	5	Private & Future Street		6.4
Area A8				
279–351	73	1ac/lot avg. SFD*	73	73.0
352	1	Water Quality Basin		2.8
353–356,360,362–366	10	Open Space		34.6
368–370	3	Private & Future Street		11.5
371–375	5	Private Drive		2.8
Area A9, A10, B1 and B2				
361	1	Area A9 Condominiums	60	6.7
376	1	Area A10 Condominiums	80	9.4
377–379	3	Open Space (LDZ)		0.7
380	1	B1 Condominiums	92	12.7
381	1	B2 Condominiums	186	14.2
382–383	2	Open Space (LDZ)		1.8
Area C1				
384–387	4	Age Qualified Condominiums	63	9.7
388–390	3	Private Drive		1.8
391–395	5	Open Space		6.3
396	1	Fire Access Road		0.5
Area C2				
397–407, 411	12	Age Qualified Condominiums	113	17.7
408–410, 412	4	Private Drive		1.7
414–422	9	Open Space		30.3
423	1	Water Tanks		1.4
Area C3				
424	1	Recreation Center		4.6
425	1	Open Space		1.6
426	1	Open Space (LDZ)		0.4
Area C4				
427	1	Age Qualified Condominiums	129	21.3
428–431	4	Open Space		18.3
Area C5				
434	1	Age Qualified Condominiums	88	16.3
435–437	3	Open Space		12.9
438	1	Open Space (LDZ)		< 0.1
Area C6				
439	1	Age Qualified Condominiums	34	7.3
440	1	Open Space		1.9
441–442	2	Open Space (LDZ)		0.1
Area C7				
443	2	Apartment/Condominium	96	4.6
444	2	Open Space (LDZ)		0.1
Area C8				
445		Apartment/Condominium	179	6.7
446		Open Space (LDZ)		0.6
Area C9		Mixed Use Commercial		
447	1	154,000 sf		6.6
449, 451–452	3	Open Space		11.7
453–454	2	Open Space (LDZ)		1.0
455–459	5	Private Drive		13.1
460–467	8	Open Space (LDZ)		3.8
Area D1				
468	1	Apartment/Condominium	326	10.3
470–475	6	Open Space		37.0
476–479	4	Open Space (LDZ)		0.6
Area E1		Mixed Use Commercial		
480–484	5	697,000 sf		36.1
485	1	Private Drive		1.5
486	1	Water Quality Basin		1.6
487–495, 498–499	11	Open Space		45.4
502–507	6	Open Space (LDZ)		4.0
Village Center				
F1 508	1	Mixed Use Commercial 337,170 sf		6.9
F2 530	1	Mixed Use Commercial 35,000 sf		2.4
F3 509, 510	2	Mixed Use Commercial 139,100 sf		5.2
F4 511	1	Mixed Use Residential/Commercial 48,100 sf	264	5.1
F5 512	1	Mixed Use Residential/Commercial 18,300 sf	272	4.5
F6 513	1	Apartment/Condominium	96	3.2
F7 514	1	Apartment/Condominium	216	7.8
F8 515	1	Library		4.0
F9 516	1	Transit		1.2
F10 517	1	Condominiums	99	3.8
F11 518	1	Condominiums	96	4.4
F12 519	1	Condominiums	128	5.1
F13 520	1	Condominiums	96	5.1
F14 521	1	Condominiums	105	6.7
F15 522	1	Condominiums	126	7.8
F16 523	1	Condominiums	114	5.3
F17 524	1	Condominiums	87	3.5
F18 525	1	Condominiums	120	6.5
F19 526	1	Recreation Center		6.9
F20 527	1	Private Park		2.9
F21 528	1	Continued Care Retirement Community	351	13.6
F22 529	1	Mixed Use Commercial 126,430 sf		2.4
531–532	2	Open Space		3.0
533–540	8	Private Drive		13.8
541–549	9	Open Space (LDZ)		3.7
Miscellaneous				
150–156	7	Open Space		12.6
357, 646, 654	3	Sewer Lift Station		0.5
358–359	2	Open Space (Lyon Cyn)		17.3
367, 655	2	Open Space (River Adjacent)		27.2
413, 432, 450, 497	4	Debris Basin		3.6
433	1	Water Facilities		1.4
448	1	Fire Station		1.5
469	1	Park		21.0
496, 647, 656	3	Water Quality Basin		13.7
500–501	2	Spineflower Preserve		65.7
648	1	Open Space		1.8
649	1	CCD Bridge		3.7
650–651, 657–658	4	Open Space (River)		218.0
652	1	Open Space		4.5
653	1	Park		5.2
		Public R/W		67.7
		CALTRANS R/W		2.2
Total	658		4412	1252.8

* ALLOWS 73 SECONDARY UNITS (1/LOT)

ABBREVIATIONS:
MMP = MAGIC MOUNTAIN PARKWAY SFD = SINGLE FAMILY DWELLING UNIT
CCD = COMMERCE CENTER DRIVE LDZ = LANDSCAPE DEVELOPMENT ZONE

GENERAL NOTES:

1. GRADE ELEVATIONS ON THE VTTM ARE APPROXIMATE. CHANGES IN THE ELEVATIONS DEPICTED ON THE TENTATIVE MAP WHICH WILL NOT SUBSTANTIALLY ALTER THE APPROVED GRADING PLAN OR RESULT IN PAD ELEVATION CHANGES OF MORE THAN 10 FEET ARE PERMITTED SUBJECT TO THE PROVISIONS OF SECTION 5.2 OF THE NEWHALL RANCH SPECIFIC PLAN.
2. PERMISSION IS REQUESTED FOR LOT LINES TO BE ADJUSTED TO THE SATISFACTION OF DRP AND DPW PROVIDED NO ADDITIONAL DEVELOPABLE LOTS ARE CREATED. THE DEGREE OF ADJUSTMENT SHALL BE CONSISTENT WITH THE INTENT OF THE SUBDIVISION MAP APPROVAL AND THE SUBDIVISION MAP ACT.
3. ALIGNMENT AND GEOMETRICS OF STREETS AND TRAILS ARE APPROXIMATE. PERMISSION IS REQUESTED FOR ADJUSTMENTS TO STREETS TO BE MADE PROVIDED THE DEPARTMENT OF PUBLIC WORKS AND DRP DETERMINE THAT THE ADJUSTMENTS ARE CONSISTENT WITH THE INTENT OF THE SUBDIVISION APPROVAL. ADJUSTMENTS TO TRAILS CAN BE MADE WITH APPROVAL BY DRP AND THE DEPARTMENT OF PARKS AND RECREATION.
4. BUILDING FOOTPRINTS SHOWN ON THE TENTATIVE MAP OR ACCOMPANYING SITE PLAN EXHIBIT MAPS ARE ONLY FOR ILLUSTRATIVE PURPOSES. RELOCATION OF BUILDINGS, OR ADJUSTMENTS IN BUILDING SQUARE FOOTAGE, NUMBER OF BUILDINGS, PARKING REQUIREMENTS AND OTHER FEATURES WHICH WILL NOT RESULT IN AN INCREASE IN TOTAL SQUARE FOOTAGE OR THE NUMBER OF DWELLING UNITS ARE PERMITTED SUBJECT TO THE PROVISIONS OF SECTION 5.2 OF THE NEWHALL RANCH SPECIFIC PLAN.
5. PERMISSION IS REQUESTED TO FILE "LARGE LOT" PARCEL MAPS OF 20 ACRES OR MORE (WITHOUT IMPROVEMENTS) OR 5 ACRES OR MORE (WITH IMPROVEMENTS) AS THE FIRST UNIT FINAL MAP. RECORDATION OF A LARGE LOT PARCEL MAP SHALL BE CONSIDERED THE FILING OF THE FIRST UNIT MAP FOR THE PURPOSES OF TIME EXTENSIONS PURSUANT TO THE SUBDIVISION MAP ACT BUT SHALL NOT REQUIRE THE OBLIGATION OF FEES, DEDICATIONS (EG. RIGHTS OF WAY OR PARKS) EXACTIONS OR INFRASTRUCTURE EXCEPT AS MAY BE REQUIRED BY CHAPTER 21.32 OF THE SUBDIVISION MAP ACT.
6. PERMISSION IS REQUESTED FOR UNIT MAP PHASING.
7. PERMISSION IS REQUESTED TO COMBINE LOTS.
8. PERMISSION IS REQUESTED TO RECORD ADDITIONAL OPEN SPACE LOTS.
9. THE LOCATIONS OF APPURTENANT STRUCTURES (E.G., PASEOS, PEDESTRIAN BRIDGES, TRANSIT SHELTERS) MAY BE RELOCATED IF DETERMINED TO BE CONSISTENT WITH THE APPROVED TENTATIVE MAP BY DRP AND DPW.
10. PROPOSED RETAIL AND OFFICE FLOOR AREA ARE INTERCHANGEABLE IF THE REQUIRED PARKING IS PROVIDED.
11. REQUEST PERMISSION TO PHASE MASS GRADE TO THE SATISFACTION OF DRP AND DPW AND THE PROVISIONS OF THE COUNTY CODE, APPROVED PROJECT CONDITIONS AND MITIGATION MEASURES.
12. PROPOSED STREET GRADES ARE APPROXIMATE AND SUBJECT TO ADJUSTMENTS PENDING DETERMINATION OF FINAL DEVELOPMENT LAYOUT AND PLANS. ANY CHANGES SHALL BE TO THE SATISFACTION OF DPW.
13. PROVIDE PROPERTY LINE RETURN RADII OF 13 FEET AT ALL LOCAL STREET AND PRIVATE DRIVE INTERSECTIONS, AND 27 FT AT THE INTERSECTION OF LOCAL STREETS OR PRIVATE DRIVES WITH PLANNED HIGHWAYS (THOSE ON THE COUNTY HIGHWAY PLAN) AND WHERE ALL PLANNED HIGHWAYS INTERSECT OR WHERE ONE OF THE ROADS SERVES A COMMERCIAL OR INDUSTRIAL DEVELOPMENT PLUS ADDITIONAL RIGHT OF WAY FOR CORNER CUT OFF TO MEET CURRENT GUIDELINES OF THE AMERICANS WITH DISABILITIES ACT (ADA) TO THE SATISFACTION OF PUBLIC WORKS.
14. ALL DIMENSIONS SHOWN ARE APPROXIMATE.
15. TOPO COMPILED ON 11/15/06 BY HUNSAKER FROM DATA FLOWN 5/24/06.
16. REQUEST MODIFICATION OF STREET FRONTAGE REQUIREMENTS PER SECTION 21.24.040 OF THE L.A. COUNTY CODE
17. SHARED AND RECIPROCAL PARKING IS DEPICTED PER THE PROVISIONS OF THE NEWHALL RANCH SPECIFIC PLANS SUBJECT TO CONFORMANCE REVIEW OR APPROVAL OF A PARKING PROGRAM.
18. NOT ALL RETAINING WALL ARE DEPICTED ON THE TENTATIVE MAP. ADDITIONAL RETAINING WALLS MAY BE NECESSARY.

SURVEY NOTES:

VERTICAL DATUM:
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS BENCHMARK DESCRIBED AS FOLLOWS: LACDPW L5402 RND HD SPK IN LOWER CONC HDWL @ N END 24 FT W/O C/L THE OLD RD (W RDWY) AND 0.6 MI S/O HENRY MAYO DR @ MI MKR #6.25 NEWHALL QUAD. 1995 ADJUSTMENT (NAVD 1988) ELEVATION = 1031.851

THERE IS APPROXIMATELY 2.3 FEET DIFFERENCE BETWEEN PREVIOUS COUNTY OF LOS ANGELES DATUMS BASED UPON NAVD 1929 AND NAVD 1988 (NAVD 1988 IS 2.3 FEET HIGHER THAN NAVD 1929).

AERIAL PLANIMETRY:
THIS SURVEY WAS PREPARED BY PHOTOGRAMMETRIC PROCESSES, UTILIZING AERIAL PHOTOGRAPHY DATED NOVEMBER 15, 2006. THE OUTLINE OF BUILDINGS AND OTHER ROOFED IMPROVEMENTS MAY INCLUDE EAVES, CANOPIES AND BALCONIES, SINCE BUILDINGS BELOW THESE ITEMS ARE NOT VISIBLE TO THE CAMERA.

TOPOGRAPHY:
BY PHOTOGRAMMETRIC PROCESSES FROM LIDAR IMAGING DATED NOVEMBER 15, 2006, AND COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS.

CONTOUR INTERVAL:
10 FOOT, UNLESS OTHERWISE NOTED.

LEGEND:

Lot 1 — LOT NO.
1,000 SF — LOT AREA (SQUARE FEET)
1010.0 — PAD ELEVATION
PROJECT BOUNDARY
PROPOSED RIGHT OF WAY
PROPOSED UTILITY EASEMENT
EXISTING EASEMENT
FUTURE RIGHT OF WAY
1000 — PROPOSED CONTOUR
DAYLIGHT LINE
RIDGE LINE
SD — STORM DRAIN
SS — SANITARY SEWER
W — WATER
STORM DRAIN INLET
CATCH BASIN
EXISTING POWER POLE
SEA — SEA, RIVER CORRIDOR
FEMA — FEMA
Q50 — EXISTING COUNTY FLOODPLAIN
404_1603
BURIED BANK STABILIZATION
LINE OF SIGHT EASEMENT
ACCESS ROAD
SLOPE TOE PROTECTION
ABANDONED OIL WELL
EXISTING OAK TREE WITH NUMBER

SHEET INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	SECTIONS & EASEMENTS
3	ONSITE VTTM
4	ONSITE VTTM
5	ONSITE VTTM
6	ONSITE VTTM
7	ONSITE VTTM
8	MAGIC MOUNTAIN PKWY EXTENSION
9	SEWER – INTERIM & ULTIMATE CONDITIONS & SCE SUBSTATION ALTERNATIVES
10	LARGE LOT PARCEL MAP AND PHASING MAP
11	OFFSITE UTILITY CORRIDOR
12	OFFSITE UTILITY CORRIDOR

SPECIAL NOTES:

1. WATER QUALITY BASINS AND CATCH BASIN FILTERS WILL PROVIDE FOR TREATMENT OF STORM WATER RUN OFF.
2. THE WATER QUALITY BASINS SHALL BE DEDICATED TO THE COUNTY WHEN COMPLETED AND ACCEPTED.
3. PROPOSED RECLAIMED WATER LINES WILL BE LOCATED IN PUBLIC STREETS AND TRAILS.

OFF-SITE IMPROVEMENTS:

1. REGIONAL WATER QUALITY BASIN IS PROPOSED WITHIN THE PROJECT BOUNDARY OF VTTM 53295/ENTRADA.
2. THE UTILITY CORRIDOR WILL GENERALLY RUN ALONG SEA 23 (SANTA CLARA RIVER) INCLUDING THE CONNECTION FROM THE WATER RECLAMATION PLANT LOCATED WEST OF PROPOSED NEIGHBORING LANDMARK VILLAGE/VTTM 53108, AND WILL ALSO INCLUDE COMMERCE CENTER DRIVE BRIDGE.
3. MAGIC MOUNTAIN PARKWAY WILL BE EXTENDED FROM ITS EXISTING TERMINUS JUST EAST OF THE PROJECT BOUNDARY AND WILL PROVIDE A WESTWARD THOROUGHFARE THROUGH THE PROJECT AND INCLUDE IMPROVEMENTS OF THE EXISTING ROADWAY FROM THE OLD ROAD WITHIN VTTM 53295.
4. AN ELECTRICAL SUBSTATION IS PROPOSED TO BE LOCATED SOUTH OF THE PROJECT BOUNDARY IN POTRERO VALLEY. THE TENTATIVE MAP DEPICTS TWO POTENTIAL LOCATIONS FOR THIS SUBSTATION WITHIN VTTM 61996.
5. WATER TANKS PARTIALLY LOCATED WITHIN THE PROJECT AND WITHIN VTTM 61996.
6. GRADING ASSOCIATED WITH THE SOUTHERLY EXTENSION OF WESTRIDGE PARKWAY, INCLUDES IMPORT OF MATERIALS FROM THE EXTENSION OF MAGIC MOUNTAIN PARKWAY.

NOTE: SPECIFIC DETAILS OF OFFSITE IMPROVEMENTS MAY BE FOUND IN THE APPLICATIONS (I.E. CUP BURDENS OF PROOF), PLANNER'S NOTEBOOK AND/OR NEWHALL RANCH SPECIFIC PLAN.

UTILITY PROVIDERS:

SEWER:	L.A. COUNTY SANITATION DIST. 32 AND NEWHALL RANCH WRP
WATER:	VALENCIA WATER COMPANY
ELECTRICAL:	SOUTHERN CALIFORNIA EDISON
GAS:	SOUTHERN CALIFORNIA GAS CO.
TELEPHONE:	AT&T
CABLE TV:	TIME WARNER CABLE

EX	EXISTING	SF	SQUARE FOOT	RW	RECLAIMED WATER
FM	FORCE MAIN	SD	STORM DRAIN	CLWA	CASTAIC LAKE WATER AGENCY
HP	HIGH POINT	SS	SANITARY SEWER	PVT	PRIVATE DRIVE
L	LENGTH	STD	STANDARD	P & F	PRIVATE AND FUTURE STREET
MIN	MINIMUM	R/W	RIGHT OF WAY	REC	RECREATION
GB	GRADE BREAK	W1	WATER ZONE – 1	O.S.	OPEN SPACE
PROP	PROPOSED	W2	WATER ZONE – 2	RUA	RESTRICTED USE AREA
R	RADIUS	W3	WATER ZONE – 3		

KEY MAP
NOT TO SCALE

LEGAL DESCRIPTION:
PARCELS 11, 12, 13, 22 AND A PORTION OF PARCEL 14 OF PARCEL MAP 24500–01, IN THE UNINCORPORATED TERRITORY OF THE COUNTY OF LOS ANGELES, AS SHOWN ON MAP FILED IN BOOK 293 PAGES 34 TO 67 INCLUSIVE, OF PARCEL MAPS, RECORDS OF LOS ANGELES COUNTY.

REGISTERED PROFESSIONAL ENGINEER MATTHEW G. HEIDEMAN No. 55639 Exp. 12–31–10 CIVIL STATE OF CALIFORNIA

PSOMAS
28470 Avenue Stanford, Suite 300
Santa Clarita, CA 91355
(661) 219–6000 (661) 775–2718 (FAX)

MATTHEW G. HEIDEMAN R.C.E. NO. 55639 DATE

DESIGNED : MGH/DE
DRAFTED : DE/MS
CHECKED : MGH

OWNER/DEVELOPER :
NEWHALL LAND
23823 WEST VALENCIA BOULEVARD
VALENCIA, CALIFORNIA 91355
TELEPHONE: (661) 255–4000
REPRESENTATIVE : COREY HARPOLE

MAJOR LAND DIVISION
VESTING TENTATIVE TRACT MAP
NO. 61105
COUNTY CASE NO. ______
LOCATED IN THE UNINCORPORATED AREA OF THE COUNTY OF LOS ANGELES STATE OF CALIFORNIA

REV: ______
DATE: 11/24/09

PROJECT NO. 1NRC0120.00
SHEET 1 OF 12

Geologic Map

PREPARED FOR
Newhall Land & Farming Company
PROJECT LOCATION
MISSION VILLAGE
Vesting Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California

SCALE	DRAWN BY	CHECKED BY
AS SHOWN	JH	TL
DATE 3-31-2010	Figure 3	JOB NO. 94-502-52

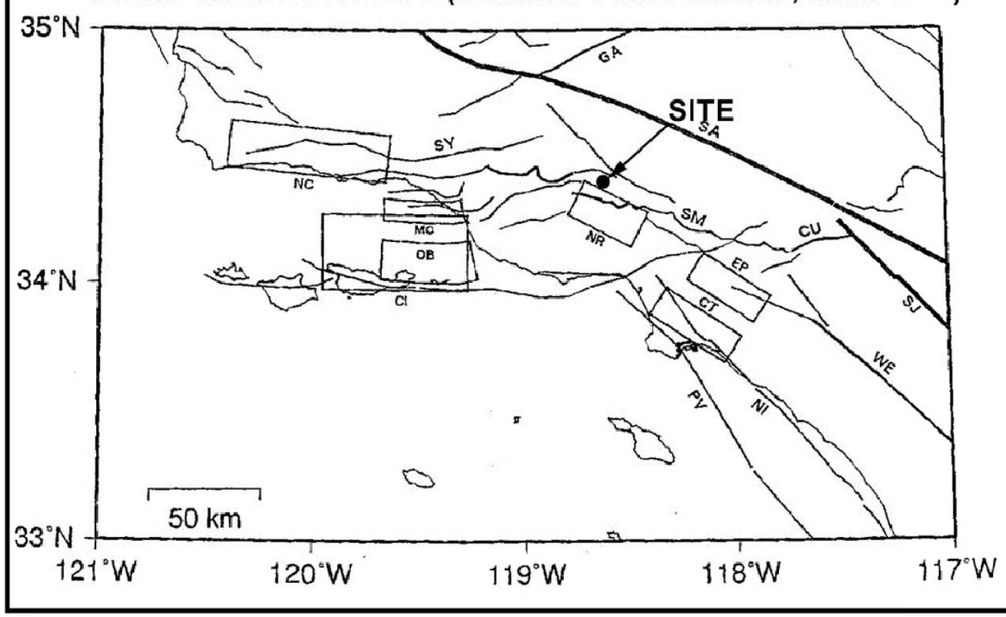
1329 SCOTT ROAD
BURBANK, CA, 91504
TEL: (818) 531-1501
FAX: (818) 531-1511
www.rtfrankian.com

ME003–01.dwg

A full-size reproduction of this figure can be found at Impact Sciences.

Geologic Time Scale			Years Before Present (Approx.)	Fault Symbol	Recency of Movement	DESCRIPTION: ON LAND	DESCRIPTION: OFFSHORE
Quaternary		Historic				Displacement during historic time (e.g. San Andreas fault 1906). Includes areas of known fault creep.	
	Late Quaternary	Holocene	200		? ? ? ? ?	Displacement during Holocene time.	Fault offsets seafloor sediments or strata of Holocene age.
			10,000			Faults showing evidence of displacement during late Quaternary time.	Fault cuts strata of Pleistocene age.
		Pleistocene	700,000		? ? ? ?	Undivided Quaternary faults – most faults in this category show evidence of displacement during the last 1,600,000 years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age.	Fault cuts strata of Quaternary age.
	Early Quaternary		1,600,000		? ?	Late Cenozoic faults within the Sierra Nevada, including parts of, but not restricted to, the Foothills fault system. These faults may have been active in Quaternary time.	
Pre-Quaternary			4.5 billion (Age of earth)			Faults without recognized Quaternary displacement or showing evidence of no displacement during Quaternary time. Not necessarily inactive. Pre-Quaternary faults not shown in Nevada and Oregon.	Fault cuts strata of Pliocene or older age.

APPROXIMATE LOCATION OF SOUTHERN CALIFORNIA BLIND THRUST FAULTS (Modified from Petersen, at al. 1996)



Reference: Modified from Jennings (1994).

Sclae: 1" ≈ 12 Miles

Regional Fault Map

PREPARED FOR
Newhall Land and Farming Company

PROJECT LOCATION
Mission Village
Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California

SCALE	DRAWN BY	CHECKED BY
1:750,000	JH	TL
DATE	FIGURE NO.	JOB NO.
3-31-10	Figure 4	94-502-52

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RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

AES SUMMARY OF CALCULATED ACCELERATIONS

Unweighted Accelerations (g)

Attenuation Relationship	Return Period Evaluated				
	72	100	200	475	1000
Boore et al. (1997)	0.52619	0.60889	0.79002	**1.02987**	1.24913
Sadigh et al. (1997)	0.42539	0.48747	0.61889	**0.79030**	0.94513
Campbell & Bozorgnia (1997)	0.47614	0.53780	0.66500	**0.82064**	0.95384
Average	0.48	0.54	0.69	**0.88**	1.05

Accelerations (g) Weighted for a 7.5 Magnitude

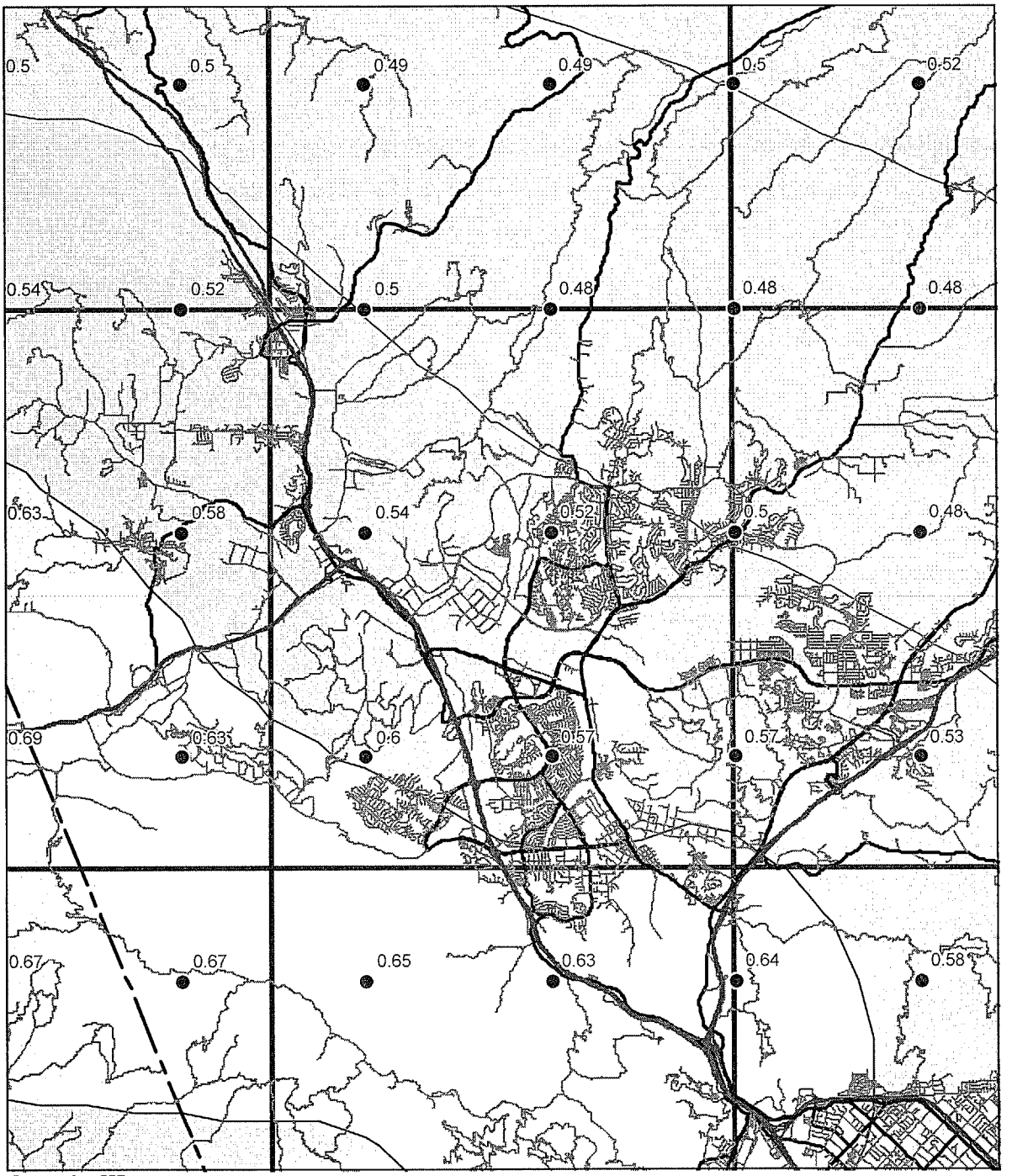
Attenuation Relationship	Return Period Evaluated				
	72	100	200	475	1000
Boore et al. (1997)	0.35374	0.41091	0.53340	**0.69925**	0.84914
Sadigh et al. (1997)	0.28404	0.32444	0.41336	**0.52657**	0.62890
Campbell & Bozorgnia (1997)	0.31921	0.36023	0.44734	**0.55377**	0.64540
Average	0.32	0.37	0.46	**0.59**	0.71

NEWHALL 7.5-MINUTE QUADRANGLE AND PORTIONS OF
ADJACENT QUADRANGLES

10% EXCEEDANCE IN 50 YEARS MAGNITUDE-WEIGHTED PSEUDO-PEAK ACCELERATION (g)
FOR ALLUVIUM

1998

LIQUEFACTION OPPORTUNITY



Base map from GDT

0 1.5 3
Miles

Department of Conservation
California Geological Survey

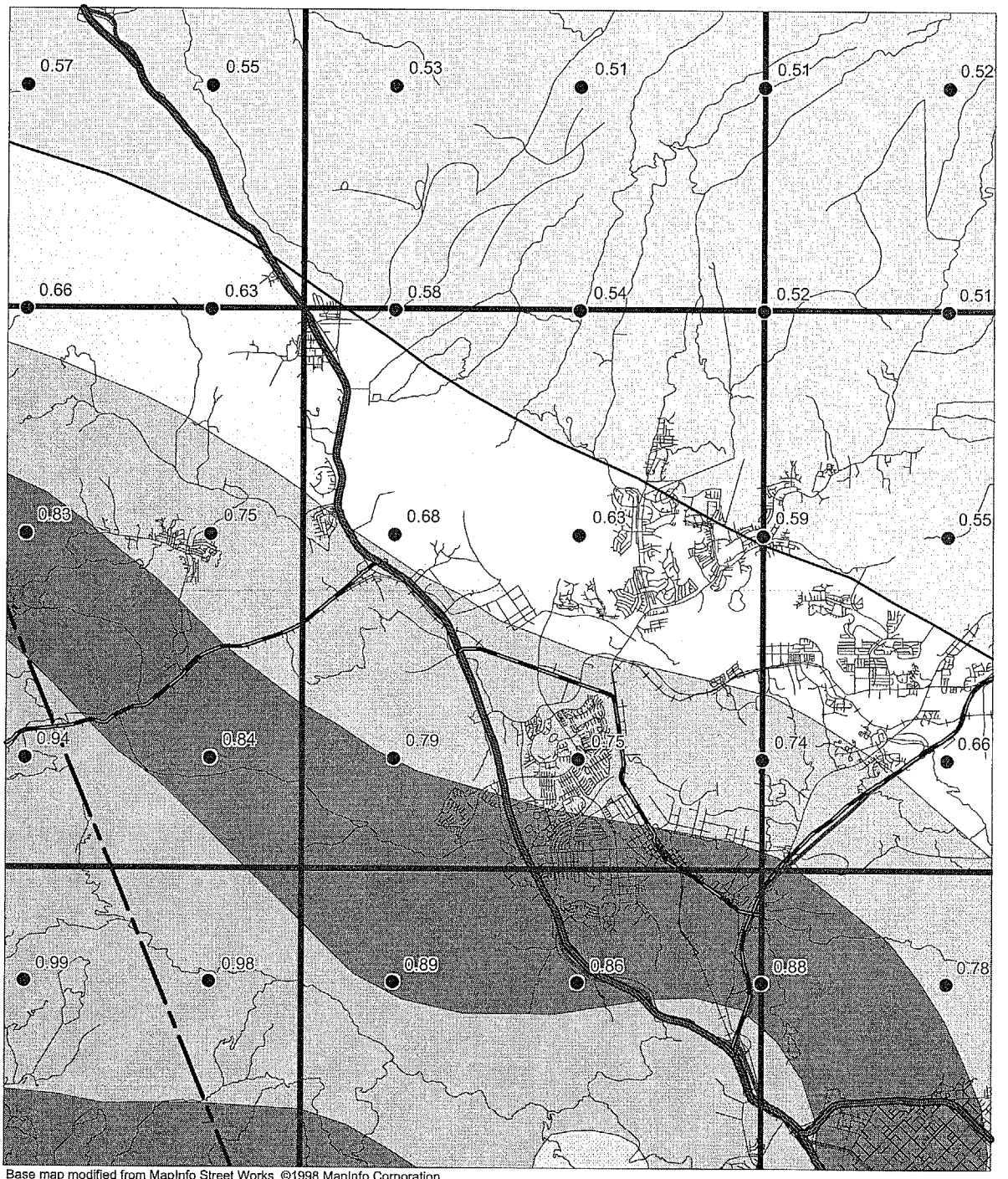
Figure 3.5

NEWHALL 7.5 MINUTE QUADRANGLE AND PORTIONS OF ADJACENT QUADRANGLES

10% EXCEEDANCE IN 50 YEARS PEAK GROUND ACCELERATION (g)

1998

ALLUVIUM CONDITIONS

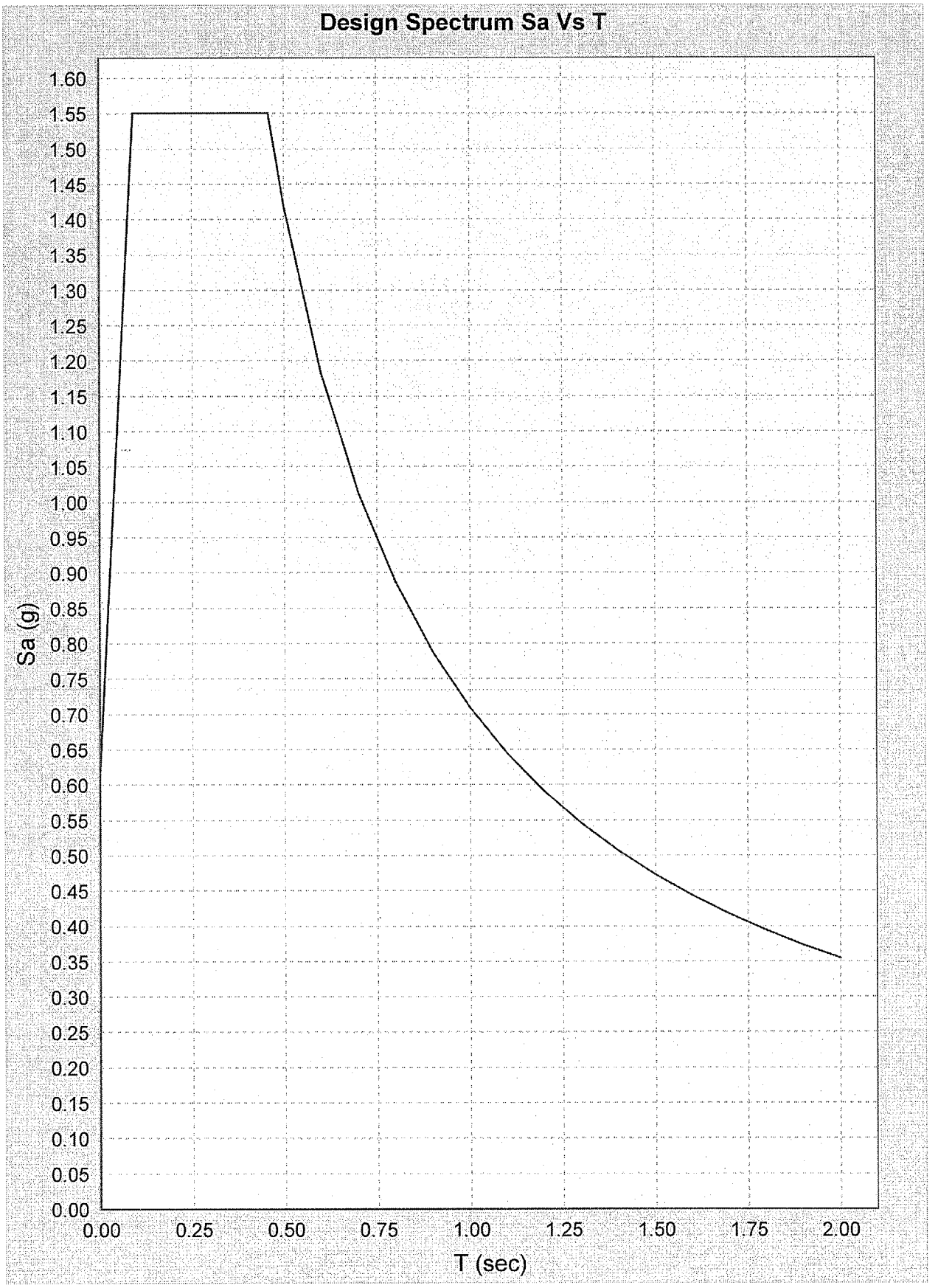


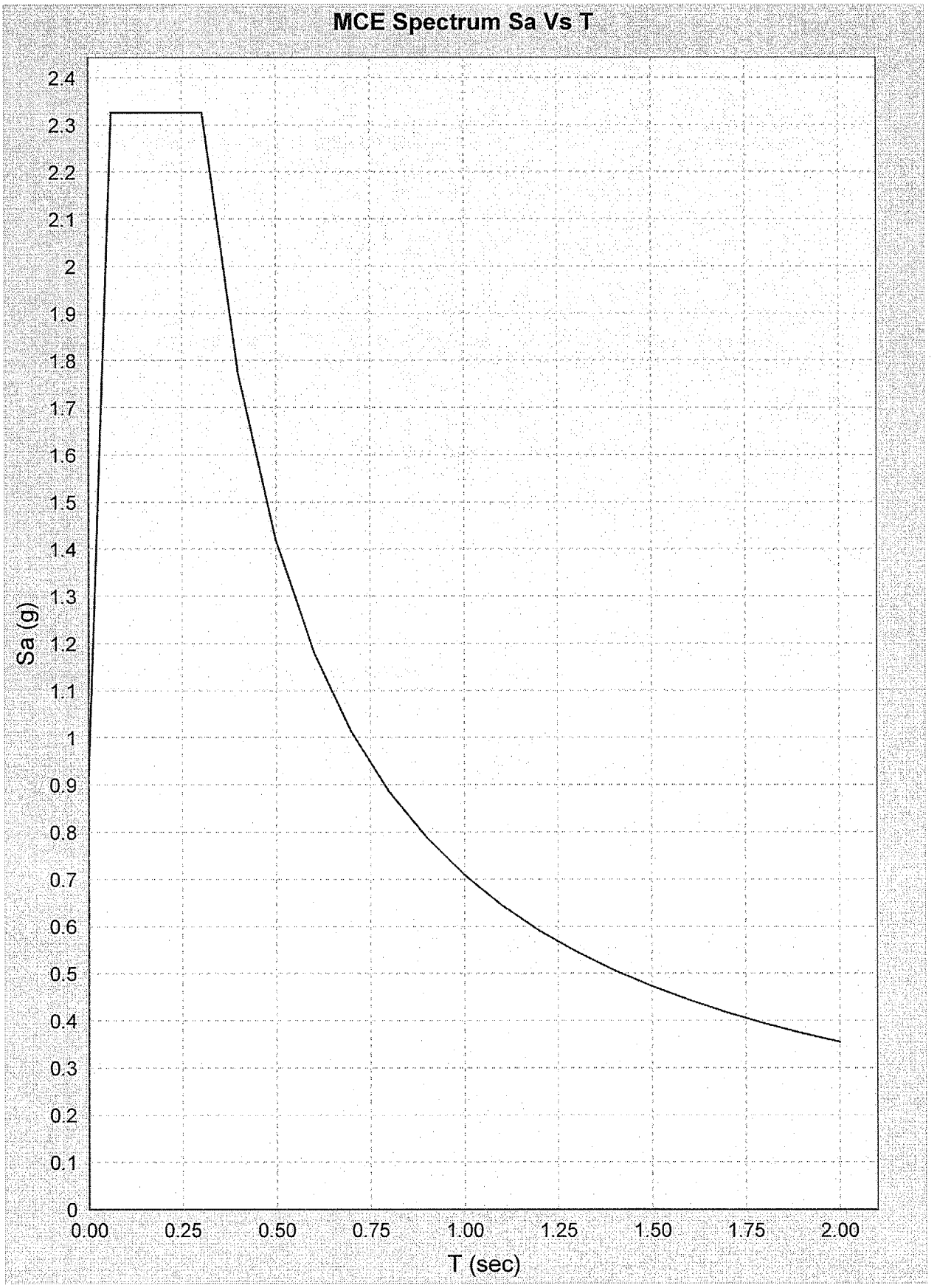
Base map modified from MapInfo Street Works ©1998 MapInfo Corporation

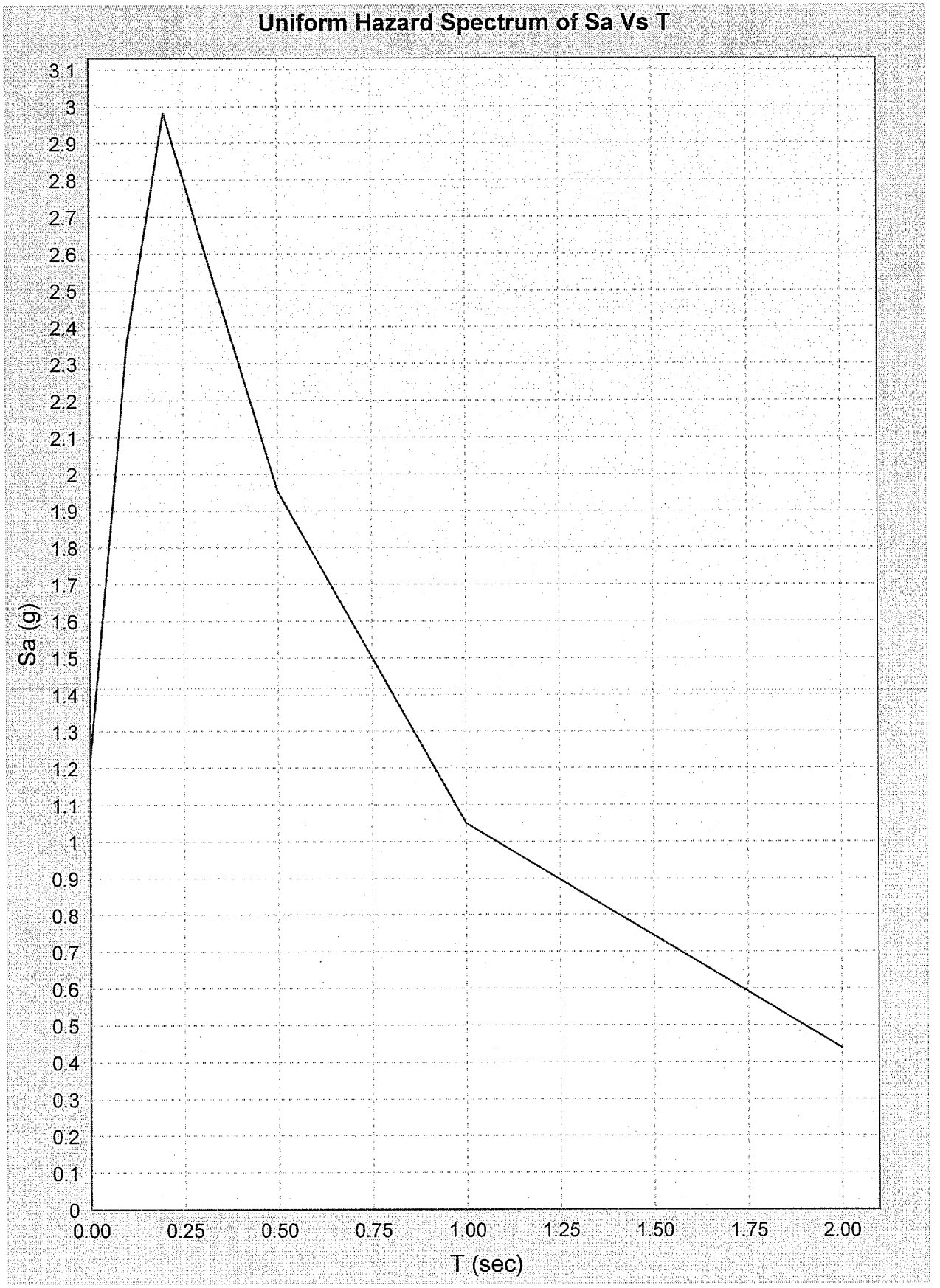
0 2.5 5
Kilometers

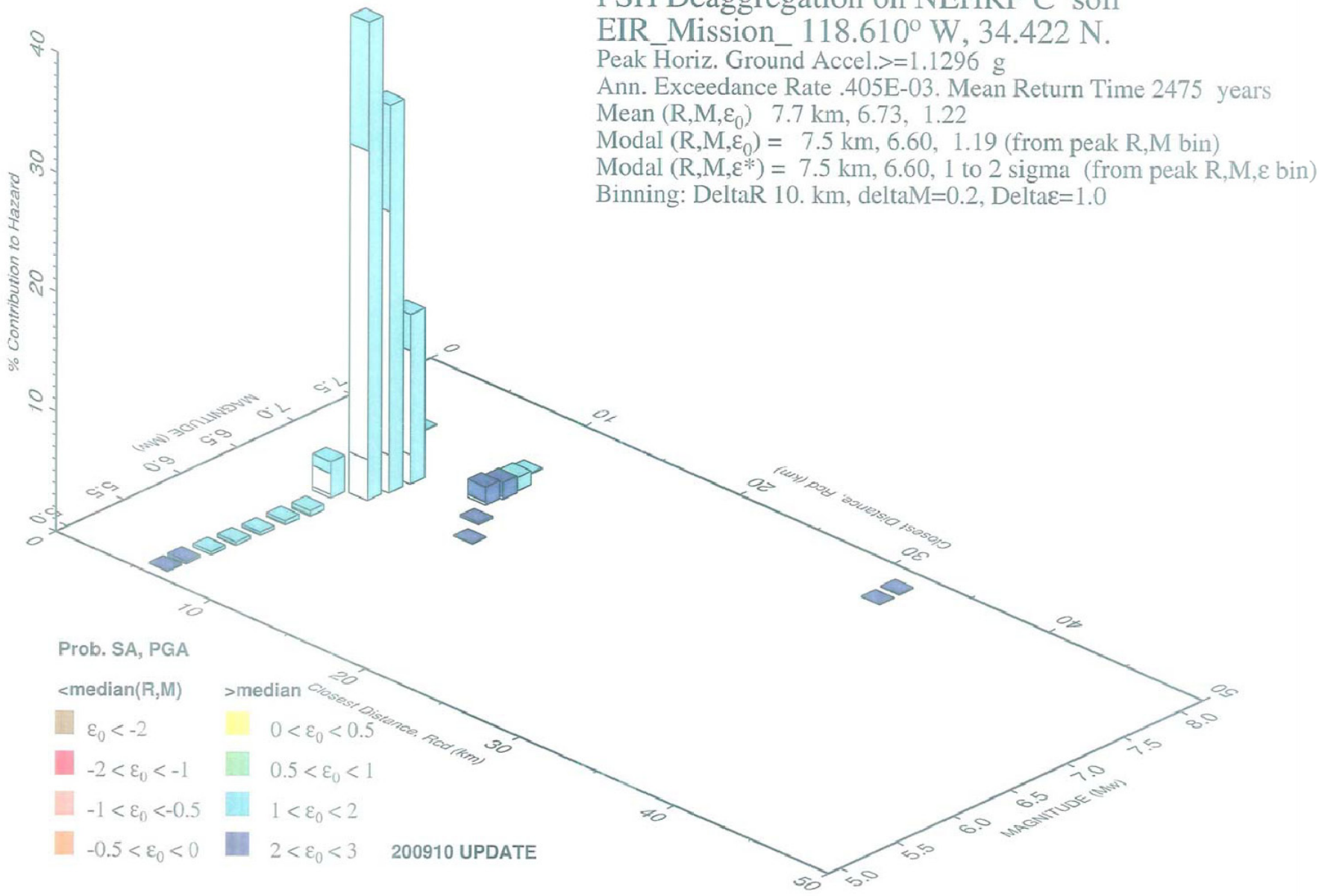
Department of Conservation
Division of Mines and Geology

Figure 3.3


Design Spectrum Sa Vs T
Sa (g)
1.60
1.55
1.50
1.45
1.40
1.35
1.30
1.25
1.20
1.15
1.10
1.05
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
T (sec)


MCE Spectrum Sa Vs T
Sa (g)
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
T (sec)


Uniform Hazard Spectrum of Sa Vs T
Sa (g)
3.1
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
T (sec)



GMT 2009 Dec 23 23:13:52 Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 600. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted

Newhall Land and Farming Company
March 31, 2010
94-502-52

APPENDIX A

HISTORIC EARTHQUAKE SEARCH RESULTS

RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

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*************************
*                       *
*    E Q S E A R C H    *
*                       *
*     Version 3.00      *
*                       *
*************************
```

ESTIMATION OF
PEAK ACCELERATION FROM
CALIFORNIA EARTHQUAKE CATALOGS

JOB NUMBER: 94-502-52

DATE: 12-23-2009

JOB NAME: EIR Mission Hills

EARTHQUAKE-CATALOG-FILE NAME: ALLQUAKE.DAT

MAGNITUDE RANGE:
MINIMUM MAGNITUDE: 4.00
MAXIMUM MAGNITUDE: 9.00

SITE COORDINATES:
SITE LATITUDE: 34.4222
SITE LONGITUDE: 118.6103

SEARCH DATES:
START DATE: 1800
END DATE: 2008

SEARCH RADIUS:
100.0 mi
160.9 km

ATTENUATION RELATION: 6) Bozorgnia Campbell Niazi (1999) Hor.-Holocene Soil-Uncor
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
ASSUMED SOURCE TYPE: DS [SS=Strike-slip, DS=Reverse-slip, BT=Blind-thrust]
SCOND: 0 Depth Source: A
Basement Depth: 5.00 km Campbell SSR: 0 Campbell SHR: 0
COMPUTE PEAK HORIZONTAL ACCELERATION

MINIMUM DEPTH VALUE (km): 3.0

EARTHQUAKE SEARCH RESULTS

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FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
GSP	34.3970	118.6090	07/22/1999	095724.0	11.0	4.00	0.108	VII	1.7(2.8)
DMG	34.3800	118.6230	10/29/1936	223536.1	10.0	4.00	0.094	VII	3.0(4.8)
GSG	34.4080	118.5590	01/17/1994	200205.4	0.0	4.00	0.093	VII	3.1(5.0)
GSP	34.3780	118.6180	01/19/1994	211144.9	11.0	5.10	0.209	VIII	3.1(5.0)
GSP	34.3740	118.6220	01/17/1994	155410.8	12.0	4.80	0.161	VIII	3.4(5.5)
GSP	34.3770	118.6490	04/27/1997	110928.4	15.0	4.80	0.153	VIII	3.8(6.1)
GSP	34.3940	118.6690	06/26/1995	084028.9	13.0	5.00	0.175	VIII	3.9(6.2)
GSP	34.3790	118.5630	01/18/1994	003935.0	7.0	4.40	0.111	VII	4.0(6.5)
GSP	34.3680	118.6370	01/17/1994	194353.4	13.0	4.10	0.088	VII	4.0(6.5)
GSP	34.3790	118.5610	01/18/1994	152346.9	7.0	4.80	0.147	VIII	4.1(6.6)
GSP	34.3620	118.6150	03/20/1996	073759.8	13.0	4.10	0.087	VII	4.2(6.7)
GSP	34.3630	118.6270	01/24/1994	055421.1	10.0	4.20	0.093	VII	4.2(6.7)
GSB	34.3580	118.6220	01/18/1994	040126.8	1.0	4.50	0.112	VII	4.5(7.2)
GSP	34.3590	118.6290	01/24/1994	055024.3	12.0	4.30	0.097	VII	4.5(7.2)
GSB	34.3600	118.5710	01/19/1994	044048.0	2.0	4.50	0.107	VII	4.8(7.8)
GSP	34.3690	118.6720	04/26/1997	103730.7	16.0	5.10	0.164	VIII	5.1(8.2)
DMG	34.3440	118.6360	02/09/1971	143436.1	-2.0	4.90	0.131	VIII	5.6(9.0)
PAS	34.3470	118.6560	04/08/1976	152138.1	14.5	4.60	0.102	VII	5.8(9.3)
GSP	34.3770	118.6980	01/18/1994	004308.9	11.0	5.20	0.161	VIII	5.9(9.5)
GSP	34.5000	118.5600	07/05/1991	174157.1	11.0	4.10	0.067	VI	6.1(9.8)
GSB	34.3330	118.6230	01/18/1994	072356.0	14.0	4.30	0.077	VII	6.2(10.0)
GSB	34.3450	118.5520	01/24/1994	041518.8	6.0	4.80	0.111	VII	6.3(10.1)
GSB	34.3430	118.6660	01/17/1994	234925.4	8.0	4.30	0.075	VII	6.3(10.2)
GSB	34.3790	118.7110	01/19/1994	210928.6	14.0	5.50	0.193	VIII	6.5(10.4)
DMG	34.4850	118.5210	07/16/1965	74622.4	15.1	4.00	0.057	VI	6.7(10.7)
GSP	34.3650	118.7080	01/19/1994	044314.5	12.0	4.10	0.060	VI	6.8(11.0)
GSP	34.3540	118.7040	05/01/1996	194956.4	14.0	4.10	0.058	VI	7.1(11.4)
GSP	34.3740	118.4950	01/28/1994	200953.4	0.0	4.20	0.061	VI	7.4(11.8)
DMG	34.5290	118.6440	02/07/1956	21656.5	16.0	4.20	0.059	VI	7.6(12.3)
GSB	34.3190	118.5580	01/18/1994	132444.1	1.0	4.50	0.074	VII	7.7(12.4)
DMG	34.3990	118.4730	03/09/1974	05431.9	24.4	4.70	0.083	VII	8.0(12.8)
DMG	34.3610	118.4870	02/10/1971	143526.7	4.4	4.20	0.055	VI	8.2(13.2)
GSP	34.3050	118.5790	01/29/1994	112036.0	1.0	5.10	0.110	VII	8.3(13.3)
GSP	34.3260	118.6980	01/17/1994	233330.7	9.0	5.60	0.167	VIII	8.3(13.4)
DMG	34.3000	118.6000	04/04/1893	1940 0.0	0.0	6.00	0.224	IX	8.5(13.6)
GSP	34.3570	118.4800	02/25/1994	125912.6	1.0	4.10	0.048	VI	8.7(14.0)
GSB	34.3010	118.5650	01/17/1994	204602.4	9.0	5.20	0.114	VII	8.8(14.1)
DMG	34.3560	118.4740	03/25/1971	2254 9.9	4.6	4.20	0.050	VI	9.0(14.5)
PAS	34.3800	118.4590	08/12/1977	21926.1	9.5	4.50	0.063	VI	9.1(14.6)
DMG	34.3840	118.4550	02/10/1971	113134.6	6.0	4.20	0.049	VI	9.2(14.8)
GSG	34.3340	118.4840	01/17/1994	223152.1	10.0	4.20	0.048	VI	9.4(15.2)
GSB	34.2850	118.6240	01/17/1994	135602.4	19.0	4.70	0.070	VI	9.5(15.3)

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DMG	34.3970	118.4390	02/21/1971	55052.6	6.9	4.70	0.067	VI	9.9(15.9)
GSP	34.2780	118.6110	01/29/1994	121656.4	2.0	4.30	0.049	VI	10.0(16.0)
DMG	34.3530	118.4560	03/07/1971	13340.5	3.3	4.50	0.057	VI	10.0(16.1)
DMG	34.4460	118.4360	02/10/1971	185441.7	8.1	4.20	0.045	VI	10.1(16.2)
GSG	34.3040	118.7220	01/17/1994	221922.3	10.0	4.00	0.037	V	10.3(16.6)
GSP	34.2740	118.5630	01/27/1994	171958.8	14.0	4.60	0.058	VI	10.6(17.0)
DMG	34.2840	118.5280	04/02/1971	54025.0	3.0	4.00	0.036	V	10.6(17.1)
DMG	34.3920	118.4270	02/21/1971	71511.7	7.2	4.50	0.053	VI	10.6(17.1)
DMG	34.4570	118.4270	02/09/1971	161926.5	-1.0	4.20	0.042	VI	10.7(17.2)
GSP	34.2690	118.5760	01/17/1994	125546.8	16.0	4.10	0.038	V	10.8(17.3)
DMG	34.2860	118.5150	03/31/1971	145222.5	2.1	4.60	0.056	VI	10.9(17.5)

EARTHQUAKE SEARCH RESULTS

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
GSP	34.3040	118.7370	01/19/1994	091310.9	13.0	4.10	0.038	V	10.9(17.5)
GSB	34.3100	118.4740	01/21/1994	184228.8	7.0	4.20	0.041	V	11.0(17.6)
DMG	34.3990	118.4190	02/10/1971	134953.7	9.7	4.30	0.044	VI	11.0(17.7)
DMG	34.2650	118.5770	04/15/1971	111432.0	4.2	4.20	0.040	V	11.0(17.7)
DMG	34.4260	118.4140	02/10/1971	518 7.2	5.8	4.50	0.050	VI	11.2(18.0)
DMG	34.2730	118.5320	06/21/1971	16 1 8.5	4.1	4.00	0.034	V	11.2(18.1)
DMG	34.4280	118.4130	04/01/1971	15 3 3.6	8.0	4.10	0.036	V	11.2(18.1)
GSP	34.3040	118.4730	01/17/1994	150703.2	2.0	4.20	0.039	V	11.3(18.2)
DMG	34.5860	118.6130	02/07/1956	31638.6	2.6	4.60	0.054	VI	11.3(18.2)
GSP	34.3170	118.4550	01/17/1994	132644.7	2.0	4.70	0.058	VI	11.4(18.4)
GSP	34.3310	118.4420	01/17/1994	141430.3	1.0	4.50	0.049	VI	11.5(18.5)
GSP	34.3110	118.4560	01/17/1994	193534.3	2.0	4.00	0.032	V	11.7(18.8)
GSB	34.3000	118.4660	01/21/1994	183915.3	10.0	4.70	0.056	VI	11.8(19.0)
PAS	34.4630	118.4090	09/24/1977	212824.3	5.0	4.20	0.037	V	11.8(19.0)
GSP	34.2910	118.4760	02/06/1994	131926.9	11.0	4.10	0.034	V	11.9(19.1)
DMG	34.3080	118.4540	02/09/1971	144346.7	6.2	5.20	0.082	VII	11.9(19.1)
DMG	34.4110	118.4010	02/09/1971	14 838.0	8.0	4.50	0.047	VI	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 8 4.0	8.0	4.00	0.031	V	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 2 3.0	8.0	4.10	0.034	V	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 745.0	8.0	4.50	0.047	VI	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 150.0	8.0	4.50	0.047	VI	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 434.0	8.0	4.20	0.037	V	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 041.8	8.4	6.40	0.207	VIII	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 159.0	8.0	4.10	0.034	V	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 1 8.0	8.0	5.80	0.134	VIII	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 550.0	8.0	4.10	0.034	V	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 154.0	8.0	4.20	0.037	V	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 730.0	8.0	4.00	0.031	V	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 710.0	8.0	4.00	0.031	V	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 325.0	8.0	4.40	0.043	VI	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 4 7.0	8.0	4.10	0.034	V	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 8 7.0	8.0	4.20	0.037	V	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 853.0	8.0	4.60	0.051	VI	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	141028.0	8.0	5.30	0.089	VII	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 140.0	8.0	4.10	0.034	V	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 231.0	8.0	4.70	0.055	VI	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 446.0	8.0	4.20	0.037	V	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 244.0	8.0	5.80	0.134	VIII	11.9(19.2)

DMG	34.4110	118.4010	02/09/1971	14 346.0	8.0	4.10	0.034	V	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 133.0	8.0	4.20	0.037	V	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 541.0	8.0	4.10	0.034	V	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 444.0	8.0	4.10	0.034	V	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 439.0	8.0	4.10	0.034	V	11.9(19.2)
DMG	34.4110	118.4010	02/09/1971	14 230.0	8.0	4.30	0.040	V	11.9(19.2)
GSP	34.2610	118.5340	01/17/1994	123939.8	14.0	4.50	0.047	VI	11.9(19.2)
DMG	34.2960	118.4640	03/30/1971	85443.3	2.6	4.10	0.034	V	12.1(19.4)
DMG	34.4330	118.3980	02/09/1971	144017.4	-2.0	4.10	0.033	V	12.1(19.5)
GSP	34.2920	118.4660	01/19/1994	144635.2	6.0	4.00	0.031	V	12.2(19.6)
GSP	34.2540	118.5450	01/17/1994	130627.9	0.0	4.60	0.050	VI	12.2(19.6)
GSP	34.2970	118.4580	01/21/1994	185344.6	7.0	4.30	0.039	V	12.2(19.7)
GSP	34.3010	118.4520	01/21/1994	185244.2	7.0	4.30	0.039	V	12.3(19.8)
GSP	34.2870	118.4660	01/19/1994	071406.2	11.0	4.00	0.030	V	12.4(20.0)
DMG	34.3570	118.4060	02/09/1971	141950.2	11.8	4.00	0.030	V	12.5(20.1)

EARTHQUAKE SEARCH RESULTS

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FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	34.4170	118.8330	06/01/1946	11 631.0	0.0	4.10	0.032	V	12.7(20.4)
GSP	34.2990	118.4390	02/03/1994	162335.4	8.0	4.20	0.034	V	12.9(20.8)
GSB	34.2990	118.4280	01/23/1994	085508.7	6.0	4.20	0.032	V	13.4(21.6)
GSP	34.2280	118.5730	01/17/1994	175608.2	19.0	4.60	0.044	VI	13.6(21.8)
DMG	34.4310	118.3690	08/14/1974	144555.2	8.2	4.20	0.031	V	13.8(22.1)
DMG	34.3960	118.3660	02/10/1971	173855.1	6.2	4.20	0.031	V	14.0(22.6)
GSP	34.2180	118.6070	01/18/1994	113509.9	12.0	4.20	0.030	V	14.1(22.7)
DMG	34.2680	118.4450	08/30/1964	225737.1	15.4	4.00	0.026	V	14.2(22.9)
DMG	34.3870	118.3640	02/09/1971	143917.8	-1.6	4.00	0.026	V	14.2(22.9)
GSP	34.3110	118.3980	06/15/1994	055948.6	7.0	4.20	0.030	V	14.3(23.1)
GSP	34.3120	118.3930	05/25/1994	125657.1	7.0	4.40	0.034	V	14.5(23.4)
GSP	34.2450	118.4710	01/18/1994	155144.9	12.0	4.00	0.025	V	14.6(23.5)
GSP	34.2890	118.4030	01/14/2001	025053.7	8.0	4.00	0.024	V	15.0(24.1)
GSP	34.2130	118.5370	01/17/1994	123055.4	18.0	6.70	0.198	VIII	15.0(24.2)
GSP	34.2840	118.4040	01/14/2001	022614.1	8.0	4.30	0.030	V	15.1(24.4)
GSP	34.2310	118.4750	03/20/1994	212012.3	13.0	5.30	0.067	VI	15.3(24.6)
GSP	34.2150	118.5100	01/19/1994	140914.8	17.0	4.50	0.035	V	15.4(24.8)
GSP	34.2930	118.3890	12/06/1994	034834.5	9.0	4.50	0.035	V	15.4(24.9)
DMG	34.4110	118.3290	02/10/1971	5 636.0	4.7	4.30	0.028	V	16.0(25.8)
DMG	34.3390	118.3320	02/09/1971	141612.9	11.1	4.10	0.023	IV	16.9(27.1)
DMG	34.3350	118.3310	02/09/1971	155820.7	14.2	4.80	0.039	V	17.0(27.4)
DMG	34.3680	118.3140	04/25/1971	1448 6.5	-2.0	4.00	0.020	IV	17.3(27.8)
T-A	34.4200	118.9200	03/29/1917	8 6 0.0	0.0	4.30	0.025	V	17.6(28.4)
DMG	34.3610	118.3060	02/09/1971	141021.5	5.0	4.70	0.034	V	17.8(28.7)
DMG	34.3700	118.3020	02/10/1971	31212.0	0.8	4.00	0.019	IV	17.9(28.8)
DMG	34.6000	118.9000	05/18/1940	91512.0	0.0	4.00	0.016	IV	20.5(33.1)
DMG	34.6670	118.8330	01/24/1950	215659.0	0.0	4.00	0.016	IV	21.1(34.0)
DMG	34.4830	118.9830	09/04/1942	63433.0	0.0	4.50	0.023	IV	21.6(34.8)
DMG	34.4830	118.9830	09/03/1942	14 6 1.0	0.0	4.50	0.023	IV	21.6(34.8)
PAS	34.5410	118.9890	06/12/1984	02752.4	11.7	4.10	0.015	IV	23.1(37.1)
PAS	34.3780	119.0350	04/03/1985	4 449.8	27.9	4.00	0.013	III	24.4(39.2)
DMG	34.5190	118.1980	08/23/1952	10 9 7.1	13.1	5.00	0.029	V	24.4(39.3)
DMG	34.1000	118.8000	05/10/1911	1340 0.0	0.0	4.00	0.013	III	24.7(39.8)
PDP	34.0590	118.3870	09/09/2001	235918.0	4.0	4.20	0.013	III	28.1(45.3)

MGI	34.1000	118.3000	07/26/1920	1215 0.0	0.0	4.00	0.011	III	28.4(45.7)
MGI	34.1000	118.3000	07/16/1920	2127 0.0	0.0	4.60	0.018	IV	28.4(45.7)
MGI	34.1000	118.3000	07/16/1920	2130 0.0	0.0	4.60	0.018	IV	28.4(45.7)
MGI	34.1000	118.3000	07/16/1920	2022 0.0	0.0	4.60	0.018	IV	28.4(45.7)
DMG	34.6830	119.0000	04/06/1943	223624.0	0.0	4.00	0.011	III	28.5(45.9)
DMG	34.7170	118.9670	06/11/1935	1810 0.0	0.0	4.00	0.011	III	28.7(46.2)
T-A	34.8300	118.7500	11/27/1852	0 0 0.0	0.0	7.00	0.114	VII	29.2(47.1)
DMG	34.7000	119.0000	10/23/1916	254 0.0	0.0	5.50	0.035	V	29.3(47.2)
DMG	34.5000	119.1170	11/17/1954	23 351.0	0.0	4.40	0.014	IV	29.3(47.2)
MGI	34.0000	118.5000	06/23/1920	1220 0.0	0.0	4.00	0.010	III	29.8(48.0)
DMG	34.0000	118.5000	11/08/1914	1140 0.0	0.0	4.50	0.015	IV	29.8(48.0)
DMG	34.0000	118.5000	06/22/1920	248 0.0	0.0	4.90	0.021	IV	29.8(48.0)
DMG	34.0000	118.5000	08/04/1927	1224 0.0	0.0	5.00	0.023	IV	29.8(48.0)
MGI	34.0000	118.5000	11/19/1918	2018 0.0	0.0	5.00	0.023	IV	29.8(48.0)
DMG	34.0000	118.5000	03/06/1918	1820 0.0	0.0	4.00	0.010	III	29.8(48.0)
MGI	34.0000	118.5000	03/08/1918	1230 0.0	0.0	4.00	0.010	III	29.8(48.0)
DMG	34.5650	118.1130	02/28/1969	45612.4	5.3	4.30	0.013	III	30.0(48.2)
DMG	34.7840	118.9020	07/27/1972	03117.4	8.0	4.40	0.014	IV	30.0(48.2)
DMG	34.6170	119.0830	02/26/1950	0 622.0	0.0	4.70	0.018	IV	30.1(48.4)

EARTHQUAKE SEARCH RESULTS

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
T-A	34.1700	118.1700	03/07/1888	1554 0.0	0.0	4.30	0.013	III	30.6(49.2)
MGI	34.0800	118.2600	07/16/1920	18 8 0.0	0.0	5.00	0.022	IV	30.9(49.8)
GSP	34.0490	118.9150	02/19/1995	212418.1	15.0	4.30	0.012	III	31.1(50.0)
DMG	34.0000	118.4170	12/07/1938	338 0.0	0.0	4.00	0.010	III	31.2(50.2)
MGI	34.0000	118.4000	01/29/1927	2324 0.0	0.0	4.00	0.009	III	31.5(50.7)
MGI	34.0000	118.4000	10/01/1930	040 0.0	0.0	4.60	0.015	IV	31.5(50.7)
MGI	34.0000	118.4000	02/07/1927	429 0.0	0.0	4.60	0.015	IV	31.5(50.7)
MGI	34.0000	118.4000	02/22/1920	1610 0.0	0.0	4.60	0.015	IV	31.5(50.7)
MGI	34.1000	118.2000	05/02/1916	1432 0.0	0.0	4.00	0.009	III	32.3(52.0)
MGI	34.1000	118.2000	04/21/1921	1538 0.0	0.0	4.00	0.009	III	32.3(52.0)
MGI	34.1000	118.2000	01/27/1860	830 0.0	0.0	4.30	0.012	III	32.3(52.0)
PAS	34.0540	118.9640	04/13/1982	11 212.2	16.6	4.00	0.009	III	32.5(52.2)
DMG	33.9500	118.6320	08/31/1930	04036.0	0.0	5.20	0.024	V	32.6(52.5)
PAS	34.1490	118.1350	12/03/1988	113826.4	13.3	4.90	0.018	IV	33.0(53.1)
PAS	33.9440	118.6810	01/01/1979	231438.9	11.3	5.00	0.020	IV	33.3(53.5)
PAS	33.9330	118.6690	10/17/1979	205237.3	5.5	4.20	0.010	III	33.9(54.6)
DMG	34.8670	118.8670	07/22/1952	74455.0	0.0	4.10	0.009	III	34.0(54.7)
MGI	34.0000	118.3000	09/03/1905	540 0.0	0.0	5.30	0.025	V	34.1(54.9)
MGI	34.0000	118.3000	06/22/1920	2035 0.0	0.0	4.00	0.009	III	34.1(54.9)
MGI	34.0000	118.3000	06/30/1920	350 0.0	0.0	4.00	0.009	III	34.1(54.9)
DMG	34.0650	119.0350	02/21/1973	144557.3	8.0	5.90	0.039	V	34.6(55.6)
DMG	34.0170	118.9670	04/16/1948	222624.0	0.0	4.70	0.015	IV	34.6(55.7)
PAS	33.9190	118.6270	01/19/1989	65328.8	11.9	5.00	0.019	IV	34.8(55.9)
DMG	33.9830	118.3000	02/11/1940	192410.0	0.0	4.00	0.008	III	35.1(56.5)
PAS	34.0160	118.9880	10/26/1984	172043.5	13.3	4.60	0.013	III	35.4(56.9)
DMG	34.8350	118.9880	11/29/1936	55445.3	10.0	4.00	0.008	III	35.7(57.4)
T-A	34.0000	118.2500	05/04/1857	6 0 0.0	0.0	4.30	0.010	III	35.7(57.4)
T-A	34.0000	118.2500	03/26/1860	0 0 0.0	0.0	5.00	0.018	IV	35.7(57.4)
T-A	34.0000	118.2500	01/10/1856	0 0 0.0	0.0	5.00	0.018	IV	35.7(57.4)
T-A	34.0000	118.2500	09/23/1827	0 0 0.0	0.0	5.00	0.018	IV	35.7(57.4)

T-A	34.0000	118.2500	01/17/1857	1 0 0.0	0.0	4.30	0.010	III	35.7(57.4)
T-A	34.0000	118.2500	05/02/1856	810 0.0	0.0	4.30	0.010	III	35.7(57.4)
T-A	34.0000	118.2500	03/21/1880	1425 0.0	0.0	4.30	0.010	III	35.7(57.4)
DMG	34.8670	118.9330	09/21/1941	1953 7.2	0.0	5.20	0.021	IV	35.8(57.5)
GSP	34.2620	118.0020	06/28/1991	144354.5	11.0	5.40	0.024	V	36.4(58.6)
GSP	34.0300	118.1800	06/12/1989	165718.4	16.0	4.40	0.011	III	36.6(58.8)
MGI	34.1000	118.1000	07/11/1855	415 0.0	0.0	6.30	0.050	VI	36.6(59.0)
MGI	34.0000	119.0000	12/14/1912	0 0 0.0	0.0	5.70	0.031	V	36.7(59.0)
DMG	34.0000	119.0000	09/24/1827	4 0 0.0	0.0	7.00	0.087	VII	36.7(59.0)
PAS	34.9430	118.7430	06/10/1988	23 643.0	6.8	5.40	0.024	V	36.7(59.1)
DMG	34.9000	118.9000	10/23/1916	244 0.0	0.0	6.00	0.039	V	36.9(59.3)
MGI	34.2000	119.2000	06/16/1914	1052 0.0	0.0	4.60	0.013	III	37.0(59.5)
GSP	34.0200	118.1800	06/12/1989	172225.5	16.0	4.10	0.008	III	37.1(59.7)
DMG	33.9030	118.4310	11/29/1938	192115.8	10.0	4.00	0.008	II	37.3(60.0)
GSP	34.2500	117.9900	06/28/1991	170055.5	9.0	4.30	0.010	III	37.3(60.0)
MGI	34.0000	118.2000	02/13/1917	13 5 0.0	0.0	4.60	0.012	III	37.4(60.2)
MGI	34.0000	118.2000	06/26/1917	2120 0.0	0.0	4.60	0.012	III	37.4(60.2)
MGI	34.0000	118.2000	06/26/1917	2115 0.0	0.0	4.60	0.012	III	37.4(60.2)
MGI	34.0000	118.2000	06/26/1917	2130 0.0	0.0	4.60	0.012	III	37.4(60.2)
MGI	34.0000	118.2000	06/26/1917	424 0.0	0.0	4.00	0.008	II	37.4(60.2)
DMG	34.8430	119.0260	03/07/1939	195331.8	10.0	4.00	0.008	II	37.4(60.2)
PAS	34.0730	118.0980	10/04/1987	105938.2	8.2	5.30	0.021	IV	37.9(61.0)
MGI	34.2000	118.0000	01/09/1921	530 0.0	0.0	4.60	0.012	III	38.0(61.2)

EARTHQUAKE SEARCH RESULTS

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FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
PAS	34.0760	118.0900	10/01/1987	1448 3.1	11.7	4.10	0.008	III	38.1(61.3)
DMG	34.8000	119.1000	09/05/1883	1230 0.0	0.0	6.00	0.038	V	38.1(61.4)
DMG	34.9000	118.9500	08/01/1952	13 430.0	0.0	5.10	0.018	IV	38.2(61.5)
PAS	34.0600	118.1000	10/01/1987	1449 5.9	11.7	4.70	0.013	III	38.4(61.8)
DMG	34.8670	119.0170	07/21/1952	2153 9.0	0.0	4.30	0.009	III	38.4(61.8)
T-A	34.9200	118.9200	01/20/1857	0 0 0.0	0.0	5.00	0.016	IV	38.6(62.1)
T-A	34.9200	118.9200	05/23/1857	0 0 0.0	0.0	5.00	0.016	IV	38.6(62.1)
T-A	34.9200	118.9200	08/29/1857	0 0 0.0	0.0	4.30	0.009	III	38.6(62.1)
PAS	34.0490	118.1010	10/01/1987	144541.5	13.6	4.70	0.013	III	38.8(62.5)
DMG	34.8850	119.0020	02/23/1939	91846.7	10.0	4.50	0.011	III	38.9(62.7)
PAS	34.0520	118.0900	10/01/1987	151231.8	10.8	4.70	0.013	III	39.2(63.1)
DMG	34.9500	118.8670	07/21/1952	121936.0	0.0	5.30	0.020	IV	39.2(63.2)
PAS	34.0610	118.0790	10/01/1987	144220.0	9.5	5.90	0.033	V	39.3(63.2)
DMG	33.9900	119.0580	05/29/1955	164335.4	17.4	4.10	0.008	II	39.3(63.2)
MGI	34.4000	119.3000	08/12/1925	1845 0.0	0.0	4.00	0.007	II	39.3(63.3)
PAS	34.0500	118.0870	10/01/1987	155953.5	10.4	4.00	0.007	II	39.4(63.4)
DMG	34.9110	118.9730	02/23/1939	84551.7	10.0	4.50	0.011	III	39.5(63.6)
PDP	33.9220	118.2700	10/28/2001	162745.6	21.0	4.00	0.007	II	39.6(63.8)
DMG	34.8830	119.0330	08/20/1952	84747.0	0.0	4.20	0.008	III	39.9(64.1)
PAS	34.0770	118.0470	02/11/1988	152555.7	12.5	4.70	0.012	III	40.0(64.4)
MGI	34.3000	119.3000	05/01/1904	1830 0.0	0.0	4.60	0.011	III	40.2(64.7)
MGI	34.3000	119.3000	09/28/1926	1749 0.0	0.0	4.00	0.007	II	40.2(64.7)
MGI	34.3000	119.3000	05/15/1927	1120 0.0	0.0	4.00	0.007	II	40.2(64.7)
DMG	34.9280	118.9700	01/15/1955	1 3 6.7	9.1	4.30	0.009	III	40.5(65.1)
DMG	35.0000	118.7330	08/23/1952	6 3 3.0	0.0	4.30	0.009	III	40.5(65.2)
DMG	35.0000	118.7330	04/29/1953	124745.0	0.0	4.70	0.012	III	40.5(65.2)

DMG	33.9390	118.2050	01/11/1950	214135.0	0.4	4.10	0.007	II	40.6(65.3)
DMG	34.1180	119.2200	03/18/1957	185628.0	13.8	4.70	0.012	III	40.6(65.4)
DMG	33.8830	118.3170	03/11/1933	1457 0.0	0.0	4.90	0.014	IV	40.8(65.7)
DMG	34.9320	118.9760	03/01/1963	02557.9	13.9	5.00	0.015	IV	40.9(65.8)
DMG	34.9030	119.0380	05/08/1939	248 5.3	10.0	4.50	0.010	III	41.1(66.2)
DMG	34.9500	118.9500	10/16/1952	1222 7.0	0.0	4.30	0.009	III	41.2(66.3)
MGI	34.1000	118.0000	01/27/1930	2026 0.0	0.0	4.60	0.011	III	41.3(66.5)
DMG	34.9000	119.0500	07/22/1952	143018.0	0.0	4.30	0.008	III	41.4(66.6)
GSP	34.9180	119.0200	12/24/2000	010421.9	14.0	4.40	0.009	III	41.4(66.6)
DMG	34.9450	118.9680	03/04/1963	201042.3	8.5	4.00	0.007	II	41.4(66.6)
DMG	34.9410	118.9870	11/15/1961	53855.5	10.7	5.00	0.015	IV	41.7(67.1)
DMG	35.0000	118.8330	07/23/1952	75319.0	0.0	5.40	0.020	IV	41.8(67.3)
DMG	35.0000	118.8330	07/23/1952	181351.0	0.0	5.20	0.017	IV	41.8(67.3)
DMG	35.0000	118.8330	12/01/1952	52610.0	0.0	4.40	0.009	III	41.8(67.3)
DMG	34.9830	118.9000	03/23/1953	17 637.0	0.0	4.00	0.007	II	42.1(67.7)
DMG	34.9830	118.9000	07/24/1952	95032.0	0.0	4.30	0.008	III	42.1(67.7)
DMG	34.9670	118.9500	11/27/1952	153641.0	0.0	4.00	0.006	II	42.3(68.0)
DMG	34.9670	118.9500	07/30/1952	11 255.0	0.0	4.10	0.007	II	42.3(68.0)
GSP	34.4810	119.3530	10/23/1996	220929.4	14.0	4.20	0.008	II	42.5(68.4)
DMG	33.9500	118.1330	10/25/1933	7 046.0	0.0	4.30	0.008	III	42.5(68.4)
MGI	33.9000	118.2000	10/08/1927	1914 0.0	0.0	4.60	0.010	III	43.0(69.2)
DMG	34.9500	119.0170	11/11/1952	181225.0	0.0	4.10	0.007	II	43.1(69.4)
DMG	34.2000	117.9000	07/13/1935	105416.5	0.0	4.70	0.011	III	43.3(69.7)
DMG	34.2000	117.9000	08/28/1889	215 0.0	0.0	5.50	0.021	IV	43.3(69.7)
MGI	33.8000	118.5000	06/18/1915	15 5 0.0	0.0	4.00	0.006	II	43.4(69.9)
DMG	34.9670	119.0000	09/02/1952	204556.0	0.0	4.70	0.011	III	43.6(70.2)
DMG	34.9330	119.0670	02/10/1954	235838.0	0.0	4.50	0.009	III	43.8(70.4)

EARTHQUAKE SEARCH RESULTS

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	33.8500	118.2670	03/11/1933	629 0.0	0.0	4.40	0.008	III	44.1(71.0)
DMG	33.8500	118.2670	03/11/1933	1425 0.0	0.0	5.00	0.014	IV	44.1(71.0)
DMG	34.9830	118.9830	05/23/1954	235243.0	0.0	5.10	0.015	IV	44.1(71.0)
DMG	35.0330	118.8500	10/07/1953	145921.0	0.0	4.90	0.013	III	44.3(71.3)
DMG	34.9220	119.1030	01/09/1963	6 4 3.8	8.7	4.00	0.006	II	44.4(71.5)
DMG	33.8670	118.2170	06/19/1944	0 333.0	0.0	4.50	0.009	III	44.4(71.5)
DMG	33.8670	118.2170	06/19/1944	3 6 7.0	0.0	4.40	0.008	III	44.4(71.5)
DMG	35.0670	118.6170	07/23/1952	235136.0	0.0	4.00	0.006	II	44.5(71.6)
DMG	33.9670	118.0500	01/30/1941	13446.9	0.0	4.10	0.007	II	44.8(72.2)
DMG	33.8670	118.2000	11/13/1933	2128 0.0	0.0	4.00	0.006	II	44.9(72.3)
DMG	35.0670	118.7670	07/22/1952	21 211.0	0.0	4.20	0.007	II	45.4(73.1)
MGI	34.0000	118.0000	05/05/1929	1 7 0.0	0.0	4.60	0.010	III	45.4(73.1)
MGI	34.0000	118.0000	05/05/1929	735 0.0	0.0	4.00	0.006	II	45.4(73.1)
MGI	34.0000	118.0000	12/25/1903	1745 0.0	0.0	5.00	0.013	III	45.4(73.1)
DMG	33.7830	118.4170	11/01/1940	725 3.0	0.0	4.00	0.006	II	45.5(73.2)
DMG	33.7830	118.4170	10/12/1940	024 0.0	0.0	4.00	0.006	II	45.5(73.2)
DMG	33.7830	118.4170	10/14/1940	205111.0	0.0	4.00	0.006	II	45.5(73.2)
DMG	33.7830	118.4170	11/02/1940	25826.0	0.0	4.00	0.006	II	45.5(73.2)
DMG	35.0630	118.4230	08/26/1952	205640.6	-0.8	4.40	0.008	III	45.5(73.2)
DMG	34.9830	119.0330	07/21/1952	235328.0	0.0	4.50	0.009	III	45.5(73.3)
DMG	35.0000	119.0000	07/21/1952	1617 0.0	0.0	4.10	0.006	II	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1313 0.0	0.0	4.50	0.009	III	45.6(73.4)

DMG	35.0000	119.0000	07/21/1952	1239 0.0	0.0	4.20	0.007	II	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1638 0.0	0.0	4.50	0.009	III	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1218 0.0	0.0	4.40	0.008	III	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1311 0.0	0.0	4.10	0.006	II	45.6(73.4)
DMG	35.0000	119.0000	07/22/1952	82122.0	0.0	4.10	0.006	II	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1210 0.0	0.0	4.50	0.009	III	45.6(73.4)
DMG	35.0000	119.0000	07/23/1952	043 8.0	0.0	4.40	0.008	III	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1542 0.0	0.0	4.20	0.007	II	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	13 8 0.0	0.0	4.50	0.009	III	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1240 0.0	0.0	4.90	0.012	III	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1259 0.0	0.0	4.20	0.007	II	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1442 0.0	0.0	4.20	0.007	II	45.6(73.4)
DMG	35.0000	119.0000	07/25/1952	0 3 0.0	0.0	4.00	0.006	II	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1417 0.0	0.0	4.10	0.006	II	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1225 0.0	0.0	4.70	0.010	III	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1536 0.0	0.0	4.20	0.007	II	45.6(73.4)
DMG	35.0000	119.0000	07/22/1952	191024.0	0.0	4.10	0.006	II	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1451 0.0	0.0	4.20	0.007	II	45.6(73.4)
DMG	35.0000	119.0000	07/22/1952	175236.0	0.0	4.10	0.006	II	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1336 0.0	0.0	4.10	0.006	II	45.6(73.4)
DMG	35.0000	119.0000	07/22/1952	133143.0	0.0	4.80	0.011	III	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1553 0.0	0.0	4.50	0.009	III	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	12 7 0.0	0.0	4.70	0.010	III	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	12 6 0.0	0.0	4.80	0.011	III	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1212 0.0	0.0	4.60	0.010	III	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	14 6 0.0	0.0	4.20	0.007	II	45.6(73.4)
DMG	35.0000	119.0000	08/10/1952	194424.0	0.0	4.10	0.006	II	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1359 0.0	0.0	4.60	0.010	III	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1228 0.0	0.0	4.20	0.007	II	45.6(73.4)
DMG	35.0000	119.0000	02/16/1919	1557 0.0	0.0	5.00	0.013	III	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1222 0.0	0.0	4.90	0.012	III	45.6(73.4)

EARTHQUAKE SEARCH RESULTS

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	35.0000	119.0000	03/13/1929	228 0.0	0.0	4.50	0.009	III	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	18 0 0.0	0.0	4.50	0.009	III	45.6(73.4)
DMG	35.0000	119.0000	01/25/1919	2229 0.0	0.0	4.00	0.006	II	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1415 0.0	0.0	4.40	0.008	III	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	1317 0.0	0.0	4.00	0.006	II	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	12 531.0	0.0	6.40	0.041	V	45.6(73.4)
DMG	35.0000	119.0000	07/21/1952	132512.0	0.0	4.50	0.009	III	45.6(73.4)
DMG	35.0330	118.9170	07/23/1952	211658.0	0.0	4.10	0.006	II	45.6(73.4)
DMG	33.7700	118.4800	04/24/1931	182754.8	0.0	4.40	0.008	III	45.6(73.4)
DMG	35.0830	118.5830	08/04/1952	535 0.0	0.0	4.00	0.006	II	45.6(73.5)
DMG	35.0830	118.5830	07/22/1952	81624.0	0.0	4.40	0.008	III	45.6(73.5)
DMG	35.0330	118.9330	07/22/1952	223133.0	0.0	4.70	0.010	III	46.0(74.0)
DMG	34.8410	119.2400	01/11/1958	23 847.4	10.8	4.00	0.006	II	46.0(74.0)
DMG	35.0000	119.0170	01/12/1954	233349.0	0.0	5.90	0.027	V	46.1(74.2)
DMG	35.0000	119.0170	05/25/1953	324 1.0	0.0	4.80	0.011	III	46.1(74.2)
DMG	35.0000	119.0170	07/21/1952	115214.0	0.0	7.70	0.111	VII	46.1(74.2)
DMG	33.7670	118.4500	10/11/1940	55712.3	0.0	4.70	0.010	III	46.2(74.3)
DMG	34.4000	117.8000	02/24/1946	6 752.0	0.0	4.10	0.006	II	46.2(74.3)

DMG	34.1500	119.3500	08/22/1950	224758.0	0.0	4.20	0.007	II	46.2(74.3)
DMG	35.0170	118.9830	08/17/1952	9 9 7.0	0.0	4.10	0.006	II	46.2(74.3)
DMG	35.0830	118.7500	07/26/1952	18 244.0	0.0	4.00	0.006	II	46.3(74.5)
DMG	35.0830	118.7500	07/26/1952	15 831.0	0.0	4.40	0.008	III	46.3(74.5)
DMG	35.0830	118.7500	07/22/1952	84734.0	0.0	4.70	0.010	III	46.3(74.5)
DMG	35.0500	118.9000	09/25/1952	162136.0	0.0	4.10	0.006	II	46.4(74.6)
DMG	33.9000	118.1000	07/08/1929	1646 6.7	13.0	4.70	0.010	III	46.4(74.6)
DMG	33.8000	118.3000	11/03/1931	16 5 0.0	0.0	4.00	0.006	II	46.5(74.8)
MGI	33.8000	118.3000	12/31/1928	1045 0.0	0.0	4.00	0.006	II	46.5(74.8)
DMG	35.0000	119.0330	07/21/1952	1157 0.0	0.0	4.50	0.009	III	46.5(74.9)
DMG	35.0000	119.0330	07/21/1952	12 2 0.0	0.0	5.60	0.021	IV	46.5(74.9)
DMG	35.0000	119.0330	07/21/1952	1154 0.0	0.0	4.50	0.009	III	46.5(74.9)
DMG	35.0000	119.0330	07/21/1952	1158 0.0	0.0	4.60	0.009	III	46.5(74.9)
DMG	35.0000	119.0330	07/21/1952	1155 0.0	0.0	4.50	0.009	III	46.5(74.9)
DMG	35.0000	119.0330	07/21/1952	1159 0.0	0.0	4.50	0.009	III	46.5(74.9)
DMG	33.9960	117.9750	06/15/1967	458 5.5	10.0	4.10	0.006	II	46.7(75.2)
PAS	35.0950	118.5190	06/22/1981	45747.3	5.0	4.00	0.006	II	46.7(75.2)
DMG	35.1000	118.6170	09/26/1952	202120.0	0.0	4.00	0.006	II	46.8(75.3)
DMG	35.0000	119.0500	09/12/1952	103525.0	0.0	4.50	0.008	III	47.1(75.7)
DMG	35.0670	118.8830	08/17/1952	21 442.0	0.0	4.30	0.007	II	47.1(75.8)
DMG	35.0670	118.8830	08/14/1952	114146.0	0.0	4.20	0.007	II	47.1(75.8)
DMG	35.0500	118.9500	11/14/1952	2334 1.4	0.0	4.00	0.006	II	47.4(76.3)
DMG	35.0500	118.9500	08/17/1952	614 4.0	0.0	4.00	0.006	II	47.4(76.3)
DMG	33.8170	118.2170	10/22/1941	65718.5	0.0	4.90	0.012	III	47.4(76.4)
DMG	35.0330	119.0000	07/22/1952	101939.0	0.0	4.10	0.006	II	47.6(76.6)
PAS	33.9060	119.1660	05/23/1978	91650.8	6.0	4.00	0.006	II	47.7(76.8)
DMG	35.0170	119.0500	08/05/1953	122059.0	0.0	4.30	0.007	II	48.1(77.3)
DMG	35.0000	119.0830	11/07/1952	85535.0	0.0	4.60	0.009	III	48.1(77.4)
DMG	35.0670	118.9330	07/23/1952	223220.0	0.0	4.10	0.006	II	48.1(77.5)
PAS	35.0460	119.0010	06/05/1975	144645.3	9.0	4.10	0.006	II	48.4(77.9)
DMG	35.0450	119.0040	03/23/1956	212327.1	12.1	4.30	0.007	II	48.5(78.0)
DMG	35.1170	118.4810	05/01/1953	64820.9	2.4	4.10	0.006	II	48.5(78.1)
DMG	33.7830	118.2500	11/14/1941	84136.3	0.0	5.40	0.017	IV	48.7(78.4)
PAS	35.0000	119.1030	05/13/1975	02135.6	19.1	4.50	0.008	III	48.7(78.4)
USG	34.4180	119.4680	09/07/1984	11 345.2	9.5	4.00	0.005	II	48.8(78.6)

EARTHQUAKE SEARCH RESULTS

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	35.0330	119.0500	08/07/1952	163151.0	0.0	4.90	0.011	III	49.0(78.8)
DMG	35.0330	119.0500	08/18/1952	44010.0	0.0	4.70	0.009	III	49.0(78.8)
DMG	35.0330	119.0500	07/27/1952	71611.0	0.0	4.10	0.006	II	49.0(78.8)
DMG	35.0670	118.9830	08/04/1952	194750.0	0.0	4.00	0.005	II	49.3(79.3)
DMG	35.1330	118.7000	09/02/1952	124132.0	0.0	4.60	0.009	III	49.3(79.4)
DMG	35.1330	118.5170	07/23/1952	152524.0	0.0	4.00	0.005	II	49.4(79.4)
DMG	35.1330	118.5170	07/22/1952	141 2.0	0.0	4.50	0.008	III	49.4(79.4)
DMG	35.1330	118.5170	08/14/1952	72822.0	0.0	4.10	0.006	II	49.4(79.4)
DMG	35.1330	118.5170	07/28/1952	54554.0	0.0	4.20	0.006	II	49.4(79.4)
GSP	35.0980	118.3060	12/31/1995	214823.1	7.0	4.00	0.005	II	49.7(80.1)
DMG	35.1330	118.7670	07/25/1952	143442.0	0.0	4.40	0.007	II	49.9(80.3)
DMG	35.1330	118.7670	07/21/1952	194122.0	0.0	5.50	0.018	IV	49.9(80.3)
DMG	33.7830	118.2000	12/27/1939	192849.0	0.0	4.70	0.009	III	50.0(80.4)
DMG	33.7590	118.2530	08/31/1938	31814.2	10.0	4.50	0.008	II	50.1(80.7)

DMG	34.1000	119.4000	05/19/1893	035 0.0	0.0	5.50	0.017	IV	50.3(80.9)
DMG	35.1500	118.6330	01/27/1954	141948.0	0.0	5.00	0.012	III	50.3(80.9)
DMG	35.1500	118.6830	08/13/1952	173925.0	0.0	4.70	0.009	III	50.4(81.1)
DMG	34.3490	119.4920	07/14/1958	52555.3	16.0	4.70	0.009	III	50.5(81.2)
DMG	35.0330	119.1000	09/02/1953	152756.0	0.0	4.00	0.005	II	50.5(81.3)
DMG	35.0330	119.1000	01/12/1954	234037.0	0.0	4.10	0.006	II	50.5(81.3)
DMG	35.0330	119.1000	01/13/1954	14531.0	0.0	4.40	0.007	II	50.5(81.3)
DMG	35.0330	119.1000	02/07/1954	0 953.0	0.0	4.40	0.007	II	50.5(81.3)
DMG	35.0670	119.0330	07/23/1952	175329.0	0.0	4.10	0.006	II	50.6(81.4)
DMG	35.0670	119.0330	07/27/1952	113438.0	0.0	4.10	0.006	II	50.6(81.4)
DMG	34.5000	119.5000	06/29/1926	2321 0.0	0.0	5.50	0.017	IV	50.9(82.0)
DMG	34.5000	119.5000	12/05/1920	1158 0.0	0.0	4.50	0.008	II	50.9(82.0)
DMG	34.5000	119.5000	08/05/1930	1125 0.0	0.0	5.00	0.011	III	50.9(82.0)
DMG	35.0660	119.0490	01/24/1974	5 2 0.8	6.4	4.30	0.006	II	50.9(82.0)
PAS	35.0180	119.1410	11/10/1981	223435.5	3.1	4.50	0.008	II	51.0(82.0)
DMG	35.1000	118.9670	08/25/1952	62026.0	0.0	4.70	0.009	III	51.0(82.0)
DMG	34.1000	117.8000	03/31/1931	2033 0.0	0.0	4.00	0.005	II	51.3(82.6)
DMG	35.0670	119.0670	02/24/1954	223022.0	0.0	4.50	0.008	II	51.5(82.9)
DMG	35.1000	119.0000	07/22/1952	14 511.0	0.0	4.30	0.006	II	51.8(83.3)
DMG	35.1000	119.0000	07/24/1952	311 7.0	0.0	4.10	0.005	II	51.8(83.3)
PAS	35.0350	119.1370	06/16/1978	42131.6	1.8	4.30	0.006	II	51.8(83.4)
DMG	33.7830	118.1330	11/20/1933	1032 0.0	0.0	4.00	0.005	II	51.9(83.5)
DMG	33.7830	118.1330	10/02/1933	91017.6	0.0	5.40	0.015	IV	51.9(83.5)
DMG	33.7830	118.1330	01/13/1940	749 7.0	0.0	4.00	0.005	II	51.9(83.5)
PAS	35.0120	119.1790	11/10/1981	2237 5.0	9.4	4.20	0.006	II	52.0(83.6)
PAS	33.9650	117.8860	01/01/1976	172012.9	6.2	4.20	0.006	II	52.0(83.7)
DMG	34.2500	119.5000	04/13/1917	359 0.0	0.0	4.50	0.007	II	52.1(83.8)
DMG	34.2500	119.5000	04/21/1917	659 0.0	0.0	4.00	0.005	II	52.1(83.8)
DMG	33.7500	118.1830	08/04/1933	41748.0	0.0	4.00	0.005	II	52.4(84.4)
DMG	35.0500	119.1330	08/06/1953	1120 4.0	0.0	4.40	0.007	II	52.5(84.5)
DMG	35.0500	119.1330	05/23/1953	75255.0	0.0	4.20	0.006	II	52.5(84.5)
DMG	35.1830	118.6000	07/26/1952	2241 3.0	0.0	4.60	0.008	III	52.5(84.5)
DMG	35.1830	118.6000	07/29/1952	154950.0	0.0	4.90	0.010	III	52.5(84.5)
DMG	35.1830	118.6000	07/26/1952	63850.0	0.0	4.00	0.005	II	52.5(84.5)
DMG	35.1830	118.6500	07/21/1952	151358.0	0.0	5.10	0.012	III	52.6(84.6)
DMG	34.2670	119.5170	04/12/1944	153310.0	0.0	4.00	0.005	II	52.8(84.9)
DMG	33.7500	118.1670	05/16/1933	205855.0	0.0	4.00	0.005	II	52.9(85.1)
DMG	33.7670	118.1170	11/04/1939	2141 0.0	0.0	4.00	0.005	II	53.3(85.8)
DMG	33.6630	118.4130	01/08/1967	738 5.3	17.7	4.00	0.005	II	53.6(86.3)

EARTHQUAKE SEARCH RESULTS

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FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	35.0500	119.1670	12/14/1950	135623.0	0.0	4.40	0.007	II	53.6(86.3)
DMG	35.2000	118.6330	07/22/1952	321 5.0	0.0	4.40	0.007	II	53.7(86.4)
DMG	35.1990	118.5310	09/01/1961	165148.9	4.5	4.00	0.005	II	53.8(86.6)
DMG	33.7500	118.1330	03/11/1933	11 4 0.0	0.0	4.60	0.008	II	53.8(86.6)
DMG	35.1940	118.4650	07/22/1952	19 858.2	3.7	4.30	0.006	II	53.9(86.8)
DMG	35.1000	119.0830	12/06/1934	743 0.0	0.0	4.00	0.005	II	53.9(86.8)
DMG	35.1000	119.0830	07/24/1946	019 8.0	0.0	4.00	0.005	II	53.9(86.8)
GSP	34.1500	117.7200	03/01/1990	032303.0	11.0	4.70	0.008	III	54.2(87.1)
DMG	34.3700	117.6500	12/08/1812	15 0 0.0	0.0	7.00	0.052	VI	54.8(88.2)
GSP	34.3740	117.6490	08/20/1998	234958.4	9.0	4.40	0.006	II	54.9(88.3)

DMG	35.2170	118.6670	09/14/1952	204324.0	0.0	4.10	0.005	II	55.0(88.5)
PAS	34.1360	117.7090	06/26/1988	15 458.5	7.9	4.60	0.007	II	55.1(88.6)
DMG	33.6320	118.4670	01/08/1967	73730.4	11.4	4.00	0.005	II	55.2(88.8)
GSP	34.1100	117.7200	04/17/1990	223227.2	4.0	4.60	0.007	II	55.2(88.8)
DMG	33.8000	118.0000	10/21/1913	938 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/12/1933	1651 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	3 9 0.0	0.0	4.40	0.006	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	1944 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/12/1933	2354 0.0	0.0	4.50	0.007	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	436 0.0	0.0	4.60	0.007	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	439 0.0	0.0	4.90	0.009	III	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	2 5 0.0	0.0	4.30	0.006	II	55.3(89.1)
DMG	33.7500	118.0830	03/12/1933	15 2 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	1653 0.0	0.0	4.80	0.009	III	55.3(89.1)
DMG	33.7500	118.0830	03/12/1933	1738 0.0	0.0	4.50	0.007	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	553 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	1956 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/13/1933	343 0.0	0.0	4.10	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/15/1933	2 8 0.0	0.0	4.10	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/13/1933	432 0.0	0.0	4.70	0.008	III	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	230 0.0	0.0	5.10	0.011	III	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	521 0.0	0.0	4.40	0.006	II	55.3(89.1)
DMG	33.7500	118.0830	03/12/1933	034 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	227 0.0	0.0	4.60	0.007	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	339 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	311 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	2 4 0.0	0.0	4.90	0.009	III	55.3(89.1)
DMG	33.7500	118.0830	03/14/1933	1219 0.0	0.0	4.50	0.007	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	3 5 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	926 0.0	0.0	4.10	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/25/1933	1346 0.0	0.0	4.10	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	1025 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	347 0.0	0.0	4.10	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	04/01/1933	642 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	04/02/1933	1536 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	1147 0.0	0.0	4.40	0.006	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	1141 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	2240 0.0	0.0	4.40	0.006	II	55.3(89.1)
DMG	33.7500	118.0830	03/16/1933	1529 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/12/1933	2128 0.0	0.0	4.10	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	555 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/14/1933	2242 0.0	0.0	4.10	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	1547 0.0	0.0	4.00	0.005	II	55.3(89.1)

EARTHQUAKE SEARCH RESULTS

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	33.7500	118.0830	03/11/1933	515 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	258 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/12/1933	6 1 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/12/1933	835 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	259 0.0	0.0	4.60	0.007	II	55.3(89.1)
DMG	33.7500	118.0830	03/15/1933	432 0.0	0.0	4.10	0.005	II	55.3(89.1)

DMG	33.7500	118.0830	03/12/1933	1825 0.0	0.0	4.10	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	04/02/1933	8 0 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	751 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	1129 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	216 0.0	0.0	4.80	0.009	III	55.3(89.1)
DMG	33.7500	118.0830	03/12/1933	027 0.0	0.0	4.40	0.006	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	513 0.0	0.0	4.70	0.008	III	55.3(89.1)
DMG	33.7500	118.0830	03/14/1933	036 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	524 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/12/1933	740 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	1357 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	911 0.0	0.0	4.40	0.006	II	55.3(89.1)
DMG	33.7500	118.0830	03/21/1933	326 0.0	0.0	4.10	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/23/1933	1831 0.0	0.0	4.10	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	910 0.0	0.0	5.10	0.011	III	55.3(89.1)
DMG	33.7500	118.0830	03/31/1933	1049 0.0	0.0	4.10	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	11 0 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	1138 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	22 0 0.0	0.0	4.40	0.006	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	323 0.0	0.0	5.00	0.010	III	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	2232 0.0	0.0	4.10	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/13/1933	131828.0	0.0	5.30	0.013	III	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	440 0.0	0.0	4.70	0.008	III	55.3(89.1)
DMG	33.7500	118.0830	03/13/1933	1532 0.0	0.0	4.10	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/13/1933	1929 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/23/1933	840 0.0	0.0	4.10	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	257 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/12/1933	616 0.0	0.0	4.60	0.007	II	55.3(89.1)
DMG	33.7500	118.0830	03/20/1933	1358 0.0	0.0	4.10	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	252 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/12/1933	448 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	210 0.0	0.0	4.60	0.007	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	336 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	1045 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	618 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/16/1933	1456 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/16/1933	1530 0.0	0.0	4.10	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	222 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	832 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/17/1933	1651 0.0	0.0	4.10	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/18/1933	2052 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	8 8 0.0	0.0	4.50	0.007	II	55.3(89.1)
DMG	33.7500	118.0830	03/19/1933	2123 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/12/1933	546 0.0	0.0	4.40	0.006	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	837 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	211 0.0	0.0	4.40	0.006	II	55.3(89.1)
DMG	33.7500	118.0830	03/30/1933	1225 0.0	0.0	4.40	0.006	II	55.3(89.1)

EARTHQUAKE SEARCH RESULTS

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	33.7500	118.0830	03/11/1933	759 0.0	0.0	4.10	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	2231 0.0	0.0	4.40	0.006	II	55.3(89.1)

DMG	33.7500	118.0830	03/15/1933	540 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	2 9 0.0	0.0	5.00	0.010	III	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	635 0.0	0.0	4.20	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	611 0.0	0.0	4.40	0.006	II	55.3(89.1)
DMG	33.7500	118.0830	03/13/1933	617 0.0	0.0	4.00	0.005	II	55.3(89.1)
DMG	33.7500	118.0830	03/11/1933	23 5 0.0	0.0	4.20	0.005	II	55.3(89.1)
GSP	34.1400	117.7000	02/28/1990	234336.6	5.0	5.20	0.012	III	55.5(89.3)
DMG	34.3670	119.5830	07/01/1941	75054.8	0.0	5.90	0.021	IV	55.5(89.4)
DMG	34.2670	119.5670	06/29/1968	191357.0	10.0	4.40	0.006	II	55.6(89.4)
GSP	34.1300	117.7000	03/01/1990	003457.1	4.0	4.00	0.005	I	55.7(89.7)
DMG	34.3330	119.5830	11/18/1941	18 810.0	0.0	4.00	0.005	I	55.8(89.7)
DMG	34.3330	119.5830	07/01/1941	830 0.0	0.0	4.00	0.005	I	55.8(89.7)
DMG	34.3330	119.5830	11/21/1941	1656 3.0	0.0	4.00	0.005	I	55.8(89.7)
DMG	34.3330	119.5830	07/01/1941	9 5 0.0	0.0	4.00	0.005	I	55.8(89.7)
DMG	34.3330	119.5830	09/15/1941	137 2.0	0.0	4.00	0.005	I	55.8(89.7)
DMG	34.3330	119.5830	09/08/1941	31245.0	0.0	4.50	0.007	II	55.8(89.7)
DMG	34.3330	119.5830	09/14/1941	14518.0	0.0	4.00	0.005	I	55.8(89.7)
DMG	34.3330	119.5830	07/12/1941	1618 0.0	0.0	4.50	0.007	II	55.8(89.7)
DMG	34.3330	119.5830	07/01/1941	2354 0.0	0.0	4.50	0.007	II	55.8(89.7)
DMG	34.3330	119.5830	07/01/1941	858 0.0	0.0	4.00	0.005	I	55.8(89.7)
DMG	34.3330	119.5830	09/25/1941	51256.0	0.0	4.00	0.005	I	55.8(89.7)
DMG	34.3330	119.5830	07/01/1941	848 0.0	0.0	4.00	0.005	I	55.8(89.7)
DMG	34.3330	119.5830	07/03/1941	1926 0.0	0.0	4.00	0.005	I	55.8(89.7)
DMG	34.3330	119.5830	09/08/1941	31423.0	0.0	4.00	0.005	I	55.8(89.7)
DMG	34.3330	119.5830	07/01/1941	1025 0.0	0.0	4.00	0.005	I	55.8(89.7)
DMG	34.3330	119.5830	07/01/1941	945 0.0	0.0	4.00	0.005	I	55.8(89.7)
DMG	34.3330	119.5830	07/02/1941	2219 0.0	0.0	4.00	0.005	I	55.8(89.7)
DMG	34.3330	119.5830	07/01/1941	819 0.0	0.0	4.00	0.005	I	55.8(89.7)
DMG	34.3330	119.5830	10/02/1938	1845 0.0	0.0	4.00	0.005	I	55.8(89.7)
DMG	34.3330	119.5830	07/01/1941	821 0.0	0.0	4.00	0.005	I	55.8(89.7)
DMG	34.3330	119.5830	07/01/1941	1820 0.0	0.0	4.00	0.005	I	55.8(89.7)
DMG	33.6330	118.4000	10/17/1934	938 0.0	0.0	4.00	0.005	I	55.8(89.8)
DMG	33.7330	118.1000	03/11/1933	1447 0.0	0.0	4.40	0.006	II	55.8(89.8)
DMG	33.7330	118.1000	03/11/1933	1350 0.0	0.0	4.40	0.006	II	55.8(89.8)
DMG	33.7330	118.1000	03/11/1933	15 9 0.0	0.0	4.40	0.006	II	55.8(89.8)
DMG	35.0500	119.2330	08/19/1952	191226.0	0.0	4.50	0.007	II	55.9(90.0)
DMG	35.2290	118.5130	06/28/1957	1132 0.8	1.6	4.10	0.005	II	56.0(90.1)
DMG	35.2330	118.6000	01/10/1953	221738.0	0.0	4.00	0.004	I	56.0(90.1)
DMG	35.2330	118.6000	07/22/1952	91025.0	0.0	4.50	0.007	II	56.0(90.1)
GSP	34.1400	117.6900	03/02/1990	172625.4	6.0	4.60	0.007	II	56.0(90.1)
DMG	35.1500	119.0500	11/11/1952	1722 8.0	0.0	4.20	0.005	II	56.1(90.3)
DMG	35.2170	118.8170	12/15/1953	124436.0	0.0	4.60	0.007	II	56.1(90.3)
DMG	35.2170	118.8170	07/23/1952	1317 5.0	0.0	5.70	0.018	IV	56.1(90.3)
DMG	35.2330	118.5330	03/17/1953	161517.0	0.0	4.00	0.004	I	56.1(90.4)
DMG	35.2330	118.5330	07/24/1952	1735 6.0	0.0	4.20	0.005	II	56.1(90.4)
DMG	35.2330	118.5330	07/30/1952	144650.0	0.0	4.10	0.005	II	56.1(90.4)
DMG	35.2330	118.5330	07/22/1952	15 314.0	0.0	4.20	0.005	II	56.1(90.4)
DMG	35.2330	118.5330	07/21/1952	174244.0	0.0	5.10	0.011	III	56.1(90.4)
DMG	35.2330	118.5330	07/29/1952	173643.0	0.0	4.40	0.006	II	56.1(90.4)
DMG	35.2350	118.5480	03/03/1973	181449.5	8.0	4.00	0.004	I	56.2(90.5)
DMG	35.2410	118.5600	07/21/1952	1912 7.4	5.8	4.30	0.006	II	56.6(91.1)

EARTHQUAKE SEARCH RESULTS

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FILE	LAT.	LONG.	DATE	TIME (UTC)	DEPTH	QUAKE	SITE ACC.	SITE MM	APPROX. DISTANCE

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CODE	NORTH	WEST		H M Sec	(km)	MAG.	g	INT.	mi [km]
DMG	35.2390	118.5180	07/21/1952	2021 5.1	-2.0	4.20	0.005	II	56.6(91.1)
DMG	34.2450	119.5880	06/29/1968	203633.6	1.8	4.00	0.004	I	57.1(91.8)
DMG	34.1000	117.6830	01/09/1934	1410 0.0	0.0	4.50	0.007	II	57.4(92.4)
DMG	34.1000	117.6830	01/18/1934	214 0.0	0.0	4.00	0.004	I	57.4(92.4)
PAS	34.0060	117.7390	02/18/1989	717 4.8	3.3	4.30	0.006	II	57.4(92.4)
GSP	35.1490	119.1040	05/28/1993	044740.6	21.0	5.20	0.011	III	57.5(92.5)
DMG	35.2500	118.4830	07/23/1952	1330 4.0	0.0	4.40	0.006	II	57.6(92.7)
DMG	35.2500	118.4830	07/23/1952	93842.0	0.0	4.20	0.005	II	57.6(92.7)
DMG	35.0830	119.2330	03/03/1956	62412.0	0.0	4.20	0.005	II	57.7(92.9)
DMG	33.9860	119.4750	08/06/1973	232917.0	16.9	5.00	0.010	III	57.8(93.1)
DMG	33.7500	118.0000	11/16/1934	2126 0.0	0.0	4.00	0.004	I	58.1(93.4)
DMG	34.3000	117.6000	07/30/1894	512 0.0	0.0	6.00	0.022	IV	58.2(93.7)
DMG	34.2550	119.6140	07/31/1968	224445.3	15.0	4.00	0.004	I	58.4(93.9)
MGI	34.0000	119.5000	05/03/1926	1353 0.0	0.0	4.30	0.005	II	58.6(94.2)
DMG	34.0000	119.5000	03/19/1905	440 0.0	0.0	4.00	0.004	I	58.6(94.2)
DMG	34.0000	119.5000	02/18/1926	1818 0.0	0.0	5.00	0.010	III	58.6(94.2)
DMG	33.7000	118.0670	02/08/1940	165617.0	0.0	4.00	0.004	I	58.8(94.5)
DMG	33.7000	118.0670	07/20/1940	4 113.0	0.0	4.00	0.004	I	58.8(94.5)
DMG	33.7000	118.0670	03/11/1933	51022.0	0.0	5.10	0.010	III	58.8(94.5)
DMG	33.7000	118.0670	03/11/1933	85457.0	0.0	5.10	0.010	III	58.8(94.5)
PAS	34.2510	119.6220	03/23/1988	84247.0	16.4	4.00	0.004	I	58.9(94.7)
PDP	33.9550	117.7460	12/14/2001	120135.5	13.0	4.00	0.004	I	59.0(94.9)
DMG	35.2670	118.4500	07/21/1952	191619.0	0.0	4.30	0.005	II	59.0(95.0)
MGI	33.8000	117.9000	05/22/1902	740 0.0	0.0	4.30	0.005	II	59.1(95.1)
DMG	34.2540	119.6280	07/08/1968	91837.2	15.7	4.00	0.004	I	59.2(95.2)
PAS	33.6710	119.1110	09/04/1981	155050.3	5.0	5.30	0.012	III	59.2(95.3)
DMG	33.6330	118.2000	11/01/1940	20 046.0	0.0	4.00	0.004	I	59.3(95.5)
DMG	35.1840	119.0990	07/01/1959	234923.4	9.0	4.70	0.007	II	59.4(95.7)
DMG	35.2830	118.5830	07/31/1952	1719 8.0	0.0	4.50	0.006	II	59.5(95.7)
PAS	33.6300	119.0200	10/23/1981	172816.9	12.0	4.60	0.007	II	59.5(95.8)
DMG	33.6300	118.2000	09/13/1929	132338.2	0.0	4.00	0.004	I	59.5(95.8)
DMG	35.2830	118.5500	07/26/1952	922 6.0	0.0	4.30	0.005	II	59.5(95.8)
DMG	35.2830	118.5500	07/22/1952	15151.0	0.0	4.40	0.006	II	59.5(95.8)
DMG	35.2830	118.5500	07/31/1952	41022.0	0.0	4.20	0.005	II	59.5(95.8)
DMG	35.2830	118.5500	08/01/1952	31611.6	0.0	4.50	0.006	II	59.5(95.8)
DMG	35.2830	118.5500	07/23/1952	737 0.0	0.0	4.80	0.008	III	59.5(95.8)
DMG	35.2830	118.5500	07/23/1952	34928.0	0.0	4.70	0.007	II	59.5(95.8)
MGI	34.0000	117.7000	12/03/1929	9 5 0.0	0.0	4.00	0.004	I	59.6(95.9)
DMG	34.3040	117.5700	05/05/1969	16 2 9.6	8.8	4.40	0.006	II	59.8(96.3)
PAS	33.6370	119.0560	10/23/1981	191552.5	6.3	4.60	0.007	II	59.9(96.4)
DMG	33.6830	118.0500	03/11/1933	658 3.0	0.0	5.50	0.014	IV	60.3(97.0)
DMG	33.6830	118.0500	03/11/1933	1250 0.0	0.0	4.40	0.006	II	60.3(97.0)
DMG	35.2900	118.4700	07/24/1952	12 757.6	14.1	4.10	0.004	I	60.4(97.3)
DMG	35.2890	118.4600	07/26/1952	1 221.3	10.8	4.20	0.005	II	60.4(97.3)
T-A	34.5000	119.6700	03/14/1857	23 0 0.0	0.0	4.30	0.005	II	60.6(97.5)
T-A	34.5000	119.6700	02/09/1902	15 0 0.0	0.0	4.30	0.005	II	60.6(97.5)
T-A	34.5000	119.6700	05/31/1854	1250 0.0	0.0	4.30	0.005	II	60.6(97.5)
T-A	34.5000	119.6700	06/01/1893	12 0 0.0	0.0	5.00	0.009	III	60.6(97.5)
T-A	34.5000	119.6700	06/25/1855	22 0 0.0	0.0	4.30	0.005	II	60.6(97.5)
T-A	34.5000	119.6700	07/09/1885	0 0 0.0	0.0	4.30	0.005	II	60.6(97.5)
DMG	34.2500	119.6540	06/29/1968	153242.8	14.6	4.10	0.004	I	60.7(97.6)
DMG	35.3000	118.6670	08/13/1952	212548.0	0.0	4.10	0.004	I	60.7(97.7)
DMG	35.3000	118.5330	09/02/1952	1638 9.0	0.0	4.00	0.004	I	60.8(97.8)

EARTHQUAKE SEARCH RESULTS

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	35.3000	118.5330	07/30/1952	95929.0	0.0	4.00	0.004	I	60.8(97.8)
DMG	35.3000	118.5330	07/21/1952	182338.0	0.0	4.50	0.006	II	60.8(97.8)
DMG	35.3000	118.5330	07/21/1952	182628.0	0.0	4.10	0.004	I	60.8(97.8)
DMG	34.1830	117.5830	10/03/1948	24628.0	0.0	4.00	0.004	I	60.9(98.0)
GSP	33.9510	117.7090	01/05/1998	181406.5	11.0	4.30	0.005	II	60.9(98.0)
DMG	35.2890	118.4110	08/10/1952	122318.0	4.0	4.60	0.007	II	60.9(98.0)
DMG	35.3000	118.5000	02/19/1953	812 6.0	0.0	4.40	0.006	II	60.9(98.0)
DMG	34.2810	117.5520	09/13/1970	44748.6	8.0	4.40	0.006	II	61.1(98.3)
DMG	35.3050	118.5070	08/09/1952	10 732.1	-2.0	4.20	0.005	II	61.2(98.5)
DMG	35.3030	118.4810	09/04/1952	18 649.1	5.8	4.40	0.006	II	61.3(98.6)
DMG	35.3030	118.4730	08/01/1952	213522.4	4.2	4.00	0.004	I	61.3(98.7)
DMG	34.1830	119.6460	06/29/1968	63320.9	8.4	4.00	0.004	I	61.3(98.7)
DMG	35.2990	118.4350	07/25/1952	20 6 6.1	-1.4	4.80	0.008	II	61.3(98.7)
DMG	35.2940	118.4010	08/13/1952	42940.6	14.5	4.60	0.006	II	61.3(98.7)
DMG	35.3080	118.5160	07/31/1952	19 515.4	7.3	4.00	0.004	I	61.4(98.8)
DMG	35.3000	118.4320	07/23/1952	61045.9	14.5	4.20	0.005	II	61.4(98.9)
DMG	35.1830	119.1740	06/04/1956	83319.3	14.3	4.00	0.004	I	61.5(98.9)
DMG	35.3000	118.8000	12/23/1905	2223 0.0	0.0	5.00	0.009	III	61.5(99.0)
DMG	33.9170	119.5000	08/26/1954	1348 3.0	0.0	4.80	0.008	II	61.6(99.2)
DMG	35.3110	118.4990	07/25/1952	1313 8.2	2.8	5.00	0.009	III	61.7(99.3)
DMG	34.4900	119.6910	09/16/1962	181235.2	13.3	4.00	0.004	I	61.7(99.3)
DMG	35.3140	118.5300	07/26/1952	225856.1	6.8	4.30	0.005	II	61.7(99.4)
DMG	35.3150	118.5160	07/25/1952	194323.7	11.2	5.70	0.016	IV	61.9(99.6)
DMG	35.3130	118.4890	10/20/1952	181443.6	14.0	4.30	0.005	II	61.9(99.6)
DMG	34.2700	117.5400	09/12/1970	143053.0	8.0	5.40	0.012	III	61.9(99.6)
DMG	35.3160	118.5140	07/24/1952	14 525.9	5.4	4.30	0.005	II	61.9(99.7)
DMG	35.3140	118.4820	08/30/1952	45559.8	5.5	4.70	0.007	II	62.0(99.8)
PAS	34.3470	119.6960	08/13/1978	225453.4	12.8	5.10	0.010	III	62.1(99.9)
MGI	34.4000	119.7000	08/26/1927	1240 0.0	0.0	4.00	0.004	I	62.1(99.9)
MGI	34.4000	119.7000	07/06/1926	1745 0.0	0.0	4.00	0.004	I	62.1(99.9)
MGI	34.4000	119.7000	06/24/1926	1530 0.0	0.0	4.00	0.004	I	62.1(99.9)
MGI	34.4000	119.7000	08/09/1926	412 0.0	0.0	4.00	0.004	I	62.1(99.9)
MGI	34.4000	119.7000	03/25/1806	8 0 0.0	0.0	5.00	0.009	III	62.1(99.9)
DMG	35.3160	118.4870	09/15/1952	44013.2	4.2	4.90	0.008	III	62.1(99.9)
DMG	35.3170	118.4940	07/25/1952	19 944.6	5.5	5.70	0.016	IV	62.1(100.0)
DMG	33.6710	118.0120	10/20/1961	223534.2	5.6	4.10	0.004	I	62.1(100.0)
DMG	35.3210	118.5400	07/24/1952	141012.2	9.5	4.00	0.004	I	62.2(100.1)
DMG	35.3200	118.5180	07/27/1952	0 915.6	6.5	4.20	0.005	II	62.2(100.1)
DMG	33.6800	117.9930	11/20/1961	85334.7	4.4	4.00	0.004	I	62.2(100.1)
MGI	34.5000	119.7000	08/26/1919	1212 0.0	0.0	4.00	0.004	I	62.3(100.2)
MGI	34.5000	119.7000	07/29/1925	14 0 0.0	0.0	4.00	0.004	I	62.3(100.2)
MGI	34.5000	119.7000	08/26/1919	1457 0.0	0.0	4.00	0.004	I	62.3(100.2)
DMG	33.6170	118.1170	01/20/1934	2117 0.0	0.0	4.50	0.006	II	62.3(100.3)
DMG	35.3210	118.4940	02/11/1955	194431.5	14.7	4.50	0.006	II	62.4(100.4)
DMG	34.3170	119.7000	10/21/1953	16 238.0	0.0	4.00	0.004	I	62.5(100.6)
GSP	35.2100	118.0660	07/11/1992	181416.2	10.0	5.70	0.015	IV	62.5(100.6)
DMG	33.5430	118.3400	09/14/1963	35116.2	2.2	4.20	0.005	II	62.6(100.8)
DMG	35.3240	118.4860	01/20/1953	81322.8	7.2	4.00	0.004	I	62.7(100.8)
DMG	34.1830	117.5480	09/01/1937	163533.5	10.0	4.50	0.006	II	62.8(101.1)
DMG	33.8540	117.7520	10/04/1961	22131.6	4.3	4.10	0.004	I	62.8(101.1)
DMG	35.3330	118.6000	07/31/1952	12 9 9.0	0.0	5.80	0.017	IV	62.9(101.2)
DMG	35.3330	118.6000	09/16/1952	142454.0	0.0	4.00	0.004	I	62.9(101.2)
DMG	35.3330	118.6000	07/23/1952	161838.0	0.0	4.50	0.006	II	62.9(101.2)

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FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	35.3330	118.6000	07/23/1952	164853.0	0.0	4.50	0.006	II	62.9(101.2)
DMG	35.3330	118.6000	08/10/1952	6 118.0	0.0	4.00	0.004	I	62.9(101.2)
DMG	35.3330	118.5670	08/08/1952	51718.0	0.0	4.00	0.004	I	62.9(101.3)
DMG	35.3300	118.5070	05/29/1968	22938.7	3.1	4.00	0.004	I	62.9(101.3)
DMG	35.3330	118.5330	08/01/1952	103556.0	0.0	4.00	0.004	I	63.0(101.4)
DMG	34.2530	119.6980	06/29/1968	191221.3	9.5	4.20	0.005	I	63.1(101.5)
MGI	33.8000	117.8000	05/20/1917	945 0.0	0.0	4.00	0.004	I	63.2(101.7)
MGI	33.8000	117.8000	05/19/1917	635 0.0	0.0	4.00	0.004	I	63.2(101.7)
MGI	33.8000	117.8000	05/19/1917	719 0.0	0.0	4.00	0.004	I	63.2(101.7)
MGI	33.8000	117.8000	11/09/1926	1535 0.0	0.0	4.60	0.006	II	63.2(101.7)
MGI	33.8000	117.8000	11/10/1926	1723 0.0	0.0	4.60	0.006	II	63.2(101.7)
MGI	33.8000	117.8000	11/04/1926	2238 0.0	0.0	4.60	0.006	II	63.2(101.7)
MGI	33.8000	117.8000	11/07/1926	1948 0.0	0.0	4.60	0.006	II	63.2(101.7)
DMG	34.2670	117.5180	09/12/1970	141011.2	8.0	4.10	0.004	I	63.2(101.7)
DMG	33.6040	119.1050	03/25/1956	332 2.3	8.2	4.20	0.005	I	63.2(101.7)
DMG	35.3330	118.7330	08/05/1952	65010.0	0.0	4.40	0.005	II	63.3(101.8)
DMG	35.3370	118.5370	08/30/1952	45954.8	3.5	4.00	0.004	I	63.3(101.9)
DMG	34.2110	117.5300	09/01/1937	1348 8.2	10.0	4.50	0.006	II	63.3(101.9)
PAS	34.2110	117.5300	10/19/1979	122237.8	4.9	4.10	0.004	I	63.3(101.9)
DMG	34.2120	119.6910	06/26/1968	181111.2	13.9	4.00	0.004	I	63.3(101.9)
DMG	35.3380	118.5230	08/06/1952	34624.2	12.6	4.30	0.005	II	63.4(102.1)
DMG	35.3350	118.4740	07/23/1952	172224.0	6.6	4.50	0.006	II	63.5(102.2)
DMG	33.6650	117.9790	10/20/1961	214240.7	7.2	4.00	0.004	I	63.5(102.3)
DMG	35.3360	118.4720	07/23/1952	105413.5	19.7	4.10	0.004	I	63.6(102.3)
DMG	33.6540	117.9940	10/20/1961	194950.5	4.6	4.30	0.005	II	63.7(102.5)
DMG	33.6590	117.9810	10/20/1961	20 714.5	6.1	4.00	0.004	I	63.8(102.7)
DMG	34.3000	117.5000	07/22/1899	2032 0.0	0.0	6.50	0.029	V	63.8(102.7)
DMG	35.3400	118.4730	07/24/1952	5 249.6	2.1	4.50	0.006	II	63.8(102.7)
DMG	34.1670	117.5330	03/01/1948	81213.0	0.0	4.70	0.007	II	63.9(102.9)
DMG	35.3450	118.5070	07/23/1952	18 328.3	10.4	4.00	0.004	I	64.0(103.0)
DMG	33.7670	117.8170	08/22/1936	521 0.0	0.0	4.00	0.004	I	64.1(103.1)
DMG	35.3510	118.5270	08/11/1952	132149.2	-2.0	4.40	0.005	II	64.3(103.5)
DMG	35.3460	118.4650	12/25/1952	55633.0	4.6	4.10	0.004	I	64.3(103.5)
MGI	33.7000	117.9000	07/08/1902	945 0.0	0.0	4.00	0.004	I	64.3(103.5)
MGI	35.3000	119.0000	01/08/1903	030 0.0	0.0	4.60	0.006	II	64.5(103.8)
MGI	35.3000	119.0000	09/04/1908	0 0 0.0	0.0	4.60	0.006	II	64.5(103.8)
DMG	35.3560	118.5380	07/19/1955	2 425.5	6.4	4.10	0.004	I	64.6(104.0)
DMG	35.3580	118.6160	08/24/1955	17 540.9	7.2	4.00	0.004	I	64.6(104.0)
DMG	33.6170	118.0330	05/21/1938	944 0.0	0.0	4.00	0.004	I	64.7(104.1)
DMG	35.3170	118.9500	09/01/1952	1039 0.0	0.0	4.10	0.004	I	64.7(104.1)
DMG	33.6170	118.0170	10/02/1933	1326 1.0	0.0	4.00	0.004	I	65.1(104.8)
DMG	33.6170	118.0170	03/14/1933	19 150.0	0.0	5.10	0.009	III	65.1(104.8)
DMG	33.6170	118.0170	03/15/1933	111332.0	0.0	4.90	0.008	II	65.1(104.8)
DMG	34.2000	117.5000	06/14/1892	1325 0.0	0.0	4.90	0.008	II	65.1(104.8)
DMG	35.3330	118.9170	07/29/1952	195132.0	0.0	4.50	0.006	II	65.2(105.0)
DMG	35.3330	118.9170	08/07/1952	1919 7.0	0.0	4.20	0.004	I	65.2(105.0)
DMG	35.3330	118.9170	08/22/1952	224124.0	0.0	5.80	0.016	IV	65.2(105.0)
DMG	35.3330	118.9170	07/31/1952	195314.0	0.0	4.50	0.006	II	65.2(105.0)
DMG	35.3670	118.5830	07/23/1952	65342.0	0.0	4.20	0.004	I	65.2(105.0)
DMG	35.3670	118.5830	09/16/1952	1521 8.0	0.0	4.30	0.005	II	65.2(105.0)
DMG	35.3670	118.5830	07/23/1952	31923.0	0.0	5.00	0.008	III	65.2(105.0)
DMG	35.3670	118.5830	07/23/1952	62628.0	0.0	4.00	0.004	I	65.2(105.0)
DMG	35.3670	118.5830	07/23/1952	4 140.0	0.0	4.70	0.006	II	65.2(105.0)

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FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	35.3670	118.5830	07/23/1952	03832.0	0.0	6.10	0.020	IV	65.2(105.0)
DMG	35.3670	118.5830	07/23/1952	04738.0	0.0	4.60	0.006	II	65.2(105.0)
DMG	35.3670	118.5830	07/27/1952	73539.0	0.0	4.20	0.004	I	65.2(105.0)
DMG	35.3670	118.5830	07/28/1952	154120.0	0.0	4.00	0.004	I	65.2(105.0)
PAS	33.5380	118.2070	05/25/1982	134430.3	13.7	4.10	0.004	I	65.3(105.0)
DMG	34.4710	119.7570	11/16/1958	934 6.1	15.2	4.00	0.004	I	65.4(105.2)
DMG	35.3670	118.5330	07/23/1952	195134.0	0.0	4.20	0.004	I	65.4(105.2)
DMG	34.1270	117.5210	12/27/1938	10 928.6	10.0	4.00	0.004	I	65.4(105.3)
DMG	34.1400	117.5150	01/01/1965	8 418.0	5.9	4.40	0.005	II	65.5(105.3)
DMG	35.3600	118.4380	08/03/1952	15156.1	7.0	4.10	0.004	I	65.5(105.4)
DMG	35.3670	118.5000	06/20/1953	231852.0	0.0	4.40	0.005	II	65.5(105.5)
DMG	34.1180	119.7020	07/05/1968	04517.2	5.9	5.20	0.010	III	65.7(105.8)
DMG	34.3250	119.7610	08/09/1956	0 849.2	4.0	4.00	0.004	I	65.9(106.1)
DMG	34.1920	119.7330	07/05/1968	036 6.4	15.6	4.00	0.004	I	66.0(106.2)
DMG	34.3500	119.7670	11/10/1940	102510.0	0.0	4.00	0.004	I	66.1(106.4)
DMG	35.3790	118.6680	11/21/1955	205527.6	5.3	4.30	0.005	II	66.1(106.4)
DMG	33.6000	118.0170	12/25/1935	1715 0.0	0.0	4.50	0.005	II	66.1(106.4)
PAS	35.3720	118.7740	12/15/1987	182346.1	3.2	4.10	0.004	I	66.2(106.6)
DMG	35.3830	118.6000	09/05/1953	192436.0	0.0	4.10	0.004	I	66.3(106.8)
DMG	35.3830	118.5670	07/23/1952	546 3.0	0.0	4.70	0.006	II	66.4(106.8)
DMG	35.3670	118.8330	03/17/1935	2026 0.0	0.0	4.00	0.004	I	66.4(106.9)
T-A	35.3300	119.0000	01/04/1870	7 0 0.0	0.0	4.30	0.005	II	66.4(106.9)
GDP	33.8060	117.7150	03/07/2000	002028.2	11.0	4.00	0.004	I	66.5(107.1)
DMG	33.5830	119.1830	02/10/1952	135055.0	0.0	4.00	0.004	I	66.6(107.1)
DMG	33.6000	118.0000	03/11/1933	217 0.0	0.0	4.50	0.005	II	66.7(107.3)
DMG	33.6000	118.0000	03/11/1933	231 0.0	0.0	4.40	0.005	II	66.7(107.3)
DMG	33.6170	117.9670	03/11/1933	154 7.8	0.0	6.30	0.023	IV	66.7(107.3)
DMG	34.2170	117.4670	03/25/1941	234341.0	0.0	4.00	0.004	I	66.7(107.4)
GSP	35.3700	118.8500	12/18/1990	165643.0	6.0	4.20	0.004	I	66.8(107.5)
DMG	33.5000	118.2500	06/18/1920	10 8 0.0	0.0	4.50	0.005	II	66.9(107.7)
DMG	35.3670	118.8830	09/12/1953	64116.0	0.0	4.10	0.004	I	67.0(107.9)
DMG	33.9500	117.5830	04/11/1941	12024.0	0.0	4.00	0.004	I	67.1(108.0)
DMG	35.3950	118.6200	08/08/1955	32150.5	4.1	4.70	0.006	II	67.2(108.1)
DMG	35.3500	118.9670	02/04/1954	204841.0	0.0	4.00	0.004	I	67.2(108.1)
DMG	33.5610	118.0580	01/15/1937	183547.0	10.0	4.00	0.004	I	67.3(108.4)
DMG	34.1760	119.7540	07/07/1968	143330.8	12.8	4.50	0.005	II	67.4(108.5)
DMG	35.4000	118.6330	10/02/1952	231021.0	0.0	4.20	0.004	I	67.5(108.7)
DMG	35.4000	118.5830	07/25/1952	7 351.0	0.0	4.10	0.004	I	67.5(108.7)
DMG	35.4000	118.5830	07/24/1952	114756.0	0.0	4.40	0.005	II	67.5(108.7)
DMG	34.1240	117.4800	05/15/1955	17 326.0	7.6	4.00	0.004	I	67.7(108.9)
DMG	35.3830	118.8500	10/13/1952	222035.0	0.0	4.00	0.003	I	67.7(109.0)
DMG	35.3830	118.8500	07/29/1952	7 347.0	0.0	6.10	0.019	IV	67.7(109.0)
MGI	34.4000	119.8000	09/09/1929	515 0.0	0.0	4.60	0.006	II	67.8(109.1)
PAS	34.4020	119.8020	03/10/1986	153316.3	18.0	4.10	0.004	I	67.9(109.3)
DMG	34.0720	119.7230	07/05/1968	23614.1	4.3	4.00	0.003	I	67.9(109.3)
DMG	34.1160	117.4750	06/28/1960	20 048.0	12.0	4.10	0.004	I	68.1(109.7)
MGI	34.3000	119.8000	07/03/1925	1821 0.0	0.0	5.30	0.010	III	68.3(110.0)
MGI	34.3000	119.8000	07/03/1925	1638 0.0	0.0	5.30	0.010	III	68.3(110.0)
DMG	34.3000	119.8000	06/29/1925	144216.0	0.0	6.25	0.021	IV	68.3(110.0)

DMG	35.4000	118.8170	07/29/1952	8 146.0	0.0	5.10	0.008	III	68.5(110.3)
DMG	33.5750	117.9830	03/11/1933	518 4.0	0.0	5.20	0.009	III	68.6(110.4)
GSP	33.6200	117.9000	04/07/1989	200730.2	13.0	4.50	0.005	II	68.7(110.6)
T-A	34.4200	119.8200	00/00/1862	0 0 0.0	0.0	5.70	0.014	III	68.9(110.9)

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FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	33.5170	118.1000	03/22/1941	82240.0	0.0	4.00	0.003	I	69.0(111.0)
DMG	33.5670	117.9830	04/17/1934	1833 0.0	0.0	4.00	0.003	I	69.1(111.2)
DMG	33.5670	117.9830	07/07/1937	1112 0.0	0.0	4.00	0.003	I	69.1(111.2)
PAS	34.1350	117.4480	01/08/1983	71930.4	4.6	4.10	0.004	I	69.2(111.4)
DMG	34.2000	119.8000	12/21/1812	19 0 0.0	0.0	7.00	0.038	V	69.6(111.9)
DMG	34.0000	117.5000	07/03/1908	1255 0.0	0.0	4.00	0.003	I	69.8(112.3)
MGI	34.0000	117.5000	12/16/1858	10 0 0.0	0.0	7.00	0.038	V	69.8(112.3)
DMG	35.4320	118.6640	09/30/1964	175125.8	7.4	4.00	0.003	I	69.8(112.3)
DMG	34.3330	119.8330	06/26/1933	62542.0	0.0	4.30	0.004	I	69.9(112.6)
DMG	34.3330	119.8330	06/26/1933	62752.0	0.0	4.30	0.004	I	69.9(112.6)
DMG	35.4330	118.7000	05/01/1954	22 439.0	0.0	4.20	0.004	I	70.0(112.6)
PAS	33.5080	118.0710	11/20/1988	53928.7	6.0	4.50	0.005	II	70.3(113.1)
DMG	34.1320	117.4260	04/15/1965	20 833.3	5.5	4.50	0.005	II	70.5(113.4)
DMG	34.2000	117.4000	07/22/1899	046 0.0	0.0	5.50	0.011	III	70.7(113.8)
DMG	34.1120	117.4260	03/19/1937	12338.4	10.0	4.00	0.003	I	70.9(114.1)
DMG	35.4540	118.6050	02/07/1964	22 750.3	-2.0	4.40	0.005	I	71.2(114.6)
GSP	34.1900	117.3900	12/28/1989	094108.1	15.0	4.50	0.005	II	71.4(114.9)
DMG	35.4540	118.4760	11/23/1953	2039 0.9	5.9	4.40	0.004	I	71.6(115.3)
DMG	35.4400	118.3470	01/02/1964	194841.0	6.3	4.20	0.004	I	71.8(115.6)
GSP	35.4530	118.4310	05/06/1997	191253.8	6.0	4.50	0.005	II	71.9(115.7)
DMG	33.8000	117.6000	09/16/1903	1210 0.0	0.0	4.00	0.003	I	72.0(115.8)
MGI	33.8000	117.6000	04/22/1918	2115 0.0	0.0	5.00	0.007	II	72.0(115.8)
DMG	35.4650	118.6680	02/07/1964	221052.0	-0.5	4.20	0.004	I	72.1(116.0)
USG	34.1390	117.3860	02/21/1987	231530.1	2.6	4.07	0.003	I	72.5(116.7)
DMG	35.3330	119.2500	01/20/1941	135816.0	0.0	4.00	0.003	I	72.6(116.8)
PAS	33.4710	118.0610	02/27/1984	101815.0	6.0	4.00	0.003	I	72.8(117.2)
DMG	33.6670	119.5000	11/30/1939	64251.0	0.0	4.00	0.003	I	72.9(117.3)
PAS	35.4520	118.8990	02/08/1985	65816.9	11.1	4.60	0.005	II	73.0(117.4)
PAS	35.2970	119.3460	05/06/1985	231433.0	24.4	4.40	0.004	I	73.4(118.1)
DMG	35.2000	119.5000	06/09/1928	822 0.0	0.0	4.00	0.003	I	73.7(118.6)
MGI	35.2000	119.5000	12/01/1920	130 0.0	0.0	4.60	0.005	II	73.7(118.6)
PAS	35.2700	119.4020	09/26/1980	131841.1	5.0	4.10	0.003	I	73.7(118.7)
DMG	33.4300	119.0960	10/31/1969	103929.0	7.3	4.80	0.006	II	73.9(119.0)
T-A	34.0000	117.4200	04/12/1888	1315 0.0	0.0	4.30	0.004	I	73.9(119.0)
T-A	34.0000	117.4200	09/10/1920	1415 0.0	0.0	4.30	0.004	I	73.9(119.0)
DMG	35.5000	118.7000	01/06/1905	1430 0.0	0.0	5.00	0.007	II	74.6(120.0)
DMG	35.5000	118.5000	07/27/1952	24912.0	0.0	4.00	0.003	I	74.7(120.2)
GSP	34.1680	117.3370	06/28/1997	214525.1	9.0	4.20	0.004	I	74.7(120.2)
MGI	34.0000	117.4000	05/22/1907	652 0.0	0.0	4.60	0.005	II	75.0(120.7)
DMG	34.1400	117.3390	02/26/1936	93327.6	10.0	4.00	0.003	I	75.1(120.8)
DMG	34.1270	117.3380	02/23/1936	222042.7	10.0	4.50	0.005	II	75.4(121.3)
DMG	34.1180	117.3410	09/22/1951	82239.1	11.9	4.30	0.004	I	75.4(121.3)
T-A	34.1700	117.3200	12/02/1859	2210 0.0	0.0	4.30	0.004	I	75.6(121.7)
DMG	33.5450	117.8070	10/27/1969	1316 2.3	6.5	4.50	0.005	I	76.0(122.4)
MGI	34.2000	117.3000	04/13/1913	1045 0.0	0.0	4.00	0.003	I	76.3(122.8)

DMG	34.0330	117.3500	04/18/1940	184343.9	0.0	4.40	0.004	I	76.8(123.6)
DMG	35.5000	118.9670	09/29/1948	4 648.0	0.0	4.20	0.003	I	77.1(124.1)
DMG	33.3670	118.1500	04/16/1942	72833.0	0.0	4.00	0.003	I	77.5(124.7)
MGI	34.1000	117.3000	12/27/1901	11 0 0.0	0.0	4.60	0.005	II	78.0(125.5)
DMG	34.1000	117.3000	02/16/1931	1327 0.0	0.0	4.00	0.003	I	78.0(125.5)
MGI	34.1000	117.3000	07/15/1905	2041 0.0	0.0	5.30	0.008	III	78.0(125.5)
MGI	34.1000	117.3000	11/22/1911	257 0.0	0.0	4.00	0.003	I	78.0(125.5)
DMG	35.3530	117.8260	07/03/1944	53823.5	-2.0	4.70	0.005	II	78.1(125.7)

EARTHQUAKE SEARCH RESULTS

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
PAS	35.2250	117.6290	05/02/1975	18 323.1	10.0	4.20	0.003	I	78.5(126.4)
DMG	34.0330	117.3170	09/03/1935	647 0.0	0.0	4.50	0.004	I	78.6(126.4)
DMG	33.9330	117.3670	10/24/1943	02921.0	0.0	4.00	0.003	I	78.6(126.5)
DMG	35.4170	119.3000	06/04/1941	84719.0	0.0	4.00	0.003	I	79.0(127.1)
DMG	33.6820	117.5530	07/05/1938	18 655.7	10.0	4.50	0.004	I	79.2(127.4)
DMG	35.5340	118.2640	05/28/1955	194420.0	12.3	4.50	0.004	I	79.2(127.5)
PAS	34.6610	119.9730	05/07/1984	193232.8	9.9	4.20	0.003	I	79.2(127.5)
DMG	33.7170	117.5170	06/19/1935	1117 0.0	0.0	4.00	0.003	I	79.2(127.5)
DMG	35.4500	119.2500	01/23/1935	1352 0.0	0.0	4.00	0.003	I	79.7(128.2)
DMG	33.7480	117.4790	06/22/1971	104119.0	8.0	4.20	0.003	I	79.7(128.2)
DMG	33.7170	117.5070	08/06/1938	22 056.0	10.0	4.00	0.003	I	79.7(128.3)
DMG	33.7250	117.4980	01/03/1956	02548.9	13.7	4.70	0.005	II	79.8(128.4)
DMG	33.3390	119.1040	10/24/1969	202642.5	-1.8	4.70	0.005	II	80.0(128.7)
DMG	33.8330	117.4000	06/05/1940	82727.0	0.0	4.00	0.003	I	80.2(129.1)
DMG	33.6990	117.5110	05/31/1938	83455.4	10.0	5.50	0.009	III	80.3(129.2)
DMG	33.7330	117.4670	10/26/1954	162226.0	0.0	4.10	0.003	I	80.9(130.1)
T-A	34.0800	117.2500	10/07/1869	0 0 0.0	0.0	4.30	0.004	I	81.1(130.6)
DMG	34.0000	117.2830	11/07/1939	1852 8.4	0.0	4.70	0.005	II	81.2(130.7)
DMG	35.3890	117.7830	07/15/1966	10 943.0	4.7	4.00	0.003	I	81.5(131.2)
GDP	34.0470	117.2550	02/21/2000	134943.1	15.0	4.50	0.004	I	81.6(131.3)
DMG	33.9960	117.2700	02/17/1952	123658.3	16.0	4.50	0.004	I	82.0(131.9)
DMG	35.6000	118.8000	06/30/1926	1331 0.0	0.0	5.00	0.006	II	82.0(132.0)
MGI	35.5000	118.0000	03/23/1918	1515 0.0	0.0	4.60	0.004	I	82.0(132.0)
DMG	35.3970	117.7730	11/18/1961	31836.0	11.1	4.30	0.003	I	82.3(132.5)
DMG	35.4140	117.7960	07/08/1970	92530.2	8.0	4.00	0.003	I	82.5(132.8)
PAS	34.0230	117.2450	10/02/1985	234412.4	15.2	4.80	0.005	II	82.7(133.0)
DMG	34.0000	117.2500	11/01/1932	445 0.0	0.0	4.00	0.003	I	83.0(133.5)
DMG	34.0000	117.2500	07/23/1923	73026.0	0.0	6.25	0.017	IV	83.0(133.5)
DMG	34.0430	117.2280	04/03/1939	25044.7	10.0	4.00	0.003	I	83.1(133.8)
GSP	34.0240	117.2300	03/11/1998	121851.8	14.0	4.50	0.004	I	83.5(134.3)
MGI	34.1000	117.2000	04/23/1923	2113 0.0	0.0	4.00	0.003	I	83.5(134.4)
DMG	33.4000	119.4000	07/24/1947	1654 2.0	0.0	4.30	0.003	I	83.8(134.9)
DMG	35.5820	118.1590	07/26/1948	1750 1.4	4.6	4.50	0.004	I	84.0(135.2)
DMG	33.2910	119.1930	10/24/1969	82912.1	10.0	5.10	0.006	II	84.9(136.7)
DMG	33.7000	117.4000	04/11/1910	757 0.0	0.0	5.00	0.006	II	85.3(137.3)
DMG	33.7000	117.4000	05/15/1910	1547 0.0	0.0	6.00	0.013	III	85.3(137.3)
DMG	33.7000	117.4000	05/13/1910	620 0.0	0.0	5.00	0.006	II	85.3(137.3)
DMG	34.0000	120.0170	04/01/1945	234342.0	0.0	5.40	0.008	III	85.4(137.5)
DMG	35.6320	118.2680	03/17/1946	81636.0	-2.0	4.60	0.004	I	85.7(138.0)
DMG	35.1060	117.3460	10/11/1966	165912.9	6.5	4.40	0.004	I	85.9(138.2)
DMG	35.6470	118.3450	06/05/1946	215932.4	0.0	4.30	0.003	I	85.9(138.2)

DMG	35.6590	118.3780	03/03/1971	12 516.0	4.1	4.00	0.003	-	86.4(139.0)
DMG	35.6670	118.4040	03/08/1971	23 8 7.7	5.9	4.10	0.003	I	86.7(139.6)
DMG	34.7000	120.1000	07/28/1945	23348.0	0.0	4.20	0.003	I	86.8(139.8)
GSP	35.1600	117.3620	06/29/1992	011813.4	4.0	4.70	0.004	I	87.2(140.3)
GSP	35.6800	118.4300	11/11/1991	045327.0	4.0	4.00	0.003	-	87.4(140.7)
DMG	34.2000	117.1000	09/20/1907	154 0.0	0.0	6.00	0.013	III	87.5(140.8)
GSP	35.1610	117.3500	06/29/1992	012615.6	6.0	4.10	0.003	I	87.8(141.3)
GSP	34.1920	117.0950	04/06/1994	190104.1	7.0	4.80	0.005	II	87.9(141.4)
DMG	35.6480	118.1870	01/19/1937	235738.5	10.0	4.00	0.002	-	88.0(141.5)
DMG	33.9000	117.2000	12/19/1880	0 0 0.0	0.0	6.00	0.013	III	88.3(142.0)
DMG	35.6870	118.2630	05/03/1936	1421 1.8	10.0	4.00	0.002	-	89.5(144.0)
DMG	35.4200	117.6000	04/23/1931	2334 7.3	0.0	4.30	0.003	I	89.5(144.1)

EARTHQUAKE SEARCH RESULTS

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	35.6770	118.2050	06/11/1935	162046.3	-1.4	4.00	0.002	-	89.6(144.2)
GSP	35.0170	117.2030	06/29/1992	041642.6	3.0	4.00	0.002	-	89.8(144.5)
PAS	34.7360	120.1470	11/06/1986	91958.3	0.0	4.00	0.002	-	90.0(144.8)
PAS	34.7370	120.1480	10/25/1984	1036 2.4	6.0	4.50	0.004	I	90.1(144.9)
DMG	35.3000	119.8000	01/09/1857	16 0 0.0	0.0	7.90	0.056	VI	90.6(145.9)
GSP	35.7310	118.4790	07/11/1999	182046.8	4.0	4.40	0.003	I	90.7(145.9)
DMG	35.6740	118.0780	03/17/1946	6 347.1	0.0	4.40	0.003	I	91.5(147.3)
DMG	35.6790	118.0770	03/25/1946	233644.9	0.0	4.30	0.003	I	91.9(147.8)
DMG	35.6770	118.0670	02/06/1947	172040.1	0.0	4.60	0.004	I	91.9(147.9)
DMG	34.3330	117.0000	02/27/1942	1 853.0	0.0	4.00	0.002	-	92.0(148.0)
PAS	35.7550	118.5420	04/17/1975	91833.8	9.6	4.00	0.002	-	92.1(148.2)
GSP	34.1800	117.0200	12/04/1991	081703.5	11.0	4.00	0.002	-	92.2(148.4)
DMG	34.4330	116.9830	04/18/1945	458 2.0	0.0	4.30	0.003	I	92.7(149.1)
DMG	35.7330	118.2330	07/10/1943	31233.0	0.0	4.00	0.002	-	93.0(149.6)
DMG	33.2670	119.4500	11/18/1947	2159 3.0	0.0	5.00	0.005	II	93.2(149.9)
DMG	34.0170	117.0500	02/19/1940	12 655.7	0.0	4.60	0.004	I	93.4(150.3)
DMG	34.7000	117.0000	07/16/1916	1150 0.0	0.0	4.50	0.003	I	93.5(150.5)
DMG	34.7000	117.0000	07/16/1916	1230 0.0	0.0	4.00	0.002	-	93.5(150.5)
DMG	35.6460	117.8950	08/31/1946	91012.8	0.0	4.20	0.003	I	93.7(150.7)
DMG	33.7380	117.1870	04/27/1962	91232.1	5.7	4.10	0.002	-	94.1(151.4)
DMG	35.7150	118.0740	03/15/1946	14 035.4	0.0	5.30	0.007	II	94.3(151.7)
DMG	34.2670	116.9670	08/29/1943	51630.0	0.0	4.00	0.002	-	94.3(151.7)
DMG	34.2670	116.9670	08/29/1943	35754.0	0.0	4.00	0.002	-	94.3(151.7)
DMG	34.2670	116.9670	08/29/1943	34513.0	0.0	5.50	0.008	II	94.3(151.7)
GSP	34.1200	116.9980	06/29/1992	144126.0	4.0	4.40	0.003	I	94.3(151.8)
DMG	35.6790	117.9550	05/26/1948	193512.2	0.0	4.10	0.002	-	94.3(151.8)
DMG	34.1670	116.9830	10/16/1951	1241 5.0	0.0	4.00	0.002	-	94.5(152.0)
DMG	35.7280	118.0990	03/24/1946	20 0 3.0	0.0	4.50	0.003	I	94.7(152.4)
GSP	34.0970	116.9960	12/05/1997	170438.9	4.0	4.10	0.002	-	94.8(152.6)
DMG	35.8000	118.5330	07/26/1932	65158.3	0.0	4.50	0.003	I	95.2(153.2)
DMG	35.7250	118.0550	03/15/1946	134935.9	22.0	6.30	0.014	IV	95.3(153.3)
GSP	34.2900	116.9460	02/10/2001	210505.8	9.0	5.10	0.005	II	95.3(153.4)
PAS	34.1510	116.9720	11/20/1978	655 9.5	6.1	4.30	0.003	I	95.3(153.4)
GSP	34.0850	116.9890	06/30/1992	214900.3	3.0	4.40	0.003	I	95.4(153.5)
PAS	34.1980	116.9590	04/01/1978	105227.4	8.0	4.00	0.002	-	95.4(153.6)
DMG	35.7230	118.0350	03/18/1946	10 555.1	0.0	4.90	0.005	II	95.5(153.7)
GSP	34.2870	116.9420	02/11/2001	003916.0	8.0	4.20	0.003	-	95.5(153.8)

DMG	33.0380	118.7340	09/13/1937	221439.5	10.0	4.00	0.002	-	95.8(154.2)
DMG	35.7140	117.9770	03/15/1946	191853.6	0.0	5.40	0.007	II	96.1(154.7)
PAS	35.7290	118.0230	06/14/1979	73928.3	5.0	4.60	0.004	I	96.1(154.7)
DMG	35.7330	118.0330	03/16/1946	195359.0	0.0	4.00	0.002	-	96.2(154.8)
DMG	35.7330	118.0330	03/26/1946	6 713.0	0.0	4.10	0.002	-	96.2(154.8)
DMG	35.7330	118.0330	03/22/1946	10 833.0	0.0	4.10	0.002	-	96.2(154.8)
DMG	35.7330	118.0330	03/17/1946	211835.0	0.0	4.00	0.002	-	96.2(154.8)
DMG	35.7330	118.0330	03/16/1946	13 7 5.0	0.0	4.10	0.002	-	96.2(154.8)
DMG	35.7330	118.0330	03/18/1946	3 022.0	0.0	4.10	0.002	-	96.2(154.8)
DMG	35.7330	118.0330	03/18/1946	115 9.0	0.0	4.10	0.002	-	96.2(154.8)
DMG	35.7330	118.0330	03/15/1946	2254 2.0	0.0	4.20	0.003	-	96.2(154.8)
DMG	35.7330	118.0330	03/24/1946	25646.0	0.0	4.40	0.003	I	96.2(154.8)
DMG	35.7330	118.0330	03/18/1946	16 346.0	0.0	4.10	0.002	-	96.2(154.8)
GSP	34.3620	116.9230	12/07/1992	033331.5	1.0	4.00	0.002	-	96.2(154.8)
DMG	34.3200	116.9250	04/18/1968	174213.4	4.7	4.00	0.002	-	96.3(155.0)
DMG	34.0000	117.0000	06/30/1923	022 0.0	0.0	4.50	0.003	I	96.5(155.2)

EARTHQUAKE SEARCH RESULTS

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
GSP	34.3770	116.9180	12/04/1992	052511.2	2.0	4.80	0.004	I	96.5(155.2)
DMG	34.4000	116.9170	02/01/1942	151555.0	0.0	4.00	0.002	-	96.5(155.2)
DMG	34.4000	116.9170	02/01/1942	151828.0	0.0	4.50	0.003	I	96.5(155.2)
DMG	34.4000	116.9170	01/25/1942	215133.0	0.0	4.00	0.002	-	96.5(155.2)
DMG	34.4000	116.9170	02/01/1942	16 334.0	0.0	4.50	0.003	I	96.5(155.2)
GSP	34.3610	116.9130	12/04/1992	125942.1	0.0	4.20	0.003	-	96.8(155.8)
DMG	34.1330	116.9500	06/10/1938	1440 0.0	0.0	4.00	0.002	-	96.8(155.8)
DMG	35.6870	117.8690	04/12/1946	103433.7	-2.0	4.00	0.002	-	96.9(155.9)
DMG	35.7450	118.0390	03/16/1946	94617.9	0.0	5.10	0.005	II	96.9(155.9)
DMG	35.7500	118.0500	09/16/1963	53616.0	0.0	4.90	0.005	I	97.0(156.1)
DMG	35.7890	118.2040	04/16/1946	1037 4.7	0.0	4.10	0.002	-	97.1(156.3)
DMG	34.3370	116.9090	11/30/1962	2351 5.5	7.0	4.30	0.003	I	97.1(156.3)
DMG	35.7450	118.0230	10/24/1959	153515.3	7.4	4.20	0.003	-	97.2(156.4)
GSP	34.3640	116.9040	11/27/1992	183225.0	1.0	4.10	0.002	-	97.3(156.6)
DMG	35.7540	118.0440	09/16/1962	53616.0	3.8	4.90	0.005	I	97.4(156.7)
DMG	35.7510	118.0290	03/15/1946	215433.4	0.0	5.20	0.006	II	97.4(156.8)
GSP	34.2560	116.9120	06/28/1992	170557.5	8.0	4.60	0.004	I	97.5(156.9)
DMG	35.7380	117.9810	03/24/1946	51727.8	0.0	4.10	0.002	-	97.6(157.0)
GSP	34.3400	116.9000	11/27/1992	160057.5	1.0	5.30	0.006	II	97.6(157.1)
DMG	35.1470	117.1310	07/01/1960	221344.6	7.7	4.50	0.003	I	97.7(157.2)
GSP	34.3690	116.8970	12/04/1992	020857.5	3.0	5.30	0.006	II	97.7(157.2)
GSP	34.1780	116.9220	06/28/1992	170131.9	13.0	4.70	0.004	I	97.8(157.3)
MGI	34.3000	116.9000	12/01/1915	14 5 0.0	0.0	4.00	0.002	-	97.8(157.5)
DMG	34.1800	116.9200	01/16/1930	034 3.6	0.0	5.10	0.005	II	97.8(157.5)
DMG	34.1800	116.9200	01/16/1930	02433.9	0.0	5.20	0.006	II	97.8(157.5)
DMG	34.7000	120.3000	01/12/1915	431 0.0	0.0	5.50	0.007	II	98.0(157.7)
DMG	34.7000	120.3000	07/31/1902	920 0.0	0.0	5.50	0.007	II	98.0(157.7)
PAS	34.2460	116.9010	06/29/1979	55320.5	5.7	4.60	0.003	I	98.2(158.0)
GSP	34.1210	116.9280	08/16/1998	133440.2	6.0	4.70	0.004	I	98.2(158.0)
GSP	35.5120	117.4940	10/19/1994	004958.8	3.0	4.20	0.003	-	98.2(158.1)
PAS	34.2490	116.9000	06/30/1979	7 353.0	5.6	4.50	0.003	I	98.2(158.1)
DMG	35.6970	117.8360	05/05/1946	9 343.7	2.3	4.20	0.003	-	98.3(158.2)
DMG	35.7530	117.9860	03/15/1946	1321 0.9	0.0	5.20	0.006	II	98.4(158.4)

PAS	34.2430	116.8960	06/30/1979	03411.6	5.8	4.90	0.004	I	98.5(158.5)
DMG	34.3240	116.8850	12/01/1962	03548.8	9.6	4.30	0.003	I	98.6(158.6)
DMG	35.7230	117.8910	04/27/1946	223723.8	-0.7	4.10	0.002	-	98.6(158.6)
DMG	34.3330	116.8830	10/14/1943	142844.0	0.0	4.50	0.003	I	98.6(158.7)
GSP	34.3700	116.8800	11/29/1992	142120.5	3.0	4.00	0.002	-	98.6(158.7)
DMG	34.5830	120.3330	12/18/1934	3 9 0.0	0.0	4.00	0.002	-	98.6(158.7)
DMG	34.5830	120.3330	12/17/1934	1110 0.0	0.0	4.50	0.003	I	98.6(158.7)
MGI	34.2000	116.9000	10/10/1915	5 6 0.0	0.0	4.00	0.002	-	98.7(158.9)
GSP	34.1120	116.9200	10/01/1998	181816.0	4.0	4.70	0.004	I	98.8(159.0)
DMG	35.7780	118.0510	03/15/1946	15 0 9.2	0.0	4.40	0.003	I	98.8(159.0)
DMG	35.7780	118.0490	01/28/1961	81246.2	5.5	5.30	0.006	II	98.8(159.0)
DMG	34.3120	116.8790	01/31/1972	155 4.2	8.0	4.00	0.002	-	99.0(159.3)
DMG	34.3250	116.8750	12/02/1962	04138.4	6.7	4.40	0.003	I	99.1(159.5)
DMG	34.9760	116.9960	11/07/1958	1738 3.7	12.2	4.10	0.002	-	99.3(159.8)
DMG	35.7000	117.8000	07/07/1930	12 9 0.0	0.0	4.50	0.003	I	99.4(160.0)
DMG	34.3500	116.8670	10/15/1943	1650 1.0	0.0	4.50	0.003	I	99.5(160.0)
MGI	34.8000	120.3000	09/11/1902	530 0.0	0.0	4.00	0.002	-	99.5(160.1)
MGI	34.8000	120.3000	09/11/1902	7 0 0.0	0.0	4.00	0.002	-	99.5(160.1)
DMG	35.7610	117.9530	06/26/1951	12639.1	8.1	4.40	0.003	I	99.6(160.3)
DMG	34.3250	116.8650	10/29/1962	24253.9	8.6	4.80	0.004	I	99.7(160.4)

EARTHQUAKE SEARCH RESULTS

Page 20

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	35.7470	117.9080	03/18/1946	155042.6	4.4	5.30	0.006	II	99.7(160.4)
DMG	35.0000	117.0000	08/01/1947	154230.0	0.0	4.00	0.002	-	99.7(160.5)
DMG	33.7000	117.1000	06/11/1902	245 0.0	0.0	4.50	0.003	I	99.7(160.5)

****

-END OF SEARCH- 1010 EARTHQUAKES FOUND WITHIN THE SPECIFIED SEARCH AREA.

TIME PERIOD OF SEARCH: 1800 TO 2008

LENGTH OF SEARCH TIME: 209 years

THE EARTHQUAKE CLOSEST TO THE SITE IS ABOUT 1.7 MILES (2.8 km) AWAY.

LARGEST EARTHQUAKE MAGNITUDE FOUND IN THE SEARCH RADIUS: 7.9

LARGEST EARTHQUAKE SITE ACCELERATION FROM THIS SEARCH: 0.224 g

COEFFICIENTS FOR GUTENBERG & RICHTER RECURRENCE RELATION:
a-value= 3.927
b-value= 0.815
beta-value= 1.877

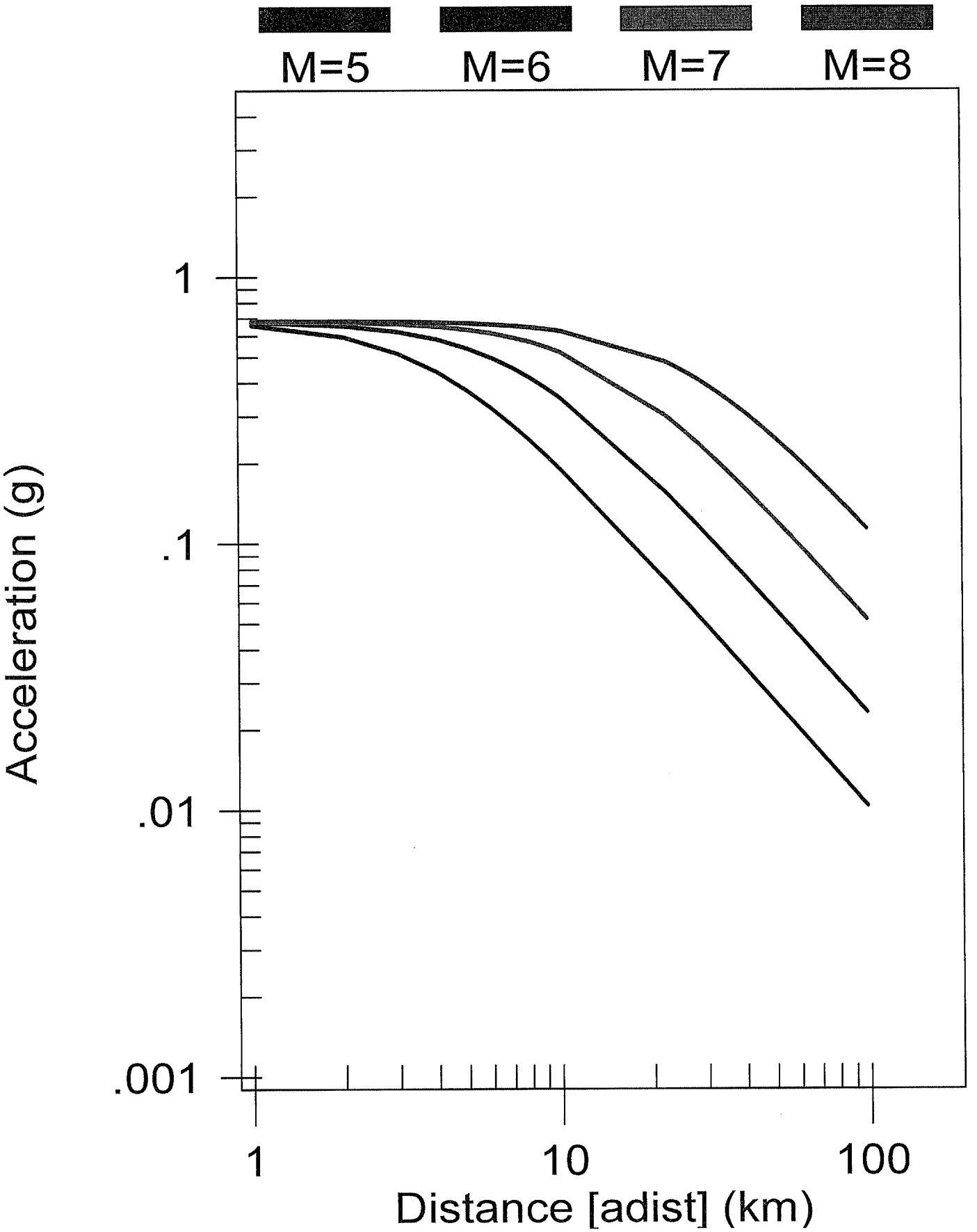
TABLE OF MAGNITUDES AND EXCEEDANCES:

Earthquake Magnitude	Number of Times Exceeded	Cumulative No. / Year

4.0	1010	4.83254
4.5	386	1.84689
5.0	141	0.67464
5.5	53	0.25359
6.0	25	0.11962
6.5	9	0.04306
7.0	7	0.03349
7.5	2	0.00957

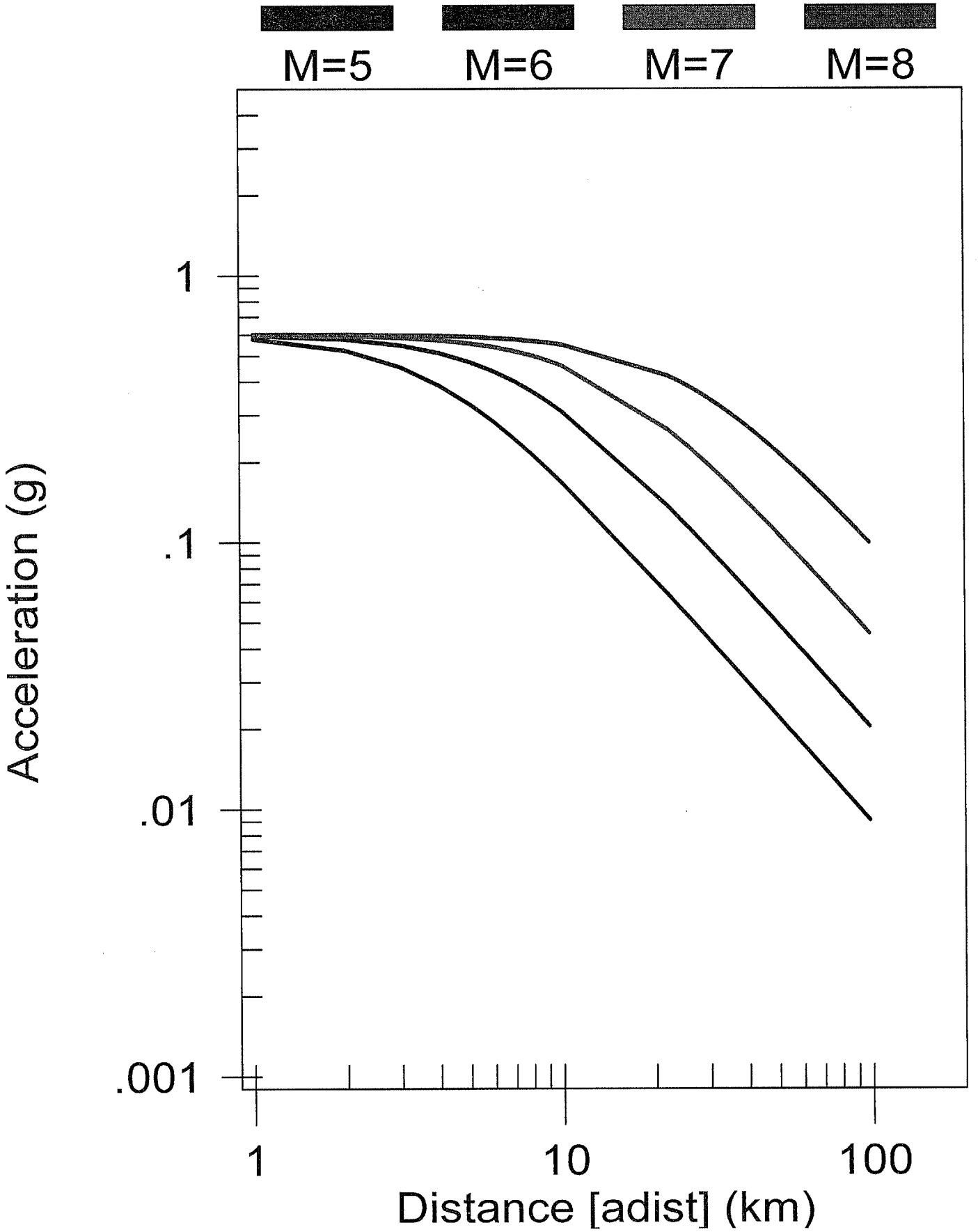
BLIND-THRUST FAULTS

6) Bozorgnia Campbell Niazi (1999) Hor.-Holocene Soil-Uncor



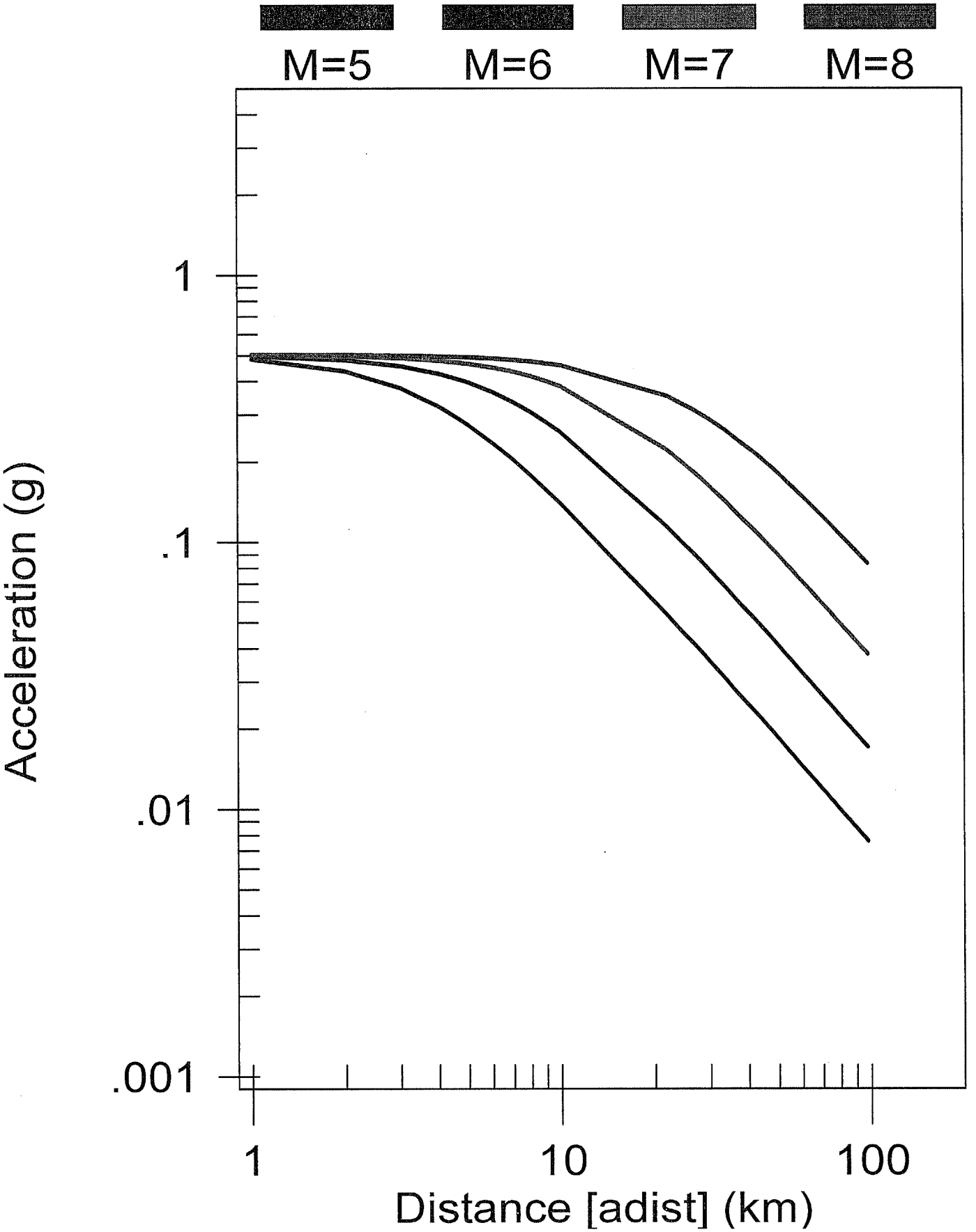
DIP-SLIP FAULTS

6) Bozorgnia Campbell Niazi (1999) Hor.-Holocene Soil-Uncor



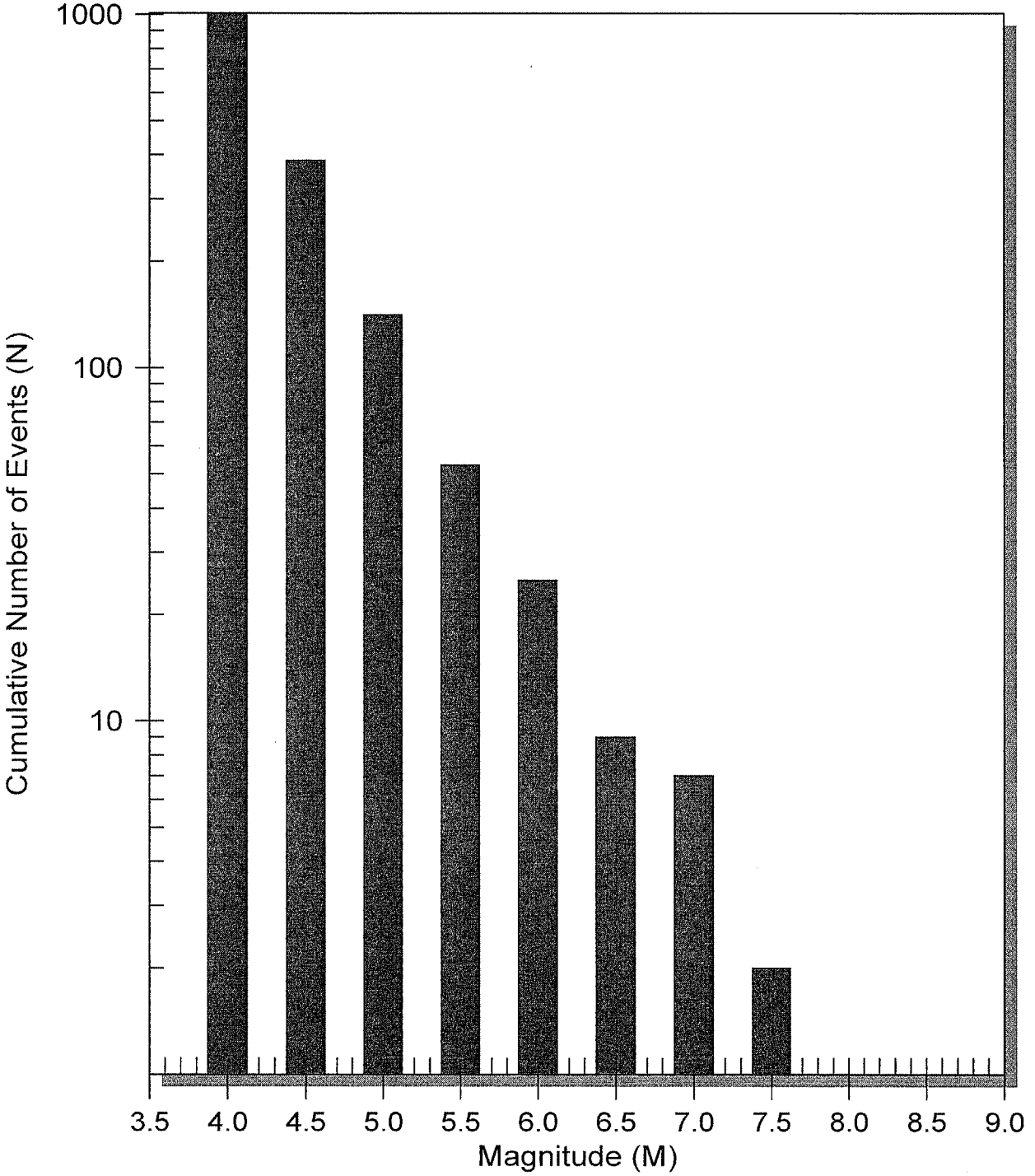
STRIKE-SLIP FAULTS

6) Bozorgnia Campbell Niazi (1999) Hor.-Holocene Soil-Uncor



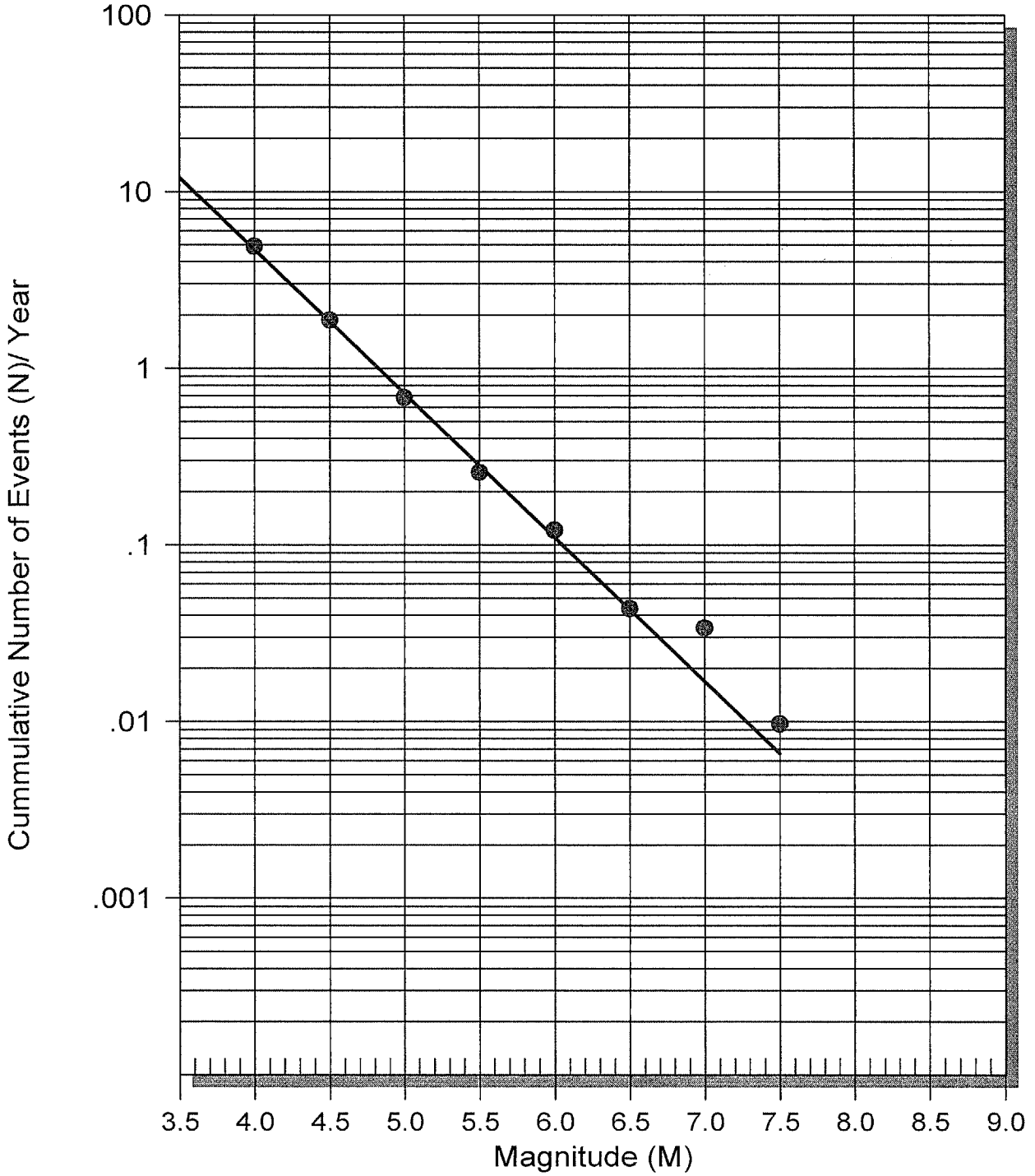
Number of Earthquakes (N) Above Magnitude (M)

EIR



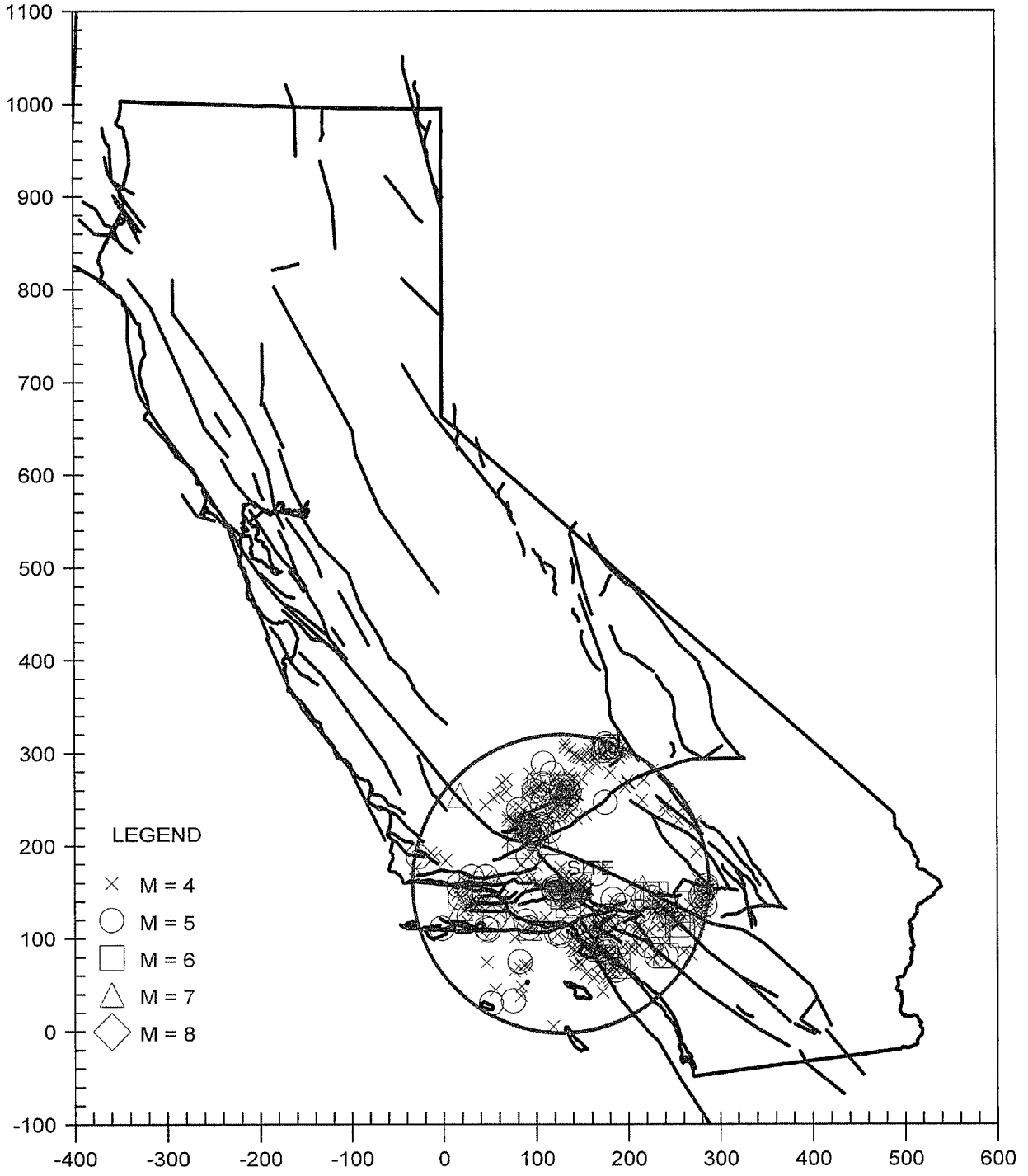
EARTHQUAKE RECURRENCE CURVE

EIR



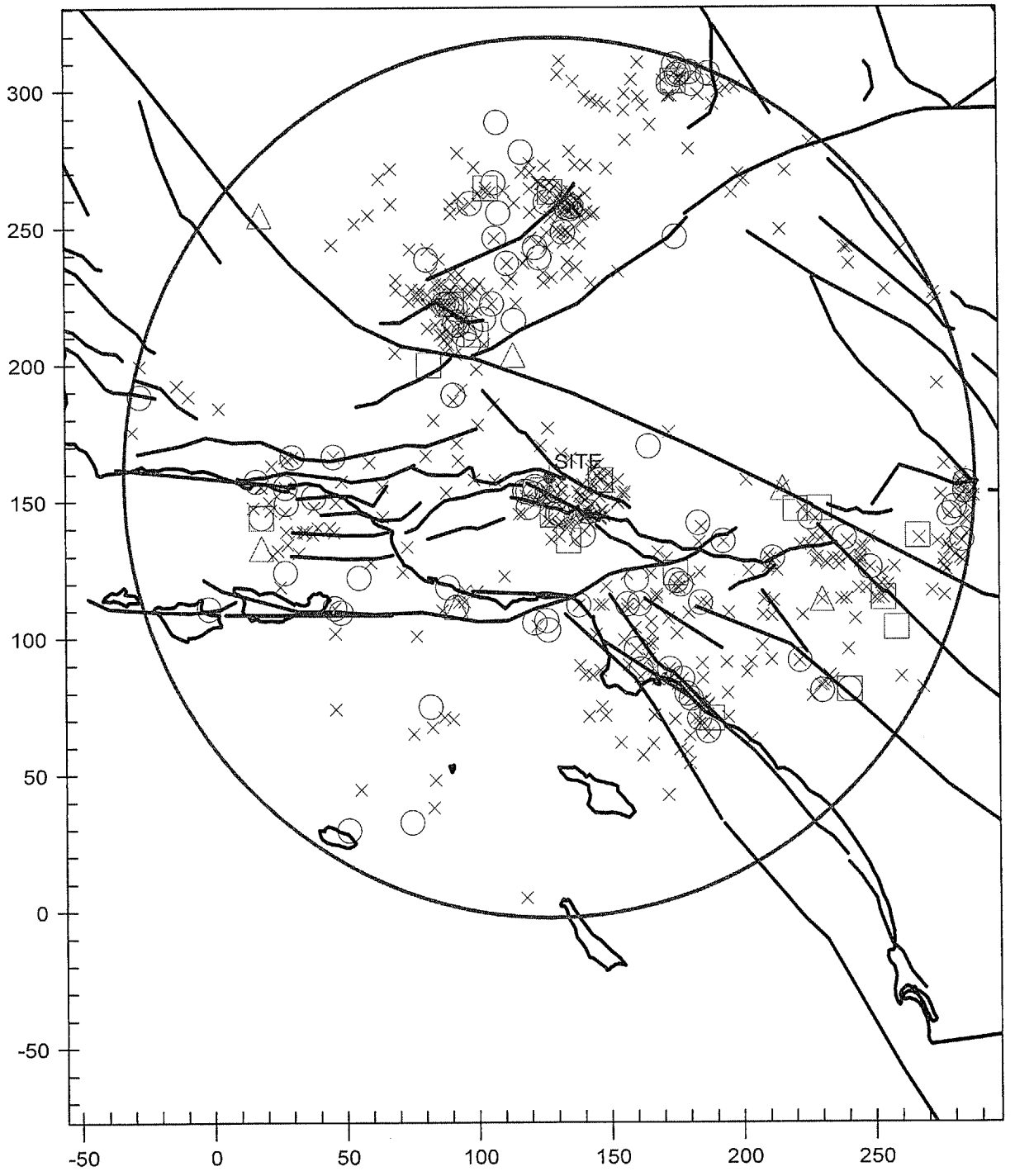
EARTHQUAKE EPICENTER MAP

EIR



EARTHQUAKE EPICENTER MAP

EIR



Newhall Land and Farming Company
March 31, 2010
94-502-52

APPENDIX B

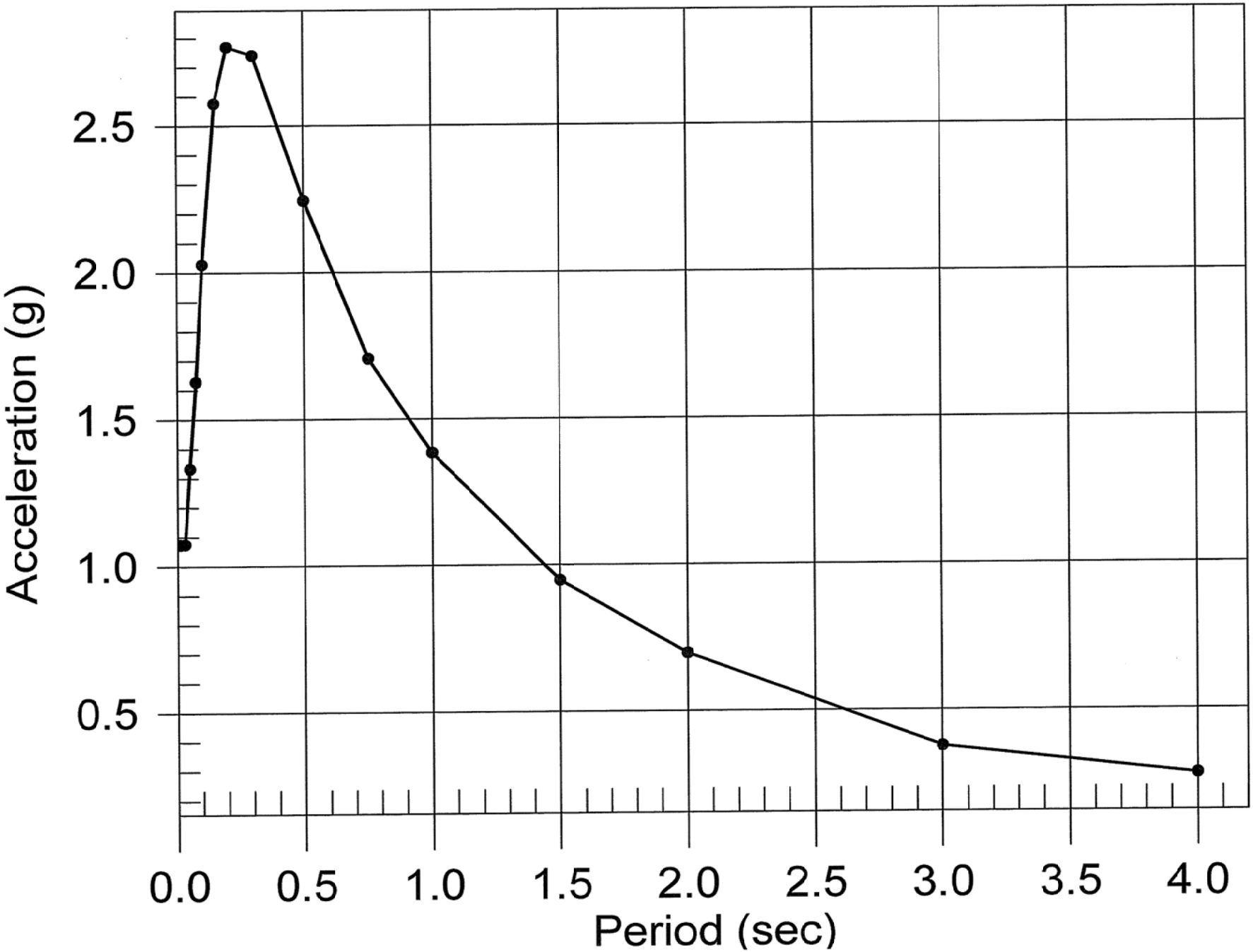
PROBABILISTIC EARTHQUAKE HAZARD ANALYSES

RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

BOZ et AL (1999) MCE

ACCELERATION vs. PERIOD

2475-Year Return Period



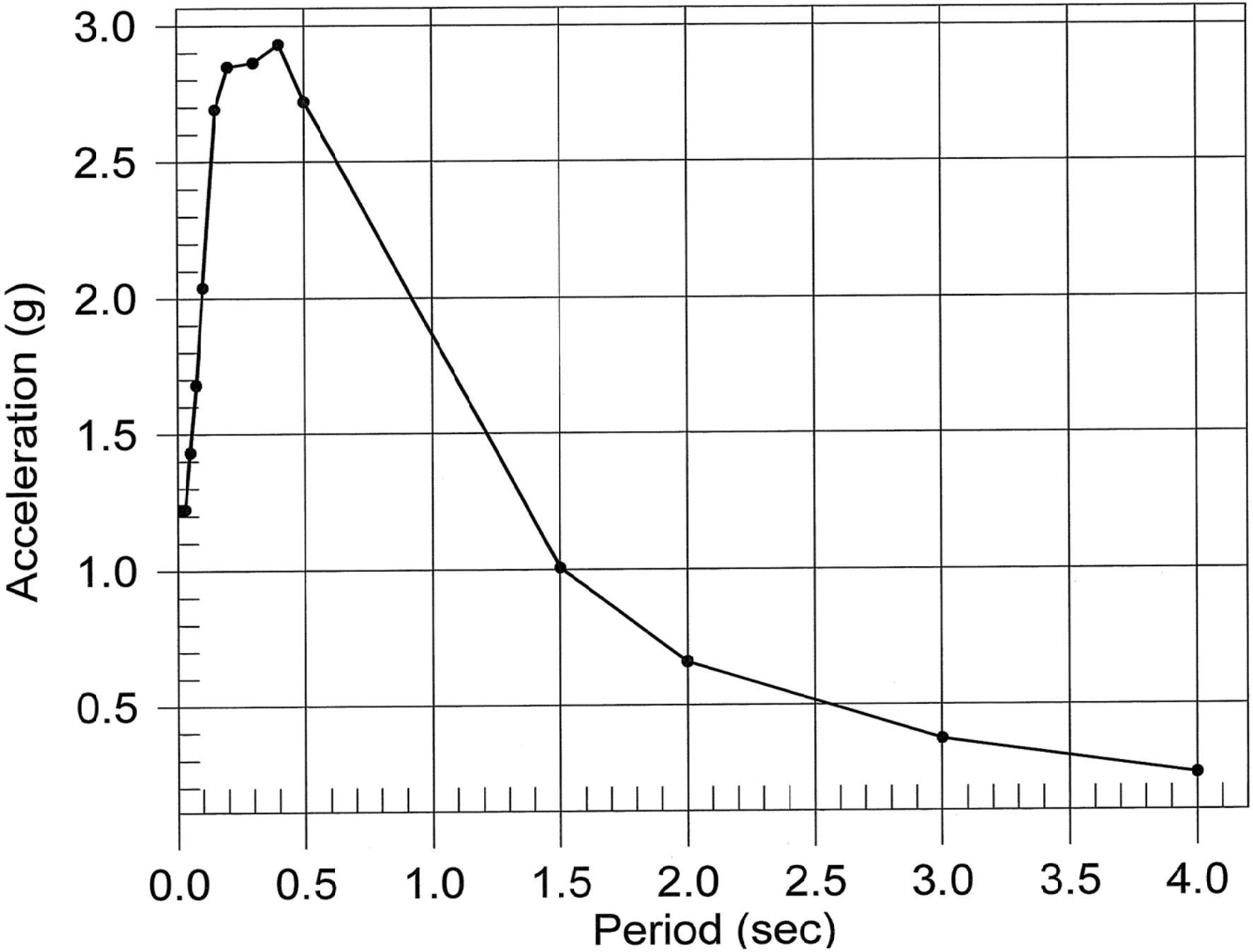
REPORT DATED 03/31/2010

JOB NO. 94-502-52

CAMPBELL (1999 rev.) MCE

ACCELERATION vs. PERIOD

2475-Year Return Period



REPORT DATED 03/31/2010

JOB NO. 94-502-52

Cynthia – Impact Sciences, Inc. Address is:
803 Camarillo Springs Road
Suite A
Camarillo, CA 93012

GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

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GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

April 29, 2010

Newhall Land and Farming Company
23823 West Valencia Boulevard
Valencia, California 91355

Job No. 94-502-022

Attention: Mr. Corey Harpole

Subject: Response to County of Los Angeles Review Sheets and Geotechnical Plan Review
Revised Vesting Tentative Tract Map No. 61105
Mission Village, Newhall Ranch
Los Angeles County, California

Reference: See Attached References

Ladies and Gentlemen:

This submittal provides information requested by the County of Los Angeles Department of Public Works (County), Geotechnical and Materials Engineering Division (GMED), Geologic and Soils Engineering Sections. The information provided is in answer to a Soils Engineering Review Sheet dated February 5, 2010, and a Geologic Review Sheet dated February 8, 2010. The GMED comments on the review sheets are shown below in bold type. Our response follows each comment in regular type.

Included in this letter is a geotechnical plan review of revised Vesting Tentative Tract Map (VTTM) No. 61105. The revised vesting tentative tract map was prepared by Psomas and is dated April 19, 2010.

R. T. FRANKIAN & ASSOCIATES
1329 SCOTT ROAD BURBANK CALIFORNIA 91504
TEL. (818) 531-1501 FAX (818) 531-1511 WWW.RTFRANKIAN.COM

RESPONSE TO GMED REVIEW SHEETS

SOILS ENGINEERING REVIEW SHEET

1. **The submitted geotechnical map sheets 11 and 12 do not show the off-site grading shown on the latest Tentative Tract Map. Verify and provide discussion, conclusions, and recommendations for the off-site grading shown on the Tentative Map. Provide geotechnical maps and Tentative Tract Map that conform.**

   <u>Note:</u> The Soils Engineering report must include conclusions and recommendations for all grading shown on the Tentative Tract Map including off-site grading. If the off-site grading is not part of the tract development it must be removed from the Tentative Tract Map.

The off-site grading reflected on Sheets 11 and 12 is for a utility corridor. The geologic and geotechnical conditions relative to the utility corridor grading were addressed by Allan E. Seward, Engineering Geology, Inc. (AES) in their May 25, 2007 and December 21, 2009 reports (AES, 2007b and 2009). R. T. Frankian & Associates (RTF&A) has reviewed the referenced AES reports and agree with their conclusions and recommendations for the off-site utility corridor grading.

The off-site grading shown on Sheet 9 for the Southern California Edison (SCE) substation alternatives was addressed by Leighton and Associates, Inc. (Leighton). We have reviewed the pertinent Leighton reports (2007, 2008, and 2010) and concur with their geologic and geotechnical findings and recommendations for the off-site grading of the proposed SCE substation.

2. **Provide revised slope stability analyses as requested by the Geology Section. Verify and revise the represented geology of the slope stability analyses as necessary.**

Revised geologic sections were prepared as requested in the geology comments. Revised slope stability calculations are presented in the Appendix. The slope

stability factor of safety results are indicated on the Geotechnical Sections, Figures 4.1 and 4.2.

3. **Provide slope stability analyses that utilize an iterative process to determine the critical failure plane. Verify the presented slope stability analyses represent the calculated critical failure plane. Provide revised analyses and recommendations as necessary.**

The previously presented slope stability calculations were for daylighted bedding conditions where the critical failure plane is defined by the geologic geometry and the failure surface with the lowest factor of safety was presented. For this response, we performed several slope stability calculations for circular failures. For each grid point presented on the slope stability calculations, a factor of safety was determined for at least 10 different circle radiuses, resulting in the evaluation of at least 2,000 individual failure surfaces. For the calculations that were utilized to determine the Restricted Use Areas (RUAs) limits, the critical failure surface for a factor of safety just above 1.5 that extends farthest from the top of the slope is presented.

4. **Provide all input data and calculated output from all slope stability analyses. Indicate the various shear strength parameters used in the analyses, in the appropriate segments of the represented slope. Include the output sheets that show the calculated factor of safety.**

For the program Slope W, the calculations presented in the Appendix are the input and output files which show the calculated factor of safety, material strengths, and failure surface. As discussed during our GMED meeting, we will take the results of the slope stability calculations and put then on the attached Geotechnical Sections that clearly show the failure surface and strength parameters.

5. **Provide a table of all shear strength parameters utilized in the slope stability analyses. Specify material represented by the shear parameters.**

As part of the evaluation of shear strength parameters to be used in slope stability calculations, the referenced reports concerning the subject site were reviewed. A discussion of the geologic factors affecting slope stability, the shear strength parameters, and the stability methods used in the analyses were previously presented in RTF&A reports (2009c, 2010) and by AES (2004d) for VTTM 61105. Shear strength parameters were summarized by AES on page F2 of Appendix F (AES, 2004d). Presented below are the recommended shear strengths for use at the subject site based on review of the referenced reports.

SUMMARY OF SHEAR STRENGTH PARAMETERS

Material	Static Cohesion (psf)	Static Ø (degrees)
Landslide Failure Plane Material	200	15
Landslide Mass	140	25
Terrace Deposit Material	200	30
Cross-Bedding	500	35
Saugus Along Bedding (static)	200	20
Saugus Along Bedding (pseudostatic)	300	30
Compacted Fill (coarse-grained)	300	30
Compacted Fill (fine-grained)	350	24
Alluvium	200	29

6. **Provide rotational static and seismic slope stability analyses for the newly proposed cut slopes presented in the Geologic Sections, Figure 3. Provide revised geotechnical cross section, for each section analyzed, showing the critical failure plane used in the analyses. Indicate the various shear strength parameters used in the analyses, in the appropriate segments of each failure plane. Show locations of the cross sections used in slope stability analyses on the geotechnical map. Recommend mitigation if factors of safety are below County minimum standards. Revise maps to show mitigation measures, as necessary.**

The requested calculations meet the County minimum requirements for stable slopes and are presented in the Appendix. The slope stability results are indicated on the attached Geotechnical Sections, Figures 4.1 and 4.2.

7. **Provide slope stability analyses for Qls XXXIX (Cross Section 9M-9M') located south of the newly proposed debris basin shown on Sheet 3. Verify the toe of the landslide in relation to the proposed debris basin. If the proposed debris basin will be utilized to mitigate the landslide, provide volume calculations that clearly show that 100 percent of the predicted landslide material will be accommodated by the debris basin. Per County policy, the catchment area must be designed for 100 percent of the predicted debris volume. Provide mitigation measures as necessary.**

As discussed in our GMED meeting, we have prepared a Geologic Section K-K at a scale of 1" = 40 feet and performed static slope stability calculations. Due to the shallow landslide failure surface, it was determined with GMED that it will not be necessary to provide seismic calculations. The slope stability calculations meet the County minimum static gross stability requirements. The slope stability calculations are presented in the Appendix and the results are indicated on the attached Geotechnical Sections, Figure 4.2.

8. **Requirements of the Geology Section are attached.**

Our responses to the Geologic Review Sheet are presented below.

9. **Include a copy of this review sheet with your response.**

The Soils Engineering and Geologic Review Sheets are included at the end of this report.

GEOLOGIC REVIEW SHEET

1. Apparent dips shown on geologic cross sections E and F appear to be 10-15° higher than supported by the data provided. Verify and revise sections and analyses as needed.

RTF&A has revised Geologic Section E-E' (shown on Figure 3.1) utilizing the bedding attitude obtained by AES in their exploratory trench, designated T-188Q, and located approximately 30 feet south of the section line. The trench, projected to the section line along the strike of bedding, is depicted on Geologic Section E-E'. The bedding measured in the trench strikes N42W and dips 48 degrees to the northeast, with an apparent easterly dip of 28 degrees, relative to Geologic Section E-E' and proposed cut slope CS-11. The 28-degree apparent dip is steeper than the 2:1 (horizontal:vertical), or 26-degree, cut slope. Accordingly, the cut slope is considered grossly stable from a geologic standpoint. RTF&A's previous recommendations regarding a 30 feet wide by 5 feet deep stability fill slope for CS-11, to restore slope grades after removal of landslide Qls III, remain applicable (RTF&A, 2009c).

Geologic Section F-F' (Figure 3.1) was revised using an apparent dip based on averaging all of the bedding attitudes measured in AES boring B-71E. The resultant average bedding attitude strikes N39W and dips 21 degrees northeast, with a resultant apparent dip of 18 degrees to the north, relative to Geologic Section F-F'. The proposed grading of Cut Slopes CS-13a and CS-13b, depicted on Geologic Section F-F,' has been revised on the April 19, 2010 Vesting Tentative Tract Map. The stability of Cut Slope CS-13a, indicated on the section line, is addressed in this report as part of our geotechnical plan review of revised Vesting Tentative Tract Map No. 61105.

2. Plot subsurface data on Sections A – F as applicable.

Geologic Sections A-A' through F-F' have been revised, where applicable, to reflect subsurface data such as bedding, or borings and test pits.

3. No grading is permitted in areas subject to geologic hazard (County of Los Angeles Building Code §110.2.2). Revise grading on lot 481 (sheet 3) to exclude grading within the proposed RUA.

Based on discussions with GMED, it is our understanding that grading within the RUAs that were established for the steep natural slopes will be permitted by the County, provided that RUAs are established and placed within lots that are not permitted to be developed. Accordingly, the lot lines for Lot 481 have been adjusted and the designated RUA, formerly established within a portion of Lot 481, is located entirely within Open Space Lot 487 (see Figure 2.3). Additionally, the RUAs previously established for Lots 19 and 20, Lot 300, and Lots 322 through 325 have now been designated as Open Space Lots 130 (Figure 2.3) , 367 (Figure 2.4) , and 358 (Figure 2.6), respectively.

Section 110.2.2 of the Los Angles County Building Code has an exception as provided in Section 110.2.3, subject to the approval of the building official. The proposed grading improves the slope stability along the natural slopes by removing driving force and provides favorable drainage.

RTF&A met with GMED on March 11, 2010 to discuss our slope stability calculations and procedure that justify a reduction to the previously recommended RUA. Presented below is a discussion of the procedures used to reduce and/or eliminate the RUA established by AES.

The RUA on Lot 481 is related to not obtaining a factor of safety in excess of 1.5 within the proposed grading limits outside of the County required building setback distance of H/3, up to a maximum of 40 feet. AES had established a failure surface where a static factor of safety of 1.55 was obtained and then applied an additional setback where an RUA was established. Our procedure was to evaluate the existing geologic sections and new geologic sections and establish a revised RUA where the factor of safety of 1.5 was obtained. The RUA was eliminated from graded areas where a factor of safety of 1.5 is obtained. The current recommended RUAs are shown on the Geotechnical Map, Figures 2.1 to 2.12.

The slope stability calculations presented for Geologic Sections G-G' and J-J' indicated that a factor of safety of at least 1.5 is obtained within the limits of proposed grading. An RUA is not required and it has been removed from the plan in this area. The slope stability calculation for Geologic Section H-H' indicates that the factor of safety for the graded area is greater than 1.5. Accordingly, the RUA has been removed from the area represented by Geologic Section H-H'. Geologic Section I-I' was constructed near AES Section 4-4'. Slope stability calculations for Geologic Section I-I' and AES Section 4-4' indicate that a factor of safety of 1.5 is not obtained until a horizontal distance of 68 feet and 72 feet respectively, from the proposed daylight line. A setback of 72 feet measured from the graded top of slope is recommended at Geologic Section I-I' and AES Section 4-4'. This RUA has been added to Figure 2.3, which encompasses the area where a static factor of safety of less than 1.5 is obtained.

A similar procedure was used for the other revised RUA areas related to slope stability. At some locations, the previously presented AES Geologic Sections (AES, 2004d) were utilized for updated slope stability calculations. These geologic sections should be reviewed within the referenced AES report (AES, 2004d). The calculations are presented in the Appendix. The slope stability calculations are presented in the Geotechnical Sections, Figure 4.1 through 4.2.

4. **Some of the subsurface data provided in Seward (7/20/04) indicates faulting through quaternary deposits and into younger deposits along the Airport Mesa and Saddle faults. Other subsurface work identified quaternary deposits with no Holocene cover. In these areas Holocene displacement cannot be proved or disproved. Building setbacks (Restricted Use Area) must be established where Holocene displacement cannot be ruled out.**

RTF&A has established "Fault Building Setbacks" for the Airport Mesa and Saddle faults (as shown on Figure 2.3 of the Geotechnical Map) for all areas of the two faults where Holocene displacement cannot be ruled out, due to a lack of datable soil horizons. In general, the fault setbacks measure approximately 50 feet on each side of the mapped fault traces. After reviewing the AES trench logs for the Airport Mesa fault, we noted several subsidiary faults in the terrace

deposits extending to ground surface. Accordingly, the Fault Building Setback for the Airport Mesa fault encompasses, and extends 50 feet beyond, these subsidiary faults. The expanded setback width is located in the vicinity of "GG Street" and Cut Slope CS-18, and measures approximately 200 feet wide.

5. The Soils Engineering review dated 2/5/10 is attached.

Our responses to the Soils Engineering review sheet were presented in the previous section of this report.

GEOTECHNICAL PLAN REVIEW
REVISED VESTING TENTATIVE TRACT MAP NO. 61105

This report presents the results of our Geotechnical Plan Review of Revised Vesting Tentative Tract Map No. 61105 (VTTM 61105) , Mission Village, Newhall Ranch, California. Previous geotechnical and geologic reports for VTTM 61105 were preformed by AES (2004a, 2004b, 2004d, 2005b, 2005, 2007d, and 2008a) and RTF&A (2009b and 2009c).

The purpose of this geotechnical plan review is to evaluate the revisions to proposed VTTM 61105, as shown on the Geotechnical Map, Figures 2.1 through 2.12. The review is based on the 1" = 100' *Major Land Division, Vesting Tentative Tract Map No. 61105*, prepared by Psomas, and dated April 19, 2010.

We have performed numerous prior geotechnical investigations within, and in the vicinity of, the site. Data from these reports were utilized in developing the VTTM 61105 conclusions and recommendations. Additionally, we have reviewed and incorporated pertinent geologic data previously developed by AES for VTTM 61105 and adjacent tracts/parcels. A list of the applicable

RTF&A and AES reports is included in the "References" section following the report text.

Our recommendations are based on the results of our review of previous data, field explorations, laboratory tests, and appropriate engineering and geologic analyses. The assessment of general site environmental conditions for the presence of contaminants in the soils and groundwater at the site was beyond the scope of this investigation. The geologic conditions on site have been previously addressed in the referenced RTF&A and AES reports, and are consistent with current conditions. The conclusions and recommendations presented in the referenced reports remain applicable, except where superseded by this report.

Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report has been prepared for Newhall Land and Farming Company and their design consultants, to be used solely for planning and design of VTTM 61105 and its associated grading. The report has not been prepared for use by other parties and may not contain sufficient information for purposes of other parties or other uses.

SUMMARY OF VESTING TENTATIVE TRACT MAP REVISIONS

The revisions to VTTM 61105 include:

Sheet 3 (Figure 2.3)

- cut slopes along east side of Commerce Center Drive (designated as Cut Slopes CS-20 and CS-55) slightly reconfigured; and
- RUAs formerly within Lots 19, 20, and 481 now designated as "Open Space Lots".

Sheet 4 (Figure 2.4)

- RUAs formerly within Lot 300 now designated as "Open Space Lot".

Sheet 6 (Figure 2.6)

- RUAs formerly within Lots 322 through 325 now designated as "Open Space Lots".

Sheet 7 (Figure 2.7)

- Westridge Parkway realigned and adjacent slopes reconfigured;
- grading in area of Cut Slope CS-13 has been revised, resulting in two cut slopes (designated Cut Slopes CS-13a and CS-13b) on each side of a private street; and
- three new cut slopes (designated Cut Slopes CS-57, CS-58, and CS-59) proposed along the eastern property line, east of Lot 661 and Westridge Parkway within VTTM 53295.

Sheet 8 (Figure 2.8)

- two new cut slopes (designated Cut Slopes CS-60 and CS-61) proposed for each side of Media Center Lane.

SCOPE OF WORK

The scope of work for the geotechnical review of the revised VTTM 61105 included:

- review of the referenced reports;

- revision of Geologic Sections A-A' and F-F,' depicting the revised grading conditions, relative to the proposed cut slopes;
- evaluation of the revised grading, relative to slope stability;
- evaluation of natural slope stability within RUAs;
- preparation of conclusions and recommendations based on existing site conditions and future intended use; and
- preparation of a Geotechnical Map, presented as Figures 2.1 through 2.12.

SLOPE STABILITY – CUT SLOPES

General: Three previously proposed cut slopes (Cut Slopes CS-13, CS-20, and CS-55) have been reconfigured from the previous vesting tentative tract map (dated November 24, 2009). Six new cut slopes (Cut Slopes CS-13b, CS-57 through CS-61) are proposed for revised VTTM 61105. A discussion of the new and revised cut slopes is presented below. The approximate locations of all of the cut slopes proposed for VTTM 61105 are depicted on Figures 2.3 through 2.8. Details specific to all proposed 61 cut slopes, including anticipated geologic conditions and recommended mitigation of potential slope instability, are presented on Table 1.

Slope stability analyses for new or revised cut slopes were performed using the program Slope/W by GEO-SLOPE International Ltd., which utilized Bishop's Simplified Method or Spencer's Method.

The analyses were based on subsurface conditions, as depicted on the Geologic Sections, presented as Figure 3.1 and 3.2. The existing ground surface, proposed grading scheme, and subsurface geologic structure are shown on the geologic sections. For analyses, where the location of weak bedding planes is

unknown or uncertain, one is assumed to be located exactly at the critical location, typically near the toe of the slope. The critical failure surface, material properties, and factors of safety are added to the geotechnical sections for presentation in this report. The geotechnical sections are presented as Figure 4.1 and 4.2.

As part of the evaluation of shear strength parameters to be used in slope stability calculations, the referenced reports concerning the subject site were reviewed. A discussion of the geologic factors affecting slope stability, the shear strength parameters, and the stability methods used in the analyses were previously presented in RTF&A reports (2009c, 2010) and by AES (2004d) for VTTM 61105. Shear strength parameters were summarized by AES on page F2 of Appendix F (AES, 2004d). Presented below are the recommended shear strengths for use at the subject site based on review of the referenced reports.

SUMMARY OF SHEAR STRENGTH PARAMETERS

Material	Static Cohesion (psf)	Static Ø (degrees)
Landslide Failure Plane Material	200	15
Landslide Mass	140	25
Terrace Deposit Material	200	30
Cross-Bedding	500	35
Saugus Along Bedding (static)	200	20
Saugus Along Bedding (pseudostatic)	300	30
Compacted Fill (coarse-grained)	300	30
Compacted Fill (fine-grained)	350	24
Alluvium	200	29

Cut Slope CS-13a: Cut Slope CS-13a (Figure 2.7), formerly CS-13, will consist of a north-northeast-facing, 2:1 slope that will attain a maximum height of approximately 60 feet. The revised cut slope height is approximately 10 feet more than the slope previously addressed by RTF&A (2009c). The slope will encounter upper Saugus Formation units, landslide Qls I, and a surficial failure. Bedding within the underlying Saugus Formation strikes northwest and dips 16 to 24 degrees towards the northeast. This bedding orientation is daylighted with respect to the proposed cut slope (see Geologic Section F-F', Figure 3). Stability analyses performed for potential failure along the adversely oriented bedding indicate that proposed cut slope meets the County minimum requirements for stable slopes and is grossly stable.

The recommended partial removal of Qls I (AES, 2005b) will likely undercut the proposed cut slope. A 30 feet wide by 5 feet deep stability fill will need to be constructed to restore slope grades in the area of the landslide removal. The recommended landslide removal depths are indicated on Figure 2.7. The stability fill will also effectively buttress any portion of the surficial failure that may remain at the conclusion of the cut slope grading.

Cut Slope CS-13b: Cut Slope CS-13b (Figure 2.7) is planned as a south-facing, 10 ± -foot high, 2:1 slope. As depicted on Geologic Section F-F', the cut slope will expose upper Saugus Formation units in which the underlying bedding strikes north-northwest and dips approximately 12 degrees towards the east. The easterly dip is favorably oriented with respect to the south-facing cut slope, and the cut slope is considered grossly stable from a geologic standpoint.

Cut Slope CS-20: Cut Slope CS-20 (Figure 2.3) will consist of a 170-foot high, 2:1, southwest-facing slope. The revised cut slope height is approximately 30 feet higher than previously proposed (RTF&A, 2009c). The cut slope will expose undifferentiated Saugus Formation units. Bedding within the underlying Saugus Formation strikes west-northwest, with dips ranging from 70 degrees to near-vertical towards the southwest. The slope is considered grossly stable from a geologic standpoint, due to the steeply dipping beds.

Cut Slope CS-55: Cut Slope CS-55 (Figure 2.3) will consist of a 130-foot high, southwest-facing, 2:1 slope. The revision to this cut slope is limited to reconfiguring the slope face appearance from relatively straight to undulatory. As addressed in our previous vesting tentative map plan review (RTF&A, 2009c), the cut slope will expose undifferentiated Saugus Formation units in which the underlying bedding strikes west-northwest, with dips ranging from 60 degrees to near-vertical towards the southwest. The bedding orientation is favorable with respect to the proposed cut slope (see Geologic Section A-A', Figure 3.1). Stability calculations for Section A-A' are presented in the Appendix, and the results are indicated on the Geotechnical Section, Figure 4.1.

Cut Slope CS-57: Cut Slope CS-57 (Figure 2.7) will be graded as a 70-foot high, west-facing, 2:1 slope. The cut slope will expose upper Saugus Formation units. Bedding within the underlying Saugus Formation strikes northwest, with dips ranging from 10 to 15 degrees towards the northeast. This bedding is favorably oriented, relative to the west-facing cut slope, and the slope is considered grossly stable.

Cut Slope CS-58: Cut Slope CS-58 (Figure 2.7) will consist of a north-, west-, and south-facing slope that will be graded at 2:1 and attain a maximum height of approximately 30 feet. The proposed cut slope is underlain by upper Saugus Formation units. Bedding within the underlying Saugus Formation strikes northwest and dips 10 to 15 degrees towards the northeast and is favorably oriented with respect to the proposed cut slope. Accordingly, CS-58 is considered grossly stable, from a geologic standpoint

Cut Slope CS-59: Cut Slope CS-59 (Figure 2.7) will consist of a north-, west-, and south-facing slope that will be graded at 2:1 and attain a maximum height of approximately 60 feet. The cut slope will expose upper Saugus Formation units in which the underlying bedding strikes northwest and dips 10 to 15 degrees towards the northeast. The northeasterly dip is favorably oriented with respect to the proposed cut slope, and the cut slope is considered grossly stable from a geologic standpoint.

Cut Slope CS-60: Cut Slope CS-60 (Figure 2.8) will consist of an east-northeast-facing, 2:1 cut slope that will be graded to a height of approximately 10 feet. The cut slope will expose engineered fill placed during the grading of Parcel Map 18654 (AES, 2007a). The engineered fill slope is considered grossly stable.

Cut Slope CS-61: Cut Slope CS-61 (Figure 2.8) is planned as a 10 ±-foot high, west-southwest-facing, 2:1 cut slope that will expose a combination of terrace deposits and engineered fill. The engineered fill was placed during Parcel Map 18654 grading (AES, 2007a), and is considered grossly stable.

Bedding within the terrace deposits strikes northwest and dips three degrees towards the northeast. This bedding orientation is considered grossly stable, relative to the west-southwest-facing cut slope.

The exposure of terrace deposits in the area of proposed Cut Slope CS-61 is limited. There is the potential that the future cut slope will encounter engineered fill overlying the terrace deposits. Therefore, it is recommended that CS-61 be observed during grading by a geologist. If an adverse fill-over-cut condition or potential seepage problem is indicated, it may be necessary to construct a stability fill against the cut slope.

CONCLUSIONS AND RECOMMENDATIONS

General: Based on the geotechnical data presented in the previous geotechnical reports by AES (2004a, 2004b, 2004d, 2005b, 2005, 2007d, and 2008a) and RTF&A (2009b and 2009c), and our review of the revised VTTM 61105 plan, it is our opinion that the proposed development of VTTM 61105 is feasible from a geotechnical standpoint. All conclusions and recommendations presented in the referenced reports remain applicable, unless superseded by this report.

Restricted Use Areas (RUAs): RUAs have been modified and eliminated in some areas, as discussed in this report and indicated on the attached Geotechnical Map, Figures 2.1 through 2.12. Furthermore, RTF&A has established a "Fault Building Setback" for both the Airport Mesa and Saddle faults, as depicted on Figure 2.3. The Fault Building Setbacks constitute RUAs. Habitable structures (i.e., structures exceeding 2,000 person-hours per year)

should not be permitted within these Fault Building Setbacks. RUAs, by definition, are excluded from our regulatory statement.

SECTION 111 STATEMENT

Based on our review of the revised vesting tentative tract map and the referenced reports, it is our professional opinion that the proposed development will be safe from hazard of landslide, settlement, or slippage, and will not adversely affect the geotechnical conditions of off-site properties, provided our recommendations and the requirements of the Los Angeles County Building Code are followed.

-oOo-

The following are attached and complete this report.

- References
- LACDPW Soils Engineering Review Sheet dated February 5, 2010
- LACDPW Geologic Review Sheet dated February 8, 2010
- Summary of Cut Slopes - Table 1
- Geotechnical Map Explanation - Figure 1 (in pocket)
- Geotechnical Map - Figure 2.1 through 2.12 (in pocket)
- Geologic Sections - Figures 3.1 and 3.2 (in pocket)
- Geotechnical Sections - Figures 4.1 and 4.2 (in pocket)
- Appendix - Slope Stability Analyses (32 pages)

PROFESSIONAL GEOLOGIST NO. 3749
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Expires: 12-31-2011
STATE OF CALIFORNIA

Respectfully submitted,

R. T. FRANKIAN & ASSOCIATES

by: Timothy P. Latiolait
Principal Engineering Geologist

REGISTERED PROFESSIONAL ENGINEER
ALAN W. RASPLICKA
No. GE 2558
Exp. 6/30/2011
GEOTECHNICAL
STATE OF CALIFORNIA

and: Alan W. Rasplicka
Principal Geotechnical Engineer

Distribution: (4) Newhall Land and Farming Company
Attn: Mr. Corey Harpole
(3 "wet-signed", stamped copies and 1 CD of pdf file for submittal to the LACDPW; 1 "wet-signed", stamped copy and 1 CD with pdf file for client files)
(1) Psomas
Attn: Mr. Matt Heideman

RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

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COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION

SOILS ENGINEERING REVIEW SHEET

Address: 900 S. Fremont Ave., Alhambra, CA 91803
Telephone: (626) 458-4925
Fax: (626) 458-4913

District Office 8.2
Job Number GMTR
Sheet 1 of 1

DISTRIBUTION:
___ Drainage
___ Grading
___ Geo/Soils Central File
___ District Engineer
___ Geologist
___ Soils Engineer
___ Engineer/Architect

Tentative Tract Map	61105
Location	Castaic
Developer/Owner	Newhall Land and Farming Company
Engineer/Architect	Psomas
Soils Engineer	R.T. Franklan & Associates (94-502-60)
Geologist	Same as above

Review of:
Revised Tentative Tract Map Dated By Regional Planning 11/24/09
Geology Report Dated 10/14/09
Soils Engineering and Geologic Report Dated **12/21/09**, 10/13/09 (Change of Consultant), 6/13/05, 12/22/04, 7/22/04
Previous Review Sheet Dated 12/8/09

ACTION:

Tentative Map feasibility is not recommended for approval.

REMARKS:

1. The submitted geotechnical maps Sheets 11 and 12 do not show the off-site grading shown on the latest Tentative Tract Map. Verify and provide discussion, conclusions, and recommendations for the off-site grading shown on the Tentative Map. Provide geotechnical maps and Tentative Tract Map that conform.

   Note: The Soils Engineering report must include conclusions and recommendations for all grading shown on the Tentative Tract Map including off-site grading. If the off-site grading is not a part this tract development it must be removed from the Tentative Tract Map.

2. Provide revised slope stability analyses as requested by the Geology Section. Verify and revise the represented geology of the slope stability analyses as necessary.

3. Provide slope stability analyses that utilize an iterative process to determine the critical failure plane. Verify the presented slope stability analyses represent the calculated critical failure plane. Provide revised analyses and recommendations as necessary.

4. Provide all input data and calculated output from all slope stability analyses. Indicate the various shear strength parameters used in the analyses, in the appropriate segments of the represented slope. Include the output sheets that show the calculated factor of safety.

5. Provide a table of all shear strength parameters utilized in the slope stability analyses. Specify material represented by the shear parameters.

6. Provide rotational static and seismic slope stability analyses for the newly proposed cut slopes presented in the Geologic Sections, Figure 3. Provide revised geotechnical cross section, for each section analyzed, showing the critical failure plane used in the analyses. Indicate the various shear strength parameters used in the analyses, in the appropriate segments of each failure plane. Show locations of the cross sections used in slope stability analyses on the geotechnical map. Recommend mitigation if factors of safety are below County minimum standards. Revise maps to show mitigation measures, as necessary.

7. Provide slope stability analyses for Qls XXXIX (Cross Section 9M-9M') located south of the newly proposed debris basin shown on Sheet 3. Verify the toe of the landslide in relation to the proposed debris basin. If the proposed debris basin will be utilized to mitigate the landslide, provide volume calculations that clearly show that 100 percent of the predicted landslide material will be accommodated by the debris basin. Per County policy, the catchment area must be designed for 100 percent of the predicted debris volume. Provide mitigation measures as necessary.

8. Requirements of the Geology Section are attached.

9. Include a copy of this review sheet with your response.

NOTE TO THE PLAN CHECKER/BUILDING AND SAFETY DISTRICT ENGINEER:
A. THE ON-SITE SOILS ARE MODERATELY TO SEVERELY CORROSIVE TO FERROUS METALS.
B. THE ON-SITE SOILS HAVE A MEDIUM EXPANSION POTENTIAL.
C. PER THE SOILS ENGINEER, DEWATERING SHALL BE REQUIRED FOR REMOVALS IN THE VICINITY OF BORINGS B-72E AND B-73E.

REGISTERED PROFESSIONAL ENGINEER YOSHIYA MORITSUGU No. 67587 Exp. 6/30/11 CIVIL STATE OF CALIFORNIA

Prepared by Yoshiya Moritsugu, GE Date 2/5/10

NOTICE: Public safety, relative to geotechnical subsurface exploration, shall be provided in accordance with current codes for excavations, inclusive of the Los Angeles County Code, Chapter 11.48, and the State of California, Title 8, Construction Safety Orders.
P:\Yosh\61105TentTh (revision)

County of Los Angeles Department of Public Works
GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION
GEOLOGIC REVIEW SHEET
900 So. Fremont Ave., Alhambra, CA 91803
TEL. (626) 458-4925

DISTRIBUTION
1 Geologist
__ Soils Engineer
1 GMED File
1 Subdivision

TENTATIVE TRACT MAP 61105
SUBDIVIDER Newhall Land and Farming Co.
ENGINEER Psomas
GEOLOGIST & SOILS ENGINEER R.T. F & A

TENTATIVE MAP DATED 11/24/09 (Rev)
LOCATION Newhall Ranch
REPORT DATE 12/21/09, 10/14/09, 10/13/09

Additional Reports Reviewed Allan Seward: 7/20/04

The Regional Planning Commission, developer, and engineer are advised that:

PRIOR TO RECOMMENDING APPROVAL OF THE TENTATIVE TRACT OR PARCEL MAP:

1. Apparent dips shown on geologic cross sections E and F appear to be 10-15° higher than supported by the data provided. Verify and revise sections and analyses as needed.

2. Plot subsurface data on sections A – F as applicable.

3. No grading is permitted in areas subject to geologic hazard (County of Los Angeles Building Code §110.2.2). Revise grading on lot 481 (sheet 3) to exclude grading within the proposed RUA.

4. Some of the subsurface data provided in Seward (7/20/04) indicates faulting through quaternary deposits and into younger deposits along the Airport Mesa and Saddle faults. Other subsurface work identified quaternary deposits with no Holocene cover. In these areas Holocene displacement cannot be proved or disproved. Building setbacks (Restricted Use Area) must be established where Holocene displacement cannot be ruled out.

5. The Soils Engineering review dated 2/5/10 is attached.

Note: For grading plan review, continuous stratigraphy will be required for all slopes where out of slope (daylighted) bedding will, or may be, exposed. Determine the weakest materials identified in the borings and provide, or revise, stability analyses and recommended mitigation based on these data.

NOTE Provide a copy of this review with your resubmittal

Prepared by _____ Reviewed by _____ Date 2/8/10
Charles Nestle

Please complete a Customer Service Survey at http://dpw.lacounty.gov/go/gmedsurvey
P:\Gmepub\Geology Review\Forms\Form01.doc
6/30/07

TABLE 1

SUMMARY OF CUT SLOPES
Mission Village/Vesting Tentative Tract No. 61105

CUT SLOPE	FIGURE NO.	SLOPE GRADIENT	SLOPE HEIGHT (feet)	SLOPE FACE DIRECTION	GEOLOGIC MATERIALS	GEOLOGIC SECTION	GEOLOGIC STABILITY	MITIGATION
CS-1a	2.6	2:1	65	W	TQsl	6-6'	Steeply dipping bedding; stable geologic structure	Construct 30' wide by 5' deep stability fill
CS-1b	2.6	2:1	75	W	TQsl	----	Steeply dipping and favorable bedding; stable geologic structure	Construct 30' wide by 5' deep stability fill
CS-2	2.6	2:1	70	N to W	TQsl, Qal, af	34-34'	Steeply dipping and neutral bedding; stable geologic structure	Grading will remove Qal & af; construct 25' wide by 3' deep stability fill along north facing segment to eliminate"sliver" fill
CS-3a	2.5 & 2.6	2:1	35	S	TQsu & af	----	Neutral bedding; stable geologic structure	Grading will remove af
CS-3b	2.5 & 2.6	2:1	35	E	TQsu & af	----	Daylighted bedding, grossly stable by inspection	Construct 20' wide by 3' deep stability fill to control erosion and seepage along daylighted bedding
CS-3c	2.6	2:1	35	N	TQsu, Qls, af	----	Daylighted bedding; grossly stable by inspection	Grading will remove Qls & af; construct 20' wide by 3' deep stability fill to control erosion and seepage along daylighted bedding
CS-4	2.6 & 2.7	2:1	40	N	TQsl, TQsu, Qls, af	32-32' & 33-33'	Daylighted bedding, grossly stable by analyses	Remove Qls & af; construct 20' wide by 3' deep stability fill to control erosion and restore slope grades in Qls removal area
CS-5	2.6	2:1	130	NW	TQsl & Qls	48-48' & 8E-8E'	Neutral bedding; stable geologic structure	Grading will remove Qls
CS-6	2.7	2:1	110	N & E	TQsl & three Qls	49-49' & 8E-8E'	Daylighted bedding to steeply dipping bedding; stable by analyses	Remove landslides; construct 100' wide by 10' deep buttress for daylighted bedding and to restore slope grades in Qls removal areas
CS-7	2.7	2:1	30	NNE	TQsl & Qsw	C-C'	Daylighted bedding, grossly stable by evaluation	Construct 20' wide by 3' deep stability fill to control erosion and seepage along daylighted bedding
CS-8	2.7	2:1	95	N, NW & W	TQsl & Qsw	47-47'	Neutral (stable) bedding for NW facing segment; N facing unstable	Grading will remove Qsw; construct 110' wide by 5' deep buttress w/1.5:1 backcut for N facing segment
CS-9	2.7	2:1	80	NNE	TQsl, Qls & Qsw	46-46'	Steeply dipping bedding; grossly stable by analyses	None
CS-10	2.7	2:1	140	NE	TQsl & Qls	18-18' & 19-19'	Steeply dipping and favorable bedding; stable geologic structure	Remove Qls; construct 30' wide by 5' deep stability fill to eliminate "sliver" cut and restore slope grades in Qls removal area
CS-11	2.7	2:1	55	E	TQsl & Qls	E-E'	Steeply dipping bedding; grossly stable by inspection	Remove Qls; construct 30' wide by 5' deep stability fill to restore slope grades in Qls removal area
CS-12a	2.7	2:1	90	NE	TQsl, TQsu & Qls	44-44' & 11E-11E'	Daylighted bedding lower portion of slope; stable by analyses	Remove Qls; construct 30' wide by 5' deep stability fill to restore slope grades in Qls removal areas
CS-12c	2.7	2:1	25	NE	TQsu	D-D'	Daylighted bedding, grossly stable by analyses	None
CS-13a	2.7	2:1	50	NNE	TQsu, Qls & Qsf	F-F'	Daylighted bedding, grossly stable by analyses	Remove Qls; construct 30' wide by 5' deep stability fill to restore slope grades in Qls removal area
CS-13b	2.7	2:1	10	S	TQsu	F-F'	Stable geologic structure	None
CS-14	2.7	2:1	75	NE	TQsu, Qls & af	D-D'	Daylighted bedding, grossly stable by analyses	Remove Qls; construct 30' wide by 5' deep stability fill to restore slope grades in Qls removal areas and control seepage along bedding
CS-15	2.5 & 2.7	2:1	70	N	TQsu, Qls, Qsw & af	22-22' & 45-45'	Daylighted bedding; unstable	Construct 85' wide by 10' deep buttress w/1.5:1 backcut (eastern half); 85' wide by 15' deep buttress w/ 1.5:1 backcut (western half)

TABLE 1

SUMMARY OF CUT SLOPES
Mission Village/Vesting Tentative Tract No. 61105

CUT SLOPE	FIGURE NO.	SLOPE GRADIENT	SLOPE HEIGHT (feet)	SLOPE FACE DIRECTION	GEOLOGIC MATERIALS	GEOLOGIC SECTION	GEOLOGIC STABILITY	MITIGATION
CS-16	2.3	2:1	30	N	TQsu, Qls & af	41-41'	Unstable due to landslide	Remove landslide beneath slope and upper pad; construct buttress to support slope and pad above landslide
CS-18	2.3	2:1	110	W, N & NW	TQs & Qt	----	Favorable bedding; Qt susceptible to erosion	Construct 35' by 5' stability fill (west-facing segment); construct 20' by 3' stability fill (north- and northwest-facing segment)
CS-19	2.3	2:1 to 3:1	25	NW, SW & SE	Qt over TQs	----	Stable geologic structure	None
CS-20	2.3	2:1	170	SW	TQs	----	Steeply dipping and favorable bedding; stable geologic structure	None
CS-21a	2.4	2:1	30	E	TQsu	----	Favorable bedding; stable geologic structure	None
CS-21b	2.4	2:1	55	S	TQsu	----	Favorable bedding; stable geologic structure	None
CS-23	2.4	2:1	40	NW	TQsu & Qls	----	Favorable bedding; stable geologic structure	Grading will remove landslide
CS-24	2.4	2:1	25	NW	TQsu & Qls	----	Neutral bedding; stable geologic structure	Grading will remove landslide
CS-26	2.4 & 2.5	2:1	40	NW	TQsu	----	Neutral bedding; stable geologic structure	None
CS-27	2.4	2:1	50	N	TQsu	23-23'	Daylighted bedding, grossly stable by analyses	Construct 30' wide by 3' deep stability fill to control erosion and seepage along daylighted bedding
CS-28a	2.4	2:1	115	W	TQsl & af	----	Favorable bedding; stable geologic structure	None
CS-28b	2.4	2:1	85	N & NW	TQsl, TQsu, Qls, af	23-23', 24-24', 31-31', 2E-2E'	Daylighted bedding; western portion stable, eastern portion unstable	Grading will remove landslide; construct stability/buttress fill 30' wide by 5' deep for full slope length
CS-29	2.4	2:1	90	NE	TQsu	15-15'	Daylighted bedding; unstable	Construct 75' wide by 10' deep buttress w/2.75:1 backcut
CS-30	2.4	2:1	25	N	TQsl & Qsw	----	Neutral to shallow daylighted component; stable geologic structure	Grading will remove Qsw
CS-31	2.4 & 2.6	2:1	30	N	TQsl & af	----	Neutral to shallow daylighted component; stable geologic structure	Grading will remove af
CS-32	2.4 & 2.6	2:1	40	E	TQsl	----	Neutral to shallow daylighted component; stable geologic structure	None
CS-33	2.6	2:1	35	W	Qt	----	Favorable bedding; Qt susceptible to erosion	Construct 25' wide by 3' deep stability fill to eliminate fill over cut condition and control ersosion of Qt
CS-34	2.6	2:1	65	NW & W	QT & af	----	Favorable bedding; Qt susceptible to erosion	Grading will remove af. Construct 30' wide by 5' deep stability fill to control erosion of Qt
CS-35	2.4 & 2.6	2:1	130	W	TQsl & Qt	----	Favorable bedding; stable geologic structure	Construct 45' wide by 5' deep stability fill to eliminate fill over cut condition and control ersosion of Qt
CS-37	2.6	2:1	25	NW	Qt & af	----	Favorable bedding; stable geologic structure	Grading will remove af. Construct 20' wide by 3' deep stability fill to control erosion of Qt

TABLE 1

SUMMARY OF CUT SLOPES
Mission Village/Vesting Tentative Tract No. 61105

CUT SLOPE	FIGURE NO.	SLOPE GRADIENT	SLOPE HEIGHT (feet)	SLOPE FACE DIRECTION	GEOLOGIC MATERIALS	GEOLOGIC SECTION	GEOLOGIC STABILITY	MITIGATION
CS-38	2.6	2:1	50	SW	TQsl	----	Stable geologic structure; "sliver" cut	Construct 20' wide by 3' deep stability fill to eliminate "sliver" cut
CS-39	2.6	2:1	65	SW	Qt	----	Favorable bedding; Qt susceptible to erosion	Construct 30' wide by 5' deep stability fill to eliminate fill over cut condition and control erosion of Qt
CS-40	2.6	2:1	50	SW	Qt & af	----	Favorable bedding; Qt susceptible to erosion	Grading will remove af. Construct 30' wide by 5' deep stability fill to control erosion of Qt
CS-41	2.6	2:1	25	SW	Qt & af	----	Favorable bedding; Qt susceptible to erosion	Grading will remove af. Construct 20' wide by 3' deep stability fill to control erosion of Qt
CS-42	2.6	2:1	35	W	TQsl & af	----	Favorable bedding; stable geologic structure	Grading will remove af
CS-43	2.6	2:1	30	SE	TQsl & af	----	Favorable bedding; stable geologic structure	Grading will remove af
CS-44	2.6	2:1	40	NW	TQsl	----	Favorable bedding; stable geologic structure	None
CS-45	2.6	2:1	40	NW	TQsl	----	Favorable bedding; slope traversed by anticline	Construct 25' wide by 3' deep stability fill to control potential erosion of TQsl along anticlinal axis
CS-46	2.8	2:1 to 3:1	100	N	TQsu & Qt	42-42' & 43-43'	Favorable bedding; stable geologic structure	None
CS-47	2.8	2:1 to 3:1	55	S	TQsu	----	Favorable bedding; stable geologic structure	None
CS-48	2.8	2:1	50	N	TQsu & Qt	----	Favorable bedding; stable geologic structure	Construct 30' wide by 5' deep stability fill to control erosion of Qt
CS-49	2.8	2:1	45	N	Qt	----	Favorable bedding; Qt susceptible to erosion	Construct 25' wide by 3' deep stability fill to control erosion of Qt
CS-50	2.8	2:1 to 3:1	75	N	Qt & af/Qal	----	Favorable bedding; Qt susceptible to erosion	Construct 30' wide by 5' deep stability fill to control erosion of Qt
CS-51	2.8	2:1	75	N	Qt	51-51'	Favorable bedding; Qt susceptible to erosion	Construct 30' wide by 5' deep stability fill to control erosion of Qt
CS-52	2.8	3:1	30	S & E	Qt	----	Favorable bedding; Qt susceptible to erosion	Construct 25' wide by 3' deep stability fill to control erosion of Qt
CS-53	2.5	2:1	105	E	TQsu & Qt	B-B'	Daylighted bedding, grossly stable by analyses	Extend terrace drains across the entire slope face to control surface drainage
CS-54	2.7	2:1	40	SW	TQsl	----	Favorable bedding; stable geologic structure	None
CS-55	2.3	2:1	130	SW	TQs	A-A'	Favorable bedding; stable geologic structure by analyses	None
CS-56	2.3	2:1	25	NW & W	Qt	----	Favorable bedding; Qt susceptible to erosion	Grading will remove af. Construct 20' wide by 3' deep stability fill to control erosion of Qt
CS-57	2.7	2:1	70	W	TQsu & Qal	----	Favorable bedding; stable geologic structure	None

TABLE 1

SUMMARY OF CUT SLOPES
Mission Village/Vesting Tentative Tract No. 61105

CUT SLOPE	FIGURE NO.	SLOPE GRADIENT	SLOPE HEIGHT (feet)	SLOPE FACE DIRECTION	GEOLOGIC MATERIALS	GEOLOGIC SECTION	GEOLOGIC STABILITY	MITIGATION
CS-58	2.7	2:1	30	N, W & S	TQsu	----	Favorable bedding; stable geologic structure	None
CS-59	2.7	2:1	60	N, W & S	TQsu	----	Favorable bedding; stable geologic structure	None
CS-60	2.8	2:1	10	ENE	cef	----	Grossly stable engineered fill	None
CS-61	2.8	2:1	10	WSW	Qt & cef	----	Favorable bedding in Qt; grossly stable engineered fill	None

GEOTECHNICAL EXPLANATION

af Artificial Fill

Qsw Slope wash; only selected, large deposits are shown

Qal Alluvium

Qsf Surficial failure; queried where uncertain

Qls Landslide deposits; queried where uncertain

Qt Terrace deposits

TQs. Saugus Formation (upper unit)

TQs. Saugus Formation (lower unit)

TQs Saugus Formation (undifferentiated)

Geologic contact; queried where inferred; dotted where concealed

Fault trace; queried where inferred; dotted where concealed; indicates up (U) or down (D) where known

Trace of syncline, showing direction of plunge; the trace is concealed where it is mapped across units younger than TQs

Trace of anticline, showing direction of plunge; the trace is concealed where it is mapped across units younger than TQs

Trace of monoclinal warp hinge line; the trace is concealed where it is mapped across units younger than TQs

Strike and dip of bedding

Approximate Strike and dip of bedding

Horizontal bedding

Strike and dip of slide plane

Strike and dip of shear

Strike and dip of fracture

Strike and dip of fault

Strike and dip of minor fault

CS-56 Cut-slope designation

Recommended buttress

Recommended stability fill

Recommended building setback for slopes (where greater than h/3)

Removal boundary

Recommended Location of Subdrain

Recommended removal depth; "CR" indicates complete removal of landslide

Partial Removal of landslide with removal depth of upper 30' of landslide material or to bedrock where landslide is less than 30' deep

A — A' Geologic Section by RTF&A

51 — 51' Geologic Section by AES

T-217Q Location of exploratory backhoe trench for Phase I Landslide Investigation (T-1Q thru T-141Q, T-146Q thru T-160Q, T-177Q thru T-214Q, & T-217Q)

T-25M Location of exploratory backhoe trench for Mesas Entertainment Landslide Investigation (T-1M thru T-25M)

T-182T Location of exploratory backhoe trench for Mesas East Tentative Map Investigation (T-1T thru T-59T, T-62T thru T-112T, T-114T, T-128T thru T-150T, T-158T, T-178T thru T-182T)

T-157T Location of long exploratory backhoe trench for Mesas East Tentative Map Investigation (T-00T, T-61T, T-113T & T-151T thru T-157T)

ET-1T Location of exploratory excavation trench for Mesas East

T-32B Location of exploratory backhoe trench for Boulder Assessment Investigation (T-1B thru T-32B)

T-74H Location of exploratory backhoe trench for Holser Investigation (T-1H thru T-74H)

T-82H Location of exploratory backhoe fault trench for Holser Investigation (T-75H thru T-82H)

DC-1H Location of exploratory dozer cut for Holser Investigation

DC-B Location of exploratory dozer cut for Mesas East

T-47I Location of exploratory backhoe trench for Phase I Feasibility Evaluation Infrastructure (T-42I thru T-47I)

T-558A Location of exploratory backhoe trench for Sand Aggregate Investigation (T-408A thru T-558A)

T-67 Location of exploratory backhoe trench for Magic Mountain (T-14 thru T-17, T-33 thru T-39, T-48, T-49, T-53, and T-55 thru T-67)

T-5MW Location of exploratory backhoe trench for Phase II Landslide Evaluation Measas West (T-7MW and T-12MW thru T-14MW)

B-73E Location of exploratory bucket-auger boring for Measas East (B-1E thru B-73E)

B-25M Location of exploratory bucket-auger boring for Measas Entertainment Landslide Investigation (B-1M thru B-25M)

B-8B Location of exploratory bucket-auger boring for Boulder Assessment Investigation (B-1B thru B-25B)

B-16W Location of exploratory bucket-auger boring for Phase II Landslide Investigation - Measas West

RTF B-5 Location of exploratory bucket-auger boring by RTF&A; see Westridge Tract 45433-04 report dated 6/3/02 (RTF B-1 thru RTF B-5)

RW-3M Location of rotary-wash boring for Geotechnical Evaluation - Measas area (RW-1M thru RW-3M)

RW-3T Location of rotary-wash boring for Measas East Tentative Map Investigation (RW-1T thru RW-3T)

HS-34T Location of hollow-stem-auger boring for Measas East Tentative Map Investigation (HS-1T thru HS-34T)

HS-13 Location of hollow-stem-auger boring for Magic Mountain Entertainment (HS-4 thru HS-6, HS-8, and HS-10 thru HS-13)

HS-14I Location of hollow-stem-auger boring for Phase I Feasibility Evaluation Infrastructure (HS-12I thru HS-14I)

CPT-16 Location of cone penetration test for Magic Mountain Entertainment (CPT-4, CPT-6, CPT-16 and CPT-18)

CPT-18M Location of cone penetration test for Preliminary Geotechnical Evaluation Measas Area (CPT-1M thru CPT-15M and CPT-18M)

Lots potentially affected by additional overexcavation requirements in the vicinity of the monoclinal warp and Lion Canyon Anticline (8-ft-minimum overexcavation)

RUA Restricted Use Area

A full-size reproduction of this figure can be found at Impact Sciences.

Geotechnical Map Explanation

Newhall Land & Farming Company

MISSION VILLAGE

Vesting Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California

NTS	JH	
4-29-2010	Figure 1	94-502-22

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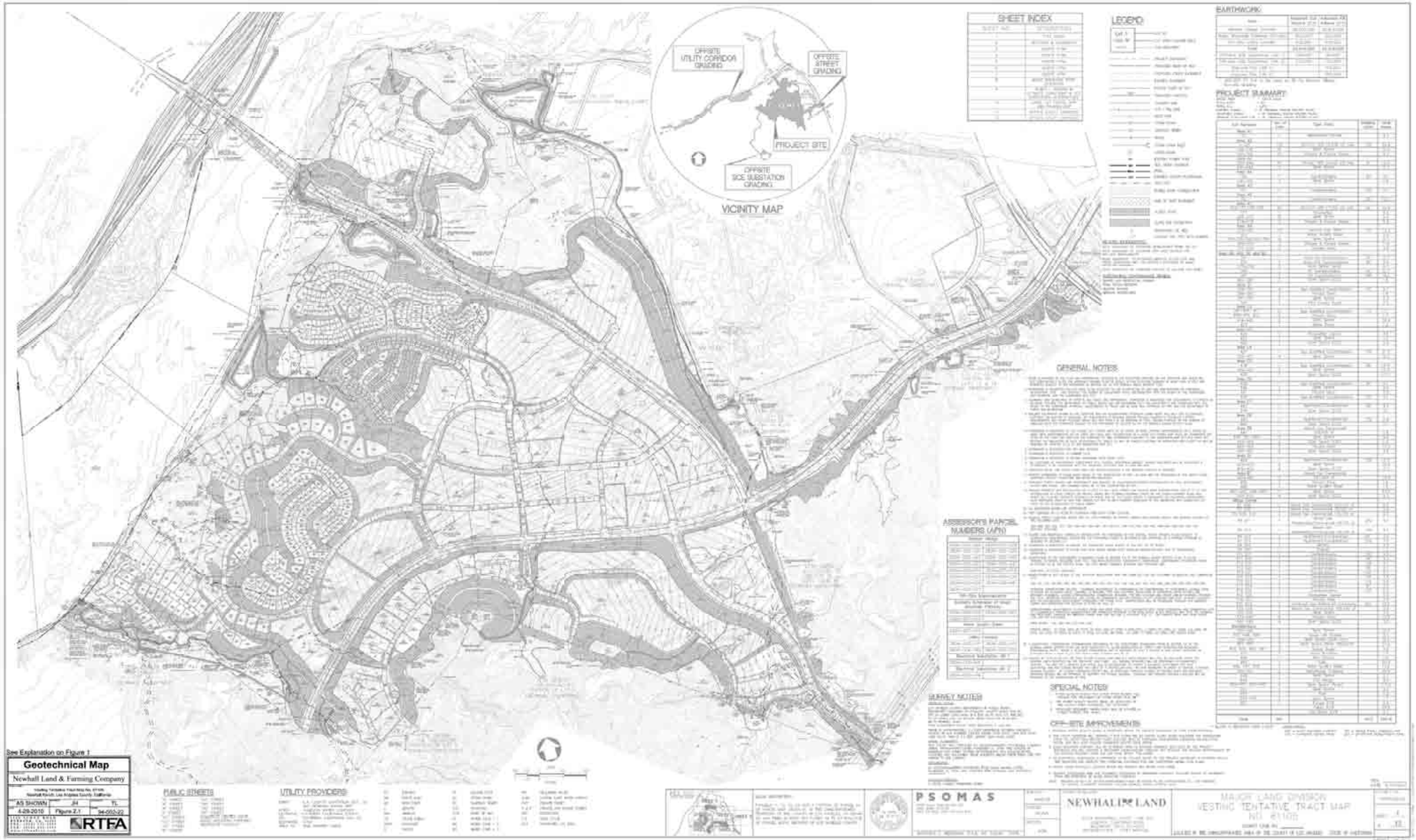

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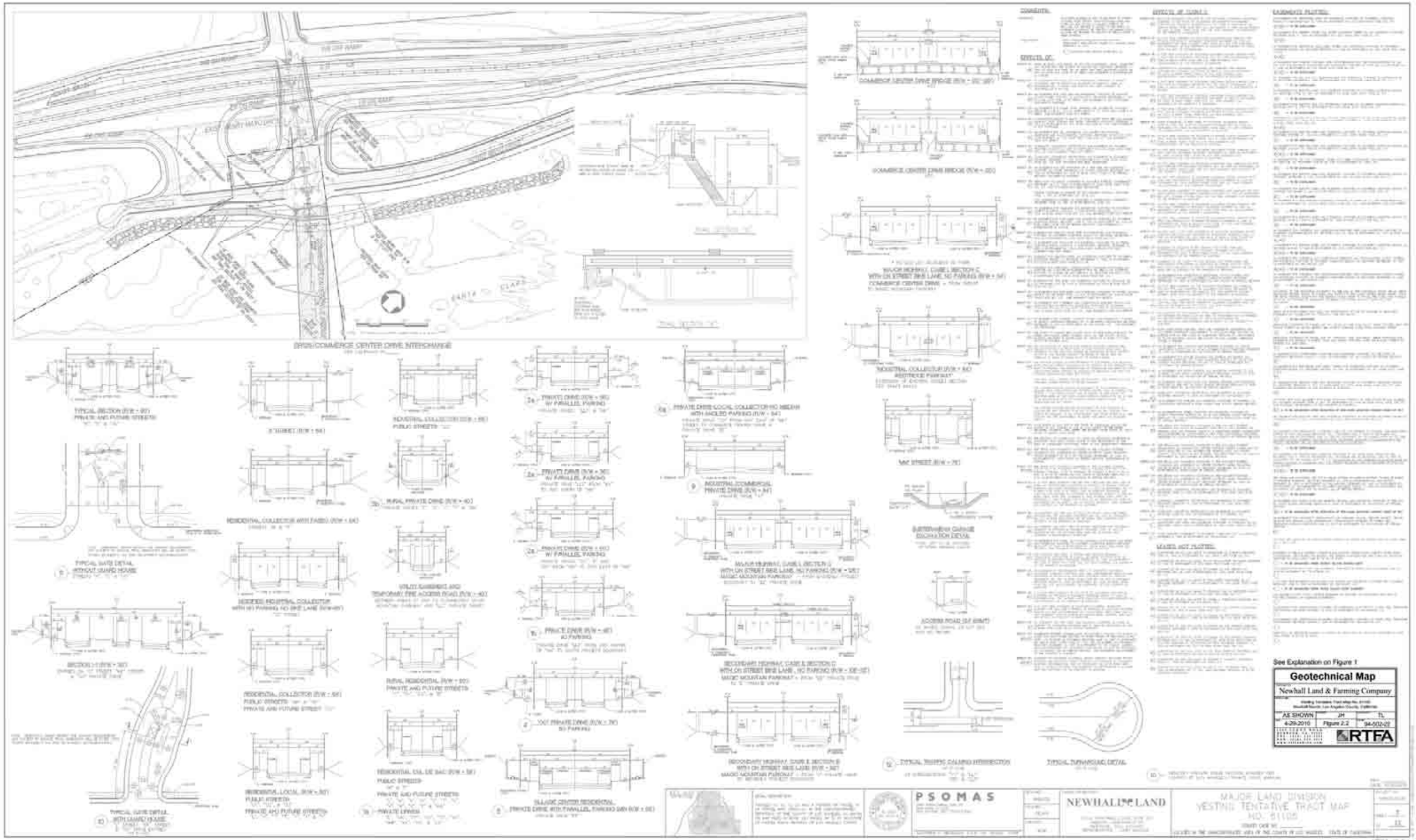

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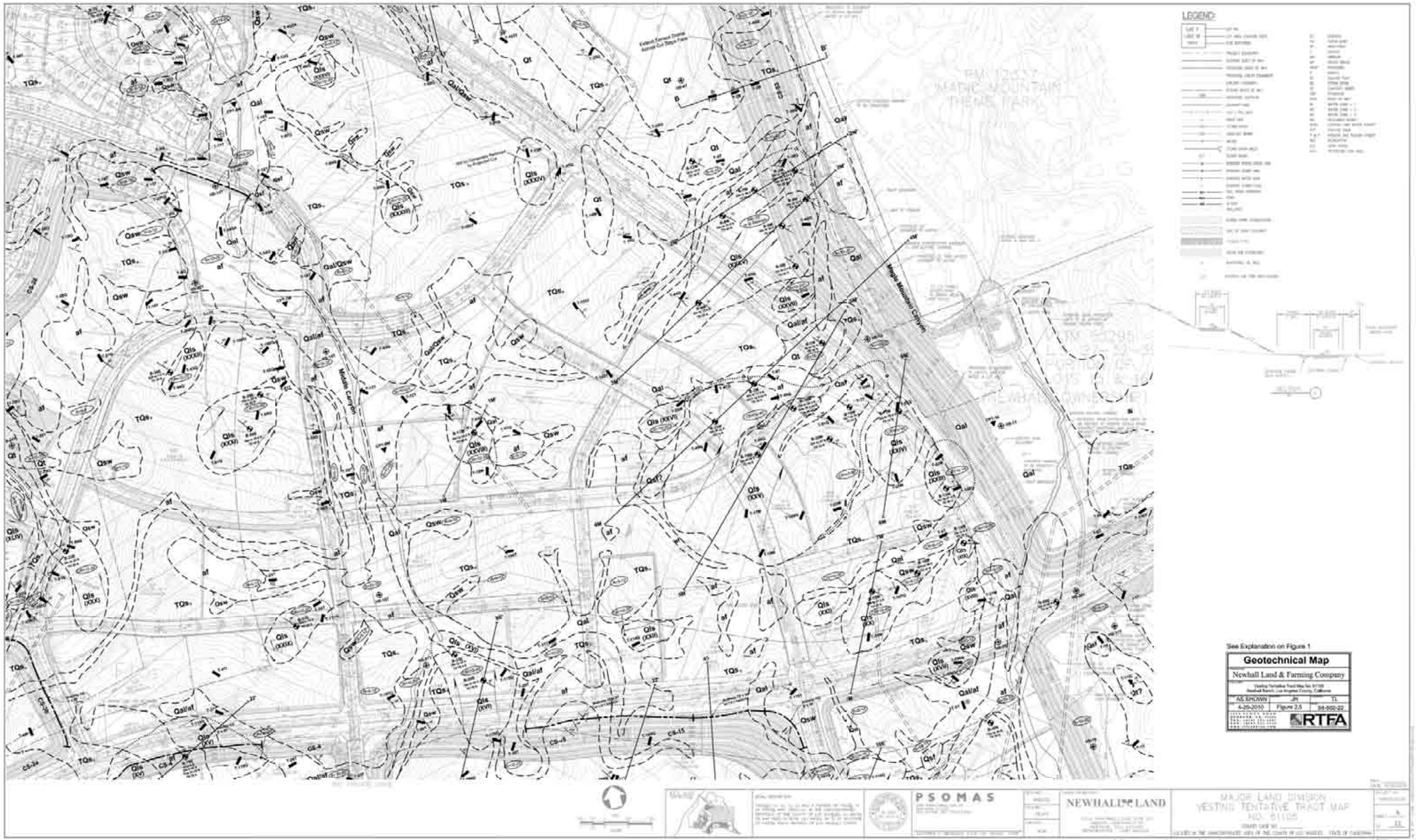

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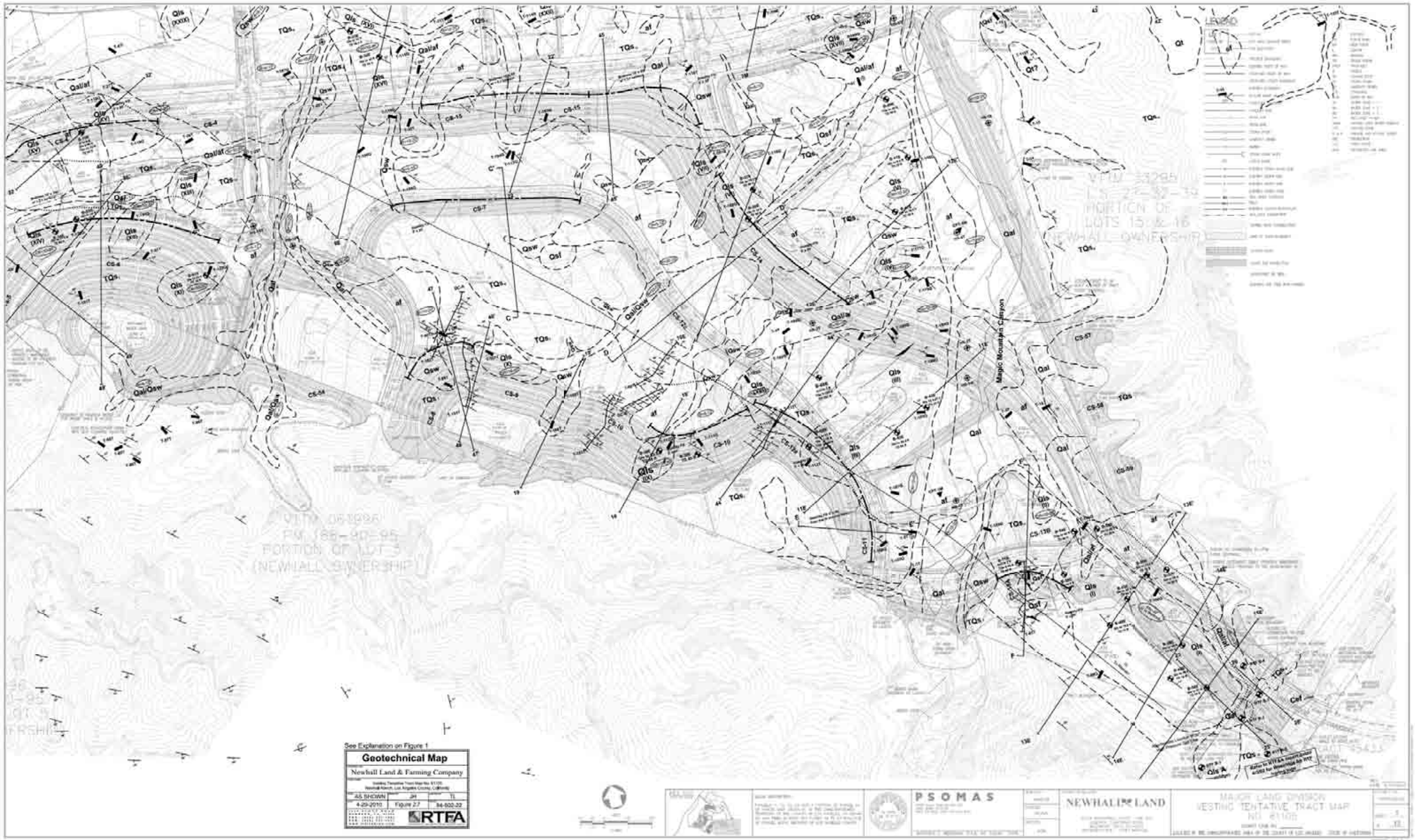

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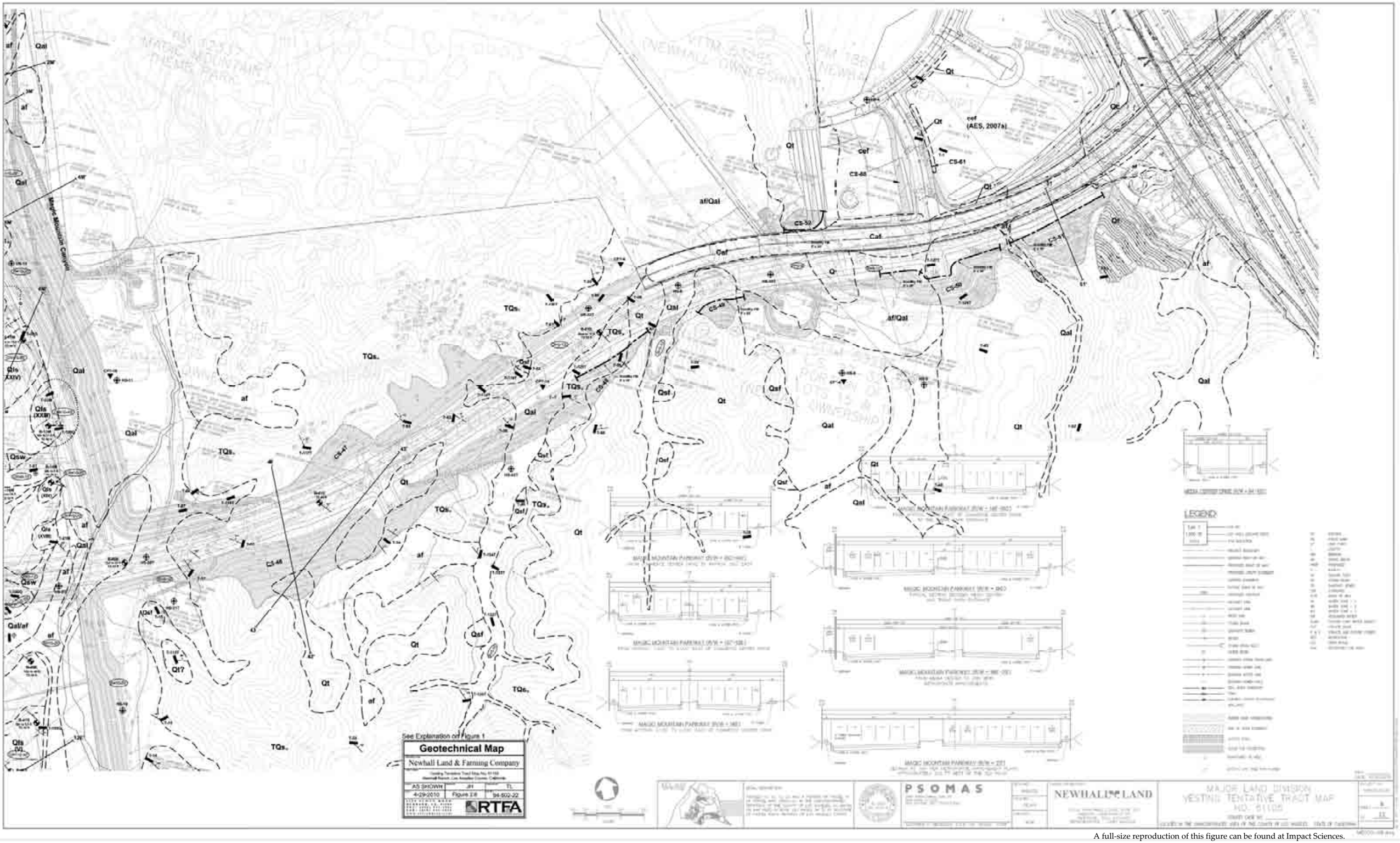

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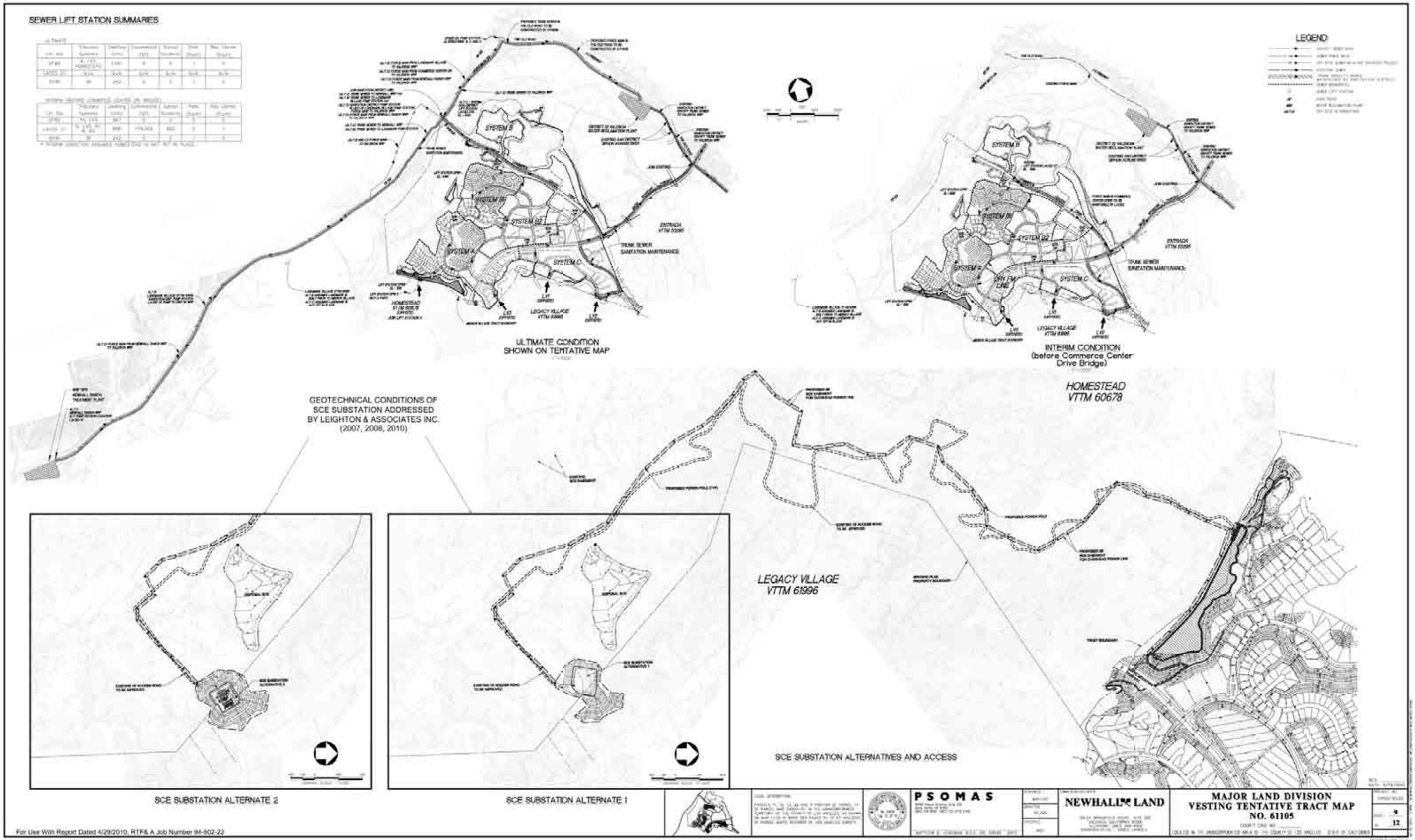
SEWER LIFT STATION SUMMARIES



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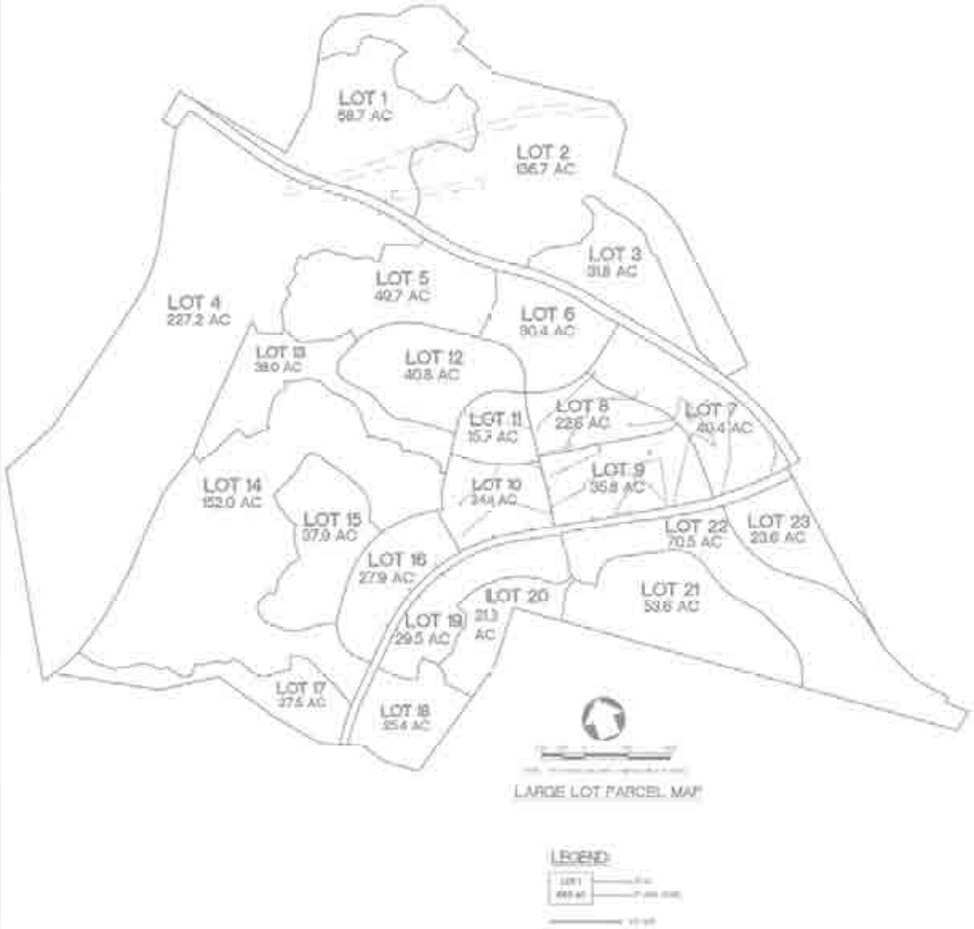

PHASE 1	
Total Ac	567.6 AC [1]
Total On-Site Ac	441.0 AC
Total Du	2,872 DU
SFD	0 DU
Condo's	2,872 DU
Total Commercial St	858,100 SF
Total Open Space	142.4 AC

[1] INCLUDES OFFSITE GRADING SHOWN ON SHEETS 9, 7, AND 8.

PHASE 2	
Total Ac	337.8 AC [2]
Total On-Site Ac	335.3 AC
Total Du	586 DU
SFD	168 DU
Condo's	418 DU
Total Commercial St	0 SF
Total Open Space	171.0 AC

[2] INCLUDES OFFSITE GRADING SHOWN ON SHEET 6.

PHASE 3	
Total Ac	207.0 AC
Total On-Site Ac	207.0 AC
Total Du	628 DU
SFD	214 DU
Condo's	414 DU
Total Commercial St	0 SF
Total Open Space	108.6 AC

PHASE 4	
Total Ac	742.1 AC [3]
Total On-Site Ac	278.5 AC
Total Du	326 DU
SFD	0 DU
Condo's	326 DU
Total Commercial St	697,000 SF
Total Open Space	224.3 AC

[3] INCLUDES OFFSITE GRADING OF UTILITY CORRIDOR AND SCE SUBSTATION SHOWN ON SHEETS 9, 11, AND 12.

NOTE: WATER QUALITY BASIN, DEBRIS BASIN, SPINEFLOWER PRESERVE AND PARKS ARE INCLUDED IN TOTAL OPEN SPACE CALCULATION

See Explanation on Figure 1

Geotechnical Map

Newhall Land & Farming Company

AS SHOWN	JH	TL
4-29-2010	Figure 2.10	M-503-22

RTFA

PSOMAS

NEWHALL LAND

MAJOR LAND DIVISION
VESTING TENTATIVE TRACT MAP
NO. 61100

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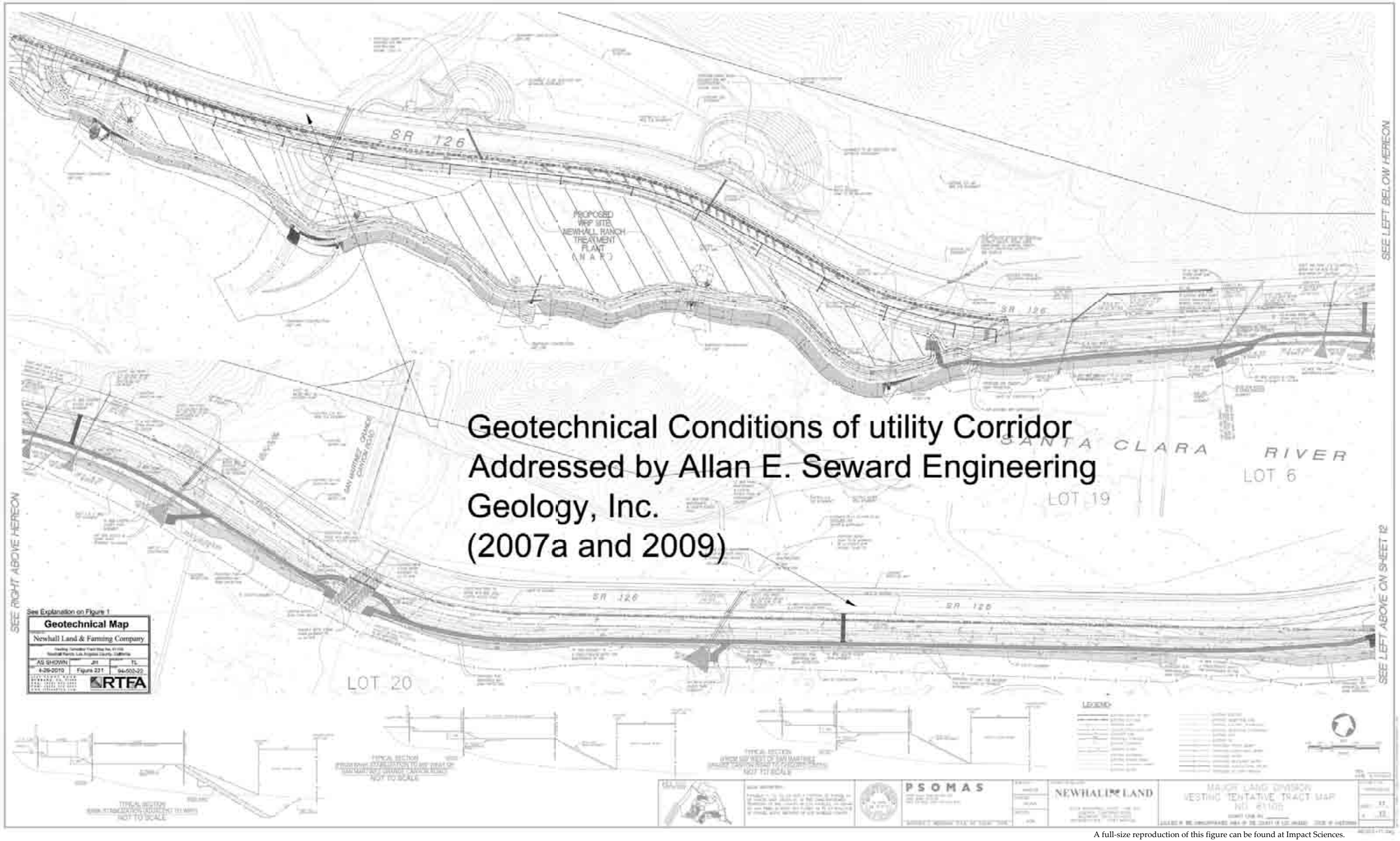

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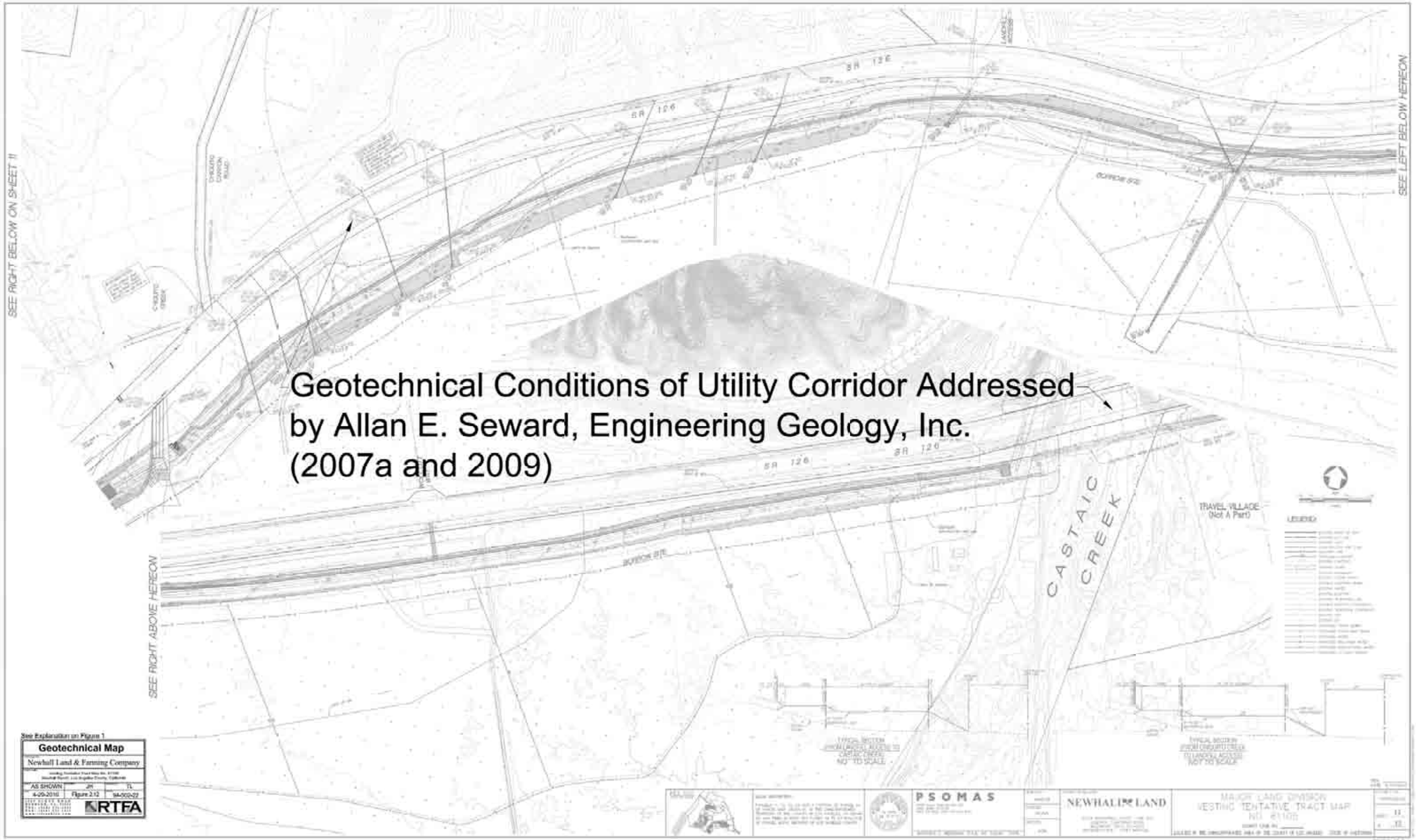

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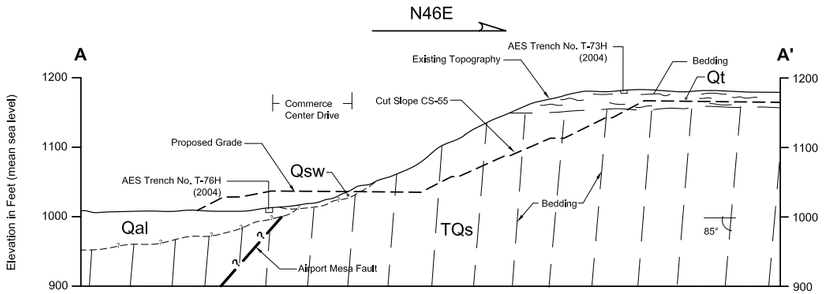

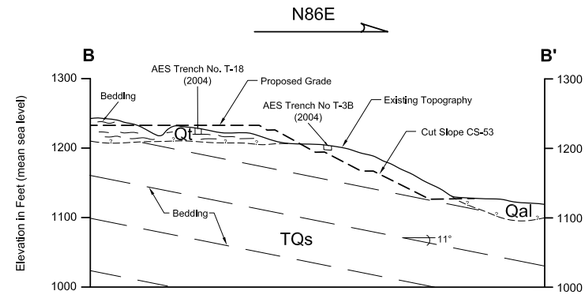

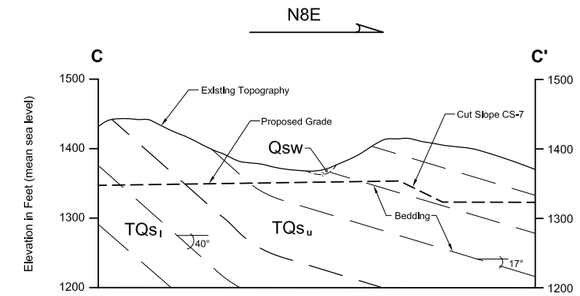

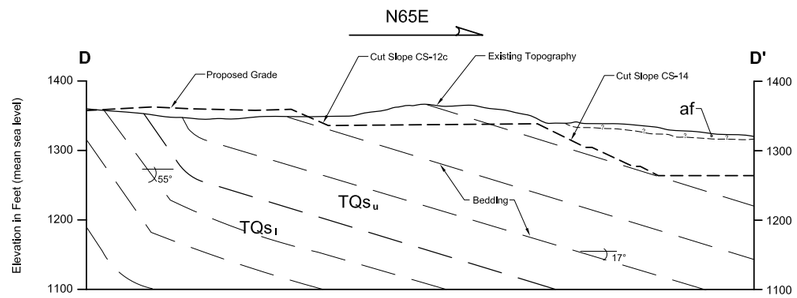

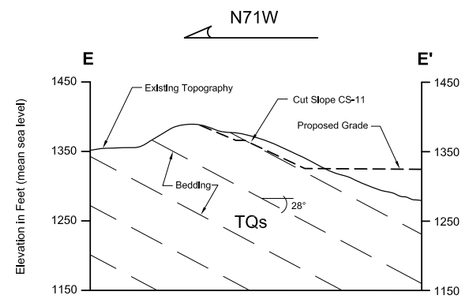

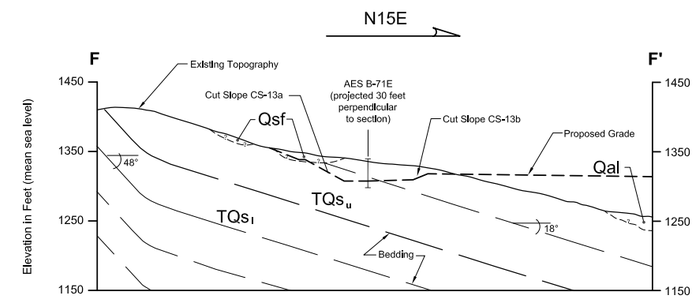

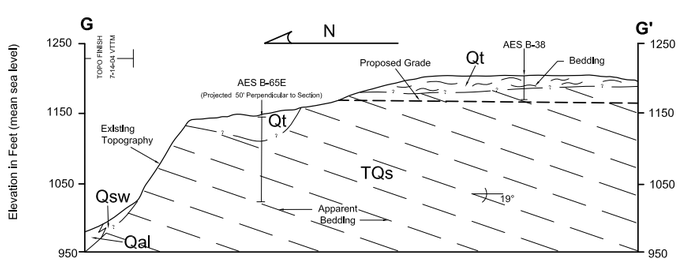

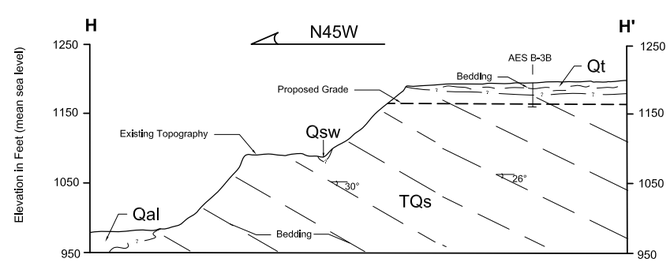

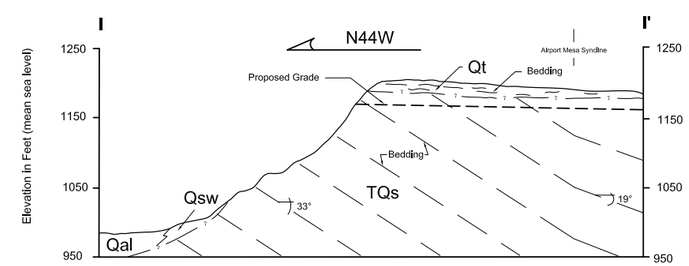

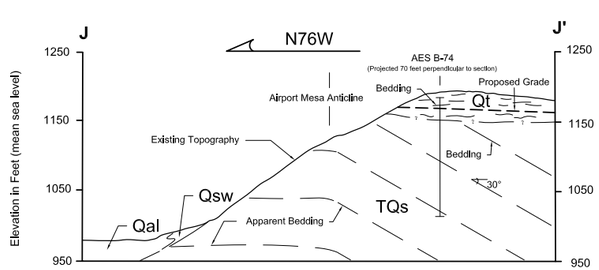

A full-size reproduction of this figure can be found at Impact Sciences.

See Explanation on Figure 1

Geologic Sections

PREPARED FOR
Newhall Land & Farming Company

Project Location
MISSION VILLAGE
Vesting Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California

SCALE	DRAWN BY	CHECKED BY
1" = 100'	JH	
DATE 4-29-2010	FIGURE 3.1	JOB NO. 94-502-22

1329 SCOTT ROAD
BURBANK, CA. 91504
TEL: (818) 531-1501
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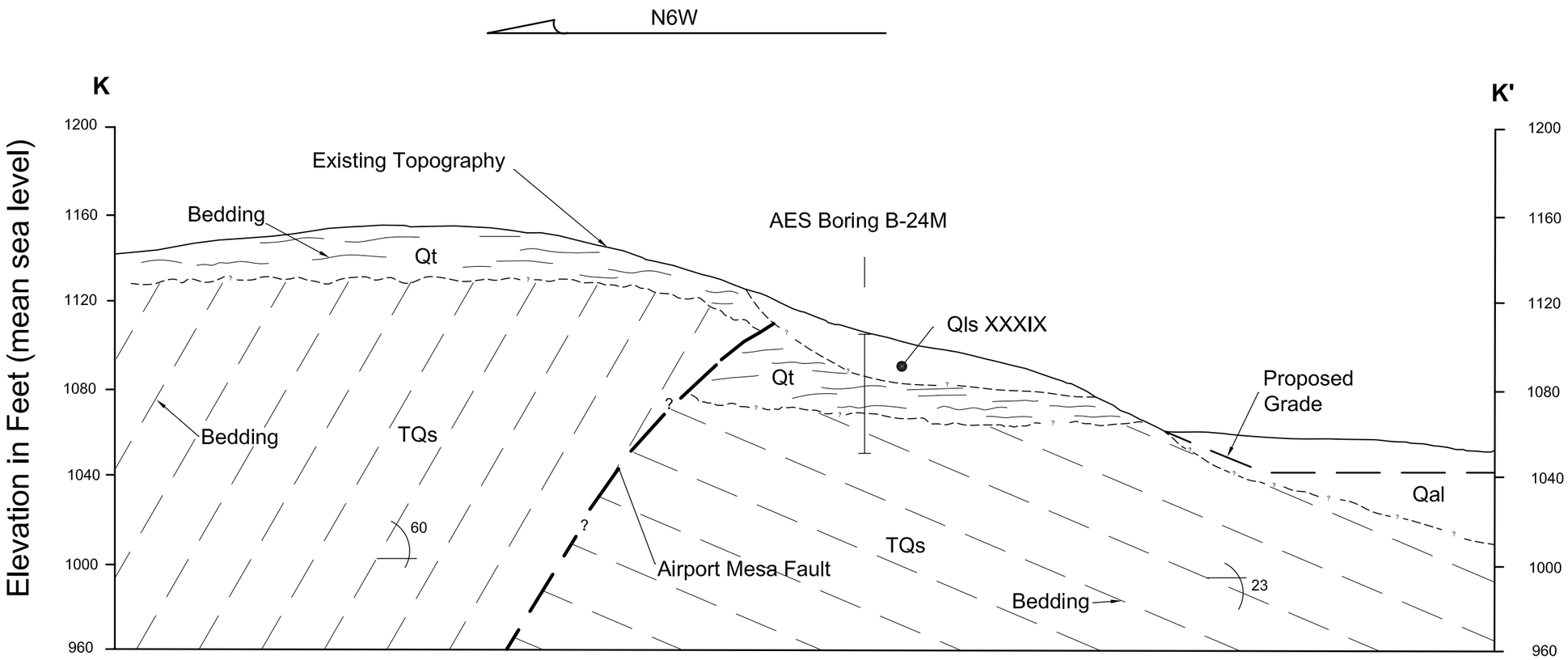

See Explanation on Figure 1

Geologic Sections

PREPARED FOR
Newhall Land & Farming Company

Project Location
MISSION VILLAGE
Vesting Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California

SCALE	DRAWN BY	CHECKED BY
1" = 40'	JH	
DATE 4-29-2010	FIGURE 3.2	JOB NO. 94-502-22

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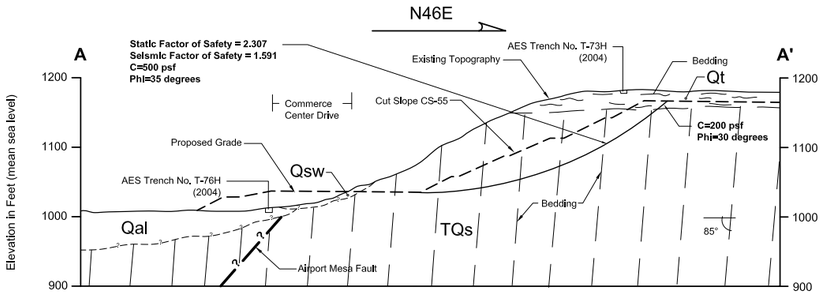

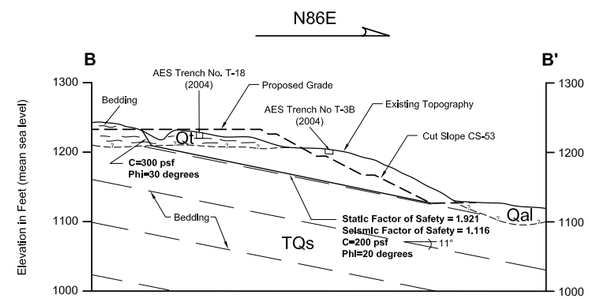

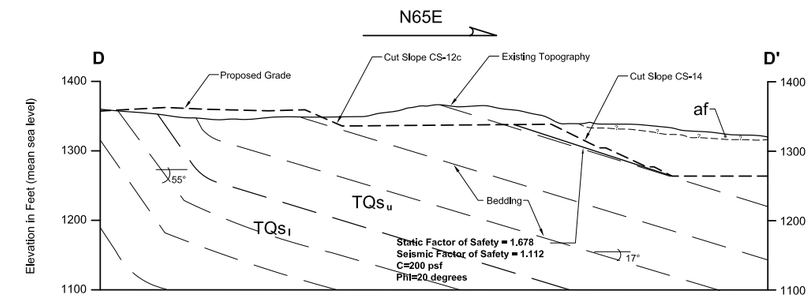

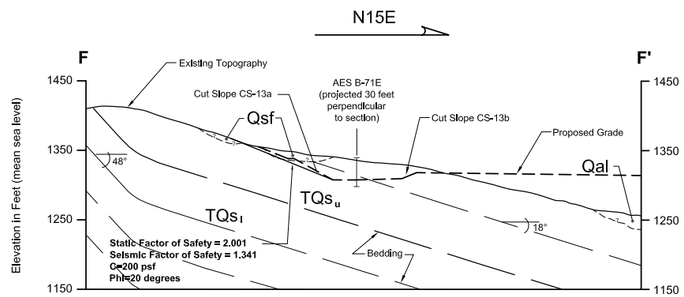

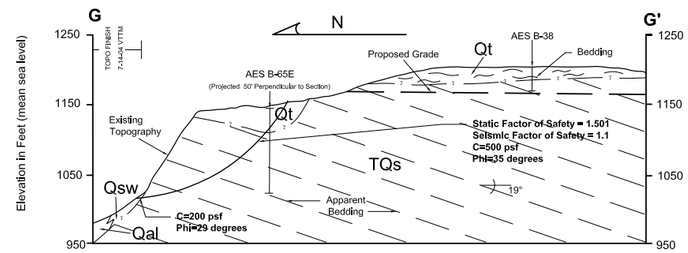

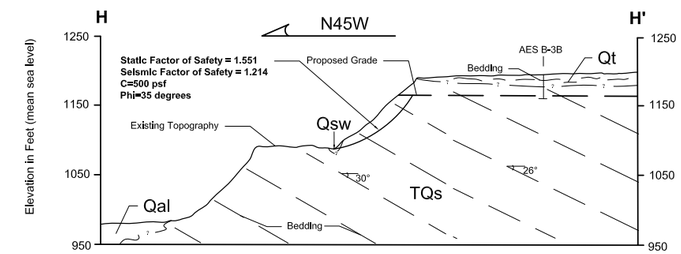

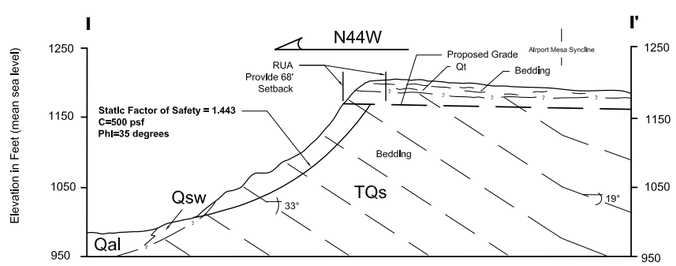

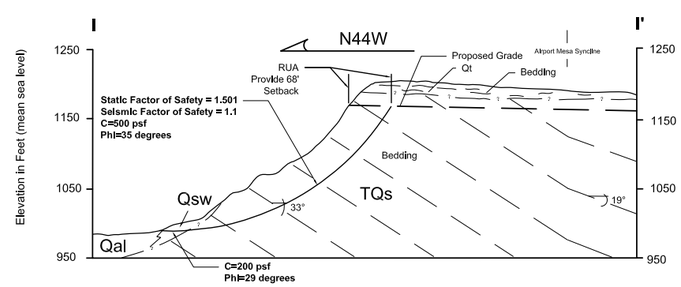

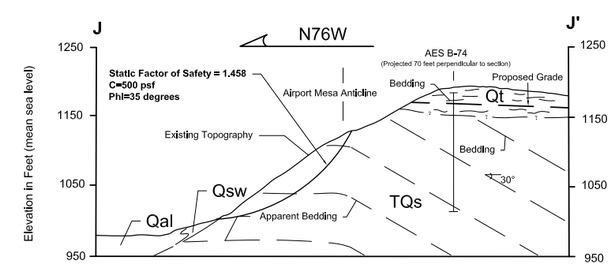

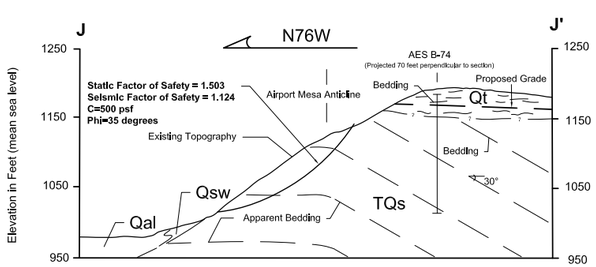

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Geotechnical Sections

PREPARED FOR
Newhall Land & Farming Company

Project Location
MISSION VILLAGE
Vesting Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California

SCALE	DRAWN BY	CHECKED BY
1" = 100'	JH	
DATE 4-29-2010	Figure 4.1	JOB NO. 94-502-22

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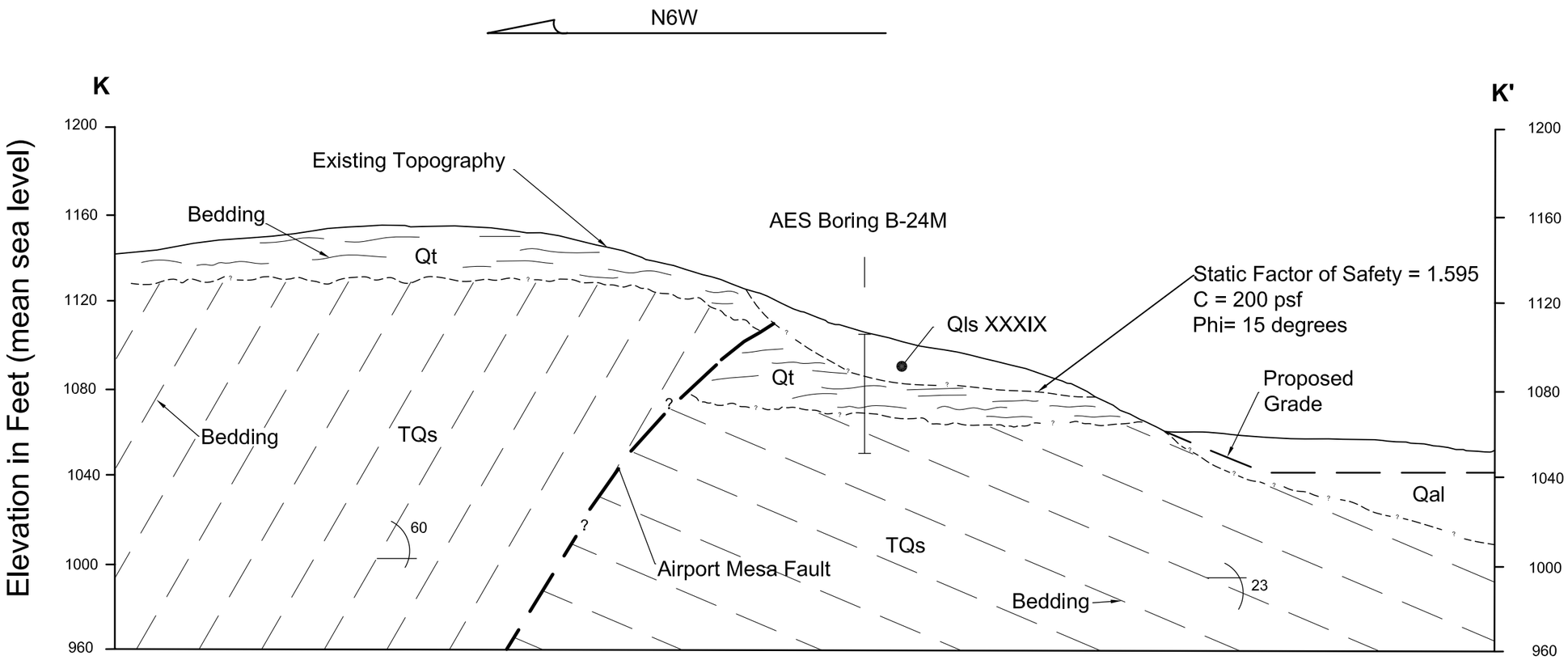

See Explanation on Figure 1

Geotechnical Sections

PREPARED FOR
Newhall Land & Farming Company

Project Location
MISSION VILLAGE
Vesting Tentative Tract Map No. 61105
Newhall Ranch, Los Angeles County, California

SCALE	DRAWN BY	CHECKED BY
1" = 40'	JH	
DATE 4-29-2010	FIGURE 4.2	JOB NO. 94-502-22

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Newhall Land & Farming Company
April 29, 2010
94-502-022

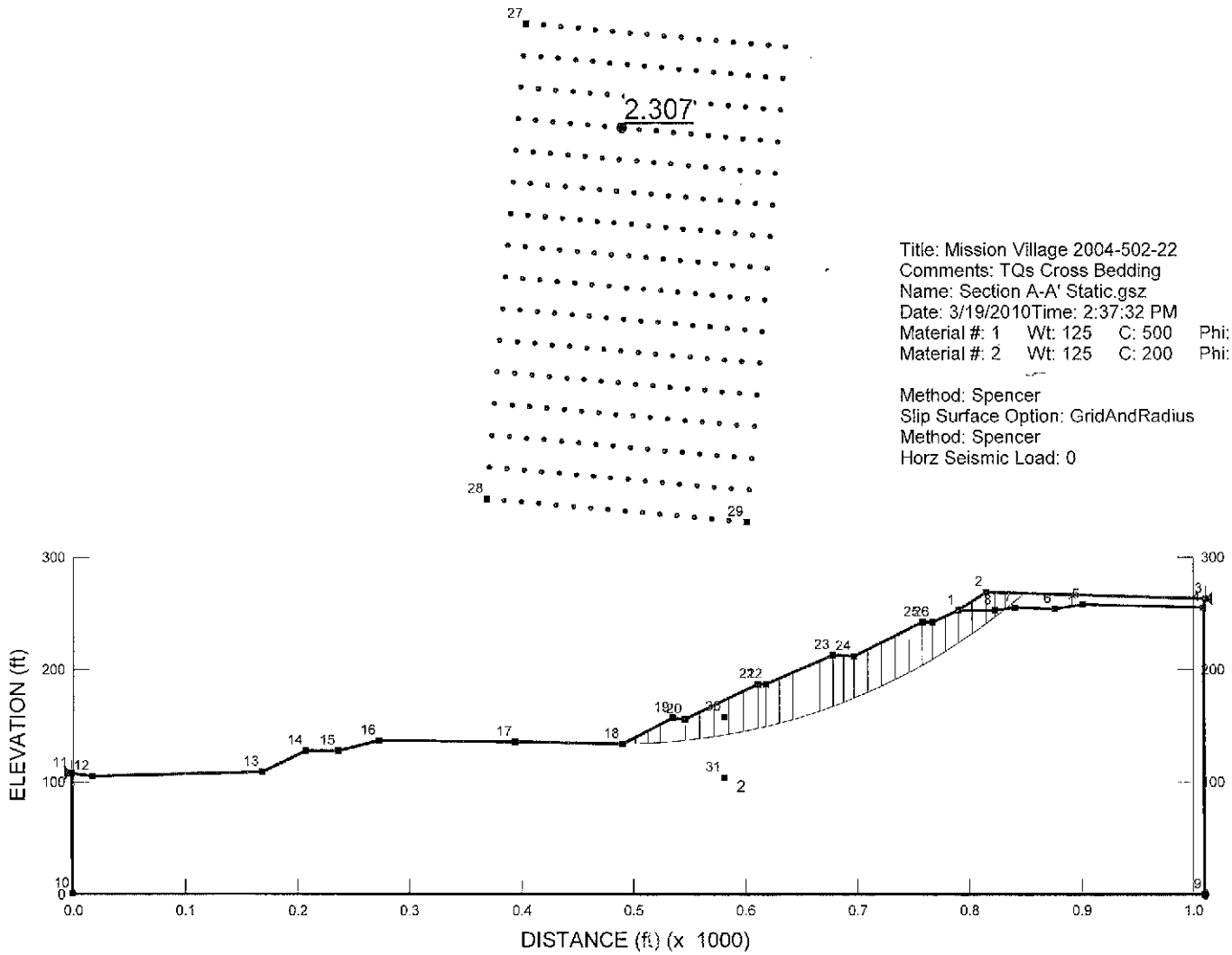
APPENDIX – SLOPE STABILITY ANALYSES

RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

Summary of Slope Stability Calculations

Section	Case	File	Factor of Safety	Condition
A-A'	Static	Section A-A' Static.gsz	2.307	Circular failure through toe
A-A'	Seismic	Section A-A' Seismic.gsz	1.591	Circular failure through toe
B-B'	Static	Section B-B' Static.gsz	1.921	Bedding through toe
B-B'	Seismic	Section B-B' Seismic.gsz	1.116	Bedding through toe
D-D'	Static	Section D-D' Static.gsz	1.678	Bedding through toe
D-D'	Seismic	Section D-D' Seismic.gsz	1.112	Bedding through toe
F-F'	Static	Section F-F' Static.gsz	2.001	Bedding through toe
F-F'	Seismic	Section F-F' Seismic.gsz	1.341	Bedding through toe
G-G'	Static	Section G-G' Static A.gsz	1.501	Furthest failure does not extend to pad (No RUA)
G-G'	Seismic	Section G-G' Seismic.gsz	1.1	Seismic with furthest failure (No RUA)
H-H'	Static	Section h-h' Static.gsz	1.551	Pad grossly stable (No RUA)
H-H'	Seismic	Section h-h' Seismic.gsz	1.214	Pad grossly stable (No RUA)
I-I'	Static	Section I-I' Static.gsz	1.443	Static S.F. < 1.5 (Provide RUA)
I-I'	Static	Section I-I' Static.gsz	1.501	Furthest failure (Setback = 68 feet)
I-I'	Seismic	Section I-I' Seismic.gsz	1.1	Seismic furthest failure (Setback < 68 feet)
J-J'	Static	Section J-J' Static.gsz	1.458	Static S.F. < 1.5
J-J'	Static	Section J-J' Static 1.gsz	1.503	Furthest failure does not extend to pad (No RUA)
J-J'	Seismic	Section J-J' Seismic.gsz	1.124	Seismic with furthest failure (No RUA)
K-K'	Static	Section K-K' Static.gsz	1.595	Failure along Existing Qls
AES 1-1'	Static	AES 1-1' Static.gsz	1.475	Static S.F. < 1.5 (Provide RUA)
AES 1-1'	Static	AES 1-1' Static.gsz	1.507	Furthest failure (Setback = 42 feet)
AES 1-1'	Seismic	AES 1-1' Seismic.gsz	1.129	Seismic furthest failure (Setback < 42 feet)
AES 2-2'	Static	AES 2-2' Static.gsz	1.446	Static S.F. < 1.5 (Provide RUA)
AES 2-2'	Static	AES 2-2' Static.gsz	1.501	Furthest failure (Setback = 80 feet)
AES 2-2'	Seismic	AES 2-2' Seismic.gsz	1.11	Seismic furthest failure (Setback < 80 feet)
AES 4-4'	Static	Section 4-4' Static.gsz	1.388	Static S.F. < 1.5 (Provide RUA)
AES 4-4'	Static	Section 4-4' Static.gsz	1.511	Furthest failure (Setback = 70 feet)
AES 4-4'	Seismic	Section 4-4' Seismic.gsz	1.104	Seismic furthest failure (Setback < 70 feet)
AES 8-8'	Static	AES 8-8' Static.gsz	1.276	Static S.F. < 1.5 (Provide RUA)
AES 8-8'	Static	AES 8-8" Static.gsz	1.502	Furthest failure (Setback = 78 feet)
AES 8-8'	Seismic	AES 8-8' Seismic.gsz	1.101	Seismic furthest failure (Setback < 78 feet)

94-502-22
April 29, 2010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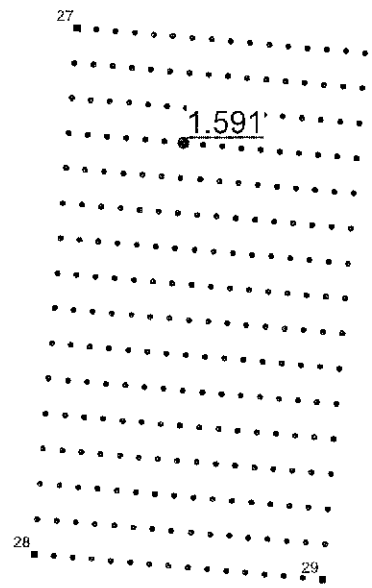
Title: Mission Village 2004-502-22
Comments: TQs Cross Bedding
Name: Section A-A' Static.gsz
Date: 3/19/2010Time: 2:37:32 PM
Material #: 1 Wt: 125 C: 500 Phi: 35
Material #: 2 Wt: 125 C: 200 Phi: 30
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0
ELEVATION (ft)
DISTANCE (ft) (x 1000)



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Comments: TQs Cross Bedding
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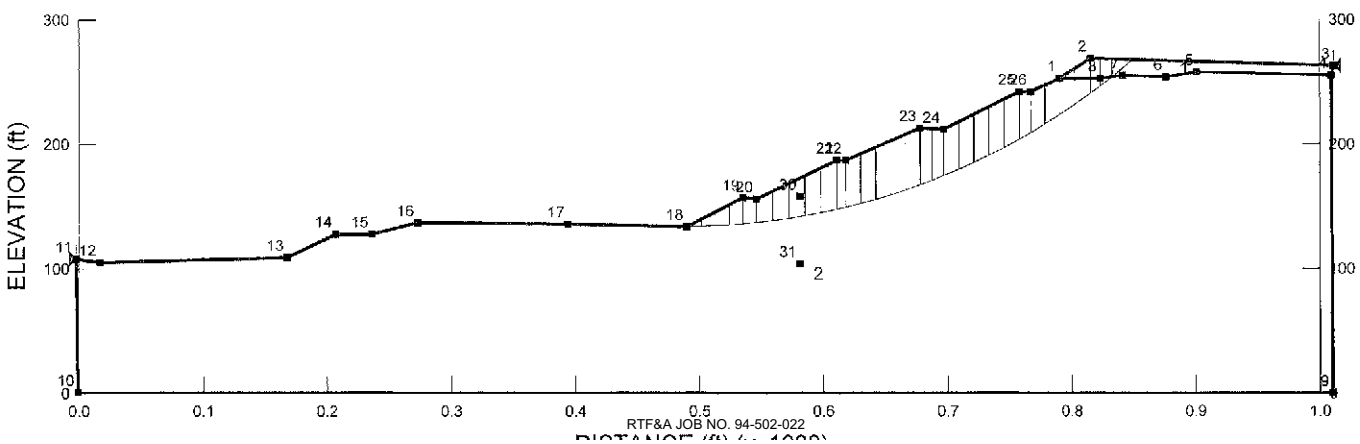
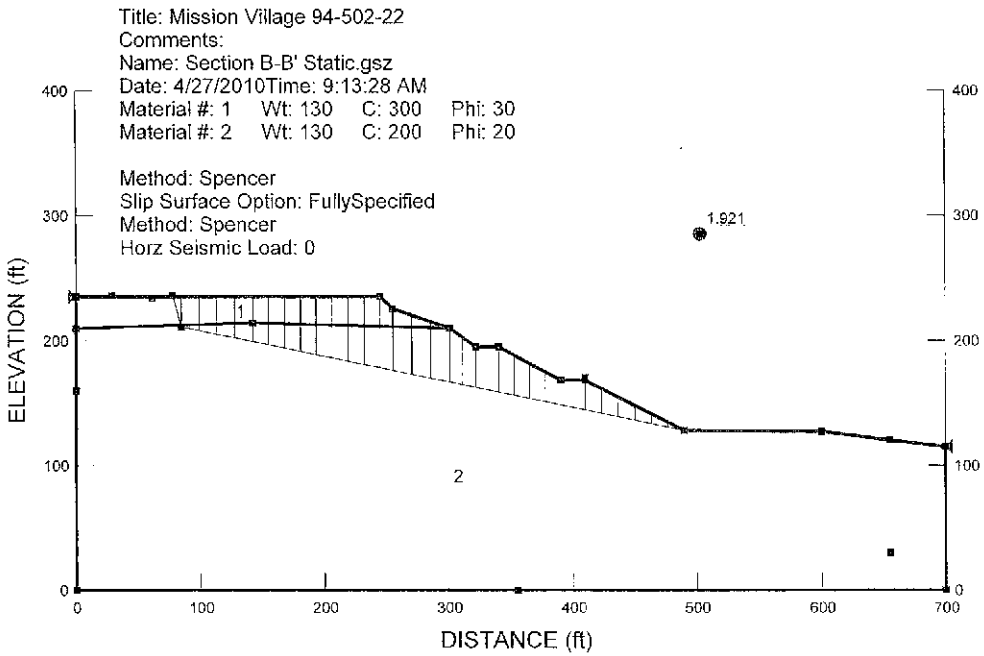
Material #: 1 Wt: 125 C: 500 Phi: 35
Material #: 2 Wt: 125 C: 200 Phi: 30

Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0.15

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Comments:
Name: Section B-B' Static.gsz
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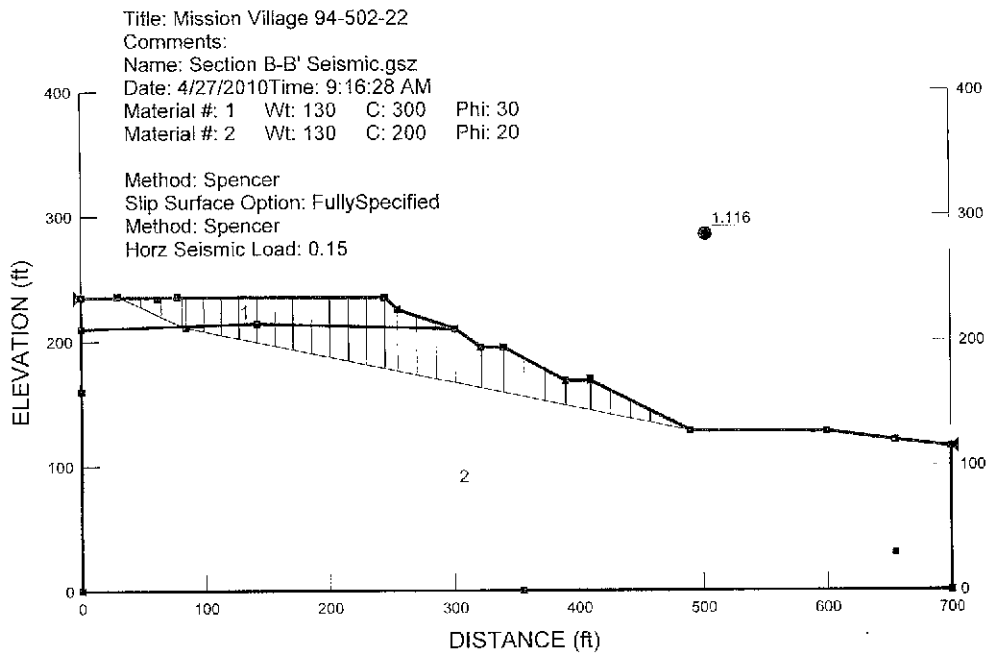
Material #: 1 Wt: 130 C: 300 Phi: 30
Material #: 2 Wt: 130 C: 200 Phi: 20
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0
1.921
1
2
ELEVATION (ft)
DISTANCE (ft)
0
100
200
300
400
500
600
700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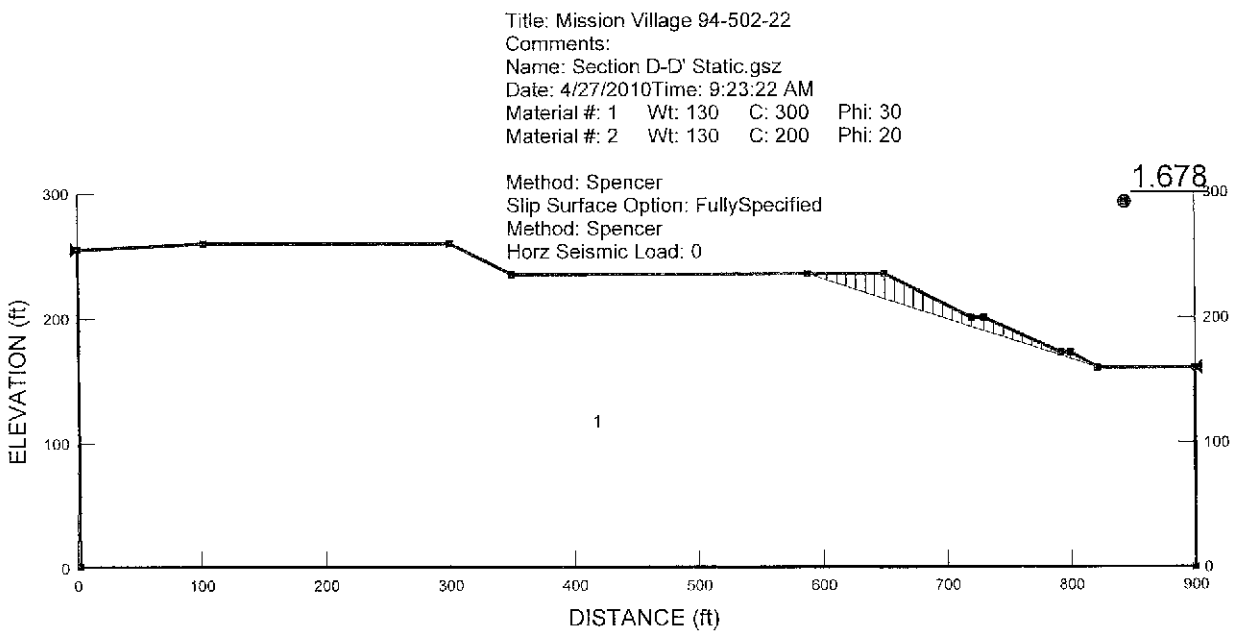
Material #: 2 Wt: 130 C: 200 Phi: 20
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0.15
1.116
1
2
ELEVATION (ft)
DISTANCE (ft)
0
100
200
300
400
500
600
700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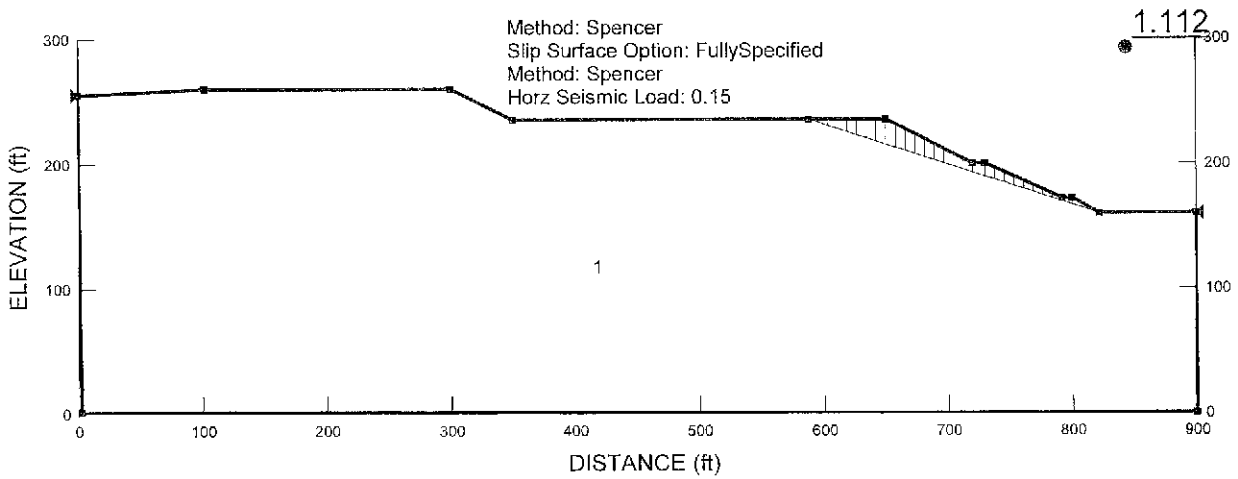
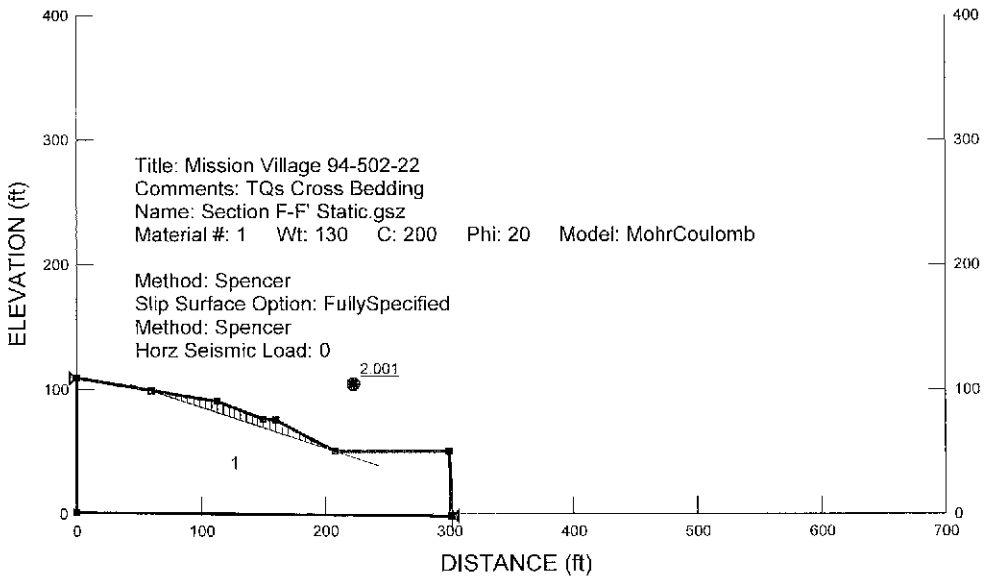
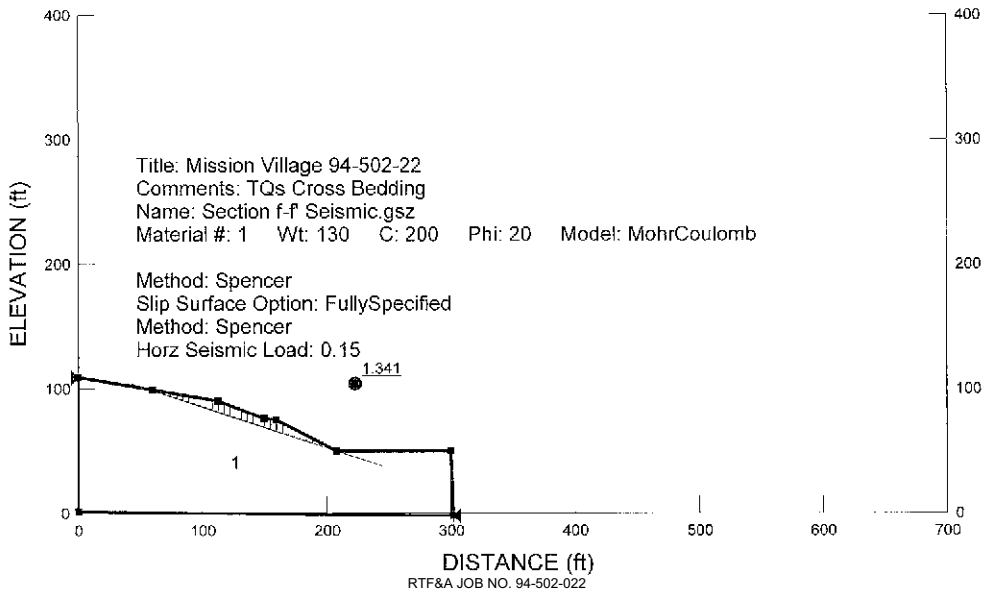
Comments:
Name: Section D-D' Static.gsz
Date: 4/27/2010Time: 9:23:22 AM
Material #: 1 Wt: 130 C: 300 Phi: 30
Material #: 2 Wt: 130 C: 200 Phi: 20
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0
1.678
1
ELEVATION (ft)
DISTANCE (ft)
0
100
200
300
400
500
600
700
800
900

Title: Mission Village 94-502-22
Comments:
Name: Section D-D' Seismic.gsz
Date: 4/27/2010Time: 9:24:56 AM
Material #: 1 Wt: 130 C: 300 Phi: 30
Material #: 2 Wt: 130 C: 200 Phi: 20

Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0.15

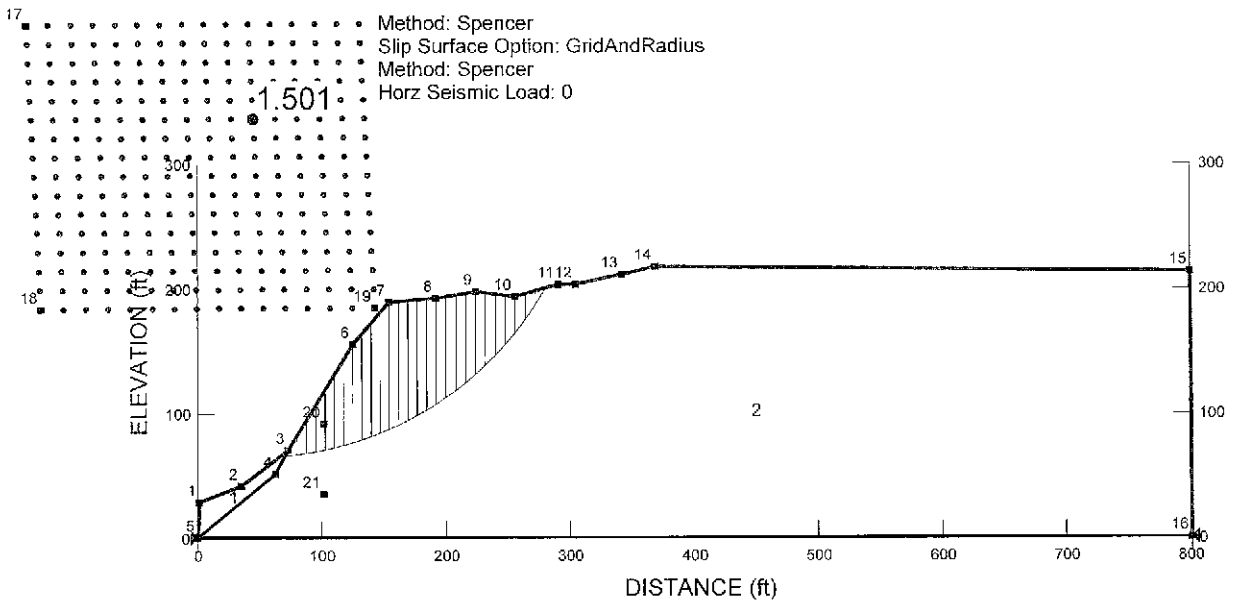



Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section F-F' Static.gsz
Material #: 1 Wt: 130 C: 200 Phi: 20 Model: MohrCoulomb
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0
2.001
1
ELEVATION (ft)
DISTANCE (ft)
0
100
200
300
400
500
600
700


Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section f-f' Seismic.gsz
Material #: 1 Wt: 130 C: 200 Phi: 20 Model: MohrCoulomb
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0.15
1.341
1
ELEVATION (ft)
DISTANCE (ft)
0
100
200
300
400
500
600
700

Title: Mission Village 2004-502-22
Comments: TQs Cross Bedding
Name: Section G-G' Static A.gsz
Date: 3/11/2010Time: 9:35:29 AM
Material #: 1 Wt: 125 C: 500 Phi: 35 Model: MohrCoulomb
Material #: 2 Wt: 125 C: 200 Phi: 29 Model: MohrCoulomb

Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0



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Comments: TQs Cross Bedding
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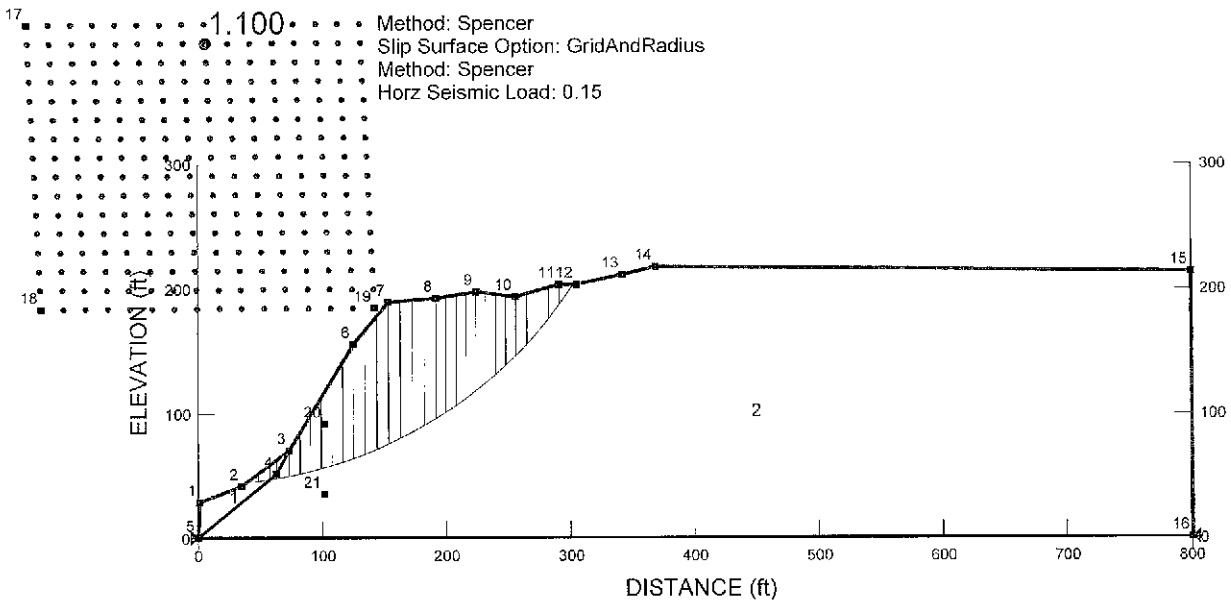
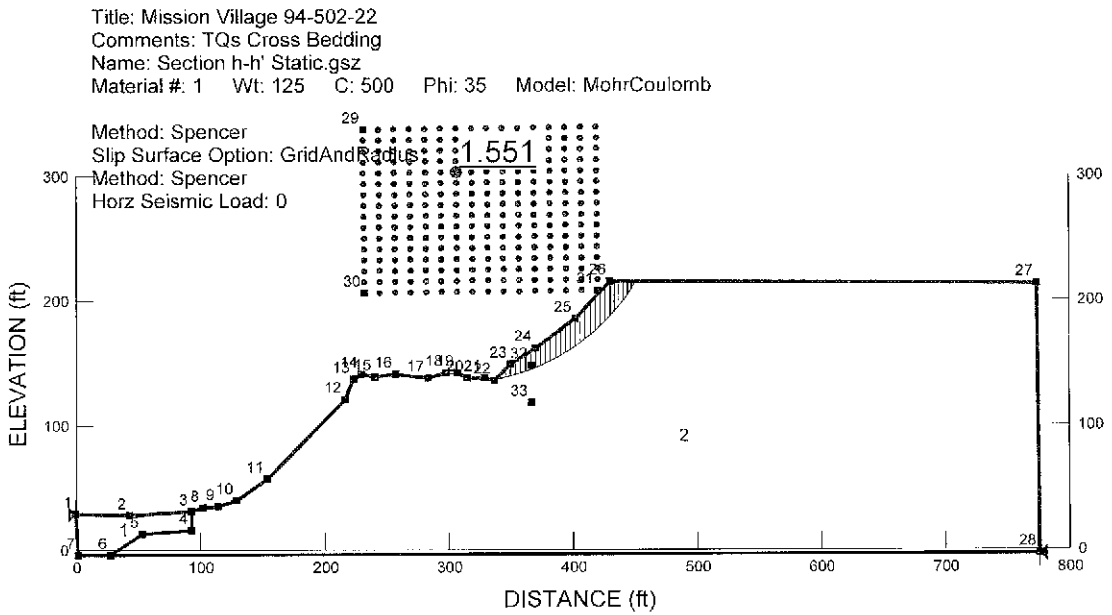
Date: 4/26/2010Time: 3:46:53 PM
Material #: 1 Wt: 125 C: 500 Phi: 35 Model: MohrCoulomb
Material #: 2 Wt: 125 C: 200 Phi: 29 Model: MohrCoulomb

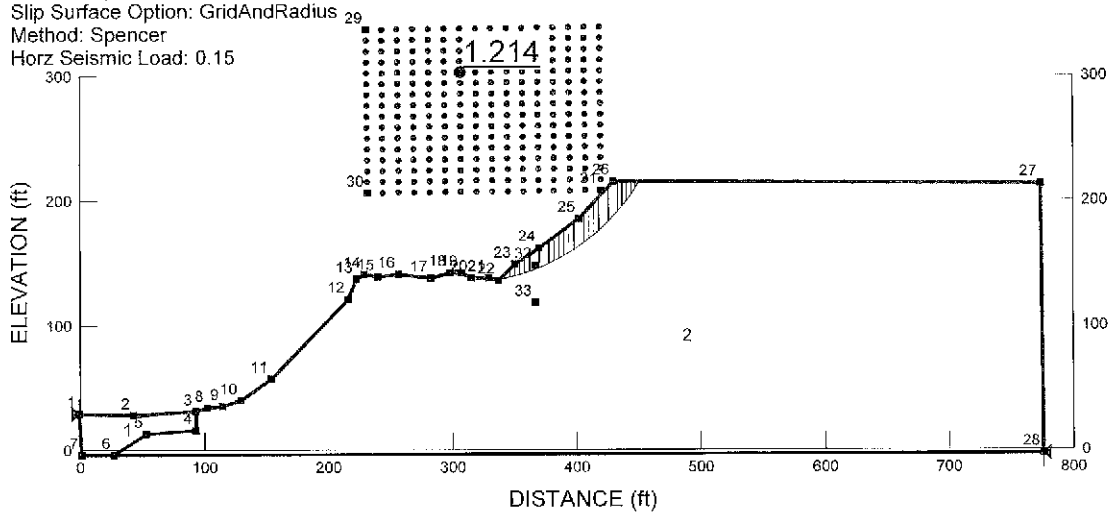
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0.15

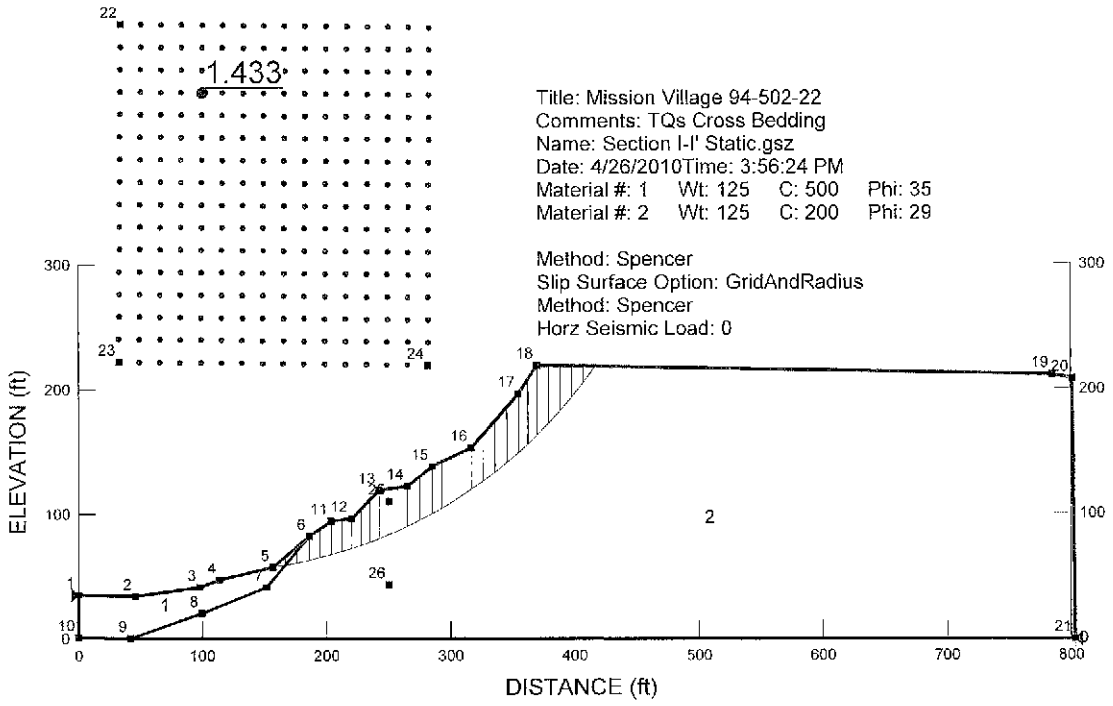


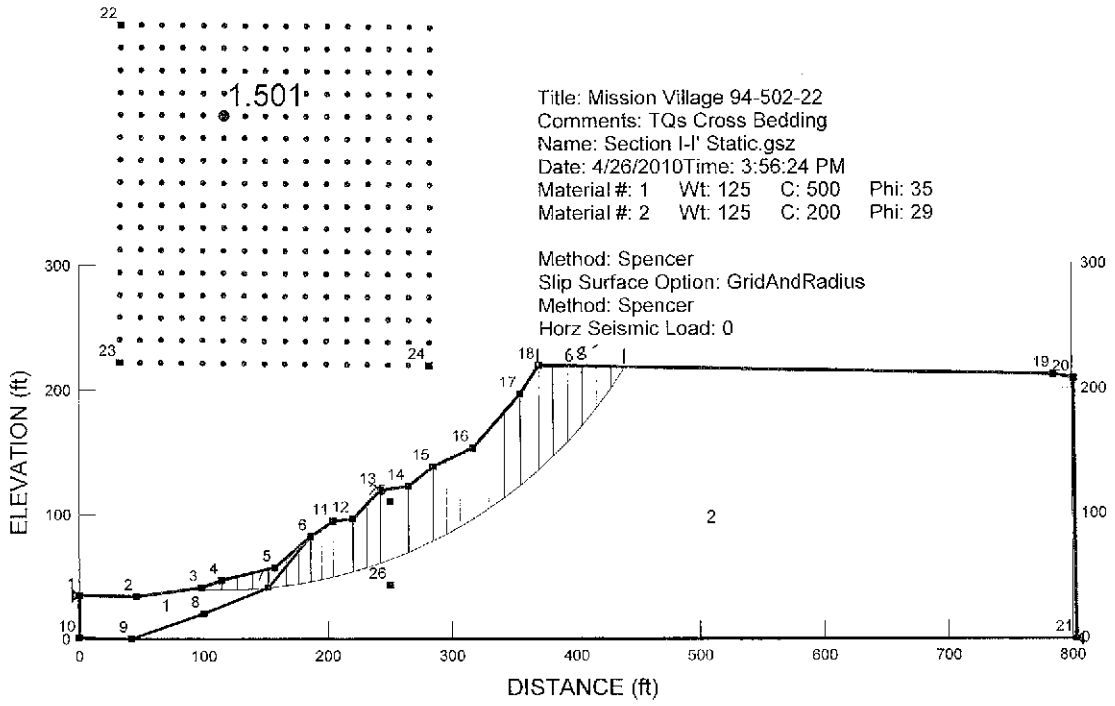

Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section h-h' Static.gsz
Material #: 1 Wt: 125 C: 500 Phi: 35 Model: MohrCoulomb
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0
1.551
ELEVATION (ft)
DISTANCE (ft)
2

Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section h-h' Seismic.gsz
Material #: 1 Wt: 125 C: 500 Phi: 35 Model: MohrCoulomb

Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0.15




1.433
Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
Name: Section I-I' Static.gsz
Date: 4/26/2010Time: 3:56:24 PM
Material #: 1 Wt: 125 C: 500 Phi: 35
Material #: 2 Wt: 125 C: 200 Phi: 29
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0
ELEVATION (ft)
DISTANCE (ft)
0
100
200
300
400
500
600
700
800
1
2


1.501
Title: Mission Village 94-502-22
Comments: TQs Cross Bedding
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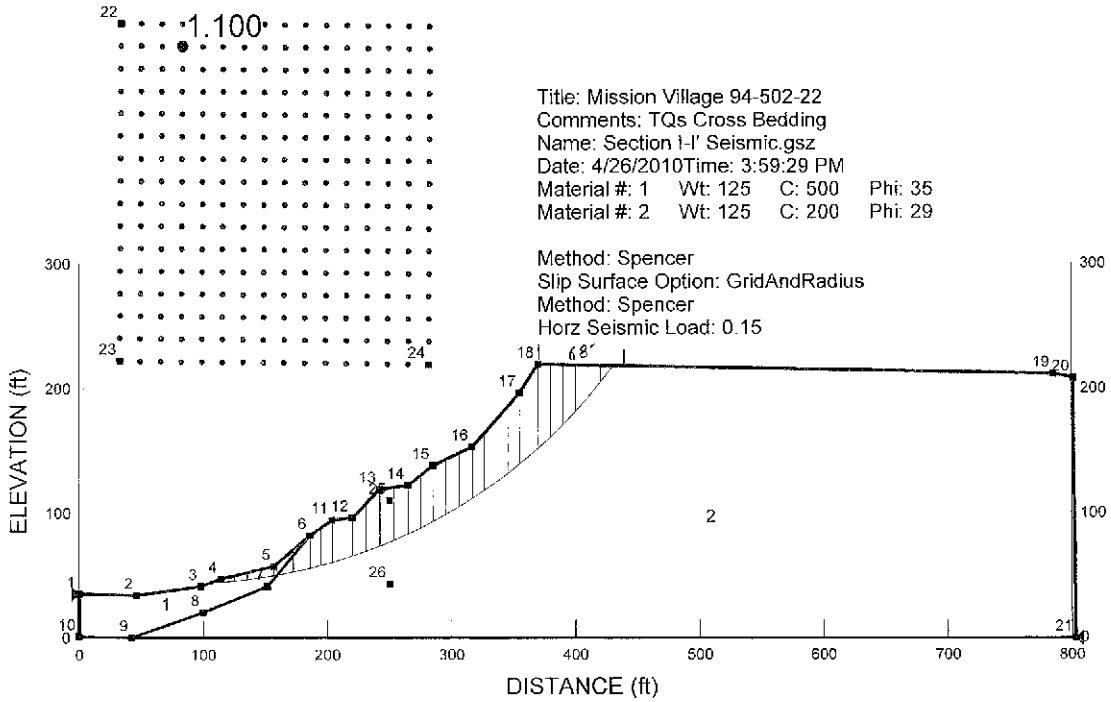
Date: 4/26/2010Time: 3:56:24 PM
Material #: 1 Wt: 125 C: 500 Phi: 35
Material #: 2 Wt: 125 C: 200 Phi: 29
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0
ELEVATION (ft)
DISTANCE (ft)
0
100
200
300
400
500
600
700
800
2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Comments: TQs Cross Bedding
Name: Section I-I' Seismic.gsz
Date: 4/26/2010Time: 3:59:29 PM
Material #: 1 Wt: 125 C: 500 Phi: 35
Material #: 2 Wt: 125 C: 200 Phi: 29
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0.15
ELEVATION (ft)
DISTANCE (ft)
0
100
200
300
400
500
600
700
800

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Method: Spencer
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Method: Spencer
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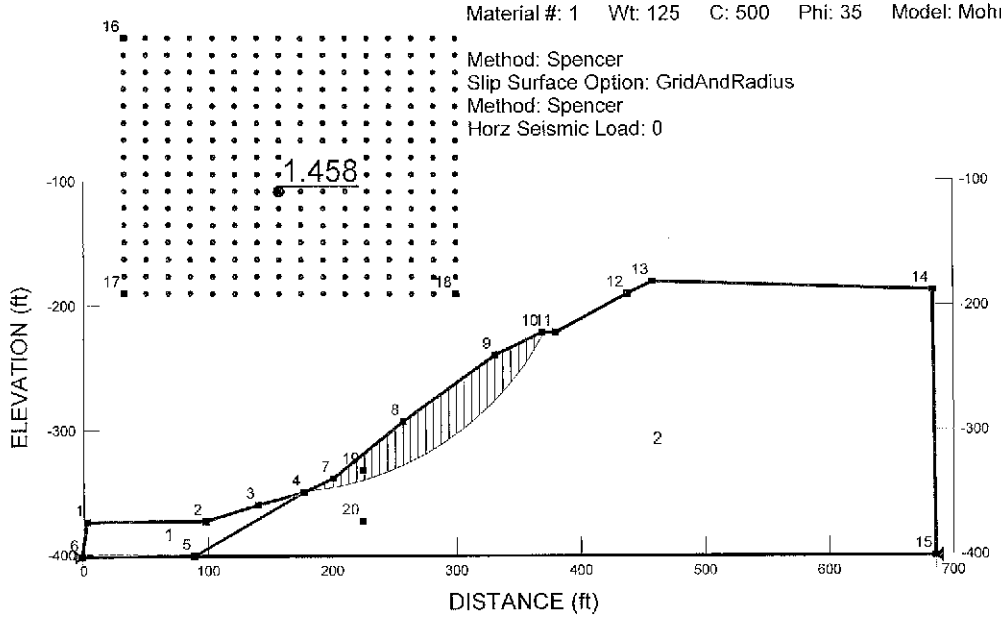

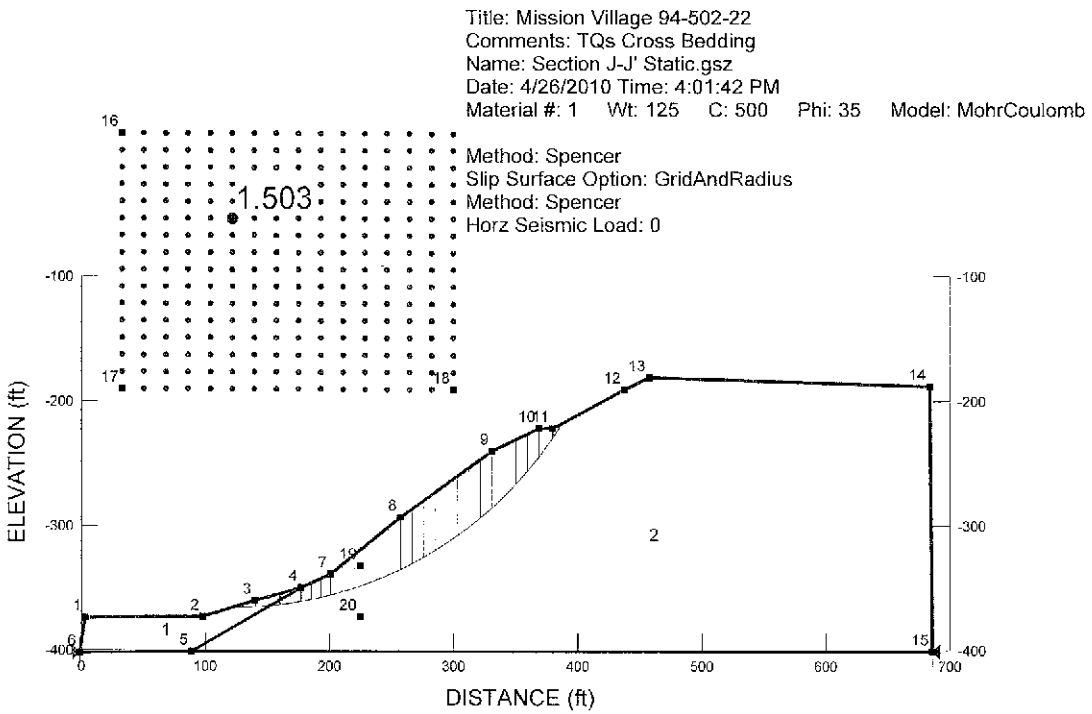
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Method: Spencer
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1.503
ELEVATION (ft)
DISTANCE (ft)
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-200
-300
-400
0
100
200
300
400
500
600
700
1
2

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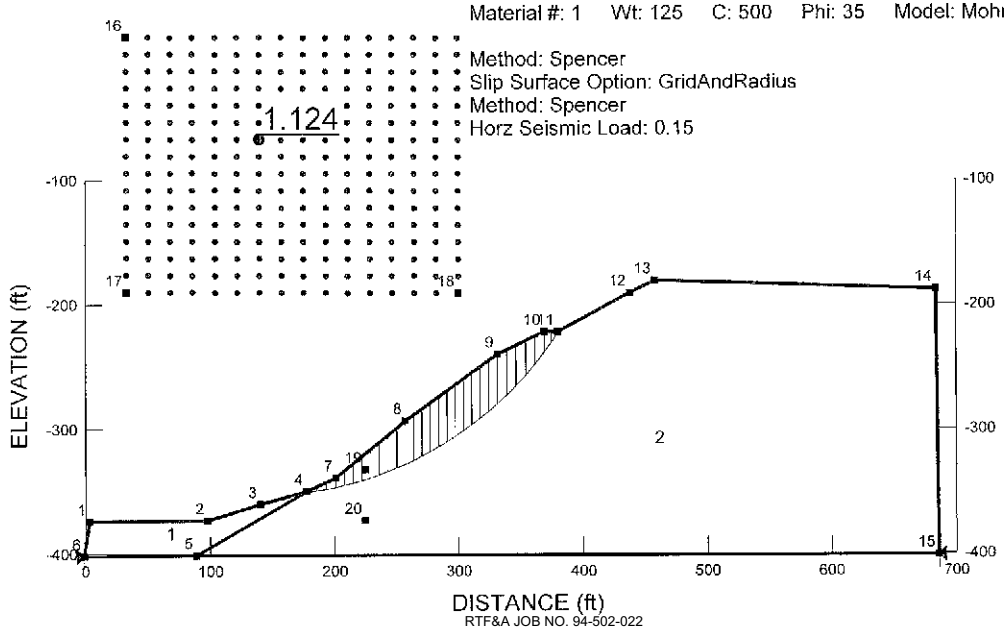

REPORT DATED APRIL 29, 2010

RTF&A JOB NO. 94-502-022

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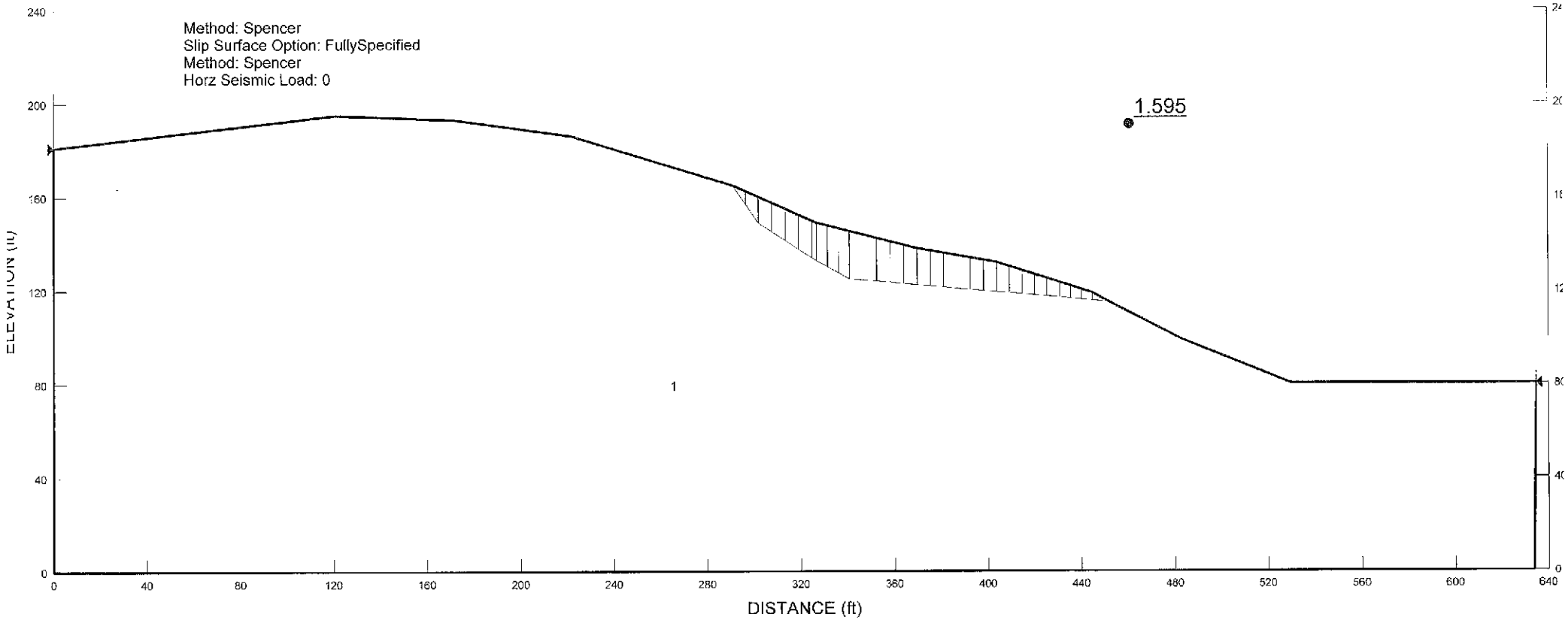
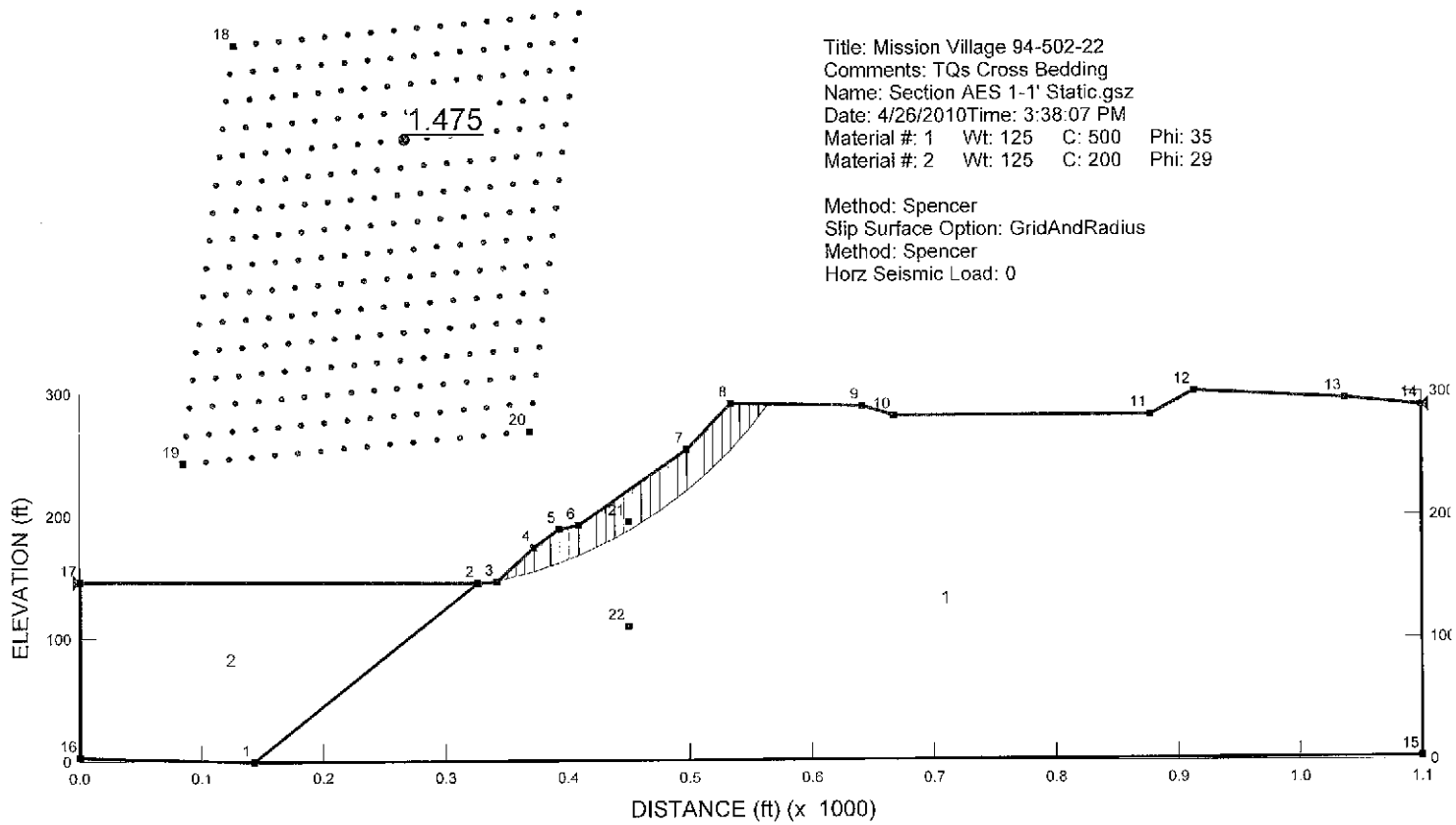
Method: Spencer
Slip Surface Option: FullySpecified
Method: Spencer
Horz Seismic Load: 0

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1.475
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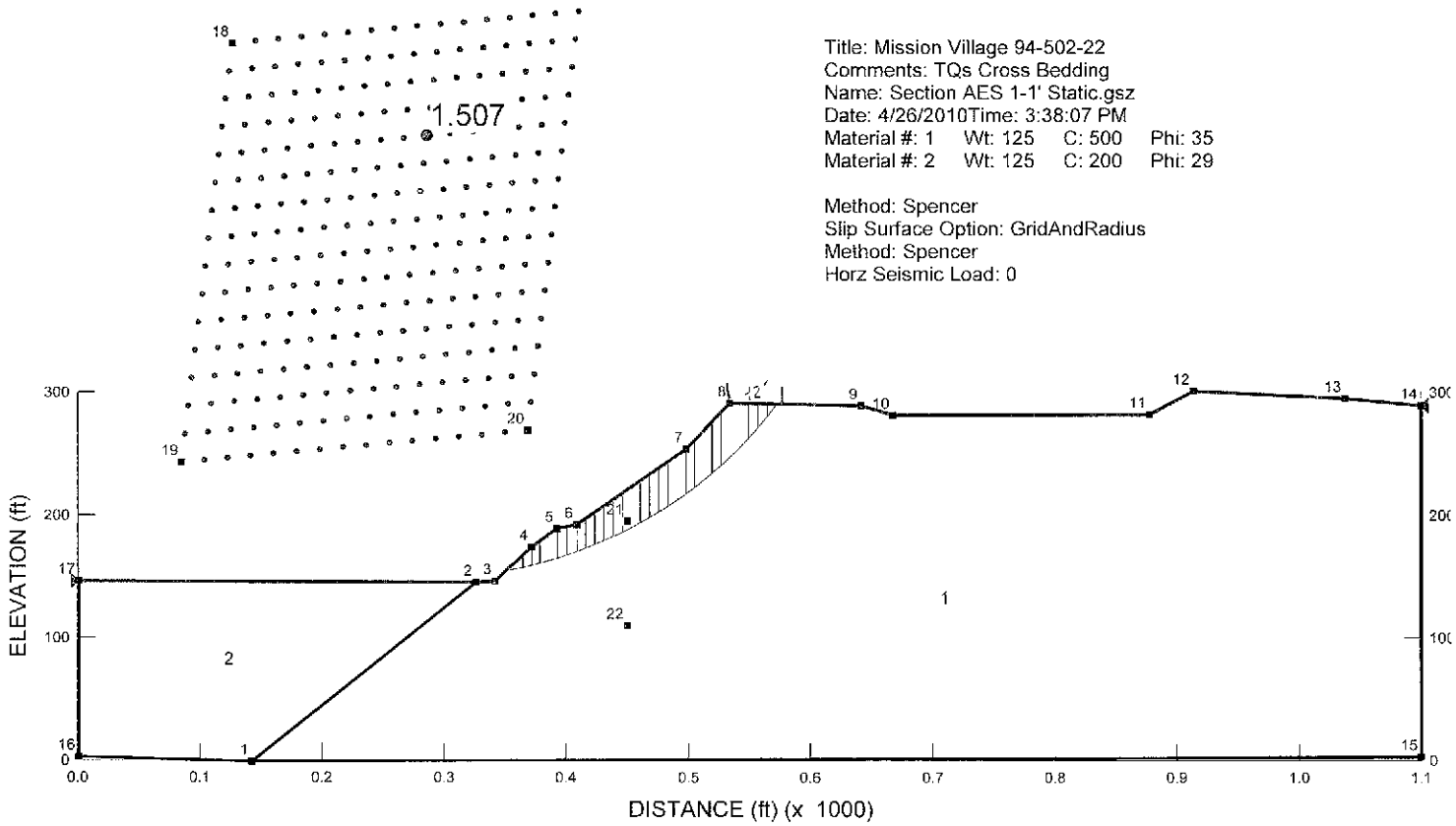
DISTANCE (ft) (x 1000)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Method: Spencer
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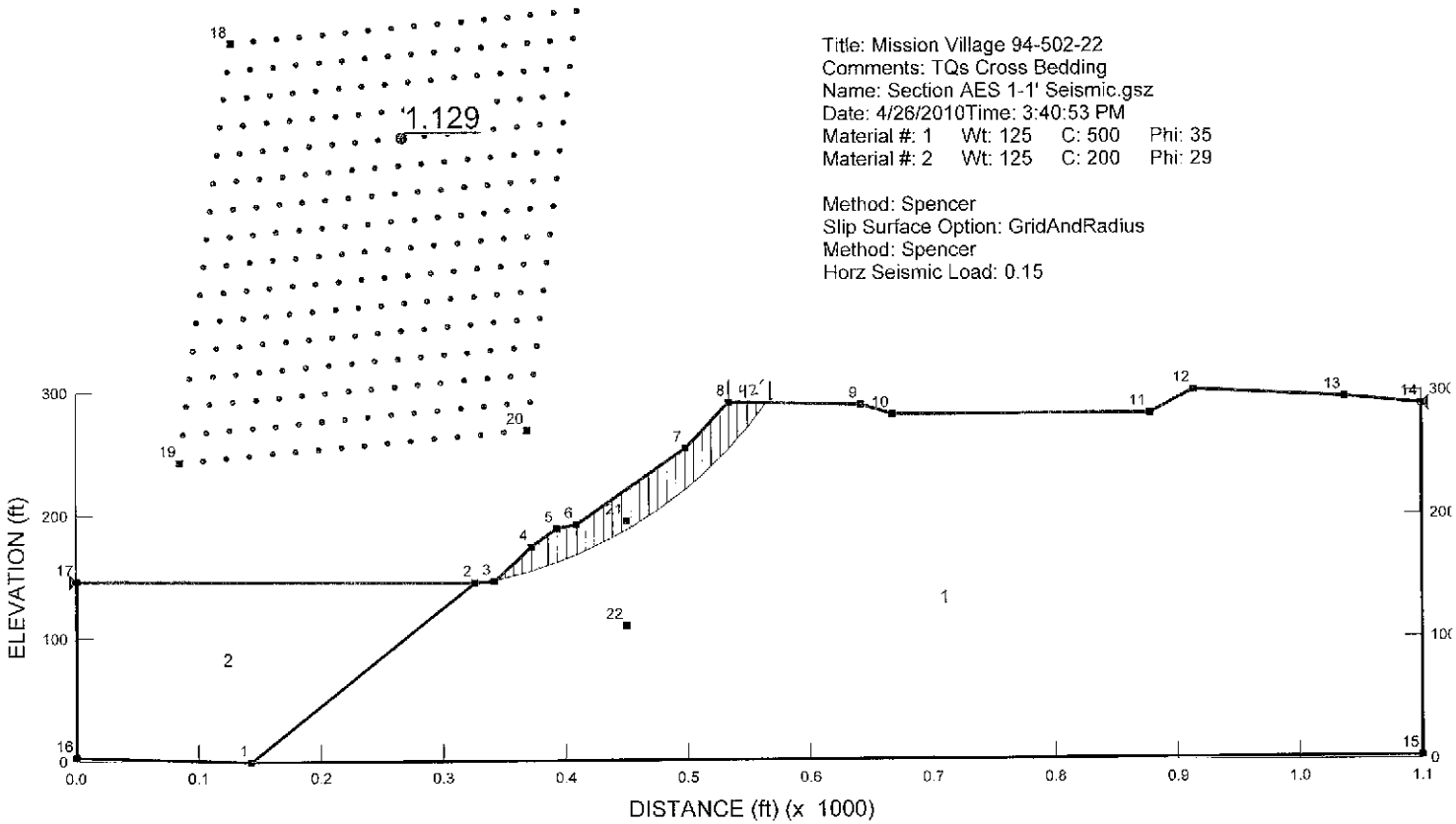
DISTANCE (ft) (x 1000)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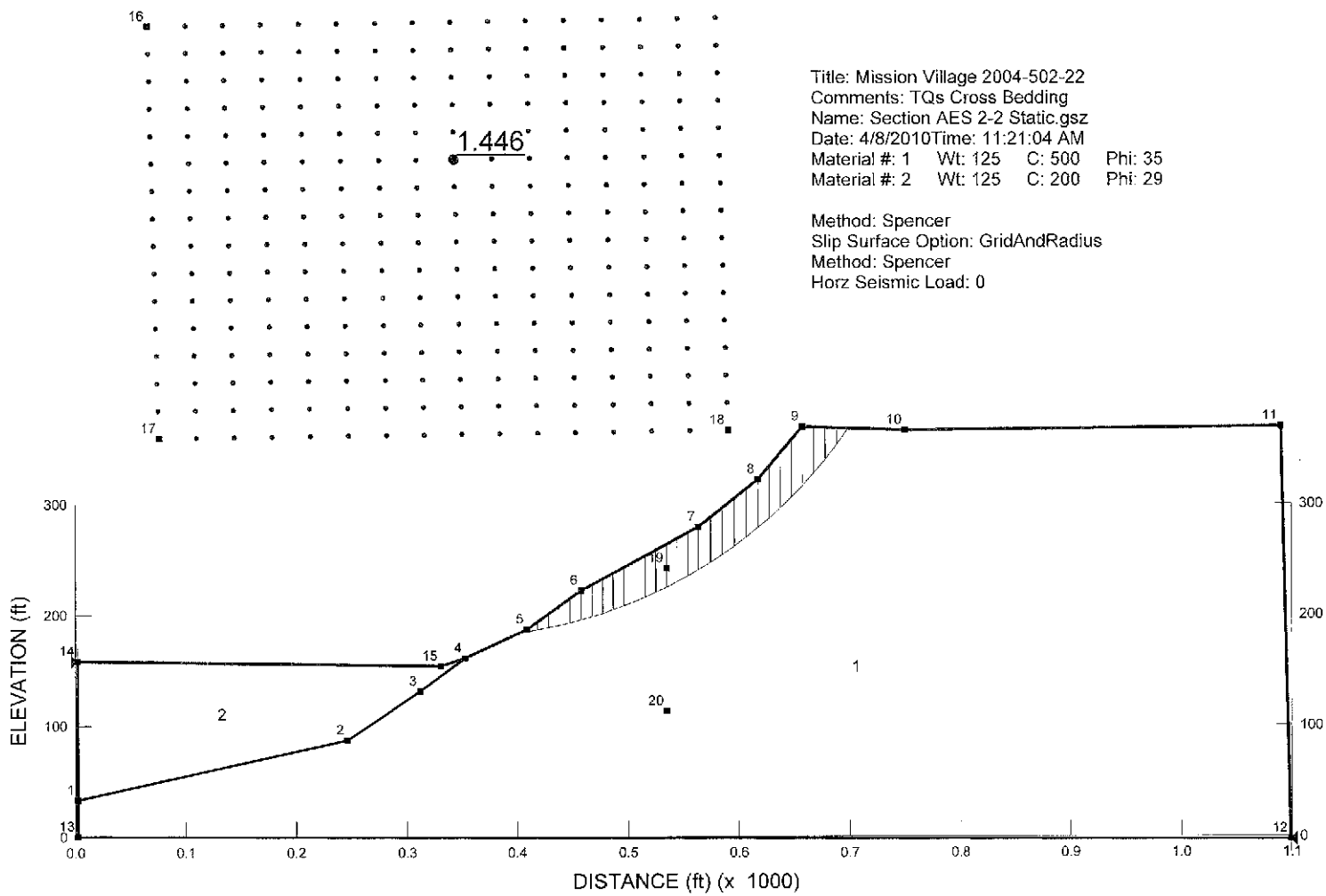
ELEVATION (ft)
DISTANCE (ft) (x 1000)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Material #: 2 Wt: 125 C: 200 Phi: 29
Method: Spencer
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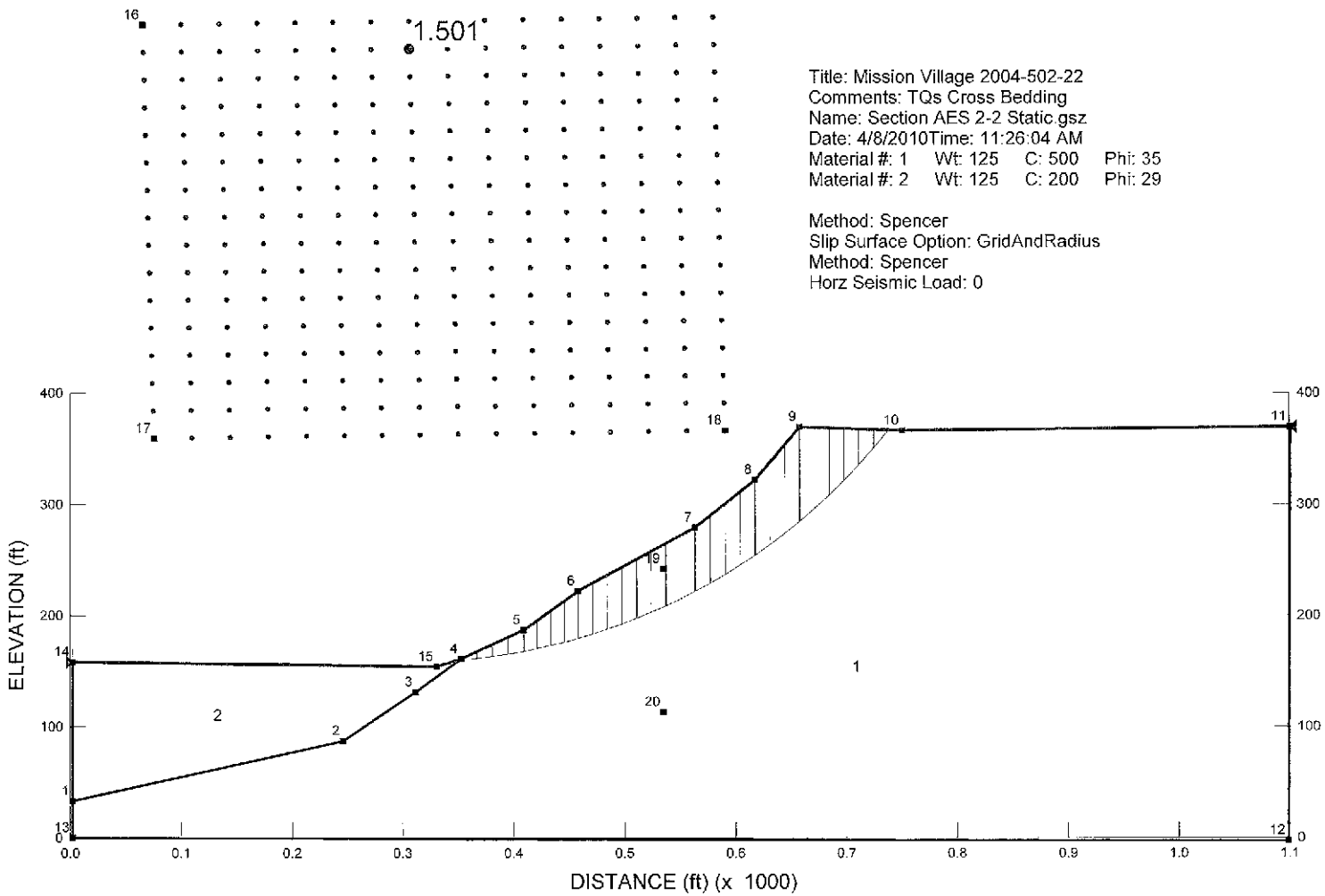
Method: Spencer
Horz Seismic Load: 0
ELEVATION (ft)
DISTANCE (ft) (x 1000)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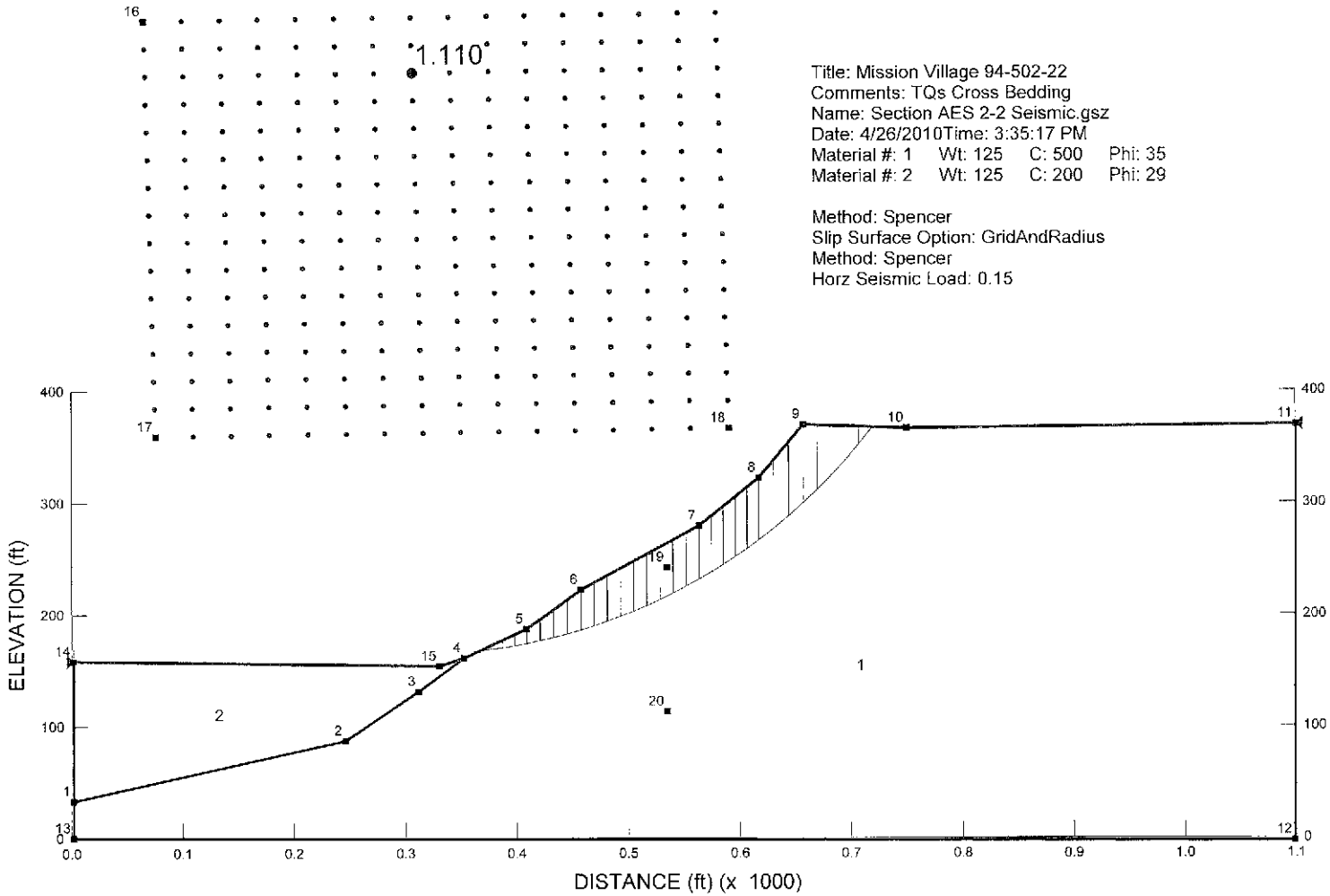
ELEVATION (ft)
DISTANCE (ft) (x 1000)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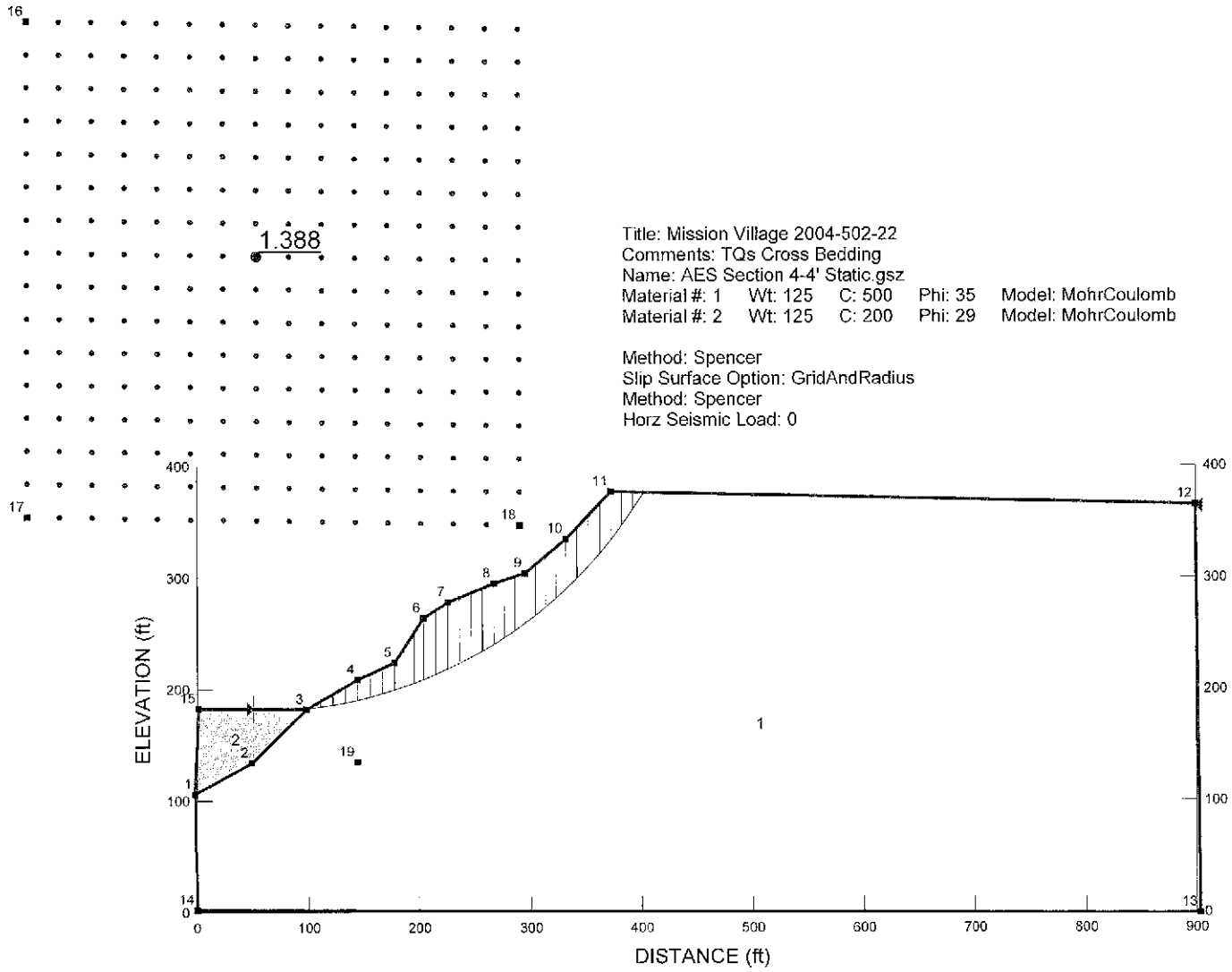
ELEVATION (ft)
DISTANCE (ft) (x 1000)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Method: Spencer
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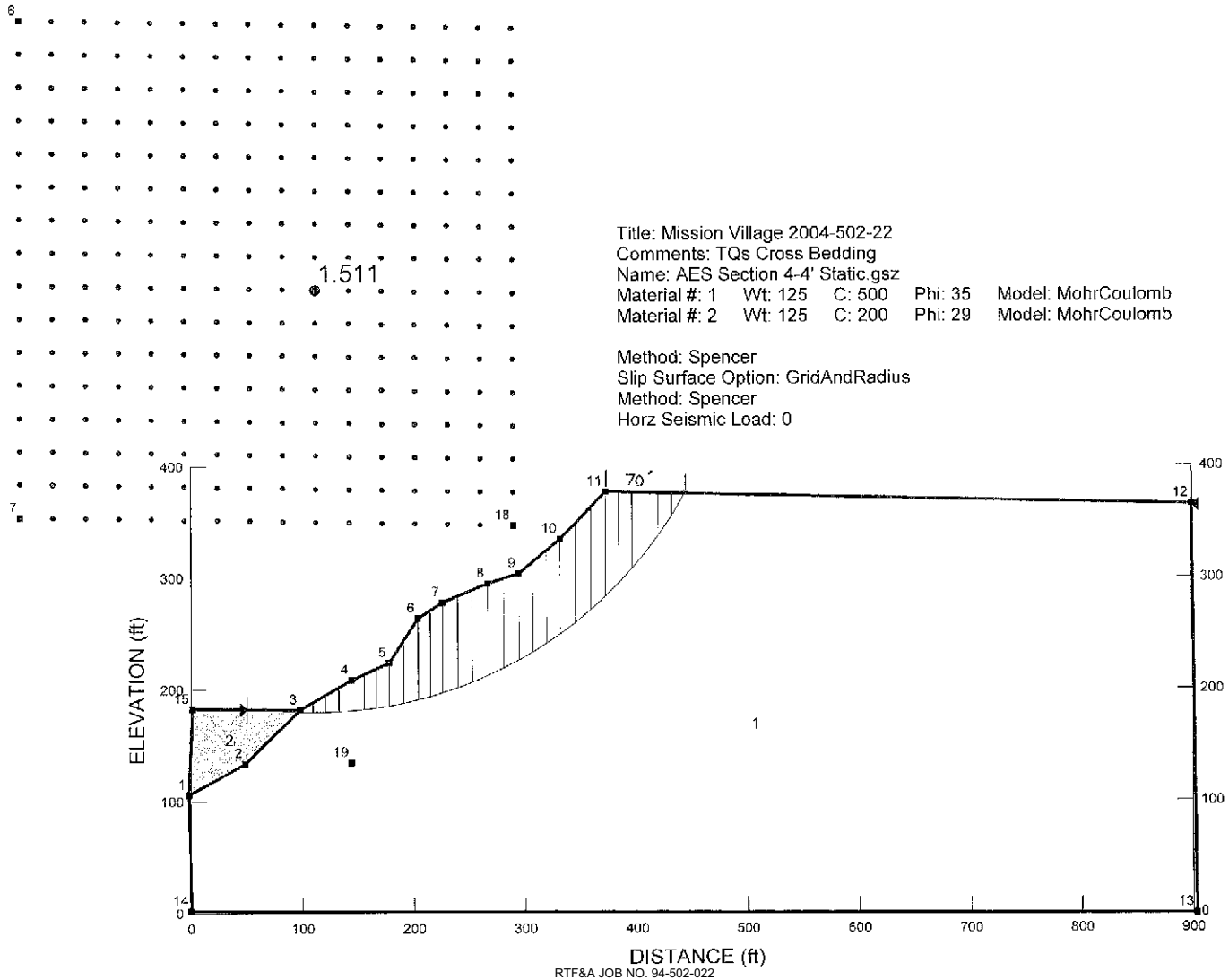
Method: Spencer
Horz Seismic Load: 0
ELEVATION (ft)
DISTANCE (ft)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Material #: 2 Wt: 125 C: 200 Phi: 29 Model: MohrCoulomb
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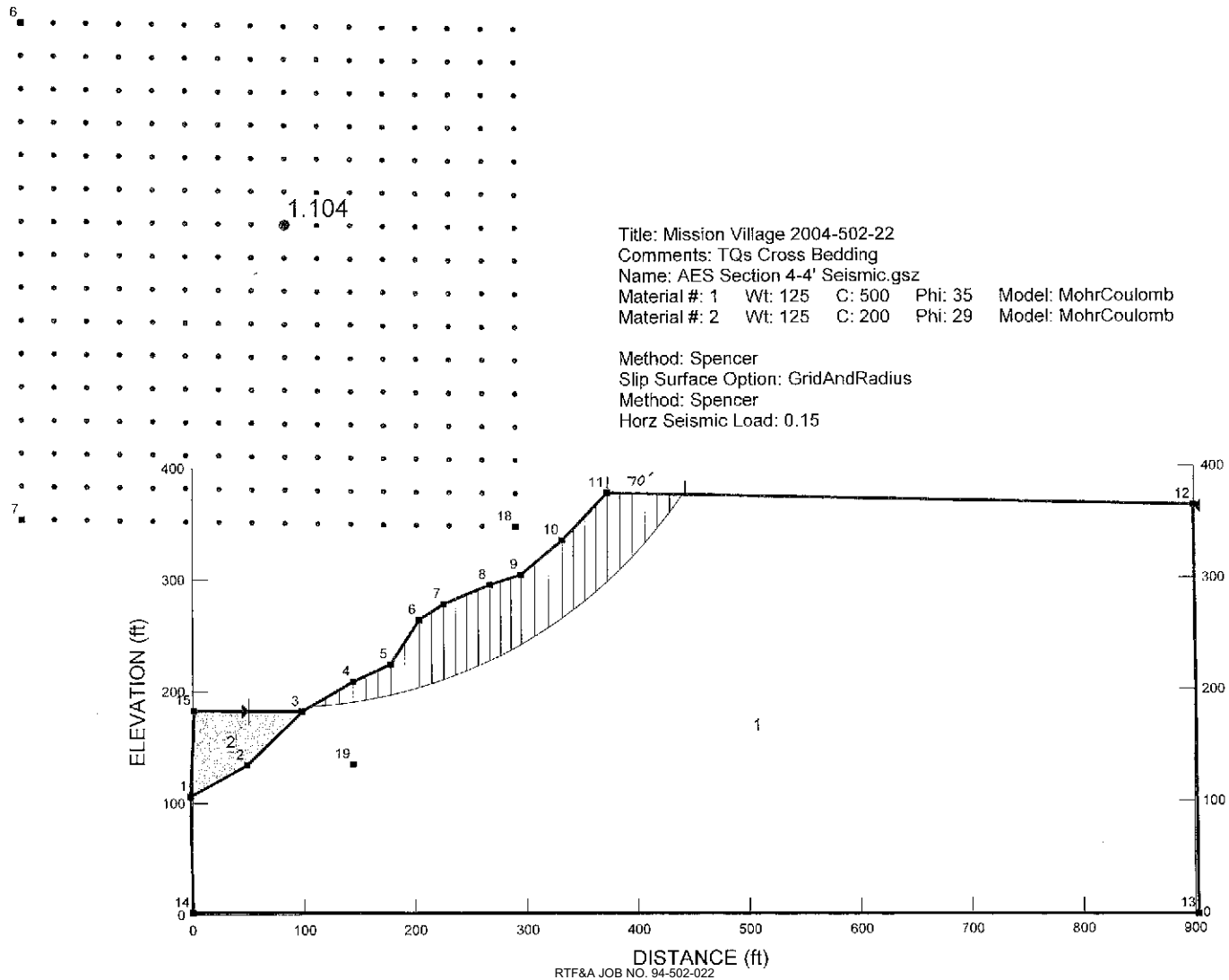
70'
ELEVATION (ft)
DISTANCE (ft)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Material #: 2 Wt: 125 C: 200 Phi: 29 Model: MohrCoulomb
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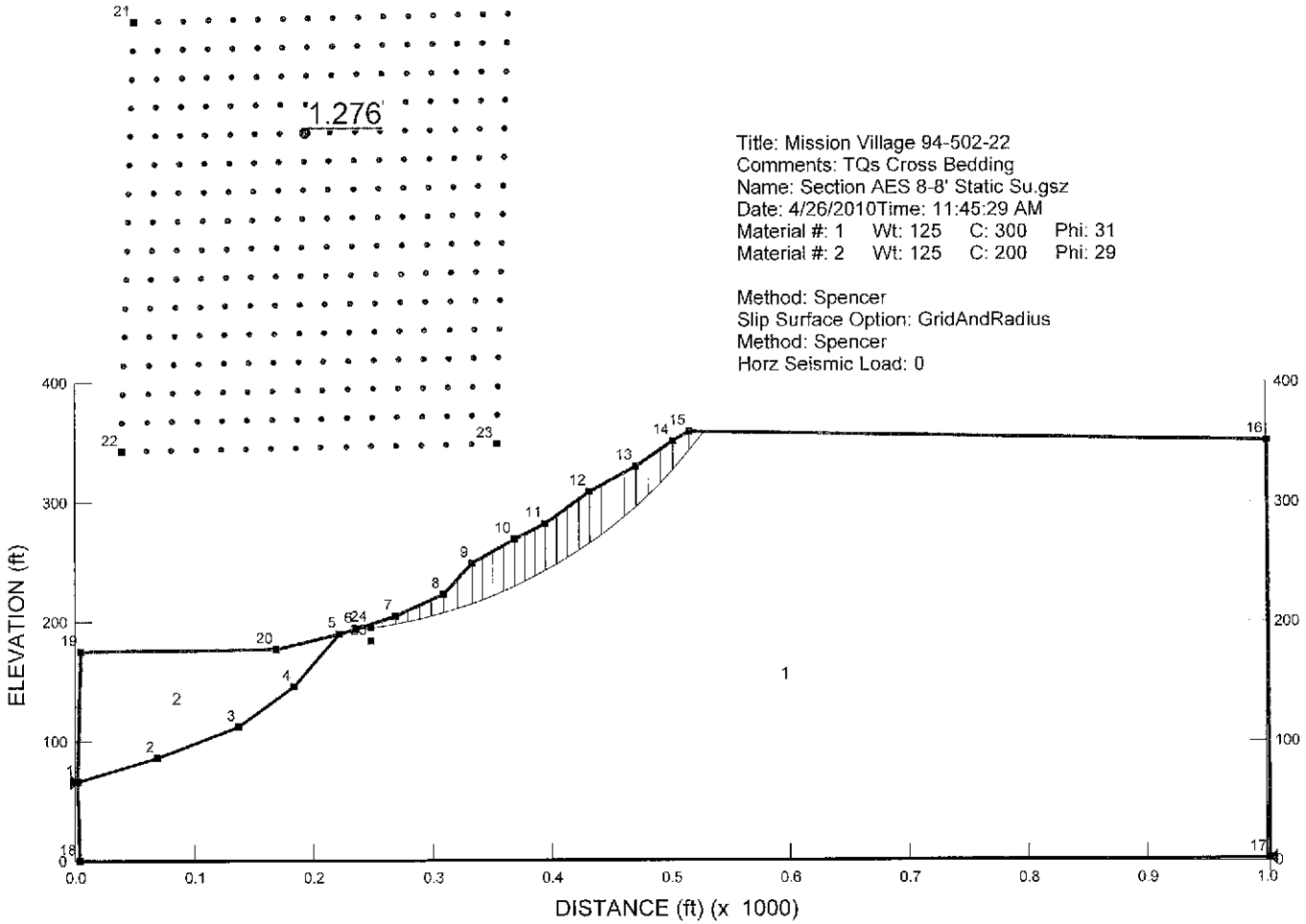
70'
ELEVATION (ft)
DISTANCE (ft)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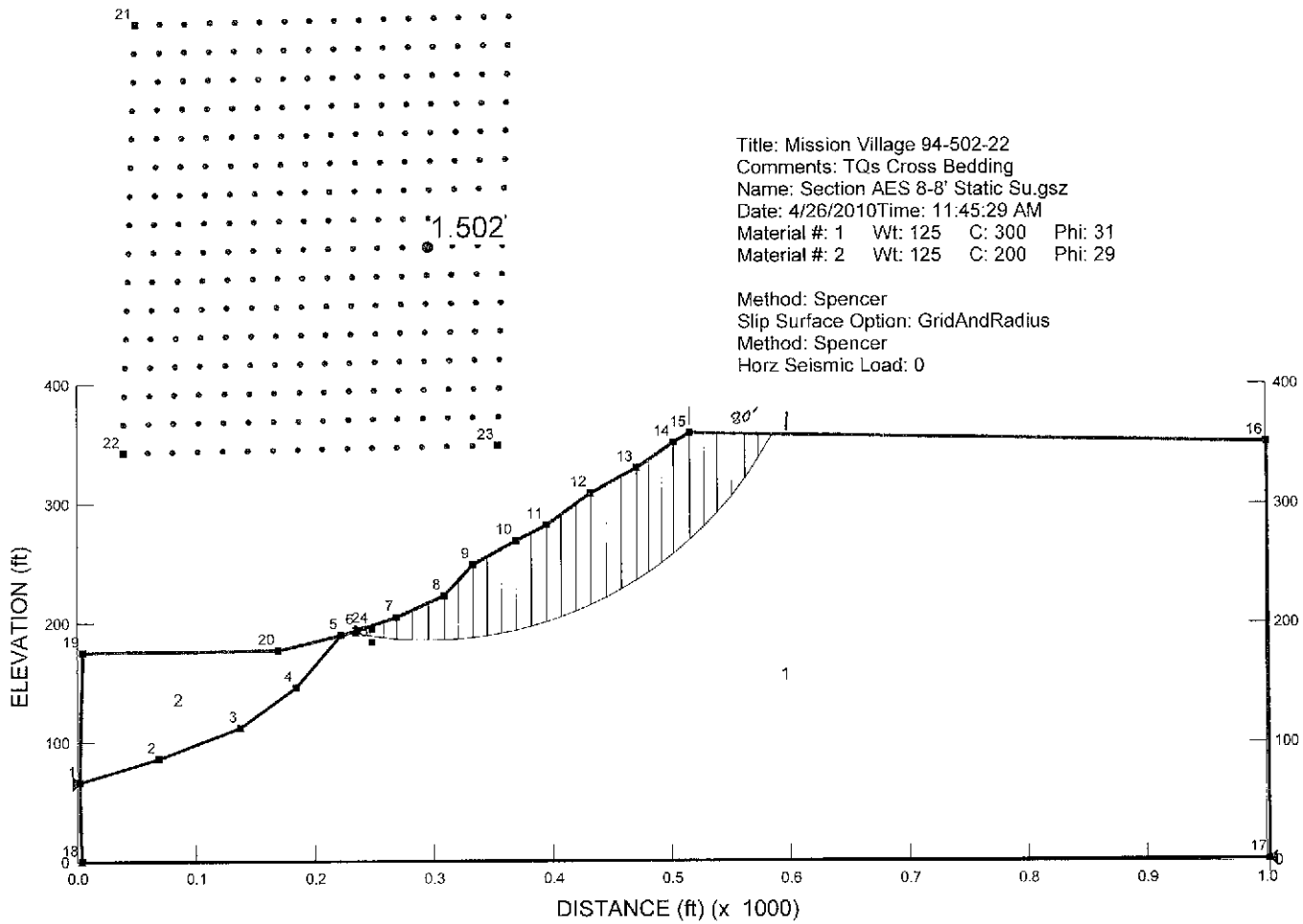
ELEVATION (ft)
DISTANCE (ft) (x 1000)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Material #: 2 Wt: 125 C: 200 Phi: 29
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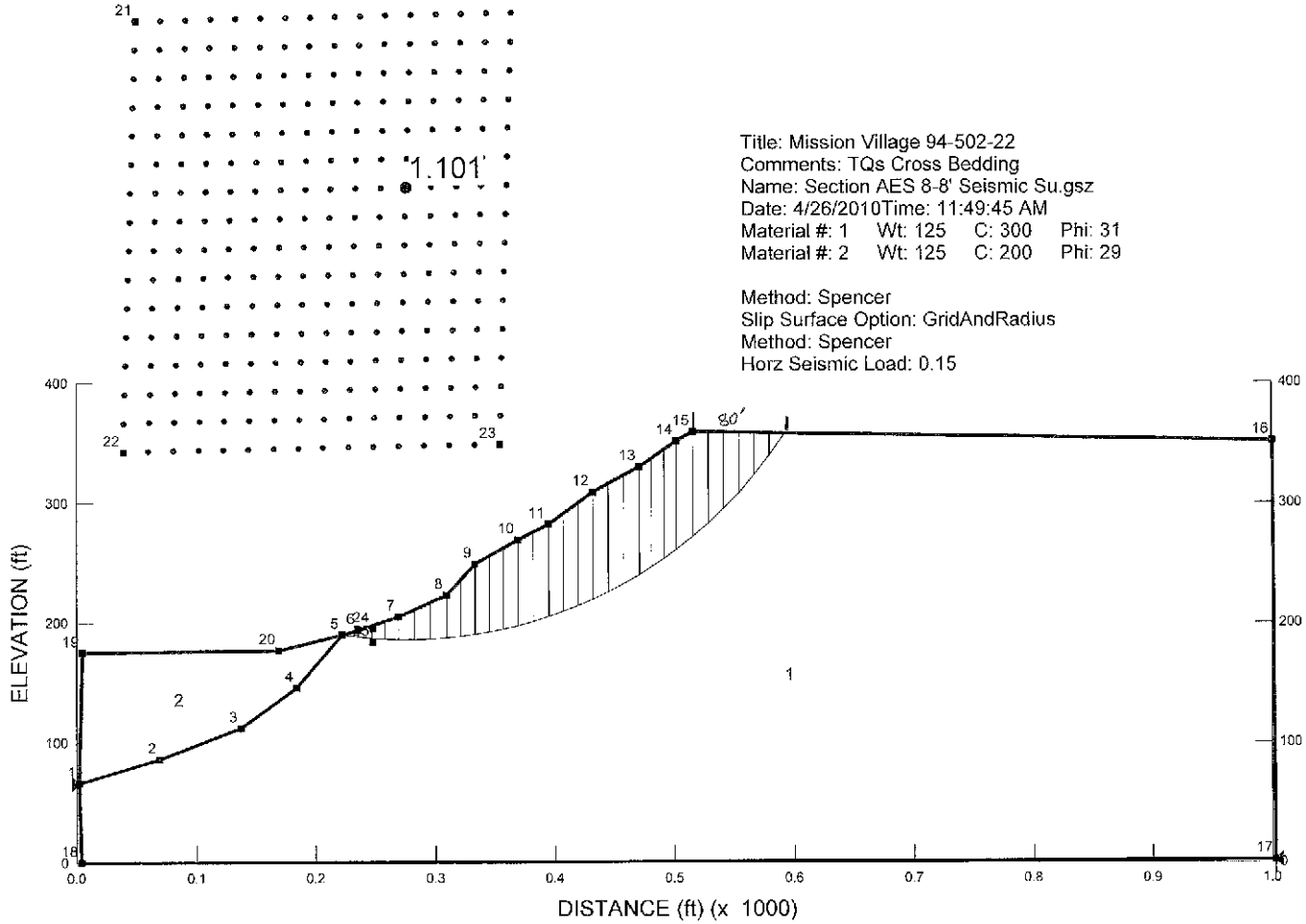
ELEVATION (ft)
DISTANCE (ft) (x 1000)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Material #: 2 Wt: 125 C: 200 Phi: 29
Method: Spencer
Slip Surface Option: GridAndRadius
Method: Spencer
Horz Seismic Load: 0.15
1.101
80'
ELEVATION (ft)
DISTANCE (ft) (x 1000)

APPENDIX 4.2

Hydrological Reports

Drainage Concept for Mesas VTTM 61105

Drainage Concept/SUSMP for:

Mission Village
VTTM 61105
County of Los Angeles

Psomas Project No:
1NRC012000
Prepared: June 27, 2005
Revised: December, 2007
Revised: November 24, 2009
Revised: February 8, 2010

Prepared for:

NEWHALL LAND

25124 Springfield Court, Suite 300
Valencia, California 91355

Prepared by:

PSOMAS
28480 Avenue Stanford, Suite 200
Valencia, CA 91355
Telephone: (661) 219-6000 Fax: (661) 775-2718

Matthew G. Heideman RCE 55639 Exp. 12-31-10

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1.0 Summary

The Mission Village Project is located within a 2,690-acre tributary area of the 1,634 square-mile Santa Clara River Basin Watershed. This Drainage Concept outlines the proposed storm water infrastructure for the Mission Village Project. This report addresses drainage from the upper limits of the project's drainage areas to the southerly edge of the Santa Clara River and along the north edge of the proposed Magic Mountain Parkway extension. Channel lining/bank stabilization is not covered by this Drainage Concept, but is instead addressed in a separate report prepared by PACE. The project boundary consists of approximately 1,200 acres of which 200 acres are within the Santa Clara River that is not a part of this hydrology. The site is downstream of an additional 1,100 acre offsite watershed. The extension of Magic Mountain Parkway to the east of the project boundary to The Old Road impacts another 550 acre offsite watershed extending into the existing Westridge development (referenced hydrology included in Appendix) bringing the total acreage covered by this hydrology to approximately 2,690 acres.

Post-development storm water flows from the site will remain the same compared to existing conditions during a 50-year Capital storm event, and total debris volume being discharged from the site would decrease approximately 40 percent due to the reduction in erodible areas on the site that are capable of producing burned and bulked flows containing debris, and the construction of on site debris basins. Because overall post-development storm flows would not be affected compared to pre-development flows, and because on-site drainage facilities would be designed and constructed to accommodate storm flows from upstream areas, no upstream or downstream flooding is anticipated during a Capital storm as a result of the project.

Upon development, pollutants from the site will be those typical of single family and multifamily development, and would include, among other things, oil and grease, sediments, nutrients, and trash fragments. To mitigate the project's impacts on the water quality of the Santa Clara River, the project will be subject to Section 402(p) of the Federal Clean Water Act, which regulates construction storm water discharges under the National Pollutant Discharge Elimination System (NPDES) program. This program requires that all flood control facilities be in compliance with the General Permit for Los Angeles County or under conditions placed upon individual NPDES permits, should an individual permit be required for any given component of the proposed project. As the proposed project builds out, development would also be required to comply with those

NPDES requirements that are in effect within the County at the time improvements are designed.

The installation of temporary and permanent erosion/sedimentation controls, and water quality control improvements will reduce erosion, sedimentation and debris-production. Water quality impacts, both within and downstream, of the project site will be at less than significant levels. The implementation of the mitigation measures required of the project and recommended in this Drainage Concept will ensure that no avoidable significant flooding, erosion, sedimentation and debris, nor water quality impacts from the proposed project are expected to occur.

2.0 Introduction

References used to prepare this section include:

- Water Quality Control Plan (Basin Plan) for the Coastal Waters of Los Angeles and Ventura Counties prepared by the California Regional Water Quality Control Board, Los Angeles Region (dated 13 June 1994 and approved 23 February 1995),

- Los Angeles County Department of Public Works Hydrology Manual (December 1991) and Sedimentation Manual (June 1993),

- California Regional Water Quality Control Board, Los Angeles Region Order No. 01-182 NPDES Permit No. CAS004001 Waste Discharge Requirements for Municipal Storm Water and Urban Runoff Discharges within the County of Los Angeles, and the Incorporated Cities Therein, Except the City of Long Beach (adopted 13 December 2001),

- California Stormwater Quality Task Force, Construction Storm Water Sampling and Analysis Guidance Document to Assist Dischargers in Complying with California State Water Resources Control Board Resolution No. 2001-046 (October 2001),

- California Water Resources Control Board Resolution No. 2001-046: Modification of Water Quality Order 99-08-DWQ State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity (adopted by the SWRCB on 26 April 2001), and

- California Water Resources Control Board Fact Sheet for Water Quality Order 99-08-DWQ: National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated With Construction Activity (General Permit).

This impact analysis focuses only on the potential hydrologic and water quality impacts of the project.

The following are definitions of several terms that are frequently used in this section of the EIR.

Best Management Practice (BMP)	In water pollution control, the best means available to control pollution of waterways from non-point sources, as opposed to best available technology, which applies to pollution control for point sources.

Burned and Bulked Runoff (Qbb)	Runoff from burned areas that is laden with burned vegetation, fines, rocks, and other debris.
Capital Flood (Qcap)	The runoff resulting from a theoretical storm based on Los Angeles County Department of Public Works methodology. The "model" storm is derived from 50-year frequency rainfall values, which occur in a time sequence patterned after actual major extra-tropical storms occurring in the Los Angeles Region. The calculations of runoff are also based on the soil types and amount of impervious surfaces in a watershed area, and on the assumption that undeveloped portions of the watershed are burned, resulting in significant amounts of debris and sediment being added to the runoff.
Clear Runoff (Qc)	Runoff that is absent of fines, rocks, vegetation, and other debris.
Closed Drainage System	A series of covered or enclosed drainage conduits used to convey storm runoff. Proposed in lower elevations of the tributary drainage courses wherever least development runoff flows would be less than 2,000 cubic feet per second.
Coefficient of Runoff	A variable in the rational runoff formula which is dependent upon soil type, rainfall intensity, and the percent of imperviousness.
Debris Basin	A basin designed to trap sediment and debris from runoff before the runoff is discharged downstream.
Detention Basin	An earthen basin in which storm flows are captured, stored, and slowly released so as to not increase peak runoff from the drainage area it serves.
Erosion	The wearing away of land surfaces by water, wind, and ice, or by gravity (as in landslides).
First Flush	The first 0.5 to 1.0 inch of runoff that discharges from a drainage area and which, when compared to the remainder of the runoff, is presumed to contain a disproportionately large load of pollutants that have accumulated on the impervious surfaces within the drainage area.
Impervious	A substance that will not permit water to flow through it.
Infiltration	Downward entry of water into soil.
Interception	That portion of precipitation intercepted by vegetation. Intercepted precipitation is disposed of by drip, stem flow, or

	evaporation (or sometimes sublimation, in the case of snow, sleet, hail, or freezing rain).
Open Drainage System	A series of uncovered or unenclosed drainages devices used to convey storm runoff. Proposed in lower elevations of the tributary drainage courses wherever least development runoff flows would exceed 2,000 cubic feet per second.
Q	Peak runoff measured in cubic feet per second.
Q50bb	Peak runoff from a 50-year rainfall intensity storm from undeveloped areas that is laden with burned vegetation, fines, rocks, and other debris.
Q50c	Peak runoff from a 50-year rainfall intensity storm from developed areas or from undeveloped areas that are not assumed to be burned or bulked.
Retention Basin	An earthen basin in which storm flows are captured, stored, and retained with no release, except by means of evaporation, infiltration, or emergency bypass.
Runoff	The portion of rainfall, melted snow, or irrigation water that flows across the ground surface rather than infiltrating into the soil.
Sedimentation	Deposition of waterborne sediments due to a decrease in water velocity and a corresponding reduction in the size and amount of sediment, which can be carried by the flowing water.
Soft Bottom Channel	A drainage channel that has been either left in or returned to as natural state as possible, with an earthen or grassy bed.
Velocity	The rate of speed at which water flows either over land or through a channel.
Water Quality Filter	A basin or depression that is lined with grass, gravel, sand, and/or other medium and designed to filter pollutants out of runoff before the runoff is discharged downstream.
Waters of the U.S.[1]	All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; all interstate waters including interstate wetlands; all other waters, such as interstate lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds,

[1] United States, Federal Register, Volume 51, Number 219, Thursday, November 13, 1986.

the use, degradation, or destruction of which could affect interstate or foreign commerce including any such waters: (1) which are or could be used by interstate or foreign travelers for recreational or other purposes; or (2) from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) which are used or could be used for industrial purposes by industries in interstate commerce. Also included are all impoundments of waters otherwise defined as waters of the United States under the definition; tributaries of water identified above; the territorial seas; and wetlands adjacent to waters (other than the waters that are themselves wetlands) identified above.

Wetlands[2] — Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

2.1. METHODOLOGY

Methodology is presented in this section to provide the reader with background information on: (1) the methods used to assess the potential flood impacts of the proposed project, and (2) the regulatory environment in which build out of the proposed flood and water quality control improvements will occur.

a. Hydrology Background

(1) Explanation of County Capital Flood[3]

In 1931, the Los Angeles County Flood Control District (LACFCD) (now the Flood Control Division of the County's Department of Public Works) began development of a Comprehensive Plan of flood control facilities to collect and convey storm flows from the mountainous canyons, the alluvial fans, and the urbanized coastal plain.

The major needs in designing the flood control system were to control high velocity canyon flows, to convey large volumes of runoff during a major storm, and to meet future

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2 United States, Federal Register, Volume 51, Number 219, Thursday, November 13, 1986.

3 Los Angeles County Department of Public Works, Hydrology Manual, (Alhambra, California: December 1990).

flood control needs. The flood protection system designed for the County is based upon the Department of Public Work's Capital Flood hydrology.

The Department's 50-year Capital Flood (or Qcap) hydrology is based on a "design," or model, theoretical storm event that is based on several assumptions as described below. The design storm event is derived from 50-year frequency rainfall values and is patterned after actual major extra-tropical storms observed in the Los Angeles region. The 50-year frequency design storm is assumed to occur over a period of four days, with the maximum rainfall on the fourth day.

Analysis of recorded major storms reveals that, during the twenty-four-hour period of maximum rainfall, rainfall intensity typically increases during the first 70 to 90 percent of the period and decreases in the remaining time. Furthermore, approximately 80 percent of the amount of the twenty-four-hour rainfall falls within the same 70 to 90 percent of the period. In developing the Capital Flood (or Qcap), the 50-year frequency design storm is assumed to fall on saturated soils. In converting rainfall to runoff, rainfall that is not lost due to the hydrologic processes of interception, evaporation, transpiration, depression storage, infiltration, or percolation is assumed to be surface runoff. The effect of snowfall or snowmelt on rainfall-runoff relationships is a consideration only in a very limited portion of the County (i.e., only the higher elevations of the County where snowfall accumulates in winter).

Another assumption made in developing a Capital Flood design flow rate is that natural portions of the watershed have been burned by fire. When a watershed burns, the soil infiltration rate decreases due to the loss of vegetation and physical changes in the soil. Based on County infiltrometer tests, a burned watershed can increase the runoff rate by 10 percent to 20 percent.

The final factor in adjusting the Capital Flood design flow rate is referred to as a bulking factor. In the area where a watershed is burned, the runoff would carry with it a large layer of eroded topsoil. This sediment, along with the associated burned trees and brush, is referred to as debris. In order to account for the addition of the debris to the runoff, the design flow rate is artificially increased by a percentage increase in flow rate, or bulking factor. The bulking factor is a function of not only soil type, but also the steepness of the terrain and the size of the drainage area. The bulking factors for larger drainage areas range from about 1.20 to 1.36, or from 20 percent to 36 percent over and above the burned flow rate.

In summary, the County's Qcap is based on a theoretical four-day storm event occurring right after the watershed has been burned. The runoff from a burned watershed is increased by 10 to 20 percent and again by 20 to 40 percent to account for debris-laden runoff. The burned and bulked peak flow rate is, therefore, 32 to 68 percent higher than a 50-year storm over a drainage area that has not been burned and that does not contribute debris to the runoff. The probability of all of the theoretical assumptions identified in the County's Capital Flood happening at the same time is extremely small. The combination of the 50-year frequency storm with the theoretical burning and bulking factors yield greater design flows under the County's methodology than the methodology used by Federal Insurance Administration (FIA) for calculating the 100-year and 500-year floods.

(2) Method of Drainage Analysis

The engineering term for the methods used to properly size pipes and channels for fluids is "hydraulic analysis." To determine the proper sizes of pipes and channels to convey storm flows, assumptions must be made regarding the amount of rainfall to design for and the amount and type of development that would take place in the drainage area. An estimate must also be made as to how often that amount of rainfall could occur. This is referred to as the storm recurrence interval, or its reciprocal value - storm frequency. For example, a storm that has a 10 percent recurrence interval is a storm that has a 10 percent chance of occurring in any given year. The reciprocal of this number (1/10) is also known as a 10-year frequency. The most important concept to keep in mind is that a pipe or channel is "designed" for a <u>rate</u> of flow (measured in cubic feet per second), not a volume of flow (measured in cubic feet or acre-feet). A dam or a lake is designed for storing or containing a certain volume, or amount, of water. A pipe of a fixed size, on the other hand, can carry different flow <u>rates</u>, depending on the pressure being placed on the water. Similarly, an open channel can carry various flow <u>rates</u> of water depending on different depths of flow in that channel.

In the case of an open channel, of concern from a flood control aspect is the depth of water in the channel, which would vary based on the flow rate (or Q value). For example, in designing a pipe or a channel, it does not matter if a 3-foot deep channel flows 3-feet deep for a week or a year, it only matters that the channel never gets deeper than 3-feet so the property adjacent to the channel does not become flooded.

In designing a storm drain system, the size of a pipe or channel that would safely carry a predicted rate of flow (expressed in cubic feet per second - cfs) must be calculated. A one-foot square box (a cubic foot) can hold 7.5 gallons of water. From this fact, the amount of storm water passing through a pipe or channel in one second can, very simply put, be calculated by multiplying the cross sectional area of the flow in the pipe (in square feet) by the rate in feet per second at which the storm flows pass through the pipe. Hence the expression, "cubic feet per second."

With the above concepts in mind, the effects of development on natural ground can be considered. Buildings, driveways, patios, and roads all represent surfaces that prevent the ground from absorbing rainwater, thereby resulting in a higher amount, or volume, of runoff compared to raw land. Conversely, impervious surfaces result in a lesser flow rate of burned and bulked runoff in developed areas than in undeveloped areas such that the overall effect is less storm runoff from developed sites.

(3) Explanation of Design Hydrology

The following is a discussion of the effects of soil type, imperviousness, and burning and bulking on storm runoff quantities.

(i) Effects of Soil Type and Amount of Imperviousness on Runoff Rates

The increase in runoff is directly related to the type of soil. Certain soil types accept water faster (are more pervious) than other soils. Therefore, the types of soils present on a site are used in the calculations of runoff. Different soil types have very different water infiltration (or absorption) rates. If a sandy soil (highly pervious) is paved over, the coefficient of runoff (C) would greatly increase, whereas if a clay soil (not highly pervious) is paved over, runoff values would go up, but not as high as in the case of sandy soil because the sandy soil absorbs water faster. In small storms, some soils can absorb 100 percent of the rainfall. For example, soil type 015, Tujunga Fine Sandy Loam, can completely absorb a 0.5 inch per hour (in/hr) storm and almost completely absorb a 1.0 in/hr storm, thereby yielding extremely low runoff rates. For a 200-acre parcel with soil types 015 (Tujunga Fine Sandy Loam) and 012 (Ramona Clay Loam), radically different runoff quantities for the same rainfall events occur. For an intense storm, I = 1.0 inch per hour, and the very pervious soil type 015 (Tujunga Fine Sandy Loam), the runoff rate would be 20 cfs. For the same size parcel on a very impervious

soil, such as soil type 012 (Ramona Clay Loam), the runoff rate would be 168 cfs. According to the Los Angeles County Department of Public Works Hydrology Manual the soil types for this watershed are 20, 98 and 97.

(ii) Effects of Burning and Bulking

Downstream drainage courses are generally changed by an increase in runoff from the impervious areas created by development. In an undeveloped watershed, Capital Flood flow rates assume a burned condition, which causes the coefficient of runoff to increase. Further, after increasing the coefficient of runoff for burning, the flow rate is then multiplied by a bulking factor to account for the amount of mud and debris that would be contained within the flow from the burned watershed. In the case of this project, the overall increase in runoff, or flow rates, due to an increase in the coefficient of runoff (C) to account for burning is approximately 25 percent. Application of the bulking factor to account for debris production would increase overall runoff quantities by approximately 36 percent over and above the burned flow rate.

b. Regulatory Setting

Development that discharges storm runoff into and/or encroaches upon natural drainages, wetlands, and/or flood plains is subject to the requirements of Federal, State and local agencies, including the United States Army Corps of Engineers (ACOE) and the California Regional Water Quality Control Board (RWQCB) pursuant to the Federal Clean Water Act; the California Department of Fish and Game (CDFG) pursuant to the State Fish and Game Code; and the Flood Control and Watershed Management Divisions of the Los Angeles County Department of Public Works (LACDPW).

(1) Federal Clean Water Act

The project would be subject to Federal permit requirements under Section 404 of the Federal Clean Water Act (CWA). Section 404 of the CWA regulates activities that result in the location of a structure, excavation, or discharge of dredged or fill material into "waters of the United States," which include wetlands along with non-wetland habitats, such as streams (including intermittent streams), rivers, lakes, ponds, etc.[4] Review of the

[4] By ACOE definition, "waters of the United States" include permanent and intermittent streams as defined by the "ordinary high water mark" which can be identified by physical characteristics, such as channel scouring, bank "shelving," areas cleared of terrestrial vegetation, litter and debris, or other indications that may be appropriate.

United States Geological Service (U.S.G.S.) Newhall quadrangle (photo revised 1988) indicates that the Santa Clara River, also referred to as "waters of the United States" exists along the northern portion of the project site and any activities in the river may come under the jurisdiction of the ACOE pursuant to Section 404 of the Clean Water Act. Actions proposed by the applicant that may fall under ACOE jurisdiction include construction of the bank stabilization and outlet structures into the river.

In 1987, the CWA was amended by adding Section 402(p) that established regulations for municipal and industrial storm water discharges under the NPDES program. Section 402, as amended, requires NPDES permits for storm water discharges from storm drain systems[5] to waters of the United States. Section 402(p)(3)(B) requires that permits for storm drain systems "(i) may be issued on a system- or jurisdiction-wide basis; (ii) shall include a requirement to effectively prohibit non-storm water discharges into the storm sewers; and (iii) shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design, and engineering methods, and other such provisions as the Administrator or the State determines appropriate for the control of such pollutants."

This program requires that all flood control facilities be in compliance with the General Permit for Los Angeles County (NPDES Municipal Permit No. CAS004001 [adopted December 13, 2001] discussed below) or conditions placed upon individual NPDES permits, should an individual permit be required for any given component of the project. Development within the project would comply with NPDES requirements that are in effect at the time improvements are designed, including the incorporation of specific Best Management Practices (BMPs) into the project. BMPs are actions and procedures established to reduce the pollutant loading in storm drain systems. The two main categories of BMPs are "source control" and "treatment control." Source control BMPs are usually the most effective and economical in preventing pollutants from entering storm and non-storm runoff and may include public education/participation activities; materials management; spill prevention and cleanup; street and storm drain maintenance; special site design modifications; and good housekeeping practices. Treatment Control BMPs involve physical treatment of the runoff, usually through structural means. Some of the more common treatment controls include oil/water separators; infiltration systems, such as ponds, vaults, trenches, dry wells, porous pavement, and concrete grids;

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[5] Storm drain systems are described as Municipal Separate Storm Sewer Systems (MS4s) and include streets, gutters, conduits, natural or artificial drains, channels and water courses or other facilities that are owned, operated, maintained or controlled by any Permittee (cities and counties) and used for the purpose of collecting, storing, transporting or disposing of storm water.

constructed wetlands; biofilters comprised of vegetated strips of land or some other medium; extended detention facilities; or a combination of these methods.
While the U.S. Environmental Protection Agency (U.S. EPA) is responsible for implementing the NPDES program at the Federal level,[6] the State Water Quality Control Board (SWQCB) is responsible for implementing the Federal NPDES requirements within California. In 1992, the SWQCB issued two Statewide NPDES General Permits: one for storm water from industrial sites (NPDES No. CAS000001), and the other for storm water from construction sites (CAS000002).

In 1990, the U.S. EPA published final regulations that establish storm water permit application requirements for specified categories of industries. In addition to requirements for specified industries, the regulations also require that discharges of storm water associated with construction activities (storm water discharges) from soil disturbance of five (5) acres or more be regulated as an industrial activity and be required to obtain individual NPDES permits for storm water discharges, or be covered by the above Statewide General Permits. The project would have construction activity that disturbs more than 5 acres and would, therefore, require a NPDES permit. Furthermore, the industrial uses on the site would also be subject to the requirements of the NPDES.

All the activities under the NPDES program are aimed at meeting water quality objectives of receiving waters, such as the Santa Clara River, which often traverse multiple counties and cities. The Los Angeles RWQCB adopted an updated Water Quality Control Plan (Basin Plan) for the Coastal Waters of Los Angeles and Ventura Counties on February 23, 1995, which includes the Santa Clara River and its watershed in the Los Angeles Region (Region 4). The Basin Plan is incorporated by reference as a part of the Los Angeles County NPDES Municipal Permit No. CAS614001, as amended and adopted on December 13, 2001 (Order No. 01-182 of the RWQCBLAR). The Basin Plan specifies the beneficial uses of receiving waters and contains both narrative and numerical water quality objectives for the receiving waters. The project site is part of the Santa Clara River Basin and associated watershed; therefore, it is subject to the requirements of the Basin Plan.

Applicants for development projects have two major responsibilities under the NPDES

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[6] On November 16, 1990, pursuant to Section 402(p) of the CWA, the EPA promulgated Federal regulations (40 Code of Federal Regulations (CFR) Part 122.26) establishing requirements for storm water discharges under the NPDES program. The regulations recognize that certain categories of non-storm water discharges may not need to be prohibited if they have been determined not to be significant sources of pollutants.

Municipal Permit No. CAS614001. The first is to submit and then implement a Standard Urban Storm Water Mitigation Plan (SUSMP) that contains design features and BMPs appropriate and applicable to the project.[7] The purpose of the SUSMP is to reduce post-construction pollutants in storm water discharges. Prior to issuance of any grading or building permit, the County must approve the SUSMP. Each permittee under CAS0040016 is required to amend its codes and ordinances no later than August 1, 2002 to comply with the amended permit under Order No. 01-182 (December 13, 2001). The second responsibility is to prepare a Storm Water Pollution Prevention Plan (SWPPP) for all construction projects with disturbed areas of 2 to 5 acres. Alternatively, the applicant may conform to the State Construction Activity Storm Water Permit for projects that disturb more than 5 acres. The applicant must ensure that a SWPPP is approved, or file a Notice of Intent to comply with the State Permit prior to issuance of a grading permit.

(2) California Department of Fish and Game

The Santa Clara River and associated vegetation on the site are potentially subject to regulation by the CDFG under Sections 1601-1603 of the California Fish and Game Code. Under Sections 1600-1607 of the Fish and Game Code, the CDFG regulates activities that would alter the flows, beds, channels or banks of streams and lakes. The term "stream" can include intermittent and ephemeral streams, rivers, creeks, dry washes, sloughs, blueline streams and watercourses with subsurface flows. The project would alter the northern bank of the Santa Clara River along the project boundary by constructing bank stabilization and eight outlets to the river.

(3) Los Angeles County Flood Control Division

In addition to the requirements identified above for preparing the hydrologic analysis for this project, the LACDPW issued a memorandum in 1986 entitled "Level of Flood Protection and Drainage Protection Standards" for development projects in Los Angeles

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7 The RWQCB, Los Angeles Region, approved the County's SUSMP that requires new construction and development projects to implement BMPs on March 8, 2000. The SUSMP requires that new developments and re-development projects employ a variety of general and land use specification measures to reduce the post-project discharge of pollutants from storm water conveyance systems to the "maximum extent practicable." In May 2000, the County of Los Angeles finalized its "Manual for the Standard Urban Storm Water Mitigation Plan," which details the requirements of the SUSMP. Projects that fall into any of the seven SUSMP development categories (including home subdivisions with 100 or more housing units) are required to incorporate appropriate SUSMP requirements into project plans as part of the development plan approval process for building and grading permits.

The County's Manual for the SUSMP is incorporated by this reference and is available for public review by contacting the Los Angeles County Department of Regional Planning

County. The memorandum established Los Angeles County policy on levels of flood protection and requires that the following facilities be designed for the Capital Flood: all facilities not under State of California jurisdiction that intercept flood waters from natural drainage courses, all areas mapped as floodways, all facilities that are constructed to drain natural depressions or sumps, and all culverts under major and secondary highways. All facilities in developed areas that are not covered by the Capital Flood protection conditions must be designed for the Urban Flood, or runoff from a 25-year frequency design storm. Because the project would intercept flood flows from natural areas its storm drainage facilities that accept these flows must be sized and designed for the Capital Flood.

In addition to meeting the level of flood protection, all development in the Santa Clara River watershed must meet standards adopted by the LACDPW for the Santa Clara River and its major tributaries in the County Sedimentation Manual (pp. 2-2 to 2-6).

3.0 EXISTING CONDITIONS

Provided below is information regarding the existing drainage characteristics of the project site and its surroundings.

a. Drainage Areas and Watercourses

The project site is located within the Santa Clara River watershed, which, in its entirety, is 1,634 square miles in area. However, the total tributary area impacted by the proposed development and covered in this report is approximately 2,690 acres (see **Drainage Study Map, Existing Hydrology**). This runoff flows to and through the site and across the proposed off-site improvements of Magic Mountain Parkway via sheet flows and natural concentrated flows. These flows eventually discharge to the Santa Clara River, either directly or to existing concrete channels that outlet to the river north and east of the Magic Mountain Theme Park at various locations as shown on the Existing Hydrology Drainage Study Map.

b. Existing Runoff Conditions

Annual rainfall in this area is typically low and occurs generally in the winter months. Runoff sources occur both on and off site with the headwaters of the streams in the steep upper canyons near the ridgelines in off-site areas. The combination of soil characteristics and high magnitude low frequency storms, which are typical of the region, produce conditions conducive to rapid accumulation of surface water and high storm peak runoffs.

Existing project site runoff was calculated for each of the 15 drainage areas on the site based on the County's Capital Flood methodology. Runoff quantities are provided in the following table "Existing Runoff Conditions". Clear flows for the 15 drainage areas total approximately 4,300 cfs, and burned and bulked flows total approximately 5,700 cfs for a 50-year Capital storm. The calculated total debris volume during a 50-year Capital storm is approximately 85,200 cubic yards.

Drainage area series 30 thru 90 and 120 all drain through the site and directly to the Santa Clara River accounting for almost half the project tributary area (1,286 acres). Drainage areas 1-20 and 100 series drain to an existing concrete channel (Line "A" PD1052) that runs through the Magic Mountain theme park. Series 500 and 600 outlet to two concrete channels that converge on the theme park property and into a culvert (Line "F" PD1052)

under the park entrance and into a concrete channel (Line "B" PD1052) on Newhall property (VTTM 53295) that drains to the Santa Clara River. Drainage area 610 outlets under Magic Mtn Pkwy directly to the same concrete channel (Line "B" PD 1052). Series 620 outlets under Magic Mtn Pkwy and into an existing concrete channel that runs along The Old Road before outletting to the river. Drainage area 622 is collected in area drains and street catch basins and piped to the same concrete channel along The Old Road. When The Old Road is relocated (prior to this project) this concrete channel will be replaced by an RCB (MTD 1764 by Metropointe Engineers) in a similar alignment as shown on the proposed condition maps.

Existing Runoff Conditions

Drainage Area	Acreage	Debris Producing Acreage	Q50[1] (cfs)	Q50bb[2](cfs)	Debris Volume[3] (cy)
1-23 series	743.8	655	1085	1493	24875
30-50 series	534.3	534.3	776	1057	14960
50 series	358.6	358.6	375	551	10041
60 series	169.3	169	307	416	6433
70 series	26.1	26.1	46	63	1428
75 series	17.3	17.3	36	49	946
80 series	75.3	75.3	77	109	3916
90 series	95.8	95.8	149	224	4311
100 series	105.2	105.2	137	198	4418
120 series	18.2	18.2	38	52	996
500 series	102.7	103	193	276	4519
600 series	402.1	376.3	959	1059	6062
610 series	19.8	19.8	45	61	1083
620 series	21.6	19	41	54	1039
622 series	6	0	21	21	0
Totals	**2,696**	**2,573**	**4,285**	**5,682**	**85,238**

[1]*Q50c - 50-year rainfall intensity clear and burned flow*
[2]*Q50bb - 50-year rainfall intensity burned and bulked flow*
[3]*Debris Volume – Cubic Yards are determined by using the debris producing rate of* **(range: 30-55 cy/ac)**, *which is specific for this area, on undeveloped areas. (see appendix for dpa ratios calculations)*

4.0. PROPOSED DRAINAGE IMPROVEMENTS

The project applicant proposes to develop the site for residential use. Upon completion of the development, site and upstream runoff would continue to flow through the site via a storm drain system that would be from the upper end of the developed area, down to the Santa Clara River. The applicant proposes to control post-development runoff through a combination of grading, storm drainpipes, channels, catch basins, outlet structures, and channel lining/bank stabilization along the river. For the purpose of this proposed drainage concept the 50-Year Urban Design Storm will be used to design all on-site drainage systems. The principal components of the drainage system will consist of:

- Storm Drains: Storm drains (pipes and reinforced concrete boxes) designed for a 50-year storm will consist of both privately and publicly maintained systems.

- Open Channels: Small open channels will consist of rectangular and trapezoidal concrete channels and will be designed for a 50-year storm.

- Catch Basins: Catch basins will be provided to intercept flows for 50-year storms to minimize flooding at street intersections and at sump locations.

- Energy Dissipaters: Energy dissipaters consisting of either rip-rap or larger standard impact type energy dissipaters may be required at outlet locations to reduce velocities where necessary to prevent erosion.

- Low Flow Pipes and Outlets: To reduce pollution from impacts from the "first flush" runoff, a series of pipes and outlets will be provided to intercept first flush runoff from paved developed areas. Mitigation will be achieved through the use of above ground and/or subsurface water quality control basins. The current concept utilizes both surface and subsurface water quality control basins near the outlet points of the storm drain pipes, as well as debris basins at the downstream ends of natural areas.

In addition, the northern bank of the Santa Clara River will be lined/stabilized as recommended in a report prepared by Psomas.

- Water Quality Basins: Basins will serve as treatment devices for first flush flows as well as energy dissipaters for the storm flows before discharging to the river.

4.1 PROJECT IMPACTS

The impacts of project implementation are discussed below for each of the threshold criteria identified for the project. Wherever a significant threshold criterion is exceeded or wherever there is the potential for a criterion to be exceeded, mitigation is identified in **Section 5, Project Mitigation Measures**. This impact analysis focuses only on the potential hydrologic and water quality impacts of the project. Channel lining/bank stabilization is addressed in a separate report.

a. Impacts Associated with Flooding During a 50-Year Capital Storm

Project development will reduce burned and bulked runoff and debris volumes from the site due to development of the site. Project development would, however, increase the clear flow runoff due to the increase in impervious surfaces. Specifically, runoff quantities provided in the following table, "Post-Development Site Runoff Conditions", demonstrate that clear flows for the 17 project drainage areas will total approximately 4,465 cfs during a 50-year storm. This represents a 5 percent increase in flows. The increase in burned flows for the proposed conditions is negligible.

Post-Development Site Runoff Conditions

Drainage Area	Acreage	Debris Producing Acreage	Q50[1] (cfs)	Q50bb[2](cfs)	[3]Debris Volume (cy)
1-31 series	735.1	498.5	1137	1137	13,459
40 series	84.8	84.8	168	242	3,986
50 series	25.6	25.6	32	45	1,400
55 series	2.0	2.0	5	7	109
60 series	172.2	15.5	302	302	408
95-119 series	474.3	126.0	759	788	5,166
140 series	20.6	20.6	33	45	1127
150 series	13.0	13.0	26	35	711
160 series	16.3	16.3	30	41	892
170 series	6.1	6.1	17	23	334
200 series	439.1	439.1	580	809	11,680
300 series	2.4	2.4	6	8	131
400 series	145.1	0	239	239	0
503 series	11.8	11.8	26	35	645
600 series	523.9	268.2	1049	1049	7914
620 series	19.6	9.4	50	50	514
630 series	2.7	0	7	7	0
Totals	**2,695**	**1,539**	**4,466**	**4,862**	**48,476**

[1]*Q50 - 50-year rainfall intensity clear and burned flow*
[2]*Q50bb - 50-year rainfall intensity burned and bulked flow*
3Debris Volume – Debris Producing acreage is multiplied by the area's debris producing rate. (range: 30-55 cy/ac)
(Debris Producing rates were taken from the LACDPW Sedimentation manual see appendix for reference sheets.

For the final design of the proposed development the 25-Year Urban Design Storm will be used as the basis of design to collect runoff from the developed areas of the site for flow-by conditions and the 50-Year Urban Design Storm will be used for sump conditions, while the upstream storm flows would be channeled through the site in facilities designed for the 50-Year Capital Flood event. Since upstream storm flows would be channeled through the site in facilities designed for the 50-Year Capital Storm, and since on-site runoff would be accommodated in facilities designed for the 25-Year Urban Design Storm pursuant to LACDPW requirements, no on-site or upstream flooding due to inadequately designed storm drainage facilities would occur.

In conclusion, overall post-development storm water flows from each drainage area on the site would remain the same compared to existing conditions during a Capital Flood event. Furthermore, on- and off-site storm drain conveyance facilities would be designed and constructed to, at a minimum, accommodate flows from the entire 2,690-acre tributary watershed during a Capital storm, not just from the project site. As a result, the

project would not result in upstream or downstream flooding, and flood impacts would be less than significant.

	Area	Debris Producing Acreage	Q50 (cfs)	Q50bb (cfs)	Debris Volume (cy)
Existing	2,696	2,573	4,285	5,682	85,238
Proposed	2,695	1,539	4,466	*4,862	48,476
Effect	0%	(-40%)	+5%	(-14%)	(-43%)

*Future developed flows anticipated to come from VTTM 53295 and VTTM 61996 result in a net increase of 905 cfs flowing through this project's flood control system and outletting to the river. The future flows result in a net increase in flow from the existing burned and bulked flow of one percent (5767-5682=85cfs).

b. Impacts Associated with Erosion, Sedimentation and Debris Transport

Upstream runoff carrying sediment or debris to developed areas in the project site will be intercepted at proposed debris basins. The largely undeveloped project site has relatively low debris potential when compared to the upland regions of the watershed near the ridgelines. However, there is still the possibility that significant sedimentation impacts may occur during grading of the site and construction of the proposed improvements if runoff from the site is not properly controlled in accordance with standard construction practices. Once developed, the project would reduce downstream sedimentation due to the replacement of existing debris-producing areas with non-erodable surfaces, including pavement, structures, and permanent vegetation which would reduce the volume of sediment in site runoff, and by treating upstream debris carrying flows entering into the developed area at debris basins. This project would decrease on-site erosion, remove sediment from upstream flows entering the project, and cause no increase in downstream sedimentation.

With the installation of non-erodable vegetation and surfaces on the site, temporary and permanent erosion control measures, and debris basins in accordance with agency requirements, impacts associated with erosion, sedimentation, and debris production would be less than under existing conditions, and less than significant.

c. Storm Water Quality Impacts

The existing surface water quality runoff from portions of the site is unknown, but based on current site conditions (i.e., undeveloped agricultural use of the site), the likely pollutant loads consist of sediment, debris, trash, pesticides/fertilizers/herbicides, oil and grease, and loose surface material characteristic of an undeveloped or semi-developed site in a suburban surrounding. During construction and upon development, the pollutant load from the site would differ from the existing pollutant load due to the transition of much of the site from agricultural to residential uses, and due to an increase in impervious surfaces. Common concerns related to surface water quality include the potential deposition of pollutants generated by motor vehicles on the project site and the maintenance of landscaped areas.

In an attempt to reduce the impact from these pollutants, a series of pipes and outlets are proposed on the site to intercept first flush runoff from paved developed areas and to channel it to subsurface water quality control basins near the outlet points of the storm drain pipes. The project will meet the main standards established by the GTW Regional Water Quality Control Board.

The quality of runoff from the project site will be subject to Section 402(p) of the Clean Water Act under the NPDES program, which, in Los Angeles County, is administered by the LACDPW Watershed Management Division. Specific mitigation measures have already been incorporated into the SUSMPs and the SWPPPs for development projects under NPDES Municipal Permit No. CAS614001. Therefore, with conformance to existing water quality requirements for the Santa Clara River watershed as specified in the NPDES permit and County regulations, potential water quality impacts of the proposed project would be less than significant.

5.0 PROJECT MITIGATION MEASURES

a. Mitigation Measures Already Incorporated into the Project

5.0-1 The on-site storm system shall be designed for 50-year storm as required.

5.0-2 Energy dissipaters consisting of either riprap or larger standard impact type energy dissipaters shall be constructed at outlet locations to the river as required by LACDPW to reduce velocities where necessary to prevent erosion.

5.0-3 Riverbank lining/stabilization will be discussed in a separate report.

5.0-4 To reduce pollution from impacts from the "first flush" runoff, a series of pipes and outlets shall be designed and constructed to intercept first flush runoff from paved developed areas and to channel it to water quality control basins. The use of catch basin filters will be used where allowed by the County.

5.0-5 To reduce debris being discharged from the site, debris basins shall be constructed to intercept flows from undeveloped areas entering into the developed portions of the site.

b. Mitigation Measures Recommended by the EIR

5.0-6 The project applicant shall prepare a final developed condition hydrology analysis in conjunction with ultimate project design, when precise engineering occurs. Those final calculations shall establish design features for the project that satisfy the criterion that post-development peak storm water runoff discharge rates, velocities, and duration in natural drainage systems mimic pre-development conditions (NPDES Permit No. CAS004001, as amended December 13, 2001). All elements of the storm drain system shall conform to the policies and standards of the Los Angeles County Department of Public Works, Flood Control Division, as applicable.

5.0-7 Ultimate project hydrology and debris production calculations shall be prepared by the project engineer to verify the requirements for debris basins and/or desilting inlets.

5.0-8 Prior to issuance of grading permits, erosion and sedimentation control plans shall be prepared by the applicant to ensure that no significant erosion or sedimentation impacts would occur during or after development of the project site. These plans shall be

prepared to the satisfaction of the County of Los Angeles. Temporary erosion control measures to be implemented during construction may include minimizing existing vegetation removal; using temporary soil covers, such as hydro seeding, to protect exposed soil from wind and rain; and installing silt fencing, berms (i.e., sandbagging), and dikes to protect storm drain inlets and drainage courses.

5.0-9 Prior to issuance of grading permits, the applicant shall obtain a storm water discharge permit for construction activities from the State Water Quality Control Board, Los Angeles Region, pursuant to the most current requirements of the National Pollutant Discharge Elimination System.

5.0-10 All applicable requirements of the NPDES Program that are in effect in Los Angeles County at the time the application is deemed complete shall be satisfied during and after project construction. These requirements currently include preparation of a Standard Urban Storm Water Mitigation Plan (SUSMP) containing design features and Best Management Practices (BMPs) appropriate and applicable to the subdivision. The requirements currently also include preparation of a Storm Water Pollution Prevention Plan (SWPPP) containing design features and BMPs appropriate and applicable to the subdivision. The project engineer recommends the following measures to be incorporated into the plan:

- The storage area of all construction vehicles shall be contained to prevent the spreading and infiltration of petroleum products and wastes into surface and subsurface water bodies.

- Homeowner's associations shall be established to, among other things, maintain common areas, including private drive and/or street sweeping to reduce solid wastes that could contaminate surface runoff.

The County of Los Angeles shall monitor compliance with these NPDES requirements:

5.0-11 Drainage improvements for each phase of the proposed development shall be completed prior to construction of any habitable structures. Such improvements shall conform to the approved drainage plan.

5.0-12 Pursuant to the requirements of Section 13260 of the California Water Code, the project applicant shall prepare a Report of Waste Discharge (ROWD) or an NPDES

application for any necessary dewatering activities within the Santa Clara River as part of this project. The project applicant shall also comply with specific requirements of the RWQCB regarding discharges into the river.

5.1 CUMULATIVE IMPACTS

Cumulative impacts for this analysis are discussed relative to the build out of the 2,690-acre tributary watershed of the Santa Clara River in which the project lies. Within the 2,690-acre tributary watershed, approximately 1,690 acres lie outside the project boundary. On-site drainage improvements would be designed to accommodate on-and off-site burned and bulked flows from the undeveloped upstream portions of the watershed during a 50-year Capital storm event. Development in the watershed must comply with the Department of Public Works design criteria that prohibits significant increased in off-site post-development storm flows and significant increases in storm flow velocities. As a result of compliance, overall storm runoff discharge quantities from the watershed under post-development runoff conditions would be less than under existing conditions largely because the runoff would be free of the debris that is typical of undeveloped watersheds and flow velocities would not increase significantly. Because on-site facilities would already have been built for burned and bulked flows from undeveloped areas, they would have more than adequate capacity to accommodate off-site flows as the off-site portions of the drainage areas develop.

Because on-site drainage facilities would have adequate capacity to capture and convey off-site flows from developed upstream areas and because the storm drainage improvements in the remainder of the watershed would be required to handle the Capital Flood, no significant increases in velocity and related scouring, and no significant cumulative project flooding impacts are expected to occur downstream of the site (including the Santa Clara River) as the 2,690-acre watershed builds out.

The cumulative effects on water quality of future development within the Santa Clara River watershed could be adverse and possibly significant. The nature of the land uses involved, the manner in which runoff is controlled prior to discharge, and the manner in which urban wastes are managed and prevented from becoming part of the storm water runoff would all affect the significance of such cumulative water quality impacts.

The Los Angeles RWQCB's adopted Water Quality Control Plan (Basin Plan) for the Coastal Waters of Los Angeles and Ventura Counties is designed to preserve and

enhance water quality and protect the beneficial uses of all regional waters within Region 4. The Plan includes narrative and numerical water quality objectives for several constituents and parameters that must be attained or maintained to protect the designated beneficial uses of the river and its tributaries. The Regional Water Quality Control Board, therefore, has the authority to regulate water quality in Los Angeles and Ventura Counties, including the Santa Clara River watershed, and it is the responsibility of the local jurisdictions (i.e., LACDPW Watershed Management Division and the Ventura County Flood Control District) to ensure that future development within the watershed would be subject to the same or similar types of water quality requirements as the proposed project. Therefore, with these requirements in place, no cumulative water quality impacts are anticipated.

5.2 CUMULATIVE MITIGATION MEASURES

All cumulative projects within the 2,690-acre tributary watershed and within other undeveloped areas of the County are required to meet the same or similar general flood control and water quality requirements as the proposed project, and other site-specific requirements that the LACDPW Flood Control Division, Watershed Management Division, and RWQCBLAR would specifically identify for those projects. These requirements serve to avoid the potential for creating flooding, erosion, siltation, and water quality impacts in the Santa Clara River and its tributaries.

5.3 UNAVOIDABLE SIGNIFICANT IMPACTS

a. Project Impacts

Implementation of the identified mitigation measures in accordance with LACDPW and RWQCBLAR requirements would reduce flooding, erosion, sedimentation, and water quality impacts to less than significant levels. Therefore, no avoidable significant impacts are anticipated.

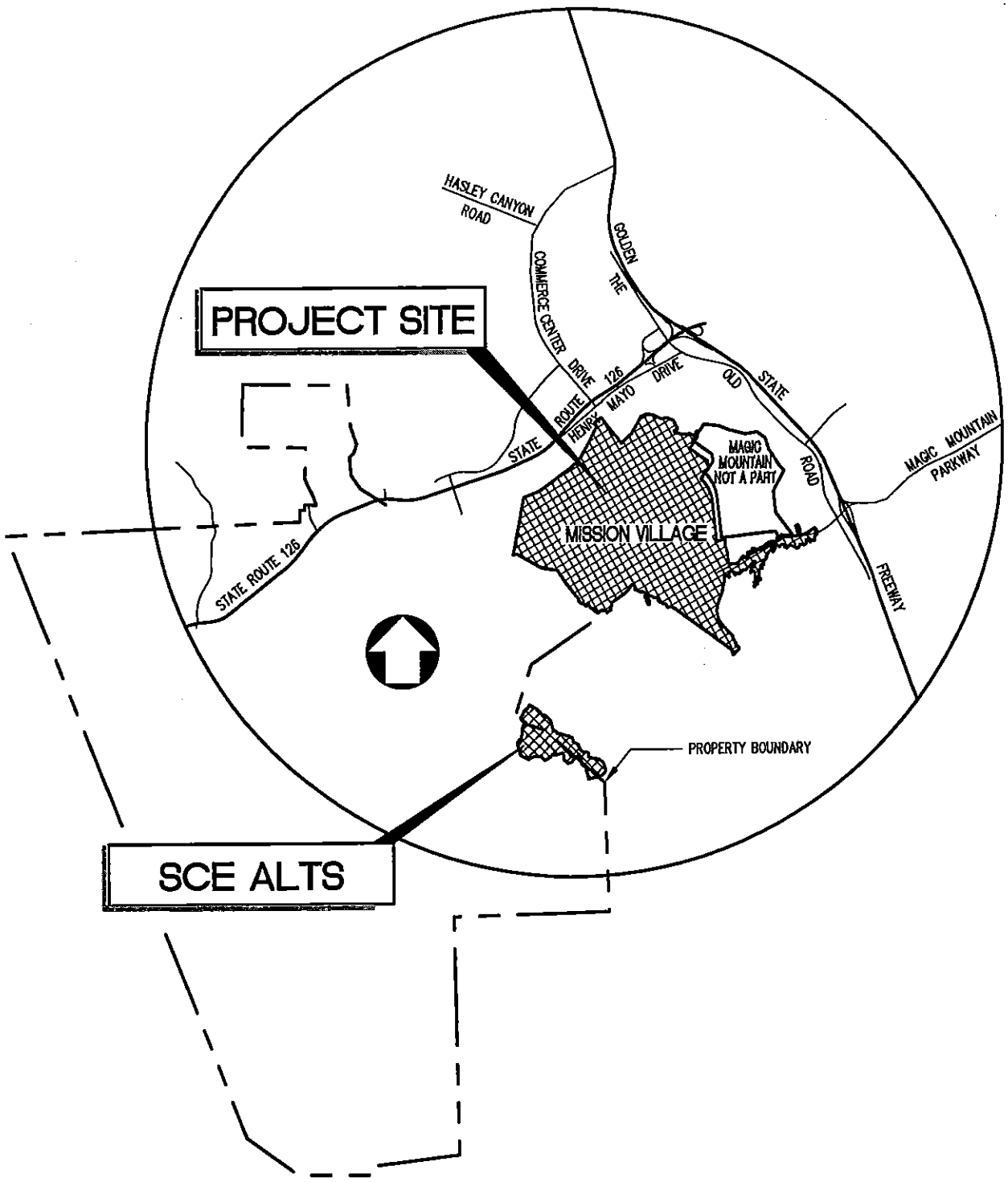
b. Cumulative Impacts

Assuming that all development within the 2,690-acre tributary area of the Santa Clara River watershed complies with agency requirements in order to ensure that upstream or downstream flooding does not occur as well as to ensure that downstream erosion and

sedimentation do not occur, no avoidable significant cumulative flooding, erosion, or sedimentation impacts would be created. These developments must also comply with the water quality requirements of the LACDPW Watershed Management Division and the RWQCBLAR; therefore, no unavoidable significant cumulative water quality impacts would occur.

7.0 Runoffs for offsite SCE Substation (proposed and existing condition)

The proposed SCE substations are located offsite and to serve the entire Mission Village project (see vicinity map on next page). The existing condition at both the SCE substations and disposal site are mountainous with low annual rainfall and is draining to nearby existing stream. The project site is located within the Santa Clara River Watershed. The total area is approximately 52.9 acres which has the burned and bulked flow and the debris volume of approximately 199 cfs and 2894 cy during a 50-year Capital storm. Since the development site is very small and has little or no impact to the existing condition, there are no change to the burned and bulked flow and the debris volume. So, there is no impact or minimal impact to this site. See hydrology calculations for both existing and proposed conditions in this report and the hydrology map sheets 10 and 11.



VICINITY MAP

NOT TO SCALE

NEWHALL LAND

PSOMAS

Existing Condition For SCE Substation 2/8/2010, 11:39 AM
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SUB-AREA AREA						TOTAL AREA	Σ Q50 (cfs)	DPV (CY)	DPV (CY)	DEBRIS CONTROL TYPE	Qpm (cfs)	Vm (cu. ft)
LOC.	Ac.	Rainfall Depth (in.)	Tc (min.)	Q50 (cfs)	Q50 BB (cfs)	Σ AREA (Ac.)			TOTAL			
SCE Substation Alt-2												
701A	43	6.6	10	109	148	43.0	148	2352	2352	Natural		
702A	0	-	-	-	-	43.0	148	0	2352	Natural		
710A	8	6.8	5	30	41	8.0	41	438	438	Natural		
711A	0	-	-	-	-	8.0	41	0	438	Natural		
720A	1.9	6.8	5	7	10	1.9	10	104	104	Natural		
721A	0	-	-	-	-	1.9	10	0	104	Natural		
					Total	**52.9**	**199**		**2894**			
SCE Substation Alt-1												
701A	43	6.6	10	109	148	43.0	148	2352	2352	Natural		
702A	0	-	-	-	-	43.0	148	0	2352	Natural		
730A	8	6.8	5	30	41	8.0	41	438	438	Natural		
731A	-	-	-	-	-	8.0	41	0	438	Natural		
740A	0.8	6.8	5	3	4	0.8	4	44	44	Natural		
741A	-	-	-	-	-	0.8	4	0	44	Natural		
					Total	**51.8**	**193**		**2833**			

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
EXISTING HYDROLOGY FOR MISSION (BURN)

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
22	701A	43.0	109.06	43.0	109.06	0	0.	.00000	.00	.00	0.	292	10	A33	.01
22	702A	.0	.00	43.0	109.06	0	0.	.00000	.00	.00	0.	292	99	A33	.00

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
EXISTING HYDROLOGY FOR MISSION (BURN)

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
22 710A	8.0	29.58	8.0	29.58	0	0.	.00000	.00	.00	0.	292	5	A34	.01
22 711A	.0	.00	8.0	29.58	0	0.	.00000	.00	.00	0.	292	99	A34	.00

Program Package Serial Number: 2033

02/04/10 FILE: E-SCE3 INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat

EXISTING HYDROLOGY FOR MISSION (BURN) STORM DAY 4

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
22 720A	1.9	7.03	1.9	7.03	0	0.	.00000	.00	.00	0.	292	5	A34	.01
22 721A	.0	.00	1.9	7.03	0	0.	.00000	.00	.00	0.	292	99	A34	.00

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
EXISTING HYDROLOGY FOR MISSION (BURN)

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
22	730A	8.0	29.58	8.0	29.58	0	0.	.00000	.00	.00	0.	292	5	A34	.01
22	731A	.0	.00	8.0	29.58	0	0.	.00000	.00	.00	0.	292	99	A34	.00

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
EXISTING HYDROLOGY FOR MISSION (BURN)

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
22 740A	.8	2.96	.8	2.96	0	0.	.00000	.00	.00	0.	292	5	A34	.01
22 741A	.0	.00	.8	2.96	0	0.	.00000	.00	.00	0.	292	99	A34	.00

Proposed Condition for SCE Substation 2/8/2010, 11:39 AM
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SUB-AREA AREA						TOTAL AREA	Σ Q50 (cfs)	DPV (CY)	DPV (CY)	DEBRIS CONTROL TYPE	Qpm (cfs)	Vm (cu. ft)
LOC.	Ac.	Rainfall Depth (in.)	Tc (min.)	Q50 (cfs)	Q50 BB (cfs)	Σ AREA (Ac.)			TOTAL			
SCE Substation Alt-2												
701A	14.6	6.6	9	34	46	14.6	46	799	799	Natural		
702A	15	6.6	9	35	48	29.6	91	821	1619	Natural		
703B	10.2	6.6	9	22	30	10.2	55	558	2177	Natural		
704AB	-	-	-	87	-	39.8	120	0	**2177**	Natural		
710A	3.2	6.8	9	7	10	3.2	10	175	175	Natural		
711A	-	-	-	7	10	3.2	10	0	**175**	Natural		
720A	4.7	6.8	6	13	18	4.7	18	257	257	Natural		
721A	-	-	-	13	18	4.7	18	0	**257**	Natural		
730A	5.1	6.8	9	12	16	5.1	12	279	279	Natural		
731A	-	-	-	12	16	5.1	12	0	**279**	Natural		
					Total:	**52.8**	**160**		**2888**			
SCE Substation Alt-1												
701A	14.6	6.6	9	34	46	14.6	46	799	799	Natural		
702A	15	6.6	9	35	48	29.6	91	821	1619	Natural		
703B	10.2	6.6	9	22	30	10.2	55	558	2177	Natural		
704AB	-	-	-	87	-	39.8	120	0	**2177**	Natural		
710A	3.2	6.8	9	7	10	3.2	10	175	175	Natural		
711A	-	-	-	-	-	3.2	10	0	**175**	Natural		
740A	2.8	6.8	5	9	12	2.8	12	153	153	Natural		
741A	-	-	-	9	12	2.8	12	0	**153**	Natural		
750A	6.1	6.8	6	17	23	6.1	23	334	334	Natural		
751A	-	-	-	-	-	6.1	23	0	**334**	Natural		
					Total	**51.9**	**165**		**2839**			

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
PROP HYDROLOGY FOR MISSION (BURN)

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
22	701A	14.6	33.72	14.6	33.72	2	800.	.06000	.00	.00	0.	292	9	A29	.01
22	702A	15.0	34.65	29.6	66.03	0	0.	.00000	.00	.00	0.	292	9	A29	.01
22	703B	10.2	21.81	10.2	21.81	4	100.	.10000	2.00	.00	0.	92	9	A29	.10
22	704AB	10.2	21.81	39.8	87.41	2	20.	.02000	.00	.00	0.	92	0	A29	.00

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
PROP HYDROLOGY FOR MISSION (BURN)

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
22 710A	3.2	7.39	3.2	7.39	0	0.	.00000	.00	.00	0.	292	9	A29	.01
22 711A	.0	.00	3.2	7.39	0	0.	.00000	.00	.00	0.	292	99	A29	.00

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
PROP HYDROLOGY FOR MISSION (BURN)

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
22 720A	4.7	13.25	4.7	13.25	0	0.	.00000	.00	.00	0.	292	6	A29	.10
22 721A	.0	.00	4.7	13.25	0	0.	.00000	.00	.00	0.	92	99	A29	.00

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
PROP HYDROLOGY FOR MISSION (BURN)

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
22 730A	5.1	11.80	5.1	11.80	0	0.	.00000	.00	.00	0.	292	9	A29	.10
22 731A	.0	.00	5.1	11.80	0	0.	.00000	.00	.00	0.	92	99	A29	.00

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
PROP HYDROLGOLY FOR MISSION (BURN)

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
22 740A	2.8	8.77	2.8	8.77	0	0.	.00000	.00	.00	0.	292	5	A29	.01
22 741A	.0	.00	2.8	8.77	0	0.	.00000	.00	.00	0.	292	99	A29	.00

Program Package Serial Number: 2033

02/04/10 FILE: P-SCE6 INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat

PROP HYDROLGOLY FOR MISSION (BURN) STORM DAY 4

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
22 750A	6.1	17.20	6.1	17.20	0	0.	.00000	.00	.00	0.	292	6	A29	.10
22 751A	.0	.00	6.1	17.20	0	0.	.00000	.00	.00	0.	292	99	A29	.00

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SUB-AREA						TOTAL AREA	Σ Q50 (cfs)	Σ Q50 BB (cfs)	DPV (CY)	Total DPV (CY)
LOC.	Ac.	Rainfall Depth (in.)	Tc (min.)	Q50 (cfs)	Q50 BB (cfs)	Σ AREA (Ac.)				
1A	36.0	7.2	13	82	104	36.0	82	104	1368	1368
2A	37.0	7.2	10	97	123	73.0	179	227	1406	2774
3A	43.3	6.9	13	96	122	116.3	212	286	1645	4419
4A	42.3	6.9	14	90	114	158.6	290	389	1607	6027
5A	20.4	6.8	10	50	64	179.0	308	420	775	6802
6A	37.4	6.9	15	83	105	216.4	385	519	1421	8223
7A	32.5	6.7	9	84	107	248.9	438	595	1235	9458
8B	47.3	6.7	10	117	149	47.3	117	149	1797	11256
9B	34.2	6.6	16	57	72	81.5	160	207	1300	12555
10AB	81.5		0	160	203	330.4	596	800	0	0
11A	34.2	6.6	10	88	112	364.6	652	880	1300	13855
12A	40.5	6.4	11	96	122	405.1	700	954	1539	15394
13A	29.9	6.6	11	60	76	435.0	737	1007	1136	16530
14A	39.3	6.3	12	89	113	474.3	751	1045	1493	18023
15C	35.9	6.9	8	109	-	35.9	109	109	0	18023
16C	26.4	6.8	11	67	-	62.3	170	170	0	18023
17C	26.9	6.8	12	65	-	89.2	234	234	0	18023
18C	37.1	6.6	7	112	142	126.3	268	298	1410	19433
19C	20.1	6.4	9	52	66	146.4	291	335	764	20197
20AC	146.4		0	291	370	620.7	1020	1358	0	0
21A	35.0	6.2	11	80	102	655.7	1025	1385	1330	21527
22A	44.5	6.1	15	87	110	700.2	1076	1459	1691	23218
23A	43.6	6.0	12	92	117	743.8	1085	1493	1657	**24875**
30A	34.5	6.4	10	80	102	34.5	80	102	966	966
31A	46.4	6.2	15	83	105	80.9	136	180	1299	2265
32B	32.6	6.2	10	73	93	32.6	73	93	913	3178
33B	45.3	6.2	12	91	116	77.9	146	190	1268	4446
34AB	77.9		0	146	185	158.8	280	368	0	4446
35C	41.6	6.4	15	70	89	41.6	70	89	1165	5611
36C	41.4	6.2	13	80	102	83.0	128	169	1159	6770
37AC	83.0		0	128	163	241.8	408	537	0	6770
38A	27.3	6.0	12	53	67	269.1	447	590	764	7535
39A	17.9	6.0	12	35	44	287.0	477	630	501	8036
40A	30.2	5.9	11	61	77	317.2	492	661	846	8882
41D	30.2	5.8	12	56	71	30.2	56	71	846	9727
42D	23.1	5.9	12	45	57	53.3	101	128	647	10374
43D	15.4	5.8	11	30	38	68.7	124	159	431	10805
44AD	68.7		0	124	157	385.9	603	807	0	10805
45A	29.7	5.8	14	51	65	415.6	626	844	832	11637
46E	37.4	6.2	15	67	85	37.4	67	85	1047	12684
47E	35.1	6.0	10	75	95	72.5	123	161	983	13667
48E	29.1	5.8	12	54	69	101.6	165	218	815	14482
49AE	101.6		0	164	208	517.2	774	1045	0	14482
50A	17.1	5.8	10	35	44	534.3	776	1057	479	**14960**

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SUB-AREA						TOTAL AREA	Σ Q50 (cfs)	Σ Q50 BB (cfs)	DPV (CY)	Total DPV (CY)
LOC.	Ac.	Rainfall Depth (in.)	Tc (min.)	Q50 (cfs)	Q50 BB (cfs)	Σ AREA (Ac.)				
51A	34.0	6.2	14	63	80	34.0	63	80	952	952
52A	36.1	6.0	10	77	98	70.1	131	169	1011	1963
53A	46.3	6.0	12	89	113	116.4	202	264	1296	3259
54A	45.9	5.8	12	85	108	162.3	268	353	1285	4544
55A	44.2	5.8	9	103	131	206.5	301	414	1238	5782
56A	38.5	5.8	13	62	79	245.0	337	466	1078	6860
57A	37.0	5.8	16	53	67	282.0	364	508	1036	7896
58A	40.7	5.8	13	65	83	322.7	368	529	1140	9036
59A	35.9	5.8	14	55	70	358.6	375	551	1005	**10041**
60A	46.9	5.8	9	102	134	46.9	102	134	1782	1782
61A	38.5	5.8	12	72	94	85.4	153	207	1463	3245
62A	27.0	5.8	12	55	72	112.4	203	274	1026	4271
63A	21.8	5.8	8	54	71	134.2	246	334	828	5100
64A	35.1	5.8	11	69	90	169.3	307	416	1334	**6433**
70A	26.1	5.8	11	46	63	26.1	46	63	1428	1428
71A	0.0	5.8	99	0	0	26.1	46	63	0	**1428**
75A	17.3	5.8	8	36	49	17.3	36	49	946	946
76A	0.0	5.8	99	0	0	17.3	36	49	0	**946**
80A	33.9	5.8	21	41	55	33.9	41	55	1763	1763
81A	41.4	5.8	21	50	68	75.3	77	109	2153	**3916**
90A	47.9	5.8	16	77	103	47.9	77	103	2156	2156
91B	47.9	5.8	18	72	96	47.9	72	96	2156	4311
92AB	47.9	5.8	0	72	96	95.8	149	224	0	**4311**
101A	37.3	5.8	12	75	100	37.3	75	100	1641	1641
102A	19.7	5.8	11	42	56	57.0	116	155	867	2508
103A	25.2	5.8	15	37	49	82.2	133	184	1109	3617
104A	23.0	5.8	19	30	40	105.2	137	198	1012	**4629**
120A	18.2	5.8	10	38	52	18.2	38	52	996	996
121A	0.0		99	0	0	18.2	38	52	0	**996**
500A	32.7	6.6	10	84	112	32.7	84	112	1439	1439
501A	30	6.4	9	78	104	62.7	146	199	1320	2759
502A	20.3	6.2	10	49	65	83.0	165	235	893	3652
503A	19.7	6.1	13	41	55	102.7	193	276	867	**4519**
598A	232.0		6	863	-	232.0	863	-	0	0
599A	11.7	6.8	8	34	45	243.7	898	909	421	421
600A	42		5	178	-	285.7	893	-	0	0
601A	16.4	6.6	12	38	51	302.1	931	955	590	1012
602A	25.7	6.4	13	56	74	327.8	903	945	925	1937
603B	23.1	6.6	10	59	78	23.1	59	78	832	2768

EXISTING 11/19/2009, 9:53 AM
M:\Newhall\PRODDATA\MesasEast-Mp\ENGR\DESIGN\HYDR\Hydr calc\EXIST-DATAnew.xls

SUB-AREA						TOTAL AREA	Σ Q50 (cfs)	Σ Q50 BB (cfs)	DPV (CY)	Total DPV (CY)
LOC.	Ac.	Rainfall Depth (in.)	Tc (min.)	Q50 (cfs)	Q50 BB (cfs)	Σ AREA (Ac.)				
604B	17.2	6.2	10	41	55	40.3	83	116	619	3388
605AB	40.3	-	0	83	0	368.1	982	1057	1451	4838
606A	34	6.2	12	74	98	402.1	959	1059	1224	**6062**
610A	19.8	6.2	11	45	61	19.8	45	61	1083	**1083**
619A	7.3	6.2	9	16	22	7.3	16	22	399	399
620A	11.7	6.2	14	20	27	19.0	35	48	640	1039
621A	2.6	6.2	10	6	-	21.6	41	54	0	**1039**
622A	6.0	6.2	5	21	-	6.0	21	21	0	0
					TOTAL:	2696	4285	5682		**85238**

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LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

EXISTING HYDROLOGY FOR MESA'S EAST (AREA'I')BURNED

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
0	1A	36.0	82.	36.0	82.	0	0.	.00000	.00	.00	0.	297	13	A36	.01
0	2A	37.0	97.	73.0	179.	1	2450.	.03000	.00	.00	0.	297	10	A36	.01
0	3A	43.3	96.	116.3	212.	0	0.	.00000	.00	.00	0.	297	13	A35	.01
0	4A	42.3	90.	158.6	290.	1	800.	.05000	.00	.00	0.	297	14	A35	.01
0	5A	20.4	50.	179.0	308.	0	0.	.00000	.00	.00	0.	297	10	A34	.01
0	6A	37.4	83.	216.4	385.	1	850.	.05000	.00	.00	0.	298	15	A35	.01
0	7A	32.5	84.	248.9	438.	0	0.	.00000	.00	.00	0.	297	9	A34	.01
0	8B	47.3	117.	47.3	117.	1	1600.	.06880	.00	.00	0.	297	10	A34	.01
0	9B	34.2	57.	81.5	160.	0	0.	.00000	.00	.00	0.	220	16	A33	.01

CONFLUENCE Q'S

0 10A TA 1158 QA 438. QAB 596. QB 158. 0 10B TB 1160 QB 160. QBA 589. QA 429.
0 10AB TAB 1158 QAB 596. QA 438. QB 158.

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
0	10AB	81.5	160.	330.4	596.	1	800.	.03750	.00	.00	0.	298	0	A33	.00
0	11A	34.2	88.	364.6	652.	1	940.	.03200	.00	.00	0.	298	10	A33	.01
0	12A	40.5	96.	405.1	700.	0	0.	.00000	.00	.00	0.	298	11	A32	.01
0	13A	29.9	60.	435.0	737.	1	1500.	.03000	.00	.00	0.	228	11	A33	.01
0	14A	39.3	89.	474.3	751.	0	0.	.00000	.00	.00	0.	298	12	A32	.01
0	15C	35.9	109.	35.9	109.	1	1165.	.13000	.00	.00	0.	98	8	A35	.47
0	16C	26.4	67.	62.3	170.	0	0.	.00000	.00	.00	0.	98	11	A34	.47
0	17C	26.9	65.	89.2	234.	1	1270.	.03500	.00	.00	0.	98	12	A34	.42
0	18C	37.1	112.	126.3	268.	1	965.	.03100	.00	.00	0.	298	7	A33	.01
0	19C	20.1	52.	146.4	291.	0	0.	.00000	.00	.00	0.	298	9	A32	.01

CONFLUENCE Q'S

0 20A TA 1164 QA 751. QAC 1014. QC 262. 0 20C TC 1159 QC 291. QCA 934. QA 643.
0 20AC TAC 1163 QAC 1020. QA 751. QC 269.

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
0	20AC	146.4	291.	620.7	1020.	1	1310.	.03000	.00	.00	0.	298	0	A32	.00
0	21A	35.0	80.	655.7	1025.	0	0.	.00000	.00	.00	0.	298	11	A31	.01
0	22A	44.5	87.	700.2	1076.	1	1350.	.03000	.00	.00	0.	298	15	A31	.01
0	23A	43.6	92.	743.8	1085.	1	20.	.02000	.00	.00	0.	298	12	A30	.01

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LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

Existing Calculation for Mesa's East (Area'A')burned

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
101	30A	34.5	80.	34.5	80.	1	2310.	.06100	.00	.00	0.	297	10	A32	.01
101	31A	46.4	83.	80.9	136.	0	0.	.00000	.00	.00	0.	297	15	A31	.01
101	32B	32.6	73.	32.6	73.	1	1520.	.06600	.00	.00	0.	297	10	A31	.01
101	33B	45.3	91.	77.9	146.	0	0.	.00000	.00	.00	0.	297	12	A31	.01

CONFLUENCE Q'S

101 34A TA 1161 QA 136. QAB 270. QB 134. 101 34B TB 1159 QB 146. QBA 279. QA 133.
101 34AB TAB 1160 QAB 280. QA 135. QB 144.

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
101	34AB	77.9	146.	158.8	280.	0	0.	.00000	.00	.00	0.	297	0	A31	.00
101	35C	41.6	70.	41.6	70.	1	1820.	.05500	.00	.00	0.	220	15	A32	.01
101	36C	41.4	80.	83.0	128.	0	0.	.00000	.00	.00	0.	297	13	A31	.01

CONFLUENCE Q'S

101 37A TA 1160 QA 280. QAC 408. QC 128. 101 37C TC 1161 QC 128. QCA 398. QA 270.
101 37AC TAC 1160 QAC 408. QA 280. QC 128.

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
101	37AC	83.0	128.	241.8	408.	1	685.	.05100	.00	.00	0.	297	0	A31	.00
101	38A	27.3	53.	269.1	447.	0	0.	.00000	.00	.00	0.	297	12	A30	.01
101	39A	17.9	35.	287.0	477.	1	1210.	.03000	.00	.00	0.	297	12	A30	.01
101	40A	30.2	61.	317.2	492.	0	0.	.00000	.00	.00	0.	297	11	A30	.01
101	41D	30.2	56.	30.2	56.	0	0.	.00000	.00	.00	0.	297	12	A29	.01
101	42D	23.1	45.	53.3	101.	1	1030.	.06000	.00	.00	0.	297	12	A30	.01
101	43D	15.4	30.	68.7	124.	0	0.	.00000	.00	.00	0.	297	11	A29	.01

CONFLUENCE Q'S

101 44A TA 1162 QA 492. QAD 601. QD 108. 101 44D TD 1158 QD 124. QDA 574. QA 449.
101 44AD TAD 1161 QAD 603. QA 489. QD 114.

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
101	44AD	68.7	124.	385.9	603.	1	1490.	.05000	.00	.00	0.	297	0	A29	.00
101	45A	29.7	51.	415.6	626.	0	0.	.00000	.00	.00	0.	297	14	A29	.01
101	46E	37.4	67.	37.4	67.	1	1490.	.06000	.00	.00	0.	297	15	A31	.01
101	47E	35.1	75.	72.5	123.	1	1100.	.06000	.00	.00	0.	297	10	A30	.01
101	48E	29.1	54.	101.6	165.	1	200.	.10000	.00	.00	0.	297	12	A29	.01

CONFLUENCE Q'S

101 49A TA 1163 QA 626. QAE 771. QE 145. 101 49E TE 1160 QE 164. QEA 737. QA 573.
101 49AE TAE 1162 QAE 774. QA 620. QE 155.

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV

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LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

Existing Calculation for Mesa's East (Area'A')burned

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
101	49AE	101.6	164.	517.2	774.	1	1000.	.05000	.00	.00	0.	297	0	A29	.00
101	50A	17.1	35.	534.3	776.	0	0.	.00000	.00	.00	0.	297	10	A29	.01

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

Existing Hydrology Calculations for Mesa's East (Area'D') Burned

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
102	51A	34.0	63.	34.0	63.	1	860.	.06000	.00	.00	0.	297	14	A31	.00
102	52A	36.1	77.	70.1	131.	1	1210.	.05000	.00	.00	0.	297	10	A30	.00
102	53A	46.3	89.	116.4	202.	1	630.	.03000	.00	.00	0.	297	12	A30	.00
102	54A	45.9	85.	162.3	268.	1	1070.	.04000	.00	.00	0.	297	12	A29	.00
102	55A	44.2	103.	206.5	301.	1	1180.	.03000	.00	.00	0.	298	9	A29	.00
102	56A	38.5	62.	245.0	337.	1	1150.	.03000	.00	.00	0.	220	13	A29	.00
102	57A	37.0	53.	282.0	364.	1	1175.	.03000	.00	.00	0.	220	16	A29	.00
102	58A	40.7	65.	322.7	368.	1	1025.	.05000	.00	.00	0.	220	13	A29	.00
102	59A	35.9	55.	358.6	375.	1	100.	.02000	.00	.00	0.	220	14	A29	.00

Program .ackage Serial Number: 2033
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LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

EXISTING HYDROLOGY FOR MESA'S EAST (AREA'C')BURNED

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
3	60A	46.9	102.	46.9	102.	1	1620.	.06000	.00	.00	0.	297	9	A29	.01
3	61A	38.5	72.	85.4	153.	0	0.	.00000	.00	.00	0.	297	12	A29	.01
3	62A	27.0	55.	112.4	203.	0	0.	.00000	.00	.00	0.	298	12	A29	.01
3	63A	21.8	54.	134.2	246.	1	500.	.05000	.00	.00	0.	298	8	A29	.01
3	64A	35.1	69.	169.3	307.	1	100.	.02000	.00	.00	0.	297	11	A29	.01

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

EXISTING HYDROLOGY FOR MESA'S EAST (AREA'F') BURNED

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
5	70A	26.1	46.	26.1	46.	1	100.	.02000	.00	.00	0.	220	11	A29	.01
5	71A	.0	0.	26.1	46.	0	0.	.00000	.00	.00	0.	220	99	A29	.00

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10/20/05 FILE: enh-ee INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
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MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

EXISTING HYDROLOGY FOR MESA'S EAST (AREA'E') BURNED

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
6	75A	17.3	36.	17.3	36.	1	100.	.02000	.00	.00	0.	220	8	A29	.01
6	76A	.0	0.	17.3	36.	0	0.	.00000	.00	.00	0.	220	99	A29	.00

Program Package Serial Number: 2033
10/04/06 FILE: enh-gg INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
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MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

STORM DAY 4

EXISTING HYDROLOGY FOR MESA'S EAST (AREA'G') BURNED -

LOCATION		SUBAREA AREA(AC)	SUBAREA Q(CFS)	TOTAL AREA(AC)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
7	80A	33.9	41.	33.9	41.	1	2060.	.04000	.00	.00	0.	220	21	A29	.01
7	81A	41.4	50.	75.3	77.	1	100.	.02000	.00	.00	0.	220	21	A29	.01

Program Package Serial Number: 2033
10/20/05 FILE: enh-bb INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

EXISTING HYDROLOGY FOR MESA'S EAST (AREA'B')BURNED

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
2	90A	47.9	77.	47.9	77.	0	0.	.00000	.00	.00	0.	297	16	A29	.01
2	91B	47.9	72.	47.9	72.	0	0.	.00000	.00	.00	0.	297	18	A29	.01

CONFLUENCE Q'S

2 92A TA 1155 QA 77. QAB 149. QB 72. 2 92B TB 1156 QB 72. QBA 149. QA 77.
2 92AB TAB 1156 QAB 149. QA 77. QB 72.

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
2	92AB	47.9	72.	95.8	149.	1	100.	.02000	.00	.00	0.	297	0	A29	.00

Program .ackage Serial Number: 2033
10/04/06 FILE: e-mehb INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

EXIST. HYDROLOGY FOR MESA'S EAST (Burn)

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
20	101A	37.3	75.	37.3	75.	1	380.	.05000	.00	.00	0.	298	12	A29	.01
20	102A	19.7	42.	57.0	116.	1	1530.	.03000	.00	.00	0.	298	11	A29	.01
20	103A	25.2	37.	82.2	133.	1	1700.	.03000	.00	.00	0.	220	15	A29	.01
20	104A	23.0	30.	105.2	137.	1	20.	.03000	.00	.00	0.	220	19	A29	.01

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12/20/06 FILE: e-nwhl INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

HYDROLOGY CALCULATION FOR AREA X-1

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
10	120A	18.2	38.	18.2	38.	1	100.	.02000	.00	.00	0.	297	10	A29	.01
10	121A	.0	0.	18.2	37.	0	0.	.00000	.00	.00	0.	297	99	A29	.00

Program Package Serial Number: 2033
10/20/05 FILE: e-500b INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

OFF-SITE HYDROLOGY FOR MESA'S EAST (BURN)

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
500	500A	32.7	84.	32.7	84.	1	1090.	.05000	.00	.00	0.	298	10	A33	.01
500	501A	30.0	78.	62.7	146.	1	1060.	.03000	.00	.00	0.	298	9	A32	.01
500	502A	20.3	49.	83.0	165.	1	710.	.03000	.00	.00	0.	298	10	A31	.01
500	503A	19.7	41.	102.7	193.	0	0.	.00000	.00	.00	0.	298	13	A31	.01

Program Package Serial Number: 2033
08/30/06 FILE: ex600b INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

Mission Village Exist. Condition, Areas 598A-606A by tvd 6/16/05

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
100	598A	232.0	863.	232.0	863.	0	0.	.00000	.00	.00	0.	98	6	A36	.66
100	599A	11.7	34.	243.7	898.	1	1510.	.03000	.00	.00	0.	298	8	A34	.01
100	600A	42.0	178.	285.7	893.	0	0.	.00000	.00	.00	0.	98	5	A36	.88
100	601A	16.4	38.	302.1	931.	1	1720.	.03000	.00	.00	0.	298	12	A33	.01
100	602A	25.7	56.	327.8	903.	0	0.	.00000	.00	.00	0.	298	13	A32	.01
100	603B	23.1	59.	23.1	59.	1	1290.	.04000	.00	.00	0.	298	10	A33	.01
100	604B	17.2	41.	40.3	83.	0	0.	.00000	.00	.00	0.	298	10	A31	.01

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*                                                                                                               *
*                                                CONFLUENCE Q'S                                                 *
*   100  605A  TA 1160 QA     903. QAB     982. QB     79.     100  605B  TB 1158 QB     83. QBA     906. QA     823.   *
*                                100  605AB TAB 1160 QAB     982. QA     903. QB     79.                                *
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
100	605AB	40.3	83.	368.1	982.	1	1620.	.03000	.00	.00	0.	298	0	A36	.00
100	606A	34.0	74.	402.1	959.	0	0.	.00000	.00	.00	0.	298	12	A31	.01

Program Package Serial Number: 2033
10/20/05 FILE: ex610b INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

Mission Village Exist. Hydrology, Area 610A by tvd 5/5/05

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
101	610A	19.8	45.	19.8	45.	0	0.	.00000	.00	.00	0.	298	11	A31	.01
101	611A	.0	0.	19.8	45.	0	0.	.00000	.00	.00	0.	298	99	A31	.00

Program ..ckage Serial Number: 2033
08/30/06 FILE: ex620b INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

Mission Village Exist Condition, Areas 619A-621A by tvd 6/22/05

STORM DAY 4

LOCATION	SUBAREA AREA(AC)	SUBAREA Q(CFS)	TOTAL AREA(AC)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
104 619A	7.3	16.	7.3	16.	0	0.	.00000	.00	.00	0.	220	9	A31	.01
104 620A	11.7	20.	19.0	35.	4	120.	.08000	2.00	.00	0.	220	14	A31	.01
104 621A	2.6	6.	21.6	41.	0	0.	.00000	.00	.00	0.	20	10	A31	.75

Program Package Serial Number: 2033
10/20/05 FILE: ex622b INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

Mission Village Exist Condition, Area 622A by tvd 5/5/05 STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
105	622A	6.0	21.	6.0	21.	0	0.	.00000	.00	.00	0.	220	5	A31	.63
105	623A	.0	0.	6.0	21.	0	0.	.00000	.00	.00	0.	220	99	A31	.00

Tc Calculations
Existing Conditions

Project	Subarea	Area (acres)	%imp	Freq	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc (min.)
NEWHALL	1A	36	0.01	50	97	2900	0.17	7.2	13
NEWHALL	2A	37	0.01	50	97	2150	0.21	7.2	10
NEWHALL	3A	43.3	0.01	50	97	2450	0.13	6.9	13
NEWHALL	4A	42.3	0.01	50	97	2880	0.14	6.9	14
NEWHALL	5A	20.4	0.01	50	97	1760	0.17	6.8	10
NEWHALL	6A	37.4	0.01	50	97	2800	0.09	6.9	15
NEWHALL	7A	32.5	0.01	50	98	1670	0.14	6.7	9
NEWHALL	8B	47.3	0.01	50	97	1760	0.16	6.7	10
NEWHALL	9B	34.2	0.01	50	20	2350	0.12	6.6	16
NEWHALL	11A	34.2	0.01	50	98	1815	0.11	6.6	10
NEWHALL	12A	40.5	0.01	50	98	2010	0.13	6.4	11
NEWHALL	13A	29.9	0.01	50	98	2030	0.13	6.6	11
NEWHALL	14A	39.3	0.01	50	98	1500	0.03	6.3	12
NEWHALL	15C	35.9	0.01	50	98	1430	0.11	6.9	8
NEWHALL	16C	26.4	0.01	50	98	1870	0.08	6.8	11
NEWHALL	17C	26.9	0.01	50	98	2140	0.06	6.8	12
NEWHALL	18C	37.1	0.01	50	98	1270	0.18	6.6	7
NEWHALL	19C	20.1	0.01	50	98	965	0.03	6.4	9
NEWHALL	21A	35	0.01	50	98	1710	0.1	6.2	11
NEWHALL	22A	44.5	0.01	50	98	2850	0.08	6.1	15
NEWHALL	23A	43.6	0.01	50	98	2160	0.1	6	12
NEWHALL	30A	34.5	0.01	50	97	1850	0.21	6.4	10
NEWHALL	31A	46.4	0.01	50	97	2920	0.15	6.2	15
NEWHALL	32B	32.6	0.01	50	97	1650	0.21	6.2	10
NEWHALL	33B	45.3	0.01	50	97	2240	0.17	6.2	12
NEWHALL	35C	41.6	0.01	50	20	2105	0.13	6.4	15
NEWHALL	36C	41.4	0.01	50	97	1820	0.06	6.2	13
NEWHALL	38A	27.3	0.01	50	97	1940	0.17	6	12
NEWHALL	39A	17.9	0.01	50	97	1815	0.15	6	12
NEWHALL	40A	30.2	0.01	50	97	1680	0.19	5.9	11
NEWHALL	41D	30.2	0.01	50	97	1940	0.16	5.8	12
NEWHALL	42D	23.1	0.01	50	97	1950	0.18	5.9	12
NEWHALL	43D	15.4	0.01	50	97	1700	0.17	5.8	11
NEWHALL	45A	29.7	0.01	50	97	2220	0.13	5.8	14
NEWHALL	46E	37.4	0.01	50	97	2525	0.12	6.2	15
NEWHALL	47E	35.1	0.01	50	97	1520	0.19	6	10
NEWHALL	48E	29.1	0.01	50	97	1900	0.18	5.8	12
NEWHALL	50A	17.1	0.01	50	97	1000	0.05	5.8	10
NEWHALL	51A	34	0.01	50	97	2205	0.09	6.2	14
NEWHALL	52A	36.1	0.01	50	97	1390	0.17	6	10
NEWHALL	53A	46.3	0.01	50	97	1760	0.14	6	12
NEWHALL	54A	45.9	0.01	50	97	1725	0.11	5.8	12
NEWHALL	55A	44.2	0.01	50	98	1445	0.16	5.8	9
NEWHALL	56A	38.5	0.01	50	20	1510	0.11	5.8	13
NEWHALL	57A	37	0.01	50	20	1940	0.1	5.8	16
NEWHALL	58A	40.7	0.01	50	20	1175	0.04	5.8	13
NEWHALL	59A	34.4	0.01	50	20	1640	0.12	5.8	14
NEWHALL	60A	46.9	0.01	50	97	1450	0.24	5.8	9
NEWHALL	61A	38.5	0.01	50	97	2000	0.19	5.8	12
NEWHALL	62A	27	0.01	50	98	2000	0.13	5.8	12

Tc Calculations
Existing Conditions

Project	Subarea	Area (acres)	%imp	Freq	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc (min.)
NEWHALL	63A	21.8	0.01	50	98	1230	0.18	5.8	8
NEWHALL	64A	33.3	0.01	50	97	1850	0.23	5.8	11
NEWHALL	70A	24.5	0.01	50	20	1090	0.1	5.8	11
NEWHALL	75A	17.3	0.01	50	20	775	0.14	5.8	8
NEWHALL	80A	33.9	0.01	50	20	2615	0.08	5.8	21
NEWHALL	81A	41.4	0.01	50	20	2270	0.05	5.8	21
NEWHALL	90A	46.3	0.01	50	97	2900	0.18	5.8	16
NEWHALL	91B	46.1	0.01	50	97	3400	0.16	5.8	18
NEWHALL	101A	37.3	0.01	50	98	2230	0.19	5.8	12
NEWHALL	102A	19.7	0.01	50	98	1580	0.09	5.8	11
NEWHALL	103A	25.2	0.01	50	20	1710	0.09	5.8	15
NEWHALL	104A	23	0.01	50	20	1700	0.03	5.8	19
NEWHALL	120A	18.2	0.01	50	97	1000	0.05	5.8	10
NEWHALL	500A	32.7	0.01	50	98	1750	0.1	6.6	10
NEWHALL	501A	30	0.01	50	98	1090	0.05	6.4	9
NEWHALL	502A	20.3	0.01	50	98	1060	0.03	6.2	10
NEWHALL	503A	19.7	0.01	50	98	2160	0.08	6.1	13
NEWHALL	599A	11.7	0.01	50	98	1100	0.07	6.8	8
NEWHALL	601A	16.4	0.01	50	98	1510	0.03	6.6	12
NEWHALL	602A	25.7	0.01	50	98	1720	0.03	6.4	13
NEWHALL	603B	23.1	0.01	50	98	1650	0.11	6.6	10
NEWHALL	604B	17.2	0.01	50	98	1290	0.04	6.2	10
NEWHALL	606A	34	0.01	50	98	1620	0.03	6.2	12
NEWHALL	610A	19.8	0.01	50	98	1800	0.09	6.2	11
NEWHALL	619A	7.3	0.01	50	20	850	0.09	6.2	9
NEWHALL	620A	11.7	0.01	50	20	1680	0.09	6.2	14
NEWHALL	621A	2.6	0.75	50	20	1010	0.02	6.2	10
NEWHALL	622A	6	0.63	50	20	770	0.25	6.2	5
SCE Substation									
NEWHALL	701A	43.2	0.01	50	92	1800	0.16	6.6	10
NEWHALL	720A	9.5	0.01	50	92	700	0.25	6.8	5
NEWHALL	722A	0.7	0.01	50	92	100	0.65	6.8	5
NEWHALL	730A	6.2	0.01	50	92	600	0.33	6.8	5

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SUB-AREA AREA						TOTAL AREA	Σ Q50 (cfs)	DPV (CY)	DPV (CY)	DEBRIS CONTROL TYPE	Qpm (cfs)	Vm (cu. ft)
LOC.	Ac.	Rainfall Depth (in.)	Tc (min.)	Q50 (cfs)	Q50 BB (cfs)	Σ AREA (Ac.)			TOTAL			
1A	36.0	7.2	13	82	104	36.0	104	972	972	Natural		
2A	37.0	7.2	10	97	123	73.0	227	999	1971	Natural		
3A	43.3	7.0	12	99	126	116.3	328	1169	3140	Natural		
4A	42.3	7.0	14	90	114	158.6	438	1142	4282	Natural		
5A	21.6	6.8	10	53	67	180.2	484	583	4865	Natural		
6A	37.4	6.8	15	74	94	217.6	574	1010	5875	Natural		
7A	24.7	6.6	9	66	84	242.3	616	667	6542	Natural		
8B	47.5	6.6	12	102	130	47.5	130	1283	7825	Natural		
9B	42.0	6.6	15	72	91	89.5	204	1134	8959	Natural		
10AB	-	-	-	645	819	331.8	819	0	8959	Natural		
11A	34.4	6.6	10	88	112	366.2	876	929	9887	Natural		
12A	28.2	6.6	11	69	88	394.4	898	761	10649	Natural		
13A	23.5	6.4	10	58	74	417.9	928	635	**11283**	Debris Basin #5		
14C	17.0	6.2	9	43	55	17.0	55	459	**459**	Debris Basin #4		
15C	22.9	6.2	15	43	-	39.9	86	0	0	N/A		
16AC	-	-	-	787	-	457.8	787	0	0	Natural		
17A	6.1	6.6	9	16	-	463.9	790	-	-	N/A		
18D	31.2	6.8	8	88	-	31.2	88	0	0	Ex. Development		
19D	13.0	6.8	9	35	-	44.2	120	0	0	Ex. Development		
20D	10.0	6.8	9	26	-	54.2	145	0	0	Ex. Development		
21D	26.9	6.8	14	57	-	81.1	201	0	0	Ex. Development		
22D	8.4	6.8	10	22	28	89.5	225	227	227	Natural		
23D	15.6	6.6	10	40	51	105.1	249	421	**648**	Debris Basin #7		
24AD	-	-	-	1016	-	569.0	1016	0	0	Natural		
25A	30.8	6.2	18	54	-	599.8	1047	0	0	N/A		
26E	31.1	6.0	14	61	-	31.1	61	0	0	N/A		
27AE	-	-	-	1087	-	630.9	1087	0	0	natural		
28A	29.5	6.0	13	60	-	660.4	1106	0	0	N/A		
29A	27.6	5.8	26	22	-	688.0	1108	0	0	N/A		
30A	39.6	5.8	23	45	57	727.6	1148	1069	**1069**	Debris Basin #14		
31A	7.5	5.8	13	9	-	735.1	1137	0	0	WQ Basin 'D'	*35.4*	*494,270*
40A	17.1	6.6	8	49	66	17.1	66	804	804	Natural		
41A	16.9	6.4	10	42	56	34.0	113	794	1598	Natural		
42A	22.9	6.2	9	58	78	56.9	176	1076	2674	Debris Carrying Culvert		
43A	27.9	6.0	9	68	91	84.8	242	1311	**3986**	Debris Basin #6		
50A	19.3	5.8	20	24	33	19.3	33	1056	1056	Debris Carrying Culvert		
51A	6.3	5.8	14	10	14	25.6	45	345	**1400**	Natural		
55A	2.0	5.8	6	5	7	2.0	7	109	**109**	Natural		
60A	4.0	6.0	5	12	16	4.0	16	148	**148**	Debris Basin #10		
61A	5.5	6.0	8	13	18	9.5	29	150	**150**	Debris Basin #11		
62A	6.0	6.0	5	18	24	15.5	48	110	**110**	Debris Basin #2		
63A	22.0	6.0	13	39	-	37.5	80	0	0	N/A		
64A	16.1	5.8	13	32	-	53.6	112	0	0	N/A		
65A	14.0	6.0	11	27	-	67.6	139	0	0	N/A		
66A	12.9	5.8	11	25	-	80.5	163	0	0	685.3		

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SUB-AREA AREA						TOTAL AREA	Σ Q50 (cfs)	DPV (CY)	DPV (CY)	DEBRIS CONTROL TYPE	Qpm (cfs)	Vm (cu. ft)
LOC.	Ac.	Rainfall Depth (in.)	Tc (min.)	Q50 (cfs)	$Q50_{BB}$ (cfs)	Σ AREA (Ac.)			TOTAL			
67A	4.0	5.8	13	8	-	84.5	171	0	0	N/A		
68B	17.0	5.8	13	30	-	17.0	30	0	0	N/A		
69B	31.8	5.8	20	43	-	48.8	73	0	0	N/A		
70B	10.6	5.8	12	21	-	59.4	94	0	0	N/A		
71AB	-	-	-	259	-	143.9	259	0	0	N/A		
72A	25.9	5.8	8	59	-	169.8	304	0	0	N/A		
73A	0.0	-	99	0	-	169.8	304	0	0	N/A		
74A	2.4	5.8	8	5	-	172.2	302	0	0	WQ Basin 'A'	*16.2*	*227,002*
75A	0.0	-	99	0	-	172.2	302	0	0	N/A		
95A	34.4	6.2	13	72	94	34.4	94	1410	1410	Natural		
96A	29.0	6.0	9	65	85	63.4	164	1189	**2599**	Debris Basin #3		
97A	16.6	6.0	10	34	-	80.0	153	0	0	N/A		
98B	15.7	6.0	12	26	-	15.7	26	0	0	N/A		
99B	39.7	6.0	20	65	-	55.4	91	0	0	N/A		
100AB	-	-	-	243	-	135.4	243	0	0	N/A		
101A	35.0	5.8	10	76	-	170.4	307	0	0	N/A		
102A	24.1	5.8	8	59	-	194.5	344	0	0	N/A		
103C	32.3	5.8	18	52	-	32.3	52	0	0	N/A		
104C	12.4	5.8	16	21	-	44.7	72	0	0	N/A		
105C	17.5	5.8	15	32	-	62.2	103	0	0	N/A		
106AC	-	-	-	447	-	256.7	447	0	0	N/A		
107A	30.5	5.8	16	51	-	287.2	491	0	0	N/A		
108D	22.0	5.8	17	38	-	22.0	38	0	0	N/A		
109D	30.2	5.8	17	49	-	52.2	86	0	0	N/A		
110AD	-	-	-	576	-	339.4	576	0	0	N/A		
111A	13.2	5.8	16	23	-	352.6	594	0	0	WQ Basin 'C'	*39*	*546,079*
112A	40.5	5.8	14	74	-	393.1	660	0	0	WQ Basin 'E'	*6.9*	*95,750*
113A	4.6	5.8	11	10	-	397.7	667	0	0	Media Filtration CB #2	*0.8*	*10,836*
114E	25.0	5.8	13	39	51	25.0	51	1025	1025	Debris Carrying Culvert		
115E	12.8	5.8	16	18	24	37.8	69	525	1550	Debris Carrying Culvert		
116AE	-	-	-	715	-	435.5	733	0	1550	Natural to River		
117F	14.0	5.8	18	13	-	14.0	13	0	0	WQ Basin 'C'	*39*	*546,079*
118AE	-	-	-	728	-	449.5	746	0	1550	Natural to River		
119A	24.8	5.8	16	35	46	474.3	788	1017	**2567**	Natural to River		
140A	20.6	5.8	13	33	45	20.6	45	1127	**1127**	Natural		
150A	13.0	5.8	9	26	35	13.0	35	711	**711**	Natural		
160A	16.3	5.8	10	30	41	16.3	41	892	**892**	Natural		
170A	6.1	5.8	5	17	23	6.1	23	334	**334**	Natural		
200A	34.5	6.4	10	80	102	34.5	102	918	918	Natural		
201A	46.4	6.2	15	83	105	80.9	180	1234	2152	Natural		
202B	41.6	6.4	12	87	110	41.6	110	1107	3259	Natural		
203B	53.0	6.2	17	89	113	94.6	207	1410	4668	Natural		
204AB	94.6	-	0	159	202	175.5	387	0	4668	Natural		

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SUB-AREA AREA						TOTAL AREA						
LOC.	Ac.	Rainfall Depth (In.)	Tc (min.)	Q50 (cfs)	Q50 BB (cfs)	Σ AREA (Ac.)	Σ Q50 (cfs)	DPV (CY)	DPV (CY) TOTAL	DEBRIS CONTROL TYPE	Qpm (cfs)	Vm (cu. ft)
205C	32.6	6.4	10	75	95	32.6	95	867	5535	Natural		
206C	45.3	6.2	13	87	110	77.9	190	1205	6740	Natural		
207AC	77.9	-	0	146	185	253.4	573	0	6740	Natural		
208A	18.6	6.0	14	33	42	272.0	609	495	7235	Debris Carrying Culvert		
209A	35.2	6.0	13	66	84	307.2	631	936	8172	Natural		
210A	7.8	5.8	10	16	20	315.0	635	207	8379	Debris Carrying Culvert		
211D	37.4	6.2	16	65	83	37.4	83	995	995	Natural		
212D	35.1	6.0	12	68	86	72.5	139	934	1929	Natural		
213D	29.3	5.8	11	57	72	101.8	180	779	2708	Debris Carrying Culvert		
214AD	101.8	-	0	140	178	416.8	794	0	0	N/A		
215A	22.3	5.8	10	42	53	439.1	809	593	**11680**	Natural		
300A	2.4	5.8	8	6	8	2.4	8	131	**131**	Natural		
400A	19.5	5.8	14	36	-	19.5	36	0	0	N/A		
401A	35.2	5.8	16	61	-	54.7	96	0	0	N/A		
402A	11.5	5.8	14	17	-	66.2	113	0	0	N/A		
403B	38.7	5.8	15	60	-	38.7	60	0	0	N/A		
404AB	-	-	-	173	-	104.9	173	0	0	N/A		
405A	9.1	5.8	8	21	-	114.0	191	0	0	N/A		
406C	22.6	5.8	14	41	-	22.6	41	0	0	N/A		
407AC	-	-	0	230	-	136.6	230	0	0	N/A		
408A	8.5	5.8	8	12	-	145.1	239	0	0	WQ Basin "B"	*13*	*181,727*
503A	11.8	6.0	11	26	35	11.8	35	645	**645**	Outlet to natural channel		
598A	232.0	-	6	741	-	232.0	741	0	0	N/A		
599A	11.7	6.6	8	34	44	243.7	785	386	386	Natural		
600A	42.0	-	5	168	-	285.7	779	0	0	N/A		
601A	16.4	6.6	12	38	49	302.1	828	541	927	Natural		
602A	25.7	6.4	13	56	72	327.8	823	848	1775	Natural		
603B	23.1	6.6	10	59	76	23.1	76	762	2538	Natural		
604B	17.2	6.4	10	43	55	40.3	114	568	3105	Natural		
605AB	40.3	-	0	84	108	368.1	958	0	3105	Natural		
606A	36.5	6.2	12	79	102	404.6	970	1205	**4310**	Debris Basin #15		
607C	18.1	6.2	11	41	56	18.1	56	597	**990**	Debris Basin #12		
608C	4.3	6.1	6	14	-	22.4	53	0	0	Media Filtration CB #5	*0.7*	*10,318*
609AC	22.4	-	-	53	-	427.0	873	0	0			
610D	32.7	6.6	10	84	113	32.7	113	1079	1079	Natural		
611D	46.5	6.4	12	105	141	79.2	227	1535	**2614**	Debris Basin #8		
612D	17.7	6.2	16	32	-	96.9	190	0	0	Media Filtration CB #3	*0.8*	*11,870*
										Media Filtration CB #4	*1.2*	*16,253*
613AD	96.2	-	-	189	-	523.9	1049	0	0	Outlet to Conc. Channel		
620A	3.7	6.2	6	11	-	3.7	11	0	0	Media Filtration CB #6	*0.5*	*6,235*
621B	9.4	6.2	11	21	29	9.4	29	514	**514**	Debris Basin #9		
622B	1.4	6.2	5	5	-	10.8	26	0	0	N/A		
623AB	10.8	-	0	25	-	14.5	36	0	0	natural		
624A	2.2	6.2	5	8	-	16.7	43	0	0	Media Filtration CB #7	*0.4*	*5,173*
625A	1.6	6.2	5	5	-	18.3	46	0	0	N/A		

PROPOSED 2/10/2010, 5:05 PM
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SUB-AREA AREA						TOTAL AREA	Σ Q50 (cfs)	DPV (CY)	DPV (CY)	DEBRIS CONTROL TYPE	Qpm (cfs)	Vm (cu. ft)
LOC.	Ac.	Rainfall Depth (in.)	Tc (min.)	Q50 (cfs)	$Q50_{BB}$ (cfs)	Σ AREA (Ac.)			TOTAL			
626A	1.3	6.2	6	4	-	19.6	50	0	0	Exist. CB Inserts #8 per MTD 1764	*0.4*	*5,663*
630A	1.6	6.2	9	4	-	1.6	4	0	0	N/A		
631A	1.1	6.2	6	4	-	2.7	7	0	0	Exist. CB Inserts #8 per MTD 1764	*0.4*	*5,663*
				TOTAL:		2695	4862		48476			

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
Proposed Hydrology for Areas 1A-31A 11/10/09 STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
2	1A	36.0	81.66	36.0	81.66	0	0.	.00000	.00	.00	0.	297	13	A36	.01
2	2A	37.0	96.94	73.0	178.61	1	1450.	.06000	.00	.00	0.	297	10	A36	.01
2	3A	43.3	99.33	116.3	258.47	0	0.	.00000	.00	.00	0.	297	12	A35	.01
2	4A	42.3	89.57	158.6	345.15	1	790.	.05000	.00	.00	0.	297	14	A35	.01
2	5A	21.6	53.18	180.2	381.38	0	0.	.00000	.00	.00	0.	297	10	A34	.01
2	6A	37.4	74.06	217.6	452.10	1	840.	.05000	.00	.00	0.	297	15	A34	.01
2	7A	24.7	66.39	242.3	484.62	0	0.	.00000	.00	.00	0.	298	9	A33	.01
2	8B	47.5	101.83	47.5	101.83	1	1600.	.07000	.00	.00	0.	297	12	A33	.01
2	9B	42.0	72.00	89.5	161.20	0	0.	.00000	.00	.00	0.	220	15	A33	.01

****
* CONFLUENCE Q'S *
* 2 10A TA 1160 QA 484.62 QAB 645.41 QB 160.79 2 10B TB 1159 QB 161.20 QBA 644.47 QA 483.27 *
* 2 10AB TAB 1160 QAB 645.41 QA 484.62 QB 160.79 *
****

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
2	10AB	89.5	161.20	331.8	645.41	1	800.	.04000	.00	.00	0.	298	0	A33	.00
2	11A	34.4	88.37	366.2	690.42	1	910.	.02000	.00	.00	0.	298	10	A33	.01
2	12A	28.2	68.80	394.4	706.99	0	0.	.00000	.00	.00	0.	298	11	A33	.01
2	13A	23.5	58.45	417.9	730.81	4	340.	.02000	6.50	.00	0.	298	10	A32	.01
2	14C	17.0	42.69	17.0	42.69	4	110.	.02000	2.50	.00	0.	298	9	A31	.42
2	15C	22.9	43.03	39.9	85.55	4	440.	.02000	3.00	.00	0.	98	15	A31	.47

****
* CONFLUENCE Q'S *
* 2 16A TA 1162 QA 728.64 QAC 786.56 QC 57.92 2 16C TC 1155 QC 85.24 QCA 596.04 QA 510.80 *
* 2 16AC TAC 1162 QAC 786.56 QA 728.64 QC 57.92 *
****

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
2	16AC	39.9	85.24	457.8	786.56	4	570.	.02000	7.00	.00	0.	298	0	A31	.00
2	17A	6.1	16.23	463.9	789.54	0	0.	.00000	.00	.00	0.	98	9	A33	.95
2	18D	31.2	87.64	31.2	87.64	1	800.	.17000	.00	.00	0.	98	8	A34	.47
2	19D	13.0	34.64	44.2	119.56	0	0.	.00000	.00	.00	0.	98	9	A34	.47
2	20D	10.0	26.02	54.2	145.15	4	570.	.02000	4.00	.00	0.	98	9	A34	.10
2	21D	26.9	57.46	81.1	201.28	4	1210.	.02000	4.00	.00	0.	98	14	A34	.42
2	22D	8.4	22.31	89.5	218.82	2	1300.	.02000	.00	.00	0.	298	10	A34	.01
2	23D	15.6	40.08	105.1	231.83	4	130.	.02000	4.50	.00	0.	298	10	A33	.01

****
* CONFLUENCE Q'S *
* 2 24A TA 1162 QA 789.54 QAD 1016.31 QD 226.78 2 24D TD 1161 QD 231.47 QDA 1013.04 QA 781.58 *
* 2 24AD TAD 1162 QAD 1016.31 QA 789.54 QD 226.78 *
****

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
2	24AD	105.1	231.47	569.0	1016.31	4	2650.	.02000	7.50	.00	0.	298	0	A33	.00
2	25A	30.8	53.90	599.8	1047.36	0	0.	.00000	.00	.00	0.	98	18	A31	.65

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
Proposed Hydrology for Areas 1A-31A 11/10/09 STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
2	26E	31.1	60.74	31.1	60.74	0	0.	.00000	.00	.00	0.	98	14	A30	.85

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*                                                CONFLUENCE Q'S                                                          *
*     2   27A  TA 1164 QA  1047.36 QAE  1087.36 QE    40.01       2   27E  TE 1155 QE    60.74 QEA   735.52 QA   674.78   *
*                                 2   27AE TAE 1164 QAE  1087.36 QA  1047.36 QE    40.01                                *
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
2	27AE	31.1	60.74	630.9	1087.36	4	1640.	.02000	7.50	.00	0.	98	0	A30	.00
2	28A	29.5	59.84	660.4	1105.64	4	3330.	.02000	7.50	.00	0.	98	13	A30	.90
2	29A	27.6	22.24	688.0	1107.64	4	1780.	.02000	8.00	.00	0.	20	26	A29	.10
2	30A	39.6	44.78	727.6	1135.61	4	490.	.02000	8.00	.00	0.	220	23	A29	.01
2	31A	7.5	8.96	735.1	1136.50	0	0.	.00000	.00	.00	0.	20	13	A29	.01

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
Proposed Hydrology for Areas 40A-43A 11/10/09 STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
2	40A	17.1	48.51	17.1	48.51	2	1250.	.03000	.00	.00	0.	298	8	A33	.01
2	41A	16.9	42.04	34.0	82.37	2	990.	.03000	.00	.00	0.	298	10	A32	.01
2	42A	22.9	57.55	56.9	124.56	2	1230.	.03000	.00	.00	0.	298	9	A31	.01
2	43A	27.9	67.77	84.8	168.11	0	0.	.00000	.00	.00	0.	298	9	A30	.01

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
Proposed Hydrology for Areas 50A 11/10/09 STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
2	50A	19.3	23.78	19.3	23.78	2	800.	.03000	.00	.00	0.	220	20	A29	.01
2	51A	6.3	9.54	25.6	32.12	0	0.	.00000	.00	.00	0.	220	14	A29	.01

Program Package Serial Number: 2033

11/16/09 FILE: pme55b INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat

Proposed Hydrology for Areas 55A 11/10/09

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
2	55A	2.0	4.86	2.0	4.86	0	0.	.00000	.00	.00	0.	220	6	A29	.01
2	56A	.0	.00	2.0	4.86	0	0.	.00000	.00	.00	0.	220	99	A29	.00

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
PROPOSED HYDROLOGY FOR MESA'S EAST (BURN) STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
6	60A	4.0	12.31	4.0	12.31	4	615.	.40000	2.00	.00	0.	297	5	A30	.01
6	61A	5.5	13.27	9.5	24.83	4	250.	.39000	2.00	.00	0.	297	8	A30	.25
6	62A	6.0	17.83	15.5	42.11	4	560.	.65000	2.00	.00	0.	97	5	A30	.50
6	63A	22.0	39.00	37.5	80.27	0	0.	.00000	.00	.00	0.	97	13	A30	.42
6	64A	16.1	31.59	53.6	111.86	0	0.	.00000	.00	.00	0.	97	13	A30	.82
6	65A	14.0	27.14	67.6	138.94	4	350.	.04000	3.00	.00	0.	97	11	A30	.42
6	66A	12.9	25.01	80.5	162.62	4	190.	.04000	3.25	.00	0.	97	11	A30	.42
6	67A	4.0	8.12	84.5	170.48	4	1760.	.04000	3.25	.00	0.	97	13	A30	.96
6	68B	17.0	30.13	17.0	30.13	4	500.	.04000	2.00	.00	0.	97	13	A30	.42
6	69B	31.8	42.88	48.8	72.93	4	110.	.02000	2.75	.00	0.	97	20	A30	.27
6	70B	10.6	21.45	59.4	94.22	4	215.	.06000	2.50	.00	0.	97	12	A30	.79

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*     6   71A  TA 1157 QA   165.62 QAB   259.30 QB    93.68       6   71B  TB 1156 QB    94.19 QBA   255.33 QA   161.15   *
*                                 6   71AB TAB 1157 QAB   259.30 QA   165.62 QB    93.68                                 *
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
6	71AB	59.4	94.19	143.9	259.30	4	820.	.09000	3.25	.00	0.	97	0	A30	.00
6	72A	25.9	58.65	169.8	303.68	4	500.	.10000	3.50	.00	0.	97	8	A30	.42
6	73A	.0	.00	169.8	303.50	2	575.	.01000	.00	.00	0.	97	99	A30	.00
6	74A	2.4	5.05	172.2	302.20	4	215.	.10000	3.50	.00	0.	97	8	A30	.10
6	75A	.0	.00	172.2	301.63	0	0.	.00000	.00	.00	0.	97	99	A30	.00

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
Proposed Hydrology Calculations for Mesa's East (burn) File: P-M STORM DAY 4

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
4 95A	34.4	72.22	34.4	72.22	1	800.	.03000	.00	.00	0.	298	13	A31	.42
4 96A	29.0	65.03	63.4	124.52	4	760.	.02000	3.50	.00	0.	297	9	A30	.01
4 97A	16.6	33.94	80.0	153.10	0	0.	.00000	.00	.00	0.	97	10	A30	.42
4 98B	15.7	25.99	15.7	25.99	0	0.	.00000	.00	.00	0.	20	12	A30	.42
4 99B	39.7	65.19	55.4	90.98	4	380.	.02000	3.00	.00	0.	98	20	A30	.82

****
* CONFLUENCE Q'S *
* 4 100A TA 1158 QA 153.10 QAB 242.87 QB 89.77 4 100B TB 1156 QB 90.90 QBA 239.81 QA 148.91 *
* 4 100AB TAB 1157 QAB 242.90 QA 152.23 QB 90.67 *
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LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
4 100AB	55.4	90.90	135.4	242.90	4	1390.	.02000	4.50	.00	0.	97	0	A30	.00
4 101A	35.0	75.57	170.4	307.39	4	830.	.02000	5.00	.00	0.	97	10	A29	.82
4 102A	24.1	58.76	194.5	344.40	0	0.	.00000	.00	.00	0.	98	8	A29	.82
4 103C	32.3	52.30	32.3	52.30	4	1660.	.02000	2.50	.00	0.	97	18	A29	.82
4 104C	12.4	21.28	44.7	72.00	0	0.	.00000	.00	.00	0.	97	16	A29	.82
4 105C	17.5	31.87	62.2	102.74	0	0.	.00000	.00	.00	0.	98	15	A29	.82

****
* CONFLUENCE Q'S *
* 4 106A TA 1158 QA 344.40 QAC 447.14 QC 102.74 4 106C TC 1158 QC 102.74 QCA 447.14 QA 344.40 *
* 4 106AC TAC 1158 QAC 447.14 QA 344.40 QC 102.74 *
****

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
4 106AC	62.2	102.74	256.7	447.14	4	1660.	.02000	5.50	.00	0.	98	0	A29	.00
4 107A	30.5	50.65	287.2	491.58	4	200.	.02000	6.00	.00	0.	20	16	A29	.82
4 108D	22.0	37.62	22.0	37.62	4	930.	.02000	2.50	.00	0.	98	17	A29	.82
4 109D	30.2	48.64	52.2	85.91	4	700.	.02000	3.00	.00	0.	20	17	A29	.82

****
* CONFLUENCE Q'S *
* 4 110A TA 1160 QA 491.38 QAD 576.19 QD 84.81 4 110D TD 1158 QD 85.67 QDA 563.80 QA 478.13 *
* 4 110AD TAD 1160 QAD 576.19 QA 491.38 QD 84.81 *
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LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
4 110AD	52.2	85.67	339.4	576.19	4	1180.	.02000	6.00	.00	0.	20	0	A29	.00
4 111A	13.2	23.24	352.6	594.33	0	0.	.00000	.00	.00	0.	20	16	A29	.95
4 112A	40.5	74.32	393.1	660.19	0	0.	.00000	.00	.00	0.	20	14	A29	.90
4 113A	4.6	9.66	397.7	666.80	2	450.	.07000	.00	.00	0.	20	11	A29	.95
4 114E	25.0	39.47	25.0	39.47	2	1850.	.03000	.00	.00	0.	220	13	A29	.01
4 115E	12.8	17.93	37.8	51.08	2	590.	.03000	.00	.00	0.	220	16	A29	.01

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
Proposed Hydrology Calculations for Mesa's East (burn) File: P-M STORM DAY 4

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV

```
*                                                CONFLUENCE Q'S                                                                                *
*      4  116A  TA 1161 QA   666.07 QAE   714.86 QE    48.79       4  116E  TE 1164 QE    50.73 QEA   681.13 QA   630.40   *
*                                4  116AE TAE 1161 QAE   714.86 QA   666.07 QE    48.79                                                    *
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LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
4 116AE	37.8	50.73	435.5	714.86	0	0.	.00000	.00	.00	0.	220	0	A29	.00
4 117F	14.0	13.43	14.0	13.43	2	970.	.05000	.00	.00	0.	20	18	A29	.01

```
*                                                CONFLUENCE Q'S                                                                                *
*      4  118A  TA 1161 QA   714.86 QAF   727.94 QF    13.08       4  118F  TF 1161 QF    13.08 QFA   727.94 QA   714.86   *
*                                4  118AF TAF 1161 QAF   727.94 QA   714.86 QF    13.08                                                    *
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LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
4 118AF	14.0	13.08	449.5	727.94	0	0.	.00000	.00	.00	0.	20	0	A29	.00
4 119A	24.8	34.74	474.3	759.48	0	0.	.00000	.00	.00	0.	220	16	A29	.01

Program Package Serial Number: 2033

10/17/05 FILE: p-me8b INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

PROPOSED HYDROLOGY FOR MESA'S EAST (BURN)

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
8 140A	20.6	33.	20.6	33.	1	50.	.02000	.00	.00	0.	220	13	A29	.01
8 141A	.0	0.	20.6	33.	0	0.	.00000	.00	.00	0.	220	99	A29	.00

Program Package Serial Number: 2033

10/19/05 FILE: p-me9b INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

PROP. HYDROLOGY FOR MESA'S EAST (BURN) STORM DAY 4

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
9 150A	13.0	26.	13.0	26.	1	50.	.02000	.00	.00	0.	220	9	A29	.01
9 151A	.0	0.	13.0	26.	0	0.	.00000	.00	.00	0.	220	99	A29	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

PROP. HYDROLOGY FOR MESA'S EAST (BURNED)

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
10	160A	16.3	30.	16.3	30.	1	50.	.02000	.00	.00	0.	220	10	A29	.01
10	161A	.0	0.	16.3	30.	0	0.	.00000	.00	.00	0.	220	99	A29	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

PROP. HYDROLOGY FOR MESA'S EAST (BURN)

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
11 170A	6.1	17.	6.1	17.	1	50.	.02000	.00	.00	0.	220	5	A29	.01
11 171A	.0	0.	6.1	16.	0	0.	.00000	.00	.00	0.	220	99	A29	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

Prop. Hydrology Calculations for Mesa's East File: P-ME1B.INL (B STORM DAY 4

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
1 200A	34.5	80.	34.5	80.	1	2310.	.06000	.00	.00	0.	297	10	A32	.01
1 201A	46.4	83.	80.9	136.	0	0.	.00000	.00	.00	0.	297	15	A31	.01
1 202B	41.6	87.	41.6	87.	1	1820.	.05500	.00	.00	0.	297	12	A32	.01
1 203B	53.0	89.	94.6	159.	0	0.	.00000	.00	.00	0.	297	17	A31	.01

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*     1  204A  TA 1161 QA     136. QAB     295. QB     159.       1  204B  TB 1161 QB     159. QBA     295. QA     136.  *
*                                1  204AB TAB 1161 QAB     295. QA     136. QB     159.                                 *
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LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
1 204AB	94.6	159.	175.5	295.	0	0.	.00000	.00	.00	0.	297	0	A31	.00
1 205C	32.6	75.	32.6	75.	1	1520.	.06600	.00	.00	0.	297	10	A32	.01
1 206C	45.3	87.	77.9	146.	0	0.	.00000	.00	.00	0.	297	13	A31	.01

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*                                                CONFLUENCE Q'S                                                 *
*     1  207A  TA 1161 QA     295. QAC     437. QC     142.       1  207C  TC 1159 QC     146. QCA     435. QA     289.  *
*                                1  207AC TAC 1160 QAC     438. QA     293. QC     145.                                 *
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LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
1 207AC	77.9	146.	253.4	438.	1	625.	.05600	.00	.00	0.	297	0	A31	.00
1 208A	18.6	33.	272.0	465.	1	2080.	.04000	.00	.00	0.	297	14	A30	.01
1 209A	35.2	66.	307.2	469.	1	690.	.04000	.00	.00	0.	297	13	A30	.04
1 210A	7.8	16.	315.0	469.	0	0.	.00000	.00	.00	0.	297	10	A29	.01
1 211D	37.4	65.	37.4	65.	1	1490.	.02000	.00	.00	0.	297	16	A31	.01
1 212D	35.1	68.	72.5	103.	1	1115.	.02000	.00	.00	0.	297	12	A30	.01
1 213D	29.3	57.	101.8	129.	0	0.	.00000	.00	.00	0.	297	11	A29	.01

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*                                                CONFLUENCE Q'S                                                 *
*     1  214A  TA 1167 QA     469. QAD     573. QD     104.       1  214D  TD 1159 QD     129. QDA     484. QA     355.  *
*                                1  214AD TAD 1166 QAD     576. QA     469. QD     107.                                 *
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LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
1 214AD	101.8	129.	416.8	576.	1	1000.	.05000	.00	.00	0.	297	0	A29	.00
1 215A	22.3	42.	439.1	580.	1	100.	.02000	.00	.00	0.	220	10	A29	.01

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

HYDROLOGY CALCULATION FOR AREA X-1

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
10 300A	2.4	6.	2.4	6.	1	100.	.02000	.00	.00	0.	297	8	A29	.01
10 301A	.0	0.	2.4	5.	0	0.	.00000	.00	.00	0.	297	99	A29	.00

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat
Proposed Hydrology Calculations for Mesa's East File: P-ME-5.inl STORM DAY 4

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
5 400A	19.5	35.55	19.5	35.55	4	760.	.02000	2.50	.00	0.	98	14	A29	.55
5 401A	35.2	61.09	54.7	96.45	4	300.	.02000	3.50	.00	0.	98	16	A29	.69
5 402A	11.5	17.16	66.2	113.19	0	0.	.00000	.00	.00	0.	97	14	A29	.10
5 403B	38.7	60.37	38.7	60.37	4	480.	.02000	3.00	.00	0.	97	15	A29	.36

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*                                                CONFLUENCE Q'S                                                 *
*     5  404A  TA 1156 QA   113.19 QAB   173.38 QB    60.19       5  404B  TB 1156 QB    60.19 QBA   173.38 QA   113.19   *
*                                5  404AB TAB 1156 QAB   173.38 QA   113.19 QB    60.19                                 *
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LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
5 404AB	38.7	60.19	104.9	173.38	4	690.	.02000	4.00	.00	0.	98	0	A29	.00
5 405A	9.1	20.93	114.0	190.77	4	440.	.02000	4.00	.00	0.	98	8	A29	.05
5 406C	22.6	40.62	22.6	40.62	4	560.	.02000	2.50	.00	0.	98	14	A29	.42

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*                                                CONFLUENCE Q'S                                                 *
*     5  407A  TA 1157 QA   190.10 QAC   230.45 QC    40.35       5  407C  TC 1156 QC    40.54 QCA   227.32 QA   186.78   *
*                                5  407AC TAC 1157 QAC   230.45 QA   190.10 QC    40.35                                 *
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LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
5 407AC	22.6	40.54	136.6	230.45	2	710.	.02000	.00	.00	0.	20	0	A29	.00
5 408A	8.5	12.00	145.1	238.59	0	0.	.00000	.00	.00	0.	20	11	A29	.10

Program Package Serial Number: 2033

11/16/09 FILE: p-503b INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\lasoilx.dat

Proposed Hydrology for Areas 503A 11/10/09 STORM DAY 4

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
2 503A	11.8	25.98	11.8	25.98	0	0.	.00000	.00	.00	0.	298	11	A30	.01
2 504A	.0	.00	11.8	25.98	0	0.	.00000	.00	.00	0.	298	99	A30	.00

Program Package Serial Number: 2033
03/26/07 FILE: p-600b INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

Mission Village Prop. Condition, Areas 600A-612D by tvd 5/5/05

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
100 598A	232.0	741.	232.0	741.	0	0.	.00000	.00	.00	0.	98	6	A31	.66
100 599A	11.7	34.	243.7	775.	1	1510.	.03000	.00	.00	0.	298	8	A34	.01
100 600A	42.0	168.	285.7	769.	0	0.	.00000	.00	.00	0.	98	5	A34	.88
100 601A	16.4	38.	302.1	807.	1	1720.	.03000	.00	.00	0.	298	12	A33	.01
100 602A	25.7	56.	327.8	785.	0	0.	.00000	.00	.00	0.	298	13	A32	.01
100 603B	23.1	59.	23.1	59.	1	1290.	.04000	.00	.00	0.	298	10	A33	.01
100 604B	17.2	43.	40.3	84.	0	0.	.00000	.00	.00	0.	298	10	A32	.01

CONFLUENCE Q'S

100 605A TA 1160 QA 785. QAB 864. QB 80. 100 605B TB 1158 QB 84. QBA 790. QA 706.
100 605AB TAB 1160 QAB 864. QA 785. QB 80.

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
100 605AB	40.3	84.	368.1	864.	1	1620.	.03000	.00	.00	0.	298	0	A32	.00
100 606A	36.5	79.	404.6	852.	4	290.	.03000	6.25	.00	0.	298	12	A31	.01
100 607C	18.1	41.	18.1	41.	4	550.	.01200	2.50	.00	0.	298	11	A31	.01
100 608C	4.3	14.	22.4	53.	0	0.	.00000	.00	.00	0.	98	6	A31	.79

CONFLUENCE Q'S

100 609A TA 1164 QA 850. QAC 873. QC 23. 100 609C TC 1155 QC 53. QCA 518. QA 465.
100 609AC TAC 1164 QAC 873. QA 850. QC 23.

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
100 609AC	22.4	53.	427.0	873.	0	0.	.00000	.00	.00	0.	98	0	A31	.00
100 610D	32.7	84.	32.7	84.	1	1765.	.05000	.00	.00	0.	298	10	A33	.01
100 611D	46.5	105.	79.2	162.	4	1400.	.03000	3.50	.00	0.	298	12	A32	.01
100 612D	17.7	32.	96.2	190.	4	700.	.03000	3.75	.00	0.	98	17	A31	.42

CONFLUENCE Q'S

100 613A TA 1164 QA 873. QAD 1049. QD 176. 100 613D TD 1162 QD 189. QDA 1022. QA 833.
100 613AD TAD 1164 QAD 1049. QA 873. QD 176.

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
100 613AD	96.2	189.	523.9	1049.	0	0.	.00000	.00	.00	0.	98	0	A31	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

Mission Village Prop. Condition, Areas 620A-625A by tvd 8/16/06 STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
104	620A	3.7	11.	3.7	11.	4	340.	.04000	2.00	.00	0.	98	7	A31	.68
104	621B	9.4	21.	9.4	21.	0	0.	.00000	.00	.00	0.	298	11	A31	.01
104	622B	1.4	5.	10.8	26.	4	200.	.03000	2.00	.00	0.	98	5	A31	.10

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*                                                CONFLUENCE Q'S                                                 *
*   104  623A  TA 1155 QA      11. QAB      36. QB      25.     104  623B  TB 1154 QB      25. QBA      36. QA      11.  *
*                               104  623AB TAB 1154 QAB      36. QA      11. QB      25.                                *
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
104	623AB	10.8	25.	14.5	36.	4	150.	.04000	2.00	.00	0.	98	0	A31	.00
104	624A	2.2	8.	16.7	43.	4	500.	.03000	2.25	.00	0.	98	5	A31	.95
104	625A	1.6	5.	18.3	46.	0	0.	.00000	.00	.00	0.	98	5	A31	.10
104	626A	1.3	4.	19.6	50.	0	0.	.00000	.00	.00	0.	98	6	A31	.95

Program Package Serial Number: 2033

08/18/06 FILE: P-630 INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50

Mission Village Prpo. Condition, Areas 630A-631A by tvd 8/18/06 STORM DAY 4

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
1 630A	1.6	4.	1.6	4.	0	0.	.00000	.00	.00	0.	98	9	A31	.10
1 631A	1.1	4.	2.7	7.	0	0.	.00000	.00	.00	0.	98	6	A31	.95

Proposed Condition
Tc Results

Project	Subarea	Area (acres)	%imp	Freq.	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc (min.)
NEWHALL	1A	36	0.01	50	97	2900	0.17	7.2	13
NEWHALL	2A	37	0.01	50	97	2150	0.21	7.2	10
NEWHALL	3A	43.3	0.01	50	97	2450	0.13	7	12
NEWHALL	4A	42.3	0.01	50	97	2880	0.14	7	14
NEWHALL	5A	21.6	0.01	50	97	1760	0.16	6.8	10
NEWHALL	6A	37.4	0.01	50	97	2800	0.09	6.8	15
NEWHALL	7A	24.7	0.01	50	98	1670	0.14	6.6	9
NEWHALL	8B	47.5	0.01	50	97	2080	0.13	6.6	12
NEWHALL	9B	42	0.01	50	20	2315	0.12	6.6	15
NEWHALL	11A	34.4	0.01	50	98	1830	0.11	6.6	10
NEWHALL	12A	28.2	0.01	50	98	2080	0.13	6.6	11
NEWHALL	13A	23.5	0.01	50	98	1790	0.13	6.4	10
NEWHALL	14C	17	0.42	50	98	1550	0.14	6.2	9
NEWHALL	15C	22.9	0.47	50	98	2770	0.07	6.2	15
NEWHALL	17A	6.1	0.95	50	98	1210	0.05	6.6	9
NEWHALL	18D	31.2	0.47	50	98	1430	0.11	6.8	8
NEWHALL	19D	13	0.47	50	98	1550	0.09	6.8	9
NEWHALL	20D	10	0.1	50	98	1500	0.08	6.8	9
NEWHALL	21D	26.9	0.42	50	98	2290	0.03	6.8	14
NEWHALL	22D	8.4	0.01	50	98	1880	0.13	6.8	10
NEWHALL	23D	15.6	0.01	50	98	1730	0.12	6.6	10
NEWHALL	25A	30.8	0.65	50	98	2650	0.02	6.2	18
NEWHALL	26E	31.1	0.85	50	98	1860	0.02	6	14
NEWHALL	28A	29.5	0.9	50	98	1640	0.02	6	13
NEWHALL	29A	27.6	0.1	50	20	3330	0.05	5.8	26
NEWHALL	30A	39.6	0.01	50	20	2900	0.08	5.8	23
NEWHALL	31A	7.5	0.01	50	20	930	0.02	5.8	13
NEWHALL	40A	17.1	0.01	50	98	1260	0.13	6.6	8
NEWHALL	41A	16.9	0.01	50	98	1660	0.11	6.4	10
NEWHALL	42A	22.9	0.01	50	98	1415	0.12	6.2	9
NEWHALL	43A	27.9	0.01	50	98	1280	0.1	6	9
NEWHALL	50A	19.3	0.01	50	20	2250	0.06	5.8	20
NEWHALL	51A	6.3	0.01	50	20	1100	0.03	5.8	14
NEWHALL	55A	2	0.01	50	20	590	0.21	5.8	6
NEWHALL	60A	4	0.01	50	97	500	0.16	5.8	5
NEWHALL	61A	5.5	0.25	50	97	930	0.10	5.8	8
NEWHALL	62A	6	0.25	50	97	500	0.10	5.8	5
NEWHALL	63A	22	0.42	50	97	1700	0.04	5.8	13
NEWHALL	64A	16.1	0.82	50	97	1925	0.05	5.8	13
NEWHALL	65A	14	0.42	50	97	1060	0.02	5.8	11
NEWHALL	66A	12.9	0.42	50	97	1060	0.02	5.8	11
NEWHALL	67A	4	0.96	50	97	2615	0.04	5.8	13
NEWHALL	68B	17	0.42	50	97	1750	0.05	5.8	13
NEWHALL	69B	31.8	0.27	50	97	2150	0.01	5.8	20
NEWHALL	70B	10.6	0.42	50	97	1600	0.05	5.8	12
NEWHALL	72A	25.9	0.4	50	97	1030	0.08	5.8	8
NEWHALL	74A	2.4	0.01	50	20	500	0.04	5.8	8
NEWHALL	95A	34.4	0.01	50	98	2205	0.08	6.2	13

Proposed Condition
Tc Results

Project	Subarea	Area (acres)	%imp	Freq.	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc (min.)
NEWHALL	96A	29	0.01	50	97	1330	0.15	6	9
NEWHALL	97A	16.6	0.42	50	97	1270	0.08	6	10
NEWHALL	98B	15.7	0.42	50	20	1620	0.08	6	12
NEWHALL	99B	39.7	0.82	50	98	2680	0.01	6	20
NEWHALL	101A	35	0.82	50	97	1250	0.05	5.8	10
NEWHALL	102A	24.1	0.82	50	98	830	0.03	5.8	8
NEWHALL	103C	32.3	0.82	50	97	2560	0.02	5.8	18
NEWHALL	104C	12.4	0.82	50	97	2180	0.02	5.8	16
NEWHALL	105C	17.5	0.82	50	98	1960	0.02	5.8	15
NEWHALL	107A	30.5	0.82	50	20	1660	0.01	5.8	16
NEWHALL	108D	22	0.82	50	98	2410	0.02	5.8	17
NEWHALL	109D	30.2	0.82	50	20	2220	0.02	5.8	17
NEWHALL	111A	13.1	0.95	50	20	2780	0.05	5.8	16
NEWHALL	112A	40.9	0.9	50	20	1650	0.02	5.8	14
NEWHALL	113A	4.7	0.95	50	20	1570	0.05	5.8	11
NEWHALL	114E	24.7	0.01	50	20	1380	0.09	5.8	13
NEWHALL	115E	12.6	0.01	50	20	1520	0.04	5.8	16
NEWHALL	117F	14	0.01	50	20	2140	0.08	5.8	18
NEWHALL	119A	24.9	0.01	50	20	1890	0.09	5.8	16
NEWHALL	140A	20.6	0.01	50	20	1520	0.10	5.8	13
NEWHALL	150A	13	0.01	50	20	1050	0.17	5.8	9
NEWHALL	160A	16.3	0.01	50	20	1250	0.21	5.8	10
NEWHALL	170A	6.1	0.01	50	20	450	0.33	5.8	5
NEWHALL	200A	34.5	0.01	50	97	1850	0.21	5.8	10
NEWHALL	201A	46.4	0.01	50	97	2920	0.15	5.8	15
NEWHALL	202B	41.6	0.01	50	97	2105	0.13	5.8	12
NEWHALL	203B	53	0.01	50	97	2950	0.10	5.8	17
NEWHALL	205C	32.6	0.01	50	97	1650	0.21	5.8	10
NEWHALL	206C	45.3	0.01	50	97	2240	0.17	5.8	13
NEWHALL	208A	18.6	0.01	50	97	2370	0.12	5.8	14
NEWHALL	209A	35.2	0.04	50	97	2295	0.15	5.8	13
NEWHALL	210A	7.8	0.01	50	97	690	0.01	5.8	10
NEWHALL	211D	37.4	0.01	50	97	2525	0.08	5.8	16
NEWHALL	212D	35.1	0.01	50	97	1490	0.06	5.8	12
NEWHALL	213D	29.3	0.01	50	97	1800	0.19	5.8	11
NEWHALL	215A	22.3	0.01	50	97	1000	0.05	5.8	10
NEWHALL	300A	2.4	0.01	50	97	700	0.05	5.8	8
NEWHALL	400A	19.5	0.55	50	98	1960	0.03	5.8	14
NEWHALL	401A	35.2	0.69	50	98	2840	0.05	5.8	16
NEWHALL	402A	11.5	0.1	50	97	1900	0.06	5.8	14
NEWHALL	403B	38.7	0.36	50	97	2450	0.07	5.8	15
NEWHALL	405A	9.1	0.05	50	98	950	0.07	5.8	8
NEWHALL	406C	22.6	0.42	50	98	1850	0.03	5.8	14
NEWHALL	408A	8.5	0.15	50	20	1060	0.07	5.8	11
NEWHALL	503A	11.8	0.01	50	98	1565	0.08	6	11

Proposed Condition
Tc Results

Project	Subarea	Area (acres)	%imp	Freq.	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc (min.)
NEWHALL	599A	11.7	0.01	50	98	1100	0.07	6.2	8
NEWHALL	601A	16.4	0.01	50	98	1510	0.03	5.8	12
NEWHALL	602A	25.7	0.01	50	98	1720	0.03	6.2	13
NEWHALL	603B	23.1	0.01	50	98	1650	0.11	6.2	10
NEWHALL	604B	17.2	0.01	50	98	1290	0.04	6.2	10
NEWHALL	606A	36.5	0.01	50	98	1620	0.03	6.2	12
NEWHALL	607C	18.1	0.01	50	98	1800	0.09	6.2	11
NEWHALL	608C	4.3	0.79	50	98	410	0.01	6.2	6
NEWHALL	610D	32.7	0.01	50	98	1750	0.09	5.8	10
NEWHALL	611D	46.5	0.01	50	98	1765	0.05	5.8	12
NEWHALL	612D	17.7	0.42	50	98	2575	0.03	6.2	16
NEWHALL	620A	3.7	0.68	50	98	540	0.03	6.2	6
NEWHALL	621B	9.4	0.01	50	98	1680	0.09	6.2	11
NEWHALL	622B	1.4	0.1	50	98	450	0.04	6.2	5
NEWHALL	624A	2.2	0.95	50	98	400	0.04	6.2	5
NEWHALL	625A	1.6	0.1	50	98	360	0.04	6.2	5
NEWHALL	626A	1.3	0.95	50	98	650	0.05	6.2	6
NEWHALL	630A	1.6	0.1	50	98	1000	0.04	6.2	9
NEWHALL	631A	1.1	0.95	50	98	650	0.05	6.2	6
SCE Substation									
DISPOSAL	701A	14.6	0.01	50	92	1550	0.15	6.6	9
DISPOSAL	702A	15	0.01	50	92	1650	0.15	6.6	9
DISPOSAL	703B	10.2	0.1	50	92	1180	0.06	6.6	9
DISPOSAL	710A	3.2	0.01	50	92	1240	0.06	6.8	9
ALT-2	720A	4.7	0.1	50	92	850	0.1	6.8	6
ALT-2	730A	5.1	0.1	50	92	1160	0.05	6.8	9
ALT-1	740A	2.8	0.01	50	92	540	0.31	6.8	5
ALT-1	750A	6.1	0.1	50	92	1010	0.17	6.8	6

Mission Village Preliminary SUSMP Summary 2/10/2010

		A	B	C	D	D	D	E	Unit	Comments
		WQ BASIN 'A'	WQ BASIN 'B'	WQ BASIN 'C'	WQ BASIN 'D'	WQ BASIN 'D' (ex. School)	WQ BASIN 'D' (ex. SFD)	WQ BASIN 'E'		
Total Area	A_T	172.2	145.1	366.6	614.4	54.2	26.9	40.5	acres	
Type of Development		Residential	Residential	Residential	Residential	School	Residential	Commercial		
% of Project Impervious		48%	45%	56%	16%	56%	42%	96%	%	
% of Project Pervious		34%	55%	22%	29%	44%	58%	4%	%	
% of Project Contributing Undeveloped Are		18%	0%	22%	55%	0%	0%	0%	%	
Total		100%	100%	100%	100%	100%	100%	100%	%	
Impervious Area	A_I	82.7	65.3	204.9	98.3	30.4	11.3	38.9	acres	
Pervious Area	A_P	58.5	79.8	80.7	178.2	23.8	15.6	1.6	acres	
Undeveloped Area	A_U	31	0	81	337.9	0	0	0	acres	
Total		172.2	145.1	366.6	614.4	54.2	26.9	40.5	acres	
Diff		0	0	0	0	0	0	0	acres	
APPENDIX A VOLUME & FLOW RATE CALCULATIONS										
Initial Tc	T_C	30	30	30	30	30	30	30	min	
Rainfall Intensity	I_X	0.193	0.193	0.193	0.193	0.193	0.193	0.193	in/hr	from Table 1
Undeveloped Runoff Coefficient	C_U	0.1	0.1	0.1	0.1	0.1	0.1	0.1		Charts D Soil Types 020/098/097
Developed Runoff Coefficient	C_D	0.484	0.46	0.547	0.228	0.548	0.436	0.868		
$C_D * I_X$		0.0934	0.0888	0.1056	0.0440	0.1058	0.0841	0.1675		
Length		8000	6000	6500	6500	2360	1850	1500		
Slope		0.03	0.007	0.03	0.03	0.05	0.06	0.02		
Calculated Tc		131.3	142.8	111.4	175.5	63.7	62.2	45.6	min	
Acceptable Tc		30	30	30	30	30	30	30	min	
SUSMP 3/4" Rainfall										
Peak Mitigation Flow Rate	Q_{PM}	***16.2***	***13.0***	***39.0***	***27.3***	***5.8***	***2.3***	***6.8***	ft^3/s	
Mitigation Volume	V_M	***227,002***	***181,727***	***546,079***	***381,368***	***80,967***	***31,935***	***95,750***	ft^3	
	V_M	**5.2**	**4.2**	**12.5**	**8.8**	**1.9**	**0.7**	**2.2**	***ac-ft***	
note: Basin 'D' includes three separate calculations										

Mission Village Drainage Concept SUSMP Calculations

2/10/2010

		CB # 2	CB # 3	CB # 4	CB # 5	CB #6	CB #7	Existing CB #8	Unit	Comments
Total Area	A_T	4.6	8.4	9.3	4.3	3.7	2.2	2.4	acres	
Type of Development		Commercial	Commercial	Commercial	Commercial	Commercial	Commercial	Commercial		
% of Project Impervious		96%	52%	68%	95%	77%	96%	96%	%	
% of Project Pervious		4%	48%	32%	5%	23%	4%	4%	%	
% of Project Contributing Undeveloped Are		0%	0%	0%	0%	0%	0%	0%	%	
Total		100%	100%	100%	100%	100%	100%	100%	%	
Impervious Area	A_I	4.4	4.4	6.3	4.2	2.4	2.1	2.3	acres	
Pervious Area	A_P	0.2	4	3	0.1	1.3	0.1	0.1	acres	
Undeveloped Area	A_U	0	0	0	0	0	0	0	acres	
Total		4.6	8.4	9.3	4.3	3.7	2.2	2.4	acres	
Diff		0	0	0	0	0	0	0	acres	
APPENDIX A VOLUME & FLOW RATE CALCULATIONS										
Initial Tc	T_C	30	30	30	30	30	30	30	min	
Rainfall Intensity	I_X	0.193	0.193	0.193	0.193	0.193	0.193	0.193	in/hr	from Table 1
Undeveloped Runoff Coefficient	C_U	0.1	0.1	0.1	0.1	0.1	0.1	0.1		Charts D Soil Types 020/098/097
Developed Runoff Coefficient	C_D	0.868	0.516	0.644	0.86	0.716	0.868	0.868		
$C_D * I_X$		0.1675	0.0996	0.1243	0.1660	0.1382	0.1675	0.1675		
Length		1450	1150	1400	400	780	1170	1170		
Slope		0.03	0.012	0.043	0.012	0.04	0.05	0.05		
Calculated Tc		42.5	56.3	46.5	25.9	33.5	35.8	35.8	min	
Acceptable Tc		30	30	30	30	30	30	30	min	
SUSMP 3/4" Rainfall										
Peak Mitigation Flow Rate	Q_{PM}	***0.8***	***0.8***	***1.2***	***0.7***	***0.5***	***0.4***	***0.4***	ft^3/s	
Mitigation Volume	V_M	***10,836***	***11,870***	***16,253***	***10,318***	***6,235***	***5,173***	***5,663***	ft^3	

APPENDIX A VOLUME & FLOW RATE CALCULATIONS

A.1 METHOD FOR CALCULATING STANDARD URBAN STORMWATER MITIGATION PLAN FLOW RATES AND VOLUMES BASED ON 0.75-INCHES OF RAINFALL: WORKSHEET

PROJECT NAME

Water Quality Basin 'E'

PROVIDE PROPOSED PROJECT CHARACTERISTICS

A_{Total}	40.9	Acres
Type of Development	Commercial	
Predominate Soil Type #	20	
% of Project Impervious	96	
% of Project Pervious	4	
% of Project Contributing Undeveloped Area	0	
A_I	39.3	Acres
A_P	1.6	Acres
A_U	0	Acres

TABLE FOR ITERATIONS:

Iteration No.	Initial T_C (min)	I_X (in/hr)	C_U	C_D	C_D*I_X (in/hr)	Calculated T_C (min)	Difference (min)
1	15	0.269	0.1	0.868	0.2318	38.5	23.5
2	30	0.193	0.1	0.868	0.1675		
3							
4							
5							
6							
7							
8							
9							
10							

Acceptable T_C value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,
   $Q_{PM} = C_D * I_X * A_{Total}$ * (1.008333 ft^3-hour / acre-inches-seconds)

Q_{PM} = 6.9 cfs

In order to determine the volume (V_M) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2{,}722.5\ ft^3/acre) * [(A_I)(0.9) + (A_P + A_U)(C_U)]$$

$$V_m = (2722.5) \times [(39.3)(0.9) + (1.610)(0.1)]$$

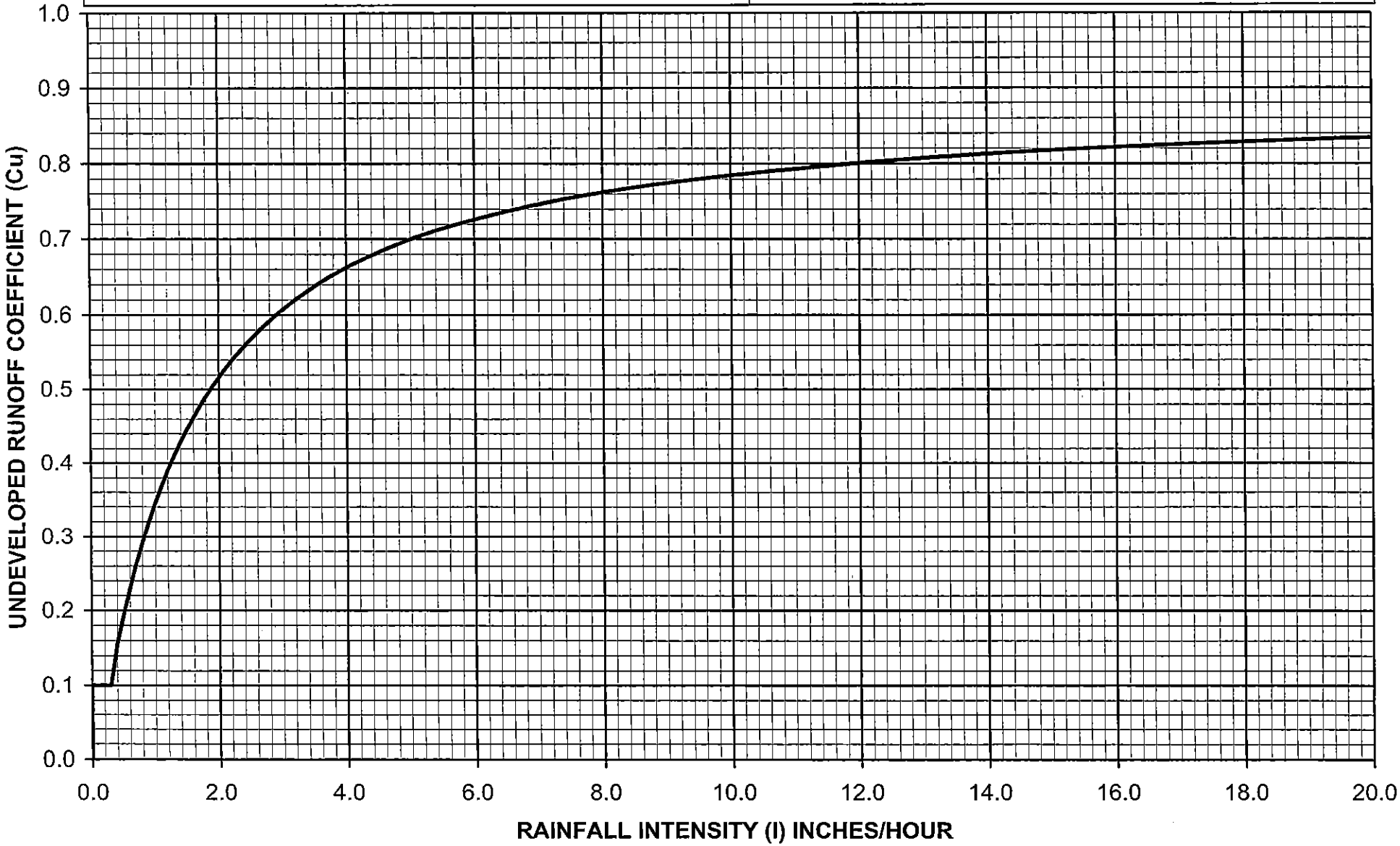
$$\boxed{V_M = 96{,}730\ ft^3 = 2.2\ AC\text{-}FT}$$

$C_D = (0.9 * IMP) + (1.0 - IMP) * C_U$

Where: C_D = Developed Runoff Coefficient
IMP = Proportion Impervious
C_U = Undeveloped runoff coefficient

Los Angeles County Department of Public Works

RUNOFF COEFFICIENT CURVE
SOIL TYPE NO. 020



$C_D = (0.9 * IMP) + (1.0 - IMP) * C_U$

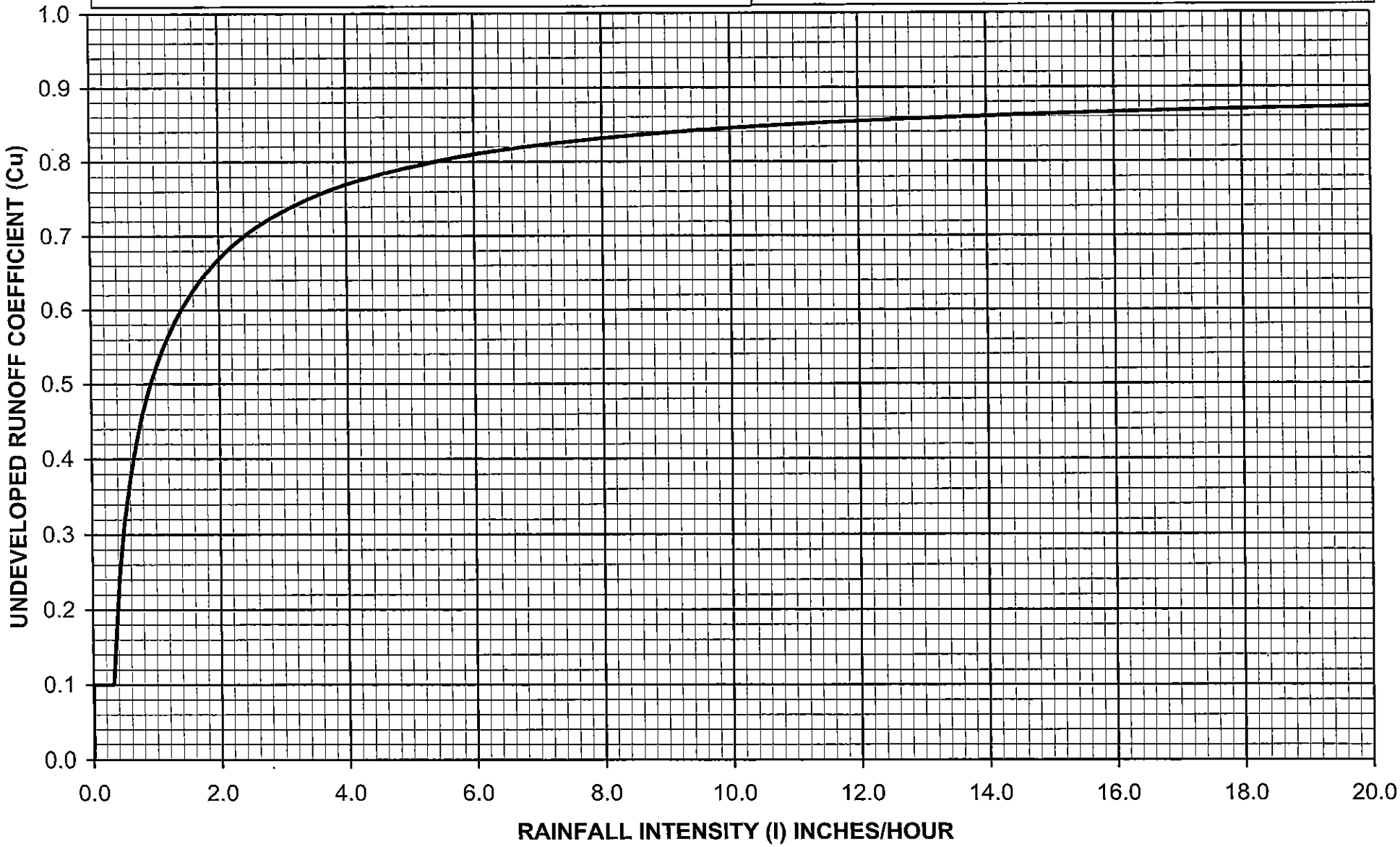
Where: C_D = Developed Runoff Coefficient

IMP = Proportion Impervious

C_U = Undeveloped runoff coefficient

Los Angeles County Department of Public Works

RUNOFF COEFFICIENT CURVE
SOIL TYPE NO. 097

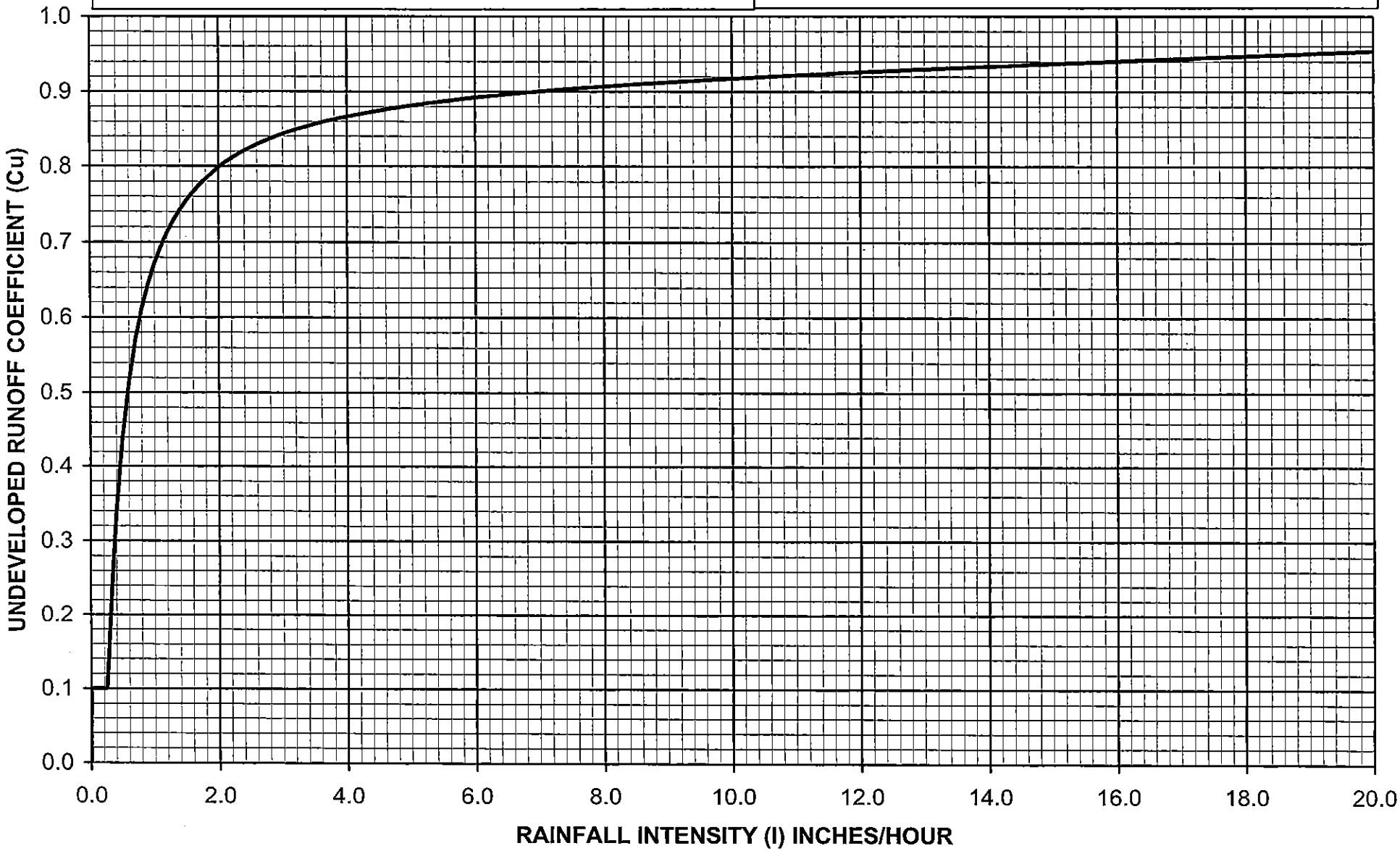


$C_D = (0.9 * IMP) + (1.0 - IMP) * C_U$

Where: C_D = Developed Runoff Coefficient
IMP = Proportion Impervious
C_U = Undeveloped runoff coefficient

Los Angeles County Department of Public Works

RUNOFF COEFFICIENT CURVE
SOIL TYPE NO. 098



DPR and Bulking Factor Summary Table
For
Mission Village

Existing Condition:

Drainage Area	Acreage	Debris Producing Area	Sq.Mi	DPA Zone	DPR (c.y. per Sq.mi.)	DPR (c.y. per acre)	Bulking Factor
1 - 23A	744	654.6	1.02	5, 8	24,000	38 [1]	1.27
30-50A	534.4	534.4	0.84	8	18,000	28	1.27
50-58A	357.1	357.1	0.56	8	18,000	28	1.27
60-64A	169.3	169.3	0.26	8	24,000	38	1.31
80-81A	75.3	75.3	0.12	8	33,000	52	1.35
90-92A	95.8	95.8	0.15	8	29,000	45	1.34
101-104A	105.2	105.2	0.16	8	28,000	44	1.33
500-503A	103	103	0.16	8	28,000	44	1.33
598-622A	167	158.8	0.25	8	23,000	36	1.33

Proposed Condition:

Drainage Area	Acreage	Debris Producing Area	Sq.Mi	DPA Zone	DPR (c.y. per Sq.mi.)	DPR (c.y. per acre)	Bulking Factor
1 - 31A	735.1	498.5	0.78	5, 8	17,000	27 [3]	1.27
40-43A	84.8	83.6	0.14	8	30,000	47	1.34
90-119A	474.3	126	0.20	8	26,000	41	1.31
200-215A	439.1	439.1	0.69	8	17,000	27	1.27
598-631A	523.9	268.2	0.42	8	21,000	33	1.29

Notes:

1) In order to be conservative, the DPR for the proposed condition was used for the existing for this watershed.
2) For watersheds less than 64 acres DPR of 54.7cy/ac was used.
3) See Appendix for Calculation.
4) For watersheds less than 64 acres the Bulking Factor of 1.36 was used.

Job No. _____ Sheet ___ of ___

Prepared by _____ Date 10/25/04

Project Name MESAS

Reviewed by _____ Date _____

Title DEBRIS CALCULATION FOR NODES / AREAS 1A THRU 22A

FWA No. PROPOSED CONDITION

DPA ZONE	DRAINAGE AREA		DEVELOPED AREA SQ. MI
	ACRES	SQ. MI	
5	238	0.37	0.02
8	400	0.62	0.12
TOTAL	637	0.99	0.14

DPA ZONE 5 ($A = 0.99\ mi^2$) $\Rightarrow$ DPR = 37,000 yd^3/mi^2

DPA ZONE 5 ($A = 0.37 - 0.02 = 0.35$) $\Rightarrow$ DPR = 48,000 yd^3/mi^2

DPA ZONE 8 ($A = 0.99\ mi^2$) $\Rightarrow$ DPR = 16,000 yd^3/mi^2

DPA ZONE 8 ($A = 0.62 - 0.12 = 0.50$) $\Rightarrow$ DPR $\cong$ 20,000 yd^3/mi^2 (ROUNDED UP)

$$DP = 37{,}000\,(0.35)\left(0.35/0.99\right) + 48{,}000\,(0.35)\left(0.62/0.99\right)$$
$$+ 16{,}000\,(0.50)\left(0.50/0.99\right) + 20{,}000\,(0.50)\left(\frac{0.37+0.12}{0.99}\right)$$

$$DP \cong 24{,}000\ yd^3/mi^2$$

USE 38 yd^3/ac

Job No. _____ Sheet ___ of ___ Prepared by _____ Date _____

Project Name MESAS Reviewed by _____ Date _____

Title BULKING FACTOR CALCULATION FOR AREAS 1A THRU 22A FWA No. PROPOSED CONDITION

DPA ZONE 5:

BULKING FACTOR $\left(\begin{array}{l} A = 637 \text{ ac} \\ = 0.99 \text{ mi}^2 \end{array}\right) \Rightarrow$ USE 1.36

BULKING FACTOR $(A = 0.37 - 0.02 = 0.35) \Rightarrow$ USE 1.39

DPA ZONE 8:

BULKING FACTOR $(A = 637 \text{ ac}) \Rightarrow$ USE 1.26

BULKING FACTOR $(A = 0.62 - 0.12 = 0.50) \Rightarrow$ USE 1.29

PEAK BULKING FACTOR: (ASSUME $Q = 1$ cfs)

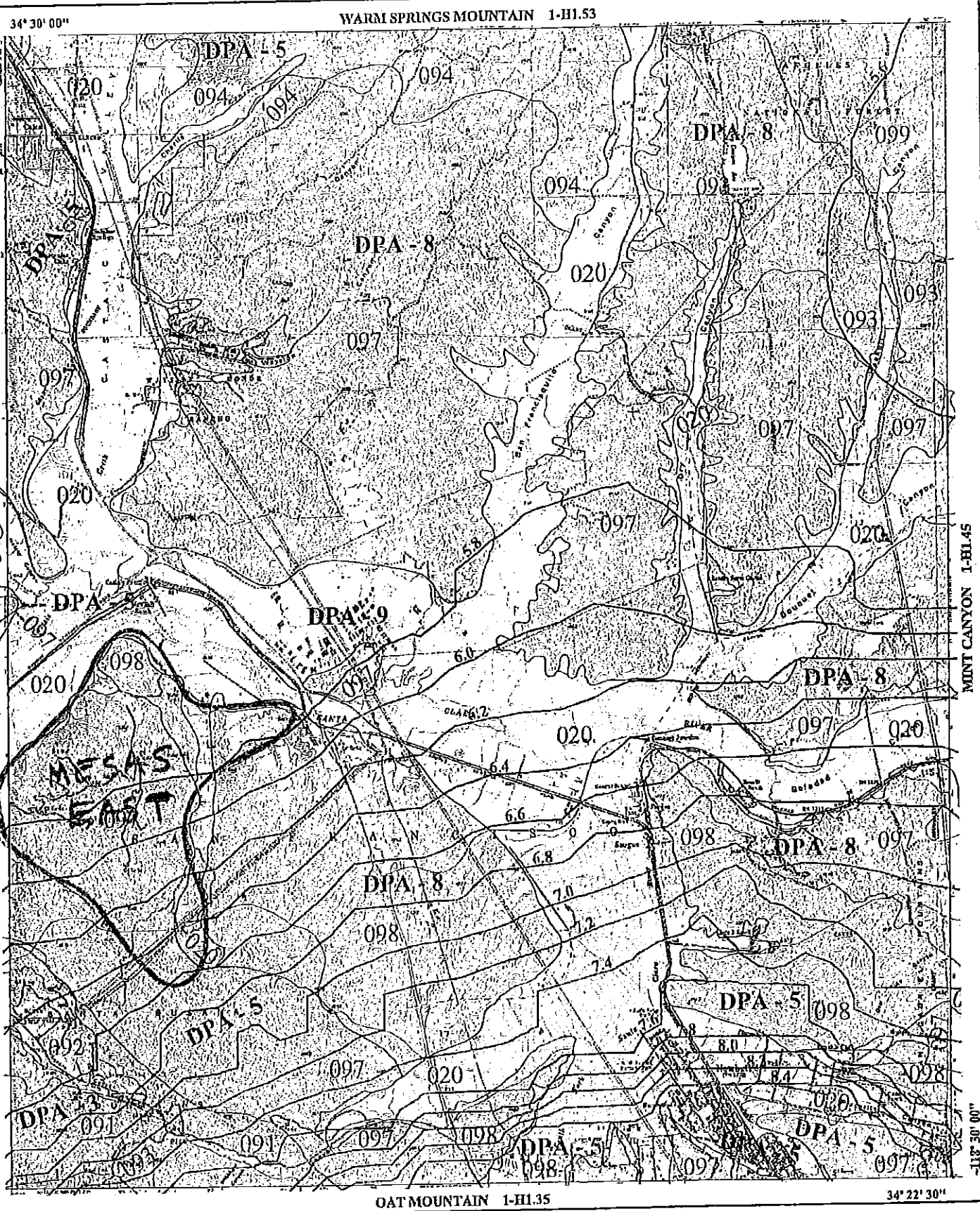
$$BF = 1.36\left[\left(\frac{0.35}{0.99}\right)\left(\frac{0.35}{0.99}\right)\right] + 1.39\left[\left(\frac{0.35}{0.99}\right)\left(\frac{0.62+0.02}{0.99}\right)\right]$$

$$+ \left(\frac{0.02}{0.99}\right) + 1.26\left[\left(\frac{0.50}{0.99}\right)\left(\frac{0.50}{0.99}\right)\right] + 1.29\left[\left(\frac{0.50}{0.99}\right)\left(\frac{0.37+0.12}{0.99}\right)\right]$$

$$+ \left(\frac{0.12}{0.99}\right) \cong 1.27$$

USE BF = 1.27

MESAS EAST



016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

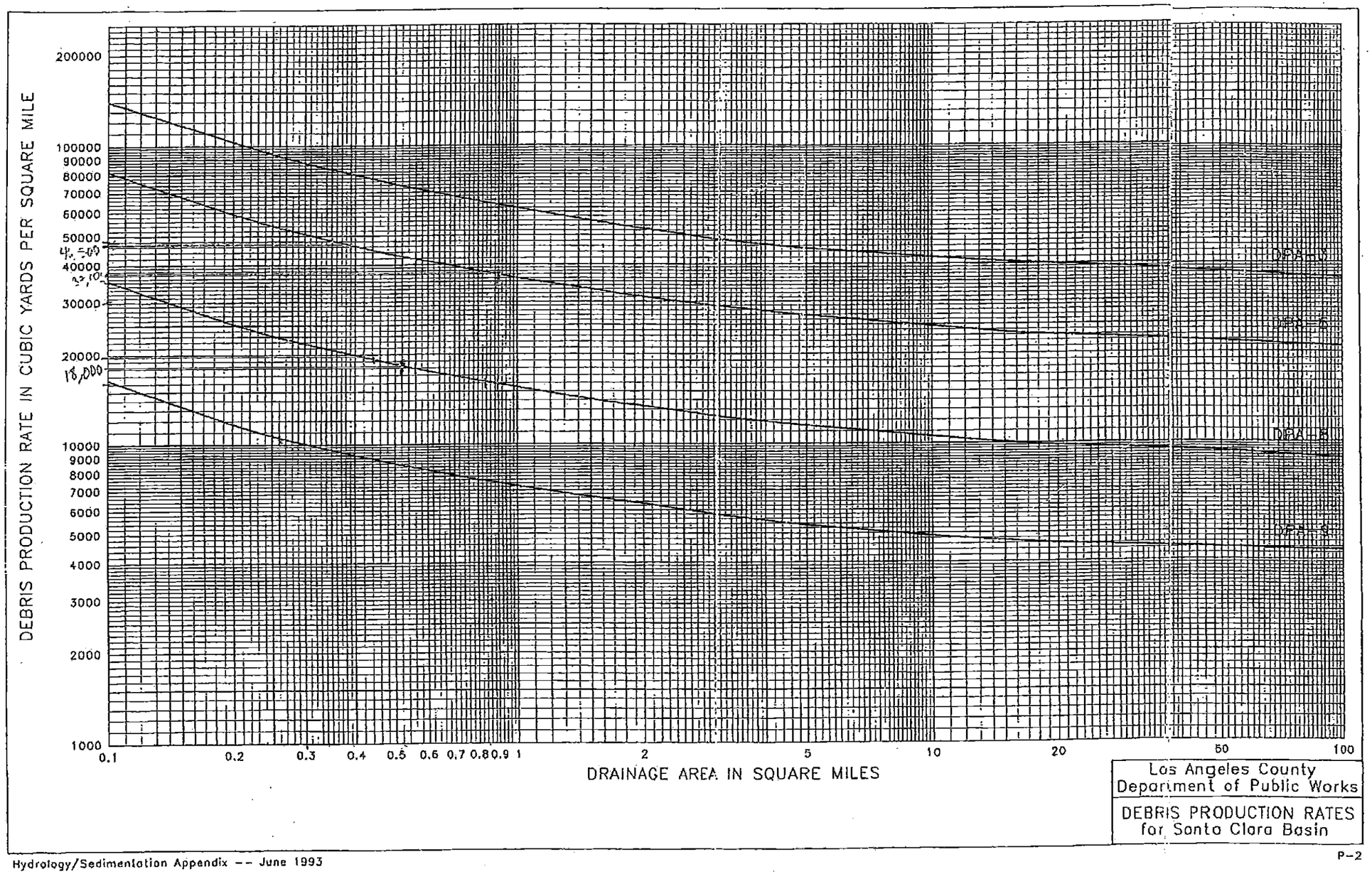
1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

NEWHALL
50-YEAR 24-HOUR ISOHYET

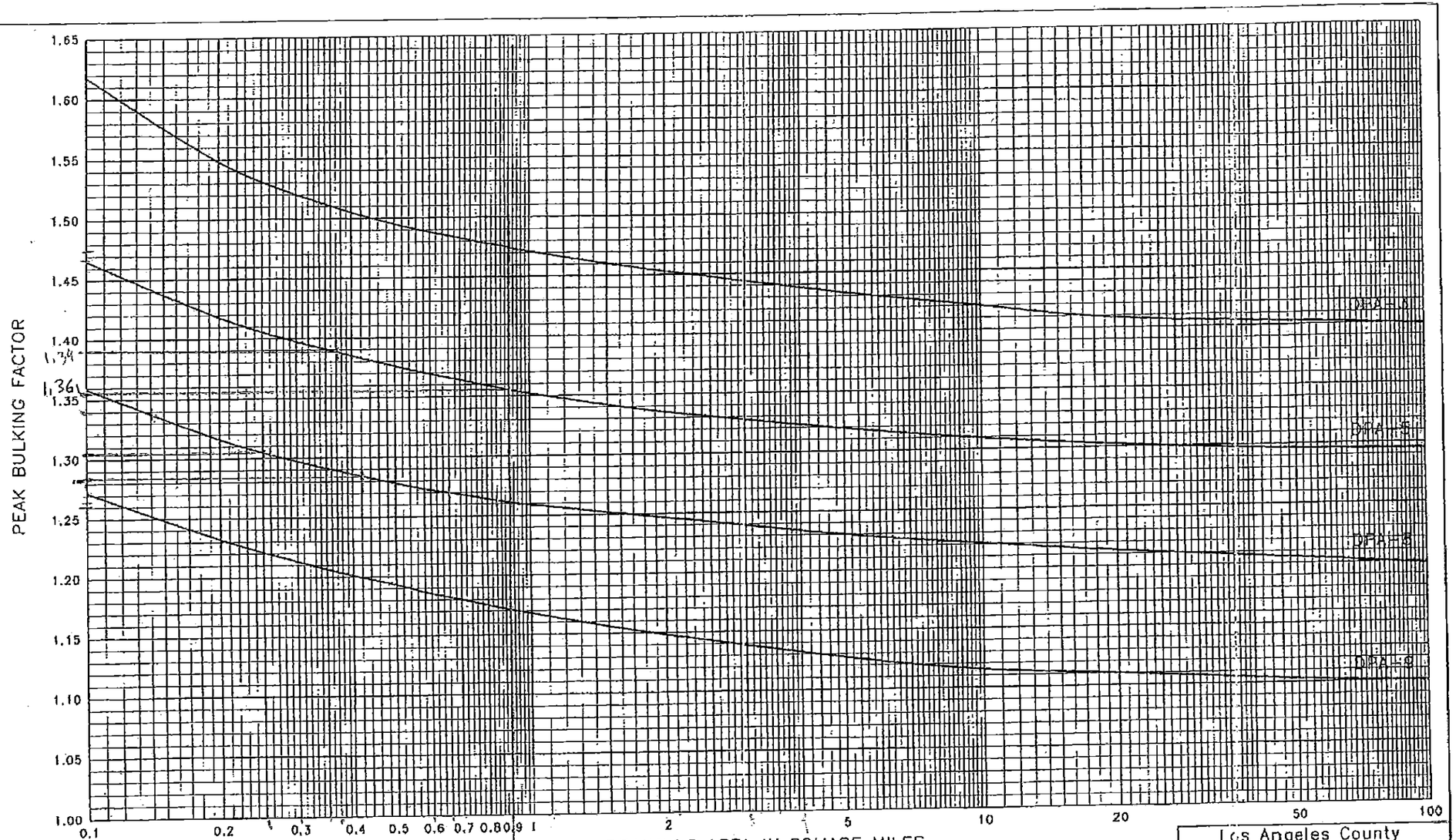
1-H1.44

LOS ANGELES COUNTY PUBLIC WORKS
Public Service That Works



Los Angeles County
Department of Public Works

DEBRIS PRODUCTION RATES
for Santa Clara Basin



Los Angeles County
Department of Public Works

PEAK BULKING FACTORS
for Santa Clara Basin

P-5

MESAS Drainage Study
Existing Trapezoidal Channel

The existing trapezoidal channel along the East side of the proposed development that runs through the Magic Mountain Theme Park has the following characteristics:

- 8' wide base
- 1:1 side slopes
- Water surface elevation of 5' (per plan PD No. 1052-shown on the following pages)
- Constant slope of 2.68%

The design flow on the existing channel per P.D. no. 1052 is 1900 cfs (see reference on next page). The impact of the proposed development will produce 1280 cfs. Therefore there is no impact to the existing channel.

P.D. NO. 1052
SHEET 2

HYDRAULIC ELEMENTS

LINE	STATION	TO STATION	* Q 25 (c.f.s.)
"A"	50+00.00	28+12.00	1900
	28+12.00	27+50.00	1946
	27+50.00	16+00.00	2038
	16+00.00	6+30.17	2106
	6+30.17	3+45.00	2233
"B"	32+15.43	22+17.98	1160
	22+17.98 (2)	13+80.00	1540
	13+80.00	4+55.81	1640
	4+55.81	2+00.00	1756
"C"	22+57.00	21+19.00	31.4
	21+19.00	19+40.00	60.7
	19+40.00	16+53.00	67
	16+53.00	15+60.00	89
	15+60.00	11+68.00	103
	11+68.00	0+00.00	131
"D"	1+61.22	0+00.00	155
"E"	0+45.00	0+00.00	6 (3)
"F"	2+67.00 (2)	0+82.00	502
	0+82.00	0+00.00	509
"G"	0+79.00	0+00.00	36 (3)

* Design Flows based on 25 year Storm Frequency.

"H"	0+37.00	0+00.00	7 (3)
"I"	0+38.00	0+00.00	5 (3)
"J"	0+17.00	0+00.00	2.5 (3)

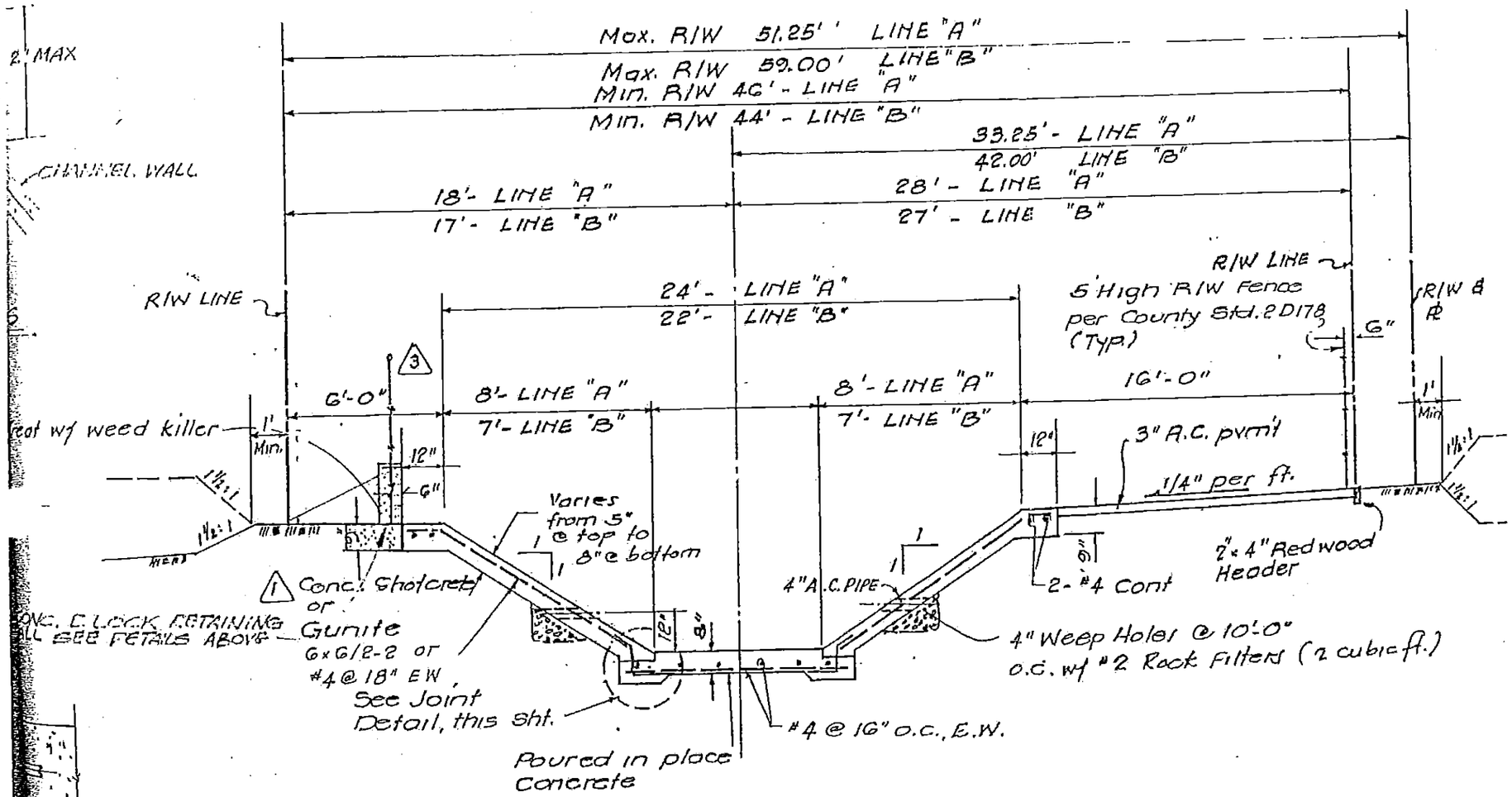
"K"	0+20.00	0+00.00	12.1 (4) (5)
"L"	0+20.00	0+00.00	5.5 (5)
"M"	1+40.00	0+00.00	29.3 (6)
"N"	0+83.00	0+00.00	31.4 (6)

LIST OF STANDARD PLANS

LOS ANGELES COUNTY FLOOD CONTROL DISTRIC

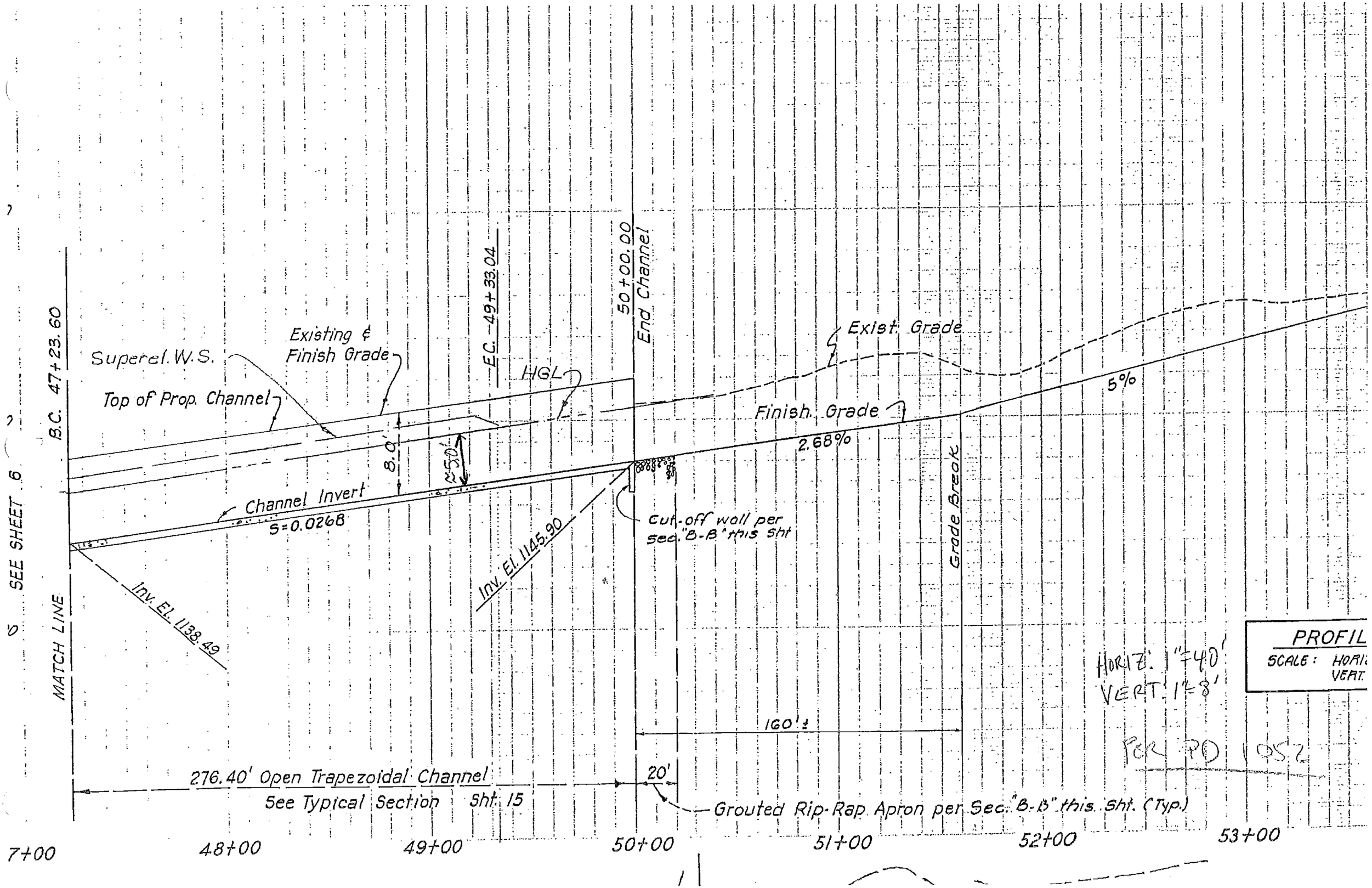
RE	e		#4 @ 8"		#4 @ 8"	#4 @ 18"
	f		#4 @ 8"		#4 @ 12"	#4 @ 18"
	g		#4 @ 12"		#4 @ 12"	#4 @ 18"

* Designed for H-20 Loading



TYPICAL TRAPEZOIDAL CHANNEL SECTION

Per PD 1052


B.C. 47+23.60
SEE SHEET 6
MATCH LINE
Superel. W.S.
Existing & Finish Grade
Top of Prop. Channel
E.C. -49+33.04
HGL
50+00.00 End Channel
Exist. Grade
Finish Grade
5%
2.68%
8.0'
≈5.0'
Channel Invert
S=0.0268
Cut-off wall per sec. "B-B" this sht
Grade Break
Inv. El. 1145.90
Inv. El. 1138.49
160'±
20'
276.40' Open Trapezoidal Channel
See Typical Section Sht. 15
Grouted Rip-Rap Apron per Sec. "B-B" this sht. (Typ.)
7+00
48+00
49+00
50+00
51+00
52+00
53+00
PROFIL
SCALE: HORI
VERT.
HORIZ. 1"=40'
VERT. 1"=8'
PER PD 1952

Existing Channel FlowMaster Calculation

(See section B-B on sheet 4/9 of Mission Village drainage concept for Tract 61105 proposed condition plans)

Existing Channel FlowMaster Calculation

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.024	
Channel Slope	0.03330	ft/ft
Left Side Slope	0.50	ft/ft (H:V)
Right Side Slope	0.50	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	1096.00	ft^3/s

Results

Normal Depth	4.21	ft < 5.0 ft "Existing Channel Depth", OK.
Flow Area	50.97	ft^2
Wetted Perimeter	19.42	ft
Top Width	14.21	ft
Critical Depth	6.43	ft
Critical Slope	0.00821	ft/ft
Velocity	21.50	ft/s
Velocity Head	7.18	ft
Specific Energy	11.40	ft
Froude Number	2.00	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.21	ft
Critical Depth	6.43	ft
Channel Slope	0.03330	ft/ft
Critical Slope	0.00821	ft/ft

Geosyntec consultants

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Memorandum

Date: 13 August 2007

To: Matt Heideman, Psomas

Copy to: Corey Harpole, Newhall Land

From: Lisa Austin and Aaron Poresky, Geosyntec Consultants

Subject: Mission Village - Evaluation of Stormwater Treatment Control BMP Sizing

---

The purpose of this memorandum is to verify that the treatment control BMPs shown on the Mission Village Vesting Tentative Tract Map No. 61105 (July 2007) are sized in compliance with the requirements of the Los Angeles County Department of Public Works Development Planning for Storm Water Management, *A Manual for the Standard Urban Stormwater Mitigation Plan* (SUSMP) (September 2002) and to verify consistency with the *Newhall Ranch Sub-Regional Stormwater Mitigation Plan* and the *Mission Village Water Quality Technical Report* (Geosyntec Consultants, 2007).

TREATMENT CONTROL BMPS

The stormwater treatment control BMPs for the Mission Village Project consist of extended detention basins (EDBs), bioretention areas, and cartridge filtration. Extended detention basins for the Project include four "Village" basins (Basin A, B, C and E) which will provide treatment for Project development areas and off-site natural areas tributary to the developed areas. Basin C will also accept flow from a portion of the Legacy Village Project in the future condition, but this runoff will be treated prior to discharging to the Mission Village drainage system and will not significantly impact capture efficiency of Mission Village Basin C. The Mission Village Project also includes one "Regional" basin (Basin D), which will provide treatment for portions of the Mission Village, Legacy Village, and Entrada Projects, as well as limited areas of existing Westridge residential land uses and Westridge High School. Cartridge filtration units, anticipated to be located within catch basins or vaults, will be used to treat portions of roadway, primarily Magic Mountain Parkway and Commerce Center Drive. Bioretention areas may be distributed throughout some of the Project's multi-family and commercial areas but have not

been included in the drainage and treatment concept at this time. This description of treatment control BMPs is consistent with the BMPs that were analyzed in the *Mission Village Water Quality Technical Report*.

The applicable sizing criterion for the Project's EDBs, established in the *Mission Village Water Quality Technical Report*, is the capture and treatment of 80% of the average annual runoff volume. This sizing criterion utilizes historical rainfall data with continuous simulation modeling and is consistent with volume-based sizing criterion #2 from the SUSMP Manual. The applicable sizing criterion for the Project's cartridge filtration units is the full capture of runoff resulting from 0.3 inches per hour rainfall intensity. This sizing criterion was developed using Project-specific rainfall to result in approximately 80% capture of average annual runoff volume, which is consistent with flow-based sizing criterion #3 from the SUSMP Manual.

VERIFICATION OF BMP SIZING

To verify that the treatment BMPs shown on the Mission Village VTTM No 61105 are adequately sized, catchment delineations, catchment imperviousness, and BMP sizes were determined. For the purpose of modeling future conditions of Basin C and Regional Basin D, design drawings from the Legacy Village Project (*Drainage Concept Study for Tentative Tract 61996*, Hunsaker and Associates, April 2007) and the Entrada Project (*Drainage Concept Study for Tentative Tract Map 53295*, Alliance Land Planning and Engineering, March 2007) were obtained and reviewed.

The EDBs for the Project are listed in Table 1 below along with the tributary area, SUSMP minimum mitigation volume, Newhall Land volume, and the volume of the basin shown in the Tentative Tract Map.

Table 1: Catchment Parameters and Basin Sizing Results

BMP ID	Tributary Area (acres)	Catchment % Imperviousness[1]	Minimum SUSMP Mitigation Volume (0.75 inches) (ac-ft)[2]	Newhall Land Basin Volume, (ac-ft)[3]	Basin Volume Provided (ac-ft)[4]
Basin A	178	38	5.4	8.6	8.6
Basin B	139	39	4.0	8.4	8.4
Basin C	357	54	12.2	25.9	25.9
Basin D	741	39	38.1	42.8	43
Basin E	45.1	85	2.4	4.5	4.5

[1] Imperviousness based on area weighted average of land use-based values from LA County Hydrology Manual; calculated for purposes of water quality analysis.
[2] Basin sizing for the volume of runoff produced from a 0.75 inch storm event and SUSMP Manual Appendix A runoff calculations. Volumes taken from *Drainage Concept/SUSMP for: Mission Village VTTM 61105* (Psomas, July 2007).
[3] Basins sized to capture and treat 80% of annual average runoff volume. Basin volumes include 5 percent allowance for sediment storage.
[4] Basin sizing per the Mission Village VTTM No. 61105 (Psomas, July 2007).
[A] Tributary area of Basin D includes future conditions of Entrada and Legacy Village Projects based on most recent available designs.

As shown in Table 1, the provided volume is greater than or equal to both the minimum SUSMP volume and the Newhall Land basin volume for all basins. The future use of onsite bioretention in portions of the basin catchments represents a treatment train approach and is anticipated to provide higher levels of treatment than treatment in an EDB alone.

The cartridge media filters for the Project are listed in Table 2 below, along with the tributary area, SUSMP design flow rate, Newhall Land design flow rate, the design flow rate used to size the filters, and the number of cartridges required at each location. Catch basins and/or vaults can be modified in final design to include the required number of cartridges.

Table 2: Catchment Parameters and Cartridge Filtration Sizing Results

BMP ID	Tributary Area (acres)	Catchment % Imperviousness[1]	SUSMP Design Flow Rate (cfs)[2]	Newhall Land Design Flow Rate (cfs)[3]	Selected Design Flow Rate (cfs)	Number of Cartridge Filters Required
CMF #2	6.2	96%	1.1	1.7	1.7	52
CMF #3	7.7	52%	0.77	1.3	1.3	38
CMF #4	9.3	68%	1.2	1.9	1.9	58
CMF #5	4.3	95%	0.72	1.2	1.2	36
CMF #6	3.7	77%	0.52	0.85	0.85	26
CMF #7	2.2	96%	0.37	0.62	0.62	19
CMF #8	2.4	96%	0.41	0.67	0.67	20

[1] Area and imperviousness based on *Drainage Concept/SUSMP for: Mission Village VTTM 61105* (Psomas, July 2007).
[2] Design flow rate of runoff produced from a 0.75 inch storm event and SUSMP Manual Appendix A runoff calculations. Flowrates taken from *Drainage Concept/SUSMP for: Mission Village VTTM 61105* (Psomas, July 2007).
[3] Design flow based on an intensity of 0.3 in/hr.

As shown in Table 5, the cartridge filtration units were sized using the more conservative Newhall design flow rate, thus they are adequately sized per SUSMP and Newhall Land criteria.

Mission Village TTM #61105

FLOOD EIR TECHNICAL REPORT - SANTA CLARA RIVER

February 2007

Prepared For:

Newhall Land/ Lennar
23823 Valencia Blvd
Valencia, CA 91355

Prepared By:

Pacific Advanced Civil Engineering, Inc. (PACE)
17520 Newhope Street, Suite 200
Fountain Valley, CA 92708

Contact Person:

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David Jaffe, Ph.D., P.E.

PACE #8613E

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List of Acronyms

ACOE	Army Corps of Engineers
AG	Agricultural and Other Development Uses
AD	Agricultural Drain
AS	Alluvial Scrub
CDFG	California Department of Fish and Game
CRW	Southern California Cottonwood/Willow Riparian Forest
CRWU	Southern California Cottonwood/Willow Upland Forest
CWA	Federal Clean Water Act
CSS	Costal Sage Scrub
ES	Elderberry Scrub
FEMA	Federal Emergency Management Agency
G	Grassland
G/D	Disturbed Grassland
GBSR	Riparian Great Basin Scrub
GR	Riparian Grassland
LACDPW	Los Angeles County Department of Public Works
LOW	Live Oak Woodland
LOW/MC	Like Oak Woodland/Mixed Chaparral
MC	Mixed Chaparral
MFS	Mule Fat Scrub
MFS/D	Disturbed Mule Fat Scrub
RWQCBLAR	Regional Water Quality Control Board, Los Angeles Region
SMFS	Successional Mule Fat Scrub
SS	Scalebroom Scrub
SWRCB	State Water Resources Control Board
WRP	Water Reclamation Plant
WRW	Southern Willow Riparian Woodland
WS	Southern Willow Scrub
N/C	Not Coded

1 Introduction

This technical report is submitted in connection with the Mission Village Tentative Tract Map #61105 project and other related improvements, including flood and erosion control in and adjacent to the Santa Clara River, various drainage improvements and construction of the Commerce Center Drive Bridge ("the Project"). The Project would implement a portion of the approved Newhall Ranch Specific Plan, located in northern Los Angeles County, California. The approved Specific Plan was the subject of extensive environmental review in the previously certified Newhall Ranch EIR (March 1999) (State Clearinghouse No. 1995011015) and the related Revised Additional Analysis (May 2003). The Project was assessed at a program-level environmental analysis for the Specific Plan and at a project-level environmental analysis for the Specific Plan's Water Reclamation Plant (WRP).

As part of that prior review, the previously certified Newhall Ranch EIR (Section 4.2, Flood) and the certified Revised Additional Analysis (Section 2.3, Floodplain Modifications) assessed the hydrology and hydraulics of the Santa Clara River corridor as a result of proposed floodplain modifications associated with build-out of the entire Newhall Ranch Specific Plan. In addition to evaluating the hydrological impacts of the Newhall Ranch Specific Plan, another objective of the analysis was to determine if predicted Project improvements (*i.e.*, "floodplain modifications") would cause significant impacts to the nature, amount and location of the aquatic/riparian habitats in the River corridor, the Specific Plan site, and the downstream reaches in Ventura County. The proposed floodplain modifications included three bridge crossings over the River, buried soil cement bank protection placement along portions of the banks in the River corridor of the Specific Plan, and removal of mostly agricultural acreage from the floodplain by raising the land areas and installing elevated bank protection. The prior analysis, referenced above, evaluated impacts on flows, floodplain and habitat areas, velocities, water depths, and sediment scouring/deposition patterns for a range of storm flows within the River (2-year through 100-year flood flows). The prior analysis determined that the proposed Specific Plan improvements would alter velocities in the River. However, the impacts were only expected during infrequent flood events (*e.g.*, 50-year and 100-year flood events), and those impacts were only anticipated to reach the buried banks. The prior analysis (Section 2.3) also found that the Specific Plan would cause an increase in water velocities, water depth, changes in sediment transport, and changes in the flooded areas. However, these hydraulic effects were found to be minor in magnitude and event. These effects were also found to be insufficient to alter the amount, location and nature of aquatic and riparian habitats in the Specific Plan area and downstream in Ventura County. The prior analysis (Section 2.3) further determined that, under the Specific Plan, the River would still retain sufficient width to allow natural fluvial processes to continue. As a result, the prior analysis (Section 2.3) concluded that the mosaic of habitats in the River that support various sensitive species would be maintained, and the population of the species within and adjacent to the River corridor would not be significantly affected.

Because of the prior environmental analysis (EIR, Section 4.2 and Revised Additional Analysis, Section 2.3), this report will focus on the analysis of the Project's specific improvements, both on-site and in and adjacent to the River corridor. The analysis in this report is facilitated by the project-specific planning conducted for the Project's tentative subdivision map, which is the mechanism used to implement portions of the

approved Newhall Ranch Specific Plan. This report will review project-specific design plans, analyze those plans against existing conditions, confirm consistency with prior design assumptions and the impact analysis provided in the previously certified EIR, inclusive of the Revised Additional Analysis, and, where necessary, update the previous analysis to reflect proposed Project conditions.

1.1 Project Description

1.1.1 Project Site

The Project lies within a contributing drainage of 2,650 acres of the overall 1,634 square-mile Santa Clara River basin watershed (PSOMAS, Mission Village Drainage Concept Report). The northerly River bank forms the northern boundary of the Project site, and the Newhall Ranch Specific Plan, more or less, forms the eastern boundary of the Project site. The Project site is located east of the proposed Landmark VTTM #53108 project site on the River's south bank upstream of the River's confluence with Castaic Creek on the north bank of the River (Figure 1.1).

Tributaries draining into or adjacent to the Project site, including Lion Canyon Creek on the project's west end (RS 30095) and Castaic Creek, which enters the River downstream of the Project site (RS 31585) on the opposite bank (Figure 1.2). The Lion Canyon Creek drainage is approximately 608 acres, with a total stream length of approximately 6050 feet. The Castaic Creek watershed, the largest of the tributary watersheds, is approximately 16.8 square miles below the dam.

Other tributaries adjacent or in the vicinity of the Project site include San Martinez Grande Canyon Creek (RS 17510), as well as drainage from the adjacent landfill (RS 24115).

The Project site, which consists of approximately 1,250 acres, is currently undeveloped, and is within the boundaries of the approved Newhall Ranch Specific Plan. Approximately 200 acres of the project boundary are within the Santa Clara River. The Specific Plan describes the type and intensity of development proposed for the Project site. The Project consists of 5,040 multi-family units, 291 single-family detached units, and a maximum of 1,299,000 square feet of retail/commercial uses. The Project also includes an elementary school, community and neighborhood parks, private recreational facilities, library and various trail and road improvements. Site preparation will include a cut and fill grading operation with fill being imported to the site from a location south of the site within the Specific Plan area. The Project also includes approximately 1,700 LF of buried soil cement bank protection on the south bank of the River. Construction of the Commerce Center Drive Bridge over the River requires 600 LF of concrete bank protection at the southerly bridge abutment and stormdrain outlets to the Santa Clara River. The Mission Village TTM #61105 project proposes the construction of the Commerce Center Drive Bridge over the Santa Clara River. The northerly bank protection at the Commerce Center Drive Bridge has been evaluated as part of the CALTRANS/LA County Department of Public Works Project (State Route 126 widening and

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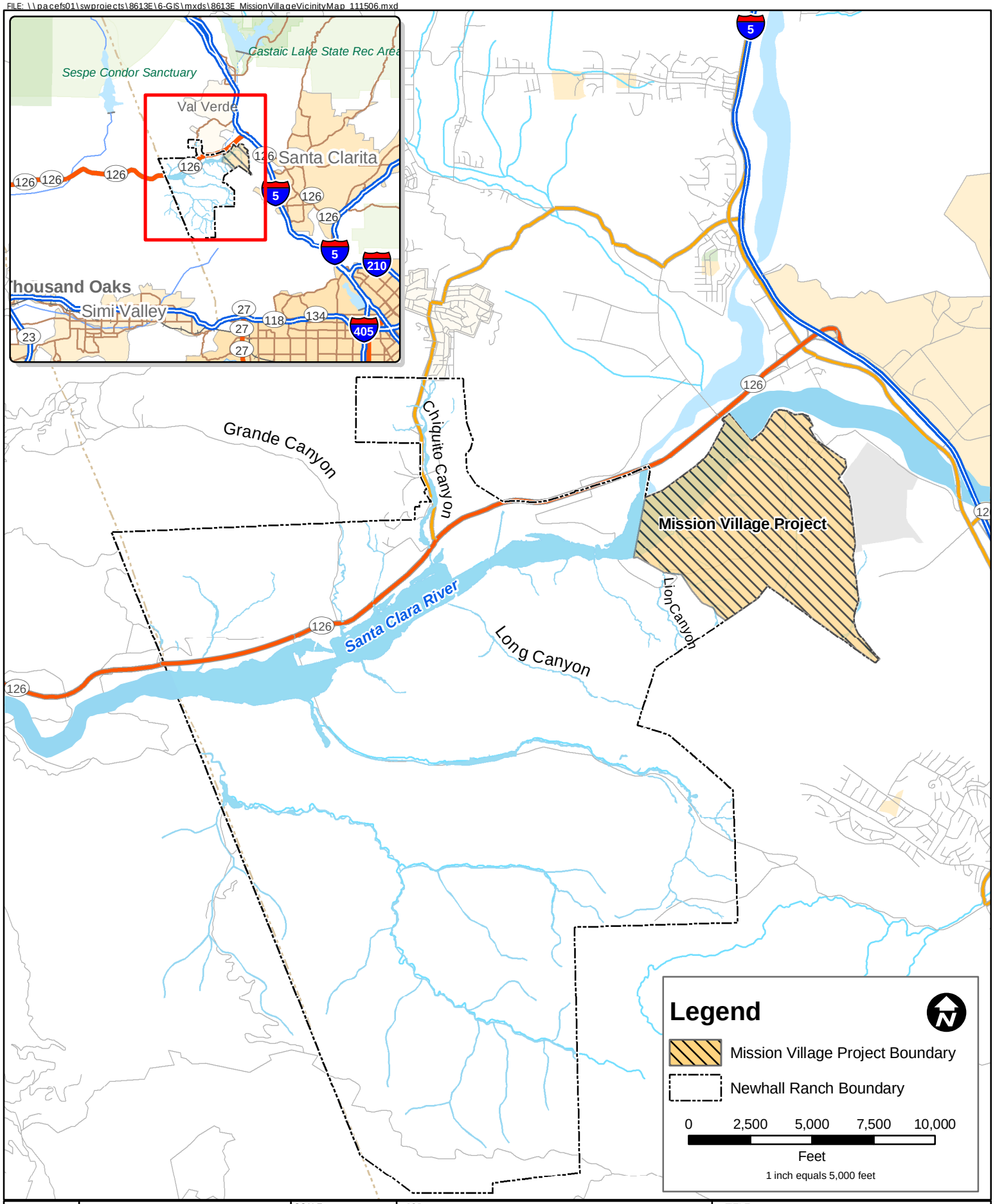


FIGURE 1

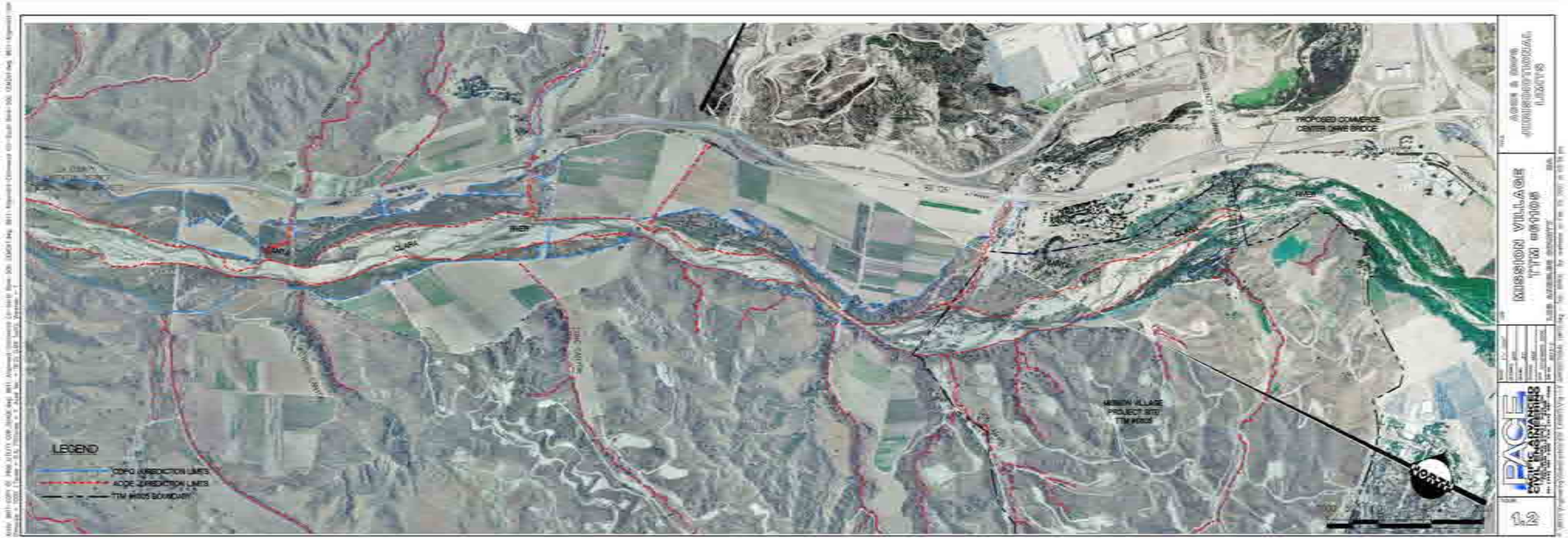
PACE
PACIFIC ADVANCED CIVIL ENGINEERING, INC.
17520 NEWHOPE STREET, SUITE 200
FOUNTAIN VALLEY, CA 92708
PH (714) 481-7300 FAX (714)481-7299

SCALE	1"= 5000'
DESIGNED	PC
DRAWING	PC
CHECKED	MW
DATE	11/15/06
JOB NO.	8613-E

JOB: MISSION VILLAGE

LOS ANGELES CO CA

TITLE: VICINITY MAP



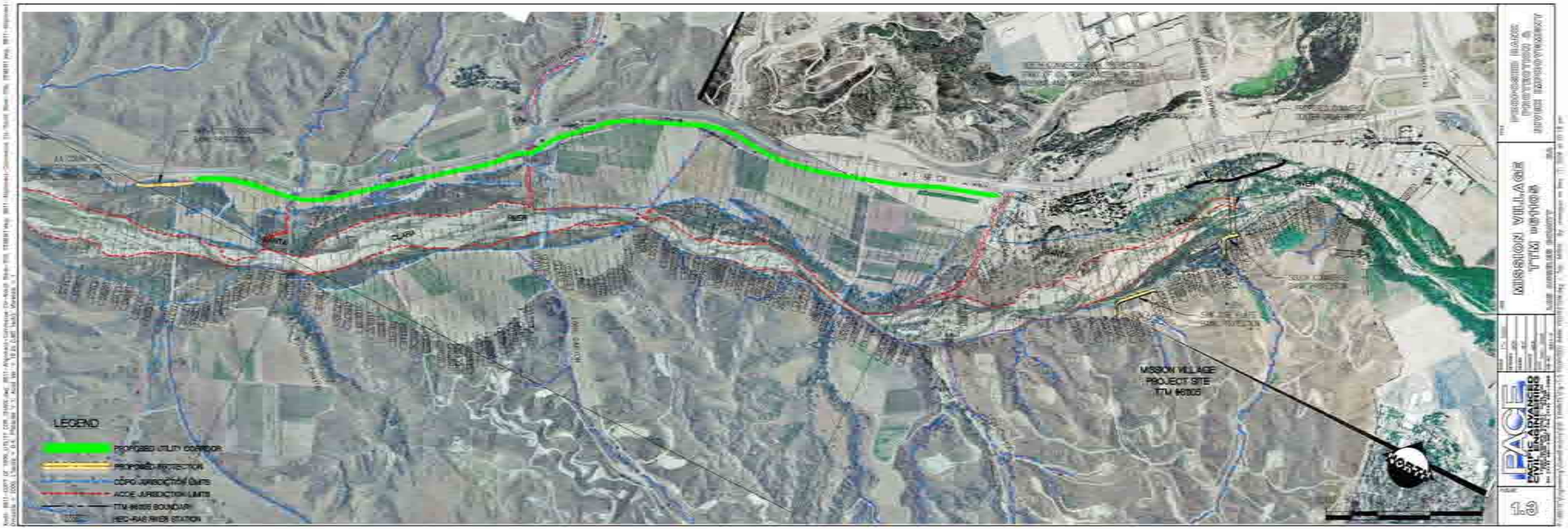
A full-size reproduction of this figure can be found at Impact Sciences.

Commerce Center Drive interchange project). Therefore, the northerly bank protection at the proposed Commerce Center Drive Bridge is part of both the existing condition and proposed condition river hydraulic models for this Mission Village EIR Technical Report. The proposed project also includes 16,000 LF of graded utility corridor along the north bank of the Santa Clara River from the Castaic Creek confluence down stream to 2000 ft west of the San Martinez Grande Canyon Creek confluence. The utility corridor includes multiple wet and dry utilities for the Mission Village project to be installed along the south side of State Route 126. The utility corridor river bank stabilization consist of geotextile reinforced vegetated slopes and some rip-rap rock protection. The rock rip-rap will be placed at the outlets of the Chiquito and San Martinez tributary confluences, at existing storm drain outlets from SR126 and at locations of the river where back scour is anticipated. As stated previously, the buried soil cement bank protection at the Newhall Ranch proposed water reclamation plant was included as part of the approved Newhall Ranch Specific Plan. The bridge would include bridge abutments, piers, and soil cement on the north and south side of the bridge (Figure 1.3). These and other proposed Project-related drainage features are described below in Sections 1.1.2 and 1.1.3.

1.1.2 Proposed Drainage Improvements – Project and Santa Clara River

The proposed improvements on the Project site that would provide flood protection and erosion control and that would occur in and adjacent to the River and its tributaries include:

- Bank stabilization;
- Various stormwater drainage outlet structures;
- Various improvements at San Jose Flats (south bank Sta. 34495 to 33500), including approximately 1,100 LF of Soil Cement river bank protection (this is a reduction of approximately 300 LF of bank protection from the Newhall Ranch Specific Plan EIR);
- Construction of the Commerce Center Drive Bridge and related bridge abutments and piers as well as exposed concrete and rip-rap bank protection on the south side of the river (approximately 600 LF on the South bank). As stated previously, the bridge and the north bank have been analyzed and approved as part of the Natural River Management Plan and SR 126/Commerce Center Interchange EIR/EIS. For the purpose of this Mission Village project river analysis this northerly bank protection (± 2000 LF) is considered part of the existing pre-project conditions. The Mission Village project will be constructed after/or concurrent with the completion of the SR 126 widening and bank protection project.
- Non structural bank protection on north bank of the River within the graded fill slope for 16,000 LF of *Utility Corridor Bank*.



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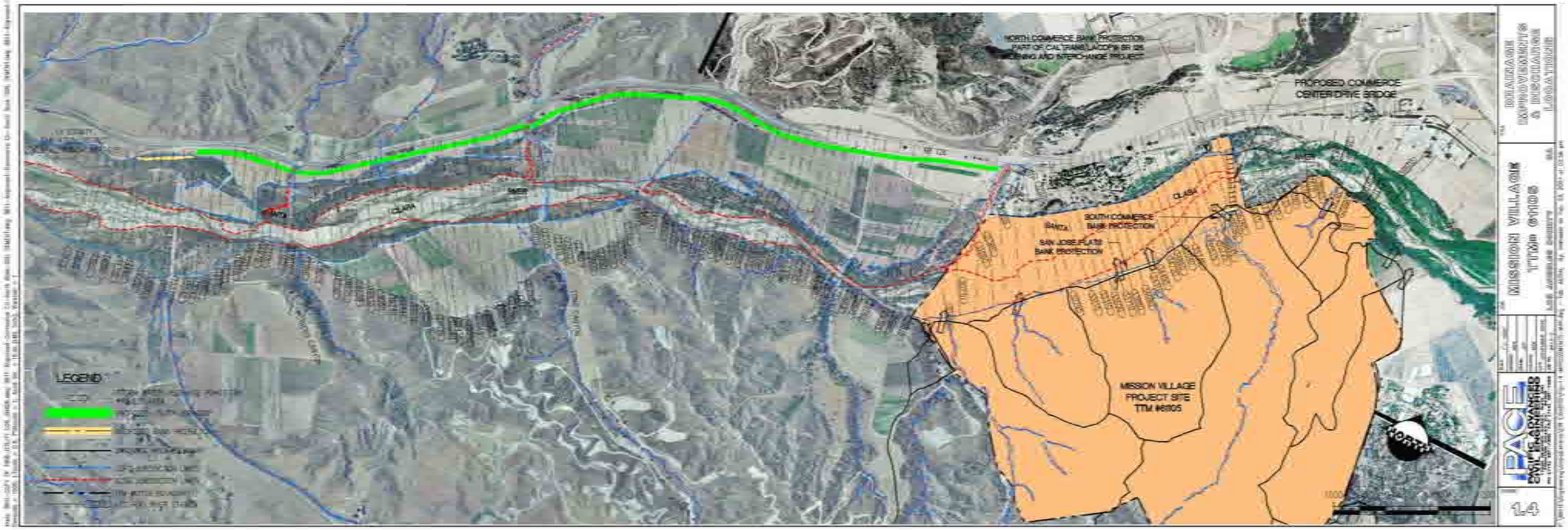
There is an additional alternative which has recently been proposed where the Newhall Ranch Full Build-out scenario would include replacement of the westerly 2000 LF of Utility Corridor non-structural bank protection with a structural type alternative. This alternative is necessary as the Newhall Ranch Full Build-out bank protection plan (approved by LACDPW 4-18-06) includes soil cement bank protection that extends southward approximately 1,000 feet into the River to facilitate the proposed Potrero Bridge. In the event Potrero Bridge and/or this projecting bank protection are eliminated there may be a future need for soil cement or other hardened bank protection along this reach of the Utility Corridor. Therefore, an alternate within the Mission Village DCR project as defined herein, the subject 2,000 linear feet of northerly river bank (STA 17360 to STA 15540) will be considered soil cement. The hydraulic top and toe analysis for this alternate is the same as the non-hardened solution just as the horizontal alignment of the Utility Corridor protection is the same for each alternative. The River and vegetation impacts from this structural alternative are within the limits of the non-structural alternative as defined in this analysis.

Bank stabilization is comprised of soil cement, rip-rap and reinforced concrete. Additionally, a form of biotech stabilization, turf reinforcement mats (TRM's) or similar protection would be utilized along portions of the utility corridor. Improvement locations are shown in Figures 1.3 and 1.4. Most of the soil cement would be buried however some portions may be exposed and rip-rap may be grouted or not grouted. Flood control improvements evaluated in this report are similar to those identified in the previously approved Newhall Ranch Specific Plan. Minor deviations from the Specific Plan were considered and evaluated in this report. The HEC-RAS models used in this analysis were revised to reflect these minor changes. For example, the bank protection at San Jose Flats has been reduced in length and direction slightly modified.

The Project's drainage facilities that would occur in or adjacent to the River corridor include:

1. *<u>Stormwater Drainage Outlets/Energy Dissipaters</u>*
   a. To reduce storm flow velocities and prevent erosion at stormwater discharge points into the River, energy dissipaters consisting of either rip-rap or other larger reinforced concrete standard impact-type energy dissipaters would be constructed at storm system outlets into the River. These energy dissipaters would slow the rate of flow of runoff into the River to prevent erosion of the stream channel. Additional dissipaters would be located at the outlet of Chiquito Creek, San Martinez Grande, Lion Canyon Creek and other locations as shown on Figure 1.4. Dissipaters will be designed based upon storm drain outlet hydraulic conditions, such as discharge, velocity and culvert size, and location within the River. The Chiquito dissipater will be located below a three barrel 14'x14', 100 foot long culvert extension with stilling basin and 10 foot drop structure. The Grande utility corridor



A full-size reproduction of this figure can be found at Impact Sciences.

extension will include a 200 foot rip-rap dissipater structure. The Lion Canyon outlet structure will include approximately 300 LF of bank stabilization at the River confluence (refer to the following discussion "Soil Cement/Bank Stabilization"). The unnamed on-site drainages to the river will include the required energy dissipation structures as well. All of these structures would require 200 feet of rip rap structure or less when they terminate at the River.

b. Drainage from the Project would pass through storm drain outlets that discharge to the River. Approximately eight outlet structures would be constructed in conjunction with the project development. Please refer to the PSOMAS Mission Village Drainage Concept report dated October, 2006 and the summary in Section 1.1.3 below.

2. Soil Cement/Bank Stabilization

The Project would include buried soil cement along the River adjacent to and downstream of the Project site. In total, approximately 4,900 linear feet (LF) of River bank would be provided with soil cement concrete or rip rap bank protection (2,000 LF of which would be pre-project as part of existing condition analysis). This would include a total of approximately 3,700 LF fronting the Project site; 1,700 LF on the south bank of the river and 2,000 LF (pre-project) fronting the Project site on the north bank of the river. Approximately 1,200 LF of buried soil cement; will be downstream of the project, on the north bank, east of the WRP (Figure 1.4*)*. Of the approximately 3,700 feet total fronting the Project site, approximately 600 LF comprise the section at south Commerce Center Drive Bridge (which will be exposed concrete bank protection), and approximately 1,100 LF comprise the San Jose Flats region bank protection, which will be buried soil cement. The bank protection is required to protect water quality improvement and the Commerce Center Drive Bridge. The installation of soil cement bank protection in the vicinity of the approved Newhall Ranch Water Reclamation Plant (WRP) will likely be installed prior to implementation of the Project, and was previously evaluated as part of the Project-specific impact analysis for the WRP, which was provided in the previously certified Newhall Ranch EIR (SCH No. 95011015) and it has not been included as part of the Mission Village hydraulic analysis. Similarly, the bank protection at the north bank of the river at the Commerce Center Drive Bridge has been evaluated as part of the Natural River Management Plan and Project Specific SR126 widening and Commerce Center Drive interchange project and is considered as part of the existing condition for the purpose of this Mission Village EIR Technical Report.

Figure 1.4 depicts soil cement bank protection extending downstream (west) of the Commerce Center Drive Bridge about 400 feet along the southern bank of the River and about 800 feet

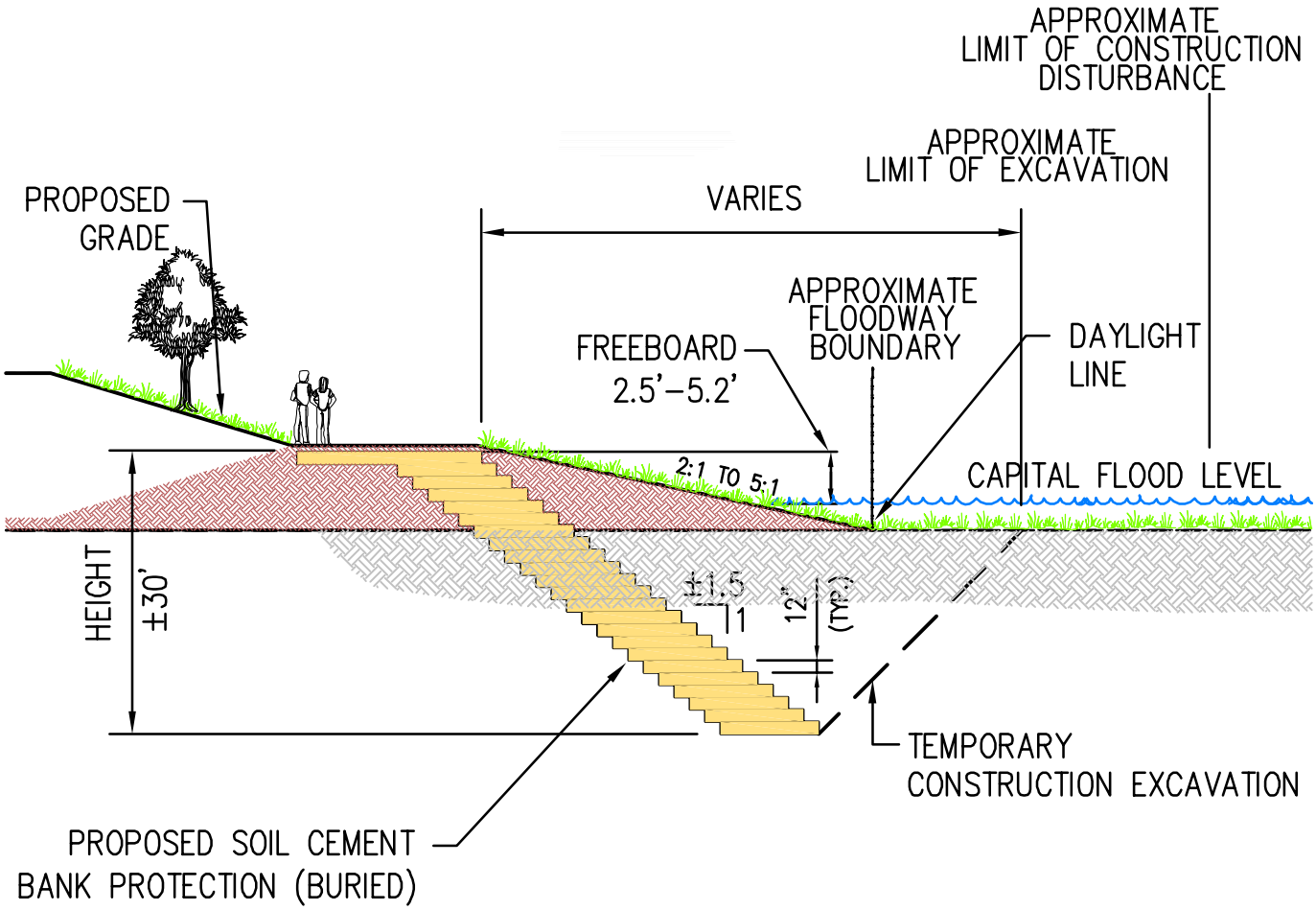
downstream along the northern bank of the River. This protection on the northern bank is primarily associated with the Highway 126 widening project. Approximately 1,100 LF of soil cement bank stabilization are shown at San Jose Flats. Additionally approximately 1,200 LF of soil cement bank stabilization is downstream of the Project site designed to protect the WRP. The bank stabilization related to the WRP was approved and analyzed at a project-level with the Newhall Ranch EIR.

A conceptual design for the Lion Canyon Creek outlet to the River is included in the PSOMAS on-site Drainage Concept Report for the Mission Village project. A portion of this River outlet will be below the River capital flood water/end and subjected to the erosive forces of the River. Soil cement or other erosive protection methods will need to be utilized to protect the proposed Lion Canyon Channel and outlet structure. This includes approximately 300 linear feet of slope erosion protection which will ultimately be part of the River bank protection plans and is now included as part of the on-site DCR. There will be no impact to the River hydraulics from the Lion Canyon outlet erosion protection as it is located behind the capital floodplain or within ineffective flow portion of the floodplain.

The majority of the Mission Village Project frontage on the south bank of the Santa Clara River does not require river bank stabilization. The proposed project development has been placed back from the river to meet geotechnical slope stability requirements and so as to eliminate the need for river bank protection. In addition the majority of the river frontage at Mission Village includes naturally occurring bluffs which are composed of erosive resistant bedrock material.

Most of the proposed bank protection would consist of buried soil cement to provide scour and freeboard flood control protection. In determining the design of the bank protection, several factors were considered, including: (1) flood control stability and durability of bank protection; (2) bank protection maintenance considerations; (3) environmental compatibility with the native area, resource enhancement concepts, and aesthetic considerations; and (4) prior success in construction and cost of construction. Soil cement bank protection provides a stable riverbank protection material, in terms of both surface erosion and structural stability. Additionally, soil cement bank protection will be mostly buried. The exposed top portion of the soil cement will be compatible with the native earth re-vegetated resource area. A typical soil cement cross-section is shown in Figure 1.5.

Soil cement is a highly compacted mixture of soil, cement, and water. As the cement hydrates, it hardens into a strong, durable, low-permeability material. Among the benefits to soil cement is that it may provide a more pleasant visual appearance, similar to



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SCALE	N.T.S.
DESIGNED	
DRAWN	JEP
CHECKED	D.J.
DATE	MAY 2006
JOB NO.	8611E

MISSION VILLAGE

TYPICAL SOIL CEMENT CROSS SECTION

FIGURE

1.5

Xrefs:
P:\8611E\Engineering\GlobalExhibits\EIR EXHIBITS\FIG-1.5 TYPICAL SOIL CEMENT X-SECTION.dwg By: mwheeler Date: Sep. 06, 2006 Time: 09:29 am

that of a natural arroyo, as opposed to the visual harshness of traditional rip-rap. Construction projects like the proposed Project, generally utilize an on-site central batch plant whereby material can be directly excavated from the channel. Excavated material is then transported to a plug mill to separate the native material, if required, and then proceed by conveyor to a batch plant. The overriding benefit to a batch plant operation is that it allows quality control of the design mix being generated through computer management. The percentage by weight for the cement content can range from eight to twelve percent, depending on native material clay content. High clay content increases the cement requirement. Soil cement mix from the batch plant has a water content of approximately 90% when ready for application. The soil cement mixture is applied in 6”-9” lifts, equal in width to the spreading equipment, which is generally eight to nine feet wide. A roller will then compact the soil cement after each lift is applied. Soil cement bank protection slopes can be constructed very steep, usually 1h:1v, which reduces the right-of-way requirements compared to other alternatives with milder side slopes Following the final lift application, the exposed channel face can be trimmed to generate a clean surface and remove any soil cement that was not compacted.

3. *Utility Corridor Slope Protection*
Turf Reinforcement Mat (TRM) or a similar geotextile vegetation reinforced bank stability protection along the Newhall Ranch utility corridor would be provided. Approximately 9,000 LF of TRMs and an additional 7,000 LF of similar protection methodologies will be installed along the southern edge of the Utility Corridor from the western end of the Project site to the easterly end of the previously approved Newhall Ranch WRP. Figure 1.4 depicts the location where this slope protection would be installed.

TRMs are designed to reinforce vegetation at the root and stem allowing vegetation to be used as erosion control in areas where flow conditions exceed the ability of natural vegetation to remain rooted. This includes applications with high slopes or stream banks where grouted rip-rap and concrete channels are aesthetically undesirable.

TRM products are constructed of two basic materials that perform different functions: (1) permanent netting designed to provide permanent structure and strength to the vegetation at the root and stem level; and (2) degradable natural and synthetic fiber netting that provides erosion control immediately after installation by holding seed and soil particles in place and trapping moisture on the soil surface. A combination of the two can be used to provide erosion control, vegetation establishment and reinforcement at one location. TRMs are secured to the soil surface using a predetermined staple pattern and either wire soil staples or biodegradable stakes.

The portion of the Utility Corridor from the Grande confluence (STA 17360) westerly approximately 2,000 feet (STA 15540) is proposed to be stabilized with TRM's. As an alternate within the Mission Village project as defined herein, the subject 2,000 linear feet of northerly river bank (STA 17360 to STA 15540) should be considered with soil cement in this document and the EIR. For evaluation purposes, the top of the soil cement (horizontal and vertical alignment) would remain as shown in the Mission Village Utility Corridor analysis within this document and as shown in the Mission Village Drainage Concept Report (currently under review by LACDPW). The toe of the soil cement would be based on the approved Newhall Ranch Santa Clara River Fluvial Analysis. The impacts of the alternatives are included in Section 4.1.3 of this analysis.

Newhall Land is currently in discussions with several of the utility agencies who will have infrastructure in the Utility Corridor. Prior to the project final map recordation, Newhall Land will finalize a maintenance agreement with an agency or some other entity (public or private – Home Owners Association, Center for Natural Land Management, Joint Power Authority, Landscape Maintenance District, etc.) for acceptance of the maintenance responsibility for grading and slope protection along the Utility Corridor.

With the TRM (bio-engineered) slope protection along the Utility Corridor it is anticipated that there will be some limited maintenance activities related to vegetation replacement, removal of non-native species, removal of non-healthy plants, grading, replacement and/or repair of the TRM's. All of this work will take place within the limits of the project disturbance limits as analyzed in the project EIR. As part of the maintenance entity agreement Newhall Land will provide a Utility Corridor maintenance easement for repair activities along the Utility Corridor to the limits of project disturbance.

In the unlikely event that maintenance or repair beyond that described above is necessary and would include impacts outside the project disturbance limits (maintenance easement) analyzed in the project EIR's the appropriate permits and approvals would have to be obtained.

4. <u>Commerce Center Drive Bridge</u>

The Commerce Center Drive Bridge over the River is to be located at RS 36515, approximately 2,250 feet upstream of the Castaic Creek discharge to the River (Figure 1.4). The bridge's proposed span is approximately 1,200 LF with eleven piers within the River along the span. Bridge abutments are approximately

120 LF of River length on both banks consisting of reinforced concrete transitioning to soil cement through approximately 2,000 LF of River length on the north bank and 600 LF of River length on the south bank. As stated previously, the northerly bank protection at the Commerce Center Drive Bridge has been evaluated as part of the CALTRANS/LA County Department of Public Works Project (State Route 126 widening and Commerce Center Drive interchange project; Sate Clearing house #2003101127) and is therefore not considered to be a part of the Mission Village project.

1.1.3 Proposed On-Site Drainage Improvements

At Project build-out, runoff from the six drainage areas that drain through or onto the Project site, as defined by the PSOMAS Mission Village Drainage Concept Report (October 2006) (Figure 1.6), would continue to flow through the Project site. Runoff from the developed portions of the Project would be channeled through the proposed stormwater conveyance system and discharged to the River after passing through various debris and water quality basins. (*Refer to*, PSOMAS Mission Village Drainage Concept Report, October 2006). As required in the Los Angeles County Department of Public Works memorandum entitled, "*Level of Flood Protection and Drainage Protection Standards*," all on-site drainage systems carrying runoff from developed areas are to be designed for the 25-year Design Storm (Urban Flood), while storm drains under major and secondary highways, open channels (main channels), debris carrying systems, and sumps are to be designed for the Capital Flood.

Runoff from the developed portions of the Project would be conveyed through the Project site using a combination of grading, storm drainpipes, vegetated swales, catch basins, retention/detention basins, water quality basins, outlet structures, and debris basins. The proposed on-site drainage improvements are described below. The locations of such improvements are also illustrated in the PSOMAS Mission Village Drainage Concept Report and in Figure 1.7, which also depicts the post-development drainage patterns of the Project site.

Project on-site drainage facilities include:

- *Storm Drains*
  Storm drains (pipes and reinforced concrete boxes) designed for either the 25-year or 50-year Capital storm would consist of both privately maintained systems (Homeowner's Associations, Assessment Districts etc.) and publicly maintained systems (County of Los Angeles). The minimum publicly-maintained mainline pipe size is 18-inch connector pipes for clear flows.

- *Open Channels*
  Existing condition open channels consist of rectangular and trapezoidal concrete channels, and are designed for either the 25-

Xrefs: 8611-COPY OF 7906_UTILITY COR_SHADE.dwg; 8611-Alignment-Commerce Ctr-North Bank-SOIL CEMENT.dwg; 8611-COPY OF NR-7104-HEC-SECS-FIG 01.dwg; NR-acoe_2004 (FIG 1.2).dwg; NR-
Dimscale = 1; LTscale = 0.4; PSltscale = 1; Acad Ver. = 16.2s (LMS Tech); Visretain = 1

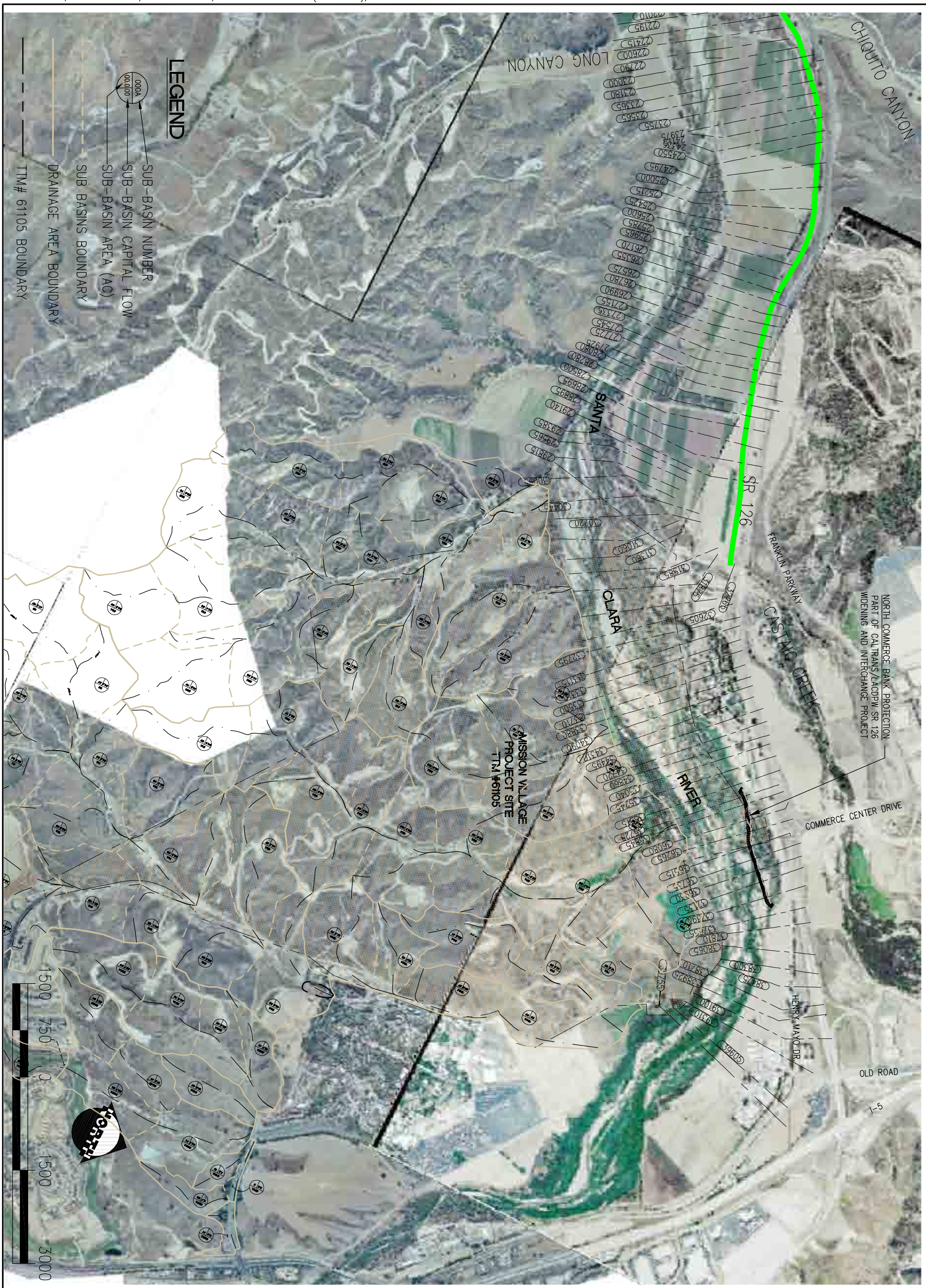

FIGURE 1.6

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PH (714) 481-7300 FAX (714) 481-7299

SCALE	1"= 1500'
DESIGNED	MEK
DRAWN	JEP
CHECKED	MEK
DATE	NOVEMBER 2006
JOB NO.	8613-E

JOB
MISSION VILLAGE
TTM# 61105
LOS ANGELES COUNTY CA

TITLE
ON-SITE EXISTING CONDITIONS SUB BASINS (FROM PSOMAS DRAINAGE CONCEPT)

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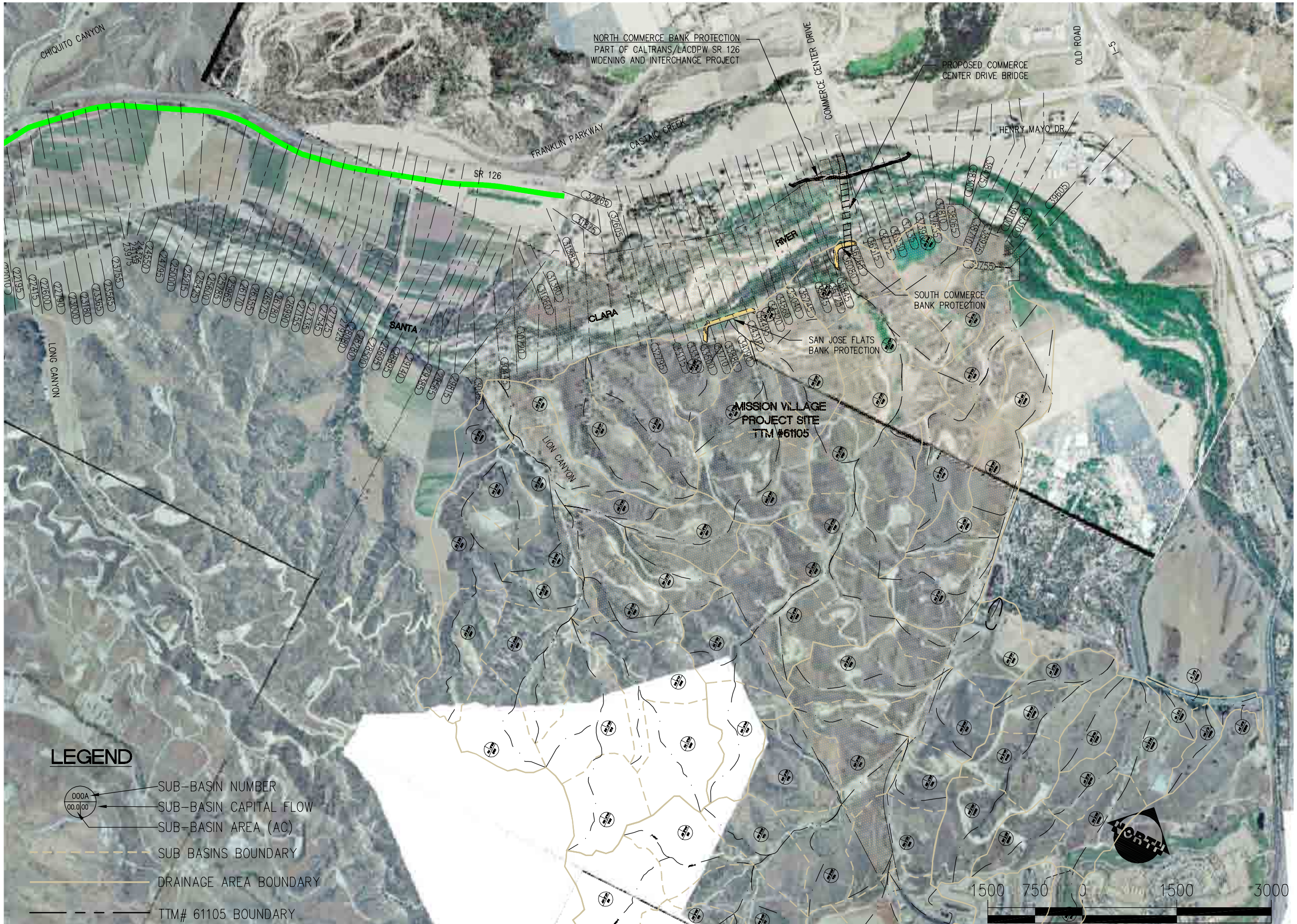

TITLE
ON-SITE PROPOSED
CONDITIONS SUB BASINS
(FROM PSOMAS
DRAINAGE CONCEPT)

JOB
MISSION VILLAGE
TTM# 61105
LOS ANGELES COUNTY CA

SCALE	1"= 1500'
DESIGNED	MEK
DRAWN	JEP
CHECKED	MEK
DATE	NOVEMBER 2006
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FIGURE
1.7

year or 50-year Capital storm, depending on the source of the runoff. The channels sized for the 50-year Capital storm would have greater capacity than those sized for the 25-year storm. There are two existing open channels; one on the east side of Magic Mountain Theme Park and one on the west side. Proposed project open channels would consist of more naturalized conveyance system. For example, Lion Canyon will have low (2 – 4 ft) drop structures made of rip rap or soil cement and minimal side slope protection (see below).

- *Lion Canyon Creek Restoration*
  Lion Canyon has been proposed for a Creek restoration-project which will include re-grading and stabilization of the creek bed and bank. The design concept is based upon stream geomorphologic principals and equilibrium slope concepts. There will be the need for frequent drop structures (approximately 25 to 40 total) within the 4000 LF of Lion Canyon Creek within Mission Village. The grade control (or drop structures) will typically be a maximum of three feet in vertical height. The creek side slopes will typically be unarmored. The Creek restoration design will reduce the velocities in the over bank areas such that it will not be necessary to armor the banks. There will be armoring placed as necessary where velocities increase at contracted portion of the creek such as at road crossings.

  As previously mentioned, the PSOMAS on-site DCR includes a conceptual design for the Lion Canyon Creek and outlet to the River. Soil cement or other erosive protection methods will need to be utilized to protect the proposed Lion Canyon Channel and outlet structure including approximately 300 linear feet of slope erosion protection.

- *Low Flow Pipes and Outlets*
  To reduce pollution impacts from the low flow runoff, a series of pipes and outlets would be provided to intercept first flush runoff from developed portions of the Project. Pollutants expected to be generated on the Project site, their potential water quality impacts, and water quality control are discussed in the Geosyntec Water Quality Technical Report for the Project. Additionally, the PSOMAS Drainage Concept Report provides a Standard Urban Stormwater Mitigation Plan (SUSMP) for the Project site.

- *Catch Basins*
  Catch basins would be provided to intercept flows beyond the 10- and 25-year storms and at strategic locations to minimize flooding at street intersections and at sump locations.

- *Debris Basins*
  To reduce debris discharged through and from the Project site, debris basins are proposed to intercept flows from undeveloped

upland areas prior to discharge into the on-site storm system (Figure 1.4).

- *Treatment BMPs*
  In order to comply with Storm Water Pollution Prevention Plans (SWPPPs) mandated by the State of California, treatment BMPs including ponds, vegetated swales and bioretention areas will be constructed where necessary to ensure that urban runoff from the Project site will meet or exceed water quality criteria.

1.2 Materials and Documents Incorporated by Reference

The following is a list of references used in this report. The documents referred to, referenced or cited in this report are incorporated by reference and are available for public review at the Los Angeles County Department of Regional Planning, 320 West Temple Street, Room 1382, Los Angeles, California 90012.

- Center for Watershed Protection. *The Practice of Watershed Protection* (2000).
- Chow, VT. *Open Channel Hydraulics* (pg *165* and pg *185).* McGraw Hill Civil Engineering Series (1959).
- *Federal Emergency Management Agency (FEMA) Flood Insurance Map 065043-0340* (October 20, 2002).
- Los Angeles County Department of Public Works. *Hydrology Manual* (December 1991) and *Sedimentation Manual* (June 1993).
- Los Angeles County Department of Public Works. *Hydrology Manual & Appendix*, 1991.
- Los Angeles County Department of Public Works. *Development Planning for Storm Water Management, A Manual for the Standard Urban Storm Water Mitigation Plan (SUSMP)* (September 2002).
- Los Angeles County of Public Works. *Level of Flood Protection and Drainage Protection Standards* (1986).
- Los Angeles County Department of Public Works. Santa Clara River Enhancement and Management Plan, *Flood Protection Report* (June 1996 Final Draft)
- Pacific Advanced Civil Engineering. *Santa Clara River Bank Protection for Landmark Village VTTM# 53108 - Drainage Concept Report* (November, 2006)
- Pacific Advanced Civil Engineering. *Newhall Ranch River Fluvial Study Phase 1 Final Draft* (March 9, 2006)
- Pacific Advanced Civil Engineering. *Newhall Ranch Santa Clara River HEC-RAS Modeling Study* (December, 2005).
- PSOMAS. *Mission Village Drainage Concept Report* (December 2005).
- PSOMAS. *Surveyed topography data for River Village (Mission Village)*, dated 1999.
- United States Army Corps of Engineers. *Santa Clara River Adopted Discharge Frequency Values* (adopted May 3, 1994 by the United States Army Corps of Engineers, the Ventura County Flood Control Department and the Los Angeles County Department of Public Works).
- Valencia Company. *Natural River Management Plan (Permitted Projects and*

Activities under the United States Corps of Engineers 404 Permit, California Department of Fish and Game 1603 Agreement and 2081 Permit (November 1998).

- Sikand. *Newhall Ranch Specific Plan Master Drainage Concept, Santa Clara River* (April 2001).
- Sikand. *Newhall Ranch Santa Clara River HEC-RAS Study* (June, 28 2000).
- Sikand. *Supplemental Report for Newhall Ranch Santa Clara River HEC-RAS Study* (July 2000).
- Simons, Li & Associates. *Summary Report, Fluvial Study of Santa Clara River and the Tributaries* (November 1990).
- Revised Additional Analysis to the Newhall Ranch Specific Plan and Water Reclamation Plant Final EIR (SCH No. 95011015), Volume VIII, May 2003, including Section 2.3, Floodplain Modifications.

1.3 Definitions

The following terms and acronyms are defined below, and are used in this report:

100-year storm	Precipitation event corresponding to a flood that has a 1/100, or one percent, chance of occurring in any given year.
ACOE	Army Corps of Engineers
Runoff (Qbb)	Runoff from burned areas that are laden with burned vegetation, fines, rocks, mud and other debris.
Capital Flood (Qcap)	The runoff resulting from a theoretical storm based on Los Angeles County Department of Public Works methodology. The “model” storm is derived from 50-year frequency rainfall values, which occur in a time sequence patterned after actual major extra-tropical storms occurring in the Los Angeles Region. The calculations of runoff are also based on the soil types and percent of impervious surfaces in a watershed area, and on the assumption that some undeveloped portions of the watershed are burned, resulting in significant amounts of debris and sediment being added to the runoff.
CDFG	California Department of Fish and Game
Clear Runoff (Qc)	Runoff that is absent of fines (finely crushed or powdered material), mud, rocks, vegetation, and other debris.
Coefficient of Runoff	Variable in the rational and modified rational method runoff formula, which is dependent upon soil type, rainfall intensity, and the percent of imperviousness.
CWA	Federal Clean Water Act
Detention Basin	Physical flood control structure that captures storm flows

	and temporarily stores these flows in man-made surface depressions and, therefore, not available for producing surface runoff during storm events. See also "Water Quality Detention Basins."
Depression Storage	Runoff that is captured by and settles in a natural or manmade depression and does not continue downstream.
Erosion	The wearing away of land surfaces by water, wind, and ice.
FEMA	Federal Emergency Management Agency
First Flush	First flush is defined in Los Angeles County as the runoff volume generated from the first 0.75-inches of rainfall in a 24-hour period.
Floodplain	Total area subject to inundation by a 100-year flood.
Impervious	A description of a soil that will not permit water to flow through it.
Infiltration	The penetration of water through the ground surface into sub-surface soil or the penetration of water from the soil into sewer or other pipes through defective joints, connections, or manhole walls.
Interception	That portion of precipitation captured by vegetation. Intercepted precipitation is disposed of by drip, stem flow, or evaporation (or sometimes sublimation, in the case of snow, sleet, hail, or freezing rain).
LACDPW	Los Angeles County Department of Public Works
Peak Flow	Peak discharge rate measured in cubic feet per second (cfs).
Percolation	The downward flow or filtering of water through pores or spaces in rock or soil.
Q	Discharge rates measured in cubic feet per second.
Q50bb	Peak runoff from a 50-year rainfall intensity storm from undeveloped areas that is laden with burned vegetation, fines, rocks, and other debris.
Q50c	Peak runoff from a 50-year rainfall intensity storm from developed areas or from undeveloped areas that are not assumed to be burned or bulked.
River	Santa Clara River

Runoff	The portion of rainfall, melted snow, or irrigation water that flows across the ground surface rather than filtrating into the soil.
RWQCBLAR	Regional Water Quality Control Board, Los Angeles Region
Sedimentation	Deposition of waterborne sediments due to a decrease in water velocity and a corresponding reduction in the size and amount of sediment, which can be carried by the flowing water.
Sump	An area from which there is no surface flow outlet.
SUSMP	Standard Urban Stormwater Mitigation Plan
SWPPP	Storm Water Pollution Prevention Plans
SWRCB	State Water Resources Control Board
Transpiration	The process by which water vapor is lost to the atmosphere from living plants.
Velocity	The rate or speed at which surface runoff water flows either over land or through a channel, measured in feet per second (fps).
Watershed	All land and water within the confines of a drainage divide.
Waters of the U.S.	Although the definition is subject to change, "Waters of the U.S." is defined as follows: All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; all interstate waters including interstate wetlands; and all other waters, such as interstate lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce including any such waters: (1) which are or could be used by interstate or foreign travelers for recreational or other purposes; or (2) from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) which are used or could be used for industrial purposes by industries in interstate commerce. Also included are all impoundments of waters otherwise defined as waters of the United States under the definition; tributaries of waters identified above;

	the territorial seas; and wetlands adjacent to waters (other than waters that are themselves wetlands) identified above. (33 C.F.R. §328.3(a) (2004).) Under the U.S. Army Corps of Engineers' definition, “Waters of the United States” are defined by the “ordinary high water mark,” which can be identified by physical characteristics, such as channel scouring, bank “shelving,” areas cleared of terrestrial vegetation, litter and debris, or other indications that may be appropriate.
Wetlands	Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. (33 C.F.R. §328.3(b) (2004).)

2 Methodology

Two development scenarios are addressed in this report:

1. Existing;
2. Existing with Project.

Brief summaries of the hydrologic and hydraulic methodology used in this report are presented as background information. The methodology was used to calculate pre- and post-development runoff quantities, the capacities of proposed improvements, and the effects of development on the River.

A third scenario, not addressed in this report, is a cumulative build-out scenario. This scenario was previously evaluated in the certified Newhall Ranch EIR, as revised by the Revised Additional Analysis, Vol. VIII (May 2003). As indicated earlier in this report, the flood protection improvements proposed in conjunction with the Project are consistent with those shown and analyzed in the build-out scenario for the Newhall Ranch Specific Plan.

2.1 Hydrology Background and Methodology

2.1.1 Los Angeles County Criteria

The Flood Control Division of the Los Angeles County Department of Public Works (LACDPW) regulates storm runoff protection. The LACDPW issued a 1986 memorandum entitled, “Level of Flood Protection and Drainage Protection Standards,” for development projects in Los Angeles County. The memorandum established Los Angeles County policy on levels of flood protection and requires that the following facilities be designed for the Capital Flood: all facilities not under State of California jurisdiction that intercept flood waters from natural drainage courses; all areas mapped as floodways; all facilities that are constructed to drain natural depressions or sumps; and all culverts under major and secondary highways. All facilities in developed areas that are not covered by the Capital Flood protection conditions must be designed for the Urban Flood, or runoff from a 25-year frequency design storm. Because the Project would also intercept flood flows from natural areas, the Project's storm drainage facilities that accept these flows must be sized and designed for the Capital Flood.

In addition to meeting this required level of flood protection, all development in the River watershed must meet standards adopted by the LACDPW for the River and its major tributaries. (*Refer to*, County Sedimentation Manual, pp. 2-2 to 2-6). Further, properties adjacent to the River that include improvements along and across a segment of the River (including the Project) must meet the standards adopted in the Newhall Ranch EIR and Revised Additional Analysis, Volume VIII (May 2003).

2.1.2 Explanation of the County Capital Flood

In 1931, the Los Angeles County Flood Control District (LACFCD) (now, the Flood Control Division of the County's Department of Public Works) began development of a comprehensive plan of flood control facilities to collect and convey flows from the mountainous canyons, the alluvial fans, and the urbanized coastal plain.

The major needs in designing the system were: reduction of damage due to high canyon flows, conveyance of large volumes of water in a major storm, and the ability to meet future flood control needs. The design of the flood protection system for the County is based on the Department of Public Works' Capital Flood hydrology.

The Department's Capital Flood (or Q_{CAP}) hydrology is based on a "design," or theoretical storm event that is derived from 50-year frequency rainfall values and is patterned after actual major extra-tropical storms observed in the Los Angeles region. The 50-year frequency design storm is assumed to occur over a period of four days, with maximum rainfall occurring on the fourth day.

Analysis of recorded major storms reveals that, during the 24-hour period of maximum rainfall, rainfall intensity typically increases during the first 70 to 90 percent of the period and decreases in the remaining time. Furthermore, approximately 80 percent of the amount of the 24-hour rainfall occurs within the same 70 to 90 percent of the period. In developing the Q_{CAP}, the 50-year frequency design storm is assumed to fall on saturated soils. In converting rainfall to runoff, rainfall that is not lost due to the hydrologic processes of interception, evaporation, transpiration, depression storage, infiltration, or percolation is assumed to be surface runoff. The effect of snowfall or snow melt on rainfall-runoff relationships is a consideration in only a very limited portion of the County (i.e., the higher elevations) where snowfall accumulates in winter.

Another assumption made in developing a Capital Flood design flow rate is that some natural portions of the watershed have been burned by fire. When a watershed burns, the soil infiltration rate decreases due to the loss of vegetation and physical changes in the soil. The County has run field infiltrometer tests to quantify the effect that burning has on the coefficient of runoff. The effect of burning the watershed can increase the design runoff rate from 10 percent to 20 percent.

The final factor in adjusting the Capital Flood design flow rate is referred to as a bulking factor. In the area where a watershed is burned, the runoff would carry with it a large layer of eroded topsoil. This sediment, along with the associated burned trees and brush, is referred to as debris. In order to account for these quantities of debris, the design flow rate is artificially increased using a prescribed bulking factor, which is a function of not only soil type, but also the steepness of the terrain and the size of the drainage basin. The bulking factors for larger drainage basins range

from about 1.20 to 1.50 or from 20 to 50 percent over and above the burned flow rate.

In September, 2003, LACDPW revised the hydrologic method that accounts for fire effects on runoff computations. In the previous practice, a completely burned watershed was assumed. The current policy was updated to employ a statistical approach that relates historical fire data and vegetation recovery rates to changes in runoff coefficient of soil. A fire factor (*FF*) has been developed to represent the effectively burned percentage of a given watershed. This factor is used to adjust runoff coefficients for Q_{CAP} hydrology. The *FF* adjusts the coefficient by indexing between an unburned and completely burned soil coefficient for a given soil. This method has yet to be officially adopted by the County.

In this report, the former Capital discharge is used for analysis and comparison. In design stages, the updated 2003 Capital discharge will be employed as this updated version is anticipated to be adopted by the County between now and approval of the Project. Because the 2003 Capital discharge rate is lower than the pre-2003 discharge rate, using the updated discharge values in the design phase will result in reduced calculated flood flows and a reduced calculated potential for flood-related impacts. Using the pre-2003 Capital discharge is more conservative in determining impacts. Any changes in design of bank protection resulting from utilizing the updated Capital discharge will only reduce the top of bank protection elevation and toe of the bank protection depth. Final design of bank protection will adhere to LACDPW Q_{CAP} design standards.

In summary, the County's Q_{CAP} is based on a theoretical four-day storm event occurring right after the watershed has been burned with the resulting flow rate being increased again by a bulking factor, thereby yielding a peak flow rate that is 32 to 80 percent higher than a 50-year storm over an unburned-unbulked drainage basin. The probability of the occurrence of all the theoretical assumptions identified in the County's Capital Flood is extremely small, and yields greater design flows than the Federal Insurance Administration's methodology for calculating the 100-year and 500-year floods. As a result, the County's methodology is more conservative than that of the Federal Emergency Management Agency (FEMA).

2.1.3 Method of Drainage Analysis

The engineering term for the method used to properly size pipes and channels is "hydraulic analysis." To determine the proper sizes of pipes and channels, assumptions must be made regarding the amount of rainfall to design for and the amount and type of development that would take place in a drainage basin. An estimate must also be made of how often that amount of rainfall could be surpassed. This is referred to as the event exceedence probability, or its reciprocal value — return period. For example, a storm that has a 10 percent exceedence probability is a storm that has a 10 percent chance of meeting or exceeding a particular volume of rain in any given year. The reciprocal of this number is also known as a 10-year return period storm. An important concept to keep in mind is

that a pipe or channel is designed for a discharge (measured in cubic feet per second), not a volume (measured in cubic feet or acre-feet). A dam or a lake is designed for storing or containing a fixed volume of water. A pipe of a fixed size, on the other hand, can carry discharges, depending on the pressure placed on the water.

In designing a storm drain system, the size of a pipe that would safely carry a predicted discharge must be calculated. A 1-foot square box that is 1-foot deep (a cubic-foot) can hold 7.5 gallons of water. Based on this fact, the amount of stormwater passing through a pipe or channel in one second can be calculated by multiplying the cross sectional area of the flow in the pipe (in square feet) by the velocity of storm flows through the pipe in feet per second. This three-dimensional rate of flow is measured in cubic feet per second, or cfs.

With the above concepts in mind, the effects of development on natural ground can be considered. Buildings, driveways, patios, sidewalks, and roads all create new impervious cover to the natural ground and prevent water from infiltrating into the ground. The water that would normally infiltrate the ground would therefore run off at a higher than normal rate. Therefore, the surface discharge from developed areas will be greater than that from undeveloped areas.

LACDPW requires that all designs utilize exceedence probability calculations for design and analysis. By employing this methodology herein, this report ensures consistency with County design standards.

2.1.4 Explanation of Design Hydrology

(a) Effects of Soil Type and Amount of Imperviousness on Runoff Rates

The rate of runoff is directly related to the type of soil on the site. Certain soil types accept water faster (are more permeable) than other soils. Therefore, the types of soils present on a site are used in the calculations of runoff. Different soil types have very different water infiltration rates. If sandy soil (highly permeable) is paved over, the coefficient of runoff (C) would greatly increase, whereas if clay soil (not highly permeable) is paved over, runoff values would go up, but by a smaller percent of the total when compared to sandy soil (because sandy soils conduct water faster). In small storms, some soils can absorb 100 percent of the rainfall. For example, soil type 015 (Tujunga Fine Sandy Loam) can completely absorb a 0.5-inch per hour (in/hr) storm and almost completely absorb a 1.0 in/hr storm, thereby yielding extremely low runoff rates. For a 200 acre parcel with soil types 015 (Tujunga Fine Sandy Loam) and 012 (Ramona Clay Loam), radically different runoff quantities for the same rainfall events occur. For an intense storm, *I=1.0 in/hr*, and the very pervious soil type 015 (Tujunga Fine Sandy Loam), the runoff rate would be 20 cfs. For the same size parcel on a very impervious soil, such as soil type 012 (Ramona Clay Loam), the runoff rate would be 168 cfs.

(b) Effects of Burning and Bulking

In an undeveloped watershed, Capital Flood flow rates assume a burned condition, which causes the coefficient of runoff to increase. Further, after increasing the coefficient of runoff for burning, the flow rate is then multiplied by a bulking factor, which is used to account for the amount of mud and debris that would be contained within the flow from the burned watershed. In the case of the Project, the increase in runoff, or flow rates, due to an increase in the coefficient of runoff (C) to account for burning is from 10 to 20 percent. Application of the bulking factor to account for debris production would increase runoff quantities by 20 to 50 percent over and above the burned flow rate.

(c) Effects of Development

As previously noted, development places impervious materials over soils had previously infiltrated stormwater. Once the impervious materials are placed over the soil, little direct infiltration occurs and runoff increases. Because development does not typically completely cover the ground surface, portions of each developed parcel (e.g., front, side, and rear yards, landscaping, open space, etc.) remain permeable to stormwater. Percent imperviousness for each land use (existing and proposed) on the Project site is presented in Table 2.1.

Table 2.1: Percent Impervious for Selected Land Uses

Land Use	Percent Imperviousness (%)
Agricultural[3]	15
Transportation	100
Single Family Residential	42
Multi Family Residential	68
Commercial	92
Open Space	0

Values are from GeoSyntec Consultants (2005).

2.2 Santa Clara River Hydraulics

The floodplain conditions of the River were modeled using River Analysis System (RAS) software developed by the U.S. Army Corps of Engineers (U.S. ACOE) Hydrologic Engineering Center (HEC). Inputs to the HEC-RAS model include channel geometry, boundary conditions, hydraulic roughness, and hydrology. HEC-GeoRAS is a HEC-developed pre-/post-processor to the hydraulic model HEC-RAS and was used to compile and store a three-dimensional representation of the land surface for defining channel and floodplain geometry. A Triangular Irregular Network (TIN) was created from surveyed 2-foot topographic data using the ArcInfo program Topogrid. The TIN was used to extract geometric data for hydraulic analysis. The original River modeling prepared by Sikand Engineering and utilized in the Newhall Ranch Revised Additional Analysis, Volume VIII (May 2003) used the HEC-RAS predecessor hydraulic model, HEC-2. The HEC-2 geometric data input methodology utilized proprietary hydraulic modeling software BOSS, which follows a very similar data input methodology as

described above. The original HEC-2 model was converted and input into HEC-RAS.

The HEC-RAS model was used to provide current state of the art one-dimensional hydraulic water surface profile modeling data output. The output data from HEC-RAS is capable of being utilized by Graphic Information System (GIS) software in a variety of methods, which facilitate more detailed evaluation of the modeling output data such as water surface elevation, floodplain limit, velocity, depth of flow, and other hydraulic parameters.

The Newhall Ranch HEC-RAS model was submitted and approved by LACDPW in the Newhall Ranch Santa Clara River HEC-RAS Modeling study (December, 2005) prepared by PACE. The report included the capital discharge run with Manning's values of 0.025, 0.060 and 0.085 for the existing and proposed conditions. The proposed condition includes proposed soil cement bank protection including: 1) the previously approved (Newhall Ranch Specific Plan EIR) WRP soil cement, 2) buried soil cement protection on the north bank of the river east of the proposed WRP (not a part of Newhall Ranch SPECIFIC PLAN EIR and therefore now included as part of the Landmark Village and Mission Village EIR document as well), 3) bank protection between Potrero and Grande confluences on the north and south banks, 4) Homestead bank protection, 5) Landmark Village Soil Cement bank protection, 6) Castaic Junction Soil Cement bank protection (not a part of Newhall Ranch),7) Mission Village Soil Cement bank protection on both the north and south banks, and 8) Commerce Center Drive/HWY 126 Widening bank protection. Three bridges are included in the model: 1) Commerce Center Drive Bridge, 2) Long Canyon Bridge, and 3) Potrero Canyon Bridge. Design data for the bridges was the latest available at the time of this report. The approved model was used for both the approved fluvial study conducted by PACE (Newhall Ranch River Fluvial Study Phase 1 Final Draft dated March 9, 2006) and this Mission Village EIR Technical Study.

It is important to note that the HEC-RAS study, as well as the fluvial study, covers the Santa Clara River corridor from I-5 to an area generally west of the Ventura County/Los Angeles County line, of which the Mission Village project is a part. The Mission project is comprised of 1) buried soil cement protection on the north bank of the river east of the proposed WRP, 2) TRMs on the north bank along the southern edge of the utility corridor, 3) San Jose Flats bank protection, and 4) Mission Village bank protection at Commerce Center Drive on the south bank. As stated previously the north bank protection at the Commerce CALTRANS/ LA County Department of Public Works Project (State Route 126 widening and Commerce Center Drive interchange project; State Clearing house #2003101127) and will be constructed prior or concurrent with Mission Village and therefore has been included as part of the Mission Village existing condition model. The studies that include areas outside of the Mission project consider impacts to the Mission project from all of the proposed Newhall Ranch improvements and they act as boundary conditions both in terms of maximum flow and physical extent.

The numerical modeling prepared for Mission Village is consistent with that prepared for the Newhall Ranch Specific Plan Program EIR. Discharges include the 0.5 (2-year), 0.2 (5-year), 0.1 (10-year), 0.05 (20-year), 0.02 (50-year), and

0.01 (100-year) annual probability return periods. The numerical modeling includes velocity distributions for nearly 150 River cross-sections. A portion of these cross-sections are illustrated in Figure 1.4. Manning's roughness values for the model bed were taken from analysis of aerial photography of the river, and vary horizontally along each model cross-section. The proposed conditions analysis was conducted by modifying the existing conditions model such that bank protection, described below, was placed within the model as encroaching levees. The impacts of the bridge are included as a part of the numerical modeling analysis.

The Project models for the River were created by modifying existing cross-section geometrics of the River to simulate the hydraulic effects of the proposed Project soil cement and erosion protection, including the Commerce Center Drive Bridge abutments and piers. The encroachment due to the soil cement was conservatively approximated with levees as a part of the geometry in the hydraulic model. The modeling of the proposed Commerce Center Drive Bridge span, soil cement, pier spacing, and abutment locations are substantially consistent with the Newhall Ranch Revised Additional Analysis, Volume VIII (May 2003). For modeling and impact analysis consideration, these conservative bridge configurations would have the greatest impact on River hydraulics. It should be pointed out that the present analysis is based on the Project-specific design details, not assumptions from the previous Newhall Ranch Specific Plan evaluation.

Existing Santa Clara River discharge rates for the 2-, 5-, 10-, 20-, 50-, and 100-year storm events were obtained from a 1994 U.S. ACOE study entitled, Santa Clara River Adopted Discharge Frequency Values. The revised Q_{CAP} values are provided by LACDPW. This study is based upon a frequency analysis of stream flow data along the Santa Clara River and, therefore, approximates River flows from observed data. These values are presented in Table 2.2. It is important to note that these values include discharges from upstream tributaries and direct runoff from the watershed. Additionally, the approved Newhall Ranch HEC-RAS and fluvial studies use the revised Q_{CAP} discharge as shown in Table 2.2, while the previous analysis including the ML maps and Specific Plan EIR use the older Q_{CAP} discharges also shown in the table.

Six of the seven recurrence intervals included in the analysis were obtained from the 1994 study; the other two from the Los Angeles County Capital Flood, is referenced from the previously published LACDPW ML Maps 43-ML-24 and 43-ML-25 of floodplain and floodway.

Table 2.2 Santa Clara River Existing Conditions Discharge By Return Period (cfs)

Location	Station	2-year	5-year	10-year	20-year	50-year	100-year	Q_{CAP-SP}	Q_{CAP}
DS Commerce Center Drive	35245	1,720	5,240	9,490	15,600	27,500	40,300	138,000	116,236
At Castaic Cr. Confluence	32265	2,527	8,232	14,942	24,157	41,141	58,207	163,000	140,776
DS Chiquito Cr. Confluence	22195	2,558	8,333	15,123	24,453	41,646	58,922	165,000	141,426
At Grande Cyn. Cr. Confluence	17360	2,581	8,408	15,263	24,675	42,025	59,457	166,500	141,426
DS Protrero Cr. Confluence	15125	2,600	8,480	15,400	24,900	42,400	60,000	168,000	142,475

DS - downstream; Q_{CAP-SP} *-* Q_{CAP} *used for the Specific Plan EIR*

The following hydraulic modeling parameters apply to the two scenarios analyzed in this report:

1. Bank stations;
2. Hydraulic roughness; and
3. Boundary conditions.

As stated previously, build-out or cumulative condition parameters are not addressed in this report, because they were analyzed previously in the certified Newhall Ranch EIR, as revised by the Revised Additional Analysis, and there have been no significant changes to the Specific Plan or its circumstances that would warrant a reanalysis of the prior program-level assessment conducted for the entire Specific Plan area (which includes the Project site).

1. Bank Stations: The bank station locations are approximated as the water surface elevation level of the runoff from an existing scenario 2-year storm event. The 2-year return interval approximates a typical ordinary high water mark.

2. Hydraulic Roughness: Discharge is calculated using hydraulic roughness coefficients in the Manning's equation. Manning's roughness coefficient values are employed in Manning's equation of the form:

$$Q = \frac{1.49}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

where *Q* is the discharge in cfs, *n* is Manning's roughness coefficient, *A* is the flow area, *R* is the hydraulic radius, and *S* is the energy slope.

For this report, the Manning's roughness coefficients were estimated from local condition observations of in-stream and floodplain vegetation, mapped by field biologists (Impact Sciences, 2002). Table 2.3 shows the variation of Manning's roughness coefficients based on vegetation and how those compare to published values. It is important to note that LACDPW bank protection design criteria require use of *n=0.085* and *0.025* for final design of bank protection top and toe elevation, respectively.

Table 2.3: Hydraulic Roughness Coefficients		
Vegetation/Land Use	**Manning's Roughness Coefficient [used in this study]**	**Reference Manning's Coefficient (Chow 1959)**
Sand with no vegetation	0.025	0.025-0.033
Sand with Sporadic Growth/Grass Pasture	0.035	0.03-0.05
Scattered Brush/Heavy Weeds/Light Brush and Trees	0.05	0.035-0.07
Dense trees	0.15	0.11-0.20

3. Boundary Conditions: Boundary conditions represent the flow conditions at the limits of the hydraulic analysis. In this study, boundary conditions reflect normal depth and an approximate channel slope of 0.5 percent at the upstream boundary and critical depth at the downstream boundary. The input hydrology is the flow rate data for the return periods as documented in Table 2.2. The Q cap used is that of the Specific plan.

The proposed Project model was created by modifying existing condition cross-section geometries to simulate the proposed Project soil cement and bridges. The encroachment due to the soil cement was approximated with levees in the hydraulic model (model levees set at equivalent elevation on slope of channel invert).

2.3 Santa Clara River Fluvial Mechanics

An evaluation of the existing and proposed fluvial characteristics and long-term stability of Santa Clara River between Interstate 5 and an area generally west of the Los Angeles/Ventura County line in the vicinity of the Newhall Ranch Specific Plan was previously prepared by PACE (Newhall Ranch River Fluvial Study Phase 1 Final Report [March 6, 2006]) and approved by LACDPW. Development along the River within the study area has the potential to modify the fluvial mechanics of the River, and the PACE fluvial analysis evaluates impacts from build-out of Newhall Ranch from (1) fluvial modifications of the river bed from single hypothetical storm events, and (2) changes in the floodplain fluvial operation over the long-term. It is important to note that the HEC-RAS and fluvial study covers an area from I-5 to generally west of the Ventura County/Los Angeles County line and is not just limited to the Mission project site, as noted above.

2.3.1 Sediment Data Collection

Sediment data collection for the Santa Clara River along the study reach was conducted by Allan E. Seward Engineering Geology Inc. Eighteen samples were collected at six different locations positioned along River subreaches. All sampling was conducted using grab samples of the upper foot of the active or recently active portion of the bed. No fine material is included in the sediment analysis because fine material is generally transported as wash load. A review of the raw gradation curves indicates that most samples are comprised of poorly graded sands with

gravels and silts. The D50 values for all samples ranged from 0.25 to 4.67 mm with an average of 0.8 mm. Additionally, previous studies noted above also found similar sandy characteristics.

2.3.2 Fluvial Analysis Components

Modifications to the river bed are measured as bed adjustment in feet. Positive adjustment indicates aggradation and negative adjustment indicates degradation. Several types of adjustment are considered in the PACE study including general adjustment, long-term adjustment, and other scour. General adjustment is scour that occurs in an individual discharge event and is calculated as the difference between sediment inflow and outflow of a given River reach. Long-term adjustment consists of fluvial processes that occur over several years. Other scour is made up of local scour, bend scour, low-flow incisement, and bedform formation.

General adjustment was estimated in this study using the US Army Corps of Engineers (ACOE) SAM steady-state, zero-dimensional numerical model. SAM is utilized to provide a first approximation of sediment transport potential for subreaches within Santa Clara River. The SAM numerical model is built upon hydraulic and fluvial representations of the study bed. The hydraulic component includes representations of bed characteristics and discharge. The fluvial component includes representation of bed gradation and sediment transport functions. SAM's hydraulic component utilized average cross-section data imported from HEC-2 numerical models of the river converted from HEC-RAS numerical models. The conversion process modifies the original numerical model, as discussed in Chapter 4 of the PACE study, so some differences in numerical models are created. Both the existing and proposed conditions HEC-RAS models are the same as those approved in the PACE HEC-RAS study of Santa Clara River. River subreaches that make up the SAM model are determined by examining the hydraulic parameters of the individual HEC-RAS cross-sections and identifying correlations between those hydraulic parameters and the longitudinal position in the channel.

Representation of sediment grain size distribution in SAM is percent finer data obtained from sieve analysis of channel sediment samples. At each sample location, multiple samples are collected and the average data is input into the model. Sediment transport equations used in all SAM modeling were chosen with the assistance of the Army Corps' SAM.AID subroutine. The SAM.AID subroutine determines the most representative transport function based on the hydraulic parameters and percent finer data by comparing model data with peer-reviewed sediment transport studies. The study found that Meyer-Peter and Muller (MPM) was the representative transport function for all subreaches for both existing and proposed conditions because it produced adjustment values within physical reason.

SAM was run for all River reaches and bed stability was estimated based on the change in potential transport between adjacent channel

subreaches for the QCAP discharge. General adjustment was also calculated using the equation specified in the Los Angeles County Hydrology and Sedimentation Manual (LACH&SM).

Long-term adjustment was calculated based on historical records in the form of topographic data. Topographic data dating from 1930, 1947, 1963, 1999, 2004 and 2005, was digitized. Cross-sections were cut at the locations of select HEC-RAS sections for each of the above referenced years from historical topography. At least one cross-section was chosen for each subreach. Areas of the 1947, 1963, 1999, 2004 and 2005 sections are calculated and the areas of the 1947, 2004 and 2005 bed are used to calculate the average change in bed elevation over time. The 1930 topography is not used to calculate average change in bed because the trends in bed change that occurred during this year occurred immediately following the failure of the St. Francis Dam upstream of the project site. Several events within the available historical record (1930 to present) have had an impact on the River bed and fluvial mechanics. Within the project reach, the failure of the Dam appears to have resulted in the abrupt scour of the bed. The sectional analysis finds that some historical sections (SRD2, SRD3, SRE1, SRE2) show little change between 1947 and 2005 suggesting an approximate equilibrium state for these subreaches. Between 1947 and 2005, 0.5, 0.7, 1.0, and 0.8 feet, respectively, of cumulative degradation appears to have occurred on these sections. Upstream sections SRA1 to SRC3 show continuous degradation over the period of record from 1947 to the present. Three sections, SRC4, SRD1 and SRE3 aggraded cumulatively between 1947 and 2005 by 1.9, 1.4, and 3.1 feet on average, respectively. While it is unclear why the observed aggradation occurred, it is presently believed to be the result of the fires of the summer of 2004 and the heavy rains of the 2004/2005 rainy season. This combination had the potential to produce high sediment runoff loading into the River. Degradation seems to be more prevalent on the upper half of the study reach while mild fluctuations are more apparent on the lower half. This appears to result from the relatively steep, narrow, winding upper portion of the study reach versus the relatively flat, wide, braided channel in the lower portion of the study reach of the River. Agricultural activities occurred, primarily in downstream sections but in upstream sections as well, so some of the observed channelization may have resulted from these activities.

Other scour considered in this study is comprised of four sub-categories: local scour, bend scour, low-flow incisement, and bedform height. Local scour occurs in the vicinity of flow obstructions including piers and abutments. Bend scour occurs because of velocity gradients around curves in fluvial systems. Three distinct bends are located in the study reach. Low flow incisement is included to represent thalweg or low flow channel depth. On-site inspection and review of historic data of this feature suggest a thalweg depth of approximately two feet. Finally, bedform height represents the dunes and anti-dunes that develop in active soft-bottomed channels during flow events. In this study, bedform height has been limited after Kennedy (1963).

General adjustment, long-term adjustment, and other scour are summed to determine total potential bed adjustment following LACH&SM methodology (Newhall Ranch River Fluvial Study - Phase 1 Final Draft, Figure 7.1 A-D). For cross-sections where SAM modeling predicts aggradation, the general adjustment contribution to total bed adjustment is not included for degradation calculations.

Freeboard is considered for the purposes of this report to be the additional height required above the top of a levee or other bank protection to prevent overtopping. Freeboard elevation is calculated in this study based on LACH&SM Chapter 5A-3, and includes LACFCDDM calculations.

3 Existing Conditions

3.1 Drainage Areas and Watercourses

The Santa Clara River traverses the northern portion of the Mission Village Project site, which is located within a contributing drainage of 2,690 acres out of the 1,634 square mile Santa Clara River watershed basin (PSOMAS, Mission Village Drainage Concept Report). This area represents less than 1 percent of the Santa Clara River basin and consists primarily of agricultural and vacant property. Rainfall in the tributary area is an annual average of 17-inches and generally occurs in the winter months. Runoff flows to and through seven contributing drainage areas on the site via sheet flows and natural concentrated flows.

3.1.1 Santa Clara River

The reach of the Santa Clara River adjacent to, and downstream of, the Project site has perennial surface flows primarily created by tertiary treated effluent discharges from two upstream water reclamation plants operated by the County Sanitation Districts of Los Angeles County. Natural flows in the River usually only occur in the winter due to storm runoff. The flows vary significantly from year-to-year.

The reach of the River within and adjacent to the Project site has multiple channels (braided). This kind of system is characterized by high sediment loads, bank erodibility, and intense and intermittent runoff conditions. Combined with the relatively flat gradient of the River at this point (less than one percent), the River has a potential to aggrade (deposit sediment) at low flow velocities.

Velocities and water surface elevations in the River vary from section-to-section based on various hydraulic and hydrologic parameters. In general, velocity and depth along the River will increase with higher discharge. An example of these relationships is provided in Table 3.1. This data indicates that velocities measured in feet per second (fps), more than double, on average, from the 2-year to the 100-year event, while the cross-sectional flow area increases about ten fold for the same the 2-year to the 100- year event. Similarly, discharge increases almost 23 times from the 2-year to the 100-year event. Velocity and cross-sectional flow area rate of increases do not correspond to the rate of discharge increases because the wide River channel allows flood flows to spread out with increasing discharge.

TABLE 3.1: DISCHARGE, VELOCITY AND FLOW AREA CHANGES BY CROSS SECTION FOR Q_2 AND Q_{100}

STATION	EVENT	FLOW Q (CFS)	VELOCITY (FPS)	FLOW AREA A (FT^2)	Q_{100}/Q_2	A_{100}/A_2
39755	Q100	40300	12.49	3226.02		
	Q2	1720	3.83	449.51	23.4	7.2
39605	Q100	40300	14.46	2786.9		
	Q2	1720	5.09	337.6	23.4	8.3
39310	Q100	40300	13.04	3091.6		
	Q2	1720	5.93	290.0	23.4	10.7
39100	Q100	40300	16.06	2509.8		
	Q2	1720	3.56	483.4	23.4	5.2
38925	Q100	40300	11.39	3558.1		
	Q2	1720	5.64	304.7	23.4	11.7
38710	Q100	40300	8.73	4659.1		
	Q2	1720	3.71	463.6	23.4	10.0
38475	Q100	40300	12.80	3147.3		
	Q2	1720	6.08	283.1	23.4	11.1
38300	Q100	40300	16.59	2429.7		
	Q2	1720	5.94	289.6	23.4	8.4
38065	Q100	40300	9.48	4253.0		
	Q2	1720	3.19	539.6	23.4	7.9
37810	Q100	40300	12.99	3102.3		
	Q2	1720	4.71	365.4	23.4	8.5
37655	Q100	40300	13.43	2999.9		
	Q2	1720	5.01	343.5	23.4	8.7
37390	Q100	40300	13.41	3004.6		
	Q2	1720	4.46	385.9	23.4	7.8
37135	Q100	40300	9.61	4193.0		
	Q2	1720	4.76	361.7	23.4	11.6
36930	Q100	40300	7.62	5287.8		
	Q2	1720	2.92	588.3	23.4	9.0
36735	Q100	40300	6.91	5839.0		
	Q2	1720	4.46	385.9	23.4	15.1
36515	Q100	40300	5.50	7327.6		
	Q2	1720	2.55	674.1	23.4	10.9
36358	Q100	40300	4.87	8271.9		
	Q2	1720	1.95	880.9	23.4	9.4
36239	Q100	40300	5.31	7590.3		
	Q2	1720	2.51	686.6	23.4	11.1
36080	Q100	58207	12.21	4875.0		
	Q2	2527	6.37	396.5	23.0	12.3
35845	Q100	58207	8.77	6633.5		
	Q2	2527	5.04	501.3	23.0	13.2
35725	Q100	58207	8.84	6700.6		
	Q2	2527	4.21	600.8	23.0	11.2
35515	Q100	58207	9.92	7257.8		
	Q2	2527	3.10	814.9	23.0	8.9
35245	Q100	58207	8.26	8407.5		
	Q2	2527	1.87	1348.5	23.0	6.2
35040	Q100	58207	8.59	6776.4		
	Q2	2527	3.82	662.0	23.0	10.2
34860	Q100	58207	11.90	4889.6		
	Q2	2527	4.97	508.9	23.0	9.6
34720	Q100	58207	13.20	4408.5		
	Q2	2527	6.22	406.3	23.0	10.8
34495	Q100	58207	8.16	7136.3		
	Q2	2527	4.78	528.6	23.0	13.5

TABLE 3.1 (CONTUNUED)

STATION	EVENT	Q (CFS)	VELOCITY (FPS)	FLOW AREA A (FT^2)	Q_{100}/Q_2	A_{100}/A_2
34310	Q100	58207	6.71	8670.58		
	Q2	2527	5.37	470.36	23.0	18.4
34090	Q100	58207	5.63	10339.8		
	Q2	2527	4.36	580.1	23.0	17.8
33880	Q100	58207	4.84	12034.4		
	Q2	2527	4.32	585.0	23.0	20.6
33710	Q100	58207	4.71	12351.1		
	Q2	2527	4.03	626.4	23.0	19.7
33500	Q100	58207	4.39	13269.0		
	Q2	2527	2.82	896.5	23.0	14.8
33310	Q100	58207	4.75	12259.7		
	Q2	2527	5.23	483.1	23.0	25.4
33115	Q100	58207	6.36	9149.2		
	Q2	2527	2.60	973.6	23.0	9.4
32795	Q100	58207	10.48	5553.5		
	Q2	2527	5.97	423.4	23.0	13.1
32605	Q100	58207	11.52	5055.2		
	Q2	2527	5.75	439.3	23.0	11.5
32265	Q100	58922	15.41	3823.1		
	Q2	2558	3.97	643.9	23.0	5.9
31875	Q100	58922	7.49	7869.5		
	Q2	2558	3.24	789.7	23.0	10.0
31585	Q100	58922	7.37	7998.6		
	Q2	2558	3.40	752.6	23.0	10.6
31360	Q100	58922	7.71	7642.4		
	Q2	2558	3.02	848.4	23.0	9.0
31060	Q100	58922	5.72	10293.5		
	Q2	2558	6.03	424.0	23.0	24.3
30720	Q100	58922	4.35	13538.5		
	Q2	2558	4.49	569.8	23.0	23.8
30445	Q100	58922	3.85	15328.0		
	Q2	2558	4.89	523.0	23.0	29.3
30095	Q100	58922	3.83	15435.1		
	Q2	2558	2.32	1104.9	23.0	14.0
29815	Q100	58922	4.45	13345.3		
	Q2	2558	1.79	1428.3	23.0	9.3
29565	Q100	58922	4.50	13227.4		
	Q2	2558	1.33	1919.3	23.0	6.9
29385	Q100	58922	5.43	10963.6		
	Q2	2558	1.52	1686.6	23.0	6.5
29140	Q100	58922	8.64	6819.6		
	Q2	2558	3.62	706.3	23.0	9.7
28895	Q100	58922	15.61	3774.1		
	Q2	2558	7.86	325.5	23.0	11.6
28695	Q100	58922	25.81	2283.1		
	Q2	2558	4.76	537.7	23.0	4.2
28500	Q100	58922	21.85	2696.9		
	Q2	2558	6.48	394.5	23.0	6.8
28280	Q100	58922	14.46	4074.3		
	Q2	2558	3.44	744.3	23.0	5.5
28080	Q100	58922	12.28	4797.1		
	Q2	2558	5.68	450.4	23.0	10.7
27925	Q100	58922	11.84	4985.0		
	Q2	2558	4.54	562.9	23.0	8.9

TABLE 3.1 (CONTUNUED)

STATION	EVENT	Q (CFS)	VELOCITY (FPS)	FLOW AREA A (FT^2)	Q_{100}/Q_2	A_{100}/A_2
27725	Q100	58922	16.45	3581.37		
	Q2	2558	5.09	502.11	23.0	7.1
27545	Q100	58922	19.42	3034.2		
	Q2	2558	5.35	478.4	23.0	6.3
27335	Q100	58922	13.94	4226.1		
	Q2	2558	4.65	550.5	23.0	7.7
27155	Q100	58922	15.42	3879.1		
	Q2	2558	4.33	591.4	23.0	6.6
26990	Q100	58922	16.60	3550.0		
	Q2	2558	6.18	414.1	23.0	8.6
26780	Q100	58922	17.96	3331.7		
	Q2	2558	5.27	485.2	23.0	6.9
26575	Q100	58922	8.84	6668.1		
	Q2	2558	4.24	603.8	23.0	11.0
26355	Q100	58922	9.72	6411.1		
	Q2	2558	5.23	488.8	23.0	13.1
26170	Q100	58922	13.44	4883.0		
	Q2	2558	5.98	428.0	23.0	11.4
25965	Q100	58922	17.18	3508.5		
	Q2	2558	4.01	638.0	23.0	5.5
25785	Q100	58922	9.37	6816.1		
	Q2	2558	2.91	880.3	23.0	7.7
25600	Q100	58922	9.79	6984.6		
	Q2	2558	4.01	638.1	23.0	10.9
25425	Q100	58922	11.47	5518.2		
	Q2	2558	4.11	622.5	23.0	8.9
25215	Q100	58922	11.58	5377.9		
	Q2	2558	6.90	370.7	23.0	14.5
25000	Q100	58922	14.10	4272.0		
	Q2	2558	5.36	477.1	23.0	9.0
24795	Q100	58922	13.88	4518.9		
	Q2	2558	6.05	423.0	23.0	10.7
24550	Q100	58922	15.17	5034.8		
	Q2	2558	4.22	605.8	23.0	8.3
24335	Q100	58922	14.04	5304.5		
	Q2	2558	5.40	473.8	23.0	11.2
24115	Q100	58922	12.93	5544.4		
	Q2	2558	5.88	435.2	23.0	12.7
23975	Q100	58922	14.01	5584.8		
	Q2	2558	4.57	559.9	23.0	10.0
23755	Q100	58922	12.64	6112.3		
	Q2	2558	5.35	477.7	23.0	12.8
23565	Q100	58922	11.15	6878.8		
	Q2	2558	7.81	327.7	23.0	21.0
23365	Q100	58922	9.79	7598.0		
	Q2	2558	5.39	474.3	23.0	16.0
23180	Q100	58922	12.57	7071.4		
	Q2	2558	5.97	428.6	23.0	16.5
23000	Q100	58922	16.41	3589.9		
	Q2	2558	3.47	737.8	23.0	4.9
22790	Q100	58922	6.78	8688.7		
	Q2	2558	5.90	433.4	23.0	20.0
22600	Q100	58922	12.78	6378.9		
	Q2	2558	4.63	552.6	23.0	11.5

TABLE 3.1 (CONTUNUED)

STATION	EVENT	Q (CFS)	VELOCITY (FPS)	FLOW AREA A (FT^2)	Q_{100}/Q_2	A_{100}/A_2
22415	Q100	58922	11.40	6766.1		
	Q2	2558	6.19	413.3	23.0	16.4
22195	Q100	59457	12.33	4822.0		
	Q2	2581	6.78	380.6	23.0	12.7
22010	Q100	59457	16.14	3683.2		
	Q2	2581	4.02	642.5	23.0	5.7
21790	Q100	59457	15.88	3745.0		
	Q2	2581	3.99	647.1	23.0	5.8
21615	Q100	59457	12.98	4607.3		
	Q2	2581	5.82	443.3	23.0	10.4
21440	Q100	59457	14.63	4065.2		
	Q2	2581	5.47	471.4	23.0	8.6
21225	Q100	59457	14.76	4270.8		
	Q2	2581	5.68	454.6	23.0	9.4
21020	Q100	59457	12.33	5479.6		
	Q2	2581	4.54	568.2	23.0	9.6
20845	Q100	59457	11.58	6079.1		
	Q2	2581	5.81	444.3	23.0	13.7
20595	Q100	59457	10.49	7086.3		
	Q2	2581	4.39	587.3	23.0	12.1
20435	Q100	59457	8.93	8695.4		
	Q2	2581	2.96	873.0	23.0	10.0
20280	Q100	59457	11.68	6518.8		
	Q2	2581	6.20	416.3	23.0	15.7
20070	Q100	59457	15.87	3937.9		
	Q2	2581	5.16	500.6	23.0	7.9
19855	Q100	59457	13.97	4384.3		
	Q2	2581	5.02	514.0	23.0	8.5
19630	Q100	59457	10.88	6278.6		
	Q2	2581	4.65	555.2	23.0	11.3
19440	Q100	59457	9.02	7627.1		
	Q2	2581	3.93	657.3	23.0	11.6
19240	Q100	59457	10.88	6140.3		
	Q2	2581	5.86	440.8	23.0	13.9
19050	Q100	59457	7.65	8794.9		
	Q2	2581	4.27	604.8	23.0	14.5
18830	Q100	59457	8.72	8804.4		
	Q2	2581	5.54	465.9	23.0	18.9
18650	Q100	59457	7.72	9802.3		
	Q2	2581	5.91	436.8	23.0	22.4
18475	Q100	59457	6.89	11311.5		
	Q2	2581	5.31	486.1	23.0	23.3
18290	Q100	59457	6.80	11250.5		
	Q2	2581	6.32	408.3	23.0	27.6
18025	Q100	59457	5.08	12735.9		
	Q2	2581	3.72	693.6	23.0	18.4
17785	Q100	59457	5.06	11816.4		
	Q2	2581	2.86	904.0	23.0	13.1
17510	Q100	59457	8.59	6922.5		
	Q2	2581	4.29	601.8	23.0	11.5
17360	Q100	59457	10.50	5689.1		
	Q2	2581	4.50	573.8	23.0	9.9
17110	Q100	59457	11.83	5062.5		
	Q2	2581	4.53	569.7	23.0	8.9

TABLE 3.1 (CONTUNUED)

STATION	EVENT	Q (CFS)	VELOCITY (FPS)	FLOW AREA A (FT^2)	Q_{100}/Q_2	A_{100}/A_2
16970	Q100	59457	12.20	4928.29		
	Q2	2581	3.84	672.05	23.0	7.3
16720	Q100	59457	11.52	5309.7		
	Q2	2581	6.52	395.9	23.0	13.4
16515	Q100	59457	14.04	4595.7		
	Q2	2581	5.84	442.0	23.0	10.4
16305	Q100	59457	10.50	7049.3		
	Q2	2581	5.18	497.9	23.0	14.2
16130	Q100	59457	11.73	7145.7		
	Q2	2581	3.96	651.2	23.0	11.0
15960	Q100	59457	12.95	6468.5		
	Q2	2581	6.68	386.2	23.0	16.7
15745	Q100	59457	9.00	8605.0		
	Q2	2581	7.14	361.3	23.0	23.8
15540	Q100	59457	9.38	7870.7		
	Q2	2581	4.55	567.1	23.0	13.9
15335	Q100	59457	6.45	9227.9		
	Q2	2581	6.52	395.6	23.0	23.3
15125	Q100	60000	5.53	10882.4		
	Q2	2600	3.01	862.8	23.1	12.6
14900	Q100	60000	5.93	11850.9		
	Q2	2600	2.25	1157.3	23.1	10.2
14720	Q100	60000	5.52	12068.9		
	Q2	2600	4.98	522.1	23.1	23.1
14480	Q100	60000	8.60	7915.5		
	Q2	2600	4.64	559.8	23.1	14.1
14315	Q100	60000	9.02	6650.7		
	Q2	2600	4.37	594.8	23.1	11.2
14090	Q100	60000	8.42	7122.4		
	Q2	2600	5.00	519.7	23.1	13.7
13850	Q100	60000	6.70	8950.5		
	Q2	2600	6.20	419.3	23.1	21.3
13635	Q100	60000	12.93	6795.2		
	Q2	2600	4.11	633.2	23.1	10.7
13425	Q100	60000	15.12	3968.3		
	Q2	2600	4.32	601.6	23.1	6.6
				MAXIMUM=	23.4	29.3
				MINIMUM=	23.0	4.2
				AVERAGE=	23.1	12.1

3.1.2 On-Site Drainages

Flows discharge from the Project to the River from approximately eight on-site areas (over 100 sub-basins). The acreage for each of the existing drainage sub-basins is provided in Table 3.2- PSOMAS. There are currently two existing drainage or erosion/sedimentation control improvements located within the Project site. The existing drainage infrastructure is two open channel facilities; PD 1052 that runs through Magic Mountain Theme Park and a second open channel that runs along Old Road. The Old Road drainage will be replaced by an RCB (MTD 1764 by Metropointe Engineers) upon relocation of the existing Old Road concrete channel prior to this project. Both of these channels discharge into the Santa Clara River.

Table 3.2: Existing On-site Drainages and Runoff Quantities

Sub basins	Area (AC)	Qbb (cfs)	Q/A (cfs/Ac)
1-23 series	743.8	1406	1.89
30-50 series	533.9	994	1.86
50 series	357.1	450	1.26
60 series	169.3	397	2.34
70 series	24.5	69	2.82
75 series	17.3	49	2.83
80 series	58.8	106	1.80
90 series	95.8	200	2.09
100 series	82.2	174	2.12
120 series	12.5	31	2.48
500 series	102.7	257	2.50
600 series	402.1	1265	3.15
610 series	19.8	61	3.08
620 series	21.6	60	2.78
622 series	6.0	21	3.50
S	2647.4	5,540	2.09

Notes:
bb: Burned and bulked flow
This was calculated by Sikand in the Newhall Ranch Specific Plan Master Hydrology and

Project Site runoff quantities for the Capital Flood for each of the six existing drainages defined by PSOMAS are provided in Table 3.2. Under existing conditions, combined flows from the Project site to the River total 5,540 cfs. Existing flow rates from observed data for the River at the Project site during 2-, 5-, 10-, 20-, 50-, 100-year and Capital storm events are compiled in Table 3.3.

Table 3.3: Existing Conditions River Flows Stations 32265 to 22195 Downstream of Castaic Creek Confluence

Recurrence Interval	Flow (Discharge) Rate (cfs)
2-Year[1]	2,527
5-Year[1]	8,232
10-Year[1]	14,942
20-Year[1]	24,157
50-Year[1]	41,141
100-Year[1]	58,207
Capital Flood[3]	163,000
Capital Flood[2]	140,776

[1]*Existing flows from United States Army Corps of Engineers, Santa Clara River Adopted Discharge Frequency Values. Adopted May 3, 1994 by the United States Army Corps of Engineers, the Ventura County Flood Control Department*

[2]*LADPW Published Capital Flood Design Flows*

[3]Q_{CAP} *used in the SPEIR*

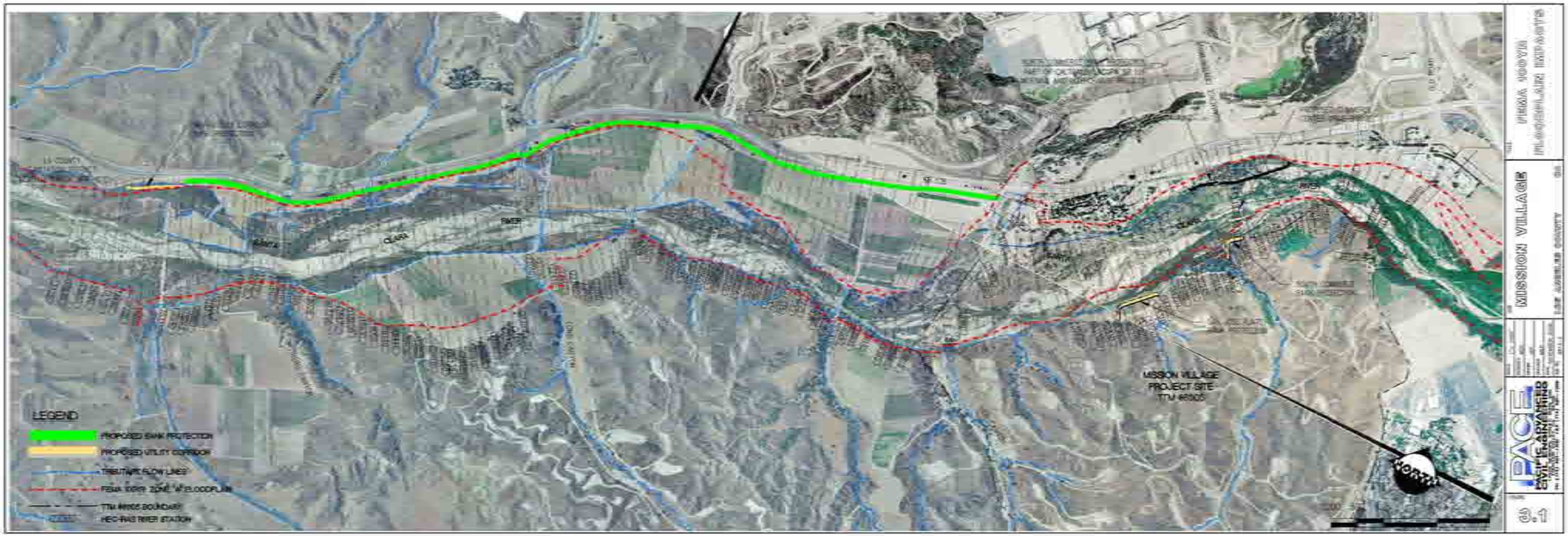
3.1.3 Off-Site Drainages

The total contributing drainage area that drains the onsite and offsite Mission Village watershed is approximately 2,690 acres (PSOMAS, Mission Village Drainage Concept Report, October 2006). This runoff flows to and through the Project site via sheet flows and natural concentrated flows. The revised Capital Flood on the River is 140,776 cfs at the Castaic Creek confluence. The Project site peak existing (burned and bulked) flow rate is approximately 186,100 cfs for the existing condition and 4,866 cfs for the proposed project condition. Therefore, Capital Flood flows from the Project site are approximately four percent of the River Capital Flood discharge rate.

In addition to the 2,690 acre drainage area, there are four jurisdictional drainages located in the vicinity of the Project, excluding the Santa Clara River. These include Castaic Creek, Chiquito Canyon Creek, San Martinez Grande Canyon Creek and Potrero Canyon Creek.

3.2 Flood Hazards

A portion of the Project site lies within the 100-year floodplain of the River and within the FEMA 100-year floodplain identified by FEMA Flood Insurance Rate Map (FIRM) No. 065043-0340 B (October 24, 2002) and 065043-0345 B (October 24, 2002) for the unincorporated areas of Los Angeles County. The FEMA 100-year floodplain is shown in Figure 3.1, and the FIRM is included in the Appendix. The 100-year floodplain boundaries are based on historical runoff records as measured with stream gauges. Mapping the 100-year floodplain is important because FEMA and the Federal Insurance Administration (FIA) use it to establish standards for flood insurance coverage. Under FIA criteria, the 100-year flood elevation is the “base flood” and any land that is outside of this 100-year, or base flood, elevation would be considered reasonably safe and free from flood hazard. The Capital flood is a discharge used by LACDPW for design



A full-size reproduction of this figure can be found at Impact Sciences.

purposes in Los Angeles County, as described above. All bank protection in Newhall Ranch will be designed to County Capital flood criteria.

Table 3.4 run shows the areas of each existing floodplain and stream for eight storm events. The existing velocities for the 2-, 5-, 10-, 20-, 50-, 100-year and Capital flood events are shown in Figure 3.2A-G run.

Table 3.4: River Floodplain Area for Different Discharges – Existing Conditions

Flood Event (years)	Area of Floodplain (AC)
2	230.6
5	303.7
10	357.6
20	510.6
50	728.8
100	804.2
CAP	979.3

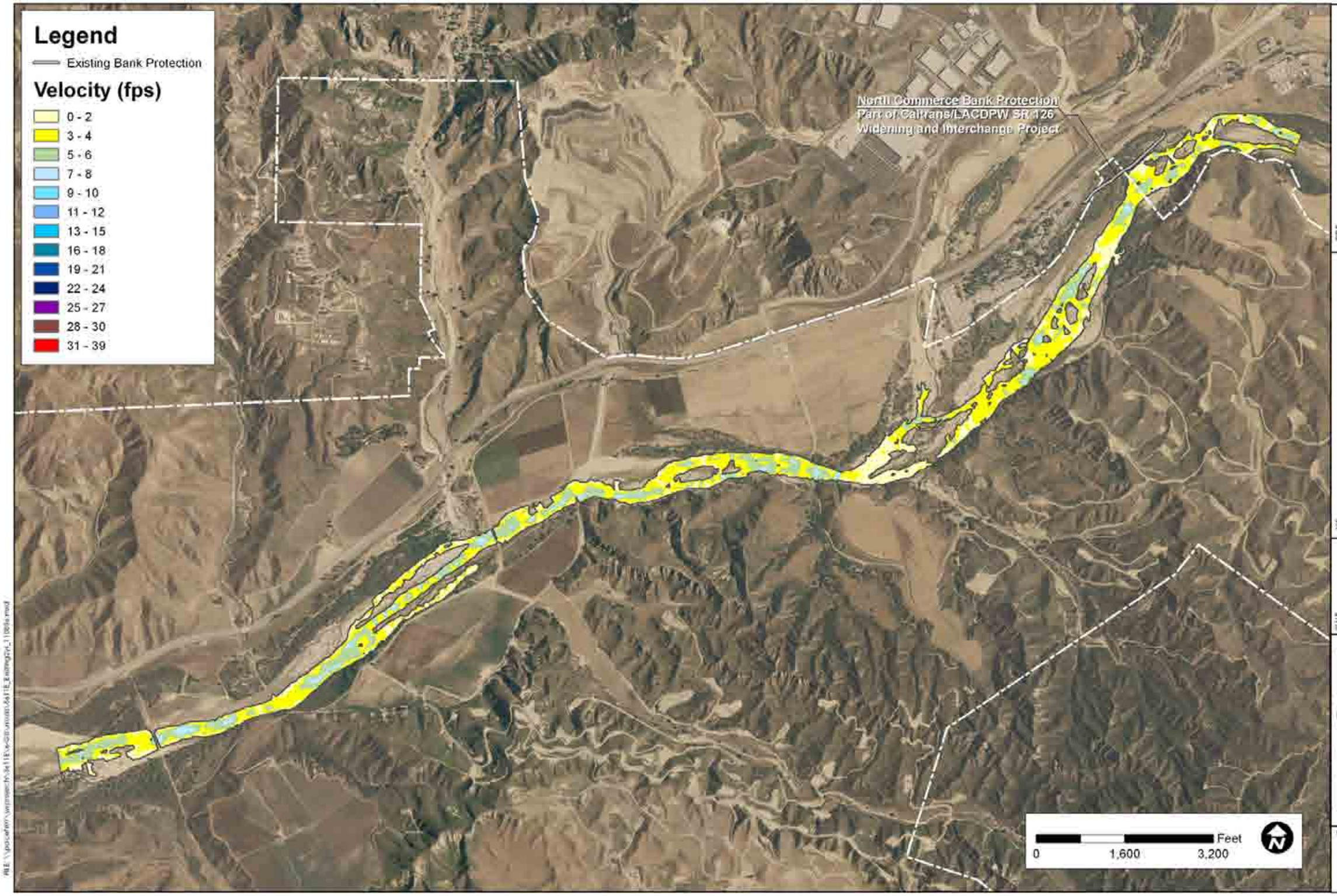
3.3 River and Floodplain Existing Conditions

The difference in elevation between the active channel bottom and the 100-year floodplain along the margins of the River varies greatly at the Project site. This difference ranges from approximately 5.5 to 19.6 feet and is dependent upon the width of the River channel at a particular location. For example, in wider portions of the River channel where flows widen with corresponding low velocities, there is only a small elevation difference between the channel bottom and the adjacent floodplain boundary. In contrast, the channel is often deep where it is narrower, creating a large elevation difference between the channel bottom and the floodplain boundary.

The existing River channel contains a variety of vegetation types. The active River channel is mostly barren due to annual scouring. However, vegetation types on the adjacent terraces vary based on elevation relative to the active channel bottom and the frequency of flooding. The following series of vegetation types occur along a vertical gradient from the channel bottom to the highest River terrace on the floodplain: emergent herbaceous, woody shrubs, and trees.

The substrate of the River channel (i.e., top layer of the River bottom) is primarily sand, which is actively eroded and deposited in flood events. Previous studies (Simons and Li) by the Los Angeles County Flood Control District have demonstrated that sediment deposition and scouring along the upper Santa Clara River are generally in equilibrium, and that there are no major trends of channel degradation or aggradation. However, some localized areas may experience either greater scouring or deposition.

The existing conditions hydraulics for the River from west of I-5 to an area generally west of the Ventura County/Los Angeles County line is presented in the Newhall Ranch Santa Clara River HEC-RAS Modeling study (PACE, December,



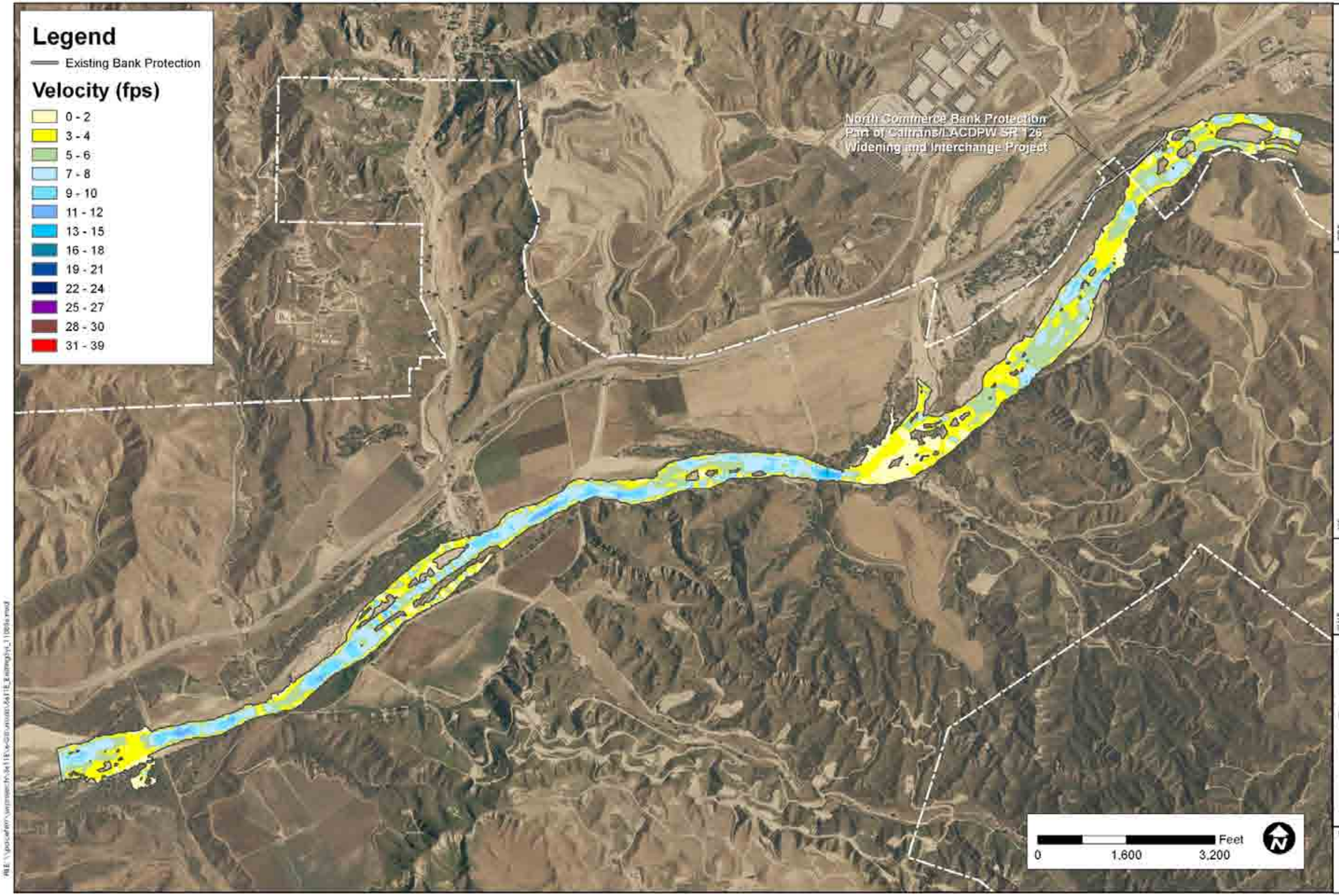
2-YEAR
EXISTING CONDITION
VELOCITY DISTRIBUTION

NEWHALL RANCH
MISSION VILLAGE

LOS ANGELES COUNTY CA

PACIFIC ADVANCED CIVIL ENGINEERING

FIGURE 3.2A



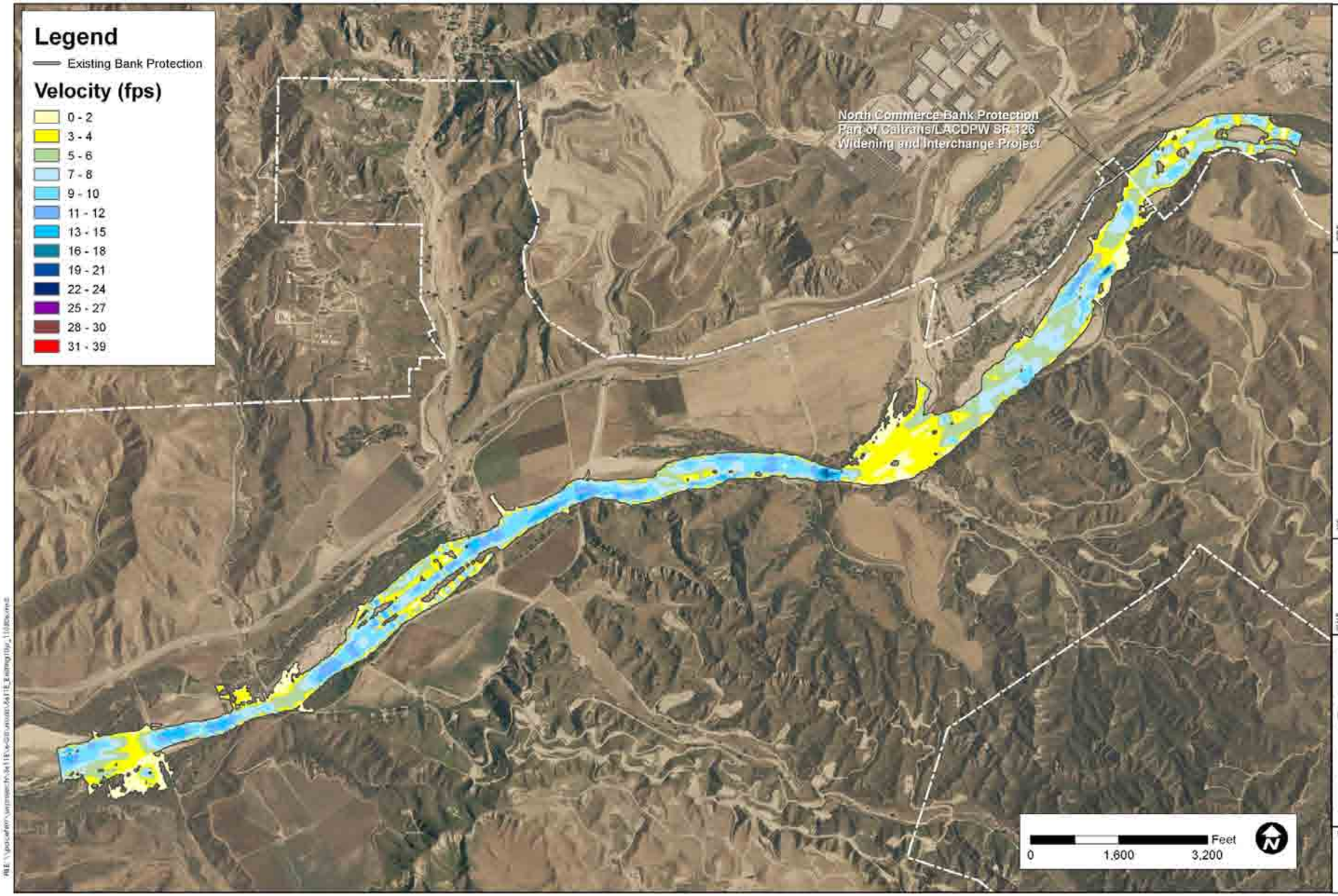
5-YEAR
EXISTING CONDITION
VELOCITY DISTRIBUTION

NEWHALL RANCH
MISSION VILLAGE

LOS ANGELES COUNTY CA

PACIFIC ADVANCED CIVIL ENGINEERING

FIGURE
3.2B



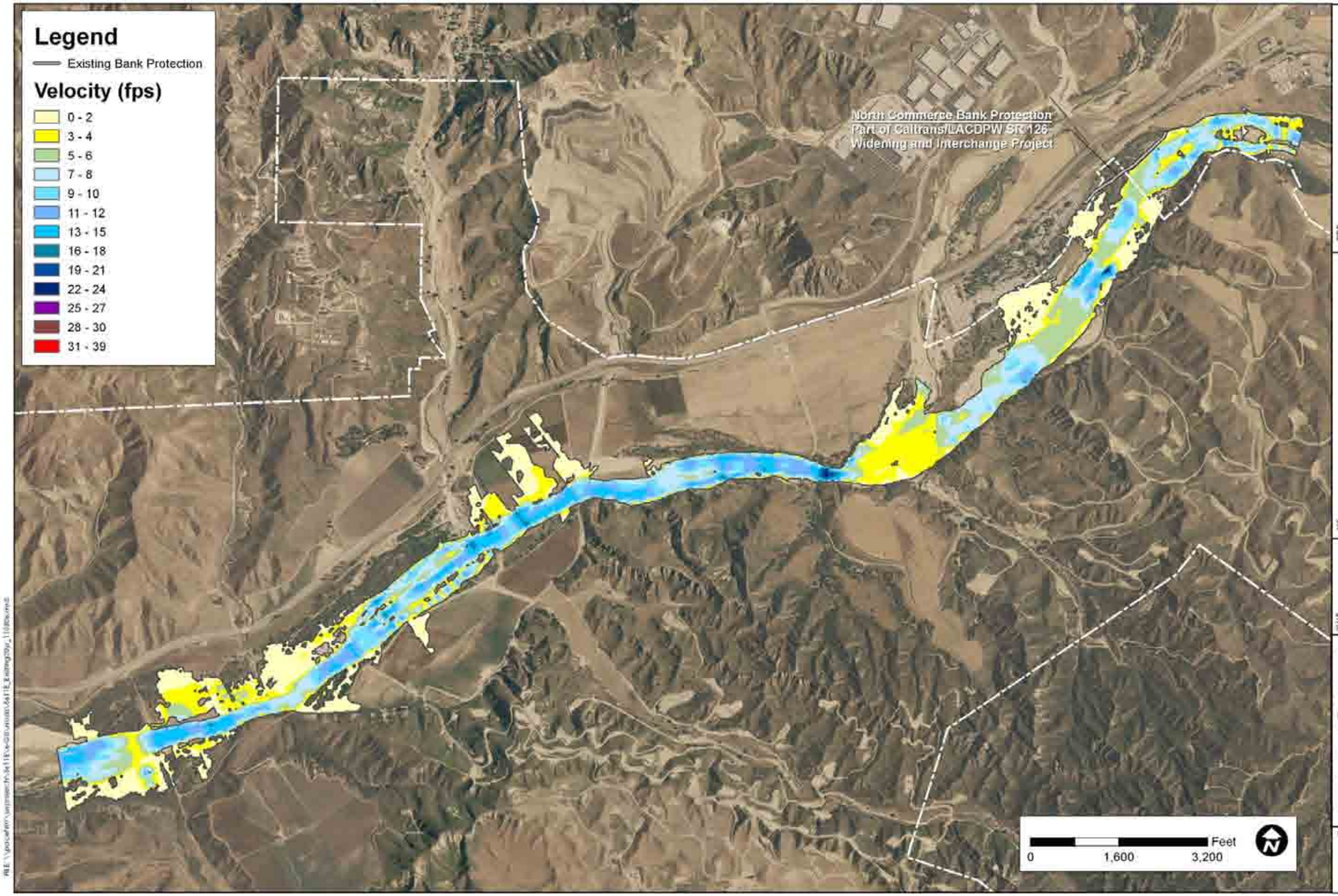
10-YEAR
EXISTING CONDITION
VELOCITY DISTRIBUTION

NEWHALL RANCH
MISSION VILLAGE

LOS ANGELES COUNTY CA

PACIFIC ADVANCED CIVIL ENGINEERING

FIGURE 3.2C



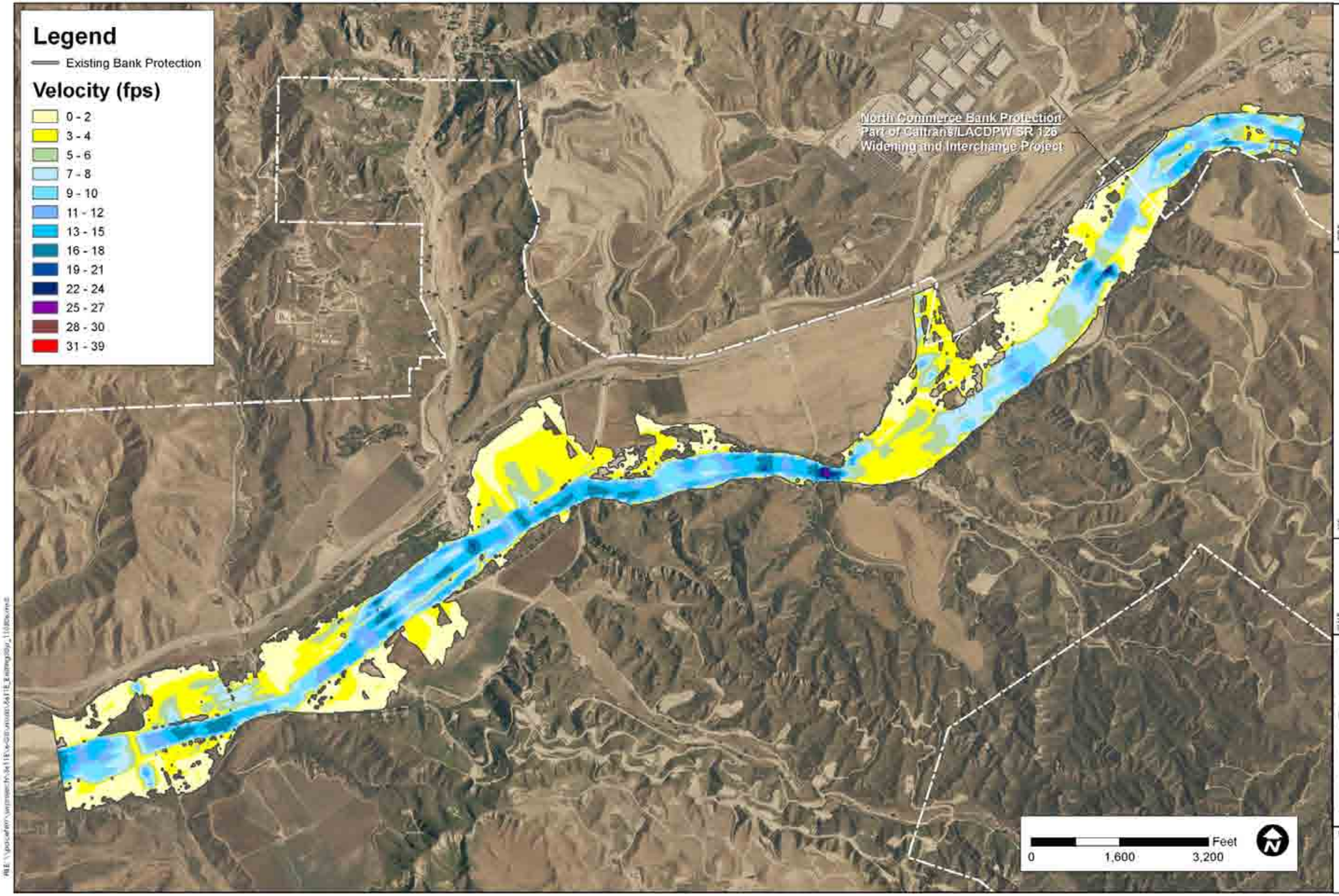
20-YEAR
EXISTING CONDITION
VELOCITY DISTRIBUTION

NEWHALL RANCH
MISSION VILLAGE

LOS ANGELES COUNTY CA

PACE
PACIFIC ADVANCED CIVIL ENGINEERING
17520 NEWHOPE STREET, SUITE 200
FOUNTAIN VALLEY, CA 92708
PH 714.963.0900 FAX 714.963.0950

FIGURE
3.2D



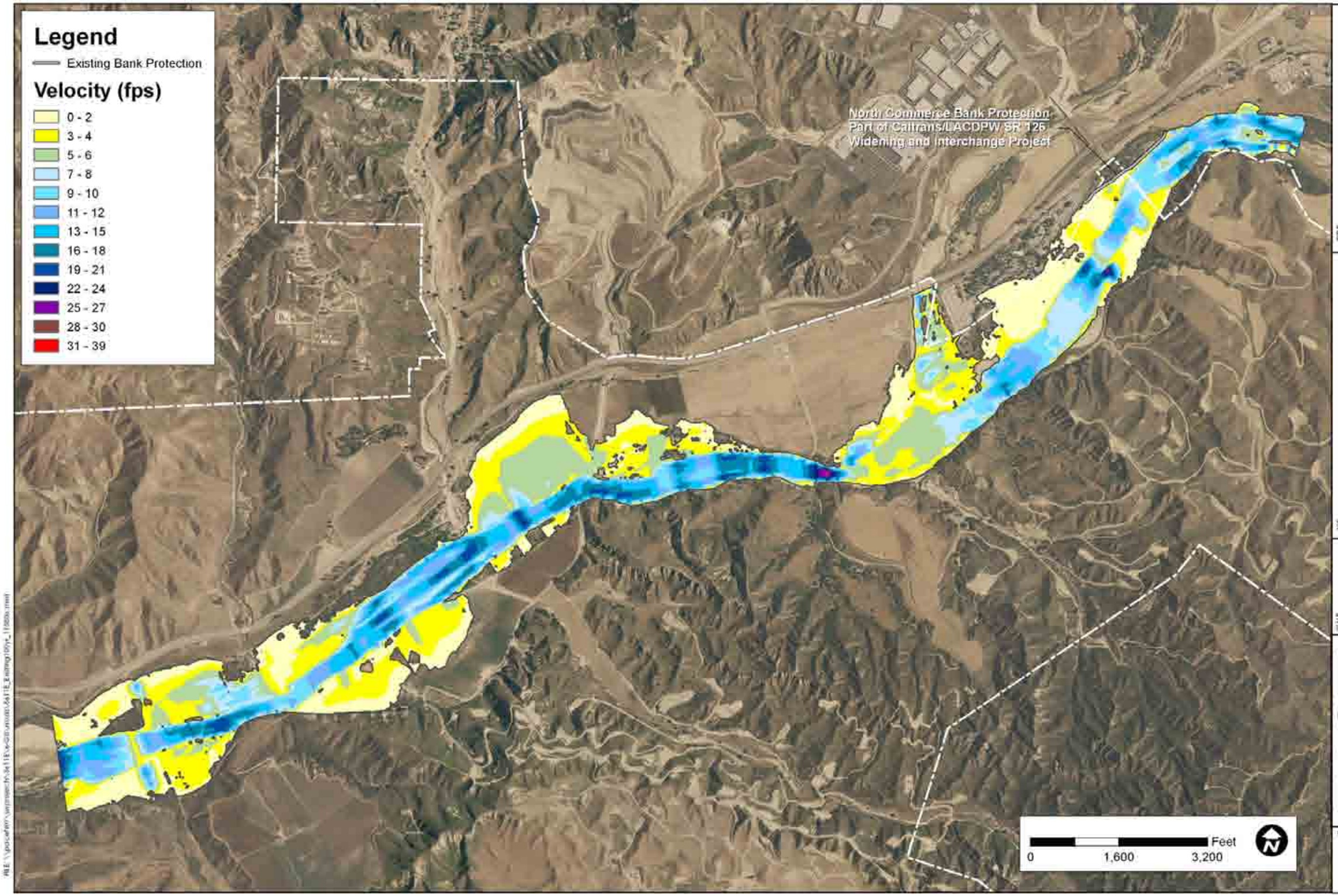
50-YEAR
EXISTING CONDITION
VELOCITY DISTRIBUTION

NEWHALL RANCH
MISSION VILLAGE

LOS ANGELES COUNTY CA

PACIFIC ADVANCED CIVIL ENGINEERING

FIGURE 3.2E



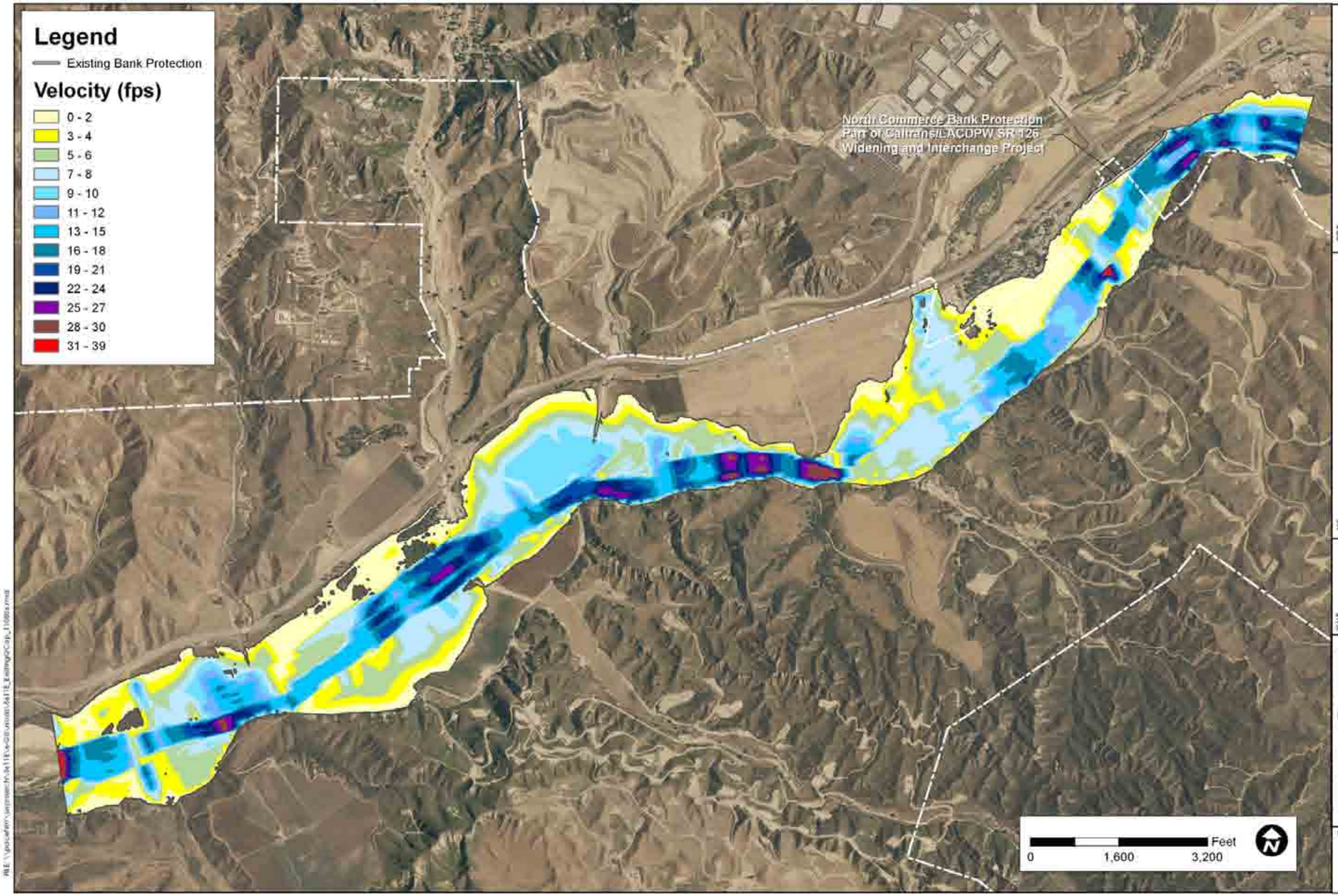
100-YEAR
EXISTING CONDITION
VELOCITY DISTRIBUTION

NEWHALL RANCH
MISSION VILLAGE

LOS ANGELES COUNTY CA

PACIFIC ADVANCED CIVIL ENGINEERING

FIGURE 3.2F



Q-CAP
EXISTING CONDITION
VELOCITY DISTRIBUTION

NEWHALL RANCH
MISSION VILLAGE

LOS ANGELES COUNTY CA

PACIFIC ADVANCED CIVIL ENGINEERING

FIGURE 3.2G

2005 The model examined the existing conditions hydrology for the 0.025, 0.060 and 0.085 Manning's values. Existing conditions sediment transport was studied in the Newhall Ranch River Fluvial Study Phase 1 Final Draft (PACE, March, 2006). Both reports have been approved by LACDPW. As noted above, the fluvial study used the same HEC-RAS model as that presented in the hydraulic study. For the existing condition SAM was run for all River reaches and bed stability was estimated based on the change in potential transport between adjacent channel subreaches for the QCAP discharge. General adjustment was also calculated using the equation specified in the Los Angeles County Hydrology and Sedimentation Manual (LACH&SM). The LACH&SM general adjustment calculation is based only on existing conditions flow mean velocity. In most circumstances, adjustment predicted by the LACH&SM is greater (more scour) than that predicted by SAM. SAM results predict general adjustment from -2.9 to +2.3 feet, and LACH&SM methodology predicts general adjustment from -2.1 to -8.1 feet, both outside of curves (PACE, March, 2006, Table 4.4). In the PACE report the outside of the curve values and inside of curve values are considered separately, as per LACDPW criteria, since outsides of curves tend to degrade while insides of curves tend to aggrade. A general trend in general adjustment for the study reach as indicated by SAM modeling is not apparent for either the existing condition. Calculations of bend scour vary from 0.0 to 11.3 feet for the existing condition and the bedform height ranges from 0.5 to 8.3 feet.

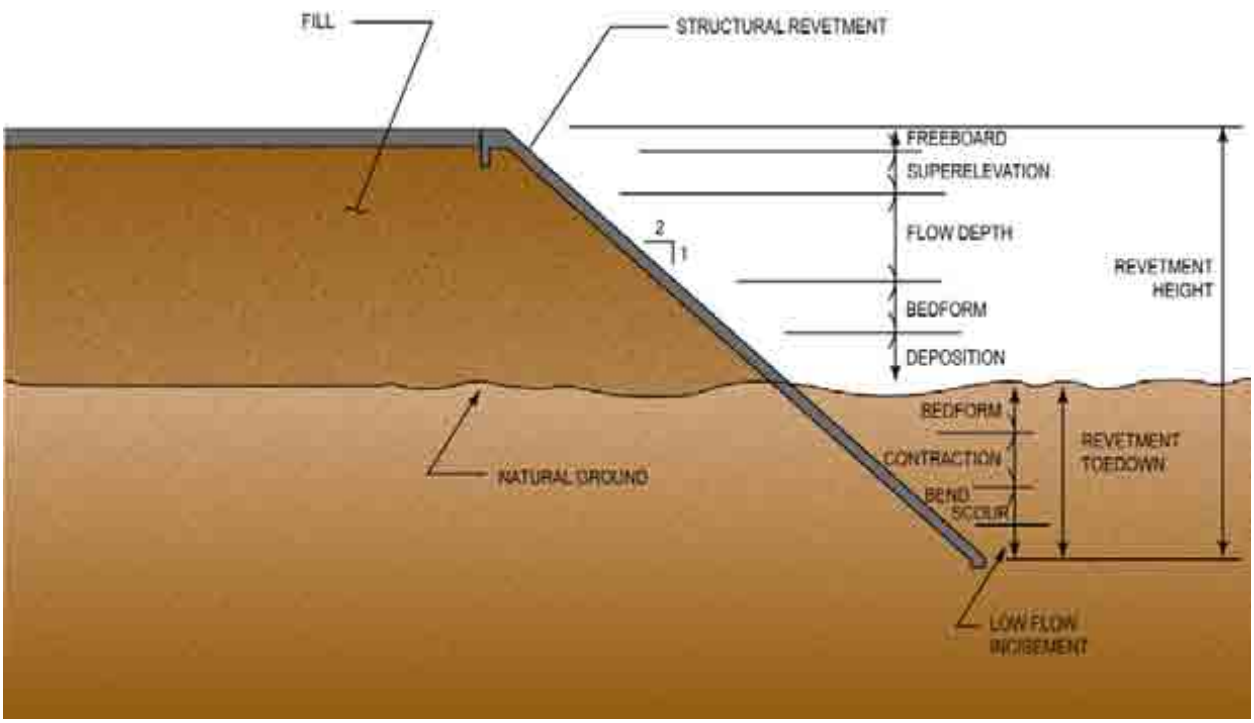
General adjustment, long-term adjustment, and other scour are summed to determine total potential bed adjustment following LACH&SM methodology (illustrated conceptually in Figure 3.3). The existing condition is predicted to have a combined bed adjustment of approximately -6.9 to -19.7 feet for the outside of curved reaches and -6.2 to -15.4 feet for the inside of curved and straight reaches. A comparison of total bed adjustment estimated by both the summed methodology and the LACFCDDM methodology shows that the more intensive LACH&SM methodology using SAM for general adjustment and historical analysis for long-term adjustment predicts a shallower toe-down for both the existing conditions than does the LACFCDDM methodology except for sections in the vicinity of subreach SRA2 and SRC2. In subreach SRA2 section 43820, very high long-term adjustment causes LACH&SM calculations of this section to exceed LACFCDDM calculations by 1.4 feet for both outside of curved reaches and straight or inside of curved reaches in the existing conditions. In SRC2 section 29140, higher general adjustment and higher bedform height cause LACH&SM calculations of this section to exceed LACFCDDM calculations by 0.6 feet in outside curved reaches and 1.2 feet in straight and inside of curved reaches for the existing condition. LACH&SM methodology utilizing SAM calculations predicts a deeper toe-down than does the LACFCDDM at these locations methodology because the LACFCDDM does not account for the effects of local degradation as effectively.

As stated previously, the existing condition HEC-RAS model for this Mission Village EIR Technical Report includes the northerly river bank protection (± 2,000 LF) associated with the Commerce Center Drive and SR126 Interchange project.

Figures 3.2A – 3.2G show the existing condition floodplain boundary and velocity zone plots for the 2, 5, 10, 20, 50, 100 and capital storm events. These values are compared in Table A.1 and others in this report.

As there are no project related impacts in the vicinity of Castaic Creek, the floodplain and velocity profile of Castaic Creek are not included in this analysis. The reader should refer to the Landmark Village EIR Technical Report or the Newhall Ranch Habitat Management plan EIR/EIS River Technical Report for detailed Castaic Creek confluence floodplain and velocity data.

Figure 3.3: Conceptual Representation of Toe-down and Freeboard Components.



4 Project Conditions

The impacts of Project implementation are discussed below. In summary, the Project includes the construction of approximately 2,900 LF of soil cement bank protection, which is primarily necessary to protect the Commerce Center Drive Bridge and WRP. In addition, approximately, 16,000 LF of TRMs, or similar protection methodologies, would be installed downstream of the Project site along the northern edge of the River to Project's water quality basin Utility Corridor from Castaic Creek to the WRP. The impacts of installing bridge piers, abutments (Commerce Center Drive Bridge), the 600 LF of bank protection at the southern end of the bridge and erosion protection along the River are analyzed in this section. This analysis focuses on the Project's hydrologic and hydraulic impacts on the River.

4.1 Alteration of Existing Drainage Patterns

4.1.1 Santa Clara River

Portions of the River corridor (from a hydrological perspective) will be encroached upon with the placement of the buried soil cement, TRMs, bridge abutments and piers, storm drain outlets and energy dissipaters proposed by the Project. Project impacts are expected to include habitat removal and disturbance, localized erosion, localized increased sedimentation, and habitat modification as a result of changes to River velocity and water surface elevation due to Project improvements. The Project will not impact overall discharge in the River because no discharge is diverted from or to the River as a result of the Project (Table 4.1). Therefore, no impacts will occur as a result of discharge changes.

Table 4.1: Project-Related Changes in Discharge Below the Specific Plan Site

Location - Downstream of the Specific Plan Site Below RS 15125	Discharge for Different Return Periods (cfs)						
	2-year	5-year	10-year	20-year	50-year	100-year	CAP
Existing Conditions	2,600	8,480	15,400	24,900	42,400	60,000	142,175
Proposed Conditions	2,600	8,480	15,400	24,900	42,400	60,000	142,175
Net Change	0	0	0	0	0	0	0

Source: Sikand Engineering (2000b). The above noted changes are considered to be "conservative" in that the predicted discharges under proposed conditions do not include the effect of the timing of flows from the Specific Plan site.

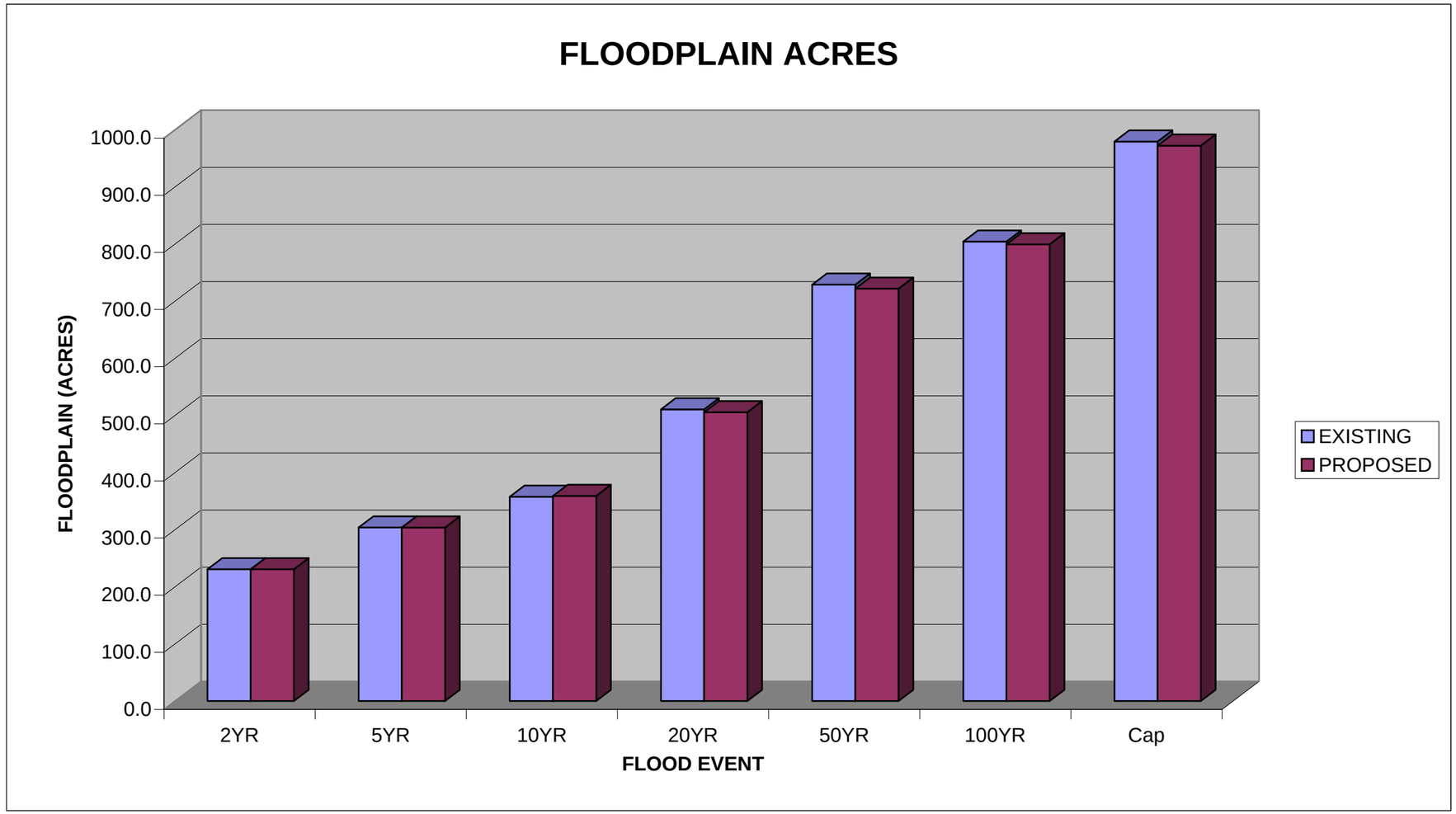
4.1.1A Changes to Velocity and Floodplain Acreage

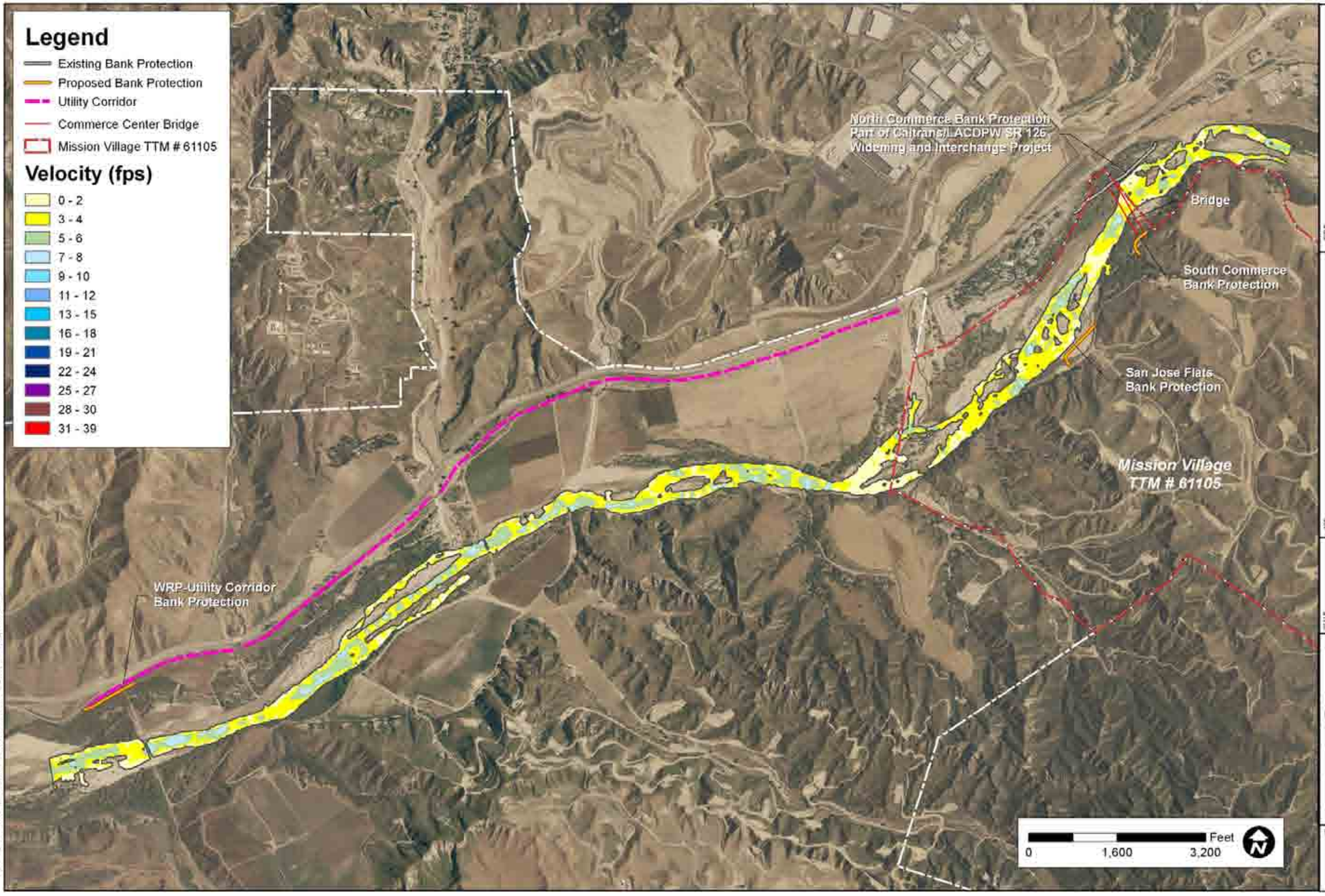
Figure 4.1 compares the changes in floodplain acreage between the existing and proposed conditions for the Mission Village River Study reach for the 2- through 100-year and Capital events. The figure shows that for the 2, 5 and 10 year events no loss of floodplain area is expected. The 20, 50, 100 and Capital events all have a floodplain area loss of 1% or less. Figure 4.2A-G shows the floodplain and velocity distribution profile for the Mission Village proposed conditions for the 2- through 100-year and Capital events. The figures can be compared directly to Figure 3.2A-G to show the difference between both the size and shape of the floodplain for the various events, and also the change in velocity distribution for the various events, between the existing and proposed conditions. These differences are quantified in Figure 4.3A-D, which

FIGURE 4.1: MISSION VILLAGE FLOODPLAIN ACREAGE COMPARISON

Floodplain Area Analysis

Flood Frequency	Existing Area	Proposed Area	Delta	Delta %
YR	(AC)	(AC)	(AC)	(AC)
2	230.6	230.6	0.0	0.0%
5	303.7	303.7	0.0	0.0%
10	357.6	359.1	1.5	0.4%
20	510.6	505.5	-5.1	-1.0%
50	728.8	721.9	-6.9	-1.0%
100	804.2	799.4	-4.8	-0.6%
CAP	979.3	972.2	-7.1	-0.7%





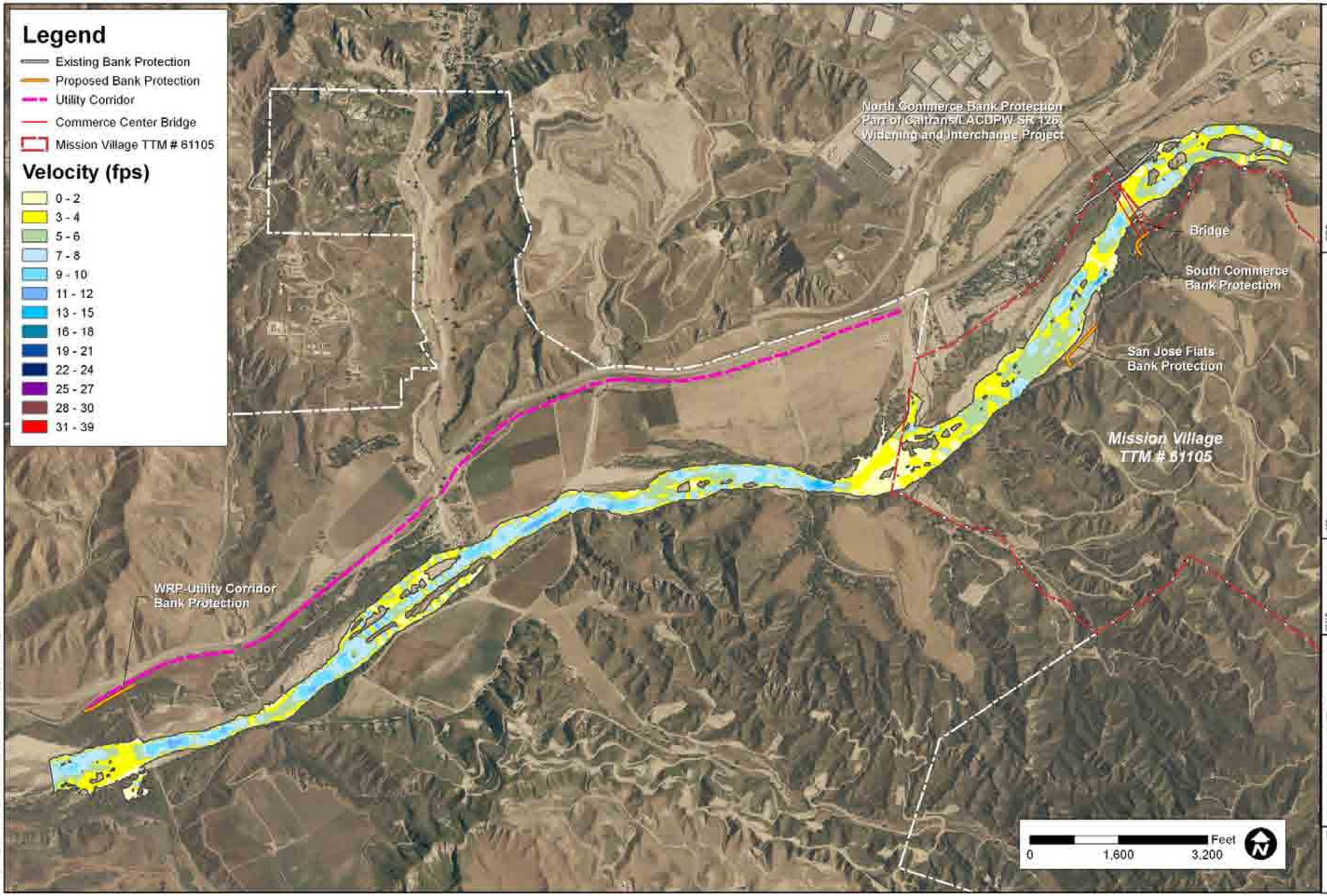
2-YEAR
PROPOSED CONDITION
VELOCITY DISTRIBUTION

NEWHALL RANCH
MISSION VILLAGE

LOS ANGELES COUNTY CA

PACIFIC ADVANCED CIVIL ENGINEERING

FIGURE
4.2A

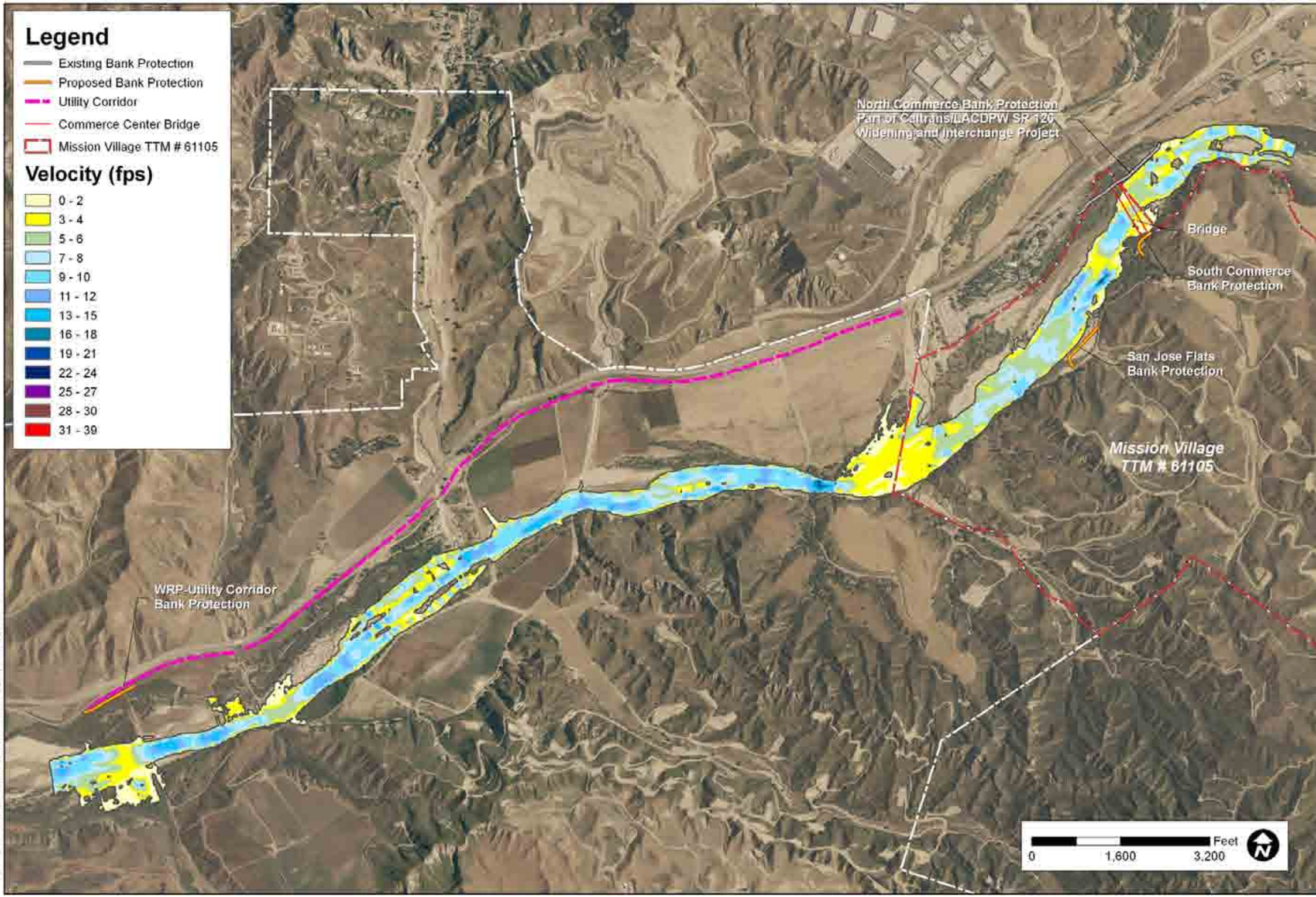


5-YEAR
PROPOSED CONDITION
VELOCITY DISTRIBUTION

NEWHALL RANCH
MISSION VILLAGE
LOS ANGELES COUNTY
CA

PACIFIC ADVANCED CIVIL ENGINEERING

FIGURE
4.2B



10-YEAR
PROPOSED CONDITION
VELOCITY DISTRIBUTION

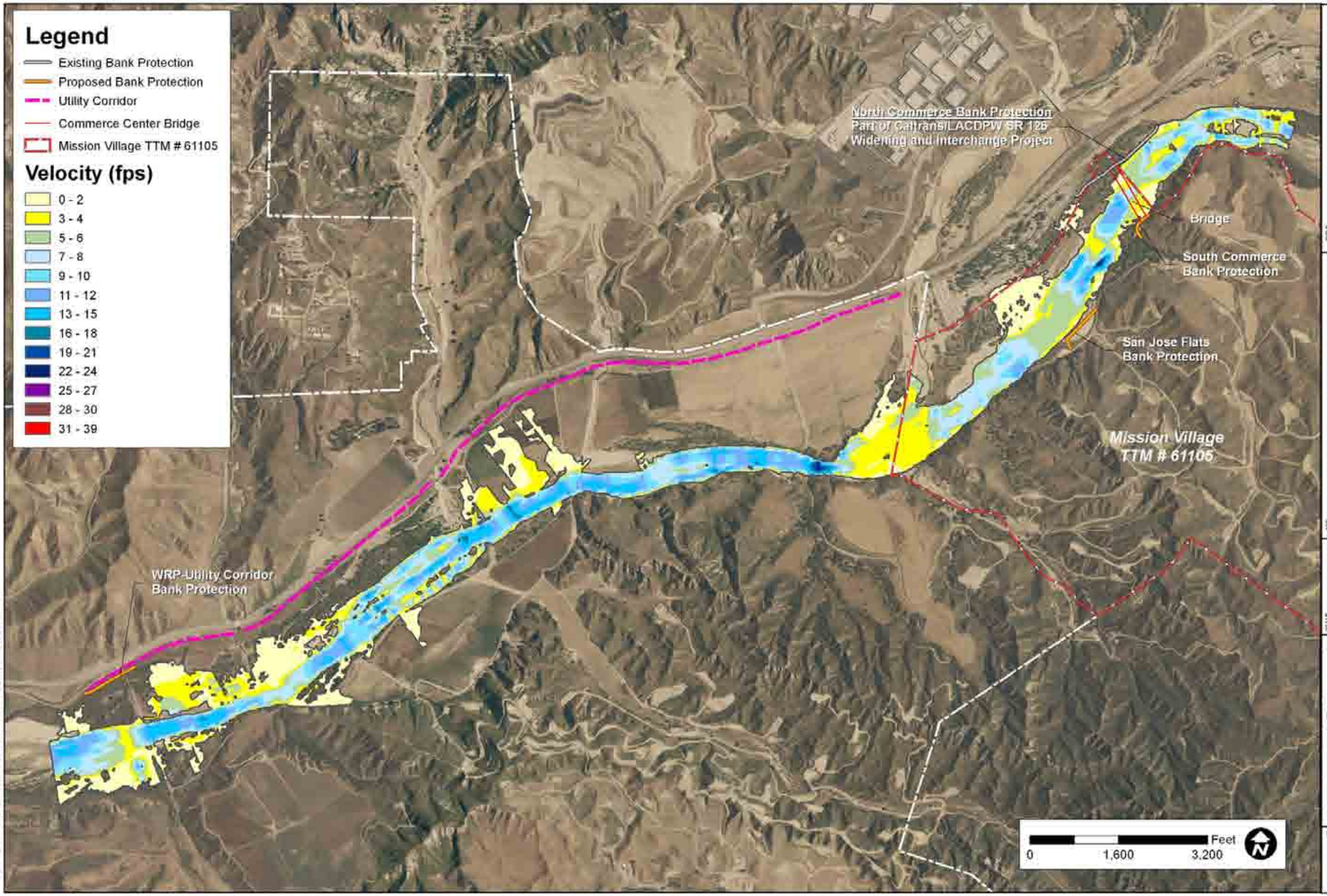
NEWHALL RANCH
MISSION VILLAGE

LOS ANGELES COUNTY
CA

SCALE 1" = 2000'
DESIGNED MW
DRAWN TH
CHECKED MW
DATE 09/11/09
JOB NO. 92188

PACE
PACIFIC ADVANCED CIVIL ENGINEERING
17520 NEWHOPE STREET, SUITE 200
FOUNTAIN VALLEY, CA 92708
PH (714) 481-7300 FAX (714) 481-7299

FIGURE
4.2C



20-YEAR
PROPOSED CONDITION
VELOCITY DISTRIBUTION

NEWHALL RANCH
MISSION VILLAGE

LOS ANGELES COUNTY CA

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FOUNTAIN VALLEY, CA 92708
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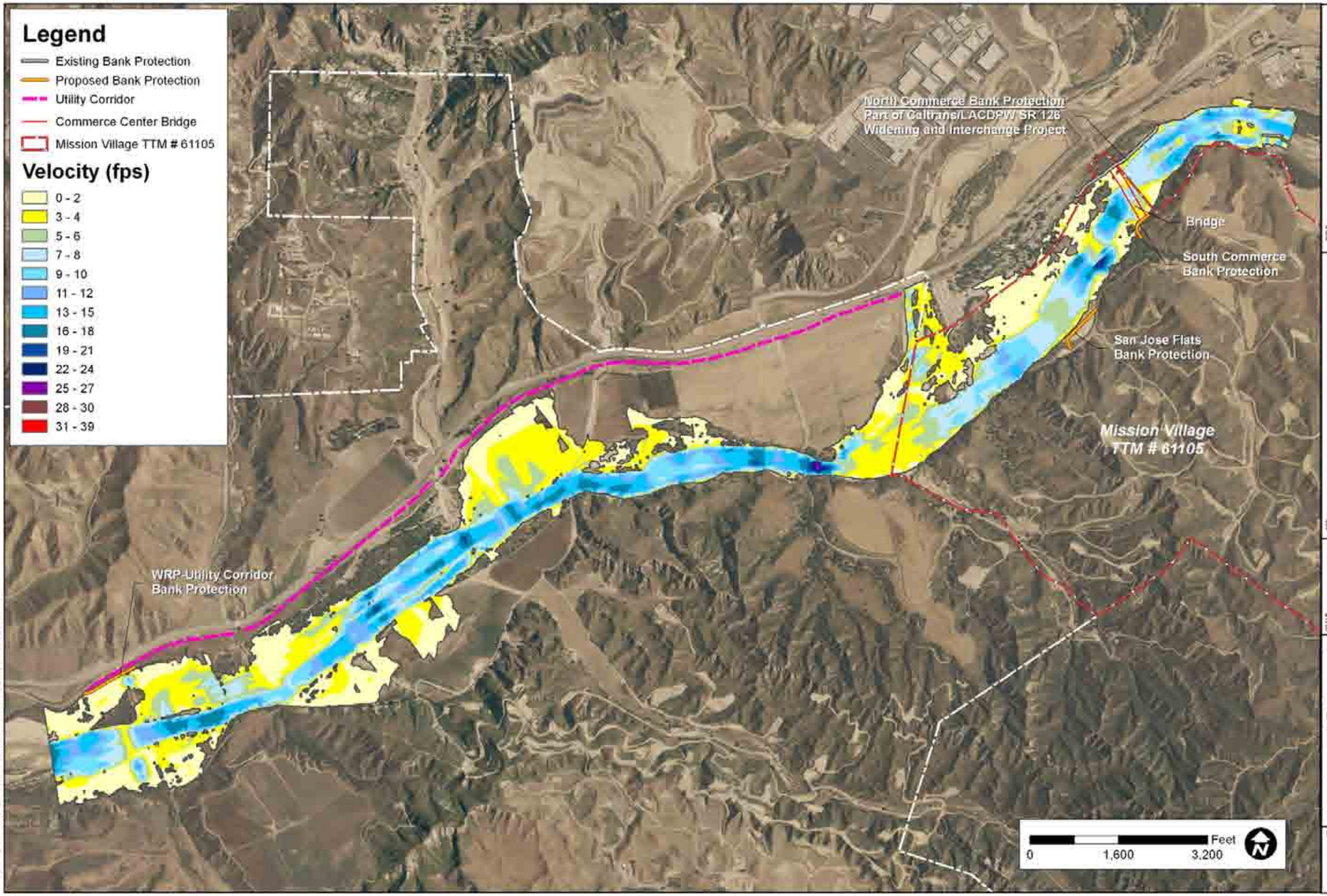
FIGURE
4.2D



50-YEAR
PROPOSED CONDITION
VELOCITY DISTRIBUTION

NEWHALL RANCH
MISSION VILLAGE

LOS ANGELES COUNTY CA

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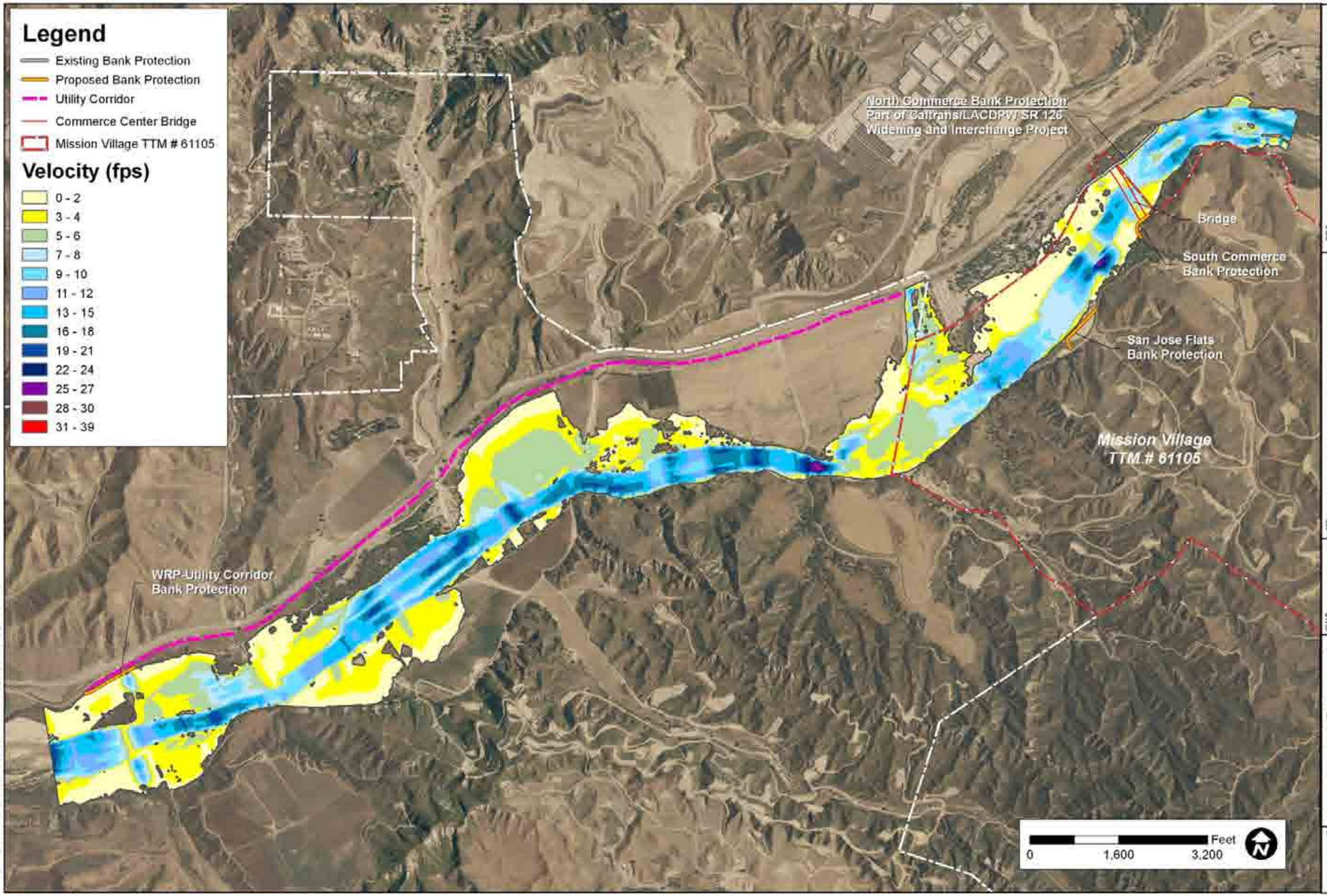
FIGURE
4.2E



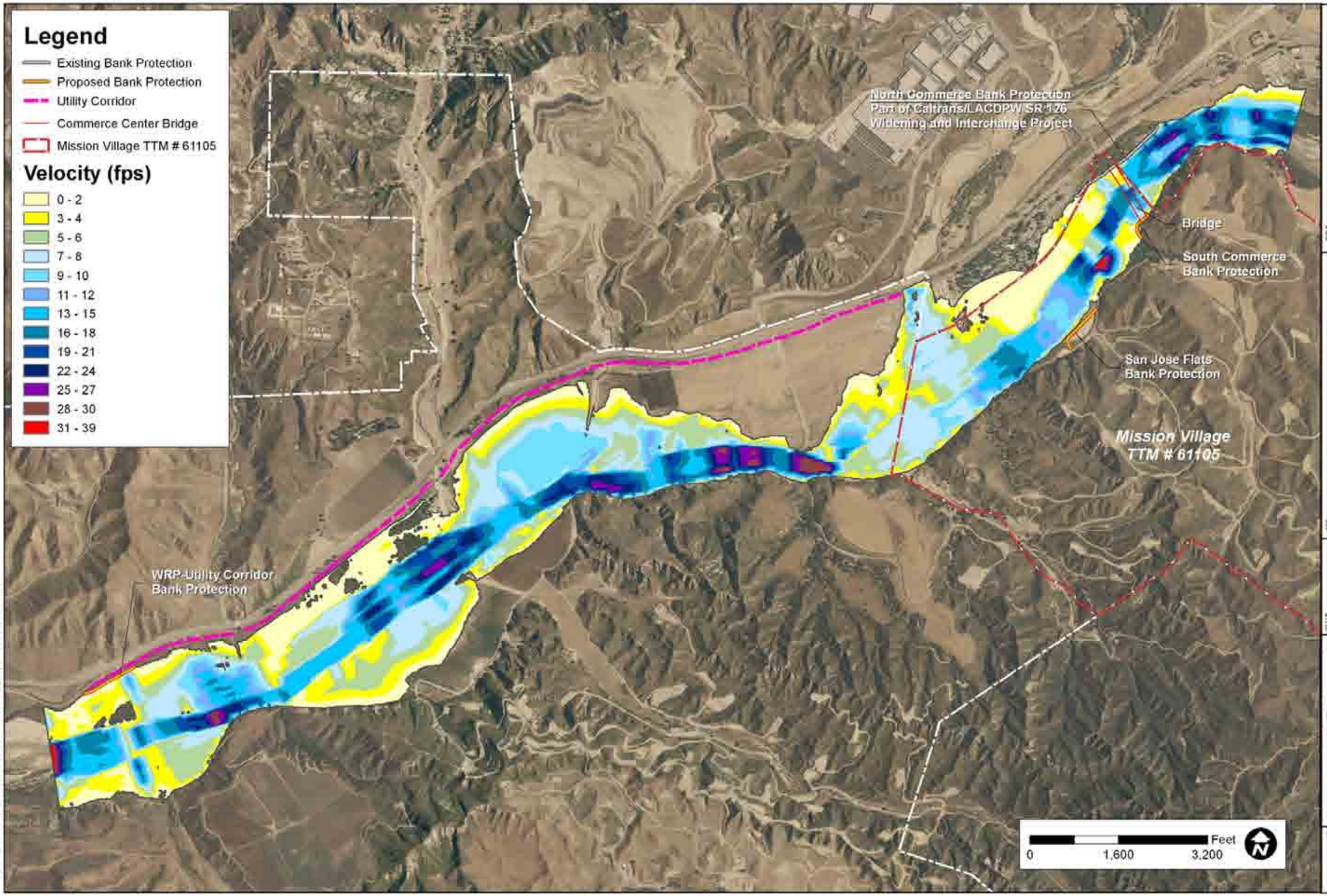
100-YEAR
PROPOSED CONDITION
VELOCITY DISTRIBUTION

NEWHALL RANCH
MISSION VILLAGE

LOS ANGELES COUNTY CA

PACIFIC ADVANCED CIVIL ENGINEERING

FIGURE
4.2F



Q-CAP
PROPOSED CONDITION
VELOCITY DISTRIBUTION

NEWHALL RANCH
MISSION VILLAGE
LOS ANGELES COUNTY
CA

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FOUNTAIN VALLEY, CA 92708
PH (714) 481-7300 FAX (714) 481-7399

FIGURE
4.2G

breaks down the floodplain area by velocity range for both the proposed and existing conditions. As with Figure 4.1, these figures shows that for the 2, 5 and 10 year events there is no change in floodplain area and minimal (<1%) change in velocity profile acreage. For the remaining events, a change in floodplain and velocity acreage between the pre and post-project is expected. However, these changes are quite small, all being 1% or less change in floodplain and velocity area for the range of discharges from the 10, 100 and Capital return periods.

The total area of floodplain where discharge velocities would be over 4 fps during a 100-year storm would be increased by 2.4 acres (± 0.5%) as a result of the proposed Mission Village Project through the installation of flood protection and bridge/roadway infrastructure.

Table 4.2 run provides a summary of floodplain acreage where Project-related increases or decreases in discharge velocities in excess of 4 fps would occur. Per Table 4.2 results, the area of floodplain subject to flows in excess of 4 fps would be reduced by approximately 0.8, 0.4, 0.5, 0.3, and 4.8 acres as a result of the proposed Project during the 2, 5, 10, 20-year and Capital storm events, respectively. The 50 and 100-year events result in 1.1 and 2.4 acres of increased acres of floodplain with velocity greater than 4 fps. The floodplain area with velocities greater than 4 fps is important as it can be assumed that minimal loss of vegetation would occur where velocity is less than 4 fps. Figures 4.4A-D where the changes in floodplain acreage with velocity in excess of 4 fps would be relative to currently mapped vegetation areas within the River floodplain.

TABLE 4.2: CHANGE (PROPOSED-EXISTING) OF FLOODPLAIN AREA WITH VELOCITIES >4FPS BY RETURN PERIOD (Acres)

Velocity	2-YR	5-YR	10-YR	20-YR	50-YR	100-YR	CAP
>4 FPS	-0.9	-0.5	-0.5	-0.4	1.1	2.5	-4.8

Note: negative values represent reduction of area of floodplain and positive values represent increases.

Where, increases in velocity in excess of 4 fps would occur along the Project site and have the potential of causing erosion. However, the Project-related increases in velocity would be mitigated by installation of buried soil cement bank protection on the River corridor. Based on the above it is clear that no significant impacts to river fluvial or vegetation area would occur as a result of the proposed project impacts to the floodplain or related floodplain velocities (see section 4.5.4 of this report for further analysis).

Table 4.3 shows that during the Capital flow storm event, Project-related improvements would result in 13 locations where there is at least a one inch increase in water surface elevation (none of which exceed one foot) and 4 locations where there is a decrease in water surface elevations (none of which exceeds one foot). These increases are localized, and as such, are not significant to water surface elevations on the River as a whole. Additionally, no significant impacts to water surface elevation will occur upstream or downstream of the Project.

TABLE 4.3: EXISTING AND PROPOSED WATER SURFACE ELEVATION CHANGES BY STATION
Qcap and n=0.060 (Referenced from DCR Table 3)

RIVER STATION	WSE EXIS	WSE PROP	Delta	RIVER STATION	WSE EXIS	WSE PROP	Delta	RIVER STATION	WSE EXIS	WSE PROP	Delta
39755	1010.7	1010.7	0.0	30445	960.5	960.5	0.0	**21615**	905.0	905.0	0.0
39605	1010.0	1010.0	0.0	30095	960.1	960.1	0.0	**21440**	903.5	903.6	0.0
39310	1008.4	1008.4	0.0	29815	959.6	959.6	0.0	**21225**	902.1	902.1	0.0
39100	1007.8	1007.8	0.0	29565	959.3	959.3	0.0	**21020**	901.2	901.2	0.0
38925	1007.1	1007.1	0.0	29385	958.8	958.8	0.0	**20845**	900.4	900.4	0.0
38710	1006.2	1006.2	0.0	**29140**	957.8	957.8	0.0	**20595**	899.2	899.2	0.0
38475	1003.7	1003.7	0.0	**28895**	952.4	952.4	0.0	**20435**	898.4	898.4	0.0
38300	1002.8	1002.8	0.0	**28695**	951.1	951.1	0.0	**20280**	897.0	897.1	0.0
38065	1001.4	1001.4	0.0	**28500**	948.7	948.7	0.0	**20070**	896.1	896.1	0.0
37810	998.3	998.3	0.1	**28280**	947.4	947.4	0.0	**19855**	895.2	895.2	0.0
37655	997.0	997.1	0.1	**28080**	946.5	946.5	0.0	**19630**	894.5	894.5	0.0
37390	995.8	995.9	0.2	**27925**	945.0	945.0	0.0	**19440**	893.9	893.9	0.0
37135	993.9	994.2	0.3	**27725**	941.9	941.9	0.0	**19240**	893.3	893.3	0.0
36930	992.9	993.2	0.4	**27545**	940.6	940.6	0.0	**19050**	892.9	892.9	0.0
36735	991.7	992.2	0.6	**27335**	939.4	939.4	0.0	**18830**	892.3	892.3	0.0
36515	990.7	991.4	0.8	**27155**	937.4	937.4	0.0	**18650**	891.9	891.9	0.0
36374	N/A	991.0	-	**26990**	936.6	936.6	0.0	**18475**	891.6	891.6	0.0
Bridge - Commerce Center Drive - P				**26780**	935.5	935.5	0.0	**18290**	891.2	891.2	0.0
36240	N/A	989.2	-	**26575**	934.6	934.6	0.0	**18025**	890.6	890.6	0.0
36080	988.0	988.0	0.0	**26355**	933.2	933.2	0.0	**17785**	889.9	889.9	0.0
35845	986.9	986.9	0.0	**26170**	932.2	932.2	0.0	**17510**	887.7	887.7	0.0
35725	986.0	986.0	0.0	**25965**	930.6	930.6	0.0	**17360**	885.3	885.2	-0.1
35515	984.7	984.7	0.0	**25785**	929.2	929.3	0.0	**17110**	882.7	882.9	0.3
35245	982.8	982.8	0.0	**25600**	928.4	928.4	0.0	**16970**	880.1	880.0	-0.1
35040	981.3	981.3	0.0	**25425**	927.8	927.8	0.0	**16720**	877.3	877.4	0.0
34860	980.0	980.0	0.0	**25215**	925.8	925.9	0.1	**16515**	875.8	875.8	0.0
34720	979.0	978.9	-0.1	**25000**	924.3	924.4	0.2	**16305**	874.7	874.7	0.0
34495	977.4	977.4	-0.1	**24795**	922.8	923.0	0.2	**16130**	873.6	873.6	0.0
34310	976.3	976.2	0.0	**24550**	921.9	922.0	0.1	**15960**	872.7	872.7	0.0
34090	975.0	975.0	0.0	**24335**	920.4	920.4	0.0	**15745**	871.7	871.8	0.0
33880	973.6	973.6	0.0	**24115**	919.1	919.1	0.0	**15540**	870.8	870.8	0.0
33710	972.6	972.6	0.0	**23975**	918.2	918.2	0.0	**15335**	869.6	869.6	0.0
33500	971.3	971.3	0.0	**23755**	917.1	917.1	0.0	**15125**	868.2	868.2	0.0
33310	970.4	970.4	0.0	**23565**	916.2	916.2	0.0	**14900**	866.7	866.8	0.1
33115	969.6	969.6	0.0	**23365**	915.3	915.4	0.0	**14720**	865.8	865.8	0.0
32795	967.8	967.8	0.0	**23180**	914.8	914.8	0.0	**14480**	864.5	864.5	0.0
32605	966.6	966.6	0.0	**23000**	914.4	914.4	0.0	**14315**	863.7	863.7	0.0
32265	965.0	965.0	0.0	**22790**	913.8	913.8	0.0	14090	862.3	862.3	0.0
31875	963.2	963.2	0.0	**22600**	913.2	913.2	0.0	13850	861.1	861.1	0.0
31585	962.4	962.4	0.0	**22415**	912.4	912.4	0.0	13635	859.9	859.9	0.0
31360	961.7	961.7	0.0	**22195**	910.6	910.6	0.0	13425	859.1	859.1	0.0
31060	961.2	961.2	0.0	**22010**	908.8	908.8	0.0				
30720	960.8	960.8	0.0	**21790**	906.1	906.1	0.0				

(1) Exist. Cond. water surface elevations and velocities are based on "n" value of 0.060 for entire width of the river for the existing Mission Village condition ("SR 126 HWY Widening" Soil Cement Bank Protection is existing levee for the project.)

(2) Prop. Cond. water surface elevations and velocities are based on "n" value of 0.060 for entire width of the river for the proposed Mission Village project improvements.

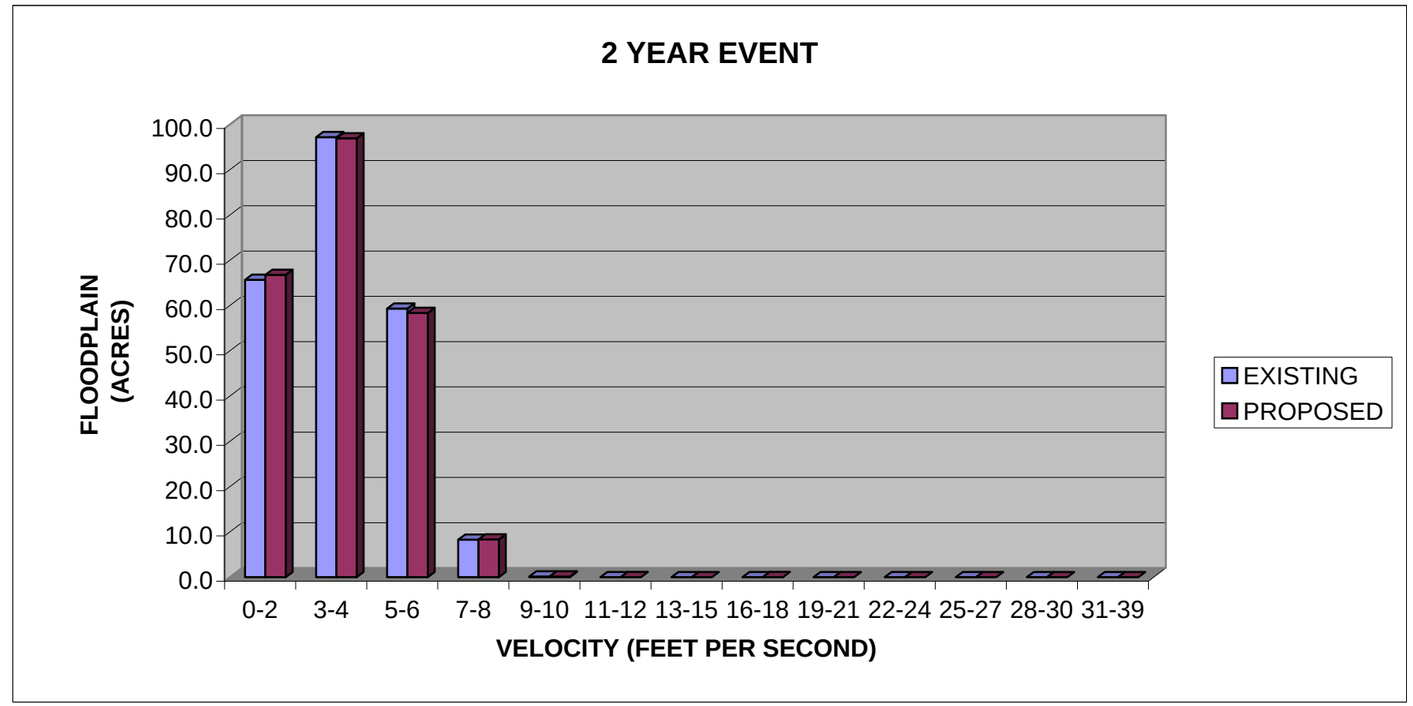
HEC-RAS Sections in bold for Mission Village Project Improvement Reaches

HEC-RAS Sections 36374 and 36240 are Proposed Bridge Sections

FIGURE 4.3a: MISSION VILLAGE FLOODPLAIN AREA BY VELOCITY IMPACTS STATISTICS

2 YEAR - Floodplain Area by Velocity

Velocity (fps)	Existing Area (AC)	Proposed Area (AC)	Delta (AC)	Delta % (%)
0-2	65.7	66.8	1.1	1.7%
3-4	97.2	96.9	-0.3	-0.3%
5-6	59.3	58.4	-1.0	-1.6%
7-8	8.3	8.3	0.1	0.7%
9-10	0.1	0.2	0.0	2.7%
11-12	0.0	0.0	0.0	0.0%
13-15	0.0	0.0	0.0	0.0%
16-18	0.0	0.0	0.0	0.0%
19-21	0.0	0.0	0.0	0.0%
22-24	0.0	0.0	0.0	0.0%
25-27	0.0	0.0	0.0	0.0%
28-30	0.0	0.0	0.0	0.0%
31-39	0.0	0.0	0.0	0.0%
	230.6	**230.6**	**0.0**	**0.0%**



5 YEAR - Floodplain Area by Velocity

Velocity (fps)	Existing Area (AC)	Proposed Area (AC)	Delta (AC)	Delta % (%)
0-2	50.3	51.6	1.2	2.4%
3-4	85.7	84.9	-0.8	-1.0%
5-6	85.4	83.7	-1.7	-2.0%
7-8	56.5	57.4	1.0	1.7%
9-10	21.2	21.4	0.2	1.0%
11-12	3.7	3.7	0.0	0.0%
13-15	0.7	0.8	0.0	4.5%
16-18	0.1	0.1	0.0	7.4%
19-21	0.0	0.0	0.0	0.0%
22-24	0.0	0.0	0.0	0.0%
25-27	0.0	0.0	0.0	0.0%
28-30	0.0	0.0	0.0	0.0%
31-39	0.0	0.0	0.0	0.0%
	303.7	**303.7**	**0.0**	**0.0%**

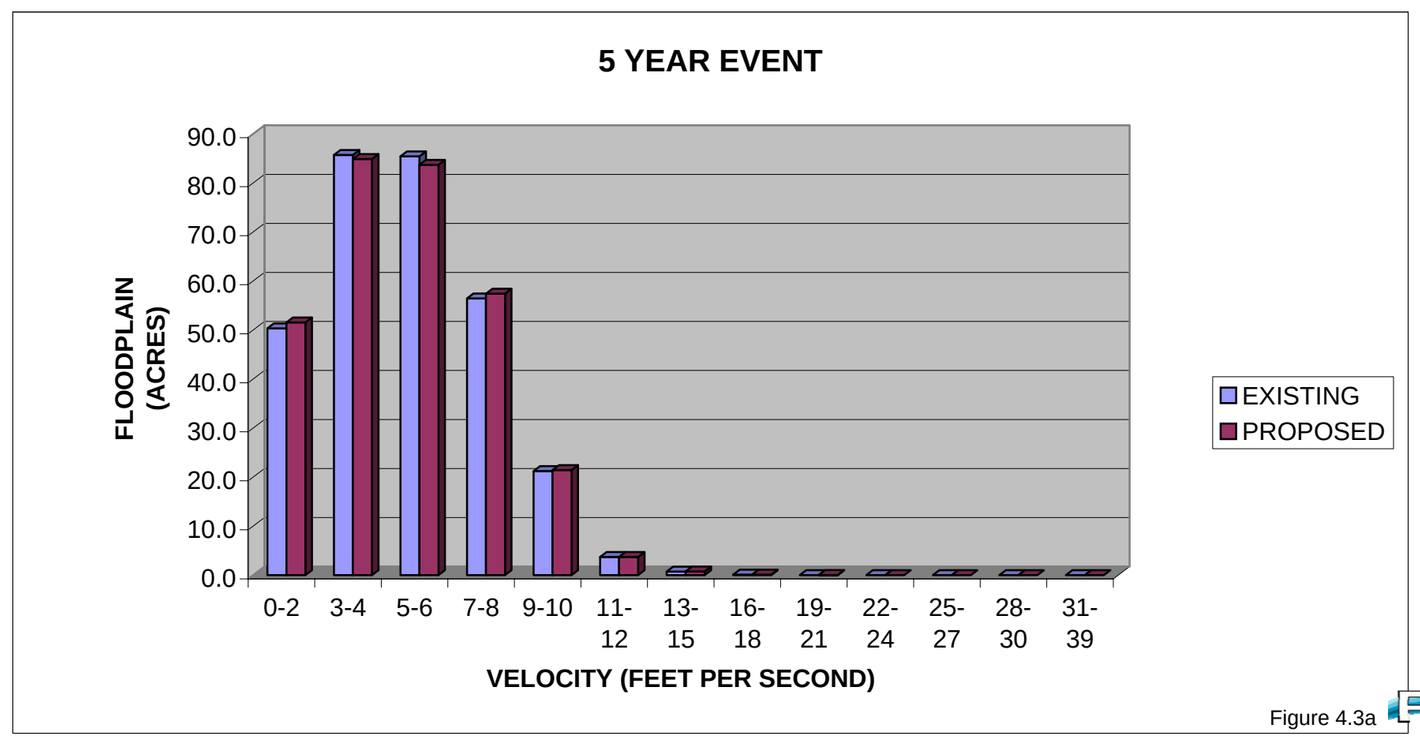
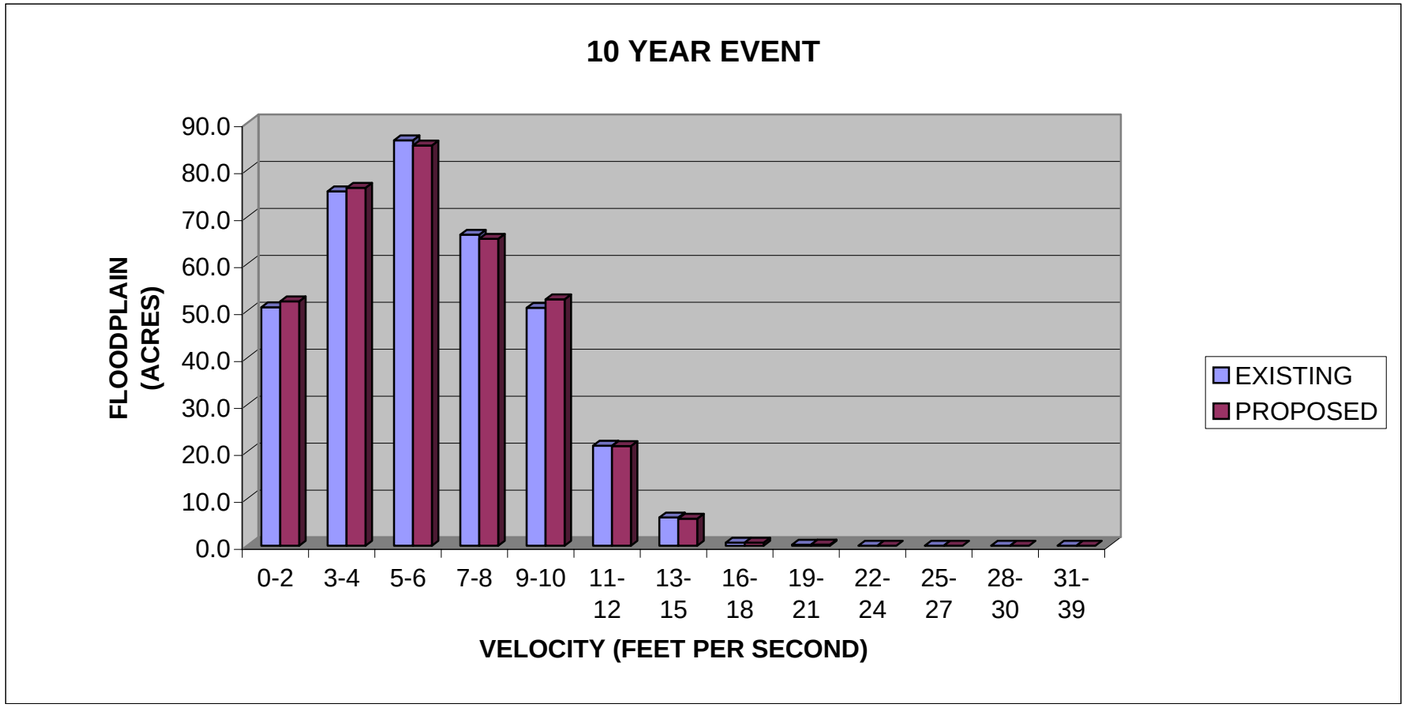


Figure 4.3a

FIGURE 4.3b: MISSION VILLAGE FLOODPLAIN AREA BY VELOCITY IMPACTS STATISTICS

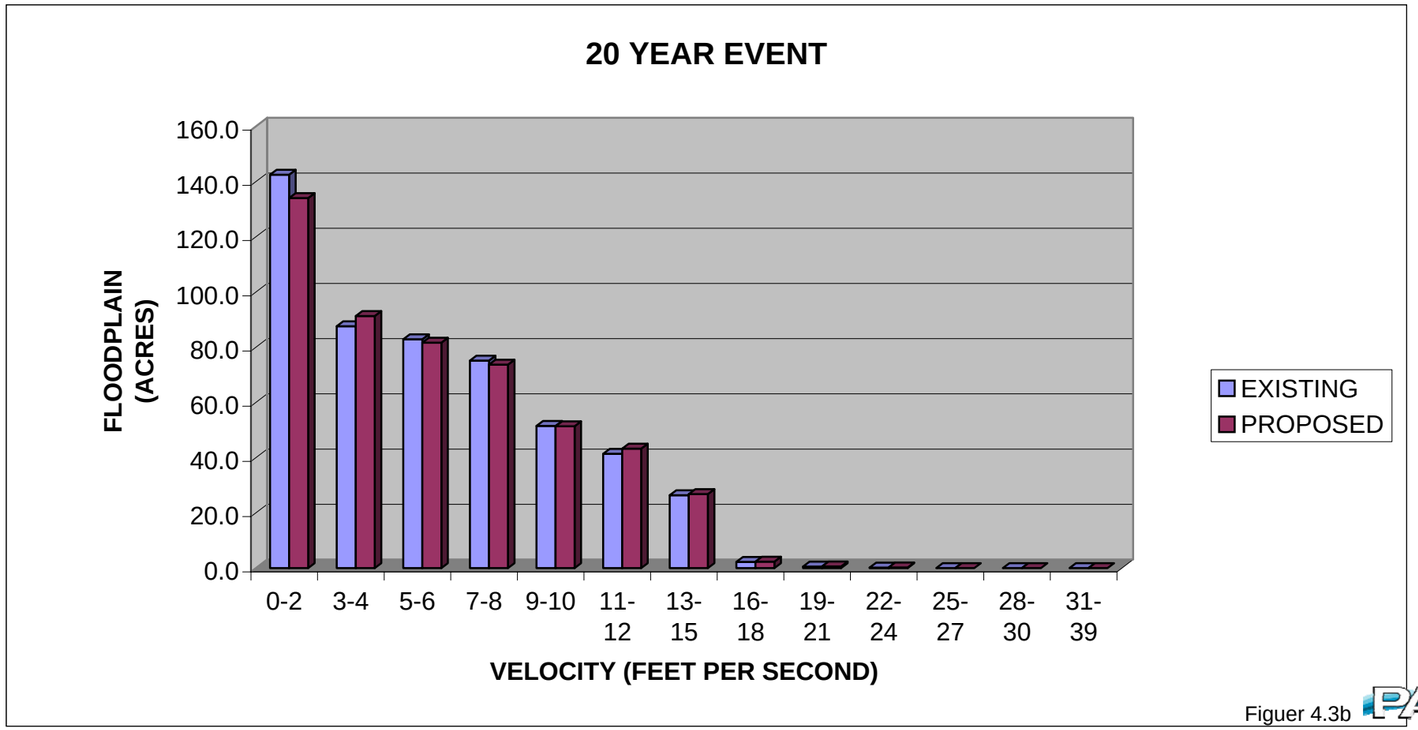
10 YEAR - Floodplain Area by Velocity

Velocity (fps)	Existing Area (AC)	Proposed Area (AC)	Delta (AC)	Delta % (%)
0-2	50.8	52.0	1.2	2.4%
3-4	75.5	76.2	0.8	1.0%
5-6	86.3	85.2	-1.1	-1.3%
7-8	66.2	65.3	-0.9	-1.3%
9-10	50.6	52.5	1.8	3.6%
11-12	21.3	21.2	-0.1	-0.4%
13-15	6.0	5.8	-0.3	-4.2%
16-18	0.6	0.6	0.0	-1.2%
19-21	0.2	0.2	0.0	6.4%
22-24	0.0	0.0	0.0	0.5%
25-27	0.0	0.0	0.0	0.0%
28-30	0.0	0.0	0.0	0.0%
31-39	0.0	0.0	0.0	0.0%
	357.6	**359.1**	**1.5**	**0.4%**



20 YEAR - Floodplain Area by Velocity

Velocity (fps)	Existing Area (AC)	Proposed Area (AC)	Delta (AC)	Delta % (%)
0-2	142.5	134.1	-8.5	-5.9%
3-4	87.6	91.3	3.7	4.2%
5-6	82.9	81.6	-1.3	-1.5%
7-8	75.2	73.7	-1.5	-1.9%
9-10	51.5	51.4	-0.1	-0.2%
11-12	41.4	43.3	1.9	4.5%
13-15	26.4	26.8	0.4	1.5%
16-18	2.3	2.4	0.1	4.4%
19-21	0.6	0.6	0.0	7.7%
22-24	0.2	0.2	0.0	10.9%
25-27	0.0	0.0	0.0	0.0%
28-30	0.0	0.0	0.0	0.0%
31-39	0.0	0.0	0.0	0.0%
	510.6	**505.5**	**-5.1**	**-1.0%**

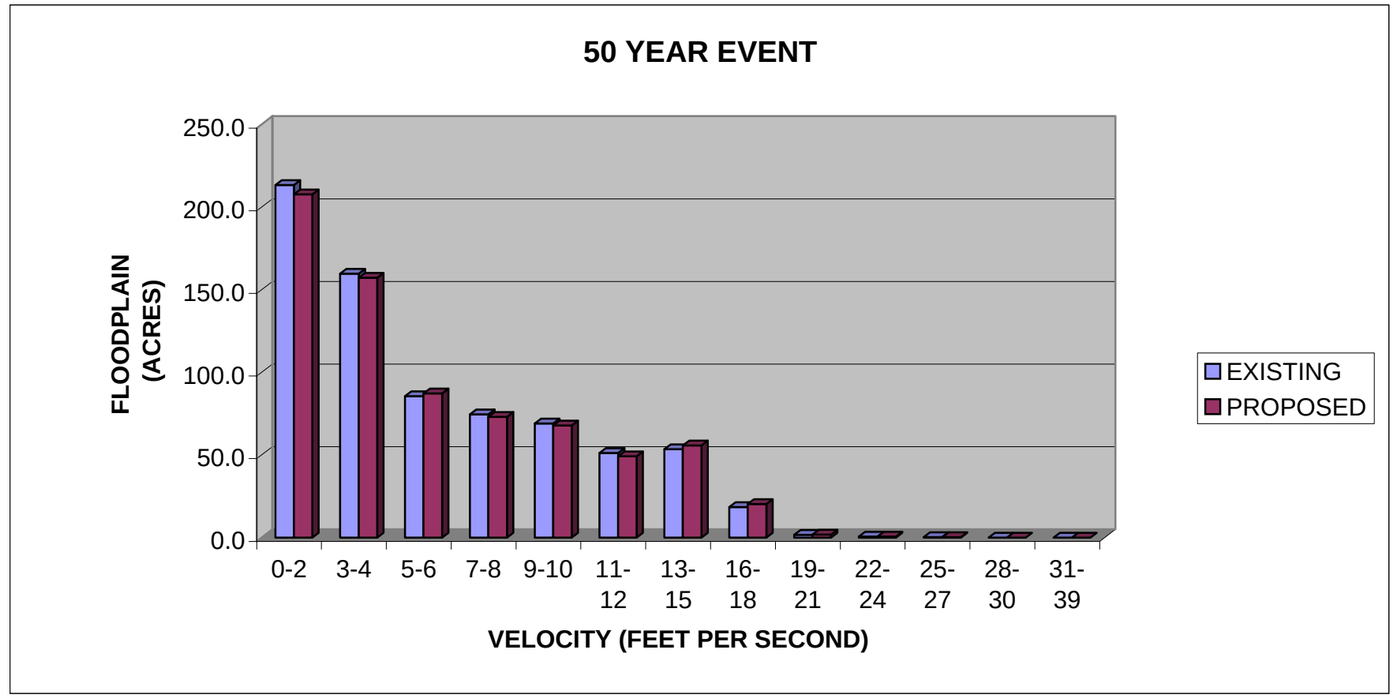


Figuer 4.3b

FIGURE 4.3c: MISSION VILLAGE FLODDPLAIN AREA BY VELOCITY IMPACTS STATISTICS

50 YEAR - Floodplain Area by Velocity

Velocity (fps)	Existing Area (AC)	Proposed Area (AC)	Delta (AC)	Delta % (%)
0-2	213.4	207.8	-5.6	-2.6%
3-4	159.7	157.4	-2.3	-1.5%
5-6	85.7	87.3	1.6	1.8%
7-8	74.6	73.2	-1.5	-1.9%
9-10	69.2	67.9	-1.3	-1.9%
11-12	51.3	49.3	-2.0	-3.8%
13-15	53.6	55.9	2.3	4.2%
16-18	18.6	20.3	1.7	9.3%
19-21	1.8	1.9	0.1	8.1%
22-24	0.6	0.7	0.1	10.5%
25-27	0.3	0.3	0.0	7.2%
28-30	0.0	0.0	0.0	0.0%
31-39	0.0	0.0	0.0	0.0%
	728.8	**721.9**	**-6.9**	**-1.0%**



100 YEAR - Floodplain Area by Velocity

Velocity (fps)	Existing Area (AC)	Proposed Area (AC)	Delta (AC)	Delta % (%)
0-2	184.7	183.1	-1.6	-0.9%
3-4	174.7	169.1	-5.6	-3.2%
5-6	131.5	134.4	3.0	2.3%
7-8	67.3	67.2	-0.1	-0.1%
9-10	65.9	63.5	-2.5	-3.8%
11-12	60.5	58.8	-1.7	-2.8%
13-15	66.3	69.2	2.8	4.3%
16-18	39.3	40.0	0.7	1.9%
19-21	11.8	11.6	-0.2	-1.6%
22-24	1.4	1.6	0.2	15.9%
25-27	0.7	0.8	0.1	10.1%
28-30	0.1	0.2	0.0	11.6%
31-39	0.0	0.1	0.1	0.0%
	804.2	**799.4**	**-4.8**	**-0.6%**

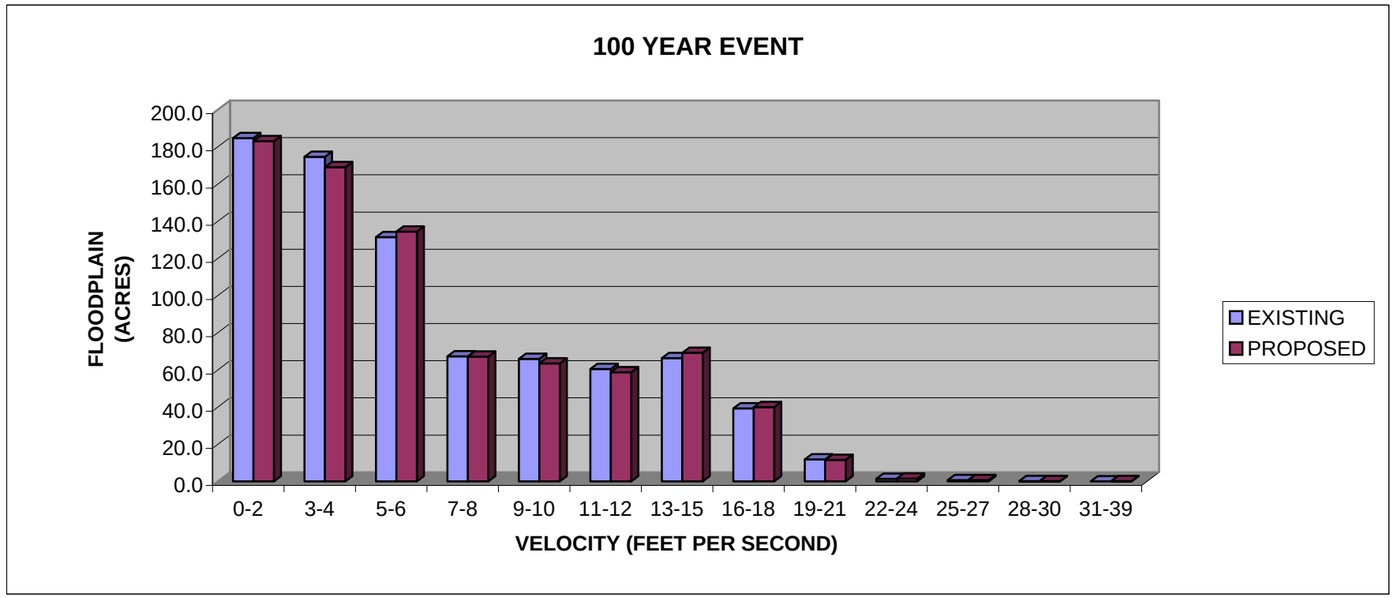


FIGURE 4.3d: MISSION VILLAGE FLODDPLAIN AREA BY VELOCITY IMPACTS STATISTICS

Qcap - Floodplain Area by Velocity

Velocity (fps)	Existing Area (AC)	Proposed Area (AC)	Delta (AC)	Delta % (%)
0-2	168.32	164.47	-3.8	-2.3%
3-4	126.35	127.90	1.6	1.2%
5-6	154.04	148.64	-5.4	-3.5%
7-8	146.16	146.09	-0.1	0.0%
9-10	85.95	84.81	-1.1	-1.3%
11-12	50.57	50.30	-0.3	-0.5%
13-15	90.31	91.75	1.4	1.6%
16-18	71.25	68.18	-3.1	-4.3%
19-21	41.88	44.89	3.0	7.2%
22-24	26.69	26.87	0.2	0.7%
25-27	11.97	12.00	0.0	0.3%
28-30	5.10	5.37	0.3	5.3%
31-39	0.74	0.91	0.2	22.8%
40-49	0.17	0.22	0.0	**25.7%**
	979.3	**972.2**	**-7.1**	**-0.7%**

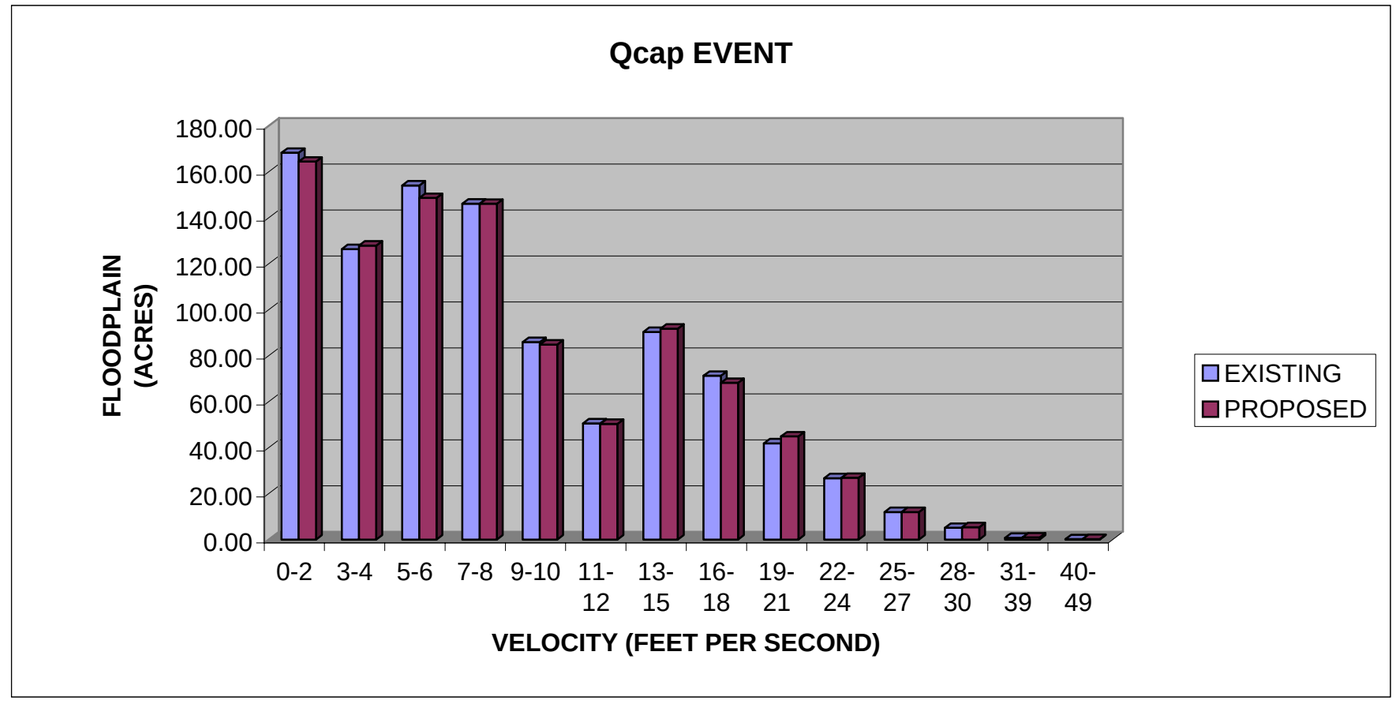
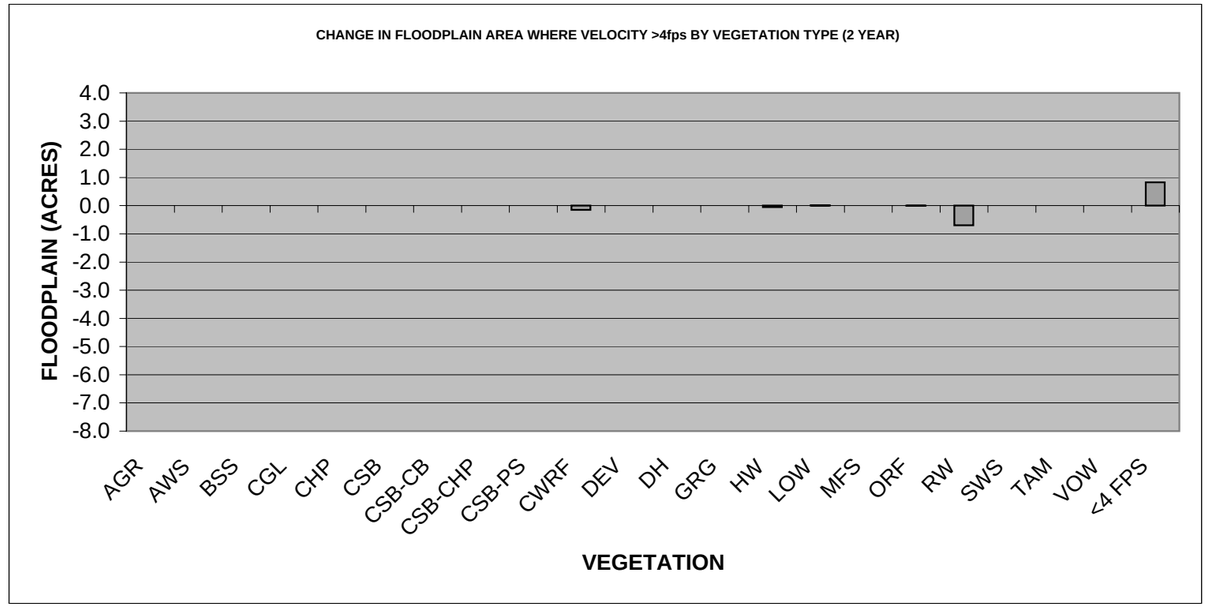


FIGURE 4.4a: MISSION VILLAGE CHANGE IN FLOODPLAIN AREA WHERE VELOCITY >4fps BY VEGETATION TYPE

Vegetation Type	2 YEAR			
	EXISTING	PROPOSED	DELTA	DELTA %
AGR	0.1	0.1	0.0	0.5%
AWS	0.0	0.0	0.0	0.0%
BSS	0.0	0.0	0.0	0.0%
CGL	0.0	0.0	0.0	0.0%
CHP	0.0	0.0	0.0	0.0%
CSB	0.0	0.0	0.0	0.0%
CSB-CB	0.0	0.0	0.0	0.0%
CSB-CHP	0.0	0.0	0.0	0.0%
CSB-PS	0.0	0.0	0.0	0.0%
CWRF	9.6	9.4	-0.2	-1.6%
DEV	0.0	0.0	0.0	0.0%
DH	0.6	0.6	0.0	0.0%
GRG	0.0	0.0	0.0	0.0%
HW	26.4	26.4	-0.1	-0.2%
LOW	0.0	0.0	0.0	0.0%
MFS	0.0	0.0	0.0	0.0%
ORF	0.1	0.1	0.0	-6.7%
RW	30.0	29.3	-0.7	-2.3%
SWS	1.0	1.0	0.0	0.4%
TAM	0.0	0.0	0.0	0.0%
VOW	0.0	0.0	0.0	0.0%
<4 FPS	162.9	163.7	0.8	0.5%
TOTAL	230.6	230.6	0.0	0.0%



AGR	Agriculture
AWS	Arrowweed scrub
BSS	Big sagebrush scrub
CGL	California annual grassland
CHP	Undifferentiated chaparral
CSB	California sagebrush
CSB-CB	California sagebrush-California buckwheat
CSB-CHP	California sagebrush-undifferentiated chaparral
CSB-PS	California sagebrush-purple sage
CWRF	Cottonwood willow riparian forest
DEV	Developed
DH	Disturbed land
GRG	Giant reed
HW	Herbaceous wetlands
LOW	Live oak woodland
MFS	Mulefat
ORF	Southern coast live oak riparian forest
RW	River wash
SWS	Southern willow scrub
TAM	Tamarisk scrub
VOW	Valley oak woodland

Vegetation Type	5 YEAR			
	EXISTING	PROPOSED	DELTA	DELTA %
AGR	0.4	0.3	0.0	-0.9%
AWS	0.0	0.0	0.0	0.0%
BSS	0.0	0.0	0.0	0.0%
CGL	0.0	0.0	0.0	0.0%
CHP	0.0	0.0	0.0	0.0%
CSB	0.0	0.0	0.0	0.0%
CSB-CB	0.0	0.0	0.0	0.0%
CSB-CHP	0.0	0.0	0.0	0.0%
CSB-PS	0.1	0.1	0.0	0.0%
CWRF	26.4	26.0	-0.4	-1.5%
DEV	0.0	0.0	0.0	0.0%
DH	1.7	1.7	0.0	-0.3%
GRG	1.2	1.2	0.0	0.0%
HW	59.9	60.2	0.3	0.4%
LOW	0.1	0.1	0.0	-1.0%
MFS	0.0	0.0	0.0	0.0%
ORF	0.2	0.2	0.0	0.3%
RW	74.3	73.9	-0.4	-0.5%
SWS	3.1	3.1	0.0	-0.6%
TAM	0.3	0.3	0.0	-1.2%
VOW	0.0	0.0	0.0	0.0%
<4 FPS	136.1	136.5	0.5	0.4%
TOTAL	303.7	303.7	0.0	0.0%

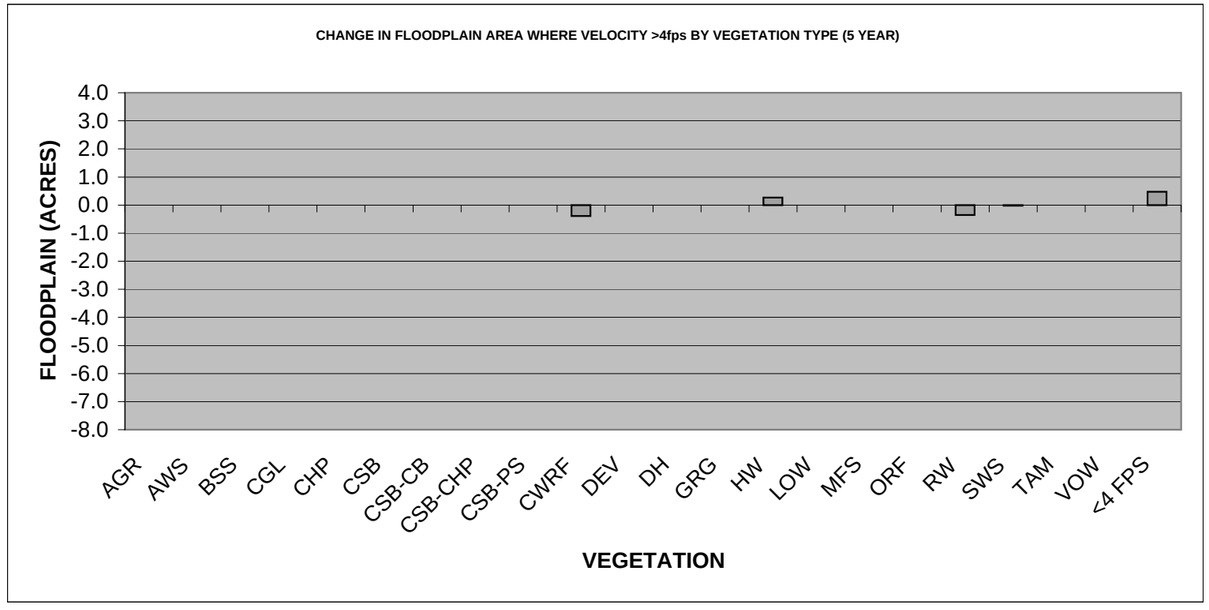
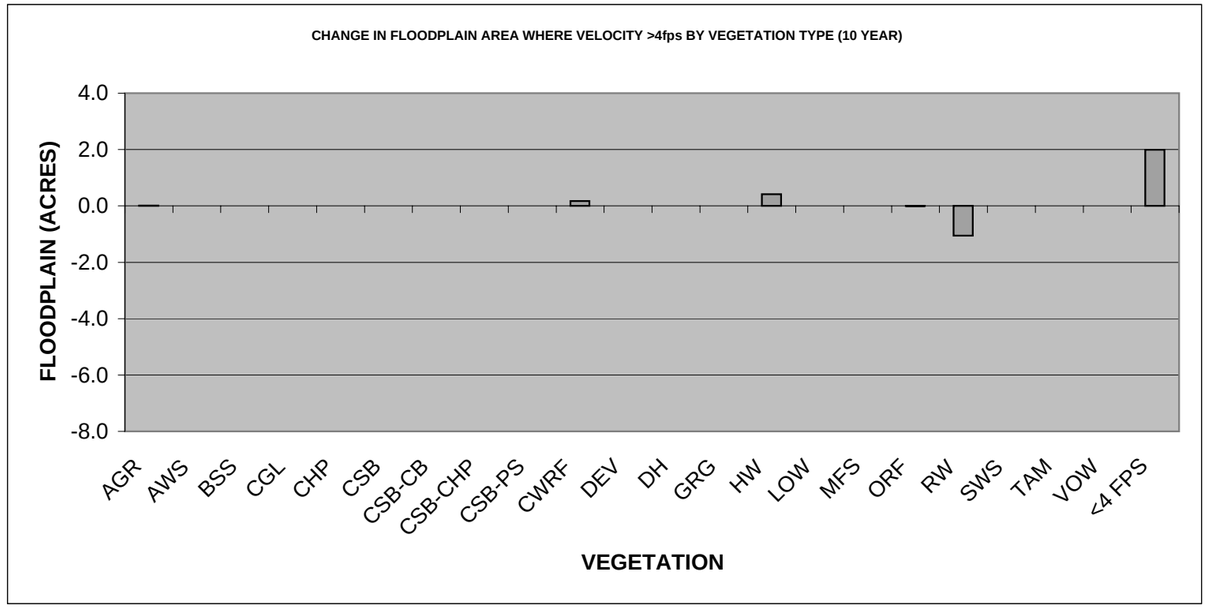


FIGURE 4.4b: MISSION VILLAGE CHANGE IN FLOODPLAIN AREA WHERE VELOCITY >4fps BY VEGETATION TYPE

Vegetation Type	10 YEAR			
	EXISTING	PROPOSED	DELTA	DELTA %
AGR	0.7	0.7	0.0	1.3%
AWS	0.0	0.0	0.0	0.0%
BSS	0.0	0.0	0.0	0.0%
CGL	0.0	0.0	0.0	0.0%
CHP	0.0	0.0	0.0	0.0%
CSB	0.0	0.0	0.0	0.0%
CSB-CB	0.0	0.0	0.0	0.0%
CSB-CHP	0.0	0.0	0.0	0.0%
CSB-PS	0.2	0.2	0.0	0.0%
CWRF	37.7	37.8	0.2	0.4%
DEV	0.0	0.0	0.0	0.0%
DH	2.1	2.1	0.0	0.0%
GRG	2.2	2.2	0.0	0.0%
HW	79.7	80.1	0.4	0.5%
LOW	0.1	0.1	0.0	-0.7%
MFS	0.0	0.0	0.0	0.0%
ORF	0.2	0.2	0.0	-5.3%
RW	102.7	101.6	-1.1	-1.0%
SWS	4.6	4.6	0.0	0.1%
TAM	1.1	1.1	0.0	0.0%
VOW	0.0	0.0	0.0	0.0%
<4 FPS	126.2	128.2	2.0	1.6%
TOTAL	357.6	359.1	1.5	0.4%



AGR	Agriculture
AWS	Arrowweed scrub
BSS	Big sagebrush scrub
CGL	California annual grassland
CHP	Undifferentiated chaparral
CSB	California sagebrush
CSB-CB	California sagebrush-California buckwheat
CSB-CHP	California sagebrush-undifferentiated chaparral
CSB-PS	California sagebrush-purple sage
CWRF	Cottonwood willow riparian forest
DEV	Developed
DH	Disturbed land
GRG	Giant reed
HW	Herbaceous wetlands
LOW	Live oak woodland
MFS	Mulefat
ORF	Southern coast live oak riparian forest
RW	River wash
SWS	Southern willow scrub
TAM	Tamarisk scrub
VOW	Valley oak woodland

Vegetation Type	20 YEAR			
	EXISTING	PROPOSED	DELTA	DELTA %
AGR	4.6	4.7	0.1	2.3%
AWS	0.0	0.0	0.0	0.0%
BSS	0.0	0.0	0.0	0.0%
CGL	0.0	0.0	0.0	0.0%
CHP	0.0	0.0	0.0	0.0%
CSB	0.0	0.0	0.0	0.0%
CSB-CB	0.0	0.0	0.0	0.0%
CSB-CHP	0.0	0.0	0.0	0.0%
CSB-PS	0.3	0.3	0.0	0.0%
CWRF	50.0	50.6	0.6	1.2%
DEV	0.0	0.0	0.0	0.0%
DH	2.8	2.8	0.0	0.0%
GRG	2.5	2.5	0.0	0.7%
HW	95.5	95.9	0.4	0.4%
LOW	0.2	0.2	0.0	0.0%
MFS	0.8	0.9	0.1	8.4%
ORF	0.2	0.2	0.0	-5.4%
RW	116.1	114.5	-1.6	-1.4%
SWS	6.3	6.3	0.0	0.0%
TAM	1.1	1.1	0.0	0.0%
VOW	0.0	0.0	0.0	0.0%
<4 FPS	230.2	225.4	-4.7	-2.0%
TOTAL	510.6	505.5	-5.1	-1.0%

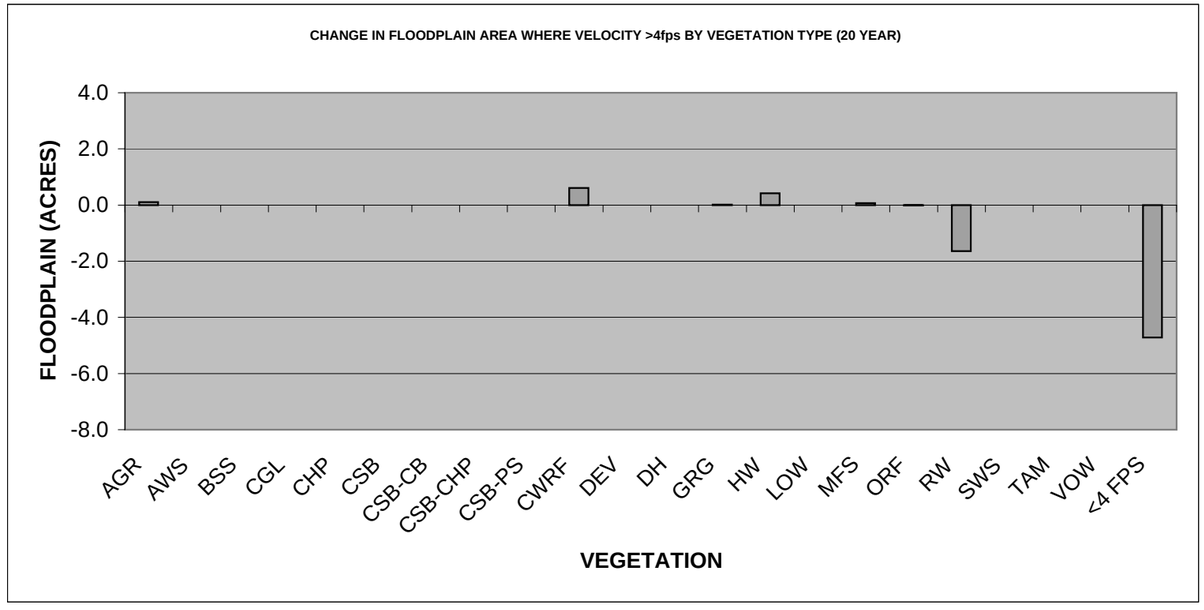
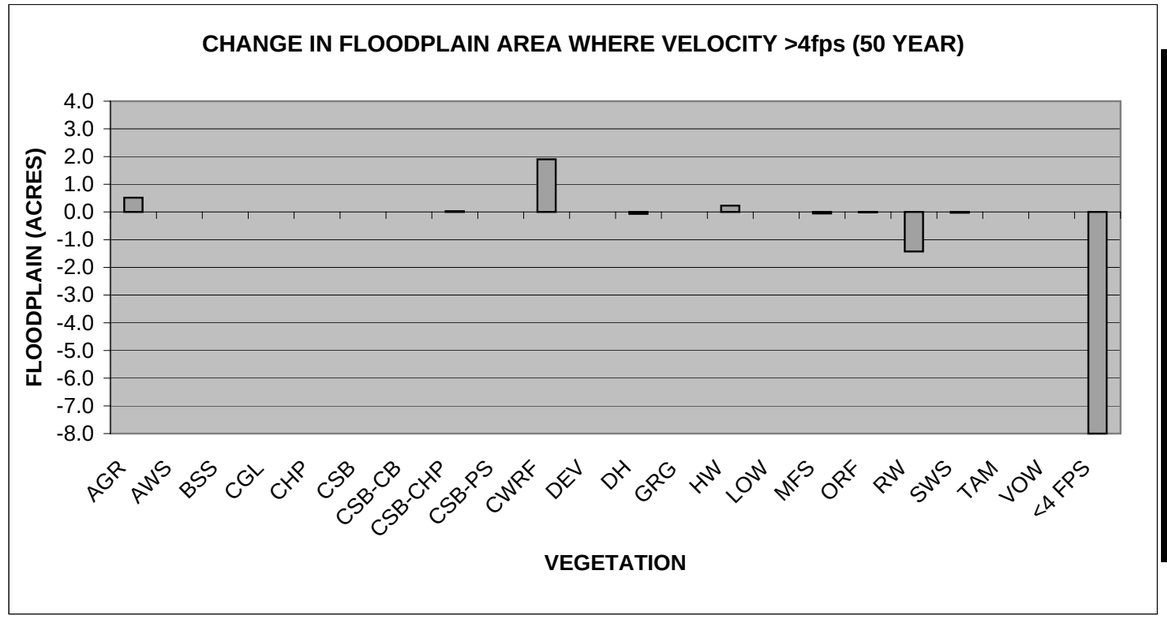


FIGURE 4.4c: MISSION VILLAGE CHANGE IN FLOODPLAIN AREA WHERE VELOCITY >4fps BY VEGETATION TYPE

Vegetation Type	50 YEAR			
	EXISTING	PROPOSED	DELTA	DELTA %
AGR	18.9	19.4	0.5	2.7%
AWS	0.0	0.0	0.0	0.0%
BSS	0.0	0.0	0.0	0.0%
CGL	0.0	0.0	0.0	0.0%
CHP	0.0	0.0	0.0	0.0%
CSB	0.0	0.0	0.0	0.0%
CSB-CB	0.0	0.0	0.0	0.0%
CSB-CHP	0.0	0.0	0.0	0.0%
CSB-PS	0.5	0.5	0.0	0.0%
CWRF	70.5	72.4	1.9	2.7%
DEV	0.0	0.0	0.0	0.0%
DH	4.4	4.3	-0.1	-1.5%
GRG	2.5	2.5	0.0	0.0%
HW	105.9	106.1	0.2	0.2%
LOW	0.3	0.3	0.0	0.0%
MFS	3.3	3.2	-0.1	-1.7%
ORF	0.3	0.2	0.0	-4.1%
RW	139.8	138.4	-1.4	-1.0%
SWS	8.3	8.3	0.0	-0.3%
TAM	1.1	1.1	0.0	0.0%
VOW	0.0	0.0	0.0	0.0%
<4 FPS	373.2	365.2	-8.0	-2.1%
TOTAL	728.8	721.9	-6.9	-1.0%



AGR	Agriculture
AWS	Arrowweed scrub
BSS	Big sagebrush scrub
CGL	California annual grassland
CHP	Undifferentiated chaparral
CSB	California sagebrush
CSB-CB	California sagebrush-California buckwheat
CSB-CHP	California sagebrush-undifferentiated chaparral
CSB-PS	California sagebrush-purple sage
CWRF	Cottonwood willow riparian forest
DEV	Developed
DH	Disturbed land
GRG	Giant reed
HW	Herbaceous wetlands
LOW	Live oak woodland
MFS	Mulefat
ORF	Southern coast live oak riparian forest
RW	River wash
SWS	Southern willow scrub
TAM	Tamarisk scrub
VOW	Valley oak woodland

Vegetation Type	100 YEAR			
	EXISTING	PROPOSED	DELTA	DELTA %
AGR	51.1	51.7	0.6	1.2%
AWS	0.0	0.0	0.0	0.0%
BSS	0.0	0.0	0.0	0.0%
CGL	0.1	0.1	0.1	133.6%
CHP	0.0	0.0	0.0	0.0%
CSB	0.0	0.0	0.0	0.0%
CSB-CB	0.0	0.0	0.0	0.0%
CSB-CHP	0.1	0.1	0.0	0.0%
CSB-PS	0.5	0.5	0.0	0.0%
CWRF	94.1	96.3	2.2	2.3%
DEV	0.0	0.0	0.0	0.0%
DH	8.7	8.8	0.0	0.0%
GRG	3.5	3.4	-0.1	-2.4%
HW	111.5	111.9	0.4	0.3%
LOW	0.4	0.4	0.0	0.4%
MFS	5.4	5.4	0.0	0.6%
ORF	0.3	0.3	0.0	-1.8%
RW	159.0	158.3	-0.8	-0.5%
SWS	8.9	8.9	0.0	-0.1%
TAM	1.3	1.3	0.0	0.6%
VOW	0.0	0.0	0.0	0.0%
<4 FPS	359.5	352.2	-7.3	-2.0%
TOTAL	804.2	799.4	-4.8	-0.6%

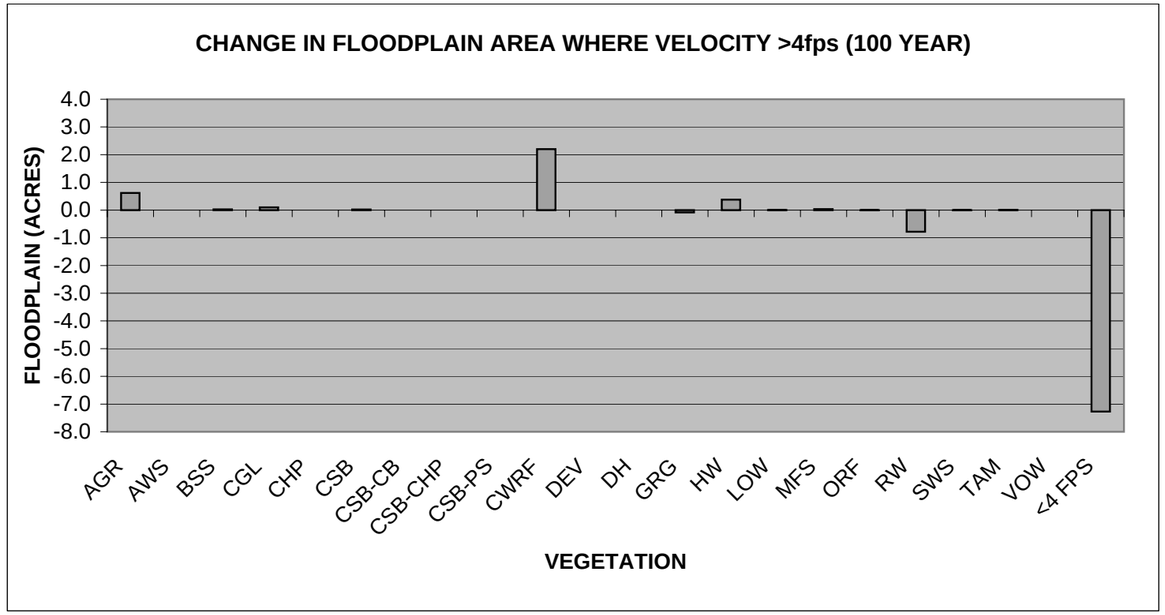
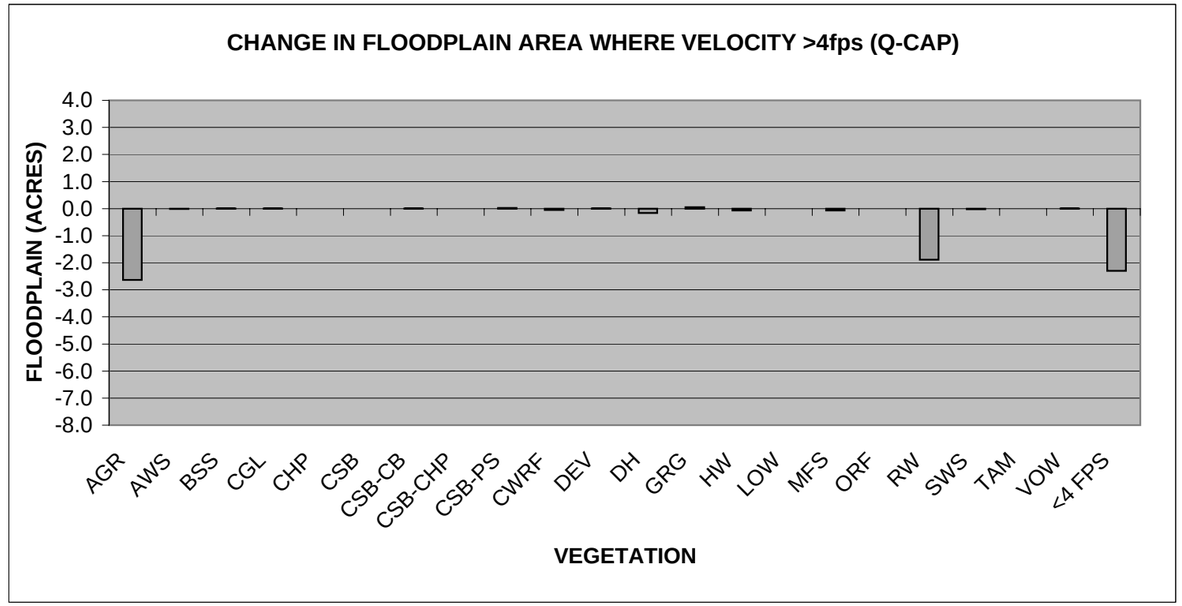


FIGURE 4.4d: MISSION VILLAGE CHANGE IN FLOODPLAIN AREA WHERE VELOCITY >4fps BY VEGETATION TYPE

Vegetation Type	CAP EVENT			
	EXISTING	PROPOSED	DELTA	DELTA %
AGR	131.1	128.5	-2.6	-2.0%
AWS	0.7	0.7	0.0	-2.2%
BSS	1.1	1.1	0.0	0.8%
CGL	2.8	2.8	0.0	0.2%
CHP	0.0	0.0	0.0	0.0%
CSB	0.1	0.1	0.0	-4.9%
CSB-CB	0.0	0.0	0.0	0.0%
CSB-CHP	0.2	0.2	0.0	-0.3%
CSB-PS	1.2	1.2	0.0	2.1%
CWRF	175.0	174.9	-0.1	0.0%
DEV	0.6	0.6	0.0	1.1%
DH	21.5	21.3	-0.2	-0.8%
GRG	6.1	6.1	0.0	0.8%
HW	120.2	120.2	-0.1	-0.1%
LOW	0.6	0.6	0.0	-0.2%
MFS	13.2	13.1	-0.1	-0.5%
ORF	0.3	0.3	0.0	-0.9%
RW	197.8	195.9	-1.9	-1.0%
SWS	10.2	10.2	0.0	-0.2%
TAM	1.9	1.9	0.0	0.0%
VOW	0.0	0.0	0.0	0.0%
<4 FPS	294.7	292.4	-2.3	-0.8%
TOTAL	979.3	972.2	-7.1	-0.7%



AGR	Agriculture
AWS	Arrowweed scrub
BSS	Big sagebrush scrub
CGL	California annual grassland
CHP	Undifferentiated chaparral
CSB	California sagebrush
CSB-CB	California sagebrush-California buckwheat
CSB-CHP	California sagebrush-undifferentiated chaparral
CSB-PS	California sagebrush-purple sage
CWRF	Cottonwood willow riparian forest
DEV	Developed
DH	Disturbed land
GRG	Giant reed
HW	Herbaceous wetlands
LOW	Live oak woodland
MFS	Mulefat
ORF	Southern coast live oak riparian forest
RW	River wash
SWS	Southern willow scrub
TAM	Tamarisk scrub
VOW	Valley oak woodland

4.1.1B Changes to Water Surface Elevation

Changes on the Santa Clara River in the form of alterations of water surface elevations and velocities, as reported in Newhall Ranch Santa Clara River HEC-RAS Modeling study (PACE, December, 2005. Newhall Land owns both sides of the River for the majority of the study reach. However, at the portion of the Santa Clara River where the existing Travel Village development is located (at approximately River stations 35725 through 31585) Newhall Land does not own this property on the north bank (Travel Village). The bank protection on the south bank of the River within Mission Village and across from the Travel Village development is at the edge of the floodplain limits and therefore does not impact the River water surface or velocity. In addition, there are no increases in water surface elevation on the Travel Village property due to the Mission Village Bank Protection project, located downstream of Travel Village.

The Mission Village Proposed Bank Protection creates minor changes in water surface elevation and velocity in the River. A detailed analysis and review of the existing vs. proposed condition flow depth and velocity along the bank of the River in the over bank area is presented in the Newhall Ranch Santa Clara River HEC-RAS Modeling study (PACE, December, 2005). The analysis shows non-scouring or minimal scour velocities in this reach and therefore to meet the environmental requirements of the project, it is proposed to utilize vegetative and geotextile type bank protection in this area.

As shown in table 4.3, for most of the project reach changes to water the 100-year surface elevation are less than one foot. Increases in water surface elevation are few and minimal.

The previously mapped (ML Map # 43-ML-23) Capital Floodplain and Floodway are based upon higher flow rate (Qcap old = 168,000cfs) vs. revised Capital Flood rate (Qcap new = 142,475cfs). This does not represent a change in hydrology of the River, but rather in analysis criteria as established by Los Angeles County.

4.1.1C Floodplain Impacts Associated with Aggradation or Degradation

SAM results for the proposed condition predict the general adjustment from -1.6 and +2.1 feet. LACH&SM methodology predicts general adjustment, as defined above, from -1.8 to -7.6 feet for the proposed condition. The general trend in general adjustment for the study reach as indicated by SAM modeling is not apparent for either the existing or proposed condition. Additionally, little change is expected between the existing and proposed conditions general adjustment.

Local scour ranges from 0.0 to 17.4 feet in the proposed conditions at the various river crossings. Results of calculations of bend scour vary from 0.0 to 8.9 feet for the proposed condition. For the proposed condition, the bedform height ranges from 0.5 to 8.0 feet. Changes between the existing and proposed conditions are a reflection primarily of the change in velocity brought about by the proposed condition. These changes tend

Table 4.4: Santa Clara River Summary of Maximum Proposed Toe-down & Freeboard (ft)

Subreach	HEC-RAS Section	Z_{99} [2]	Outside Curved Reach		Straight-Inside Curved Reach		WSE	Outside Curved Reach		Straight-Inside Curved Reach	
			Maximum Total Degradation [3]	Proposed Toe-down Elevation [1,4]	Maximum Total Degradation [3]	Proposed Toe-down Elevation [1,4]		Maximum Total Freeboard [3]	Proposed Top of Levee Elevation [1]	Maximum Total Freeboard [3]	Proposed Top of Levee Elevation [1]
SRA1	46195	1035.0	14.0	1021.0	14.0	1021.0	1063.1	3.1	1066.3	3.1	1066.3
	46020	1032.0	14.0	1018.0	14.0	1018.0	1062.0	3.0	1065.0	3.0	1065.0
	45545	1030.0	14.0	1016.0	14.0	1016.0	1057.9	3.4	1061.3	3.4	1061.3
	45030	1025.0	14.0	1011.0	14.0	1011.0	1054.2	3.0	1057.3	3.0	1057.3
	44585	1022.0	14.0	1008.0	14.0	1008.0	1050.6	3.2	1053.8	3.2	1053.8
	44210	1020.0	14.0	1006.0	14.0	1006.0	1047.8	2.9	1050.8	2.9	1050.8
SRA2	43820	1018.0	15.4	1002.6	15.4	1002.6	1042.1	3.9	1046.0	3.9	1046.0
	43610	1017.0	17.0	1000.0	17.0	1000.0	1038.3	4.0	1042.2	4.0	1042.2
	43410	1016.0	15.8	1000.2	15.8	1000.2	1035.8	3.6	1039.4	3.6	1039.4
	43200	1014.0	16.3	997.7	16.3	997.7	1033.2	3.5	1036.7	3.5	1036.7
	42975	1012.0	15.5	996.5	15.5	996.5	1031.0	2.9	1033.8	2.7	1033.7
	42815	1011.0	15.5	995.5	15.5	995.5	1029.7	2.5	1032.2	2.5	1032.2
	42590	1010.0	21.0	989.0	14.7	995.3	1028.4	2.5	1030.9	2.5	1030.9
	42430	1008.0	21.0	987.0	15.3	992.7	1027.5	2.5	1030.0	2.5	1030.0
	42215	1006.0	21.0	985.0	14.7	991.3	1026.7	2.5	1029.2	2.5	1029.2
	41940	1005.0	15.0	990.0	11.9	993.1	1025.6	2.5	1028.1	2.5	1028.1
	41730	1004.0	15.0	989.0	12.0	992.0	1024.6	2.5	1027.1	2.5	1027.1
	41460	1002.0	15.0	987.0	11.9	990.1	1023.2	2.5	1025.7	2.5	1025.7
SRA3	41280	1001.0	12.5	988.5	12.5	988.5	1021.8	2.5	1024.3	2.5	1024.3
	41080	1000.0	14.0	986.0	14.0	986.0	1020.5	2.5	1023.0	2.5	1023.0
	40825	999.5	21.0	978.5	14.0	985.5	1019.3	2.5	1021.8	2.5	1021.8
	40585	998.0	18.0	980.0	12.5	985.5	1018.3	2.5	1020.8	2.5	1020.8
	40335	996.0	15.0	981.0	10.0	986.0	1017.4	2.5	1019.9	2.5	1019.9
	40130	995.0	15.0	980.0	10.0	985.0	1016.6	2.5	1019.1	2.5	1019.1
	39945	994.0	15.0	979.0	10.0	984.0	1015.9	2.5	1018.4	2.5	1018.4
	39755	994.0	12.5	981.5	12.5	981.5	1014.6	2.5	1017.1	2.5	1017.1
	39605	993.0	14.0	979.0	14.0	979.0	1013.7	2.5	1016.2	2.5	1016.2
	39310	992.0	18.0	974.0	12.5	979.5	1012.2	2.5	1014.7	2.5	1014.7
	39100	990.0	14.0	976.0	14.0	976.0	1011.1	2.5	1013.6	2.5	1013.6
	38925	989.5	10.0	979.5	10.0	979.5	1010.3	2.5	1012.8	2.5	1012.8
SRA4	38710	988.0	10.0	978.0	10.0	978.0	1009.2	2.5	1011.7	2.5	1011.7
	38475	986.0	12.5	973.5	12.5	973.5	1007.0	2.6	1009.5	2.6	1009.5
	38300	985.5	14.0	971.5	14.0	971.5	1005.8	2.5	1008.3	2.5	1008.3
	38065	984.0	10.0	974.0	10.0	974.0	1004.1	2.5	1006.6	2.5	1006.6
	37810	983.0	14.0	969.0	14.0	969.0	1001.4	2.8	1004.2	2.8	1004.2
	37655	982.0	14.0	968.0	14.0	968.0	999.9	2.6	1002.5	2.6	1002.5
	37390	981.0	14.0	967.0	14.0	967.0	998.5	2.5	1001.0	2.5	1001.0
	37135	980.0	12.5	967.5	12.5	967.5	996.8	2.5	999.3	2.5	999.3
	36930	978.0	14.0	964.0	14.0	964.0	995.7	2.5	998.2	2.5	998.2
	36735	977.0	12.5	964.5	12.5	964.5	994.6	2.5	997.1	2.5	997.1
	36515	975.0	15.0	960.0	10.0	965.0	993.6	2.5	996.1	2.5	996.1
	36265	974.0	15.0	959.0	10.0	964.0	992.3	2.5	994.8	2.5	994.8
SRB1	36080	973.0	22.9	950.1	22.0	951.0	990.6	2.5	993.1	2.5	993.1
	35845	971.0	15.0	956.0	10.0	961.0	989.1	2.5	991.6	2.5	991.6
	35725	970.0	15.0	955.0	10.0	960.0	988.3	2.5	990.8	2.5	990.8
	35515	969.0	18.0	951.0	12.5	956.5	986.9	2.5	989.4	2.5	989.4
	35245	968.0	18.0	950.0	12.5	955.5	985.0	2.5	987.5	2.5	987.5
	35040	967.0	21.0	946.0	14.0	953.0	983.6	2.5	986.1	2.5	986.1
	34860	966.0	21.0	945.0	14.0	952.0	982.3	2.5	984.8	2.5	984.8
	34720	965.5	21.0	944.5	14.0	951.5	981.3	2.5	983.8	2.5	983.8
	34495	964.0	18.0	946.0	12.5	951.5	979.7	2.5	982.2	2.5	982.2
	34310	963.0	18.0	945.0	12.5	950.5	978.4	2.5	980.9	2.5	980.9
	34090	962.0	18.0	944.0	12.5	949.5	977.0	2.5	979.5	2.5	979.5
SRB2	33880	960.0	18.0	942.0	12.5	947.5	975.7	2.5	978.2	2.5	978.2
	33710	959.0	18.0	941.0	12.5	946.5	974.6	2.5	977.1	2.5	977.1
	33500	958.0	18.0	940.0	12.5	945.5	973.3	2.5	975.8	2.5	975.8
	33310	957.0	18.0	939.0	12.5	944.5	972.3	2.5	974.8	2.5	974.8
	33115	956.0	15.0	941.0	10.0	946.0	971.4	2.5	973.9	2.5	973.9
	32795	954.0	15.0	939.0	10.0	944.0	969.7	2.5	972.2	2.5	972.2
	32605	952.0	15.0	937.0	10.0	942.0	968.7	2.5	971.2	2.5	971.2
SRC1	32265	950.0	18.0	932.0	12.5	937.5	967.2	2.5	969.7	2.5	969.7
	31875	949.0	15.0	934.0	10.0	939.0	965.6	2.5	968.1	2.5	968.1
	31585	946.0	15.0	931.0	10.0	936.0	964.7	2.5	967.2	2.5	967.2
	31360	944.0	15.0	929.0	10.0	934.0	963.9	2.5	966.4	2.5	966.4
	31060	942.0	12.0	930.0	8.0	934.0	963.2	2.5	965.7	2.5	965.7
	30720	940.0	12.0	928.0	8.0	932.0	962.5	2.5	965.0	2.5	965.0
	30445	938.0	12.0	926.0	8.0	930.0	962.1	2.5	964.6	2.5	964.6
	30095	936.0	12.0	924.0	8.0	928.0	961.5	2.5	964.0	2.5	964.0
	29815	935.0	12.0	923.0	8.0	927.0	960.8	2.5	963.3	2.5	963.3
	29565	934.0	12.0	922.0	8.0	926.0	960.3	2.5	962.8	2.5	962.8
	29385	933.0	12.0	921.0	8.0	925.0	959.6	2.5	962.1	2.5	962.1
SRC2	29140	932.0	12.0	920.0	9.1	922.9	958.4	2.5	960.9	2.5	960.9
	28895	930.0	21.0	909.0	14.0	916.0	953.8	4.8	958.6	4.7	958.5
	28695	928.0	15.0	913.0	15.0	913.0	952.9	2.5	955.4	2.5	955.4
	28500	927.5	14.7	912.8	14.7	912.8	950.5	3.1	953.5	2.9	953.4
	28280	926.0	21.0	905.0	14.0	912.0	949.8	2.5	952.3	2.5	952.3
	28080	925.0	15.0	910.0	10.0	915.0	949.1	2.5	951.6	2.5	951.6
	27925	924.0	10.3	913.7	10.3	913.7	948.1	2.5	950.6	2.5	950.6
	27725	923.0	14.0	909.0	14.0	909.0	946.1	2.9	949.0	2.9	949.0
	27545	922.0	15.0	907.0	15.0	907.0	944.3	3.1	947.4	3.1	947.4
	27335	921.0	14.1	906.9	14.1	906.9	943.0	2.7	945.7	2.6	945.6
	27155	920.5	14.0	906.5	14.0	906.5	941.5	2.9	944.4	2.8	944.2
SRC3	26990	920.0	21.0	899.0	14.0	906.0	940.4	2.5	942.9	2.5	942.9
	26780	918.0	21.0	897.0	14.0	904.0	939.3	2.5	941.8	2.5	941.8
	26575	917.0	21.0	896.0	14.0	903.0	938.5	2.5	941.0	2.5	941.0
	26355	916.0	18.0	898.0	12.5	903.5	937.6	2.5	940.1	2.5	940.1
	26170	915.0	18.0	897.0	12.5	902.5	936.9	2.5	939.4	2.5	939.4
	25965	914.0	21.0	893.0	14.0	900.0	936.2	2.6	938.8	2.5	938.7
	25785	913.5	21.0	892.5	14.0	899.5	935.5	2.7	938.2	2.5	938.0
	25600	912.5	21.0	891.5	14.0	898.5	934.8	2.5	937.3	2.5	937.3
	25425	911.0	21.0	890.0	14.0	897.0	934.1	2.5	936.7	2.5	936.6
	25215	910.0	15.0	895.0	10.0	900.0	933.3	2.5	935.8	2.5	935.8
	25000	909.0	15.0	894.0	10.0	899.0	932.5	2.5	935.0	2.5	935.0
SRC4	24795	908.0	15.0	893.0	10.0	898.0	931.5	3.7	935.2	3.4	934.9
	24550	906.0	18.0	888.0	12.5	893.5	930.1	3.6	933.6	3.3	933.4
	24335	905.0	21.0	884.0	14.0	891.0	928.5	3.9	932.4	3.6	932.1
	24115	904.0	21.0	883.0	14.0	890.0	927.0	3.8	930.8	3.5	930.5
	23975	903.5	21.0	882.5	14.0	889.5	926.1	3.5	929.7	3.3	929.4
	23755	902.0	21.0	881.0	14.0	888.0	924.7	3.2	927.9	3.1	927.8
	23565	900.0	21.0	879.0	14.0	886.0	923.6	3.7	927.3	3.4	927.0
	23365	900.0	21.0	879.0	14.0	886.0	922.4	3.5	925.9	3.2	925.6
	23180	899.0	21.0	878.0	14.0	885.0	921.5	3.2	924.6	3.0	924.4
	23000	898.0	21.0	877.0	14.0	884.0	920.0	3.3	923.3	3.0	923.0
	22790	897.5	26.8	870.7	23.0	874.5	917.5	3.1	920.6	3.0	920.5
	22600	896.0	21.0	875.0	14.0	882.0	915.8	3.2	919.0	2.9	918.7
	22415	895.5	21.0	874.5	14.0	881.5	914.4	3.2	917.6	2.9	917.4

1 - Phase 1 Analysis, see end note

2 - Minimum 1999 Bed Elevation

3 - Toe-down and Freeboard based on max of LA County Hydrology & Sedimentation Manual (with SAM general aggradation) and LA County Design Manual, as per Hydrology & Sedimentation Manual

4 - Values at bridges are approxmiate. Final design of levee at bridge locations will include detailed bridge analysis

Table 4.4: (Continued) Santa Clara River Summary of Maximum Proposed Toe-down & Freeboard (ft)

Subreach	HEC-RAS Section	Z_{99} [2]	Outside Curved Reach		Straight-Inside Curved Reach		WSE	Outside Curved Reach		Straight-Inside Curved Reach	
			Maximum Total Degradation [3]	Proposed Toe-down Elevation [1,4]	Maximum Total Degradation [3]	Proposed Toe-down Elevation [1,4]		Maximum Total Freeboard [3]	Proposed Top of Levee Elevation [1]	Maximum Total Freeboard [3]	Proposed Top of Levee Elevation [1]
SRD1	22195	894.0	15.0	879.0	10.0	884.0	913.1	2.5	915.6	2.5	915.6
	22010	892.0	18.0	874.0	12.5	879.5	911.4	2.5	913.9	2.5	913.9
	21790	891.5	21.0	870.5	14.0	877.5	909.9	2.6	912.6	2.5	912.4
	21615	892.0	21.0	871.0	14.0	878.0	908.9	2.6	911.5	2.5	911.4
	21440	890.0	18.0	872.0	12.5	877.5	907.8	2.5	910.3	2.5	910.3
	21225	888.0	21.0	867.0	14.0	874.0	906.7	2.5	909.2	2.5	909.2
	21020	887.0	21.0	866.0	14.0	873.0	905.6	2.5	908.1	2.5	908.1
	20845	886.0	18.0	868.0	12.5	873.5	904.7	2.5	907.2	2.5	907.2
	20595	885.0	15.0	870.0	10.0	875.0	903.6	2.5	906.1	2.5	906.1
	20435	884.0	15.0	869.0	10.0	874.0	902.8	2.5	905.3	2.5	905.3
	20280	883.7	18.0	865.7	12.5	871.2	901.8	2.5	904.3	2.5	904.3
	20070	882.0	21.0	861.0	14.0	868.0	900.6	2.5	903.1	2.5	903.1
SRD2	19855	880.5	21.0	859.5	14.0	866.5	899.6	3.0	902.6	2.9	902.5
	19630	880.0	21.0	859.0	14.0	866.0	898.6	2.9	901.5	2.9	901.5
	19440	878.0	15.0	863.0	10.0	868.0	897.9	3.0	900.8	3.0	900.8
	19240	877.5	18.0	859.5	12.5	865.0	896.9	3.4	900.3	3.4	900.2
	19050	876.0	21.0	855.0	14.0	862.0	896.2	4.1	900.3	4.1	900.3
	18830	874.0	15.0	859.0	10.0	864.0	895.4	4.1	899.4	4.0	899.4
	18650	873.5	15.0	858.5	10.0	863.5	894.7	4.0	898.7	4.0	898.7
	18475	872.0	13.6	858.4	8.0	864.0	894.3	3.4	897.6	3.4	897.6
	18290	871.5	14.1	857.4	8.0	863.5	893.6	3.2	896.8	3.2	896.8
	18025	870.0	8.0	862.0	8.0	862.0	892.9	3.1	895.9	3.1	895.9
	17785	868.0	8.0	860.0	8.0	860.0	892.0	3.2	895.2	3.2	895.2
SRD3	17510	868.0	10.0	858.0	10.0	858.0	890.4	2.5	892.9	2.5	892.9
	17360	868.0	12.5	855.5	12.5	855.5	888.3	2.5	890.8	2.5	890.8
	17110	864.0	14.0	850.0	14.0	850.0	885.5	2.5	888.0	2.5	888.0
	16970	863.7	14.0	849.7	14.0	849.7	884.0	2.5	886.5	2.5	886.5
	16720	863.5	14.0	849.5	14.0	849.5	882.3	2.5	884.8	2.5	884.8
	16515	862.0	14.0	848.0	14.0	848.0	881.2	2.5	883.7	2.5	883.7
	16305	860.0	10.0	850.0	10.0	850.0	880.4	2.5	882.9	2.5	882.9
	16130	860.0	12.5	847.5	12.5	847.5	879.4	2.5	881.9	2.5	881.9
	15960	859.0	12.5	846.5	12.5	846.5	878.6	2.5	881.1	2.5	881.1
	15745	858.0	10.0	848.0	10.0	848.0	877.6	2.5	880.1	2.5	880.1
	15540	857.5	10.0	847.5	10.0	847.5	876.7	2.5	879.2	2.5	879.2
	15335	856.0	12.5	843.5	12.5	843.5	874.8	2.5	877.3	2.5	877.3
SRE1	15125	854.0	26.1	827.9	26.1	827.9	872.0	2.5	874.5	2.5	874.5
	14900	853.0	14.0	839.0	14.0	839.0	869.7	2.5	872.2	2.5	872.2
	14720	852.0	21.0	831.0	14.0	838.0	868.4	2.5	870.9	2.5	870.9
	14480	850.5	21.0	829.5	14.0	836.5	866.9	2.5	869.4	2.5	869.4
	14315	850.0	15.0	835.0	10.0	840.0	866.0	2.5	868.5	2.5	868.5
	14090	850.0	15.0	835.0	10.0	840.0	864.8	2.5	867.3	2.5	867.3
	13850	848.0	15.0	833.0	10.0	838.0	863.6	2.5	866.1	2.5	866.1
	13635	846.0	18.0	828.0	12.5	833.5	862.5	2.5	865.0	2.5	865.0
	13425	845.0	21.0	824.0	14.0	831.0	861.8	2.5	864.3	2.5	864.3
	13190	844.0	15.0	829.0	10.0	834.0	861.1	2.5	863.6	2.5	863.6
SRE2	13030	843.0	15.0	828.0	10.0	833.0	860.6	4.2	864.8	4.1	864.8
	12835	842.0	10.0	832.0	10.0	832.0	860.0	4.7	864.7	4.6	864.7
	12615	841.0	10.0	831.0	10.0	831.0	859.3	5.2	864.6	5.2	864.6
	12395	840.0	10.0	830.0	10.0	830.0	858.7	5.1	863.8	5.1	863.8
	12195	839.0	10.0	829.0	10.0	829.0	858.1	4.2	862.3	4.2	862.3
	11995	837.0	10.0	827.0	10.0	827.0	857.3	4.1	861.4	4.1	861.4
	11780	836.0	10.0	826.0	10.0	826.0	856.6	4.0	860.5	4.0	860.5
	11605	835.5	10.0	825.5	10.0	825.5	855.8	4.0	859.8	4.0	859.8
	11405	834.0	10.0	824.0	10.0	824.0	854.6	3.9	858.6	3.9	858.6
	11180	833.0	12.5	820.5	12.5	820.5	852.7	3.9	856.6	3.9	856.6
SRE3	11015	831.5	14.0	817.5	14.0	817.5	850.2	3.8	854.0	3.8	854.0
	10835	831.0	14.0	817.0	14.0	817.0	848.1	3.7	851.8	3.7	851.8
	10575	830.0	14.0	816.0	14.0	816.0	846.1	3.8	849.9	3.8	849.9
	10390	828.0	14.0	814.0	14.0	814.0	845.1	3.1	848.2	3.1	848.2
	10225	827.5	12.5	815.0	12.5	815.0	844.1	3.1	847.2	3.1	847.2
	10000	826.0	10.0	816.0	10.0	816.0	842.6	3.1	845.7	3.1	845.7
	9820	824.0	14.0	810.0	14.0	810.0	841.4	3.1	844.5	3.1	844.5
	9595	823.8	10.0	813.8	10.0	813.8	839.9	3.1	843.0	3.1	843.0
	9385	823.0	18.0	805.0	12.5	810.5	838.6	3.1	841.7	3.1	841.7
	9220	822.0	18.0	804.0	12.5	809.5	837.6	3.1	840.7	3.1	840.7
	9025	821.0	18.0	803.0	12.5	808.5	836.6	3.1	839.7	3.1	839.7

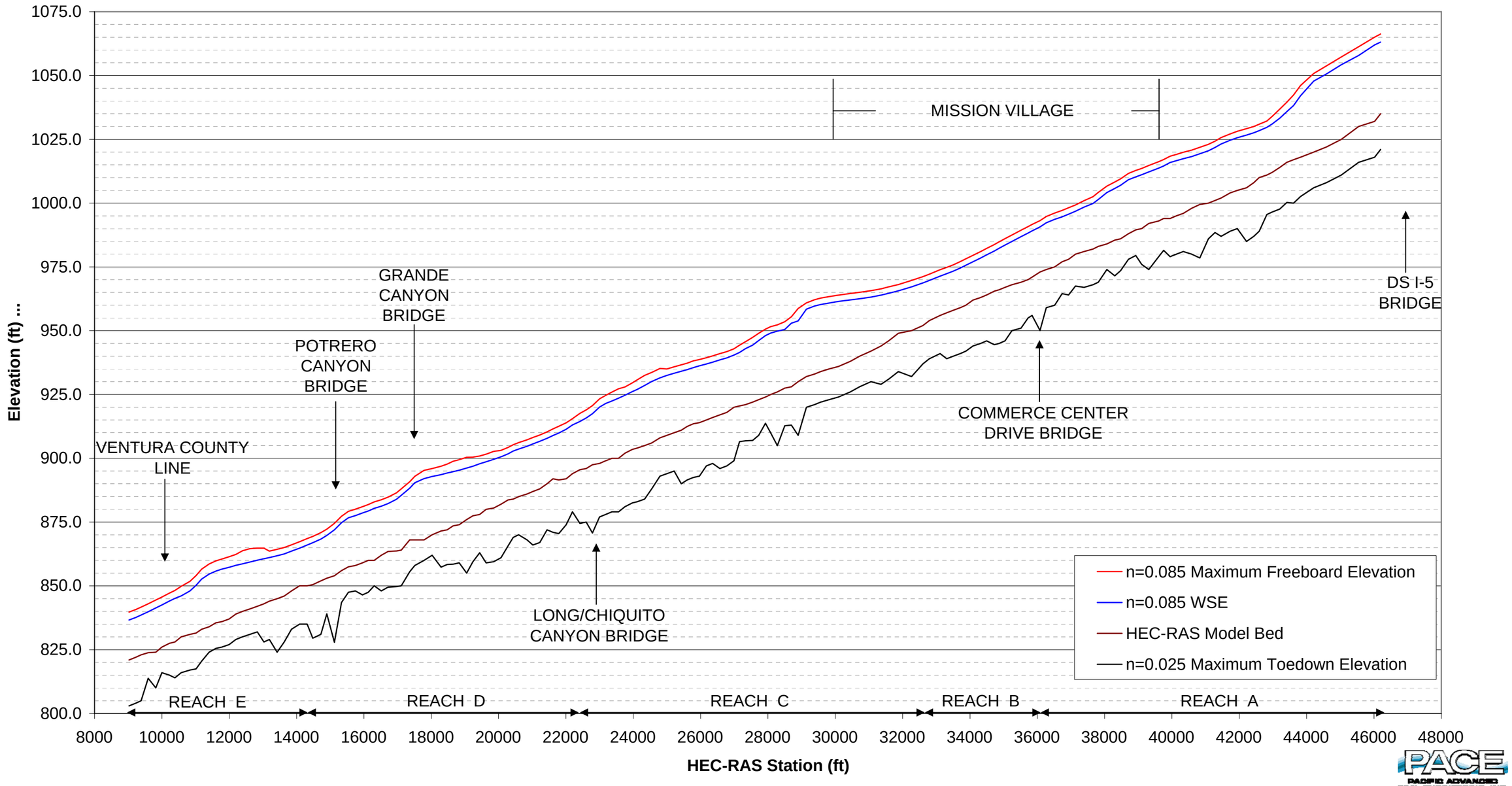
1 - Phase 1 Analysis, see end note

2 - Minimum 1999 Bed Elevation

3 - Toe-down and Freeboard based on max of LA County Hydrology & Sedimentation Manual (with SAM general aggradation) and LA County Design Manual, as per Hydrology & Sedimentation Manual

4 - Values at bridges are approxmiate. Final design of levee at bridge locations will include detailed bridge analysis

Figure 4.5: Santa Clara River Proposed Conditions Outside Curved Reach Maximum Toedown & Freeboard Summary



to be very localized, primarily at crossings, and are not expected to impact fluvial mechanics on the River as a whole.

General adjustment, long-term adjustment, and other scour are summed to determine total potential bed adjustment following LACH&SM methodology. Calculations for the proposed condition predict that the combined bed adjustment ranges from approximately -6.7 to -26.2 feet for both the outside of curved reaches and for the inside of curved and straight reaches.

A comparison of total bed adjustment estimated by both the summed methodology and the LACFCDDM methodology shows that the more intensive LACH&SM methodology using SAM for general adjustment and historical analysis for long-term adjustment predicts a shallower toe-down for proposed conditions than does the LACFCDDM methodology except for sections in the vicinity of subreach, SRB1 and SRE1. In SRB1 section 36080 and SRE1 section 15125, the presence of proposed bridges causes LACH&SM calculations of this section to greatly exceed LACFCDDM calculations, by more than 10 feet. LACH&SM methodology utilizing SAM calculations predicts a deeper toe-down than does the LACFCDDM at these locations methodology because the LACFCDDM does not account for the effects of local degradation as effectively. Only minor differences are expected between the existing and proposed condition with the largest differences being local to bridge crossings.

Freeboard is considered for the purposes of this report to be the additional height required above the top of a levee or other bank protection to prevent overtopping. Freeboard elevation is calculated in this study based on LACH&SM Chapter 5A-3, and includes LACFCDDM calculations. The freeboard for the River ranges from approximately 2.5 to 5.2 feet for both outside of curved and straight or inside of curved reaches in the proposed condition. Maximum total toe-down, total freeboard, toe-down elevation and freeboard elevation are presented in Table 4.4 and Figure 4.5. It should be noted that the fluvial study findings confirm the of the velocity distribution data above and the vegetation data below concerning the minimal change to erosion expected by the construction of the proposed project.

These changes are not considered significant and it is expected that various Newhall related impacts will be localized, and, with respect to implementation of the proposed improvements, that the fluvial mechanics of the River will remain essentially the same after construction of the Mission Village flood protection improvements. The River is expected continue to behave fluvially as it did prior to construction of these proposed improvements.

Impacts associated with erosion and sediment deposition and, therefore, streambed modification within the River are evaluated as a function of in-stream velocities, which are indicators for potential riverbed scouring. This is discussed in detail in Section 4.5.1.

4.1.2 On-site drainage

Implementation of the Project (with the associated storm drain system) would affect the previously described on-site natural tributary drainage channels. While existing discharges from the Project site are not concentrated into centralized outlet structures (as proposed by the Project), surface water flows naturally form paths of least resistance and concentrate at existing topographic depressions or cut channels that serve as concentrated discharge locations. Therefore, while the Project includes development of the storm drain system and will have predefined outlets, this condition will not significantly alter existing drainage patterns. The Project also includes the use of energy dissipaters at the storm drain outlets to the River. Installation of these improvements will dissipate the energy that could cause erosion at the Project outlets.

The PSOMAS Drainage Concept compares the existing and proposed developed condition hydrology, and concludes that a net decrease of Q_{CAP}=*-791 cfs* is expected to occur in the proposed Project condition, as presented in Table 4.5 from PSOMAS. The apparent cause of the reduction of the peak discharge is a function of the reduction of the time of concentration for the project. That is, the increase in imperviousness reduces the time of concentration for various sub-basins. As a result the hydrograph of water discharged from the Project site is flatter and broader, reducing the peak. This small change (<1%) shows that the existing and proposed Project condition are substantially consistent. It is important to note that the existing condition is the 50-year burned and bulked discharge, also defined as the Capital discharge. The proposed Project condition, in contrast, is the burned and unbulked discharge. In the proposed Project condition, water from off-site discharging through the Project will pass through sediment basins that act to remove or unbulk sediment from the water. While the volume of water is the same for both the existing condition and proposed Project condition, the existing condition discharge is laden with sediment while the proposed Project condition discharge has had sediment removed.

Table 4.5: Existing vs. Proposed Condition On-site Hydrology Comparison Capital Event (CFS)

Existing[1]	Proposed[2]	Delta
5657	4866	-791

1. Burned and bulked 2. Burned or Design

4.1.3 Proposed Floodplain Modifications

4.1.3.1 Consistency with the Newhall Ranch EIR

The Newhall Ranch Specific Plan proposed utilization of innovative techniques to meet the requirements of flood control while maintaining the natural resources within the Santa Clara River. The Project will implement these techniques as part of its flood control improvements. Traditional flood control techniques in use in Los Angeles County rely on reinforced concrete or grouted rock rip-rap to minimize erosion while

maximizing the volume of flood flows carried by the drainage. While exceedingly efficient as a flood control technique, this approach retains none of the natural resource value.

In contrast, the Conceptual Backbone Drainage Plan of the Newhall Ranch Specific Plan provides drainage and flood control protection to developed uses while preserving the River as a natural resource. The Drainage Plan utilizes several criteria that are to be implemented by projects that develop within the Specific Plan area. The primary criteria are as follows:

- Flood corridor must allow for the passage of Los Angeles County Capital Flood discharge without the permanent removal (maintenance) of natural River vegetation (except at bridge crossings);

- The banks of the River will generally be established outside of the "waters of the United States" as defined by federal laws and regulations and as determined by the delineation completed by the ACOE in August 1993;

- Where the ACOE delineation width is insufficient to contain the Capital Flood flow, the flood corridor will be widened by an amount sufficient to carry the Capital Flood flow without the necessity of permanently removing vegetation or significantly increasing velocity; and

- Soil cement and other project bank protection will occur only where necessary to protect against erosion adjacent to the proposed development. Where existing bluffs are determined to be stable and there is no adjacent proposed development, no bank protection will be built.

The improvements proposed by the Project are consistent with these criteria. Most of the flood protection associated with the Project is buried bank stabilization to stabilize River and creek banks. As illustrated in this report, the design and location of the flood protection improvements is sufficient to carry the Capital Flood discharge and adheres to FEMA requirements. The location of areas where soil cement would be provided is depicted on Figure 1.4 and is outside of the ACOE jurisdictional limits. Finally, only areas where flood protection is necessary are proposed for improvements.

At limited locations on the Project site, such as at outlet structures, access ramps, or bridge abutments, grouted rip-rap or reinforced concrete would be used to minimize erosion. In the Project area, approximately 17 percent of the River corridor would be protected with flood protection improvements, while 83 percent of the River corridor would remain in a natural state. Approximately 4 percent of the area is proposed for flood protection improvements that would consist of buried

bank stabilization, approximately 12 percent would consist of TRM's (those areas along the utility corridor) and 1 percent would be reinforced concrete or rip rap with exposed conditions.

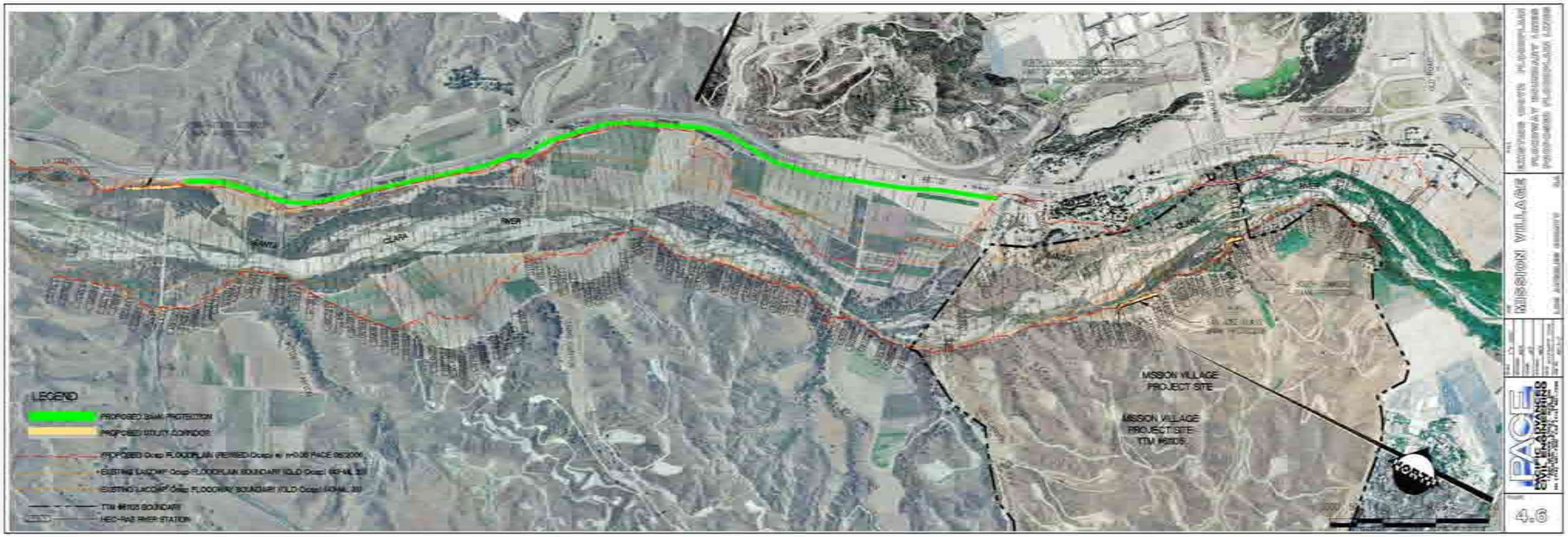
Buried soil cement, now employed on numerous projects within the Santa Clarita Valley, is a modern flood control technique used to protect against erosion while maintaining natural vegetation and soft banks. Figure 1.5 depicts a typical cross-section for buried soil cement. As shown, this approach uses soil cement, primarily consisting of on-site materials, generally installed in locations set back from the riparian corridor, which is then buried and re-vegetated with native plant species. This type of flood protection allows for the creation of a large river corridor with significant buffers, which maintains the natural habitat presently found along the River. In conclusion, this report confirms the project's consistency with the Newhall Ranch Specific Plan.

4.1.3.2 Modification of County Floodway Map/Consistency with County Capital discharge requirements

Los Angeles County has mapped its floodplain and flood way for the River under its Q_{CAP} requirements (Figure 4.6). All projects developed within the unincorporated areas of the County of Los Angeles are required to comply with the County's Q_{CAP} requirements. The project design is consistent with the Capital discharge requirements since design modeling is based on the Capital discharge. Finally, if the Project is approved at the project-level, the County's Map Floodway will be changed to correspond with Project improvements.

4.1.3.3 FEMA 100-Year Floodplain

The Project would necessitate encroachments into the existing FEMA 100-year floodplain. These encroachments were all discussed in detail in the Newhall Ranch Specific Plan EIR. These encroachments would require FEMA review and approval in the form of the Conditional Letter of Map Revision/Letter of Map Revision (CLOMR/LOMR) floodplain map revision process. In the overall 1,250 acre site, only approximately 5.5 acres of the Project development acreage is within existing FEMA – PACE proposed 100 year floodplain. This developed region consists of the proposed Commerce Center Drive Bridge and the SR 126 widening bank protection area at the north end of the bridge. In summary, the FEMA 100-year floodplain line corresponds to an existing elevation where flooding could occur in a 100-year storm. To meet the FEMA requirements, the Project proposes the raising of the development footprint to an elevation above the existing FEMA maximum flooding elevation. Additionally, the Project incorporates buried soil cement at the southern bank of Commerce Center Drive Bridge, at San Jose Flats and at the WRP as well as bank stabilization along the River corridor to protect the site from erosion.



A full-size reproduction of this figure can be found at Impact Sciences.

Encroachment impacts were evaluated using floodplain and habitat engineering and analyzed on the basis of depth and velocity, as described below. Additionally, some banks located out of the floodplain will require stabilization because of the need to protect for the Q_{CAP} discharge.

The bank stabilization and erosion protection would provide adequate protection to the developed areas from flood hazards. Additionally, the locations and dimensions of this bank stabilization, erosion protection and bridge abutments are such that neither would impede or redirect flood flows within the River. Therefore, a modification to the FEMA flood hazard boundary is appropriate to correspond to the location of the flood protection improvements.

The Commerce Center Drive Bridge is proposed to be constructed across the River, near the eastern end of the Project site (Figure 1.4). Commerce Center Drive Bridge is to include abutments, rip-rap transitions to soil cement, and approaches that would reduce the width of the 100-year floodplain. Table 4.6 details the area change between each flood event's proposed and existing condition. It can be seen in the 4.2 A-G run that the existing active River channel width, which carries the 2- through 10-year flood events, would be completely spanned by the bridge and remain unaffected. The 20-, 50-, 100-year and Q_{CAP} events would be impacted by the narrowing of the channel resulting in localized increases in velocity and water surface elevation. This bank stabilization, located at both ends of the Commerce Center Drive Bridge, is consistent with the bank stabilization improvements described in the Newhall Ranch Specific Plan. Finally, flooding up to and including the 100-year and Q_{CAP} events would be contained within the north and south bridge abutments.

Table 4.6: Pre- and Post-Development Floodplain/River Area (AC)

Storm Event	Existing Conditions Acreage	Post Development	DELTA (%)
2-Year	230.6	230.6	0.0%
5-Year	303.7	303.7	0.0%
10-Year	357.6	359.1	0.4%
20-Year	510.6	505.5	-1.0%
50-Year	728.8	721.9	-1.0%
100-Year	804.2	799.4	-0.6%
CAP	979.3	972.2	-0.7%

Although soil cement or other erosive protection methods will need to be utilized to protect the proposed Lion Canyon Channel and outlet structure, there will be no resulting impacts to the River hydraulics as it is located behind the

capital floodplain or within ineffective flow portion of the floodplain.

The Utility Corridor soil cement alternative STA 17360 to STA 15540 will not increase the impacts as described in Table 4.6 above. The proposed alternative horizontal alignment is outside of the 2, 5, 10, 20 and 50 year floodplain limits. The proposed impacts from the alternative are included with Table 4.6 impact values. The area of permanent impact from the soil cement would be slightly increased (2,000 LF x ± 20 feet width or approximately 40,000 square feet).

4.2 Housing or Structures within a 100-Year Flood Hazard Area

Consistent with the approved Newhall Ranch Specific Plan, a portion of the project tract map site, which consists of residential lots, internal roads and other development, is within the existing FEMA 100-year floodplain (Figure 3.1). This portion of the proposed development is situated on existing agricultural lands within the floodplain area. However, this portion of the proposed development would be filled and, thereby elevated, so that the developed topography would no longer be within the existing FEMA 100-year floodplain. As additional flood protection, the Project's southern boundary proposes buried soil cement, which would stabilize the elevated bank and protect the proposed development from flood hazards. The buried soil cement is designed to act as a non-erodible boundary to contain flood waters during a Capital Flood discharge. Figure 3.1 illustrates the existing FEMA 100-year floodplain zone, proposed development within that area and the proposed soil cement bank protection.

Because a portion of the Project development is within the existing FEMA 100-year floodplain, adjustments to the FEMA published maps, (FIRMs), are required. These adjustments are administered by FEMA, and revisions to the mapping are made by applicants applying for a Letter of Map Revisions -- based on Fill (LOMR-F). LOMR-Fs are documents issued by FEMA that remove property and/or structures from special flood hazard areas. It is a common accepted practice, both nationwide and within Los Angeles County, to process revisions to the FEMA floodplain maps (*i.e.*, LOMR-Fs). The issuance of a LOMR-F would eliminate the property and/or structures from the applicable FEMA 100-year map. Any property and/or structures that are elevated above the FEMA 100-year floodplain zone are considered reasonably safe and free from flood hazard. Figure 4.7A-G depicts the proposed final FEMA 100-year floodplain zone, consistent with the proposed developed topography and soil cement bank protection.

The Commerce Center Drive Bridge is proposed to be constructed across the River, near the eastern end of the Project site (Figure 1.4). Commerce Center Drive Bridge is to include abutments, rip-rap transitions to soil cement, and approaches that would reduce the width of the 100-year floodplain. Table 4.6 details the area change between each flood event's proposed and existing condition. It can be seen in the 4.7A-G run that the existing active River channel width, which carries the 2- through 20-year flood events, would be completely spanned by the bridge and remain unaffected. The 50-, 100-year and Q_{CAP}

events would be impacted by the narrowing of the channel resulting in localized increases in velocity and water surface elevation. This bank stabilization, located at both ends of the Commerce Center Drive Bridge, is consistent with the bank stabilization improvements described in the Newhall Ranch Specific Plan. Finally, flooding up to and including the 100-year and Q_{CAP} events would be contained within the north and south bridge abutments. As a result no impacts are anticipated due to the location of the proposed bridge.

4.3 Whether Runoff Volumes Would Exceed Existing or Planned Systems

The Project would increase the amount of runoff from the Project areas covered by roads, buildings, paved parking areas, and other relatively impermeable or impervious features (refer to Table 2.1 for the assumed percent imperviousness for each land use proposed for the Project site). Specifically, impervious surfaces on the Project site would increase the amount of clear flow runoff from the site. Burned and bulked runoff and debris volumes, however, would be reduced because the developed portions of the Project site would be covered with impervious surfaces and non-erodible vegetation, and because debris basins are proposed just upstream of the Project site that would reduce the amount of debris and sediment in the runoff.

The post-development runoff quantities are provided in Table 4.7 (PSOMAS) and the discharge is predicted to total 4,866 cfs for the Project site during a 50-year storm, which is a 791 cfs reduction in 50-year flows when compared to pre-development conditions. This reduction in the discharge is largely due to Project debris basins that would capture upstream bulk flows and allow debris to settle out from the runoff before it enters the storm system through the developed portion of the site.

The LACDPW defined criteria for design of flood control systems establish the more severe hydrologic conditions (e.g., burned and bulked) as the basis of impact evaluation (refer to Sections 2.1.1 and 2.1.2 of this report). The 50-year total runoff from the Project site essentially would be the same under existing and proposed Project conditions because, despite the increase in imperviousness, the sediment basins reduce the bulking. Therefore, the Project would not result in a significant increase in on-site or downstream flooding impacts.

Table 4.7: Post-Development Site Runoff Conditions Summary

Drainage Area	Acreage	Debris Producing Acreage	Q50[1] (cfs)	Q50bb[2](cfs)	[3]Debris Volume (cy)	Q/A (cfs/Ac)
1-28 series	637.2	512.6	1049	1425	20482	20,482
60 series	175.8	17.5	316	319	440	440
80 series	117.5	0	231	231	0	0
95-119 series	464	121.8	776	838	4994	4994
120 series	12.5	12.5	29	39	684	684
130 series	31.4	0	32	32	0	0
140 series	20.6	20.6	33	45	1127	1127
150 series	13	13	26	35	711	711
160 series	16.3	16.3	30	41	892	892
170 series	6.1	6.1	17	23	334	334
190 series	32.9	32.9	55	75	1800	1800
200 series	424.8	424.8	740	940	11300	11,300
400 series	138.7	0	220	220	0	0
500 series	107.7	90.7	211	221	4263	4263
600 series	406.9	170.9	851	969	6152	6152
610 series	18.1	18.1	41	56	990	990
620 series	26.7	5.7	68	76	514	514
Totals	***2,650**	**1,464**	**4,745**	**5,585**	**54,301**	**54,301**

[1]*Q50 - 50-year rainfall intensity clear and burned flow*
[2]*Q50bb - 50-year rainfall intensity burned and bulked flow*
3Debris Volume – Debris Producing acreage is multiplied by the area's debris producing rate. (range: 30-55 cy/ac) (Debris Producing rates were taken from the LACDPW Sedimentation manual see appendix for reference sheets.
** The increase in acreage was due to the widening of Magic Mtn. Parkway. (See Section 4.1)*

4.4 Exposure to Significant Risk of Loss, Injury, or Death

Although the site is presently subject to some debris and mud flows, adequate building setbacks from natural slopes and debris control facilities proposed in upstream areas of the Project site would protect the proposed development from debris and mudflow hazards.

As designed, the proposed southerly bridge bank protection and the proposed Commerce Center Drive Bridge would increase the water surface elevation of the River primarily upstream of the proposed Commerce Center Drive Bridge. An increase in water surface elevation greater than one foot does not occur at any section as can be seen in the Qcap, n=0.060 run as presented in Table 4.3. A discussion of water surface elevation change based on the approved Newhall Ranch Santa Clara River HEC-RAS Modeling study is included in 4.1.1B, above. All increases in water levels would dissipate, returning to a pre-project condition,

prior to the end of the proposed project area as indicated by HEC-RAS numerical modeling, because encroachments into the floodplain are only minimal. Therefore, increases in flood water elevations due to Project-related improvements would be limited to the applicant's property, in areas where no development is planned, or would be mitigated with the installation of flood protection. Therefore, the Project improvements would not expose people or structures to a significant risk of loss, injury or death involving flooding.

4.5 Whether Substantial Alteration of an Existing Drainage Pattern Would Result In Substantial Erosion or Situation and Harmful Increases in Erosion

4.5.1 Santa Clara River

Erosion is not anticipated to be a concern on developed portions of the Project site because the site would be covered with impermeable or impervious surfaces and landscaping would minimize the potential for erosion from undeveloped areas. Potential for erosion within the River and the major tributaries impacted by the Project can be evaluated by reviewing changes to hydraulic shear stress or flow velocities, in conjunction with potentially erodible materials. In Los Angeles County, velocities are the preferred indicator for potential streambed erosion. Because the riverbed is composed of alluvial materials, the non-erodible velocities (velocities below which no erosion would occur) range from 2.5 feet per second (fine gravels under clear flow conditions) to 5.0 feet per second (alluvial silts transporting colloidal materials) (Chow, 1959). Therefore, a representative velocity of 4.0 feet per second was determined to be the appropriate indicator for potential erosion.

A potentially significant erosion impact would arise if a significant amount of a floodplain area were in the 0-4-foot per second range, but as a result of the Project (including the Commerce Center Drive Bridge and downstream bank protection); the area would be subjected to velocities greater than 4 feet/second (Figure 4.8). The changes in acreage for a given velocity range are shown in Figure 4.9A-D run. Additionally, the approved Newhall Ranch River Fluvial Study Phase 1 Final Draft (PACE, March, 2006) found that large changes in bed elevation during a Capital event are not expected except at proposed bridge piers.

4.5.2 On-Site Drainage Discharge Points

The Los Angeles MS4 Permit notes that increased volume, velocity, and discharge duration of stormwater runoff from developed areas could potentially accelerate downstream erosion and impair stream habitat. As a result, the Permit stipulates that “Permittees shall control post-peak stormwater runoff in Natural Drainage Systems to prevent accelerated stream erosion and protect stream habitat.” The following discussion supports the conclusion that there are no significant downstream impacts potentially accelerating erosion or significantly impacting stream habitat:

FIGURE 4.8: MISSION VILLAGE FLOODPLAIN AREA BY VELOCITY IMPACTS STATISTICS

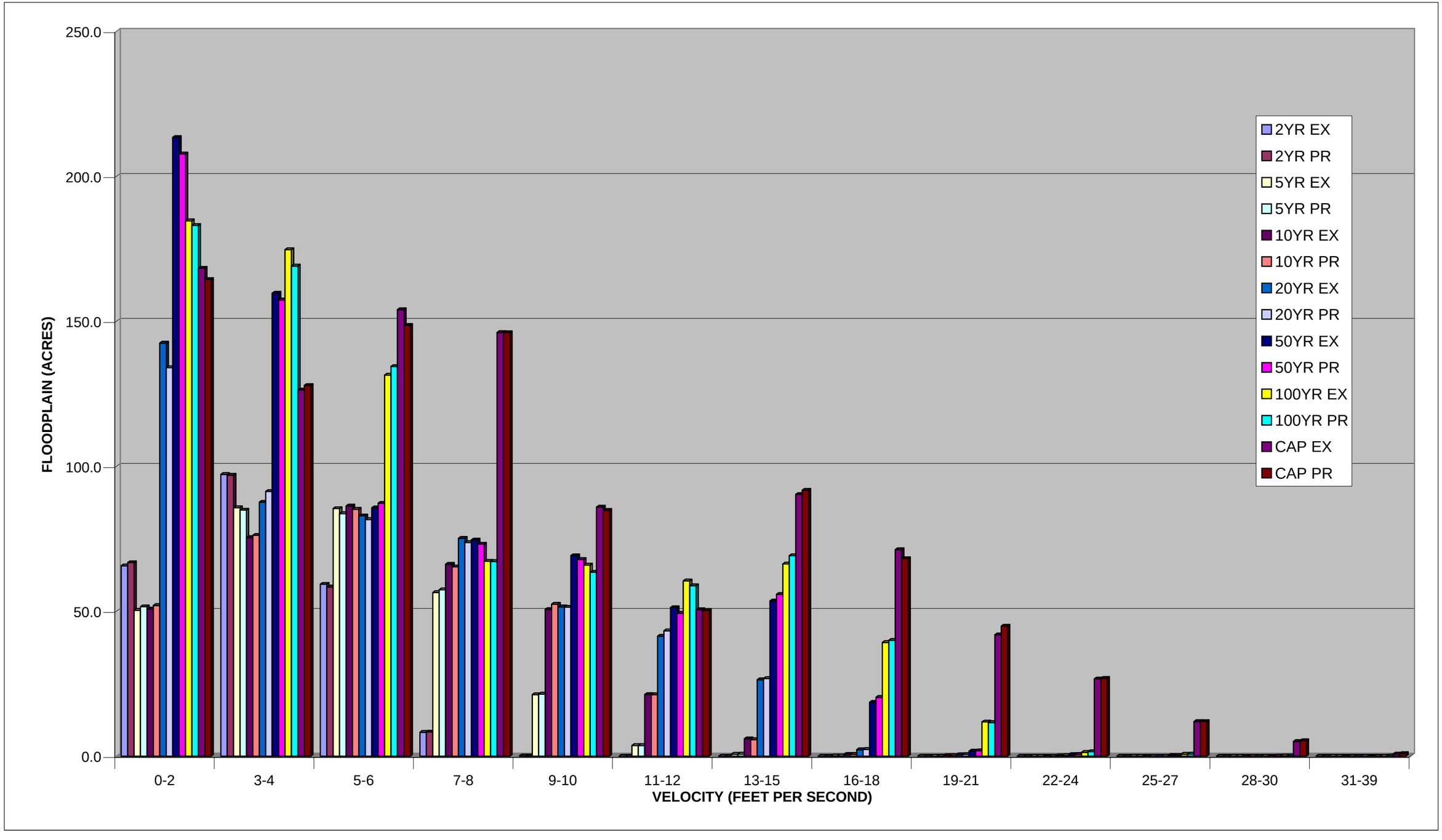
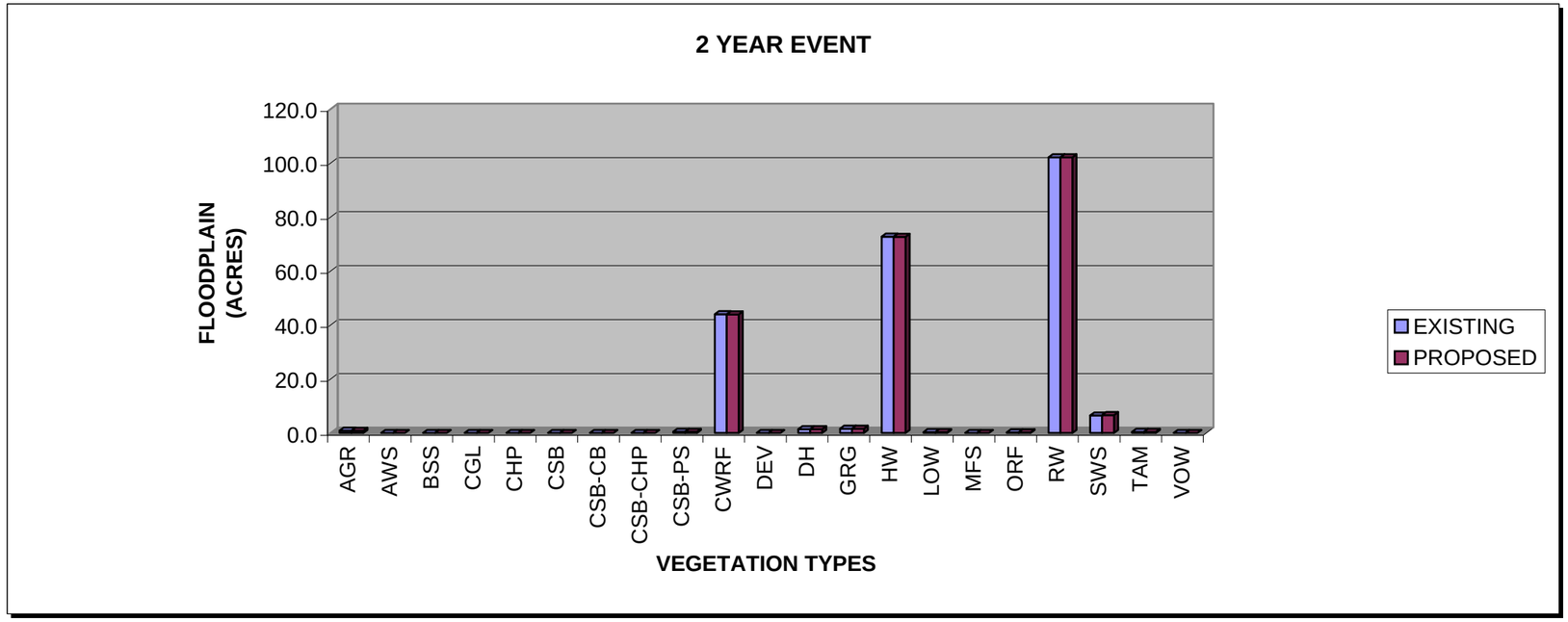


Figure 4.8

FIGURE 4.9a: MISSION VILLAGE FLOODPLAIN OVERALL VEGETATION COMPARISONSATION COMPARISONS

2 YEAR - Floodplain Overall Vegetation

Vegetation	EXISTING	PROPOSED	DELTA	DELTA %
TYPE	(AC)	(AC)	(AC)	(%)
AGR	0.9	0.8	0.0	-2.7%
AWS	0.0	0.0	0.0	0.0
BSS	0.0	0.0	0.0	0.0
CGL	0.0	0.0	0.0	0.0
CHP	0.0	0.0	0.0	0.0
CSB	0.0	0.0	0.0	0.0
CSB-CB	0.0	0.0	0.0	0.0
CSB-CHP	0.0	0.0	0.0	0.1
CSB-PS	0.5	0.5	0.0	0.0
CWRF	44.0	43.9	-0.1	0.0
DEV	0.0	0.0	0.0	0.0
DH	1.4	1.4	0.0	0.0
GRG	1.6	1.6	0.0	0.0
HW	72.7	72.6	-0.1	0.0
LOW	0.3	0.3	0.0	0.0
MFS	0.0	0.0	0.0	0.3
ORF	0.2	0.2	0.0	0.0
RW	102.1	102.1	0.0	0.0
SWS	6.5	6.6	0.1	0.0
TAM	0.4	0.4	0.0	0.0
VOW	0.0	0.0	0.0	0.0
TOTAL	**230.6**	**230.6**	**0.0**	**0.0%**



5 YEAR - Floodplain Overall Vegetation

Vegetation	EXISTING	PROPOSED	DELTA	DELTA %
TYPE	(AC)	(AC)	(AC)	(%)
AGR	1.1	1.1	0.0	-3.0%
AWS	0.0	0.0	0.0	0.0
BSS	0.0	0.0	0.0	0.0
CGL	0.0	0.0	0.0	0.0
CHP	0.0	0.0	0.0	0.0
CSB	0.0	0.0	0.0	0.0
CSB-CB	0.0	0.0	0.0	0.0
CSB-CHP	0.0	0.0	0.0	0.0
CSB-PS	0.5	0.5	0.0	0.0
CWRF	63.0	63.0	0.0	0.0
DEV	0.0	0.0	0.0	0.0
DH	2.2	2.2	0.0	0.0
GRG	2.4	2.4	0.0	0.0
HW	94.2	94.1	-0.1	0.0
LOW	0.4	0.4	0.0	0.0
MFS	0.2	0.2	0.0	0.1
ORF	0.2	0.3	0.0	0.0
RW	130.9	130.8	-0.1	0.0
SWS	7.4	7.6	0.1	0.0
TAM	1.1	1.1	0.0	0.0
VOW	0.0	0.0	0.0	0.0
TOTAL	**303.7**	**303.7**	**0.0**	**0.0%**

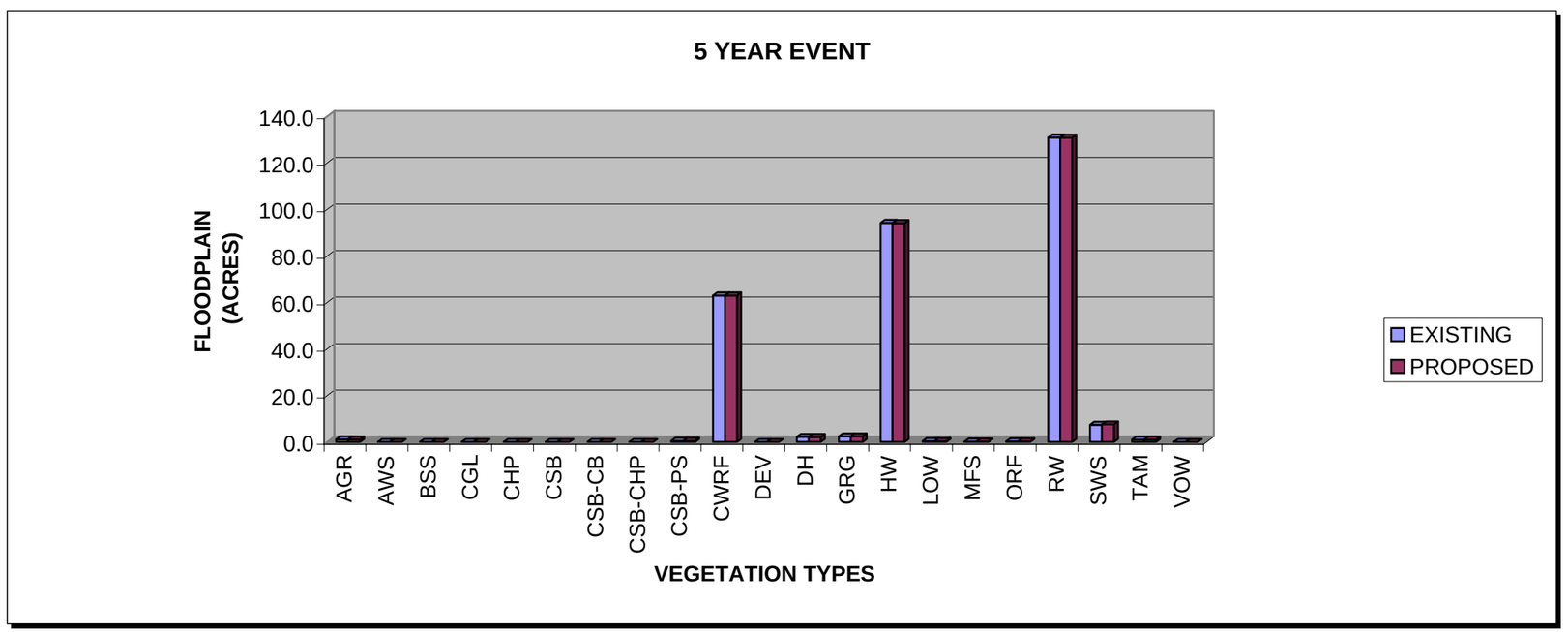
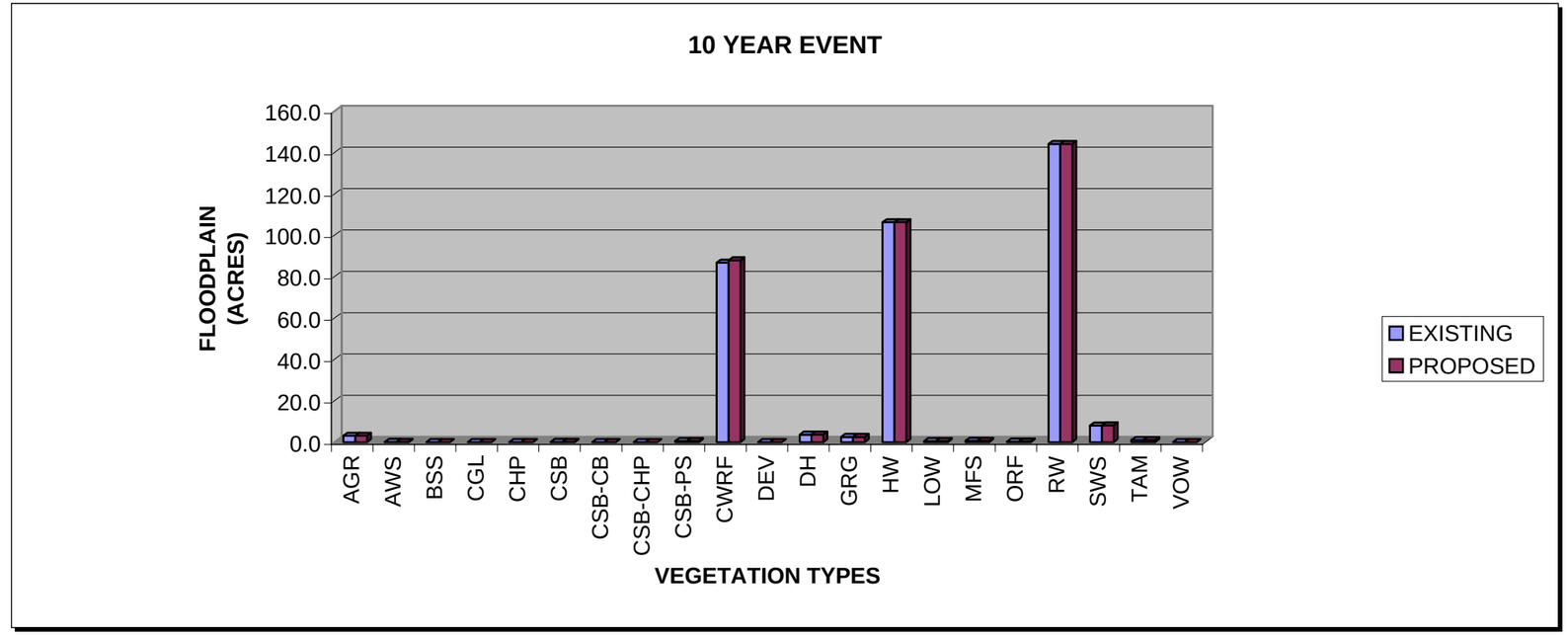


FIGURE 4.9b: MISSION VILLAGE FLOODPLAIN OVERALL VEGETATION COMPARISONS

10 YEAR - Floodplain Overall Vegetation

Vegetation Type	EXISTING (AC)	PROPOSED (AC)	DELTA (AC)	DELTA % (%)
AGR	3.1	3.1	0.0	0.6%
AWS	0.1	0.1	0.0	-0.1
BSS	0.0	0.0	0.0	0.0
CGL	0.0	0.0	0.0	0.0
CHP	0.0	0.0	0.0	0.0
CSB	0.0	0.1	0.1	1.9
CSB-CB	0.0	0.0	0.0	0.0
CSB-CHP	0.0	0.0	0.0	0.6
CSB-PS	0.5	0.5	0.0	0.0
CWRF	86.8	87.9	1.1	0.0
DEV	0.0	0.0	0.0	0.0
DH	3.6	3.7	0.0	0.0
GRG	2.5	2.5	0.0	0.0
HW	106.3	106.3	0.0	0.0
LOW	0.5	0.5	0.0	0.0
MFS	0.6	0.6	0.0	0.0
ORF	0.3	0.3	0.0	0.1
RW	144.1	144.2	0.1	0.0
SWS	8.0	8.2	0.1	0.0
TAM	1.1	1.1	0.0	0.0
VOW	0.0	0.0	0.0	-0.2
TOTAL	**357.6**	**359.1**	**1.5**	**0.4%**



20 YEAR - Floodplain Overall Vegetation

Vegetation Type	EXISTING (AC)	PROPOSED (AC)	DELTA (AC)	DELTA % (%)
AGR	46.0	46.6	0.7	1.4%
AWS	0.6	0.6	0.0	-0.1
BSS	0.0	0.0	0.0	-0.1
CGL	0.1	0.1	0.0	0.0
CHP	0.0	0.0	0.0	0.0
CSB	0.2	0.2	0.0	-0.1
CSB-CB	0.0	0.0	0.0	0.0
CSB-CHP	0.1	0.1	0.0	-0.1
CSB-PS	0.6	0.6	0.0	0.0
CWRF	144.0	139.5	-4.5	0.0
DEV	0.2	0.2	0.0	0.0
DH	9.1	9.1	0.0	0.0
GRG	3.0	2.7	-0.3	-0.1
HW	117.0	117.3	0.3	0.0
LOW	0.7	0.7	0.0	0.0
MFS	6.9	6.9	0.0	0.0
ORF	0.3	0.3	0.0	0.0
RW	171.8	170.7	-1.1	0.0
SWS	9.0	9.0	0.0	0.0
TAM	1.1	1.1	0.0	0.0
VOW	0.0	0.0	0.0	0.0
TOTAL	**510.6**	**505.5**	**-5.1**	**-1.0%**

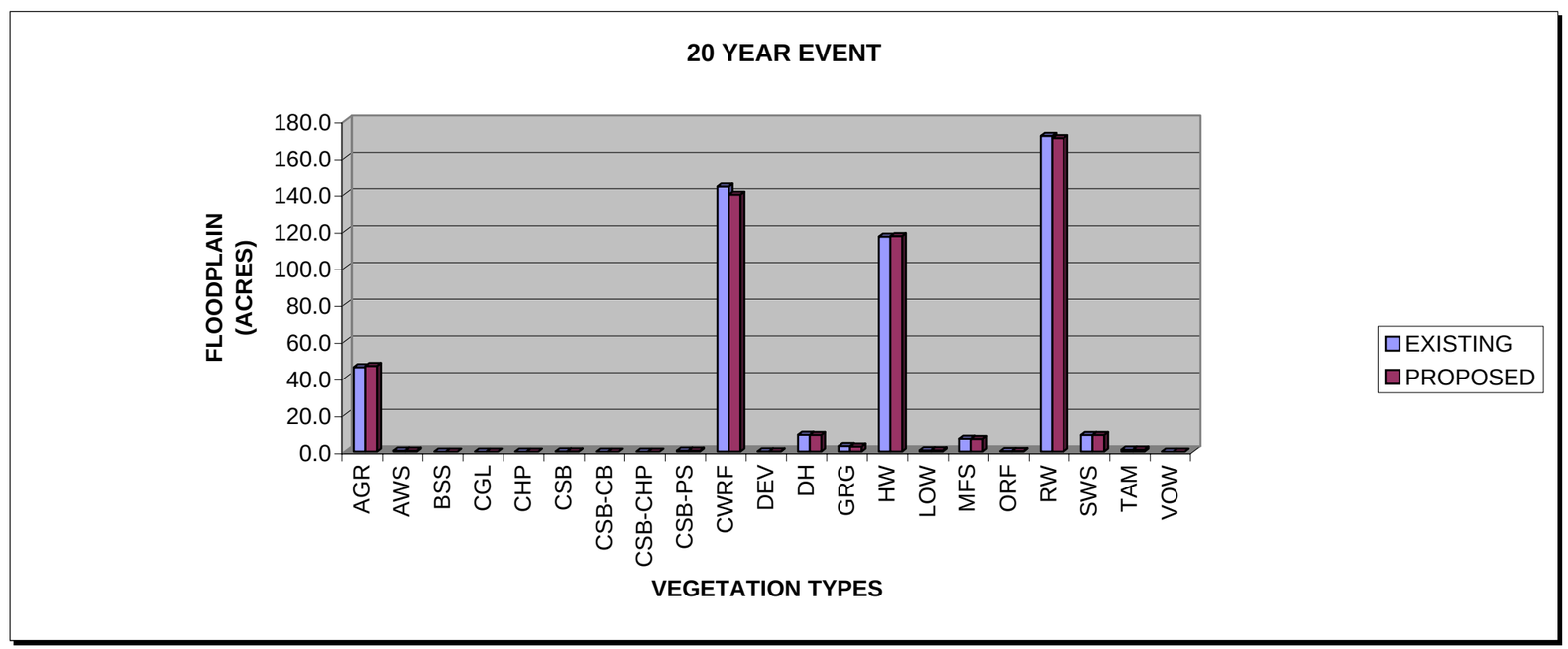
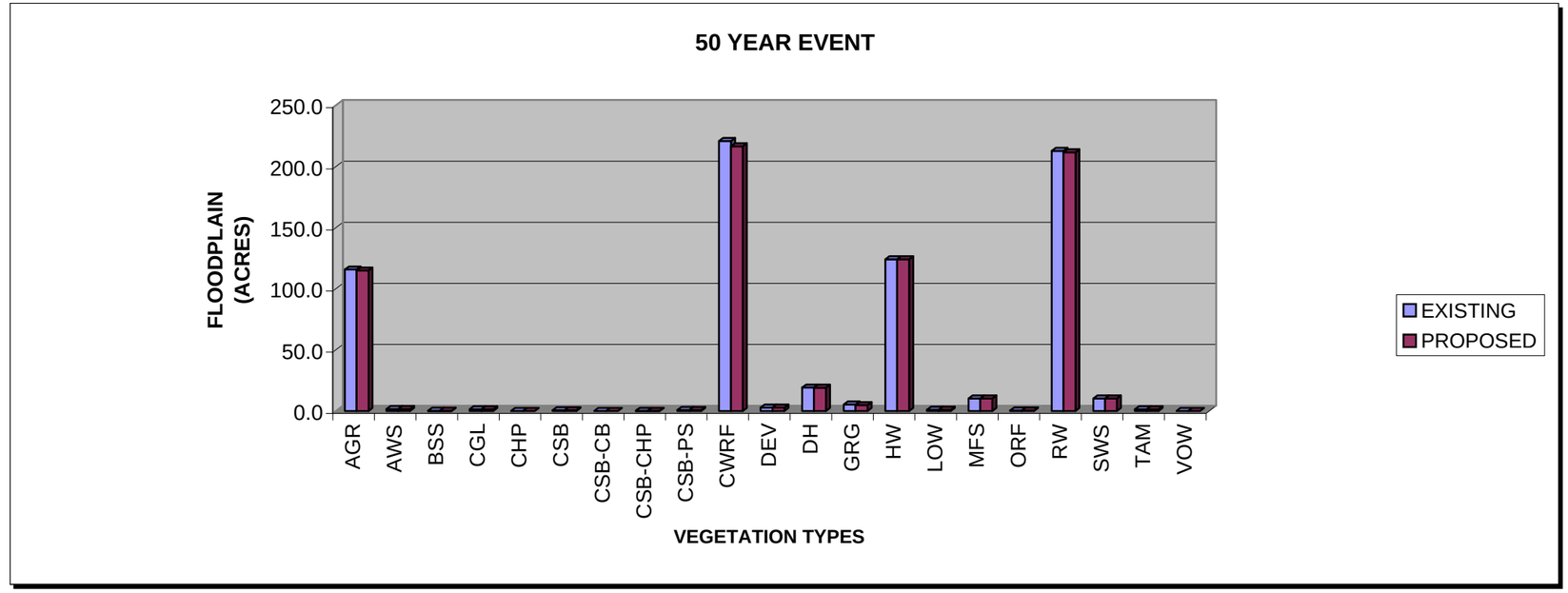


FIGURE 4.9c: MISSION VILLAGE FLOODPLAIN OVERALL VEGETATION COMPARISONS

50 YEAR - Floodplain Overall Vegetation

Vegetation Type	EXISTING (AC)	PROPOSED (AC)	DELTA (AC)	DELTA % (%)
AGR	115.7	115.0	-0.8	-0.7%
AWS	1.6	1.6	0.0	0.0
BSS	0.3	0.3	0.0	0.0
CGL	1.4	1.4	0.0	0.0
CHP	0.0	0.0	0.0	0.0
CSB	0.7	0.6	0.0	0.0
CSB-CB	0.0	0.0	0.0	0.0
CSB-CHP	0.1	0.1	0.0	0.0
CSB-PS	0.8	0.8	0.0	0.0
CWRF	220.9	216.6	-4.3	0.0
DEV	2.7	2.7	0.0	0.0
DH	19.2	19.0	0.0	0.0
GRG	5.3	4.8	-0.5	-0.1
HW	124.1	124.1	0.0	0.0
LOW	0.9	0.9	0.0	0.0
MFS	10.2	10.2	0.0	0.0
ORF	0.3	0.3	0.0	0.0
RW	212.8	211.7	-1.1	0.0
SWS	10.3	10.3	0.0	0.0
TAM	1.4	1.4	0.0	0.0
VOW	0.0	0.0	0.0	0.0
TOTAL	**728.8**	**721.9**	**-6.9**	**-1.0%**



100 YEAR - Floodplain Overall Vegetation

Vegetation Type	EXISTING (AC)	PROPOSED (AC)	DELTA (AC)	DELTA % (%)
AGR	144.3	143.4	-0.9	-0.7%
AWS	2.1	2.1	0.0	0.0
BSS	0.4	0.4	0.0	0.0
CGL	4.2	4.2	0.0	0.0
CHP	0.0	0.0	0.0	0.0
CSB	1.1	1.1	0.0	0.0
CSB-CB	0.0	0.0	0.0	0.0
CSB-CHP	0.2	0.2	0.0	0.0
CSB-PS	0.9	0.9	0.0	0.0
CWRF	247.7	244.9	-2.8	0.0
DEV	4.1	4.1	0.0	0.0
DH	23.6	23.0	0.0	0.0
GRG	5.7	5.5	-0.2	0.0
HW	125.7	125.7	0.0	0.0
LOW	1.0	1.0	0.0	0.0
MFS	13.0	13.0	0.0	0.0
ORF	0.3	0.3	0.0	0.0
RW	217.7	217.4	-0.3	0.0
SWS	10.8	10.8	0.0	0.0
TAM	1.4	1.4	0.0	0.0
VOW	0.0	0.0	0.0	0.0
TOTAL	**804.2**	**799.4**	**-4.8**	**-0.6%**

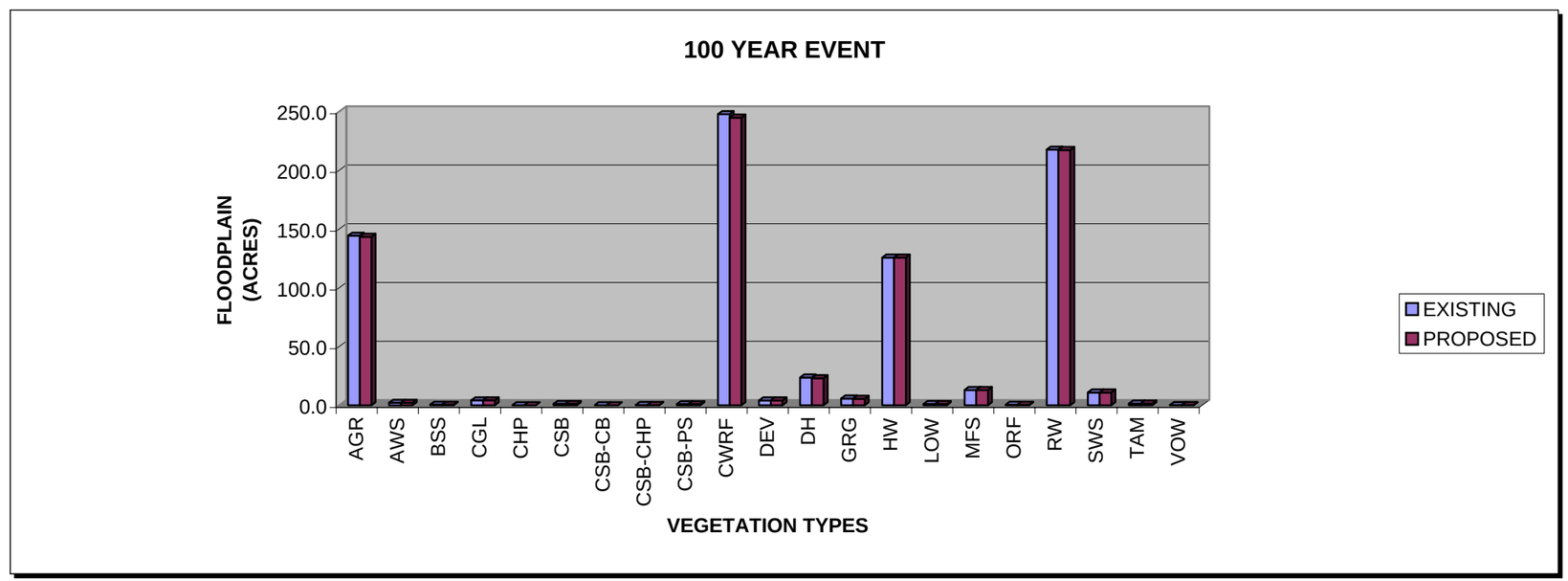
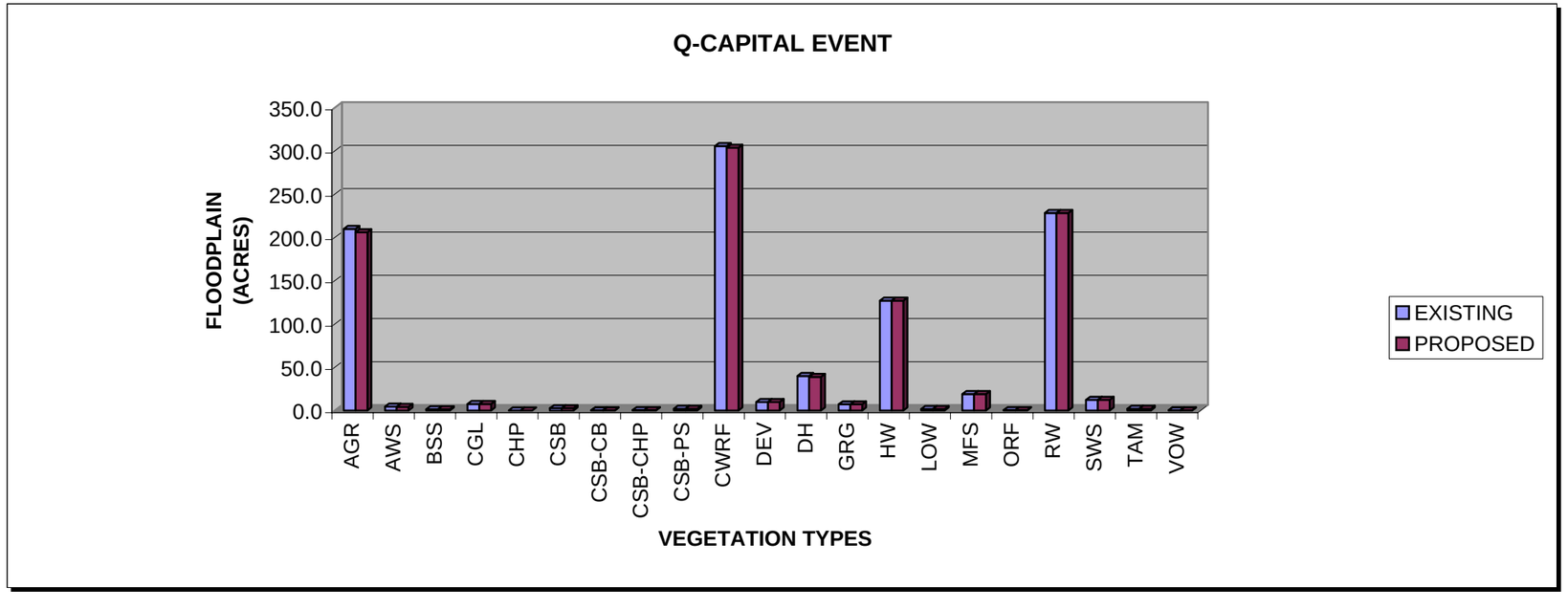


FIGURE 4.9d: MISSION VILLAGE FLOODPLAIN OVERALL VEGETATION COMPARISONS

CAP - Floodplain Overall Vegetation

	EXISTING	PROPOSED	DELTA	DELTA %
Type	**(AC)**	**(AC)**	**(AC)**	**(%)**
AGR	209.8	205.8	-4.0	-1.9%
AWS	4.4	4.1	-0.2	-0.1
BSS	1.3	1.3	0.0	0.0
CGL	7.4	7.4	0.0	0.0
CHP	0.0	0.0	0.0	0.2
CSB	2.5	2.5	0.0	0.0
CSB-CB	0.0	0.0	0.0	0.0
CSB-CHP	0.3	0.3	0.0	0.0
CSB-PS	1.8	1.8	0.0	0.0
CWRF	305.4	303.5	-2.0	0.0
DEV	9.6	9.6	0.0	0.0
DH	39.8	38.8	-1.0	0.0
GRG	7.1	7.1	0.0	0.0
HW	126.8	126.8	0.0	0.0
LOW	1.6	1.5	0.0	0.0
MFS	18.8	18.9	0.0	0.0
ORF	0.3	0.3	0.0	0.0
RW	228.1	228.1	0.0	0.0
SWS	12.2	12.2	0.0	0.0
TAM	1.9	1.9	0.0	0.0
VOW	0.1	0.0	0.0	0.0
TOTAL	**979.3**	**972.2**	**-7.1**	**-0.7%**



- In natural riverine systems such as Santa Clara River and its tributaries, frequent discharges (on the order of the average annual and 2-year flows) dictate stream geomorphology. Extended and frequent discharges at these critical flow rates would potentially impact stream health. The Project proposes to install water quality design features, which will capture runoff from small, frequent storms and release flows to the River at non-erosive rates. That is, water from the basins would be released a rate substantially less than existing discharges associated with two-year storms, therefore, erosive impacts to the River would be reduced to a less than significant level.

- To reduce storm flow velocities during smaller, more frequent flows (i.e., 2-year storm events) and to prevent erosion at stormwater discharge points into the River, the Project incorporates energy dissipaters consisting of either rip-rap or larger standard impact type energy dissipaters at affected storm system outlets in the River. These energy dissipaters would slow the rate of flow of runoff into the River in order to prevent erosion of the stream channel.

- Energy dissipaters and water quality basins used to reduce erosion risk in smaller events will also reduce erosion risk in larger events. It should be noted, however, that erosive forces in the River associated with less frequent, large events (100-year discharge) have erosive impacts that far exceed the erosive impacts of the Project.

4.5.3 Utility Corridor Analysis

The proposed utility corridor is comprised of two parts: the westerly extension of the utility corridor (9,000 LF protected with TRM's) and the easterly extension of the utility corridor (7,000 LF from upstream of Chiquito Canyon to Castaic Creek) which requires no stabilization as it is several hundred feet outside of the 100-year and the Capital event floodplains. Mission Village and Landmark Village River Drainage Concept Reports submitted to LACDPW Nov. 2006 both support the use of TRM's on the westerly extension of the utility corridor, rather than exposed or buried soil cement.

A hydraulic analysis of the westerly extension of the utility corridor (protected with TRM's) is described below. This analysis evaluated water velocities in the reach between the Project site and the WRP on the northern edge of the River corridor, STA 32265 to STA 15540. A uniform distance from the SR126 and the rail right-of-way area to the southern edge of the utility corridor was established for the entire reach. The horizontal location of the corridor is proposed to be approximately 67 feet from the rail right-of-way area to the edge of the utility corridor. At this location, a vertical levee was created in HEC-RAS to represent the boundary between the River and the utility corridor. The levee affected the hydraulic geometry of 33 cross-sections in the reach downstream from Mission Village west to the WRP. A primary simulation was run in HEC-RAS, the Q_{CAP} flood event (140,793 cfs) and the 100-year event

(58,207 cfs) under a mixed flow regime and a mixed Manning's *n* conditions n=0.060 and n=0.025. For the Capital Event, when the water surface elevation was high enough to reach the northerly bank, the water velocities at the levee over bank of the Utility Corridor were low, ranging from 3.4 to 7.3 fps for n=0.06 and 4.8 to 7.6 fps for n=0.025 (Table 4.9). For the 100-year event with n=0.060 only five of the 34 sections even had floodplain adjacent to the proposed Utility Corridor and the velocity ranges from 1.9 to 2.8 fps (non-erosive velocities). These modeled velocities would not require hardened bank protection. In this case, approximately 9,000 linear feet of TRM will be permanently placed on the bank to ensure protection from erosion.

TABLE 4.8: PROPOSED QCAP VELOCITIES ALONG THE UTILITY CORRIDOR (FPS)
(Referenced from Mission Village DCR Table 9)

HEC-RAS River Section No.	Channel Vel.(1) (fps)	Overbank Vel.(1) (fps)	Channel Vel.(2) (fps)	Overbank Vel.(2) (fps)	Channel Vel.(3) (fps)	Overbank Vel.(3) (fps)
32265	7.2		5.8		16.0	
31875	6.7		6.2		9.8	
31585	6.1		6.1		13.8	
31360	6.5		6.2		14.7	
31060	5.9		5.2		12.8	
30720	5.1		4.4		6.9	
30445	5.0		3.9		5.4	
30095	5.7		4.0		4.9	
29815	6.6		4.7		5.6	
29565	6.5		4.6		5.5	
29385	7.5		5.5		6.6	
29140	8.8		7.5		9.0	
28895	19.7		17.1		17.1	
28695	13.5		12.8		26.1	
28500	14.9		11.9		25.0	
28280	14.1		10.1		23.6	
28080	13.1		9.2		18.3	
27925	14.3		9.7		14.7	
27725	17.1		10.9		16.5	
27545	15.9		10.3		17.0	
27335	14.0		9.4		12.8	
27155	15.3		10.3		15.4	
26990	12.1		9.1		15.5	
26780	11.1		8.0		18.1	
26575	9.5		6.7		10.0	
26355	10.5		7.6		12.6	
26170	10.9		8.2		13.8	
25965	11.8		8.4		15.9	
25785	11.9		8.2		12.8	
25600	10.6		7.9		14.3	
25425	8.5		6.5		14.7	
25215	10.6		7.5		11.8	
25000	**10.1**	**5.6**	7.8		14.2	
24795	**9.9**	**6.5**	**8.6**	**3.4**	**13.6**	**4.2**
24550	**8.3**	**6.5**	**6.3**	**4.1**	**16.3**	**7.7**
24335	**10.3**	**7.2**	**8.4**	**4.2**	**10.9**	**4.4**
24115	**9.5**	**7.3**	**7.7**	**4.7**	**15.3**	**5.4**
23975	8.9		7.0		16.1	
23755	8.6		6.8		14.3	
23565	**8.5**	**6.9**	7.4		10.9	

(1) Prop. Cond. Velocity are based on Qcap and "n" value of 0.060 for entire width of the river.
(2) Prop. Cond. Velocity are based on Q100 and "n" value of 0.060 for entire width of the river.
(3) Prop. Cond. Velocity are based on Qcap and "n" value of 0.025 for entire width of the river.
Prop. Cond. Velocities (1), (2) and (3) are average velocity of flow in right overbank
Prop. Cond. Overbank Velocities are velocity of flow in right overbank (approx. 200 feet from FP)
Velocity in bold for sections where FP reaches the Utility Corridor Bank

TABLE 4.8: (CONTINUED)
(Referenced from Mission Village DCR Table 9)

HEC-RAS River Section No.	Channel Vel.(1) (fps)	Overbank Vel.(1) (fps)	Channel Vel.(2) (fps)	Overbank Vel.(2) (fps)	Channel Vel.(3) (fps)	Overbank Vel.(3) (fps)
23365	**8.2**	**6.9**	**7.3**	**5.2**	**15.0**	**7.4**
23180	**7.9**	**6.1**	**6.7**	**4.4**	**16.4**	**6.7**
23000	**6.2**	**5.0**	**4.7**	**3.8**	15.0	
22790	6.6		5.2		8.3	
22600	7.9		6.5		12.1	
22415	8.6		6.5		9.8	
22195	10.3		7.7		12.4	
22010	12.2		9.1		15.3	
21790	13.7		9.1		16.0	
21615	11.3		8.1		12.3	
21440	11.4		8.0		15.1	
21225	10.5		8.8		11.6	
21020	**9.1**	**3.8**	6.6		17.8	
20845	**8.7**	**4.7**	**6.7**	**1.8**	11.3	
20595	**9.0**	**4.6**	**6.7**	**1.6**	9.6	
20435	**9.3**	**4.2**	**6.8**	**1.1**	8.6	
20280	**10.7**	**5.3**	**10.0**	**1.6**	11.4	
20070	**8.7**	**4.3**	7.4		17.4	
19855	**8.3**	**4.3**	7.1		14.2	
19630	**7.9**	**2.7**	6.5		13.9	
19440	**7.3**	**2.2**	6.0		8.8	
19240	**7.5**	**2.3**	6.7		11.5	
19050	6.7		5.8		13.1	
18830	6.8		6.1		11.0	
18650	6.8		5.8		14.6	
18475	**6.1**	**4.5**	4.9		9.4	
18290	**6.6**	**4.0**	5.4		9.2	
18025	6.5		4.7		6.6	
17785	7.38		5.33		7.1	
17510	11.18		8.28		11.0	
17360	14.02		9.80		13.2	
17110	**13.6**	**6.8**	10.7		18.9	
16970	**15.7**	**6.4**	12.5		18.3	
16720	**11.5**	**6.9**	8.1		19.7	
16515	**10.4**	**7.2**	**8.0**	**3.8**	14.7	
16305	**9.1**	**7.1**	6.6		16.1	
16130	9.0		7.0		11.2	
15960	7.6		5.6		12.6	
15745	7.0		5.1		8.5	
15540	**7.4**	6.5	5.6		9.0	

(1) Prop. Cond. Velocity are based on Qcap and "n" value of 0.060 for entire width of the river.
(2) Prop. Cond. Velocity are based on Q100 and "n" value of 0.060 for entire width of the river.
(3) Prop. Cond. Velocity are based on Qcap and "n" value of 0.025 for entire width of the river.
Prop. Cond. Velocities (1), (2) and (3) are average velocity of flow in right overbank
Prop. Cond. Overbank Velocities are velocity of flow in right overbank (approx. 200 feet from FP)
Velocity in bold for sections where FP reaches the Utility Corridor Bank

4.5.4 Impact on Floodplain and Habitat Area

The proposed improvements associated with the Specific Plan would alter the existing boundary of the River floodplain at the Project site, as shown in Figure 3.1. A summary of the changes in the floodplain area and velocity due to the development of the Project are shown in Figure 4.1 and Table 4.9.

TABLE 4.9: CHANGE (PROPOSED-EXISTING) IN ACREAGE OF VEGETATION BY TYPE EXPOSED TO VELOCITIES > 4FPS BY RETURN PERIOD

Vegetation	2-YR	5-YR	10-YR	20-YR	50-YR	100-YR	CAP
AGR	0.0	0.0	0.0	0.1	0.5	0.6	-2.6
AWS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BSS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CGL	0.0	0.0	0.0	0.0	0.0	0.1	0.0
CHP	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CSB	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CSB-CB	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CSB-CHP	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CSB-PS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CWRF	-0.2	-0.4	0.2	0.6	1.9	2.2	-0.1
DEV	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DH	0.0	0.0	0.0	0.0	-0.1	0.0	-0.2
GRG	0.0	0.0	0.0	0.0	0.0	-0.1	0.0
HW	-0.1	0.3	0.4	0.4	0.2	0.4	-0.1
LOW	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MFS	0.0	0.0	0.0	0.1	-0.1	0.0	-0.1
ORF	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RW	-0.7	-0.4	-1.1	-1.6	-1.4	-0.8	-1.9
SWS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TAM	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VOW	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>4 FPS	-0.9	-0.5	-0.5	-0.4	1.1	2.5	-4.8
<4 FPS	0.8	0.5	2.0	-4.7	-8.0	-7.3	-2.3
TOTAL	**0.0**	**0.0**	**1.5**	**-5.1**	**-6.9**	**-4.8**	**-7.1**

AGR	Agriculture	DH	Disturbed land
AWS	Arrowweed scrub	GRG	Giant reed
BSS	Big sagebrush scrub	HW	Herbaceous wetlands
CGL	California annual grassland	LOW	Live oak woodland
CHP	Undifferentiated chaparral	MFS	Mulefat
CSB	California sagebrush	ORF	Southern coast live oak riparian forest
CSB-CB	California sagebrush-California buckwheat	RW	River wash
CSB-CHP	California sagebrush-undifferentiated chaparral	SWS	Southern willow scrub
CSB-PS	California sagebrush-purple sage	TAM	Tamarisk scrub
CWRF	Cottonwood willow riparian forest	VOW	Valley oak woodland
DEV	Developed		
N/C	Not Coded		

For higher frequency floods the proposed floodplain modifications are very minor so minimally hinder flows or reduce the floodplain area (Figure 4.1). During more infrequent floods the River flows would be confined within the bank protection stabilizations. This would limit the area of the

floodplain during these infrequent flood events, resulting in inundation over a smaller area. Figure 4.9A-D shows the different habitat types affected by proposed development at different return periods. The figure shows that a large percent of the total impact results from converting agricultural land to a developed condition. Figure 4.10 compares the vegetation acres within various flood events for both the existing and proposed conditions. The figure shows that some vegetation types are more exposed to flooding in the Project condition, while the largest decrease is under agriculture. This data is shown numerically in Table 4.10.

TABLE 4.10: ACREAGE INUNDATED BY HABITAT TYPE DURING DIFFERENT RETURN PERIODS

HABITAT TYPE	FLOOD EVENTS													
	2-year		5-year		10-year		20-year		50-year		100-year		Q cap	
	EXIS	PROP	EXIS	PROP	EXIS	PROP	EXIS	PROP	EXIS	PROP	EXIS	PROP	EXIS	PROP
AGR	0.9	0.8	1.1	1.1	3.1	3.1	46.0	46.6	115.7	115.0	144.3	143.4	209.8	205.8
AWS	0.0	0.0	0.0	0.0	0.1	0.1	0.6	0.6	1.6	1.6	2.1	2.1	4.4	4.1
BSS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.4	0.4	1.3	1.3
CGL	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	1.4	1.4	4.2	4.2	7.4	7.4
CHP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CSB	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.7	0.6	1.1	1.1	2.5	2.5
CSB-CB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CSB-CHP	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3
CSB-PS	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.8	0.8	0.9	0.9	1.8	1.8
CWRF	44.0	43.9	63.0	63.0	86.8	87.9	144.0	139.5	220.9	216.6	247.7	244.9	305.4	303.5
DEV	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	2.7	2.7	4.1	4.1	9.6	9.6
DH	1.4	1.4	2.2	2.2	3.6	3.7	9.1	9.1	19.2	19.0	23.6	23.0	39.8	38.8
GRG	1.6	1.6	2.4	2.4	2.5	2.5	3.0	2.7	5.3	4.8	5.7	5.5	7.1	7.1
HW	72.7	72.6	94.2	94.1	106.3	106.3	117.0	117.3	124.1	124.1	125.7	125.7	126.8	126.8
LOW	0.3	0.3	0.4	0.4	0.5	0.5	0.7	0.7	0.9	0.9	1.0	1.0	1.6	1.5
MFS	0.0	0.0	0.2	0.2	0.6	0.6	6.9	6.9	10.2	10.2	13.0	13.0	18.8	18.9
ORF	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
RW	102.1	102.1	130.9	130.8	144.1	144.2	171.8	170.7	212.8	211.7	217.7	217.4	228.1	228.1
SWS	6.5	6.6	7.4	7.6	8.0	8.2	9.0	9.0	10.3	10.3	10.8	10.8	12.2	12.2
TAM	0.4	0.4	1.1	1.1	1.1	1.1	1.1	1.1	1.4	1.4	1.4	1.4	1.9	1.9
VOW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
TOTAL	230.6	230.6	303.7	303.7	357.6	359.1	510.6	505.5	728.8	721.9	804.2	799.4	979.3	972.2

AGR	Agriculture	CSB-CHP	California sagebrush-undifferentiate	LOW	Live oak woodland
AWS	Arrowweed scrub	CSB-PS	California sagebrush-purple sage	MFS	Mulefat
BSS	Big sagebrush scrub	CWRF	Cottonwood willow riparian forest	ORF	Live oak riparian forest
CGL	California annual grassland	DEV	Developed	RW	River wash
CHP	Undifferentiated chaparral	DH	Disturbed land	SWS	Southern willow scrub
CSB	California sagebrush	GRG	Giant reed	TAM	Tamarisk scrub
CSB-CB	California sagebrush-California buc	HW	Herbaceous wetlands	VOW	Valley oak woodland

FIGURE 4.10: MISSION VILLAGE FLOODPLAIN OVERALL VEGETATION COMPARISONS

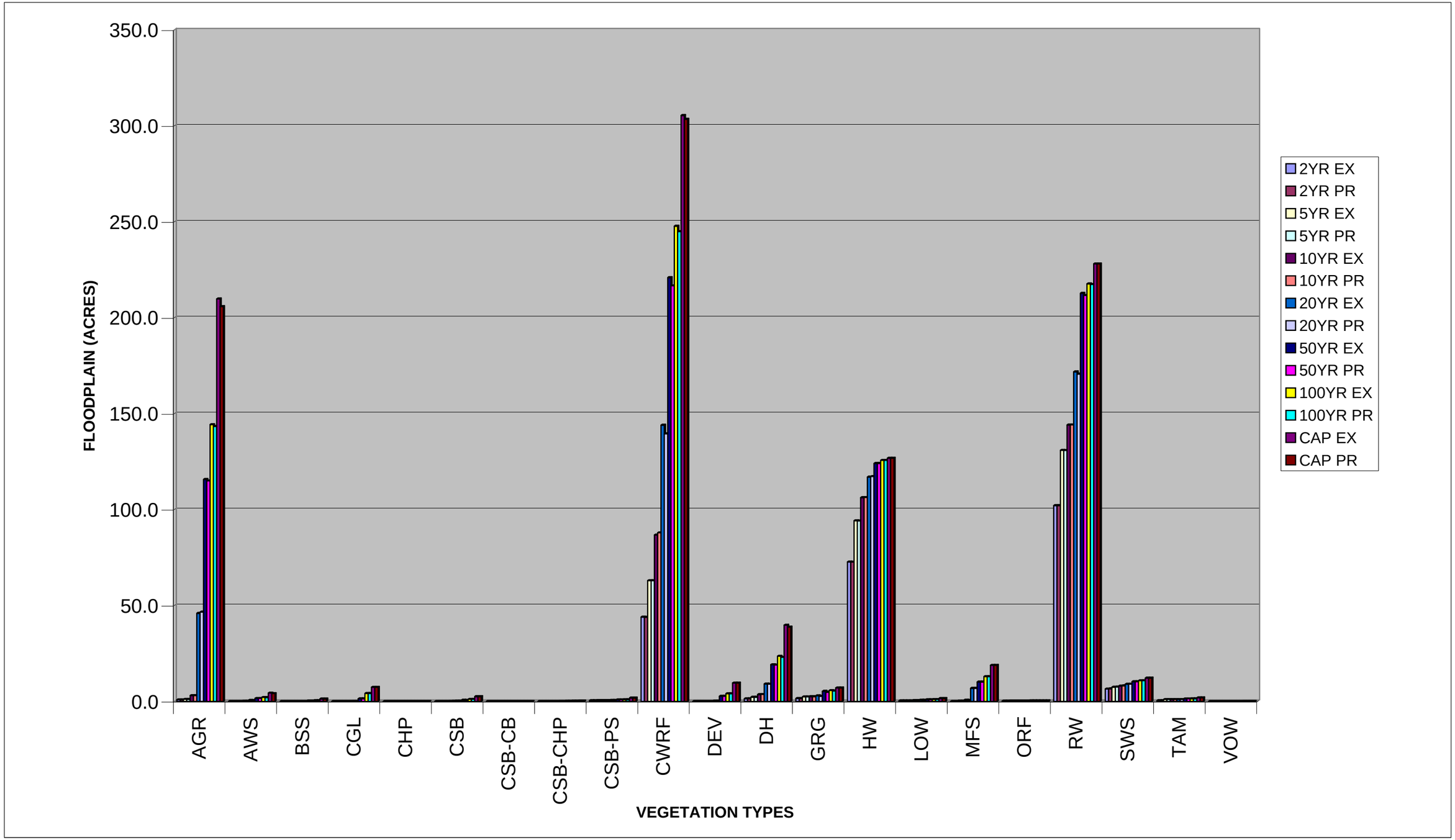


Figure 4.10

Drainage Concept Report for Mission Village Santa Clara River Bank Protection, July 2007

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
SUBDIVISION PLAN CHECKING SECTION – HYDROLOGY UNIT

To: PACE & PSOMAS

Attention MARK KREBS & MATTHEW HEIDEMAN

REVIEW OF TR NO. 061105
TRANS DATE: 01/23/08

[ ] Provide a drainage concept prior to approval of the tentative map. Sufficient information must be submitted to the Department showing the extent of the drainage problem and proposed solution.

[X] The Drainage Concept/SUSMP has been approved subject to conditions noted herein or shown on the returned map.

[ ] The drainage concept/SUSMP is unsatisfactory. Note the reasons stated herein or shown on returned map.

[ ] Prior to tentative map approval, comply with the Standard urban Stormwater Mitigation Plan (SUSMP) requirements. (www.888cleanla.com)

The first .75 inches of stormwater runoff volume from the site must be treated prior to discharging into stormwater conveyance systems.

[ ] Resubmit these sheets with check print, two (2) revised sets of the drainage concept, and the *MORA input/output file(s) on disk* (if applicable) for further consideration. Additional changes maybe required as determined by further review.

COMMENTS:

REVIEWED BY Yong Guo DATE 01/30/08
YONG GUO - (626) 458-4921

Mission Village TTM # 61105

Drainage Concept Report for Mission Village Santa Clara River Bank Protection

DRAINAGE CONCEPT/STORM WATER QUALITY PLAN

July 2007
(December 2006) Revised
(July 2006) Revised

IS CONCEPTUALLY APPROVED

Prepared For:

APPROVED BY: Yong Gwu RCE NO. 67363 DATE: 01/30/08

NEWHALL LAND
A LENNAR/LNR COMPANY

CHECKED BY: _____ DATE: 01/30/08

LAND DEVELOPMENT DIVISION
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

The Utility Corridor non-structural embankment details and stability are not part of this approval

Submitted To:

Los Angeles County Department of Public Works

REGISTERED PROFESSIONAL ENGINEER
MARK EDWARD KREBS
No. 049292
Exp. 09-30-08
CIVIL
STATE OF CALIFORNIA

Prepared by:

PACE

Pacific Advanced Civil Engineering, Inc. (PACE)
17520 Newhope Street, Suite 200
Fountain Valley, CA 92708
(714) 481-7300

Contact Person:
Mark Krebs, P.E.
Veljka Burazer

PACE JN 8611E

Capital Floodplain & Floodway Revision Analysis

Los Angeles County Adopted ML Map No. 43-ML 26 and 27

Santa Clara River at Proposed Mission Village TTM #61105

January 2008
(December 2007) - Revised

Submitted to:

Los Angeles County Department of Public Works

Prepared on Behalf of:

Newhall Land/Lennar

DRAINAGE CONCEPT/STORM WATER QUALITY PLAN
IS CONCEPTUALLY APPROVED
APPROVED BY: Yong Gill RCE NO. 67363 DATE: 01/30/08
CHECKED BY: NM DATE: 01/30/08
LAND DEVELOPMENT DIVISION
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

Prepared by:

Pacific Advanced Civil Engineering, Inc.
17520 Newhope Street, Suite 200
Fountain Valley, CA 92708
(714) 481-7300

Contacts:
Mark Krebs, P.E.
Chet Van Horn, E.I.T.

PACE JN 8611E

PACIFIC ADVANCED CIVIL ENGINEERING, INC.

17520 Newhope Street, Suite 200 ▪ Fountain Valley, California 92708 ▪ 714.481.7300 ▪ fax: 714.481.

December 19, 2007

Mr. Gary Guo
Land Development Division
LA County Department of Public Works
900 South Fremont, 3rd Floor
Alhambra, CA 91803

Re: Response to Review Comments – Reference VTTM #061105 (Hydraulics and Fluvial Study Embankment) Trans date: 7/10/07 - Comment Letter dated 8/28/07 regarding Newhall Ranch Mission Village (VTTM #061105) Drainage Concept Report **#8611E**

Dear Mr. Guo,

Pacific Advanced Civil Engineering, Inc (PACE) is pleased to respond to Offsite Hydraulic / Embankment Comments letter dated August 28, 2007 regarding the Mission Village Drainage Concept report submittal:

Please note: Per your suggestion, PACE is resubmitting the July 2007 Mission Village Santa Clara River DCR dated July 2007 for 4th Check with the changes requested from the review comments letter dated 8/28/07. Due to minimal changes PACE has opted to not make another "revision" to this report. The only revisions are Figure 02 which has been revised per your comments and we have changed the date on the Binder Cover and Spine Label with a new date of November 2007. These two items need to replace the items in the July 2007 DCR.

LADPW Comment:

1. Show and call out TR 61105/Mission Village tract boundary instead of "project boundary" on Figure 02.

PACE Response:

Figure 02 has been revised

LADPW Comment:

2. *Drainage acceptance letters are required for any offsite impact including velocity and water surface elevation increases prior to improvement plan submittal (information only).*

PACE Response:

Noted

LADPW Comment:

3. The utility corridor non-structural embankment will be constructed according to the grading plans by Psomas per the report. The details and stability of the utility corridor embankment are not part of the review. They should be reviewed and approved by grading plan checking. If the utility corridor embankment belongs to Mission Village project, only freeboard and velocities related to the embankment will be reviewed in Drainage Concept (information only).

PACE Response:

Noted

LADPW Comment:

4. Submit hydraulics plan-checking fee of $3,750.00 for this review.

PACE Response:

Newhall Land to submit check directly to LACDPW.

LADPW Comment:

5. The floodway or floodplain as shown on Figure 02 is incorrect.

PACE Response:

Figure 02 has been revised accordingly.

LADPW Comment:

6. Coordinate with Psomas and submit this hydraulic report/maps together with the drainage concept by Psomas when the drainage concept is ready for approval.

PACE Response:

Noted

Thank you for your time and consideration. If you have any questions or concerns about the letter presented please contact us at (714) 481-7300.

Sincerely,

Mark E. Krebs, P.E.
President

Enclosures: (2) Copies of Revised "Figure 02" and (2) New Binder Covers/Spine Labels for Mission Village Santa Clara River DCR dated November 2007 Submitted for 4th Check
(1) Copy of LACDPW Red-lined "Figure 02" from Mission Village River DCR dated July 2007

Cc: Corey Harpole/Newhall Land – With (1) Copy of Revised "Figure 02" and (1) New Binder Cover/Spine Label for Mission Village Santa Clara River DCR dated November 2007.
Jeff Johnston/Newhall Land – W/o enclosure
Steve Sheridan/LACDPW – W/o enclosure

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COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
SUBDIVISION PLAN CHECKING SECTION – HYDROLOGY UNIT

To: PACE

Attention MARK KREBS/LUIS ALVAREZ

REVIEW OF TR NO. 061105 (Hydraulics and Fluvial Study for Embankment)
TRANS DATE: 07/10/07

[X] The Drainage Concept is unsatisfactory. Note the reasons stated herein or shown on returned map.

[X] Resubmit these sheets with check print, two (2) revised sets of the drainage concept, and the electronic input files for HEC-RAS (if applicable) for further consideration. Additional changes maybe required as determined by further review.

COMMENTS:

1. Show and call out TR 61105/Mission Village tract boundary instead of "project boundary" on Figure 02.
2. Drainage acceptance letters are required for any offsite impact including velocity and water surface elevation increases prior to improvement plan submittal (information only).
3. The utility corridor non-structural embankment will be constructed according to the grading plans by Psomas per the report. The details and stability of the utility corridor embankment are not part of the review. They should be reviewed and approved by grading plan checking. If the utility corridor embankment belongs to Mission Village project, only freeboard and velocities related to the embankment will be reviewed in Drainage Concept (information only).
4. Submit hydraulics plan-checking fee of $3,750.00 for this review.
5. The floodway or floodplain as shown on Sheet 02 is incorrect.
6. Coordinate with Psomas and submit this hydraulics report/maps together with the drainage concept by Psomas when the drainage concept is ready for approval.

REVIEWED BY Yong Guo **DATE 08/28/07**

GARY GUO - (626) 458-4921

PACIFIC ADVANCED CIVIL ENGINEERING, INC.

17520 Newhope Street, Suite 200 ▪ Fountain Valley, California 92708 ▪ 714.481.7300 ▪ fax: 714.481

July 6, 2007

Mr. Gary Guo
Land Development Division
LA County Department of Public Works
900 South Fremont, 3rd Floor
Alhambra, CA 91803

Re: Response to Review Comments – Reference VTTM #061105 (Offsite Hydraulics/Embankment) Trans date: 12/16/06 - Comment Letter dated 2/6/07 regarding Newhall Ranch Mission Village (VTTM #061105) Drainage Concept Report **#8611E**

Dear Mr. Guo,

Pacific Advanced Civil Engineering, Inc (PACE) is pleased to respond to Offsite Hydraulic / Embankment Comments letter dated February 6, 2007 regarding the Mission Village Drainage Concept report submittal:

LADPW Comment:

The mixed uses of pre-project and existing conditions created much confusion for this project that caused extensive plan-checking time and new comments.

PACE Response:

PACE and LACDPW have met and discussed this issue and as directed by LACDPW PACE has modified the report to include existing vs. proposed project (where project includes all of the adjacent improvements as well) conditions.

LADPW Comment:

1. *Show TR 61105/Mission Village tract boundary on Figure 02. Drainage acceptance letters are required for any offsite impact including velocity and water surface elevation increases prior to drainage concept approval (2nd request).*

PACE Response:

PACE and LACDPW have met and discussed this issue and as directed by LACDPW Newhall will provide Drainage Acceptance Letter for any impacts to Newhall owned property. Regarding the SR 126 Widening / Commerce Center Drive Interchange Bank Protection portion of the project any impacts and obtaining the associated Drainage Acceptance Letters are the responsibility of LACDPW.

LADPW Comment:

2. Stamp and sign all maps enclosed in the reports.

PACE Response:
PACE has done this as requested by LACDPW.

LADPW Comment:

3. The bridge will all its related components including abutments, north embankment and piers should be defined as proposed.

PACE Response:

Comment incorporated into this submittal. Refer to above reply to the LACDPW general comment regarding resubmittal.

LADPW Comment:

4. Use only existing and proposed conditions for the offsite impact analysis.

PACE Response:

Refer to above reply to the LACDPW general comment regarding resubmittal. Updated Report includes revised "Table 3" which is "Existing Condition" vs. "Proposed Condition" and Change in Water Surface Elevation and Change in Velocity are shown.

LADPW Comment:

5. The boundary conditions on page 8 are incorrect.

PACE Response:

Thank you for this correction. We inadvertently provided incorrect values. Resubmittal includes the correct information.

LADPW Comment:

6. All embankments as stated on page 12 related to Mission Village project should be defined in the HEC-RAS input files for proposed conditions. Their offsite impacts should be analyzed.

PACE Response:

Refer to response to item number 4 above and see Table 3 in report for impacts to water surface elevation and velocity.

LADPW Comment:

7. *Describe/clarify the conditions on the first page of each Appendix.*

PACE Response:

Completed as requested by LACDPW.

LADPW Comment:

8. *The summary table in Appendix IX showing offsite impact is not the same as the one shown in Figure 02. Clarify pre-project and existing conditions.*

PACE Response:

Table 3 analysis is also shown on Figure 2 as requested by LACDPW.

LADPW Comment:

9. *Provide drainage acceptance letters from all affected offsite property owners for increase of velocities or water surface elevations (shown in Appendix IX summary table and Figure 02).*

PACE Response:

Refer to response for item number 1 above. Newhall will provide Drainage Acceptance Letter for any impacts to Newhall owned property. The only other impacts are related to the SR 126 Widening / Commerce Center Drive Interchange Bank Protection where LACDPW is responsible for obtaining any necessary Drainage Acceptance Letters.

LADPW Comment:

10. *Show calculations for the toe-down and freeboard of the Commerce Center Bridge North Embankment in table 1-X.*

PACE Response:

Refer to Section 5 of the report for Bridge Scour Calculations and Appendix VIII has been added to include the bridge scour calculations per your request.

LADPW Comment:

11. The utility corridor non-structural embankment will be constructed according to the grading plans by Psomas per the report. The details and stability of the utility corridor embankment are not part of the review. They should be reviewed and approved by grading plan checking. If the utility corridor embankment belongs to Mission Village project, only freeboard and velocities related to the embankment will be reviewed in Drainage Concept (information only).

PACE Response:

Information only. No response required.

LADPW Comment:

12. Submit hydraulic plan-checking fee of $6,840.00 for this review. Future plan-checking fee will be charged according to the time spent on each review.

PACE Response:

Newhall to provide check.

LADPW Comment:

13. Address other comments on the maps and in the report.

PACE Response:

Resubmittal includes report and map revisions per your request.

LADPW Comment:

14. A meeting is required prior to next submittal.

PACE Response:

Newhall, PACE and LACDPW met on February 14, 2007 and there were several follow up conference calls and discussions regarding the LACDPW review of the Mission Village River DCR. We believe that most of the issues have been resolved and if there are further comments or questions regarding this resubmittal we recommend that we have a meeting to discuss.

Thank you for your time and consideration. If you have any questions or concerns about the letter presented please contact us at (714) 481-7300.

Sincerely,

Mark E. Krebs, P.E.
President

Enclosures: (2) Copies of Revised Mission Village Santa Clara River DCR dated July 2007 Submitted for 3rd Check
(1) Copy of LACDPW Red-lined Mission Village River DCR dated December 2006
(1) Check for $6,840 payable to LACDPW for Hydraulic Plan Check Fee

Cc: Corey Harpole/Newhall Land – With one copy of revised DCR only.
Jeff Johnston/Newhall Land – W/o enclosure
Steve Sheridan/LACDPW – W/o enclosure

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COPY

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
SUBDIVISION PLAN CHECKING SECTION – HYDROLOGY UNIT

To: PACE

Attention MARK KREBS/LUIS ALVAREZ

REVIEW OF TR NO. 061105 (Offsite Hydraulics/Embankment)
TRANS DATE: 12/26/06

[X] The Drainage Concept is unsatisfactory. Note the reasons stated herein or shown on returned map.

[X] Resubmit these sheets with check print, two (2) revised sets of the drainage concept, and the electronic input files for HEC-RAS (if applicable) for further consideration. Additional changes maybe required as determined by further review.

COMMENTS:

The mixed uses of pre-project and existing conditions created much confusion for this project that caused extensive plan-checking time and new comments.

1. Show TR 61105/Mission Village tract boundary on Figure 02. Drainage acceptance letters are required for any offsite impact including velocity and water surface elevation increases prior to drainage concept approval (2nd request).
2. Stamp and sign all maps enclosed in the reports.
3. The bridge with all its related components including abutments, north embankment and piers, should be defined as proposed.
4. Use only existing and proposed conditions for the offsite impact analysis.
5. The boundary conditions on page 8 are incorrect.
6. All embankments as stated on page 12 related to Mission Village project should be defined in the HEC-RAS input files for proposed conditions. Their offsite impacts should be analyzed.
7. Describe/clarify the conditions on the first page of each Appendix.
8. The summary table in Appendix IX showing offsite impact is not the same as the one shown on Figure 02. Clarify pre-project and existing conditions.
9. Provide drainage acceptance letters from all affected offsite property owners for increase of velocities or water surface elevations (shown in Appendix IX summary table and Figure 02).
10. Show calculations for the toe-down and freeboard of the Commerce Center Bridge North Embankment in table 1-X.
11. The utility corridor non-structural embankment will be constructed according to the grading plans by Psomas per the report. The details and stability of the utility corridor embankment are not part of the review. They should be reviewed and approved by grading plan checking. If the utility corridor embankment belongs to Mission Village project, only freeboard and velocities related to the embankment will be reviewed in Drainage Concept (information only).
12. Submit hydraulics plan-checking fee of $6,840.00 for this review. Future plan-checking fee will be charged according to the time spent on each review.
13. Address other comments on the maps and in the report.
14. A meeting is required prior to next submittal.

REVIEWED BY Yong Guo **DATE 02/06/07**

GARY GUO - (626) 458-4921

Mission Village TTM # 61105

Drainage Concept Report for
Mission Village Santa Clara River Bank Protection

July 2007
(December 2006) Revised
(July 2006) Revised

Prepared For:

NEWHALL LAND
A LENNAR/LNR COMPANY

Submitted To:

Los Angeles County Department of Public Works

Prepared by:

PACE

Pacific Advanced Civil Engineering, Inc. (PACE)
17520 Newhope Street, Suite 200
Fountain Valley, CA 92708
(714) 481-7300

Contact Person:
Mark Krebs, P.E.
Veljka Burazer

PACE JN 8611E

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Figures (located in body of report)

Figure A: Mission Village Project Vicinity Map

Figure A1: Santa Clara River Watershed Aerial Map

Figure A2: Proposed Mission Village VTTM# 61105 Project Aerial Map

Figure A3: Mission Village *"Lion Canyon Bank Protection"* – Plan (1"=300')

Figure B: Mission Village *"SR 126 Widening/Commerce Center Drive Interchange Bank Protection"* - Profile

Figure C: Mission Village *"Commerce Center Bridge South Bank"* - Profile

Figure D: Mission Village *"San Jose Flats Bank"* - Profile

Figure E: *"SR 126 Utility Corridor Bank"* and *"WRP Utility Corridor Bank"* - Profile

Figures (located at end of report)

Figure 01: Mission Village – Project Aerial Map

Figure 02: Mission Village – Project Overall Map with HEC-RAS Cross-Section (1"=300')

Figure 03: Mission Village *"SR 126 Widening/Commerce Center Drive Interchange Bank Protection"* – Plan (1"=100'), Profile and Typical Sections

Figure 04: Mission Village *"Commerce Center Bridge South Bank"* and *"San Jose Flats Bank"* - Plan (1"=100'), Profile and Typical Sections

Figure 05: *"SR 126 Utility Corridor Bank"* - Plan (1"=100') and Typical Sections

Figure 05AA: *"SR 126 Utility Corridor Bank"* - Plan (1"=100')

Figure 05A: *"SR 126 Utility Corridor Bank"* - Plan (1"=100'), Profile and Typical Sections

Figure 05B: *"SR 126 Utility Corridor Bank"* - Plan (1"=100'), Profile and Typical Sections

Figure 05C: *"SR 126 Utility Corridor Bank"* and *"WRP Utility Corridor Bank"* - Plan, Profile and Typical Sections

Figure 05D: *"SR 126 Utility Corridor Bank"* and *"WRP Utility Corridor Bank"* - Cross-Sections, 1"=20'

Figure 05E: *"SR 126 Utility Corridor Bank"* - Cross-Sections, 1"=20'

Appendices

Appendix I: Existing condition HEC-RAS Model (Q_{cap}, n=0.060); Summary Table, Profile and Cross-Sections

Appendix II: Proposed project condition HEC-RAS Model (Q_{cap}, n=0.060); Summary Table, Profile and Cross-Sections

Appendix III: Proposed project condition HEC-RAS Model (Q_{cap}, n=0.085); Summary Table, Profile and Cross-Sections

Appendix IV: Proposed project condition HEC-RAS Model (Q_{cap}, n=0.025); Summary Table, Profile and Cross-Sections

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Appendix V: *"Newhall Ranch River Fluvial Study"* - Phase 1 Final Draft
- LACDPW Fluvial Approval letter dated April 18, 2006
- Table 8: "Santa Clara River Summary of Maximum Proposed Toe-down & Freeboard"
- Tables for Freeboard and Toe-down values

Appendix VI: LACDPW Floodway Maps: 43-ML23, 43-ML24, 43-ML25, 43-ML26 and 43-ML27

Appendix VII: Geotechnical Letter Report "Evaluation of Soil Cement Liner Slope Gradient," October 13 2003, Allan E. Seward Engineering Geology, Inc.

Appendix VIII: Proposed Commerce Center Drive Bridge

- Preliminary Location, Span and Clearance Plan, Sikand Engineering Associates
- Santa Clara River @ Commerce Center Drive Bridge Average Gradation Curve, Allan E. Seward Engineering Geology, Inc.
- HEC RAS hydraulic analysis for Bridge Scour
- Estimating Scour at Bridge, HEC RAS Hydraulic Reference

Appendix IX: Pre-project condition HEC-RAS Model (Q_{cap}, n=0.060); Summary Table, Profile and Cross-Sections

Appendix X: *Summary Table* - changes in Water Surface Elevation & Velocity between Mission Village pre-project condition and Mission Village proposed project condition (n=0.060)

1 Introduction

Newhall Land has retained Pacific Advanced Civil Engineering, Inc. (PACE) to provide river hydraulic analysis and flood protection system analysis along the north and south banks of the Santa Clara River (River) associated with the proposed Mission Village TTM # 61105 (see Figure A). The project area extends from the east end of the future Newhall Ranch Water Reclamation Plant (WRP and extends upstream past the confluence at Castaic Creek, and ends 1,200 feet upstream from the proposed *"Commerce Center Drive"* Bridge (see *Figure 1* and *Figure 2*).
The proposed land development project site Mission Village (TTM # 61105) consists primarily of an elevated alluvial surface historically utilized for agricultural grazing and oil production activities.
Although the land development portion of Mission Village is confined to the south of the river, there are infrastructure elements necessary for the project development that includes the north bank of the river as well. The horizontal alignment of the proposed bank protection roughly coincides with the pre-project bank of the River. The bank protection horizontal alignments follow the proposed project alignment that was evaluated and approved in the Newhall Ranch Specific Plan. The alignment also follows the Newhall Ranch Santa Clara River HEC-RAS Modeling and Newhall Ranch River Fluvial Study - Phase 1 Final Draft prepared by PACE, both recently approved by Los Angeles County Department of Public Works (LACDPW).

In summary, the proposed Mission Village project bank protection and River infrastructure (Specific Plan) analysis includes the following conditions and elements within each condition:

1. **Existing Condition:**

    a. Based on 1999 topographic mapping and approved fluvial analysis existing conditions (no bank protection on Santa Clara River from Old Road to County Line).

2. **Pre-Project Condition (Pre-Project Analysis only included in Appendix):**

    a. Buried soil cement bank protection – Mission Village *"SR 126 Widening/ Commerce Center Drive Interchange Bank Protection"* on the north bank – 2,000 LF.

    Note: This portion of the bank protection is being included as part of the pre-project condition and will be constructed concurrently or prior to Mission Village Project. The SR 126 Widening/ Commerce Center Drive Interchange Bank Protection is a stand alone project underway by LACDPW & CALTRANS (Note: Pre-Project Condition HEC-RAS analysis and comparison is provided for reference only and is included in Appendix IX and X).

3. **Proposed Project Condition:**

    a. Partially exposed soil cement bank protection – Mission Village *"Commerce Center Bridge South Bank"* - 600 LF

    b. *"Commerce Center Drive Bridge"* at Santa Clara River (Sikand submitted Location Span and Clearance document with total bridge length of 1,255 LF and 13 piers

    c. Buried soil cement bank protection – Mission Village *"San Jose Flats Bank"* on the south bank – 1,100 LF

    d. Buried soil cement bank protection – Mission Village *"Lion Canyon Bank"* on the south bank – 450 LF

    e. Non structural bank protection on fill slope at the utility corridor – "*SR 126 Utility Corridor Bank*" on the north bank – 16,000 LF

    f. Buried soil cement bank protection – *"WRP Utility Corridor Bank*" on the north bank – 1,200 LF

Based upon prior LACDPW reviews of this document, it has been determined necessary to include evaluation of existing condition HEC-RAS model vs. the proposed project conditions including SR126 widening/Commerce Center Drive interchange bank protection. Without this, the Mission Village River Bank Protection DCR could not be approved prior to approval of stand alone SR126 widening/Commerce Center Drive interchange DCR analysis. Therefore it was determined necessary to provide evaluation of both conditions:

a) Project vs. Existing – provided in body of report as primary analysis
b) Project vs. Pre-Project – provided in Appendix IX and X for reference only

A stand alone Mission Village bank protection analysis is not necessary as Mission Village would not proceed without the SR126 widening/Commerce Center Drive interchange bank protection.

Mission Village *"SR 126 Widening/Commerce Center Drive Interchange Bank Protection"* is buried soil cement bank protection located south of State Route 126, along the north bank of the river at the north end of Commerce Center Drive Bridge. This soil cement is part of the pre-project condition which has been evaluated as part of the CALTRANS/LA County Department of Public Works Project (State Route 126 widening and Commerce Center Drive interchange project; State Clearing House Project #2003101127) and is therefore not considered to be a part of the Mission Village project. This bank protection is approximately 2,000 linear feet with a horizontal alignment that starts approximately 850 feet west from the central line of proposed "Commerce Center Drive" Bridge, runs under the Bridge and ends approximately 1,150 feet east (upstream) adjacent to the slope of the pre-project road. Riprap will be utilized for the transition structure at the terminus and will tie into the high ground on the west end of bank protection and into the slope of pre-project road on the east end of bank protection. (See *Figure 3* in *Figures* for bank location plan and profile.) CH_2MHill is NLF consultant preparing design of SR 126 widening/Commerce Center Drive interchange project (for joint LACDPW/Caltrans project) and to date they have utilized the buried soil cement bank protection alignment as provided by PACE and approved by LACDPW (Newhall Ranch River Fluvial Study - Phase 1 Final Draft). The SR 126 widening project is a stand-alone project that shall be completed prior or concurrently to the Mission Village project and as such is not specifically part of the Mission Village project. However, for the purpose of the Mission Village project DCR analysis HEC-RAS modeling it is included as part of both the pre-project and proposed project conditions.

Mission Village *"Commerce Center Drive Bridge South Bank"* is partially exposed soil cement bank protection located along the south bank of the River and on the northern portion of the proposed Mission Project Site TTM # 61105. The bank protection is approximately 600 linear feet. The horizontal alignment starts approximately 450 feet west from the central line of the proposed *"Commerce Center Drive Bridge"*, runs under the Bridge and ends approximately 150 feet east (upstream) adjacent to the pre-project slope. Riprap will be utilized for the transition structure at the terminus on the west end east end of bank protection and will tie into the high ground of pre-project riverbank. (See *Figure 4* in *Figures* for bank location plan and profile.) PSOMAS is Newhall Land civil engineering consultant for Mission Village Tentative Tract Map and associated infrastructure plan production. PACE and PSOMAS have coordinated efforts related to detailed bank protection layout at South Bank.

Proposed *"Commerce Center Drive Bridge"* over the River would include abutments and bank stabilization on the northern and southern sides of the bridge, which would protect against the erosive forces of the River. The Bridge Location, Span and Clearance have been prepared by Sikand. The preliminary bridge design is shown on plan included in this report as Appendix VIII. The bank protections; *"SR 126 Widening/Commerce Center Drive interchange Bank Protection"* and *"Commerce Center Drive Bridge South Bank"* will be designed and constructed to LACDPW standards and will ultimately be accepted by LACDPW for maintenance.

Mission Village *"San Jose Flats Bank"* is buried soil cement bank protection located along the south bank of the River and on the northern portion of the proposed Mission Project Site TTM # 61105. The bank protection is approximately 1,100 linear feet and protects the proposed Mission Village stormwater quality basin. The horizontal alignment starts approximately 1,700 feet west from the central line of the

proposed *"Commerce Center Drive Bridge"*. Riprap will be utilized for the transition structure at the terminus on the west end east end of bank protection and will tie into the high ground of pre-project riverbank. (See *Figure 4* for bank location plan and profile.) The bank protection in this area has been reduced and realigned since the Newhall Ranch River Fluvial Study - Phase 1 Final Draft analysis; however, there are no fluvial impacts as some of the bank protection has been eliminated or moved further back from the river.

Mission Village *"Lion Canyon Bank Protection"* is proposed buried soil cement bank protection located along the south bank of the River and on the northern portion of the proposed Mission Project Site TTM # 61105. The bank protection is approximately 450 linear feet and protects the Lion Canyon tributary outlet to the Santa Clara River from lateral bank migration. There are no HEC-RAS model impacts from this bank protection structure as it is located fully behind the existing condition Capital Floodplain lines. The detailed analysis, planning and engineering of this structure will be part of the Lion Canyon tributary detailed design effort. It is shown in this DCE as part of the overall Mission Village project and has also been considered in the Mission Village EIR River Flood Technical Report. The proposed bank protection horizontal alignment starts approximately 3,400 feet west from the "*San Jose Flats Bank" and the proposed bank protection spans the gap between two existing geologic features (bluffs) along the south bank of the river. The bank protection will stabilize the Lion Canyon tributary outlet and the river bank between the hardened "bluffs." This portion of the bank protection was not included in the previously approved Newhall Ranch Fluvial Analysis but it does not impact the Capital Floodplain and therefore will not impact fluvial analysis or offsite water surface elevations* (See *Figure A3* for bank location.)

"SR 126 Utility Corridor Bank" is proposed non-structural bank erosion protection on the existing slope or fill slope of the utility corridor located south of State Highway 126, and runs along the north bank of the River floodplain creating the Newhall Ranch Utility Corridor. The Utility Corridor width varies from 75 to 90 feet. The horizontal alignment extends from the future water reclamation plant (WRP) site and along the pre-project River bank to approximately 16,000 linear feet upstream to the river confluence at Castaic Creek. The final Utility Corridor bank grading will be constructed according to PSOMAS grading plans, with the bank slope protected with geotextile reinforced vegetated – bioengineer slope / erosion protection or other suitable non-hardened bank protection methods as per PACE construction plans. This bank slope protection will be constructed to protect the Utility Corridor. (See *Figures 5A, 5B, 5C, 5D and 5E* for bank location plan, profile and cross- sections.) Newhall is currently in negotiations with Valencia Water Company and Los Angeles County Sanitation District (LACSD) regarding acceptance of maintenance responsibility for the utility corridor.

"WRP Utility Corridor Bank" is buried soil cement bank protection located south of State Highway 126, and continues along the north bank of the River and protects a portion of the 75 foot wide Newhall Ranch Utility Corridor. The horizontal alignment extends from the future water reclamation plant (WRP) site and extends upstream along the pre-project River bank approximately 1,200 linear feet. This soil cement bank protection will be constructed to protect the Utility Corridor (and ultimately future projects) will connect to the future Potrero Bridge soil cement bank protection. See *Figure 5C* for bank location plan, profile and typical section. Newhall is currently negotiating with LACSD to accept this bank protection for maintenance as it connects to proposed LACSD WRP bank protection. The portion of the Utility Corridor from the Grande confluence (STA 17360) westerly approximately 2,000 feet (STA 15540) is proposed to be stabilized with bio-engineered erosion protection as part of the Mission Village and Utility Corridor project. The Newhall Ranch full build-out bank protection plan (approved by LACDPW 4-18-06) includes soil cement bank protection that extends southward approximately 1,000 feet into the River to facilitate the proposed potrero bridge crossing. In the event the potrero bridge crossing and/or this projecting bank protection is eliminated there may be a future need for soil cement or other hardened bank protection along this reach of the Utility Corridor. Therefore, an alternate within the Mission Village DCR project as defined herein, the subject 2,000 linear feet of northerly river bank (STA 17360 to STA 15540) will be considered soil cement. The hydraulic top and toe analysis for this alternate is same as non-hardened solution as the horizontal alignment of the Utility Corridor protection is the same for each alternative.

The proposed soil cement bank protections are primarily necessary to protect the proposed development of the proposed Mission Village Project and associated local and regional infrastructure (bridge and utilities) from potential erosion due to the river.
PACE has utilized the revised Capital Flood (Q_{cap}) flow rates from LACDPW Water Resources Division for the entire River watershed. Based on current hydrology, LACDPW hydraulic design criteria and updated topography, the proposed soil cement bank protection design has been established per the Newhall Ranch River Fluvial Study - Phase 1 Final Draft. The study evaluated the hydraulic analysis and compared several methodologies in order to determine the horizontal and vertical bank protection alignment.

The purpose of this Mission Village Drainage Concept Report (DCR) is to determine the impacts of the proposed project with respect to the pre-project and existing conditions. WSE (water surface elevation), velocity and floodplain changes will be noted by comparing the Q_{cap} HEC-RAS n=0.060 runs of the proposed project and pre-project conditions. Top and toe will be established as the more conservative value provided from the respective Q_{cap} HEC-RAS n=0.085 and n=0.025 runs of the "Newhall Ranch River Fluvial Study - Phase 1 Final Draft" and "Santa Clara River HEC-RAS Modeling" reports completed by PACE. Finally, the analyses and calculations for Q_{cap} using the various Manning values are presented to show the changes in the water surface elevations and velocity values compared with those in the LACDPW approved Newhall Ranch River Fluvial Study - Phase 1 Final Draft to ensure that the proposed soil cement bank protection design can be used for the proposed Mission Village project. (Refer to *Section 3* and *Section 4*.)

Proposed bank protection will consist of an 8-foot wide soil cement section with varied height (top and toe as required) and a 1.5:1 slope (verified in the geotechnical analyses). Upon completion of the installation, the soil cement will be backfilled (buried) with native soils on a 4:1 slope. The excavation required to construct the bank protection will be backfilled and returned to pre-project grade, except as overlayed by the 4:1 fill slope.

All water surface elevations and topography shown in this report and in the construction drawings are based on the North American Vertical Datum (NAVD) 1988, with 1995 adjustment. Topographic mapping data as shown on plan, figure etc is from 1998 PSOMAS mapping of Newhall Ranch. This is same topographic mapping used for the HEC-RAS modeling analysis and approved fluvial analysis.

In addition to this report, a separate Federal Emergency Management Agency (FEMA) Conditional Letter of Map Revision (CLOMR) for the Mission Village TTM #61105 Bank Protection project will be prepared and submitted to LACDPW and will be forwarded to FEMA for review and approval.

Geotechnical firm Alan E. Seward Engineering Geology has prepared geotechnical reports for Mission Village TTM #61105. The soil cement bank protection construction documents will incorporate the geotechnical investigation of the site to determine both the specific locations of the on-site soils suitable for use with soil cement and potentially high groundwater levels.

This report is being prepared for review and approval by the LACDPW. The bank protection design procedure and construction documents details and specifications will follow LACDPW Standards.

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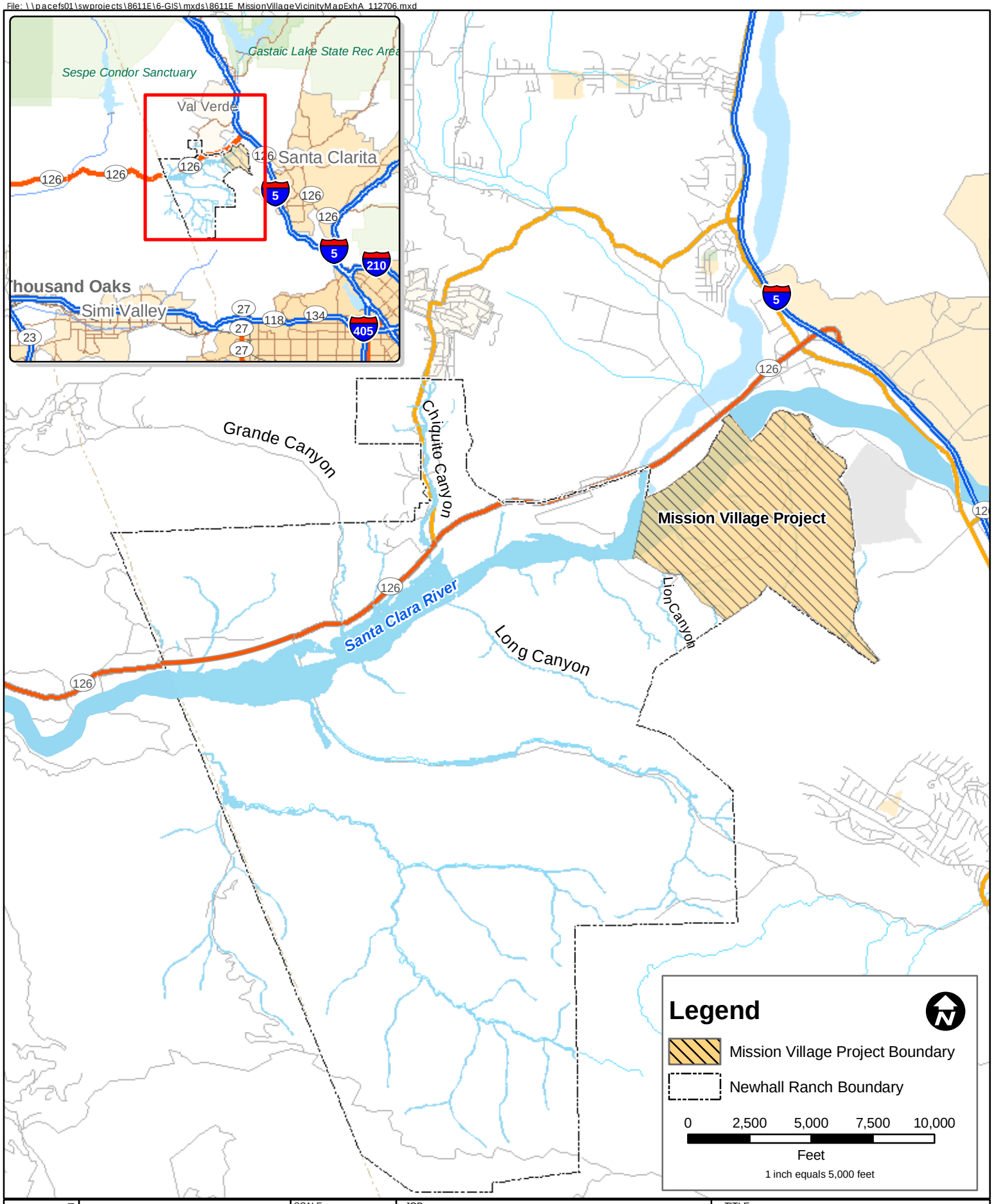


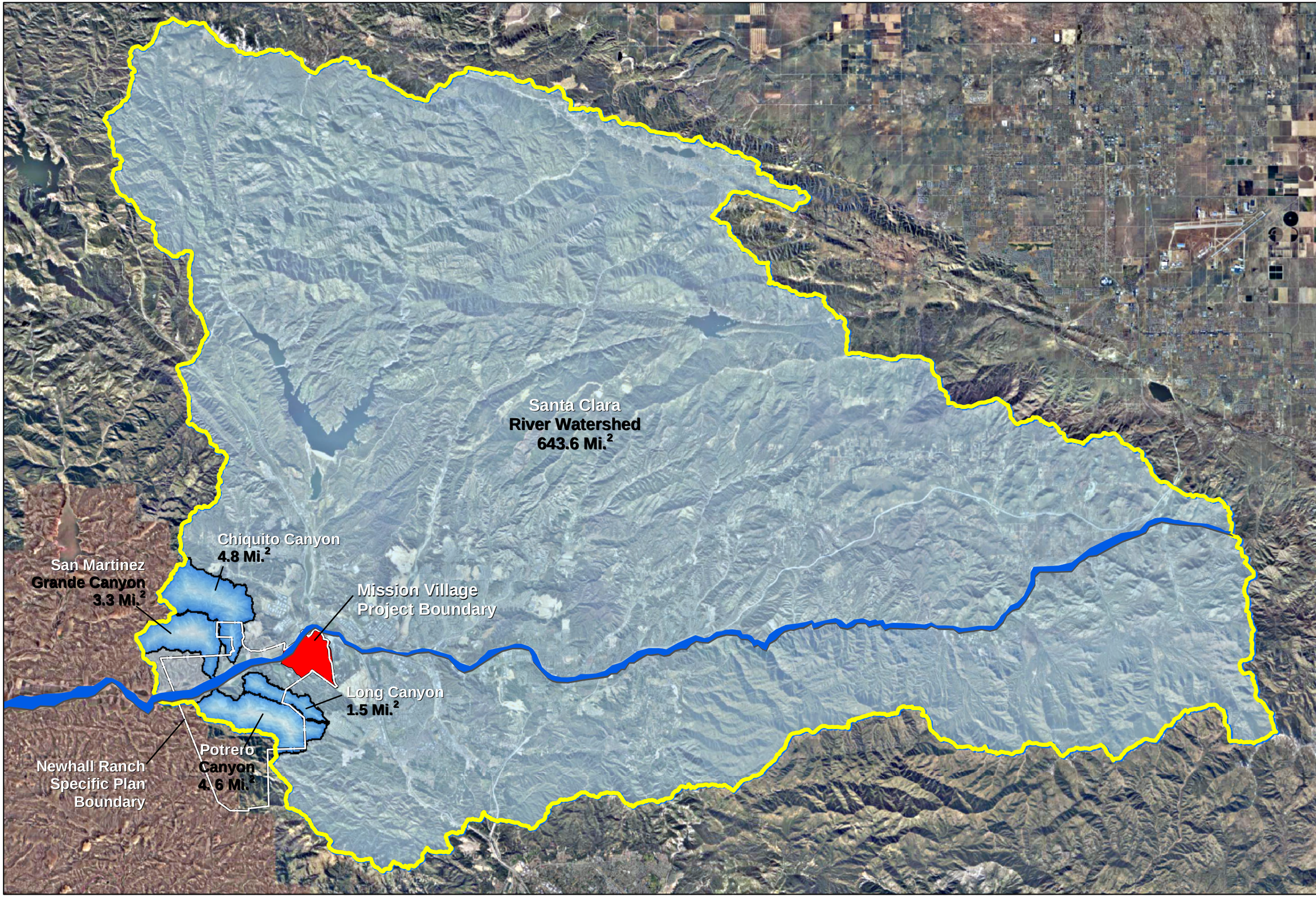
FIGURE A

PACE
PACIFIC ADVANCED CIVIL ENGINEERING, INC.

SCALE	1"= 5000'
DESIGNED	PC
DRAWING	PC
CHECKED	MW
DATE	11/15/06
JOB NO.	8613-E

JOB
MISSION VILLAGE
LOS ANGELES CO CA

TITLE
VICINITY MAP



TITLE

SANTA CLARA RIVER
NEWHALL RANCH WATERSHED
MISSION VILLAGE

JOB

MISSION VILLAGE
DRAINAGE CONCEPT
REPORT

LOS ANGELES CO. CA

SCALE	1"= 15,500'
DESIGNED	TH
DRAWING	TH
CHECKED	MK
DATE	06/22/06
JOB NO.	8137E

PACE
PACIFIC ADVANCED
CIVIL ENGINEERING
17520 NEWHOPE STREET, SUITE 200
FOUNTAIN VALLEY, CA 92708
PH (714) 481-7300 FAX (714) 481-7299

FIGURE

A1

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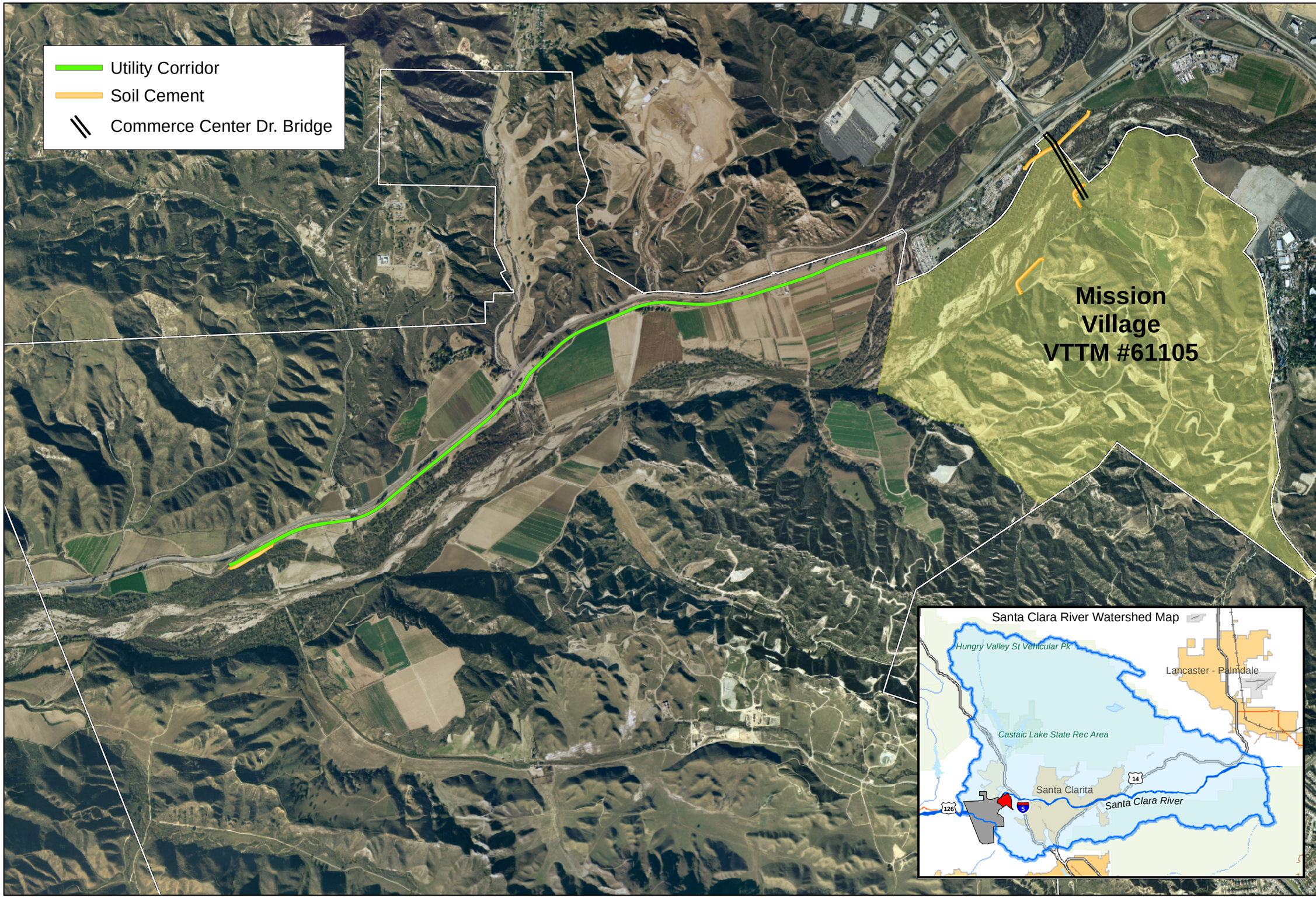

TITLE

VTTM #61105
PROPOSED MISSION VILLAGE
RIVER BANK STABILIZATION

JOB

MISSION VILLAGE
DRAINAGE CONCEPT
REPORT

LOS ANGELES CO. CA

SCALE	1"= 2,000'
DESIGNED	TH
DRAWING	TH
CHECKED	MK
DATE	06/22/06
JOB NO.	8137E

PACE
PACIFIC ADVANCED CIVIL ENGINEERING
17520 NEWHOPE STREET, SUITE 200
FOUNTAIN VALLEY, CA 92708
PH (714) 481-7300 FAX (714) 481-7299

FIGURE

A2

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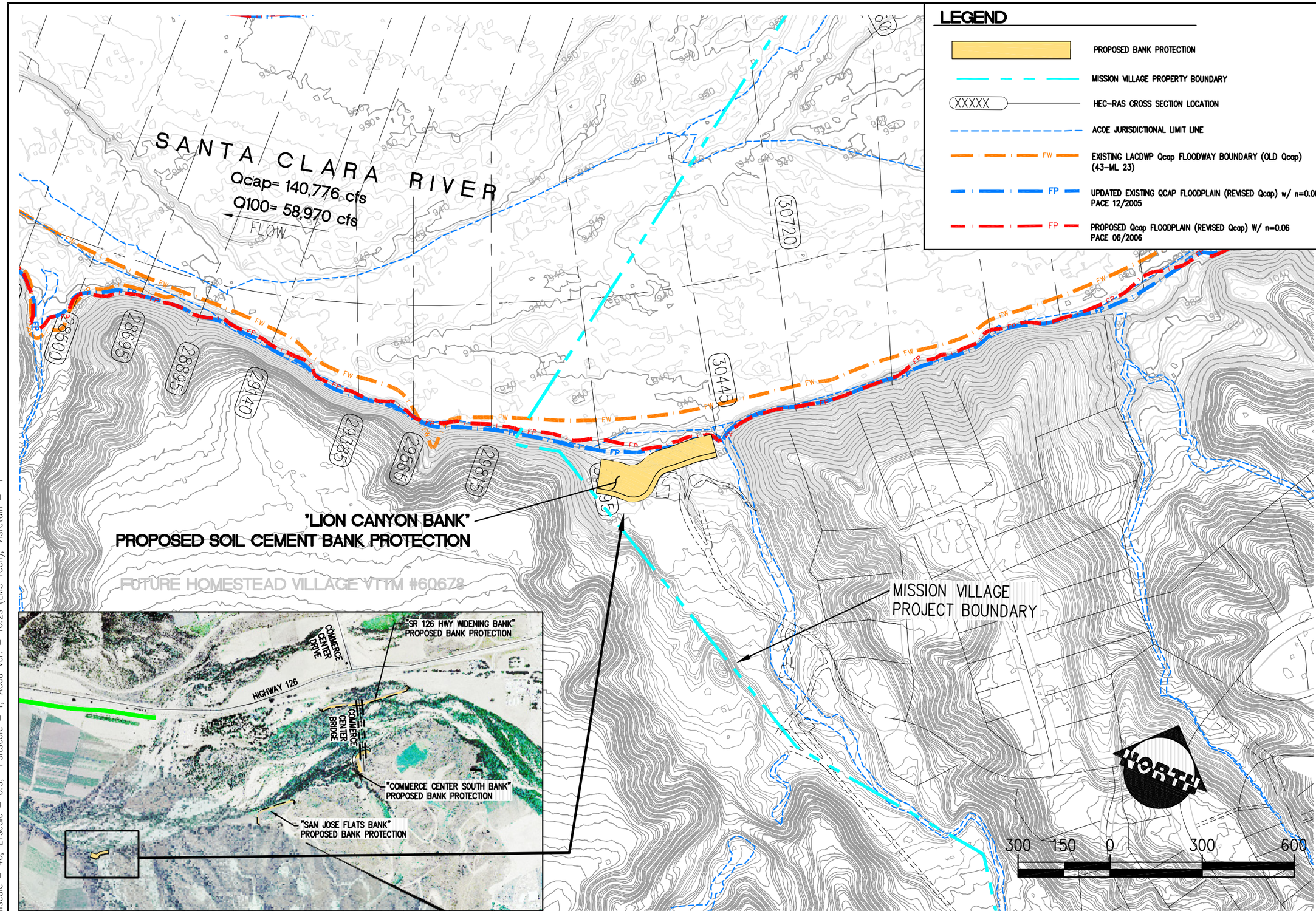

LEGEND

- PROPOSED BANK PROTECTION
- MISSION VILLAGE PROPERTY BOUNDARY
- XXXXX HEC-RAS CROSS SECTION LOCATION
- ACOE JURISDICTIONAL LIMIT LINE
- FW EXISTING LACDWP Qcap FLOODWAY BOUNDARY (OLD Qcap) (43-ML 23)
- FP UPDATED EXISTING QCAP FLOODPLAIN (REVISED Qcap) w/ n=0.06 PACE 12/2005
- FP PROPOSED Qcap FLOODPLAIN (REVISED Qcap) W/ n=0.06 PACE 06/2006

TITLE
LION CANYON
BANK PROECTION

JOB
MISSION VILLAGE
SANTA CLARA RIVER
PROPOSED BANK PROTECTION
LOS ANGELES COUNTY CA

SCALE	1"= 300'
DESIGNED	V.B.
DRAWN	E.N.
CHECKED	M.E.K.
DATE	JUNE 2007
JOB NO.	8611E

PACE
PACIFIC ADVANCED CIVIL ENGINEERING
17520 NEWHOPE STREET, SUITE 200
FOUNTAIN VALLEY, CA 92708
PH (714) 481-7300 FAX (714) 481-7299

FIGURE
A3

Xrefs: NR-cdfg_2004.dwg; NR-chiquito revetment.dwg; NR-p-bank protection_REV.dwg; GR_ALT1 (GROUND).dwg; CHIQ_ALT1(GROUND).dwg; 7904-E-ALIGNMENT-WEST.dwg; 7906-COPY OF 7104-SCR-FIN
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P:\8611E\Engineering\GlobalExhibits\Fig-A3-Lion Canyon.dwg - Tab: SCR Existing Figure 02 - by jpreston on 07/03/07 at 11:42:19 AM

2 Hydrology

The total Santa Clara River Watershed encompasses 1,621 square miles (within 644 square miles at the Los Angeles County Line) with 17-inch average annual rainfall in the region The River lies within the jurisdiction of the LACDPW, which has completed an extensive hydrologic analysis of the watershed and provided updated capital flood flow rates for this reach of the river.

All of the proposed developed area of the 1,252 acres Mission Village TTM 61105 is currently above or will be filled to be above the capital floodplain and therefore none of the improvements proposed on the site would be subject to flood hazard from the River or other nearby drainages.

PSOMAS has prepared for submittal to LACDPW, an on-site Drainage Concept Report for the Mission Village project. This on-site DCR includes conceptual design for the Lion Canyon Creek and the outlet to the River. A portion of this River outlet will be below the River capital flood water/end and subjected to the erosive forces of the River. Soil cement or other erosive protection methods will need to be utilized to protect the proposed Lion Canyon Channel and outlet structure. This includes approximately 300 linear feet of slope erosion protection which will ultimately be part of the River bank protection plans and is now included as part of the on-site DCR. There will be no impact to the River hydraulics from the Lion Canyon outlet erosion protection as it is located behind the capital floodplain or in ineffective flow portion of the floodplain.

FEMA has published maps to designate flood hazard zones that are accepted as the floodplain boundaries for insurance purposes. The Los Angeles County Flood Control District (LACFCD) analyzes conditions based on the Q_{cap}. The Q_{cap} assumes a burned watershed and the resulting bulked peak flows. The Q_{cap} is in excess of the flow anticipated by the base flood or 100-year FEMA storm event. (See *Table 1* for Q_{cap} and 100-year flow rates.)

Although the FEMA 100-year storm is used for flood insurance purposes, the design storm established by LACDPW is the Q_{cap}, which is defined as follows:

1. The design storm is assumed to occur on already saturated soils over a period of four days, with the maximum rainfall falling on the fourth day. During the 24-hour period of maximum rainfall, the rainfall intensity typically increases during the first 70-90% of the period and decreases in the remaining time. Furthermore, approximately 80% of the amount of the 24-hour rainfall falls within the same 70-90% of the period.

2. When converting rainfall to runoff, rainfall that is not lost due to hydrologic processes of interception, evaporation, transpiration, depression storage, infiltration or percolation is assumed to be surface runoff.

3. The natural portions of the watershed are assumed to have been burned by fire, which decreases soil infiltration.

4. A bulking factor is assumed. In the area where a watershed is burned, the runoff would carry with it a large layer of eroded topsoil, burned trees and brush. To account for the quantity of debris, the design flow rate is artificially increased by a percentage increase in flow rate, or bulking factor.

PACE has utilized the Q_{cap} flow rates from LACDPW Water Resources Division for the entire River watershed. (*Table 1*)

Table 1. Design Hydrology for Mission Village			
HEC-RAS Reach Cross-Section	**100-Year Flow Rate (cfs)**	**Qcap Flow Rate (cfs)**	**Reach Location Description**
35245	58,970	116,236	D/S from Proposed Commerce Center Drive Bridge to Castaic Creek Confluence
32265	58,970	140,776	Castaic Creek Confluence to Chiquito Canyon
22195	60,236	141,426	Chiquito Canyon to Potrero Canyon
15125	62,000	142,475	Potrero Canyon to Los Angeles/Ventura County Line

3 HEC-RAS Modeling

An extensive analysis was done to determine hydraulic design data and to determine the top and toe elevations for future proposed bank protections in the "Newhall Ranch River Fluvial Study - Phase 1 Final Draft" and "Santa Clara River HEC-RAS Modeling" reports completed by PACE.

3.1 Summary from "Newhall Ranch Santa Clara River HEC-RAS Modeling"

The HEC-RAS modeling analysis has been complete and approved for the existing and proposed project conditions for all of the Newhall Ranch Proposed Soil Cement Bank Protection Projects along the River between the I-5 Freeway and the Los Angeles/Ventura County Line for the Q_{cap} Storm Event. The Newhall Ranch Proposed Soil Cement Bank Protection Projects (full build out of Newhall Ranch project) along the River include:

1. Newhall Ranch Water Reclamation Plant (WRP) Soil Cement Bank Protection – 4,385 LF.
2. Soil Cement Bank Protection between the Grande and Potrero confluences (along north bank) (Homestead West) – 3,300 LF.
3. Homestead Proposed Bank Protection (along south bank) – 2,450 LF.
4. Landmark Village Soil Cement Bank Protection (both north and south banks of the River) – 10,500 LF, 6,300 LF.
5. Bank Protection for proposed Commerce Center Drive Bridge/Hwy 126 Widening Bank Protection – 2,500 LF.
6. Proposed Utility Corridor grading and slope erosion protection – 7,080 LF. (Chiquito confluence to WRP bank protection)

The proposed bridges over the River included in the overall proposed Newhall Ranch condition HEC-RAS models include:

1. Commerce Center Drive Bridge
2. Long Canyon Bridge
3. Potrero Canyon Bridge

3.2 HEC-RAS Models Developed for the Mission Village DCR (Existing, Pre-project and Proposed Project)

Prior to the Mission Village project bank protection construction the *"SR 126 Widening/ Commerce Center Drive Interchange Bank Protection"* will be constructed. Therefore for the project purposes, PACE used the approved HEC-RAS Model for existing river condition from the LACDPW approved "Newhall Ranch Santa Clara River HEC-RAS Modeling" and revised the model by including the *"SR 126 Widening/ Commerce Center Drive Interchange Bank Protection"*. The revised model is submitted here as the *Mission Village Pre-project Condition* HEC-RAS Model.

For the project design purposes, PACE used the approved HEC-RAS Model for proposed-river condition from the "Newhall Ranch Santa Clara River HEC-RAS Modeling" and revised the model by eliminating the proposed bank protection and bridges along the River that are not associated with the Mission Village project. In addition, the modeled proposed condition grading at the utility corridor was updated based on most current grading provided by PSOMAS. The revised model is submitted here as the *Mission Village Proposed project Condition* HEC-RAS Model.

Boundary conditions for the flow were established as known water surfaces reflecting the existing boundary water surfaces from the "Newhall Ranch Santa Clara River HEC-RAS Modeling". Boundary conditions for the existing pre-project and proposed project conditions are identical because the extents of the HEC-RAS models are outside of the area impacted by the proposed project.

Table 1.2 HEC-RAS model boundary flow conditions for Mission Village		
Manning's	**U/S Known WSE for Qcap (HEC-RAS Section 39755)**	**D/S Known WSE for Qcap (HEC-RAS Section 13425)**
n =0.085	1013.33	861.91
n =0.060	1010.68	859.12
n =0.025	1007.49	853.32

The Mission Village proposed project condition HEC-RAS Model <u>includes</u> the following proposed river related improvements:

1. Mission Village Soil Cement Bank Protections; *"SR 126 Widening/ Commerce Center Drive Interchange South Bank Protection"* and *"San Jose Flats Bank"* – 2,000 LF, 600 LF and 1,100 LF respectively
2. *TRM's "SR 126 Utility Corridor Bank"* and Soil Cement Bank Protection "*WRP Utility Corridor Bank"* – 16,000 LF and – 1,200 LF respectively
3. *"Commerce Center Drive Bridge"*

and <u>does not</u> include:

4. Newhall Ranch Water Reclamation Plant (WRP) Soil Cement Bank Protection – 4,385 LF.
5. Soil Cement Bank Protection between the Grande and Potrero confluences (along north bank) (Homestead West) – 3,300 LF.
6. Homestead Proposed Bank Protection (along south bank) – 2,450 LF.
7. Long Canyon Bridge and Potrero Canyon Bridge.
8. Landmark Village Soil Cement Bank Protection (both north and south banks of the River) – 10,500 LF, 6,300 LF.

Commerce Center Drive Bridge is one of the proposed bridges over the River that has been included in the proposed condition HEC-RAS models, while Long Canyon Bridge and Potrero Canyon Bridge have not been included. For the purposes of the bridge modeling in this project, the two new HEC-RAS sections upstream and downstream from the bridge have been created within the HEC-RAS analysis (*Figure 2*). *Table 2* below identifies the various HEC-RAS runs used in this report.

Table 2. Santa Clara River HEC-RAS Models for Mission Village DCR (1)		
HEC-RAS File Name	**Description**	**Use**
Existing project Condition	Existing vegetation, n=0.060	Determine existing conditions Capital Flood water surface elevations and flow velocities Santa Clara River from RS 13425 to RS 39755
Proposed Condition	Existing vegetation, n=0.060	Determine proposed conditions Capital Flood water surface elevations and flow velocities Santa Clara River from RS 13425 to RS 39755
Proposed Condition	Full vegetation, n=0.085	**Determine proposed conditions Capital Flood maximum water surface elevations within Santa Clara River from RS 13425 to RS 39755**
Proposed Condition	No vegetation, n=0.025	**Determine proposed conditions Capital Flood maximum flow velocities within Santa Clara River from 13425 to RS 39755**
Pre-project Condition	Existing vegetation, n=0.060	Determine pre-project conditions Capital Flood water surface elevations and flow velocities Santa Clara River from RS 13425 to RS 39755

(1) HEC-RAS models for Proposed Conditions included in this report are revised approved HEC-RAS models for Proposed Conditions per Newhall Ranch-Santa Clara River HEC-RAS Modeling Report, prepared by PACE.
Items in bold are HEC-RAS models that are pertinent to the Top and Toe Bank Protection design.

Analyses and calculations for Q_{cap} with a Manning's value of 0.060 are presented to identify the changes in floodplain acreage, water surface elevation and velocity among the:

- Existing and proposed project condition (refer to Section 4.1 and Table 3)
- Pre-project and proposed project condition (refer to Table in Appendix IX)

They are also used to ensure that there are no increases in water surface elevation or velocity on the Travel Village property from the Mission Village pre-project condition to the proposed project condition.

Analyses and calculations for Q_{cap} with a Manning's values of 0.085, 0.025 are presented to show the maximum water surface elevation and velocity values for the Mission Village proposed project condition. Water surface elevation and velocity values of the "Newhall Ranch Santa Clara River HEC-RAS Modeling" (refer to *Table 4* and *Table 5)* are compared with the Newhall Ranch River Fluvial Study - Phase 1 Final Draft to ensure the most conservative design values for the bank protection top and toe. It may be determined necessary to modify the values for each because of the proposed project analysis in this report (refer to *Section 4.2* and *Section 4.3).* See Appendix *V Table 8* "Santa Clara River Summary of Maximum Proposed Tow-down and Freeboard" from the Newhall Ranch River Fluvial Study - Phase 1 Final Draft.

Analyses and calculations for Q_{100} with Manning values of 0.060 have been evaluated and these HEC-RAS Models will be used for FEMA Conditional Letter of Map Revision CLOMR and LOMR. PACE will prepare a separate FEMA CLOMR submittal for LACDPW/FEMA review. The enclosed CD includes all the Capital flood HEC-RAS models as shown in the Appendix and the 100-year storm HEC-RAS models for various models that have been used for evaluation of non-LACDPW maintained facilities "SR 126 Utility Corridor Bank" or FEMA submittals. Hard copies of the 100-year HEC-RAS models are not included in this report, only the input and output files have been provided.

4 Summary of HEC-RAS Results

4.1 Existing vs. Proposed Condition and Pre-project vs. Proposed Condition (n=0.06)

Newhall Land owns the land encompassing the River and both the north and south banks of the River for the majority of the study reach. However, at the reach of the River where the existing Travel Village development is located (at approximately River stations 35725 through 31585) Newhall Land does not own the property on the north bank (Travel Village) of the River. As identified in the LACDPW approved Newhall Ranch Santa Clara River HEC-RAS Modeling report prepared by PACE and as verified in this Mission Village analysis, there are no increases in water surface elevation or velocity (beyond the proposed bank protection) on the Travel Village property (or anywhere off of the Newhall Ranch boundary) due to the Mission Village project. This can be seen on *Table 3* and *Table Appendix X*, between River stations 35725 and 31585. The increases in water surface elevation associated with the SR126 Widening/Commerce Center Drive Interchange/Bridge are all contained within the proposed project bank protection. Per previous discussion with LACDPW land development division staff the SR126 widening project is a joint LACDPW/CALTRANS project and per the project conditions the County is required to obtain any property or acceptances necessary to construct the SR126 widening project bank protection. Newhall is not responsible for obtaining private landowner approval.

As stated above, PACE utilized HEC-RAS analyses for Q_{cap} with a Manning's value of 0.060 to identify the changes in floodplain, water surface elevation and velocity for the Mission Village pre-project project condition and proposed project condition. (Refer to *Table 2)*
The water surface and velocity for the proposed project condition are presented and compared with the water surface and velocity for Mission Village existing project condition in *Table 3.* (Detailed model results are shown in *Appendixes I* and *II*.)
The water surface and velocity for the proposed project condition are presented and compared with the water surface and velocity for Mission Village pre-project condition in *Table Appendix X.* (Detailed model results for Mission Village pre-project condition are shown in *Appendix IX*).

Located between River station 37390 and 35725, the proposed *"Commerce Center Bridge South Bank"* soil cement bank protection and proposed *"Commerce Center Drive Bridge"* create various changes in water surface elevation and velocity. The water surface elevation increases up to a maximum of 2.0 ft. This occurs because the proposed project extends into the existing floodplain causing a narrowing of the proposed floodplain and higher water surface elevations and velocities. This increase in water surface elevation occurs approximately 2,000 feet upstream from the proposed *"Commerce Center Drive Bridge"* through the River station 38475 (Refer to *Table 3*). Located on the south bank of the River is the proposed bank protection *"San Jose Flats Bank"* between River station 34310 and 33710 however it causes no increases in water surface elevation or velocity. Located on the north bank of the River to protect the proposed utility corridor between River station 32265 and 14315, the proposed bank protections *"SR 126 Utility Corridor Bank"* and "*WRP Utility Corridor Bank"* create very small changes in water surface elevation and velocity in the River. The water surface elevation increases to a maximum of 0.2 ft at the River stations 24550 and 17110. Increases of 0.1 ft occur along the utility corridor at the River stations 25600, 25000, 24795, 24335, 23180, 21440, 20280, 16720, 15745 and 14900. The velocity increases between River station 24550 and 23975 up to a maximum of 0.3 fps and an increase of 0.2 fps at River stations 23000, 16970 and 16515. There are increases of 0.1 fps at the River stations 20595, 20280, 19630, 17510, 17360, 15125, 14720 and 14480 as well as increases of 0.2 fps at the River stations 16970 and 16515. There are no increases in water surface elevation or velocity downstream of River station 14315. All proposed increases in water surface elevation and velocity occur on property owned by Newhall Land. In accordance with LACDPW criteria, Newhall Land will need to provide a "drainage acceptance letter" to formally allow these changes in the floodplain. (Refer to *Table 3*.)

Newhall Land will prepare and submit formal ML map revisions for Floodplain and Floodway for LACDPW Review and ultimately for Los Angeles County Board of Supervisors approval prior to recordation of final map. The proposed condition Capital Floodplain line and the pre-project condition Capital Floodplain line is shown on *Figure 2*.

Table 3: Changes in Water Surface Elevation and Velocity (Q_{cap} and n=0.060)

HEC-RAS River Section No.	Existing Cond. WSE (1) (ft)	Proposed Cond. WSE (3) (ft)	Delta 3-1 WSE (ft)	Existing Cond. Vel.(1) (fps)	Proposed Cond. Vel.(3) (fps)	Delta 3-1 Vel. (fps)
39755	1010.7	1010.7	0.0	10.5	10.5	0.0
39605	1010.0	1010.0	0.0	9.8	9.8	0.0
39310	1008.4	1008.4	0.0	10.1	10.1	0.0
39100	1007.8	1007.8	0.0	8.4	8.4	0.0
38925	1007.1	1007.1	0.0	8.6	8.5	-0.1
38710	1006.1	1006.2	0.1	8.9	8.9	0.0
38475	1003.6	1003.7	0.1	12.5	12.4	-0.1
38300	1002.7	1002.8	0.1	11.1	11.0	-0.1
38065	1001.3	1001.4	0.1	11.2	11.1	-0.1
37810	997.7	998.3	0.6	14.5	13.8	-0.7
37655	995.1	997.1	2.0	15.2	12.6	-2.6
37390	994.1	995.9	1.8	10.2	10.2	0.0
37135	992.6	994.2	1.6	9.8	11.0	1.2
36930	991.8	993.2	1.4	9.1	10.0	0.9
36735	990.8	992.2	1.4	9.1	10.0	0.9
36515	990.0	991.4	1.4	8.4	8.8	0.4
36374		991.0			8.3	
Bridge - Commerce Center Drive - Proposed						
36240		989.2			9.7	
36080	988.0	988.0	0.0	8.2	10.0	1.8
35845	986.9	986.9	0.0	8.3	8.5	0.2
35725	986.0	986.0	0.0	9.4	9.3	-0.1
35515	984.7	984.7	0.0	10.3	10.3	0.0
35245	982.8	982.8	0.0	10.4	10.4	0.0
35040	981.3	981.3	0.0	11.4	11.4	0.0
34860	980.0	980.0	0.0	9.9	9.9	0.0
34720	979.0	978.9	-0.1	9.4	9.4	0.0
34495	977.4	977.4	0.0	9.7	9.2	-0.5
34310	976.3	976.2	-0.1	10.0	9.7	-0.3
34090	975.0	975.0	0.0	9.4	9.1	-0.3
33880	973.6	973.6	0.0	9.3	9.2	-0.1
33710	972.6	972.6	0.0	8.7	8.7	0.0
33500	971.3	971.3	0.0	8.9	8.9	0.0
33310	970.4	970.4	0.0	7.8	7.8	0.0
33115	969.6	969.6	0.0	7.2	7.2	0.0
32795	967.8	967.8	0.0	8.0	8.0	0.0
32605	966.6	966.6	0.0	8.1	8.1	0.0

(1) Existing Cond. water surface elevations and velocities are based on "n" value of 0.060 for entire width of the river for the existing Mission Village condition with topography only (No bank protection is included in this condition).

(3) Proposed project Cond. water surface elevations and velocities are based on "n" value of 0.060 for entire width of the river for the proposed Mission Village project improvements.

HEC-RAS Sections in bold for Mission Village Project Improvement Reaches.

HEC-RAS Sections 36374 and 36240 are Proposed Bridge Sections.

Table 3: (Continued) Changes in Water Surface Elevation and Velocity (Q_{cap} and n=0.060)						
HEC-RAS River Section No.	**Existing Cond. WSE (1) (ft)**	**Proposed Cond. WSE (3) (ft)**	**Delta 3-1 WSE (ft)**	**Existing Cond. Vel.(1) (fps)**	**Proposed Cond. Vel.(3) (fps)**	**Delta 3-1 Vel. (fps)**
32265	965.0	965.0	0.0	7.3	7.2	-0.1
31875	963.2	963.2	0.0	6.7	6.7	0.0
31585	962.4	962.4	0.0	6.1	6.1	0.0
31360	961.7	961.7	0.0	6.5	6.5	0.0
31060	961.2	961.2	0.0	5.9	5.9	0.0
30720	960.8	960.8	0.0	5.1	5.1	0.0
30445	960.5	960.5	0.0	5.0	5.0	0.0
30095	960.1	960.1	0.0	5.7	5.7	0.0
29815	959.6	959.6	0.0	6.6	6.6	0.0
29565	959.3	959.3	0.0	6.5	6.5	0.0
29385	958.8	958.8	0.0	7.5	7.5	0.0
29140	957.8	957.8	0.0	8.8	8.8	0.0
28895	952.4	952.4	0.0	19.7	19.7	0.0
28695	951.1	951.1	0.0	13.5	13.5	0.0
28500	948.7	948.7	0.0	14.9	14.9	0.0
28280	947.4	947.4	0.0	14.1	14.1	0.0
28080	946.5	946.5	0.0	13.1	13.1	0.0
27925	945.0	945.0	0.0	14.3	14.3	0.0
27725	941.9	941.9	0.0	17.1	17.1	0.0
27545	940.6	940.6	0.0	15.9	15.9	0.0
27335	939.4	939.4	0.0	14.0	14.0	0.0
27155	937.4	937.4	0.0	15.3	15.3	0.0
26990	936.6	936.6	0.0	12.1	12.1	0.0
26780	935.5	935.5	0.0	11.1	11.1	0.0
26575	934.6	934.6	0.0	9.5	9.5	0.0
26355	933.2	933.2	0.0	10.5	10.5	0.0
26170	932.2	932.2	0.0	10.9	10.9	0.0
25965	930.6	930.6	0.0	11.8	11.8	0.0
25600	929.2	929.3	0.1	11.9	11.9	0.0
25425	928.4	928.4	0.0	10.6	10.6	0.0
25215	927.8	927.8	0.0	8.5	8.5	0.0
25000	925.8	925.9	0.1	10.7	10.6	-0.1
24795	924.3	924.4	0.1	10.4	10.1	-0.3
24550	922.8	923.0	0.2	9.8	9.9	0.1
24335	921.9	922.0	0.1	8.0	8.3	0.3
24115	920.4	920.4	0.0	10.0	10.3	0.3
23975	919.1	919.1	0.0	9.3	9.5	0.2

(1) Existing Cond. water surface elevations and velocities are based on "n" value of 0.060 for entire width of the river for the existing Mission Village condition with topography only (No bank protection is included in this condition).

(3) Proposed project Cond. water surface elevations and velocities are based on "n" value of 0.060 for entire width of the river for the proposed Mission Village project improvements.

HEC-RAS Sections in bold for Mission Village Project Improvement Reaches.

HEC-RAS Sections 36374 and 36240 are Proposed Bridge Sections.

Table 3: (Continued) Changes in Water Surface Elevation and Velocity (Q_{cap} and n=0.060)						
HEC-RAS River Section No.	**Existing Cond. WSE (1) (ft)**	**Proposed Cond. WSE (3) (ft)**	**Delta 3-1 WSE (ft)**	**Existing Cond. Vel.(1) (fps)**	**Proposed Cond. Vel.(3) (fps)**	**Delta 3-1 Vel. (fps)**
23755	918.2	918.2	0.0	8.9	8.9	0.0
23565	917.1	917.1	0.0	8.6	8.6	0.0
23365	916.2	916.2	0.0	8.5	8.5	0.0
23180	915.3	915.4	0.1	8.2	8.2	0.0
23000	914.8	914.8	0.0	7.7	7.9	0.2
22790	914.4	914.4	0.0	6.2	6.2	0.0
25785	913.8	913.8	0.0	6.6	6.6	0.0
22600	913.2	913.2	0.0	7.9	7.9	0.0
22415	912.4	912.4	0.0	8.6	8.6	0.0
22195	910.6	910.6	0.0	10.3	10.3	0.0
22010	908.8	908.8	0.0	12.2	12.2	0.0
21790	906.1	906.1	0.0	13.7	13.7	0.0
21615	905.0	905.0	0.0	11.3	11.3	0.0
21440	903.5	903.6	0.1	11.4	11.4	0.0
21225	902.1	902.1	0.0	10.5	10.5	0.0
21020	901.2	901.2	0.0	9.1	9.1	0.0
20845	900.4	900.4	0.0	8.7	8.7	0.0
20595	899.2	899.2	0.0	8.9	9.0	0.1
20435	898.4	898.4	0.0	9.3	9.3	0.0
20280	897.0	897.1	0.1	10.6	10.7	0.1
20070	896.1	896.1	0.0	8.7	8.7	0.0
19855	895.2	895.2	0.0	8.3	8.3	0.0
19630	894.5	894.5	0.0	7.8	7.9	0.1
19440	893.9	893.9	0.0	7.3	7.3	0.0
19240	893.3	893.3	0.0	7.5	7.5	0.0
19050	892.9	892.9	0.0	6.7	6.7	0.0
18830	892.3	892.3	0.0	6.8	6.8	0.0
18650	891.9	891.9	0.0	6.8	6.8	0.0
18475	891.6	891.6	0.0	6.1	6.1	0.0
18290	891.2	891.2	0.0	6.6	6.6	0.0
18025	890.6	890.6	0.0	6.5	6.5	0.0
17785	889.9	889.9	0.0	7.4	7.4	0.0
17510	887.7	887.7	0.0	11.1	11.2	0.1
17360	885.3	885.2	-0.1	13.9	14.0	0.1
17110	882.7	882.9	0.2	14.2	13.6	-0.6
16970	880.1	880.0	-0.1	15.5	15.7	0.2
16720	877.3	877.4	0.1	11.5	11.5	0.0

(1) Existing Cond. water surface elevations and velocities are based on "n" value of 0.060 for entire width of the river for the existing Mission Village condition with topography only (No bank protection is included in this condition).

(3) Proposed project Cond. water surface elevations and velocities are based on "n" value of 0.060 for entire width of the river for the proposed Mission Village project improvements.

HEC-RAS Sections in bold for Mission Village Project Improvement Reaches.

HEC-RAS Sections 36374 and 36240 are Proposed Bridge Sections.

Table 3: (Continued) Changes in Water Surface Elevation and Velocity (Q_{cap} and n=0.060)						
HEC-RAS River Section No.	**Existing Cond. WSE (1) (ft)**	**Proposed Cond. WSE (3) (ft)**	**Delta 3-1 WSE (ft)**	**Existing Cond. Vel.(1) (fps)**	**Proposed Cond. Vel.(3) (fps)**	**Delta 3-1 Vel. (fps)**
16515	875.8	875.8	0.0	10.2	10.4	0.2
16305	874.7	874.7	0.0	9.1	9.1	0.0
16130	873.6	873.6	0.0	9.0	9.0	0.0
15960	872.7	872.7	0.0	7.6	7.6	0.0
15745	871.7	871.8	0.1	7.0	7.0	0.0
15540	870.8	870.8	0.0	7.4	7.4	0.0
15335	869.6	869.6	0.0	7.8	7.7	-0.1
15125	868.2	868.2	0.0	8.5	8.6	0.1
14900	866.7	866.8	0.1	9.2	9.0	-0.2
14720	865.8	865.8	0.0	8.8	8.9	0.1
14480	864.5	864.5	0.0	8.6	8.7	0.1
14315	863.7	863.7	0.0	8.0	8.0	0.0
14090	862.3	862.3	0.0	8.5	8.5	0.0
13850	861.1	861.1	0.0	8.3	8.3	0.0
13635	859.9	859.9	0.0	9.6	9.6	0.0
13425	859.1	859.1	0.0	7.4	7.4	0.0

(1) Existing Cond. water surface elevations and velocities are based on "n" value of 0.060 for entire width of the river for the existing Mission Village condition with topography only (No bank protection is included in this condition).

(3) Proposed project Cond. water surface elevations and velocities are based on "n" value of 0.060 for entire width of the river for the proposed Mission Village project improvements.

HEC-RAS Sections in bold for Mission Village Project Improvement Reaches.

HEC-RAS Sections 36374 and 36240 are Proposed Bridge Sections.

4.2 Proposed Condition (n=0.085) and Top of Bank Protection Determination

As stated above, PACE utilized HEC-RAS analyses of Q_{cap} with a Manning's value of 0.085 (*Table 2)* to determine the proposed condition maximum water surface and resulting top of bank protection.

The proposed project condition maximum water surface are presented and compared with the proposed Newhall Ranch build-out condition maximum water surface elevations from the Newhall Ranch River Fluvial Study - Phase 1 Final Draft in *Table 4*.

The *Commerce Center Drive* Bridge was previously modeled with the blocked obstruction method. (Refer to *"Newhall Ranch Santa Clara River HEC-RAS Modeling".*) The HEC-RAS models submitted with the DCR have been revised to include more detailed modeling of the bridge deck, piers, and abutment based on the preliminary location, span, and clearance information provided in *Appendix VIII*. For the purposes of the bridge modeling in this project, the two new HEC-RAS bridge sections have been created within the HEC-RAS analysis. (Refer to River Sections 36374 and 36240 on *Figure 2*).
Based on this more detailed modeling and two new bridge HEC-RAS sections, the proposed condition maximum water surface for the Proposed project modeling are different from the Newhall Ranch River Fluvial Study - Phase 1 Final Draft maximum water surface values (Refer to *Table 4*). Because of the major difference between two Models, the top elevations from Newhall Ranch River Fluvial Study - Phase 1 Final Draft are not going to be included in further design of top bank elevation for the bank protection at the Bridge; *"SR 126 Widening/ Commerce Center Drive Interchange Bank Protection"" and "Commerce Center Bridge South Bank"*.

The minor increases of 0.1 ft at the River stations 34310 and 34090 (Refer to *Table 4*) are considered and the new top bank elevation is calculated for the bank protection "*San Jose Flats Bank" (*Refer to *Tables 4.1 and 8.1*).

Freeboard calculations are provided and shown on *Table 4.1* and *Table 4.2.* The new freeboard values are used to calculate the new minimum top elevation to compare with the top elevations from Newhall Ranch River Fluvial Study - Phase 1 Final Draft. The higher value of top elevations is going to be the minimum designed top elevation for soil cement bank protection in this report (Refer to *Table 6*, *Table 7 and Table 8).* See "Santa Clara River Summary of Maximum Proposed Tow-down and Freeboard", *Table 8* from Newhall Ranch River Fluvial Study - Phase 1 Final Draft in *Appendix V*. For evaluation of the alternate extension of the *"WRP Utility Corridor Bank"* soil cement for the 1,200 LF west of the Grande confluence, the top of the soil cement (horizontal and vertical alignment) would remain as shown in the Mission Village Utility Corridor analysis within this document. The top for the soil cement alternative would be a maximum of the values as shown within this document.

As stated in section 1.0 of this report there is additional River bank stabilization (Refer to "Lion Canyon Bank") that will be required to protect the Lion Canyon Creek outlet and River confluences for Drainage Concept Report (DCR) purposes. This bank protection has been included as part of the on-site DCR as prepared by PSOMAS. Final design and construction plans will integrate the River bank protection for Lion Canyon with the rest of the River bank protection. The design top and toe of the Lion Canyon outlet protection will follow the top and toe as determined by this River DCR analysis unless localized Lion Canyon issues require additional protection. The other tributary outlets which are part of the Mission Village project are Grande, Chiquito and Castaic Creeks. Each of these tributaries will be addressed in the detailed design of the Utility Corridor grading and utility plan. This River DCR will serve as design guideline for each of these tributaries.

The water surface elevations of the n=0.085 model are shown on *Table 4* and the detailed model results are shown in *Appendixes III*. The purpose of providing the n=0.85 water surface comparison is to quickly enable the reviewer to determine if it is the Mission Village proposed project or the Newhall Land full build-out condition that controls the top of bank elevation decision.

Table 4: Changes in Water Surface Elevation Between Mission Village Proposed Condition and Newhall Ranch Build Out for Design of Top of Bank Protection

(Q_{cap} and n=0.085)

HEC-RAS River Section No.	Prop. Cond. Mission Village WSE (2) (ft)	Prop. Cond. Newhall Ranch (Build Out) WSE (3) (ft)	Delta 2& 3 WSE (ft)
38065	1004.1	1004.1	0.0
37810	1001.6	1001.4	0.2
37655	1000.4	999.9	0.5
37390	998.9	998.5	0.4
37135	997.1	996.8	0.3
36930	996.0	995.7	0.3
36735	994.9	994.6	0.3
36515	993.9	993.6	0.3
36374	993.4		
Bridge - Commerce Center Drive - Proposed			
36240	991.5		
36080	990.3	990.6	-0.3
35845	989.0	989.1	-0.1
35725	988.1	988.3	-0.2
35515	986.8	986.9	-0.1
34495	979.6	979.7	-0.1
34310	978.5	978.4	0.1
34090	977.1	977.0	0.1
33880	975.7	975.7	0.0
33710	974.6	974.6	0.0
33500	973.4	973.3	0.1
15540	872.9	876.7	-3.8
15335	871.8	874.8	-3.0
15125	870.5	872.0	-1.5
14900	869.2	869.7	-0.5
14720	868.2	868.4	-0.2
14480	866.8	866.9	-0.1
14315	866.1	866.0	0.1

(2) Prop. Cond. water surface elevations are based on "n" value of 0.085 for entire width of the river for the proposed Mission Village proposed project improvements.

(3) Proposed Water Surface Elevation (WSE) are from Fluvial Study for Santa Clara River.

HEC-RAS Sections in bold for Mission Village Project Soil Cement Bank Protection Reaches

HEC-RAS Sections 36374 and 36240 are Proposed Bridge Sections

TABLE 4.1: CALCULATIONS FOR TOTAL FREEBOARD BY INDIVIDUAL ADJUSTMENT COMPONENT BASED ON LACH&SM - SANTA CLARA RIVER PROPOSED CONDITIONS OUTSIDE CURVED REACH Q_{CAP} n=0.085

SECTION	Y_{MAX}	Y_{TOT}=	V (FPS)	FLOW DEPTH (FT)	Y_{AGG}+	Y_{GA}+	CHANNEL TYPE	BOTTOM WIDTH (FT)	TOP WIDTH (FT)	Y_{SE}+	BEND COEFF	SIDE SLOPE	RADIUS	H/2	Y_{DM}
37655	2.5	2.5	9.8	18.4	1.0	0.1	2	348.9	946.7	0.1	1	1.5	9000	1.3	2.5
37390	2.5	2.1	8.4	17.9	1.0	0.1	2	803.3	832.1	0.0	1	1.5	9000	1.0	2.5
37135	2.5	2.2	9.0	17.1	1.0	0.1	2	564.0	831.1	0.0	1	1.5	9000	1.1	2.5
36930	2.5	2.0	8.3	18.0	1.0	0.1	2	708.3	886.2	0.0	1	1.5	9000	0.9	2.5
36735	2.5	2.1	8.2	17.9	1.0	0.1	2	633.8	929.7	0.1	1	1.5	9000	0.9	2.5
36515	2.5	1.9	7.4	18.9	1.0	0.1	2	532.1	1001.1	0.1	1	1.5	9000	0.7	2.5
36374	2.5	1.8	7.0	19.3	1.0	0.1	2	400.0	1104.2	0.0	1	1.5	9000	0.7	2.5
36240	2.5	2.0	8.0	17.4	1.0	0.1	2	359.0	1107.8	0.1	1	1.5	9000	0.9	2.5
36080	2.5	2.0	8.2	17.3	1.0	0.0	2	326.3	1162.8	0.1	1	1.5	9000	0.9	2.5
35845	2.5	1.7	7.0	18.0	1.0	0.0	2	376.2	1477.6	0.0	1	1.5	9000	0.7	2.5
35725	2.5	1.8	7.6	18.1	1.0	0.0	2	378.2	1451.1	0.0	1	1.5	9000	0.8	2.5
35515	2.5	2.0	8.3	17.8	1.0	0.0	2	379.3	1500.0	0.1	1	1.5	9000	0.9	2.5
35245															
35040															
34860															
34720															
34495	2.5	1.8	7.3	15.6	1.0	0.0	2	504.6	1459.7	0.1	1	1.5	9000	0.7	2.5
34310	2.5	1.9	7.8	15.5	1.0	0.0	2	684.5	1408.6	0.1	1	1.5	9000	0.8	2.5
34090	2.5	1.8	7.4	15.1	1.0	0.0	2	787.5	1369.8	0.1	1	1.5	9000	0.7	2.5
33880	2.5	2.0	7.4	15.7	1.0	0.2	2	761.0	1475.7	0.1	1	1.5	9000	0.7	2.5
33710	2.5	1.9	6.9	15.6	1.0	0.2	2	719.2	1642.0	0.1	1	1.5	9000	0.6	2.5
33500	2.5	1.9	7.1	15.4	1.0	0.2	2	666.4	1720.2	0.1	1	1.5	9000	0.7	2.5

DEFINITIONS
Y_{MAX} = GREATER OF THE DM AND S&H HEIGHTS
Y_{TOT}=TOTAL EMBANKMENT PROTECTION IN FEET BASED ON THE H&S
V(FPS) =VELOCITY IN FEET PER SECOND
FLOW DEPTH=WATER DEPTH IN CHANNEL IN FEET
Y_{AGG}=LONG TERM AGGRADATION IN FEET
Y_{GA}=GENERAL AGGRADATION IN FEET FROM SAM
CHANNEL TYPE=CHANNEL SHAPE/FLOW FACTOR:
IF Fr<1, RECTANGULAR = 0; IF Fr>1, RECTANGULAR = 1;
IF Fr<1, TRAPEZOIDAL = 2; IF Fr>1, TRAPEZOIDAL = 3.
Y_{SE}=SUPER ELEVATION IN FEET
BEND COEFF=BEND COEFFICIENT; IF NO BEND=0, BEND=1
SIDE SLOPE=CHANNEL SIDE SLOPE (H:V), UNITLESS
BOTTOM WIDTH=CHANNEL BOTTOM WIDTH IN FEET, $Q_{2\text{-}YEAR}$ TOP WIDTH
RADIUS=RADIUS OF CURVATURE TO CENTERLINE IN FEET
H/2=HALF BEDFORM HEIGHT IN FEET, LIMITED TO FLOW DEPTH,
AFTER KENNEDY (1963)
Y_{DM} = EMBANKMENT PROTECTION REQUIRED BY THE LACFCDDM IN FEET

GENERAL
THIS SPREADSHEET IS DESIGNED TO CALCULATE TOP PROTECTION (FREE BOARD) BASED ON LACDWP COUNTY HYDROLOGY MANUAL (1991) PAGES 5.8-5.9 AND ASSOCIATED APPENDICES (SEDIMENTATION MANUAL). ALL VELOCITIES ARE IN FPS, WITH NO MAXIMUM VALUE. THE USER SHOULD CONSIDER A PRACTICAL MAXIMUM OF APPROXIMATELY 20-30 FPS. THE PRESENT VERSION (8/05) WILL CALCULATE UP TO 100 VELOCITIES AT ONE TIME. LONG TERM AGGRADATION IS USER SUPPLIED. GENERAL AGGRADATION IS ALSO USER SUPPLIED. SUPER ELEVATION AT BENDS IS BASED ON LACFCDDM EQUATIONS FOUND IN C-3.1. BEDFORM HEIGHT, LIMITED TO FLOW DEPTH AFTER KENNEDY (1963), IS BASED ON EQUATIONS IN APPENDIX Q13. IF FLOW IS SUPERCRITICAL SPREADSHEET REPORTS LACFCDDM TOTAL WALL HEIGHT INSTEAD OF FREEBOARD. LOS ANGELES COUNTY FLOOD CONTROL DISTRICT DESIGN MANUAL (LACFCDDM) VALUES ARE PRESENTED AS A PART OF LACH&SM CALCULATIONS. THE SPREADSHEET CALCULATES THE GREATER OF THE TWO METHODOLOGIES. BOTTOM WIDTH IS BASED ON THE 2-YEAR WATER SURFACE AFTER ACOE PROCEDURES.

COLOR CODES
OUTPUT
DATA FROM HEC-RAS
USER SUPPLIED DATA
INTERMEDIATE CALCULATIONS (INDIVIDUAL SHEETS ONLY)

DESIGNED BY DAVID A JAFFE, PHD, PE
PACIFIC ADVANCED CIVIL ENGINEERING, INC
AUGUST, 2005

TABLE 4.2: CALCULATIONS FOR TOTAL FREEBOARD BY INDIVIDUAL ADJUSTMENT COMPONENT BASED ON LACH&SM - SANTA CLARA RIVER PROPOSED CONDITIONS STRAIGHT-INSIDE CURVED REACH Q_{CAP} n=0.085

SECTION	Y_{MAX}	Y_{TOT}=	V (FPS)	FLOW DEPTH (FT)	Y_{AGG}+	Y_{GA}+	CHANNEL TYPE	BOTTOM WIDTH (FT)	TOP WIDTH (FT)	Y_{SE}+	BEND COEFF	SIDE SLOPE	RADIUS	H/2	Y_{DM}
36515	2.5	1.8	7.4	18.9	1.0	0.1	2	532.1	1001.1	0.0	0	1.5	9000	0.7	2.5
36374	2.5	1.8	7.0	19.3	1.0	0.1	2	400.0	1104.2	0.0	0	1.5	9000	0.7	2.5
36240	2.5	2.0	8.0	17.4	1.0	0.1	2	359.0	1107.8	0.0	0	1.5	9000	0.9	2.5
36080	2.5	1.9	8.2	17.3	1.0	0.0	2	326.3	1162.8	0.0	0	1.5	9000	0.9	2.5
35845	2.5	1.7	7.0	18.0	1.0	0.0	2	376.2	1477.6	0.0	0	1.5	9000	0.7	2.5

DEFINITIONS
Y_{MAX} = GREATER OF THE DM AND S&H HEIGHTS
Y_{TOT}=TOTAL EMBANKMENT PROTECTION IN FEET BASED ON THE H&S
V(FPS) =VELOCITY IN FEET PER SECOND
FLOW DEPTH=WATER DEPTH IN CHANNEL IN FEET
Y_{AGG}=LONG TERM AGGRADATION IN FEET
Y_{GA}=GENERAL AGGRADATION IN FEET FROM SAM
CHANNEL TYPE=CHANNEL SHAPE/FLOW FACTOR:
IF Fr<1, RECTANGULAR = 0; IF Fr>1, RECTANGULAR = 1;
IF Fr<1, TRAPEZOIDAL = 2; IF Fr>1, TRAPEZOIDAL = 3.
Y_{SE}=SUPER ELEVATION IN FEET
BEND COEFF=BEND COEFFICIENT; IF NO BEND=0, BEND=1
SIDE SLOPE=CHANNEL SIDE SLOPE (H:V), UNITLESS
BOTTOM WIDTH=CHANNEL BOTTOM WIDTH IN FEET, $Q_{2\text{-YEAR}}$ TOP WIDTH
RADIUS=RADIUS OF CURVATURE TO CENTERLINE IN FEET
H/2=HALF BEDFORM HEIGHT IN FEET, LIMITED TO FLOW DEPTH,
AFTER KENNEDY (1963)
Y_{DM} = EMBANKMENT PROTECTION REQUIRED BY THE LACFCDDM IN FEET

GENERAL
THIS SPREADSHEET IS DESIGNED TO CALCULATE TOP PROTECTION (FREE BOARD) BASED ON LACDWP COUNTY HYDROLOGY MANUAL (1991) PAGES 5.8-5.9 AND ASSOCIATED APPENDICES (SEDIMENTATION MANUAL). ALL VELOCITIES ARE IN FPS, WITH NO MAXIMUM VALUE. THE USER SHOULD CONSIDER A PRACTICAL MAXIMUM OF APPROXIMATELY 20-30 FPS. THE PRESENT VERSION (8/05) WILL CALCULATE UP TO 100 VELOCITIES AT ONE TIME. LONG TERM AGGRADATION IS USER SUPPLIED. GENERAL AGGRADATION IS ALSO USER SUPPLIED. SUPER ELEVATION AT BENDS IS BASED ON LACFCDDM EQUATIONS FOUND IN C-3.1. BEDFORM HEIGHT, LIMITED TO FLOW DEPTH AFTER KENNEDY (1963), IS BASED ON EQUATIONS IN APPENDIX Q13. IF FLOW IS SUPERCRITICAL SPREADSHEET REPORTS LACFCDDM TOTAL WALL HEIGHT INSTEAD OF FREEBOARD. LOS ANGELES COUNTY FLOOD CONTROL DISTRICT DESIGN MANUAL (LACFCDDM) VALUES ARE PRESENTED AS A PART OF LACH&SM CALCULATIONS. THE SPREADSHEET CALCULATES THE GREATER OF THE TWO METHODOLOGIES. BOTTOM WIDTH IS BASED ON THE 2-YEAR WATER SURFACE AFTER ACOE PROCEDURES.

COLOR CODES
OUTPUT
DATA FROM HEC-RAS
USER SUPPLIED DATA
INTERMEDIATE CALCULATIONS (INDIVIDUAL SHEETS ONLY)

DESIGNED BY DAVID A JAFFE, PHD, PE
PACIFIC ADVANCED CIVIL ENGINEERING, INC
AUGUST, 2005

4.3 Proposed Condition (n=0.025) and Toe of Bank Protection Determination

As stated above as per LACDPW standard, PACE utilized HEC-RAS analyses for Q_{cap} and Manning value of 0.025 (refer to *Table 2)* to determine the proposed condition maximum flow velocities for determination of bank protection toe-down.

The proposed project condition maximum flow velocities are presented and compared with the proposed Newhall Ranch build-out condition maximum flow velocities from the Newhall Ranch River Fluvial Study - Phase 1 Final Draft in *Table 5*.

As stated previously, the *"Commerce Center Drive Bridge"* was previously modeled with the blocked obstruction method. (Refer to *"Newhall Ranch Santa Clara River HEC-RAS Modeling".*) The HEC-RAS models submitted with the DCR have been revised to include more detailed modeling of the bridge deck, piers, and abutment based on the preliminary location, span, and clearance information provided in *Appendix VIII*. For the purposes of the bridge modeling in this project, the two new HEC-RAS bridge sections have been created within the HEC-RAS analysis. (Refer to River Sections 36374 and 36240 on *Figure 2*).
Based on this more detailed modeling and two new bridge HEC-RAS sections, the proposed condition maximum velocity for the proposed project modeling are different from the Newhall Ranch River Fluvial Study - Phase 1 Final Draft maximum velocity. Refer to *Table 5.* Because of the major difference between two Models, the toe elevations from Newhall Ranch River Fluvial Study - Phase 1 Final Draft are not going to be included in further design of toe elevations for the bank protection at the Bridge; SR *126 Widening/Commerce Center Drive Interchange Bank Protection" and "Commerce Center Bridge South Bank"*.

The minor increases of 1.6 fps at the River station 34310 and 0.9 fps at the River station 33710 (Refer to *Table 5*) are considered and the new toe bank elevation is calculated for the bank protection "*San Jose Flats Bank" (*Refer to *Tables 5.1 and 8.1*).

Toe-down calculations are provided and shown on *Table 5.1* and *Table 5.2.* The new toe-down values are used to calculate the new minimum toe elevation to compare with the toe elevations from Fluvial Study. The higher value of toe elevations is going to be the minimum designed toe elevation for soil cement bank protection in this report (Refer to *Table 6*, *Table 7* and *Table 8*). See "Santa Clara River Summary of Maximum Proposed Tow-down and Freeboard", *Table 8* from Newhall Ranch River Fluvial Study - Phase 1 Final Draft in *Appendix V*. For evaluation of the alternate extension of the *"WRP Utility Corridor Bank"* soil cement for the 1,200 LF west of the Grande confluence, the toe of the soil cement would be based on the approved Newhall Ranch Santa Clara River Fluvial Analysis.

The velocities values of the n=0.025 model are shown on *Table 5* and the detailed model results are shown in *Appendixes IV*. The purpose of providing *Table 5* velocity comparison is to quickly enable the reviewer to determine if it is the Mission Village stand alone project or the Newhall Ranch full build-out condition that controls the toe of the bank elevation decision.

Table 5: Changes in Velocity Between Mission Village Proposed Condition and Newhall Ranch Build Out for Design of Toe of Bank Protection (Q_{cap} and n=0.025)			
HEC-RAS River Section No.	**Prop. Cond. Mission Village Vel.(2) (fps)**	**Prop. Cond. Newhall Ranch (Build Out) Vel.(3) (fps)**	**Delta 2 & 3 Vel. (fps)**
37810	18.2	18.2	0.0
37655	21.2	20.9	0.3
37390	23.3	23.7	-0.4
37135	16.9	16.6	0.3
36930	20.6	19.8	0.8
36735	16.3	16.1	0.2
36515	12.8	12.9	-0.1
36374	11.8		
Bridge - Commerce Center Drive - Proposed			
36240	17.9		
36080	15.0	14.7	0.3
35845	18.0	11.0	7.0
35725	14.3	15.0	-0.7
35515	16.7	17.1	-0.4
34495	18.1	17.4	0.7
34310	18.4	16.8	1.6
34090	16.9	17.0	-0.1
33880	14.3	16.6	-2.3
33710	16.3	15.4	0.9
33500	15.9	16.2	-0.3
15540	11.1	10.6	0.5
15335	12.7	16.2	-3.5
15125	16.0	17.9	-1.9
14900	14.7	19.3	-4.6
14720	16.0	18.1	-2.1
14480	15.5	19.0	-3.5
14315	15.2	14.0	1.2

(2) Proposed Cond. velocities are based on "n" value of 0.025 for entire width of the river for Mission Village proposed project improvements.

(3) Proposed Cond. velocities are from Newhall Ranch River Fluvial Study - Phase 1 Final Draft.

HEC-RAS Sections in bold for Mission Village Project Soil Cement Bank Protection Reaches

HEC-RAS Sections 36374 and 36240 are Proposed Bridge Sections

TABLE 5.1: CALCULATIONS FOR TOTAL TOE-DOWN BY INDIVIDUAL ADJUSTMENT COMPONENT BASED ON LACH&SM W/ SAM -- SANTA CLARA RIVER PROPOSED CONDITIONS OUTSIDE CURVED REACH Q_{CAP} n=0.025

SECTION	Z_{MAX}=	Z_{TOT}=	V (FPS)	FLOW DEPTH (FT)	Z_{DEG}+	Z_{GS}+	PIER TYPE	B	ABUT TYPE	A	SOFT	Z_{LS}+	BEND COEFF	HYD DEPTH	E SLOPE	TOP WIDTH	RADIUS	Z_{BS}+	Z_I+	H/2	Z_{DM}=
37655	14.0	9.8	21.2	10.3	2.7	0.0	0	0.0	1	0.0	0	0.0	1	7.4	0.009	735.9	9000	0.0	2.0	5.1	14.0
37390	14.0	8.2	23.3	7.0	2.7	0.0	0	0.0	1	0.0	0	0.0	1	6.4	0.013	776.2	9000	0.0	2.0	3.5	14.0
37135	12.5	8.5	16.9	9.6	2.7	0.0	0	0.0	1	0.0	0	0.0	1	8.8	0.004	779.2	9000	0.0	2.0	3.8	12.5
36930	14.0	8.7	20.6	8.0	2.7	0.0	0	0.0	1	0.0	0	0.0	1	7.3	0.008	761.8	9000	0.0	2.0	4.0	14.0
36735	12.5	8.3	16.3	10.1	2.7	0.0	0	0.0	1	0.0	0	0.0	1	8.2	0.005	856.0	9000	0.0	2.0	3.6	12.5
36515	15.0	7.2	12.8	12.2	2.7	0.0	0	0.0	1	0.0	0	0.0	1	9.4	0.002	957.4	9000	0.3	2.0	2.2	15.0
36374	22.0	22.0	11.8	13.1	2.7	0.0	0.9	4.0	1	0.0	0	14.8	1	9.1	0.002	1067.0	9000	0.6	2.0	1.9	15.0
36240	24.3	24.3	17.9	10.0	2.7	0.0	0.9	4.0	1	0.0	0	14.8	1	6.2	0.008	1043.8	9000	0.5	2.0	4.3	18.0
36080	15.0	9.7	15.0	11.7	3.2	0.7	0	0.0	1	0.0	0	0.0	1	6.9	0.005	1128.0	9000	0.8	2.0	3.0	15.0
35845	21.0	11.6	18.0	10.6	3.2	0.7	0	0.0	1	0.0	0	0.0	1	4.9	0.008	1306.5	9000	1.3	2.0	4.4	21.0
35725	15.0	10.3	14.3	12.7	3.2	0.7	0	0.0	1	0.0	0	0.0	1	6.2	0.004	1337.7	9000	1.6	2.0	2.8	15.0
35515	18.0	11.4	16.7	12.1	3.2	0.7	0	0.0	1	0.0	0	0.0	1	5.9	0.004	1356.7	9000	1.8	2.0	3.8	18.0
35040																					
34860																					
34720																					
34495	21.0	11.3	18.1	8.9	3.2	0.7	0	0.0	1	0.0	0	0.0	1	5.0	0.009	1277.3	9000	1.0	2.0	4.4	21.0
34310	21.0	11.4	18.4	8.6	3.2	0.7	0	0.0	1	0.0	0	0.0	1	5.3	0.006	1332.0	9000	1.2	2.0	4.3	21.0
34090	18.0	10.7	16.9	8.5	3.2	0.7	0	0.0	1	0.0	0	0.0	1	5.3	0.007	1305.3	9000	1.0	2.0	3.8	18.0
33880	15.0	9.4	14.3	10.4	3.4	0.0	0	0.0	1	0.0	0	0.0	1	6.1	0.004	1331.5	9000	1.3	2.0	2.8	15.0
33710	18.0	10.2	16.3	9.5	3.4	0.0	0	0.0	1	0.0	0	0.0	1	5.2	0.006	1366.5	9000	1.3	2.0	3.6	18.0
33500	18.0	10.3	15.9	9.5	3.4	0.0	0	0.0	1	0.0	0	0.0	1	5.3	0.006	1472.9	9000	1.5	2.0	3.4	18.0

DEFINITIONS

V(FPS) =VELOCITY IN FEET PER SECOND
Z_{TOT}=TOTAL POTENTIAL VERTICAL ADJUSTMENT IN FEET
Z_{DEG}=LONG TERM DEGRADATION IN FEET
Z_{GS}=GENERAL SCOUR IN FEET FROM SAM
Z_{LS}=LOCAL SCOUR IN FEET
PIER TYPE=PIER SHAPE FACTOR; IF NO PIERS=**0**
1.0=SQUARE NOSE; **0.9** ROUND NOSE; **0.9** CYLINDER;
0.8 SHARP NOSE; **0.9** GROUP OF CYLINDERS
FLOW DEPTH=WATER DEPTH IN CHANNEL IN FEET
B=WIDTH OF PIERS IN FEET; NO PIER=0
ABUT TYPE=VERT WALL FACTOR; IF VERT=**2**; NON VERT=**1**
A=ABUTMENT PROTRUSION INTO FLOW PATH IN FEET
SOFT = SOFT BOTTOM AT A BRIDGE OR AN ABUTMENT
0 = HARD BOTTOM; **1** = SOFT BOTTOM
Z_{BS}=BEND SCOUR IN FEET
BEND COEFF=BEND COEFFICIENT; IF NO BEND=0, BEND=1
HYD DEPTH=HYDRAULIC DEPTH IN FEET
E SLOPE=ENERGY SLOPE, UNITLESS
TOP WIDTH=CHANNEL TOP WIDTH IN FEET
RADIUS=RADIUS OF CURVATURE TO CENTERLINE IN FEET
Z_I=LOW-FLOW INCISEMENT IN FEET, MEASURED OR 2'; VALUE **NOT LESS THAN 2'**
H=BEDFORM HEIGHT IN FEET, LIMITED TO FLOW DEPTH AFTER KENNEDY (1963)
Z_{DM}=CUT OFF DEPTH REQUIRED BY LACFCDDM

GENERAL

THIS SPREADSHEET IS DESIGNED TO CALCULATE SCOUR PROTECTION (TOE DOWN) BASED ON LADPW COUNTY HYDROLOGY MANUAL (1991) PAGES 5.2-5.8 AND ASSOCIATED APPENDICES (SEDIMENTATION MANUAL). ALL VELOCITIES ARE IN FPS, WITH A MAXIMUM VALUE LIMITED BY THE EQUATION. THE PRESENT VERSION (10/04) WILL CALCULATE UP TO 50 VELOCITIES AT ONE TIME. LONG TERM DEGRADATION IS USER SUPPLIED. GENERAL SCOUR IS TAKEN FROM APPENDIX Q3, INTERPOLATED. LOCAL SCOUR AT BENDS AND ABUTMENTS ARE BASED ON LADWP EQUATIONS FOUND IN APP Q12. BEND SCOUR IS BASED ON EQUATIONS IN APPENDIX Q12. A LONGITUDINAL EXTENT BASED ON SECONDARY CURRENTS IS NOT INCLUDED. BEDFORM HEIGHT IS BASED ON EQUATIONS IN APPENDIX Q13. JULY 2005 REVISION INCLUDES CALCULATION FOR CUT OFF DEPTH BASED ON LOS ANGELES COUNTY FLOOD CONTROL DISTRICT DESIGN MANUAL. THE CALCULATION DOES NOT CONSIDER ADJUSTMENTS TO CUT OFF DEPTH BASED ON TABLE F-06
THE OCTOBER 2005 REVISION INCLUDES ADDITIONAL TOEDOWN AT BRIDGES/ABUTMENTS WITH SOFT BOTTOMS.

COLOR CODES

OUTPUT
DATA FROM HEC-RAS
USER SUPPLIED DATA
INTERMEDIATE CALCULATIONS (INDIVIDUAL SHEETS ONLY)

DESIGNED BY DAVID A JAFFE, PHD, PE
PACIFIC ADVANCED CIVIL ENGINEERING, INC
OCTOBER, 2004
OCTOBER 2005, REVISED

TABLE 5.2: CALCULATIONS FOR TOTAL TOE-DOWN BY INDIVIDUAL ADJUSTMENT COMPONENT BASED ON LACH&SM W/ SAM -- SANTA CLARA RIVER PROPOSED CONDITIONS STRAIGHT-INSIDE CURVED REACH Q_{CAP} n=0.025

SECTION	Z_{MAX}=	Z_{TOT}=	V (FPS)	FLOW DEPTH (FT)	Z_{DEG}+	Z_{GS}+	PIER TYPE	B	ABUT TYPE	A	SOFT	Z_{LS}+	BEND COEFF	HYD DEPTH	E SLOPE	TOP WIDTH	RADIUS	Z_{BS}+	Z_I+	H/2	Z_{DM}=
36515	10.0	6.9	12.8	12.2	2.7	0.0	0	0.0	1	0.0	0	0.0	0	9.4	0.002	957.4	9000	0.0	2.0	2.2	10.0
36374	21.4	21.4	11.8	13.1	2.7	0.0	0.9	4.0	1	0.0	0	14.8	0	9.1	0.002	1067.0	9000	0.0	2.0	1.9	10.0
36240	23.8	23.8	17.9	10.0	2.7	0.0	0.9	4.0	1	0.0	0	14.8	0	6.2	0.008	1043.8	9000	0.0	2.0	4.3	12.5
36080	10.0	8.9	15.0	11.7	3.2	0.7	0	0.0	1	0.0	0	0.0	0	6.9	0.005	1128.0	9000	0.0	2.0	3.0	10.0
35845	14.0	10.2	18.0	10.6	3.2	0.7	0	0.0	1	0.0	0	0.0	0	4.9	0.008	1306.5	9000	0.0	2.0	4.4	14.0

DEFINITIONS

V(FPS) =VELOCITY IN FEET PER SECOND
Z_{TOT}=TOTAL POTENTIAL VERTICAL ADJUSTMENT IN FEET
Z_{DEG}=LONG TERM DEGRADATION IN FEET
Z_{GS}=GENERAL SCOUR IN FEET FROM SAM
Z_{LS}=LOCAL SCOUR IN FEET
PIER TYPE=PIER SHAPE FACTOR; IF NO PIERS=**0**
1.0=SQUARE NOSE; **0.9** ROUND NOSE; **0.9** CYLINDER;
0.8 SHARP NOSE; **0.9** GROUP OF CYLINDERS
FLOW DEPTH=WATER DEPTH IN CHANNEL IN FEET
B=WIDTH OF PIERS IN FEET; NO PIER=0
ABUT TYPE=VERT WALL FACTOR; IF VERT=**2**; NON VERT=**1**
A=ABUTMENT PROTRUSION INTO FLOW PATH IN FEET
SOFT = SOFT BOTTOM AT A BRIDGE OR AN ABUTMENT
0 = HARD BOTTOM; **1** = SOFT BOTTOM
Z_{BS}=BEND SCOUR IN FEET
BEND COEFF=BEND COEFFICIENT; IF NO BEND=0, BEND=1
HYD DEPTH=HYDRAULIC DEPTH IN FEET
E SLOPE=ENERGY SLOPE, UNITLESS
TOP WIDTH=CHANNEL TOP WIDTH IN FEET
RADIUS=RADIUS OF CURVATURE TO CENTERLINE IN FEET
Z_I=LOW-FLOW INCISEMENT IN FEET, MEASURED OR 2'; VALUE **NOT LESS THAN 2'**
H=BEDFORM HEIGHT IN FEET, LIMITED TO FLOW DEPTH AFTER KENNEDY (1963)
Z_{DM}=CUT OFF DEPTH REQUIRED BY LACFCDDM

GENERAL

THIS SPREADSHEET IS DESIGNED TO CALCULATE SCOUR PROTECTION (TOE DOWN) BASED ON LADPW COUNTY HYDROLOGY MANUAL (1991) PAGES 5.2-5.8 AND ASSOCIATED APPENDICES (SEDIMENTATION MANUAL). ALL VELOCITIES ARE IN FPS, WITH A MAXIMUM VALUE LIMITED BY THE EQUATION. THE PRESENT VERSION (10/04) WILL CALCULATE UP TO 50 VELOCITIES AT ONE TIME. LONG TERM DEGRADATION IS USER SUPPLIED. GENERAL SCOUR IS TAKEN FROM APPENDIX Q3, INTERPOLATED. LOCAL SCOUR AT BENDS AND ABUTMENTS ARE BASED ON LADWP EQUATIONS FOUND IN APP Q12. BEND SCOUR IS BASED ON EQUATIONS IN APPENDIX Q12. A LONGITUDINAL EXTENT BASED ON SECONDARY CURRENTS IS NOT INCLUDED. BEDFORM HEIGHT IS BASED ON EQUATIONS IN APPENDIX Q13. JULY 2005 REVISION INCLUDES CALCULATION FOR CUT OFF DEPTH BASED ON LOS ANGELES COUNTY FLOOD CONTROL DISTRICT DESIGN MANUAL. THE CALCULATION DOES NOT CONSIDER ADJUSTMENTS TO CUT OFF DEPTH BASED ON TABLE F-06
THE OCTOBER 2005 REVISION INCLUDES ADDITIONAL TOEDOWN AT BRIDGES/ABUTMENTS WITH SOFT BOTTOMS.

COLOR CODES

OUTPUT
DATA FROM HEC-RAS
USER SUPPLIED DATA
INTERMEDIATE CALCULATIONS (INDIVIDUAL SHEETS ONLY)

DESIGNED BY DAVID A JAFFE, PHD, PE
PACIFIC ADVANCED CIVIL ENGINEERING, INC
OCTOBER, 2004
OCTOBER 2005, REVISED

Table 6: Mission Village Project vs. Newhall Ranch Fluvial Top and Toe of Bank Protection (North Bank)

HEC-RAS River Section No.	Outside Curved Reach				Bank Stations (ft)	Designed Top El. (ft)	Designed Toe El. (ft)
	Top of Bank(3) (Newhall Ranch) (ft)	Top of Bank(2) (Mission Village) (ft)	Toe of Bank(3) (Newhall Ranch) (ft)	Toe of Bank(2) (Mission Village) (ft)			
37655	1002.51	1002.88	968.00	968.00	3273.42		
					3091.05		**967.48**
					3040.00	**1002.22**	
37390	1000.95	**1001.35**	967.00	**967.00**	**2919.56**	**1001.35**	**967.00**
37135	999.29	**999.62**	967.50	**967.50**	**2655.75**		
36930	998.17	**998.50**	964.00	**964.00**	**2461.06**		**964.00**
36735	997.11	**997.39**	964.50	**964.50**	**2268.79**		
					2136.62		**959.65**
					2086.62		**949.14***
36515	996.12	**996.38**	960.00	**960.00**	**2060.91**	**996.40**	
36374		**995.87**		**952.62**	**2036.62**		**949.14***
Bridge - Commerce Center Drive - Proposed							
36240		**993.97**		**949.69**	**1902.62**		**948.50***
					1852.62		**948.50***
				956.01	**1802.62**		**956.01**
36080	993.14	**992.82**	958.00	**958.00**	**1626.95**		**958.00**
35845	991.64	**991.46**	956.00	**950.00**	**1370.17**		**950.00**
35725	990.79	**990.62**	955.00	**955.00**	**1241.66**	**990.80**	**955.00**
					1100.00	**990.00**	**952.97**
35515	989.35	989.26	951.00	951.00	962.98		

(2) Top and Toe Bank Elevations are minimum top and toe elevations. Refer to Table 6.1

(3) Top and Toe Bank Elevations are from Fluvial Study for Santa Clara River and they are not considered. Refer to Section 4.2 and 4.3.

Bank Protection Sections and Minimum Designed Top and Toe Elevations in bold

Designed Top and Toe Elevations, Grade Break (GB) elevations in bold

Designed Toe El. (*) per Table 11.1 (Final Bridge Scouring of 25.50 ft included)

Table 6.1: S*R 126 Widening/Commerce Center Drive Interchange Bank Protection"* (North Bank) - Calculated Top and Toe Elevations for Mission Village

HEC-RAS River Section No.	Prop. Cond. WSE (2) (ft)	Outside Curved Reach Freeboard (2) (Table 4.1) (ft)	Outside Curved Reach Top of Bank(2) (ft)	River Invert Elevations (ft)	Bank Stations (ft)	Outside Curved Reach Toe-Down (2) (Table 5.1) (ft)	Outside Curved Reach Toe of Bank(2) (ft)
37655	1000.38	2.50	1002.88	982.00		14.00	968.00
37390	998.85	2.50	**1001.35**	981.00	**2919.56**	14.00	**967.00**
37135	997.12	2.50	**999.62**	980.00	**2655.75**	12.50	**967.50**
36930	996.00	2.50	**998.50**	978.00	**2461.06**	14.00	**964.00**
36735	994.89	2.50	**997.39**	977.00	**2268.79**	12.50	**964.50**
36515	993.88	2.50	**996.38**	975.00	**2060.91**	15.00	**960.00**
36374	993.37	2.50	**995.87**	974.64	**2036.62**	22.02	**952.62**
Bridge - Commerce Center Drive - Proposed							
36240	991.47	2.50	**993.97**	974.00	**1902.62**	24.31	**949.69**
36080	990.32	2.50	**992.82**	973.00	**1626.95**	15.00	**958.00**
35845	988.96	2.50	**991.46**	971.00	**1370.17**	21.00	**950.00**
35725	988.12	2.50	**990.62**	970.00	**1241.66**	15.00	**955.00**
35515	986.76	2.50	989.26	969.00		18.00	951.00

Figure B: Mission Village "SR 126 Widening/Commerce Center Drive Interchange Bank Protection"
Soil Cement Bank Protection

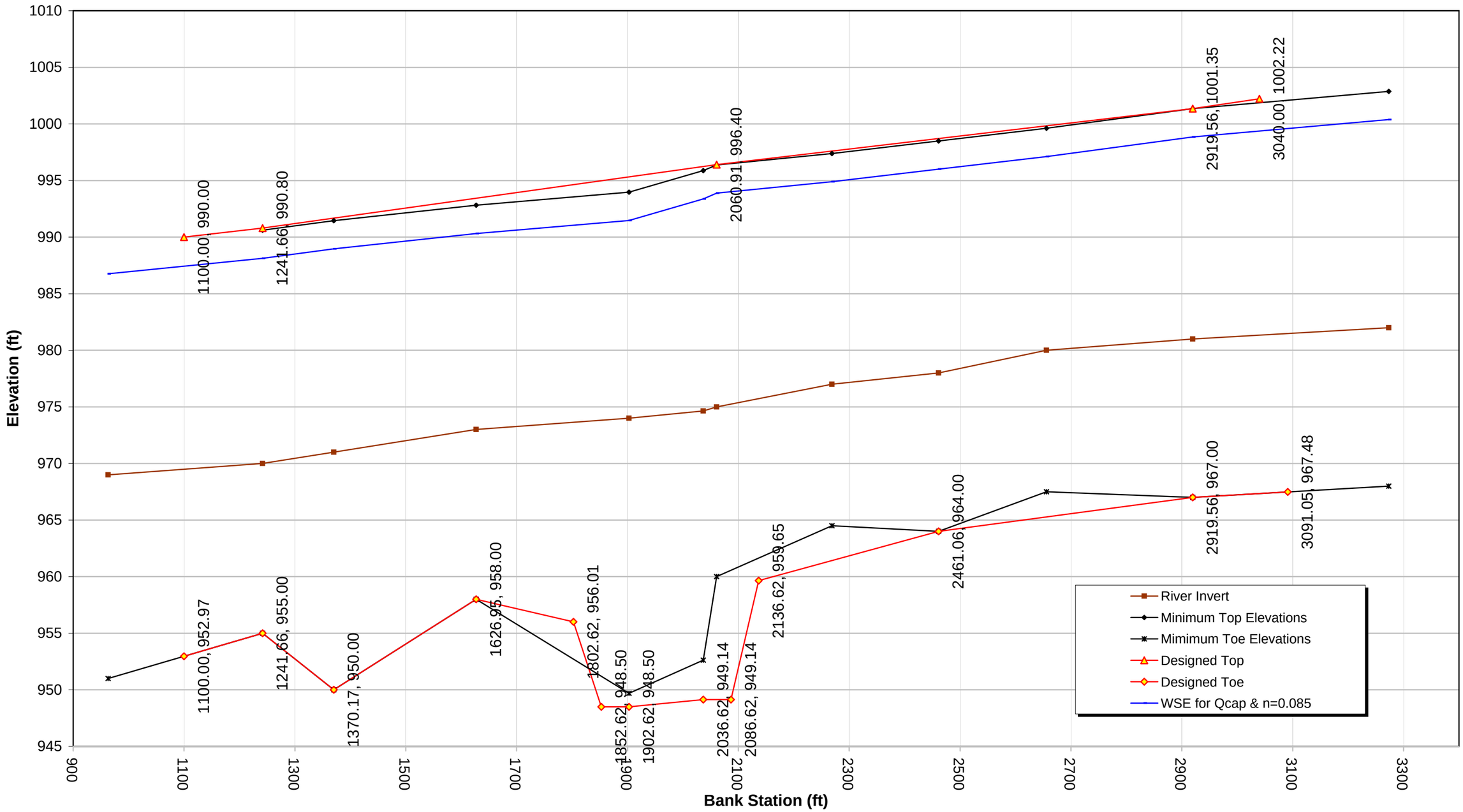


Table 7: Mission Village Project vs. Newhall Ranch Fluvial Top and Toe of Bank Protection Comparison (South Bank)							
HEC-RAS River Section No.	Straight-Inside Curved Reach				Bank Stations (ft)	Designed Top El. (ft)	Designed Toe El. (ft)
	Top of Bank(3) (Newhall Ranch) (ft)	Top of Bank(2) (Mission Village) (ft)	Toe of Bank(3) (Newhall Ranch) (ft)	Toe of Bank(2) (Mission Village) (ft)			
36374		995.87		953.27	1573.60	995.90	949.14*
					1554.46	**995.90**	**949.14***
Bridge - Commerce Center Drive - Proposed							
36240		**993.97**		**950.16**	**1431.65**	**994.00**	**948.50***
					1381.65		**948.50***
36080	993.14	**992.82**	963.00	**963.00**	**1342.52**	**992.85**	**963.00**
					1000.00	**992.85**	**963.00**

(2) Top and Toe Bank Elevations are minimum top and toe elevations. Refer to Table 7.1
(3) Top and Toe Bank Elevations are from Fluvial Study for Santa Clara River and are not considered. Refer to Section 4.2 and 4.3.
Bank Protection Sections and Minimum Designed Top and Toe Elevations in bold
Designed Top and Toe Elevations, Grade Break (GB) elevations in bold
Designed Toe El. (*) per Table 11.2 (Final Bridge Scouring of 25.50 ft included)

Table 7.1: Commerce Center Bridge South Bank - Calculated Freeboard and Toe-Down and Calculated Top and Toe Elevations							
HEC-RAS River Section No.	Prop. Cond. WSE (2) (ft)	Straight-Inside Curved Reach Freeboard (2) (Table 4.2) (ft)	Straight-Inside Curved Reach Top of Bank(2) (ft)	River Invert Elevations (ft)	Bank Stations (ft)	Straight-Inside Curved Reach Toe-Down (2) (Table 5.2) (ft)	Straight-Inside Curved Reach Toe of Bank(2) (ft)
36374	993.37	2.50	995.87	974.64	1573.60	21.37	953.27
Bridge - Commerce Center Drive - Proposed							
36240	991.47	2.50	**993.97**	974.00	**1431.65**	23.84	**950.16**
36080	990.32	2.50	**992.82**	973.00	**1342.52**	10.00	**963.00**

Figure C: Mission Village "Commerce Center Bridge South Bank" Soil Cement Bank Protection

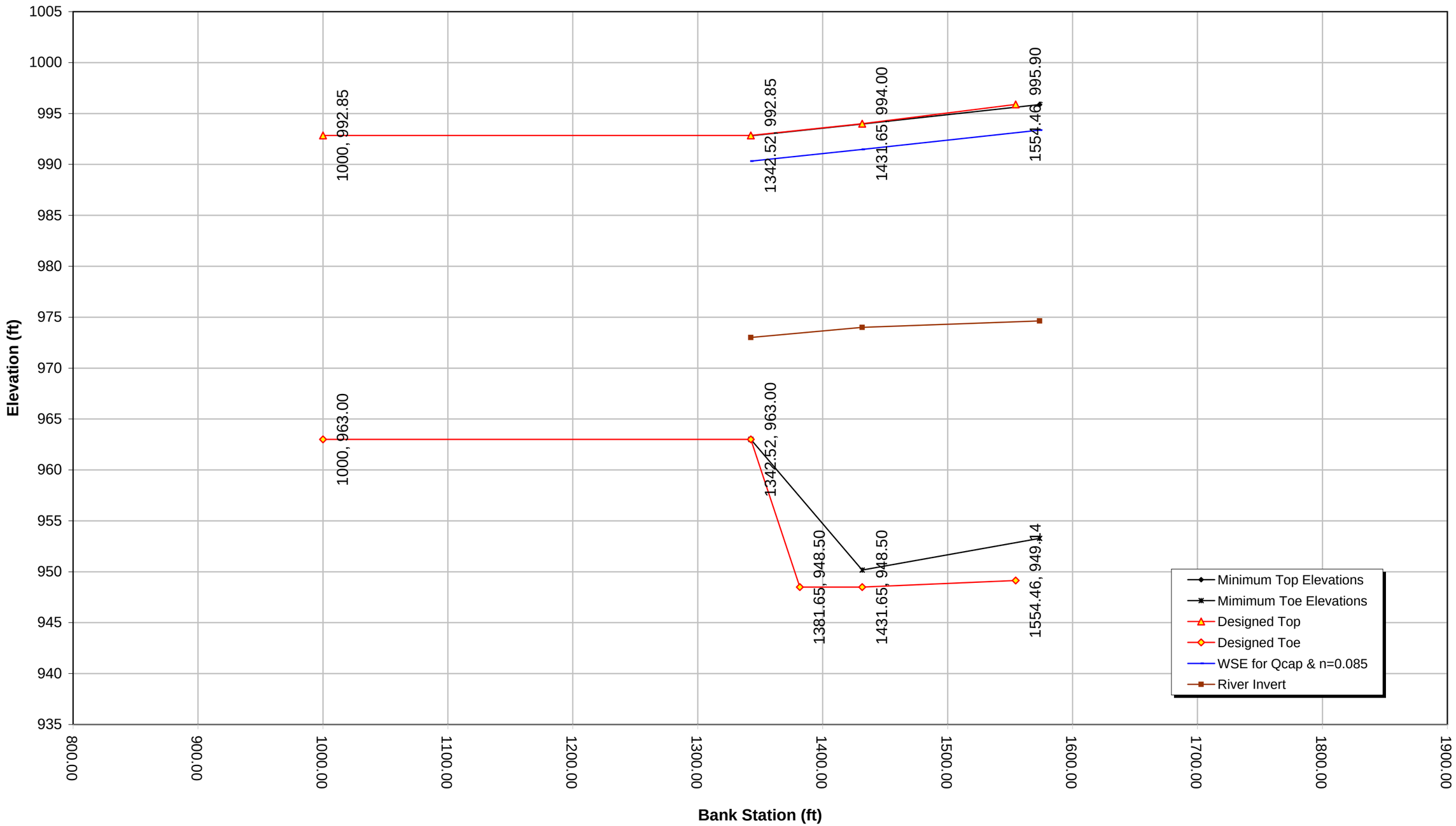


Table 8: San Jose Flats Bank - Top and Toe Elevation from Newhall Ranch River Fluvial Study - Calculated Top and Toe Elevations and Designed Minimum Top and Toe Elevations for Soil Cement Bank Protection

HEC-RAS River Section No.	Outside Curved Reach				Bank Stations (ft)	Designed Top El. (ft)	Designed Toe El. (ft)
	Top of Bank(3) (Newhall Ranch) (ft)	Top of Bank(2) (Mission Village) (ft)	Toe of Bank(3) (Newhall Ranch) (ft)	Toe of Bank(2) (Mission Village) (ft)			
34495	982.24	982.12	946.00	943.00	2120.00		
					2033.32	**981.70**	**942.50**
34310	980.94	**980.96**	945.00	**942.00**	**1915.24**	**981.00**	**942.00**
34090	979.54	**979.62**	944.00	**944.00**	**1688.29**		
33880	978.16	**978.23**	**942.00**	945.00	**1466.18**		**942.00**
33710	977.05	**977.14**	941.00	**941.00**	**1297.30**	**977.15**	**941.00**
					1053.74		**940.52**
					1000.00	**976.40**	
33500	975.81	975.90	940.00	940.00	783.00		

(2) Top and Toe Bank Elevations are minimum top and toe elevations. Refer to Table 8.1
(2) Top and Toe Bank Elevations are minimum top and toe elevations except for Section 33880.
(3) Top and Toe Bank Elevations are from Fluvial Study for Santa Clara River.
Bank Protection Sections and Minimum Designed Top and Toe Elevations in bold
Designed Top and Toe Elevations, Grade Break (GB) elevations in bold

Table 8.1: San Jose Flats Bank - Calculated Freeboard and Toe-down and Calculated Top and Toe Elevations

HEC-RAS River Section No.	Prop. Cond. WSE (2) (ft)	Outside Curved Reach Freeboard (2) (Table 4.1) (ft)	Outside Curved Reach Top of Bank(2) (ft)	River Invert Elevations (ft)	Bank Stations (ft)	Outside Curved Reach Toe-Down (2) (Table 5.1) (ft)	Outside Curved Reach Toe of Bank(2) (ft)
34495	979.62	2.50	982.12	964.00		21.00	943.00
34310	978.46	2.50	**980.96**	963.00	**1915.24**	21.00	**942.00**
34090	977.12	2.50	**979.62**	962.00	**1688.29**	18.00	**944.00**
33880	975.73	2.50	**978.23**	960.00	**1466.18**	15.00	**945.00**
33710	974.64	2.50	**977.14**	959.00	**1297.30**	18.00	**941.00**
33500	973.40	2.50	975.90	958.00		18.00	940.00

Figure D: Mission Village "San Jose Flats Bank" soil cement bank protection

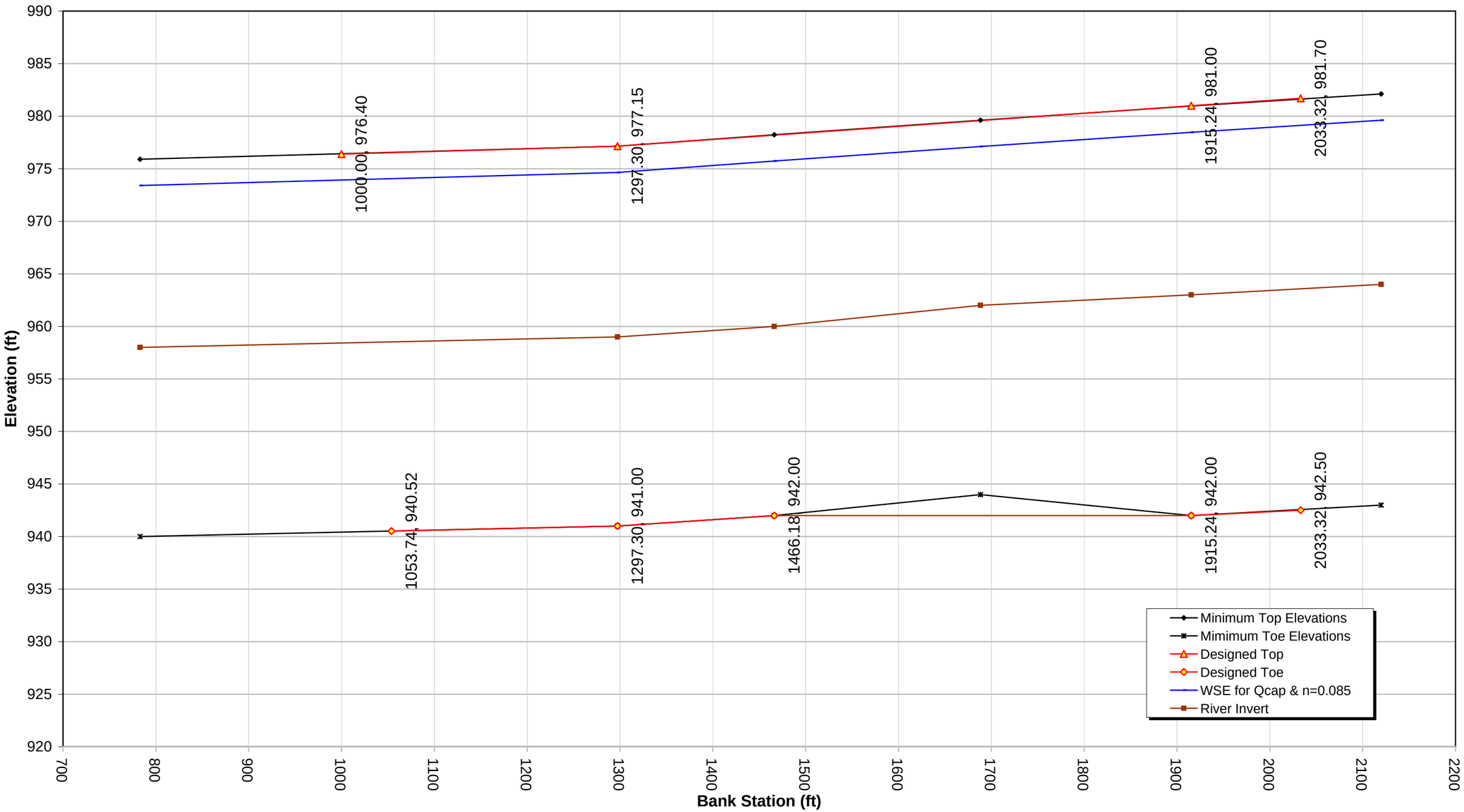


Table 9: *SR 126 Utility Corridor Bank* and *WRP Utility Corridor Bank - Water Surface Elevations and Velocities for Proposed Condition and Top Grade Elevations*

HEC-RAS River Section No.	Ex. River Invert (ft)	Proposed Condition							Prop. Top Elev of Finish Grade[4] (ft)
		Channel Vel.[1] (fps)	Overbank Vel.[1] (fps)	Channel Vel.[2] (fps)	Overbank Vel.[2] (fps)	Channel Vel.[3] (fps)	Overbank Vel.[3] (fps)	WSE[1] (ft)	
32265	950.00	7.2		5.8		16.0		965.0	972.0
31875	949.00	6.7		6.2		9.8		963.2	974.0
31585	946.00	6.1		6.1		13.8		962.4	974.0
31360	944.00	6.5		6.2		14.7		961.7	974.0
31060	942.00	5.9		5.2		12.8		961.2	974.0
30720	940.00	5.1		4.4		6.9		960.8	974.0
30445	938.00	5.0		3.9		5.4		960.5	974.0
30095	936.00	5.7		4.0		4.9		960.1	972.0
29815	935.00	6.6		4.7		5.6		959.6	970.0
29565	934.00	6.5		4.6		5.5		959.3	966.0
29385	933.00	7.5		5.5		6.6		958.8	964.0
29140	932.00	8.8		7.5		9.0		957.8	962.0
28895	930.00	19.7		17.1		17.1		952.4	960.0
28695	928.00	13.5		12.8		26.1		951.1	960.0
28500	927.50	14.9		11.9		25.0		948.7	958.0
28280	926.00	14.1		10.1		23.6		947.4	958.0
28080	925.00	13.1		9.2		18.3		946.5	956.0
27925	924.00	14.3		9.7		14.7		945.0	956.0
27725	923.00	17.1		10.9		16.5		941.9	955.0
27545	922.00	15.9		10.3		17.0		940.6	953.0
27335	921.00	14.0		9.4		12.8		939.4	951.0
27155	920.50	15.3		10.3		15.4		937.4	949.0
26990	920.00	12.1		9.1		15.5		936.6	948.0
26780	918.00	11.1		8.0		18.1		935.5	946.0
26575	917.00	9.5		6.7		10.0		934.6	944.0
26355	916.00	10.5		7.6		12.6		933.2	946.0
26170	915.00	10.9		8.2		13.8		932.2	948.0
25965	914.00	11.8		8.4		15.9		930.6	956.0
25785	913.50	11.9		8.2		12.8		929.3	950.0
25600	912.50	10.6		7.9		14.3		928.4	950.0
25425	911.00	8.5		6.5		14.7		927.8	950.0
25215	910.00	10.6		7.5		11.8		925.9	947.5
25000	909.00	**10.1**	**5.6**	7.8		14.2		924.4	946.0
24795	908.00	**9.9**	**6.5**	**8.6**	**3.4**	**13.6**	**4.2**	923.0	942.0

(1) Prop. Cond. WSE and Velocity are based on Qcap and "n" value of 0.060 for entire width of the river.
(2) Prop. Cond. Velocity are based on Q100 and "n" value of 0.060 for entire width of the river.
(3) Prop. Cond. Velocity are based on Qcap and "n" value of 0.025 for entire width of the river.
(4) Proposed Top Elev. of Finish Grade per PSOMAS proposed bank grading
Prop. Cond. Velocities (1), (2) and (3) are average velocity of flow in right overbank
Prop. Cond. Overbank Velocities are velocity of flow in right overbank (approx. 200 feet from FP)
Velocity in bold for sections where FP reaches the Utility Corridor Bank

Table 9: (continued) SR 126 Utility Corridor Bank and WRP Utility Corridor Bank - Water Surface Elevations and Velocities for Proposed Condition and Top Grade Elevations

HEC-RAS River Section No.	Ex. River Invert (ft)	Proposed Condition							Prop. Top Elev of Finish Grade(4) (ft)
		Channel Vel.(1) (fps)	Overbank Vel.(1) (fps)	Channel Vel.(2) (fps)	Overbank Vel.(2) (fps)	Channel Vel.(3) (fps)	Overbank Vel.(3) (fps)	WSE(1) (ft)	
24550	906.00	**8.3**	**6.5**	**6.3**	**4.1**	**16.3**	**7.7**	922.0	940.0
24335	905.00	**10.3**	**7.2**	**8.4**	**4.2**	**10.9**	**4.4**	920.4	938.0
24115	904.00	**9.5**	**7.3**	**7.7**	**4.7**	**15.3**	**5.4**	919.1	936.0
23975	903.50	8.9		7.0		16.1		918.2	940.0
23755	902.00	8.6		6.8		14.3		917.1	938.0
23565	900.00	**8.5**	**6.9**	7.4		10.9		916.2	937.0
23365	900.00	**8.2**	**6.9**	**7.3**	**5.2**	**15.0**	**7.4**	915.4	937.0
23180	899.00	**7.9**	**6.1**	**6.7**	**4.4**	**16.4**	**6.7**	914.8	936.0
23000	898.00	**6.2**	**5.0**	**4.7**	**3.8**	15.0		914.4	936.0
22790	897.50	6.6		5.2		8.3		913.8	936.0
22600	896.00	7.9		6.5		12.1		913.2	935.0
22415	895.50	8.6		6.5		9.8		912.4	926.0
22195	894.00	10.3		7.7		12.4		910.6	919.0
22010	892.00	12.2		9.1		15.3		908.8	922.0
21790	891.50	13.7		9.1		16.0		906.1	916.5
21615	892.00	11.3		8.1		12.3		905.0	914.4
21440	890.00	11.4		8.0		15.1		903.6	912.3
21225	888.00	10.5		8.8		11.6		902.1	910.1
21020	887.00	**9.1**	**3.8**	6.6		17.8		901.2	908.1
20845	886.00	**8.7**	**4.7**	**6.7**	**1.8**	11.3		900.4	906.0
20595	885.00	**9.0**	**4.6**	**6.7**	**1.6**	9.6		899.2	903.2
20435	884.00	**9.3**	**4.2**	**6.8**	**1.1**	8.6		898.4	901.6
20280	883.70	**10.7**	**5.3**	**10.0**	**1.6**	11.4		897.1	899.8
20070	882.00	**8.7**	**4.3**	7.4		17.4		896.1	898.4
19855	880.50	**8.3**	**4.3**	7.1		14.2		895.2	897.4
19630	880.00	**7.9**	**2.7**	6.5		13.9		894.5	896.2
19440	878.00	**7.3**	**2.2**	6.0		8.8		893.9	896.2
19240	877.50	**7.5**	**2.3**	6.7		11.5		893.3	897.2
19050	876.00	6.7		5.8		13.1		892.9	898.1
18830	874.00	6.8		6.1		11.0		892.3	899.3
18650	873.50	6.8		5.8		14.6		891.9	900.1
18475	872.00	**6.1**	**4.5**	4.9		9.4		891.6	900.9
18290	871.50	**6.6**	**4.0**	5.4		9.2		891.2	901.0
18025	870.00	6.5		4.7		6.6		890.6	900.0

(1) Prop. Cond. WSE and Velocity are based on Qcap and "n" value of 0.060 for entire width of the river.
(2) Prop. Cond. Velocity are based on Q100 and "n" value of 0.060 for entire width of the river.
(3) Prop. Cond. Velocity are based on Qcap and "n" value of 0.025 for entire width of the river.
(4) Proposed Top Elev. of Finish Grade per PSOMAS proposed bank grading
Prop. Cond. Velocities (1), (2) and (3) are average velocity of flow in right overbank
Prop. Cond. Overbank Velocities are velocity of flow in right overbank (approx. 200 feet from FP)
Velocity in bold for sections where FP reaches the Utility Corridor Bank

Table 9: (continued) SR 126 Utility Corridor Bank and WRP Utility Corridor Bank - Water Surface Elevations and Velocities for Proposed Condition and Top Grade Elevations

HEC-RAS River Section No.	Ex. River Invert (ft)	Proposed Condition							Prop. Top Elev of Finish Grade(4) (ft)
		Channel Vel.(1) (fps)	Overbank Vel.(1) (fps)	Channel Vel.(2) (fps)	Overbank Vel.(2) (fps)	Channel Vel.(3) (fps)	Overbank Vel.(3) (fps)	WSE(1) (ft)	
17785	868.00	7.38		5.33		7.1		889.9	899.4
17510	868.00	11.18		8.28		11.0		887.7	898.2
17360	866.50	14.02		9.80		13.2		885.2	897.1
17110	864.00	**13.6**	**6.8**	10.7		18.9		882.9	896.0
16970	863.70	**15.7**	**6.4**	12.5		18.3		880.0	895.1
16720	863.50	**11.5**	**6.9**	8.1		19.7		877.4	894.5
16515	862.00	**10.4**	**7.2**	**8.0**	**3.8**	14.7		875.8	892.7
16305	860.00	**9.1**	**7.1**	6.6		16.1		874.7	890.7
16130	860.00	9.0		7.0		11.2		873.6	888.2
15960	859.00	7.6		5.6		12.6		872.7	886.8
15745	858.00	7.0		5.1		8.5		871.8	884.7
15540	857.50	**7.4**	6.5	5.6		9.0		870.8	882.6
15335	856.00	**7.7**	**7.0**	**6.6**	**4.0**	**9.7**	**3.1**	869.6	880.7
15125	854.00	**8.6**	**8.0**	**6.4**	**6.0**	**15.4**	**10.9**	868.2	878.7
14900	853.00	**9.0**	**7.3**	**6.8**	**5.1**	**11.5**	**6.8**	866.8	876.4
14720	852.00	**8.9**	**6.7**	**6.6**	**5.0**	**12.5**	**8.1**	865.8	875.8
14480	850.50	**8.7**	**6.8**	**6.5**	**4.1**	**11.2**	**5.3**	864.5	874.6
14315	850.00	8.00		6.03		11.0		863.7	874.0

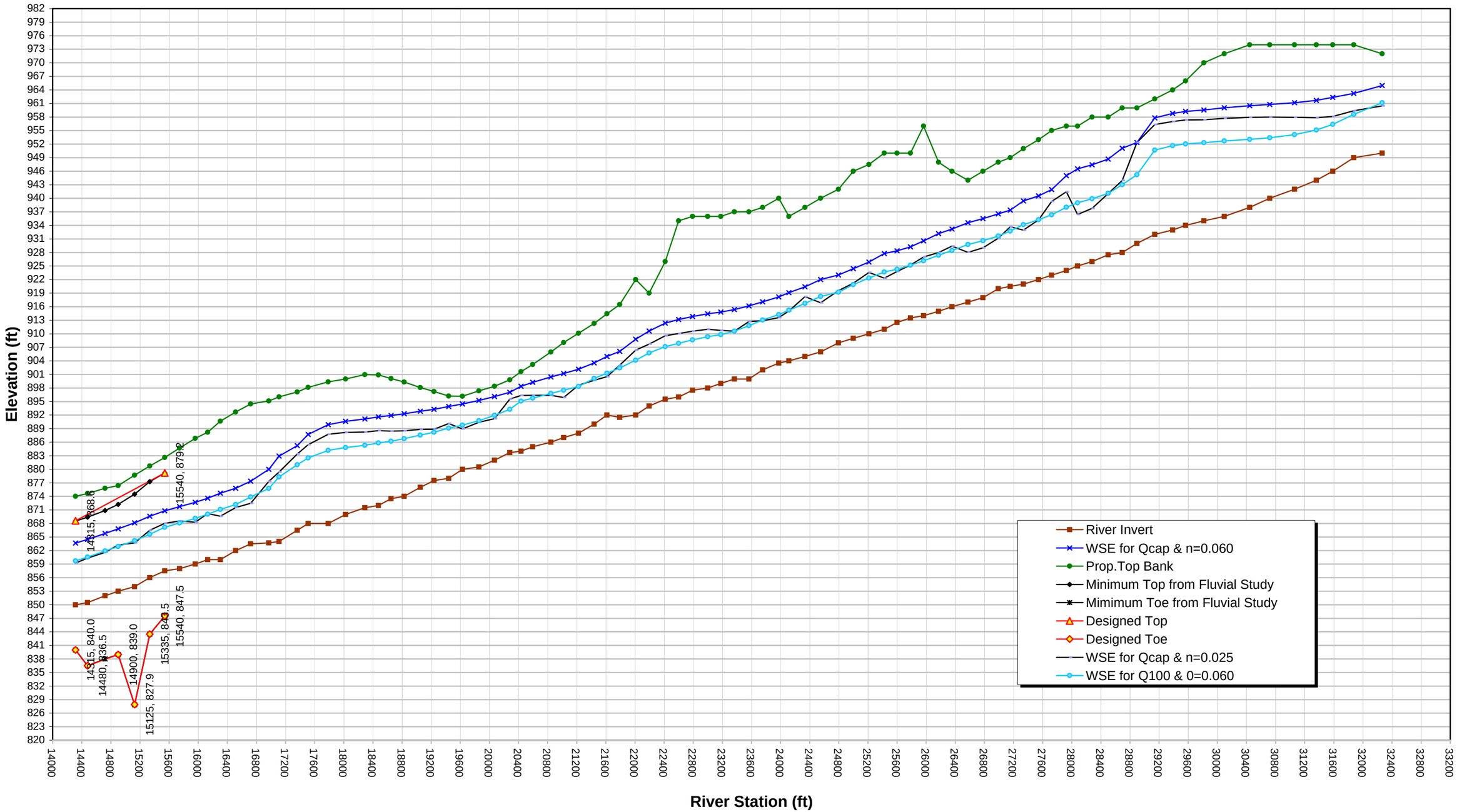
(1) Prop. Cond. WSE and Velocity are based on Qcap and "n" value of 0.060 for entire width of the river.
(2) Prop. Cond. Velocity are based on Q100 and "n" value of 0.060 for entire width of the river.
(3) Prop. Cond. Velocity are based on Qcap and "n" value of 0.025 for entire width of the river.
(4) Proposed Top Elev. of Finish Grade per PSOMAS proposed bank grading
Prop. Cond. Velocities (1), (2) and (3) are average velocity of flow in right overbank
Prop. Cond. Overbank Velocities are velocity of flow in right overbank (approx. 200 feet from FP)
Velocity in bold for sections where FP reaches the Utility Corridor Bank
Soil Cement Bank Protection from River Section 15335 - 14480

Table 10: ***WRP Utility Corridor Bank" - Top and Toe Elevation from Newhall Ranch River Fluvial Study and Designed Top and Toe Elevation for*** **soil cement bank protection**

HEC-RAS River Section No.	Outside Curved Reach Top of Bank(3) (ft)	Straight-Inside Curved Reach Top of Bank(3) (ft)	Outside Curved Reach Toe of Bank(3) (ft)	Straight-Inside Curved Reach Toe of Bank(3) (ft)	Designed Top El. (ft)	Designed Toe El. (ft)
15540	879.2	**879.2**	847.5	**847.5**	**879.2**	**847.5**
15335	877.3	**877.3**	843.5	**843.5**	877.3	**843.5**
15125	874.5	**874.5**	827.9	**827.9**	875.3	**827.9**
14900	872.2	**872.2**	839.0	**839.0**	873.1	**839.0**
14720	870.9	**870.9**	831.0	**838.0**	871.9	838.1
14480	869.4	**869.4**	829.5	**836.5**	869.6	**836.5**
14315	868.5	**868.5**	835.0	**840.0**	**868.6**	**840.0**

Bank Protection Sections and Calculated Minimum Top and Toe Elevations in bold
(3) Top and Toe Bank Elevations are from Fluvial Study for Santa Clara River
Designed Top and Toe elevations in bold are soil cement grade break points elevations (GB)

Figure E: "WRP Utility Corridor Bank" and "SR 126 Utility Corridor Bank"



5 HEC RAS Model Bridge Scour Calculation

The enclosed Mission Village DCR analysis has been revised from the Newhall Ranch Santa Clara River HEC-RAS Modeling to include more detailed modeling of the *"Commerce Center Drive Bridge"*. The updated Bridge modeling is based on the preliminary location, span and clearance information available (refer to Appendix VIII). The previously approval fluvial analysis included a preliminary estimate of pier and abutment scour of 13.3 feet with a total scour of 22.9 feet for the Outside Curved Reach and a total scour of 22.0 feet for the Straight/Inside Curved Reach (based upon block obstruction HEC-RAS Modeling and preliminary scour analysis) in the vicinity of the bridge. The revised HEC-RAS model for the Mission Village DCR project and the more detailed Bridge modeling was used to update the bridge pier/abutment scour analysis.

For the purpose of this project, the pier scouring is calculated using two methods; HEC-18 calculations from HEC-RAS program and equation from LADPW County Hydrology Manual:

1. The HEC-18 calculation was used to calculate the contraction and pier scour at the proposed Commerce Center Drive Bridge. The result of the model (Qcap and n=0.025) is 14.1 feet of combined contraction and pier maximum scour potential at the *"Commerce Center Drive Bridge"*. (Detailed scour calculation is shown in *"HEC RAS hydraulic analysis for Bridge Scour"*, *Appendix VIII*.) Total scour depth inside the bridge (16.8 feet) is a combination of long-term bed elevation changes of 2.7 feet (refer to Newhall Ranch River Fluvial Study - Phase 1 Final Draft and *Table 5.1* or *Table 5.2*), contraction scour, and local scour at each individual pier and abutment. (Refer to *"Estimating Scour at Bridge"* from HEC-18 Report, *Appendix VIII* and *Table 11* below.) The top width of the local scour hole around a pier is computed as 2.0 Ys (2x12.3'=24.6') to each side of the pier.

2. The equation from LADPW County Hydrology Manual was used to calculate the pier scour at the proposed Commerce Center Drive Bridge. The result of the model (Qcap and n=0.025) is 14.8 feet of pier maximum scour potential at the *"Commerce Center Drive Bridge"*. Calculations for the revised bank protection toe-down based on hydraulic output from the proposed project HEC-RAS model are shown in *Table 5.1* and *Table 5.2*.

The first and last piers of the bridge structure, recognized as a "bridge abutment", are located behind to the soil cement bank protection. The next piers are located 95 feet from the North abutment and 68 feet from the South abutment. The width of pier scour hole is 24.6' to each side of the pier and the bank protection with trail (16' minimum to 30' maximum wide) is located next to the abutment.

The recently approved (LACDPW) report "Hydraulic Calculations for Location, Span and Clearance for Commerce Center Drive Bridge" prepared by Sikand dated April 18, 2006 provides toe and top based on the PACE repot "Newhall Ranch Santa Clara River HEC-RAS Modeling". The Sikand report offers both a minimum calculated total pier scouring of 22.5 ft and an approved total pier scouring of 25.5 ft. Both values are compared to the values PACE has generated for the same study area (see *Table 11.1* and *Table 11.2)*. The resulting toe-down values are similar in both reports and therefore we are using the LACDPW approved values from the Sikand report. Final design of the bridge will include detailed scour evaluations for final bridge abutment and pier design layout. Our recommendation is to move forward with the project planning and the bridge design based upon the LACDPW approved values from the Sikand report.

Table 11: Minimum Scour Elevation for *"Commerce Center Drive Bridge"*		
Pier next to North Bank 948.50 (refer to *Table 11.1*)	**Pier next to South Bank** 948.50 (refer to *Table 11.2*)	**All other Piers** 948.50 (974.00-25.5)
North Bank U/S at Bridge Abutment 949.14 (refer to *Table 11.1*)	**South Bank U/S at Bridge Abutment** 949.14 (refer to *Table 11.2*)	
North Bank D/S at Bridge Abutment 948.50 (refer to *Table 11.1*)	**South Bank D/S at Bridge Abutment** 948.50 (refer to *Table 11.2*)	

The Approved 25.5 ft of total pier scour from the "Hydraulic Calculations for Location, Span and Clearance for "Commerce Center Drive Bridge over Santa Clara River" is used in these scour elevations.

Table 11.1: Summary of Toe-Down for and Toe Elevations for *"Commerce Center Bridge"* and the Mission Village *"SR 126 HWY/Commerce Center Interchange Bank"*

HEC-RAS River Section No.	Bank Stations (ft)	River Invert Elevations (ft)	Outside Curved Reach Toe-Down (Table 5.1) (ft)	Min. Calculated Total Pier Scouring per Approved Report * (ft)	Approved Total Pier Scouring per Approved Report * (ft)	Designed Toe El. (Toe-Down is 25.50') (ft)
36374	1531.94	974.64	22.02	22.50	25.50	949.14
Bridge - Commerce Center Drive - Proposed						
36240	1397.94	974.00	24.31	22.50	25.50	948.50

(*) "Hydraulic Calculations for Location, Span and Clearance for Commerce Center Drive Bridge over Santa Clara River"
Approved Report, prepared by Sikand Engineering Associates, 04/18/06
Total Pier scouring per Approved Report is also considered as Toe-Down for Bank Protection per this report analysis.

Table 11.2: Summary of Toe-Down for and Toe Elevations for *"Commerce Center Bridge"* and the Mission Village *"Commerce Center Bridge South Bank"* soil cement bank protection

HEC-RAS River Section No.	Bank Stations (ft)	River Invert Elevations (ft)	Straight-Inside Curved Reach Toe-Down (Table 5.2) (ft)	Min. Calculated Total Pier Scouring per Approved Report * (ft)	Approved Total Pier Scouring per Approved Report * (ft)	Designed Toe El. (Toe-Down is 25.50') (ft)
36374	1531.94	974.64	21.37	22.50	25.50	949.14
Bridge - Commerce Center Drive - Proposed						
36240	1397.94	974.00	23.84	22.50	25.50	948.50

(*) "Hydraulic Calculations for Location, Span and Clearance for Commerce Center Drive Bridge over Santa Clara River"
Approved Report, prepared by Sikand Engineering Associates, 04/18/06
Total Pier scouring per Approved Report is also considered as Toe-Down for Bank Protection per this report analysis.

6 Pre-project and Proposed Floodplain Mapping

In the 1980's LACDPW mapped the capital floodplain for the River according to maps 43-ML23 to 43-ML26. These maps were adopted by the Board of Supervisors in August 1984 by Ordinance No. 84-0136. Based on current topography, current LACDPW hydraulic design criteria and revised hydrology provided by LACDPW, PACE has prepared a draft revised capital floodplain (Figure #2) utilizing the updated capital flood flow rates, updated topographic mapping and a Manning's roughness coefficient of 0.060. A separate analysis will be prepared for revision of the ML Map floodplain and floodway within each village of Newhall Ranch. The Mission Village ML revision report will be submitted to LACDPW for review and approval, and the ML Maps will be presented to the Board of Supervisors for approval prior to recordation of the Mission Village Final Map.

The proposed floodplain mapping was established based on proposed river improvements on both north and south sides of the River per HEC-RAS modeling for this project. The revised Q_{cap} flow rate and a Manning's roughness coefficient of .060 were utilized for the hydraulic analysis. (Refer to *Figures 3, 4, 5A, 5B, 5C, 5D and 5E* in the *Figures* section of the report for the pre-project and floodplain lines.

FEMA Flood Insurance Rate Maps (FIRM's) will be revised following the CLOMR and LOMR processes where impacts to the existing FEMA floodplain occur.

7 Fluvial Analysis

The technical study in the recently approved report Newhall Ranch River Fluvial Study - Phase 1 Final Draft provides an evaluation of the pre-project and proposed fluvial characteristics and long-term stability of the River between Interstate 5 and an area generally west of the Los Angeles/Ventura County line as described in the Newhall Ranch Specific Plan. Development along the River within the study area has the potential to modify the fluvial mechanics of the River. The proposed soil cement bank protection on both the north and south banks of the River is intended to provide long-term erosion protection from lateral migration of the bank and flood protection for the adjacent proposed development areas. The completed analysis evaluates impacts of the Newhall Ranch build-out of from (1) fluvial modifications of the river bed from single hypothetical storm events, and (2) changes in the floodplain fluvial mechanics over the long-term.

Sediment data collection for the River along the study reach was conducted by Allan E. Seward Engineering Geology Inc. Eighteen samples were collected at six different locations positioned along River subreaches. All sampling was conducted using grab samples of the upper foot of the active or recently active portion of the bed. No fine material is included in the sediment analysis because fine material is generally transported as wash load. A review of the raw gradation curves indicates that most samples are comprised of poorly graded sands with gravels and silts. The D_{50} values for all samples ranged from 0.25 to 4.67 mm with an average of 0.8 mm. Additionally, previous studies noted above also found similar sandy characteristics. No cobbles are present in the Seward study and sampling was not conducted for cobble grain sizes. Cobbles are not present in any of the grain size distribution curves in the heretofore discussed SLA study (particularly in the Landmark study reach), and a careful review of the boring logs down to approximately 10 feet (approximately five times the SAM single event depth) notes only sporadic cobble observances, generally less than 5% and rarely as much as 10%. More important is the fact that at sample location 11 (in the Landmark Village study reach), p. B.5, not until 8.5 feet are any cobbles observed. Because of the paucity of cobble occurrence in the both the boring logs and their depth below the SAM single event depth, taken here as the active depth, PACE believes that the sampling data collected by Seward is representative of the active bed.

General adjustment was estimated in this study using the US Army Corps of Engineers (ACOE) SAM steady-state zero-dimensional numerical model. SAM is utilized to provide a first approximation of sediment transport potential for subreaches within the River. The SAM numerical model is built upon hydraulic and fluvial representations of the study bed. The hydraulic component includes representations of bed characteristics and discharge. The fluvial component includes representation of bed gradation and sediment transport functions. SAM's hydraulic component utilized average cross-section data imported from HEC-2 numerical models of the river converted from HEC-RAS numerical models. The conversion process modifies the original numerical model, as discussed in Chapter 4 of the Newhall Ranch River Fluvial Study - Phase 1 Final Draft, so some differences in numerical models are created. Both the existing and proposed conditions HEC-RAS models were originally developed by Sikand Engineering in the *Newhall Ranch Santa Clara River HEC-RAS Study* (June 2000) and submitted as part of the Newhall Ranch Specific Plan. The pre-project condition HEC-RAS model was later developed by PACE derived from the existing condition HEC-RAS model while including the SR 126 Hwy Widening at Commerce Center Bridge bank protection. The HEC-RAS model that is the basis of the SAM modeling, and that is the basis of the Landmark DCR report, has been refined by PACE in the *Newhall Ranch Santa Clara River HEC-RAS Modeling* report. The current model resembles the Sikand model but has been refined to address current LACDPW modeling standards and updated proposed project conditions. River subreaches that make up the SAM model are determined by examining the hydraulic parameters of the individual HEC-RAS cross-sections and identifying correlations between those hydraulic parameters and the longitudinal position in the channel.

SAM was run for all River reaches and bed stability was estimated based on the change in potential transport between adjacent channel subreaches for the Q_{CAP} discharge. General adjustment based on SAM modeling is presented in Chapter 4 of the fluvial report. General adjustment was also calculated using the equation specified in the Los Angeles County Hydrology and Sedimentation Manual

(LACH&SM). The LACH&SM general adjustment calculation is based only on flow mean velocity. In most circumstances, adjustment predicted by the LACH&SM is greater (more scour) than that predicted by SAM for both the pre-project and proposed conditions. SAM results predict general adjustment from -2.9 to +2.3 feet for the pre-project condition, and -1.6 and +2.1 feet for the proposed condition. LACH&SM methodology predicts general adjustment from -2.1 to -8.1 feet for the pre-project and -1.8 to -7.6 feet for the proposed condition, both outside of curves (Table 4.4). In this report the outside of the curve values and inside of curve values are considered separately, as per LACDPW criteria, since outsides of curves tend to degrade while insides of curves tend to aggrade. It is not presently clear if the changes in general adjustment result from the alteration of the hydrology caused by full build-out, or from changes in the velocity in the River associated with specific individual project improvements. It is expected that various Newhall related impacts will be localized, and, with respect to implementation of the proposed improvements, that the River will continue to behave fluvially as it did prior to construction of these proposed improvements. Long-term changes to hydrology and sediment production are not addressed in the first phase report, but may be addressed in the second phase Fluvial Analysis. Finally, the general trend in general adjustment for the study reach as indicated by SAM modeling is not apparent for either the pre-project or proposed condition.

Long-term adjustment was calculated based on historical topographic data records. Topographic data dating from 1930, 1947, 1963, 1999, 2004 and 2005, was digitized. Cross-sections were cut at the locations of select HEC-RAS sections for each historical topography. At least one cross-section was chosen for each subreach established in Chapter 4. Areas of the 1947, 1963, 1999, 2004 and 2005 sections are calculated and the areas of the 1947, 2004 and 2005 bed are used to calculate the average change in bed elevation over time. The 1930 topography is not used to calculate average change in bed because the trends in bed change that occurred during this year occurred immediately following the failure of the St. Francis Dam upstream of the project site. Several events within the available historical record (1930 to present) have had an impact on the River bed and fluvial mechanics. These events include failure of the upstream dam, construction of bridges spanning the River, agricultural infill along the River banks, and periodic burning of surrounding vegetation during forest fires. The most significant historical event in the formation of the present bed condition was the failure of the Dam. Within the project reach, the failure of the Dam appears to have resulted in the abrupt scour of the bed. The sectional analysis finds that some historical sections (SRD2, SRD3, SRE1, SRE2) show little change between 1947 and 2005 suggesting an approximate equilibrium state for these subreaches. Between 1947 and 2005, 0.5, 0.7, 1.0, and 0.8 feet, respectively, of cumulative degradation appears to have occurred on these sections. Upstream sections SRA1 to SRC3 show continuous degradation over the period of record from 1947 to the present. Three sections, SRC4, SRD1 and SRE3 aggraded cumulatively between 1947 and 2005 by 1.9, 1.4, and 3.1 feet on average, respectively. While it is unclear why the observed aggradation occurred, it is presently believed to be the result of the fires of the summer of 2004 and the heavy rains of the 2004/2005 rainy season. This combination had the potential to produce high sediment runoff loading into the River. Degradation seems to be more prevalent on the upper half of the study reach while mild fluctuations about a mean are more apparent on the lower half. This appears to result from the relatively steep, narrow, winding upper portion of the study reach versus the relatively flat, wide, braided channel in the lower portion of the study reach of the River. Agricultural activities occurred, primarily in downstream sections but in upstream sections as well, so some of the observed channelization may have resulted from these activities.

Other scour considered in this study is comprised of four sub-categories: local scour, bend scour, low-flow incisement, and bedform height. Local scour occurs in the vicinity of flow obstructions including piers and abutments. Bend scour occurs because of velocity gradients around curves in fluvial systems. Three distinct bends are located in the study reach. Low flow incisement is included to represent thalweg or low flow channel depth. On-site inspection and review of historic data of this feature suggest a thalweg depth of approximately two feet. Finally, bedform height represents the dunes and anti-dunes that develop in active soft-bottomed channels during flow events. In this study, bedform height has been limited after Kennedy (1963). Local scour ranges from 0.0 to 17.4 feet in the proposed conditions at the various river crossings. Results of calculations of bend scour vary from 0.0 to 11.3 feet for the pre-project condition and 0.0 to 8.9 feet for the proposed condition. For both the pre-project condition and the proposed condition, the bedform height ranges from 0.5 to 8.3 feet. Changes between the pre-project and

proposed conditions are a reflection primarily of the change in velocity brought about by the proposed condition.

General adjustment, long-term adjustment, and other scour are summed to determine total potential bed adjustment following LACH&SM methodology. For cross-sections where SAM modeling predicts aggradation, the general adjustment contribution to total bed adjustment is not included for degradation calculations. The pre-project condition is predicted to have a combined bed adjustment of approximately -6.9 to -19.7 feet for the outside of curved reaches and -6.2 to -15.4 feet for the inside of curved and straight reaches. Calculations in the proposed condition predict that the combined bed adjustment ranges from approximately -6.7 to -26.2 feet for both the outside of curved reaches and for the inside of curved and straight reaches.

A comparison of total bed adjustment estimated by both the summed methodology and the LACFCDDM methodology shows that the more intensive LACH&SM methodology using SAM for general adjustment and historical analysis for long-term adjustment predicts a shallower toe-down for both the pre-project and proposed conditions than does the LACFCDDM methodology except for sections in the vicinity of subreach SRA2, SRB1, SRC2, and SRE1. In subreach SRA2 section 43820, very high long-term adjustment causes LACH&SM calculations of this section to exceed LACFCDDM calculations by 1.4 feet for both outside of curved reaches and straight or inside of curved reaches in the pre-project and proposed conditions. In SRC2 section 29140, higher general adjustment and higher bedform height cause LACH&SM calculations of this section to exceed LACFCDDM calculations by 0.6 feet in outside curved reaches and 1.2 feet in straight and inside of curved reaches for the pre-project condition. In SRB1 section 36080 and SRE1 section 15125, the presence of proposed bridges causes LACH&SM calculations of this section to greatly exceed LACFCDDM calculations, by more than 10 feet. LACH&SM methodology utilizing SAM calculations predicts a deeper toe-down than does the LACFCDDM at these locations methodology because the LACFCDDM does not account for the effects of local degradation as effectively.

Freeboard is considered for the purposes of this report to be the additional height required above the top of a levee or other bank protection to prevent overtopping. Freeboard elevation is calculated in this study based on LACH&SM Chapter 5A-3, and includes LACFCDDM calculations. The freeboard for the River ranges from approximately 2.5 to 5.2 feet for both outside of curved and straight or inside of curved reaches in the proposed condition. Maximum total toe-down, total freeboard, toe-down elevation and freeboard elevation are presented in *Appendix V Table 8*.

8 Proposed Soil Cement Bank Protection

Note to Reviewer (regarding proposed bank protection method): The Mission Village River Bank Protection DCR has been prepared based upon use of standard soil cement bank protection. However, other recently approved alternatives (soil cement with launch stone (riprap), insitu soil mixed or other) may be considered once more detailed information is available regarding groundwater level, quantity and quality. However, the bank protection top and toe elevations as presented in this analysis will not change due to alternative bank protection construction method.

Mission Village "SR 126 HWY Widening at Commerce Drive Bridge" – The buried soil cement bank protection is buried soil cement bank protection located south of State Route 126, along the north bank of the river at the north end of Commerce Center Drive Bridge. This soil cement is part of the pre-project condition which has been evaluated as part of the CALTRANS/LA County Department of Public Works Project (State Route 126 widening and Commerce Center Drive interchange project; Sate Clearing house #2003101127) and is therefore not considered to be a part of the Mission Village project. The bank protection is approximately 2,000 linear feet. The horizontal alignment starts approximately 850 feet west from the central line of proposed "Commerce Center Drive" bridge, runs under the bridge and ends approximately 1150 feet east (upstream) adjacent to the slope of the pre-project road. Riprap will be utilized for the transition structure at the terminus and will tie into the high ground on the west end of bank protection and into the slope of pre-project road on the east end of bank protection. (See *Figure 03* for bank location plan and profile.)

Mission Village "Commerce Center Bridge South Bank" – The partially exposed soil cement bank protection soil cement bank protection is located along the south bank of the River and on the northern portion of the proposed Mission Project Site TTM # 61105. The bank protection is approximately 600 linear feet. The horizontal alignment starts approximately 450 feet west from the central line of the proposed "Commerce Center Drive" bridge, runs under the bridge and ends approximately 150 feet east (upstream) adjacent to the pre-project slope. Riprap will be utilized for the transition structure at the terminus on the west end east end of bank protection and will tie into the high ground of pre-project riverbank. (See *Figure 4* in *Figures* for bank location plan and profile.)

Mission Village *"Lion Canyon Bank Protection"* is proposed buried soil cement bank protection located along the south bank of the River and on the northern portion of the proposed Mission Project Site TTM # 61105. The bank protection is approximately 450 linear feet and protects the Lion Canyon tributary outlet to the Santa Clara River from lateral bank migration. There are no HEC-RAS model impacts from this bank protection structure as it is located fully behind the existing condition Capital Floodplain lines. The detailed analysis, planning and engineering of this structure will be part of the Lion Canyon tributary detailed design effort. It is shown in this DCE as part of the overall Mission Village project and has also been considered in the Mission Village EIR River Flood Technical Report. The proposed bank protection horizontal alignment starts approximately 3,400 feet west from the "*San Jose Flats Bank"* and the proposed bank protection spans the gap between two existing geologic features (bluffs) along the south bank of the river. The bank protection will stabilize the Lion Canyon tributary outlet and the river bank between the hardened "bluffs." This portion of the bank protection was not included in the previously approved Newhall Ranch Fluvial Analysis but it does not impact the Capital Floodplain and therefore will not impact fluvial analysis or offsite water surface elevations (See Figure A3 for bank location.)

Mission Village "San Jose Flats" – The buried soil cement bank protection is located along the south bank of the River and on the northern portion of the proposed Mission Project Site TTM # 61105. The bank protection is approximately 1,100 linear feet. The horizontal alignment starts approximately 1700 feet west from the central line of the proposed "Commerce Center Drive" bridge. Riprap will be utilized for the transition structure at the terminus on the west end east end of bank protection and will tie into the high ground of pre-project riverbank. (See *Figure 4* in *Figures* for bank location plan and profile.)

Mission Village "WRP Utility Corridor Bank" – The buried soil cement bank protection is located south of State Highway 126, along the north bank of the River floodplain and creates the 75 foot wide Newhall Ranch Utility Corridor. The horizontal alignment extends from the proposed water reclamation plant (WRP) site on the eastside along the pre-project River bank approximately 1,200 linear feet. This soil cement bank protection will be constructed to protect the Utility Corridor. (See *Figure 5C* in *Figures* for bank location plan, profile and typical section.) The Utility Corridor soil cement alternative STA 17360 to STA 15540 will increase the area of permanent impact by approximately 2,000 linear feet x ± 20 feet width or approximately 40,000 square feet.

Tributary Outlet / River Confluence Bank Protection – As discussed in section 2.0 and 4.2 of the DCR analysis, future design detail will be required to incorporate the River bank stabilization and required to protect drainage and utility infrastructure from River bank erosion. For the Mission Village project this includes Lion, Grande, Chiquito, Castaic, and other smaller tributaries.

In some cases (Lion) the solution may be several hundred linear feet of full height soil cement bank protection. In other cases (Grande) the solution may be a 50 foot wide grouted rock riprap section to protect the grade above the proposed utilities within the Utility Corridor.

However, the potential impacts to the River hydraulics are included in the DCR analysis and the environmental impacts are included as part of the Mission Village – EIR River Technical Report.

The soil cement bank protections *"SR 126 HWY Widening"*, *"Commerce Center South Bank"* and *"WRP Utility Corridor Bank"* are primarily necessary to protect the proposed residential and commercial development on the proposed Mission Village Project Site and the *"Commerce Center Drive"* Bridge from potential erosion due to project implementation.

The proposed bank protections will consist of standard soil cement to provide scour and freeboard flood control protection for all storm events up to the Q_{cap}. The critical factors in determining the design of the bank protection were based on the following criteria:

1. Flood control stability and durability of bank protection.
2. Safety concerns regarding access to and from the channel in dry and wet conditions.
3. Bank protection maintenance considerations.
4. Environmental compatibility with the native area and resource enhancement concepts, and aesthetic considerations.
5. Constructability and cost of construction.

Soil cement bank protection is constructed as a monolithic and homogenous structure consisting of approximately 90% native soils and 10% cement. The typical section consists of 8-foot wide and 6- to 12-inch thick layers of soil cement. Each layer of soil cement is set back from the edge of the previous layer, at a 1.5:1 slope. The entire section varies in total height, from 32 to 42 feet, based on varying freeboard, flow depth and toe-down requirements along the length of the river.

The proposed soil cement bank protection addresses the above design criteria as follows:

1. Soil cement provides a stable riverbank protection material, in terms of both surface erosion and structural stability. Preliminary geotechnical analysis indicates that locally available native soils are considered acceptable for use as soil cement.

2. Exposed areas of the soil cement will be aesthetically compatible with the native earth re-vegetated resource area since it offers a natural soil cement material color. Exposed areas include the top portions of the soil cement at storm drain outlets, access ramps and regions of the *Commerce Center Bridge South Bank* soil cement which will be exposed at the bridge area.

The bank protection incorporates a 16-foot wide access road that follows the alignment of the bank protection and is located directly above the top layer of soil cement *(*Refer to Typical Sections on *Figures 3* and *4).*

This report implements the analysis and values of the minimum top bank protection and toe-down elevations from the recently approved Newhall Ranch River Fluvial Study - Phase 1 Final Draft (see Appendix V).

8.1 Material Suitability of Soil Cement

The following excerpts were taken from various ACI and PCA publications referenced in the bibliography.

The erosion and overtopping of river banks by floodwaters is a significant flood control concern in the southwest. In order to protect valuable land, bridges, and buildings from such erosion, many communities have found that stabilized soil, in the form of soil cement, meets the criteria of cost-effectiveness, performance, functional life, and aesthetics.

The American Concrete Institute (ACI 116R) defines soil cement as "a mixture of soil and measured amounts of cement and water compacted to a high density." Soil cement can be further defined as a material produced by blending, compacting, and curing a mixture of soil/aggregate, Portland cement, possibly admixtures including pozzolans, and water, to form a hardened material with specific engineering properties. The soil/aggregate particles are bonded by cement paste, but unlike concrete, the individual particle is not completely coated with cement paste.

A wide variety of soils can be used to make durable soil cement. In fact, most soils in Southern California are suitable for use in soil cement. Ideally, sand to silty sand with the highest dry unit weight possible should be used to make soil cement, as that material is more likely to be well graded. For maximum economy and most efficient construction, the Portland Cement Association (PCA) recommends that:

1. The soil contains no material retained on a 3-inch (75 mm) sieve.
2. Between 60 percent and 90 percent passes the No. 4 (4.75 mm) sieve.
3. Between 5 percent and 25 percent passes the No. 200 (0.074 mm) sieve.
4. The Plasticity Index (PI) of the fines should not exceed eight.

An analysis of the soil classification, cement content, borrows area/earthwork and groundwater levels follows:

<u>Soil Classification</u>
Preliminary borings for the Mission Village Project site indicate that some of the soil along the proposed limits of excavation is generally suitable for use with soil cement. However, other sources of material, whether found on-site or imported, may need to be blended in to optimize the soil cement mix design. Additional geotechnical investigation will be required to determine the suitability of soils for use with soil cement for the final design. For ideal base material gradation for soil cement: 100-80% passing through ¾" sieve, 90-60% passing through No. 4 sieve, 50-30 percent passing through No. 40 sieve, and 25-5% passing through No. 200 sieve. A well graded material with some fine sands, and no or minimal clays are required. The gradation test data of various borings, provided in the geotechnical report, were used to determine the location of the soils that contain suitable material for use in soil cement.

<u>Cement Content</u>
An efficient mix utilizes the minimum cement content necessary to reach the specified design strengths. For this mix, base cement content of 7% to 10%, by weight will be used. Per the project specifications, the final cement content will be based on testing of the actual soil cement base material stockpile. Based on strength and durability relationships developed by the PCA, the cement content will be determined based on achieving a 7-day unconfined compressive strength of approximately 750 psi.

Aggregate Location and Volumes

It is estimated that approximately 51,000CY of soil cement will be required for the 4,900 LF of bank protection for "*SR 126 HWY Widening at Commerce Drive Bridge*", "*Commerce Center Bridge South Bank*", "*San Jose Flats*", *"Lion Canyon Outlet"* and "*WRP Utility Corridor Bank*".

Groundwater Levels

All information on groundwater levels will be based on geotechnical investigations for this project site. It is assumed that dewatering will be required for construction of the proposed soil cement bank protection and construction of the proposed soil cement toe erosion protection and it will be determined based on geotechnical report and groundwater levels at the time of construction.

9 Proposed Non Structural Bank Protection on Fill Slope at Utility Corridor

Mission Village "SR 126 Utility Corridor Bank" - PACE has been retained by Newhall Land to provide engineering and design recommendations for future erosion control improvements along the southerly side of the Newhall Ranch Utility Corridor, adjacent to State Route 126. The proposed bank protection is located along the south side of State Route 126, from the easterly end of the future water reclamation plant (WRP) along the proposed riverbank approximately 16,000 linear feet to the easterly confluence at Castaic Creek. The proposed bank protection will protect the addition of the 75 to 90 foot wide Newhall Ranch Utility Corridor. The final utility corridor bank grading will be constructed according to grading plans designed by PSOMAS. The southerly fill slope along State Route 126 is proposed to be protected with a TRM to be shown on future PACE drainage/erosion improvement plans. The bank protection will be provided to protect the Newhall Ranch Utility Corridor as shown on *Figures 5AA*, *5A*, *5B*, *5C*, *5D* and *5E* for bank location plan views, profiles, typical cross section and cross sections.

Refer to *Table 8* and *Figures 5A*, *5B* and *5C* for more detailed analysis and review of the pre-project vs. proposed condition flow depth and velocity along the north bank of the River in the over bank area. The analysis shows non-scouring or minimal scour velocities in this reach. This reach outlines velocity design requirements utilized for identification of appropriate mitigation to minimize potential erosion along Santa Clara River. Therefore, to meet environmental requirements of the project, it is proposed to utilize vegetative and geotextile type erosion control bank protection in this area. Recommendations consist of providing geosynthetic protection, such as Turf Reinforcement Mats (TRMs), used in combination with vegetation to further protect soil from erosion. Based on (1) vendor published criteria/information, (2) calculated local velocities, and (3) proposed vegetation with irrigation, an appropriate type of TRM that will be a part of the final design for this project is Enkamat 7010.

TRMs are designed to provide reinforcing of vegetation at the root and stem areas, thereby allowing vegetation to be used as erosion control in areas where flow conditions could exceed the ability of natural and planted vegetation to remain rooted. TRMs are suitable for locations with high slopes or stream banks where grouted riprap and concrete channels are hydraulically unnecessary and hardened bank protection is aesthetically undesirable. TRMs are secured to the soil surface using a predetermined staple size and pattern; including toedown trenching along the outer limits of the TRMs.

TRM products are constructed of two basic materials that perform different functions: (1) permanent netting designed to provide permanent structure and strength to the vegetation at the root and stem level, and (2) degradable natural and synthetic fiber netting that provides temporary and/or initial erosion control immediately after installation by holding seed and soil particles in place and trapping moisture on the soil surface. As a result, these products can provide erosion control, assistance in vegetation establishment, and slope reinforcement along graded areas.

10 Planning and Environmental Issues

The major environmental and planning issues impacting the proposed bank protection project are the jurisdictional limits of the ACOE and California Department of Fish and Game (CDFG). No construction may occur within the jurisdictional limits without prior approval from both the ACOE and CDFG. At several locations, the limit of construction disturbance lies within the jurisdiction limits. These impacts will require mitigation in the form of in-kind re-vegetation. The excavation required to construct the bank protection will be backfilled and returned to pre-project grade or lower in order to facilitate re-vegetation. The top portion of the bank protection above the river invert will be left exposed.

The majority of the improvements for the Mission Village project bank protection are outside of the ACOE/CDFG resources. The Phase I – Natural River Management Plan 404/401 Permit includes all of the proposed ACOE/CDFG Jurisdictional Impacts from the I-5 to the Commerce Center Drive Bridge including North and South bank protection at Bridge/SR 126 Widening/Commerce Center Drive Interchange Bank Protection.

Newhall Land is in the process of developing a Natural River Management Plan "Phase Two" EIR and technical support documents for public review. This document will be referred to as, "Newhall Ranch Resource Management Development Plan." This document will address the proposed Newhall Ranch project impacts to the Santa Clara River and the tributaries for the area downstream of the Commerce Center Drive Bridge.

The Newhall Ranch Resource Management Development Plan EIR and ensuing 404/1603 Permits will identify environmental impacts of the project and provide necessary mitigation measures. These documents will also establish limits of temporary and permanent encroachment within the ACOE and CDF jurisdictional limits for construction and long-term maintenance.

11 Conclusion

The proposed design for soil cement bank protections along the River is based on the LACDPW approved *Newhall Ranch River Fluvial Study - Phase 1 Final Draft by PACE* which provides the hydraulic and fluvial analysis and compares design recommendations for the full build-out of the Newhall Ranch river bank protection. The purpose of this Mission Village Drainage Concept Report is to present the proposed river improvements for Mission Village TTM # 61105 and evaluate the hydraulic impacts of the existing condition in comparison with the proposed project condition bank protection top and toe to determine the most critical conditions and to ensure that the most conservative design is selected. Although, proposed project bank protection causes impacts within the study reach, the impacts are all contained within the overall proposed improvement along the river. Therefore, it is not impacting any non-Newhall Land properties.

Currently, the project site is located under Zone A on the FEMA Flood Insurance Rate Map (FIRM) Community No. 065043-0340B. A Conditional Letter of Map Revision (CLOMR) application for the Mission Village project will be submitted to LACDPW for review and submittal to FEMA. Upon completion of the project, a Letter of Map Revision (LOMR) application will be submitted to FEMA, requesting that the FIRM be revised to reflect the proposed condition.

Los Angeles County Capital floodway maps for the Santa Clara River were adopted by the Board of Supervisors in August 1984 by Ordinance No. 84-0136. It is being proposed that Newhall Land revise the Los Angeles County Capital Floodway Maps Nos. 335-ML1 and ML2 upon completion of all River improvement from Interstate 5 on the east and to a point directly downstream of the Ventura County/Los Angeles County line.

12 Bibliography

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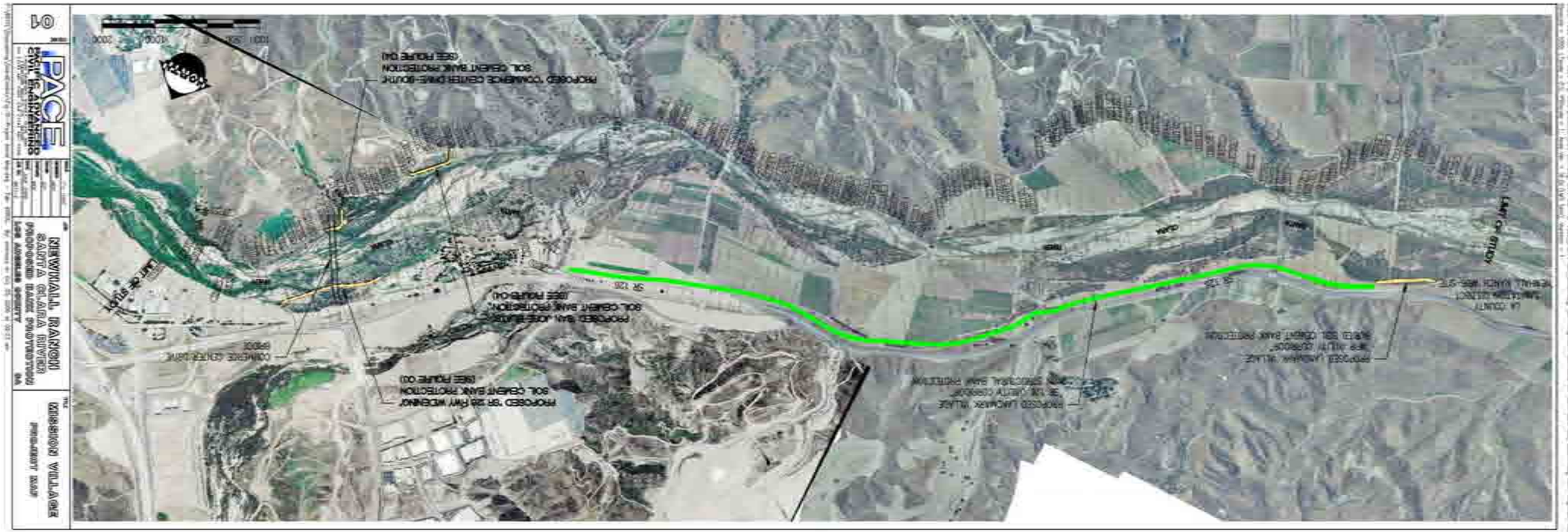

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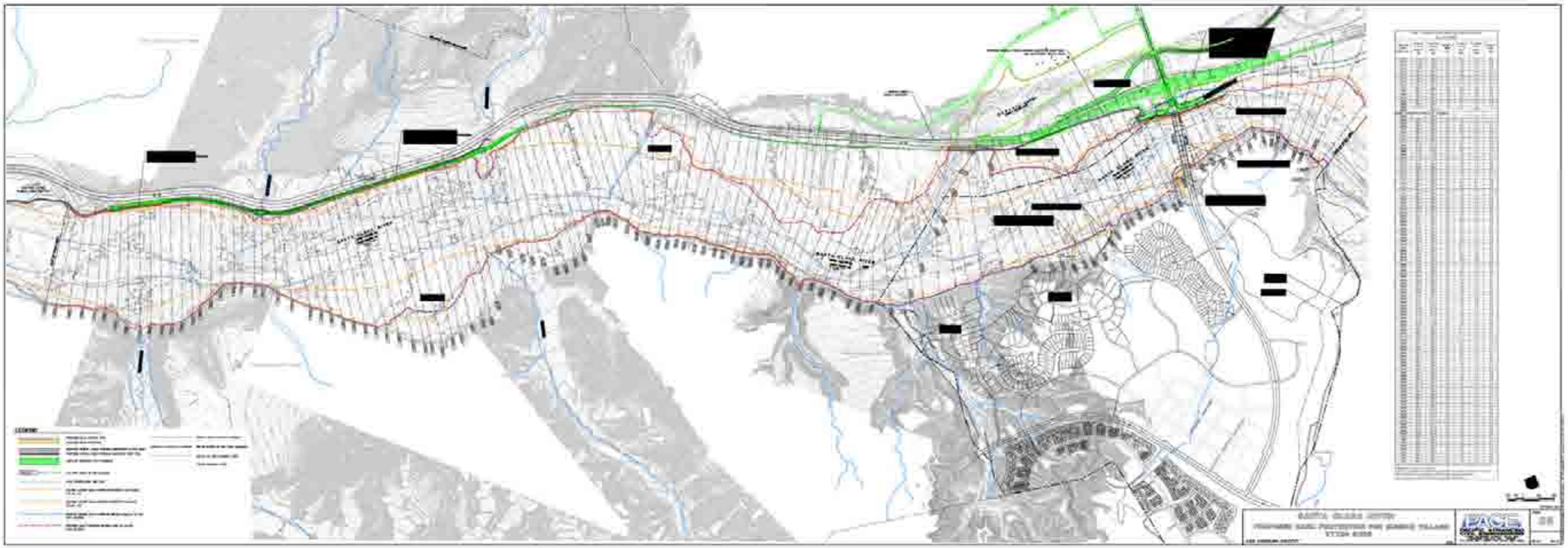

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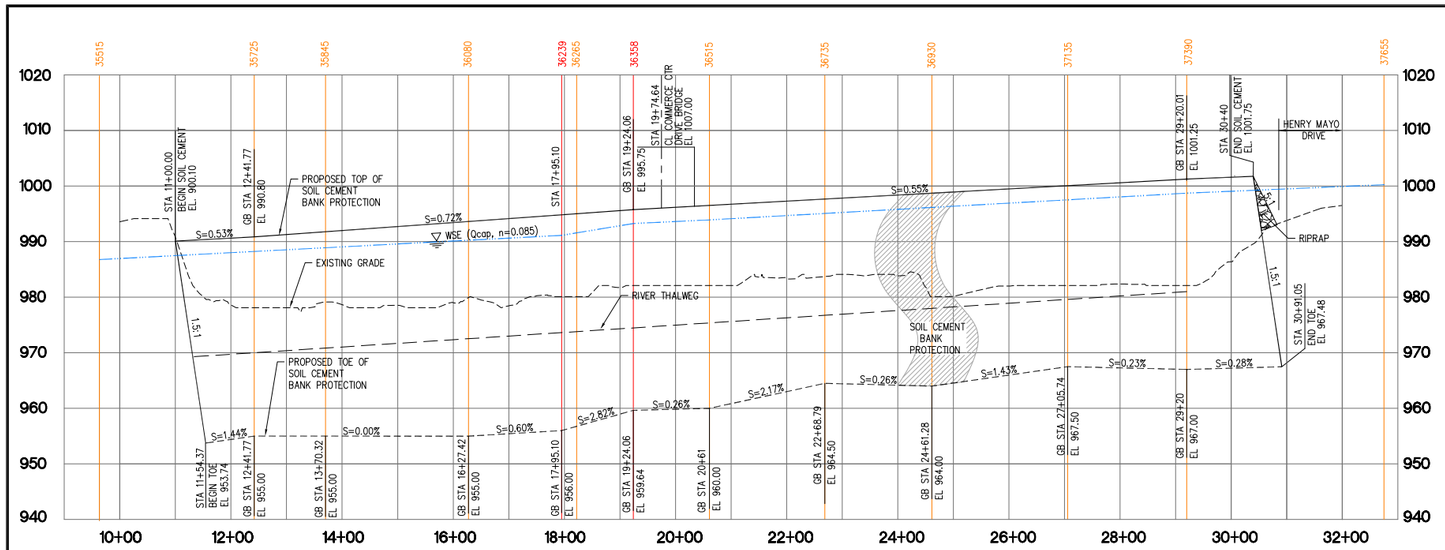

PROFILE

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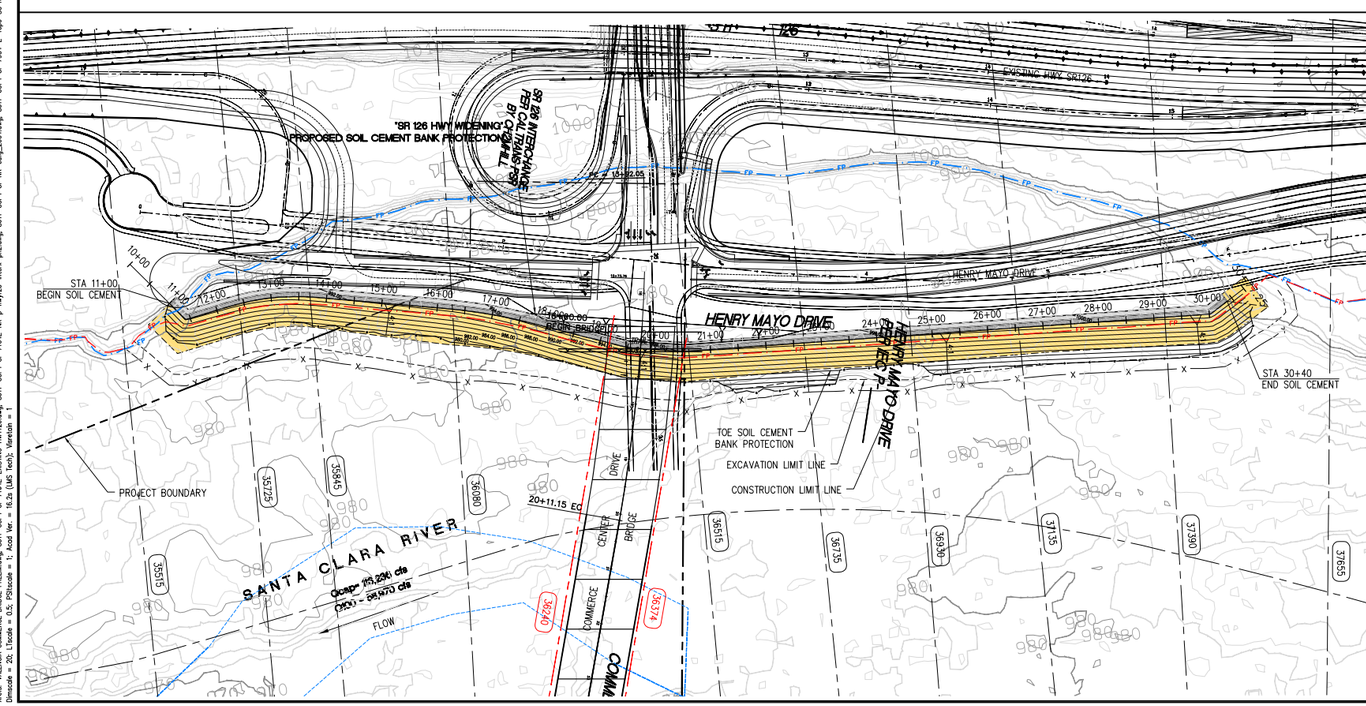
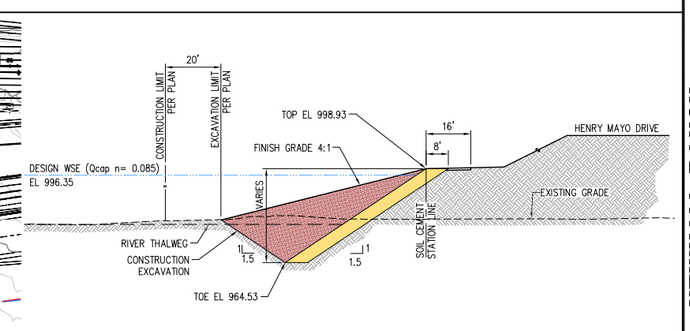
VERT. SCALE: 1" = 10'





SECTION AT STA 25+00

SCALE: 1"=20'

LEGEND

- PROPOSED MULTI-PURPOSETRAIL
- PROPOSED BANK PROTECTION
- HEC-RAS CROSS SECTION LOCATION
- HEC-RAS CROSS SECTION (PROPOSED CONDITION
- ACOE JURISDICTIONAL LINE
- UPDATED EXISTING QCAP FLOODPLAIN (REVISED Qcap) PACE 12/2005
- PROPOSED Qcap FLOODPLAIN (REVISED Qcap) PACE 06/2006

100 50 0 100 200

TITLE: PROPOSED SOIL CEMENT BANK PROTECTION, PALN PROFILE & TYP. SECTIONS
SR 126 HWY WIDENING

SCALE	1"=100'
DESIGNED	VB
DRAWN	JFP
CHECKED	MEK
DATE	JUNE 2006
JOB NO.	8611E

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NEWHALL RANCH
SANTA CLARA RIVER
MISSION VILLAGE
BANK PROTECTION TTM #61105
LOS ANGELES COUNTY

PACE
PACIFIC ADVANCED CIVIL ENGINEERING
27201 TOURNEY ROAD, SUITE 200
SANTA CLARITA, CA 91355
PH (714) 481-7300 FAX (714) 481-7299

FIGURE 03

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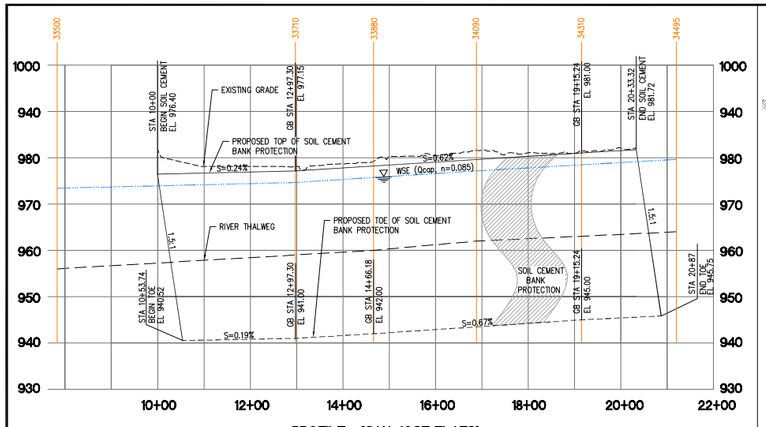

PROFILE - "SAN JOSE FLATS"
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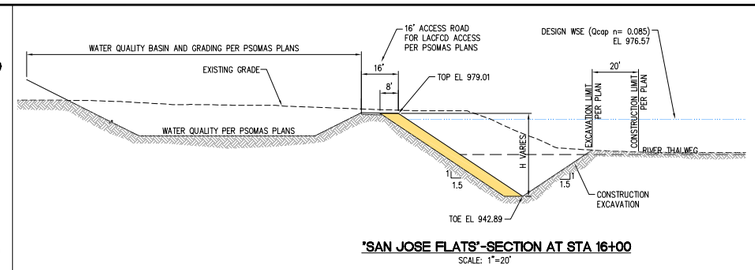
VERT. SCALE: 1" = 10'



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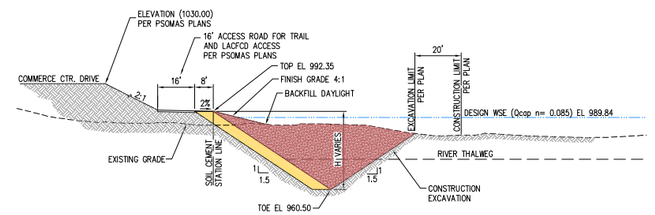

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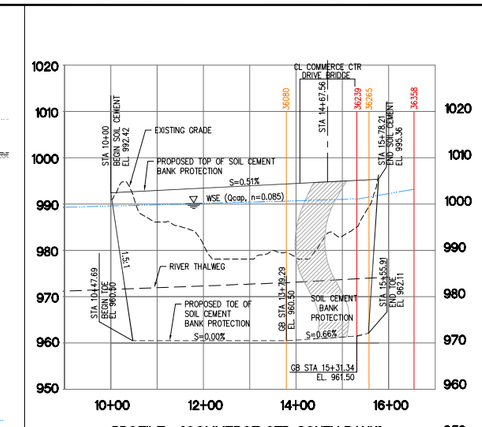

PROFILE - "COMMERCE CTR. SOUTH BANK"
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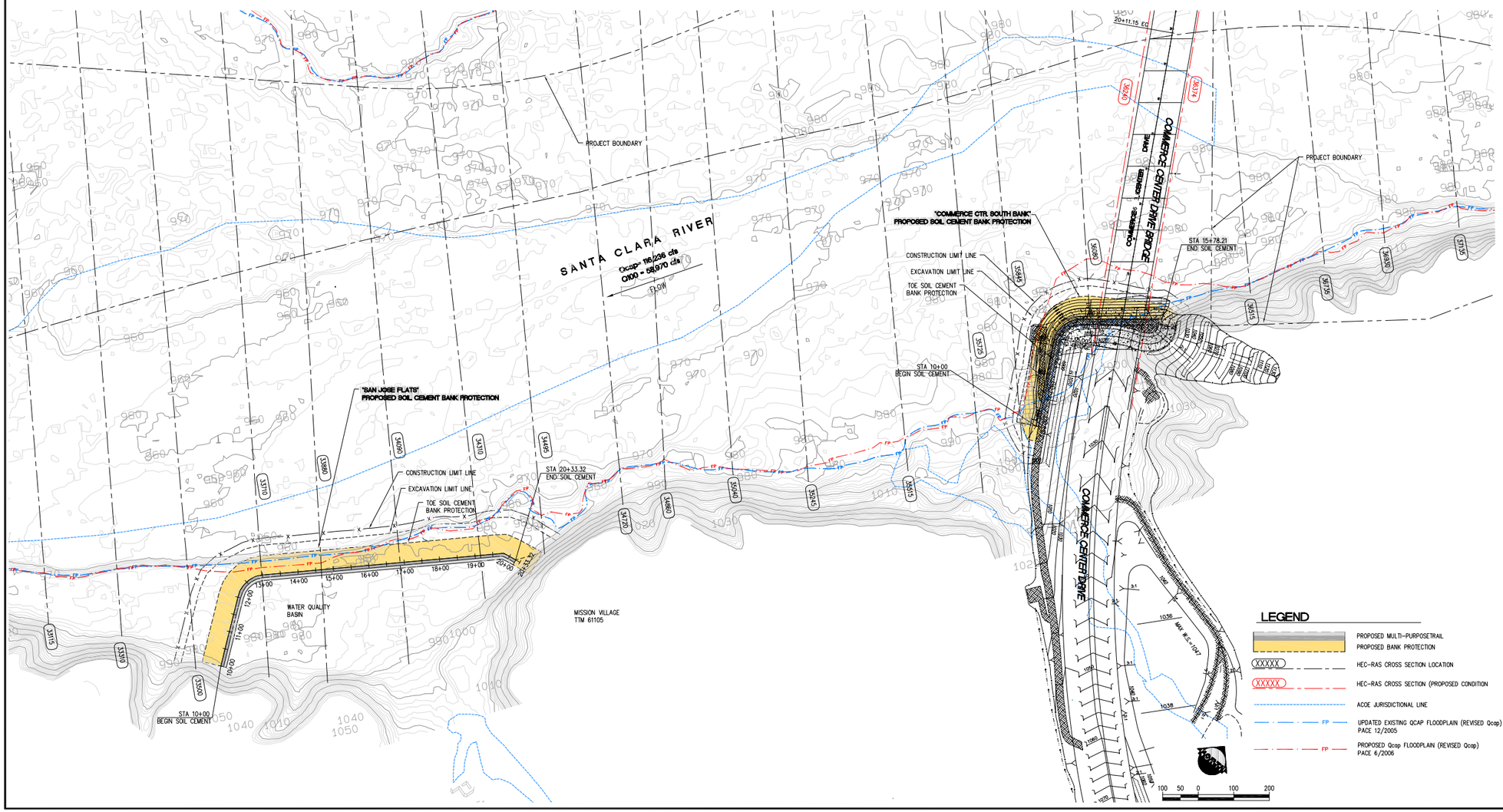

NO	BY	DATE	REVISIONS	DATE	APP

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SCALE 1"=100'
DESIGNED VB
DRAWN JEP
CHECKED MEK
DATE JUNE 2006
JOB NO. 8611E

TITLE
PROPOSED SOIL CEMENT BANK PROTECTION, PLAN PROFILE & TYP. SECTIONS SAN JOSE FLATS & NORTH BANK

JOB
NEWHALL RANCH
SANTA CLARA RIVER
MISSION VILLAGE
BANK PROTECTION TTM #61105
LOS ANGELES COUNTY CA.

PACE
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FIGURE 04
JOB NO. 8611E

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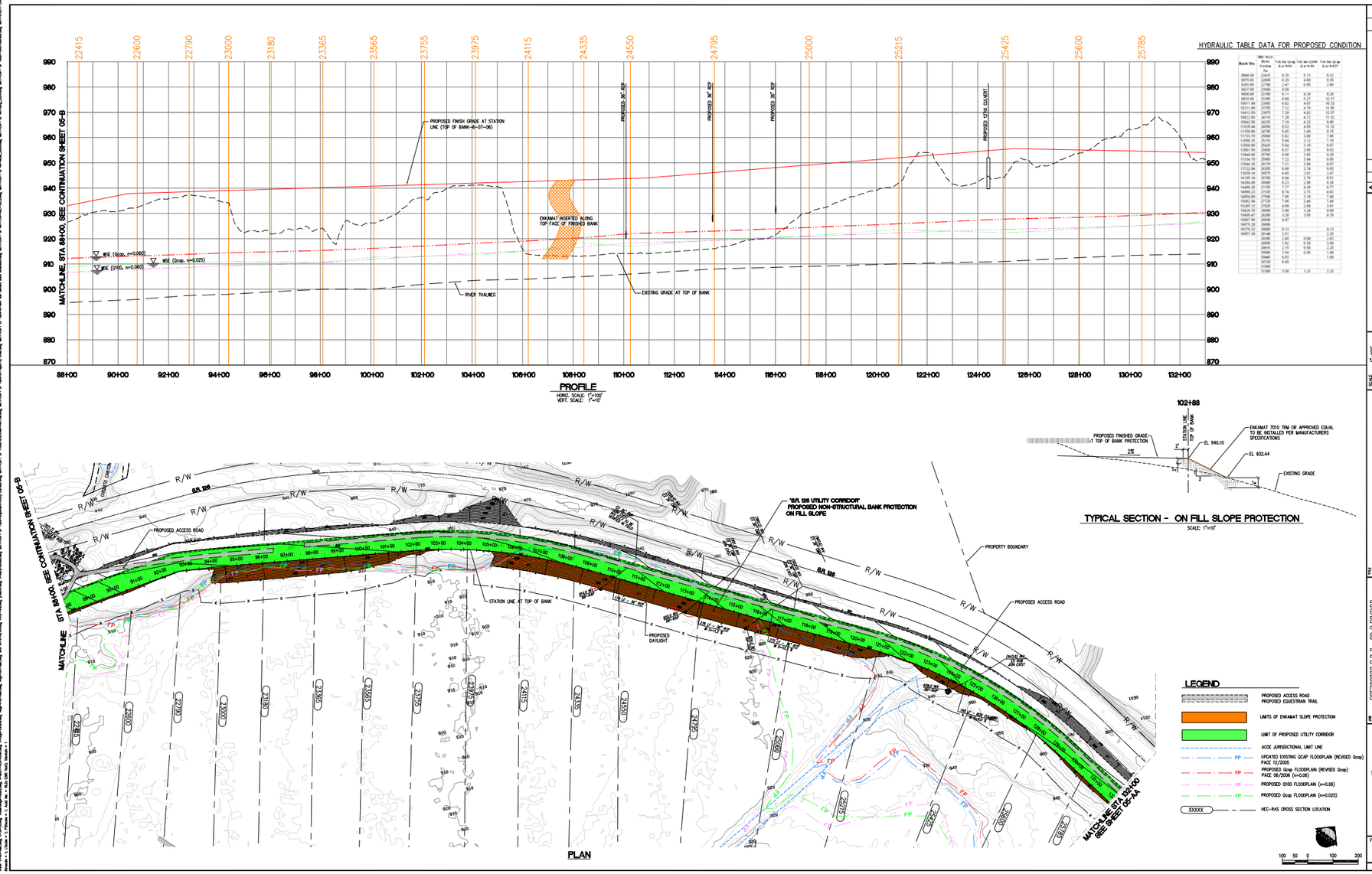
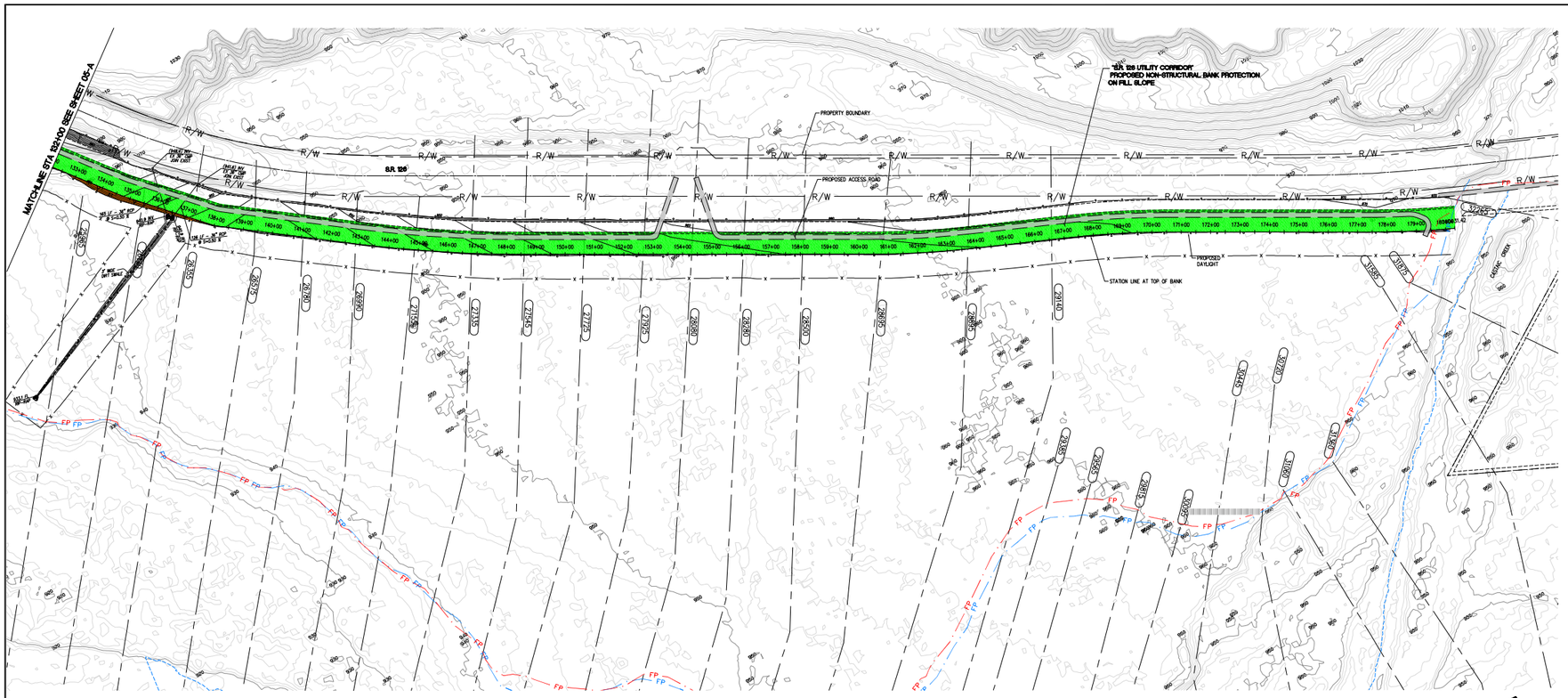


HYDRAULIC TABLE DATA FOR PROPOSED CONDITION

Bank Sta	HEC RAS River Station No.	Vel. for Qcap d=0.06	Vel. for Qcap d=0.025	Vel. for Q100 d=0.06	Vel. for Qcap d=0.027
8846.00	22415	6.35	5.11		8.32
8875.93	22600	6.29	4.60		8.35
8291.60	22790	2.47	0.65		2.86
8437.88	23000	6.59			
8815.66	23180	6.89	4.39		9.26
8916.68	23365	6.89	5.27		12.17
10011.99	23565	6.92	4.67		10.33
10211.88	23755	7.12	4.79		11.85
10413.50	23975	7.29	4.82		12.57
10622.89	24115	7.26	4.72		11.52
10942.58	24335	7.19	4.23		9.85
11128.44	24550	6.49	3.49		8.13
11358.44	24795	6.40	3.60		8.10
11733.70	25000	5.62	3.60		7.06
12088.35	25215	5.94	3.12		7.16
12509.96	25425	5.64	3.10		8.07
12861.58	25600	6.57	3.85		9.53
13049.80	25785	6.66	3.85		9.28
13334.70	25985	7.22	3.94		8.65
13544.26	26175	7.21	3.96		9.07
13629.14	26365	4.45	2.51		2.47
13659.14	26575	4.45	2.51		2.47
14105.14	26780	6.94	3.70		8.51
14284.88	26990	8.23	2.96		8.26
14466.28	27155	7.77	4.34		9.77
14668.23	27335	6.74	2.73		4.82
14858.80	27545	7.66	3.10		7.40
15000.12	27735	4.09	2.66		3.61
15295.12	27925	4.09	2.66		3.61
15426.76	28090	3.98	3.24		9.66
15600.47	28280	3.29	3.05		8.79
15687.58	28580	4.67			
16075.28	28690				
16370.32	28890	6.13			9.13
16657.39	29090	2.64			2.65
	29195	2.64	0.99		2.65
	29585	1.82	0.30		2.09
	29815	2.15	0.58		2.25
	30095	1.54	0.45		1.40
	30445	0.93			1.66
	30720	0.45			
	31080				
	31580	3.50	1.21		3.33



PLAN

HYDRAULIC TABLE DATA FOR PROPOSED CONDITION

Bank Sta	HEC-RAS Cross Section No.	T.W. for Q=qcap ft.w.s.(ft.msl)
8845.50	22815	6.36
8875.83	22800	6.29
9877.83	22795	2.46
9877.83	22790	2.46
9800.68	23160	6.51
9810.90	23345	6.69
10811.99	23565	6.92
10211.89	23755	7.12
10413.50	23875	7.29
10612.99	24000	7.46
10842.99	24105	7.59
11026.44	24550	8.52
11358.49	24795	8.45
11733.70	25000	5.62
12089.35	25215	5.94
12569.96	25425	5.84
12844.99	25545	6.08
13049.95	25795	6.98
13334.79	25965	7.22
13544.29	26175	7.24
13722.04	26355	6.90
14000.14	26565	6.94
14105.14	26795	6.94
14294.99	26990	6.23
14499.29	27155	7.72
14690.23	27315	6.74
14859.69	27545	7.06
15063.54	27725	7.06
15242.79	27900	3.98
15429.79	28080	3.98
15605.47	28260	3.28
15807.59	28500	4.07
16075.29	28665	
16275.12	28815	9.13
16657.39	29040	2.70
	29365	2.40
	29545	1.92
	29815	2.15
	30085	1.54
	30445	0.93
	30805	0.45
	31030	
	31360	3.56
	31585	
	31875	
	32245	2.06

LEGEND

- PROPOSED ACCESS ROAD
- PROPOSED EQUESTRIAN TRAIL
- LIMITS OF ENKAMAT SLOPE PROTECTION
- LIMIT OF PROPOSED UTILITY CORRIDOR
- ACOE JURISDICTIONAL LIMIT LINE
- FP — UPDATED EXISTING QCAP FLOODPLAIN (REVISED Qcap) PACE 12/2005
- FP — PROPOSED Qcap FLOODPLAIN (REVISED Qcap) PACE 06/2006 (n=0.06)
- XXXXX — HEC-RAS CROSS SECTION LOCATION

100 50 0 100 200

REVISIONS			
△1			
△2			
△3			
△4			
△5	BY	DATE	

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SCALE 1"=100'
DESIGNED HB
DRAWN AFP
CHECKED JEFF
DATE JANUARY 2006
JOB NO. 661E

TITLE
LANDMARK VILLAGE "S.R. 126 UTILITY CORRIDOR" BANK PLAN

NEWHALL RANCH
SANTA CLARA RIVER
MISSION VILLAGE
VTTM061105
LOS ANGELES COUNTY
CA.

PACE
PACE CIVIL ENGINEERING
PH (714) 693-1925 FAX (714) 693-1928
FIGURE 05AA
JOB NO. 661E

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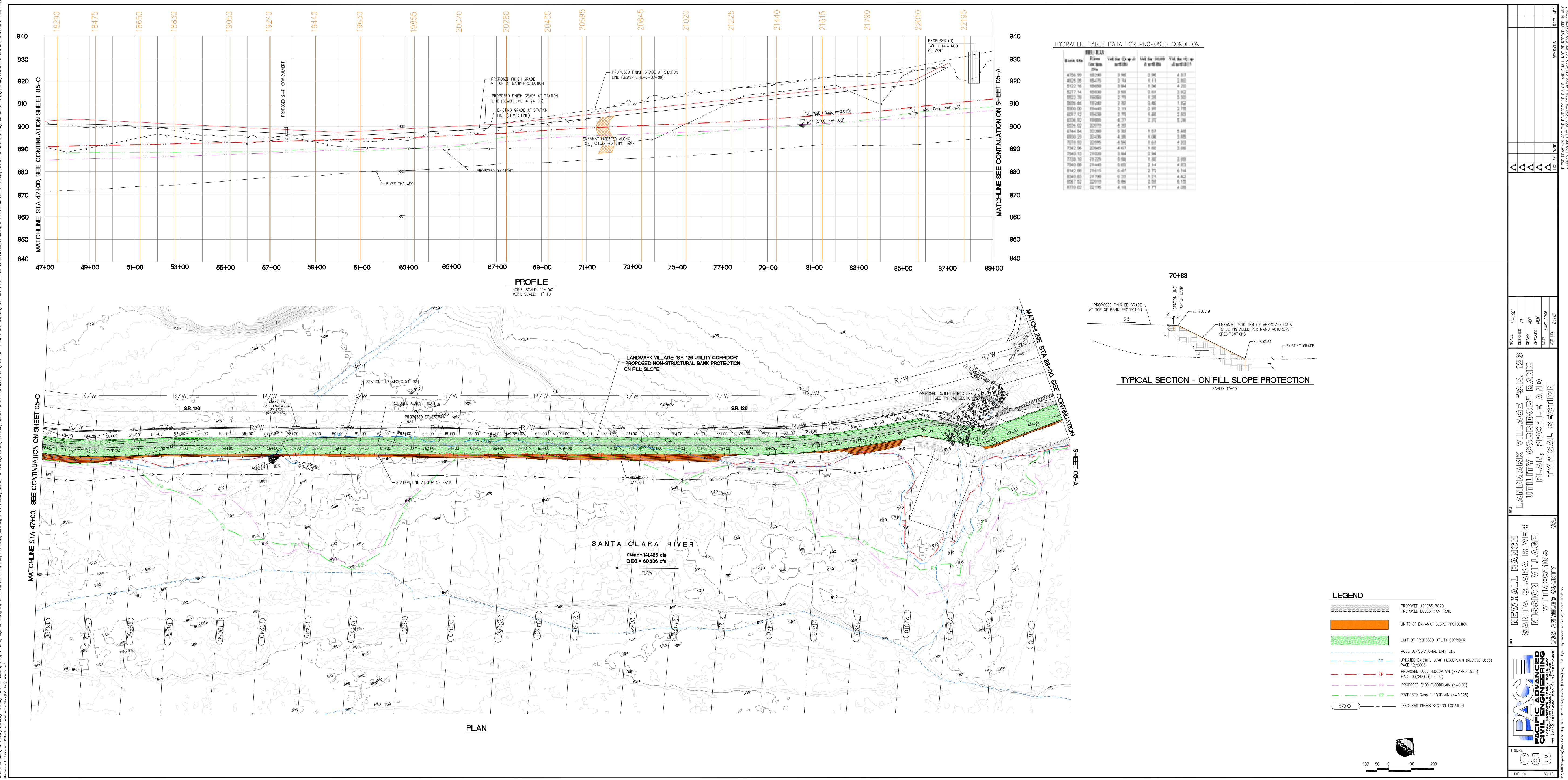

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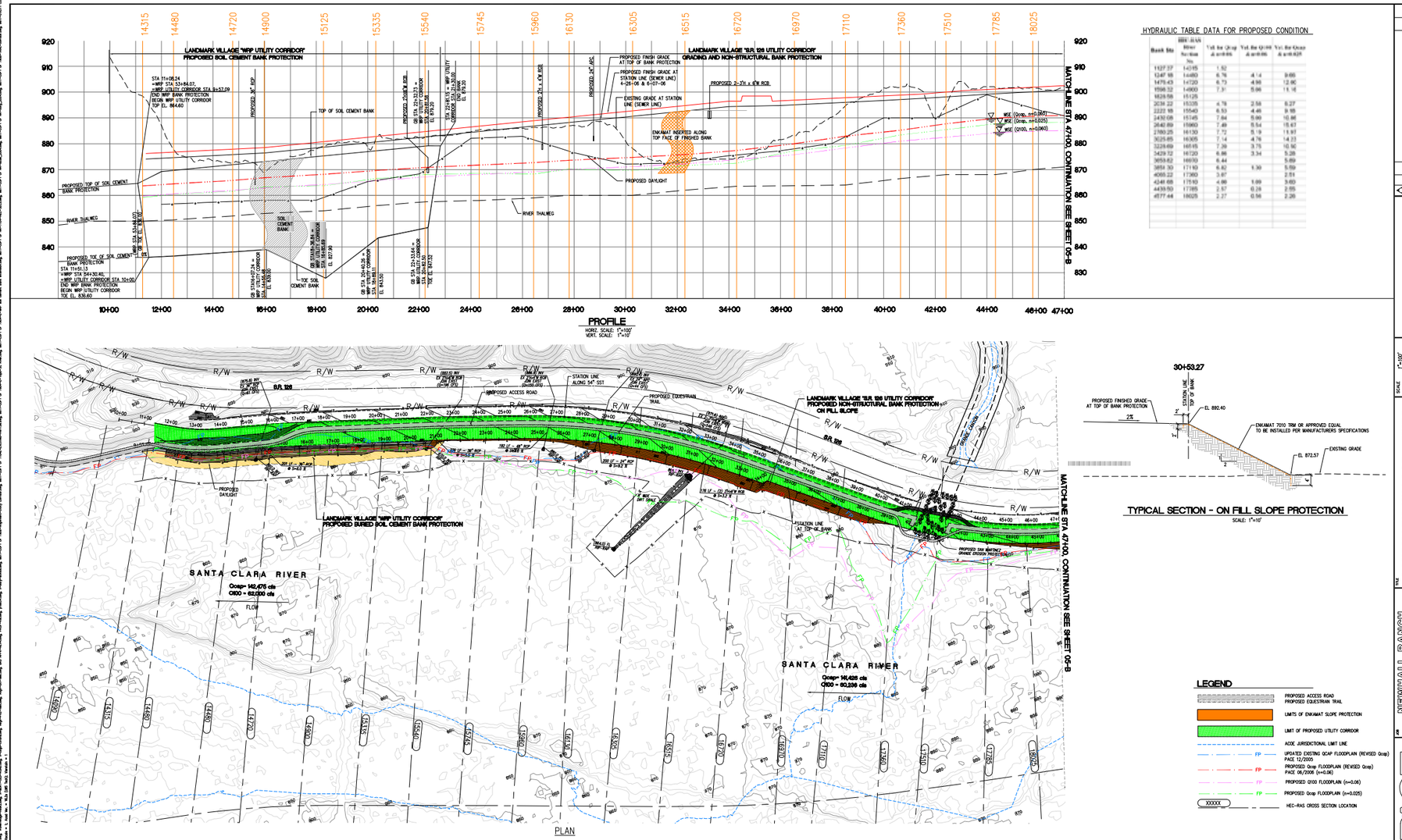

HYDRAULIC TABLE DATA FOR PROPOSED CONDITION

Bank Sta	HEC-RAS River Station No.	Vel. for Q=Qcap & n=0.035	Vel. for Q=100 & n=0.035	Vel. for Qcap & n=0.025
1127.37	14315	1.52		
1247.16	14480	6.76	4.14	9.66
1479.43	14720	6.73	4.98	12.06
1596.32	14900	7.31	5.66	11.16
1628.58	15125			
2036.22	15335	4.78	2.58	8.27
2223.18	15540	6.53	4.46	9.98
2432.08	15745	7.84	5.60	10.86
2642.89	15960	7.49	5.54	15.43
2780.25	16130	7.72	5.19	11.97
3025.85	16305	7.14	4.76	14.23
3229.69	16515	7.29	3.75	10.92
3429.72	16720	6.88	3.34	5.28
3653.82	16970	6.44		5.89
3851.30	17110	6.82	1.30	5.59
4066.22	17360	3.87		2.51
4249.68	17510	4.00	1.09	3.60
4439.50	17785	2.57	0.28	2.55
4577.44	18025	2.27	0.56	2.26

TYPICAL SECTION - ON FILL SLOPE PROTECTION

SCALE: 1"=10'

LEGEND

- PROPOSED ACCESS ROAD
- PROPOSED EQUESTRIAN TRAIL
- LIMITS OF ENKAMAT SLOPE PROTECTION
- LIMIT OF PROPOSED UTILITY CORRIDOR
- ACOE JURISDICTIONAL LIMIT LINE
- FP — UPDATED EXISTING QCAP FLOODPLAIN (REVISED Qcap) PACE 12/2005
- FP — PROPOSED Qcap FLOODPLAIN (REVISED Qcap) PACE 06/2006 (n=0.06)
- FP — PROPOSED Q100 FLOODPLAIN (n=0.06)
- FP — PROPOSED Qcap FLOODPLAIN (n=0.025)
- XXXXX — HEC-RAS CROSS SECTION LOCATION

100 50 0 100 200

REV.	BY	DATE	REVISIONS	DATE APPR.
1				
2				
3				
4				
5				

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SCALE 1"=100'
DESIGNED HB
DRAWN BB
CHECKED AFP
DATE JAN. 2006
JOB NO. 8611E

TITLE
LANDMARK VILLAGE - WRP & S.R. 126 UTILITY CORRIDOR
BANK - PLAN, PROFILE AND TYPICAL SECTION

NEWHALL RANCH
SANTA CLARA RIVER
MISSION VILLAGE
VTTM61106
LOS ANGELES COUNTY
CA.

PACE
CIVIL ENGINEERING
PACE ENGINEERING, INC.
24700 McBEAN PKWY., SUITE 200
SANTA CLARITA, CA 91355
PH (661) 259-7388 FAX (661) 259-7399

FIGURE
05C

JOB NO. 8611E

A full-size reproduction of this figure can be found at Impact Sciences.

4			
3			
2			
1			
0	BY	DATE	REVISIONS

THESE DRAWINGS ARE THE PROPERTY OF P.A.C.E. AND SHALL NOT BE REPRODUCED IN ANY MANNER NOR BE USED FOR CONSTRUCTION UNLESS STAMPED "ISSUED FOR CONSTRUCTION".

SCALE 1"=20'
DESIGNED JB
DRAWN BY
CHECKED BY
DATE JANUARY
JOB NO. 8611E

WRP & S.R. 126 UTILITY CORRIDOR BANK - CROSS SECTIONS

NEWHALL RANCH
SANTA CLARA RIVER
MISSION VILLAGE
TTM61105
LOS ANGELES COUNTY, CA.

PACE
PACE ENGINEERING
CIVIL ENGINEERS
PH (805) 526-5700 FAX (805) 526-7299
1156 N. MOUNTAIN AVE., OJAI, CA. 93023

FIGURE 05D

JOB NO. 8611E

A full-size reproduction of this figure can be found at Impact Sciences.

A full-size reproduction of this figure can be found at Impact Sciences.

Appendix I: Q_{cap} Existing Condition HEC-RAS Model (n = 0.060); Summary Table, Profile & Cross-Sections

HEC-RAS Plan: Ex.060 River: Reach #1 Reach: SCR Profile: Rev BB FP

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
SCR	39755	Rev BB FP	115111.00	994.00	1010.68	1007.49	1012.19	0.006155	10.48	12573.89	1464.82	0.52
SCR	39605	Rev BB FP	115111.00	993.00	1009.99	1005.91	1011.30	0.004899	9.80	13358.61	1367.83	0.47
SCR	39310	Rev BB FP	115111.00	992.00	1008.42	1004.44	1009.75	0.005131	10.14	13702.08	1594.90	0.48
SCR	39100	Rev BB FP	115111.00	990.00	1007.78	1002.13	1008.77	0.003469	8.44	15312.17	1495.33	0.40
SCR	38925	Rev BB FP	115111.00	989.50	1007.06	1001.39	1008.12	0.003746	8.56	14535.44	1360.04	0.41
SCR	38710	Rev BB FP	115111.00	988.00	1006.13	1000.08	1007.30	0.003772	8.91	13799.78	1209.15	0.42
SCR	38475	Rev BB FP	115111.00	986.00	1003.61	999.95	1005.93	0.008113	12.49	9836.33	947.67	0.60
SCR	38300	Rev BB FP	115111.00	985.50	1002.69	997.52	1004.58	0.005876	11.09	10671.87	923.98	0.52
SCR	38065	Rev BB FP	115111.00	984.00	1001.25	995.71	1003.20	0.005703	11.21	10350.30	803.29	0.51
SCR	37810	Rev BB FP	115111.00	983.00	997.73	995.23	1000.99	0.012373	14.50	7972.51	712.39	0.73
SCR	37655	Rev BB FP	115111.00	982.00	995.14	994.09	998.72	0.016921	15.21	7638.91	802.91	0.84
SCR	37390	Rev BB FP	115111.00	981.00	994.07	989.88	995.63	0.005931	10.17	11636.90	1018.72	0.51
SCR	37135	Rev BB FP	115111.00	980.00	992.64	988.63	994.06	0.005874	9.80	12138.16	1107.16	0.50
SCR	36930	Rev BB FP	115111.00	978.00	991.76	987.06	992.96	0.004476	9.09	13360.45	1195.47	0.45
SCR	36735	Rev BB FP	115111.00	977.00	990.84	986.55	992.05	0.004773	9.10	13287.79	1233.52	0.46
SCR	36515	Rev BB FP	115111.00	975.00	990.03	985.42	991.06	0.003962	8.38	14476.75	1343.55	0.43
SCR	36265	Rev BB FP	115111.00	974.00	988.93	984.77	989.98	0.004748	8.24	13990.37	1382.63	0.46
SCR	36080	Rev BB FP	116236.00	973.00	988.00	984.06	989.04	0.005308	8.22	14198.20	1480.62	0.46
SCR	35845	Rev BB FP	116236.00	971.00	986.86	982.87	987.88	0.004538	8.25	14589.29	1566.52	0.45
SCR	35725	Rev BB FP	116236.00	970.00	986.04	982.83	987.26	0.005463	9.40	13601.10	1519.85	0.50
SCR	35515	Rev BB FP	116236.00	969.00	984.66	981.71	986.05	0.006031	10.25	13010.11	1452.88	0.52
SCR	35245	Rev BB FP	116236.00	968.00	982.78	980.46	984.27	0.007168	10.44	12560.53	1568.87	0.56
SCR	35040	Rev BB FP	116236.00	967.00	981.26	978.98	982.80	0.006993	11.42	12560.76	1473.48	0.56
SCR	34860	Rev BB FP	116236.00	966.00	979.96	977.39	981.49	0.008091	9.93	11795.28	1397.48	0.59
SCR	34720	Rev BB FP	116236.00	965.50	978.97	976.19	980.35	0.007306	9.42	12382.70	1434.60	0.56
SCR	34495	Rev BB FP	116236.00	964.00	977.44	974.45	978.81	0.006536	9.68	12740.57	1425.59	0.53
SCR	34310	Rev BB FP	116236.00	963.00	976.28	973.01	977.65	0.005765	10.00	12869.21	1322.41	0.51
SCR	34090	Rev BB FP	116236.00	962.00	974.96	971.64	976.32	0.006486	9.37	12407.30	1303.60	0.54
SCR	33880	Rev BB FP	116236.00	960.00	973.59	970.46	974.93	0.006786	9.30	12498.86	1427.95	0.55
SCR	33710	Rev BB FP	116236.00	959.00	972.55	969.23	973.74	0.006397	8.74	13300.90	1602.52	0.53
SCR	33500	Rev BB FP	116236.00	958.00	971.32	968.41	972.43	0.005880	8.91	14258.80	1707.37	0.49
SCR	33310	Rev BB FP	116236.00	957.00	970.43	967.01	971.36	0.004942	7.75	15004.20	1770.85	0.47
SCR	33115	Rev BB FP	116236.00	956.00	969.56	965.60	970.37	0.004682	7.21	16112.70	1830.33	0.43
SCR	32795	Rev BB FP	116236.00	954.00	967.77	964.61	968.76	0.005444	7.96	14608.31	1842.49	0.50
SCR	32605	Rev BB FP	116236.00	952.00	966.63	963.61	967.66	0.005916	8.14	14271.43	2251.57	0.52
SCR	32265	Rev BB FP	140776.00	950.00	964.96	961.33	965.78	0.004999	7.25	19437.63	2824.58	0.49
SCR	31875	Rev BB FP	140776.00	949.00	963.21	959.38	963.92	0.004345	6.74	20945.08	2535.92	0.41
SCR	31585	Rev BB FP	140776.00	946.00	962.35	956.96	962.93	0.002610	6.12	23002.38	2314.83	0.34
SCR	31360	Rev BB FP	140776.00	944.00	961.70	955.41	962.35	0.002380	6.54	22096.28	1957.63	0.33

HEC-RAS Plan: Ex.060 River: Reach #1 Reach: SCR Profile: Rev BB FP (Continued)

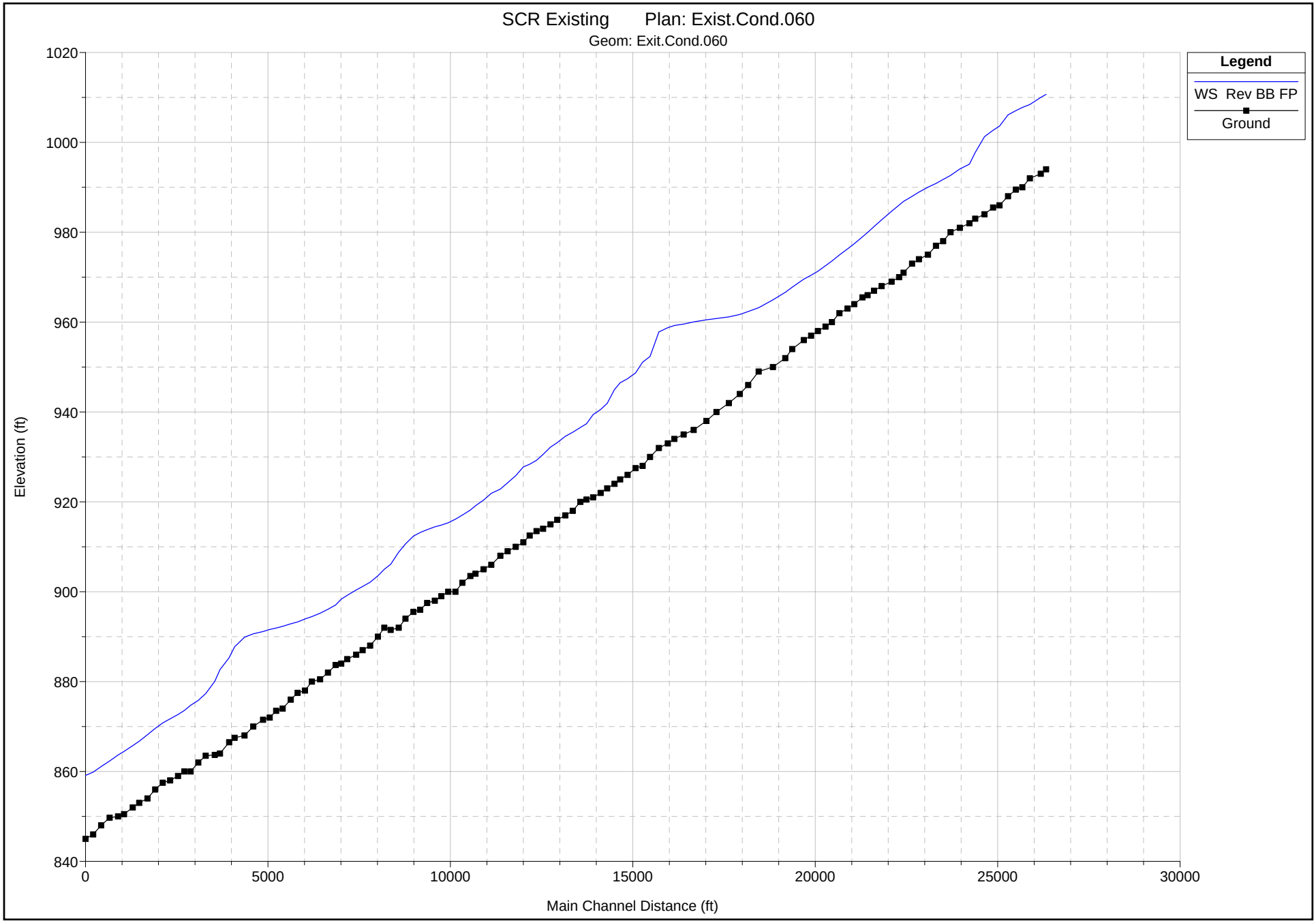
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
SCR	31060	Rev BB FP	140776.00	942.00	961.18	953.29	961.72	0.001734	5.92	23780.65	1967.63	0.30
SCR	30720	Rev BB FP	140776.00	940.00	960.79	951.33	961.20	0.001155	5.14	27379.31	1925.71	0.24
SCR	30445	Rev BB FP	140776.00	938.00	960.51	949.57	960.91	0.000977	5.04	28148.21	1996.42	0.22
SCR	30095	Rev BB FP	140776.00	936.00	960.06	947.93	960.55	0.001009	5.71	26351.58	2118.83	0.23
SCR	29815	Rev BB FP	140776.00	935.00	959.57	948.10	960.22	0.001321	6.64	23723.93	2024.45	0.26
SCR	29565	Rev BB FP	140776.00	934.00	959.25	947.27	959.88	0.001282	6.48	23804.88	2045.65	0.27
SCR	29385	Rev BB FP	140776.00	933.00	958.77	948.98	959.59	0.001772	7.47	21266.39	1975.97	0.31
SCR	29140	Rev BB FP	140776.00	932.00	957.82	950.99	959.01	0.003115	8.84	17006.33	1725.07	0.42
SCR	28895	Rev BB FP	140776.00	930.00	952.36	952.36	957.25	0.013878	19.72	9132.66	1056.57	0.82
SCR	28695	Rev BB FP	140776.00	928.00	951.09	947.96	953.92	0.009196	13.52	10416.23	1092.57	0.77
SCR	28500	Rev BB FP	140776.00	927.50	948.69	945.08	952.05	0.009434	14.87	10048.78	996.52	0.67
SCR	28280	Rev BB FP	140776.00	926.00	947.41	941.85	950.28	0.005996	14.06	11209.99	1031.84	0.56
SCR	28080	Rev BB FP	140776.00	925.00	946.51	940.04	949.05	0.005297	13.05	11838.45	978.08	0.52
SCR	27925	Rev BB FP	140776.00	924.00	945.01	939.47	948.08	0.006558	14.26	10544.04	811.40	0.58
SCR	27725	Rev BB FP	140776.00	923.00	941.92	939.31	946.30	0.010561	17.12	8751.00	667.06	0.72
SCR	27545	Rev BB FP	140776.00	922.00	940.55	937.81	944.29	0.009792	15.90	9437.01	808.15	0.69
SCR	27335	Rev BB FP	140776.00	921.00	939.42	936.22	942.22	0.007576	13.96	11188.74	999.50	0.61
SCR	27155	Rev BB FP	140776.00	920.50	937.38	935.86	940.58	0.009959	15.27	10639.15	1089.01	0.69
SCR	26990	Rev BB FP	140776.00	920.00	936.56	933.79	938.74	0.008364	12.09	12230.60	1218.39	0.62
SCR	26780	Rev BB FP	140776.00	918.00	935.50	931.71	937.16	0.005557	11.05	14288.79	1294.32	0.51
SCR	26575	Rev BB FP	140776.00	917.00	934.60	929.99	935.97	0.005299	9.46	15058.59	1311.98	0.48
SCR	26355	Rev BB FP	140776.00	916.00	933.19	929.39	934.74	0.005715	10.46	14502.88	1340.29	0.52
SCR	26170	Rev BB FP	140776.00	915.00	932.18	928.71	933.71	0.005457	10.89	14925.53	1368.29	0.50
SCR	25965	Rev BB FP	140776.00	914.00	930.57	927.71	932.43	0.006860	11.83	13642.82	1342.49	0.56
SCR	25785	Rev BB FP	140776.00	913.50	929.24	926.49	931.10	0.007329	11.93	13814.28	1484.48	0.57
SCR	25600	Rev BB FP	140776.00	912.50	928.37	925.46	929.74	0.005698	10.63	16128.46	1827.99	0.51
SCR	25425	Rev BB FP	140776.00	911.00	927.76	924.28	928.73	0.004364	8.54	18519.32	2042.82	0.45
SCR	25215	Rev BB FP	140776.00	910.00	925.82	923.53	927.42	0.008028	10.70	14700.88	1899.79	0.59
SCR	25000	Rev BB FP	140776.00	909.00	924.25	922.50	925.66	0.007638	10.37	16062.88	2366.92	0.58
SCR	24795	Rev BB FP	140776.00	908.00	922.84	920.87	924.04	0.006853	9.80	16972.01	2324.33	0.55
SCR	24550	Rev BB FP	140776.00	906.00	921.90	918.41	922.71	0.004158	8.04	19875.21	2246.68	0.44
SCR	24335	Rev BB FP	140776.00	905.00	920.38	918.12	921.60	0.006765	10.02	16596.56	2097.67	0.54
SCR	24115	Rev BB FP	140776.00	904.00	919.13	916.28	920.22	0.006046	9.33	17217.54	2029.24	0.50
SCR	23975	Rev BB FP	140776.00	903.50	918.17	914.88	919.21	0.005446	8.91	17445.12	1932.94	0.48
SCR	23755	Rev BB FP	140776.00	902.00	917.07	913.54	918.04	0.004926	8.63	18062.90	1994.76	0.47
SCR	23565	Rev BB FP	140776.00	900.00	916.15	912.70	917.09	0.004884	8.49	18397.22	2081.59	0.47
SCR	23365	Rev BB FP	140776.00	900.00	915.34	911.36	916.19	0.004101	8.17	19452.44	2083.25	0.43
SCR	23180	Rev BB FP	140776.00	899.00	914.83	909.87	915.50	0.002702	7.74	22214.35	2152.97	0.35
SCR	23000	Rev BB FP	140776.00	898.00	914.44	908.40	915.02	0.002312	6.15	23236.24	2155.79	0.32

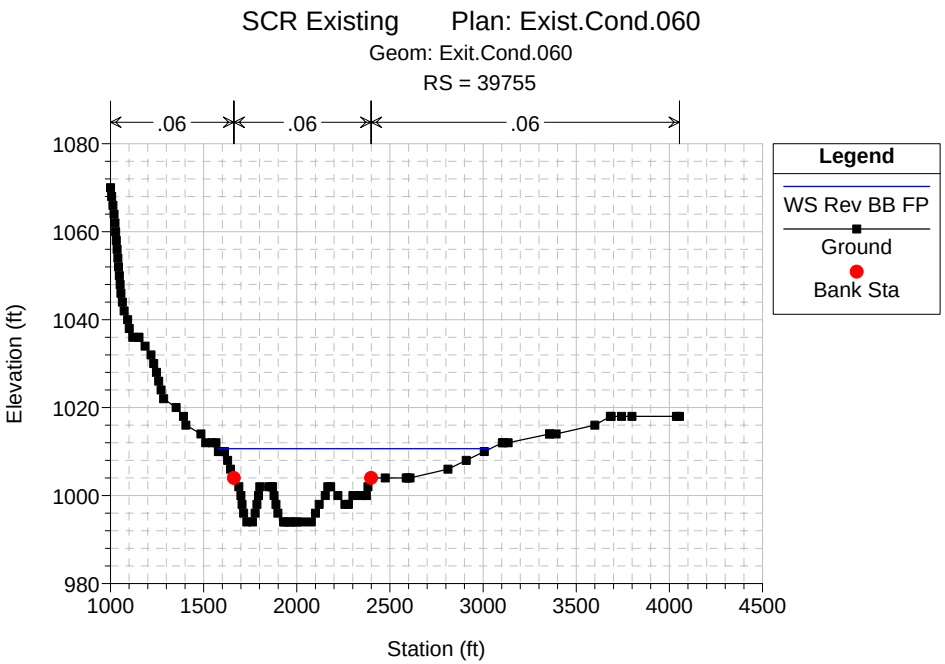
HEC-RAS Plan: Ex.060 River: Reach #1 Reach: SCR Profile: Rev BB FP (Continued)

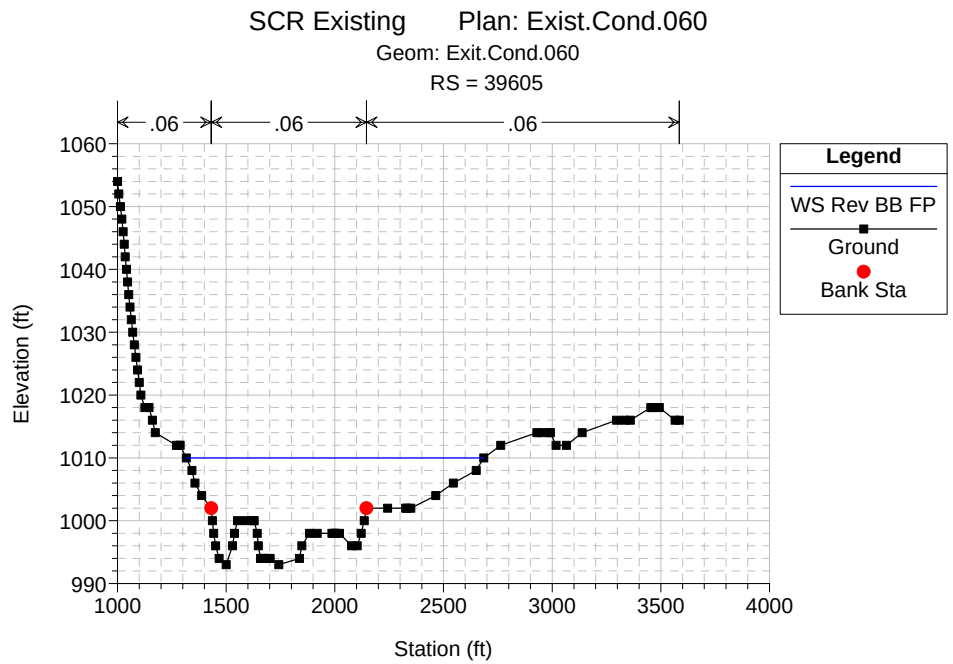
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
SCR	22790	Rev BB FP	140776.00	897.50	913.82	908.15	914.49	0.002643	6.60	21557.06	2014.36	0.35
SCR	22600	Rev BB FP	140776.00	896.00	913.17	907.78	913.94	0.002990	7.89	20501.46	1908.99	0.38
SCR	22415	Rev BB FP	140776.00	895.50	912.37	907.11	913.31	0.003714	8.61	18751.73	1840.12	0.42
SCR	22195	Rev BB FP	141426.00	894.00	910.63	906.79	912.24	0.006033	10.34	14383.84	1480.94	0.53
SCR	22010	Rev BB FP	141426.00	892.00	908.81	906.38	910.92	0.007822	12.21	12996.47	1561.41	0.60
SCR	21790	Rev BB FP	141426.00	891.50	906.10	904.87	908.83	0.011140	13.68	11580.28	1949.55	0.70
SCR	21615	Rev BB FP	141426.00	892.00	904.99	903.04	906.84	0.008623	11.32	13835.67	2046.13	0.62
SCR	21440	Rev BB FP	141426.00	890.00	903.54	901.59	905.31	0.008379	11.42	14303.66	2024.42	0.60
SCR	21225	Rev BB FP	141426.00	888.00	902.11	900.27	903.49	0.007564	10.51	16302.52	2368.75	0.56
SCR	21020	Rev BB FP	141426.00	887.00	901.16	897.78	902.17	0.004676	9.10	19399.07	2632.97	0.46
SCR	20845	Rev BB FP	141426.00	886.00	900.39	897.38	901.29	0.004825	8.72	20025.53	2728.67	0.46
SCR	20595	Rev BB FP	141426.00	885.00	899.21	896.42	900.15	0.004580	8.93	20085.48	2717.12	0.45
SCR	20435	Rev BB FP	141426.00	884.00	898.35	895.77	899.35	0.005019	9.28	19383.80	2673.48	0.47
SCR	20280	Rev BB FP	141426.00	883.70	897.04	895.55	898.34	0.008053	10.64	16892.31	2636.65	0.58
SCR	20070	Rev BB FP	141426.00	882.00	896.09	893.00	897.00	0.004652	8.65	19676.96	2507.77	0.45
SCR	19855	Rev BB FP	141426.00	880.50	895.23	891.50	896.05	0.003895	8.29	21009.22	2626.90	0.41
SCR	19630	Rev BB FP	141426.00	880.00	894.46	890.05	895.23	0.003364	7.84	21650.12	2701.24	0.39
SCR	19440	Rev BB FP	141426.00	878.00	893.92	889.11	894.61	0.002774	7.29	22725.77	2677.81	0.36
SCR	19240	Rev BB FP	141426.00	877.50	893.28	888.88	894.02	0.003095	7.50	21630.17	2495.76	0.38
SCR	19050	Rev BB FP	141426.00	876.00	892.87	887.49	893.47	0.002413	6.67	23395.12	2355.26	0.33
SCR	18830	Rev BB FP	141426.00	874.00	892.31	886.81	892.94	0.002465	6.82	22809.13	2189.48	0.34
SCR	18650	Rev BB FP	141426.00	873.50	891.91	885.64	892.53	0.002136	6.84	23250.96	2064.41	0.32
SCR	18475	Rev BB FP	141426.00	872.00	891.61	884.74	892.15	0.001837	6.05	24134.96	1964.47	0.30
SCR	18290	Rev BB FP	141426.00	871.50	891.15	884.50	891.78	0.002098	6.61	22526.65	1863.74	0.32
SCR	18025	Rev BB FP	141426.00	870.00	890.63	882.91	891.26	0.001812	6.46	22407.92	1628.78	0.30
SCR	17785	Rev BB FP	141426.00	868.00	889.88	882.81	890.72	0.002623	7.38	19389.15	1439.16	0.35
SCR	17510	Rev BB FP	141426.00	867.50	887.74	883.58	889.59	0.005819	11.13	13569.97	1326.12	0.54
SCR	17360	Rev BB FP	141426.00	866.50	885.32	883.37	888.29	0.011400	13.90	10497.55	1226.61	0.74
SCR	17110	Rev BB FP	141426.00	864.00	882.67	881.59	885.45	0.010782	14.20	11574.66	1412.77	0.71
SCR	16970	Rev BB FP	141426.00	863.70	880.06	880.06	883.52	0.015779	15.54	10321.86	1517.94	0.86
SCR	16720	Rev BB FP	141426.00	863.50	877.33	875.45	879.23	0.009849	11.47	13398.44	1714.86	0.65
SCR	16515	Rev BB FP	141426.00	862.00	875.83	873.72	877.30	0.008144	10.23	15061.35	1920.47	0.59
SCR	16305	Rev BB FP	141426.00	860.00	874.73	871.44	875.78	0.005519	9.06	17733.62	2088.74	0.49
SCR	16130	Rev BB FP	141426.00	860.00	873.58	870.71	874.68	0.006452	8.98	16938.20	2091.54	0.54
SCR	15960	Rev BB FP	141426.00	859.00	872.66	869.21	873.55	0.005505	7.63	18687.30	2233.26	0.46
SCR	15745	Rev BB FP	141426.00	858.00	871.73	867.77	872.50	0.004211	6.97	20198.45	2290.77	0.42
SCR	15540	Rev BB FP	141426.00	857.50	870.80	867.17	871.59	0.004535	7.37	19895.75	2339.05	0.44
SCR	15335	Rev BB FP	141426.00	856.00	869.59	866.50	870.52	0.005818	7.76	18301.05	2324.06	0.48
SCR	15125	Rev BB FP	142475.00	854.00	868.18	864.50	869.30	0.005569	8.49	17003.63	2080.42	0.49

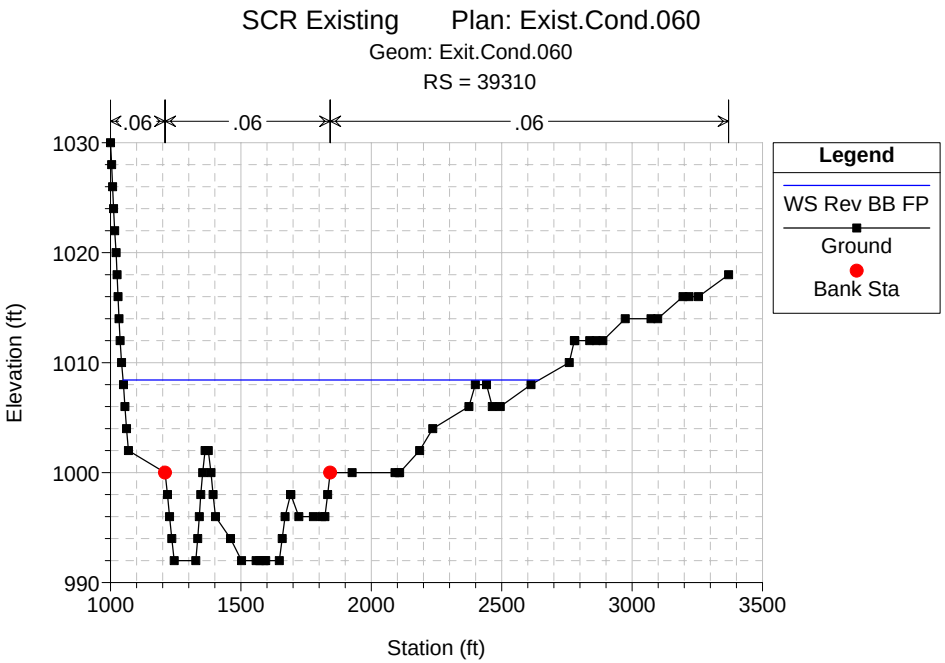
HEC-RAS Plan: Ex.060 River: Reach #1 Reach: SCR Profile: Rev BB FP (Continued)

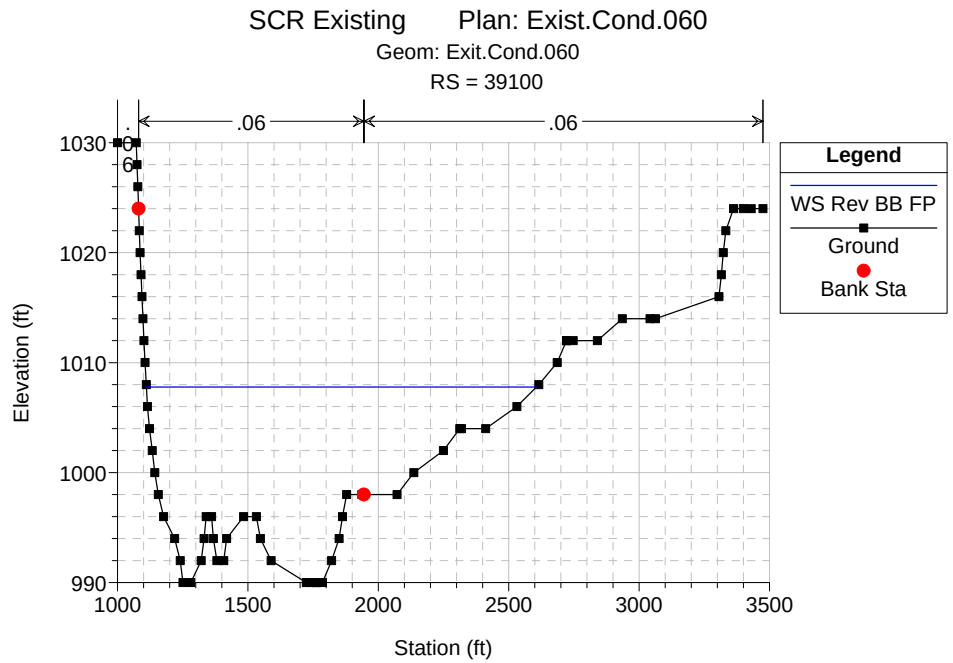
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
SCR	14900	Rev BB FP	142475.00	853.00	866.73	863.42	867.94	0.006250	9.24	16536.96	2097.69	0.52
SCR	14720	Rev BB FP	142475.00	852.00	865.76	862.17	866.85	0.005814	8.76	17360.37	1979.97	0.49
SCR	14480	Rev BB FP	142475.00	850.50	864.47	860.73	865.52	0.005156	8.56	17648.52	1869.17	0.46
SCR	14315	Rev BB FP	142475.00	850.00	863.67	859.81	864.66	0.005069	8.00	17816.17	1917.85	0.46
SCR	14090	Rev BB FP	142475.00	849.71	862.32	858.64	863.43	0.005608	8.47	16872.27	1798.30	0.48
SCR	13850	Rev BB FP	142475.00	848.00	861.10	857.10	862.16	0.005089	8.29	17235.08	1755.83	0.46
SCR	13635	Rev BB FP	142475.00	846.00	859.85	856.30	861.02	0.005383	9.61	16962.23	1792.97	0.49
SCR	13425	Rev BB FP	142475.00	845.00	859.12	854.56	859.97	0.003887	7.41	19281.49	1923.12	0.41

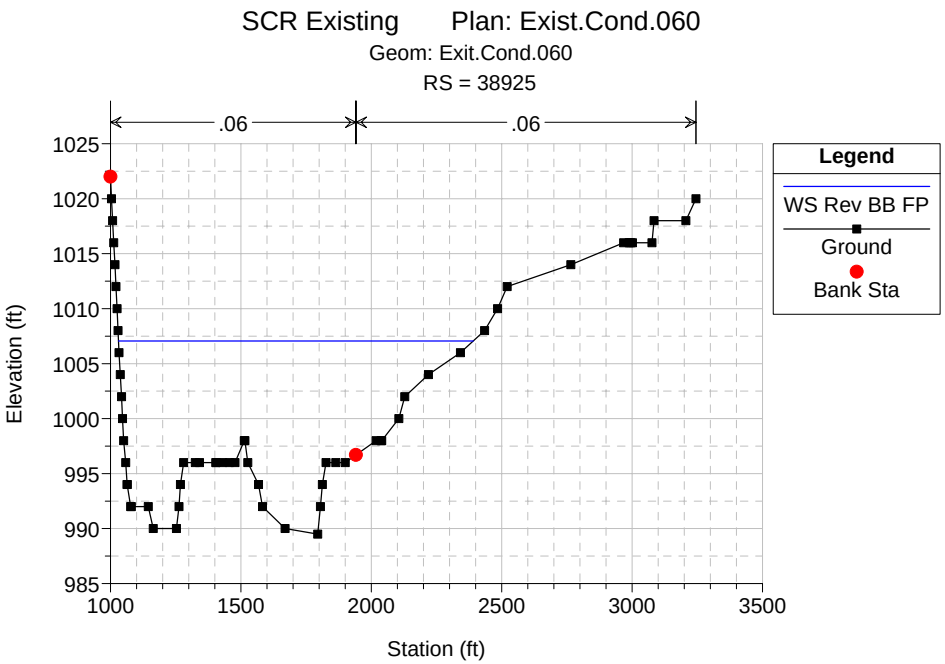

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
Legend
WS Rev BB FP
Ground
Elevation (ft)
1020
1000
980
960
940
920
900
880
860
840
0
5000
10000
15000
20000
25000
30000
Main Channel Distance (ft)

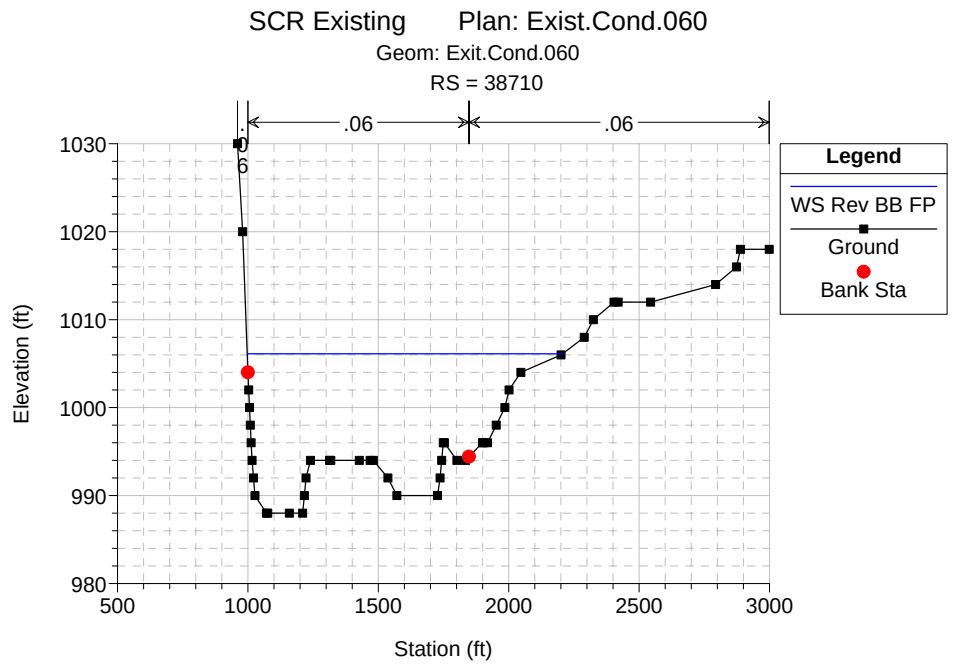

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 39755
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 39605
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 39310
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 39100
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 38925
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 38710
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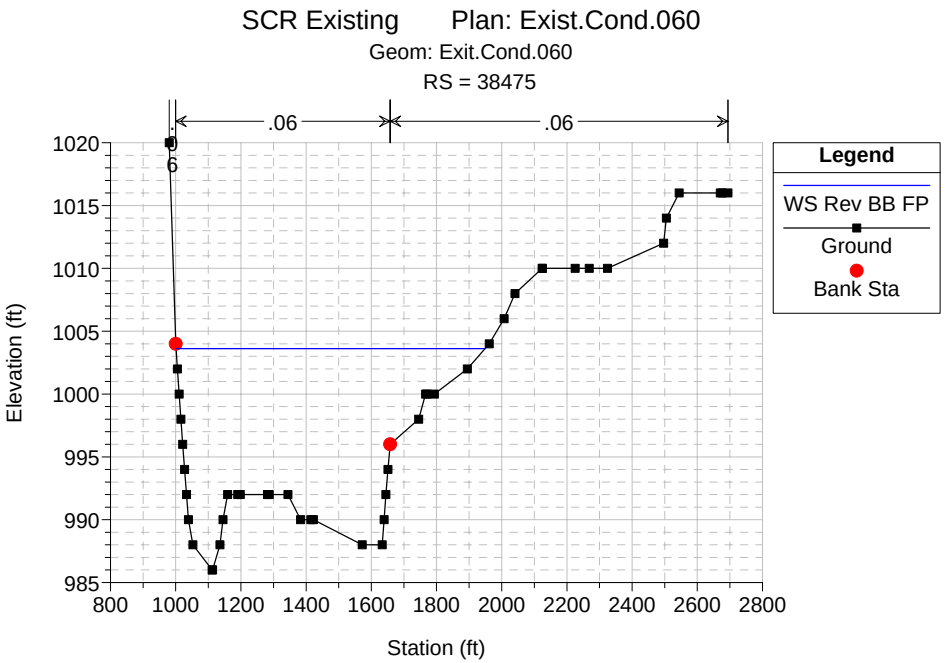
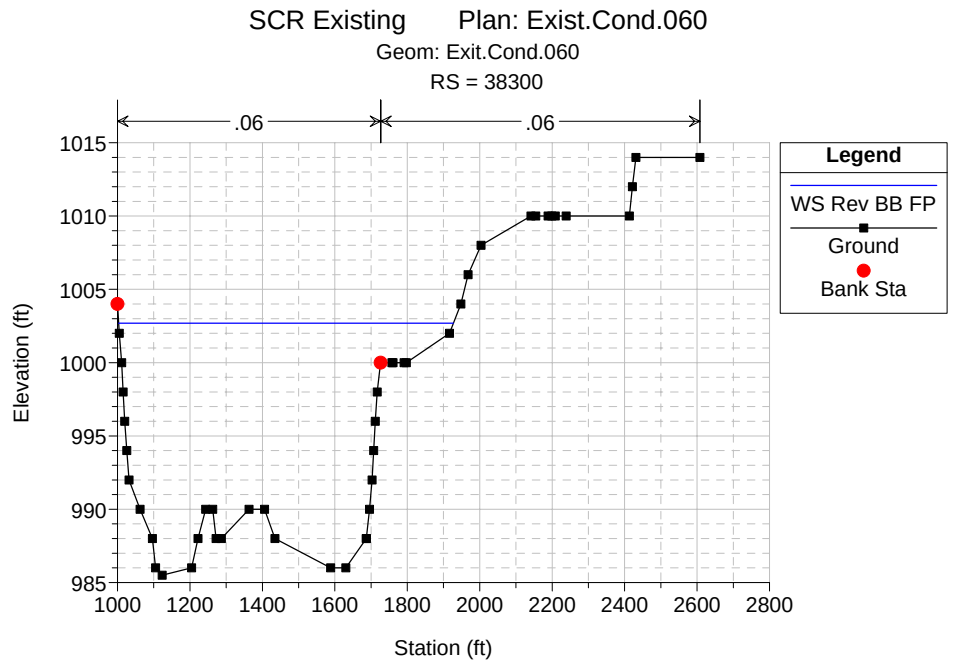
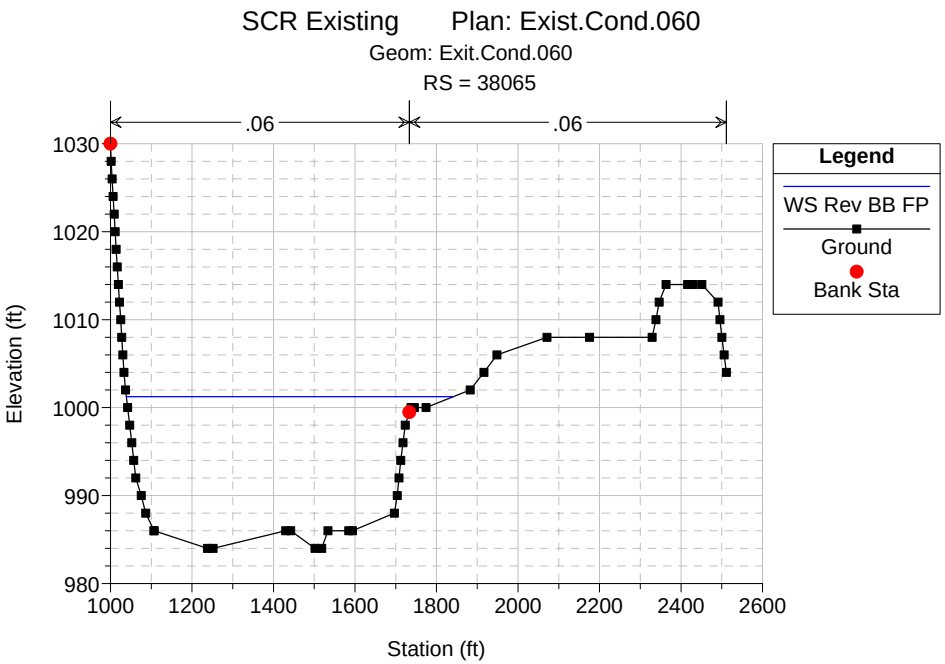
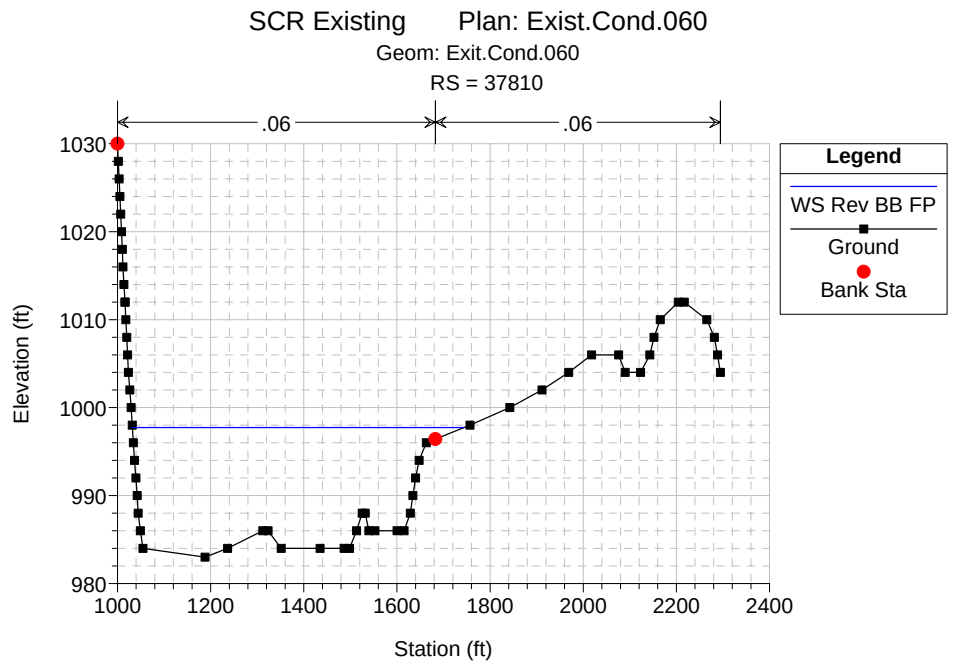
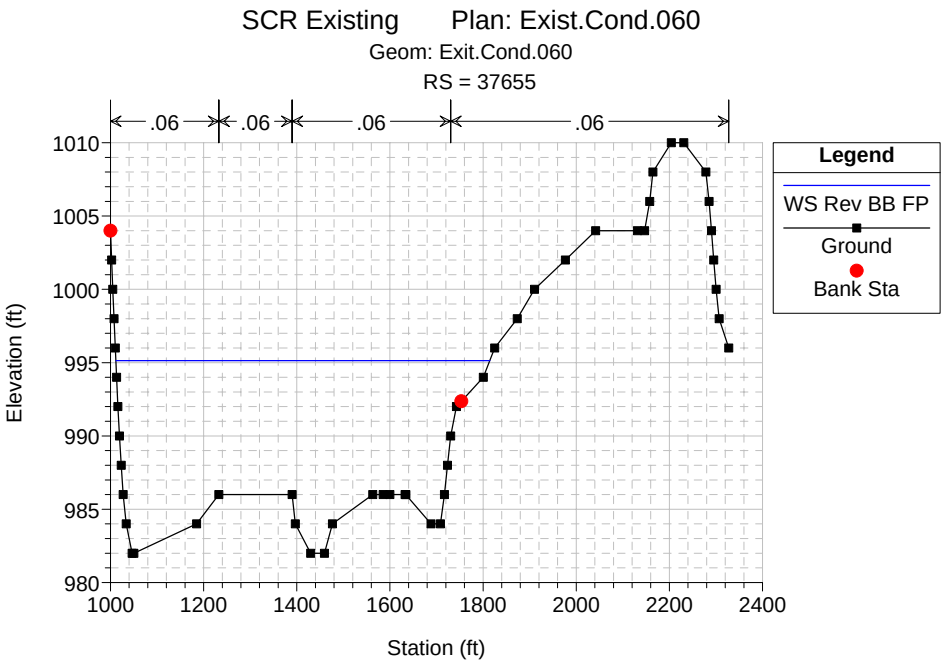
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

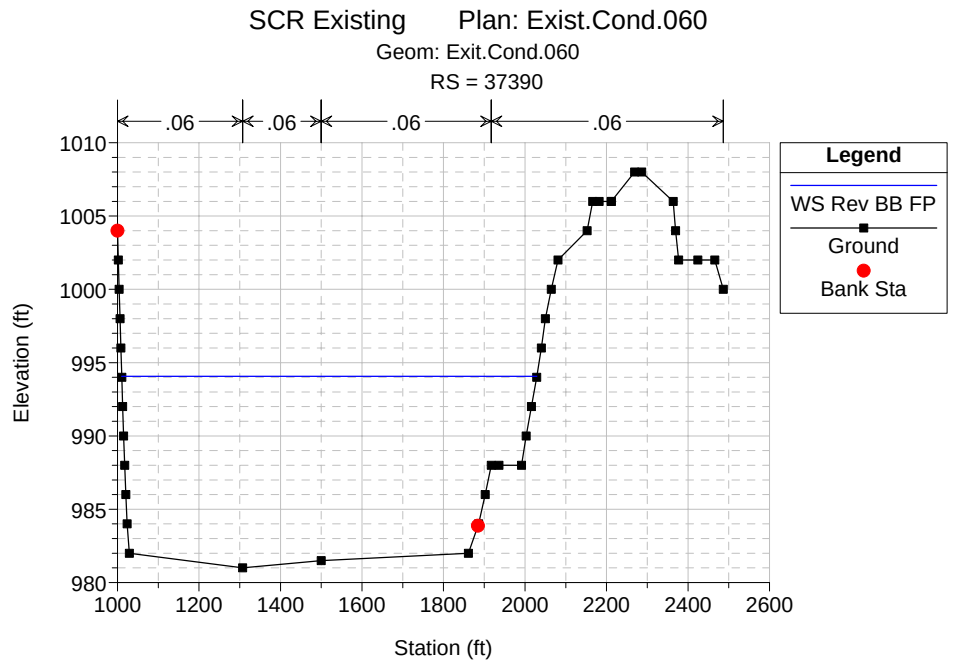

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 38475
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

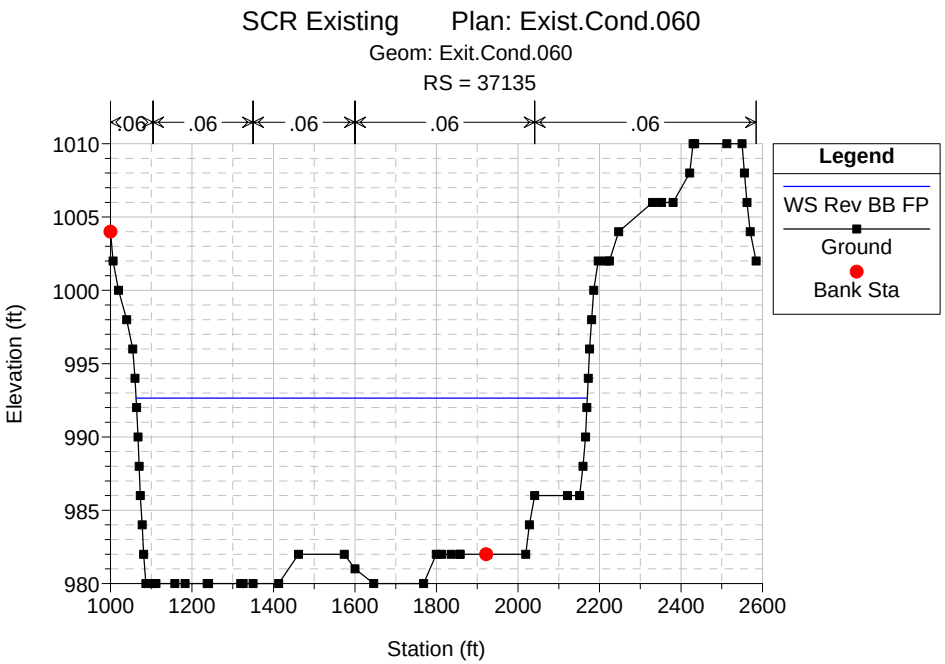

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 38300
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

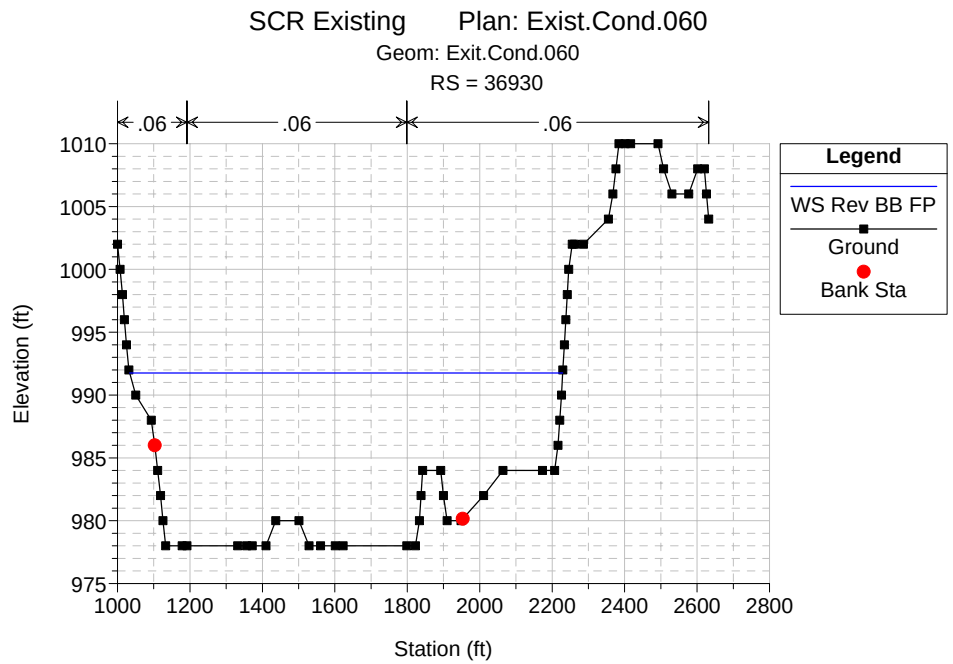

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 38065
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

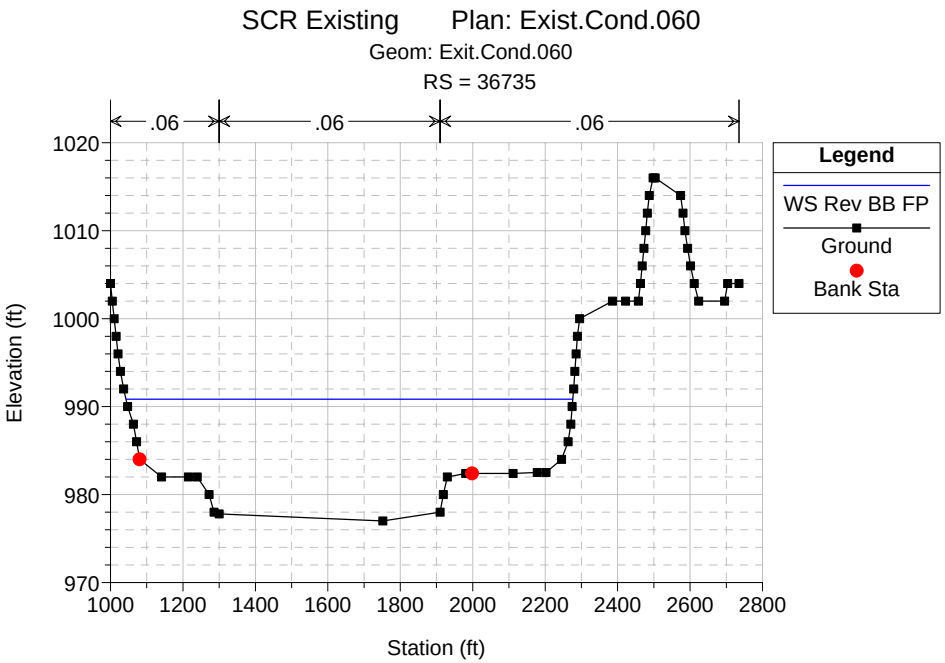

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 37810
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

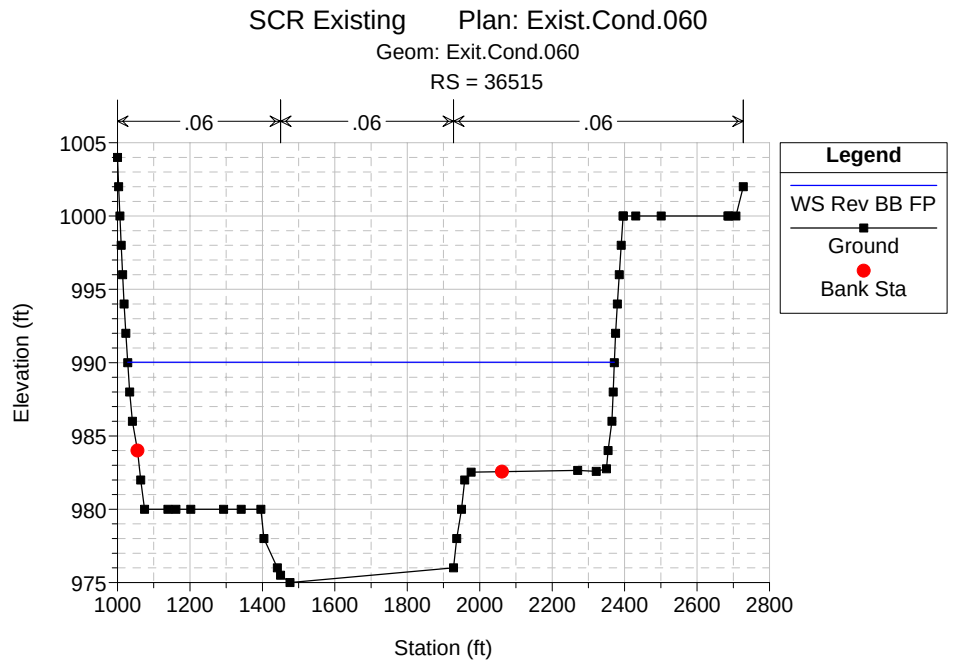

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 37655
.06
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

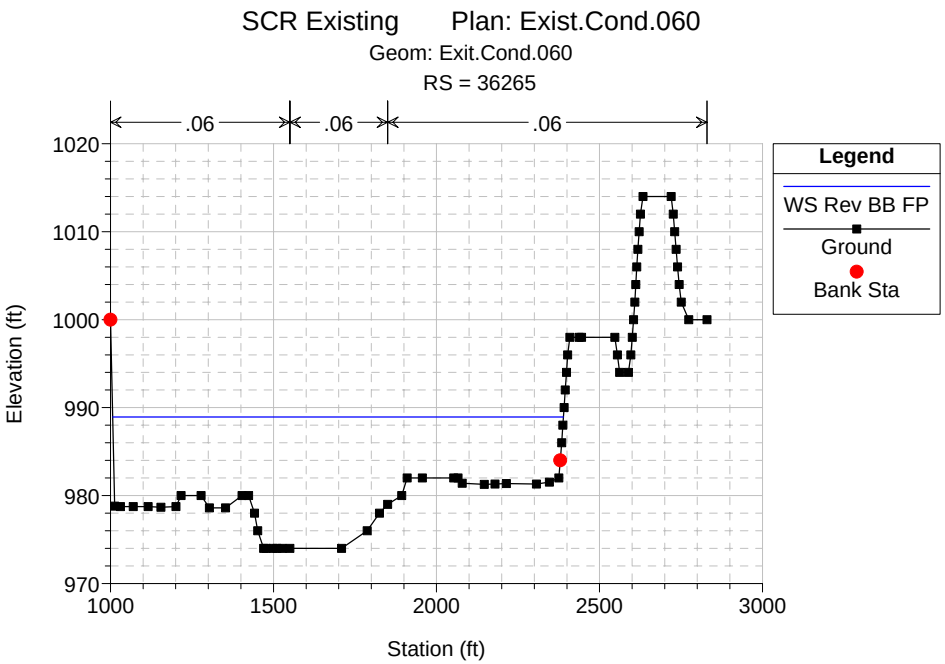

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 37390
.06
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

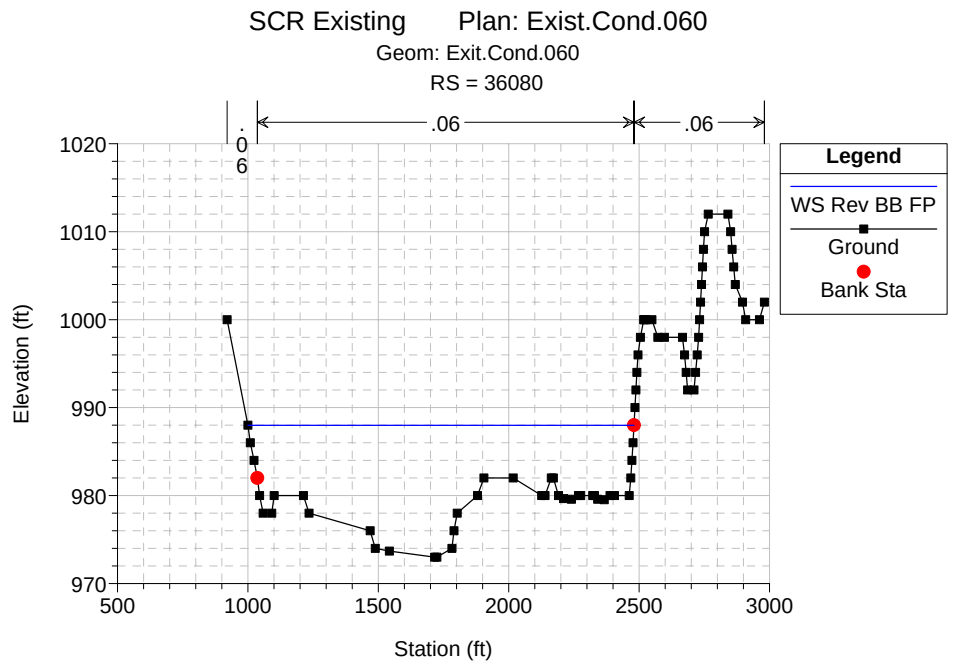

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 37135
.06
.06
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

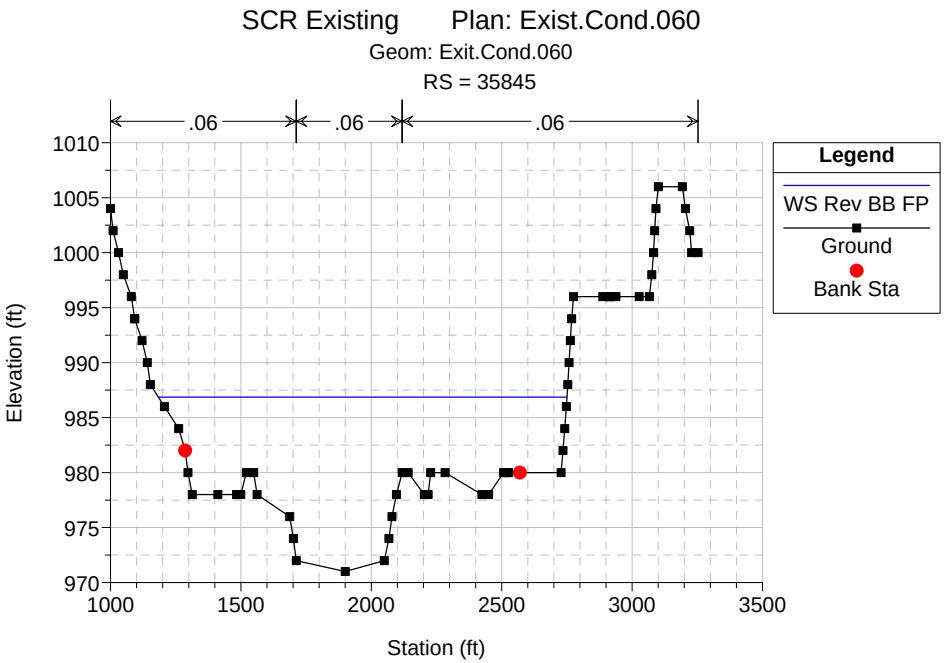

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 36930
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

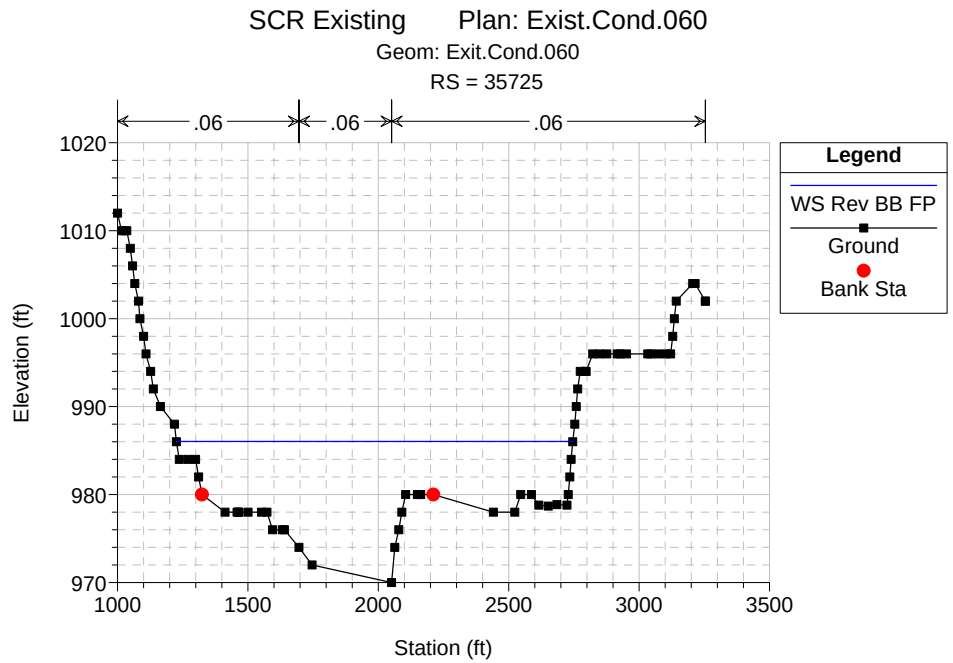

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 36735
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

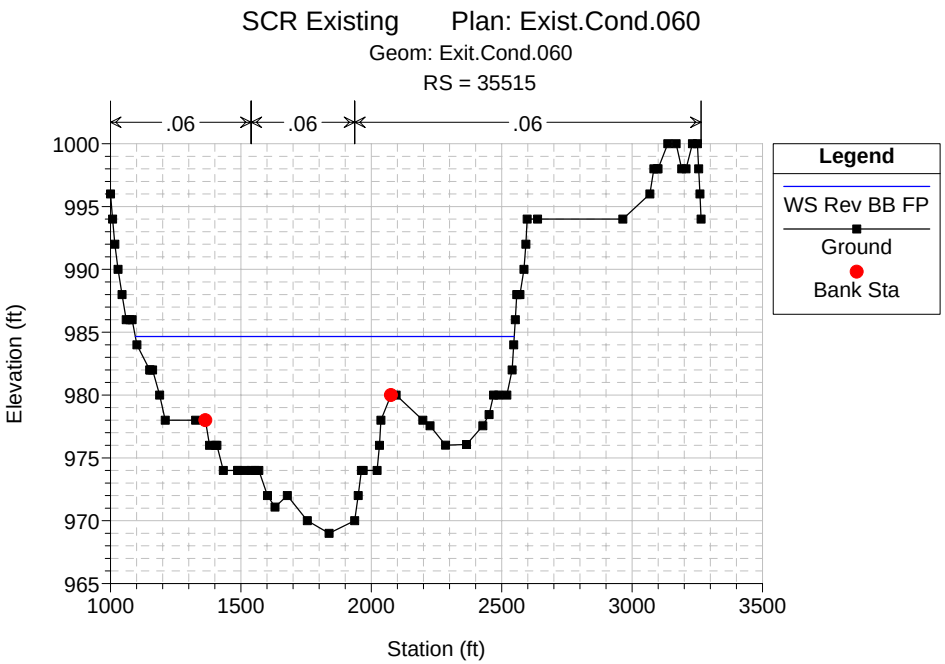

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 36515
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

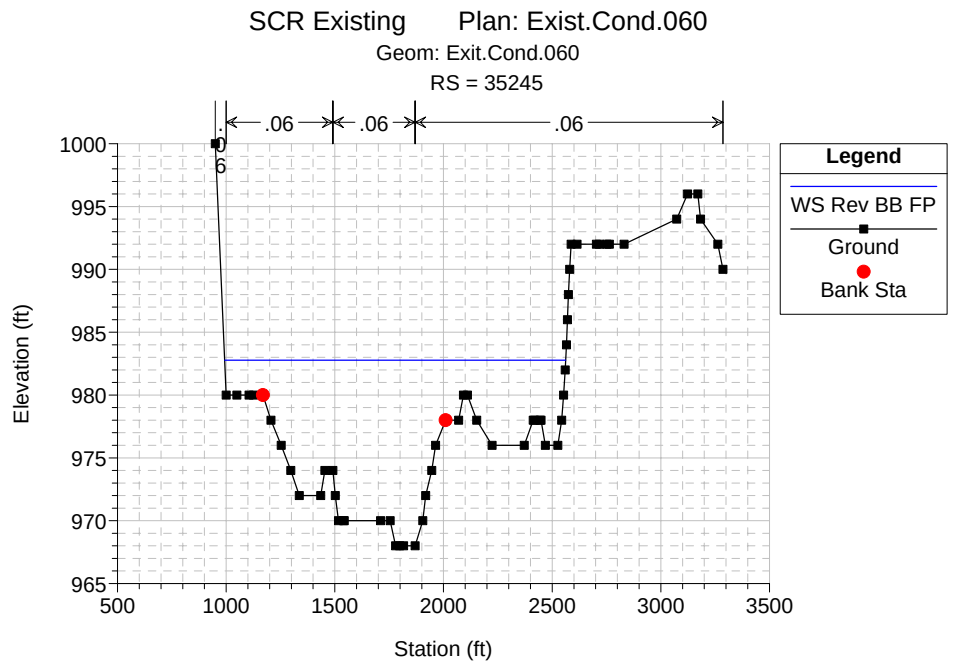

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 36265
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

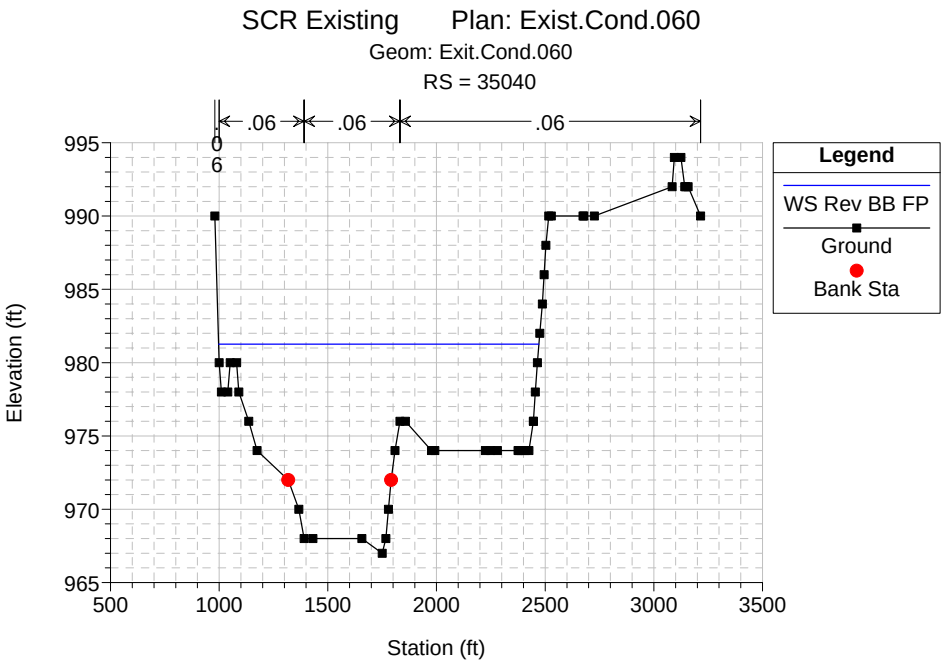

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 36080
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

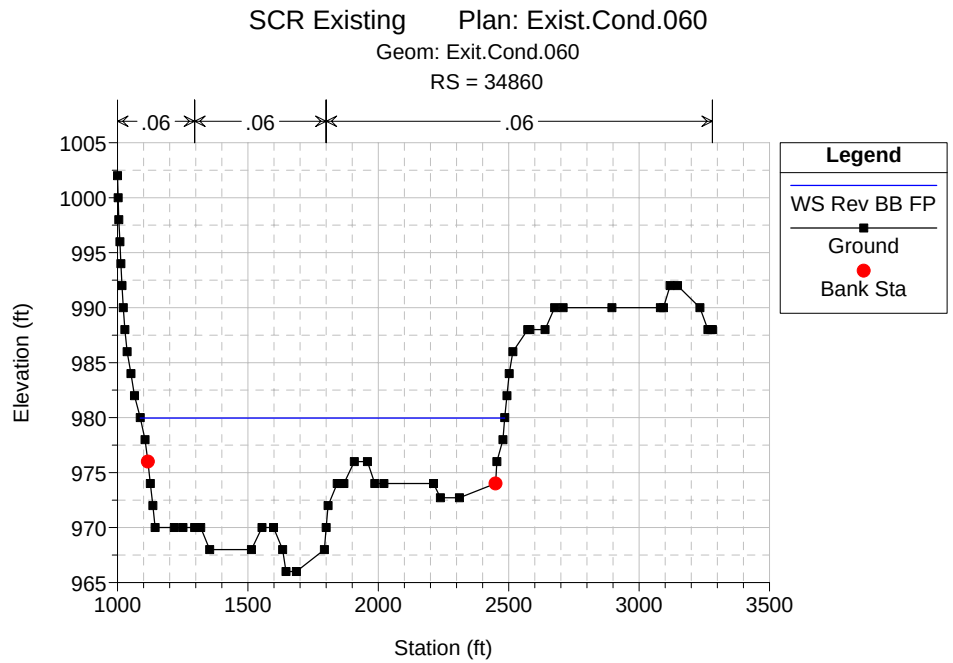

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 35845
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

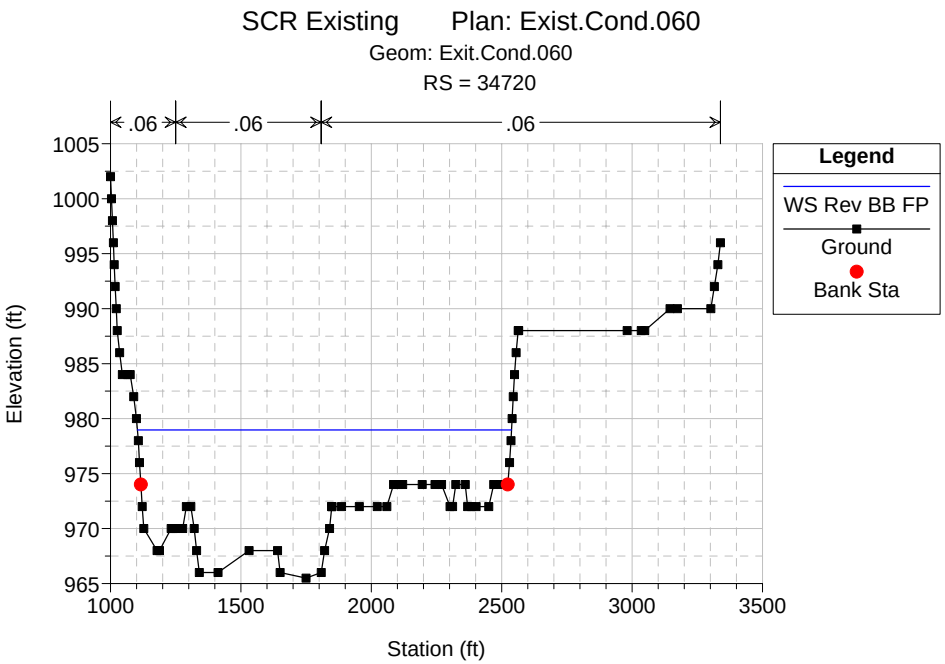

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 35725
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

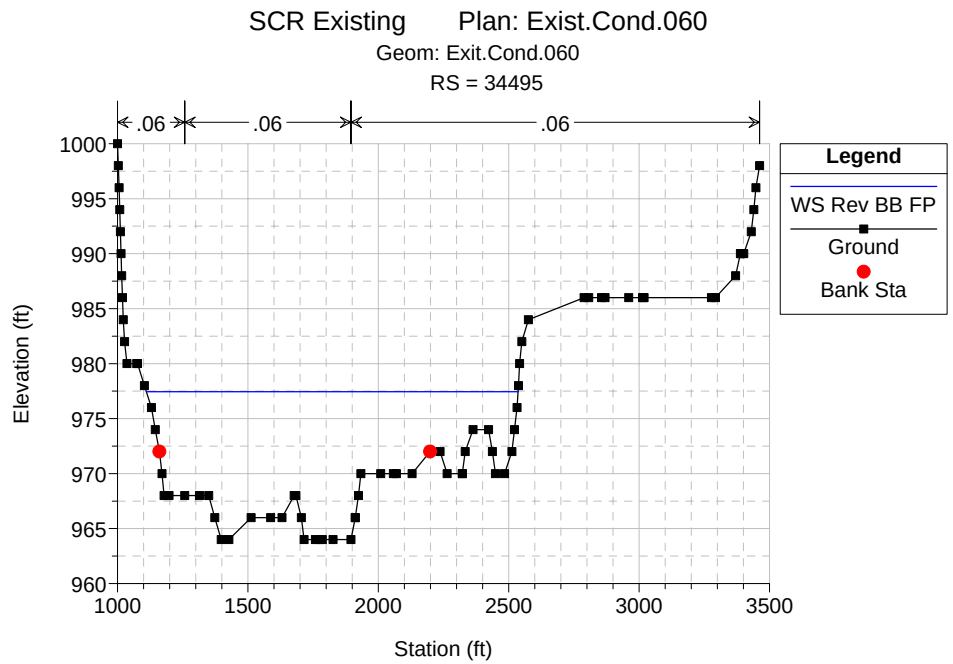

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 35515
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

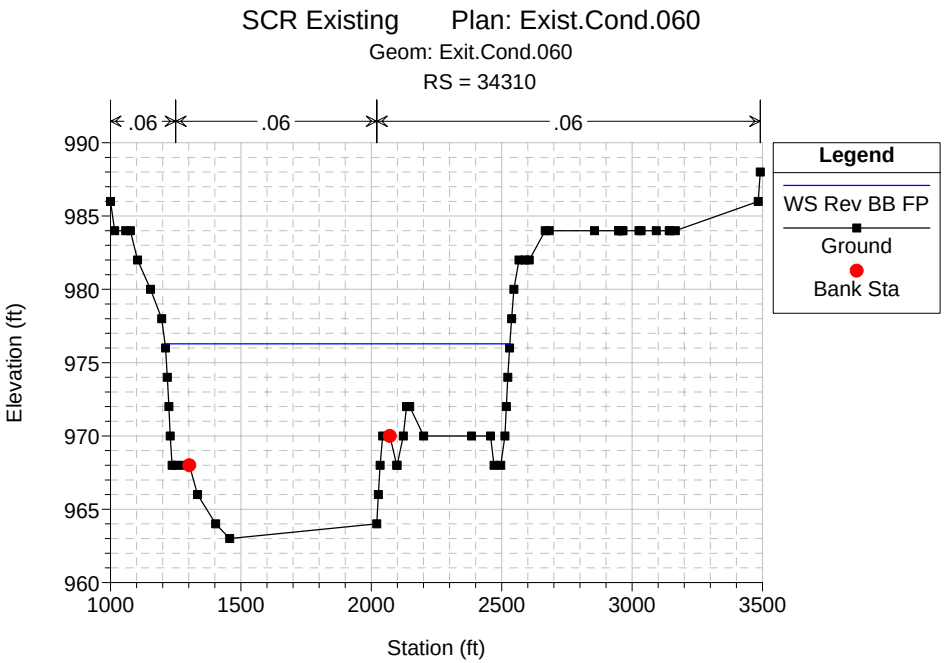

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 35245
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

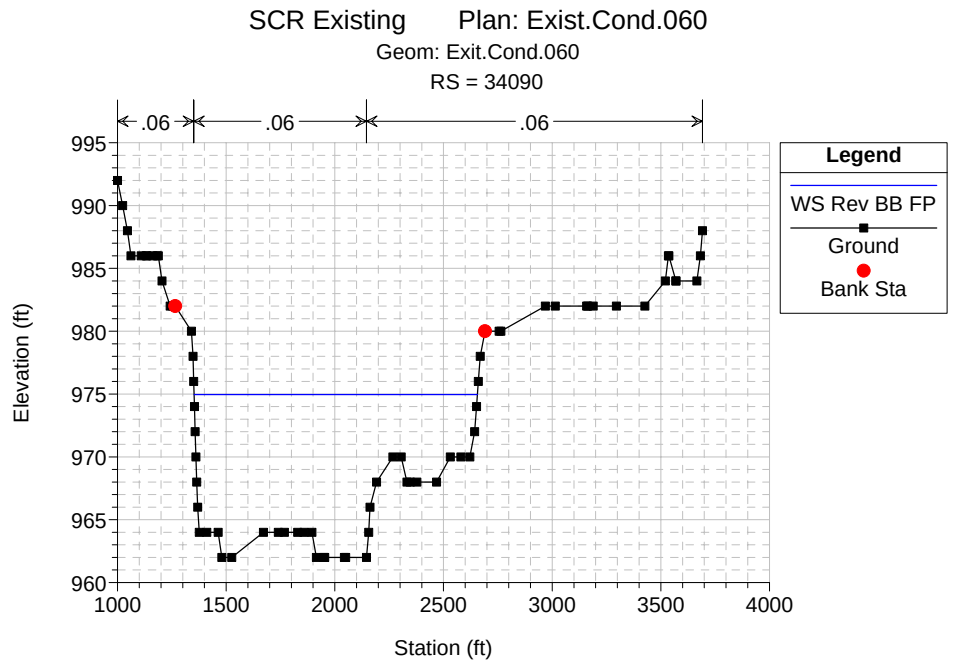

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 35040
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 34860
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 34720
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 34495
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 34310
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 34090
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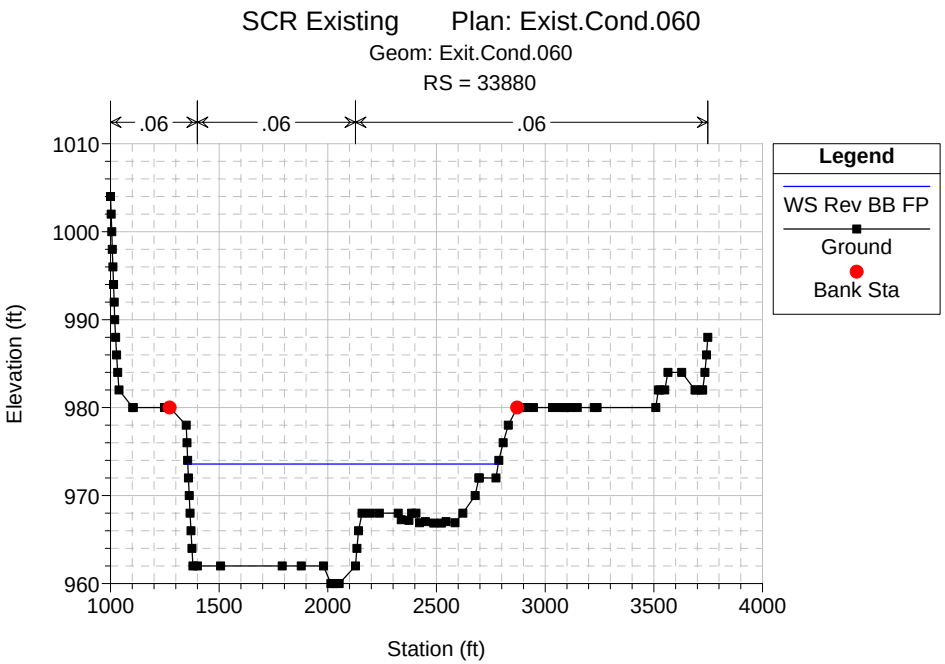
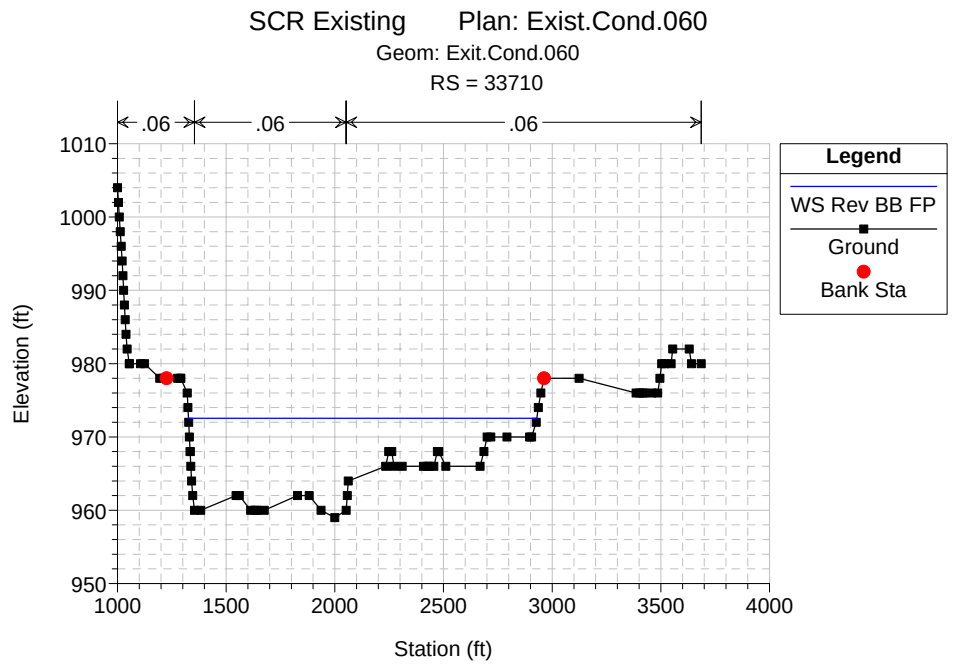
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 33880
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 33710
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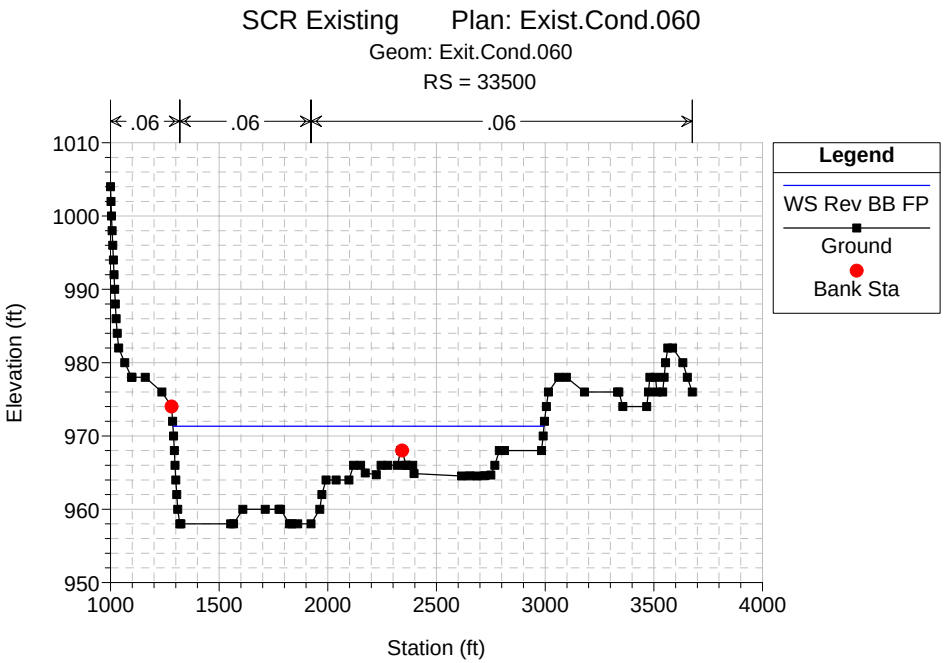
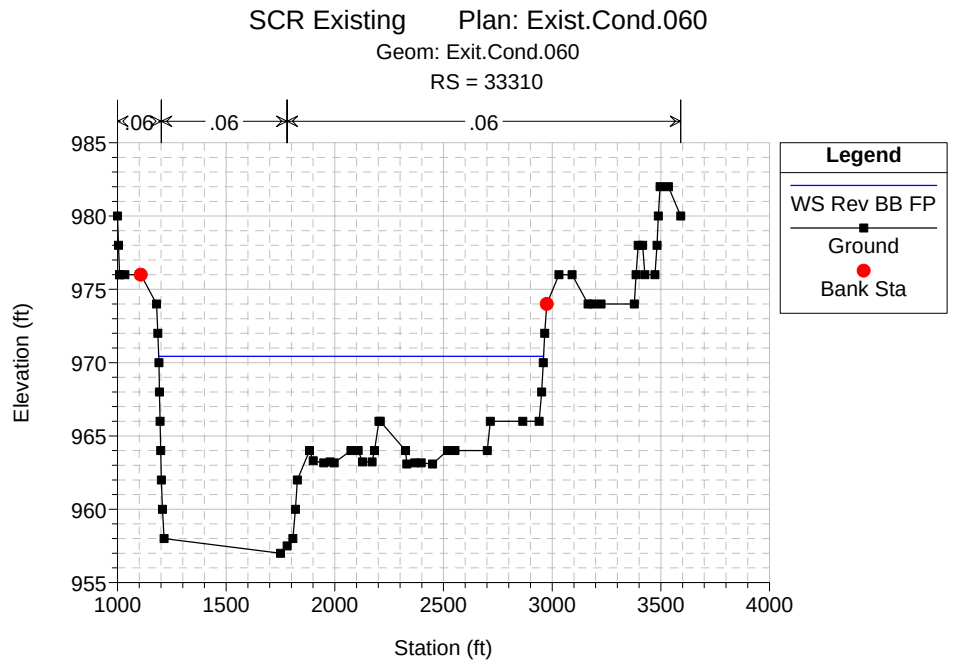
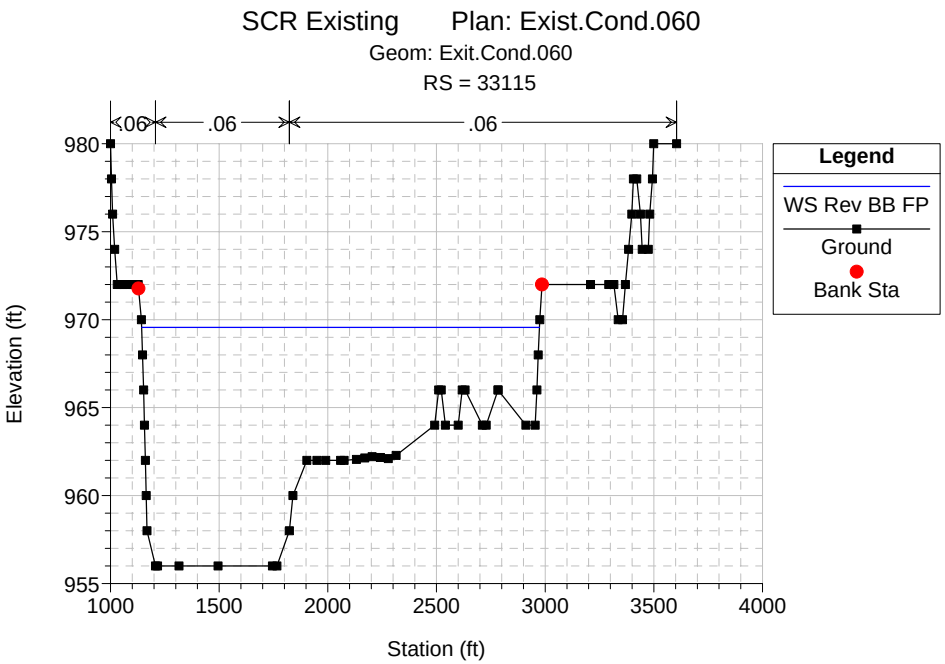
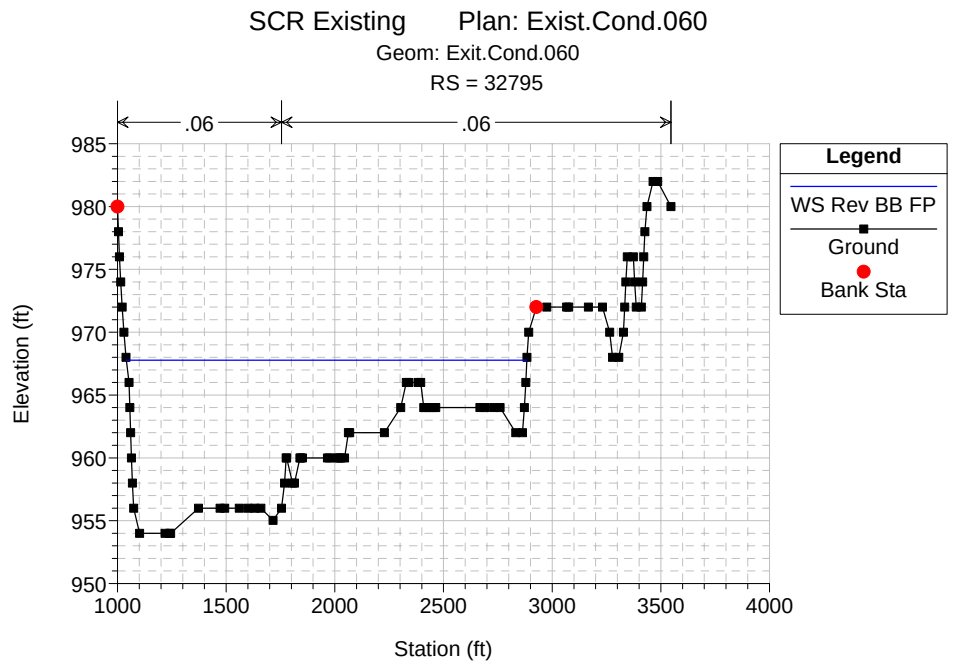
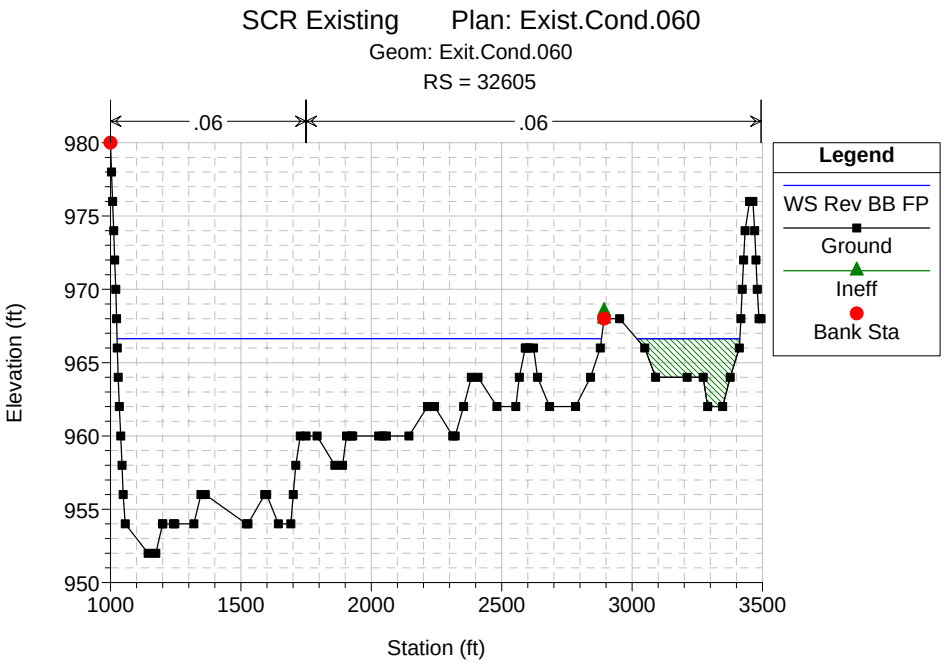
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

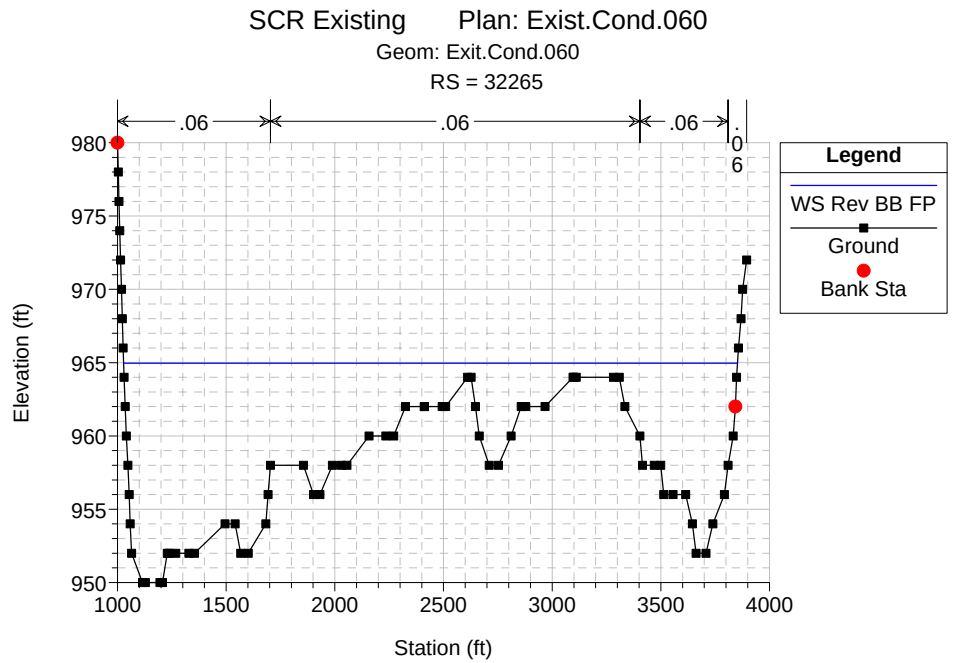

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 33500
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

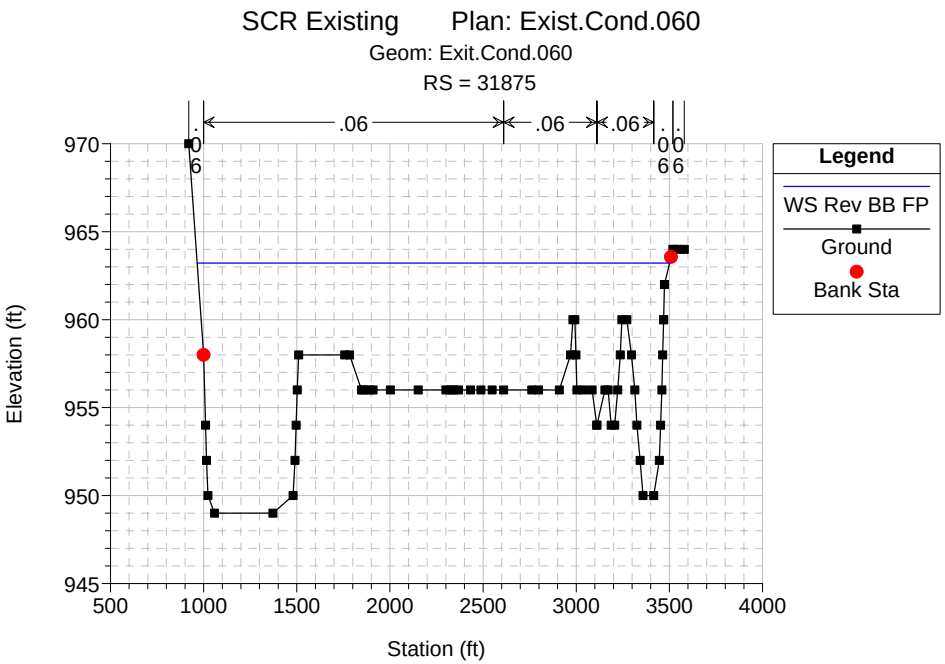

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 33310
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

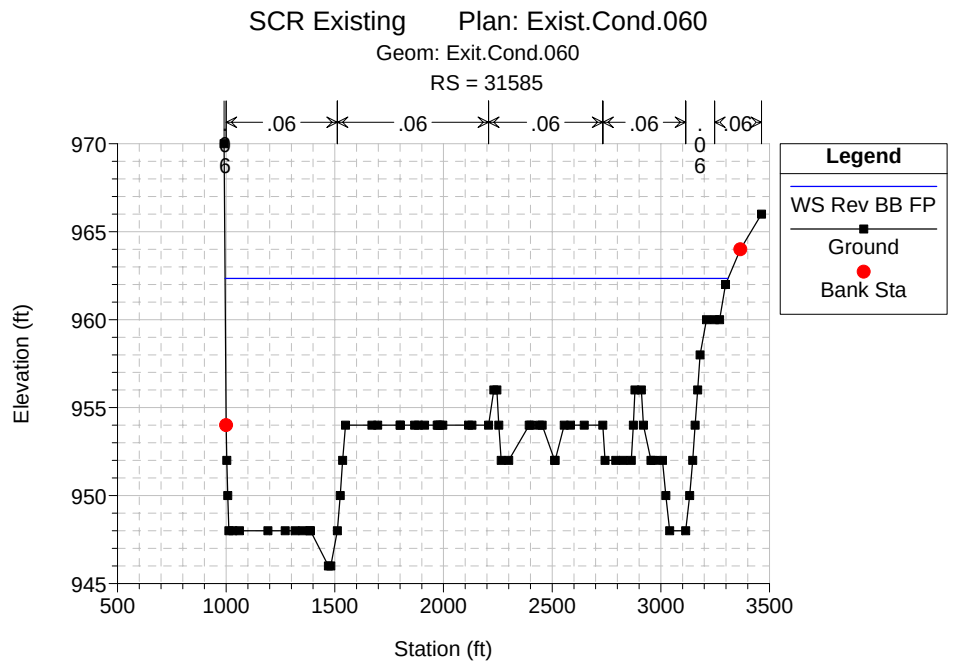

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 33115
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

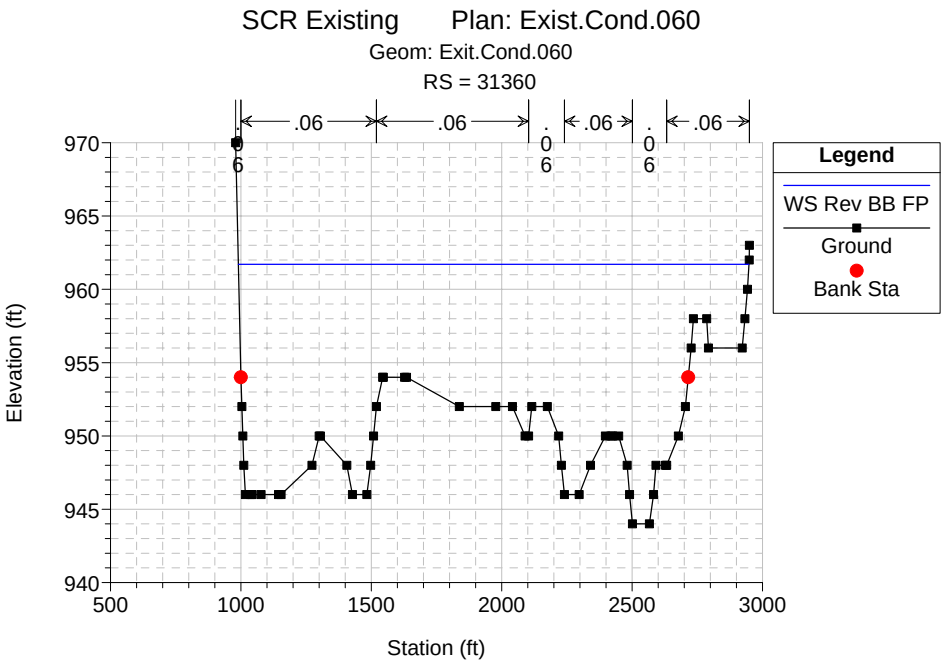

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 32795
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)

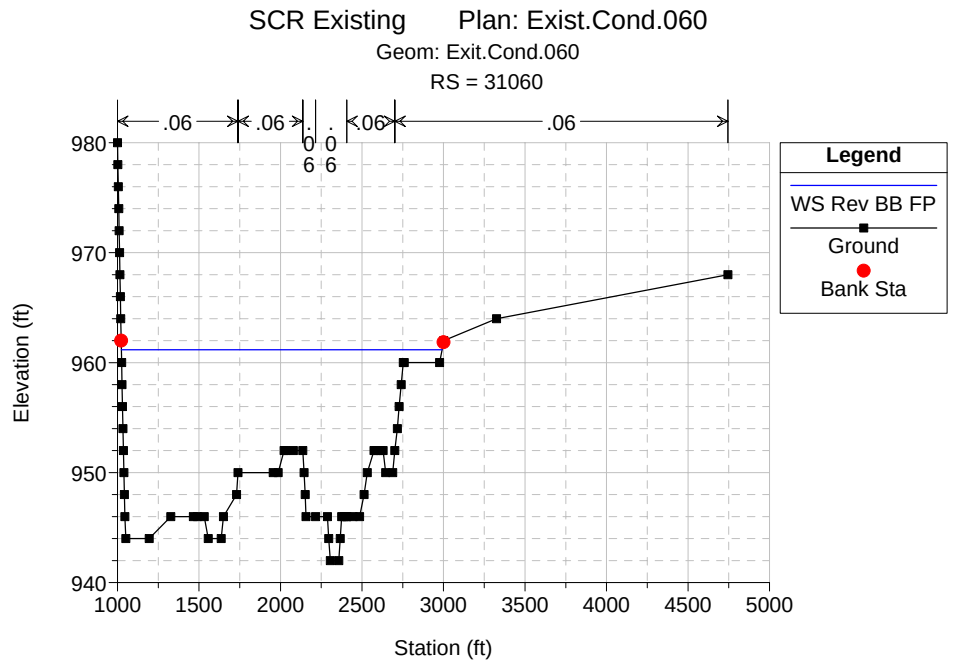

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 32605
.06
.06
Legend
WS Rev BB FP
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

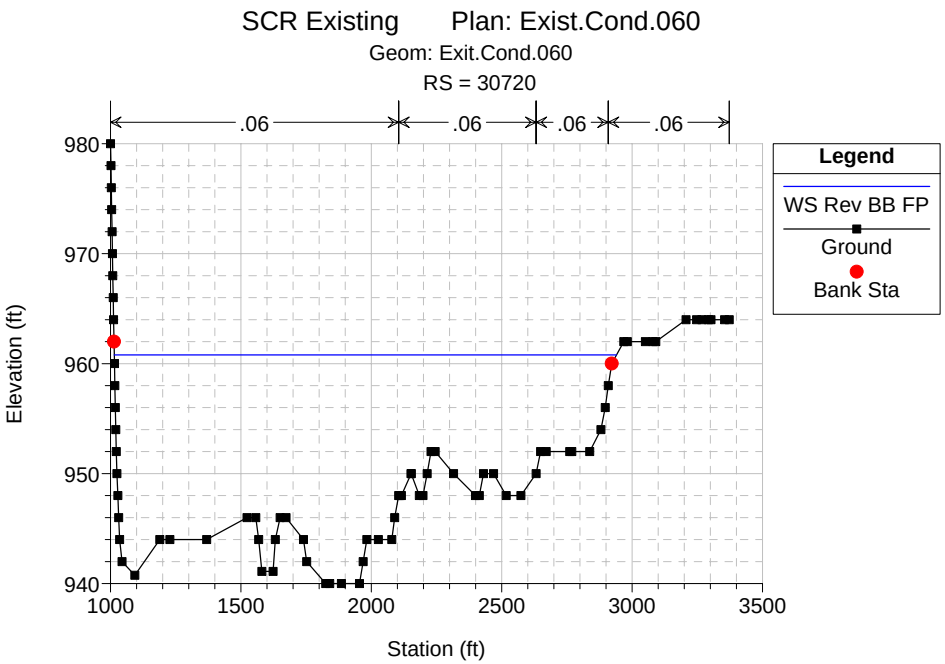

SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 32265
.06
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 31875
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 31585
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 31360
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 31060
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 30720
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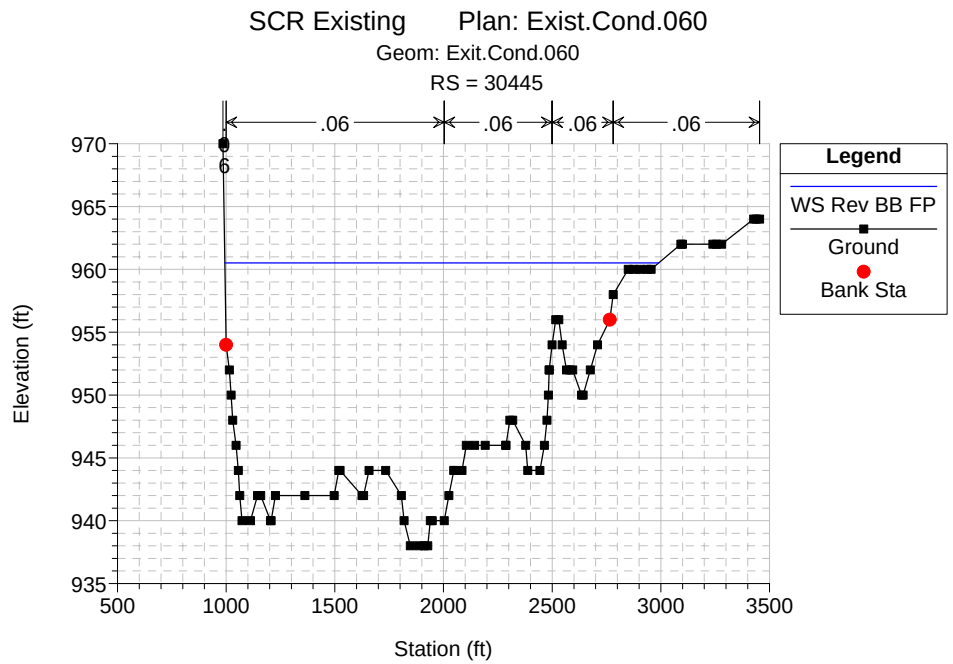
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 30445
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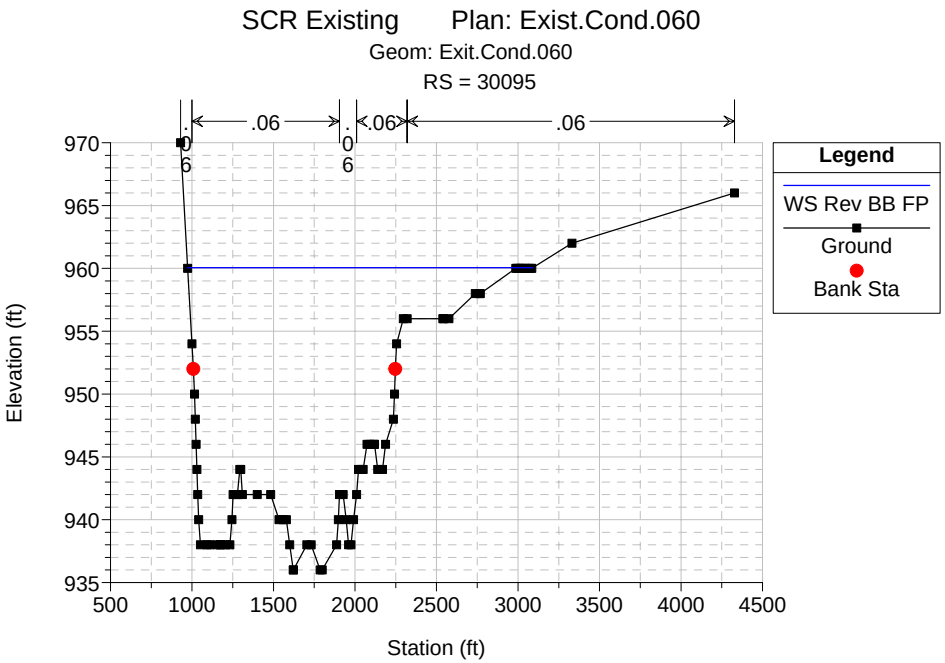
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 30095
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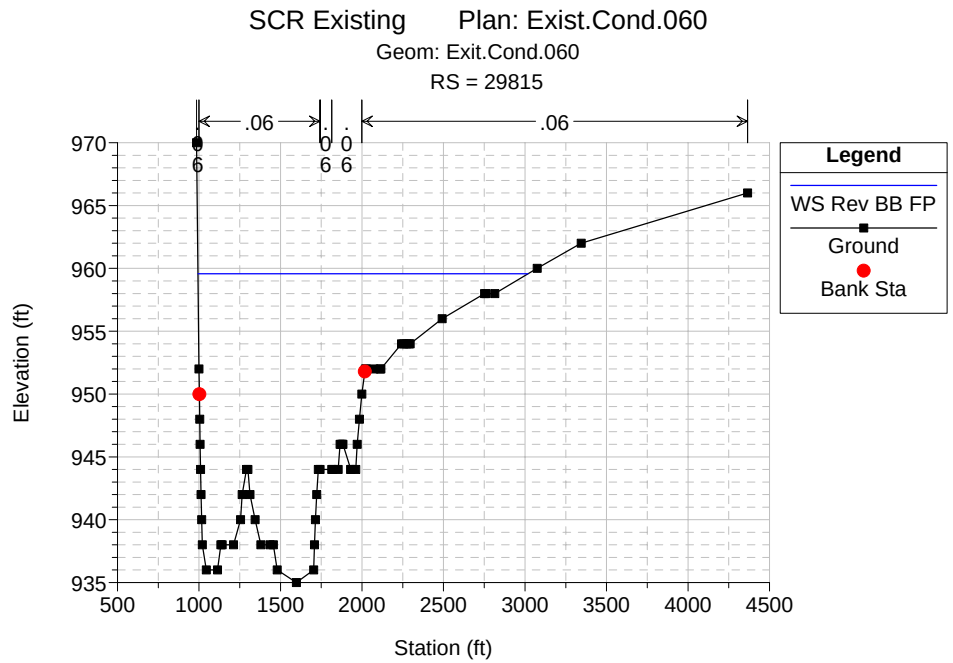
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 29815
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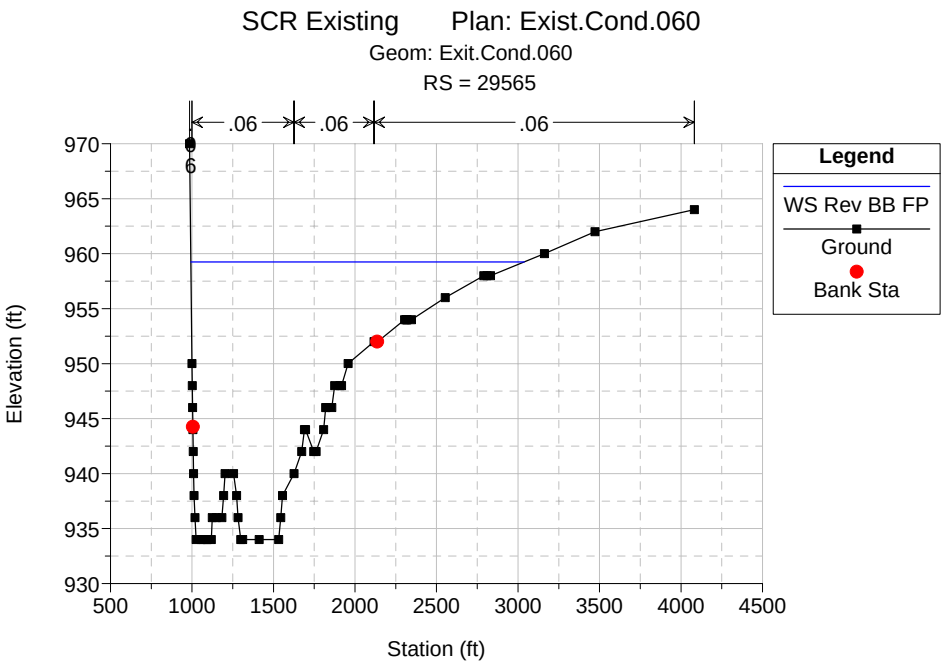
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 29565
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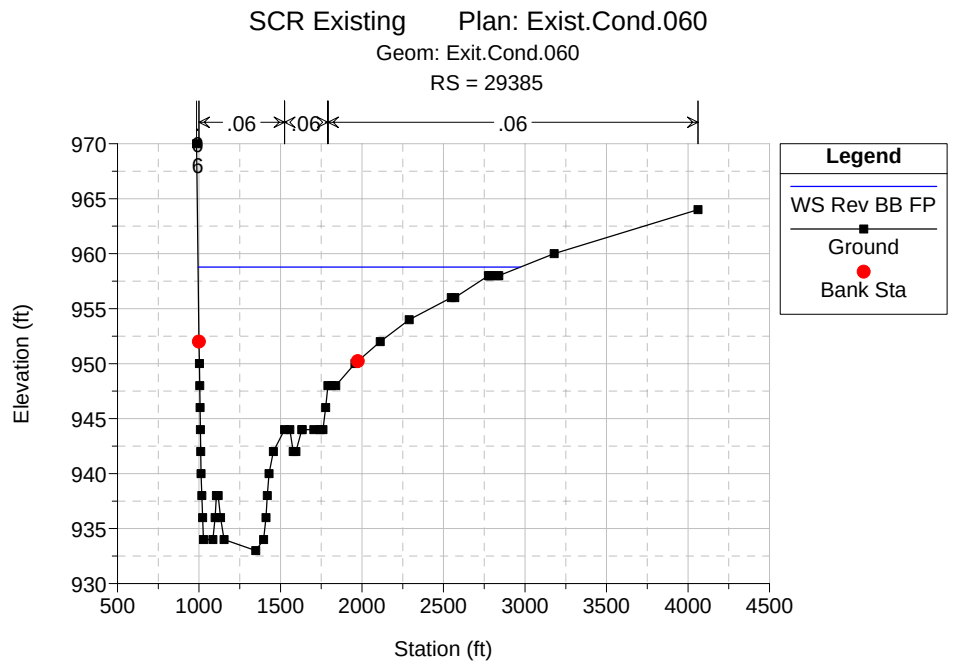
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 29385
.06
.06
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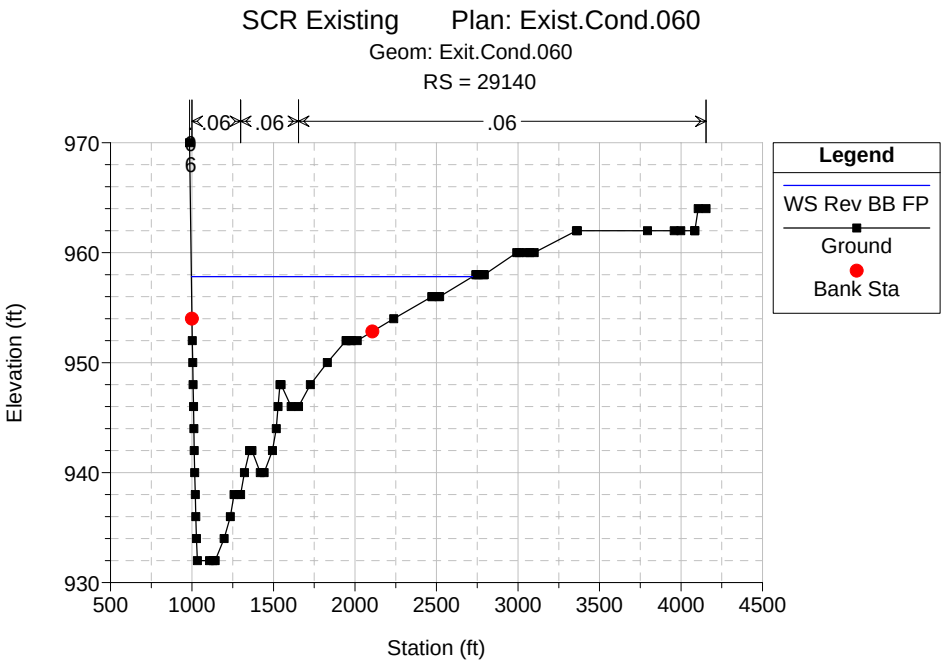
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 29140
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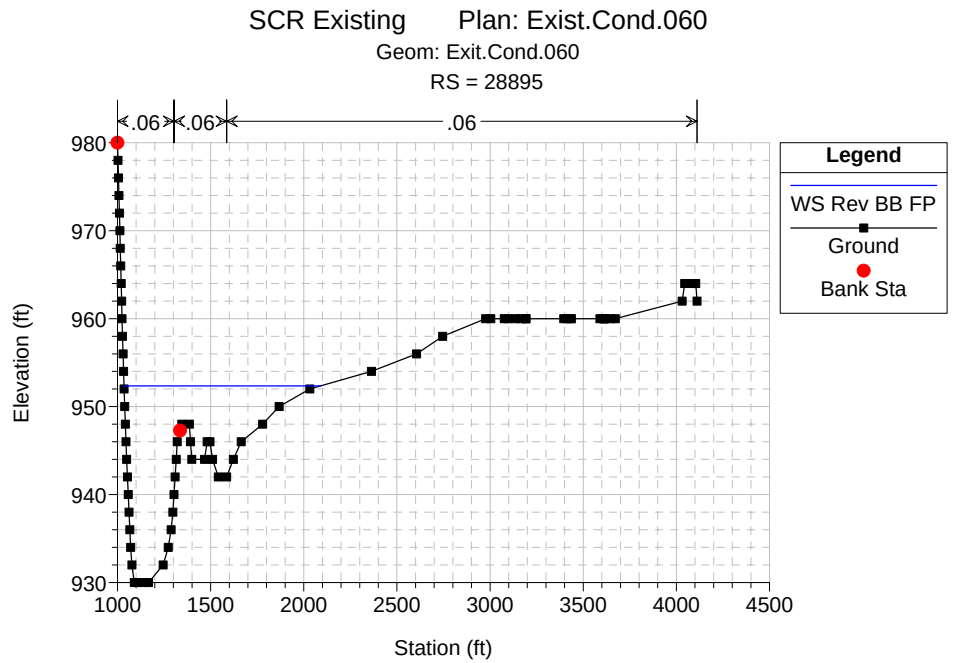
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 28895
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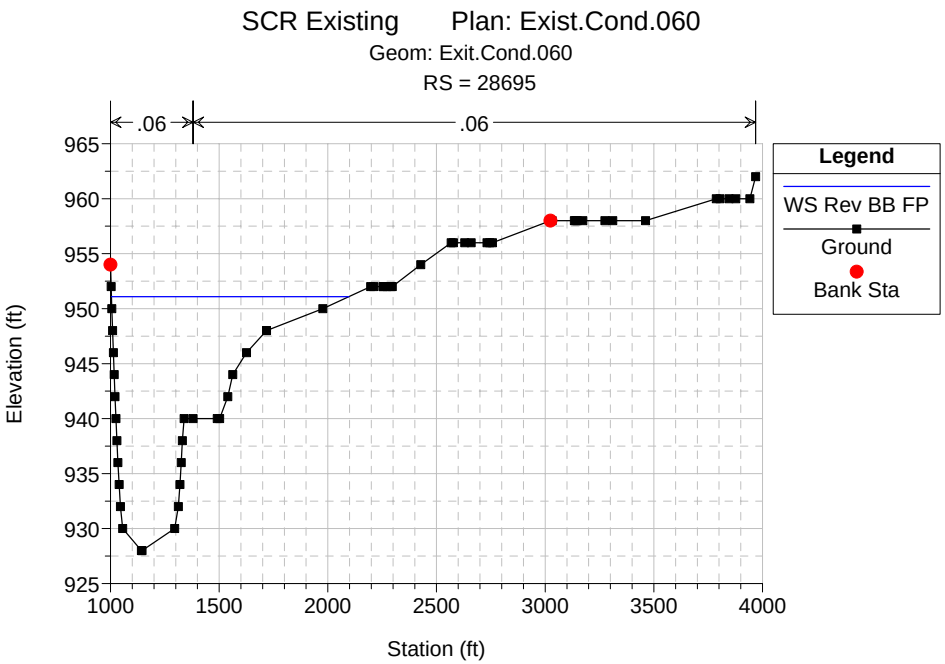
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 28695
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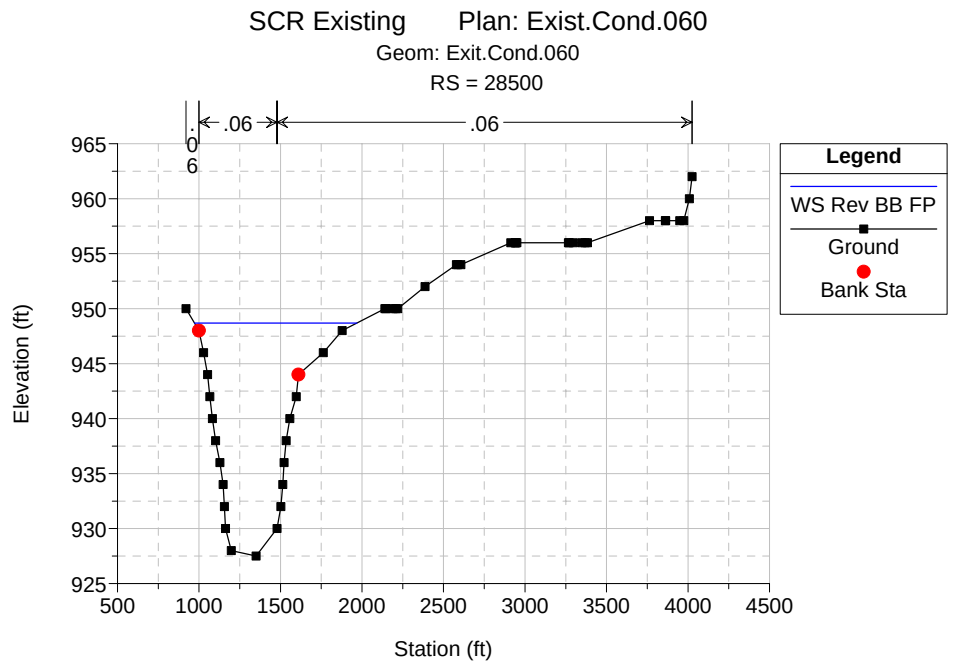
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 28500
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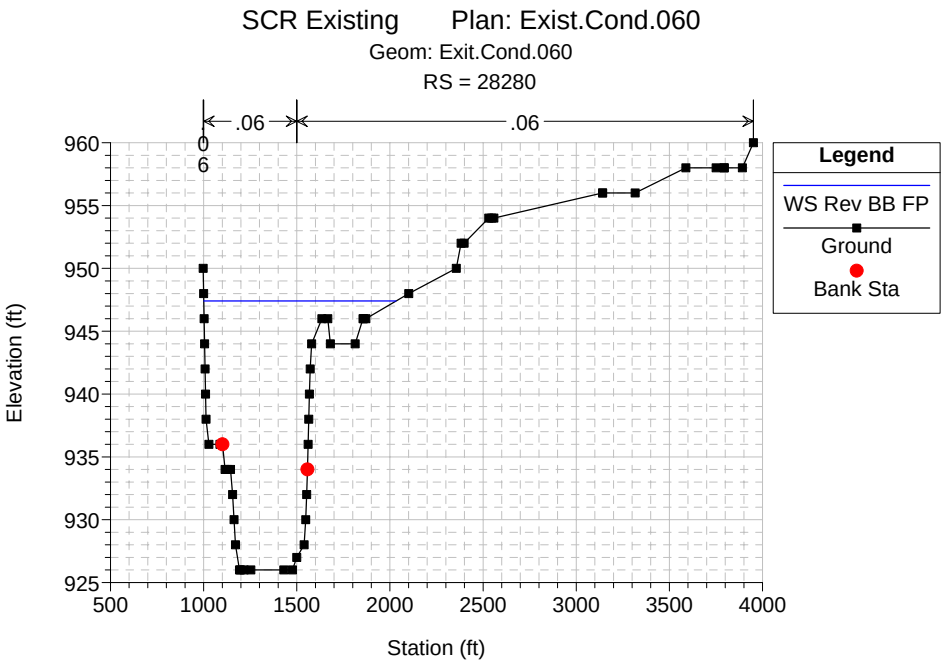
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 28280
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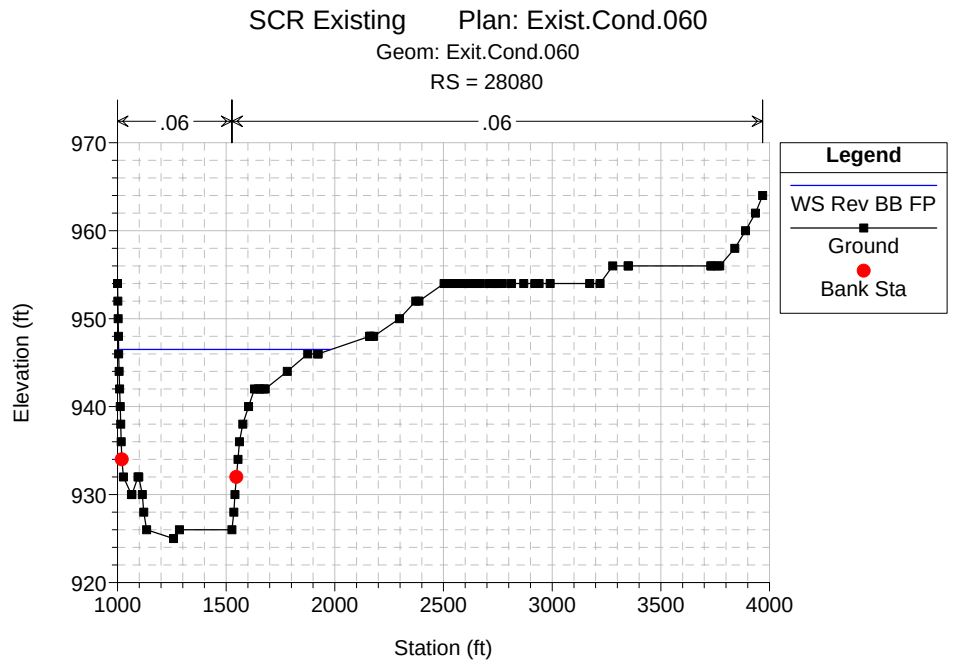
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 28080
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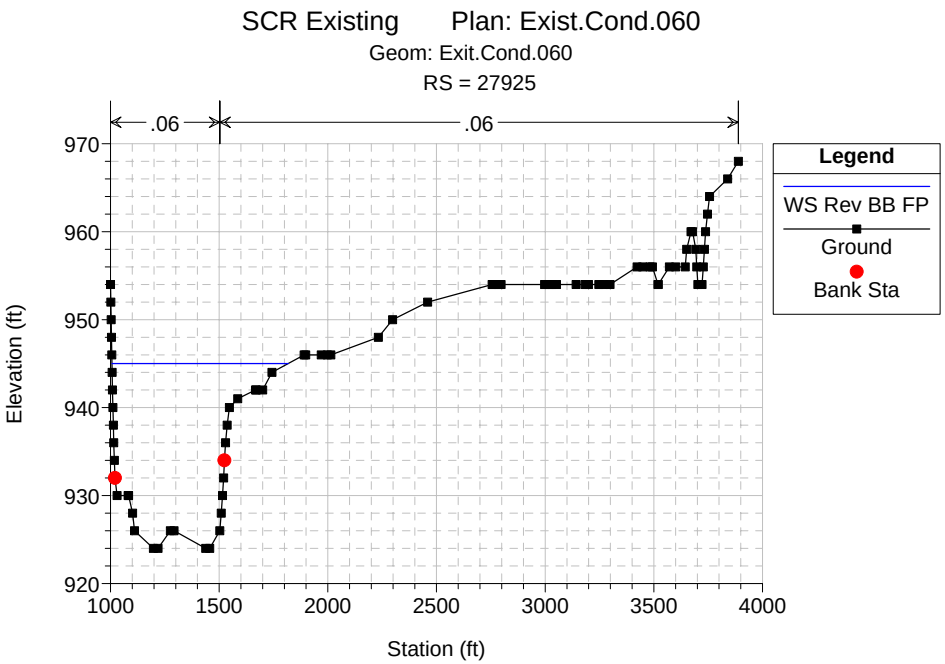
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 27925
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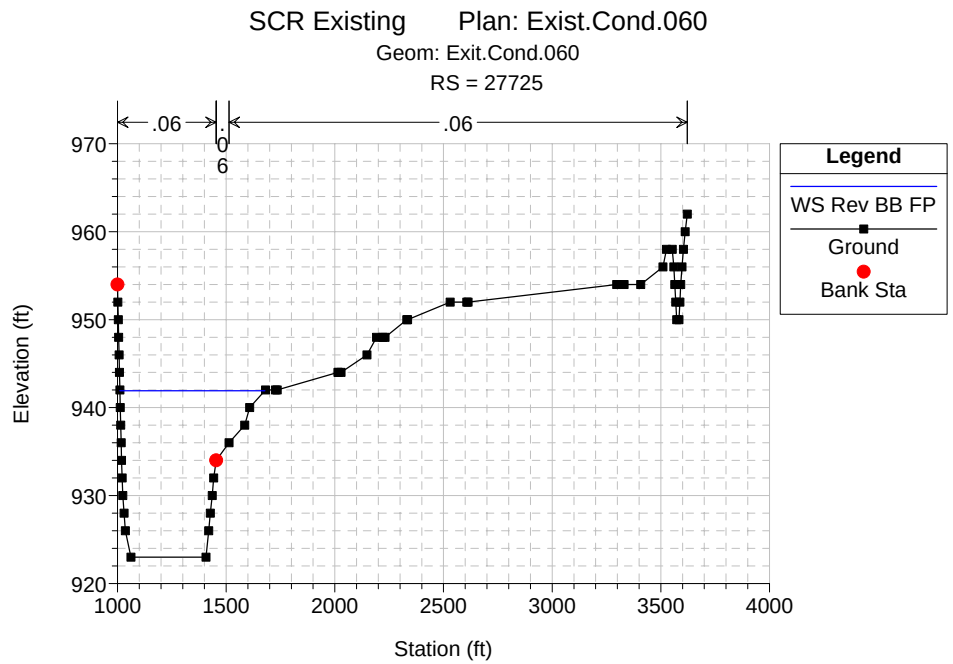
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 27725
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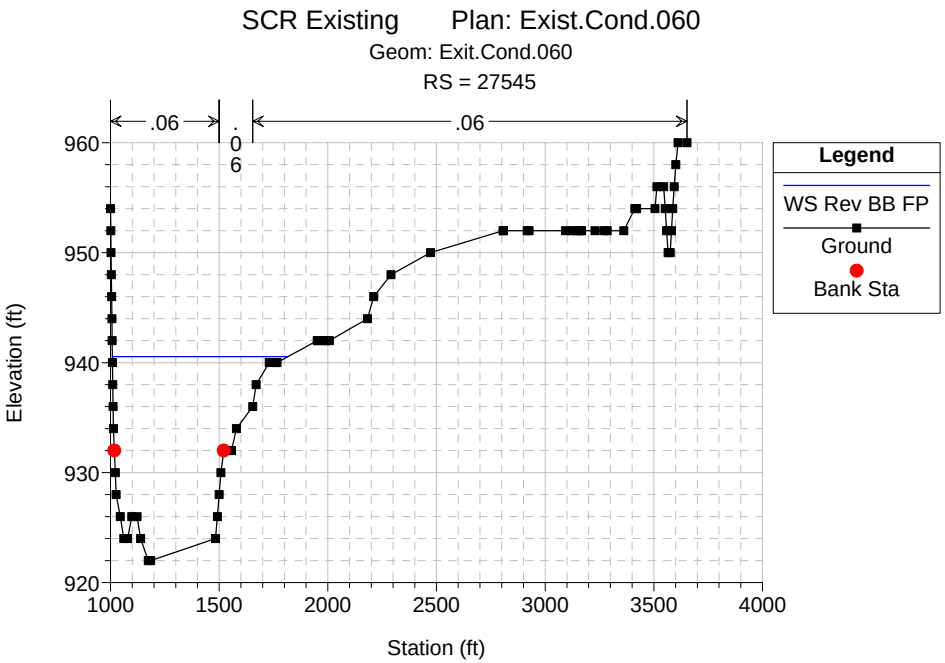
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 27545
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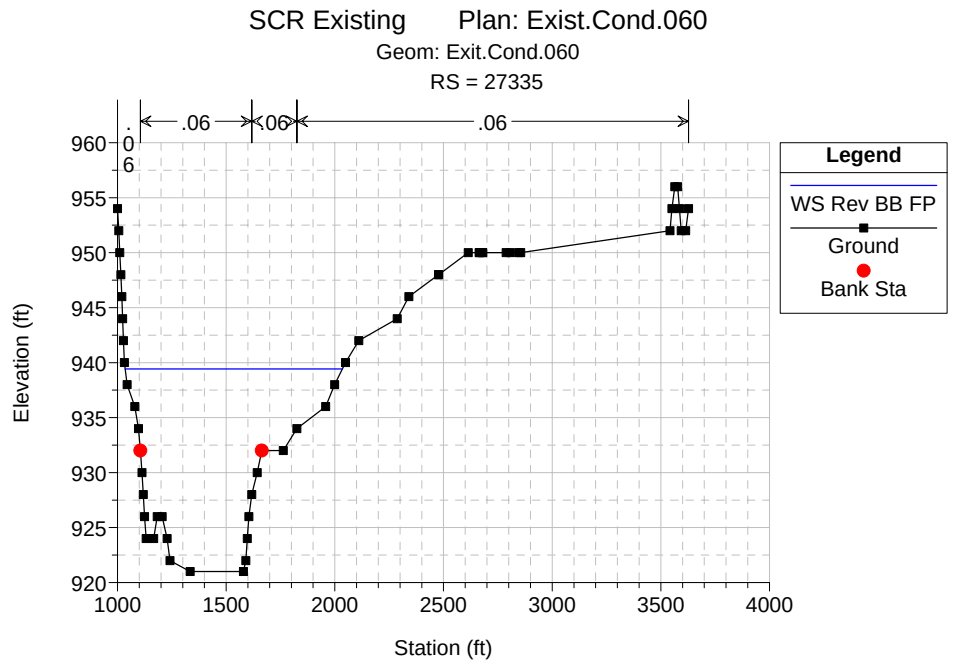
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 27335
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.06
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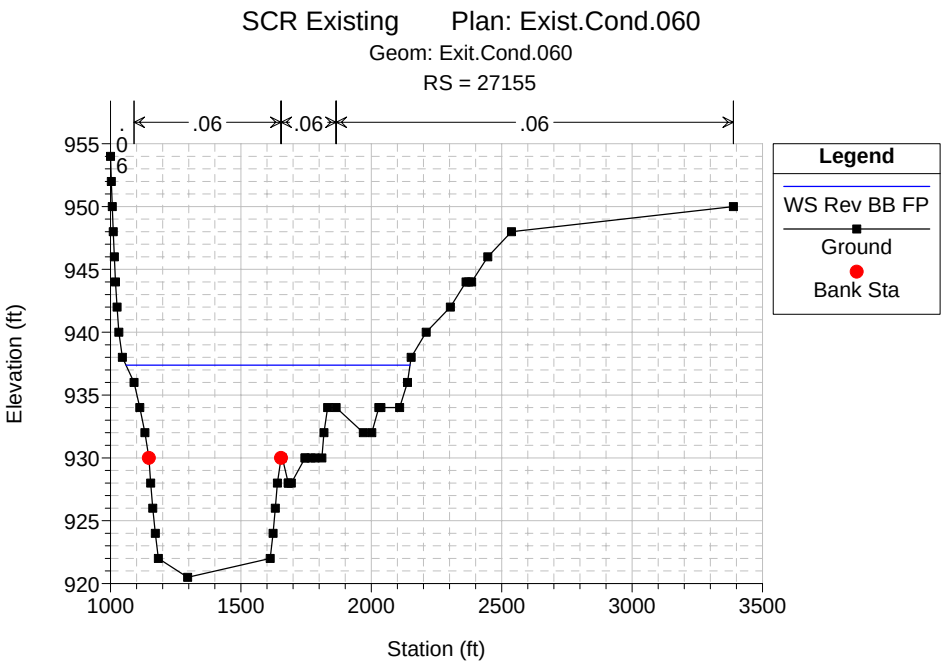
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 27155
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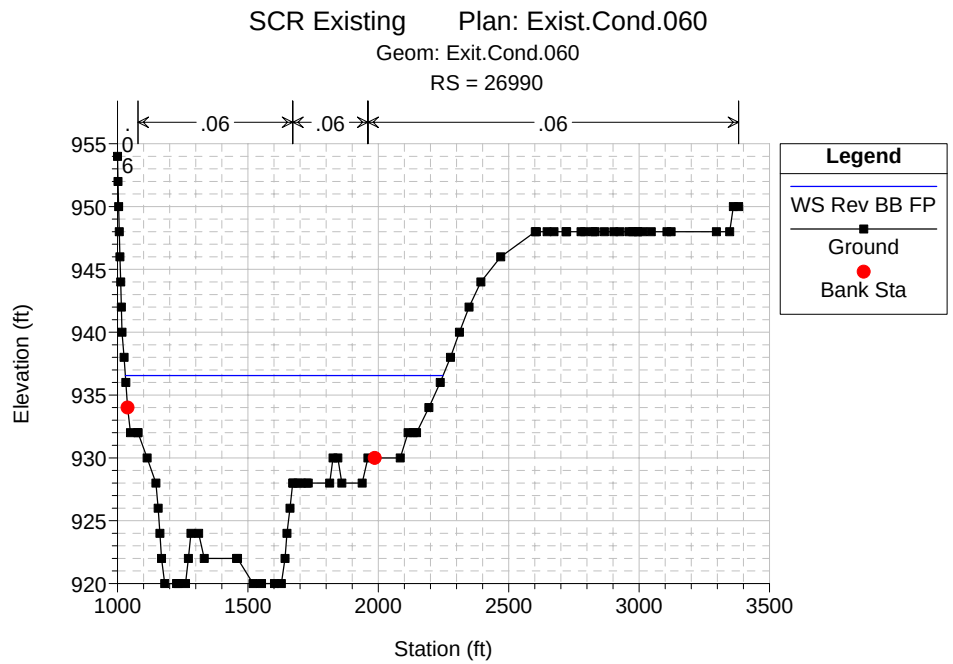
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 26990
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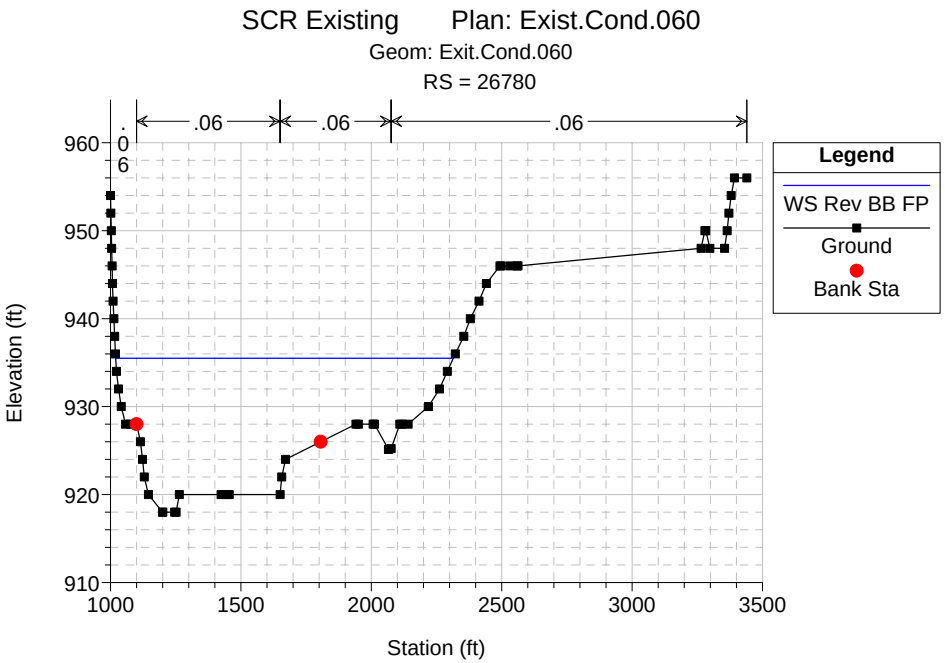
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 26780
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.06
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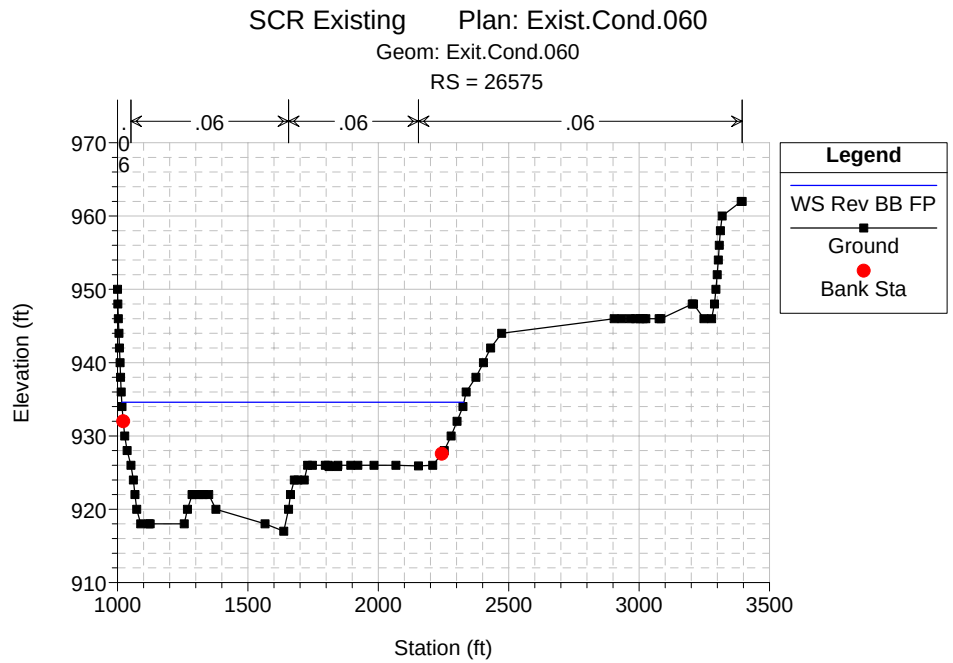
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 26575
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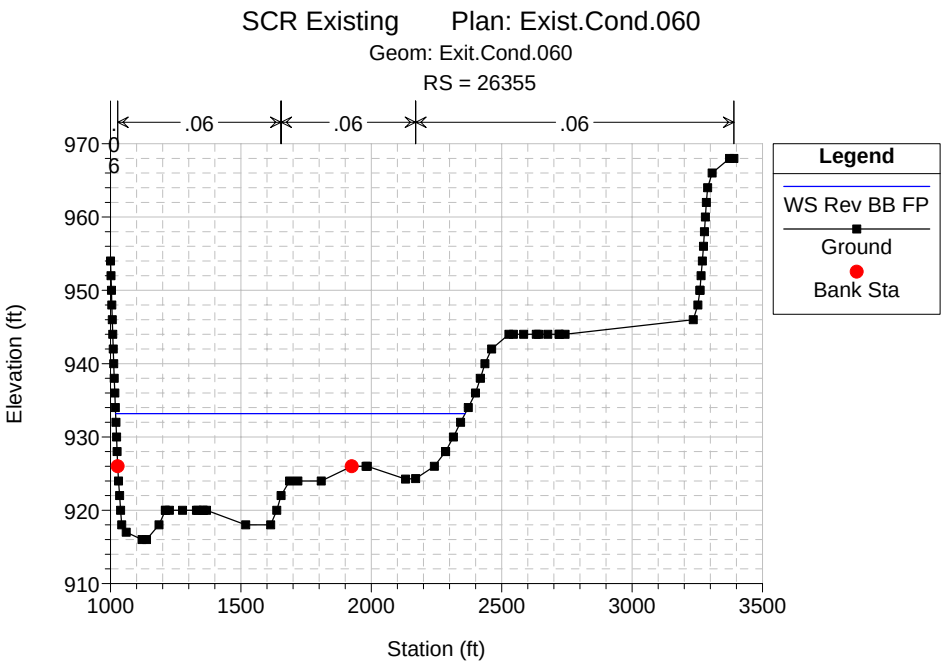
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 26355
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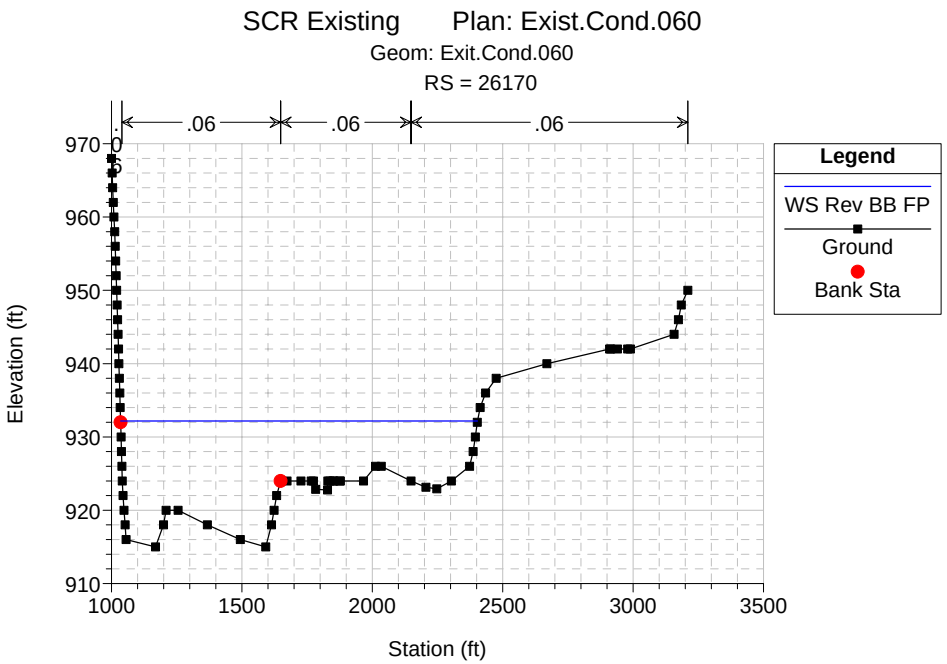
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 26170
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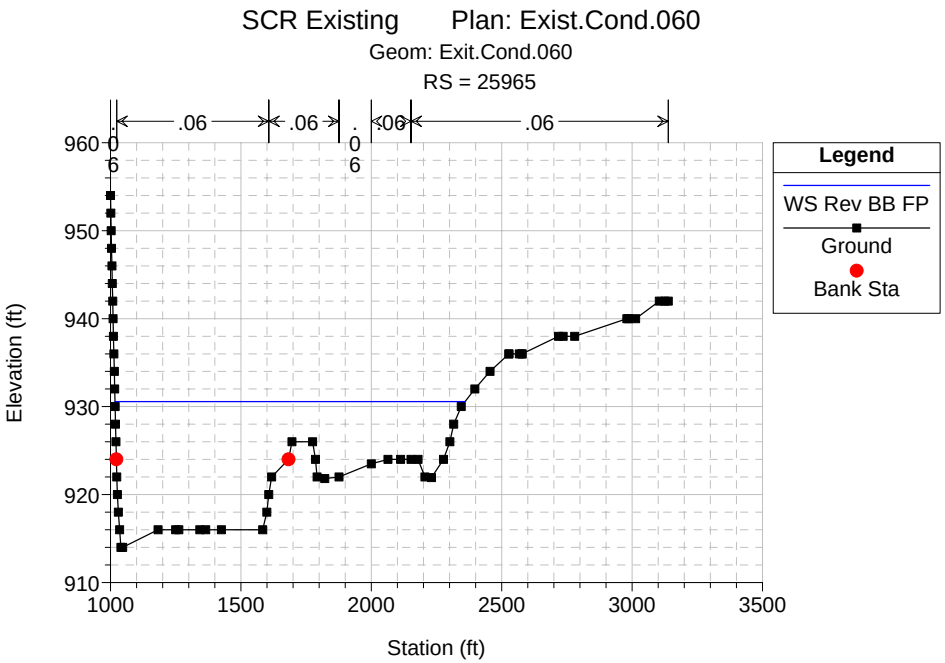
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 25965
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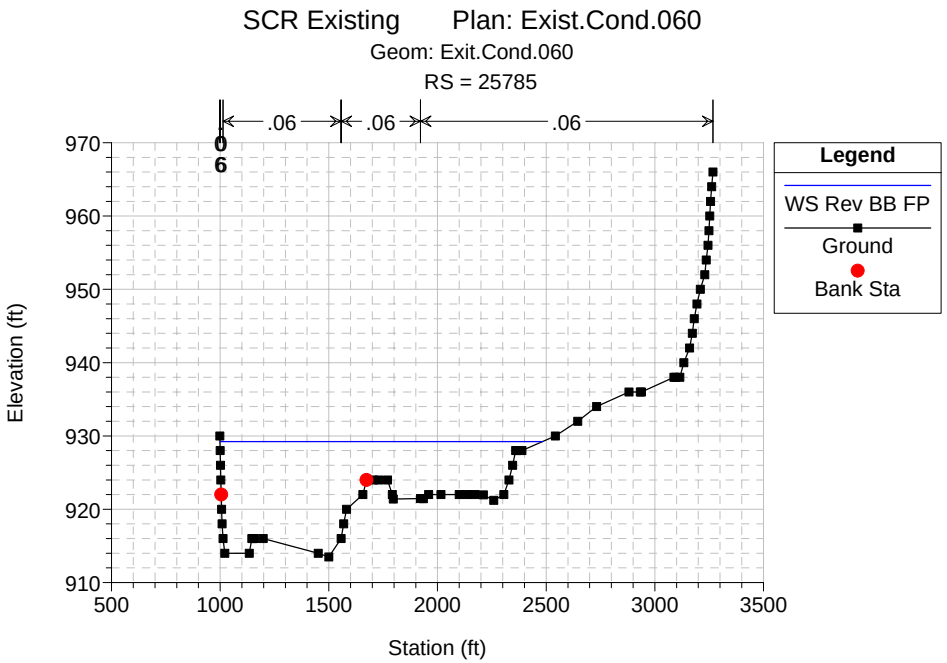
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 25785
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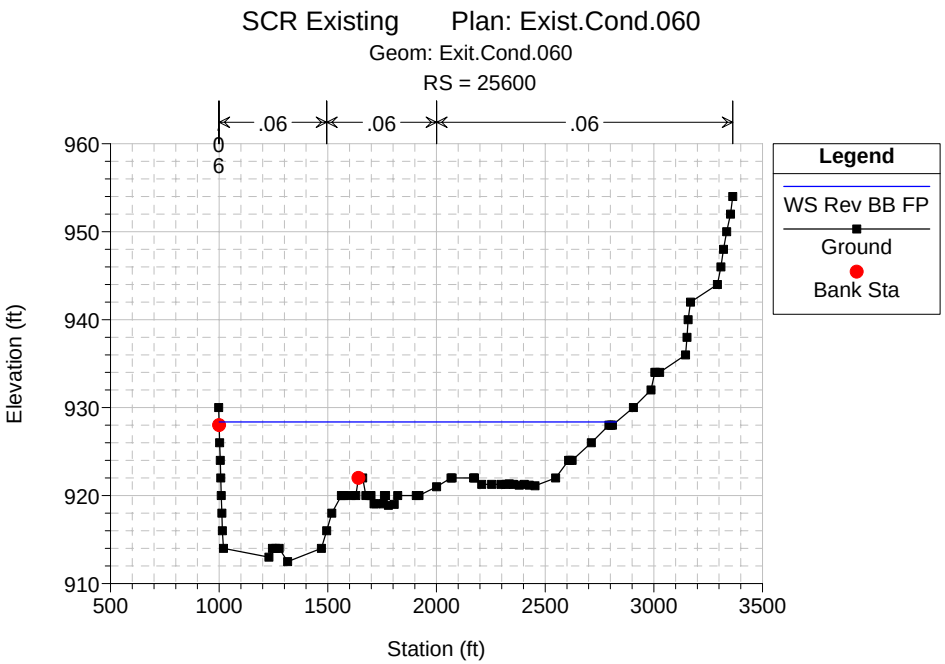
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 25600
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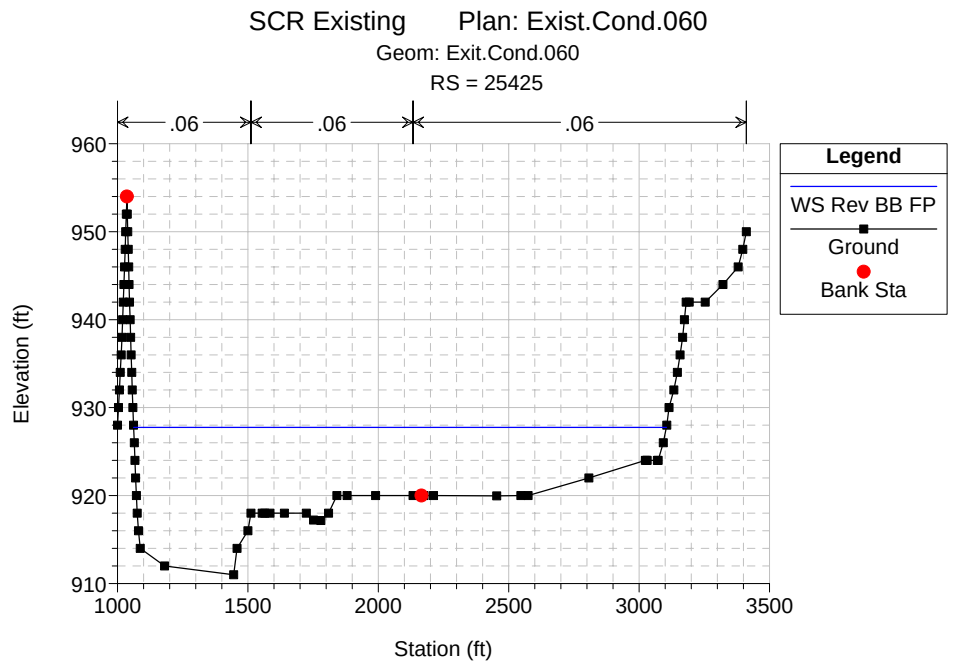
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 25425
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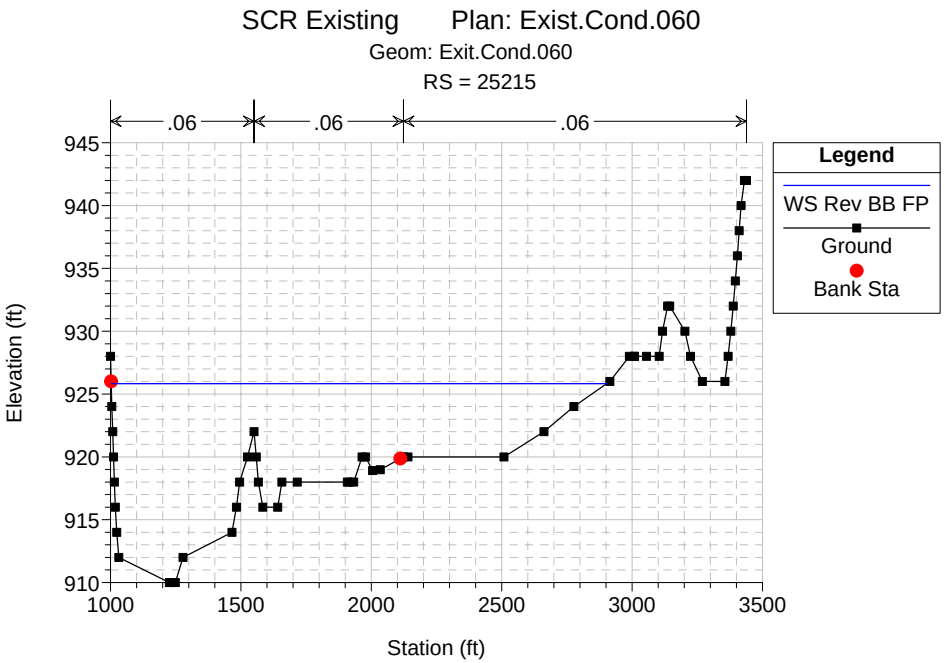
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 25215
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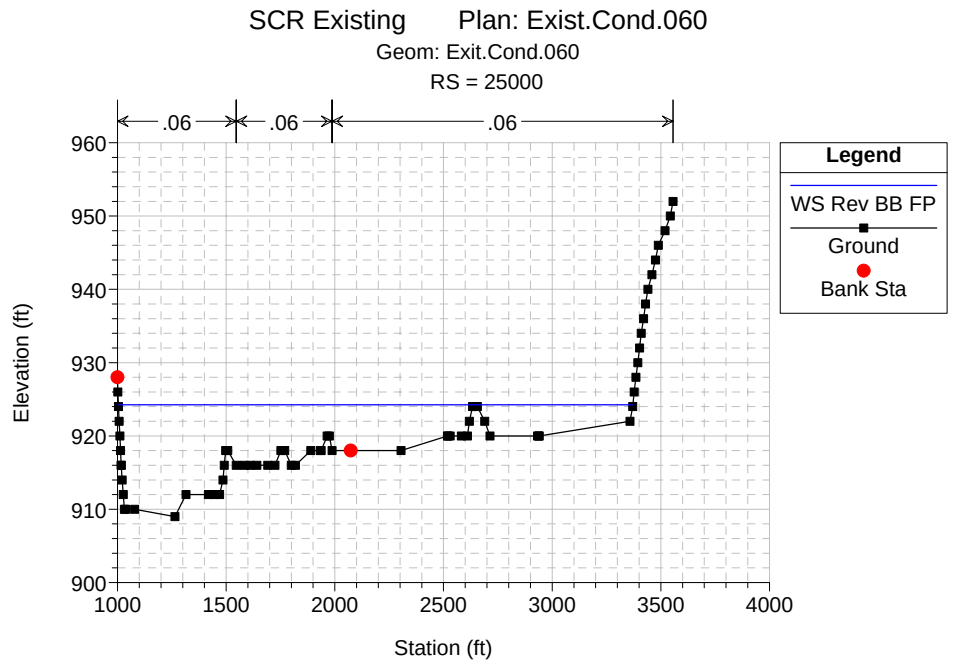
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 25000
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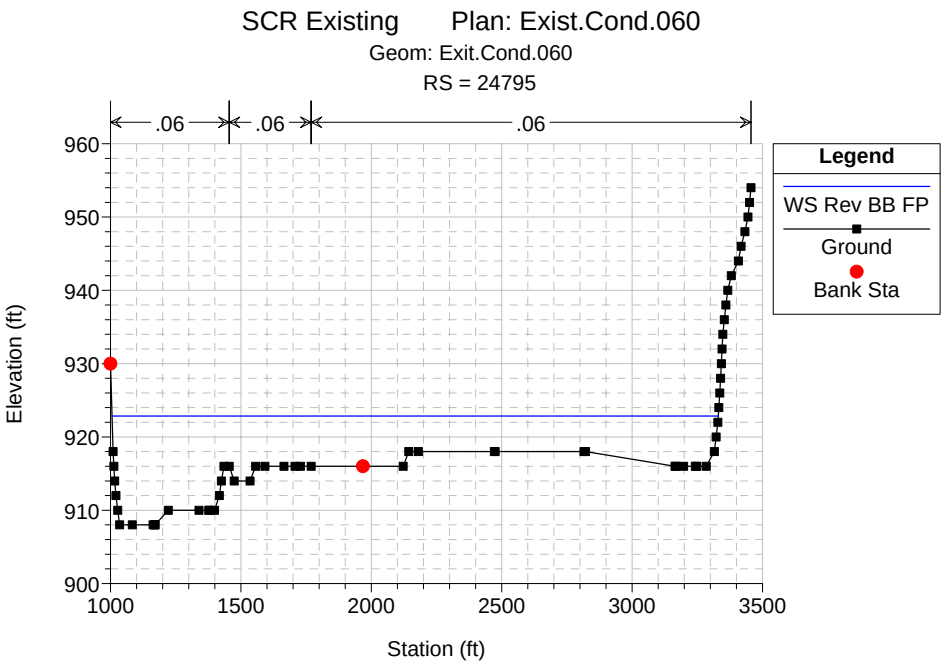
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 24795
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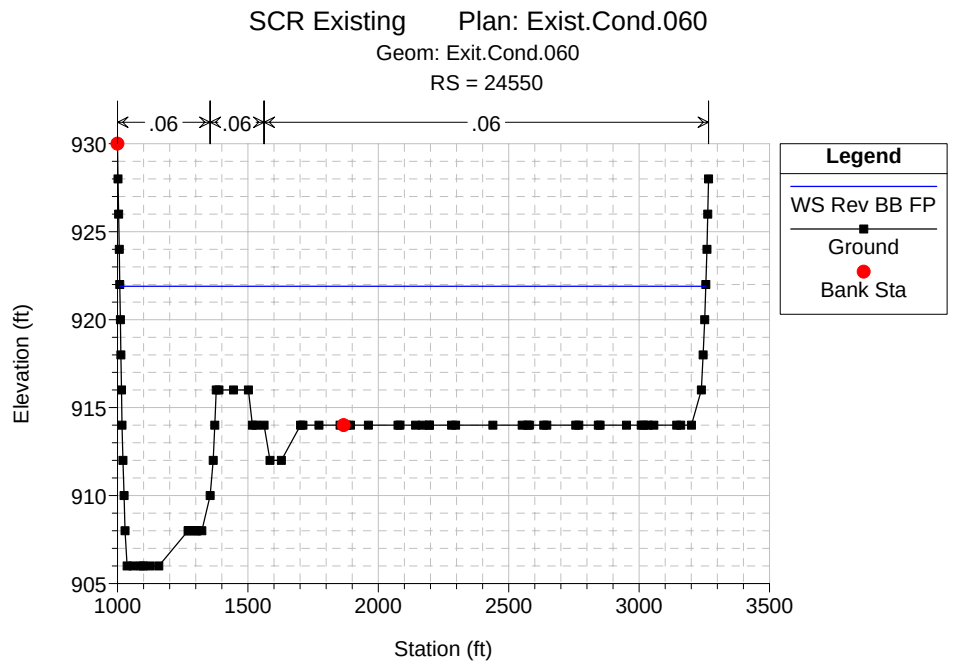
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 24550
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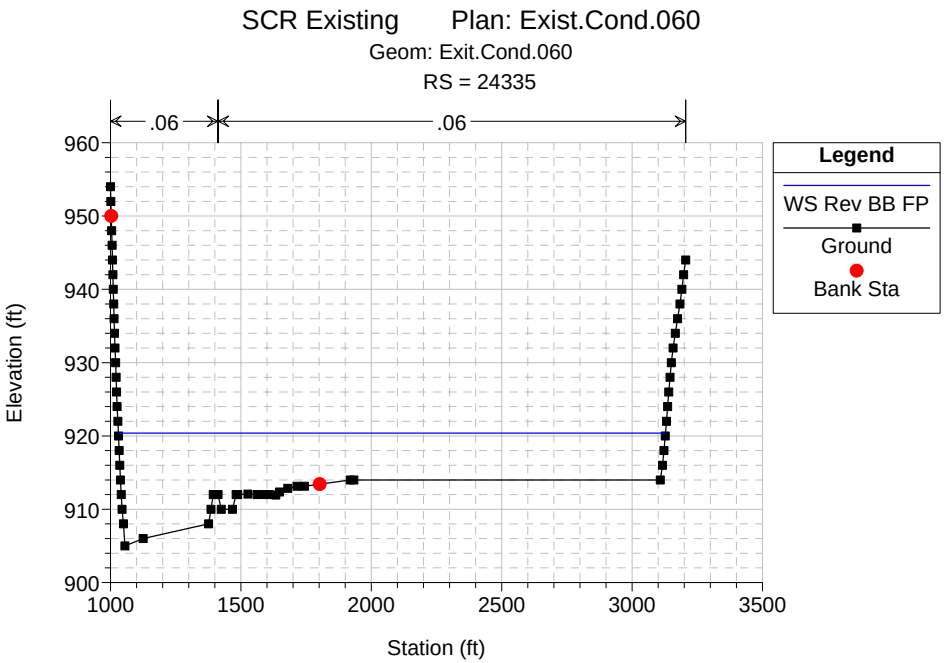
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 24335
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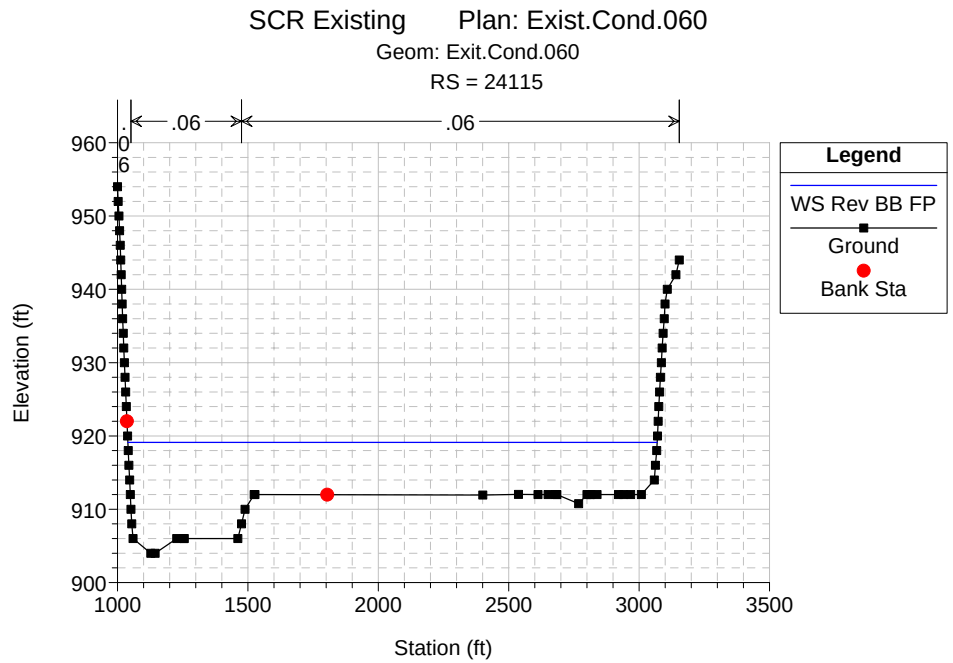
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 24115
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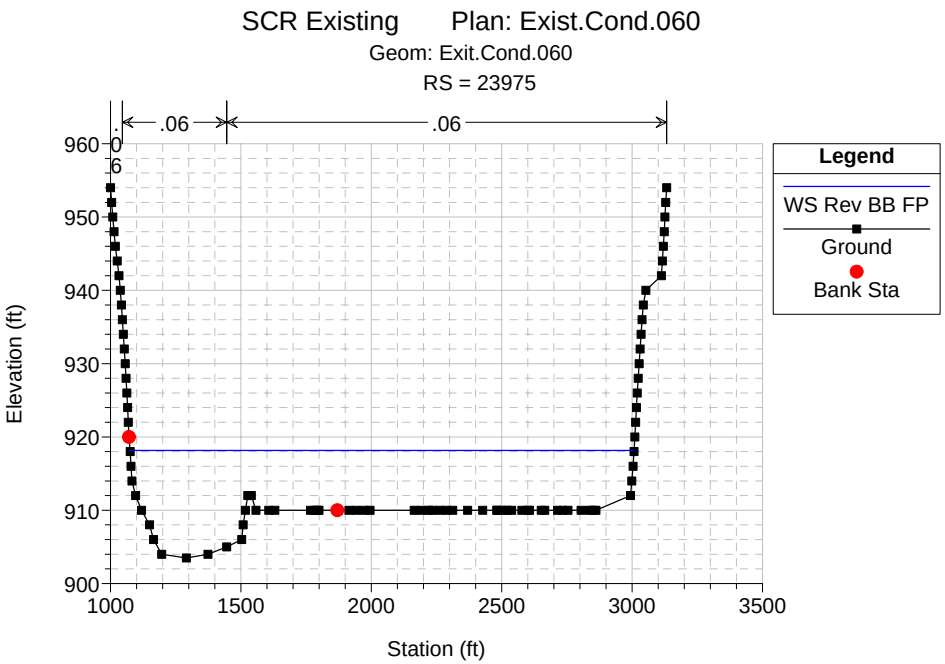
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 23975
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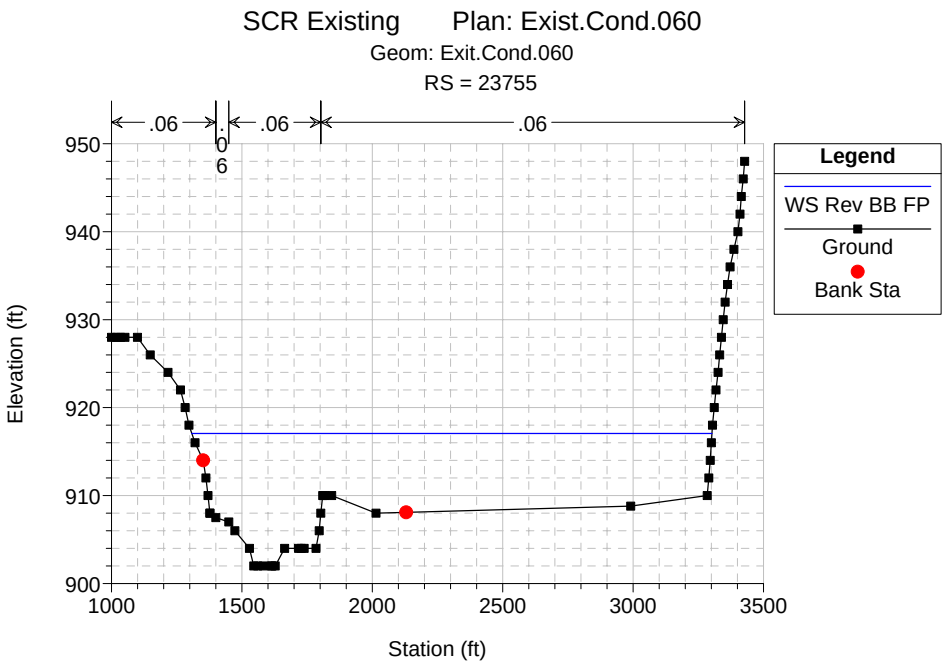
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 23755
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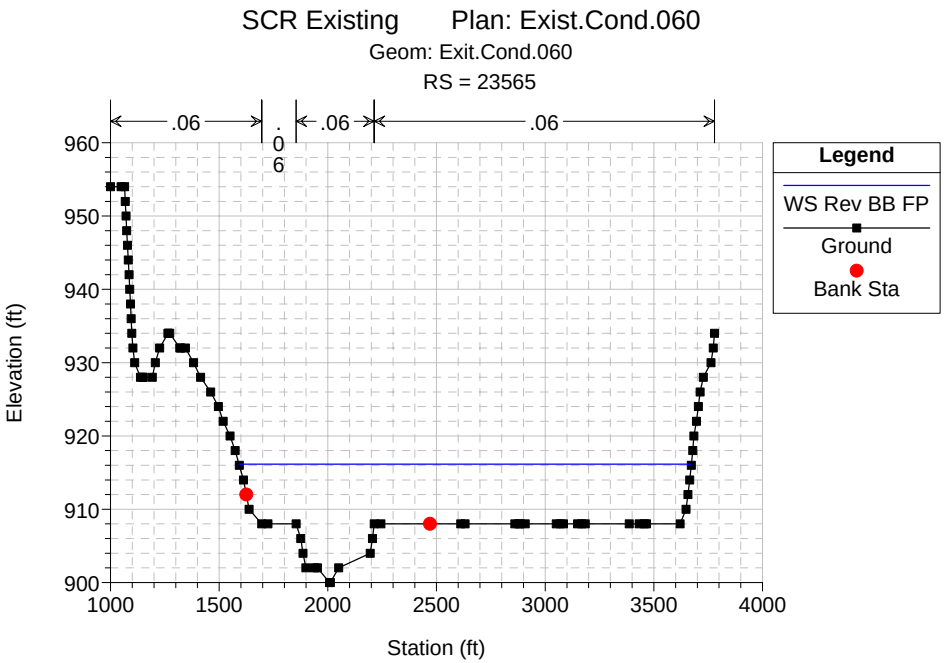
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 23565
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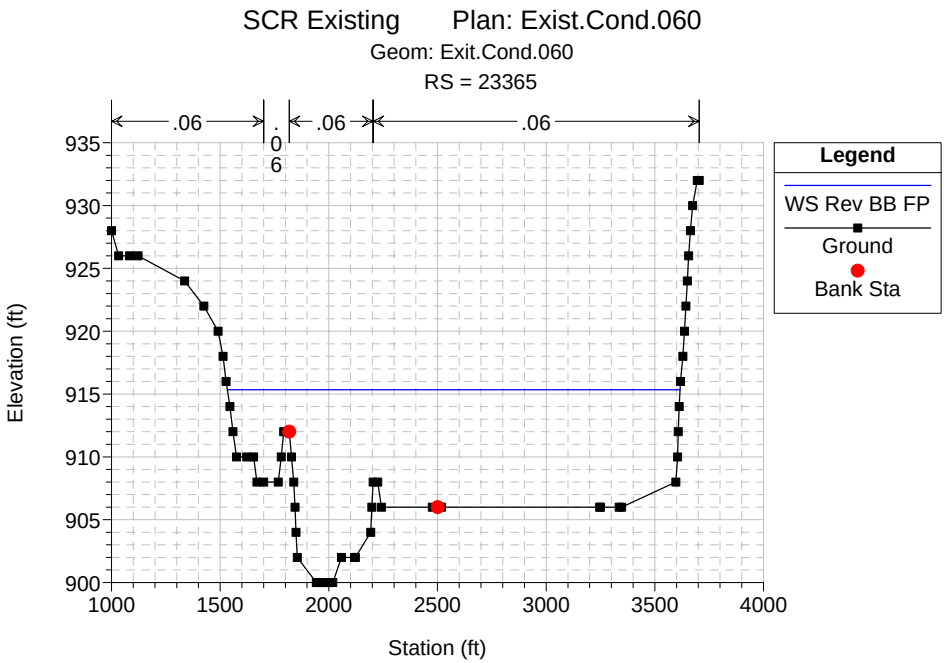
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
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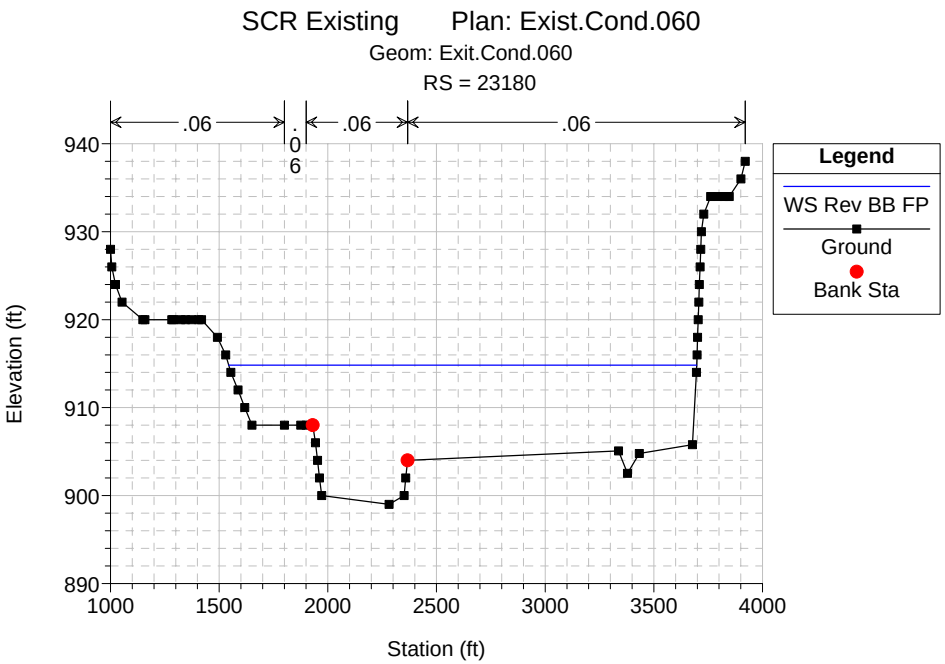
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 23180
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.06
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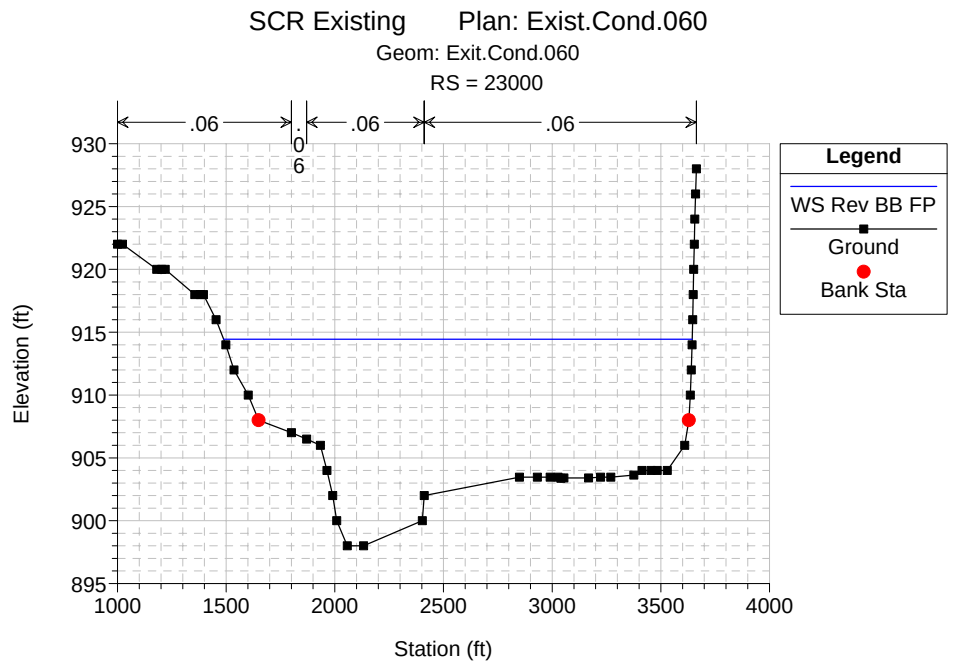
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 23000
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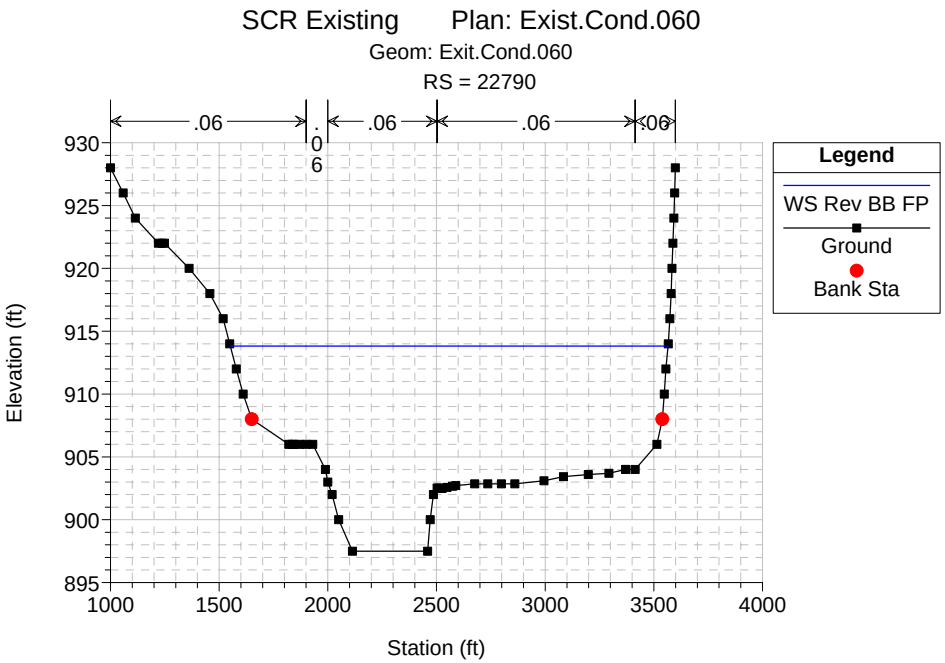
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 22790
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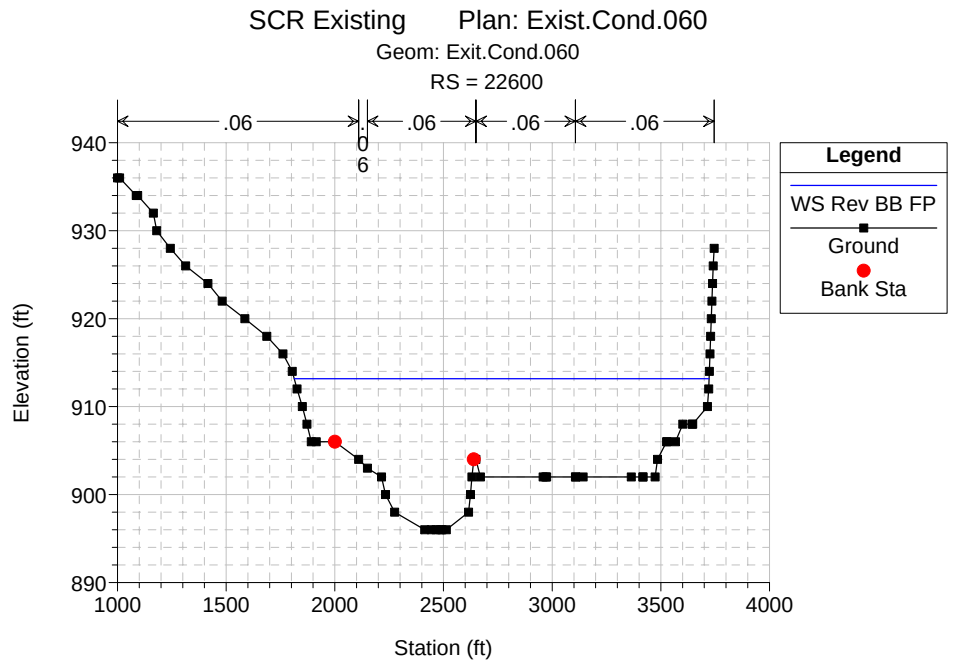
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 22600
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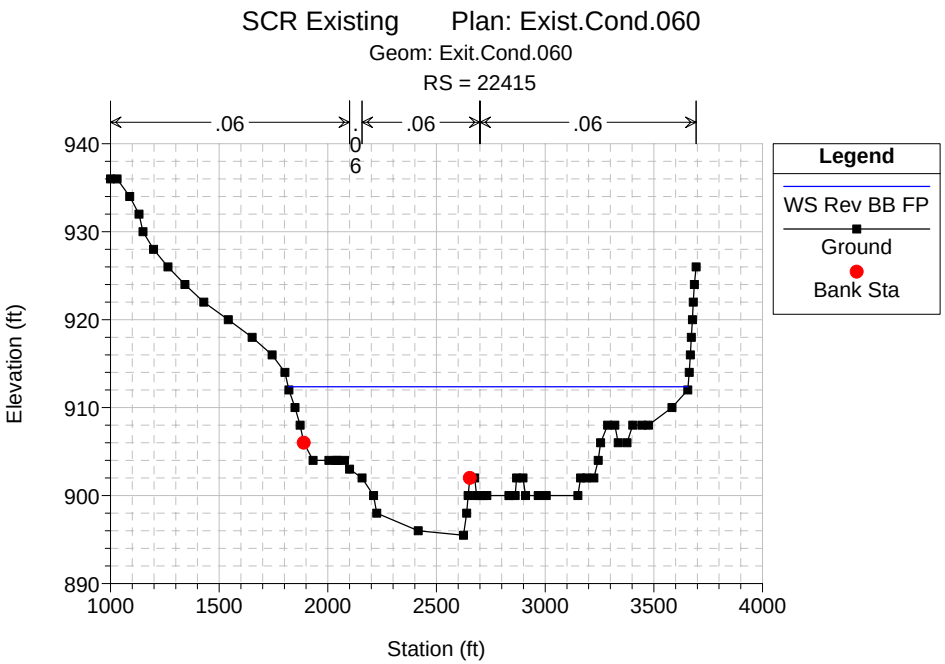
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Exit.Cond.060
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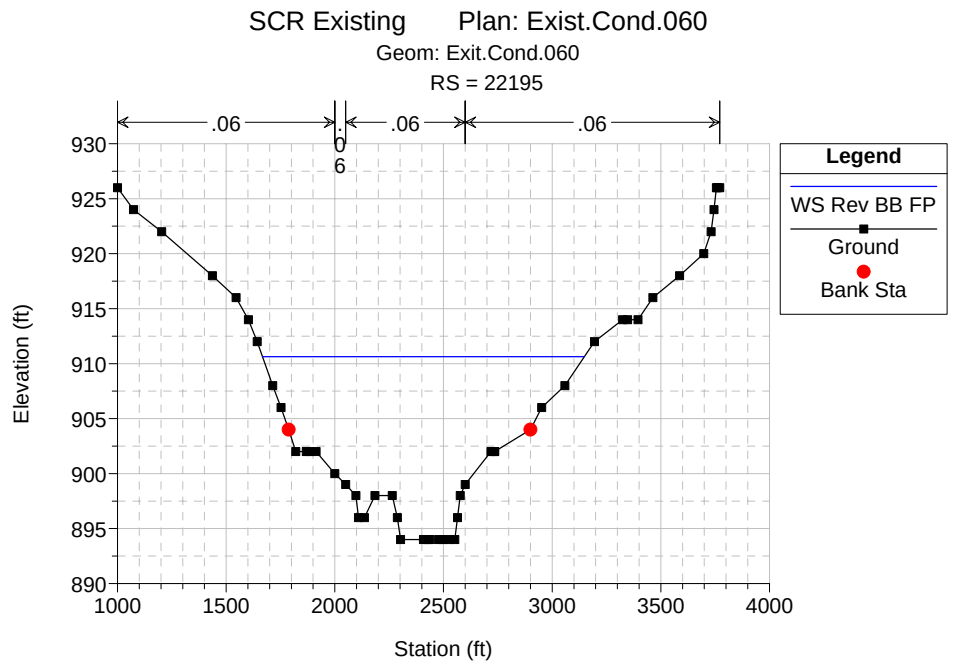
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Exit.Cond.060
RS = 22195
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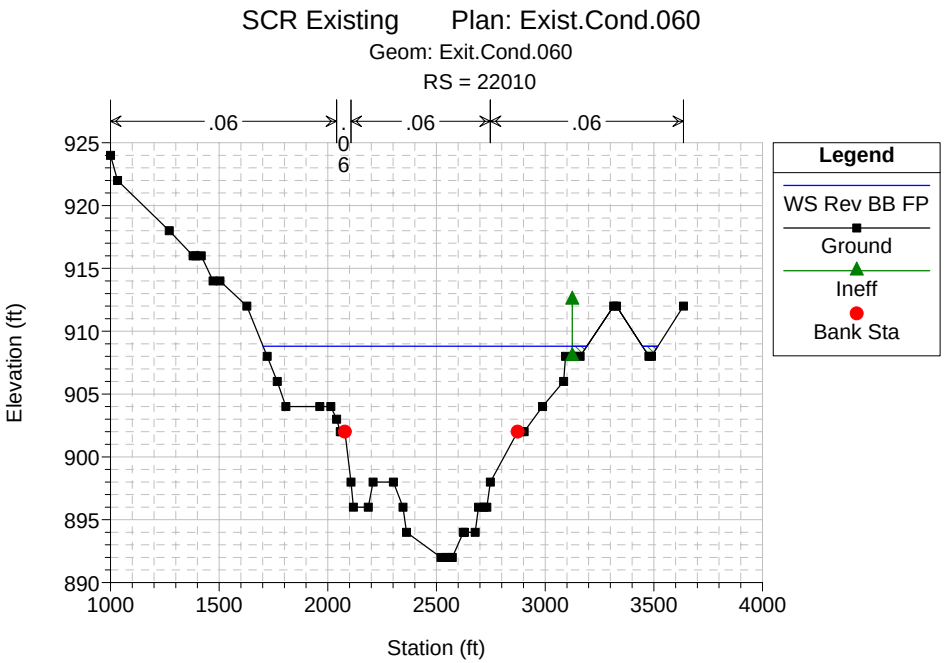
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 22010
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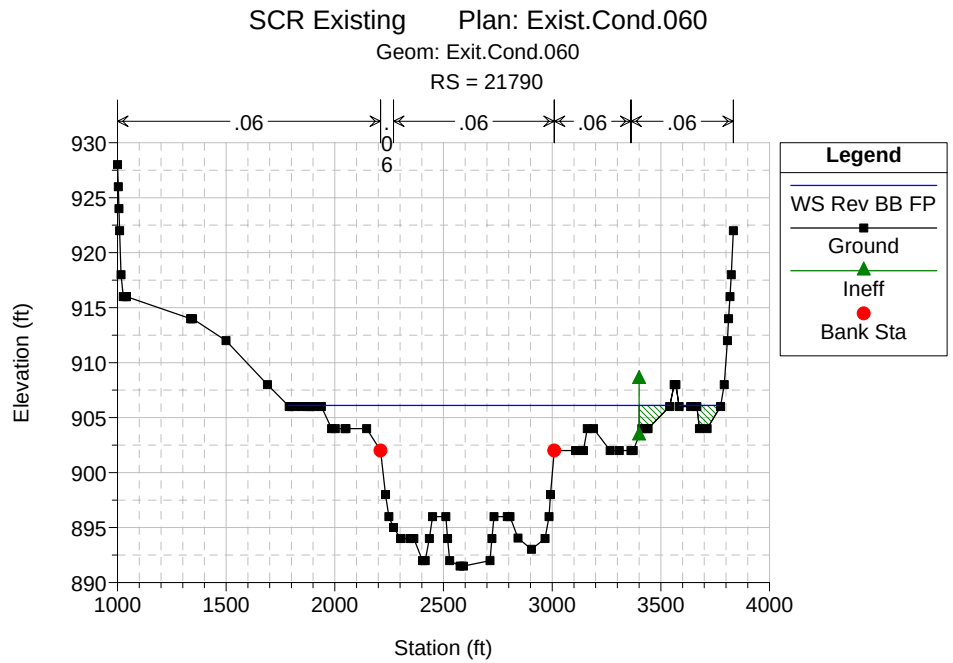
Legend
WS Rev BB FP
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 21790
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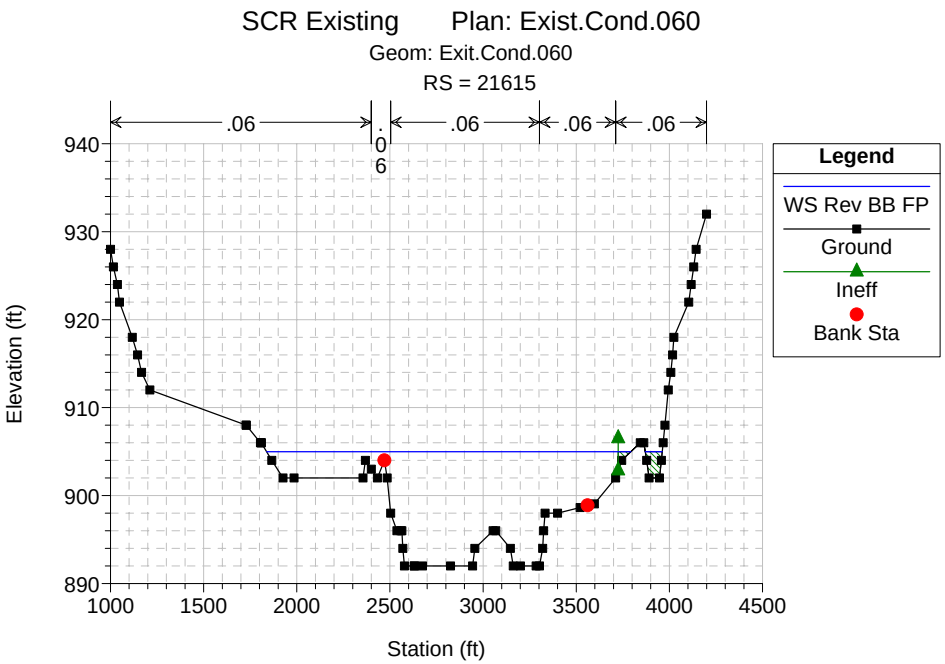
Legend
WS Rev BB FP
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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Geom: Exit.Cond.060
RS = 21615
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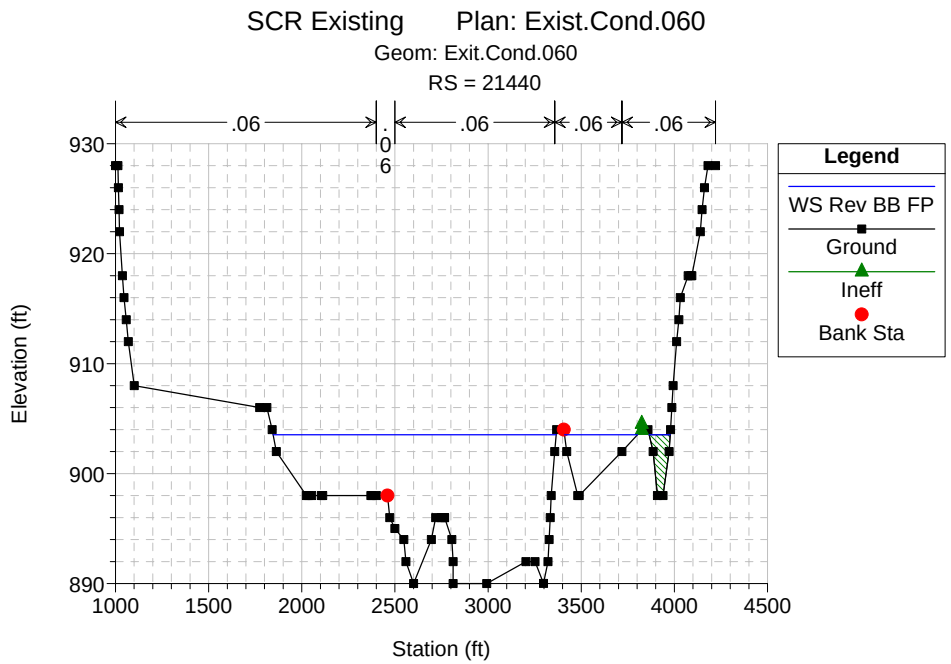
Legend
WS Rev BB FP
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 21440
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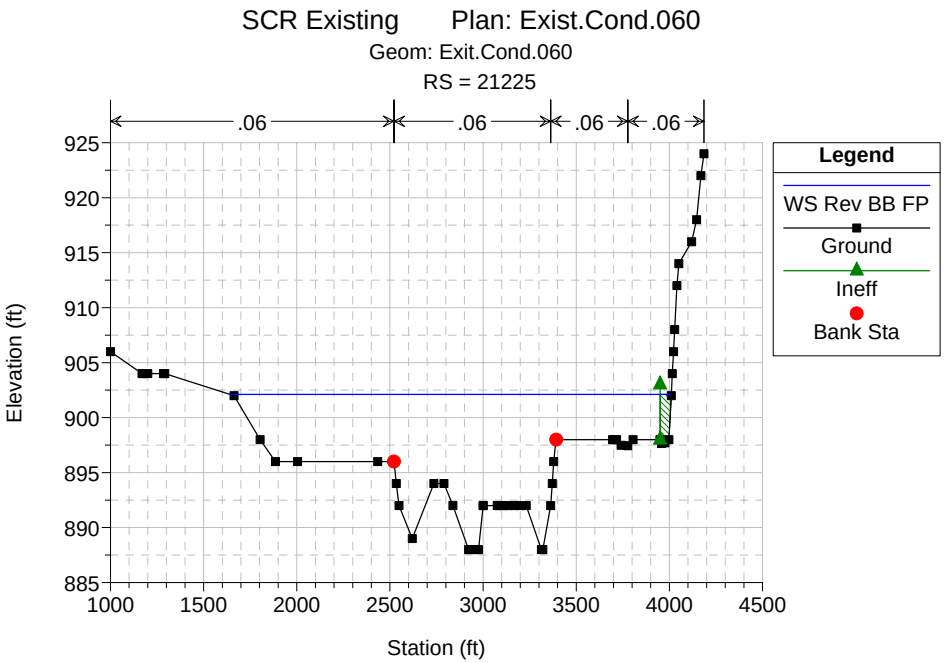
Legend
WS Rev BB FP
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 21225
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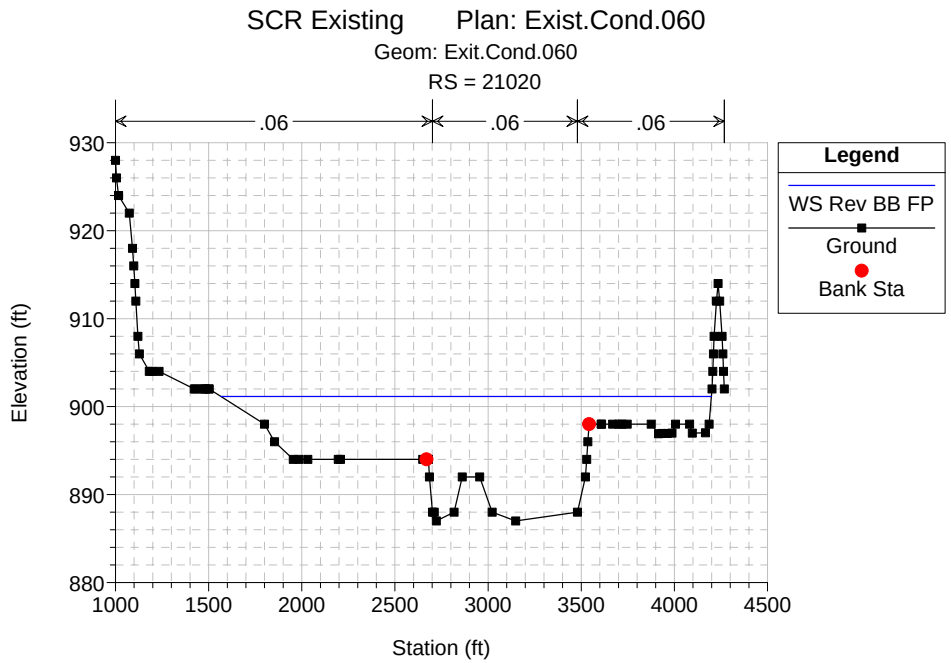
Legend
WS Rev BB FP
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 21020
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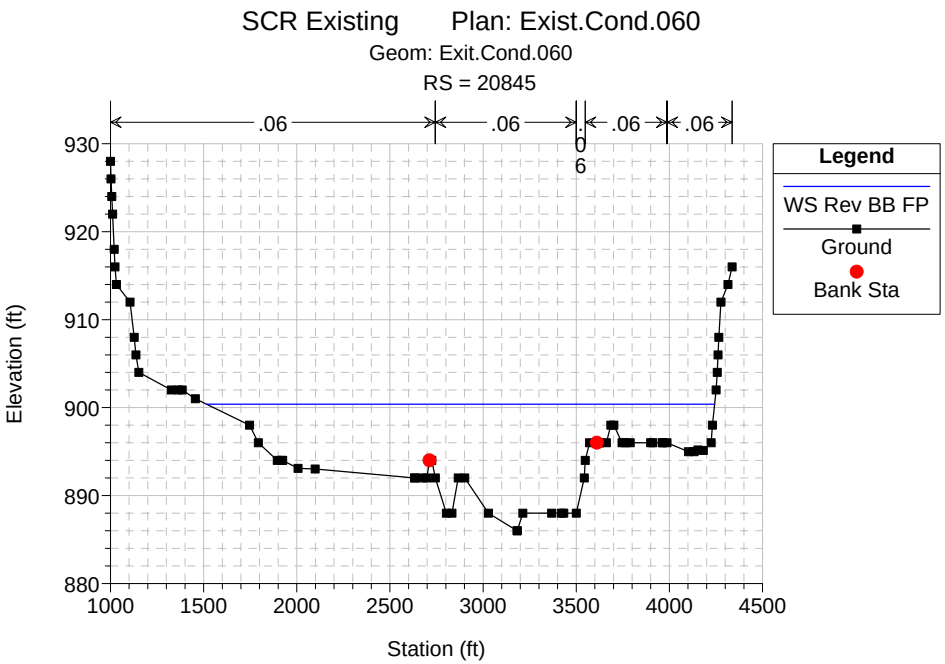
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 20845
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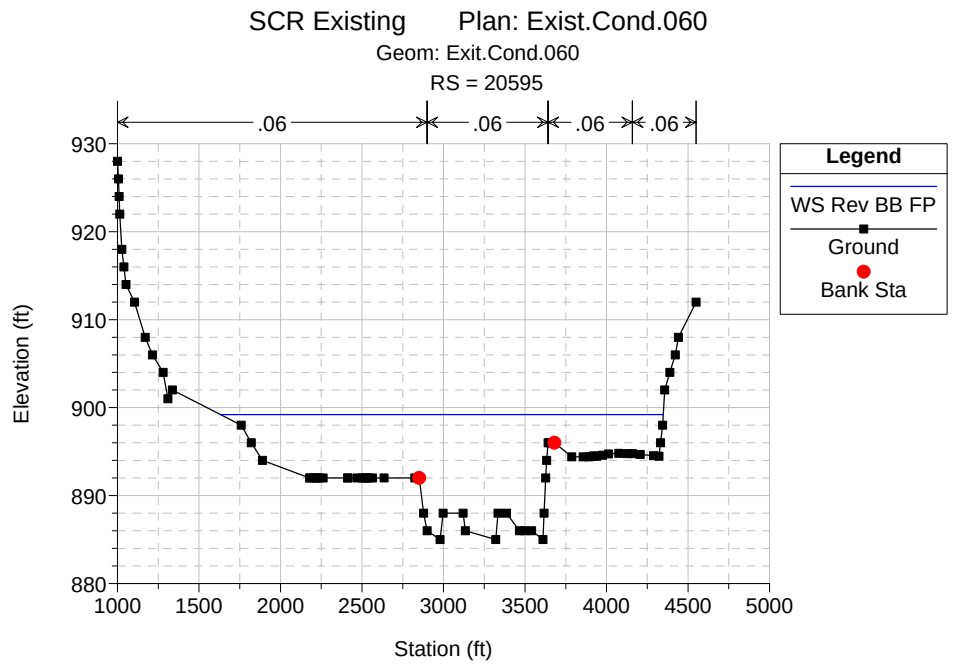
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 20595
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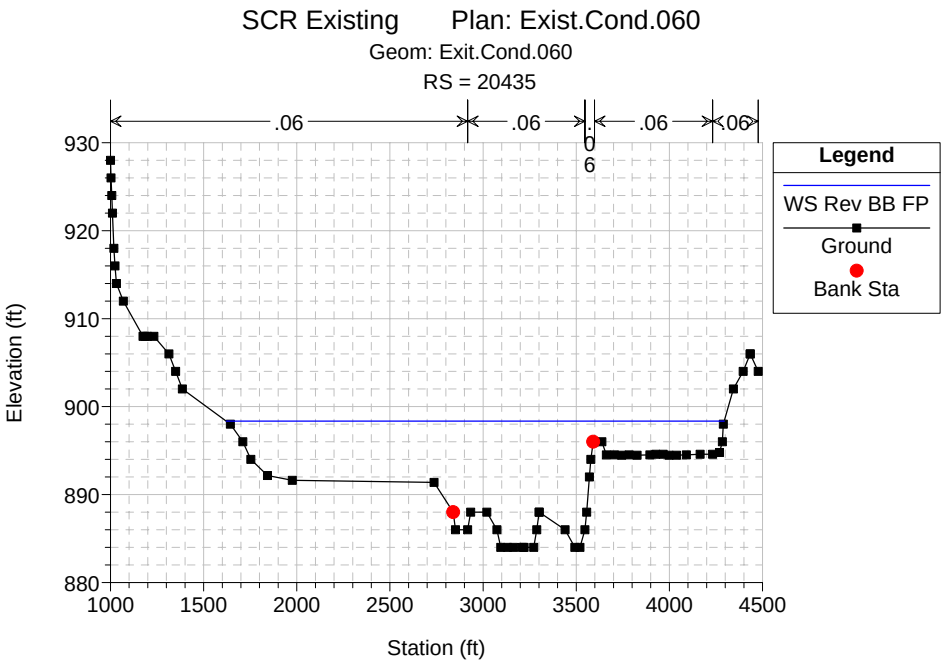
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 20435
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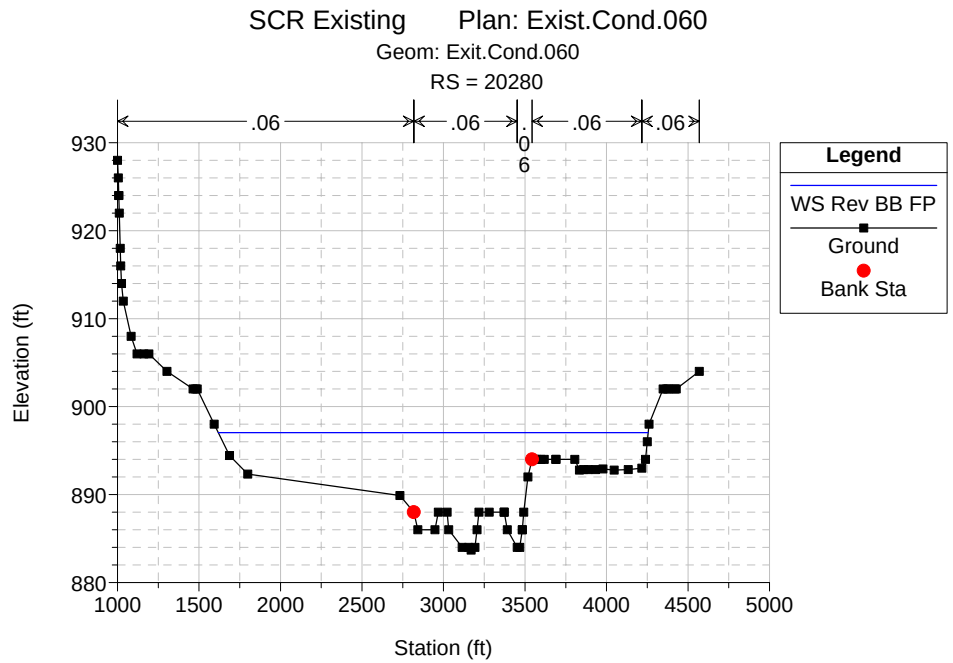
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 20280
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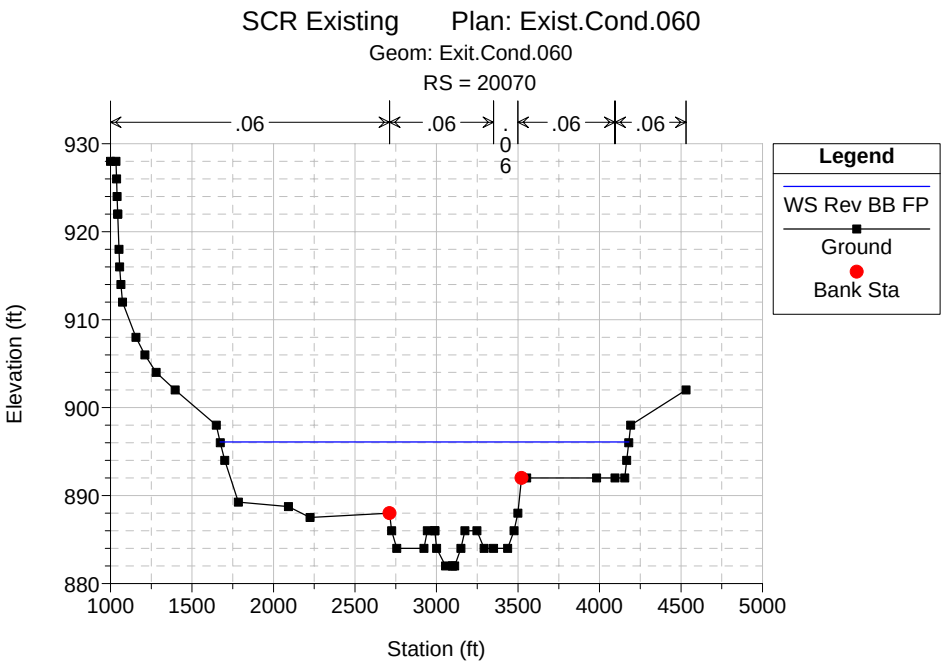
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 20070
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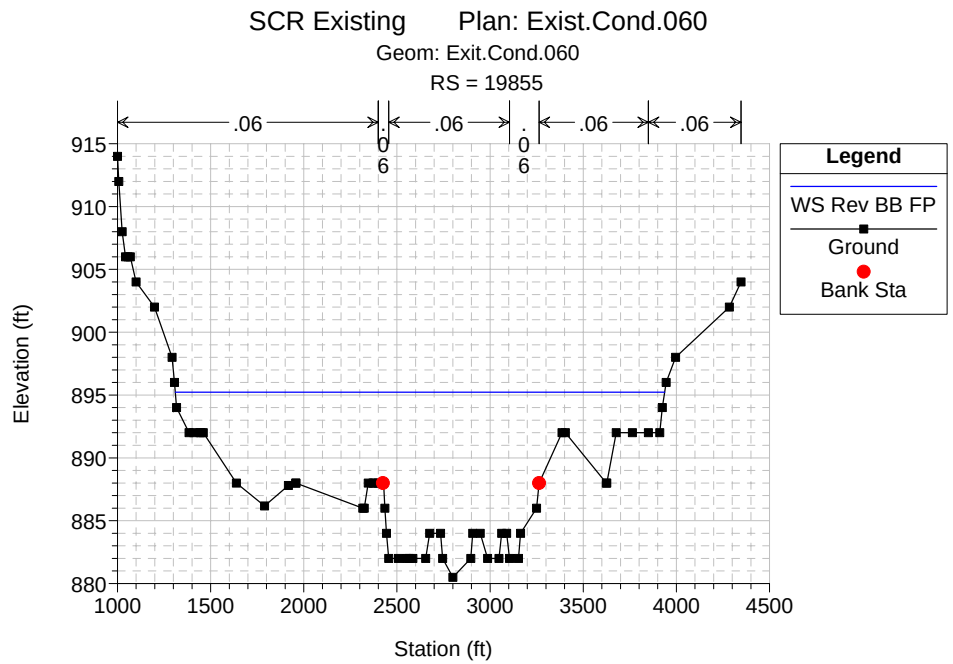
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 19855
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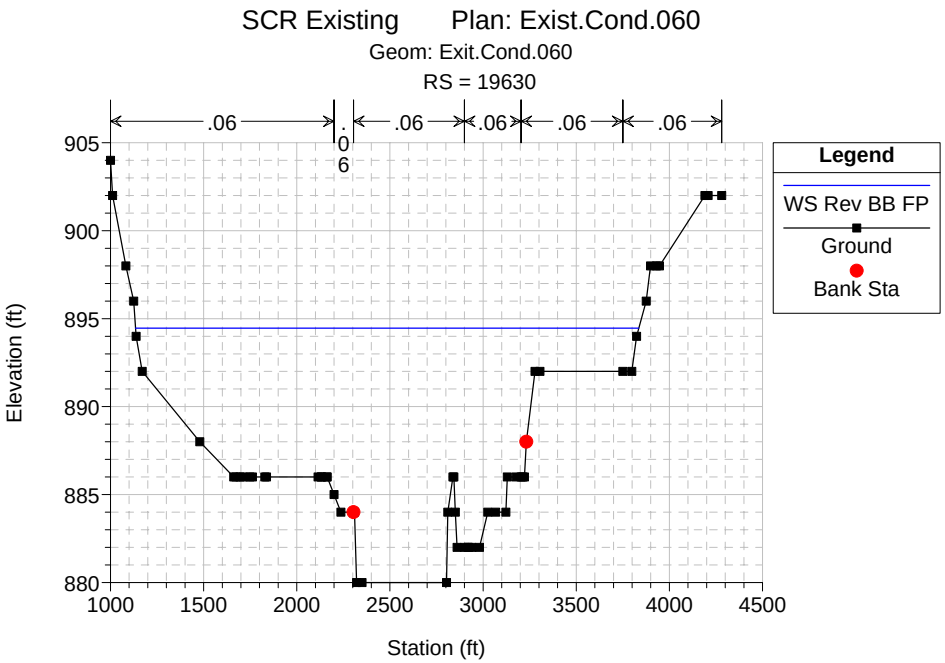
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 19630
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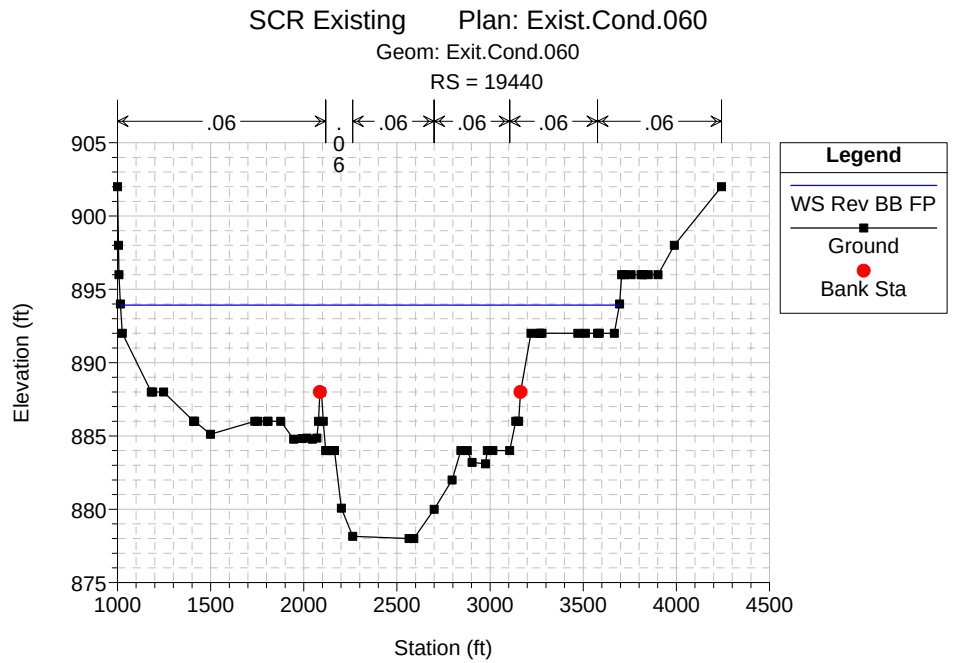
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 19440
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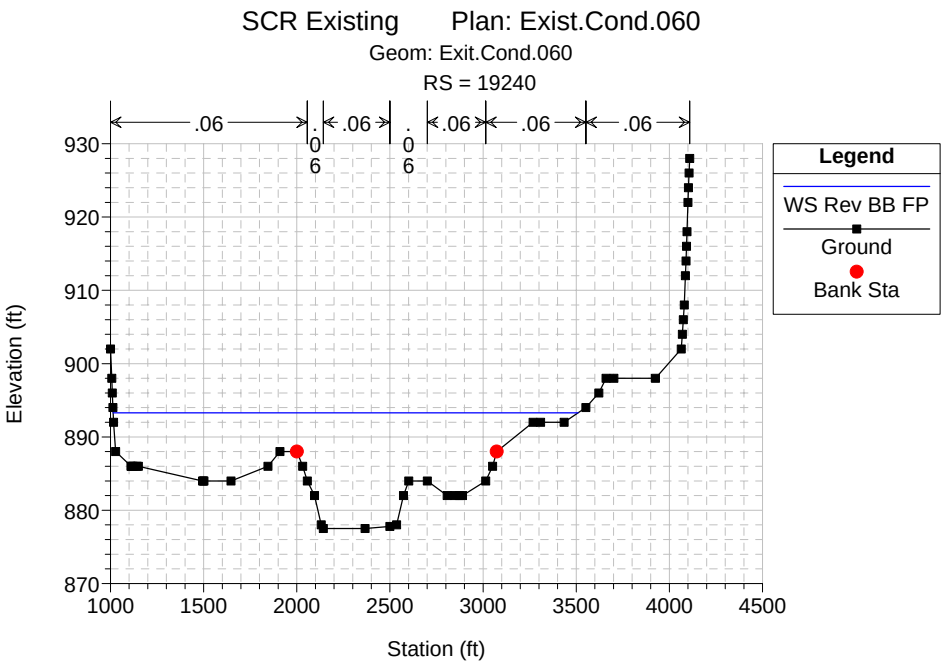
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 19240
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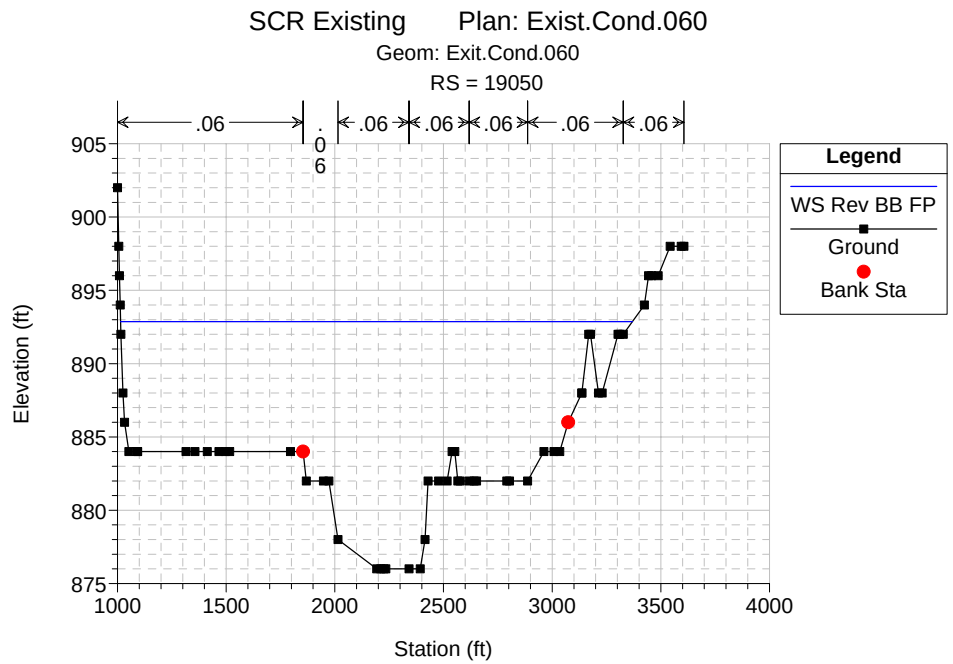
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 19050
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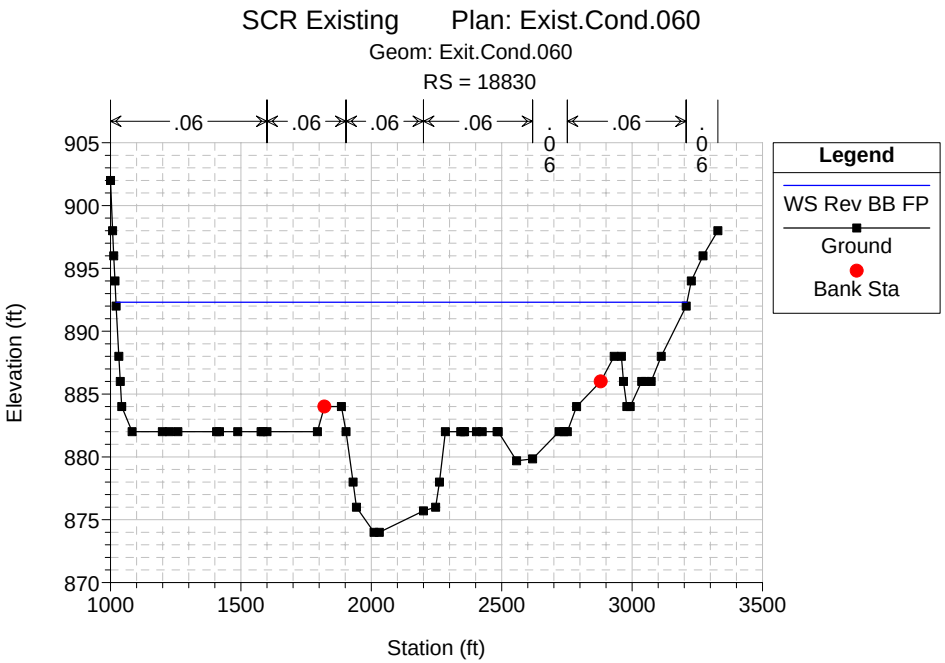
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 18830
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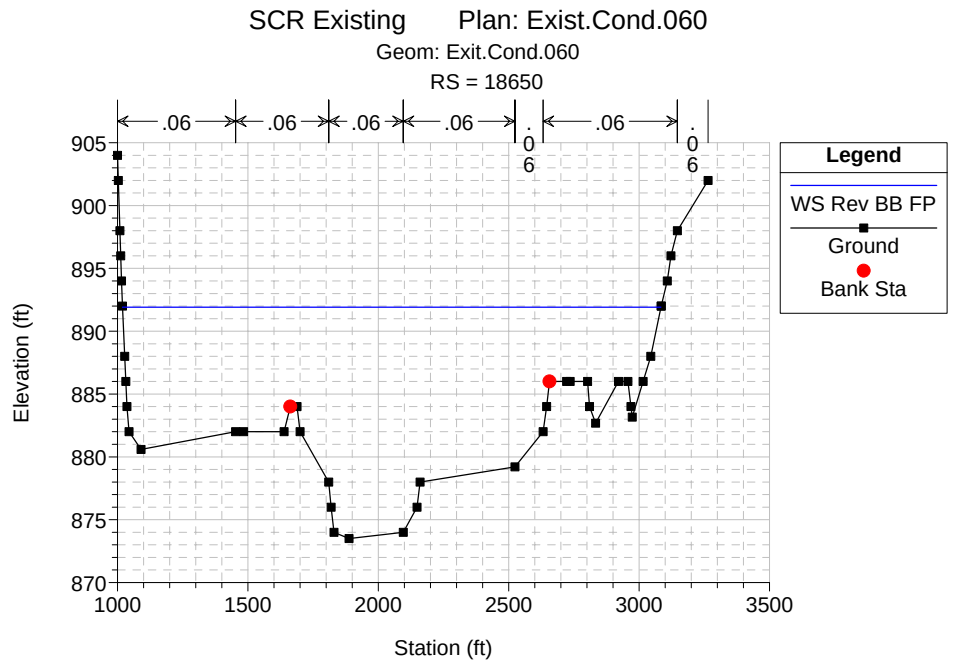
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 18650
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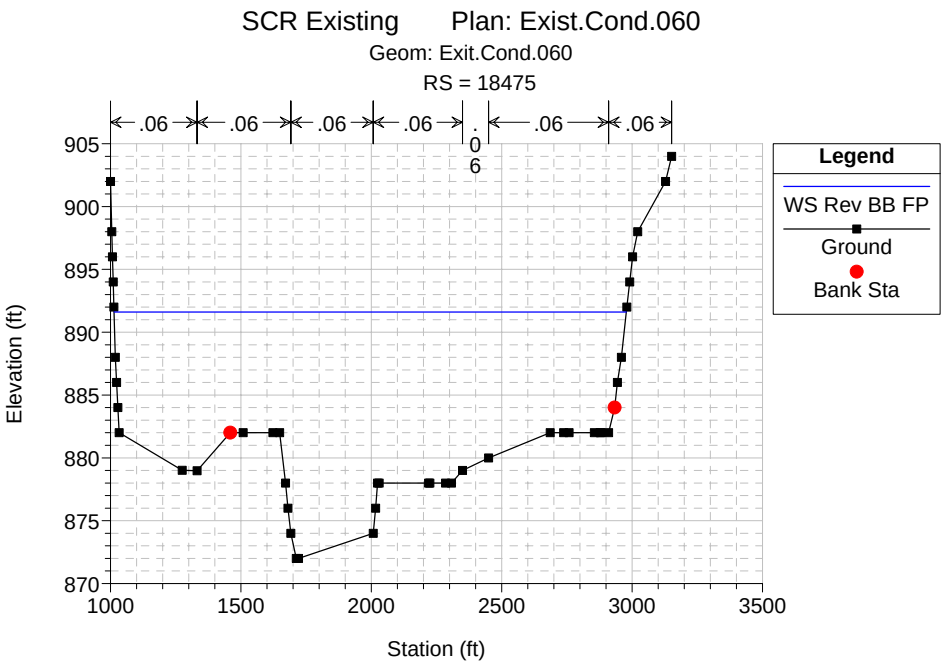
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
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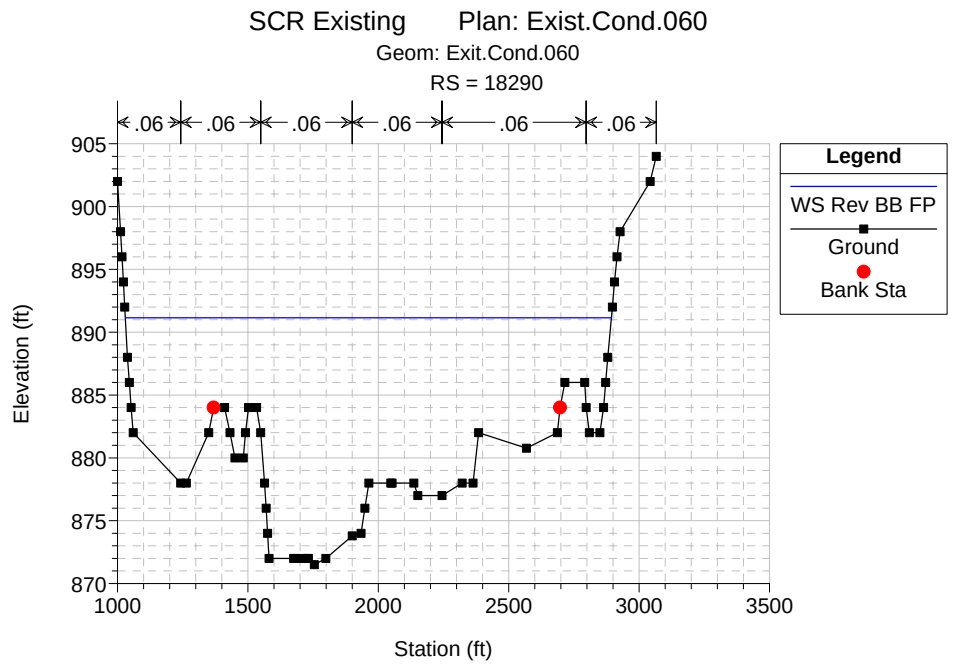
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 18290
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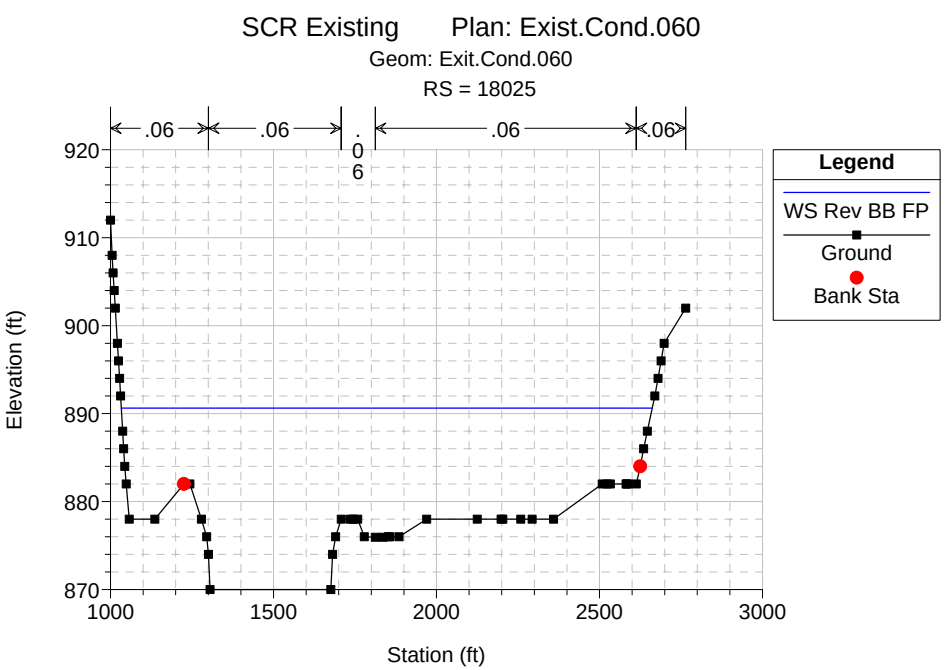
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 18025
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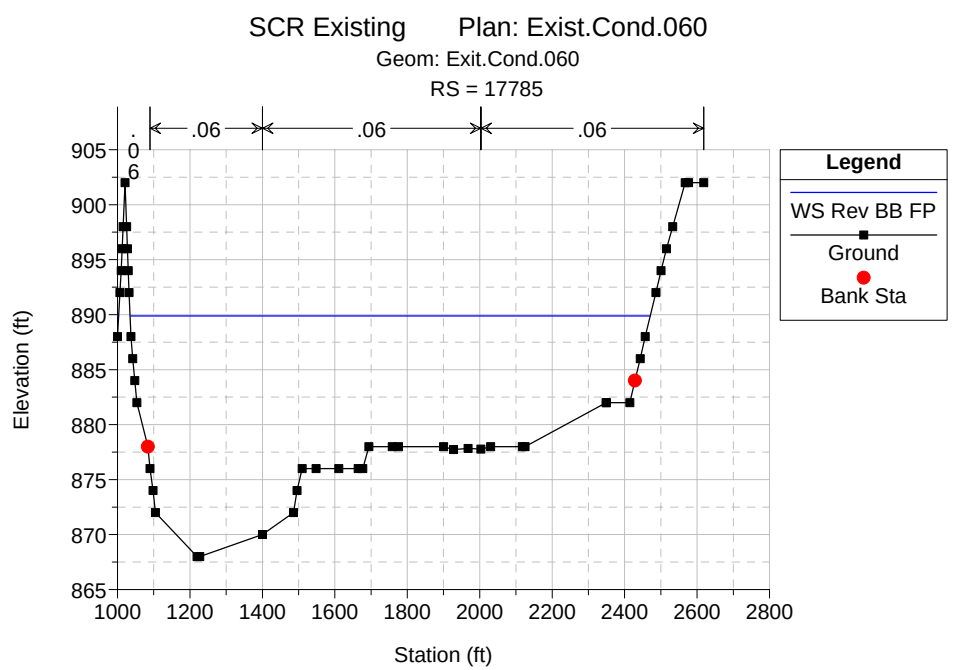
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 17785
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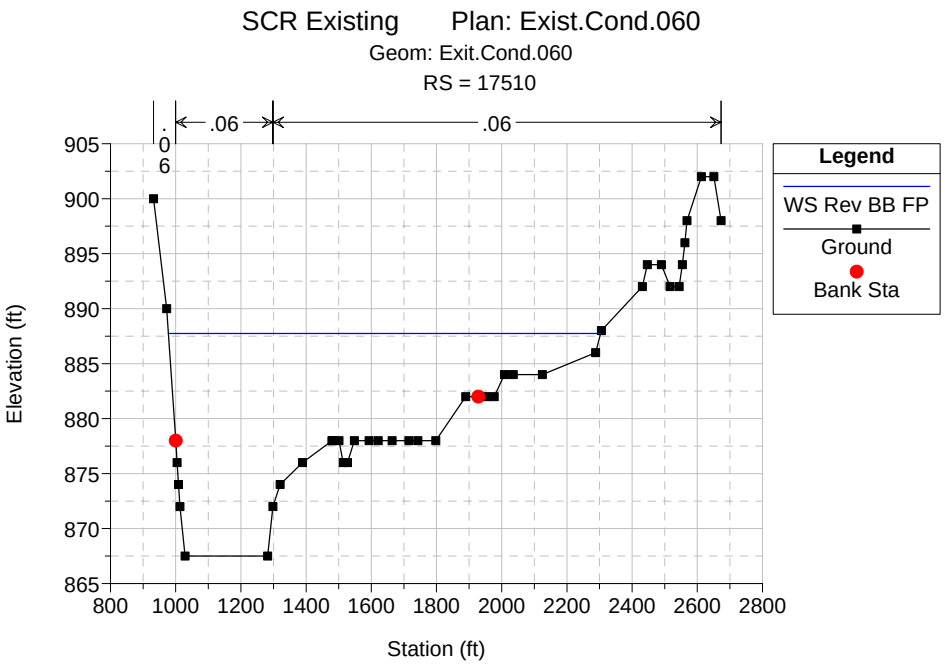
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 17510
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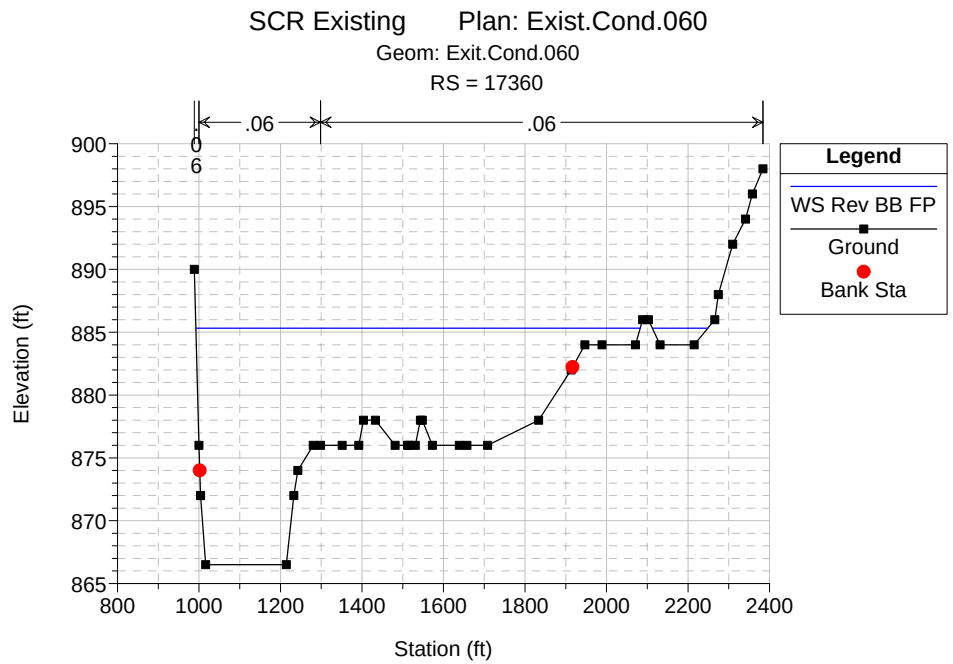
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 17360
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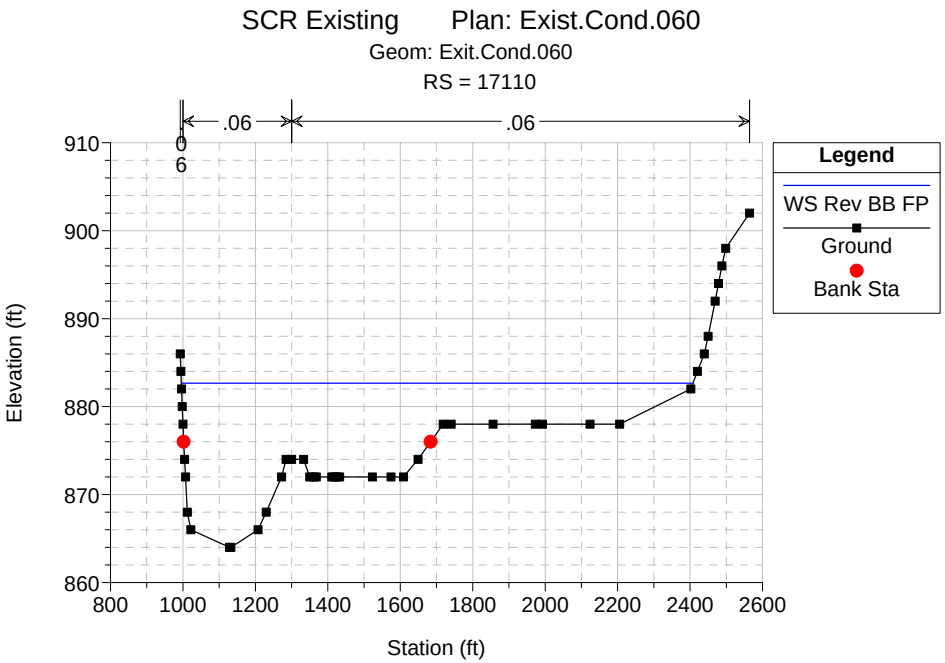
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 17110
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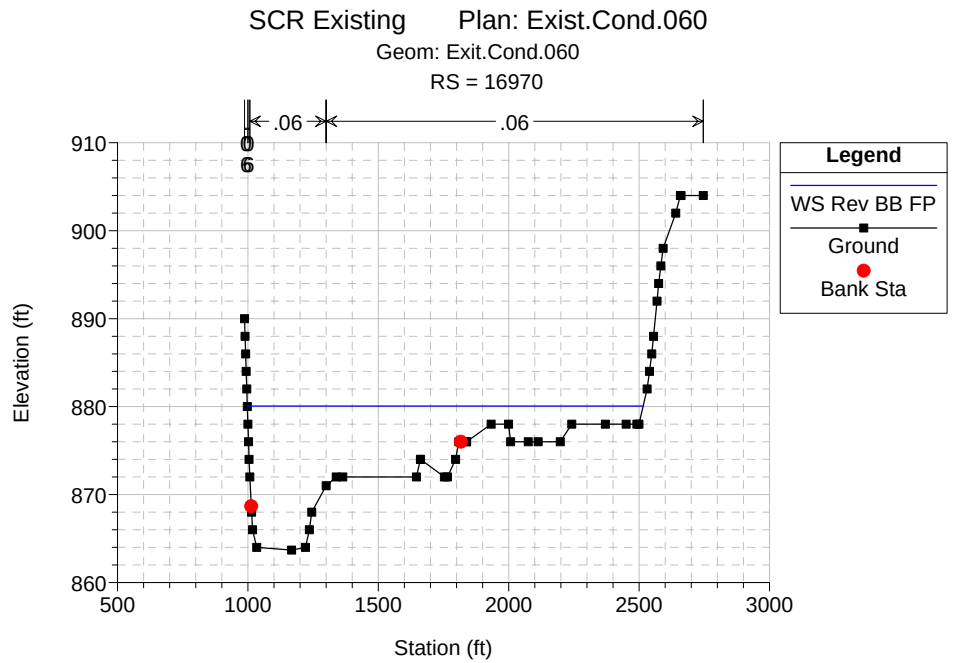
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 16970
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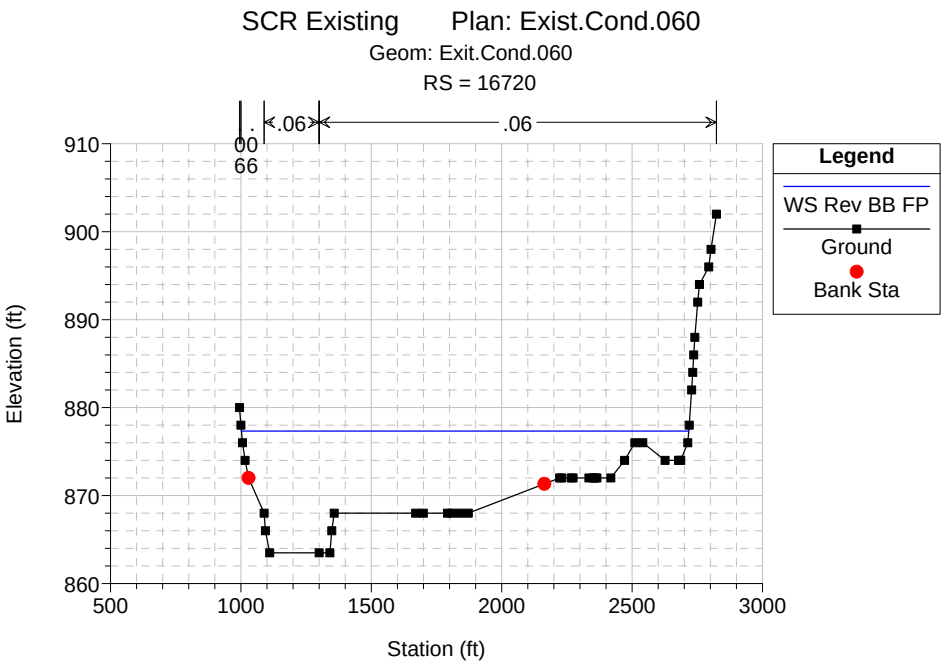
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
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Legend
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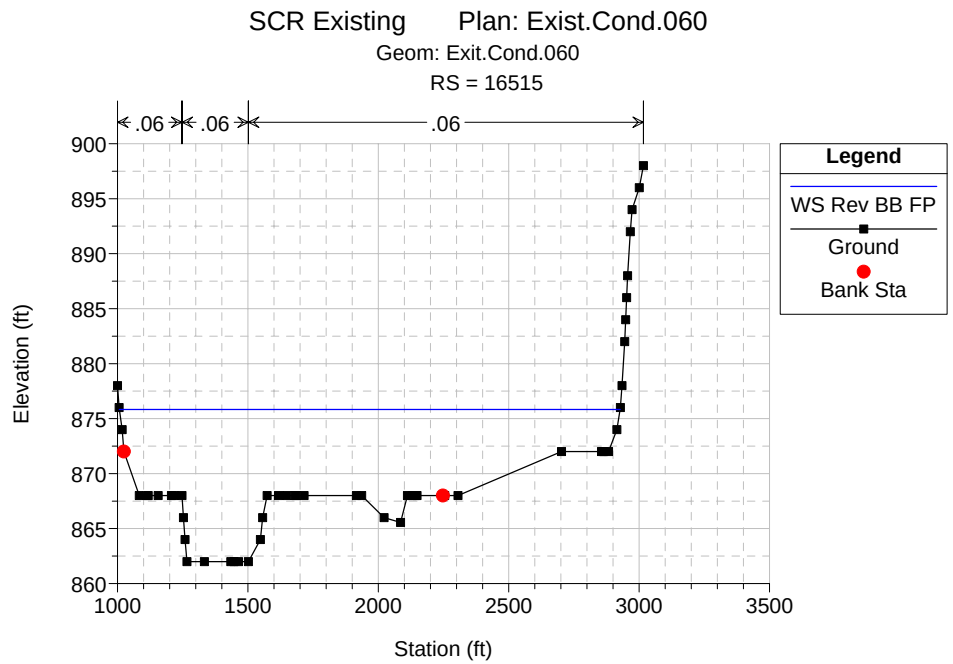
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 16515
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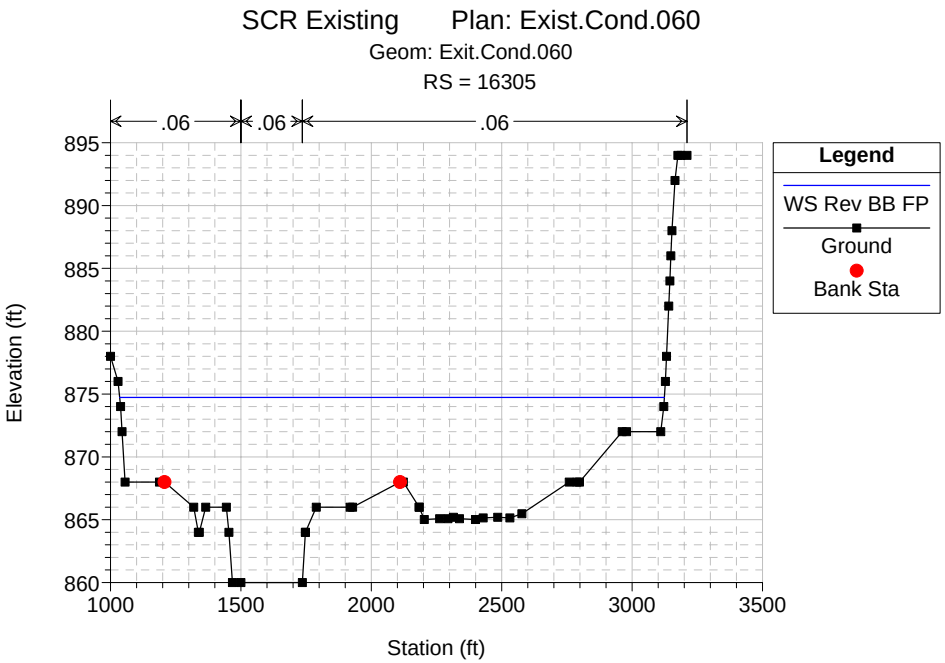
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 16305
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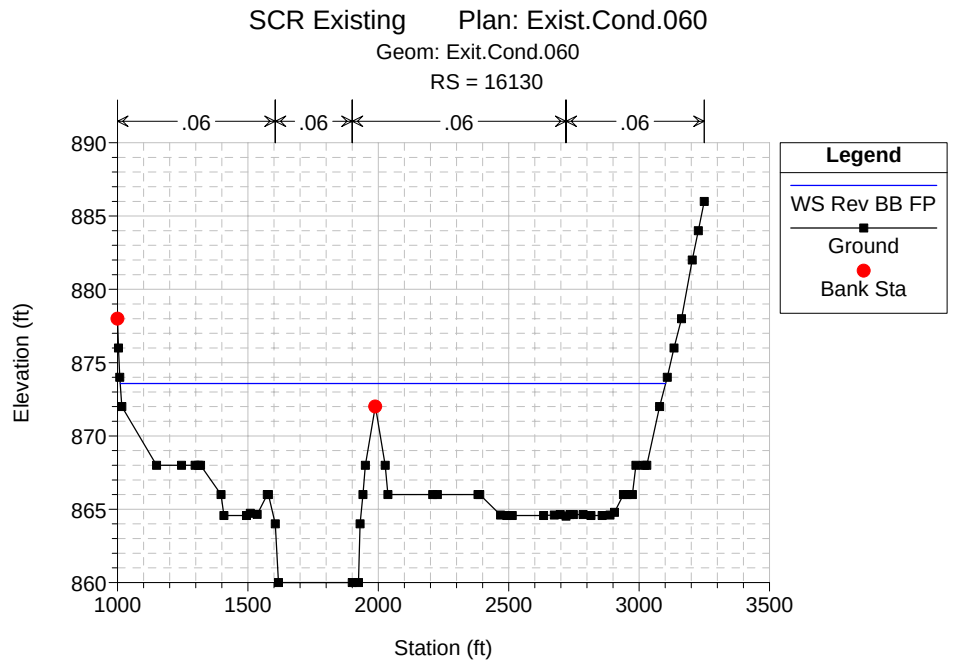
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
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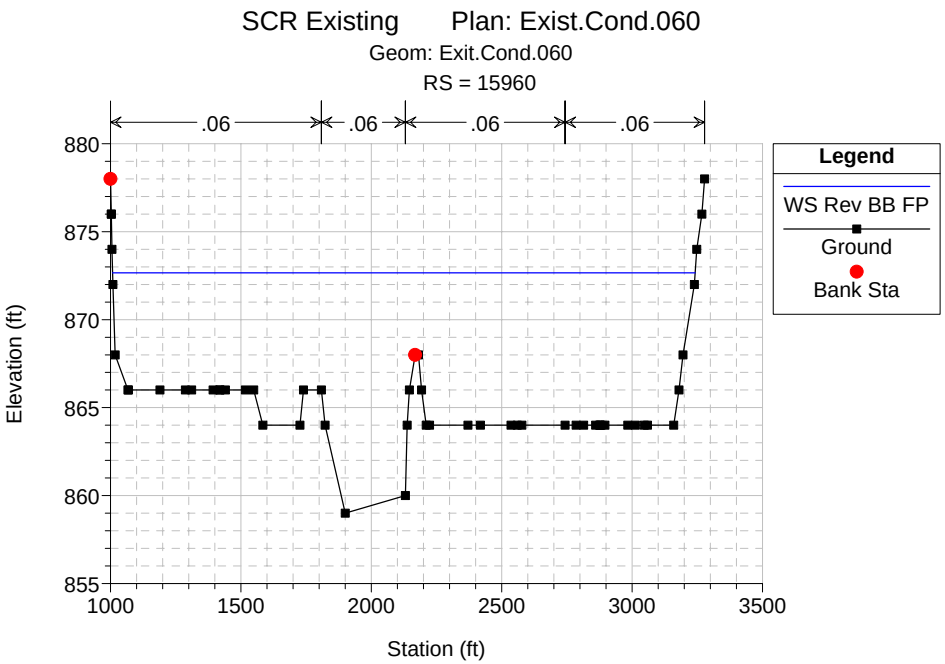
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 15960
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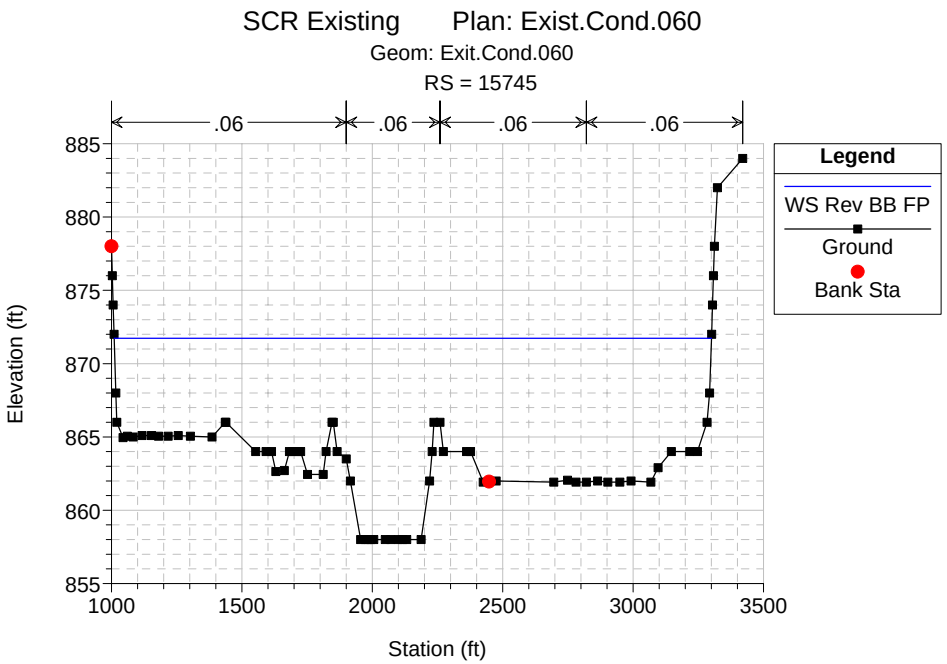
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 15745
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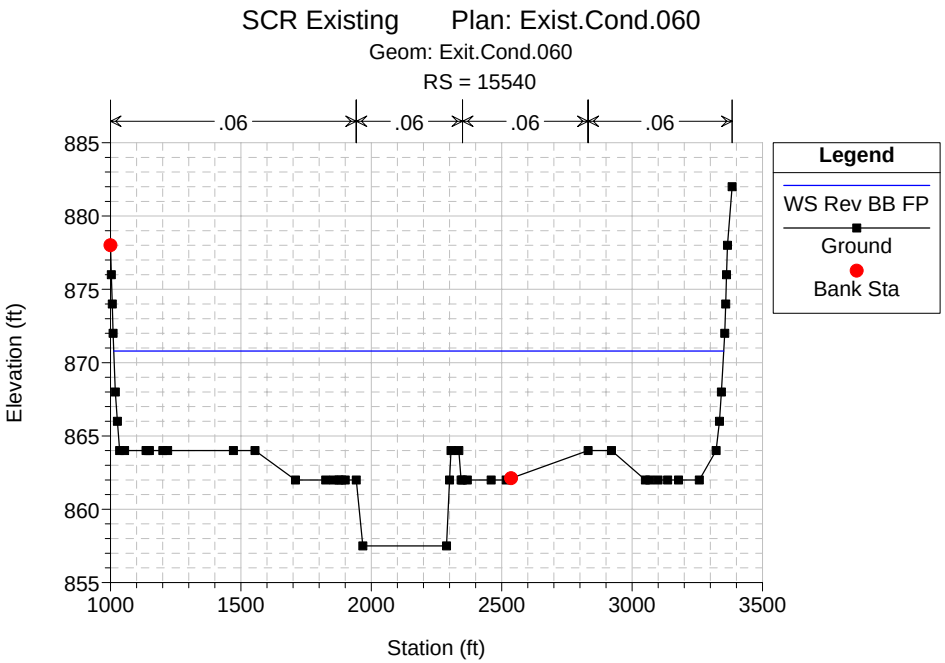
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
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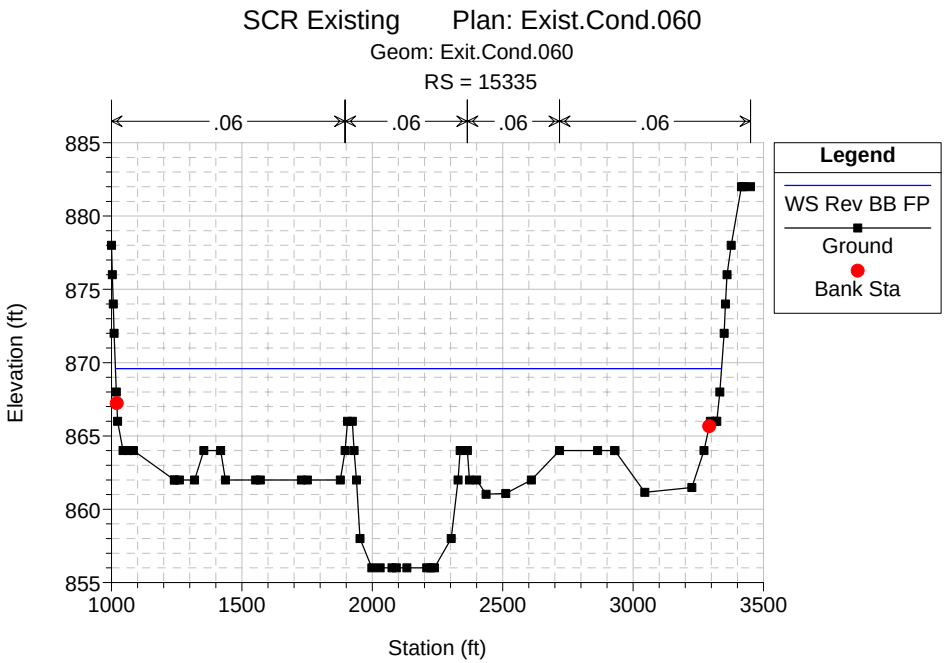
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
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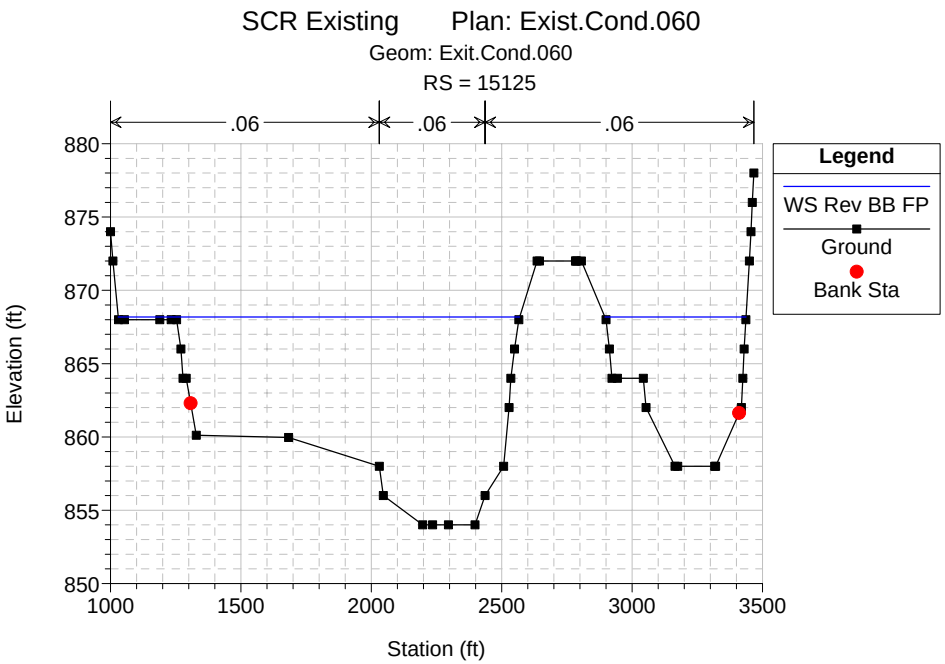
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
RS = 15125
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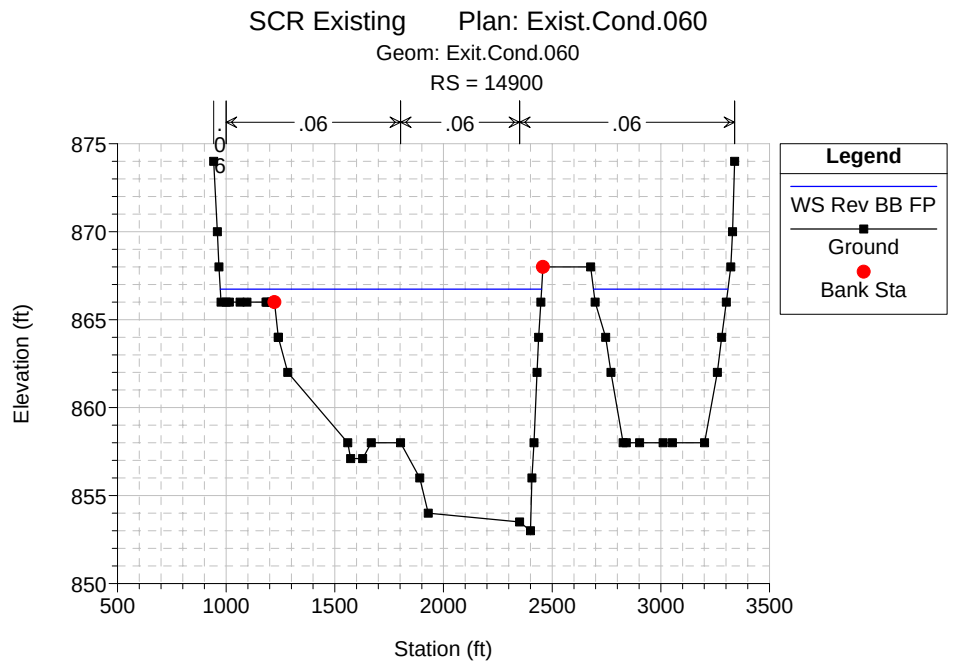
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
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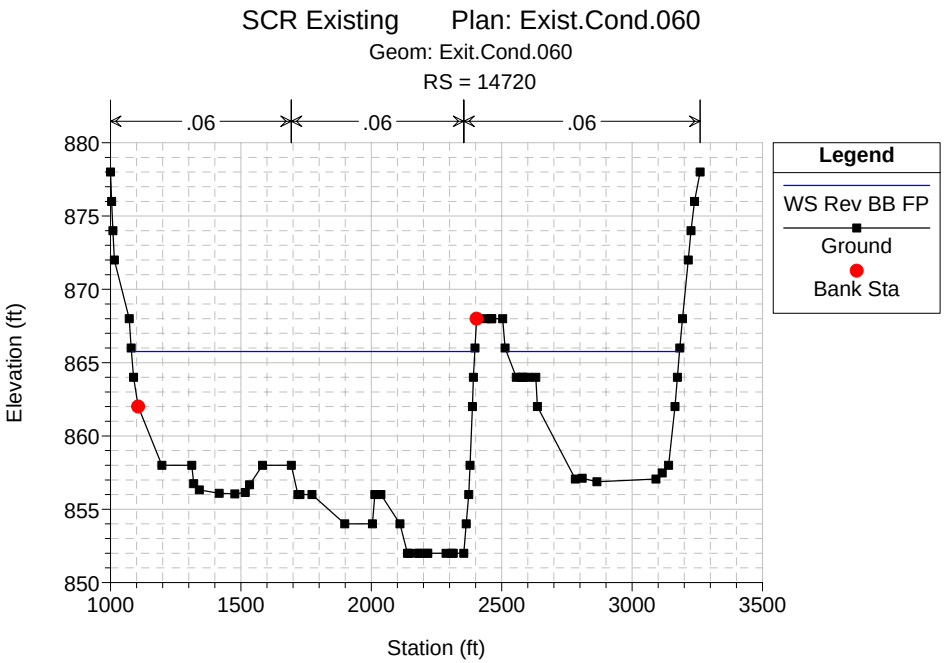
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Exit.Cond.060
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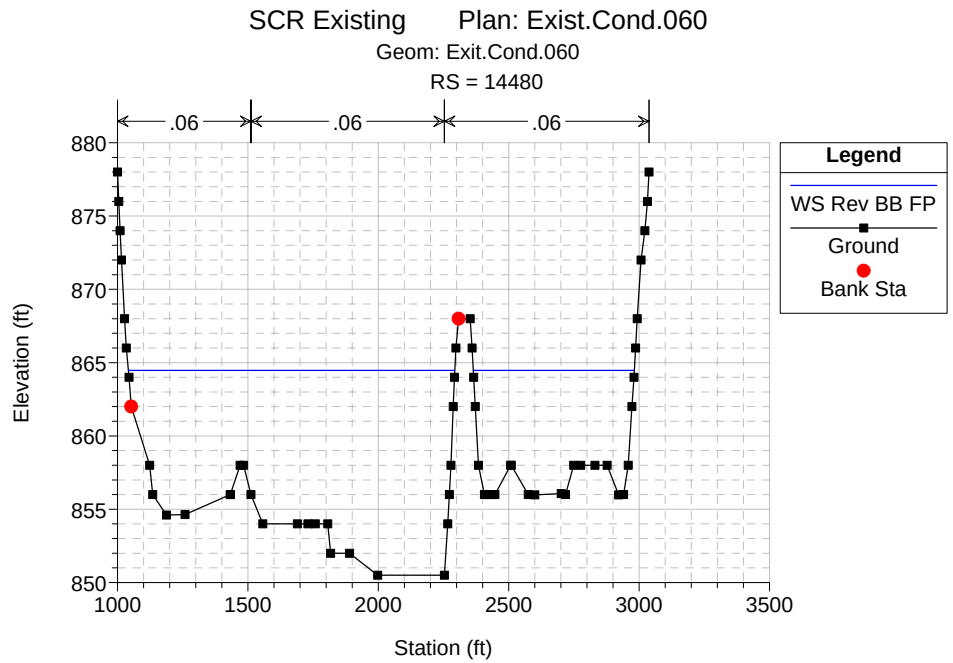
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Exit.Cond.060
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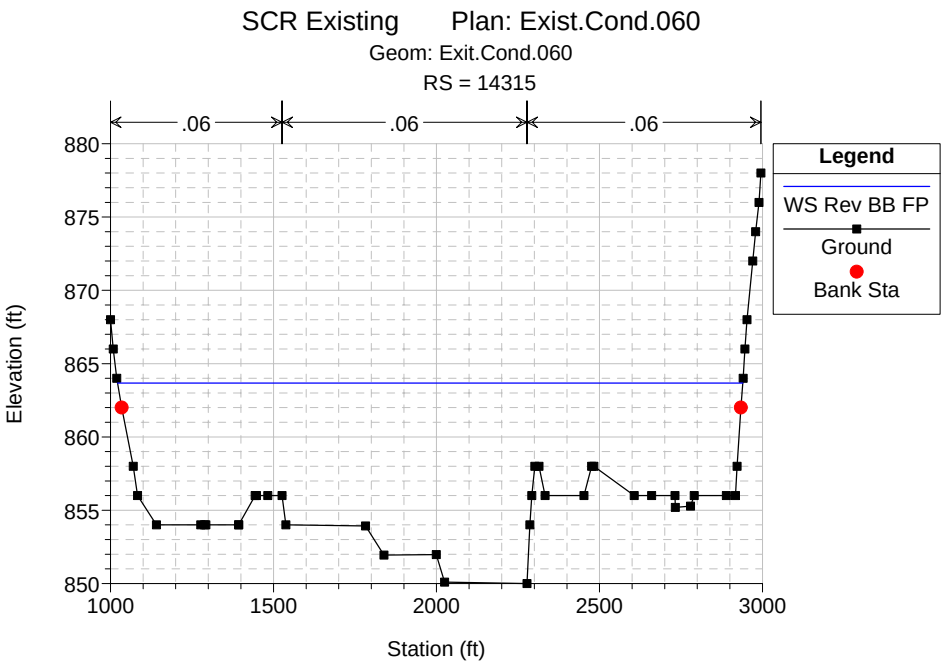
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Exit.Cond.060
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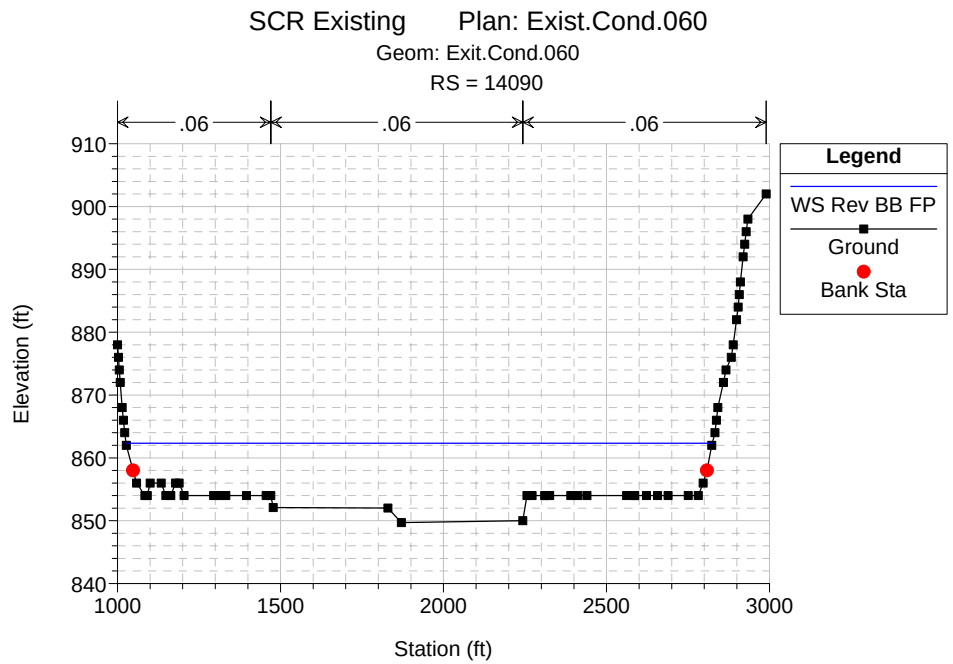
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Exit.Cond.060
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.06
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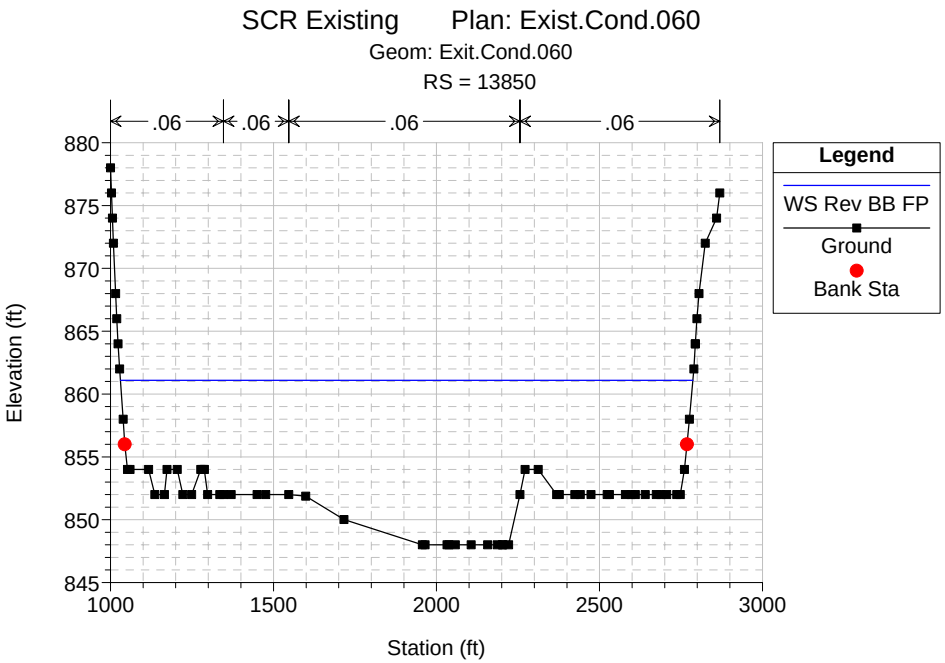
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Existing Plan: Exist.Cond.060
Geom: Exit.Cond.060
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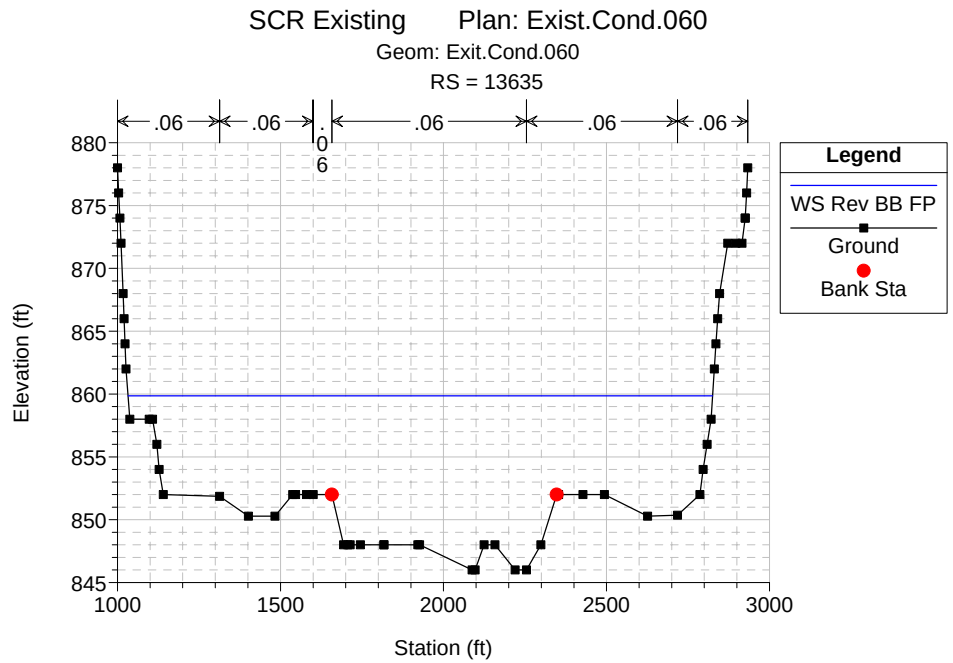
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Exit.Cond.060
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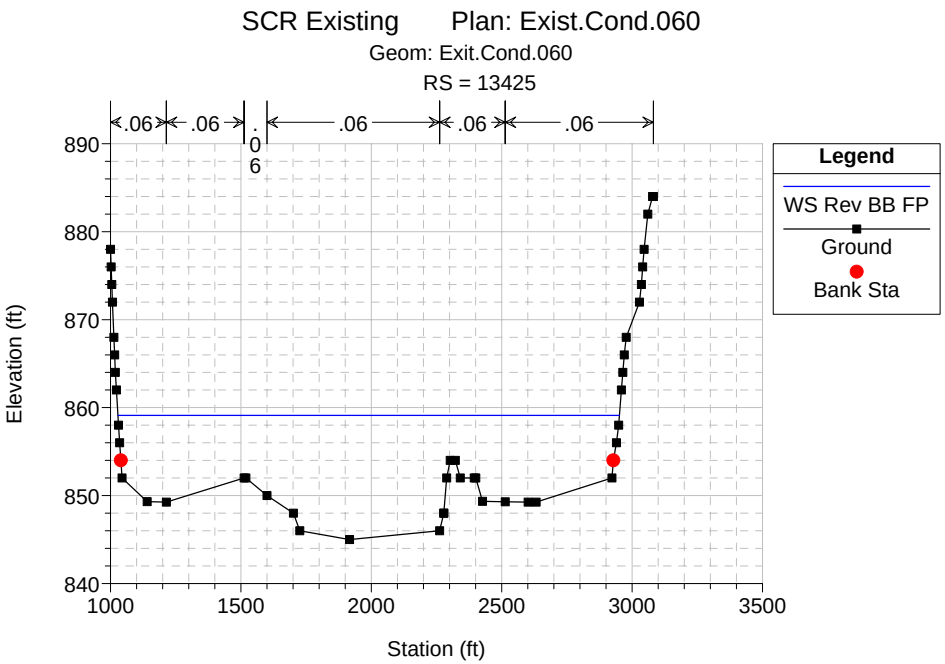
.06
.06
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Exit.Cond.060
RS = 13425
.06
.06
.06
.06
.06
.06
Legend
WS Rev BB FP
Ground
Bank Sta
Elevation (ft)
890
880
870
860
850
840
1000
1500
2000
2500
3000
3500
Station (ft)

Appendix II: Q_{cap} Proposed Project Condition HEC-RAS Model (n = 0.060); Summary Table, Profile & Cross-Sections

HEC-RAS Plan: Pr.060 River: SCR Reach: Project Profile: Rev BB

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Project	39755	Rev BB	115111.00	994.00	1010.68	1007.49	1012.19	0.006146	10.48	12580.87	1465.08	0.52
Project	39605	Rev BB	115111.00	993.00	1009.99	1005.91	1011.30	0.004890	9.80	13367.05	1368.01	0.47
Project	39310	Rev BB	115111.00	992.00	1008.43	1004.44	1009.76	0.005110	10.12	13723.31	1595.92	0.48
Project	39100	Rev BB	115111.00	990.00	1007.79	1002.13	1008.78	0.003453	8.43	15336.82	1496.06	0.40
Project	38925	Rev BB	115111.00	989.50	1007.08	1001.39	1008.14	0.003726	8.54	14563.34	1361.03	0.41
Project	38710	Rev BB	115111.00	988.00	1006.15	1000.08	1007.32	0.003747	8.89	13832.35	1210.38	0.41
Project	38475	Rev BB	115111.00	986.00	1003.67	999.95	1005.97	0.007972	12.42	9898.41	950.04	0.60
Project	38300	Rev BB	115111.00	985.50	1002.77	997.52	1004.64	0.005751	11.01	10753.31	925.57	0.51
Project	38065	Rev BB	115111.00	984.00	1001.39	995.71	1003.30	0.005534	11.10	10458.33	810.90	0.51
Project	37810	Rev BB	115111.00	983.00	998.33	995.23	1001.29	0.010537	13.81	8408.17	739.85	0.68
Project	37655	Rev BB	115111.00	982.00	997.14	994.10	999.59	0.009310	12.63	9282.13	855.33	0.64
Project	37390	Rev BB	115111.00	981.00	995.94	990.39	997.55	0.005135	10.18	11303.91	817.40	0.48
Project	37135	Rev BB	115111.00	980.00	994.16	989.60	996.05	0.006570	11.03	10440.45	805.86	0.54
Project	36930	Rev BB	115111.00	978.00	993.23	987.60	994.79	0.005000	10.00	11506.84	866.85	0.48
Project	36735	Rev BB	115111.00	977.00	992.21	987.09	993.75	0.005449	9.95	11569.13	908.31	0.49
Project	36515	Rev BB	115111.00	975.00	991.44	985.42	992.64	0.004028	8.79	13090.19	985.64	0.43
Project	36374	Rev BB	115111.00	974.11	991.04	985.06	992.11	0.003781	8.28	13896.08	1090.14	0.41
Project	36299		Bridge									
Project	36240	Rev BB	115111.00	974.11	989.20	985.19	990.66	0.006439	9.71	11856.90	1094.19	0.52
Project	36080	Rev BB	116236.00	973.00	988.04	984.69	989.60	0.007590	10.04	11572.59	1148.70	0.56
Project	35845	Rev BB	116236.00	971.00	986.89	982.91	988.01	0.005181	8.49	13689.77	1433.70	0.48
Project	35725	Rev BB	116236.00	970.00	985.99	982.70	987.31	0.006046	9.33	12834.44	1432.33	0.52
Project	35515	Rev BB	116236.00	969.00	984.66	981.71	986.05	0.006031	10.25	13009.58	1452.87	0.52
Project	35245	Rev BB	116236.00	968.00	982.78	980.46	984.27	0.007171	10.44	12558.42	1568.86	0.56
Project	35040	Rev BB	116236.00	967.00	981.26	978.98	982.80	0.007003	11.42	12555.09	1473.45	0.56
Project	34860	Rev BB	116236.00	966.00	979.95	977.40	981.46	0.008311	9.87	11778.23	1397.32	0.60
Project	34720	Rev BB	116236.00	965.50	978.91	976.17	980.30	0.007553	9.46	12291.13	1434.22	0.57
Project	34495	Rev BB	116236.00	964.00	977.35	974.30	978.67	0.006901	9.22	12609.77	1424.09	0.55
Project	34310	Rev BB	116236.00	963.00	976.23	972.90	977.51	0.005476	9.71	13346.36	1390.77	0.49
Project	34090	Rev BB	116236.00	962.00	974.98	971.50	976.25	0.006060	9.05	12840.92	1352.43	0.52
Project	33880	Rev BB	116236.00	960.00	973.59	970.45	974.92	0.006730	9.23	12590.22	1447.36	0.55
Project	33710	Rev BB	116236.00	959.00	972.56	969.24	973.73	0.006377	8.70	13366.39	1623.01	0.53
Project	33500	Rev BB	116236.00	958.00	971.32	968.41	972.43	0.005880	8.91	14258.70	1707.37	0.49
Project	33310	Rev BB	116236.00	957.00	970.43	967.01	971.36	0.004941	7.75	15004.31	1770.85	0.47
Project	33115	Rev BB	116236.00	956.00	969.56	965.60	970.37	0.004682	7.21	16112.81	1830.33	0.43
Project	32795	Rev BB	116236.00	954.00	967.77	964.61	968.76	0.005443	7.96	14608.98	1842.49	0.50
Project	32605	Rev BB	116236.00	952.00	966.63	963.61	967.66	0.005915	8.14	14272.68	2251.61	0.52
Project	32265	Rev BB	140776.00	950.00	964.96	961.33	965.78	0.004995	7.24	19442.45	2824.59	0.49
Project	31875	Rev BB	140776.00	949.00	963.22	959.37	963.92	0.004338	6.73	20954.53	2536.02	0.41

HEC-RAS Plan: Pr.060 River: SCR Reach: Project Profile: Rev BB (Continued)

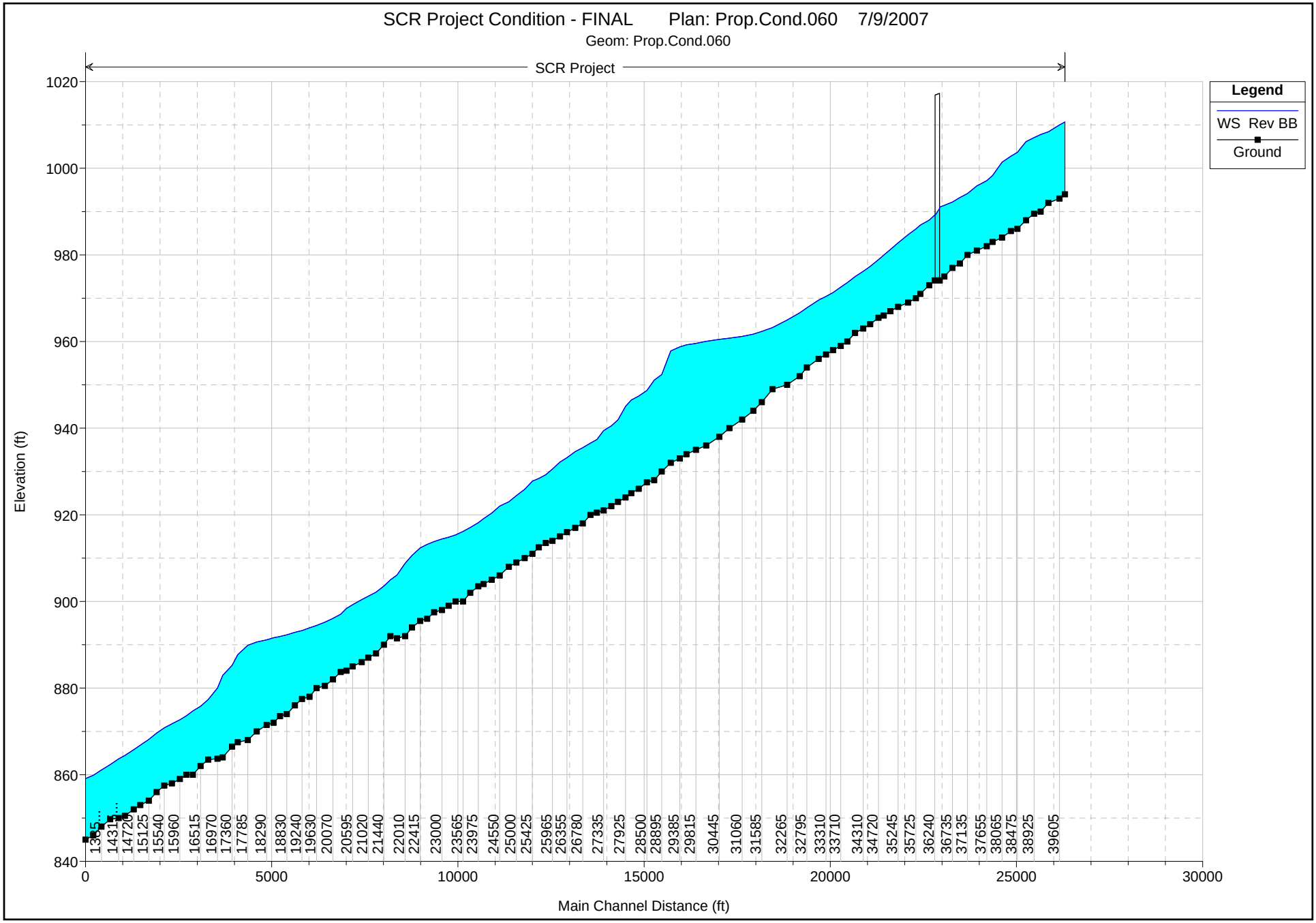
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Project	31585	Rev BB	140776.00	946.00	962.35	956.99	962.93	0.002621	6.12	23006.05	2314.89	0.34
Project	31360	Rev BB	140776.00	944.00	961.70	955.41	962.35	0.002380	6.54	22096.52	1957.63	0.33
Project	31060	Rev BB	140776.00	942.00	961.18	953.29	961.72	0.001734	5.92	23780.89	1967.63	0.30
Project	30720	Rev BB	140776.00	940.00	960.79	951.33	961.20	0.001155	5.14	27379.42	1925.71	0.24
Project	30445	Rev BB	140776.00	938.00	960.51	949.57	960.91	0.000977	5.04	28148.33	1996.42	0.22
Project	30095	Rev BB	140776.00	936.00	960.06	947.93	960.55	0.001009	5.71	26351.71	2118.84	0.23
Project	29815	Rev BB	140776.00	935.00	959.57	948.10	960.22	0.001321	6.64	23724.05	2024.46	0.26
Project	29565	Rev BB	140776.00	934.00	959.25	947.27	959.88	0.001282	6.48	23805.00	2045.66	0.27
Project	29385	Rev BB	140776.00	933.00	958.77	948.98	959.59	0.001772	7.47	21266.51	1975.98	0.31
Project	29140	Rev BB	140776.00	932.00	957.82	950.99	959.01	0.003115	8.84	17006.33	1725.07	0.42
Project	28895	Rev BB	140776.00	930.00	952.36	952.36	957.25	0.013878	19.72	9132.66	1056.57	0.82
Project	28695	Rev BB	140776.00	928.00	951.09	947.96	953.92	0.009195	13.51	10416.50	1092.60	0.77
Project	28500	Rev BB	140776.00	927.50	948.69	945.08	952.05	0.009434	14.87	10048.90	996.54	0.67
Project	28280	Rev BB	140776.00	926.00	947.41	941.85	950.28	0.005996	14.06	11209.93	1031.83	0.56
Project	28080	Rev BB	140776.00	925.00	946.51	940.04	949.05	0.005297	13.05	11838.39	978.08	0.52
Project	27925	Rev BB	140776.00	924.00	945.01	939.47	948.08	0.006558	14.26	10543.99	811.39	0.58
Project	27725	Rev BB	140776.00	923.00	941.92	939.31	946.30	0.010561	17.12	8750.96	667.06	0.72
Project	27545	Rev BB	140776.00	922.00	940.55	937.81	944.29	0.009793	15.90	9436.76	808.12	0.69
Project	27335	Rev BB	140776.00	921.00	939.42	936.22	942.22	0.007577	13.96	11188.61	999.50	0.61
Project	27155	Rev BB	140776.00	920.50	937.38	935.86	940.58	0.009958	15.27	10639.61	1089.02	0.69
Project	26990	Rev BB	140776.00	920.00	936.56	933.79	938.74	0.008363	12.09	12231.12	1218.40	0.62
Project	26780	Rev BB	140776.00	918.00	935.50	931.71	937.16	0.005556	11.05	14289.90	1294.34	0.51
Project	26575	Rev BB	140776.00	917.00	934.60	929.99	935.97	0.005297	9.46	15060.28	1311.99	0.48
Project	26355	Rev BB	140776.00	916.00	933.19	929.39	934.75	0.005712	10.45	14505.66	1340.33	0.51
Project	26170	Rev BB	140776.00	915.00	932.19	928.71	933.71	0.005452	10.89	14929.88	1368.31	0.50
Project	25965	Rev BB	140776.00	914.00	930.58	927.71	932.44	0.006847	11.82	13651.67	1342.66	0.56
Project	25785	Rev BB	140776.00	913.50	929.25	926.49	931.10	0.007304	11.92	13831.32	1485.37	0.57
Project	25600	Rev BB	140776.00	912.50	928.39	925.46	929.76	0.005665	10.61	16161.50	1828.88	0.51
Project	25425	Rev BB	140776.00	911.00	927.78	924.32	928.75	0.004330	8.52	18568.32	2043.02	0.45
Project	25215	Rev BB	140776.00	910.00	925.89	923.53	927.46	0.007843	10.61	14824.05	1904.35	0.59
Project	25000	Rev BB	140776.00	909.00	924.43	922.50	925.77	0.007109	10.11	16433.08	2347.85	0.56
Project	24795	Rev BB	140776.00	908.00	923.01	920.96	924.24	0.006822	9.87	16720.70	2228.06	0.55
Project	24550	Rev BB	140776.00	906.00	922.00	918.53	922.88	0.004381	8.30	19100.39	2114.57	0.45
Project	24335	Rev BB	140776.00	905.00	920.40	918.22	921.71	0.007117	10.29	16042.33	2000.98	0.56
Project	24115	Rev BB	140776.00	904.00	919.12	916.30	920.26	0.006269	9.49	16853.63	1974.66	0.51
Project	23975	Rev BB	140776.00	903.50	918.18	914.88	919.22	0.005430	8.90	17461.17	1932.97	0.48
Project	23755	Rev BB	140776.00	902.00	917.08	913.54	918.05	0.004903	8.62	18089.69	1994.95	0.47
Project	23565	Rev BB	140776.00	900.00	916.17	912.70	917.11	0.004847	8.46	18441.94	2081.93	0.46
Project	23365	Rev BB	140776.00	900.00	915.36	911.37	916.21	0.004101	8.18	19410.90	2071.90	0.43

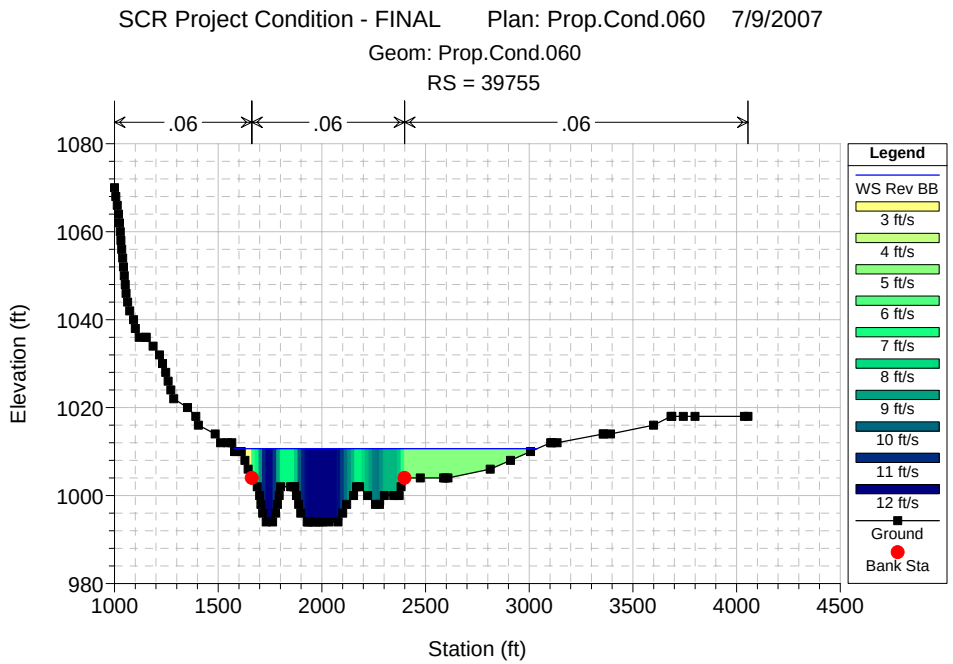
HEC-RAS Plan: Pr.060 River: SCR Reach: Project Profile: Rev BB (Continued)

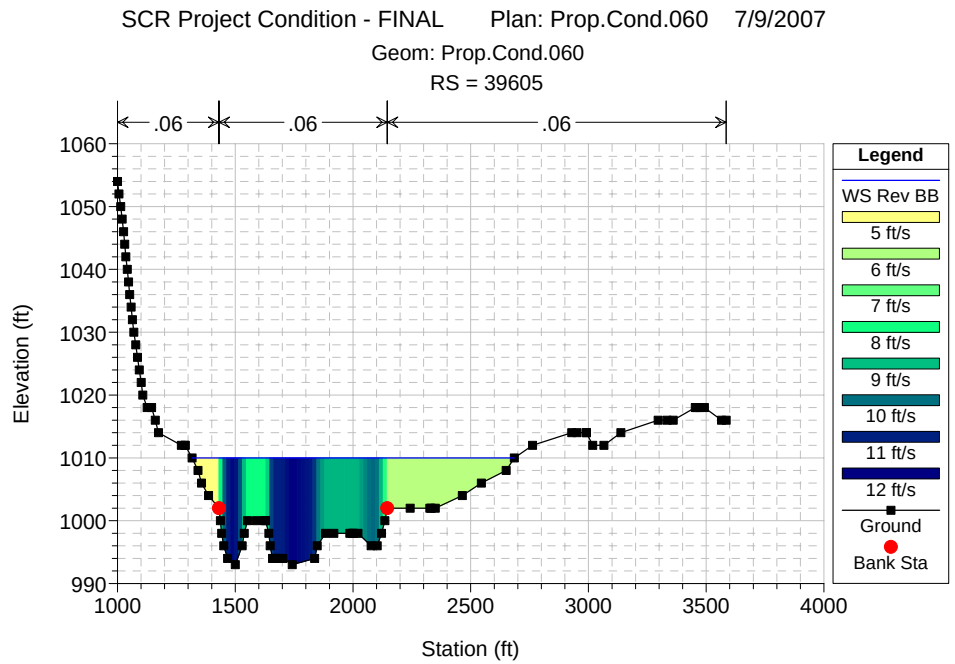
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Project	23180	Rev BB	140776.00	899.00	914.82	909.92	915.52	0.002784	7.85	21875.86	2120.65	0.36
Project	23000	Rev BB	140776.00	898.00	914.44	908.39	915.03	0.002334	6.17	23133.67	2141.67	0.32
Project	22790	Rev BB	140776.00	897.50	913.82	908.15	914.49	0.002643	6.60	21557.06	2014.36	0.35
Project	22600	Rev BB	140776.00	896.00	913.17	907.78	913.94	0.002990	7.89	20501.46	1908.99	0.38
Project	22415	Rev BB	140776.00	895.50	912.37	907.11	913.31	0.003714	8.61	18751.73	1840.12	0.42
Project	22195	Rev BB	141426.00	894.00	910.63	906.79	912.24	0.006033	10.34	14383.75	1480.94	0.53
Project	22010	Rev BB	141426.00	892.00	908.81	906.38	910.92	0.007822	12.21	12996.47	1561.41	0.60
Project	21790	Rev BB	141426.00	891.50	906.11	904.87	908.83	0.011132	13.68	11583.43	1949.69	0.70
Project	21615	Rev BB	141426.00	892.00	904.99	903.04	906.85	0.008608	11.31	13844.77	2046.57	0.62
Project	21440	Rev BB	141426.00	890.00	903.55	901.59	905.32	0.008343	11.41	14325.83	2025.53	0.60
Project	21225	Rev BB	141426.00	888.00	902.14	900.27	903.51	0.007493	10.48	16362.87	2373.67	0.56
Project	21020	Rev BB	141426.00	887.00	901.20	897.78	902.21	0.004602	9.05	19514.86	2636.40	0.45
Project	20845	Rev BB	141426.00	886.00	900.43	897.38	901.34	0.004797	8.71	19967.07	2688.40	0.46
Project	20595	Rev BB	141426.00	885.00	899.24	896.38	900.19	0.004614	8.98	19883.13	2656.28	0.46
Project	20435	Rev BB	141426.00	884.00	898.39	895.77	899.40	0.004993	9.27	19301.01	2617.90	0.47
Project	20280	Rev BB	141426.00	883.70	897.05	895.55	898.37	0.008176	10.73	16664.80	2566.83	0.58
Project	20070	Rev BB	141426.00	882.00	896.10	892.99	897.01	0.004682	8.68	19522.96	2457.09	0.45
Project	19855	Rev BB	141426.00	880.50	895.22	891.50	896.06	0.003932	8.33	20798.21	2551.37	0.42
Project	19630	Rev BB	141426.00	880.00	894.45	890.05	895.23	0.003387	7.87	21473.26	2615.62	0.39
Project	19440	Rev BB	141426.00	878.00	893.92	889.11	894.61	0.002789	7.31	22585.45	2601.72	0.36
Project	19240	Rev BB	141426.00	877.50	893.28	888.88	894.02	0.003087	7.49	21677.07	2495.53	0.38
Project	19050	Rev BB	141426.00	876.00	892.87	887.49	893.47	0.002413	6.67	23392.53	2355.21	0.33
Project	18830	Rev BB	141426.00	874.00	892.31	886.81	892.94	0.002466	6.82	22806.32	2189.47	0.34
Project	18650	Rev BB	141426.00	873.50	891.91	885.64	892.53	0.002137	6.84	23247.94	2064.39	0.32
Project	18475	Rev BB	141426.00	872.00	891.61	884.74	892.15	0.001838	6.05	24119.98	1958.02	0.30
Project	18290	Rev BB	141426.00	871.50	891.15	884.50	891.78	0.002097	6.61	22511.26	1855.78	0.32
Project	18025	Rev BB	141426.00	870.00	890.63	882.91	891.25	0.001813	6.46	22405.63	1628.77	0.30
Project	17785	Rev BB	141426.00	868.00	889.88	882.81	890.72	0.002624	7.38	19386.78	1439.14	0.35
Project	17510	Rev BB	141426.00	867.50	887.72	883.58	889.59	0.005880	11.18	13616.64	1417.48	0.55
Project	17360	Rev BB	141426.00	866.50	885.24	883.38	888.26	0.011683	14.02	10397.40	1222.58	0.75
Project	17110	Rev BB	141426.00	864.00	882.92	881.61	885.45	0.009689	13.62	12045.96	1392.72	0.67
Project	16970	Rev BB	141426.00	863.70	880.00	880.00	883.56	0.016272	15.73	10089.50	1440.33	0.87
Project	16720	Rev BB	141426.00	863.50	877.37	875.46	879.29	0.009832	11.48	13119.85	1563.80	0.65
Project	16515	Rev BB	141426.00	862.00	875.80	873.65	877.34	0.008454	10.40	14576.64	1793.92	0.60
Project	16305	Rev BB	141426.00	860.00	874.71	871.41	875.79	0.005533	9.06	17417.93	1985.25	0.50
Project	16130	Rev BB	141426.00	860.00	873.59	870.71	874.68	0.006438	8.97	16949.43	2091.64	0.54
Project	15960	Rev BB	141426.00	859.00	872.67	869.21	873.56	0.005487	7.63	18706.38	2233.31	0.46
Project	15745	Rev BB	141426.00	858.00	871.75	867.77	872.51	0.004191	6.96	20228.36	2290.82	0.42
Project	15540	Rev BB	141426.00	857.50	870.81	867.17	871.60	0.004505	7.36	19941.84	2340.34	0.43

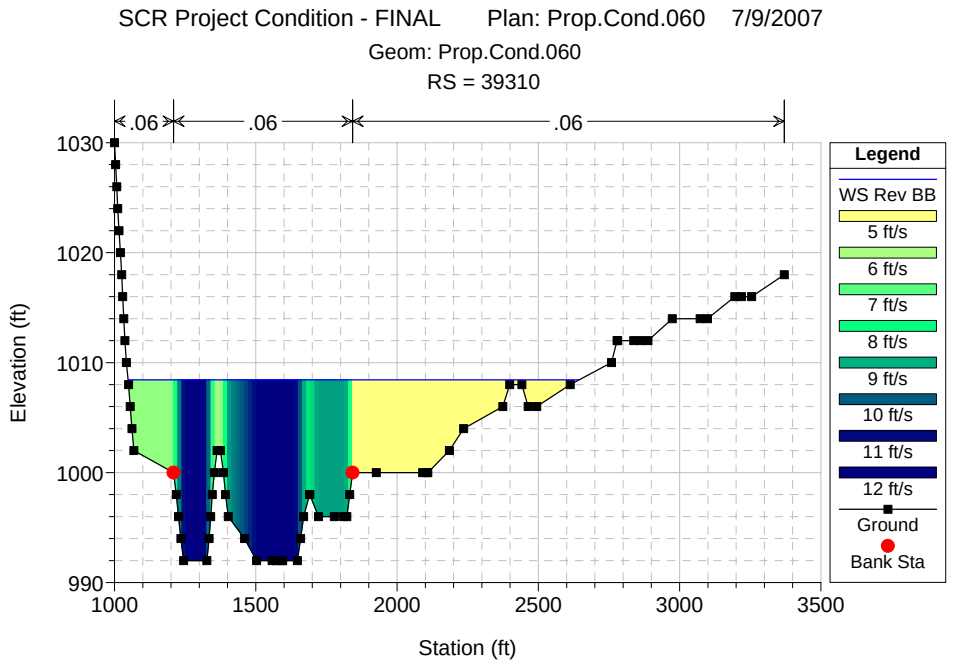
HEC-RAS Plan: Pr.060 River: SCR Reach: Project Profile: Rev BB (Continued)

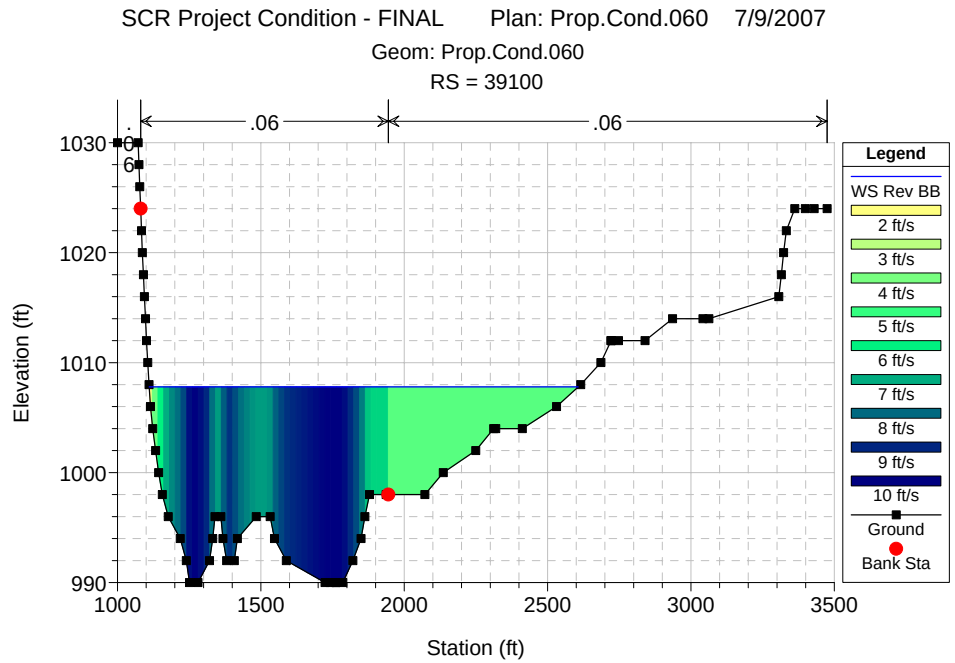
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Project	15335	Rev BB	141426.00	856.00	869.62	866.50	870.54	0.005735	7.72	18357.76	2303.74	0.48
Project	15125	Rev BB	142475.00	854.00	868.15	864.54	869.30	0.005773	8.64	16663.59	2030.83	0.50
Project	14900	Rev BB	142475.00	853.00	866.82	863.28	867.97	0.005856	8.99	16854.77	2075.32	0.50
Project	14720	Rev BB	142475.00	852.00	865.79	862.23	866.93	0.005999	8.92	16978.13	1914.42	0.50
Project	14480	Rev BB	142475.00	850.50	864.46	860.80	865.55	0.005370	8.73	17266.39	1824.14	0.47
Project	14315	Rev BB	142475.00	850.00	863.67	859.81	864.66	0.005069	8.00	17816.17	1917.85	0.46
Project	14090	Rev BB	142475.00	849.71	862.32	858.64	863.43	0.005609	8.47	16872.16	1798.30	0.48
Project	13850	Rev BB	142475.00	848.00	861.10	857.10	862.17	0.005088	8.29	17235.29	1755.83	0.46
Project	13635	Rev BB	142475.00	846.00	859.85	856.30	861.02	0.005383	9.61	16962.34	1792.97	0.49
Project	13425	Rev BB	142475.00	845.00	859.12	854.56	859.97	0.003887	7.41	19281.49	1923.12	0.41

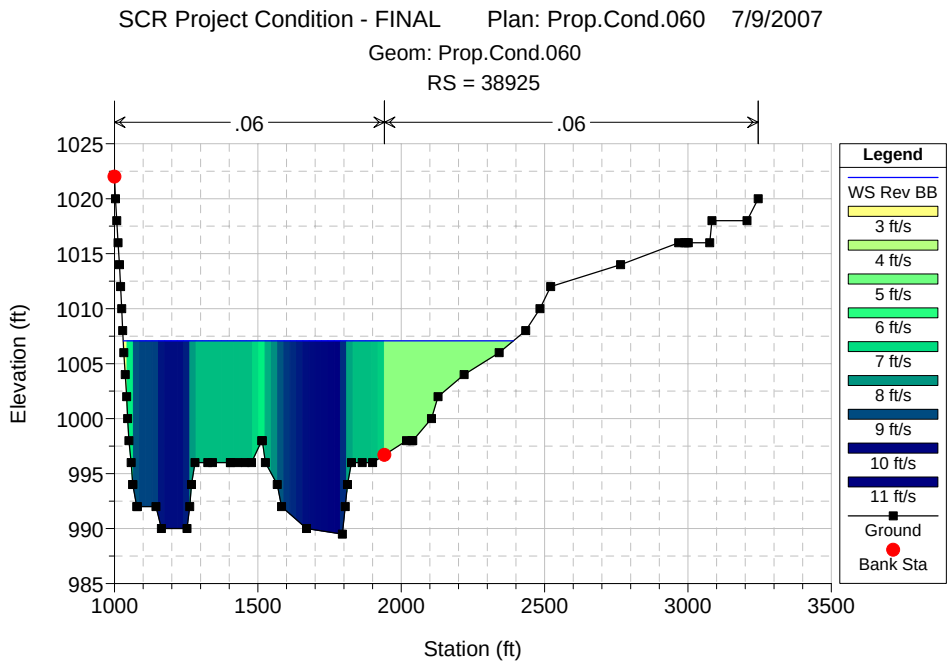

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
SCR Project
Legend
WS Rev BB
Ground
Elevation (ft)
Main Channel Distance (ft)
1020
1000
980
960
940
920
900
880
860
840
0
5000
10000
15000
20000
25000
30000
13805...
14310...
14720
15125
15540
15960
16515
16970
17360
17785
18290
18830
19240
19630
20070
20595
21020
21440
22010
22415
23000
23565
23975
24550
25000
25425
25965
26355
26780
27335
27925
28500
28895
29385
29815
30445
31060
31585
32265
32795
33310
33710
34310
34720
35245
35725
36240
36735
37135
37655
38065
38475
38925
39605

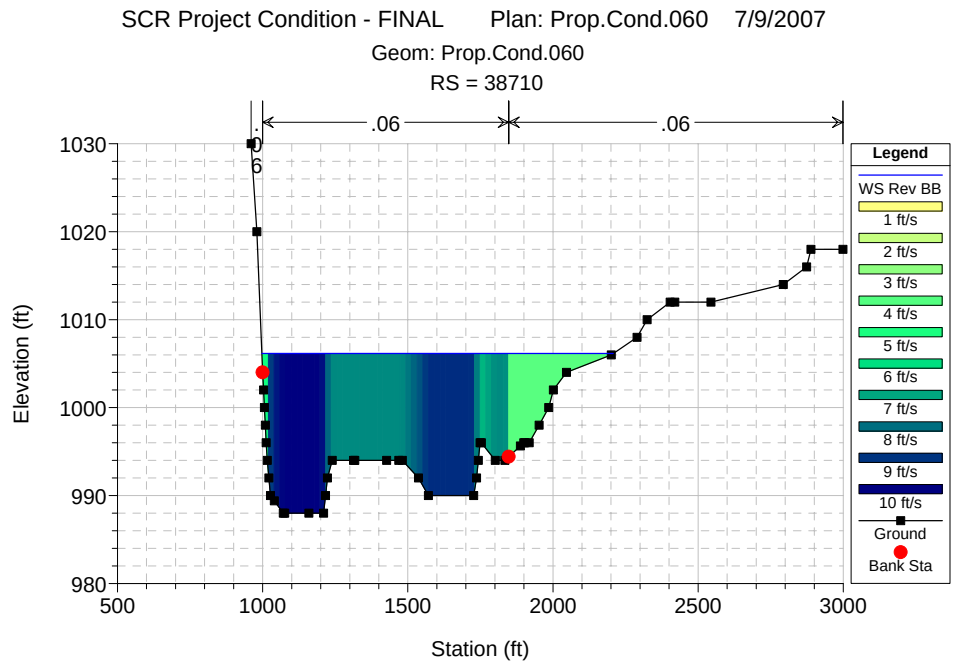

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 39755
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta

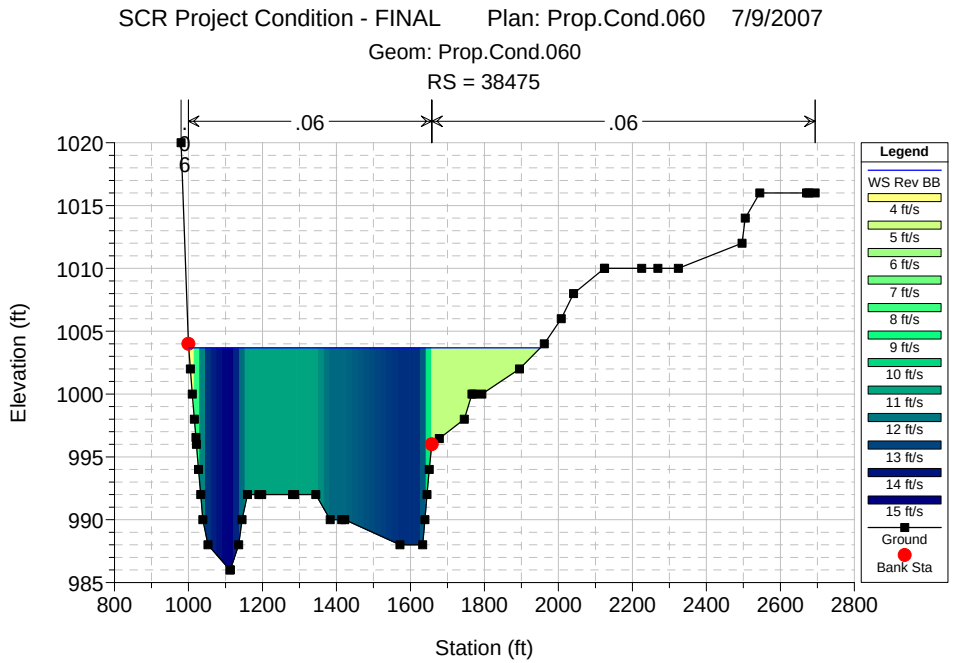

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 39605
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta

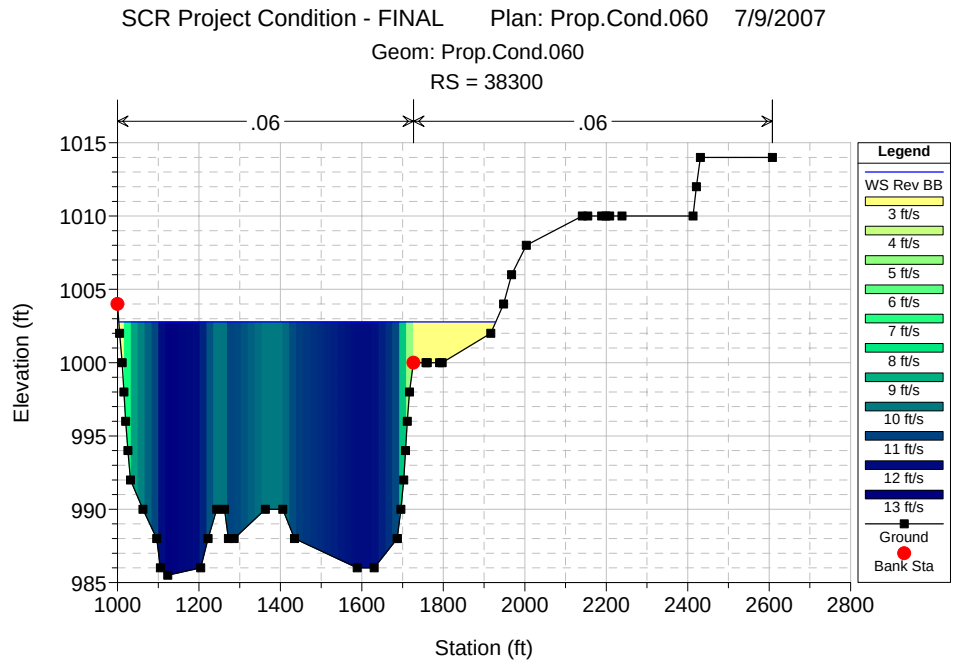

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 39310
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta

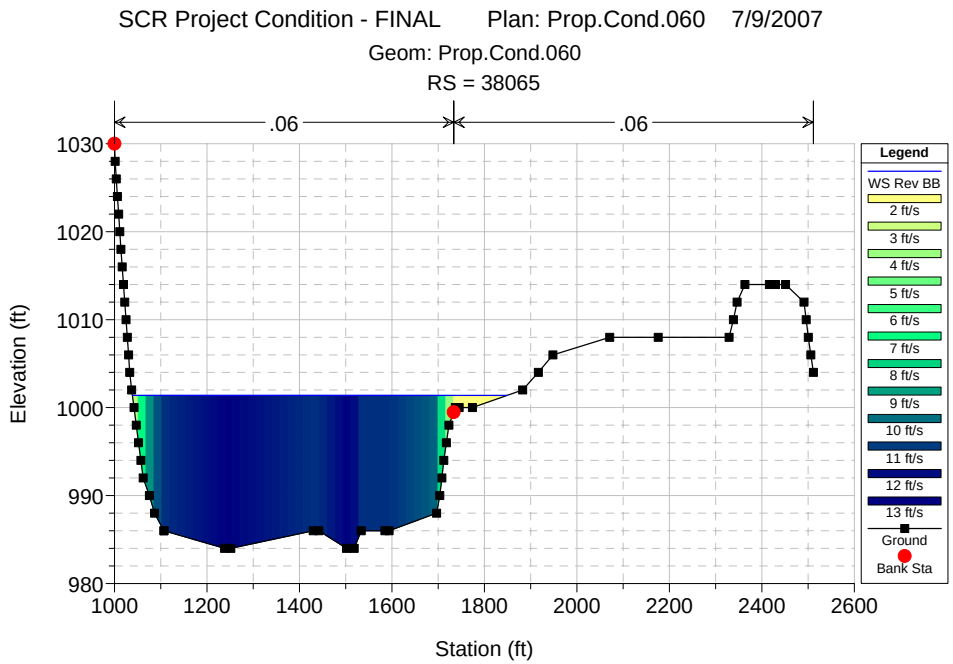

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 39100
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta

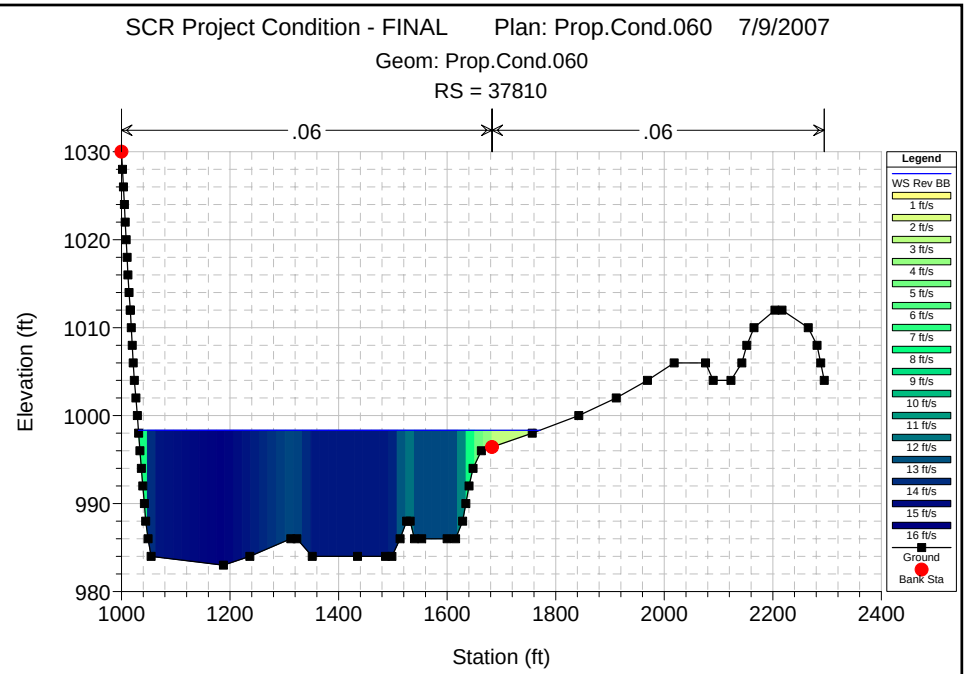

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 38925
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta

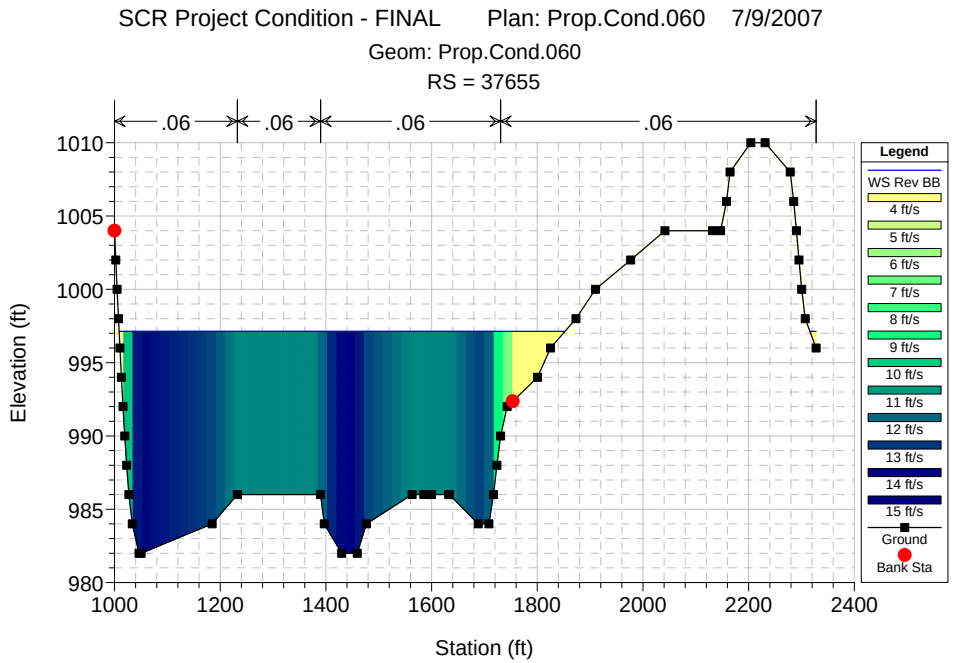

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 38710
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta

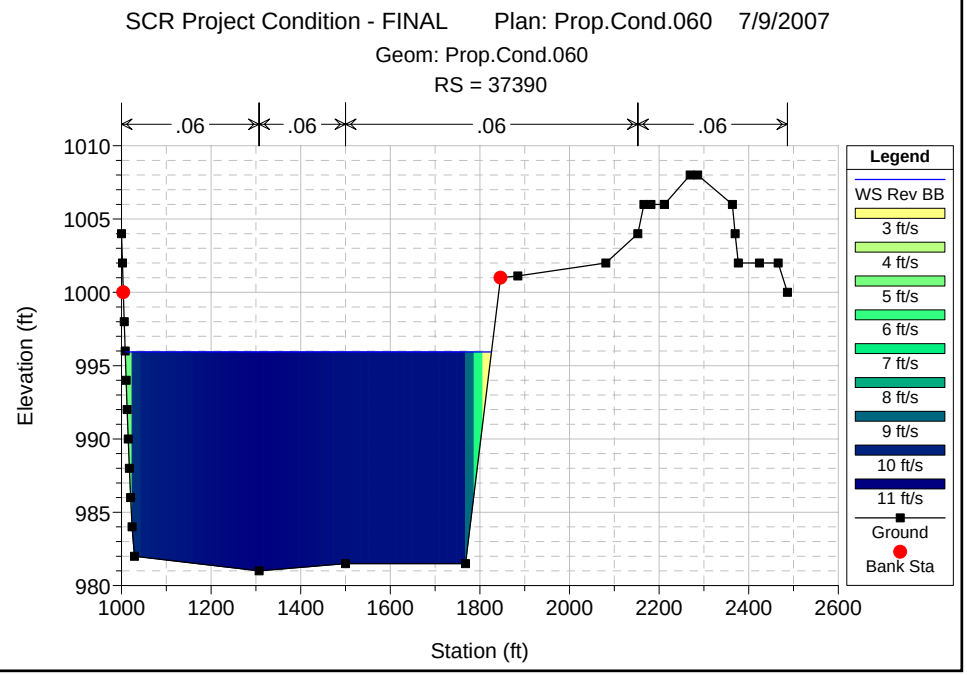

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 38475
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
Ground
Bank Sta

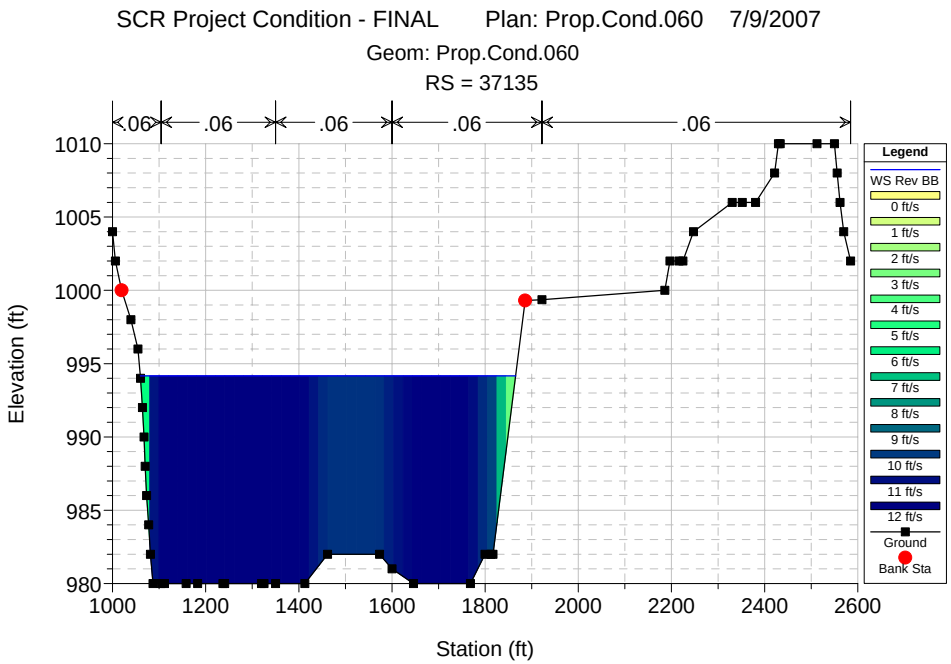

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 38300
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta

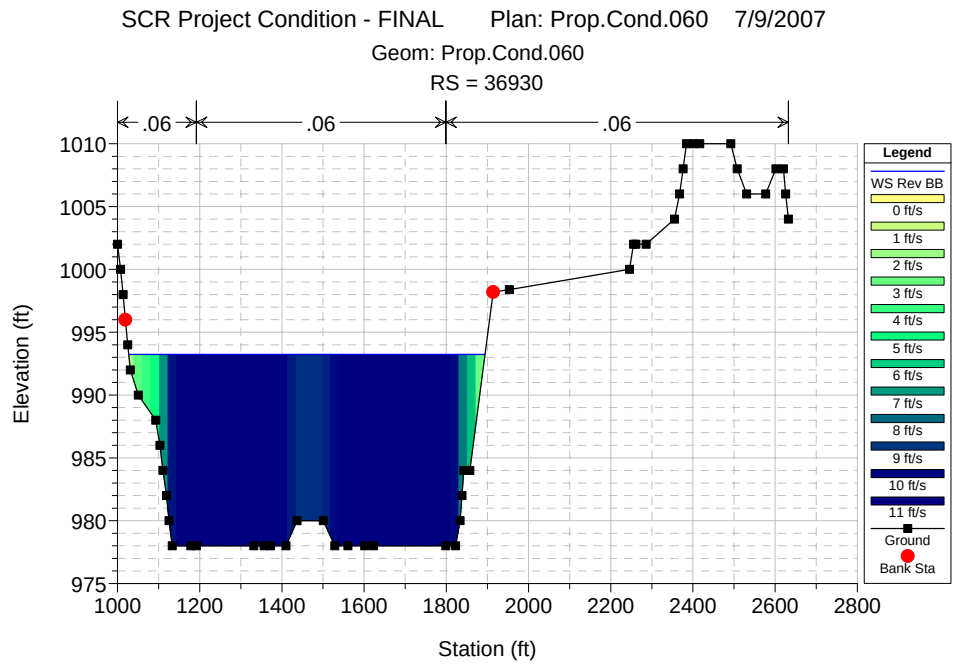

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 38065
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta

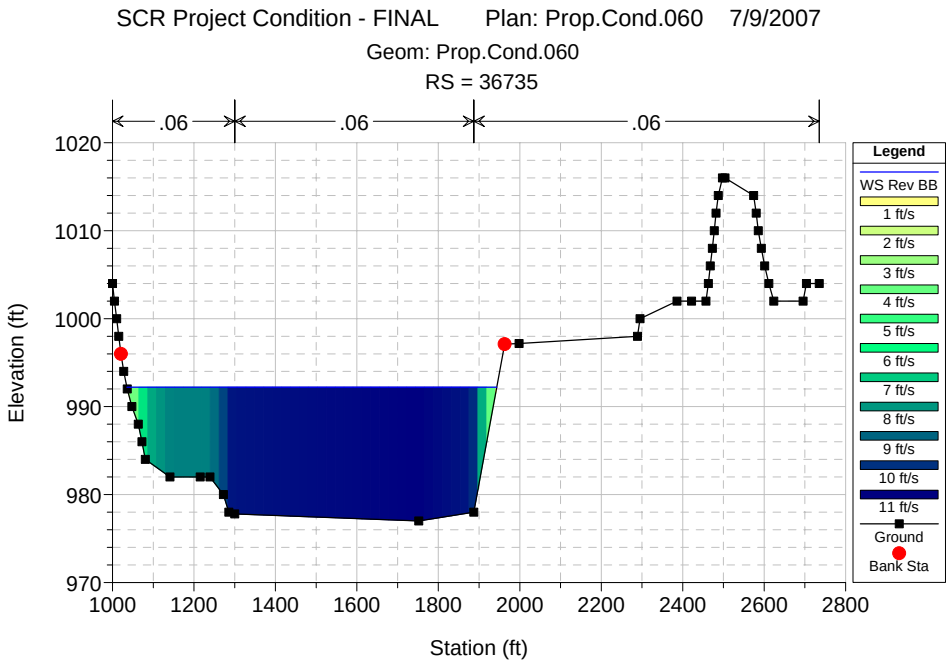

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 37810
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
Ground
Bank Sta

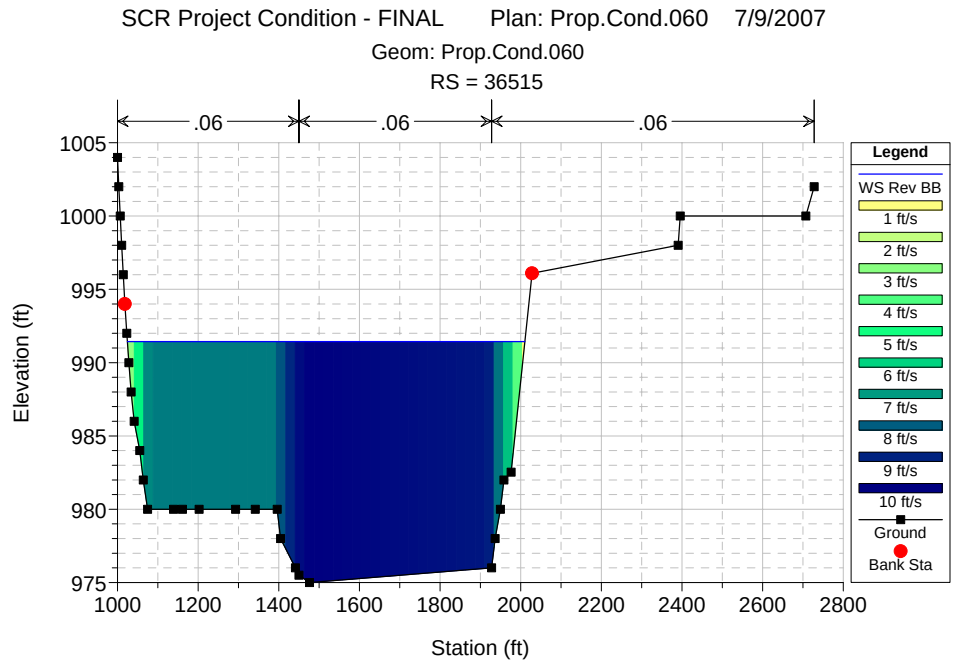

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 37655
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
Ground
Bank Sta

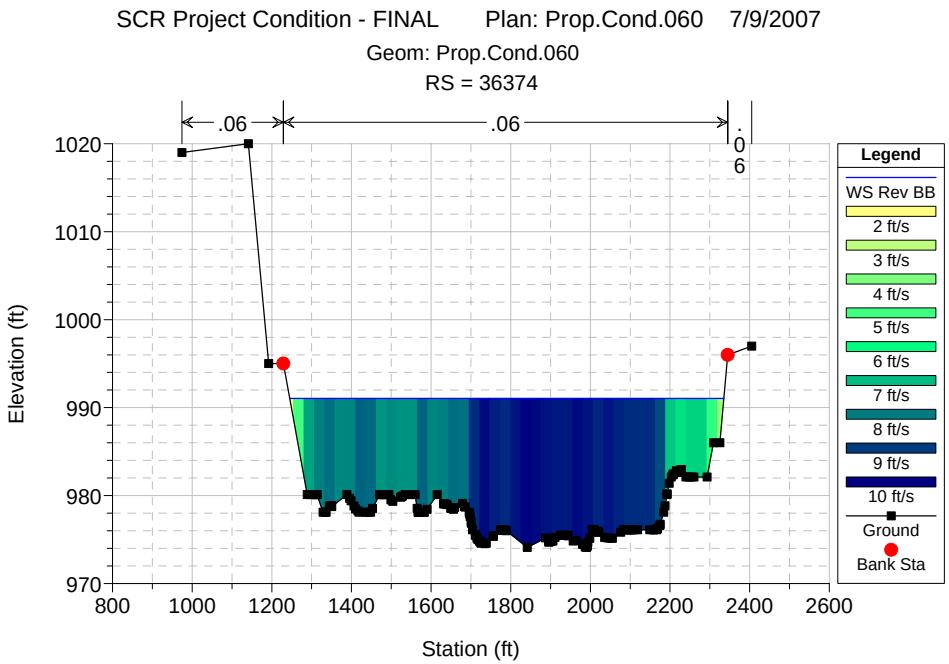

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 37390
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta

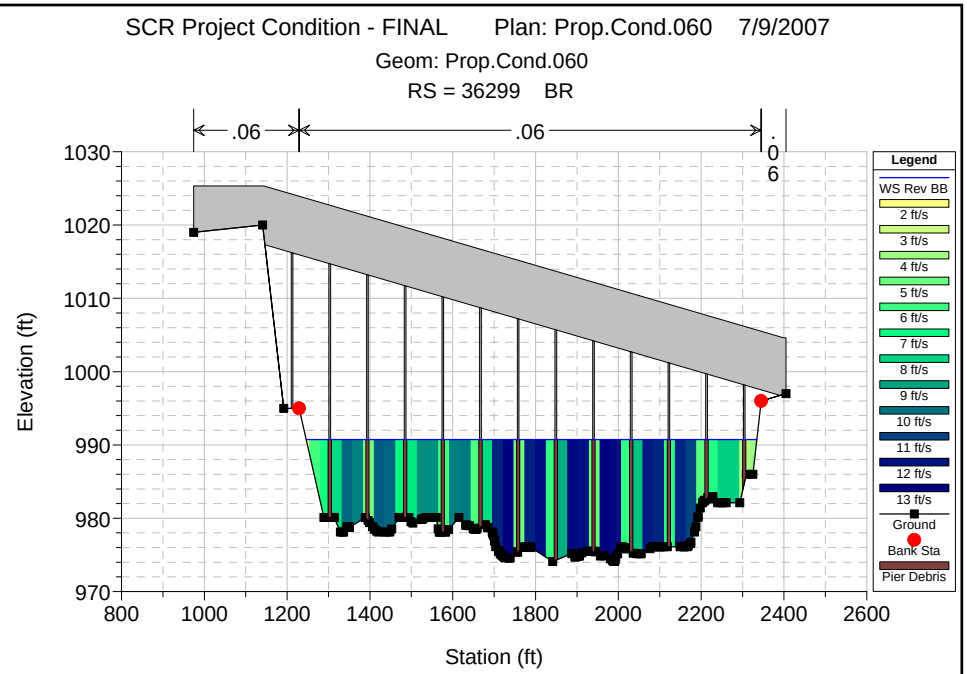

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 37135
.06
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta

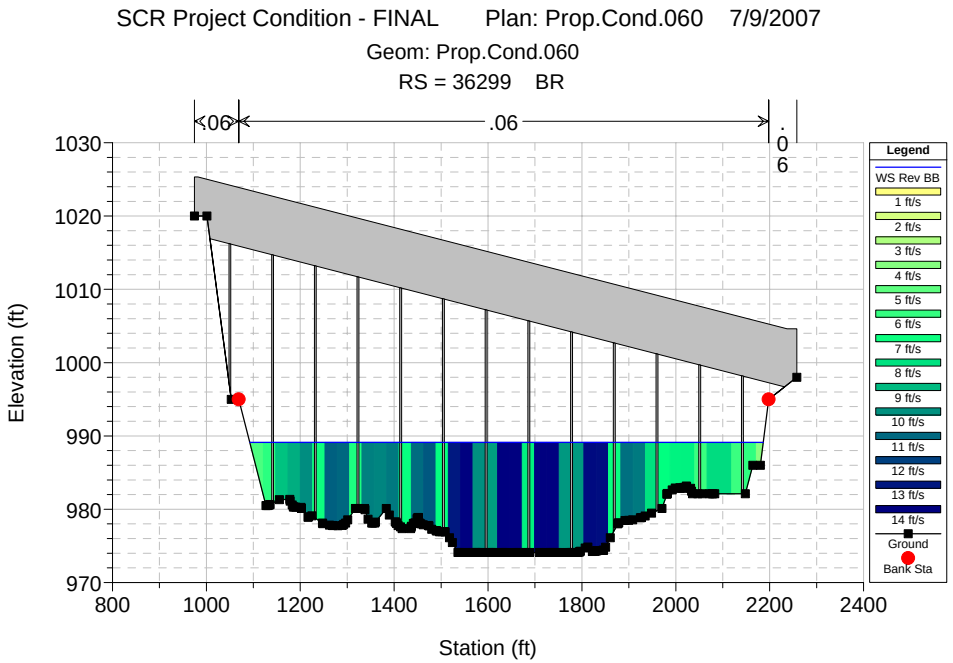

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 36930
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta

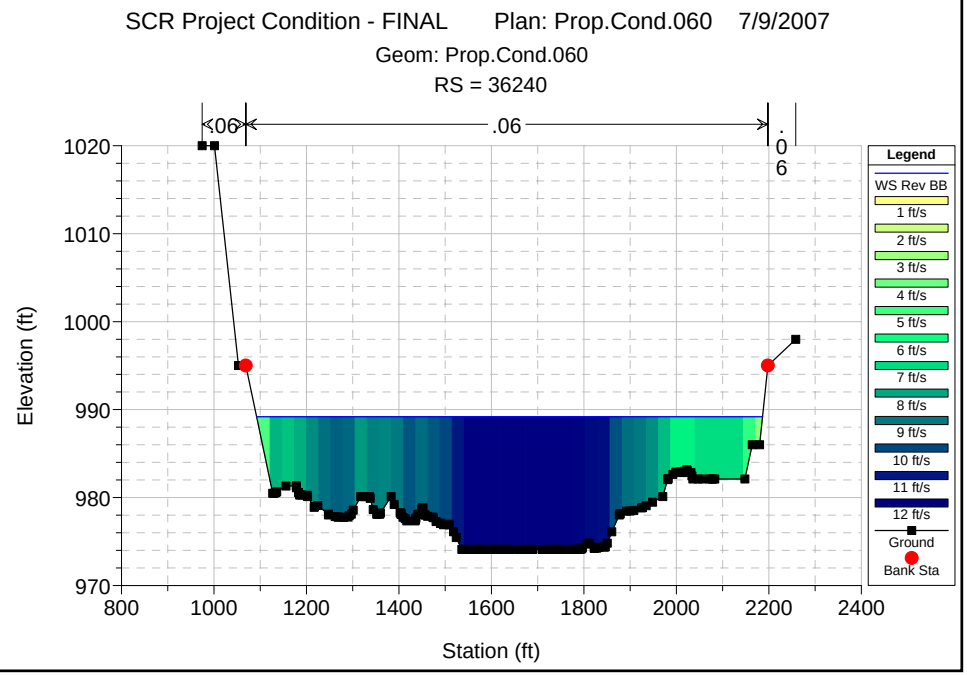

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 36735
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta

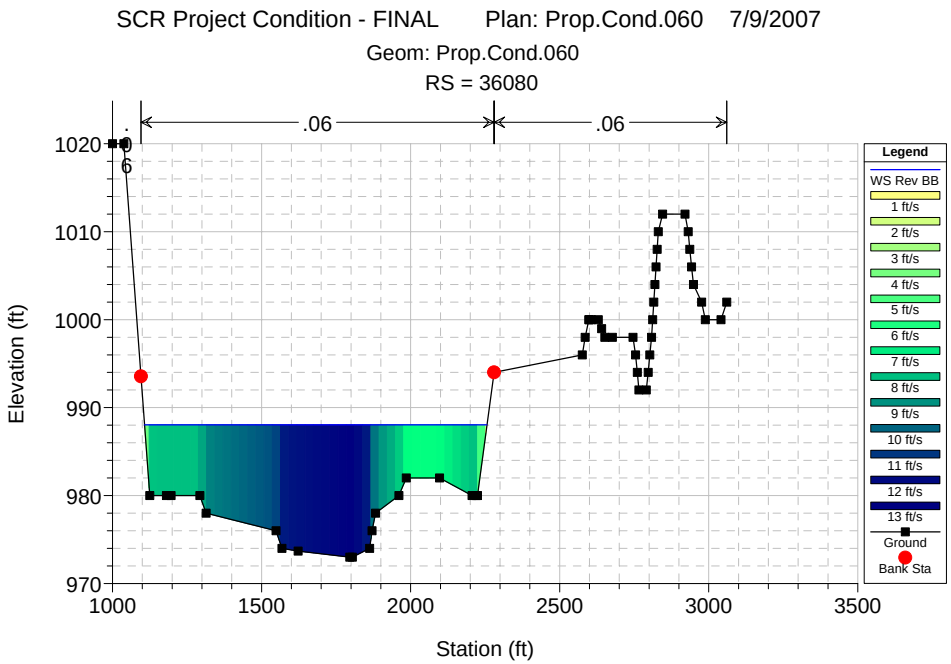

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 36515
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta

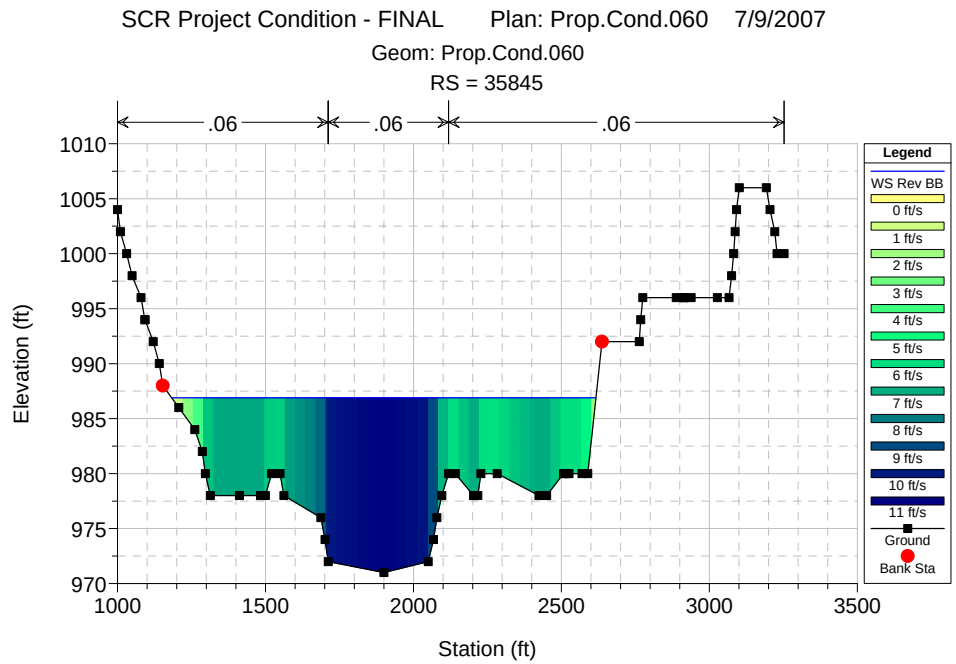

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 36374
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta

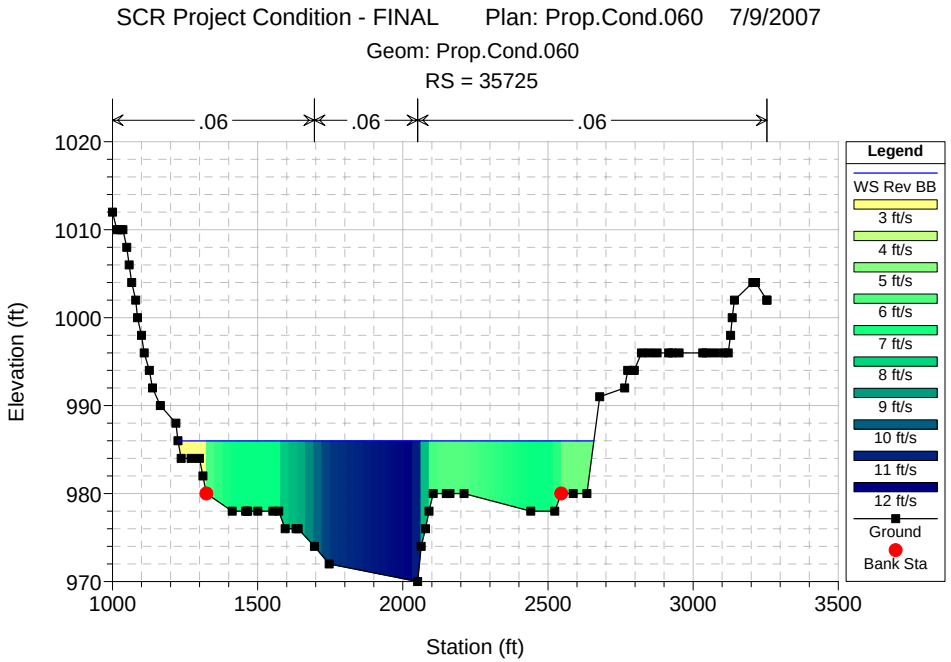

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 36299 BR
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta
Pier Debris

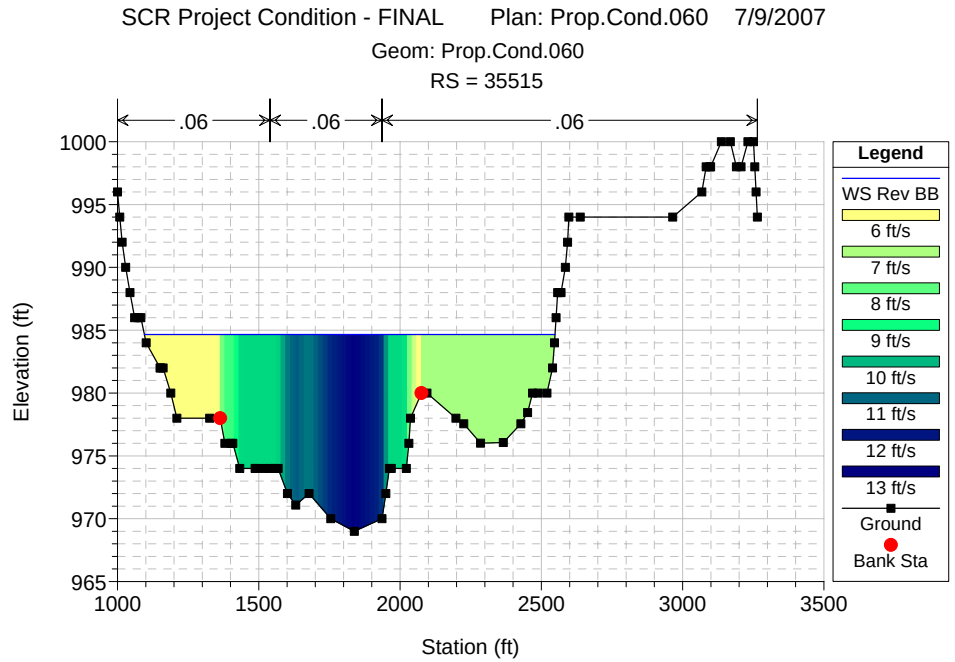

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 36299 BR
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
Ground
Bank Sta

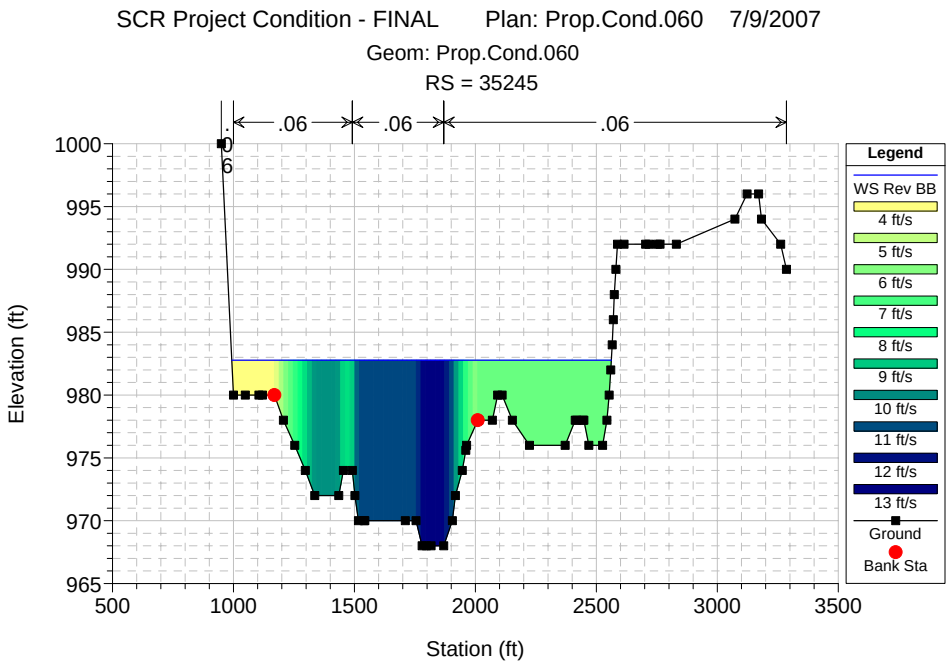

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 36240
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta

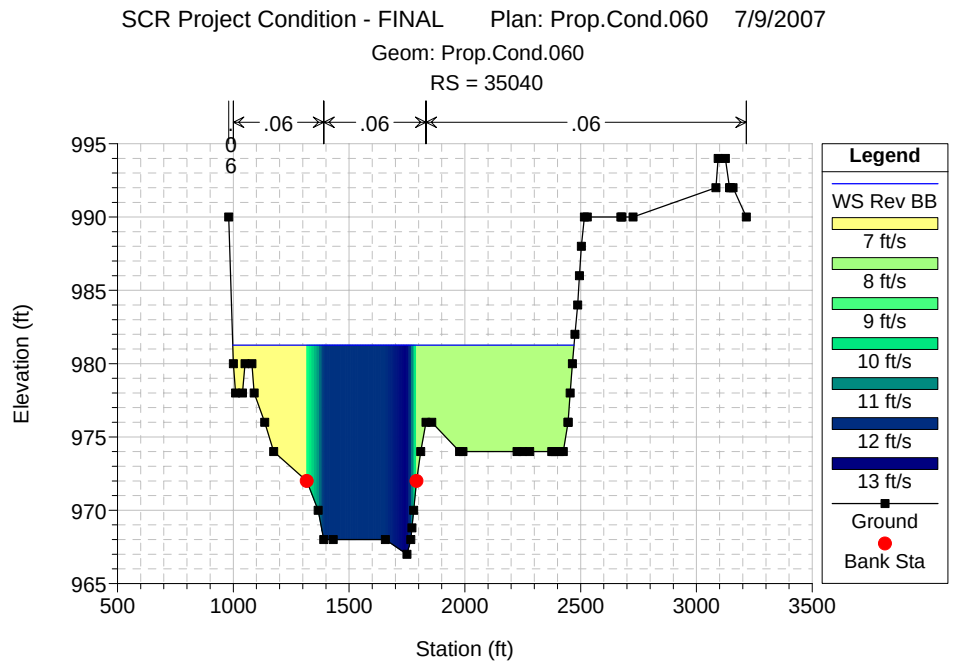

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 36080
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 35845
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 35725
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 35515
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 35245
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 35040
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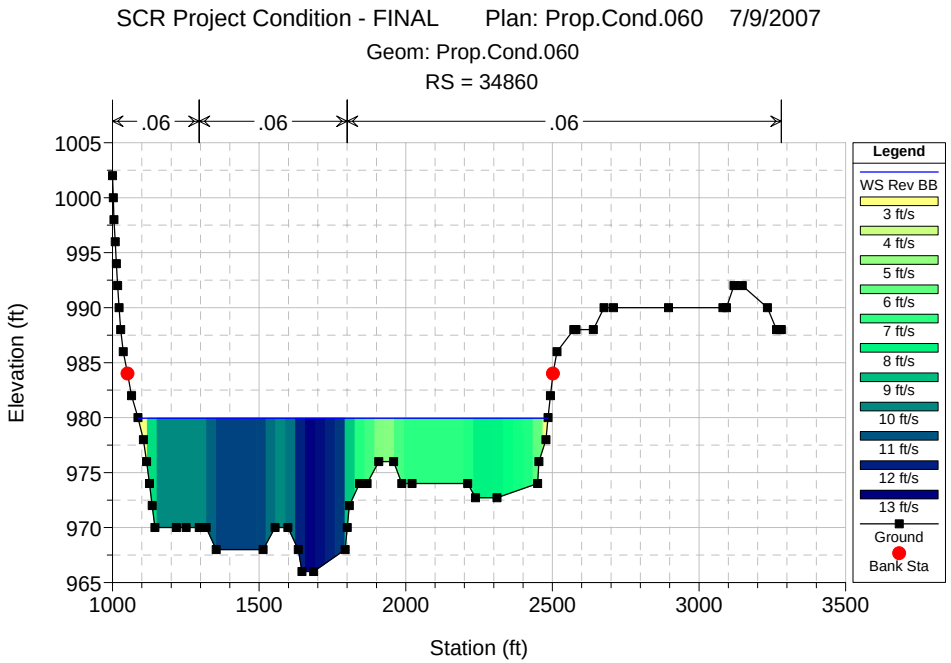
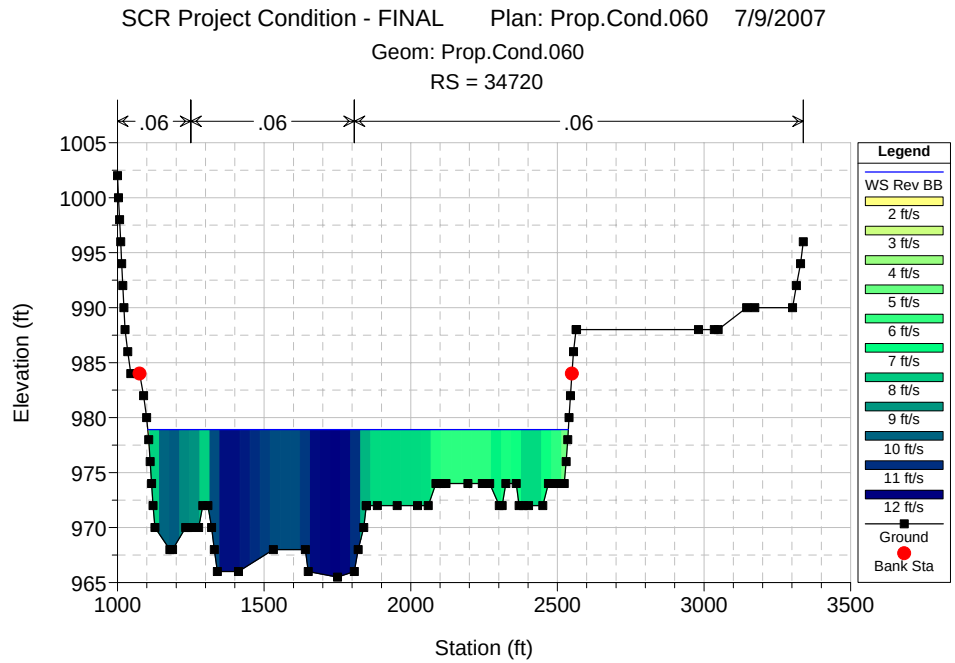
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 34860
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 34720
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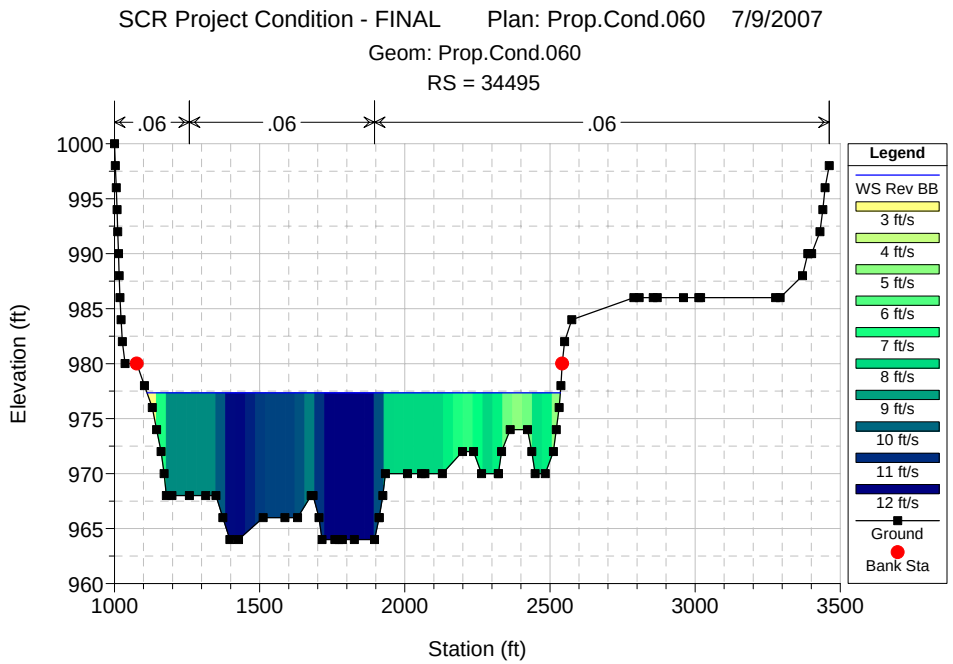
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 34495
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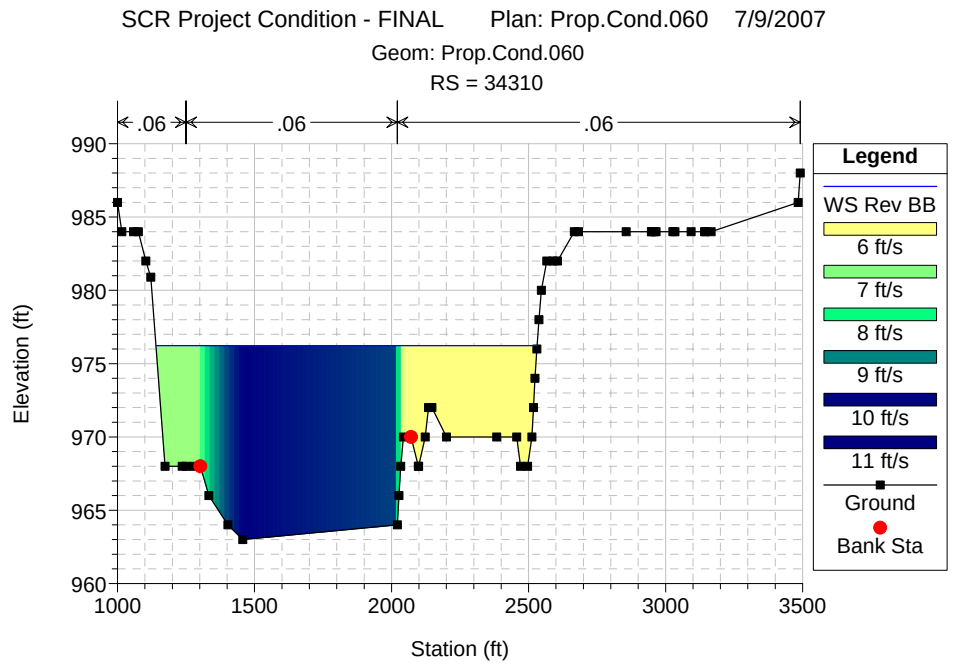
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 34310
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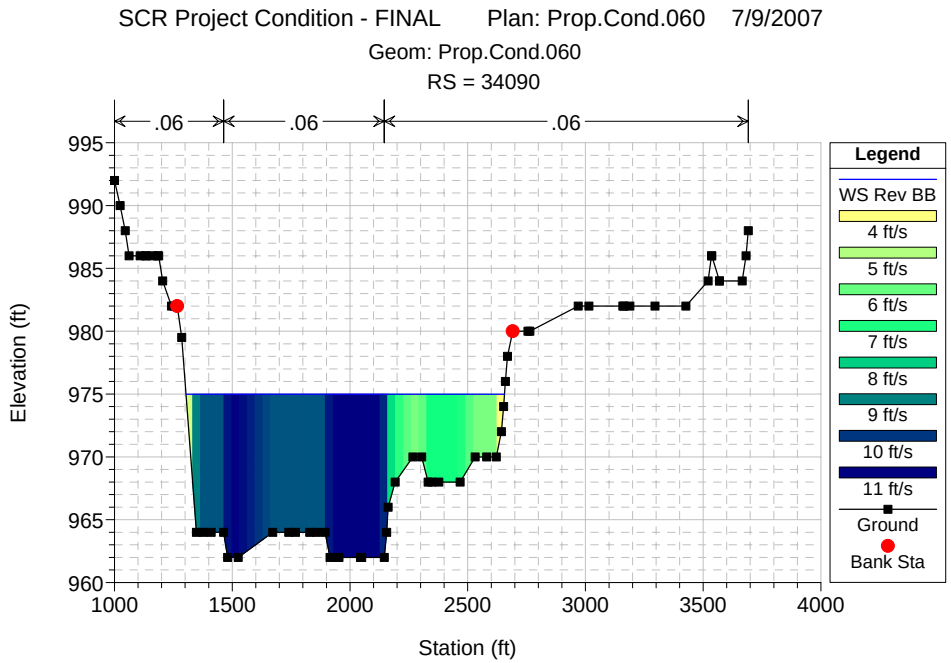
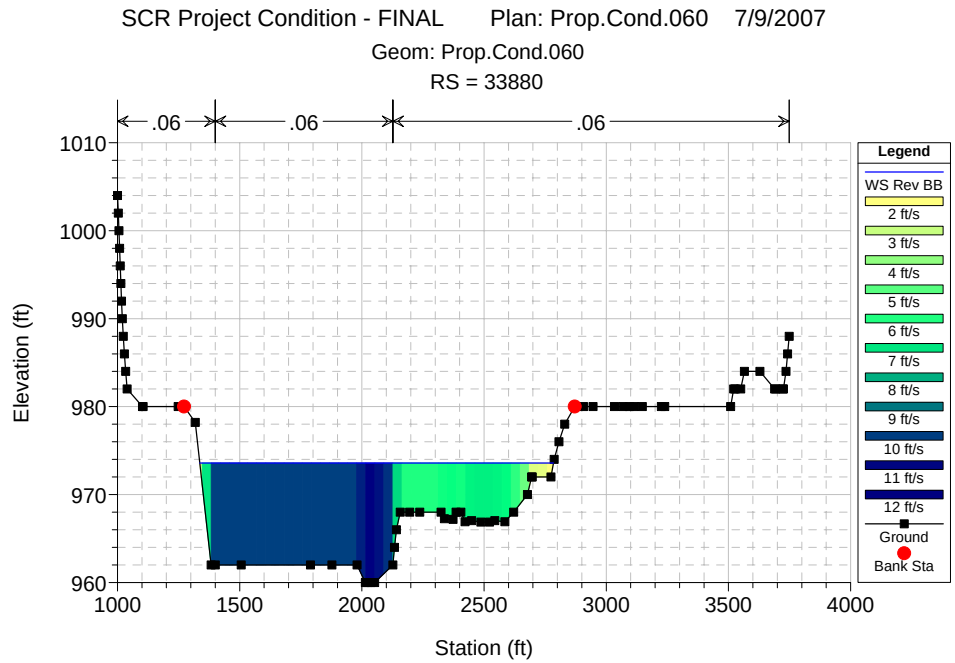
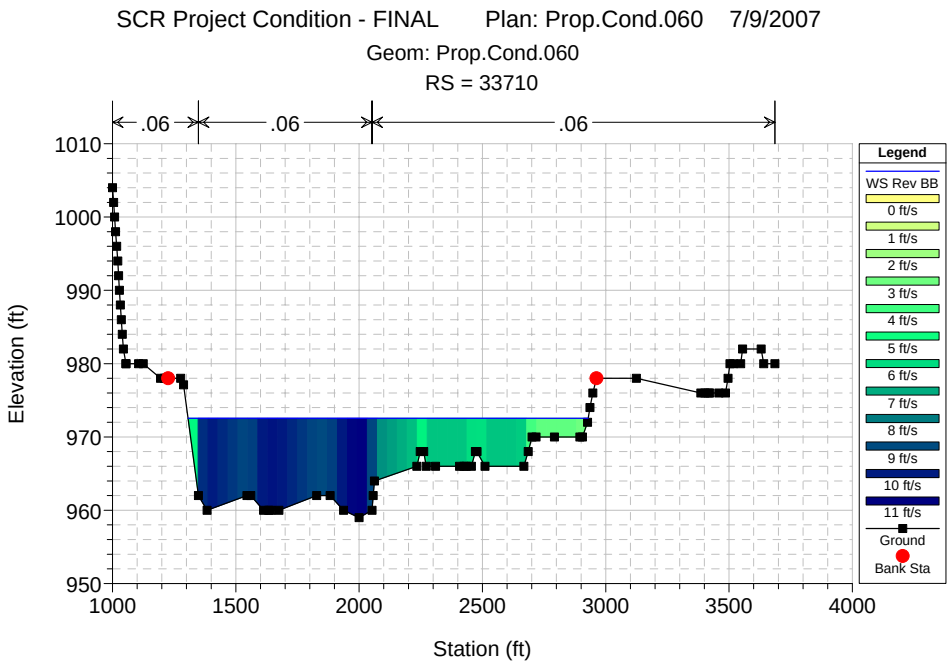
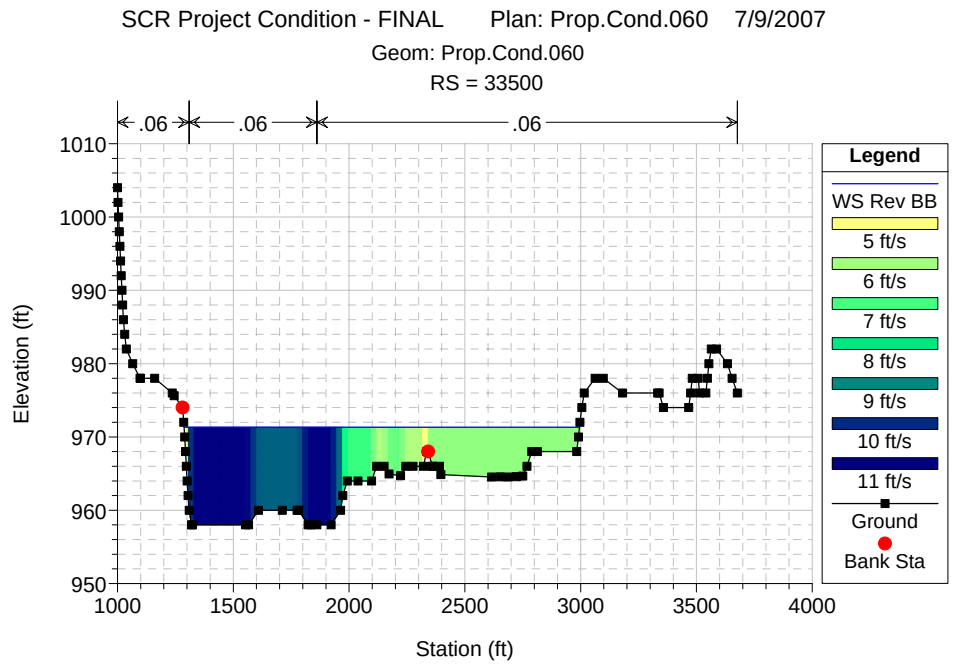
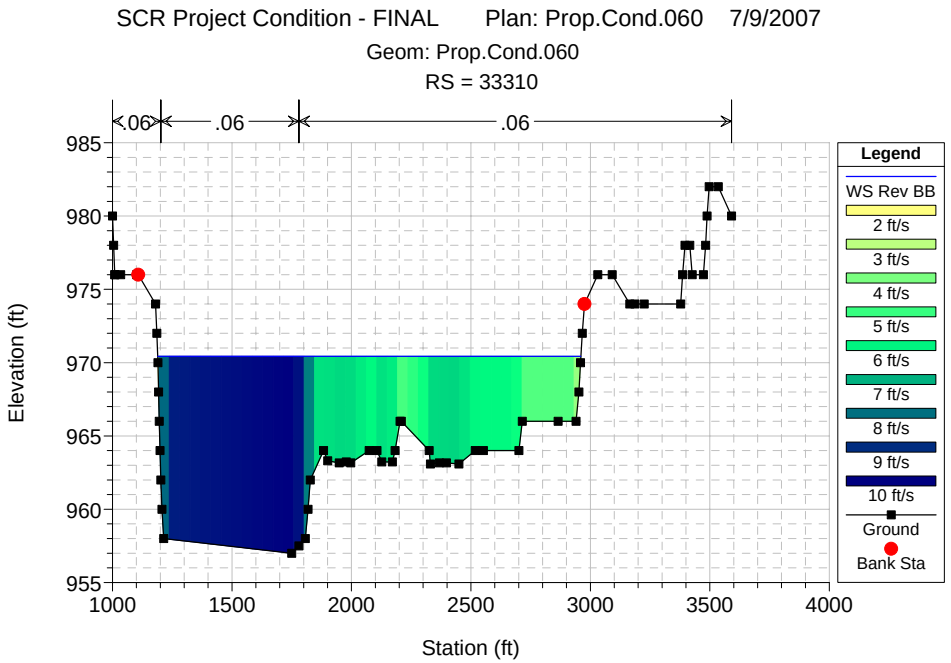
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta

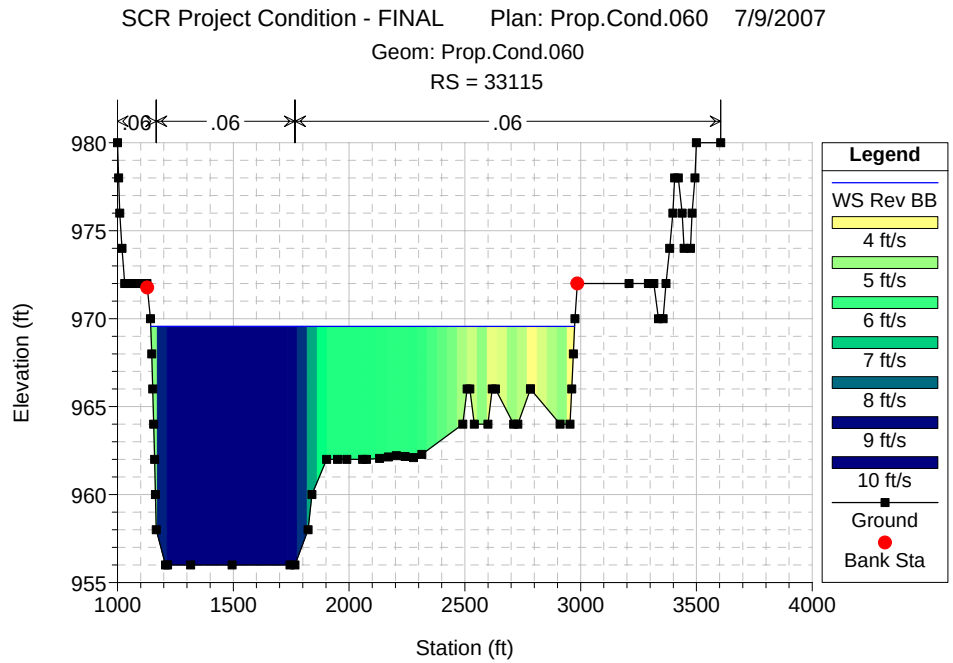

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 34090
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 33880
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta

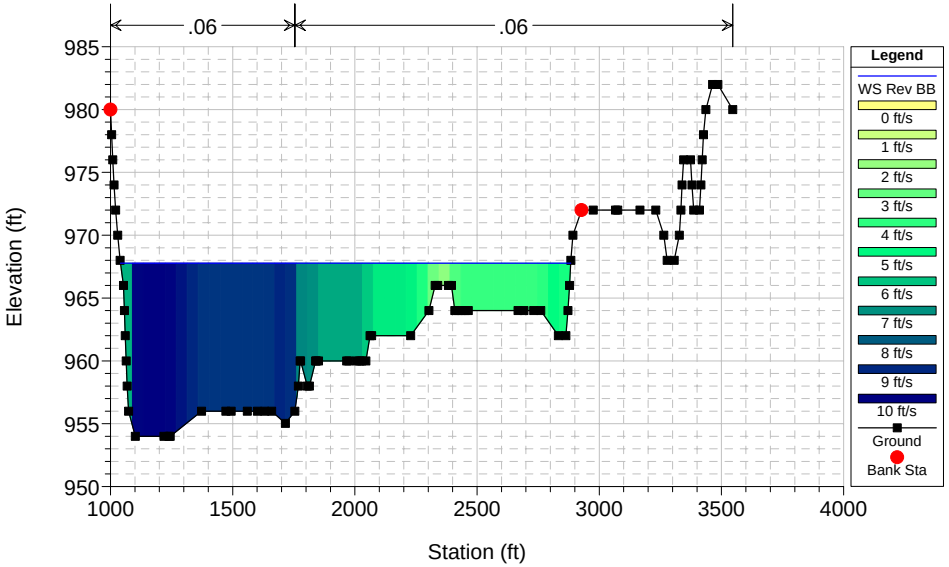

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 33710
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 33500
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta

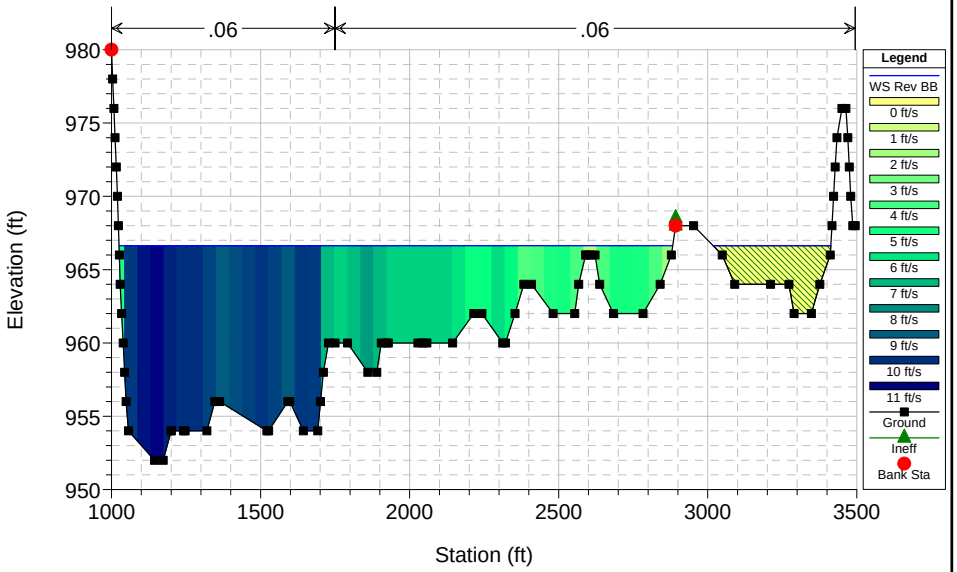

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 33310
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 33115
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta

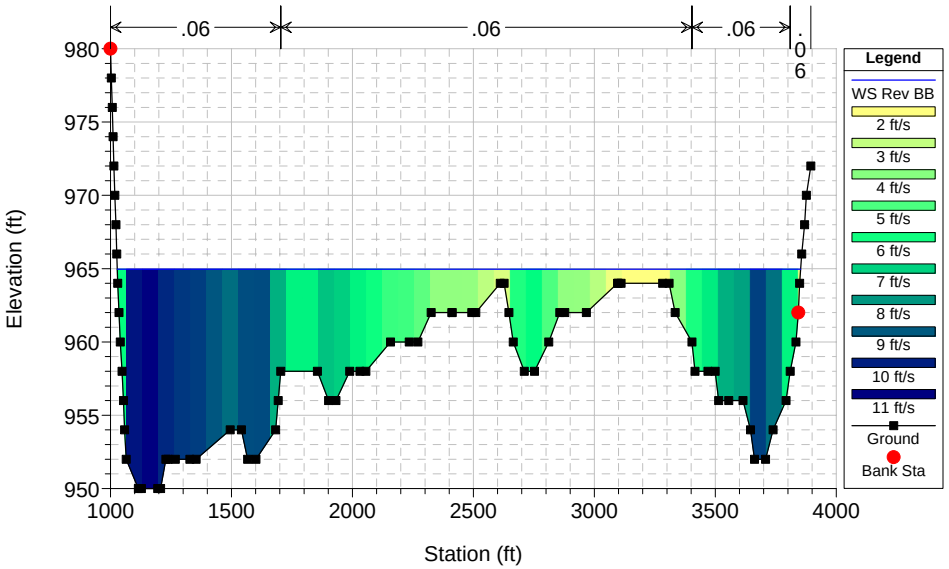
SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 32795



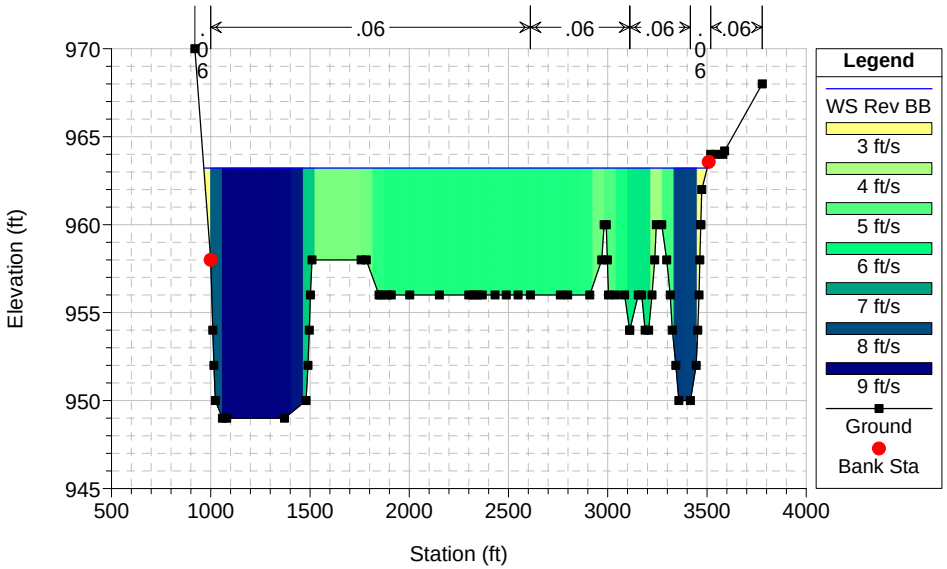
SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 32605

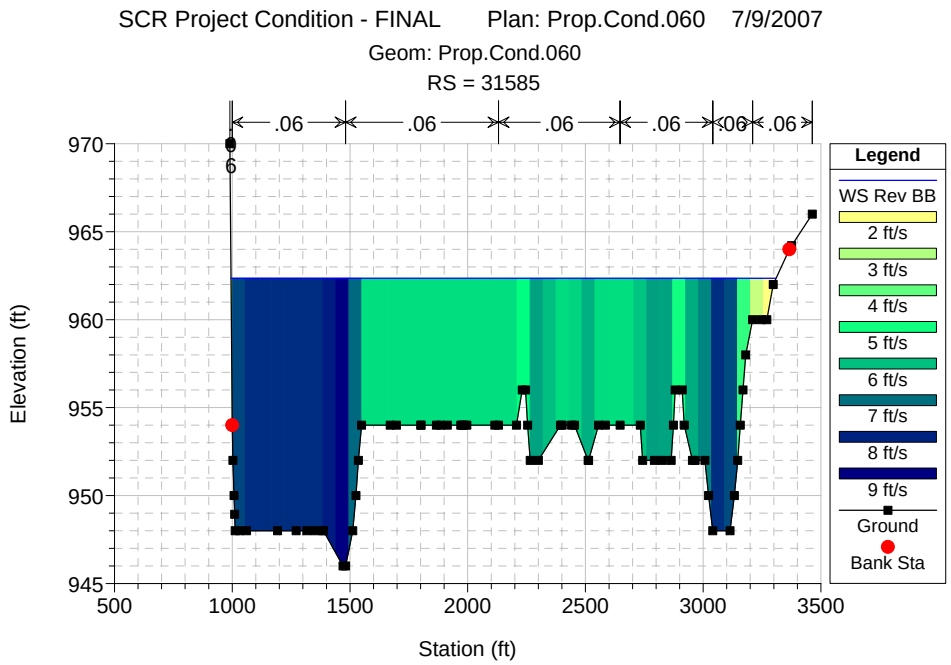


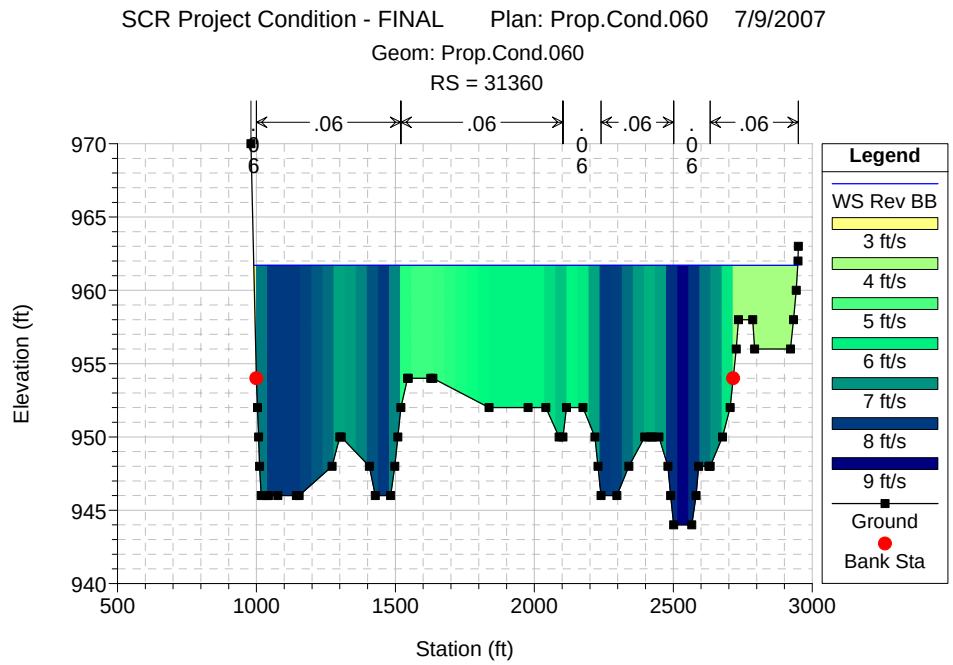
SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 32265

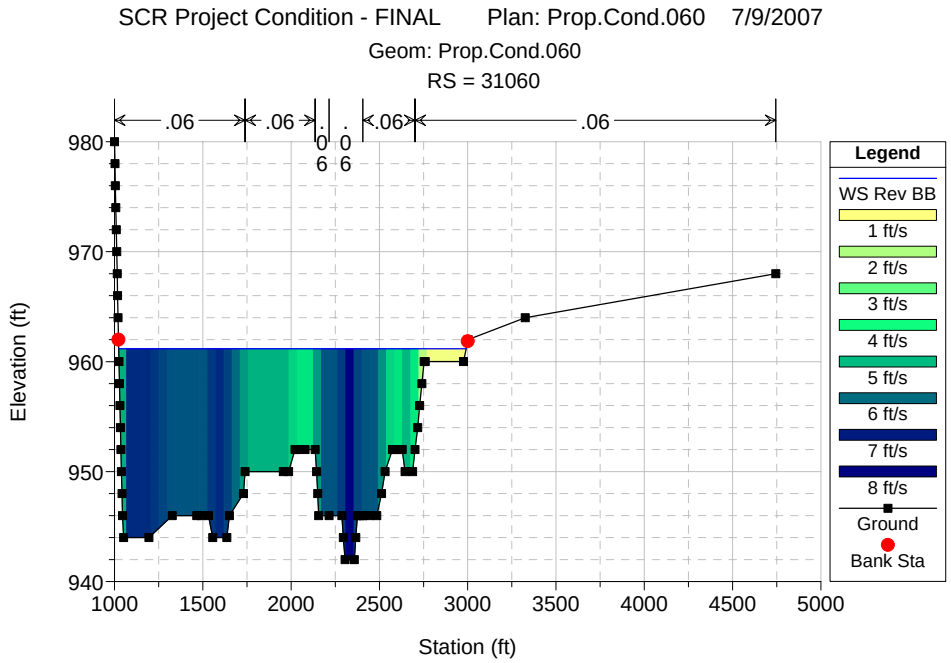


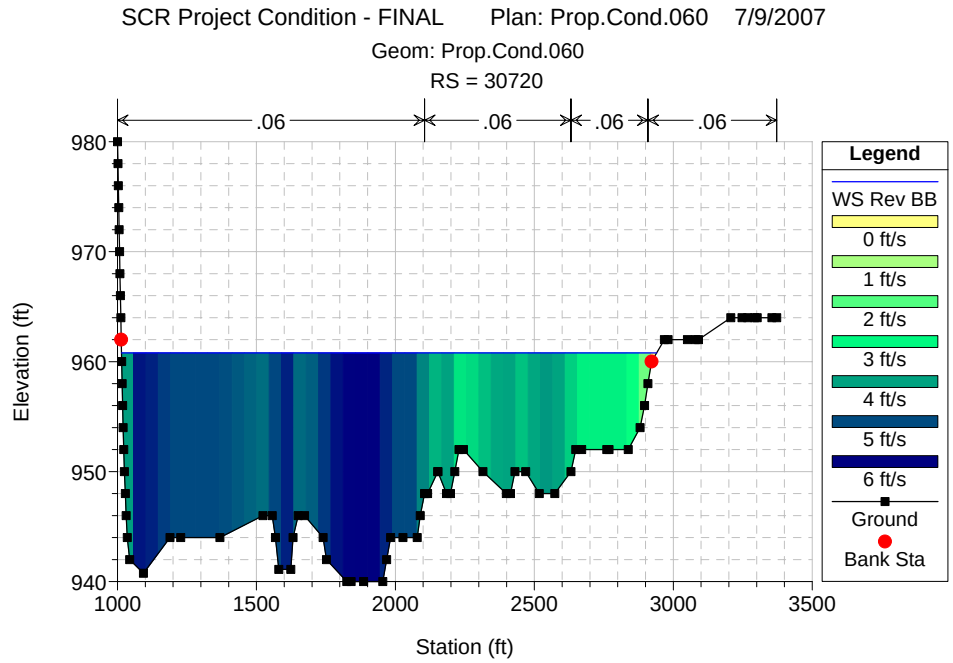
SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 31875




SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 31585
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 31360
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 31060
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 30720
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
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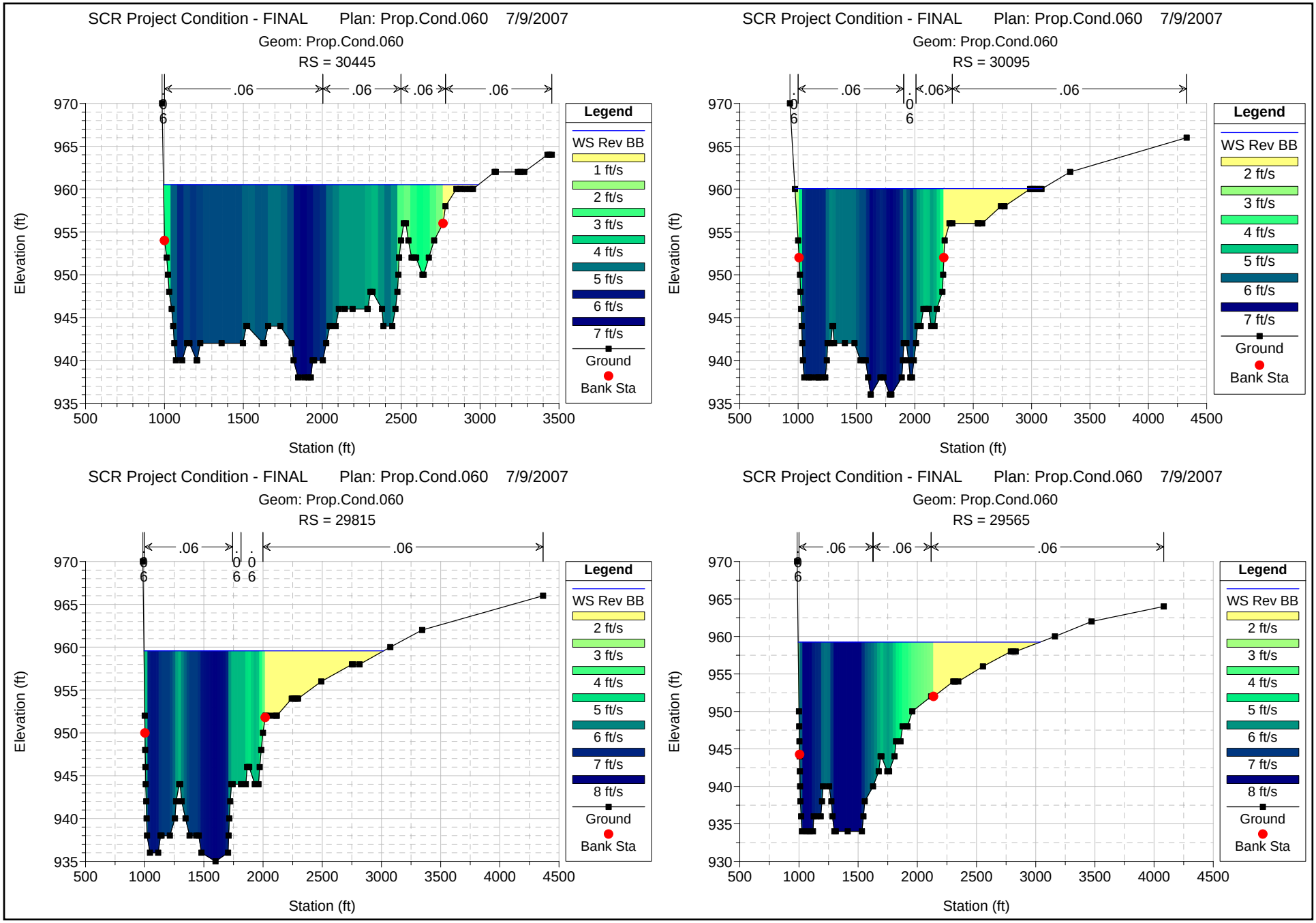
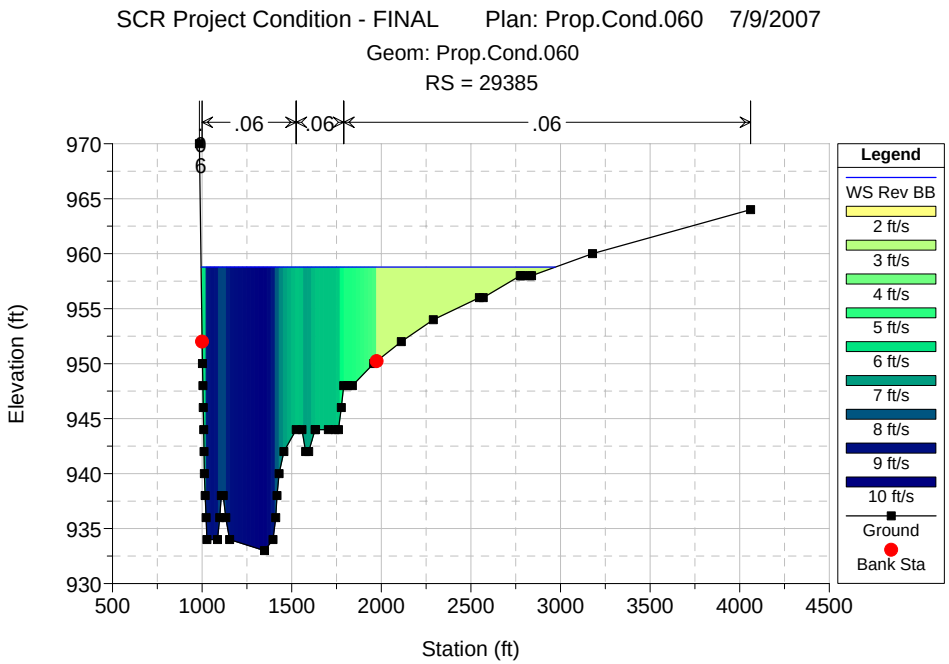
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 30445
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta
SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 30095
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta
SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 29815
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta
SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 29565
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 29385
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.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
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5 ft/s
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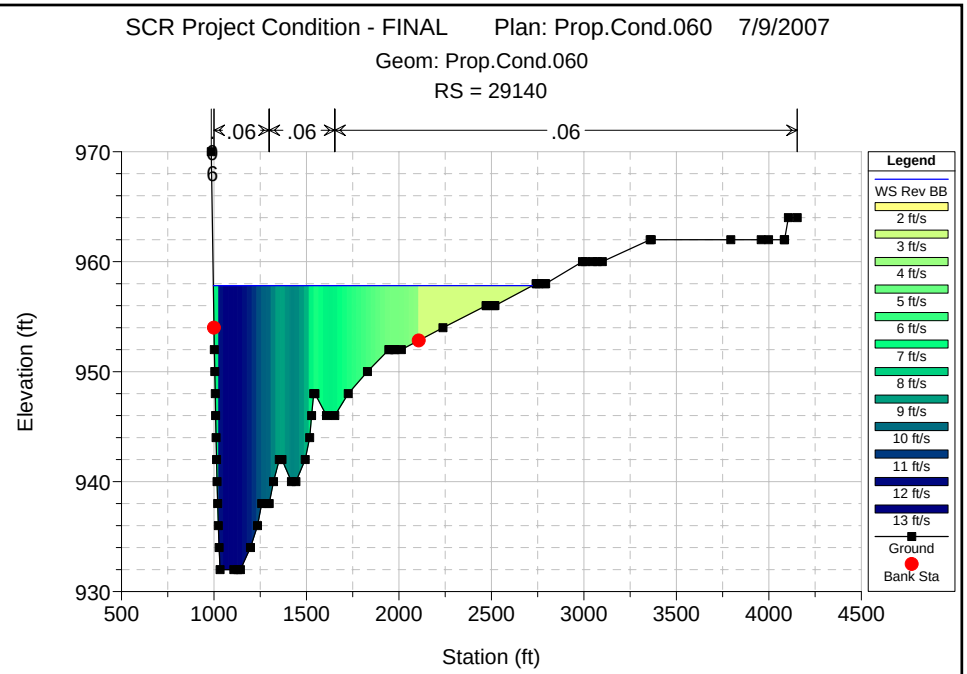
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 29140
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.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
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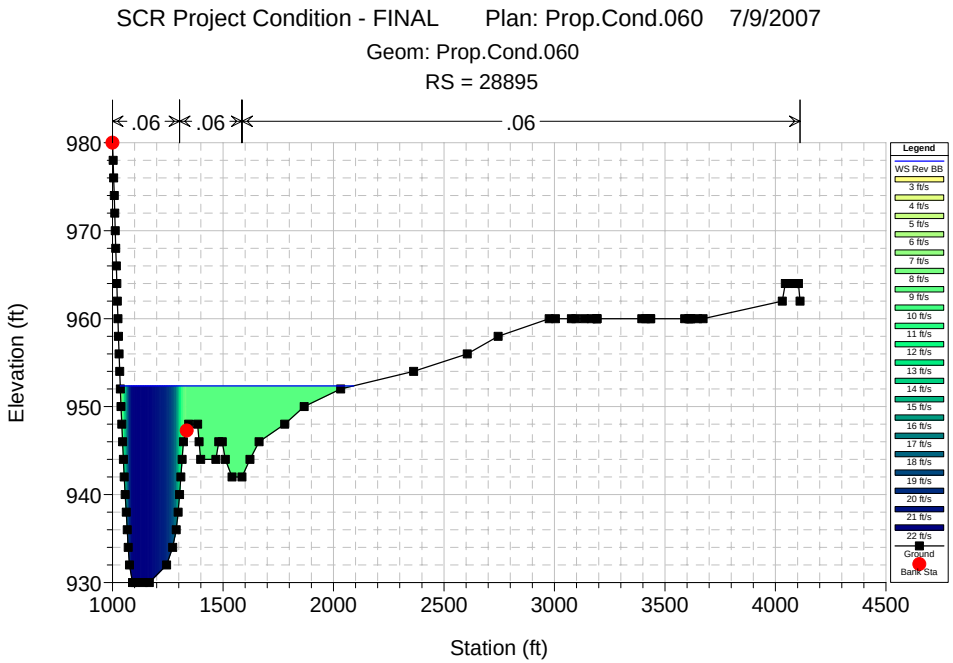
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 28895
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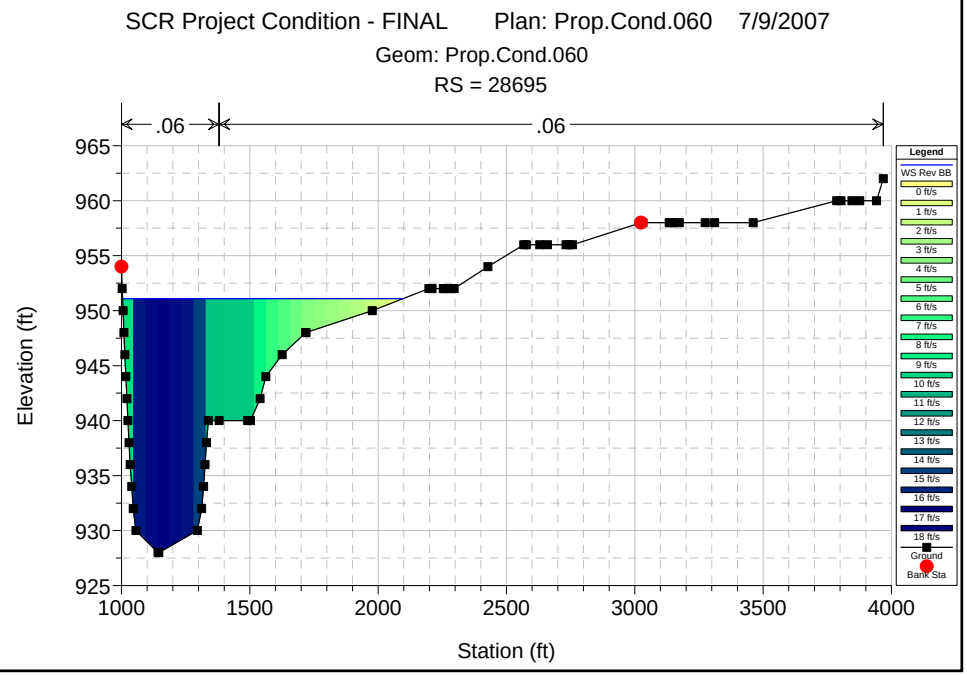
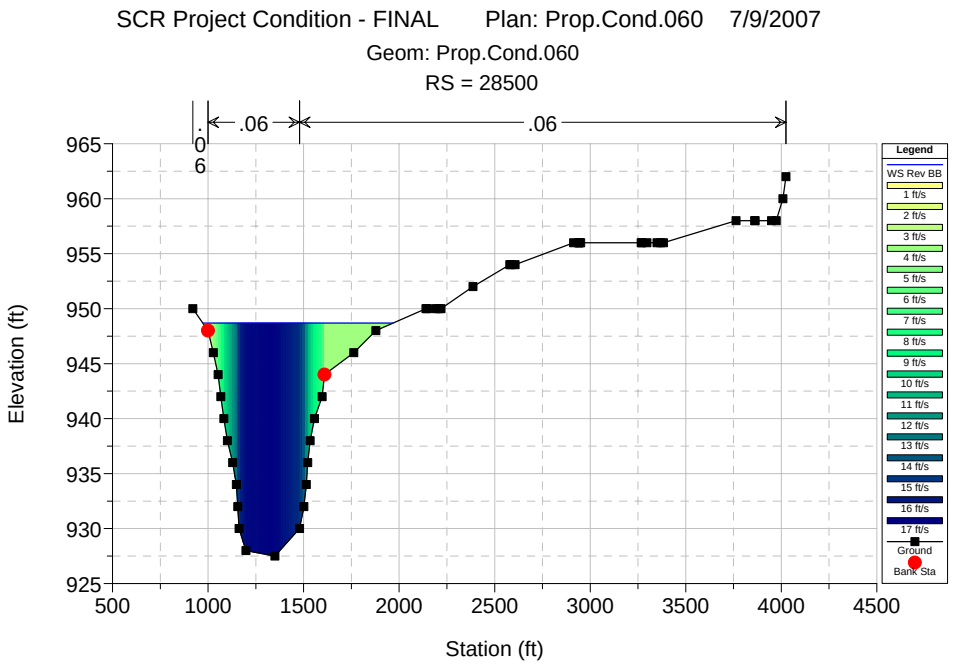
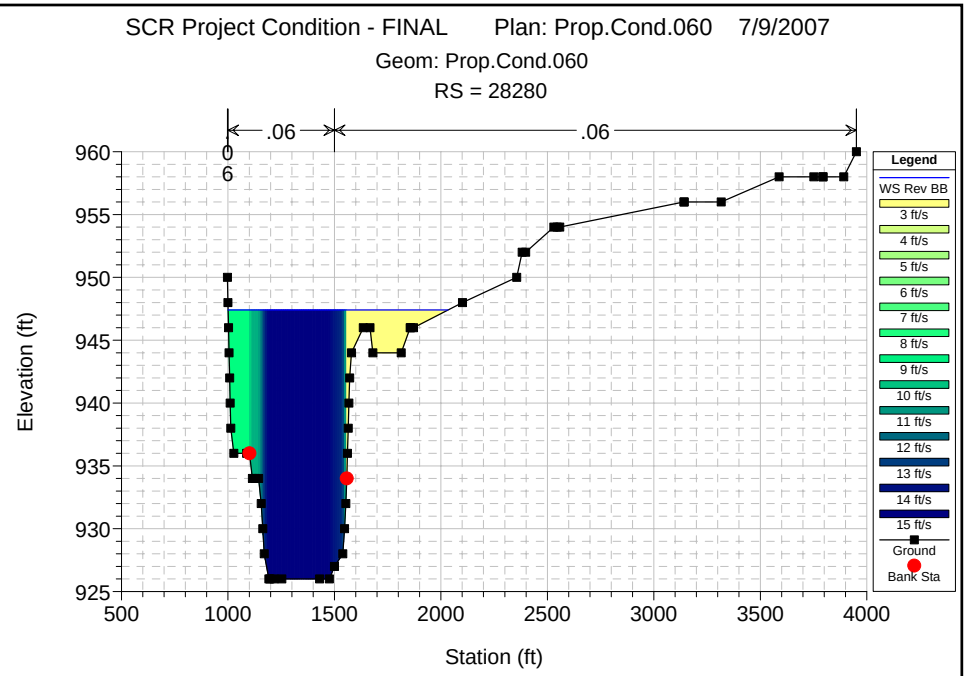
.06
.06
Elevation (ft)
Station (ft)
Legend


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 28695
.06
.06
Elevation (ft)
Station (ft)
Legend


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 28500
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 28280
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
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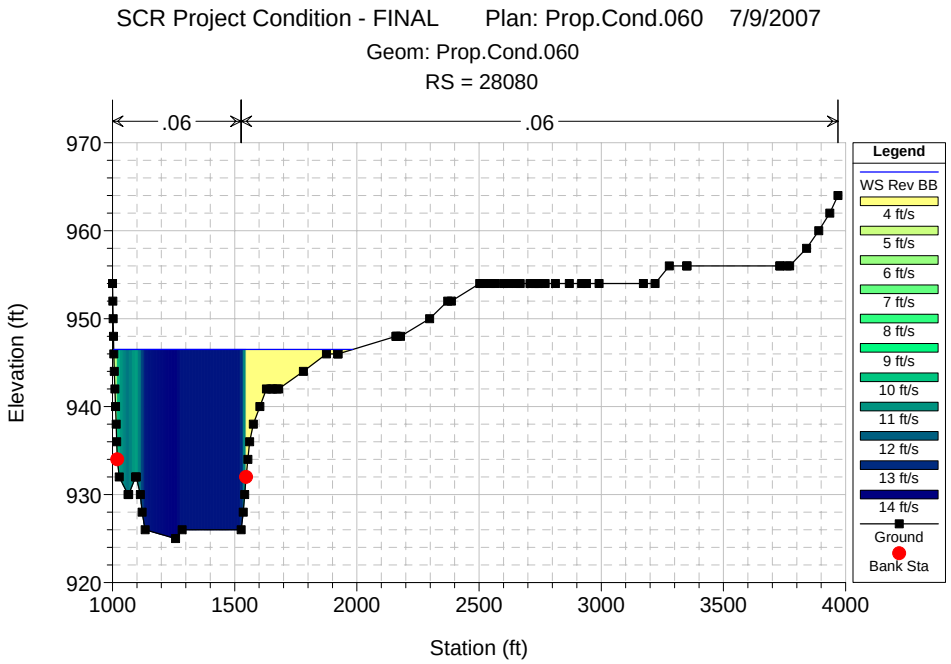
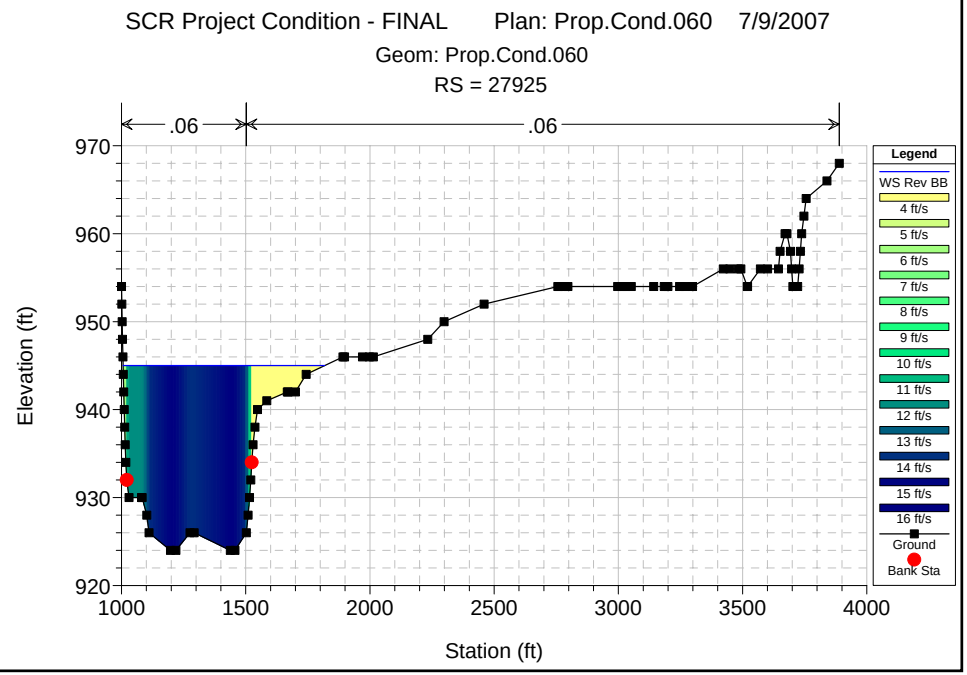
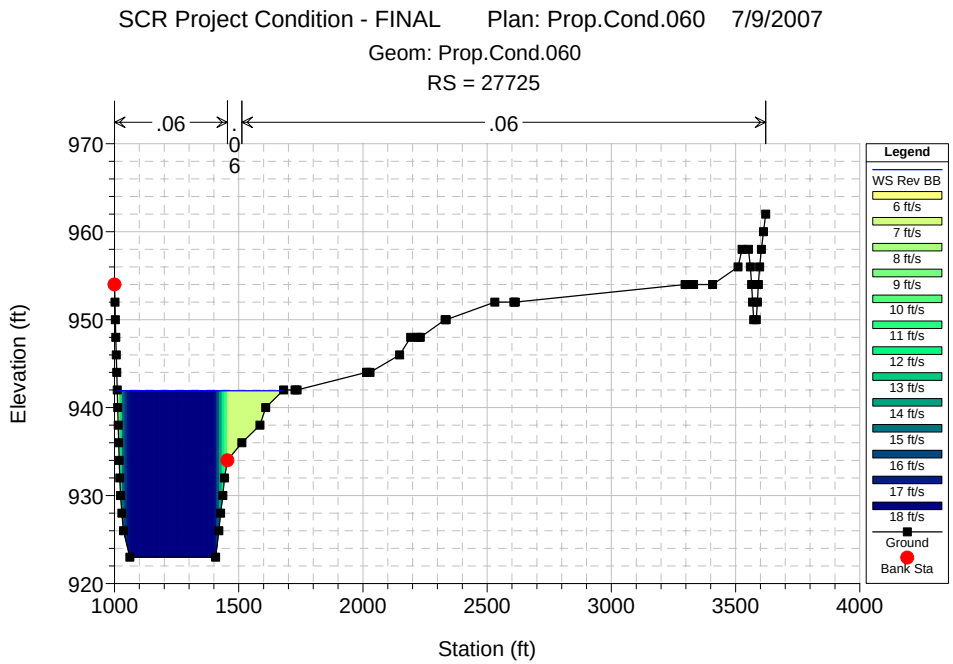
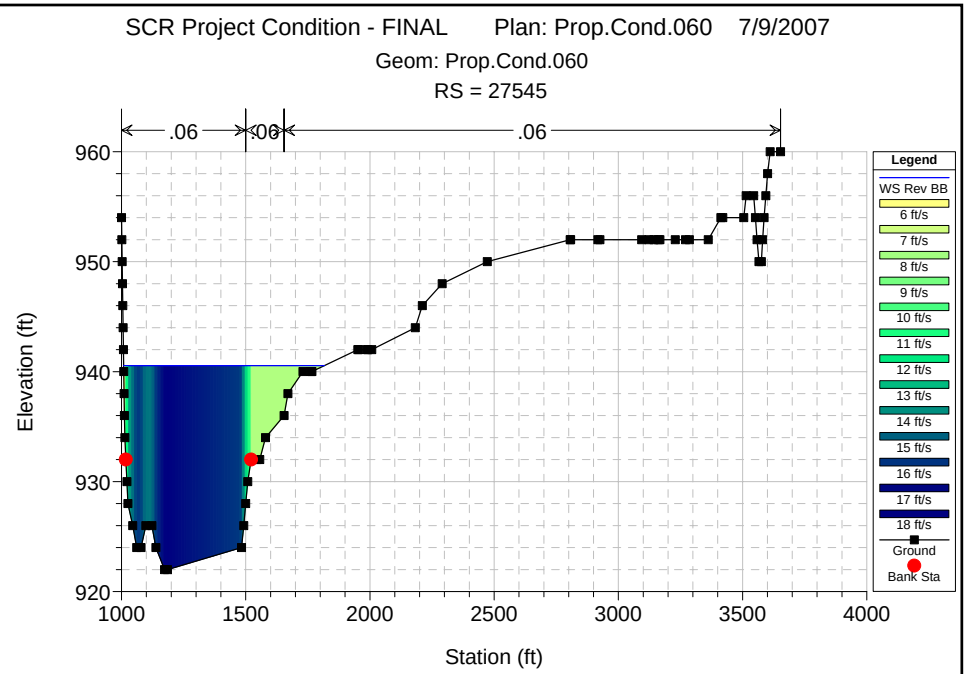
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 28080
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 27925
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 27725
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 27545
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
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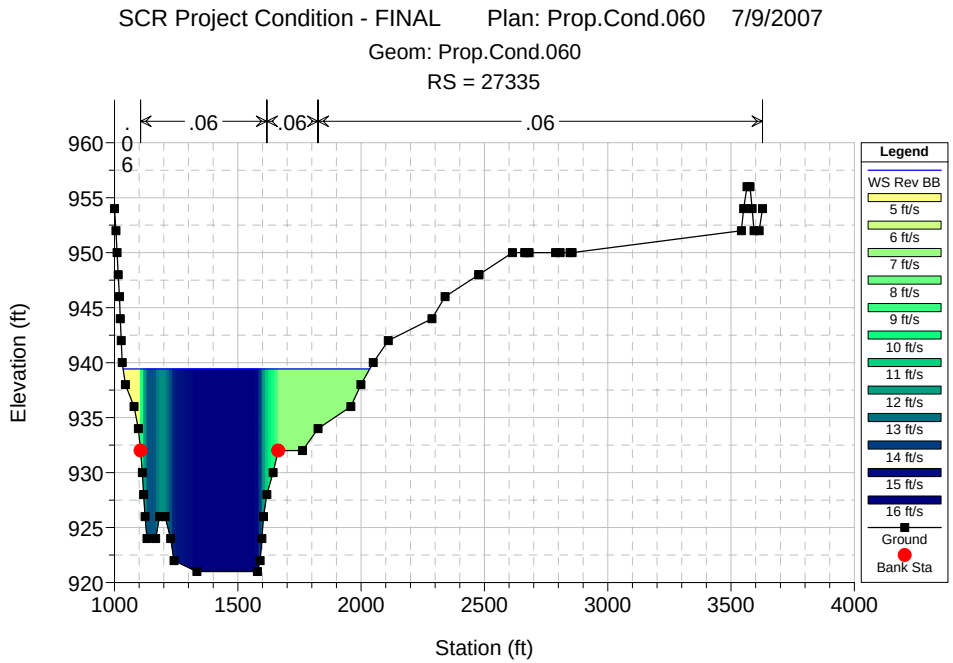
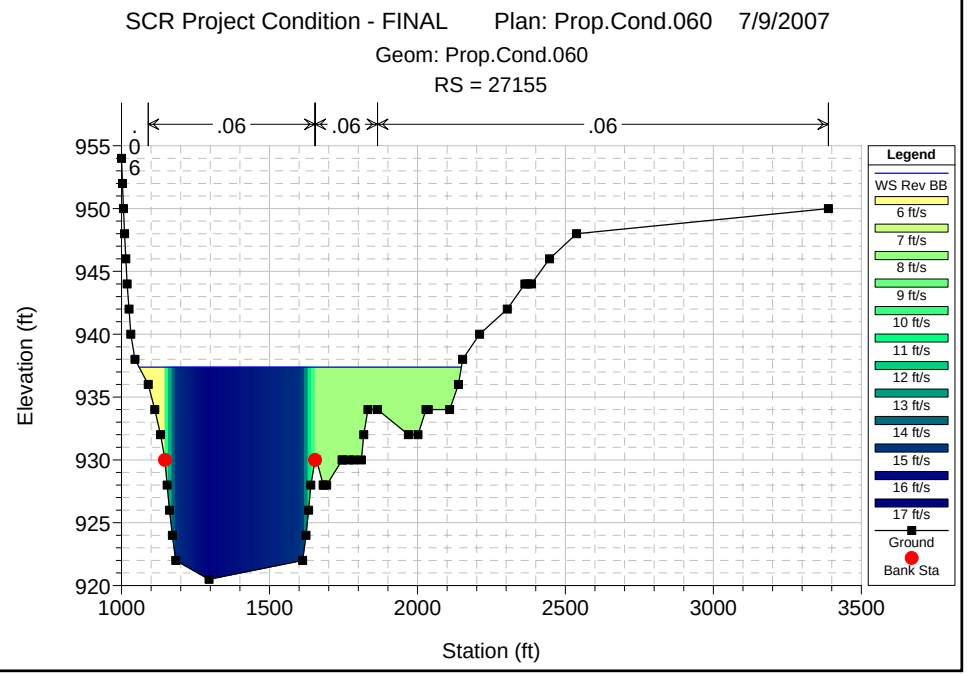
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 27335
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 27155
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.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
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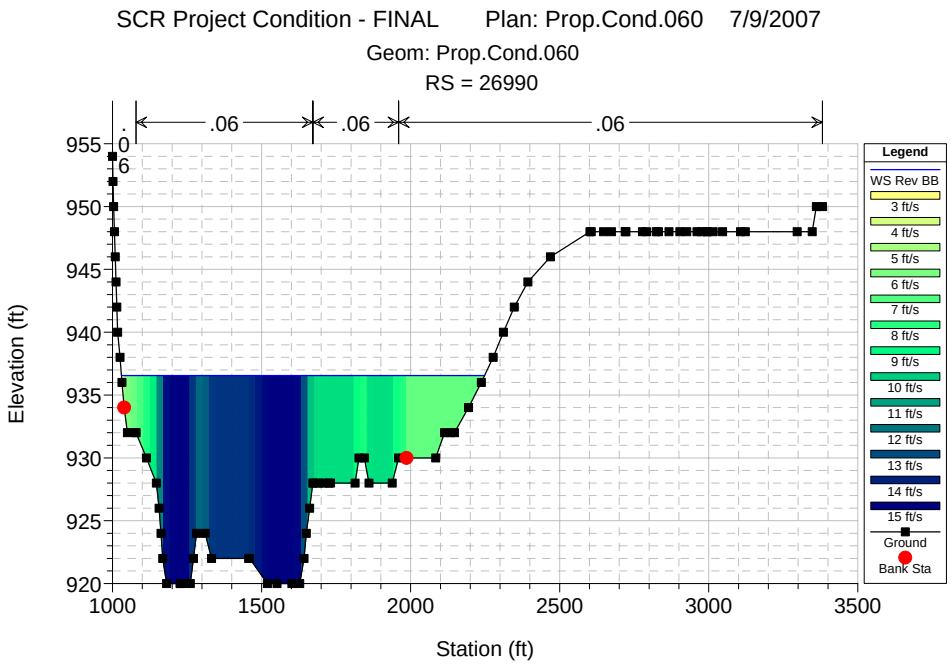
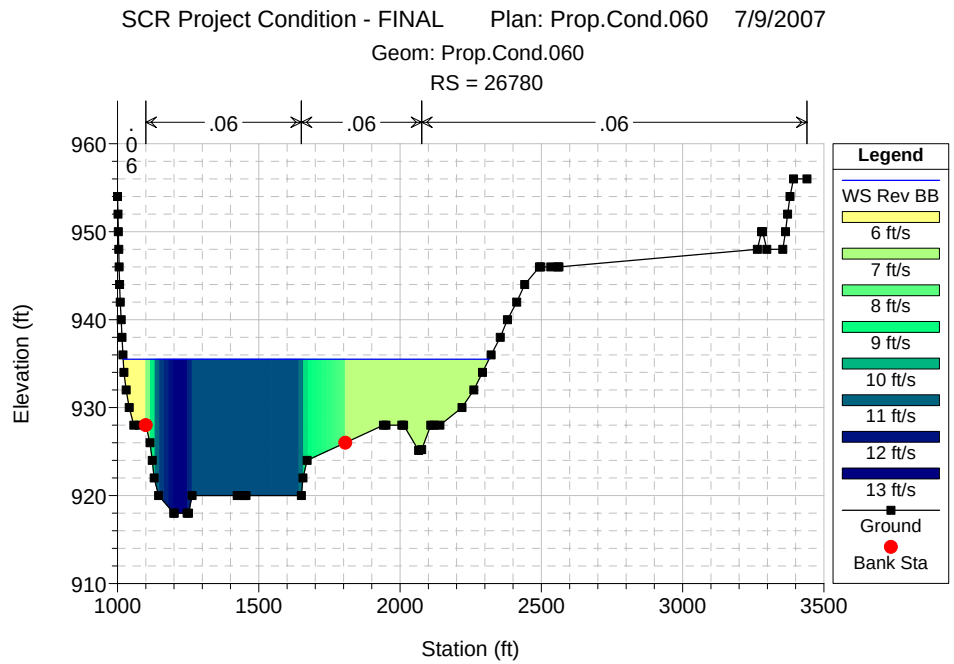
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 26990
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 26780
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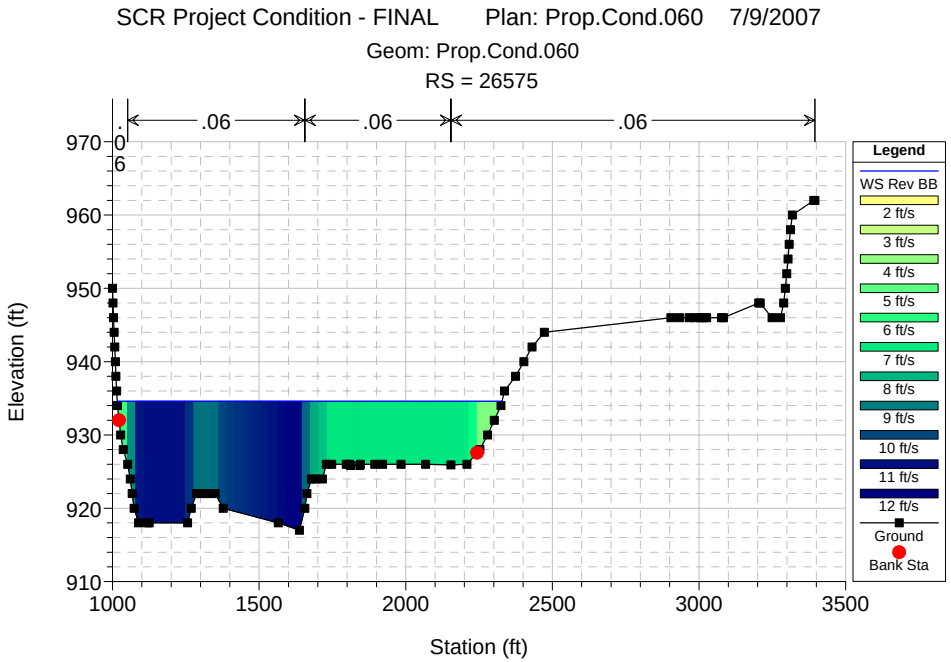
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 26575
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.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
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7 ft/s
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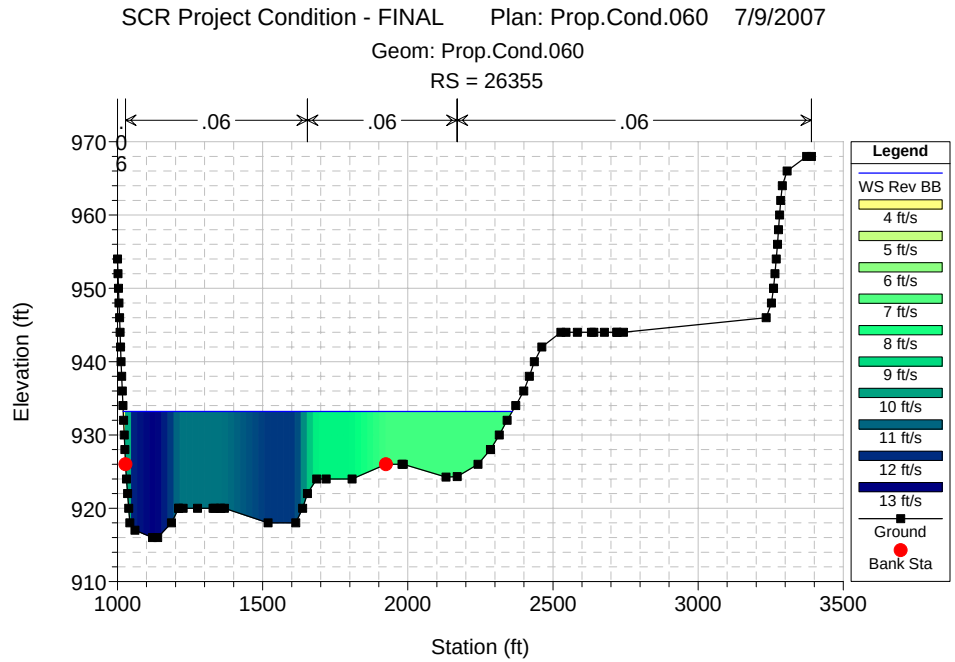
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 26355
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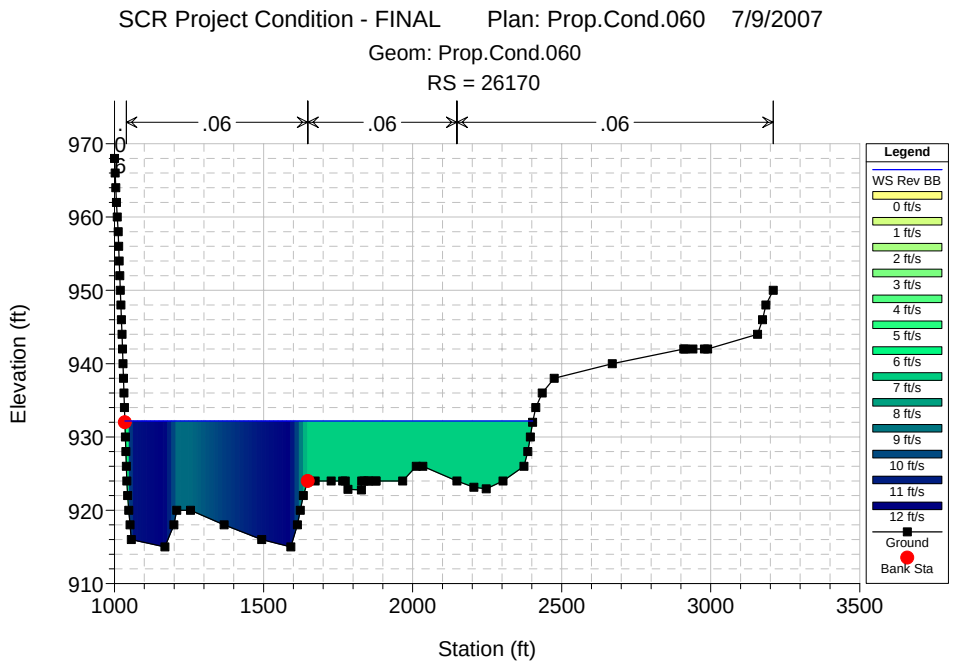
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 26170
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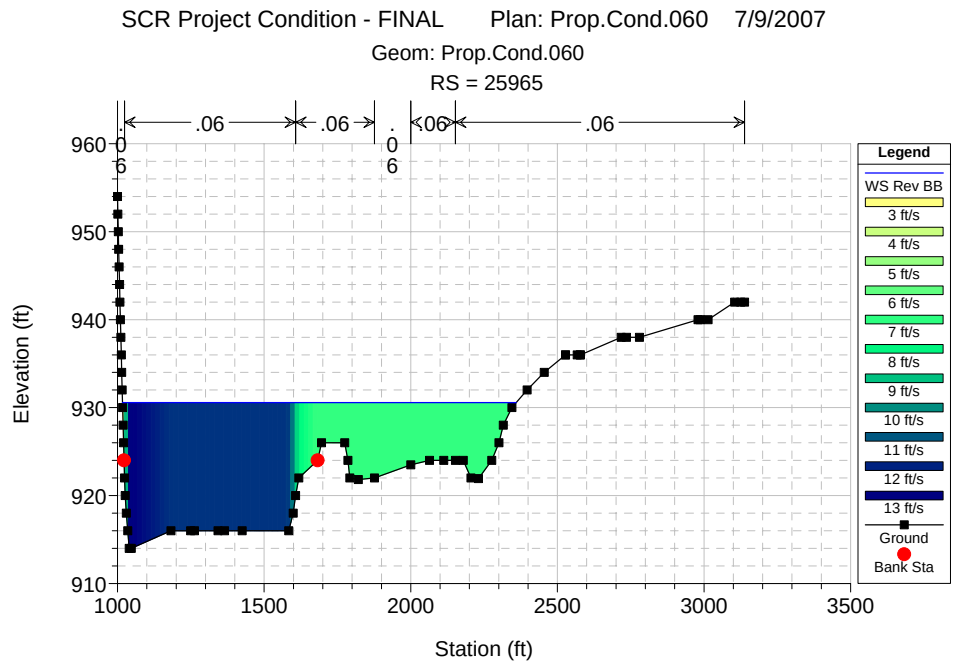
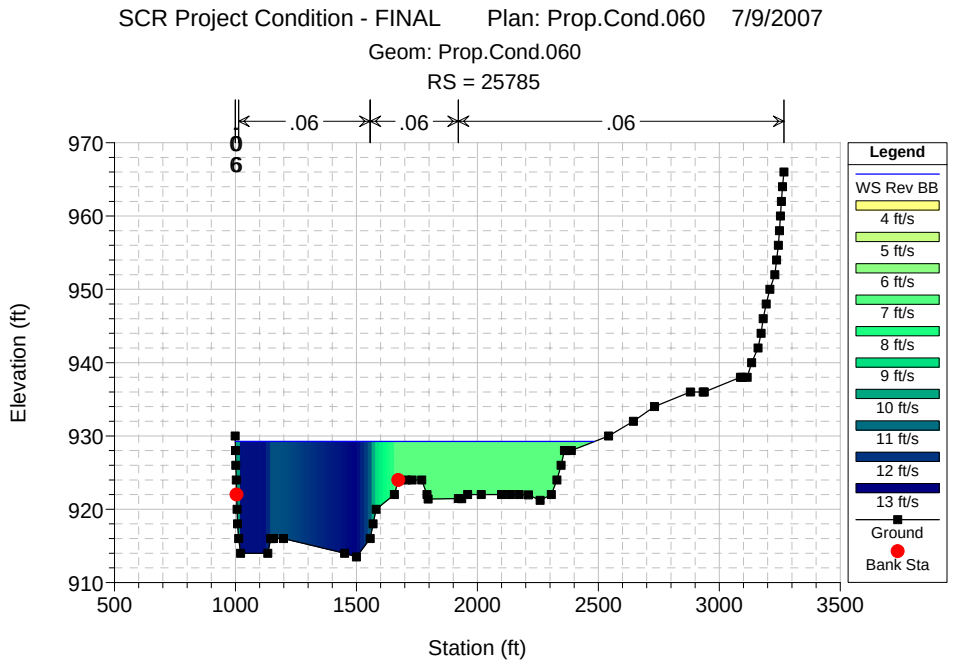
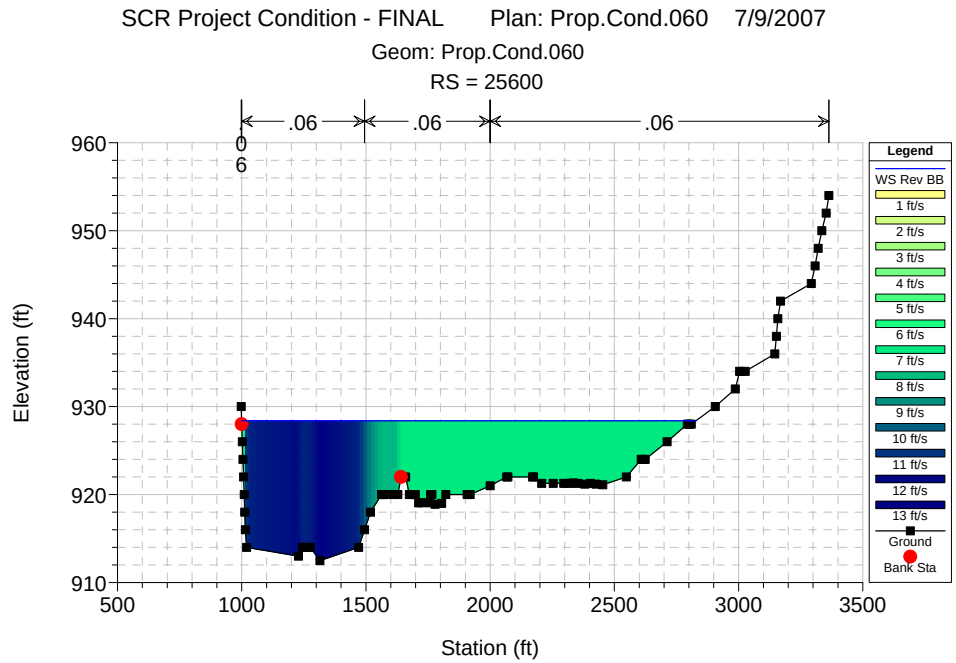
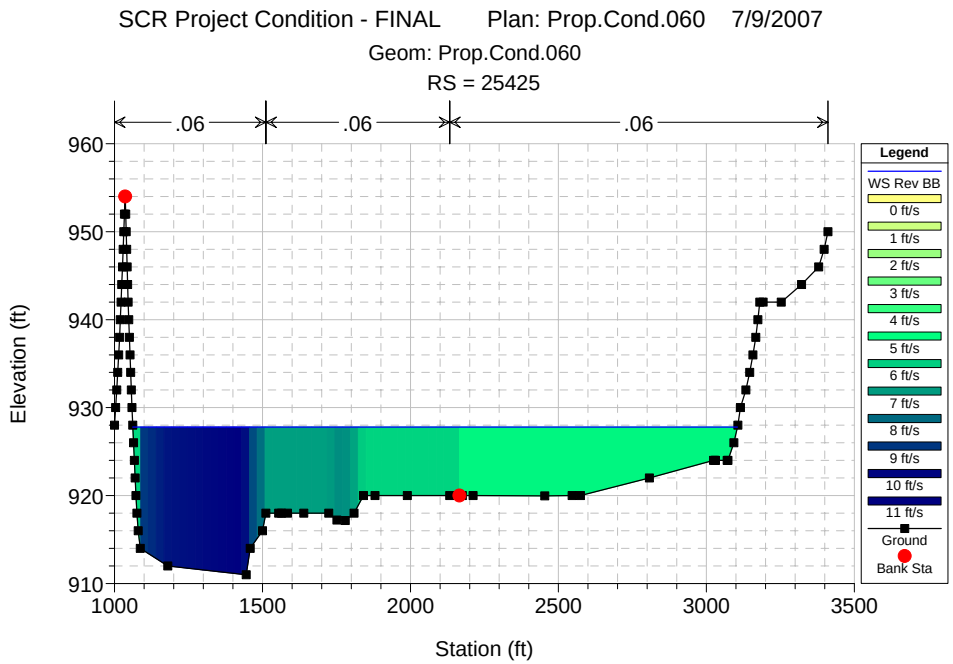
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 25965
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 25785
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 25600
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 25425
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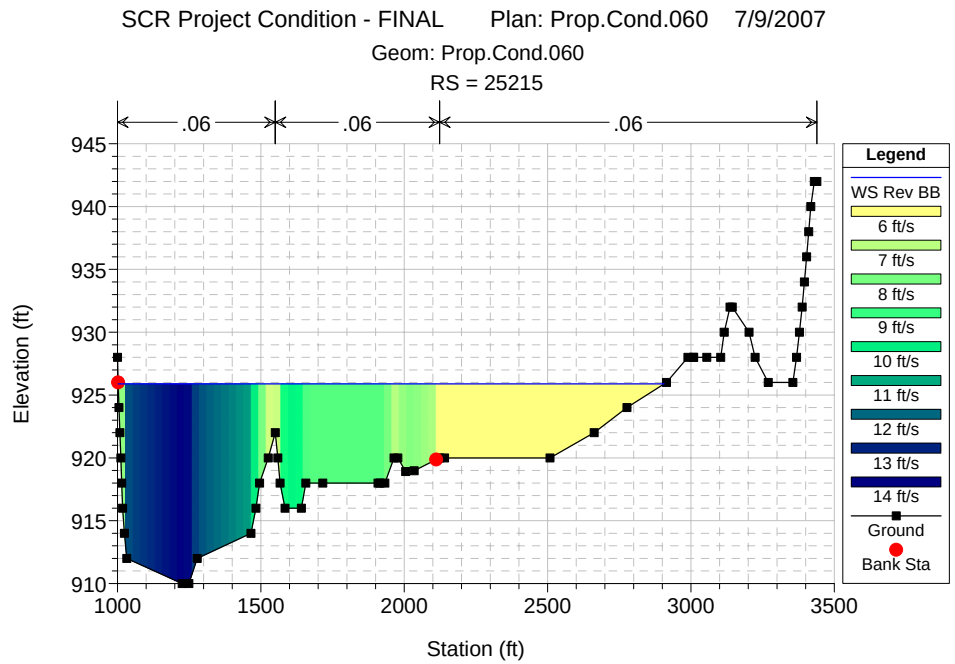
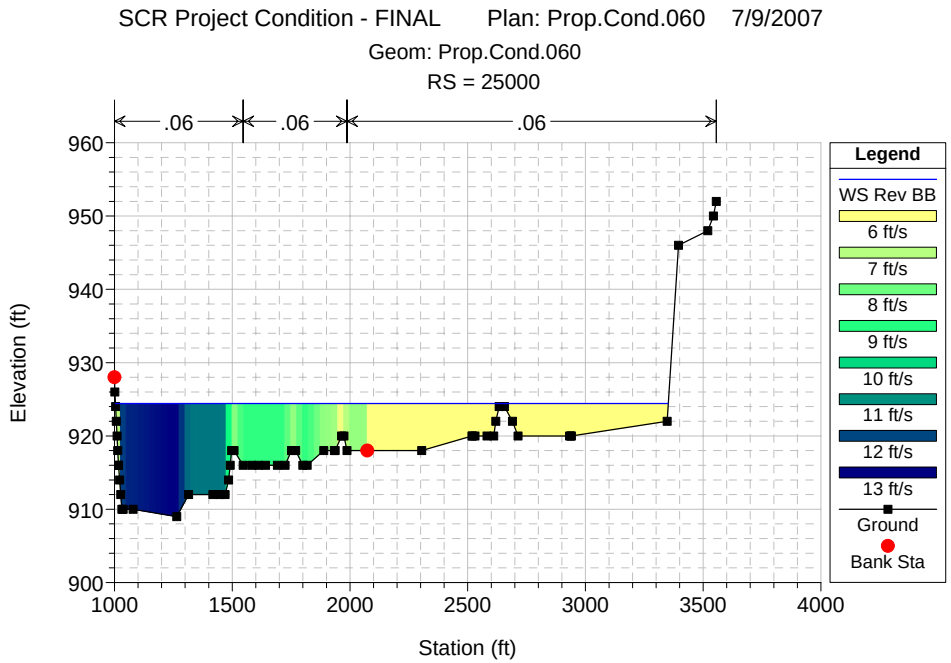
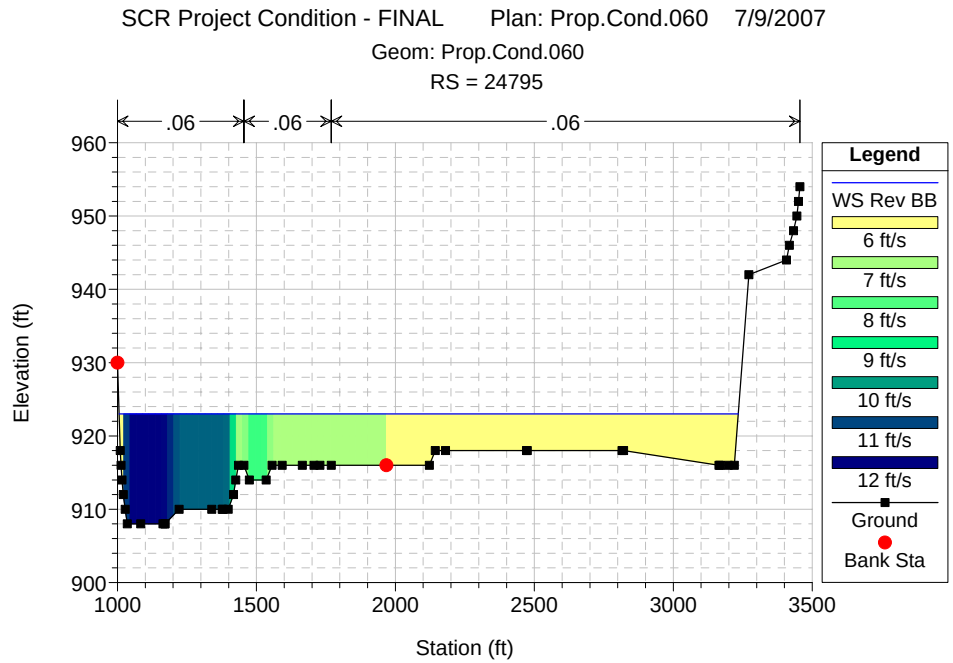
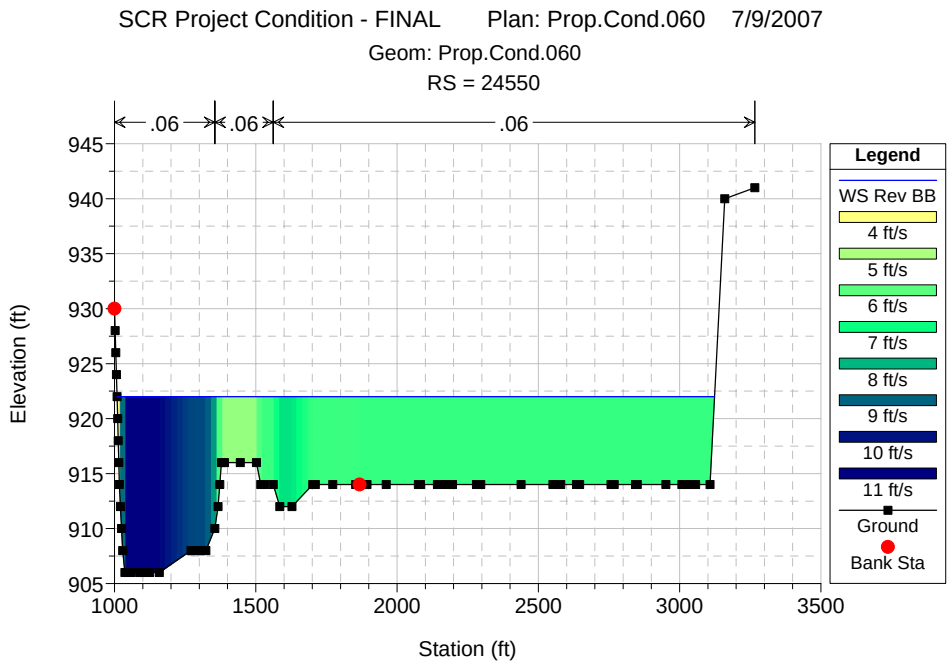
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 25215
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 25000
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 24795
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 24550
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
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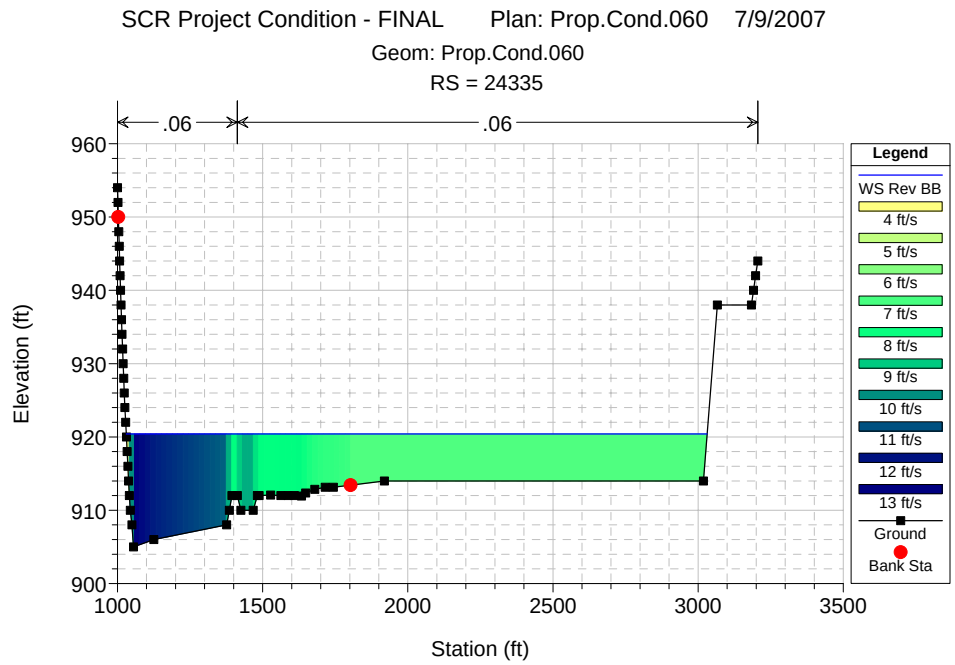
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta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Geom: Prop.Cond.060
RS = 24335
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
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8 ft/s
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11 ft/s
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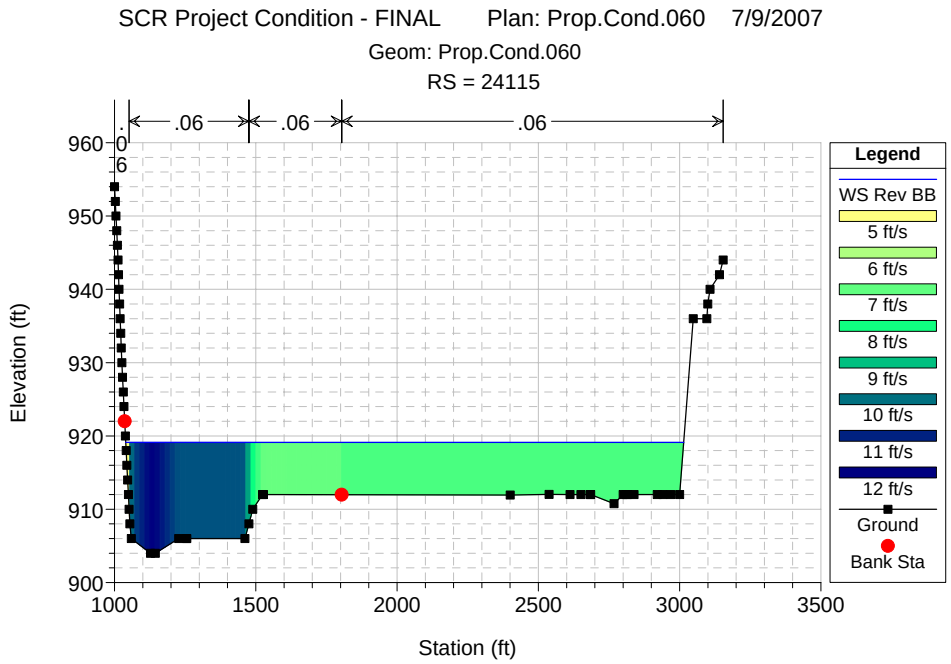
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 24115
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
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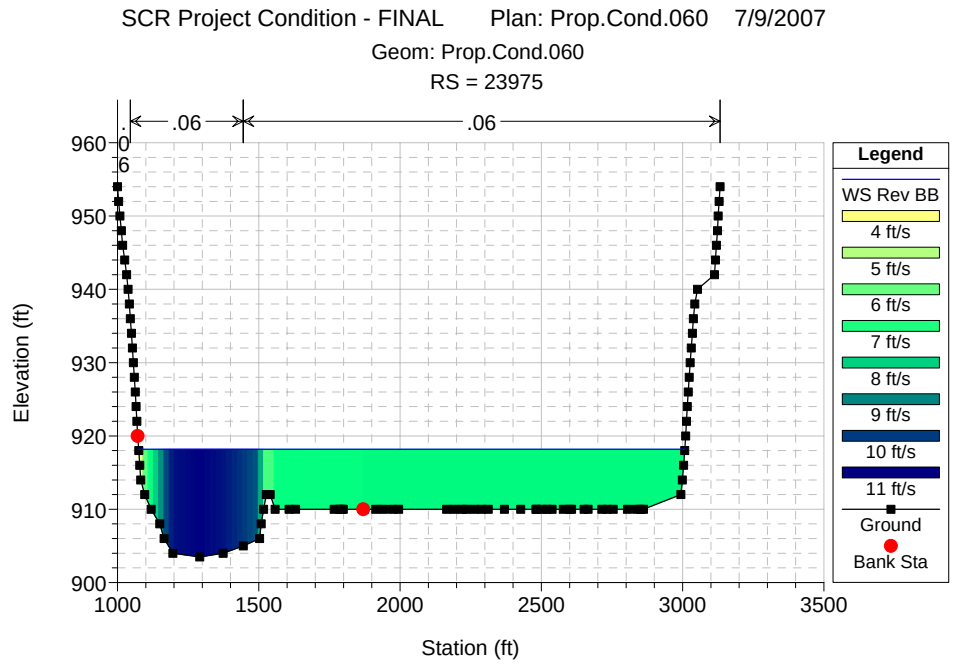
11 ft/s
12 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 23975
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
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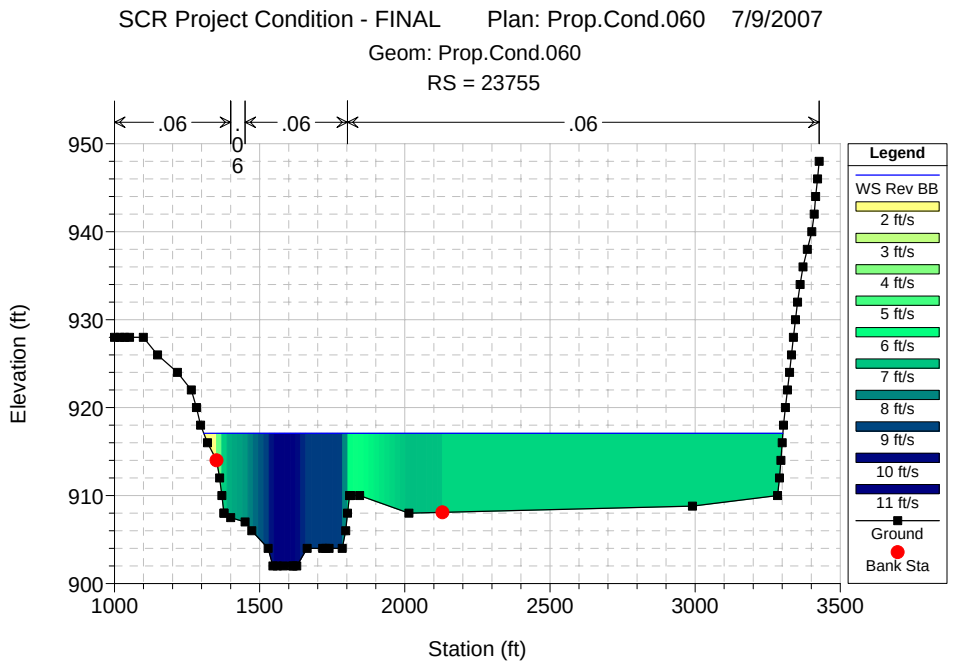
11 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 23755
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
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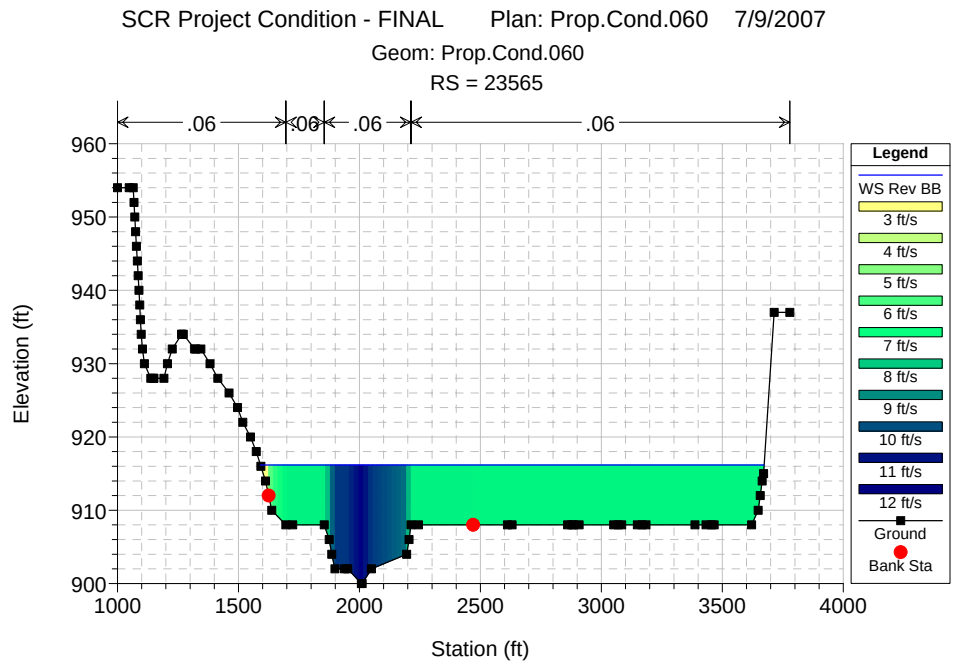
10 ft/s
11 ft/s
Ground
Bank Sta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Geom: Prop.Cond.060
RS = 23565
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
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5 ft/s
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7 ft/s
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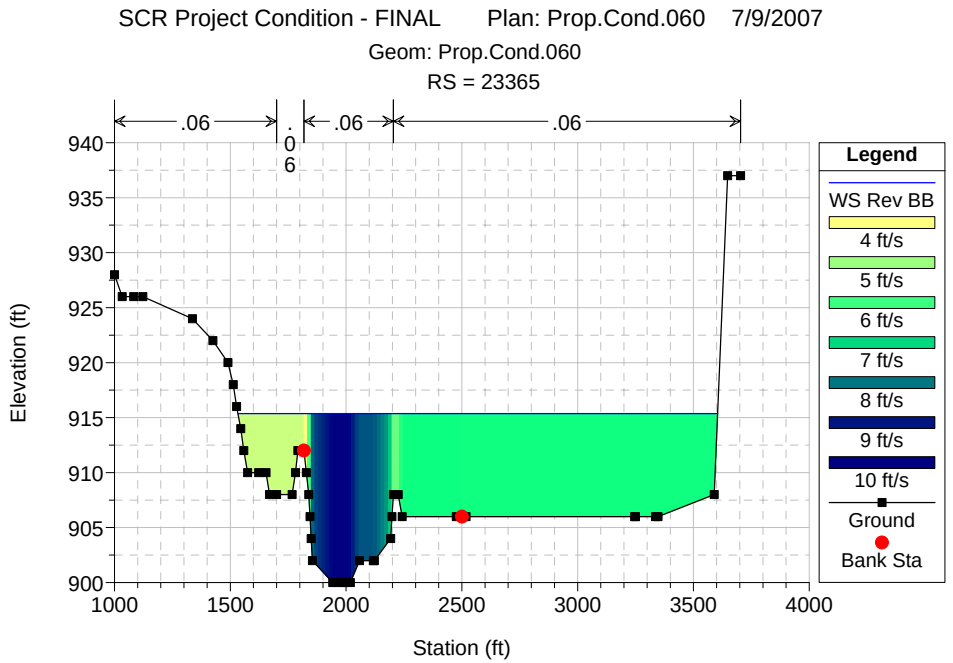
11 ft/s
12 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 23365
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
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5 ft/s
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7 ft/s
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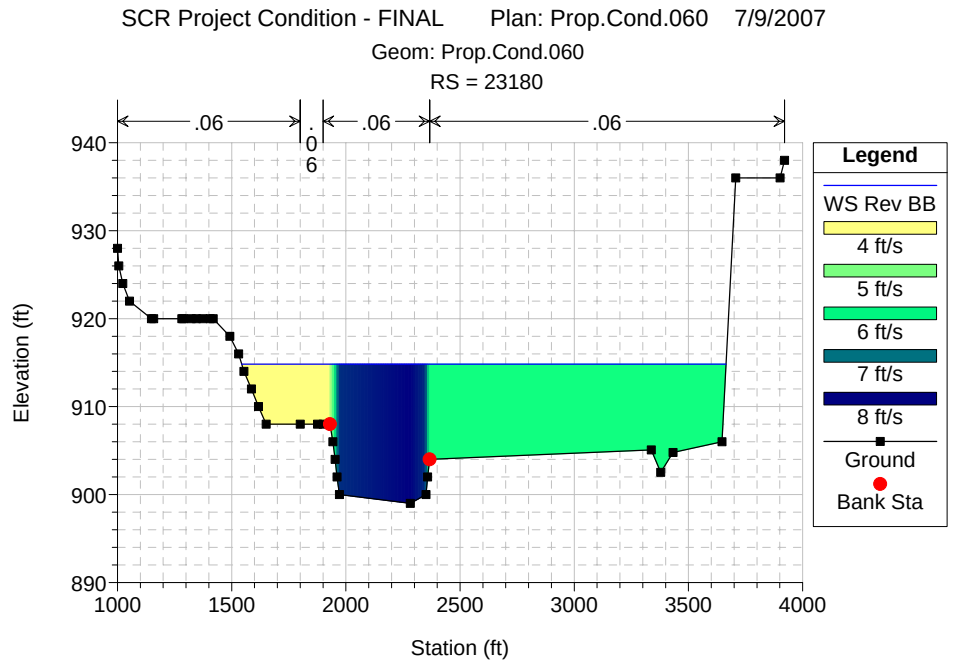
9 ft/s
10 ft/s
Ground
Bank Sta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Geom: Prop.Cond.060
RS = 23180
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
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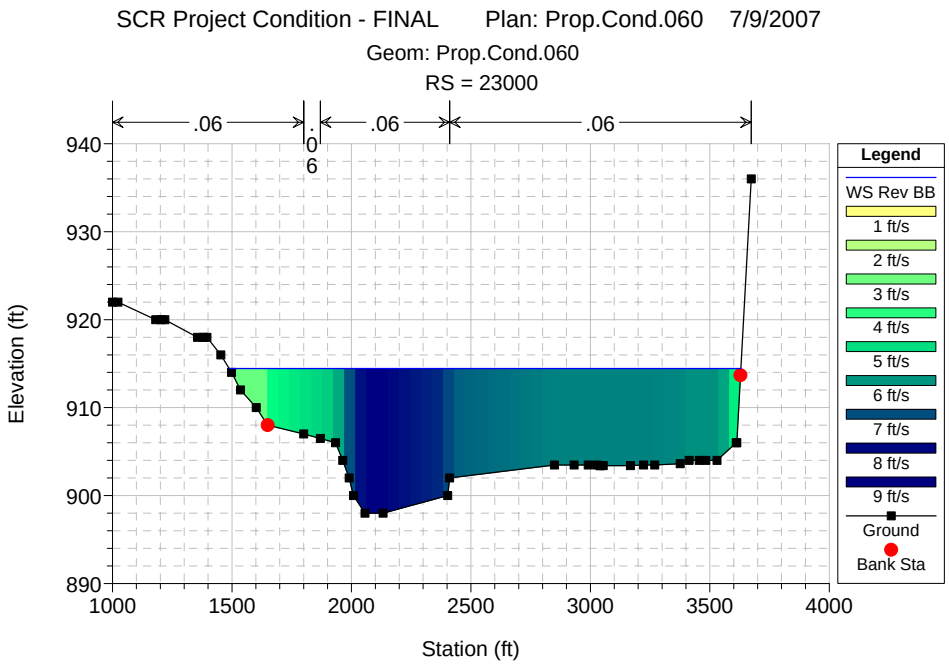
7 ft/s
8 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 23000
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
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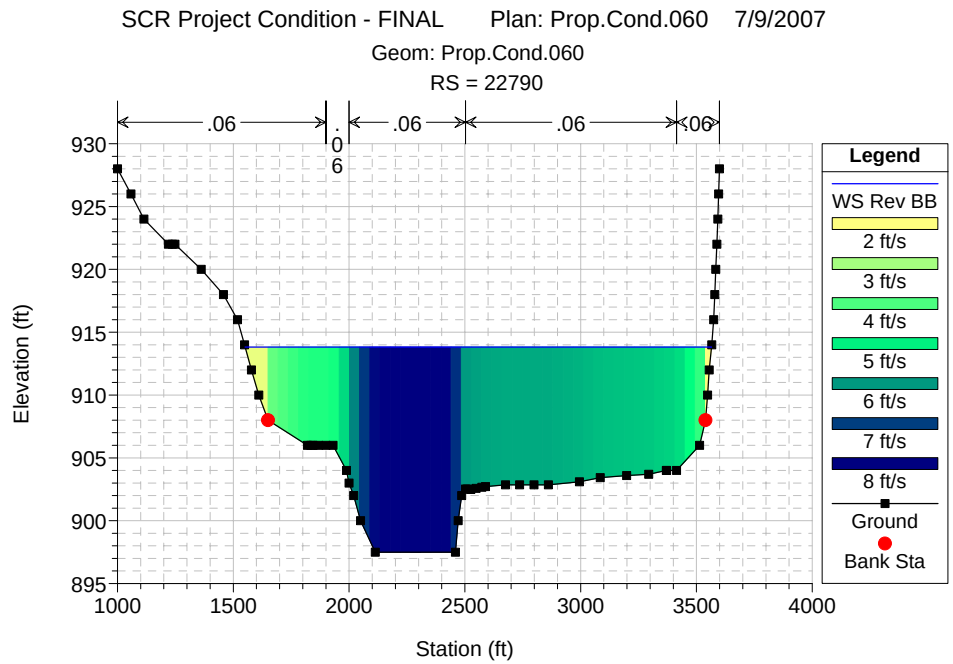
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 22790
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
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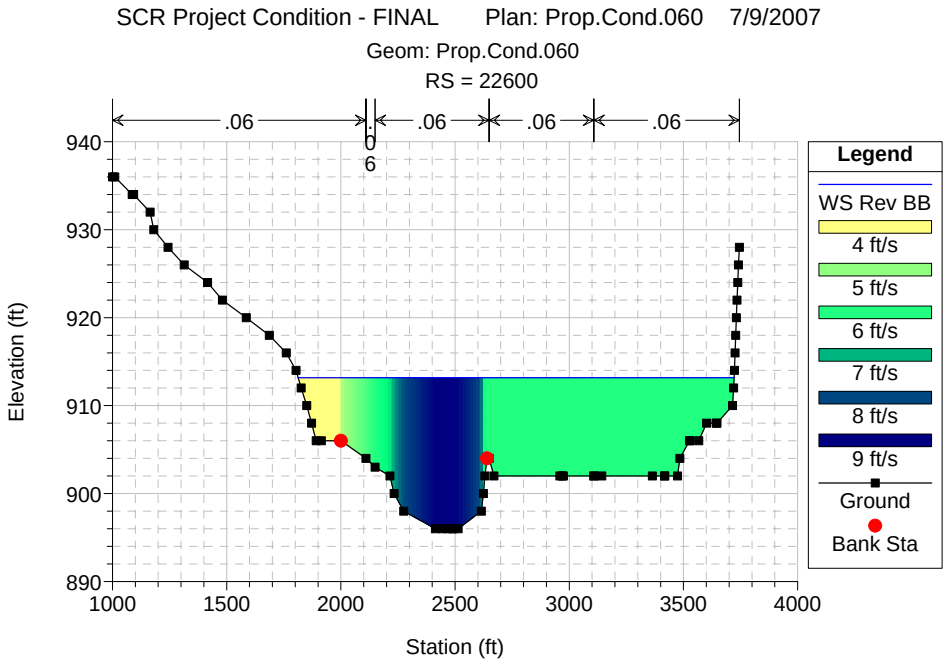
7 ft/s
8 ft/s
Ground
Bank Sta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Geom: Prop.Cond.060
RS = 22600
.06
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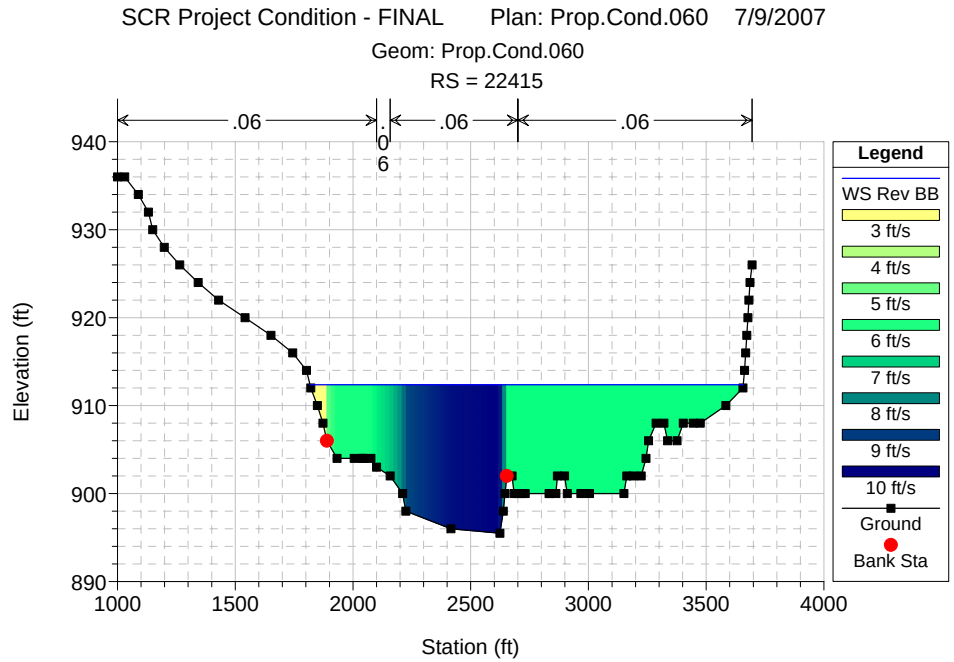
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 22415
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
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5 ft/s
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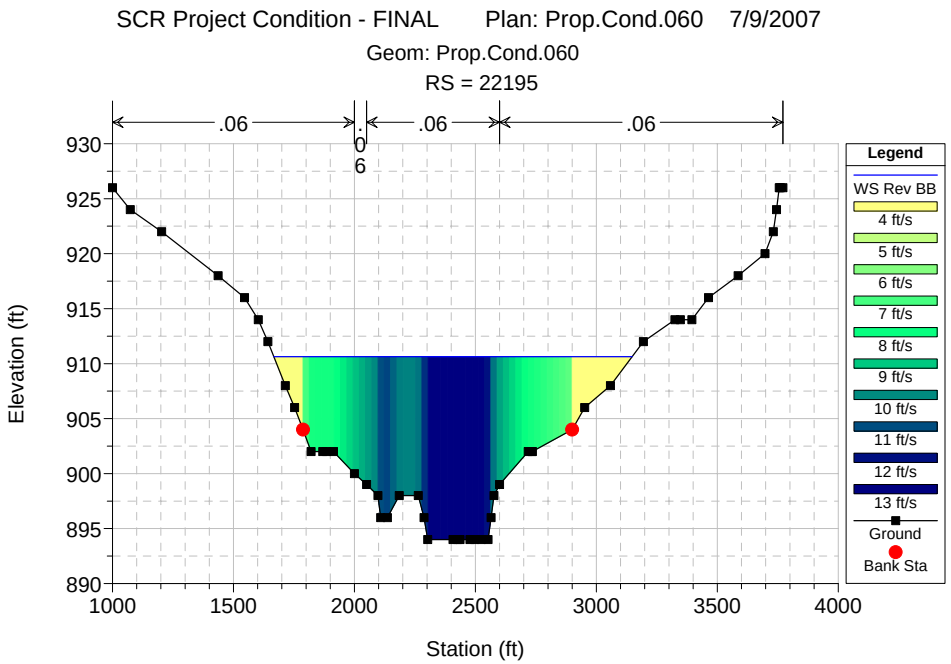
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 22195
.06
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.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
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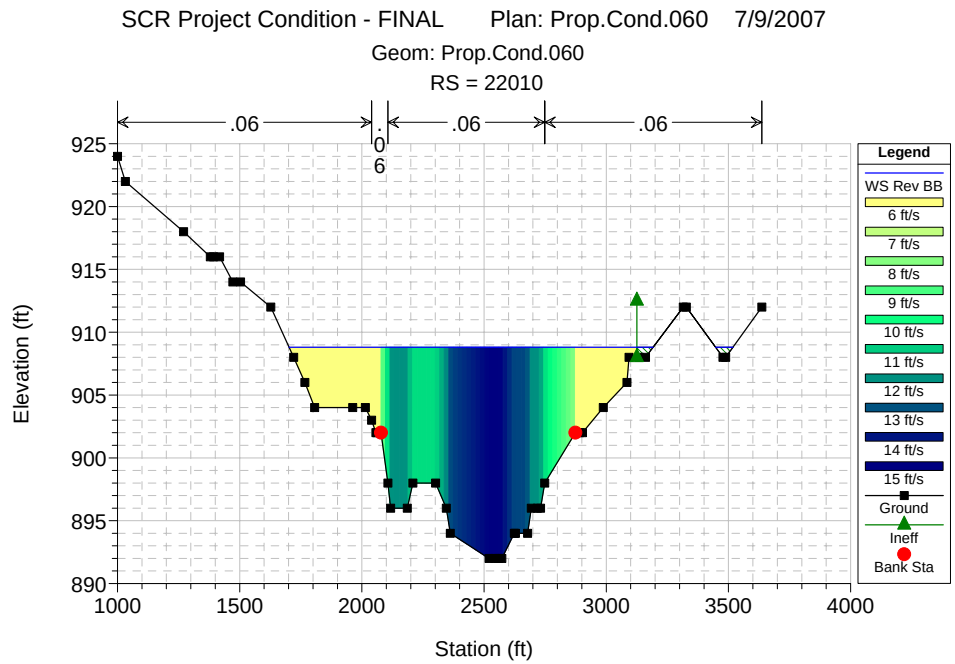
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 22010
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
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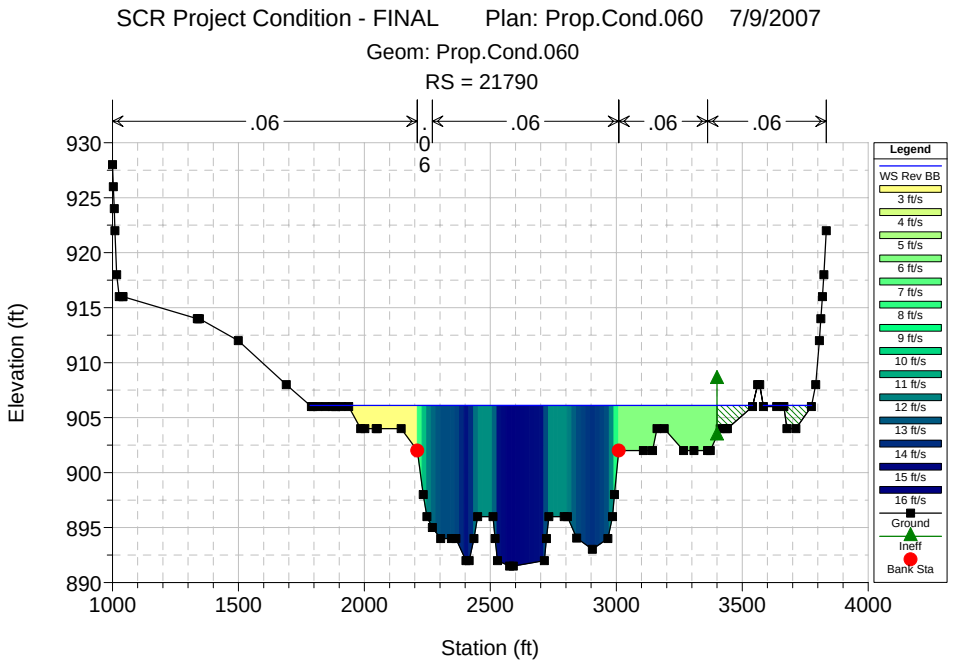
14 ft/s
15 ft/s
Ground
Ineff
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 21790
.06
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
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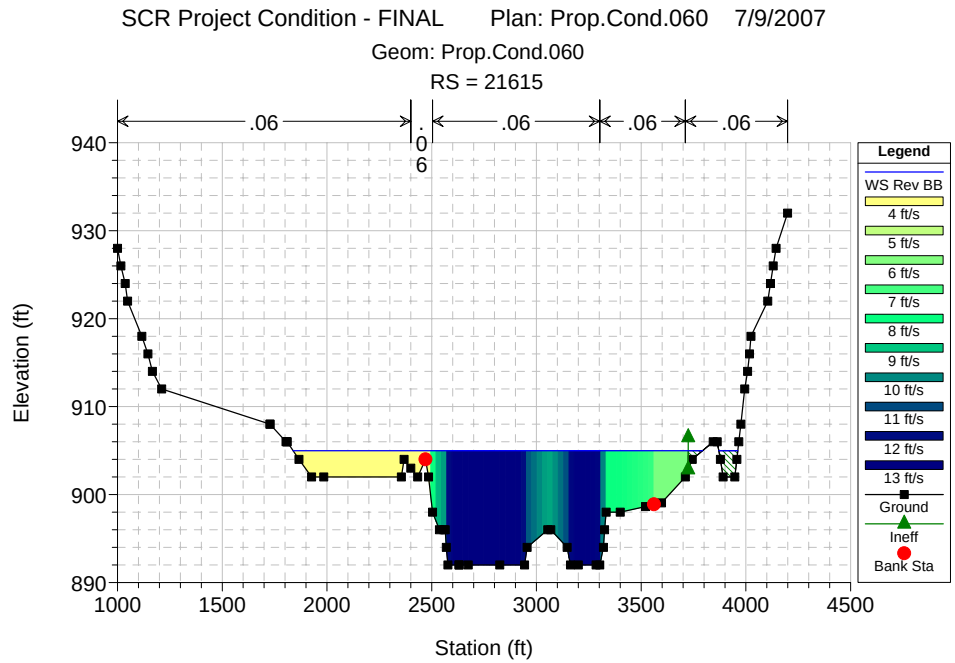
Ground
Ineff
Bank Sta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Geom: Prop.Cond.060
RS = 21615
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.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
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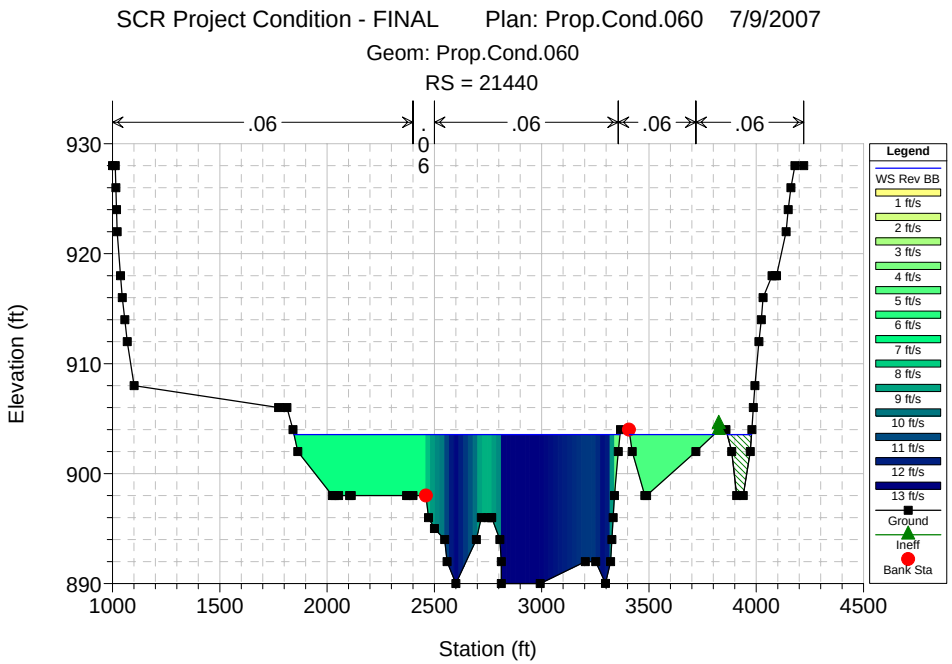
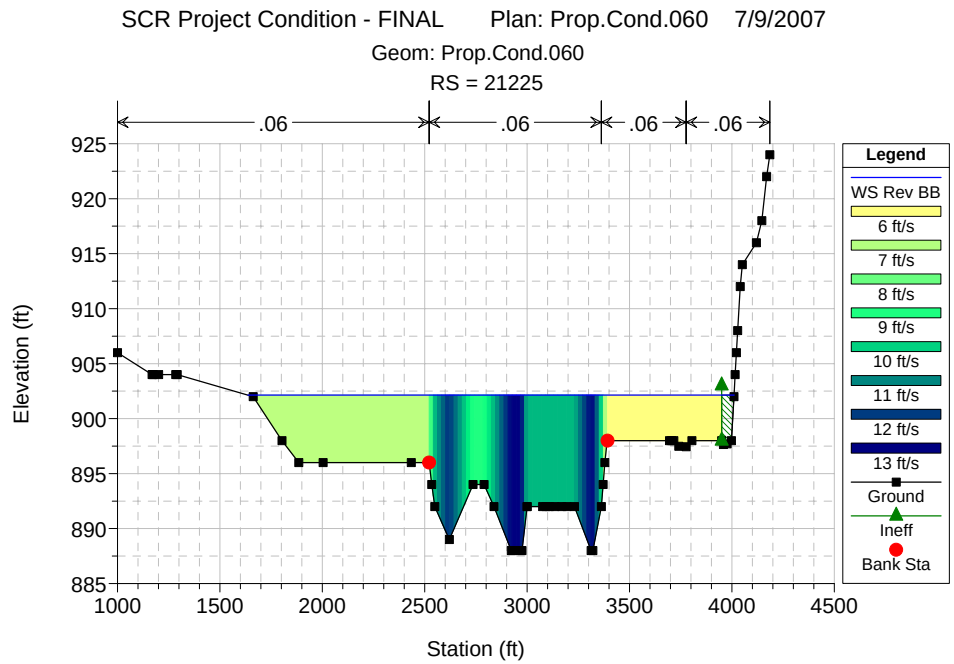
Ground
Ineff
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 21440
.06
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Ineff
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 21225
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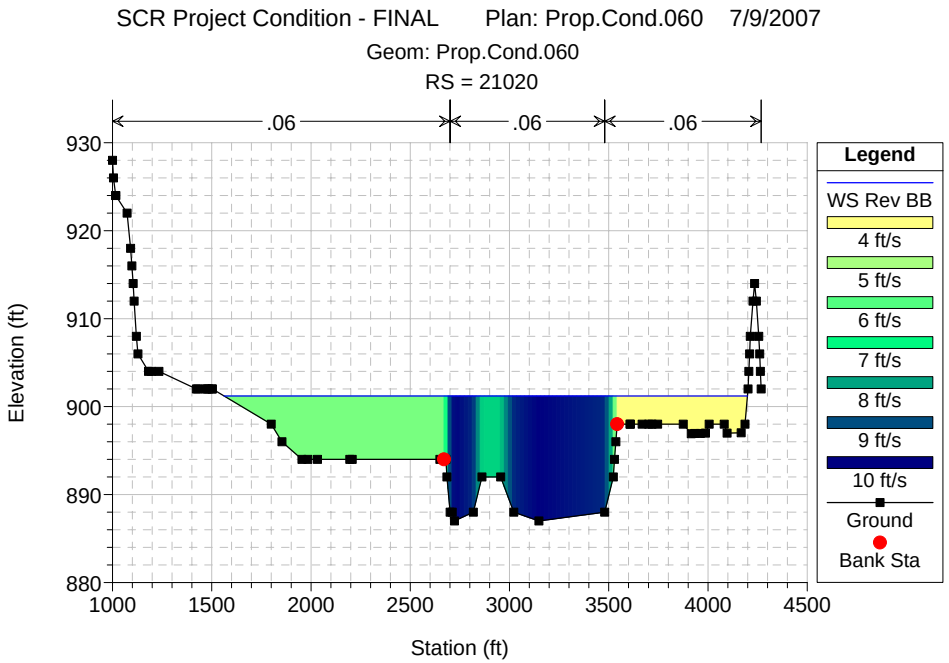
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Ineff
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 21020
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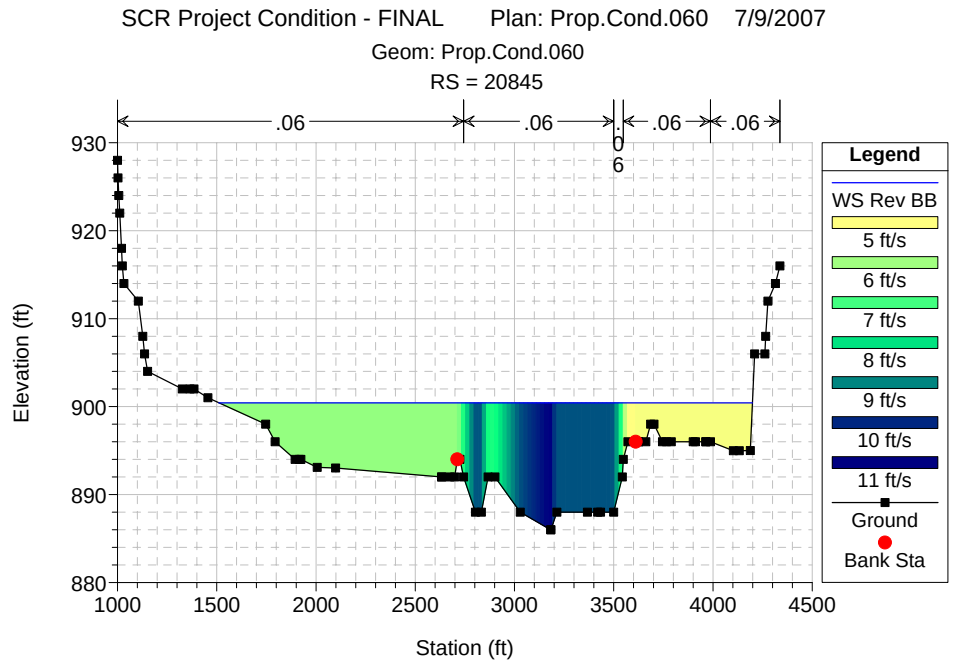
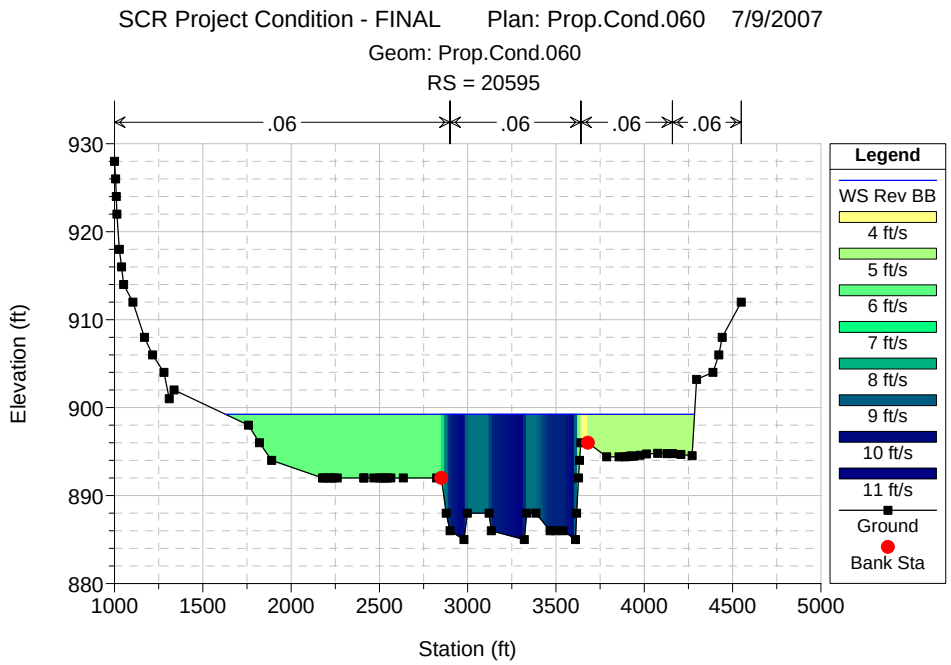
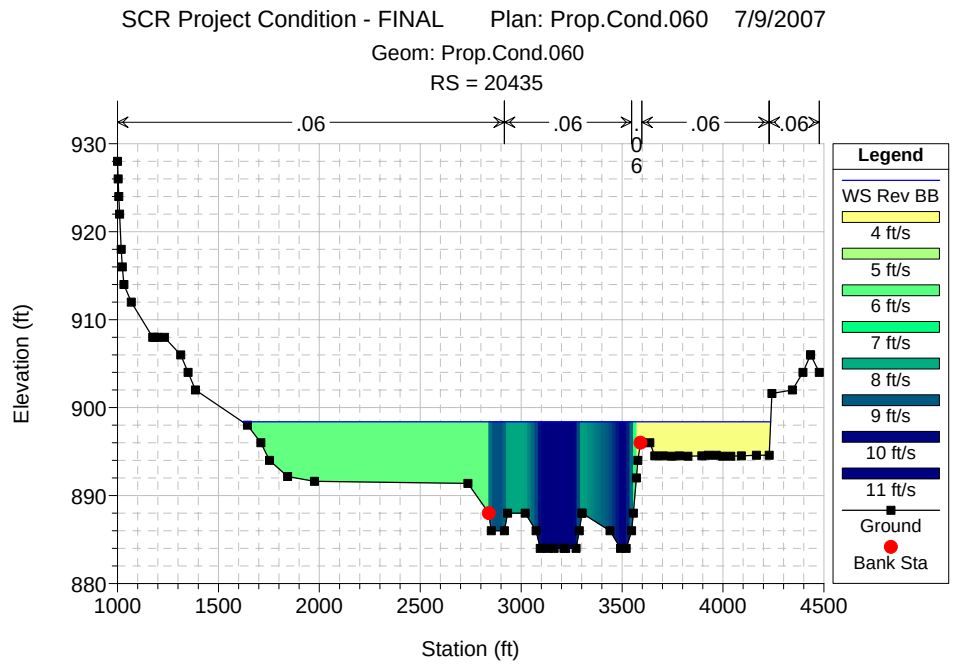
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 20845
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 20595
.06
.06
.06
.06
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 20435
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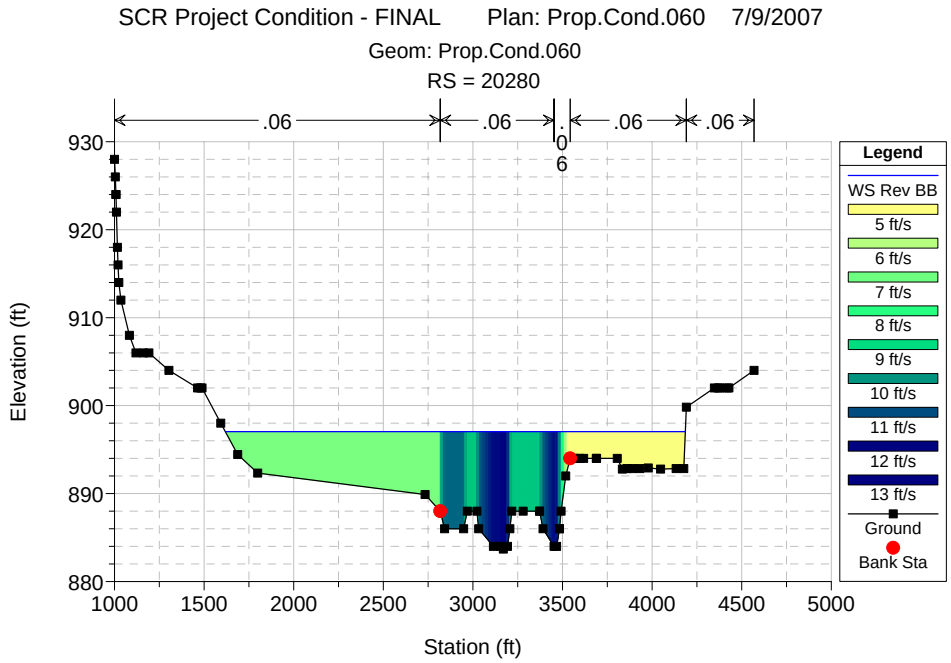
.06
.06
.06
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 20280
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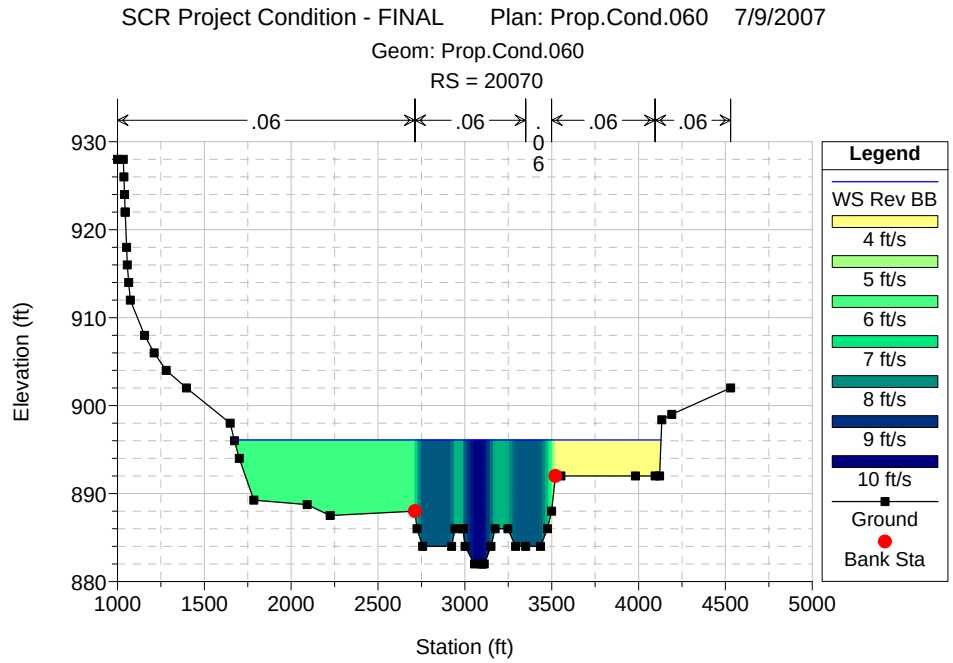
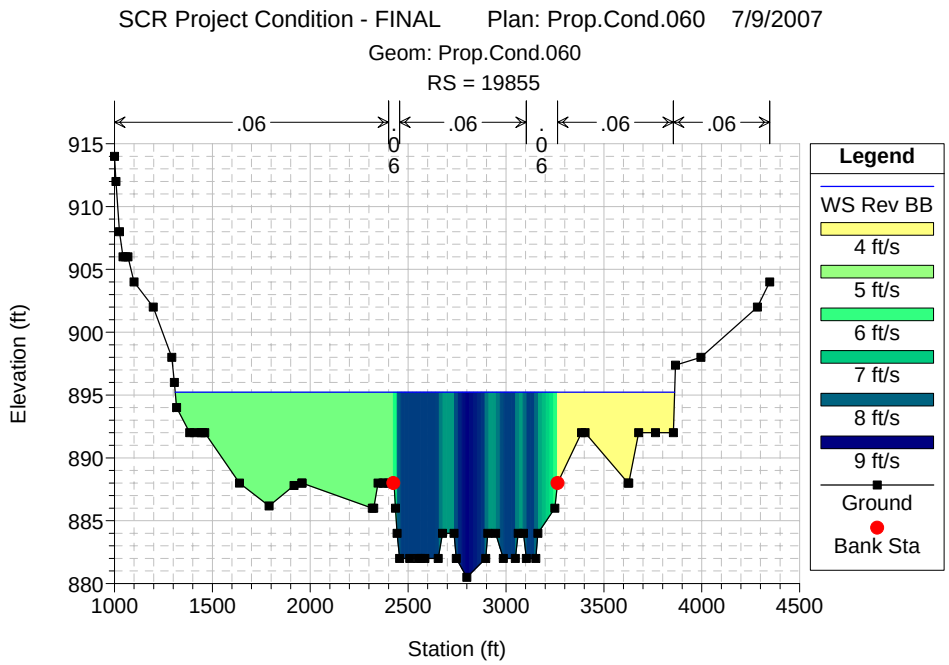
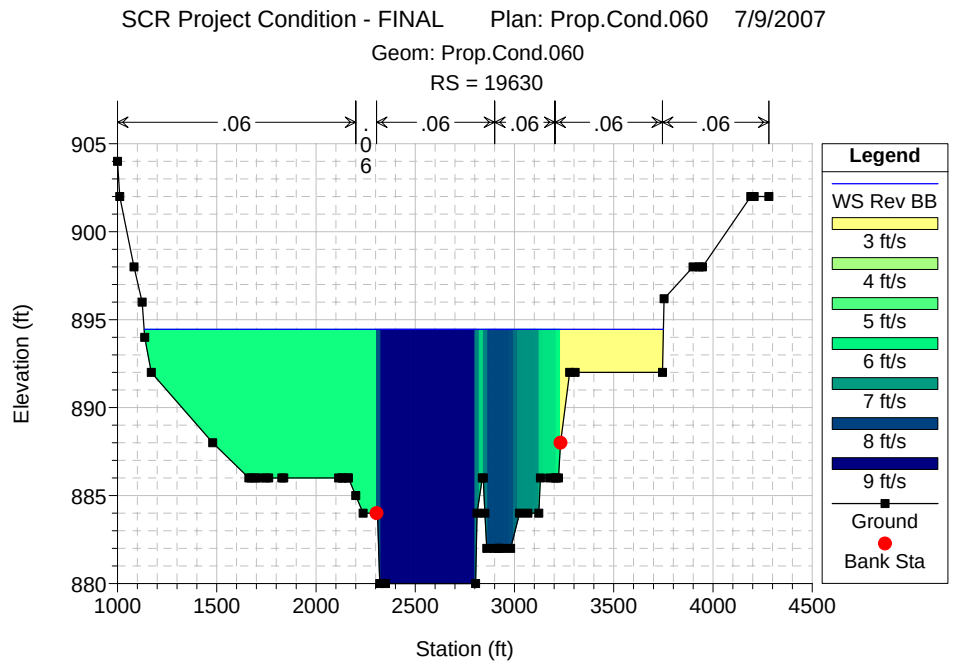
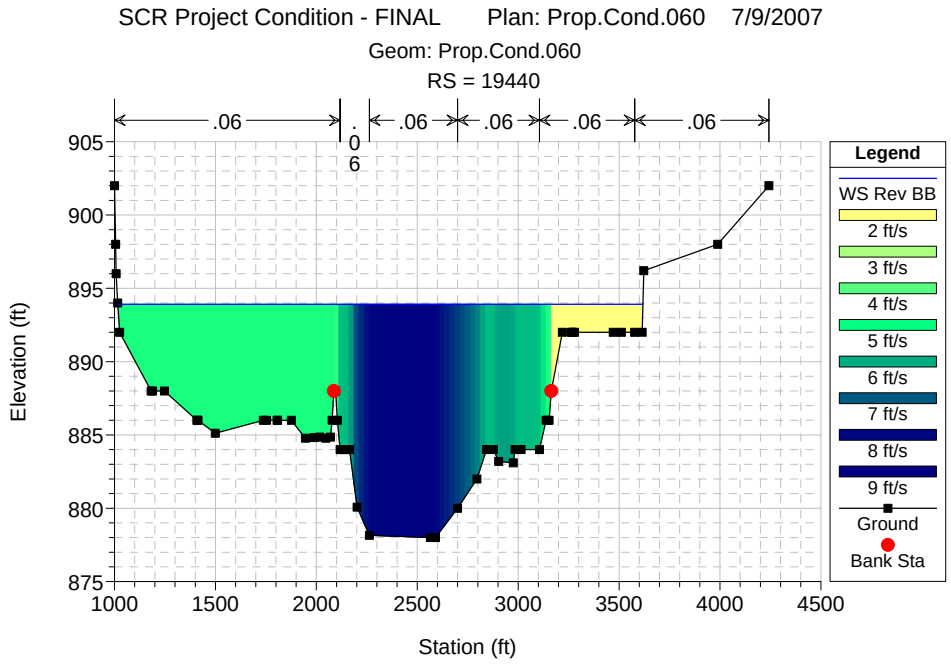
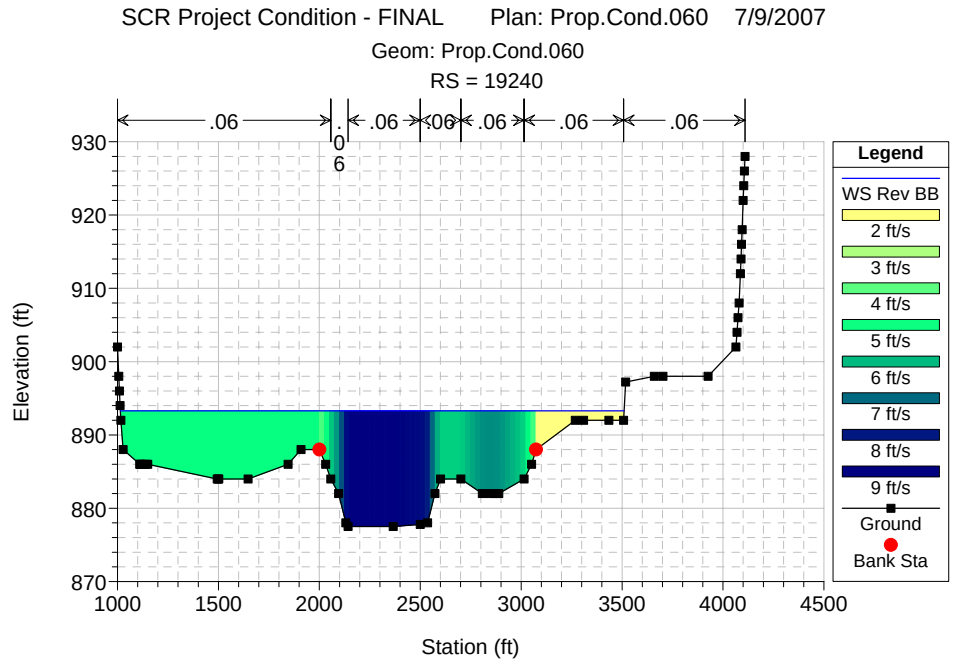
.06
.06
.06
Legend
WS Rev BB
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)

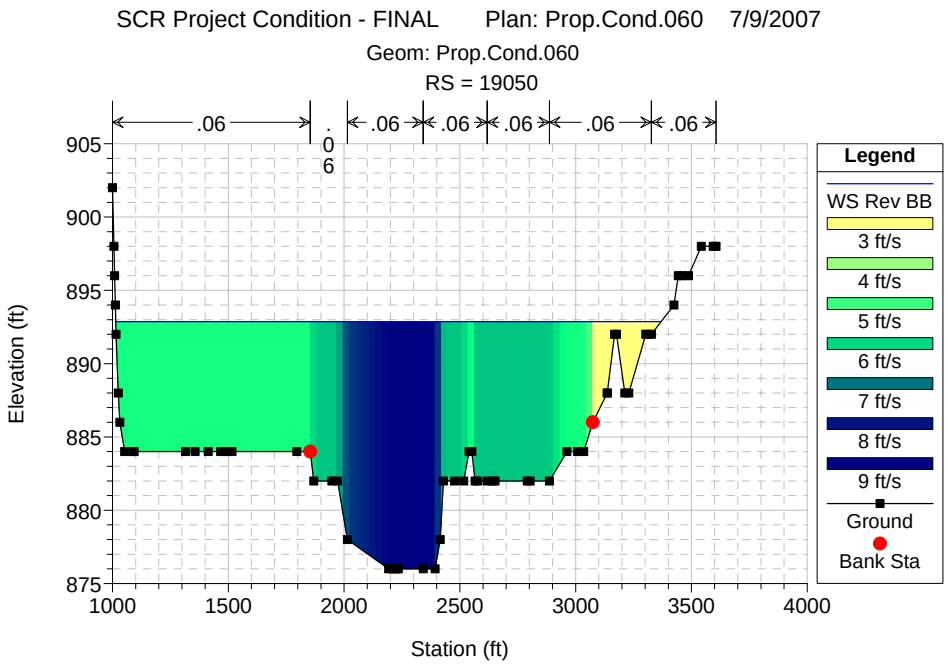

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 20070
.06
.06
.06
.06
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)

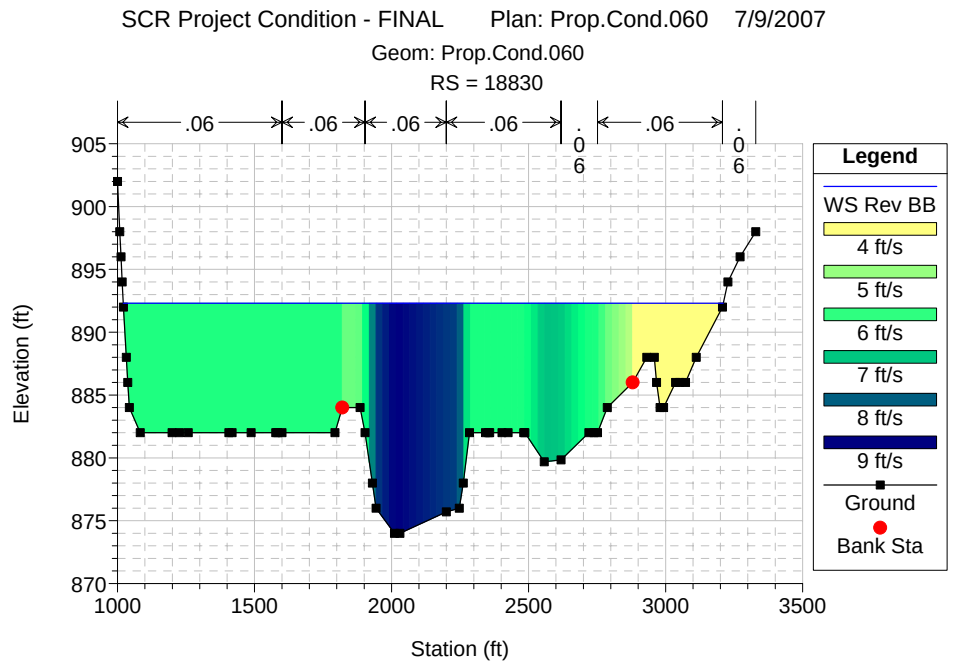

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 19855
.06
.06
.06
.06
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)

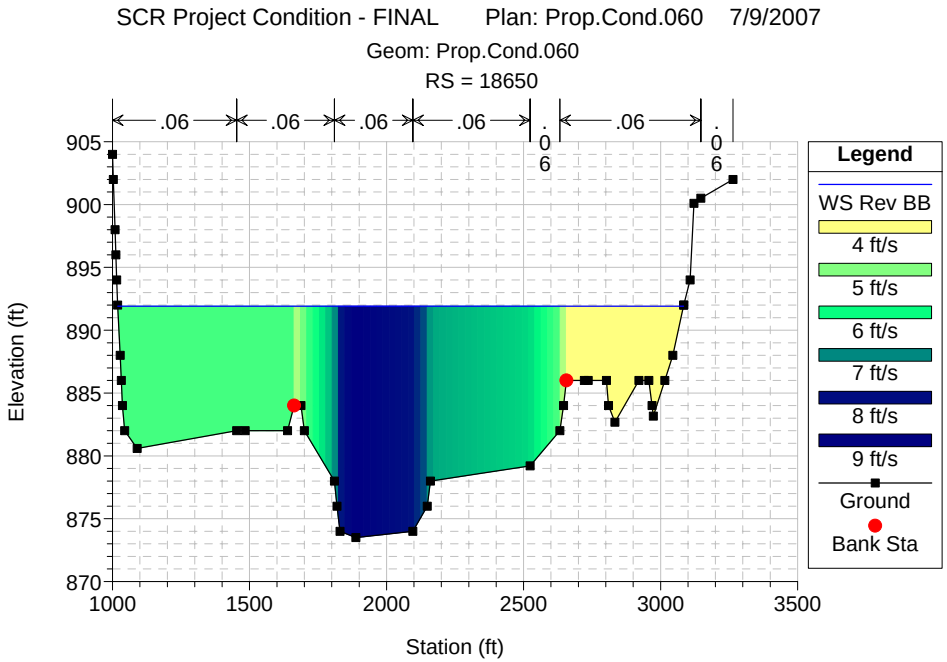

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 19630
.06
.06
.06
.06
.06
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)

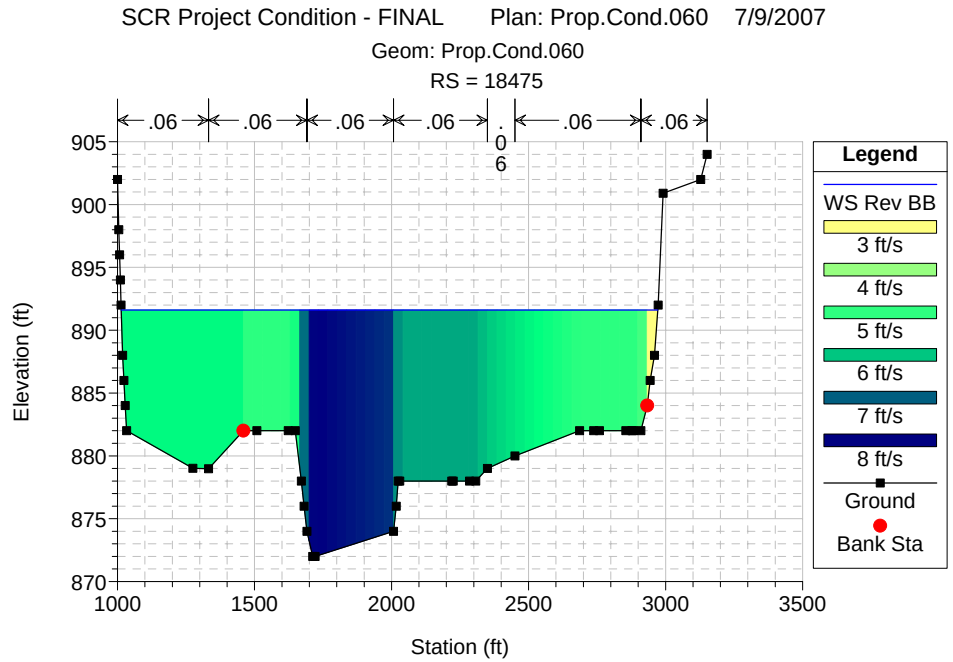

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 19440
.06
.06
.06
.06
.06
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)

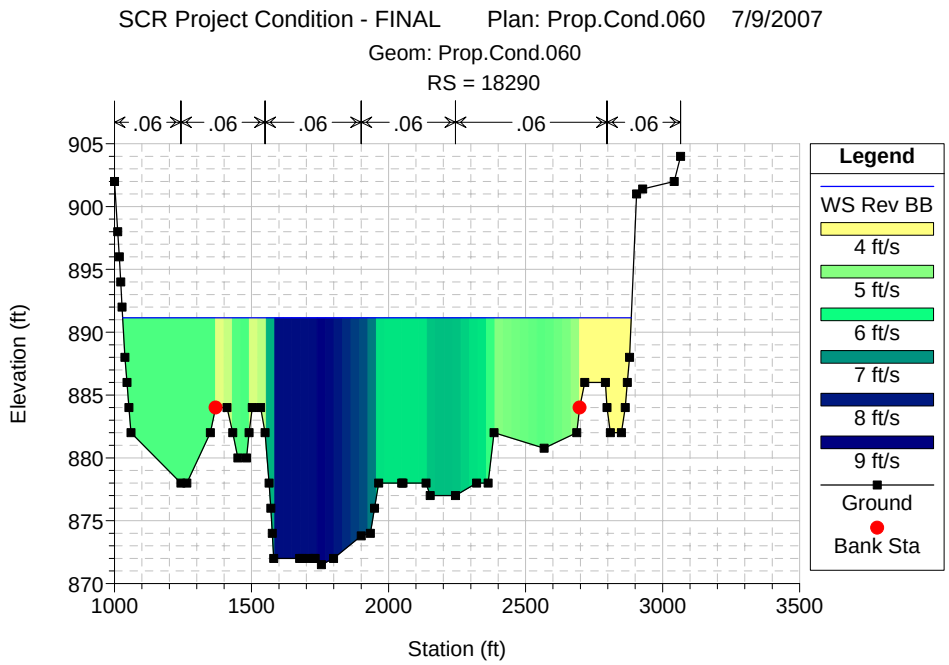

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 19240
.06
.06
.06
.06
.06
.06
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)

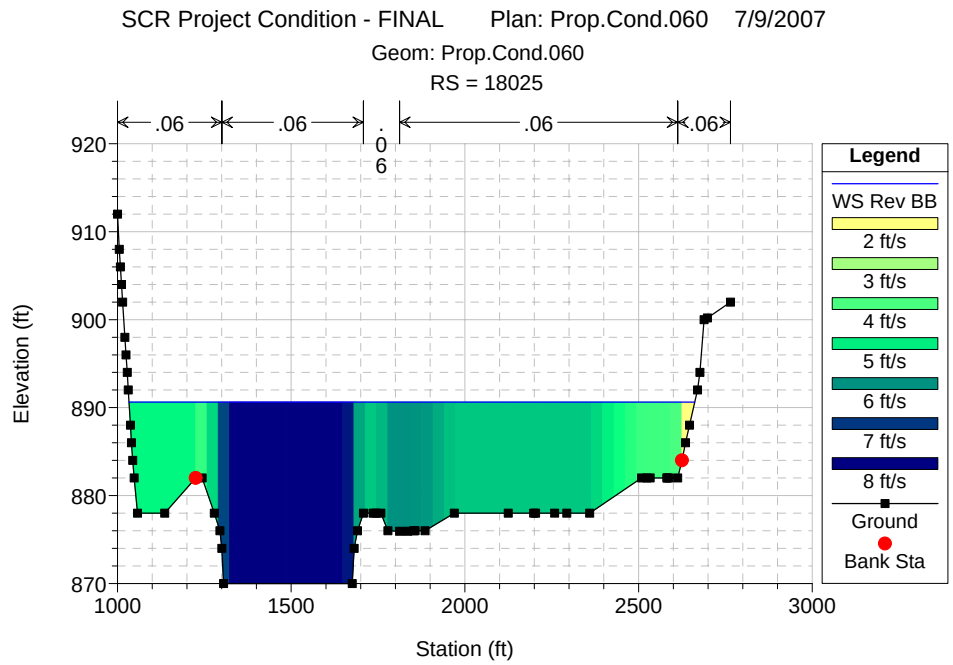

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 19050
.06
.06
.06
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta

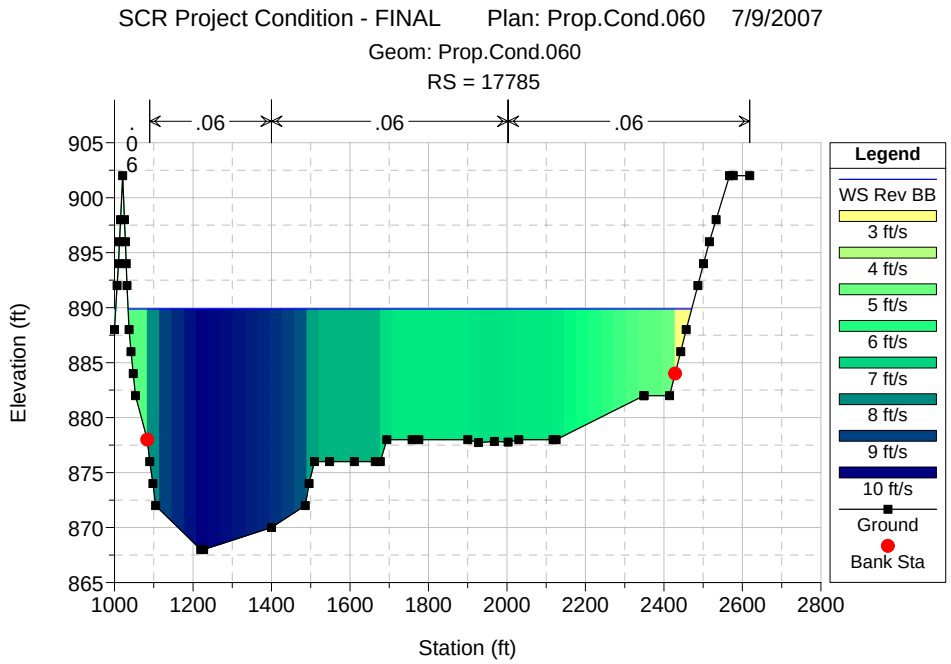

SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 18830
.06
.06
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 18650
.06
.06
.06
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 18475
.06
.06
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 18290
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 18025
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 17785
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
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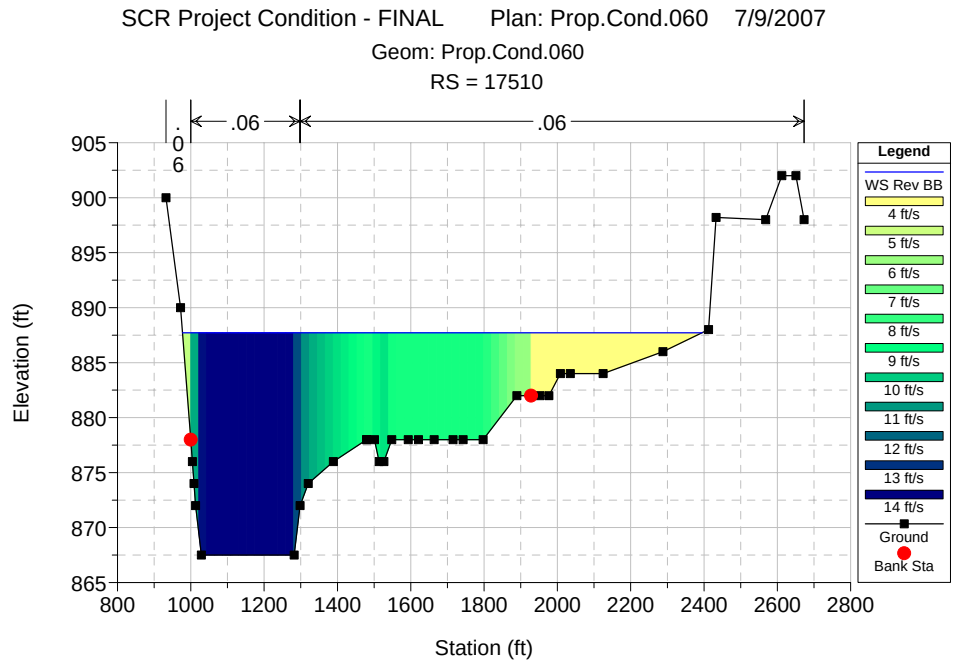
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 17510
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
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9 ft/s
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11 ft/s
12 ft/s
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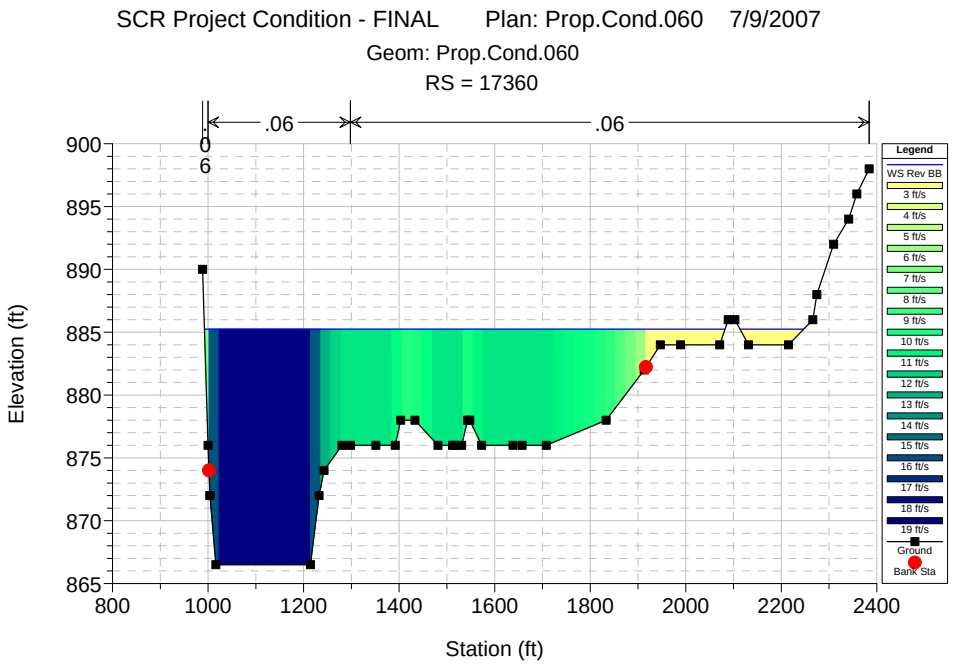
14 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 17360
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
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14 ft/s
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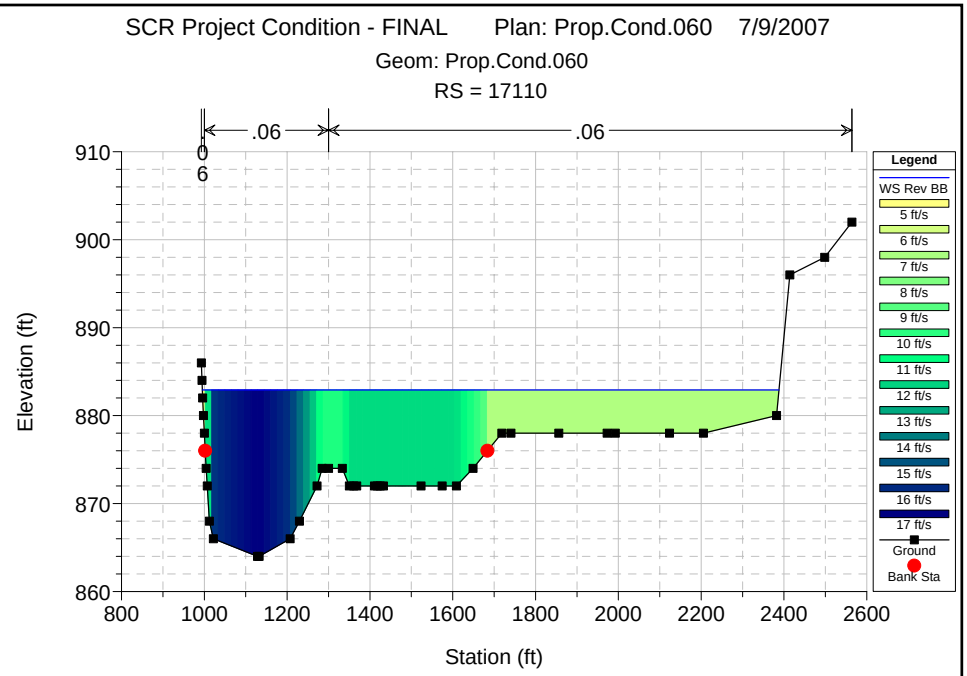
16 ft/s
17 ft/s
18 ft/s
19 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 17110
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
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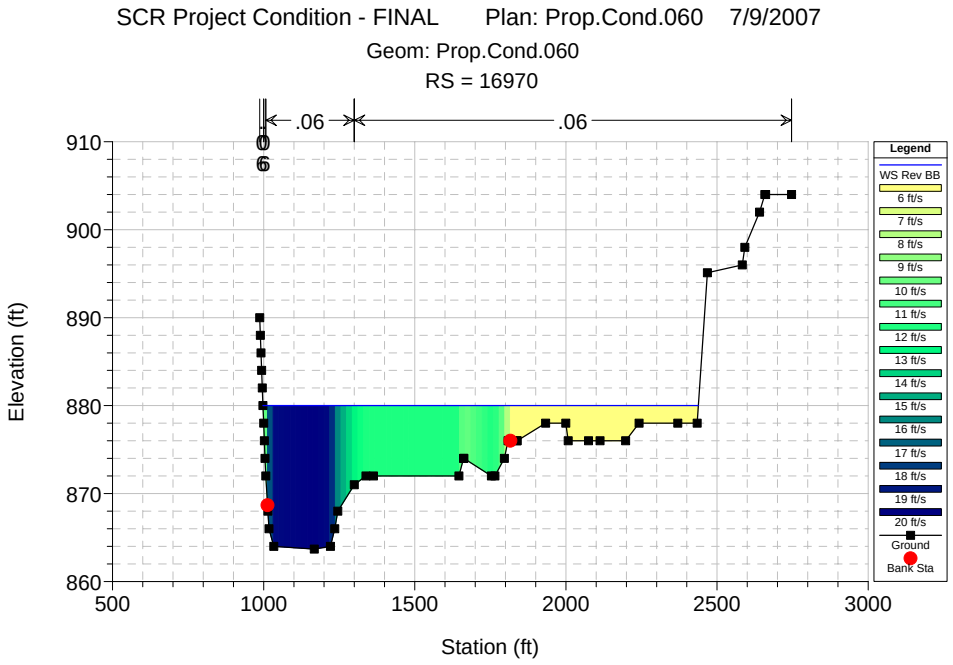
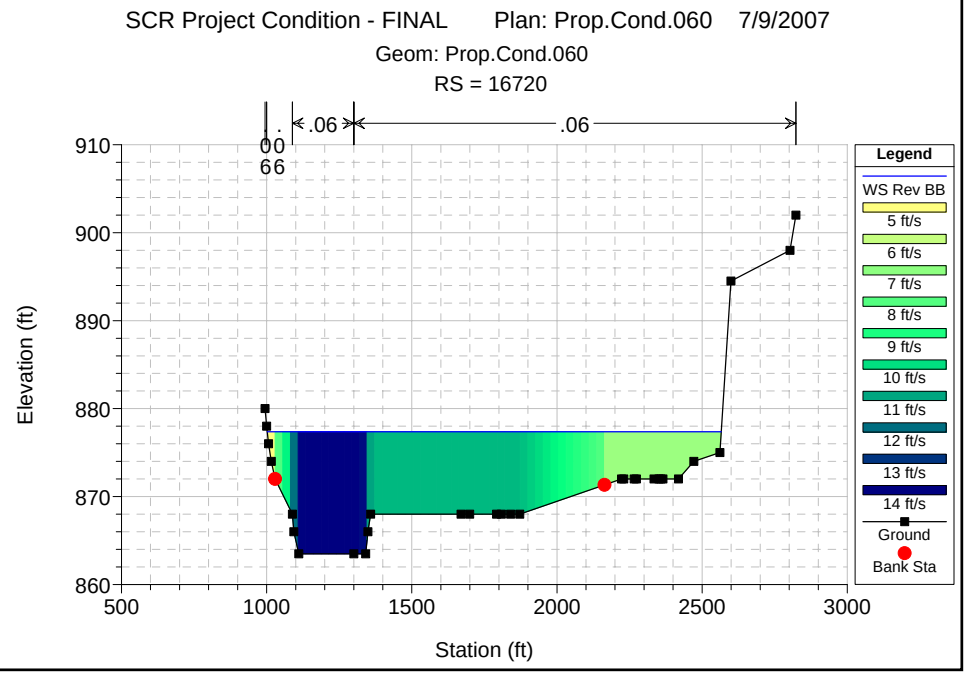
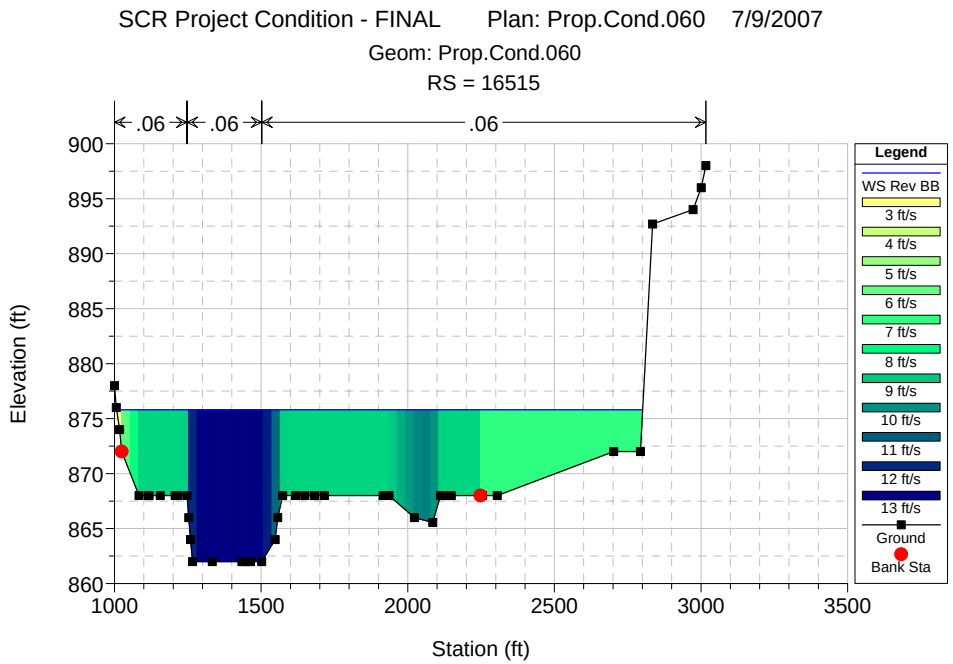
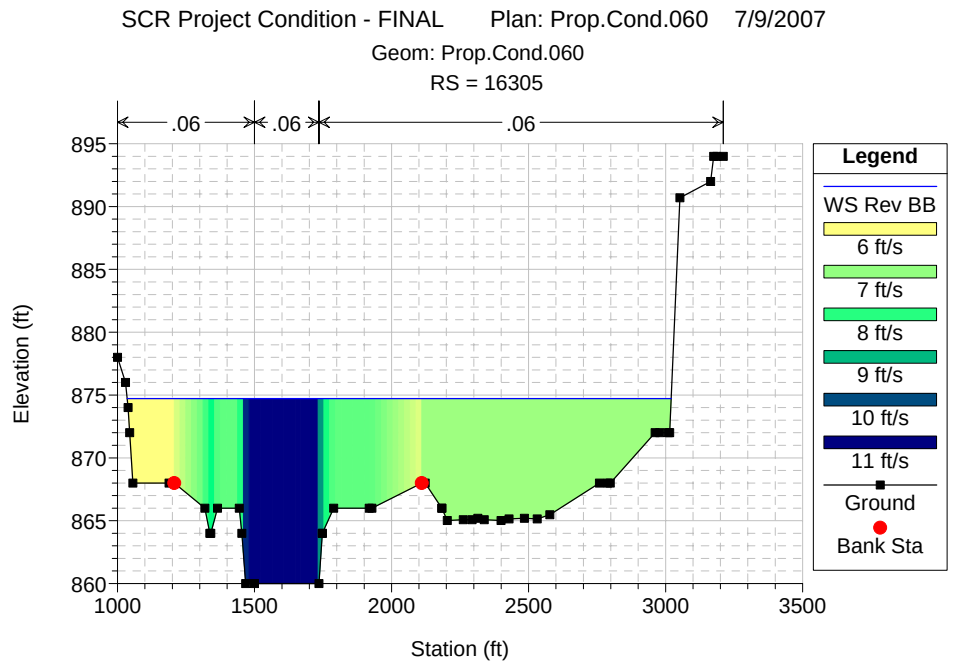
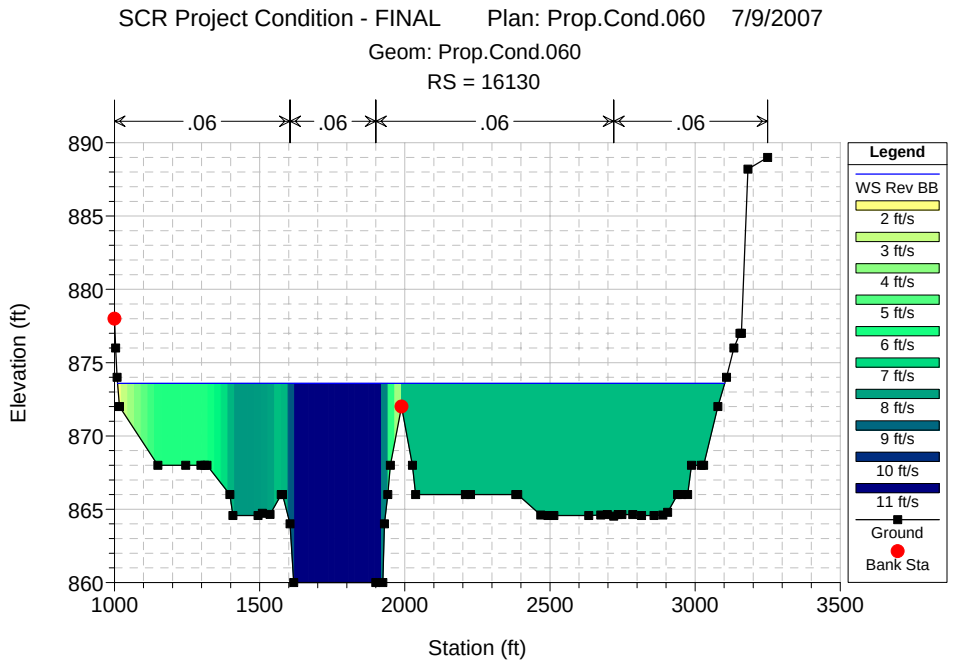
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 16970
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
20 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 16720
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 16515
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 16305
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 16130
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
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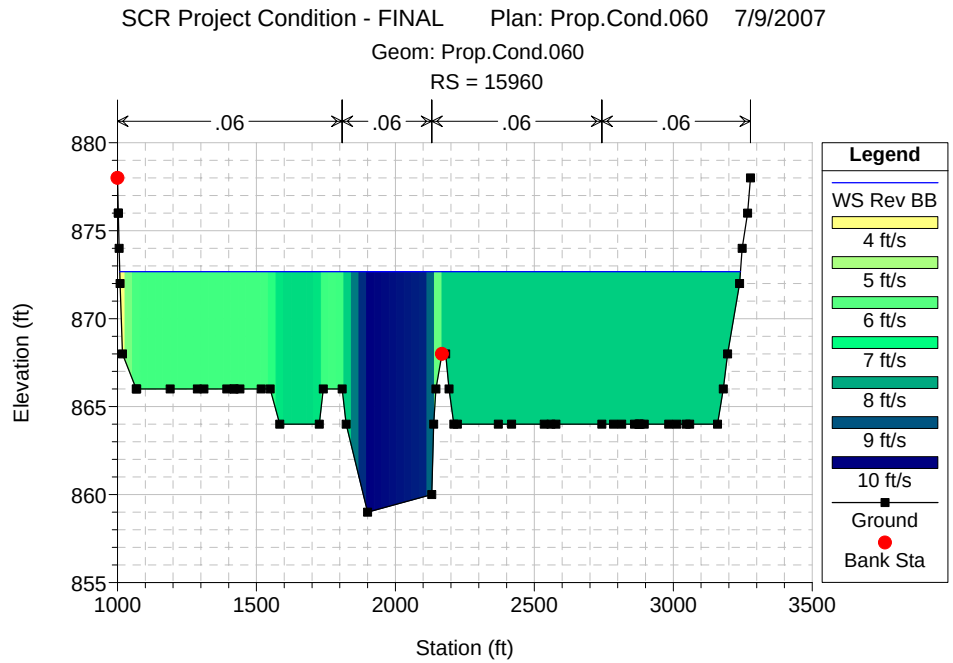
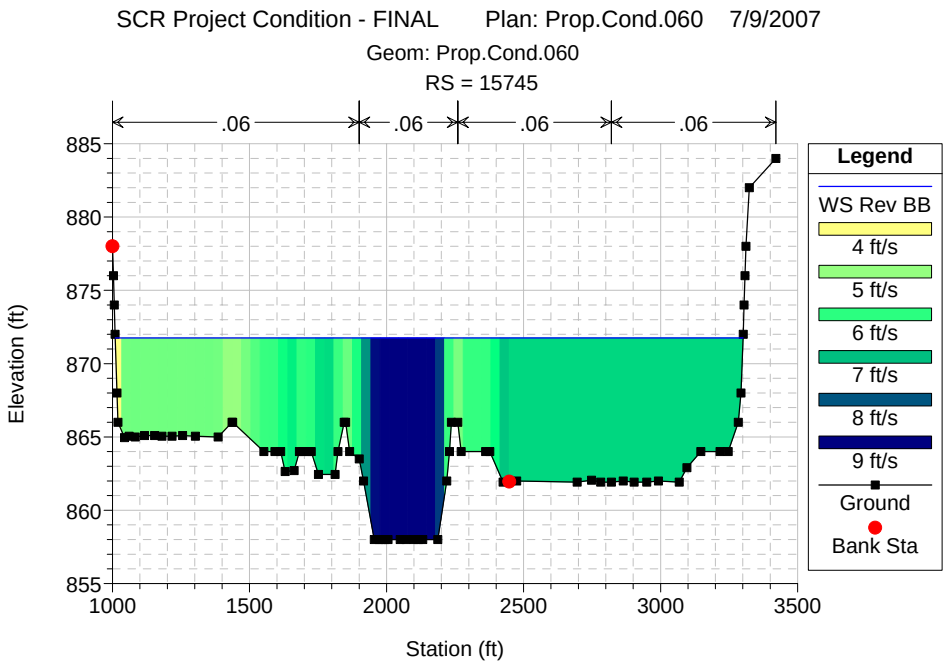
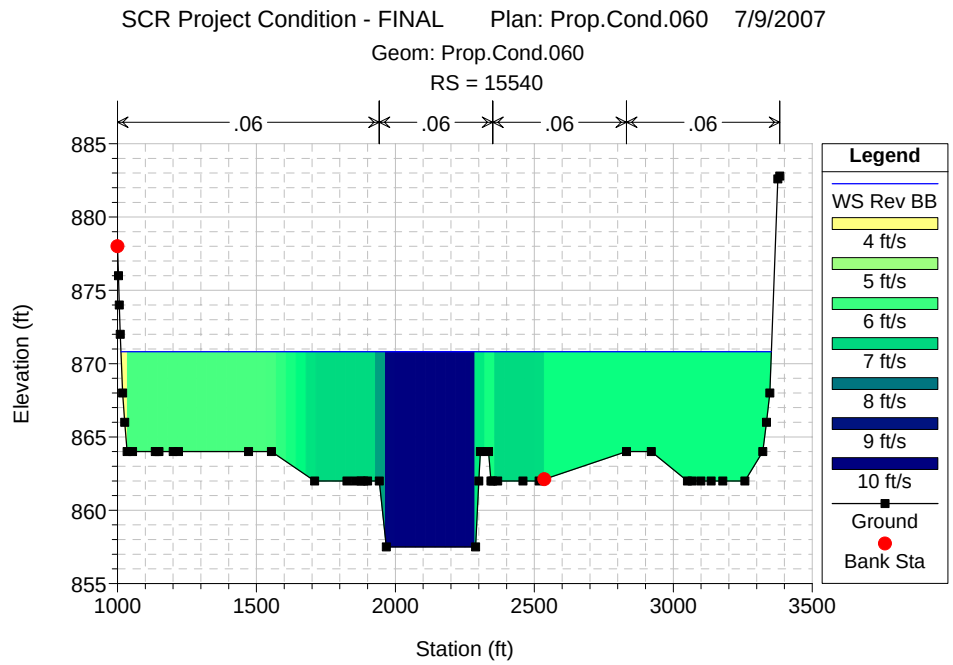
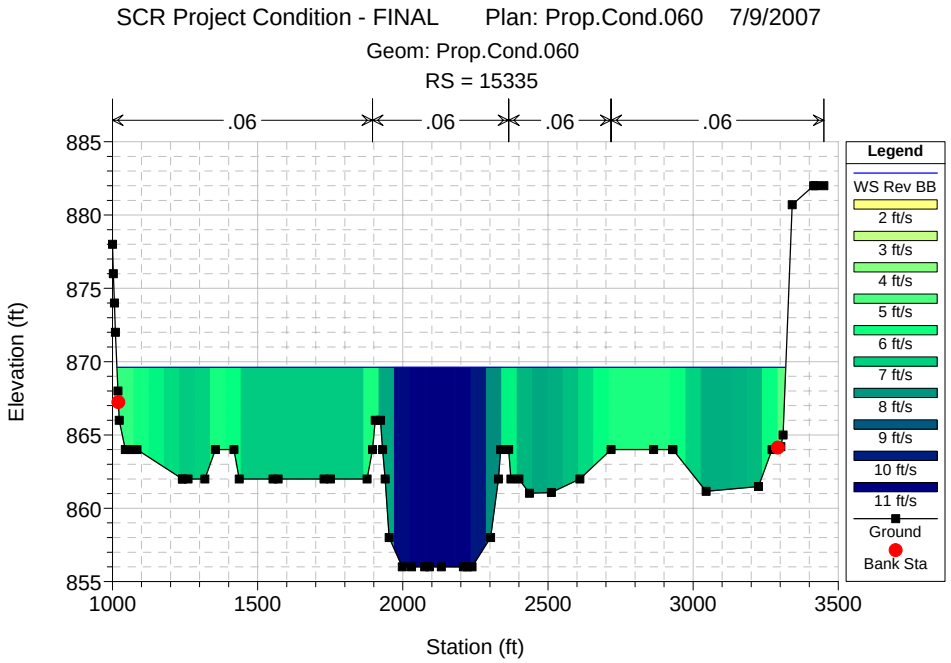
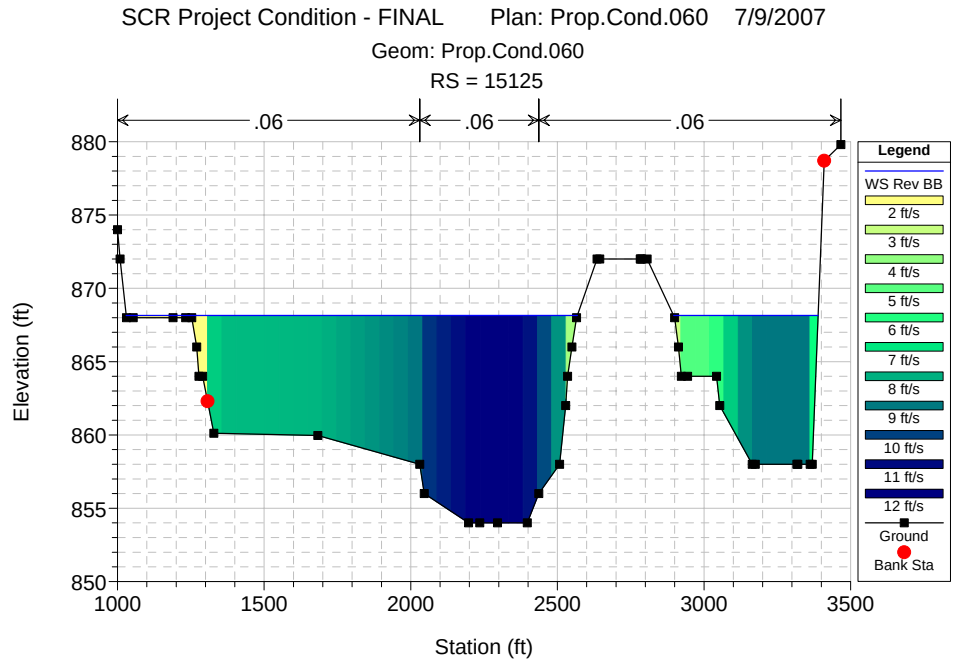
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 15960
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 15745
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 15540
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 15335
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta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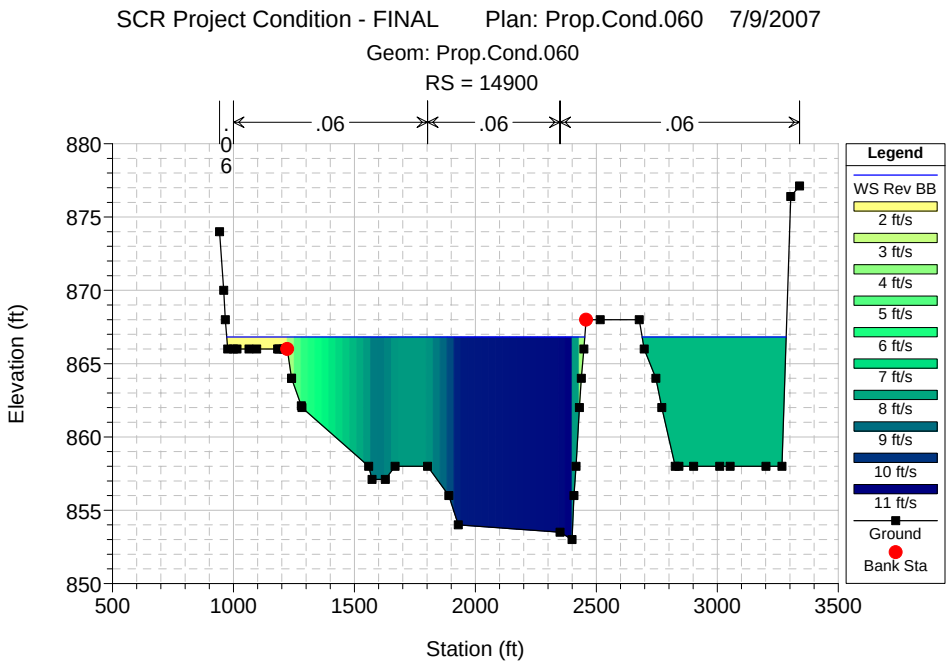
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta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Geom: Prop.Cond.060
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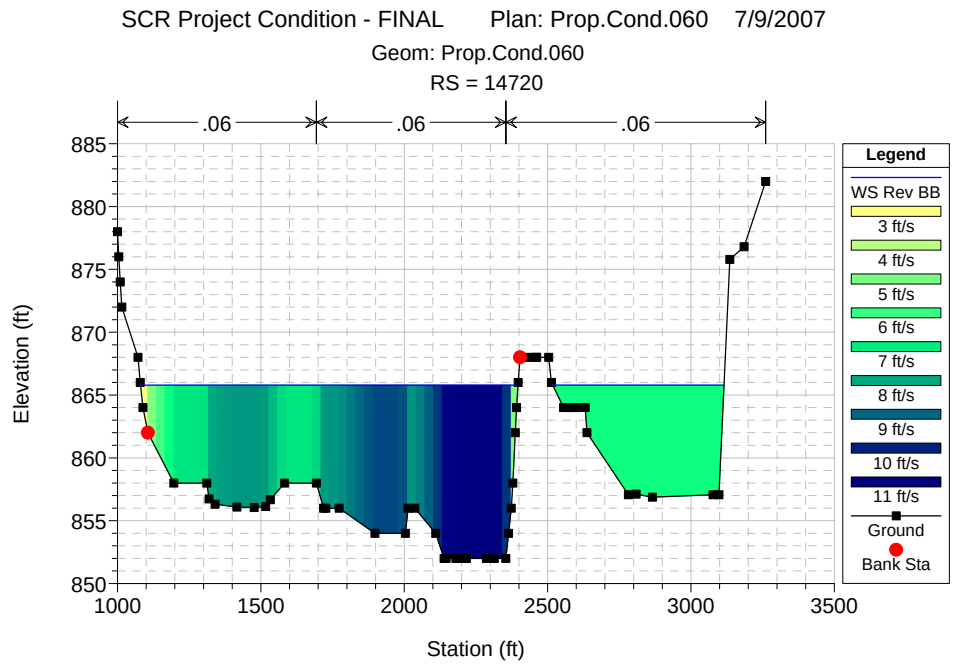
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
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.06
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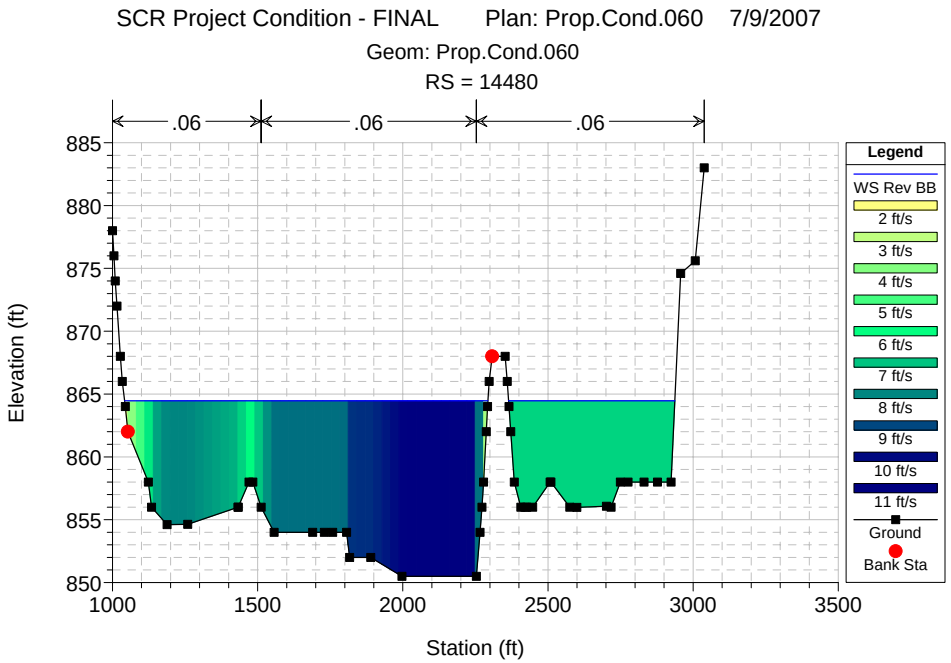
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
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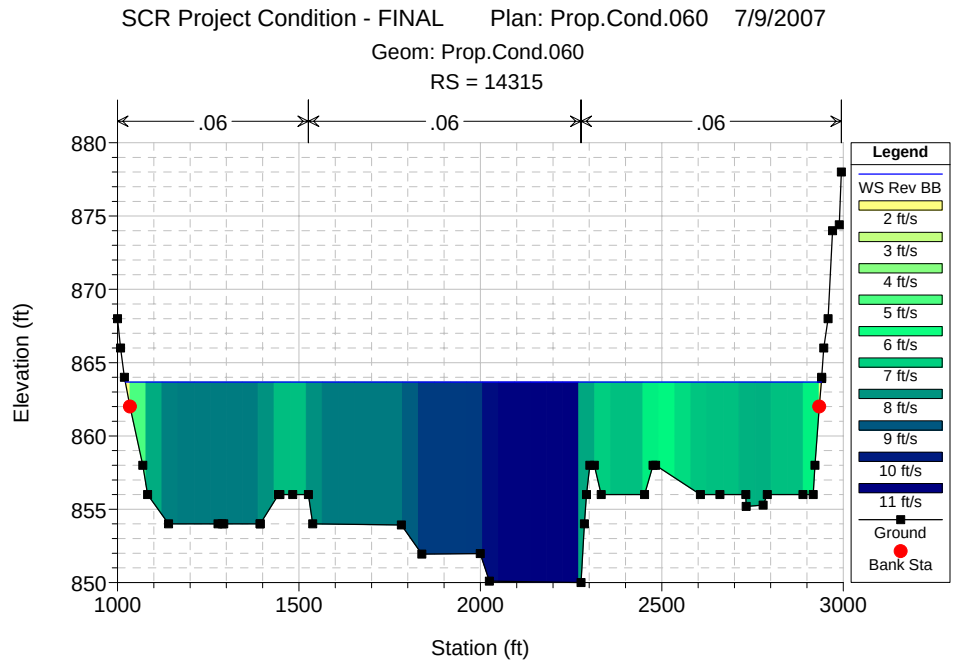
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
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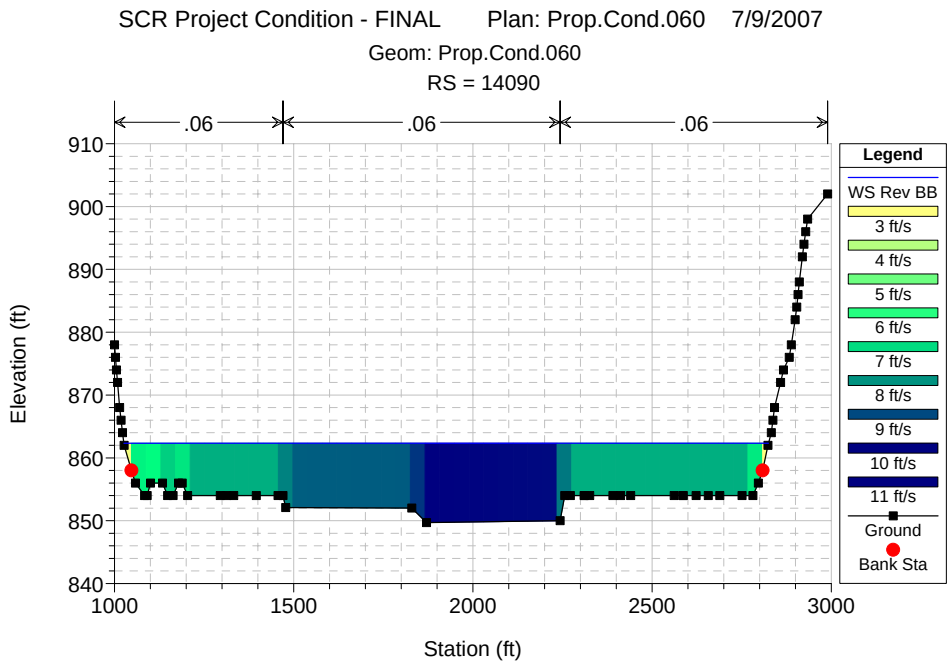
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
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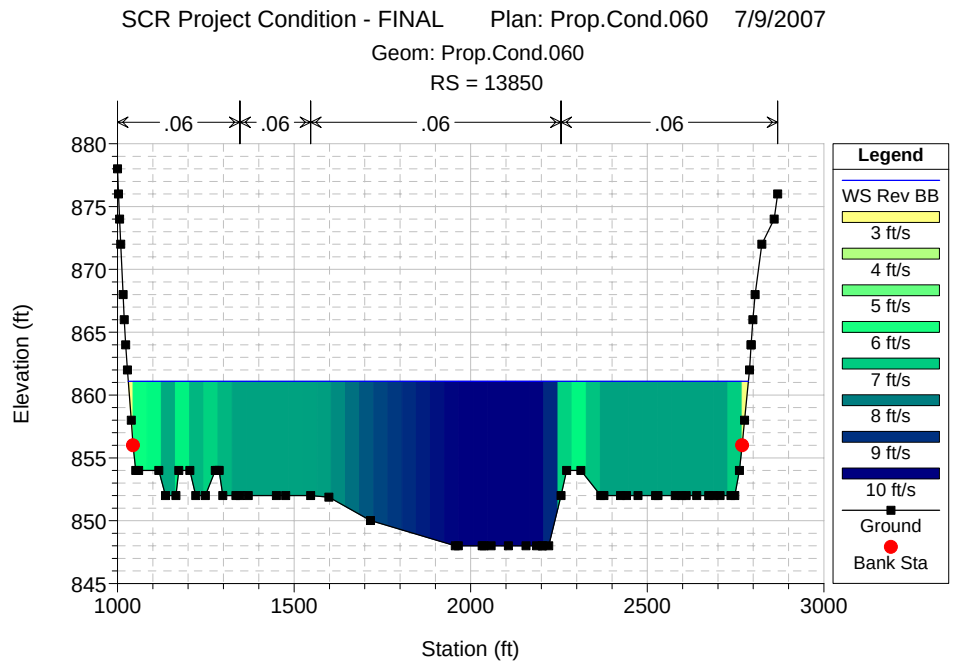
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
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.06
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
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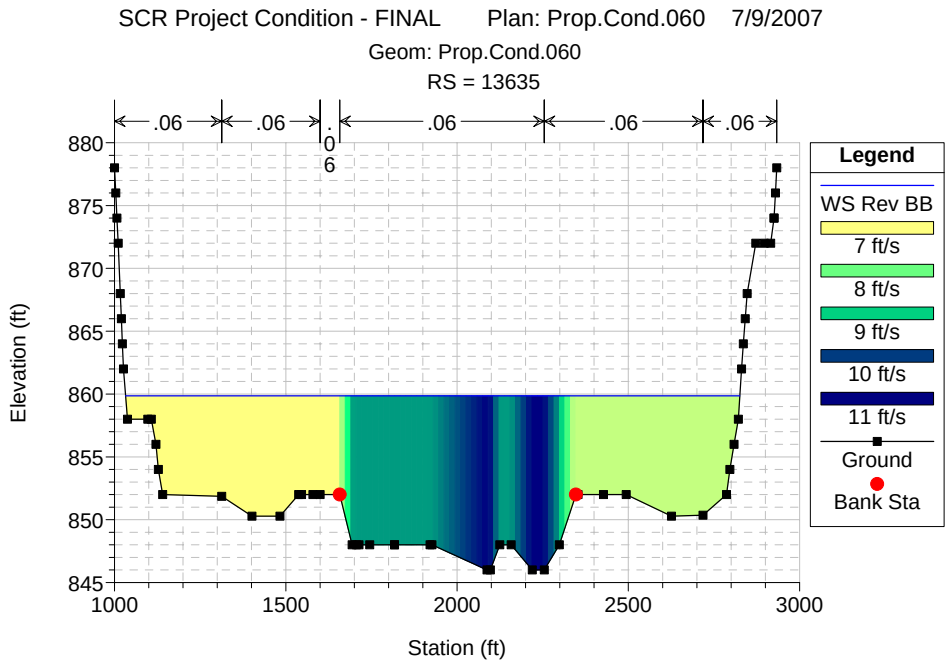
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 13635
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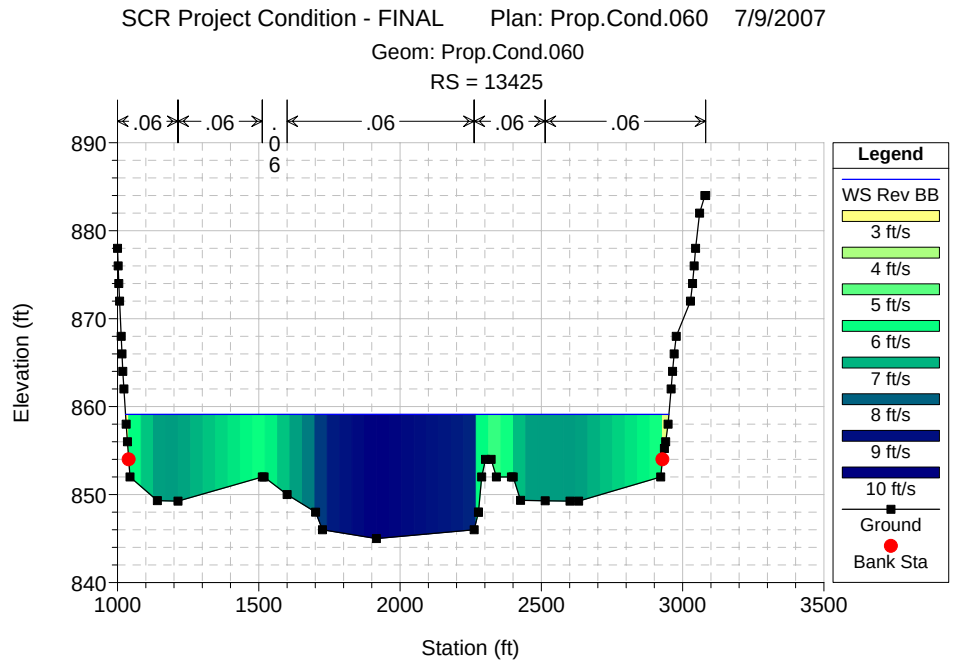
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.060 7/9/2007
Geom: Prop.Cond.060
RS = 13425
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.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta

Appendix III: Q_{cap} Proposed Project Condition HEC-RAS Model (n = 0.085); Summary Table, Profile & Cross-Sections

HEC-RAS Plan: Pr.085 River: SCR Reach: Project Profile: Rev BB

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Project	39755	Rev BB	115111.00	994.00	1013.38	1007.49	1014.26	0.005762	8.15	16915.32	1794.38	0.37
Project	39605	Rev BB	115111.00	993.00	1012.60	1005.91	1013.42	0.004986	7.85	17177.87	1648.46	0.34
Project	39310	Rev BB	115111.00	992.00	1011.16	1004.44	1011.89	0.004616	7.66	18328.95	1731.35	0.33
Project	39100	Rev BB	115111.00	990.00	1010.39	1002.13	1011.01	0.003568	6.74	19349.20	1588.18	0.29
Project	38925	Rev BB	115111.00	989.50	1009.65	1001.39	1010.33	0.003920	6.92	18195.63	1449.58	0.30
Project	38710	Rev BB	115111.00	988.00	1008.68	1000.08	1009.46	0.004136	7.35	17023.52	1307.26	0.32
Project	38475	Rev BB	115111.00	986.00	1006.76	999.95	1008.12	0.007379	9.67	12954.57	1023.58	0.42
Project	38300	Rev BB	115111.00	985.50	1005.66	997.52	1006.87	0.006013	8.95	13488.97	964.33	0.38
Project	38065	Rev BB	115111.00	984.00	1004.07	995.71	1005.40	0.006306	9.29	12759.57	885.03	0.39
Project	37810	Rev BB	115111.00	983.00	1001.55	995.23	1003.35	0.009783	10.85	11006.38	868.82	0.48
Project	37655	Rev BB	115111.00	982.00	1000.38	994.10	1001.84	0.008307	9.79	12211.67	946.71	0.44
Project	37390	Rev BB	115111.00	981.00	998.85	990.39	999.95	0.005561	8.40	13706.22	832.12	0.36
Project	37135	Rev BB	115111.00	980.00	997.12	989.60	998.37	0.006873	8.95	12855.92	831.12	0.40
Project	36930	Rev BB	115111.00	978.00	996.00	987.60	997.06	0.005476	8.26	13935.20	886.16	0.37
Project	36735	Rev BB	115111.00	977.00	994.89	987.09	995.93	0.005942	8.21	14025.46	929.71	0.37
Project	36515	Rev BB	115111.00	975.00	993.88	985.42	994.73	0.004690	7.42	15513.12	1001.10	0.33
Project	36374	Rev BB	115111.00	974.11	993.37	985.06	994.13	0.004400	7.00	16453.51	1104.20	0.32
Project	36299		Bridge									
Project	36240	Rev BB	115111.00	974.11	991.47	985.19	992.47	0.006948	8.02	14358.29	1107.82	0.39
Project	36080	Rev BB	116236.00	973.00	990.32	984.69	991.36	0.007814	8.18	14211.17	1162.79	0.41
Project	35845	Rev BB	116236.00	971.00	988.96	982.91	989.72	0.005686	6.95	16722.71	1477.56	0.36
Project	35725	Rev BB	116236.00	970.00	988.12	982.70	988.98	0.006358	7.56	15892.39	1451.14	0.39
Project	35515	Rev BB	116236.00	969.00	986.76	981.71	987.65	0.006394	8.26	16101.99	1500.01	0.39
Project	35245	Rev BB	116236.00	968.00	984.96	980.46	985.85	0.006958	8.15	15989.73	1580.09	0.40
Project	35040	Rev BB	116236.00	967.00	983.51	978.98	984.43	0.006812	8.85	15887.86	1491.22	0.40
Project	34860	Rev BB	116236.00	966.00	982.20	977.40	983.14	0.008031	7.77	14967.04	1430.83	0.42
Project	34720	Rev BB	116236.00	965.50	981.16	976.17	982.03	0.007288	7.48	15539.80	1449.30	0.40
Project	34495	Rev BB	116236.00	964.00	979.62	974.30	980.45	0.006783	7.32	15886.75	1459.70	0.39
Project	34310	Rev BB	116236.00	963.00	978.46	972.90	979.29	0.005708	7.82	16470.95	1408.55	0.36
Project	34090	Rev BB	116236.00	962.00	977.12	971.50	977.97	0.006429	7.38	15756.73	1369.76	0.38
Project	33880	Rev BB	116236.00	960.00	975.73	970.45	976.58	0.006904	7.40	15709.67	1475.68	0.40
Project	33710	Rev BB	116236.00	959.00	974.64	969.24	975.39	0.006397	6.93	16773.68	1642.01	0.38
Project	33500	Rev BB	116236.00	958.00	973.40	968.41	974.09	0.005844	7.08	17819.02	1720.16	0.36
Project	33310	Rev BB	116236.00	957.00	972.42	967.01	973.03	0.005153	6.27	18547.96	1783.33	0.34
Project	33115	Rev BB	116236.00	956.00	971.47	965.60	972.01	0.004945	5.92	19667.13	1895.57	0.32
Project	32795	Rev BB	116236.00	954.00	969.69	964.61	970.32	0.005716	6.40	18226.22	1917.69	0.36
Project	32605	Rev BB	116236.00	952.00	968.69	963.61	969.24	0.005195	6.07	20134.02	2407.27	0.34
Project	32265	Rev BB	140776.00	950.00	967.15	961.33	967.61	0.004484	5.50	25622.89	2839.89	0.32
Project	31875	Rev BB	140776.00	949.00	965.56	959.37	965.98	0.003816	5.24	27096.20	2707.27	0.28

HEC-RAS Plan: Pr.085 River: SCR Reach: Project Profile: Rev BB (Continued)

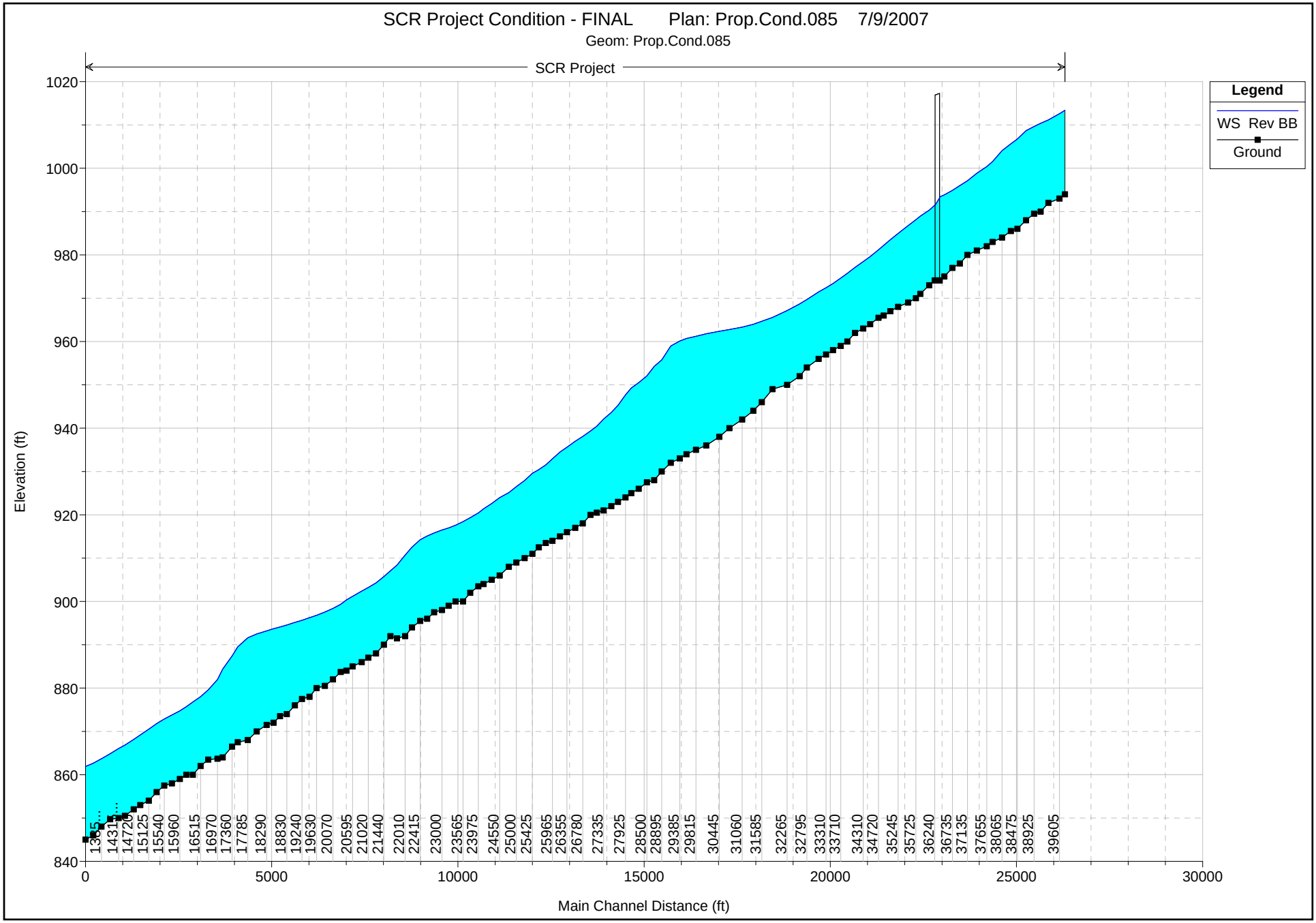
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Project	31585	Rev BB	140776.00	946.00	964.67	956.99	965.05	0.002691	4.95	28488.97	2405.44	0.25
Project	31360	Rev BB	140776.00	944.00	963.99	955.41	964.44	0.002664	5.44	26577.03	1962.49	0.25
Project	31060	Rev BB	140776.00	942.00	963.32	953.29	963.71	0.002122	5.02	28168.23	2195.10	0.24
Project	30720	Rev BB	140776.00	940.00	962.76	951.33	963.08	0.001535	4.52	31325.84	2122.23	0.20
Project	30445	Rev BB	140776.00	938.00	962.37	949.57	962.68	0.001361	4.49	32047.45	2314.72	0.19
Project	30095	Rev BB	140776.00	936.00	961.79	947.93	962.18	0.001460	5.12	30221.37	2339.55	0.20
Project	29815	Rev BB	140776.00	935.00	961.20	948.10	961.71	0.001932	5.96	27202.44	2243.56	0.23
Project	29565	Rev BB	140776.00	934.00	960.71	947.27	961.22	0.001942	5.88	26958.88	2280.34	0.23
Project	29385	Rev BB	140776.00	933.00	960.13	948.98	960.79	0.002694	6.78	24110.82	2215.02	0.27
Project	29140	Rev BB	140776.00	932.00	958.97	950.99	959.94	0.004808	8.05	19093.65	1894.25	0.36
Project	28895	Rev BB	140776.00	930.00	955.75	952.36	958.06	0.011883	14.28	13601.27	1544.41	0.55
Project	28695	Rev BB	140776.00	928.00	954.27	947.96	955.72	0.009037	9.67	14565.28	1446.40	0.54
Project	28500	Rev BB	140776.00	927.50	952.08	945.08	953.95	0.008598	11.42	14381.94	1474.36	0.47
Project	28280	Rev BB	140776.00	926.00	950.52	941.85	952.30	0.006462	11.35	15008.90	1365.30	0.42
Project	28080	Rev BB	140776.00	925.00	949.28	940.04	951.00	0.006263	10.94	14982.93	1251.51	0.41
Project	27925	Rev BB	140776.00	924.00	947.70	939.47	949.86	0.007983	12.13	13253.35	1194.89	0.46
Project	27725	Rev BB	140776.00	923.00	945.26	939.31	947.94	0.010899	13.69	11869.52	1096.02	0.53
Project	27545	Rev BB	140776.00	922.00	943.64	937.81	945.96	0.010085	12.76	12473.20	1144.70	0.51
Project	27335	Rev BB	140776.00	921.00	942.09	936.22	943.91	0.008365	11.42	13967.76	1090.61	0.46
Project	27155	Rev BB	140776.00	920.50	940.46	935.86	942.27	0.009252	11.73	14153.04	1201.34	0.48
Project	26990	Rev BB	140776.00	920.00	939.34	933.79	940.67	0.008017	9.50	15713.20	1280.05	0.44
Project	26780	Rev BB	140776.00	918.00	938.09	931.71	939.16	0.005874	8.93	17697.69	1339.65	0.38
Project	26575	Rev BB	140776.00	917.00	936.99	929.99	937.94	0.005749	7.85	18232.00	1342.44	0.36
Project	26355	Rev BB	140776.00	916.00	935.59	929.39	936.62	0.006161	8.54	17765.36	1376.79	0.39
Project	26170	Rev BB	140776.00	915.00	934.48	928.71	935.50	0.006018	8.90	18090.15	1385.44	0.38
Project	25965	Rev BB	140776.00	914.00	932.93	927.71	934.13	0.007316	9.57	16884.59	1408.46	0.42
Project	25785	Rev BB	140776.00	913.50	931.52	926.49	932.69	0.007749	9.61	17369.82	1621.69	0.43
Project	25600	Rev BB	140776.00	912.50	930.44	925.46	931.31	0.006163	8.55	20004.79	1926.08	0.38
Project	25425	Rev BB	140776.00	911.00	929.59	924.32	930.25	0.004964	7.02	22281.88	2056.82	0.34
Project	25215	Rev BB	140776.00	910.00	927.92	923.53	928.88	0.007864	8.38	19001.20	2128.79	0.42
Project	25000	Rev BB	140776.00	909.00	926.51	922.50	927.26	0.006599	7.67	21316.07	2354.77	0.39
Project	24795	Rev BB	140776.00	908.00	925.12	920.96	925.84	0.006357	7.52	21437.32	2234.05	0.38
Project	24550	Rev BB	140776.00	906.00	923.96	918.53	924.55	0.004703	6.67	23255.82	2120.74	0.33
Project	24335	Rev BB	140776.00	905.00	922.62	918.22	923.40	0.006605	7.85	20492.34	2008.41	0.39
Project	24115	Rev BB	140776.00	904.00	921.37	916.30	922.07	0.005882	7.35	21314.19	1982.01	0.36
Project	23975	Rev BB	140776.00	903.50	920.42	914.88	921.08	0.005304	6.99	21806.17	1940.54	0.35
Project	23755	Rev BB	140776.00	902.00	919.33	913.54	919.95	0.004834	6.80	22600.01	2021.92	0.33
Project	23565	Rev BB	140776.00	900.00	918.43	912.70	919.02	0.004681	6.62	23186.78	2109.20	0.33
Project	23365	Rev BB	140776.00	900.00	917.61	911.37	918.16	0.004126	6.49	24091.97	2093.55	0.31

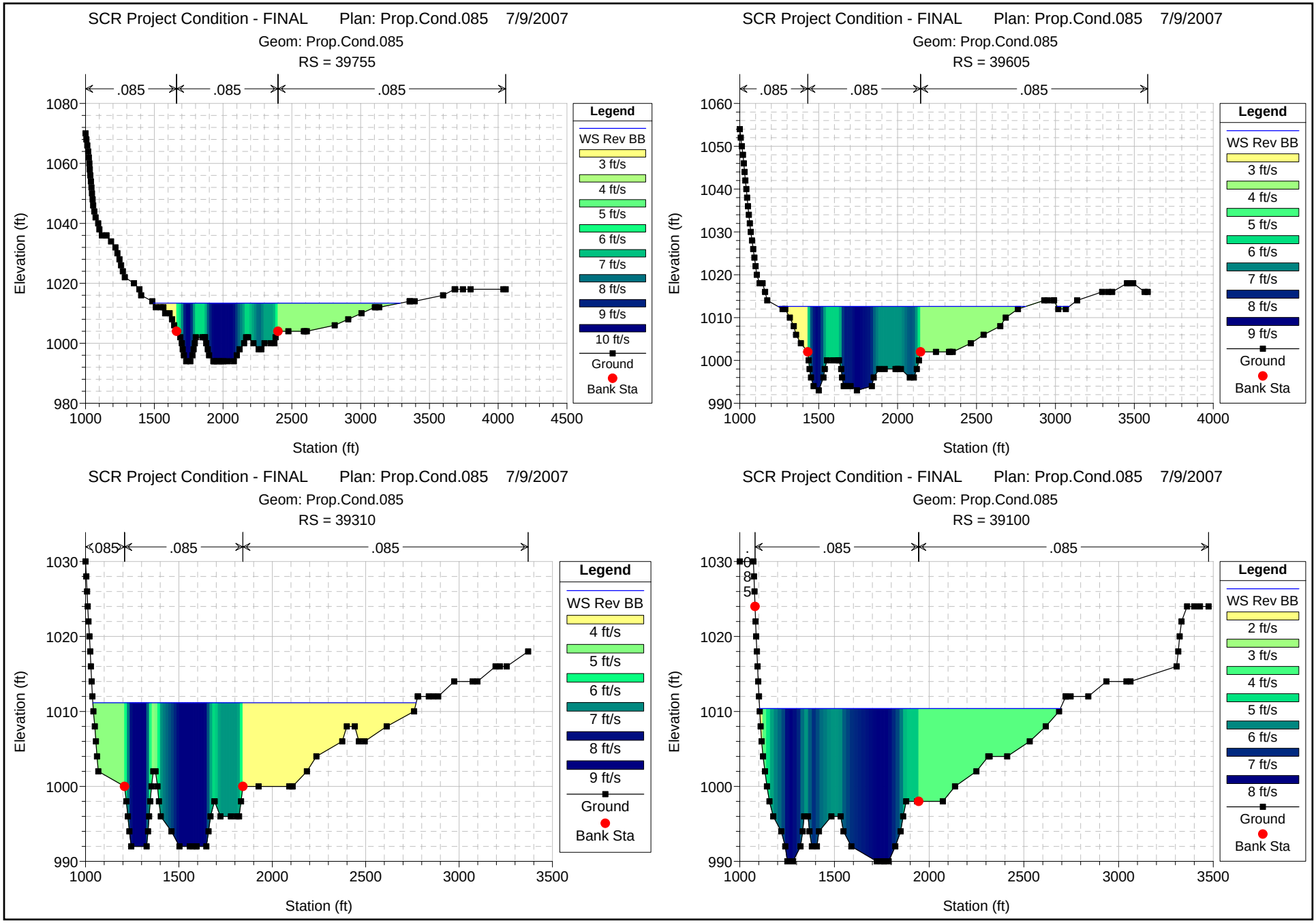
HEC-RAS Plan: Pr.085 River: SCR Reach: Project Profile: Rev BB (Continued)

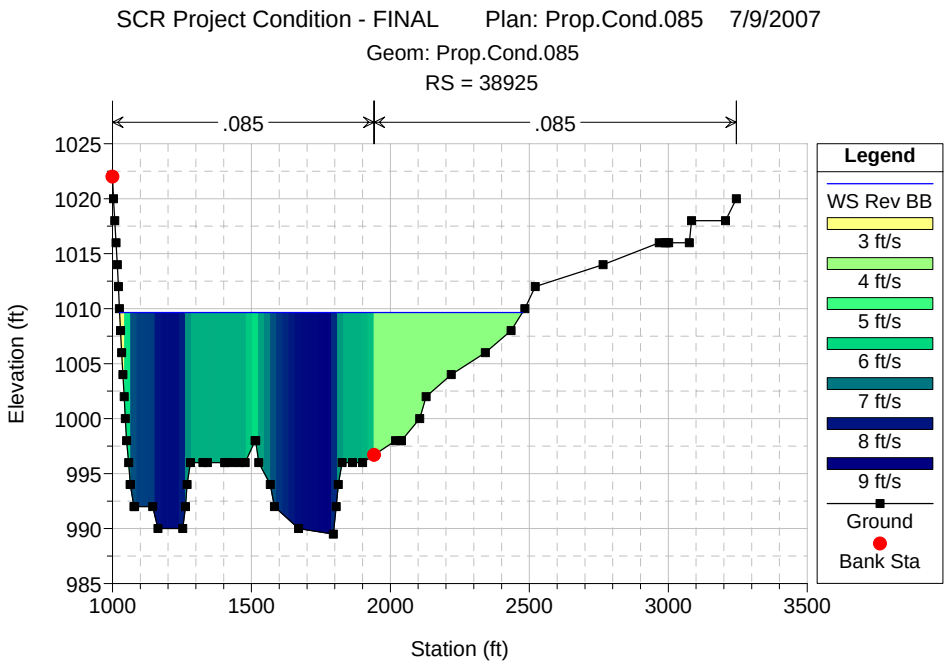
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Project	23180	Rev BB	140776.00	899.00	916.98	909.92	917.44	0.003067	6.37	26481.73	2157.46	0.27
Project	23000	Rev BB	140776.00	898.00	916.50	908.39	916.91	0.002692	5.20	27591.19	2195.38	0.25
Project	22790	Rev BB	140776.00	897.50	915.82	908.15	916.30	0.003103	5.58	25615.50	2052.66	0.27
Project	22600	Rev BB	140776.00	896.00	915.10	907.78	915.65	0.003567	6.61	24213.89	1944.53	0.30
Project	22415	Rev BB	140776.00	895.50	914.24	907.11	914.91	0.004403	7.19	22225.04	1868.51	0.33
Project	22195	Rev BB	141426.00	894.00	912.53	906.79	913.67	0.007225	8.74	17296.90	1597.37	0.42
Project	22010	Rev BB	141426.00	892.00	910.71	906.38	912.13	0.009113	10.16	15740.30	1820.07	0.47
Project	21790	Rev BB	141426.00	891.50	908.38	904.87	909.95	0.010746	10.64	15393.06	2121.29	0.50
Project	21615	Rev BB	141426.00	892.00	907.08	903.04	908.14	0.008252	8.75	18595.05	2208.37	0.43
Project	21440	Rev BB	141426.00	890.00	905.73	901.59	906.69	0.007628	8.61	19368.67	2169.01	0.42
Project	21225	Rev BB	141426.00	888.00	904.29	900.27	905.07	0.007097	8.12	22163.29	2871.79	0.40
Project	21020	Rev BB	141426.00	887.00	903.22	897.78	903.83	0.004759	7.17	25122.67	2899.42	0.33
Project	20845	Rev BB	141426.00	886.00	902.39	897.38	902.95	0.004927	6.91	25429.23	2910.46	0.34
Project	20595	Rev BB	141426.00	885.00	901.18	896.38	901.76	0.004816	7.12	25248.49	2873.40	0.34
Project	20435	Rev BB	141426.00	884.00	900.34	895.77	900.95	0.005091	7.29	24532.44	2747.48	0.34
Project	20280	Rev BB	141426.00	883.70	899.35	895.55	900.03	0.006538	7.73	22653.69	2632.05	0.38
Project	20070	Rev BB	141426.00	882.00	898.38	892.99	898.92	0.004355	6.66	25182.20	2509.33	0.32
Project	19855	Rev BB	141426.00	880.50	897.56	891.50	898.04	0.003640	6.34	26775.84	2607.34	0.29
Project	19630	Rev BB	141426.00	880.00	896.81	890.05	897.27	0.003230	6.06	27691.69	2696.30	0.28
Project	19440	Rev BB	141426.00	878.00	896.26	889.11	896.68	0.002781	5.73	28690.18	2626.54	0.26
Project	19240	Rev BB	141426.00	877.50	895.65	888.88	896.09	0.003032	5.85	27589.21	2504.01	0.27
Project	19050	Rev BB	141426.00	876.00	895.17	887.49	895.56	0.002542	5.38	28918.85	2424.90	0.25
Project	18830	Rev BB	141426.00	874.00	894.57	886.81	894.99	0.002669	5.55	27798.57	2224.05	0.26
Project	18650	Rev BB	141426.00	873.50	894.11	885.64	894.54	0.002461	5.68	27825.06	2092.74	0.25
Project	18475	Rev BB	141426.00	872.00	893.71	884.74	894.11	0.002227	5.15	28250.00	1965.54	0.23
Project	18290	Rev BB	141426.00	871.50	893.20	884.50	893.66	0.002575	5.64	26333.23	1864.98	0.25
Project	18025	Rev BB	141426.00	870.00	892.50	882.91	892.98	0.002431	5.68	25468.23	1641.38	0.25
Project	17785	Rev BB	141426.00	868.00	891.62	882.81	892.27	0.003549	6.54	21899.53	1457.22	0.29
Project	17510	Rev BB	141426.00	867.50	889.54	883.58	890.86	0.007378	9.51	16229.07	1442.21	0.43
Project	17360	Rev BB	141426.00	866.50	887.42	883.38	889.37	0.012622	11.39	13154.81	1281.30	0.55
Project	17110	Rev BB	141426.00	864.00	884.39	881.61	886.20	0.012376	11.63	14095.48	1396.83	0.54
Project	16970	Rev BB	141426.00	863.70	881.96	880.00	884.09	0.016534	12.37	12925.29	1446.48	0.63
Project	16720	Rev BB	141426.00	863.50	879.58	875.46	880.76	0.009492	9.06	16584.69	1574.60	0.46
Project	16515	Rev BB	141426.00	862.00	878.01	873.65	878.95	0.007950	8.12	18543.30	1805.40	0.42
Project	16305	Rev BB	141426.00	860.00	876.78	871.41	877.48	0.005656	7.23	21547.25	2006.97	0.36
Project	16130	Rev BB	141426.00	860.00	875.69	870.71	876.38	0.006232	7.01	21393.66	2125.20	0.38
Project	15960	Rev BB	141426.00	859.00	874.75	869.21	875.31	0.005310	6.11	23353.85	2250.27	0.33
Project	15745	Rev BB	141426.00	858.00	873.78	867.77	874.28	0.004286	5.65	24900.10	2297.33	0.31
Project	15540	Rev BB	141426.00	857.50	872.86	867.17	873.37	0.004489	5.88	24756.84	2348.48	0.31

HEC-RAS Plan: Pr.085 River: SCR Reach: Project Profile: Rev BB (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Project	15335	Rev BB	141426.00	856.00	871.80	866.50	872.37	0.005261	6.07	23392.22	2312.72	0.33
Project	15125	Rev BB	142475.00	854.00	870.50	864.54	871.20	0.005650	6.76	21586.20	2145.11	0.36
Project	14900	Rev BB	142475.00	853.00	869.19	863.28	869.89	0.005825	7.21	22080.33	2326.98	0.36
Project	14720	Rev BB	142475.00	852.00	868.15	862.23	868.86	0.005859	7.14	21555.82	2050.70	0.36
Project	14480	Rev BB	142475.00	850.50	866.84	860.80	867.53	0.005229	6.93	21643.07	1856.36	0.34
Project	14315	Rev BB	142475.00	850.00	866.05	859.81	866.68	0.004845	6.37	22415.14	1938.30	0.33
Project	14090	Rev BB	142475.00	849.71	864.84	858.64	865.53	0.005190	6.68	21424.01	1813.83	0.34
Project	13850	Rev BB	142475.00	848.00	863.69	857.10	864.36	0.004756	6.56	21802.90	1769.55	0.33
Project	13635	Rev BB	142475.00	846.00	862.65	856.30	863.33	0.004703	7.28	21993.80	1806.92	0.33
Project	13425	Rev BB	142475.00	845.00	861.91	854.56	862.43	0.003524	5.80	24665.15	1936.17	0.28


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
SCR Project
Legend
WS Rev BB
Ground
Elevation (ft)
Main Channel Distance (ft)
1020
1000
980
960
940
920
900
880
860
840
0
5000
10000
15000
20000
25000
30000
13855...
14310...
14720
15125
15540
15960
16515
16970
17360
17785
18290
18830
19240
19630
20070
20595
21020
21440
22010
22415
23000
23565
23975
24550
25000
25425
25965
26355
26780
27335
27925
28500
28895
29385
29815
30445
31060
31585
32265
32795
33310
33710
34310
34720
35245
35725
36240
36735
37135
37655
38065
38475
38925
39605


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 39755
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta
SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 39605
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta
SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 39310
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta
SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 39100
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta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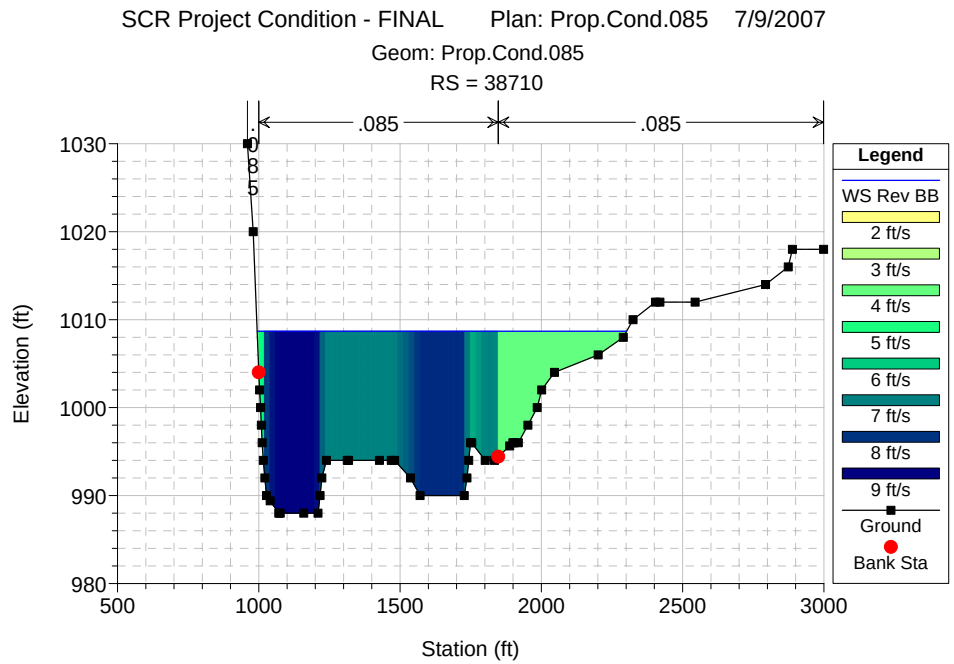
Geom: Prop.Cond.085
RS = 38925
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta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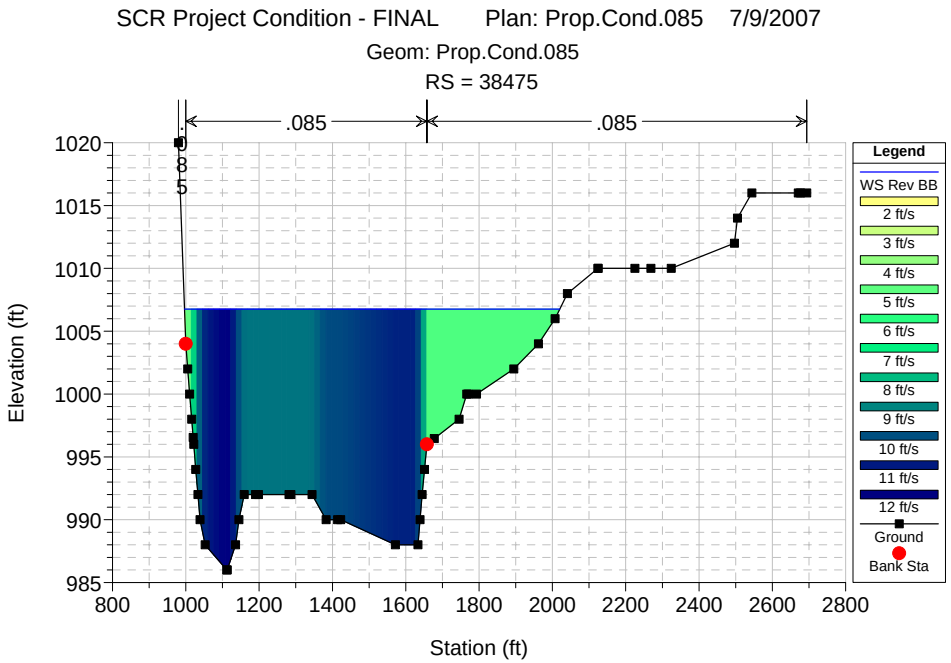
Geom: Prop.Cond.085
RS = 38710
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta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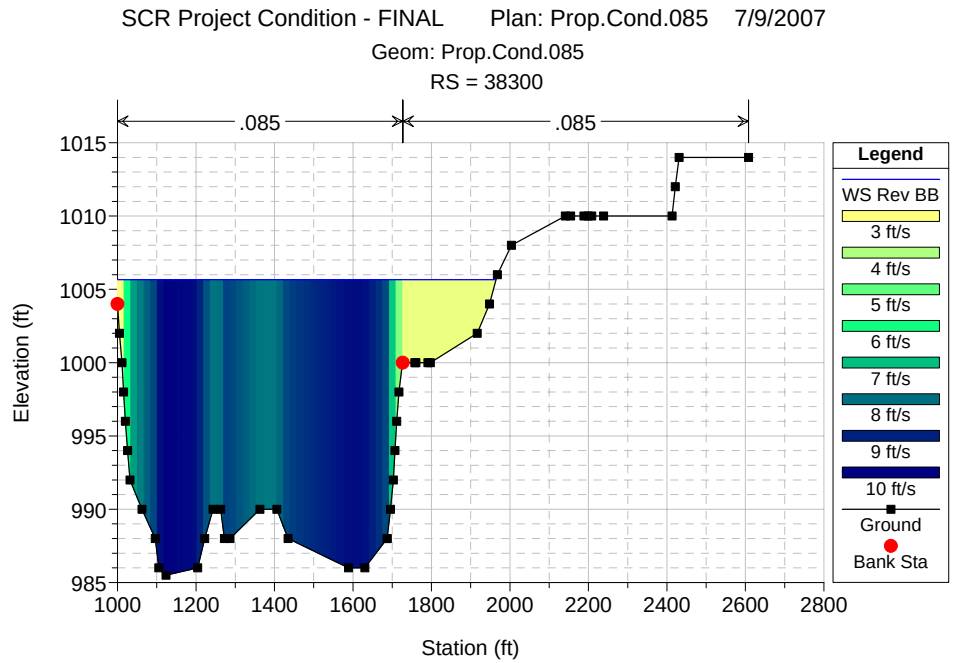
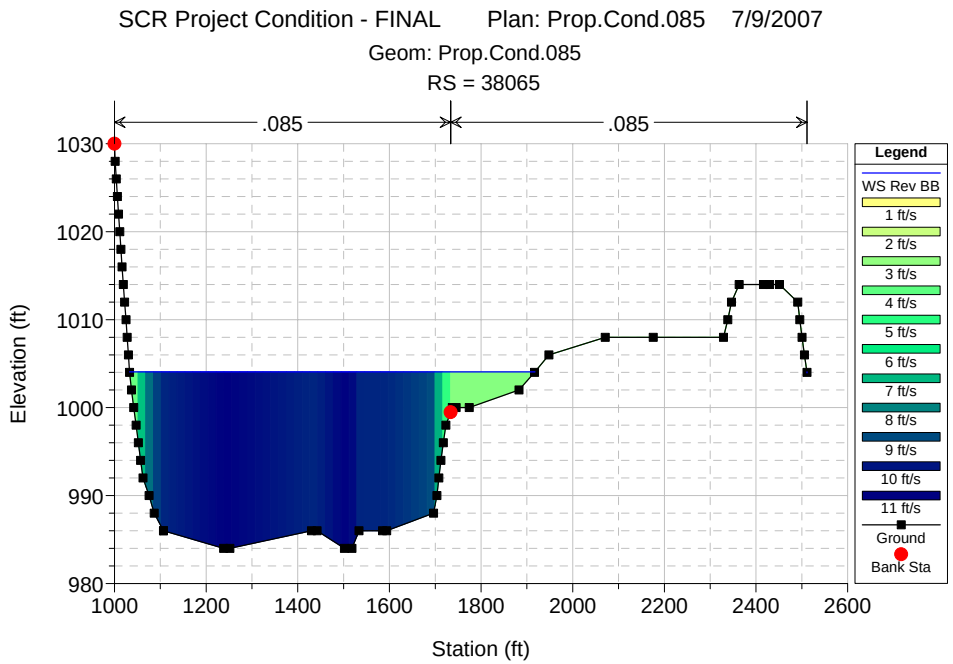
Geom: Prop.Cond.085
RS = 38475
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 38300
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta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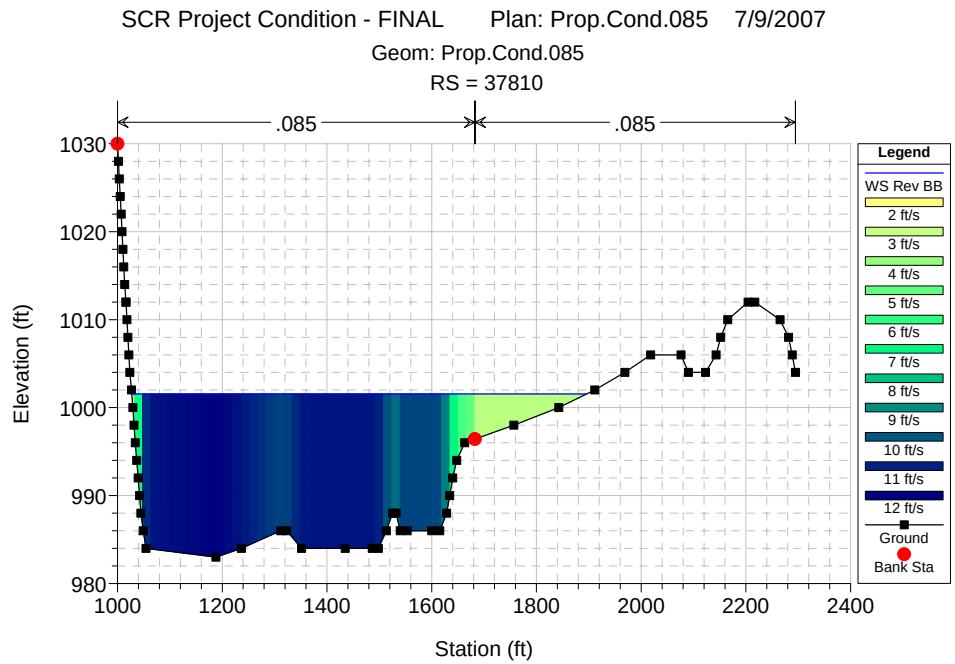
Geom: Prop.Cond.085
RS = 38065
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta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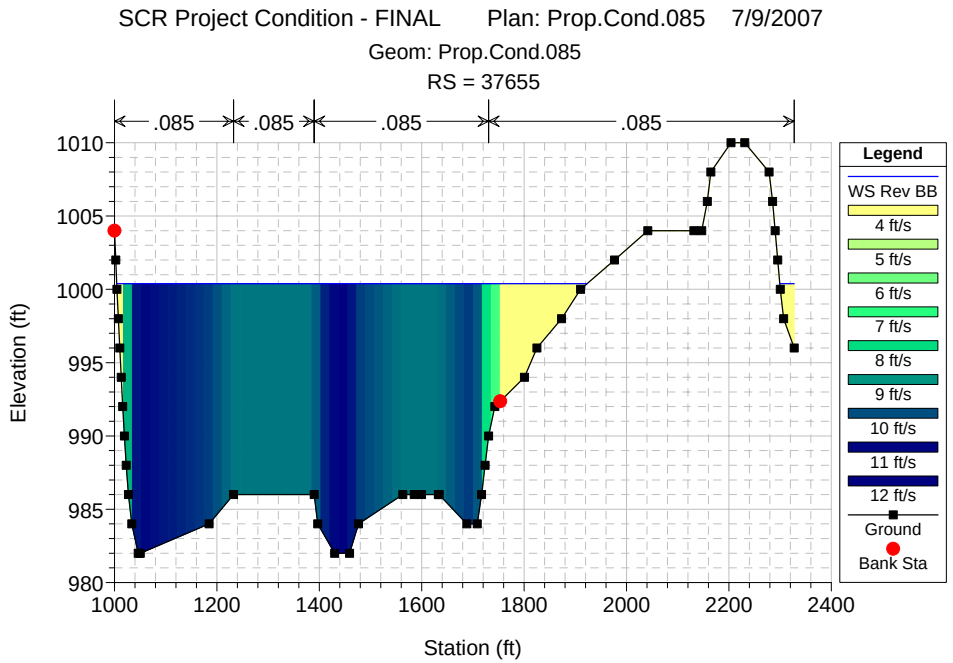
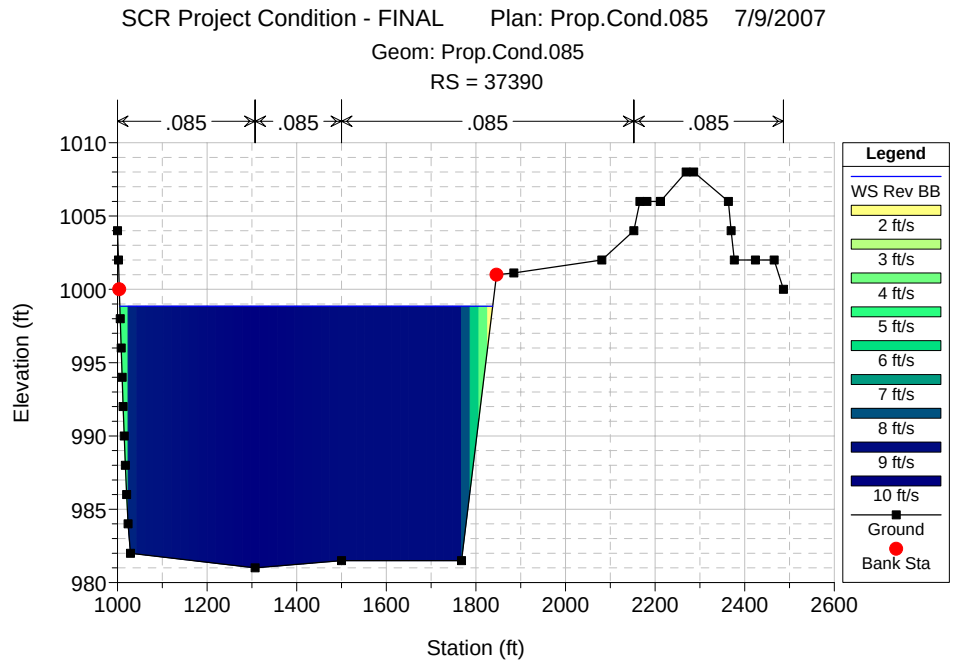
Geom: Prop.Cond.085
RS = 37810
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 37655
.085
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta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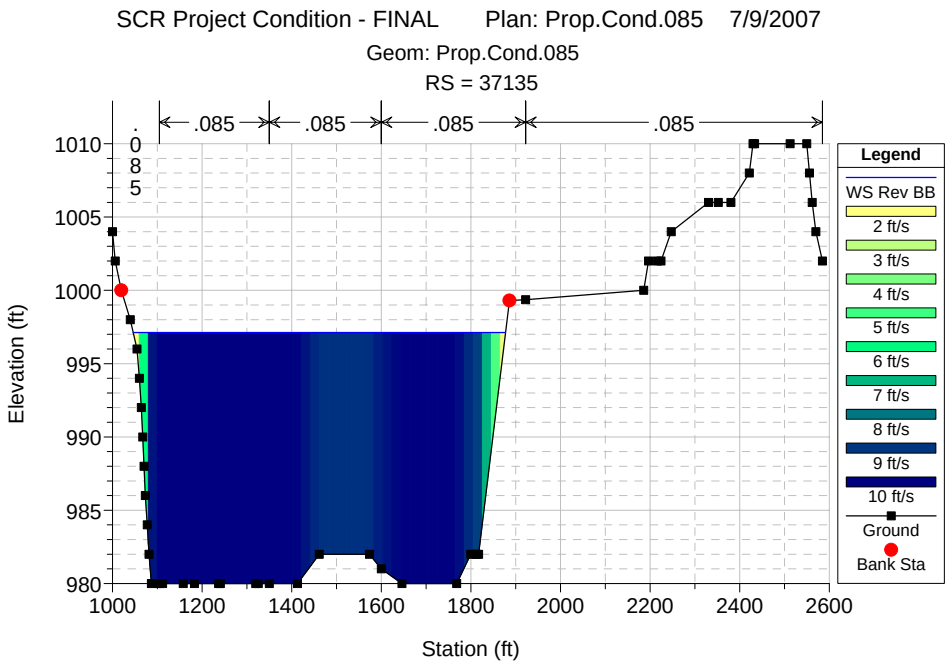
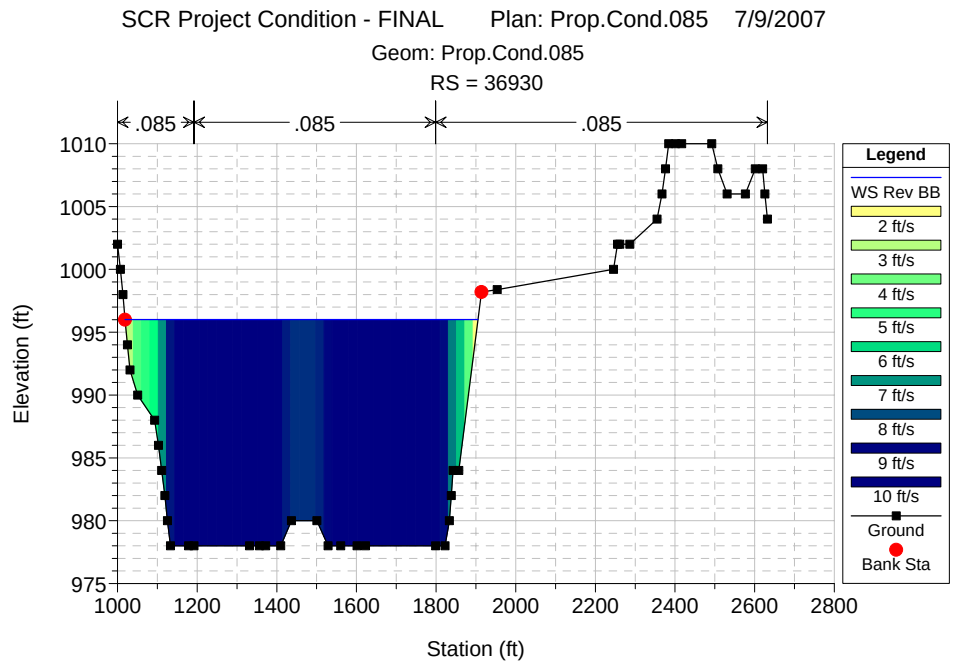
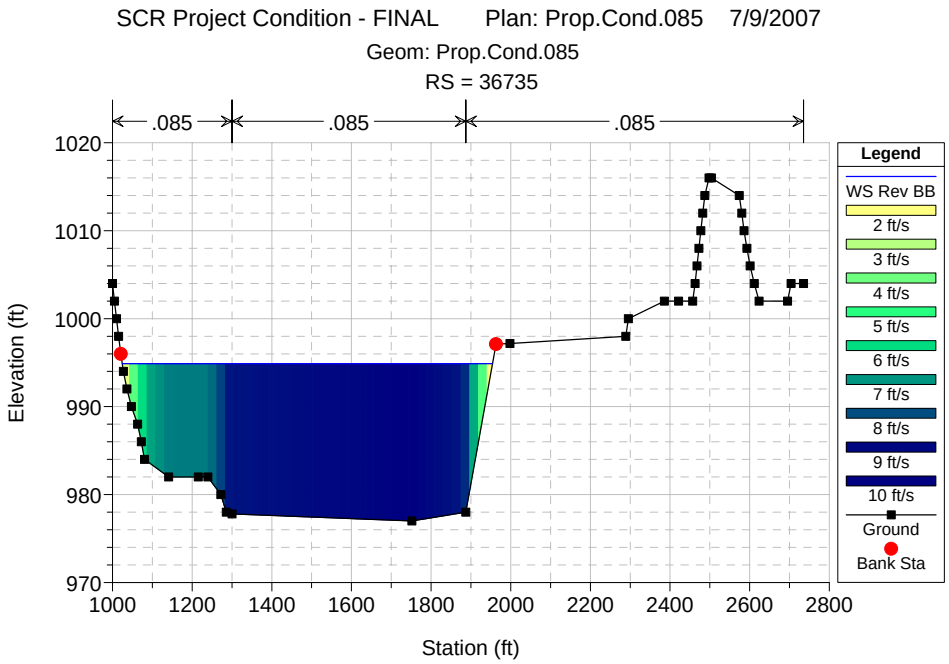
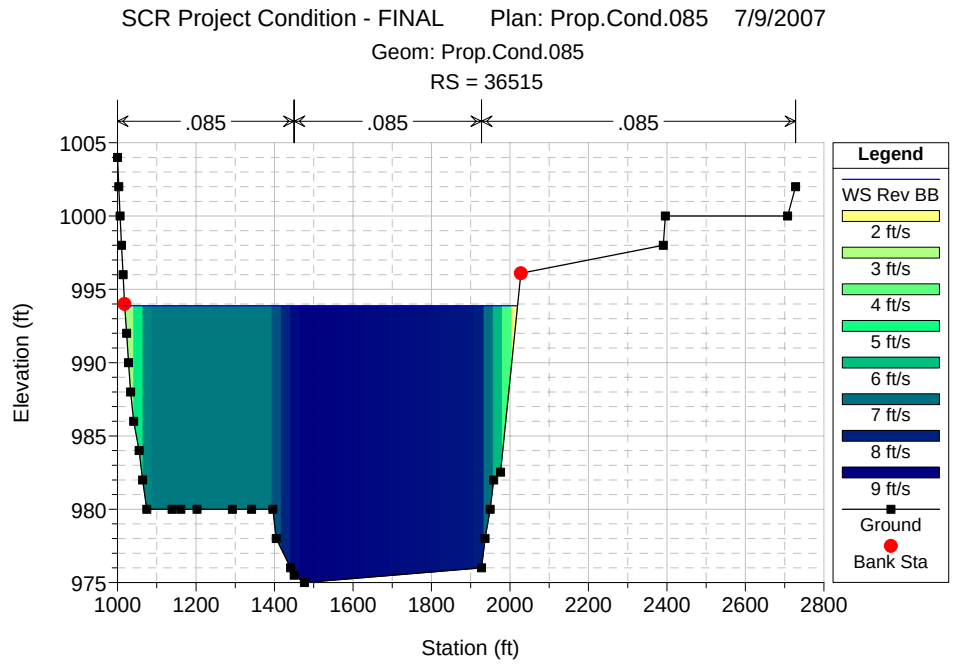
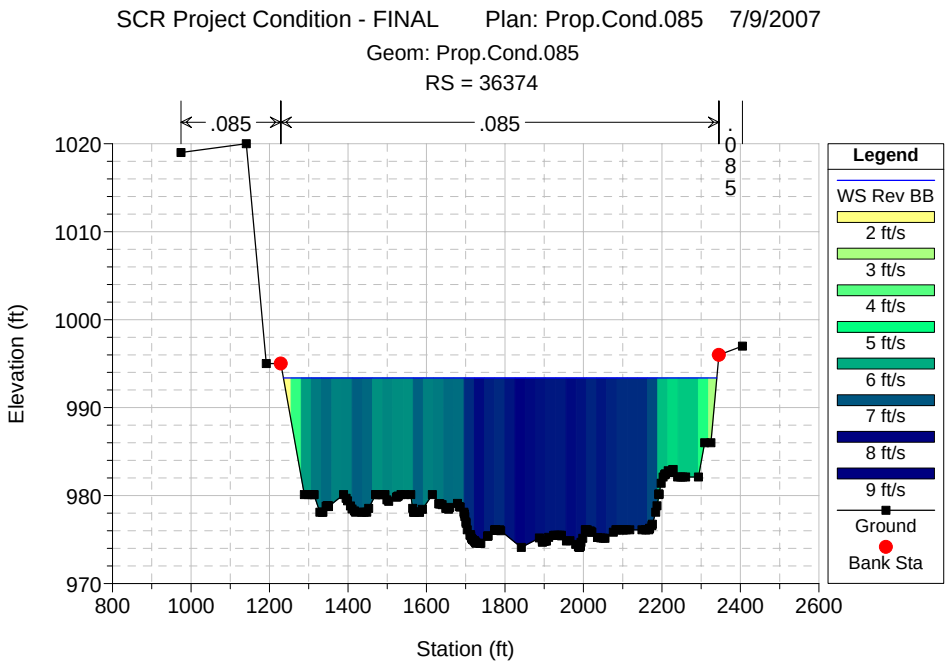
Geom: Prop.Cond.085
RS = 37390
.085
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta

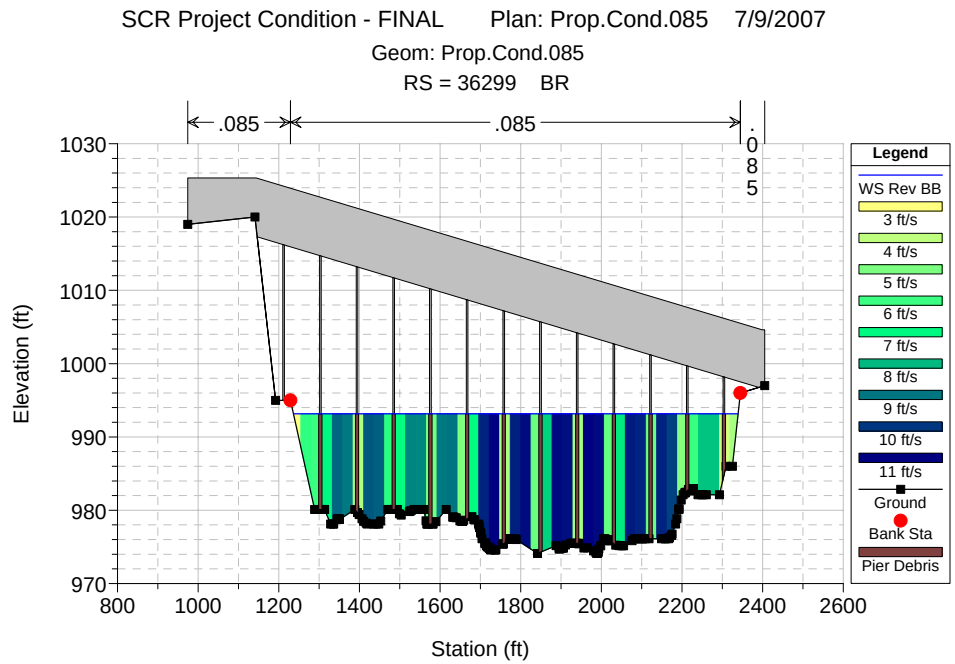

SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 37135
.085
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta

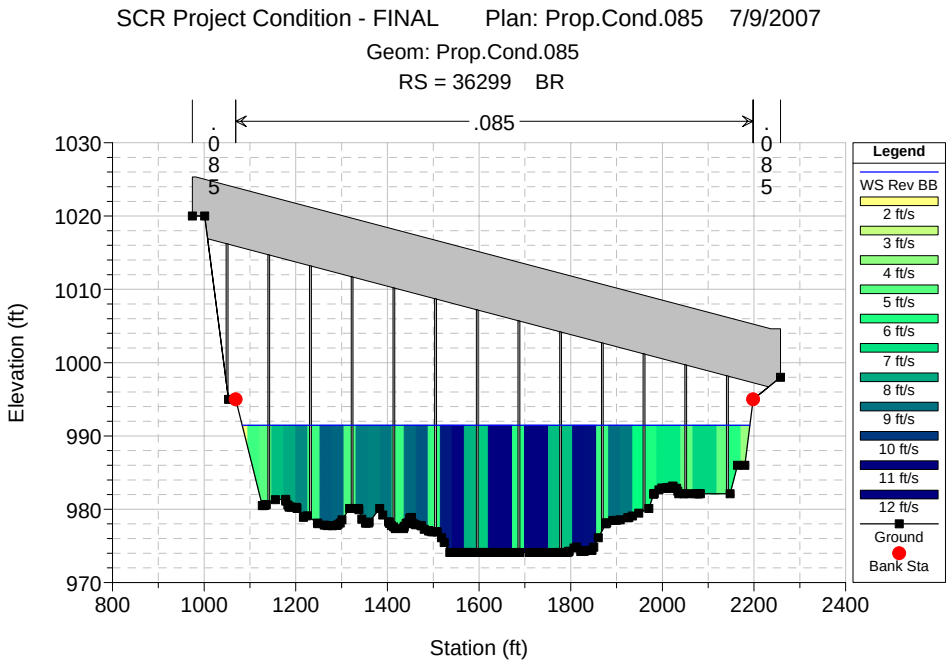

SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 36930
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 36735
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 36515
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 36374
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 36299 BR
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta
Pier Debris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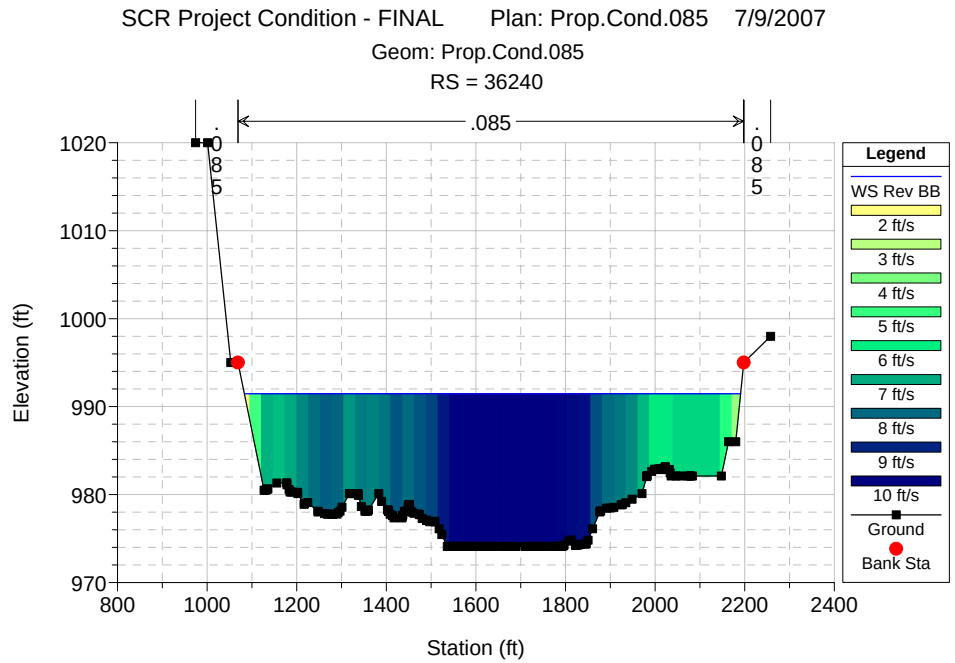
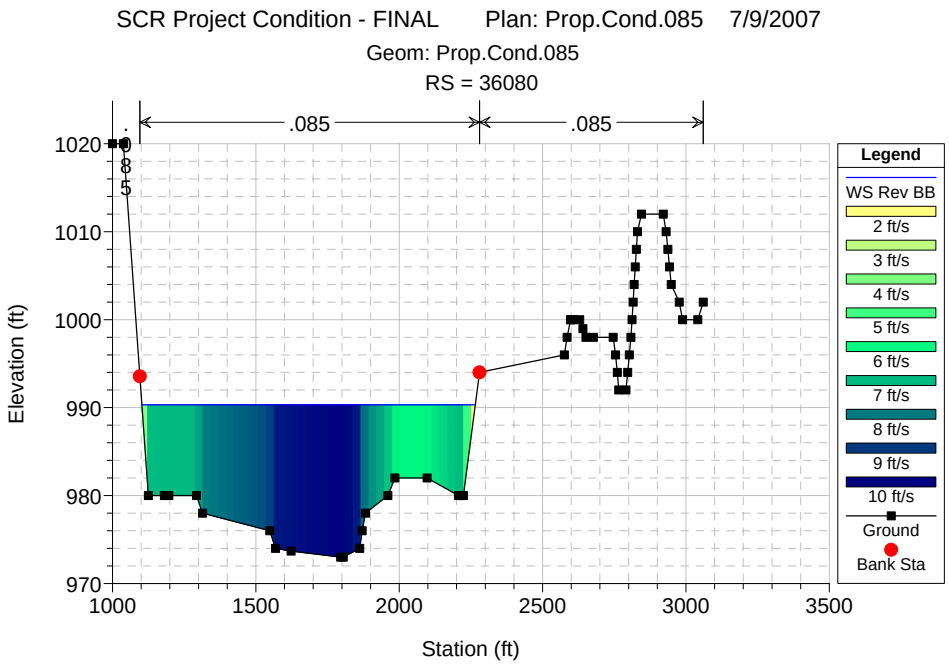
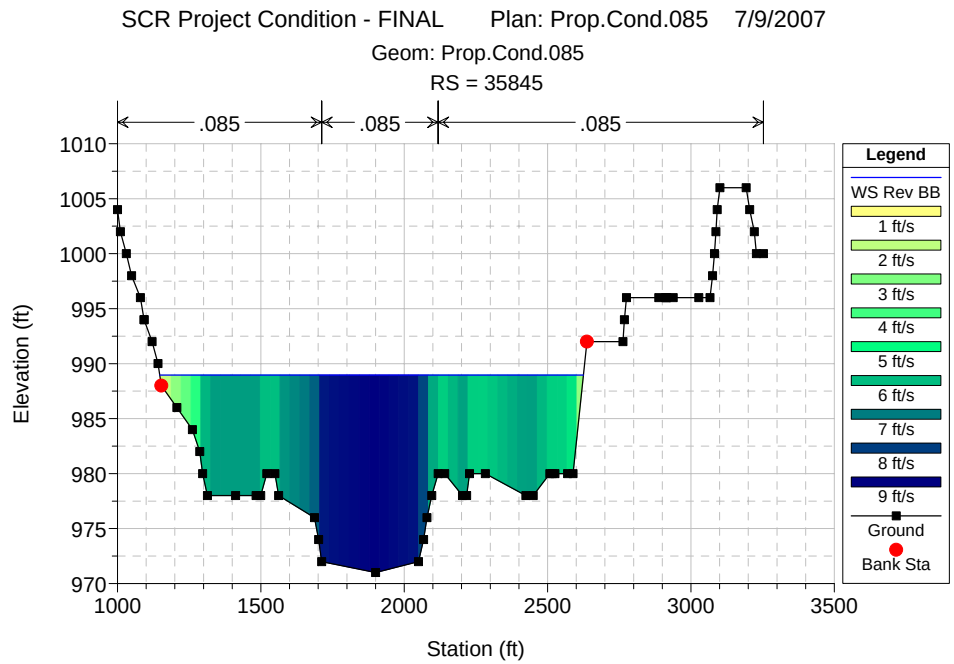
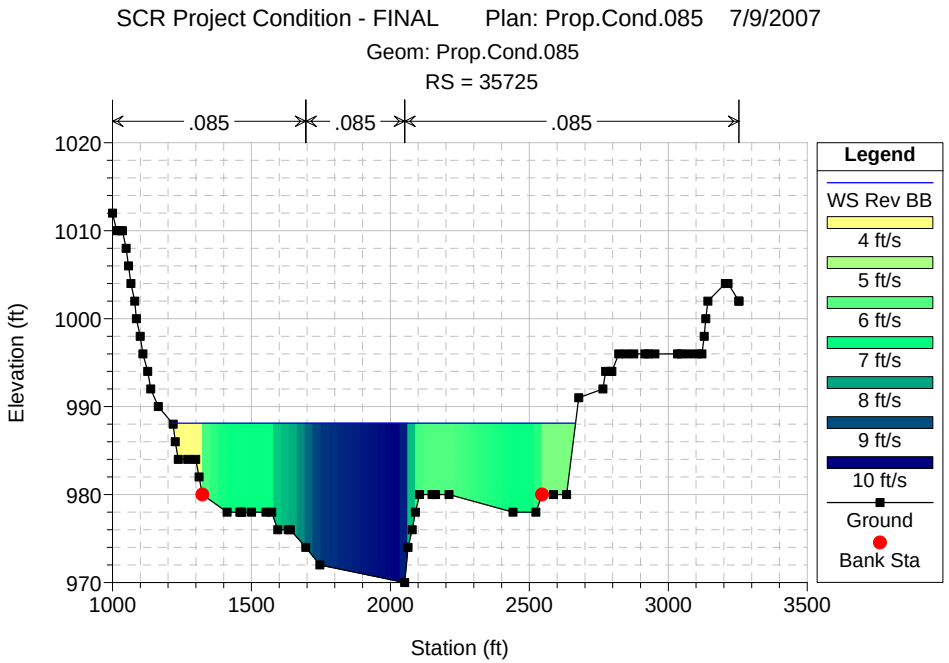
Geom: Prop.Cond.085
RS = 36299 BR
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 36240
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 36080
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 35845
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta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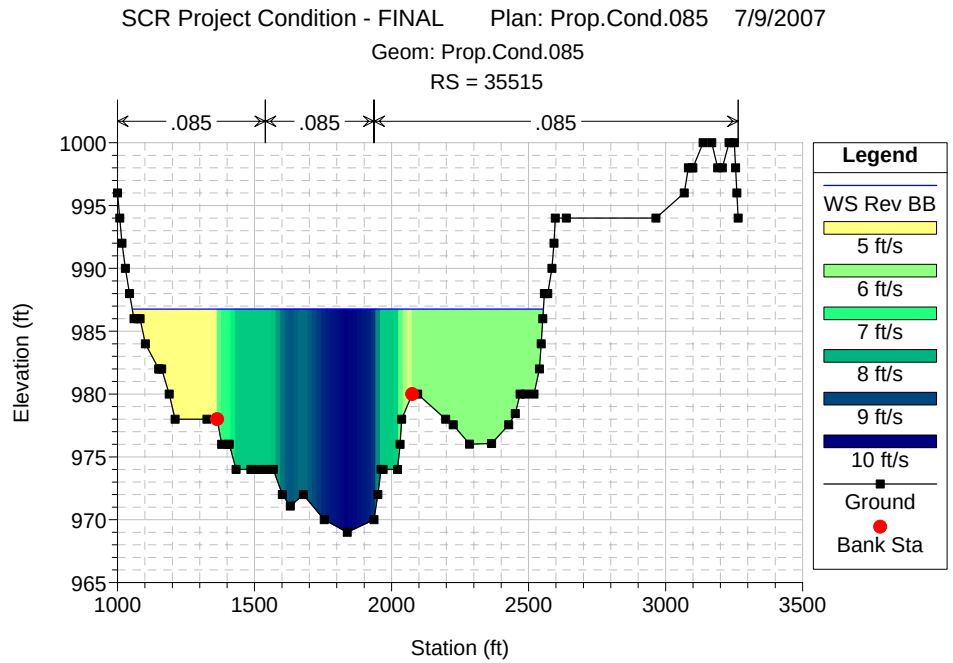
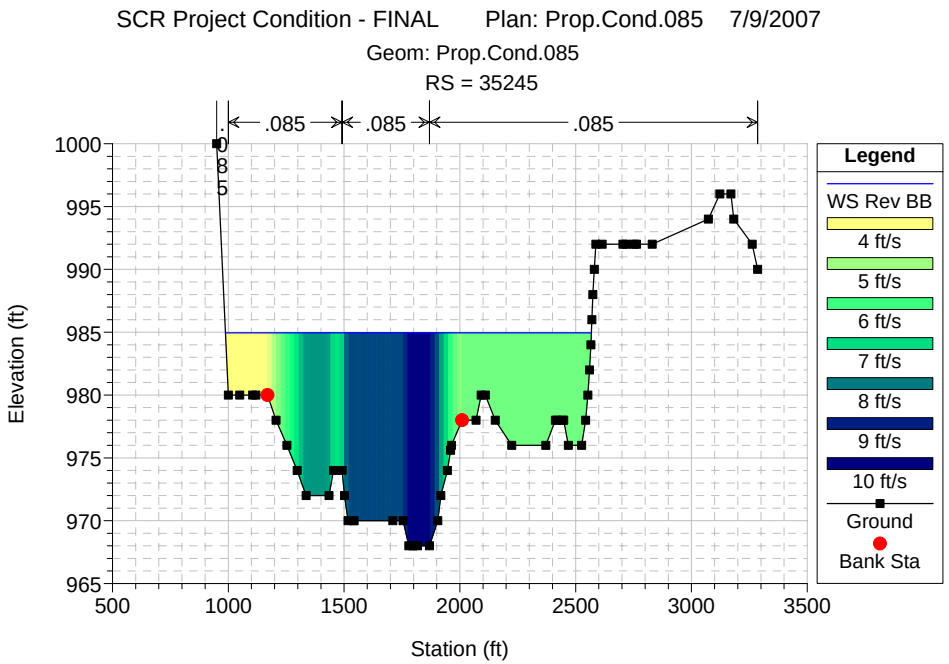
Geom: Prop.Cond.085
RS = 35725
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 35515
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 35245
.085
.085
.085
Legend
WS Rev BB
4 ft/s
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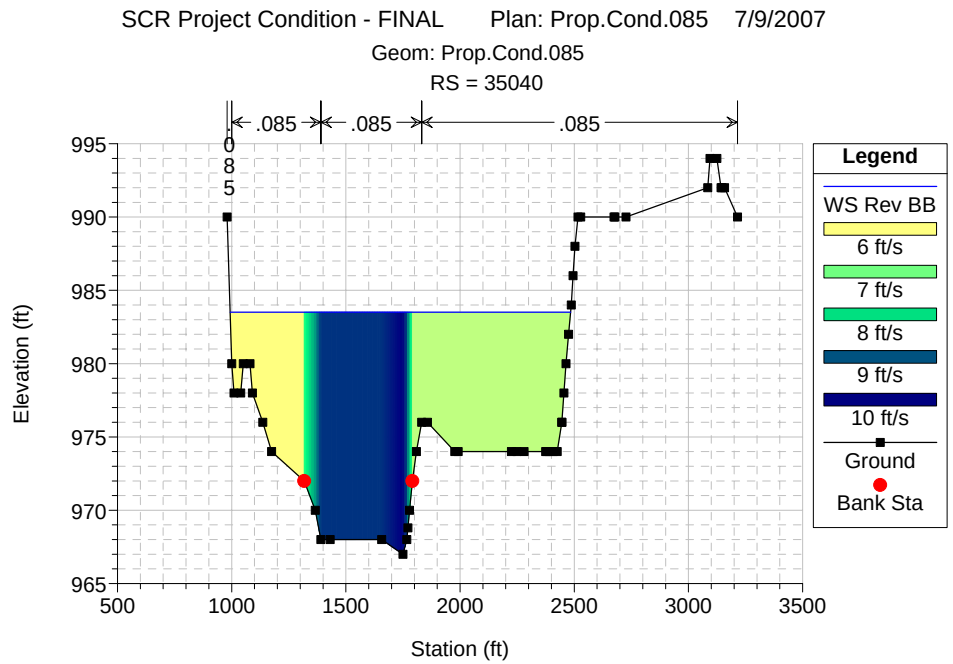
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Prop.Cond.085
RS = 35040
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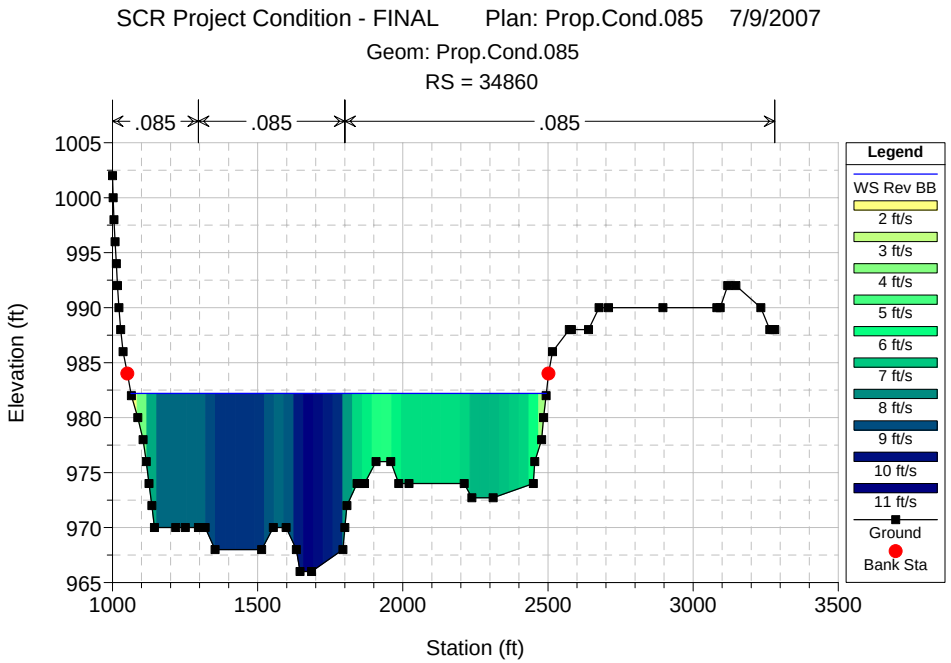
.085
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Prop.Cond.085
RS = 34860
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Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
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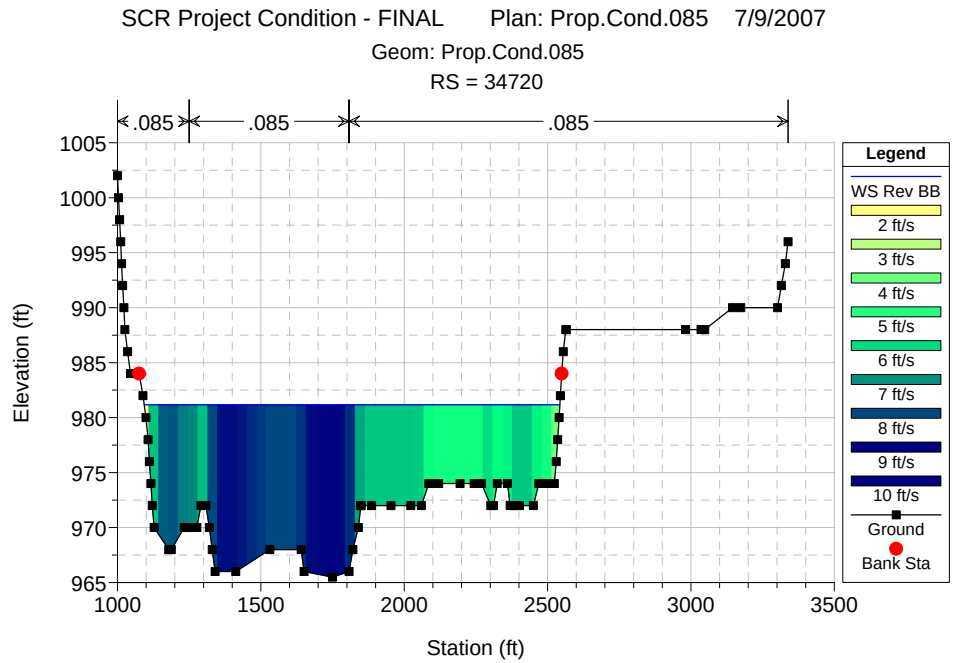
10 ft/s
11 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Prop.Cond.085
RS = 34720
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Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
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7 ft/s
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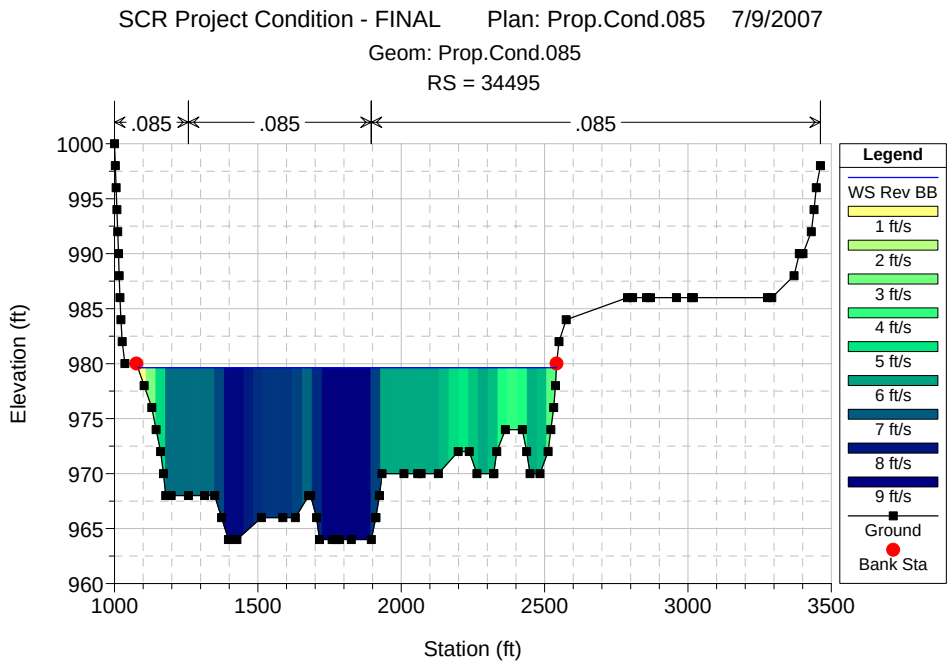
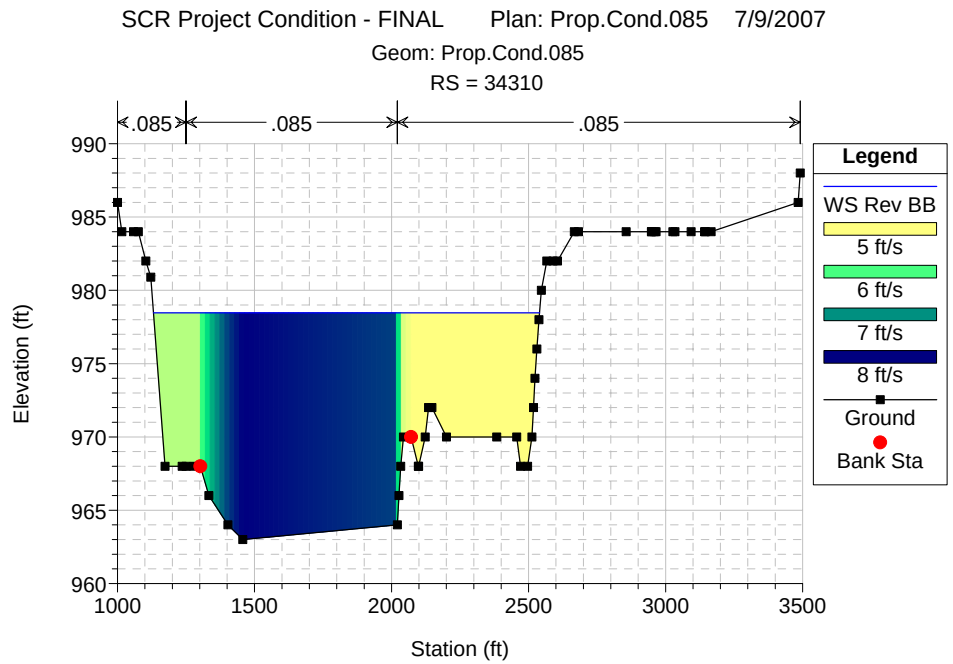
9 ft/s
10 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 34495
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 34310
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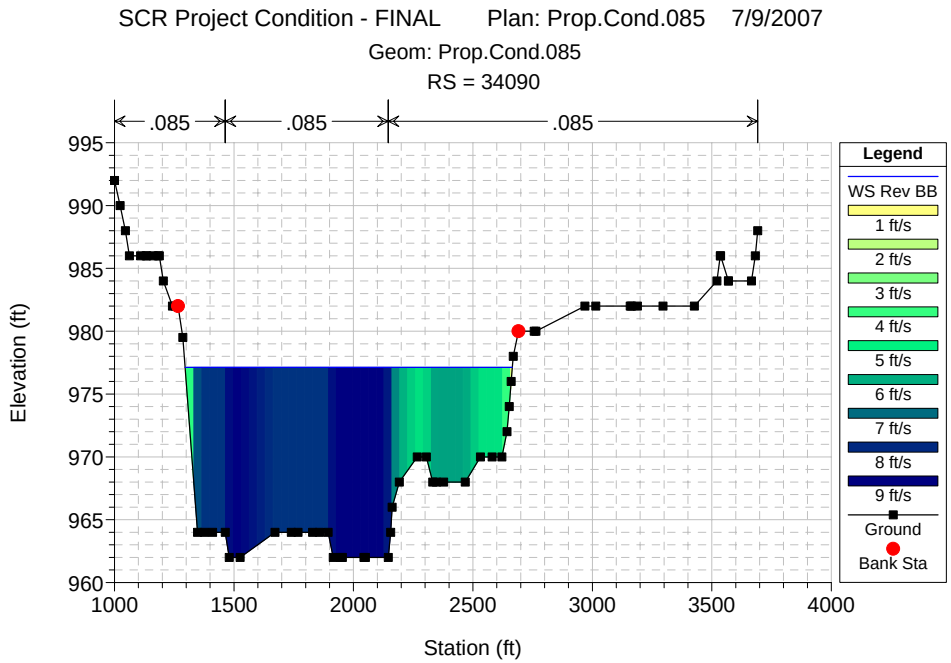
Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 34090
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
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3 ft/s
4 ft/s
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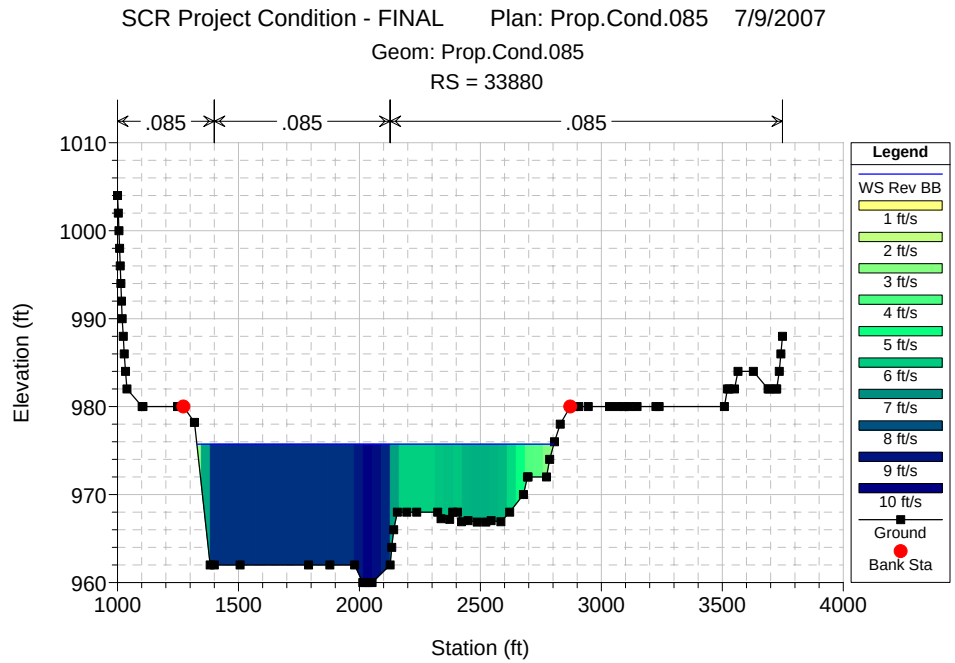
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 33880
.085
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.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
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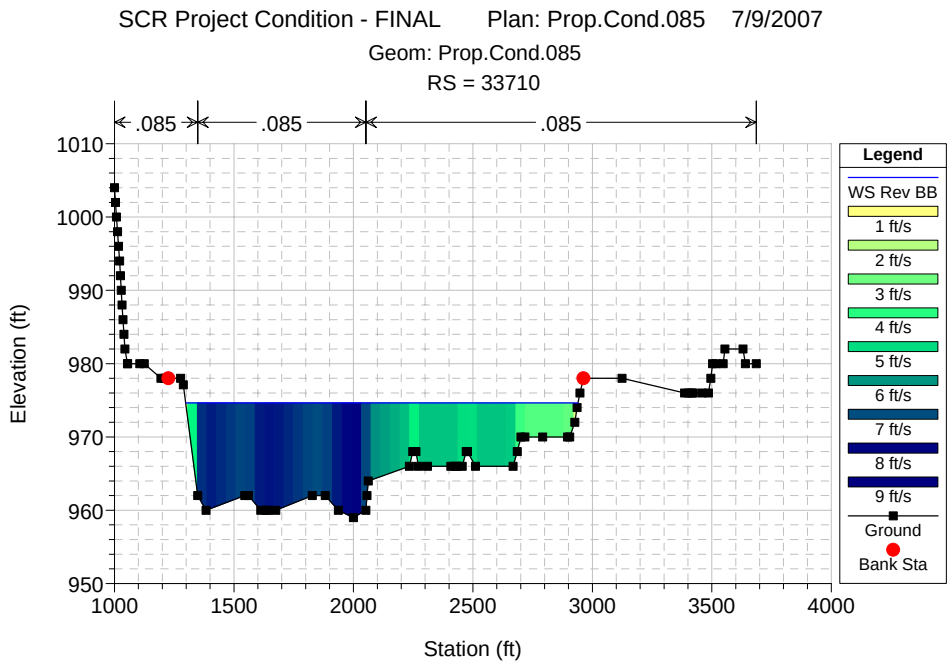
9 ft/s
10 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 33710
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.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
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4 ft/s
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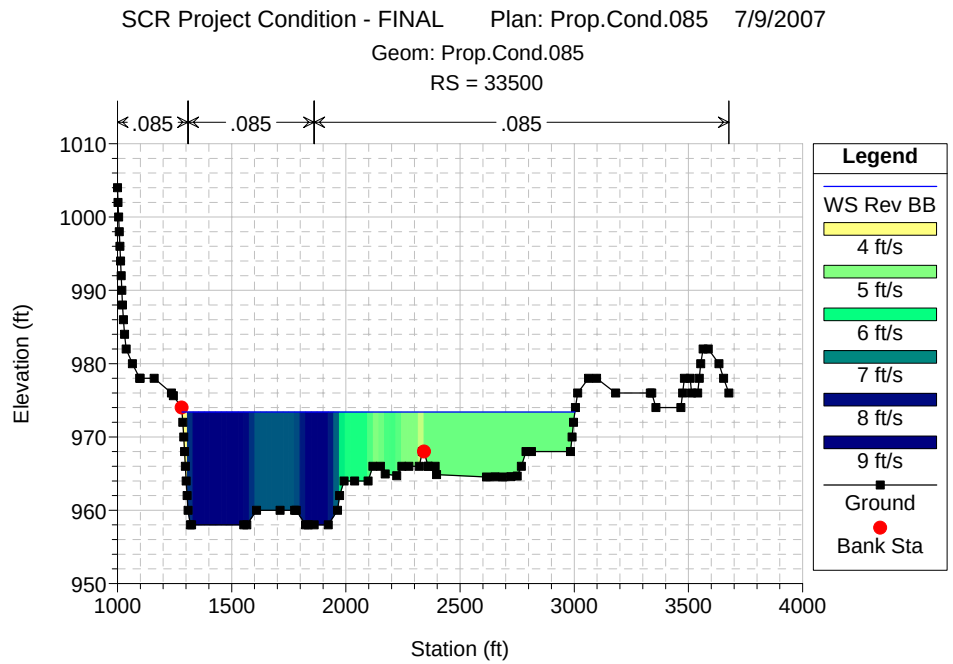
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 33500
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
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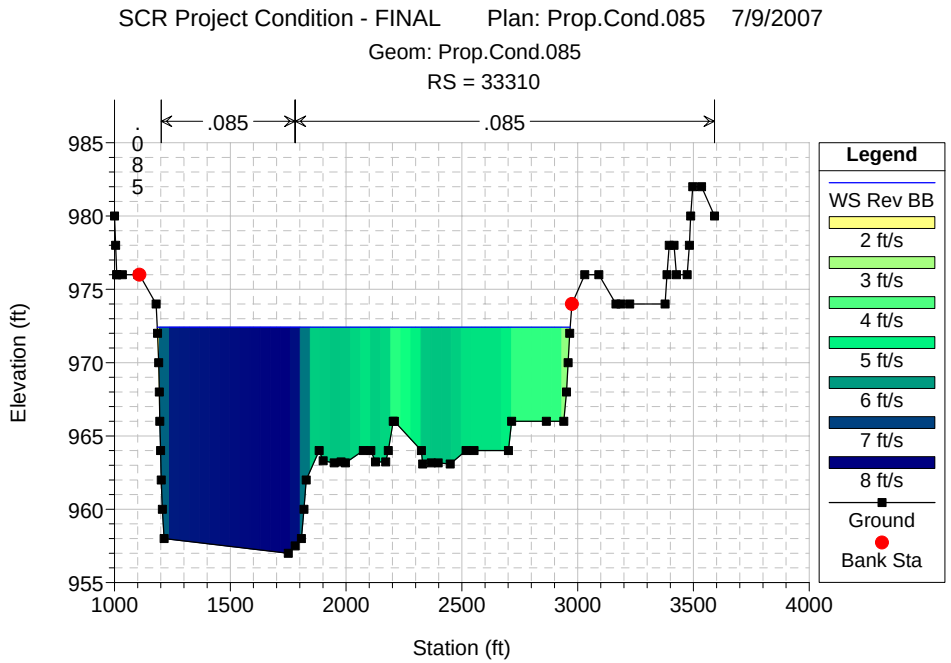
9 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 33310
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
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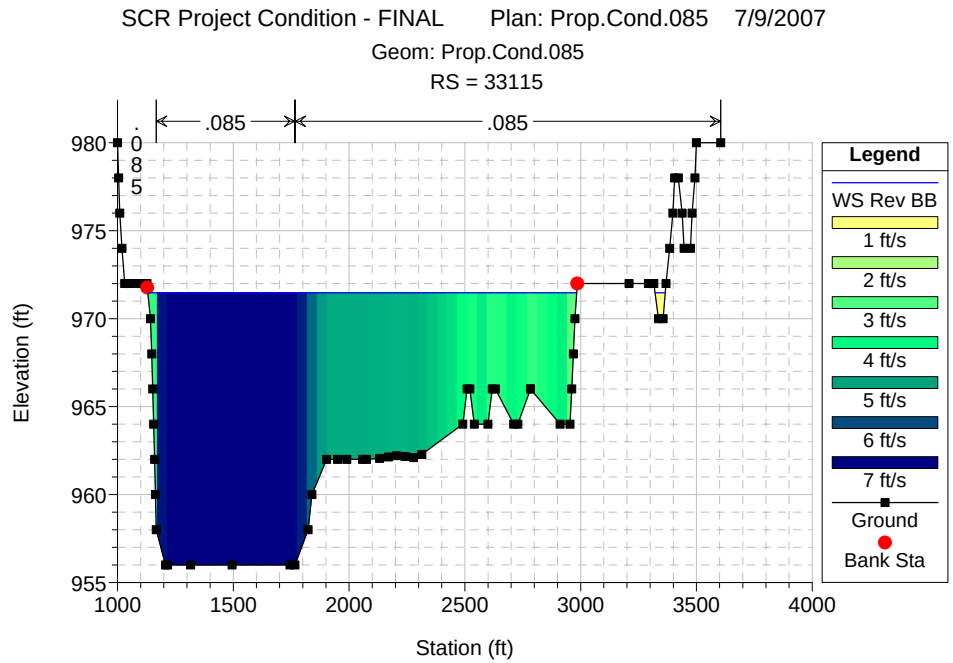
8 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 33115
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Elevation (ft)
Station (ft)
Legend
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1 ft/s
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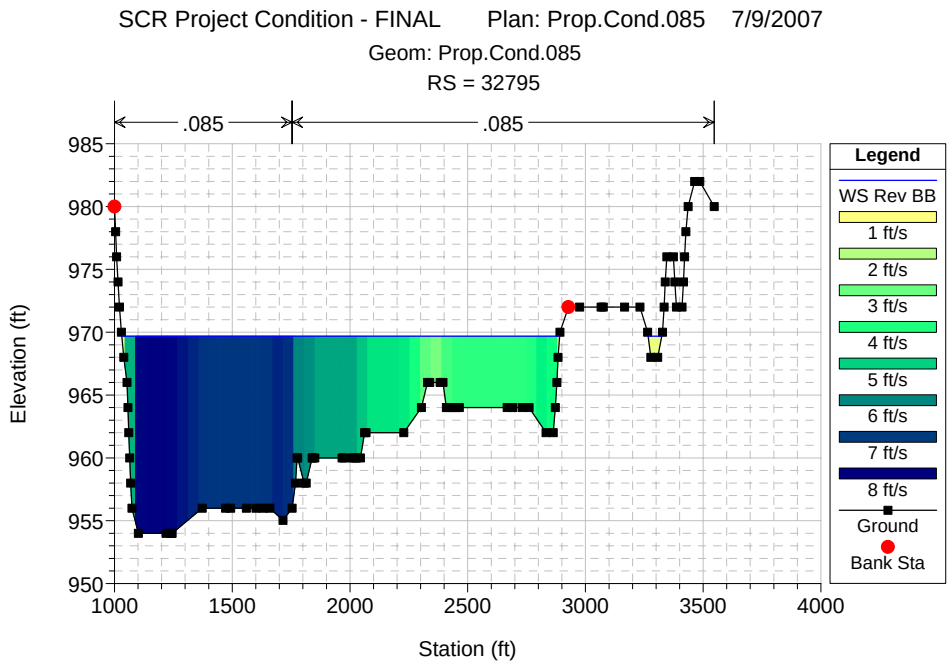
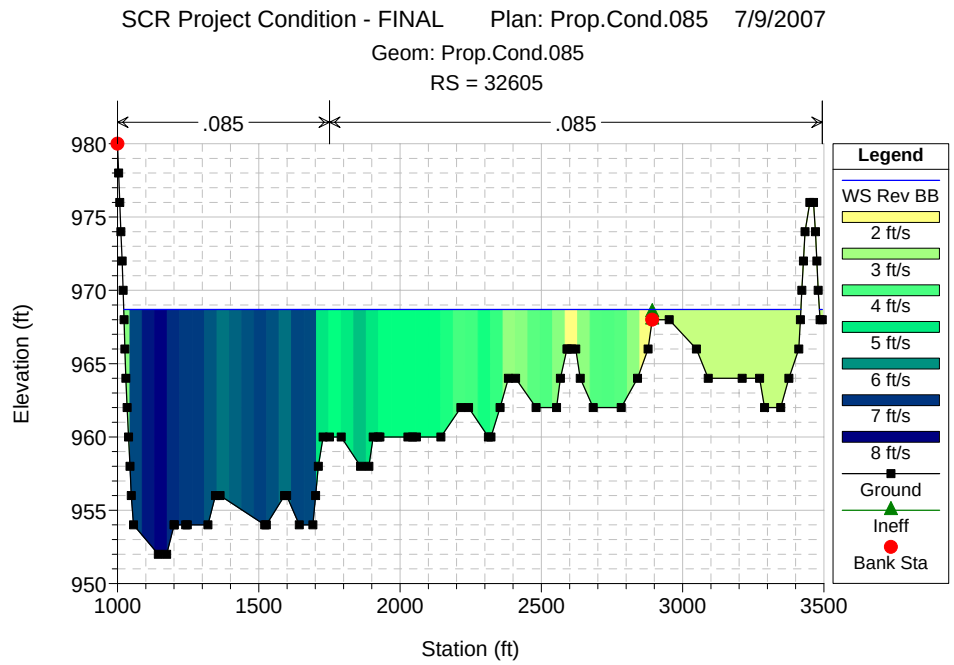
7 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 32795
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 32605
.085
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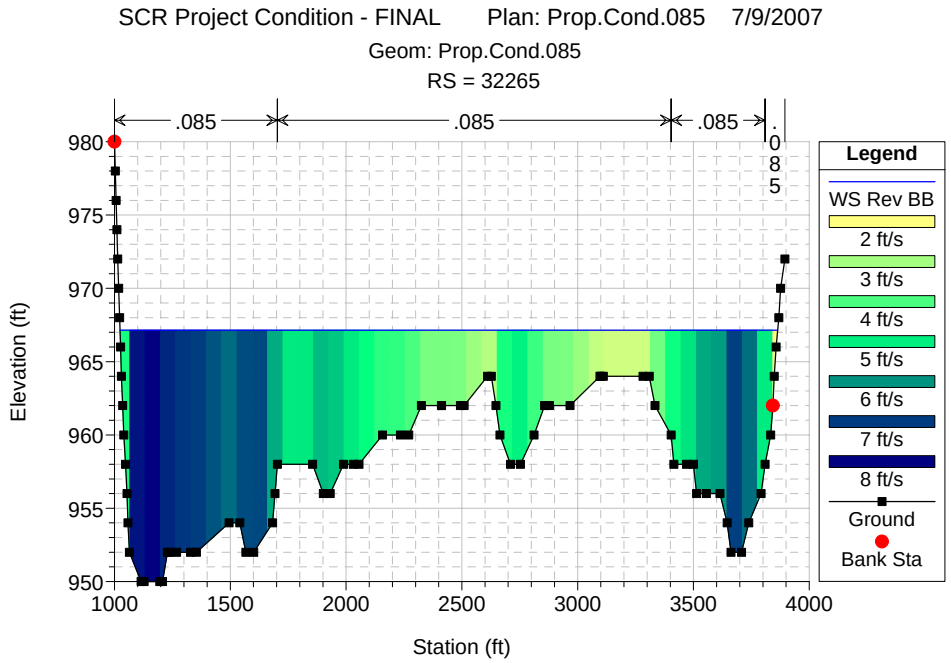
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Ineff
Bank Sta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Geom: Prop.Cond.085
RS = 32265
.085
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.085
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
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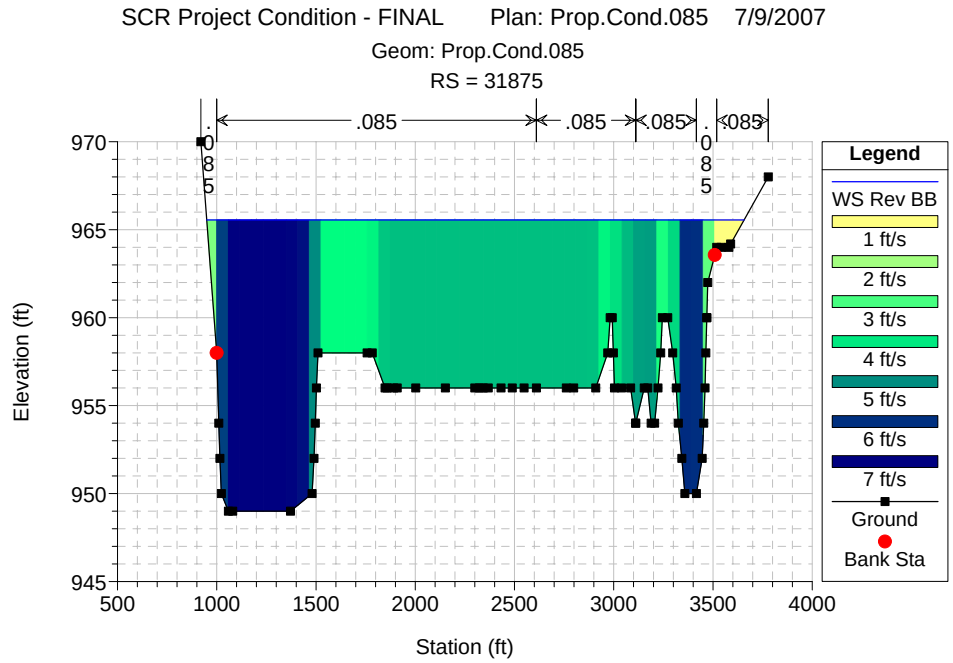
7 ft/s
8 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 31875
.085
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.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
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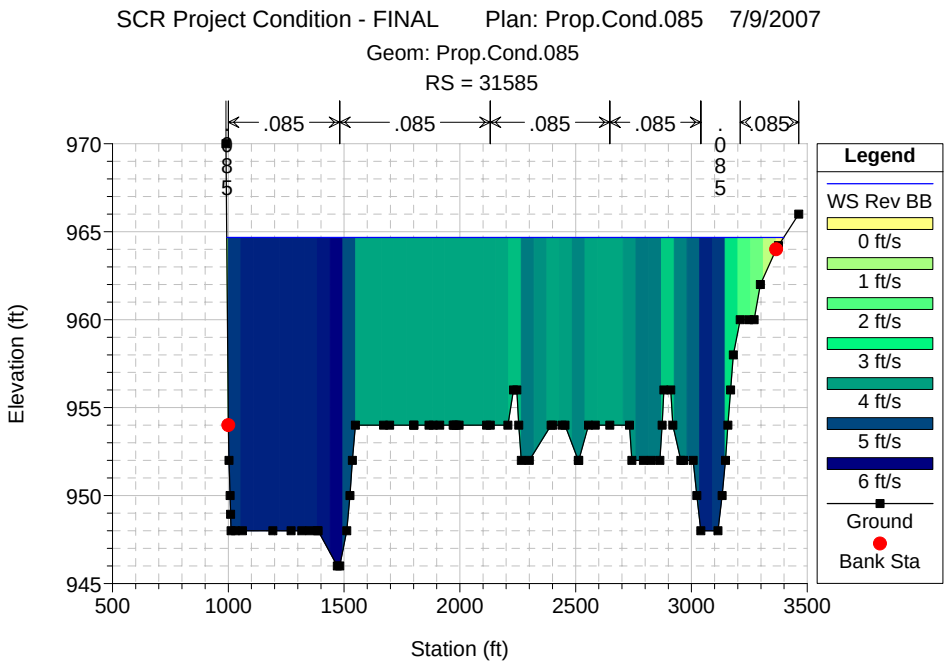
6 ft/s
7 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 31585
.085
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.085
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
0 ft/s
1 ft/s
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3 ft/s
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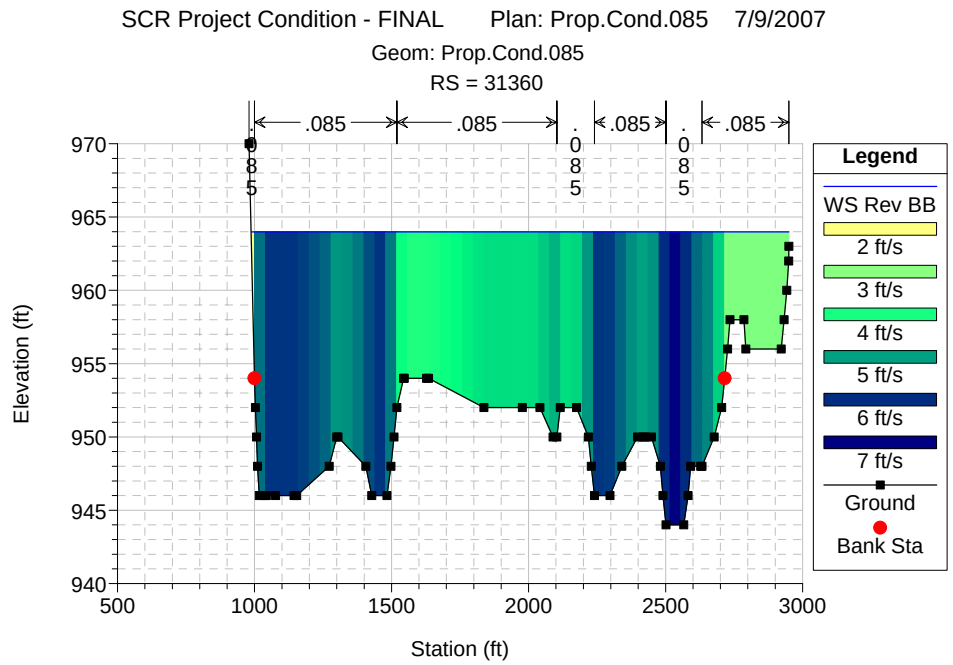
5 ft/s
6 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 31360
.085
.085
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
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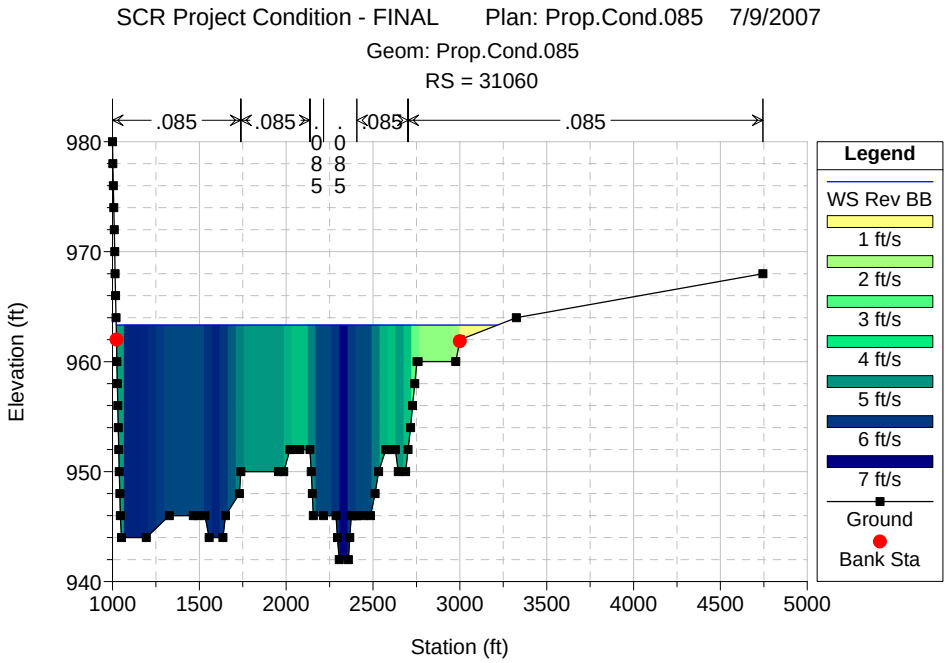
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 31060
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.085
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
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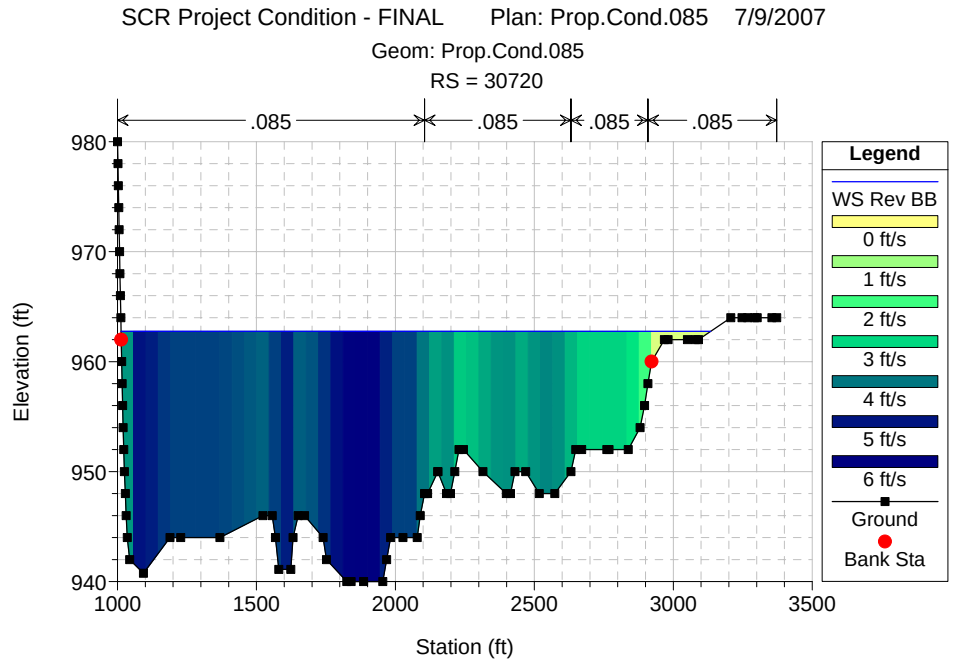
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 30720
.085
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
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0 ft/s
1 ft/s
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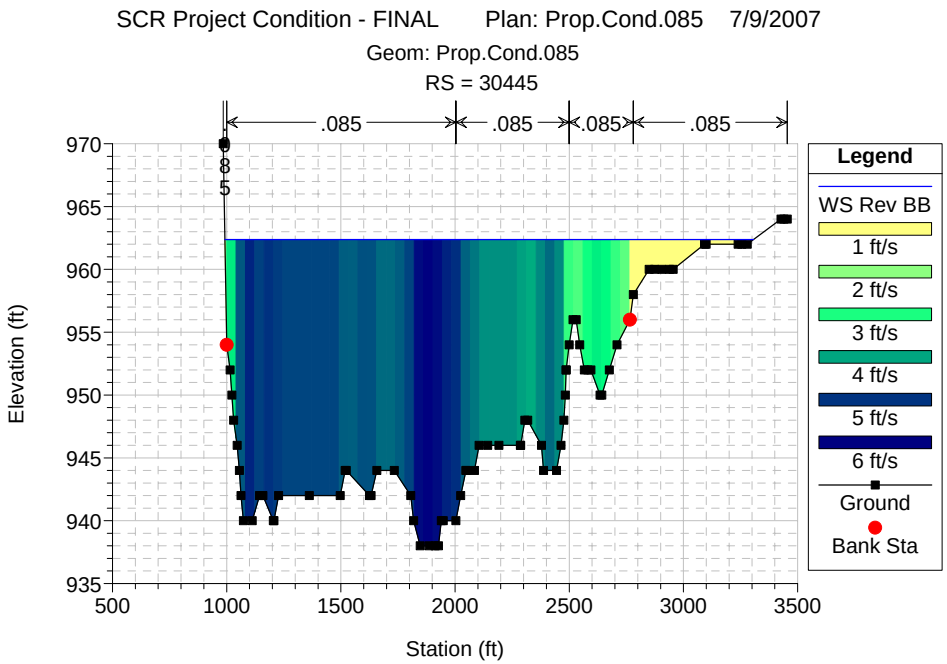
6 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 30445
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
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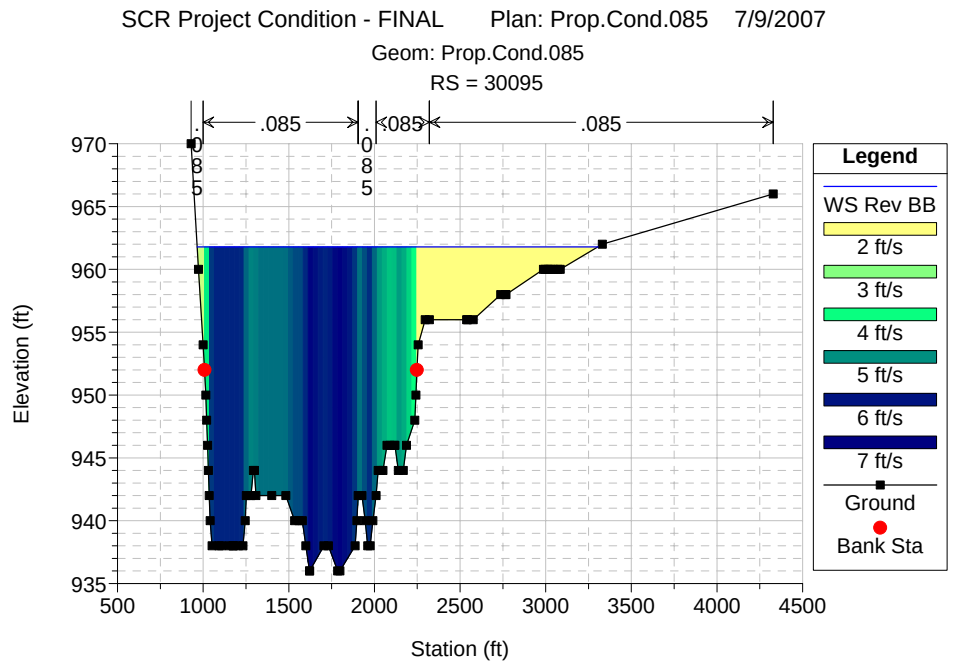
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 30095
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
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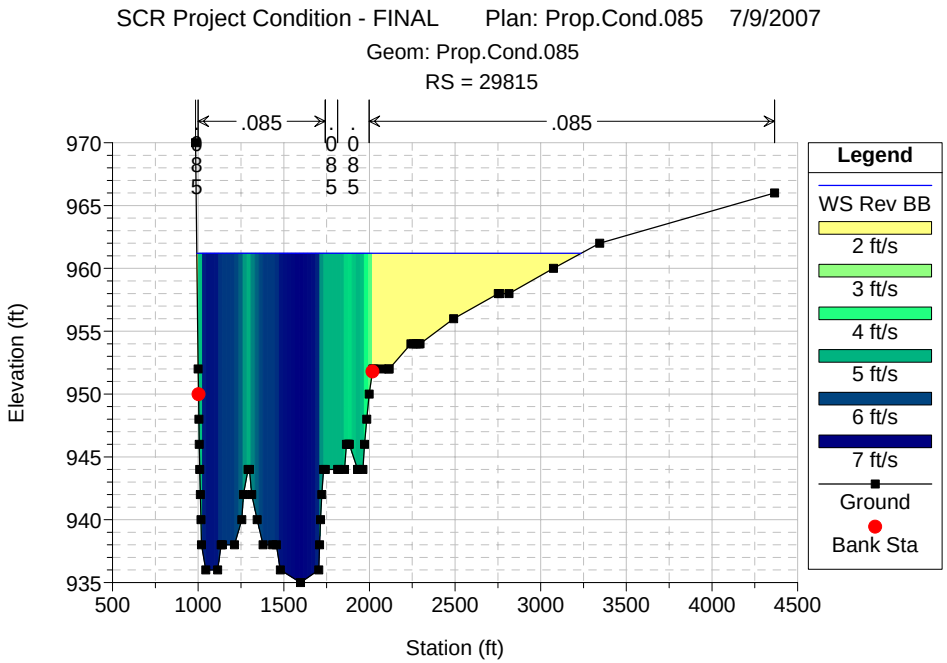
7 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 29815
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
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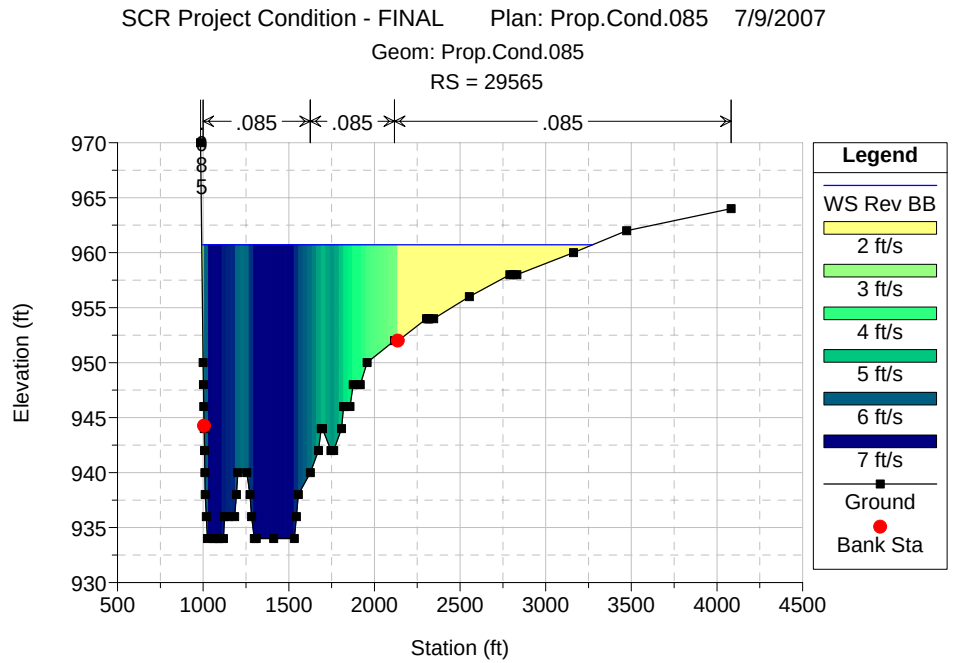
7 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 29565
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
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3 ft/s
4 ft/s
5 ft/s
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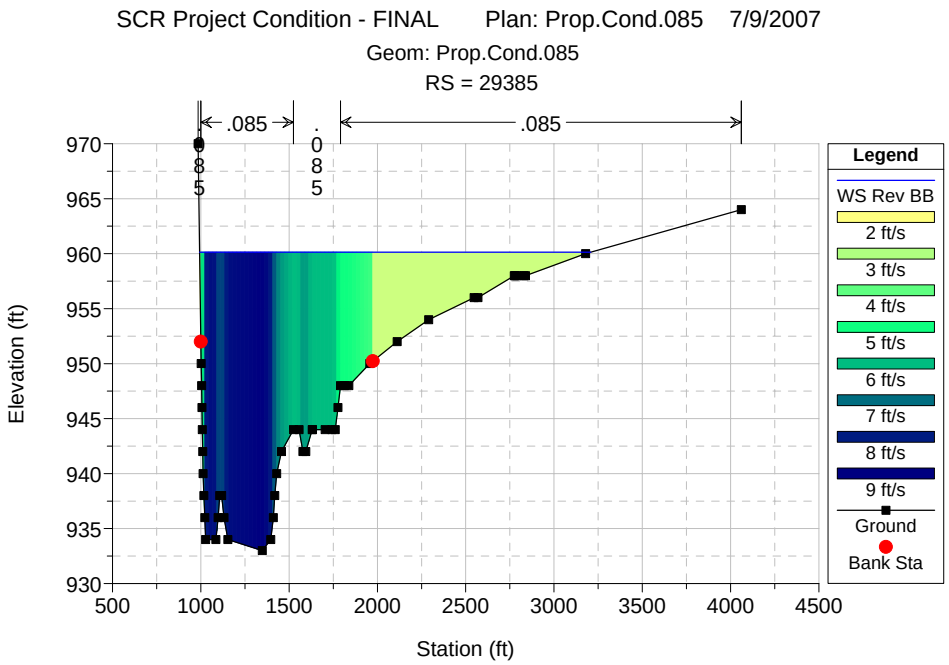
7 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 29385
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.085
Elevation (ft)
Station (ft)
Legend
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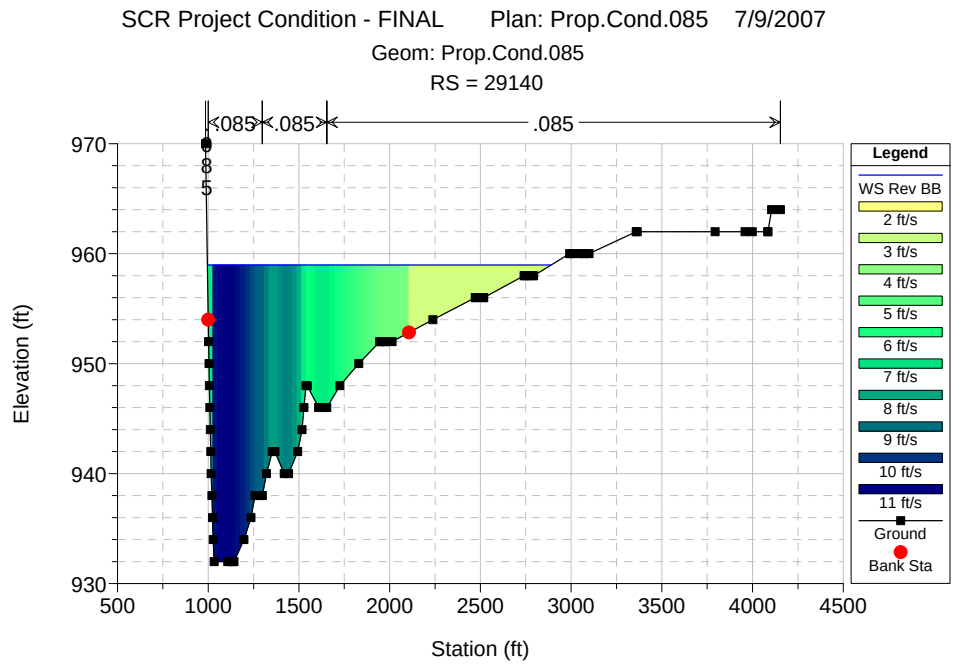
9 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 29140
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.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
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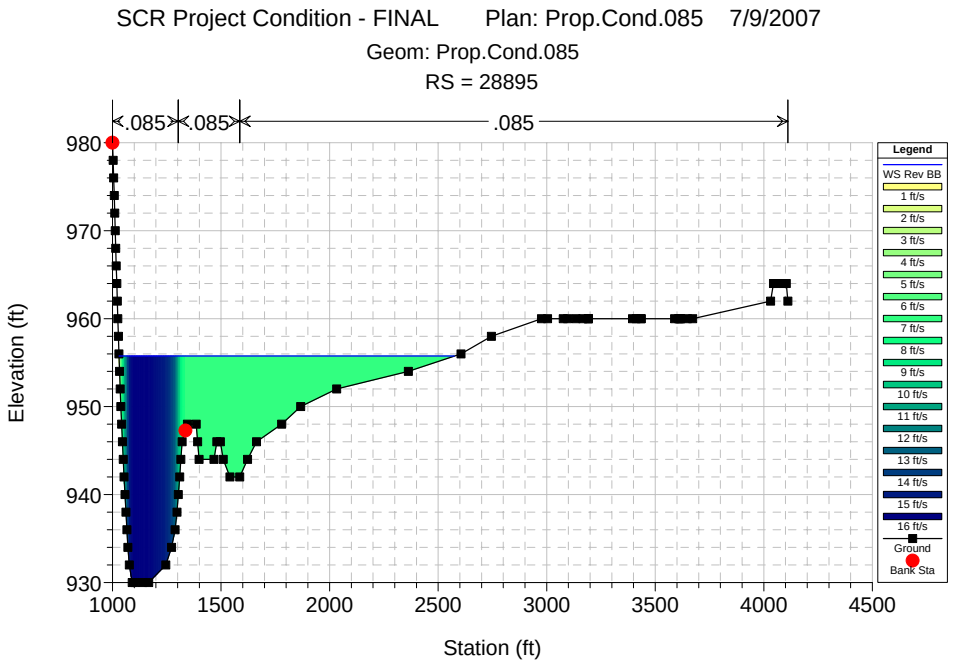
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 28895
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
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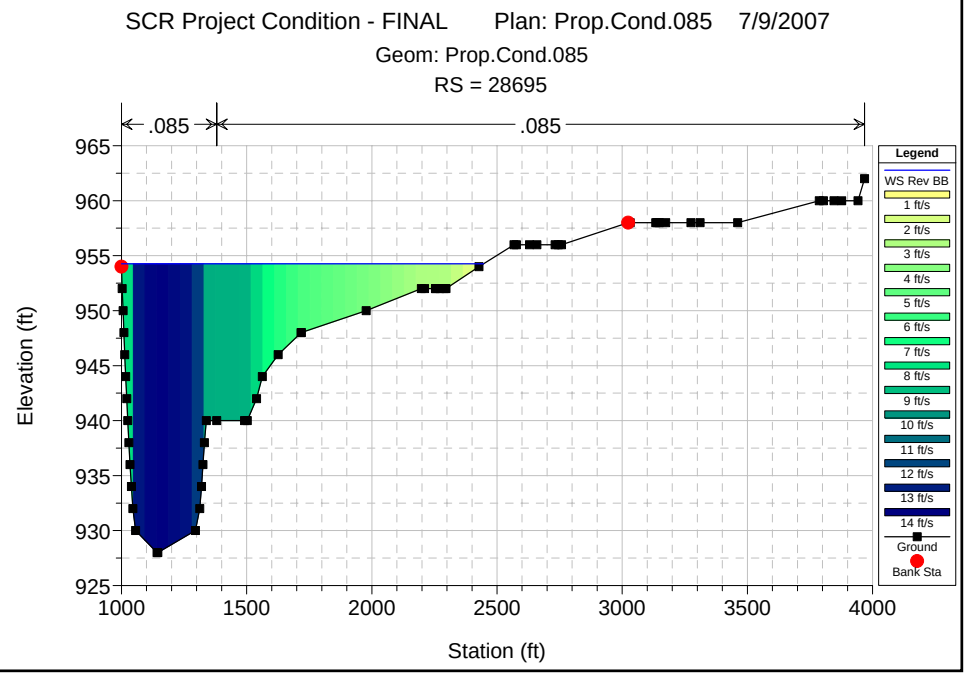
16 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 28695
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.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
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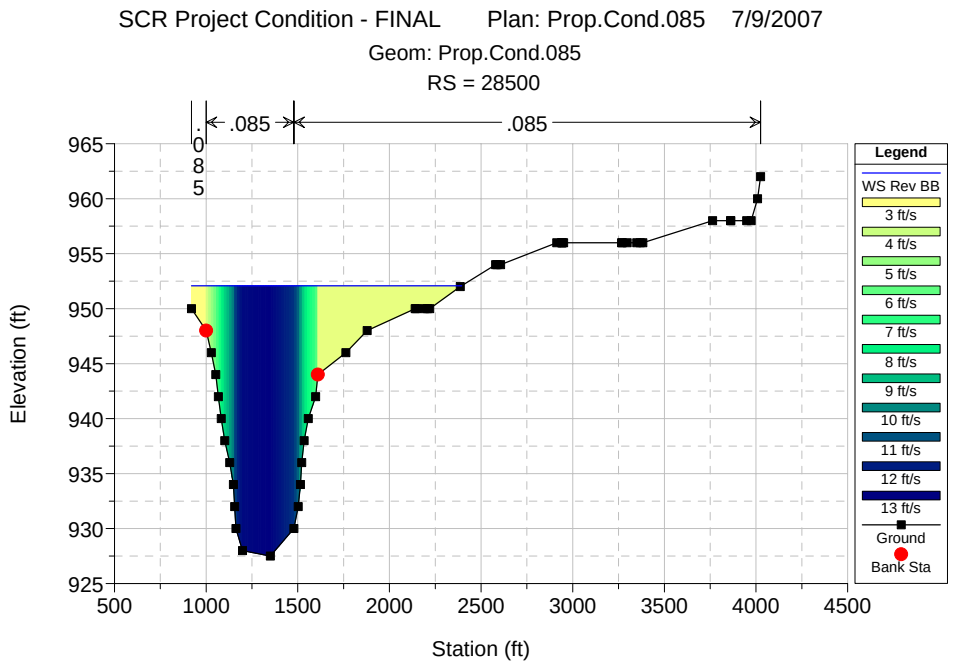
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 28500
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
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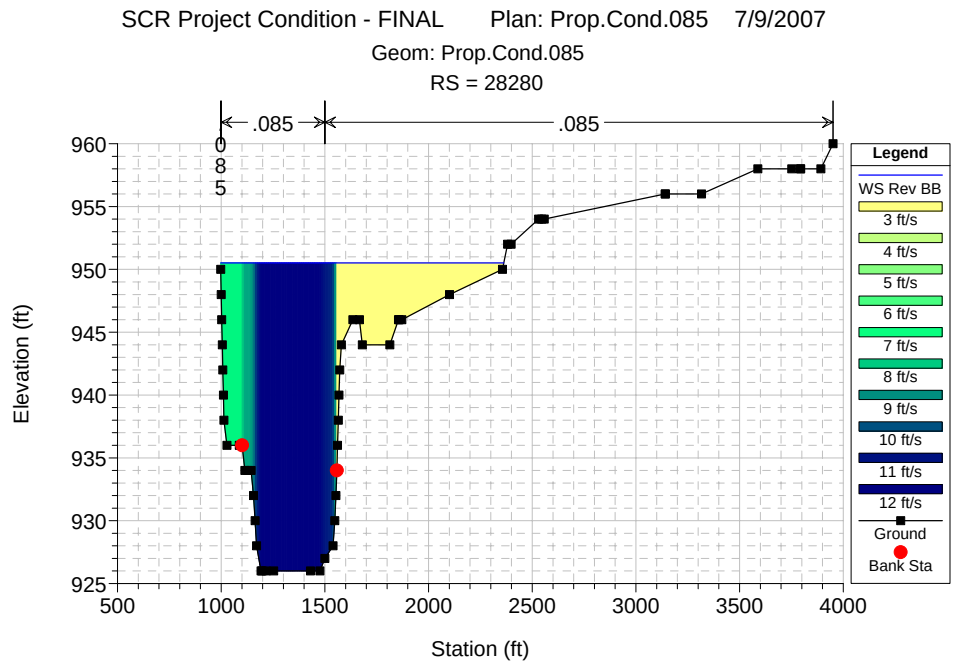
12 ft/s
13 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 28280
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
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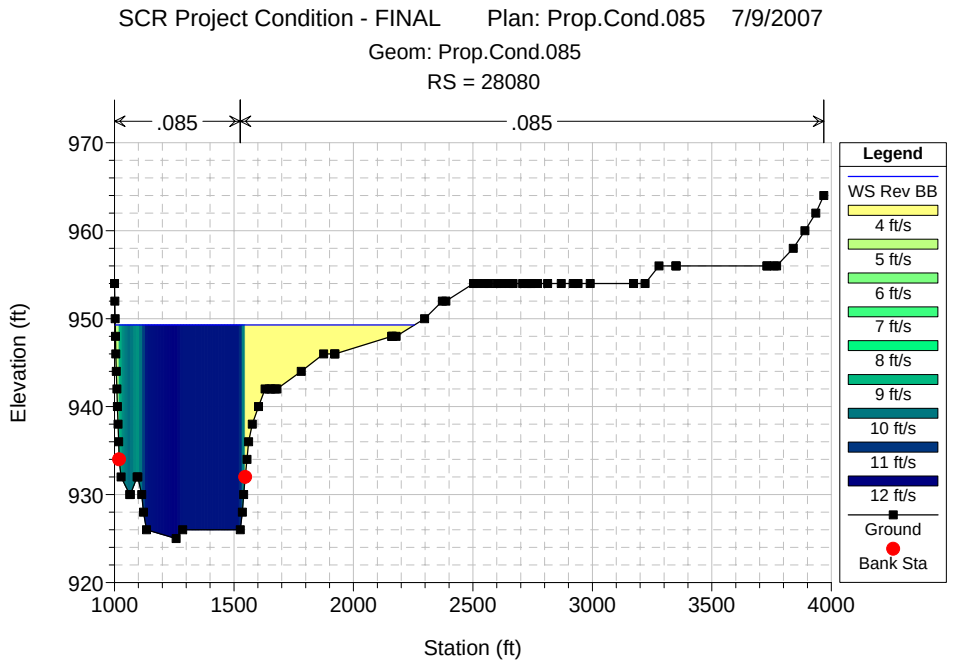
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 28080
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
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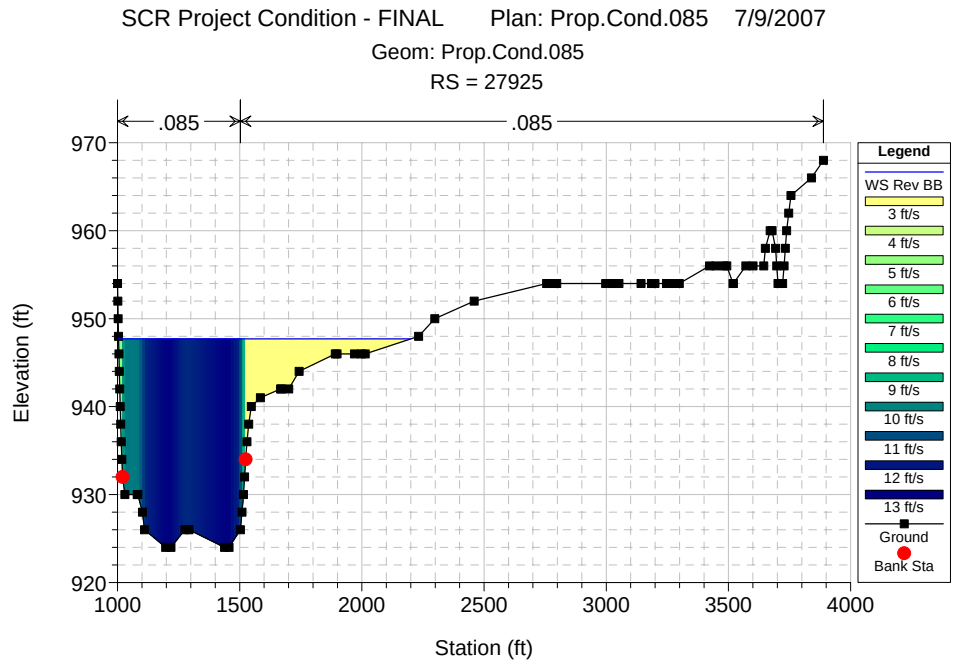
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 27925
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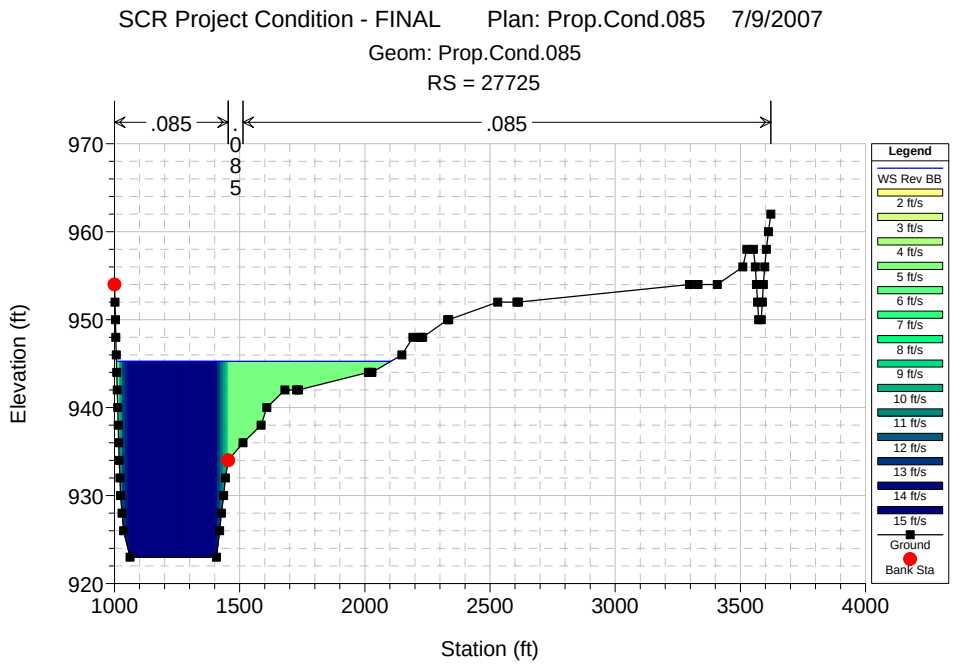
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 27725
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
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3 ft/s
4 ft/s
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6 ft/s
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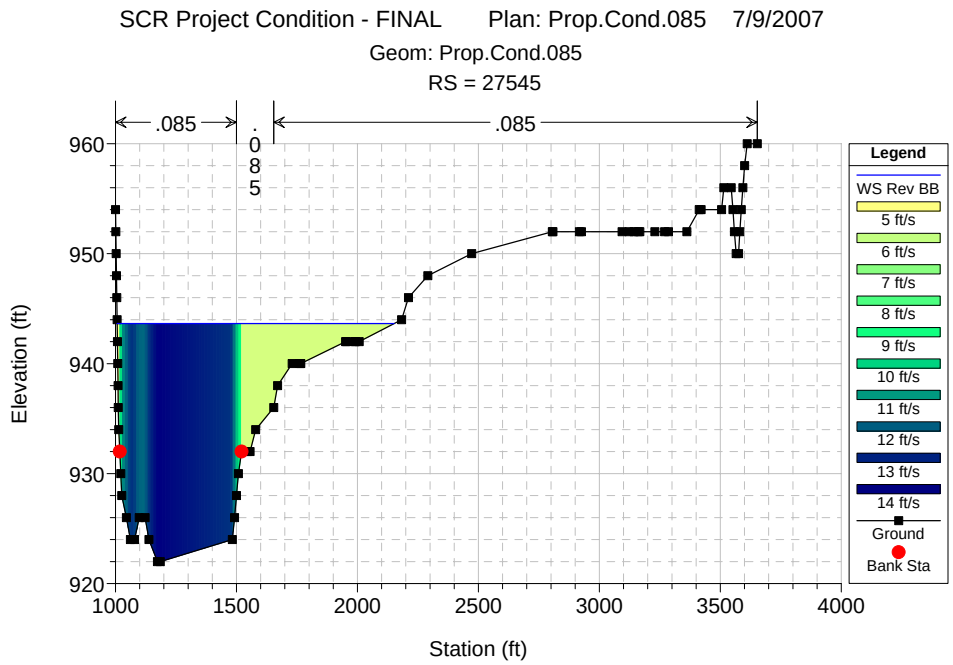
13 ft/s
14 ft/s
15 ft/s
Ground
Bank Sta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RS = 27545
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
6 ft/s
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9 ft/s
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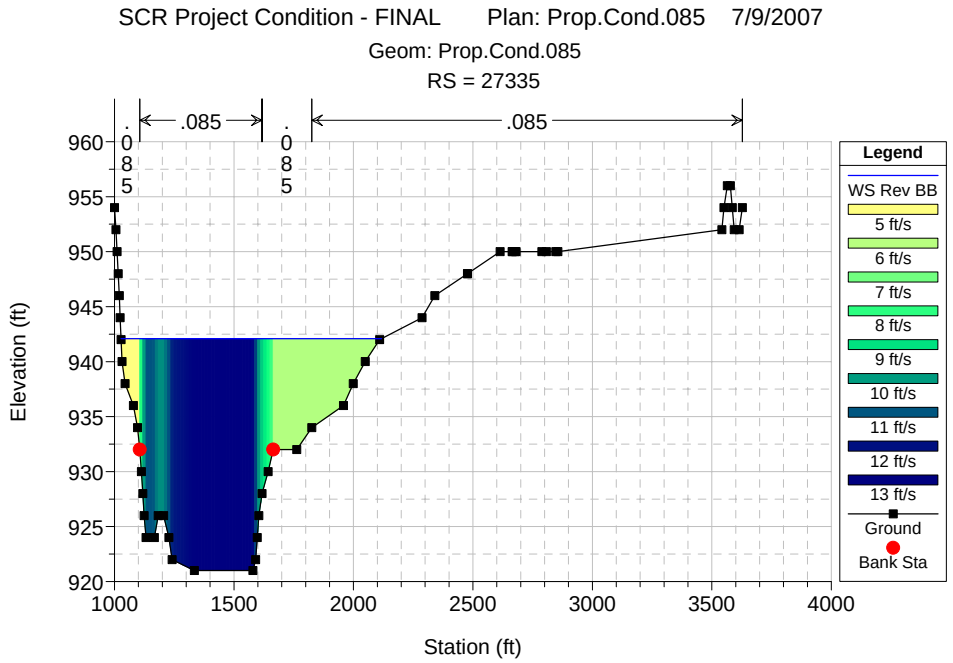
12 ft/s
13 ft/s
14 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 27335
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
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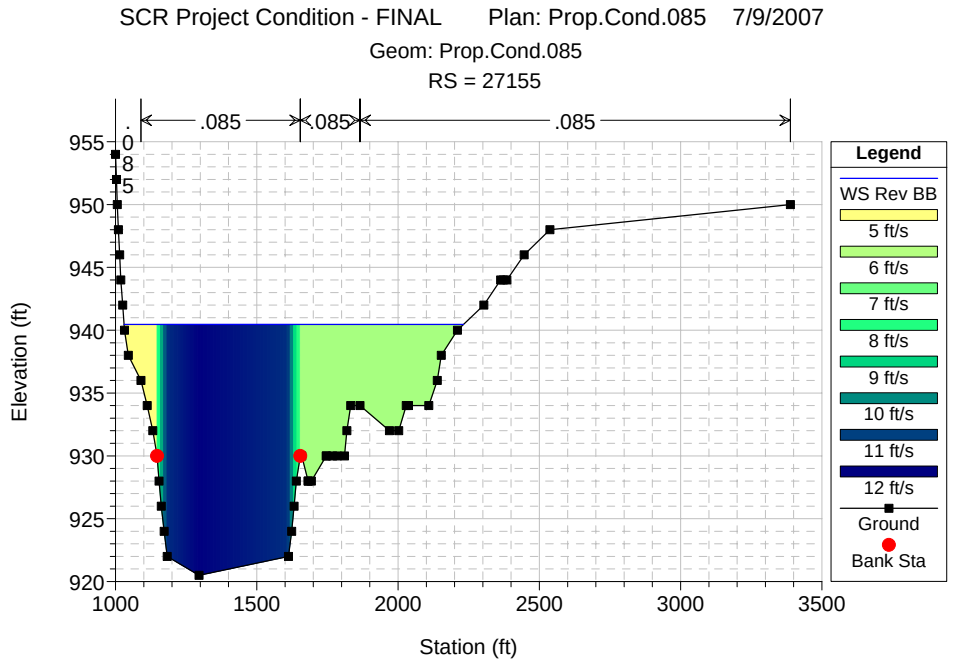
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 27155
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.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
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7 ft/s
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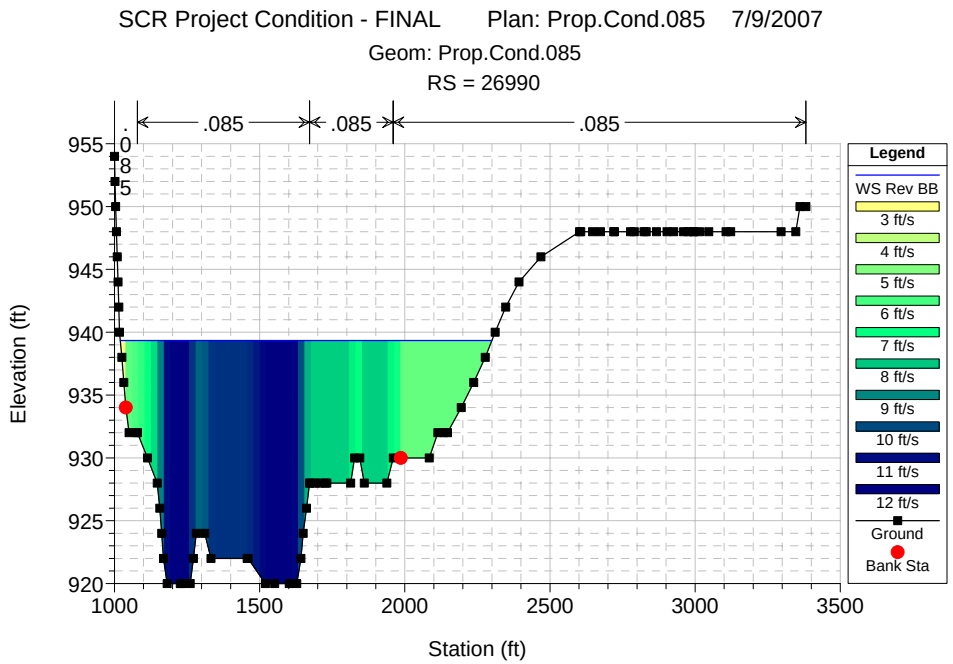
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 26990
.085
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
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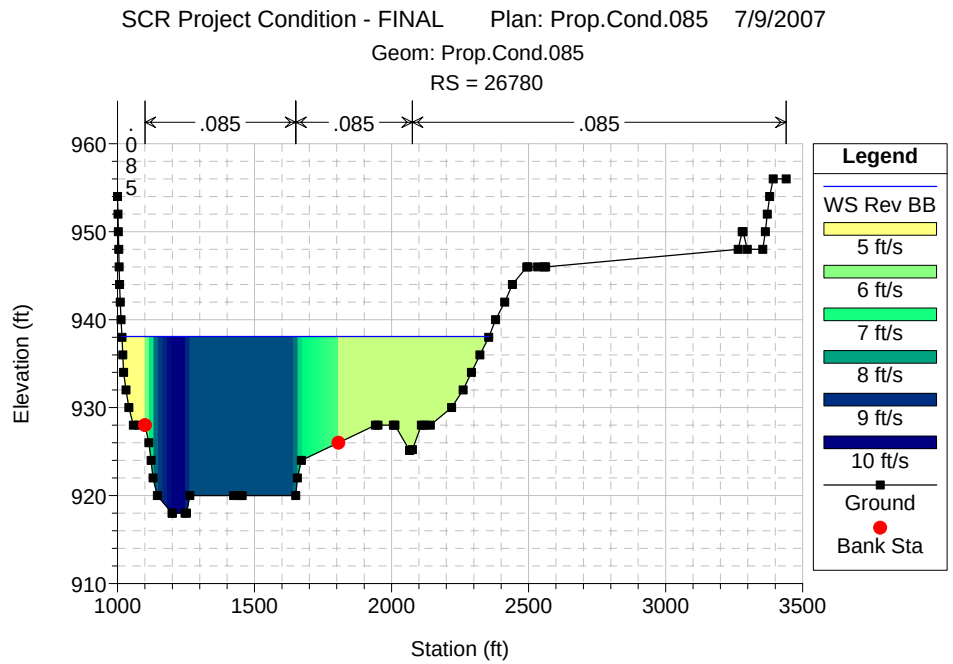
12 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 26780
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
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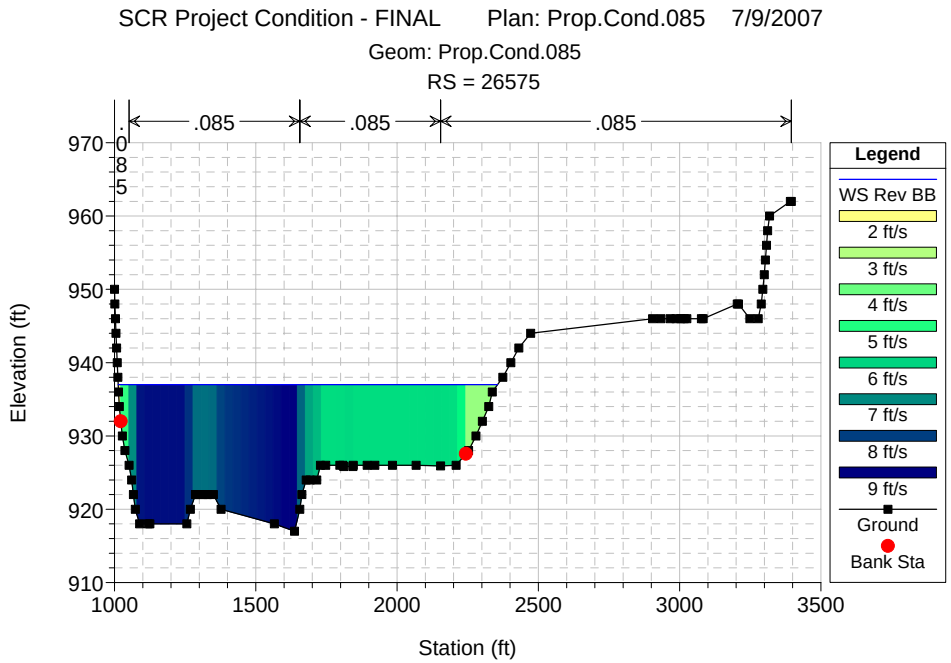
9 ft/s
10 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 26575
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.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
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4 ft/s
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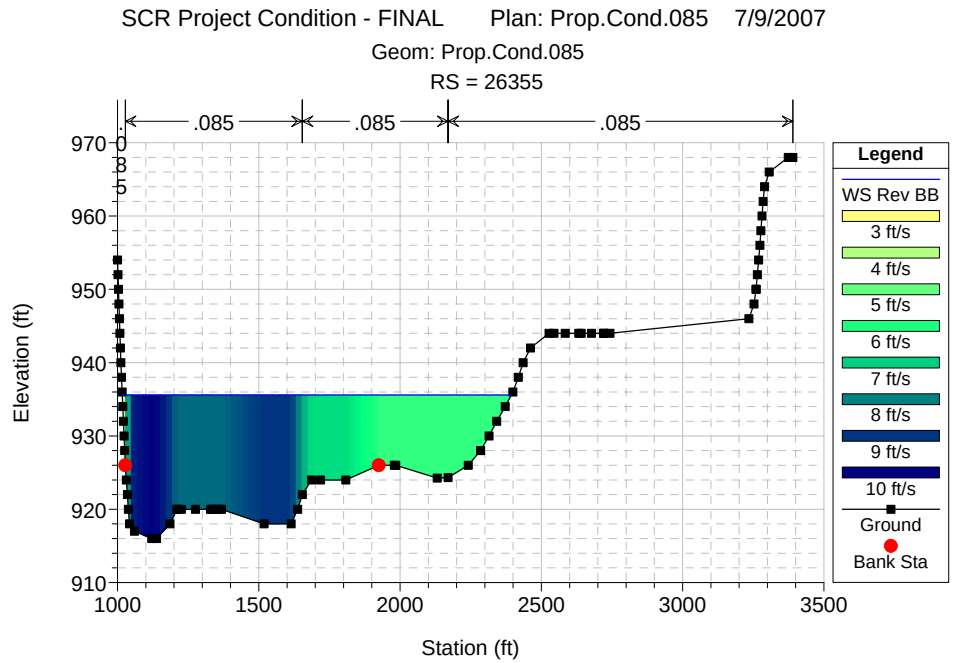
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 26355
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
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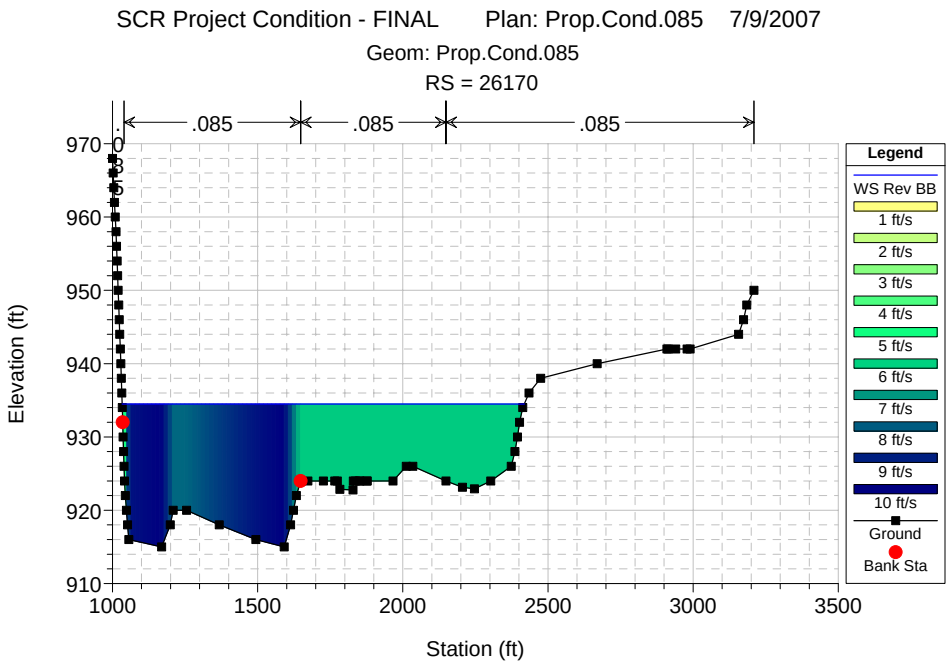
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 26170
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
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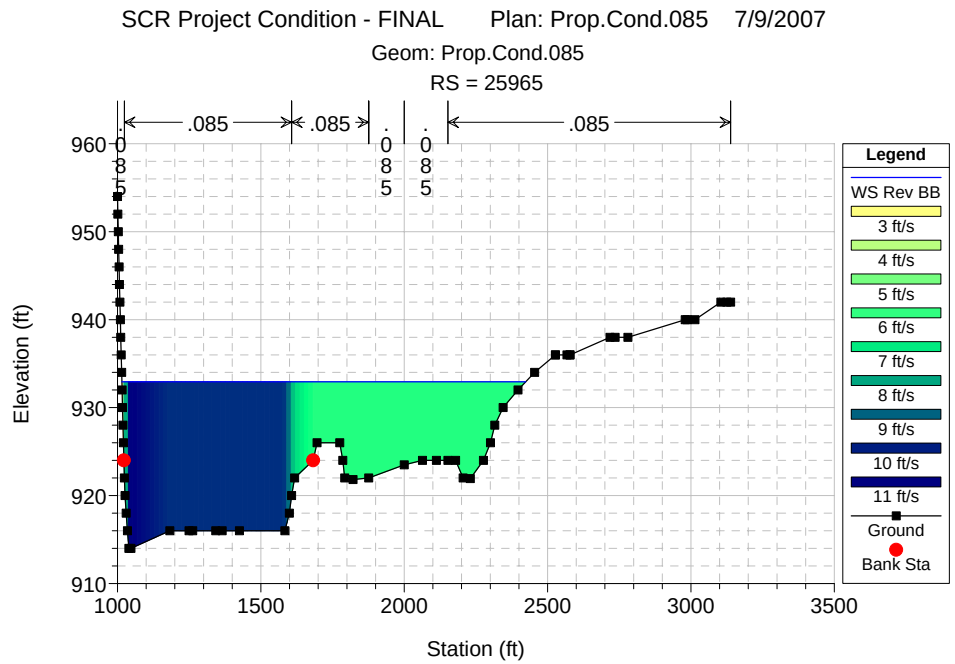
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 25965
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
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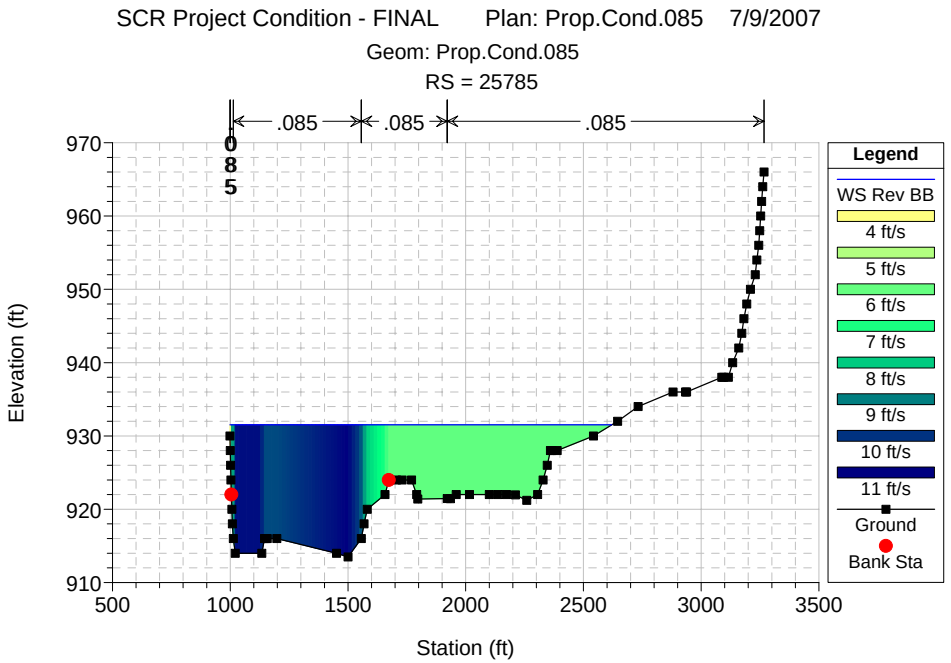
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 25785
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
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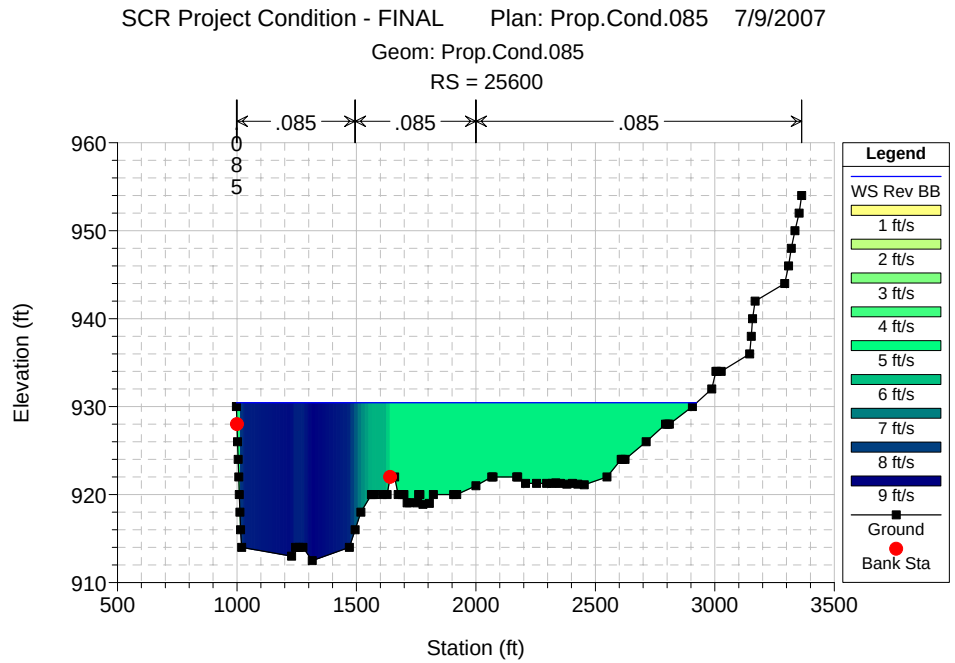
11 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 25600
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
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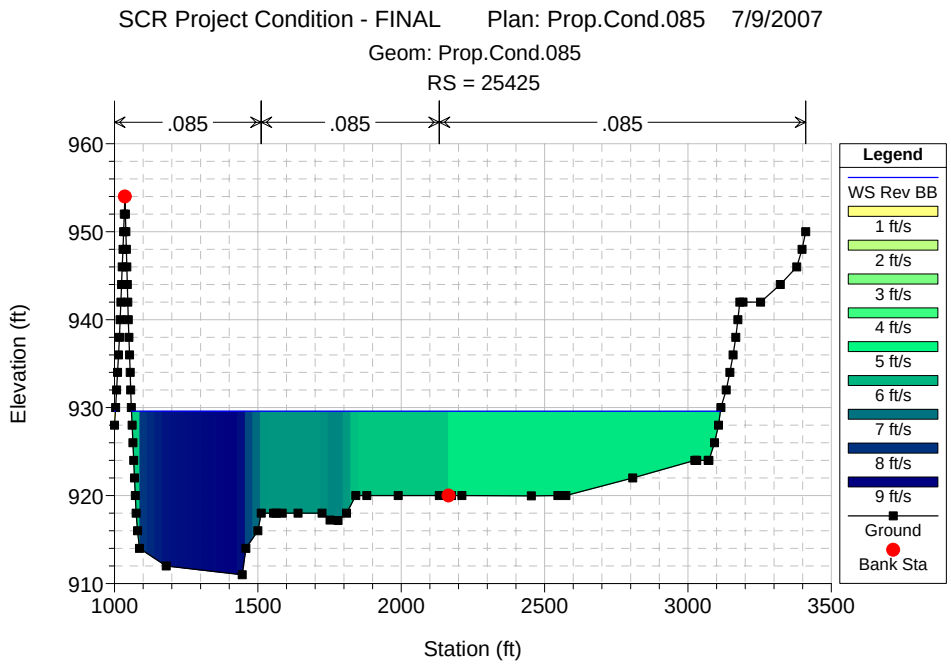
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 25425
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
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3 ft/s
4 ft/s
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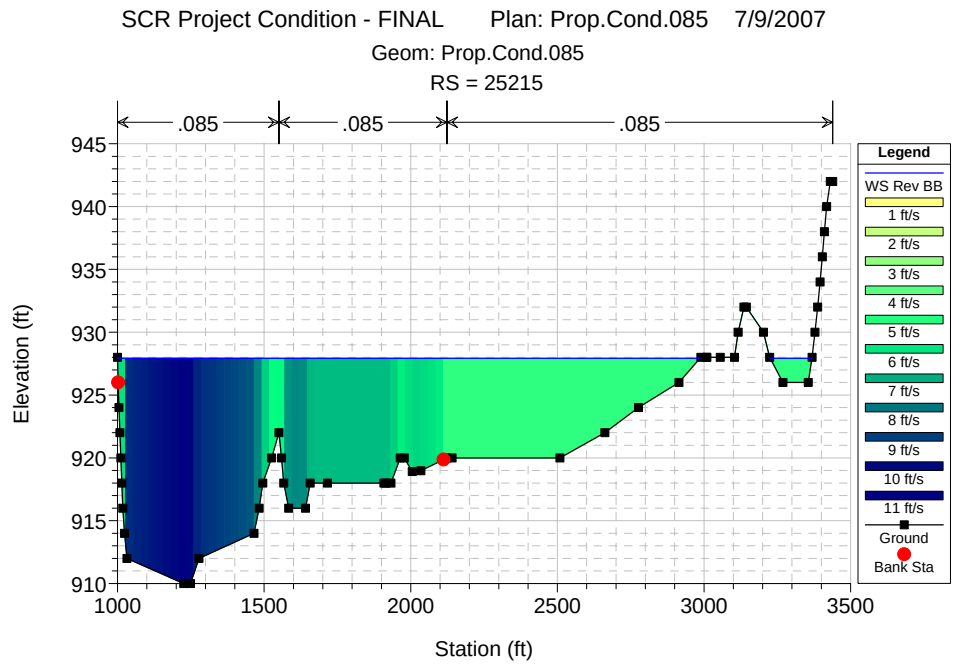
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 25215
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
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6 ft/s
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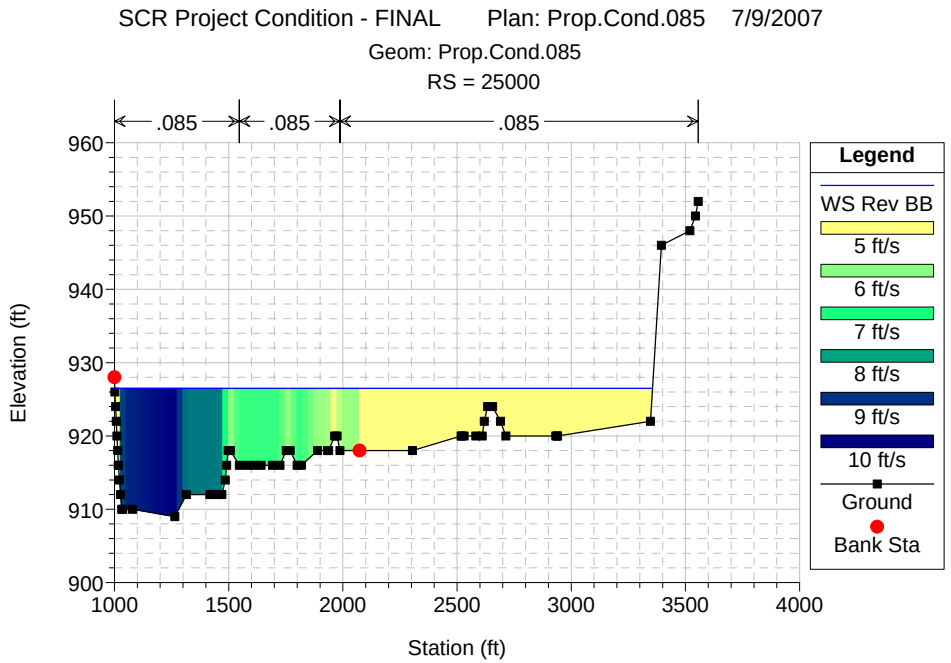
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 25000
.085
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.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
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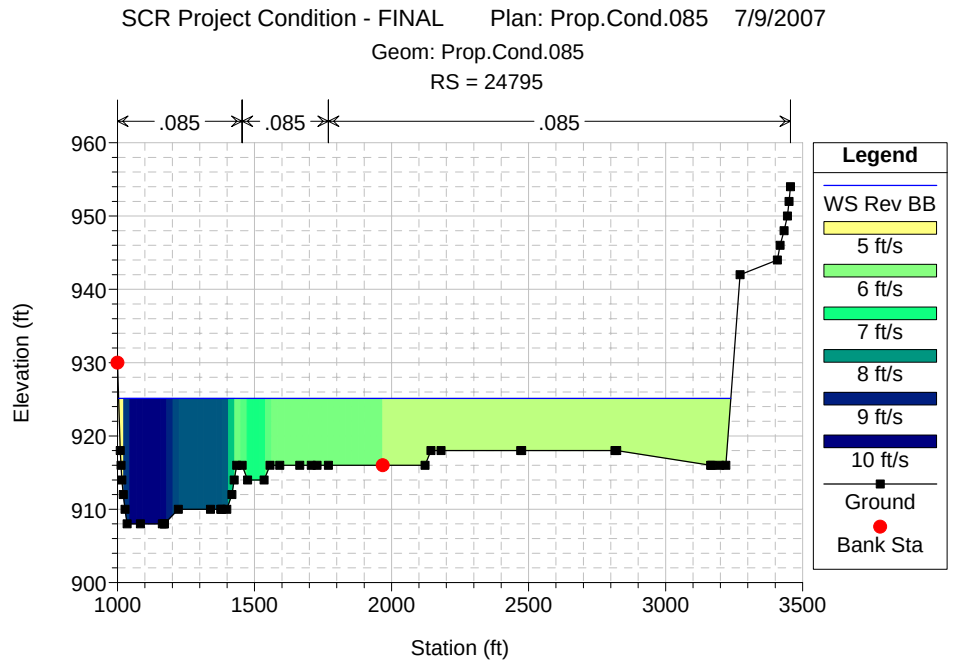
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 24795
.085
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.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
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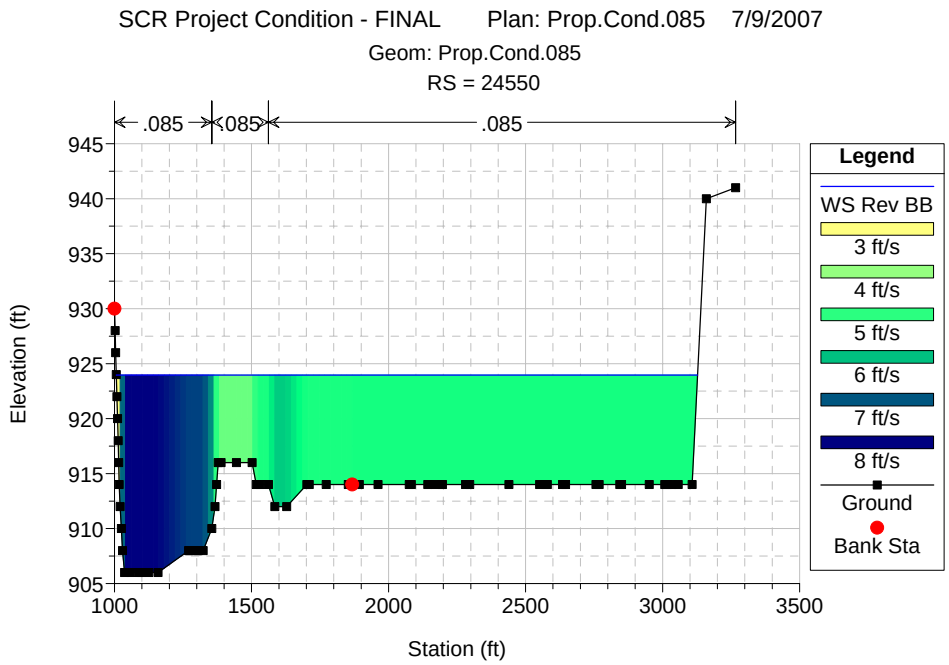
10 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 24550
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.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
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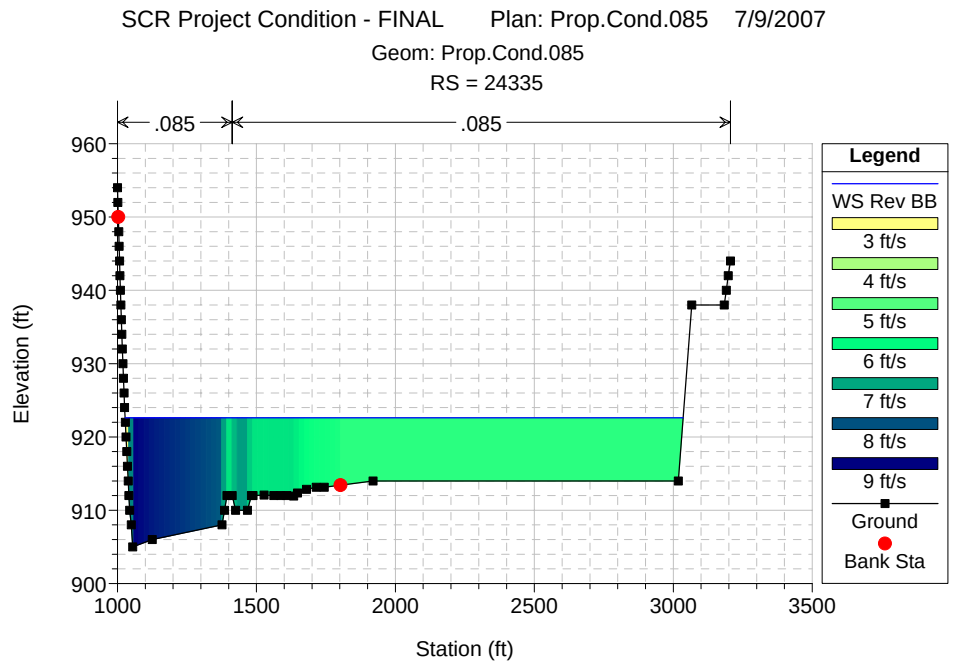
8 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 24335
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Elevation (ft)
Station (ft)
Legend
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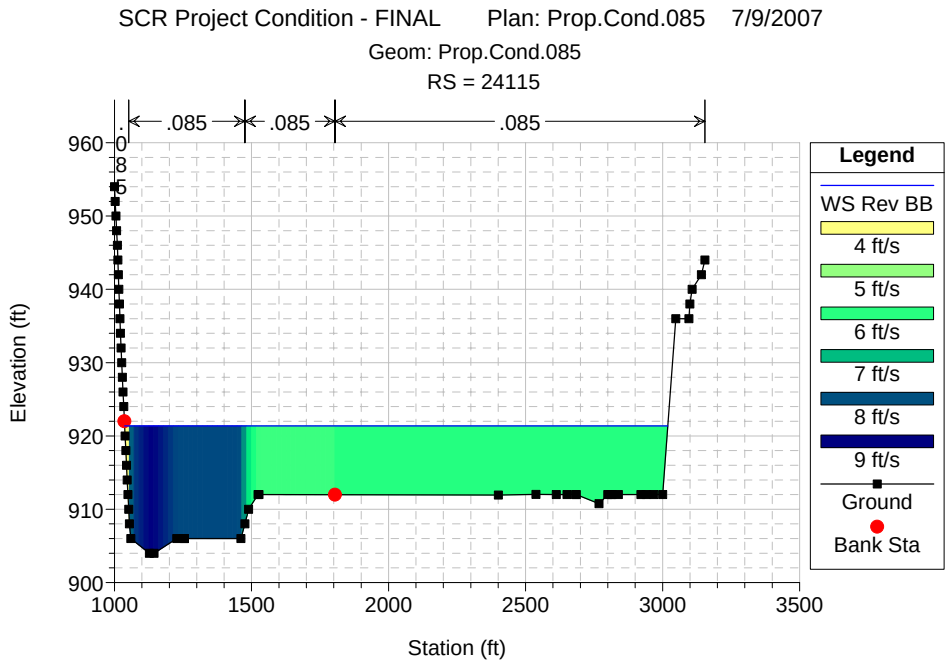
9 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 24115
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Elevation (ft)
Station (ft)
Legend
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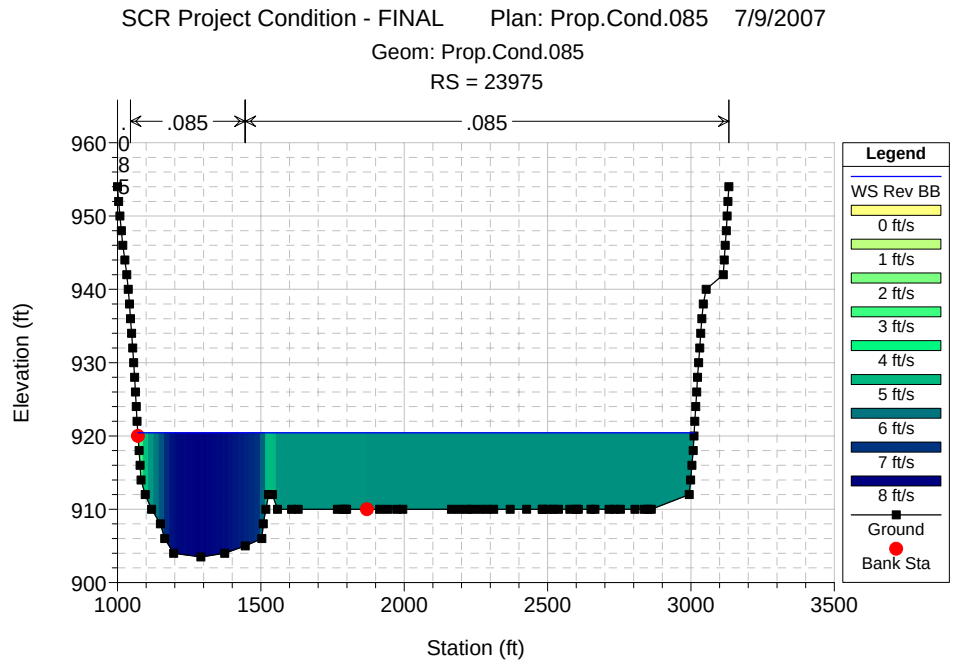
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 23975
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
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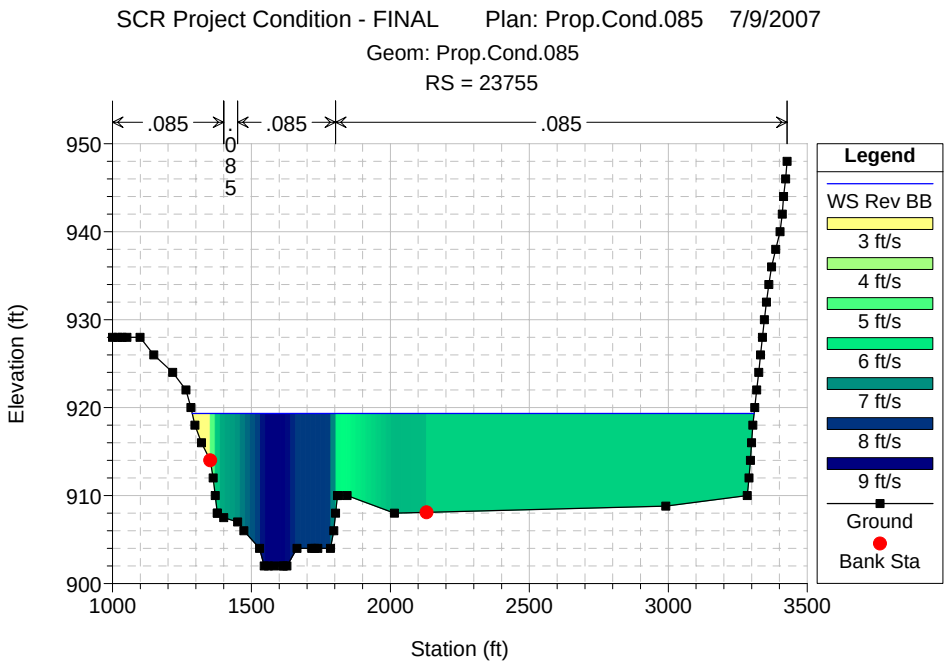
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 23755
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Elevation (ft)
Station (ft)
Legend
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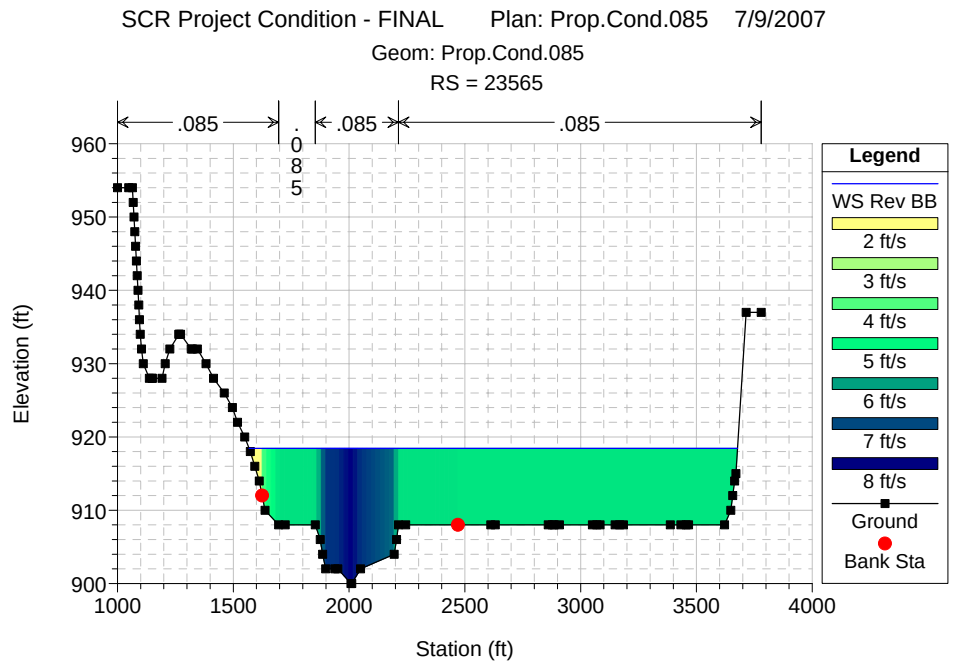
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 23565
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Elevation (ft)
Station (ft)
Legend
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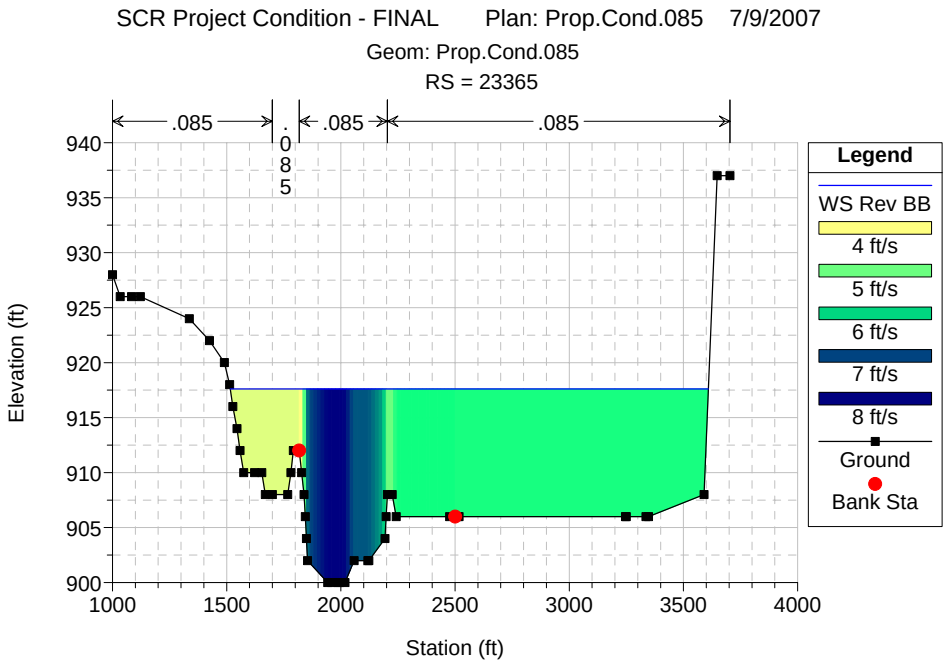
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 23365
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
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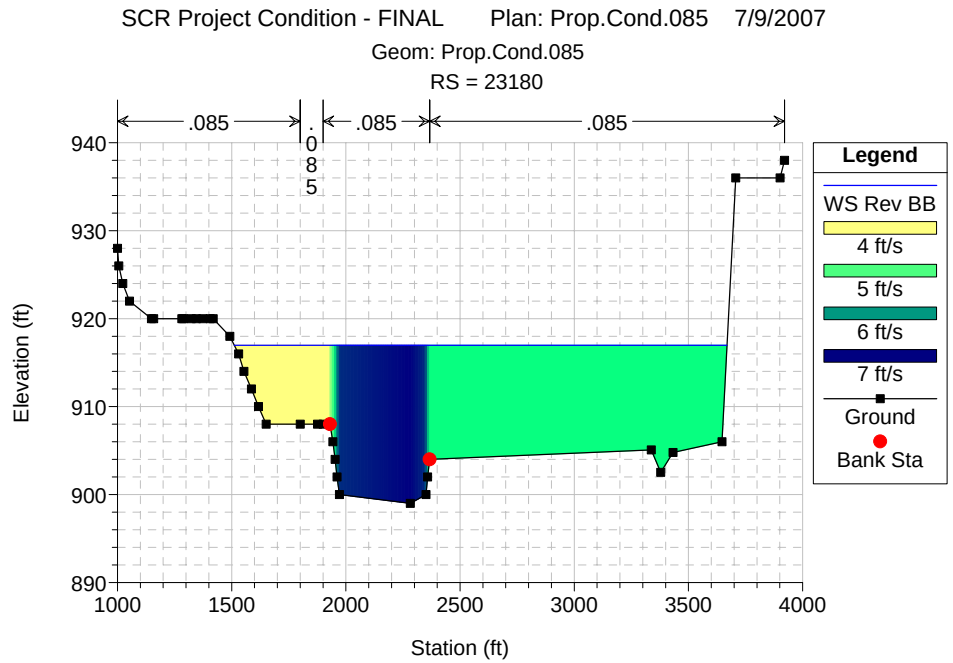
Ground
Bank Sta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Geom: Prop.Cond.085
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Elevation (ft)
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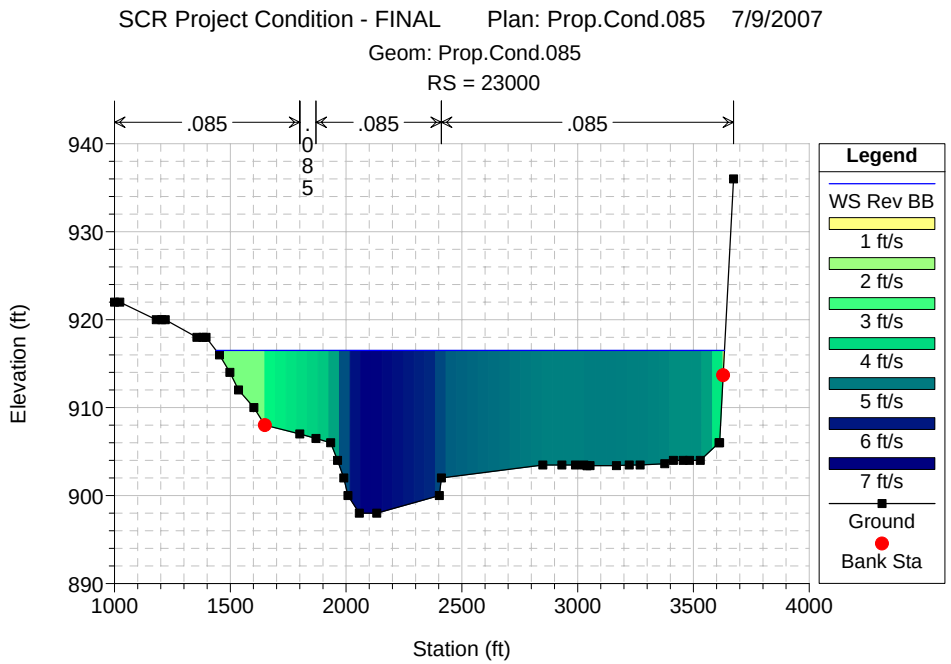
Bank Sta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Geom: Prop.Cond.085
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Elevation (ft)
Station (ft)
Legend
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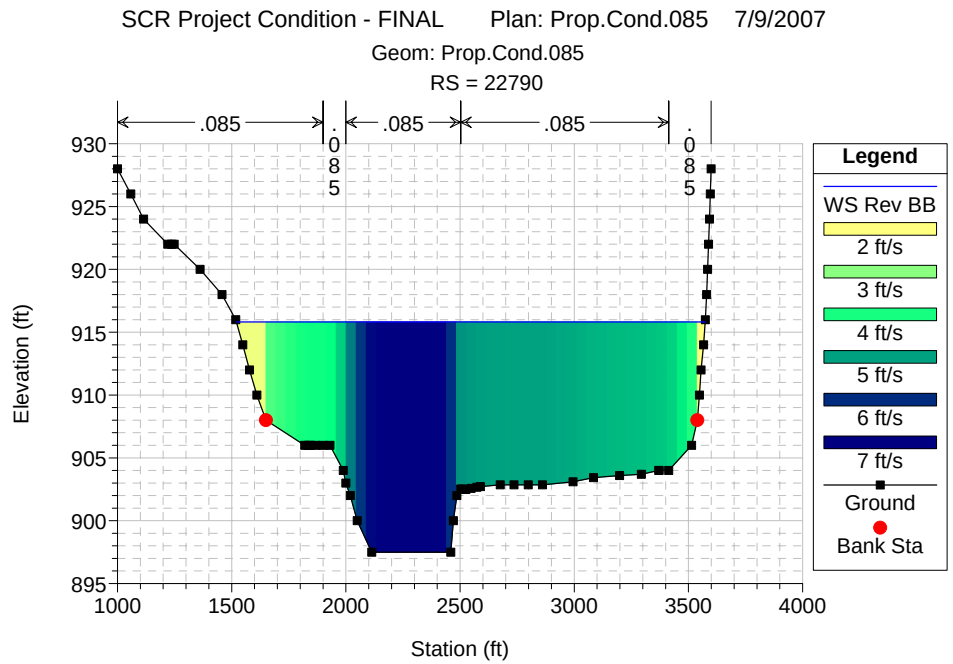
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 22790
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.085
.085
Elevation (ft)
Station (ft)
Legend
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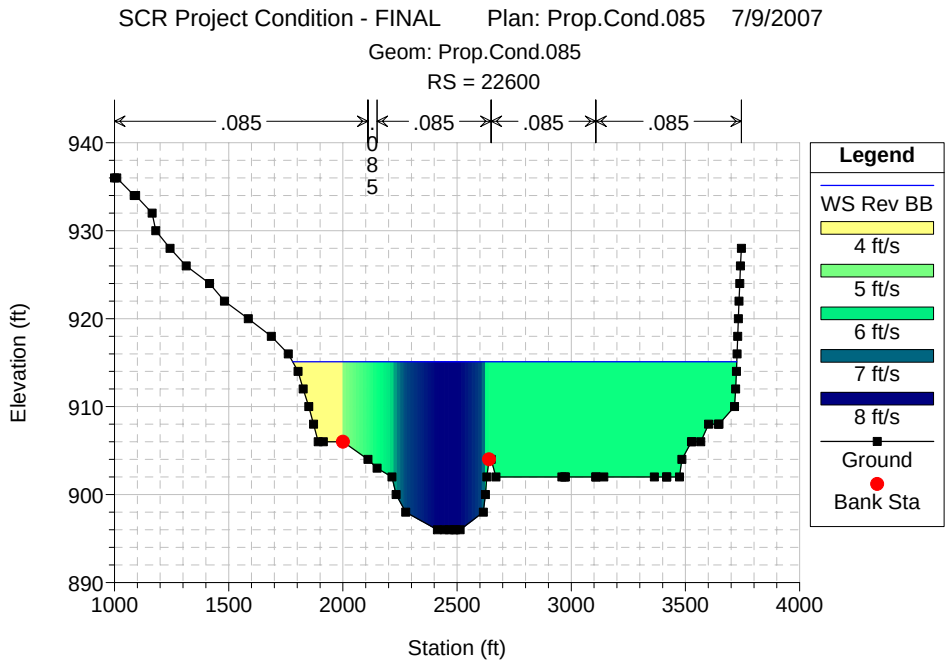
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 22600
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
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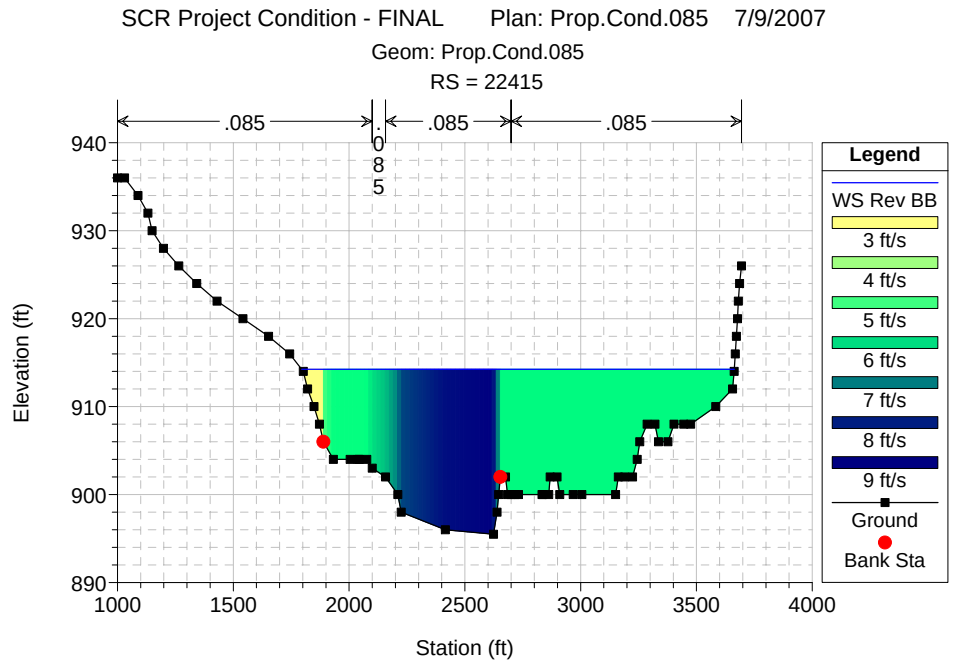
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 22415
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.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
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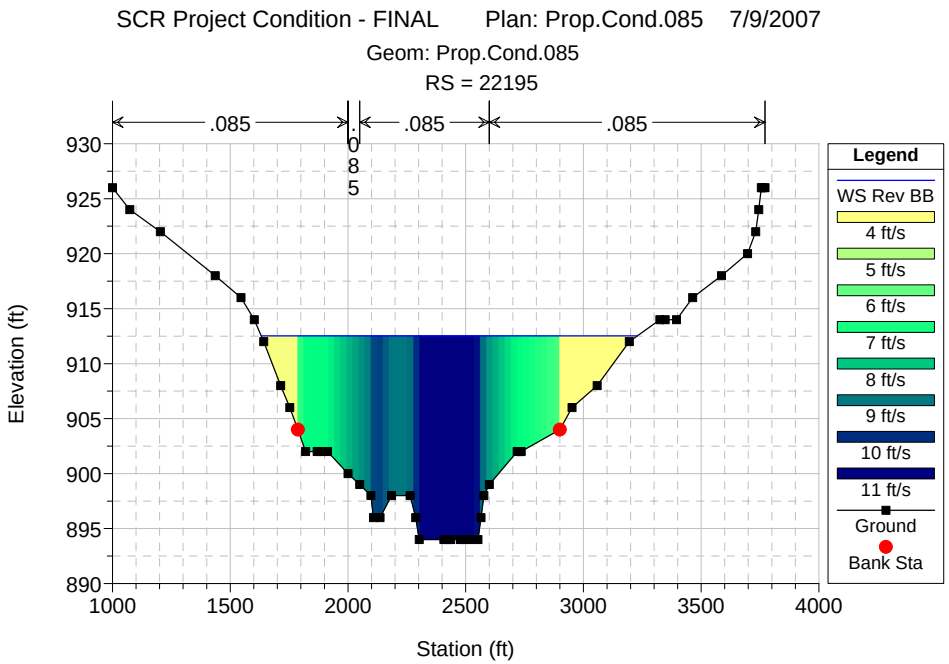
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 22195
.085
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.085
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
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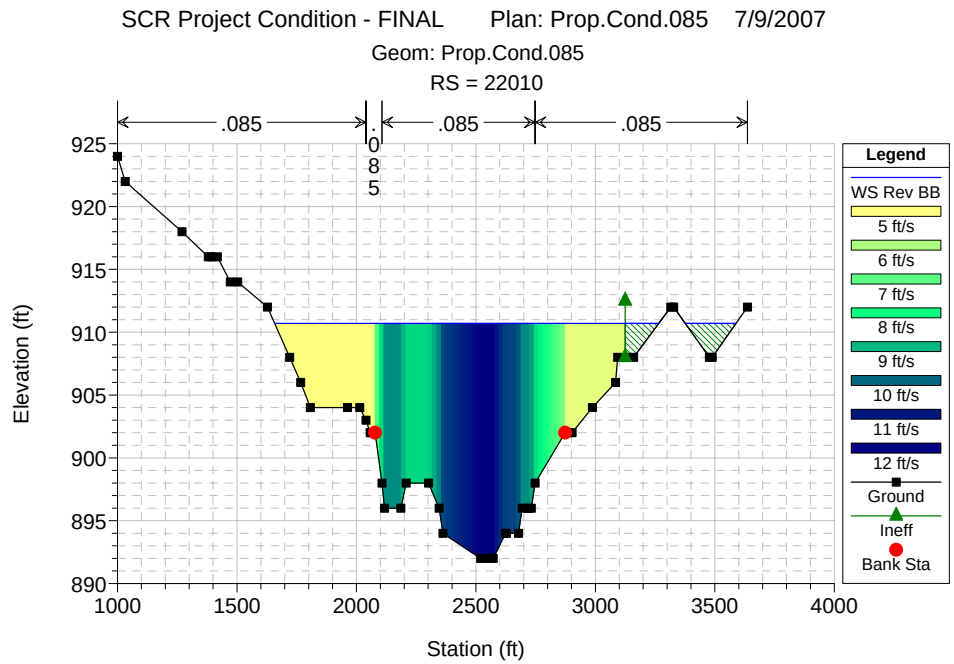
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 22010
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
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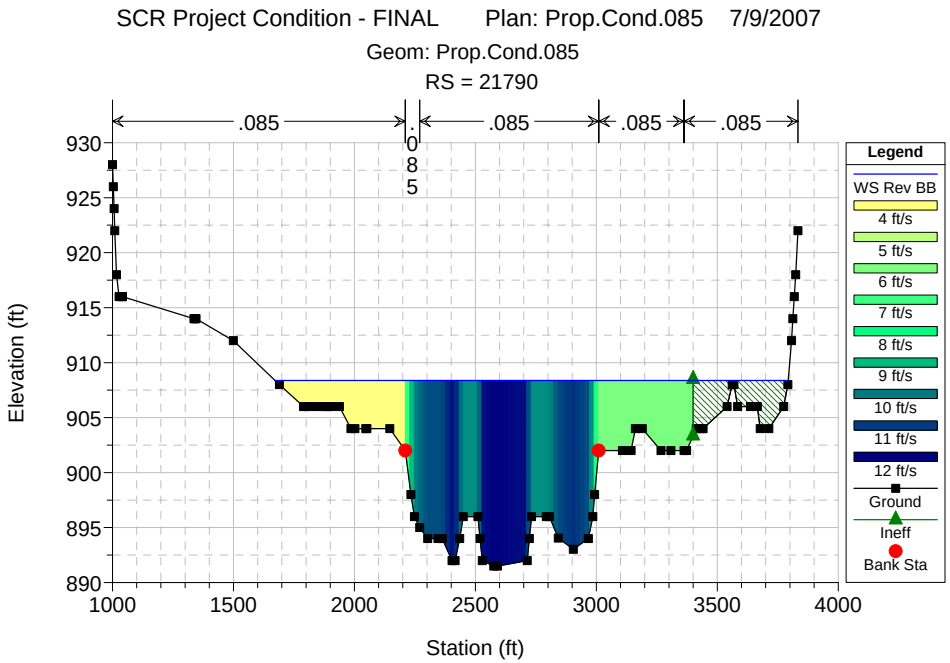
Bank Sta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Geom: Prop.Cond.085
RS = 21790
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
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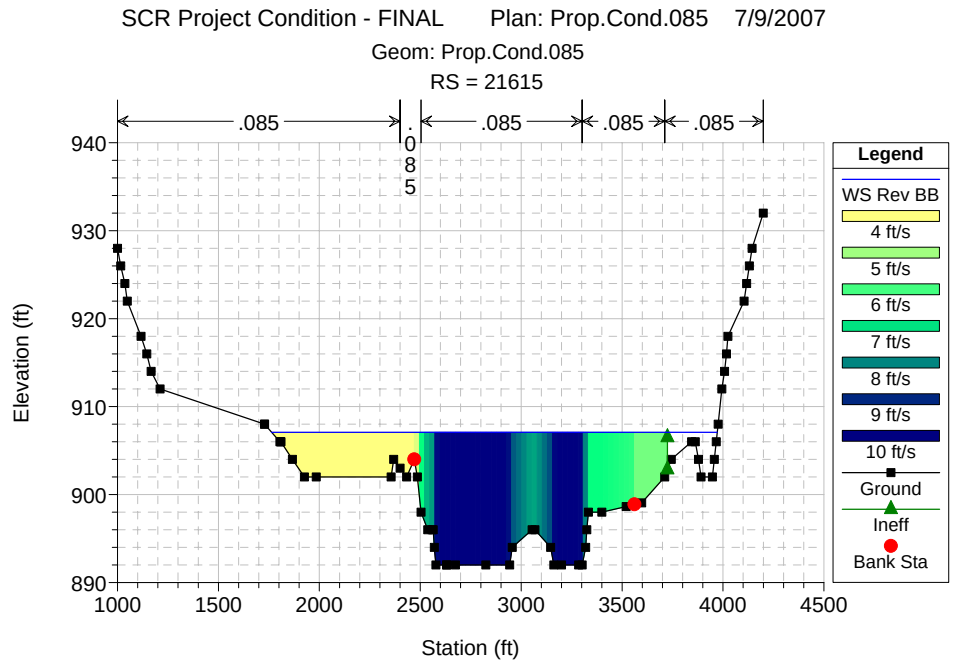
Bank Sta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Geom: Prop.Cond.085
RS = 21615
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
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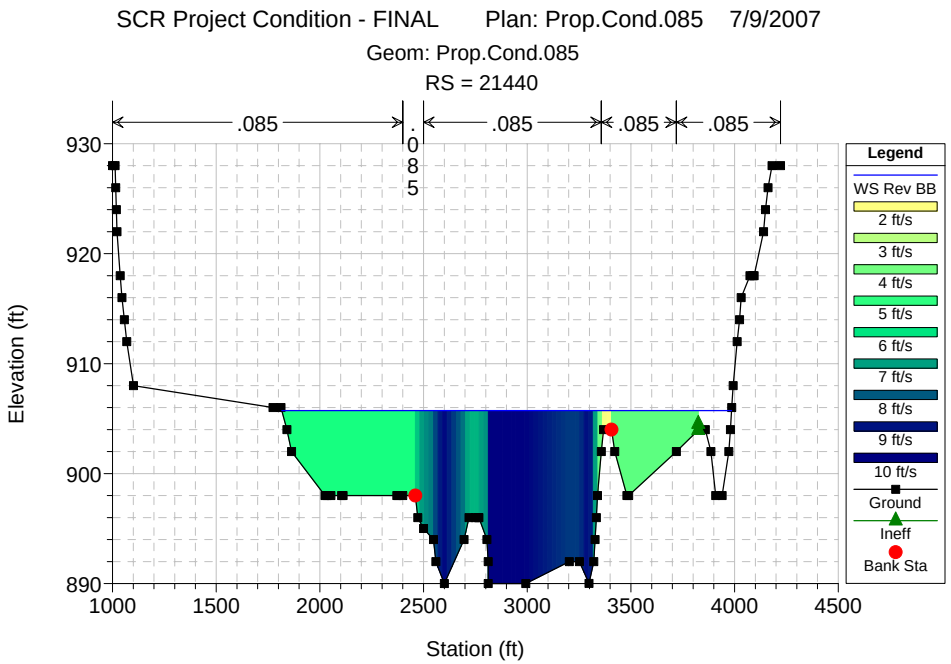
9 ft/s
10 ft/s
Ground
Ineff
Bank Sta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Geom: Prop.Cond.085
RS = 21440
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
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9 ft/s
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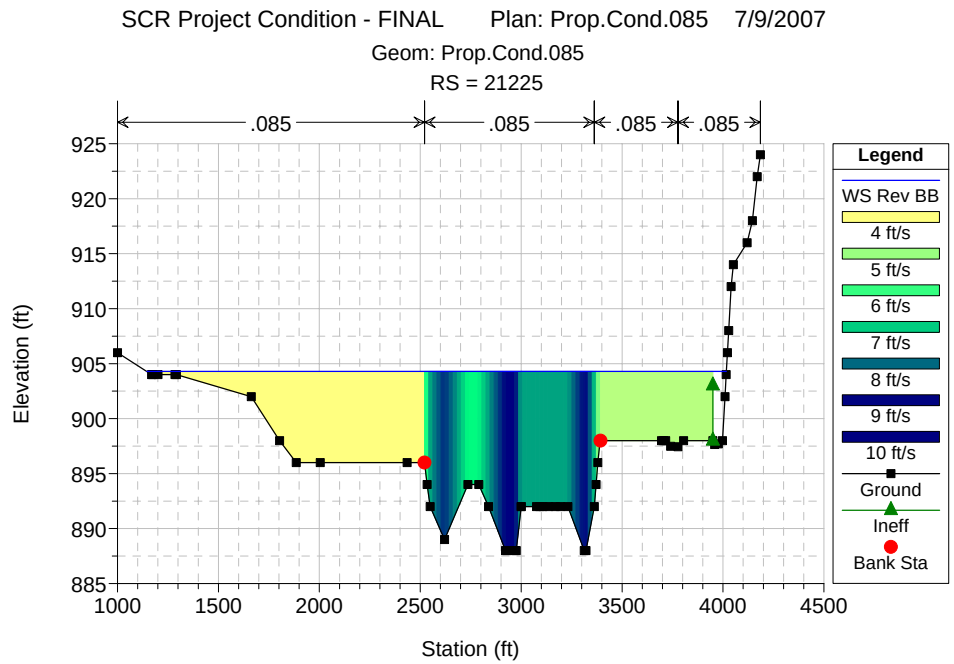
Ground
Ineff
Bank Sta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Elevation (ft)
Station (ft)
Legend
WS Rev BB
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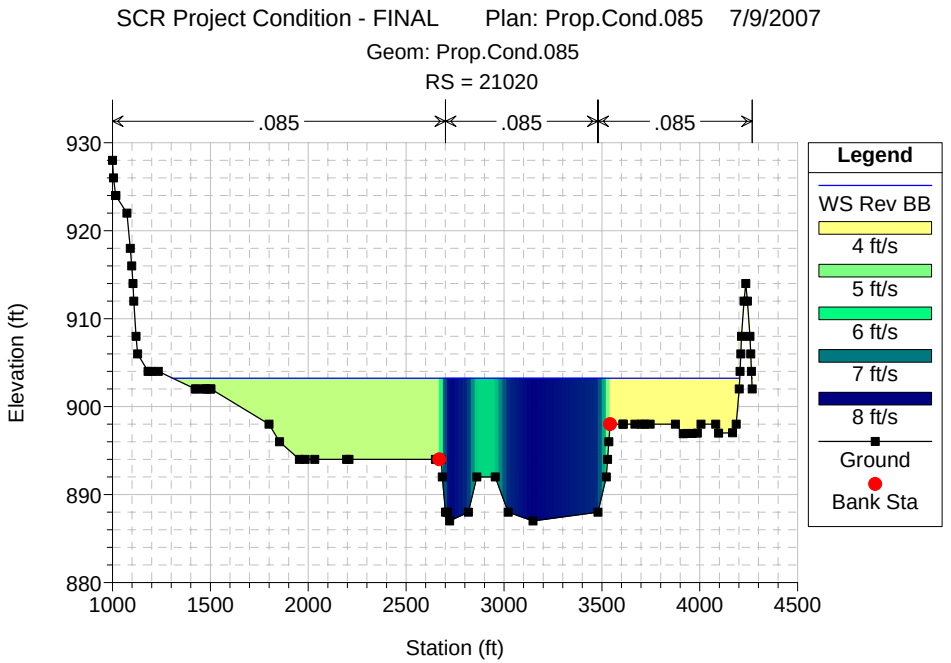
Ground
Ineff
Bank Sta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RS = 21020
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Station (ft)
Legend
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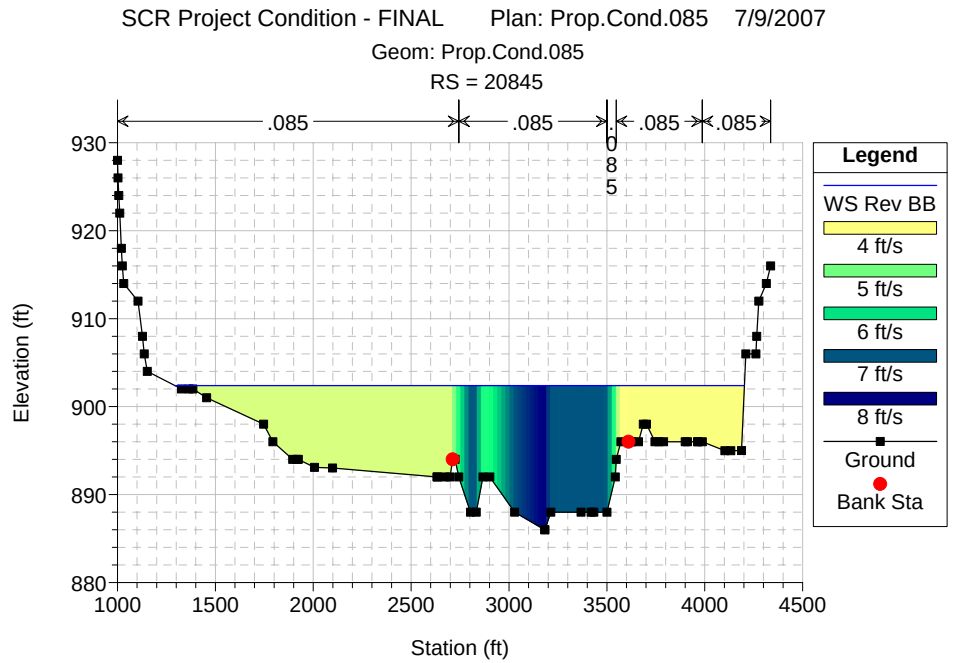
8 ft/s
Ground
Bank Sta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Elevation (ft)
Station (ft)
Legend
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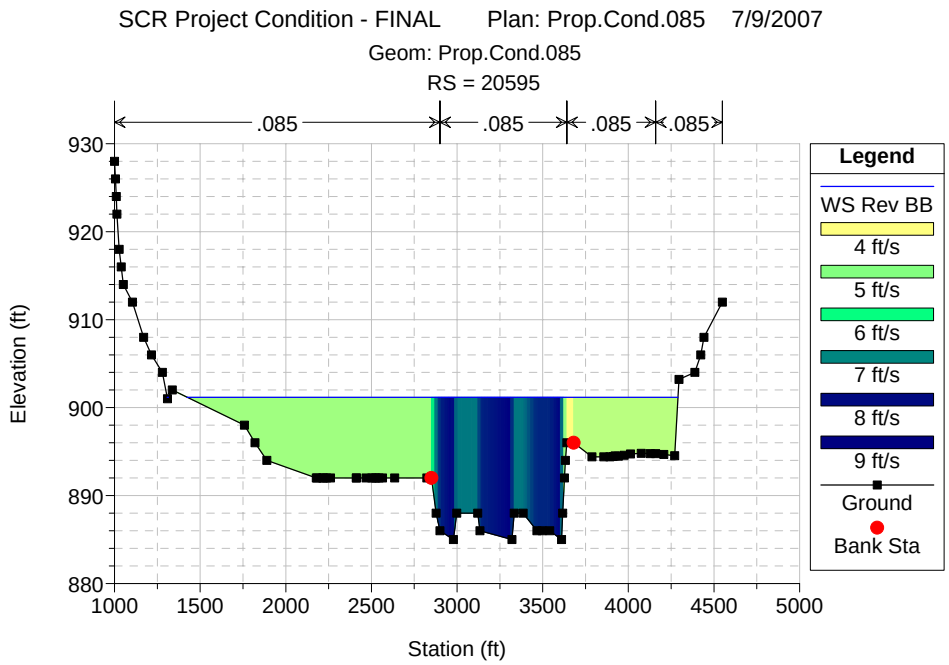
8 ft/s
Ground
Bank Sta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RS = 20595
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Elevation (ft)
Station (ft)
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WS Rev BB
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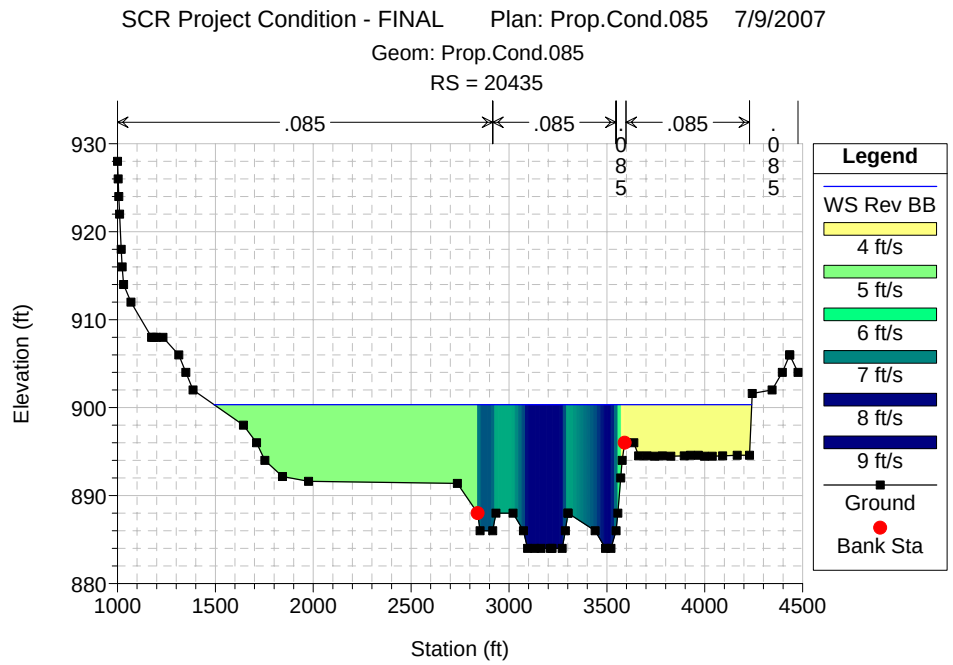
9 ft/s
Ground
Bank Sta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Elevation (ft)
Station (ft)
Legend
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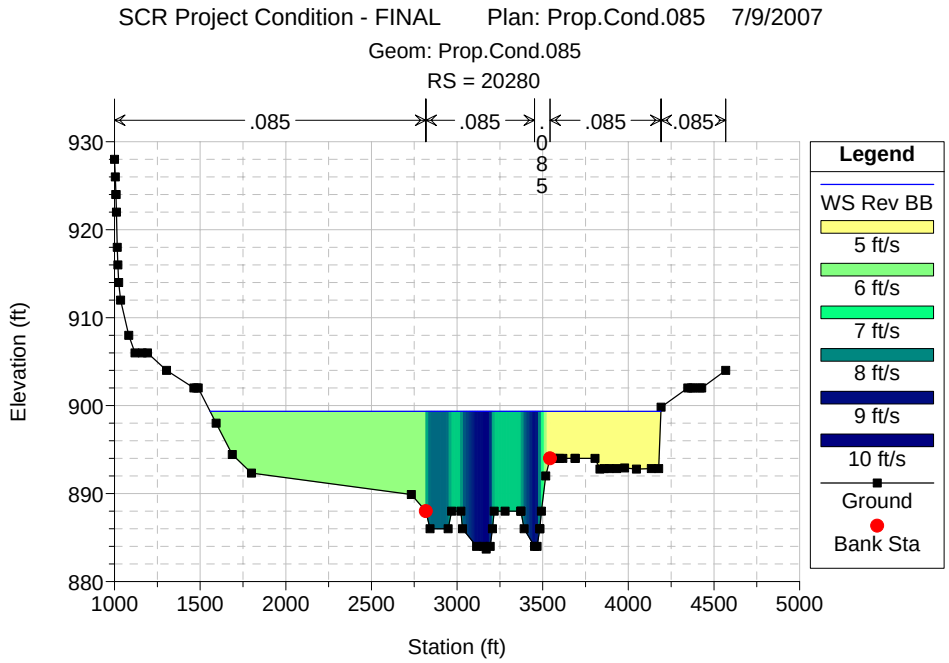
8 ft/s
9 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
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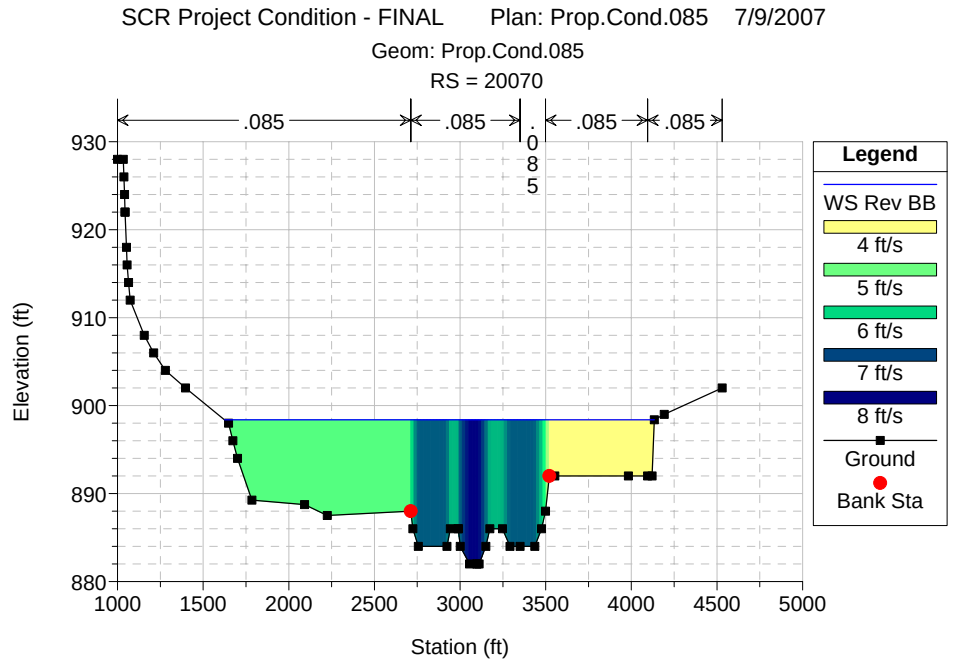
10 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 20070
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
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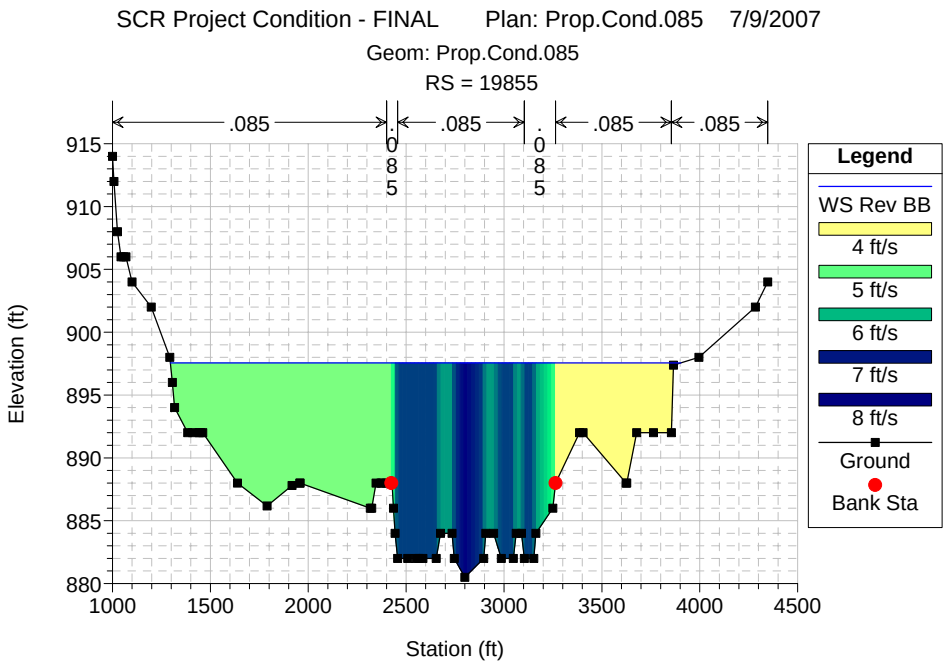
7 ft/s
8 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 19855
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Legend
WS Rev BB
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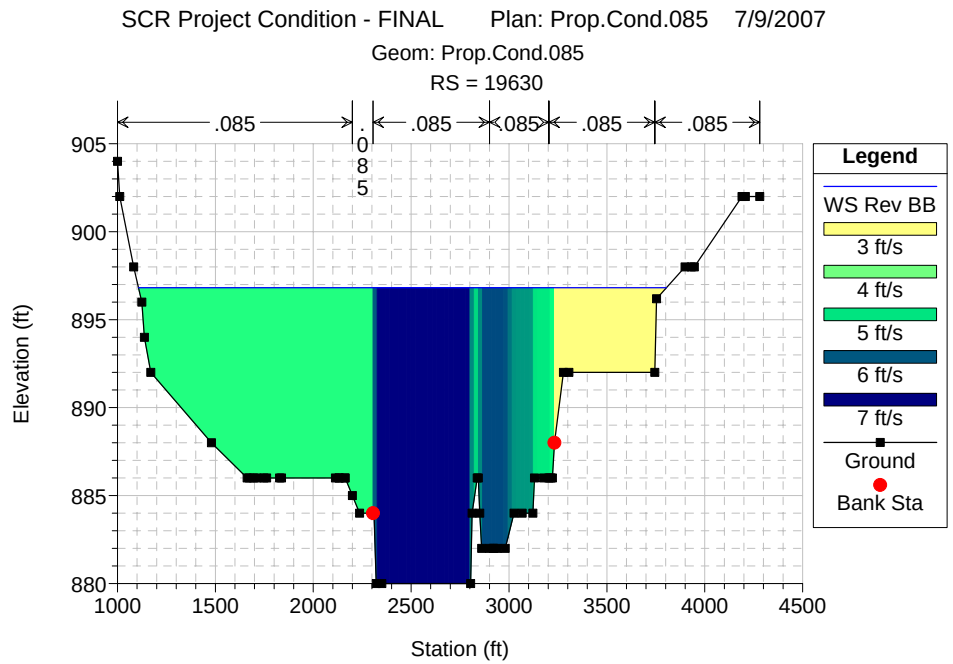
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Prop.Cond.085
RS = 19630
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Legend
WS Rev BB
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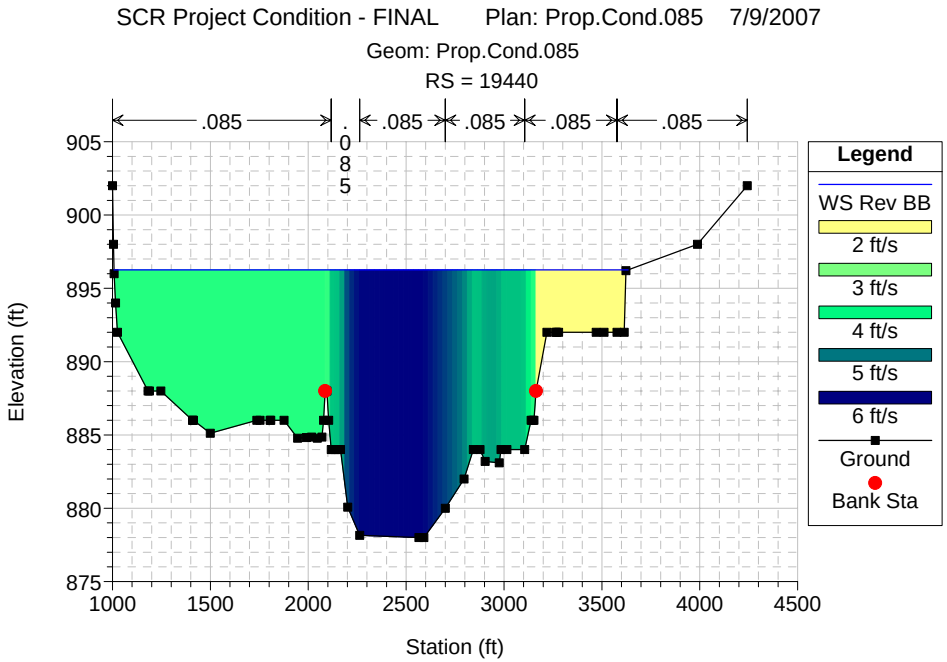
6 ft/s
7 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Prop.Cond.085
RS = 19440
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Legend
WS Rev BB
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3 ft/s
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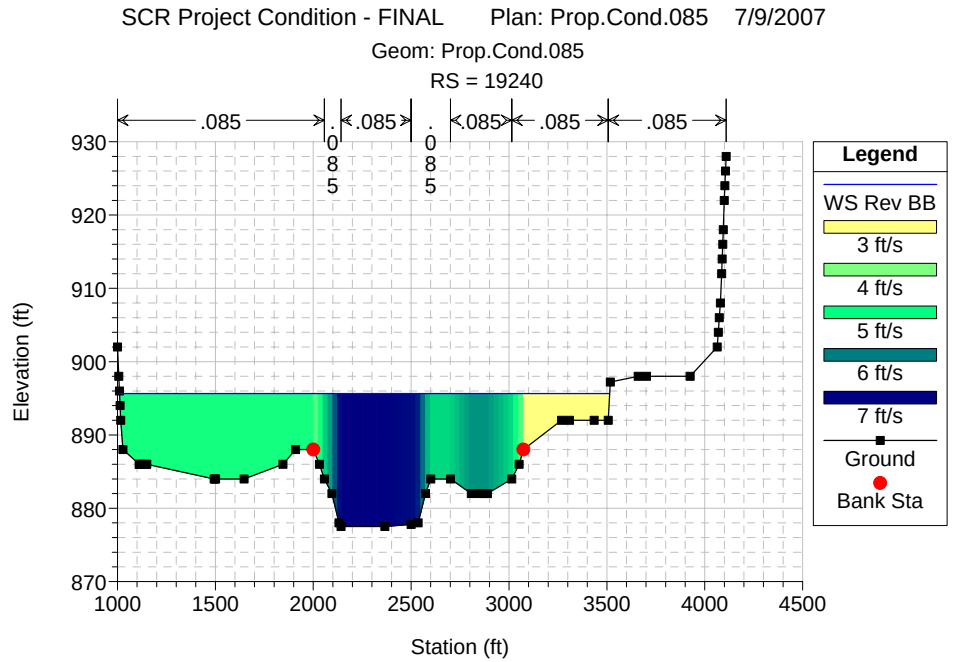
6 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)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RS = 19240
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.085
Legend
WS Rev BB
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4 ft/s
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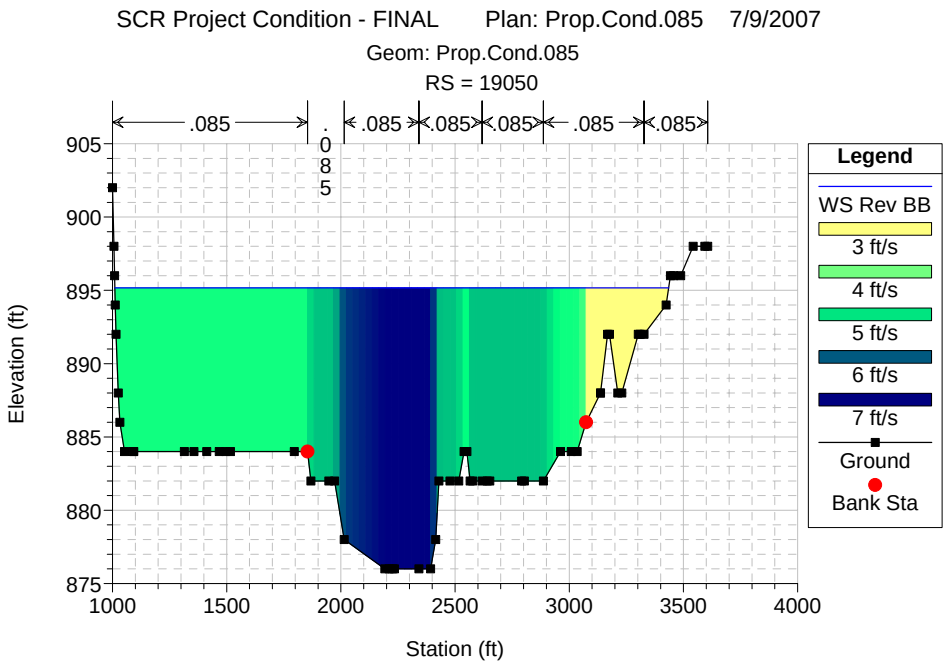
6 ft/s
7 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
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RS = 19050
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.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
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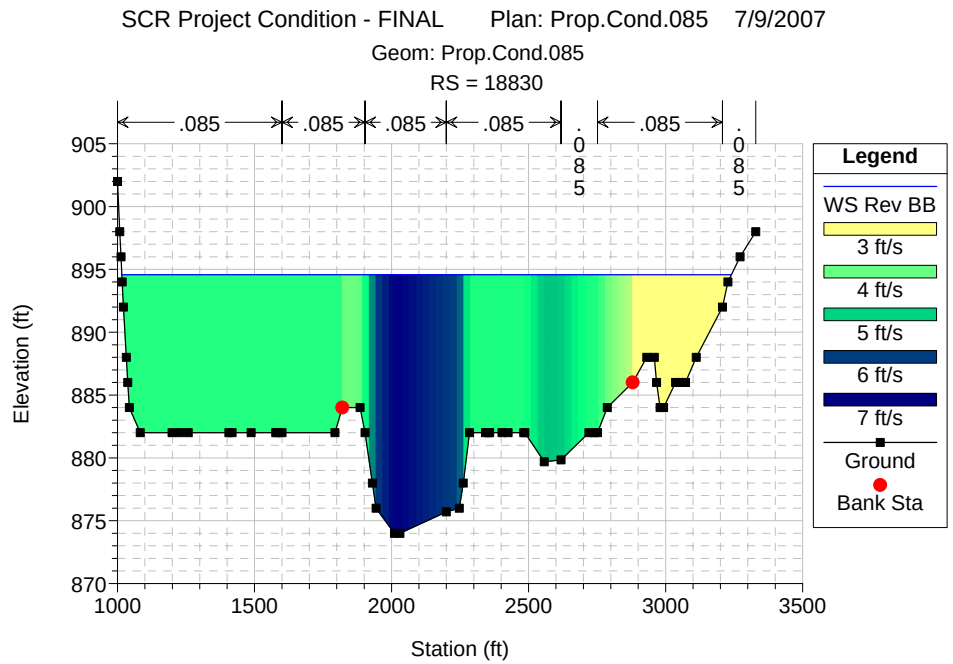
6 ft/s
7 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 18830
.085
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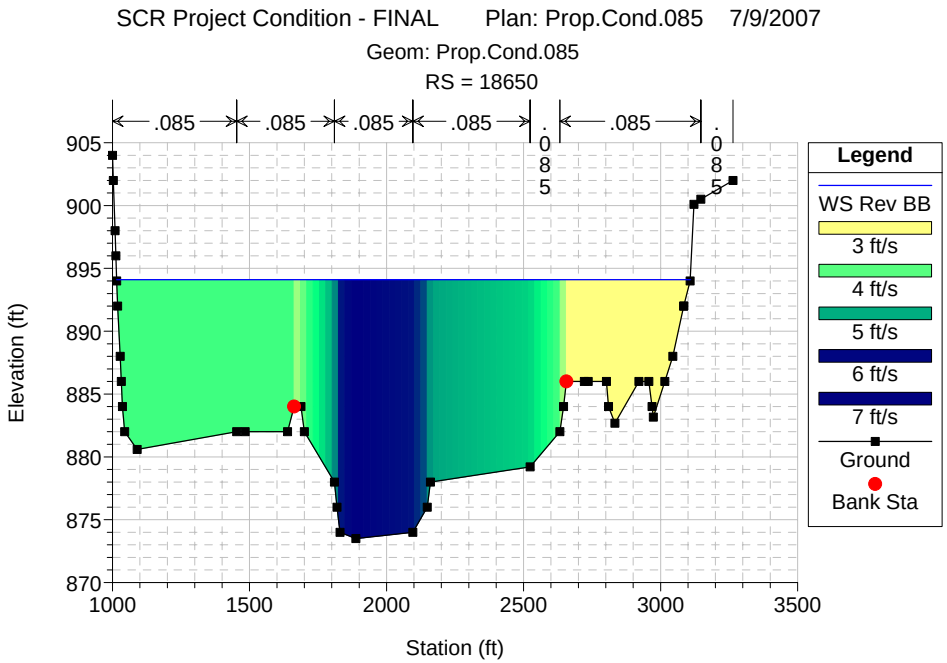
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 18650
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.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
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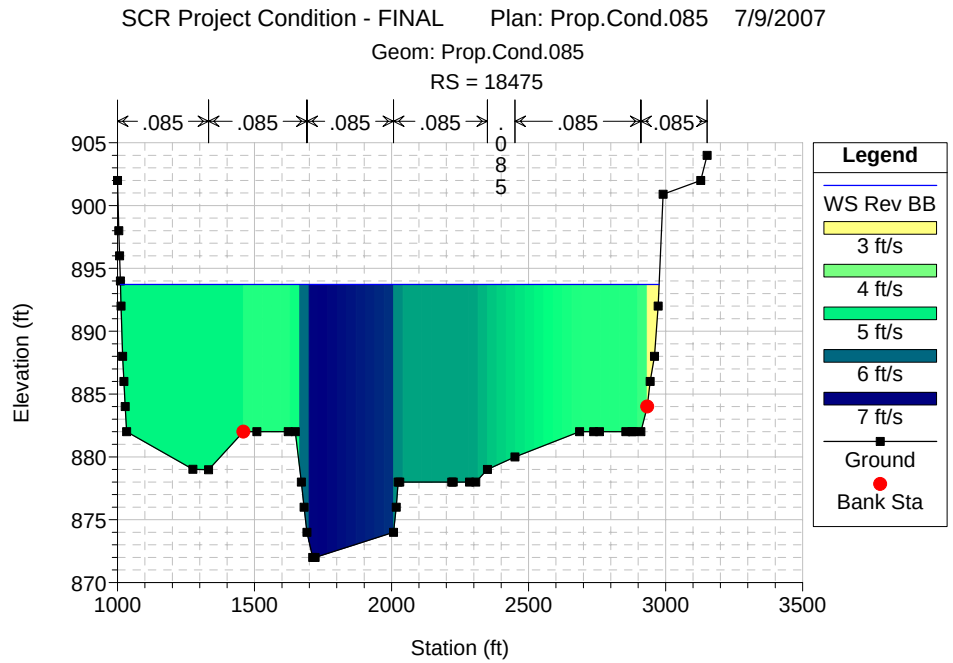
6 ft/s
7 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 18475
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.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
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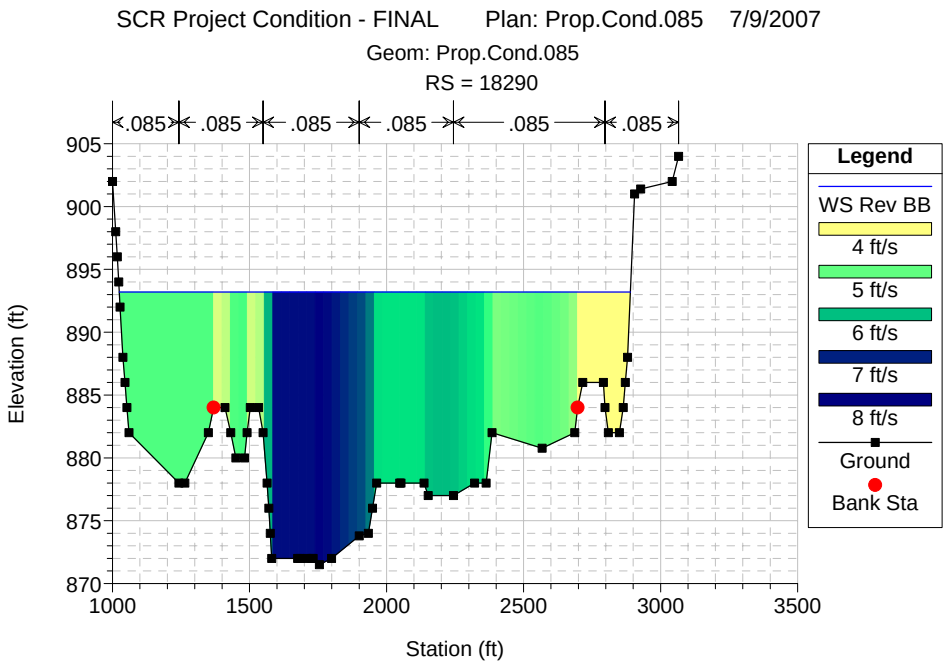
6 ft/s
7 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 18290
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Legend
WS Rev BB
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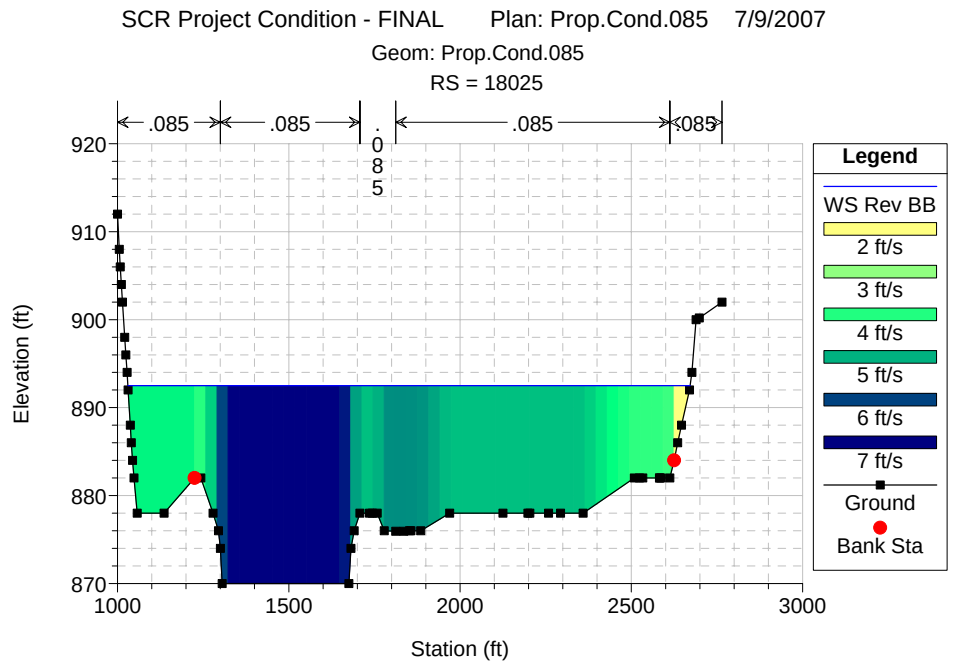
Ground
Bank Sta
Elevation (ft)
Station (ft)


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 18025
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Legend
WS Rev BB
2 ft/s
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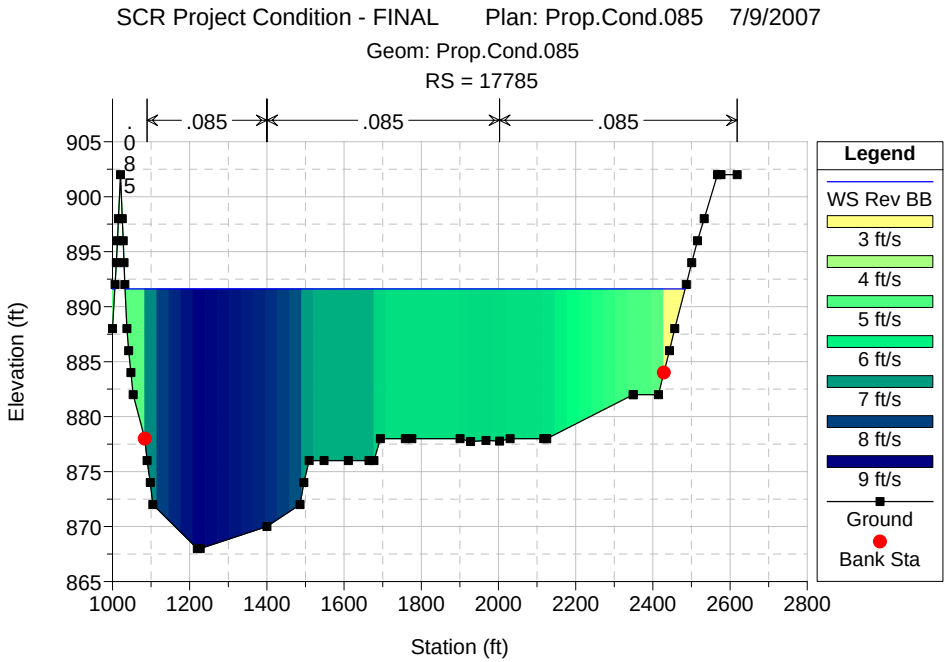
7 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Prop.Cond.085
RS = 17785
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Legend
WS Rev BB
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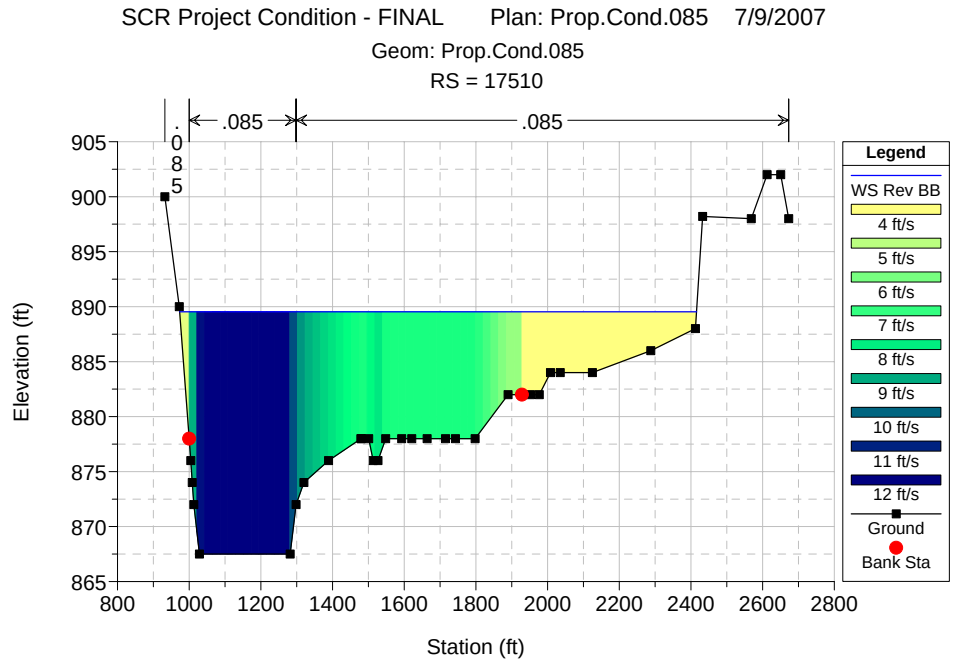
9 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Prop.Cond.085
RS = 17510
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Legend
WS Rev BB
4 ft/s
5 ft/s
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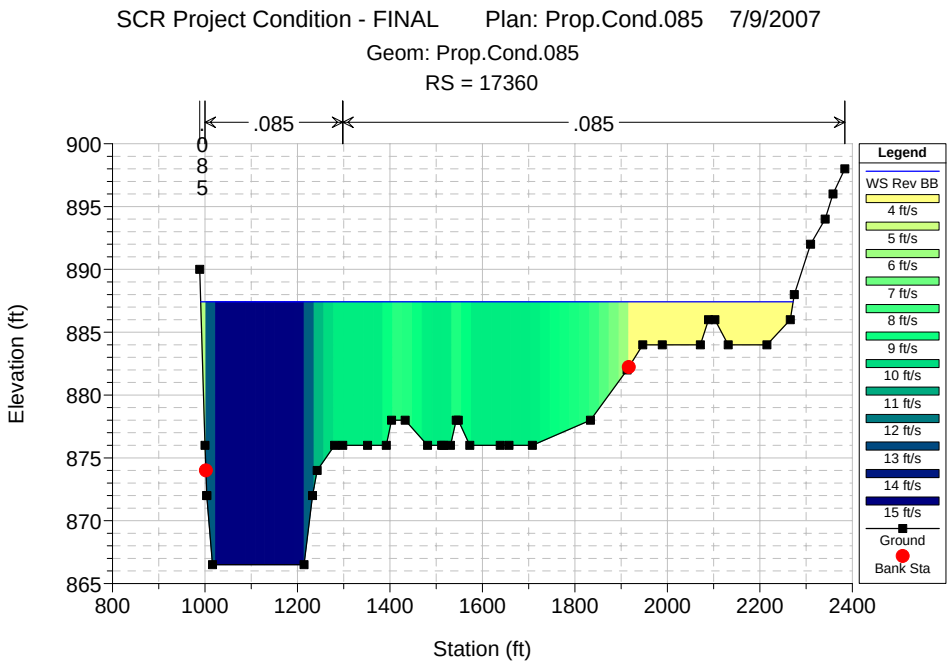
12 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)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Geom: Prop.Cond.085
RS = 17360
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
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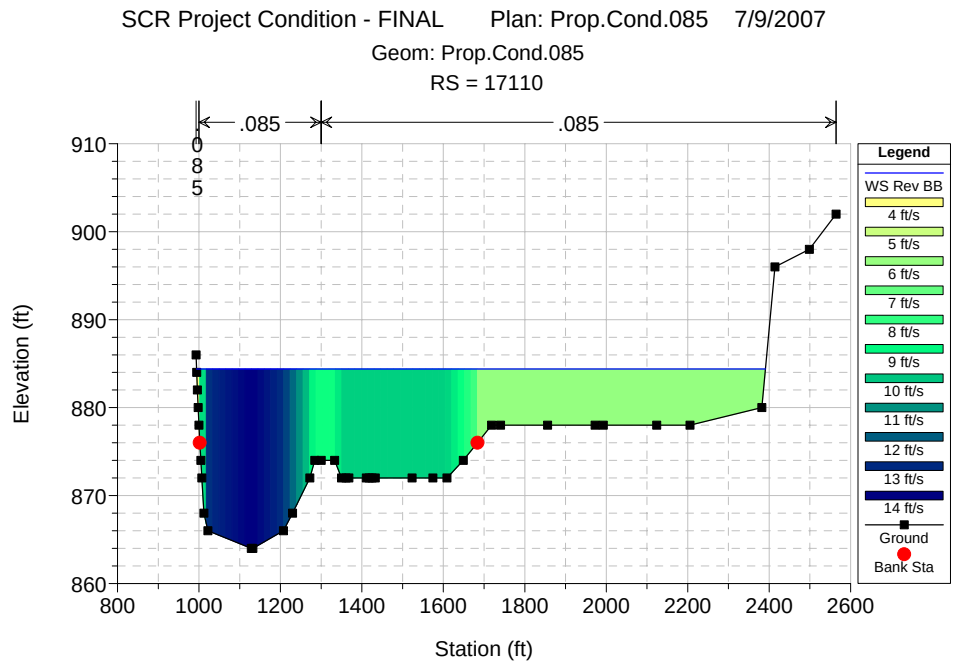
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 17110
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
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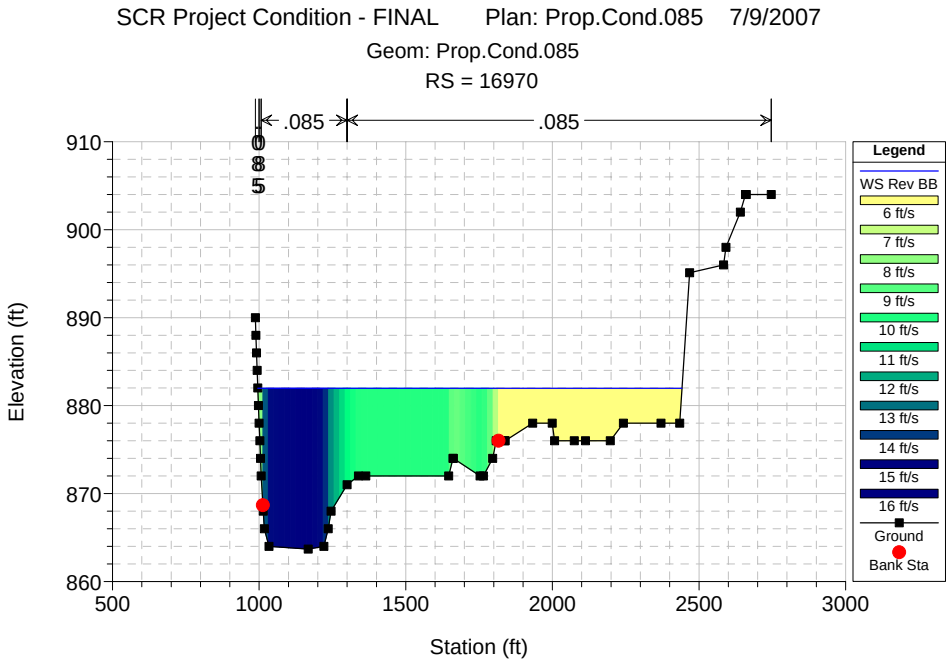
Bank Sta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Geom: Prop.Cond.085
RS = 16970
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.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
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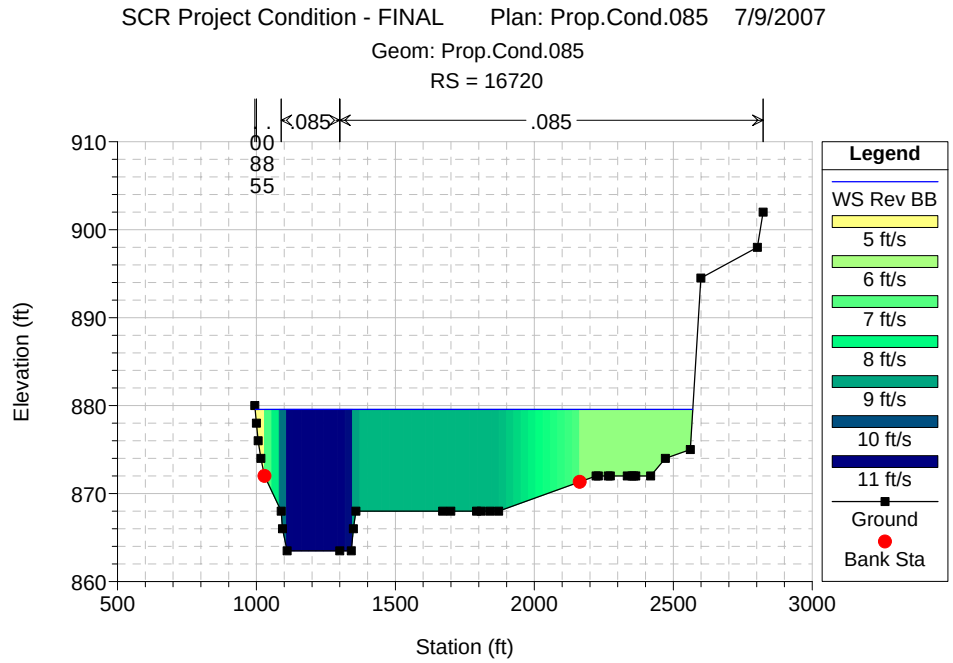
16 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 16720
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Elevation (ft)
Station (ft)
Legend
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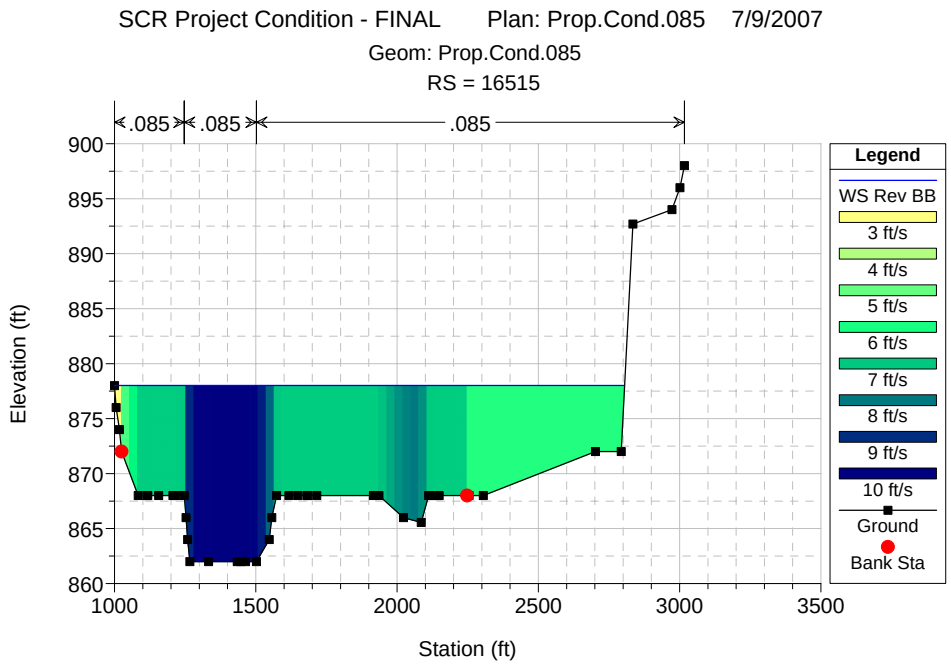
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 16515
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Elevation (ft)
Station (ft)
Legend
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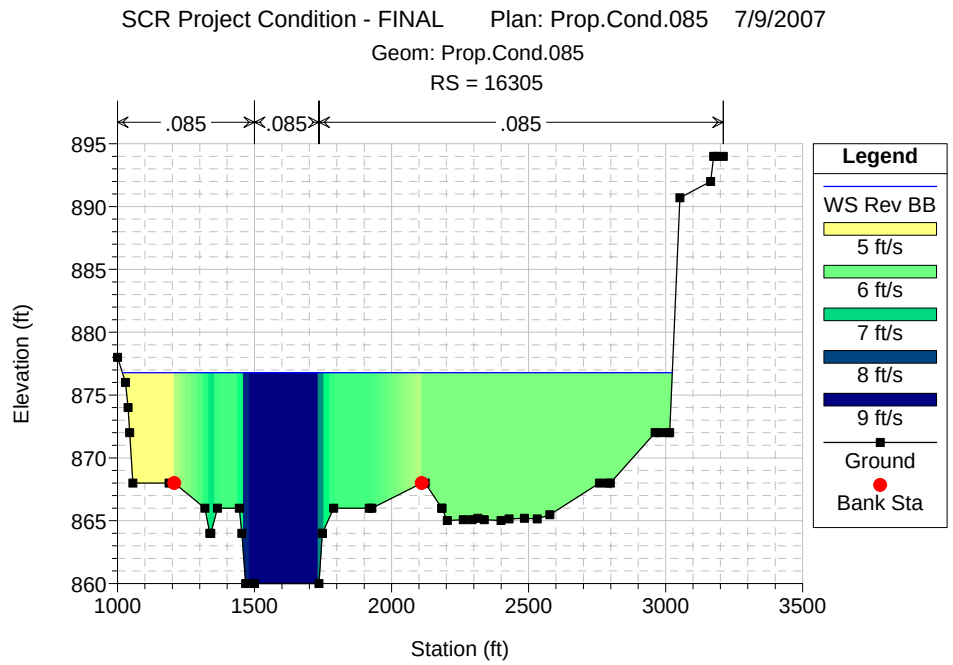
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 16305
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
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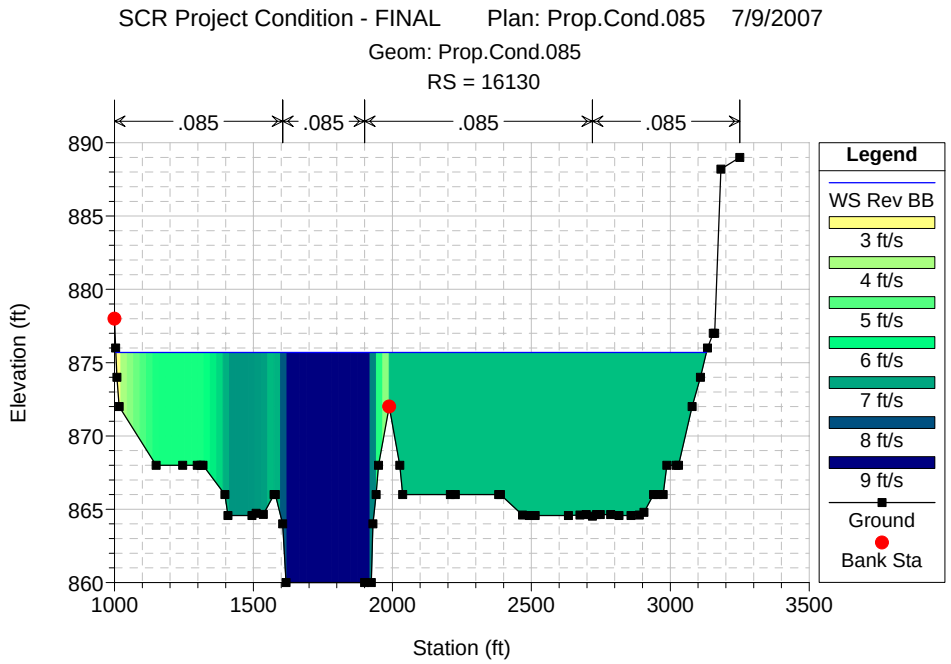
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 16130
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Elevation (ft)
Station (ft)
Legend
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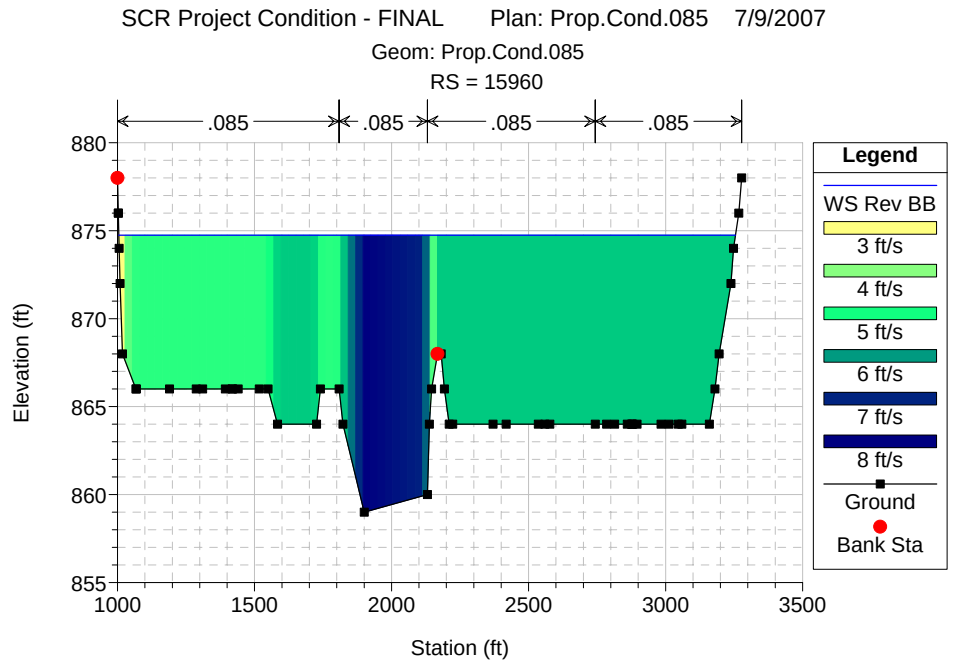
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 15960
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
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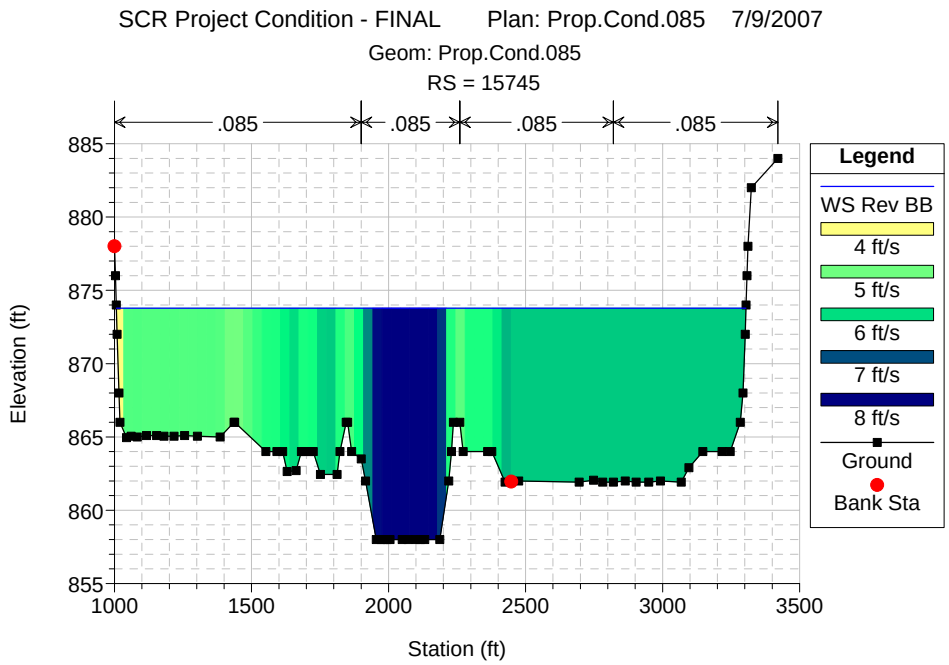
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
RS = 15745
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
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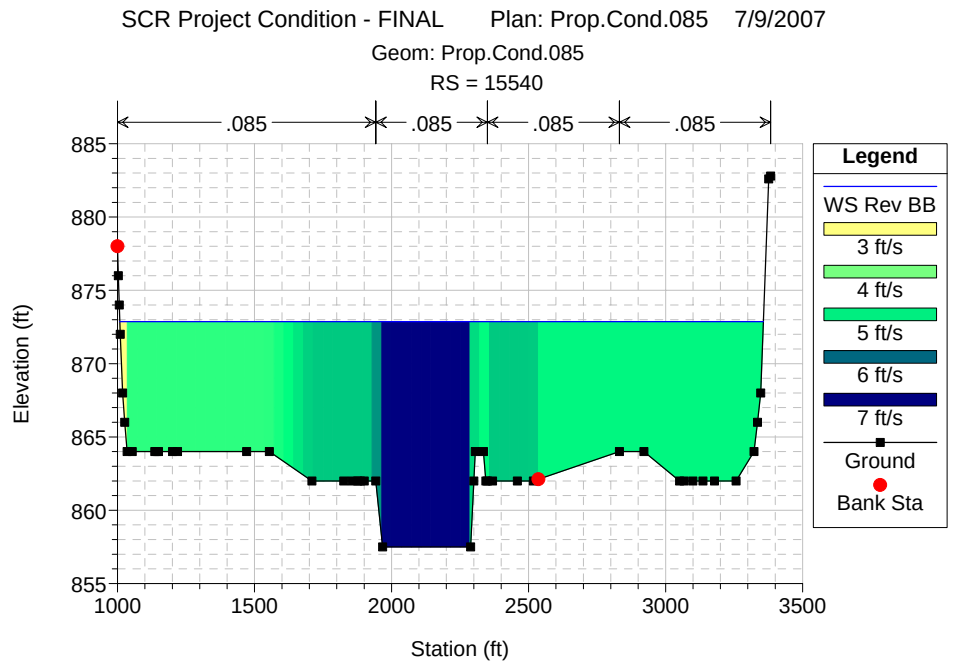
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
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Elevation (ft)
Station (ft)
Legend
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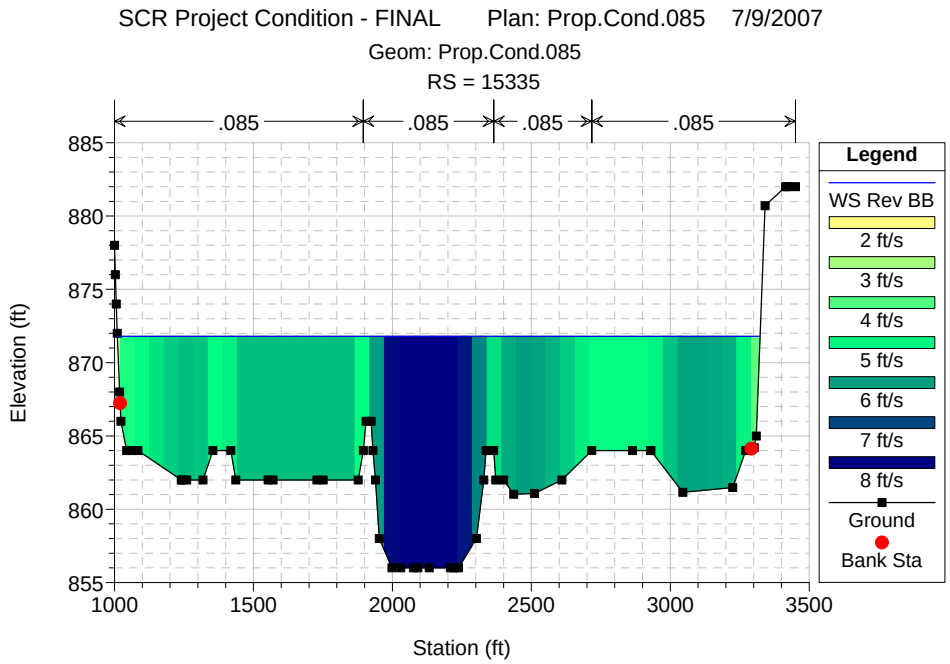
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 15335
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Elevation (ft)
Station (ft)
Legend
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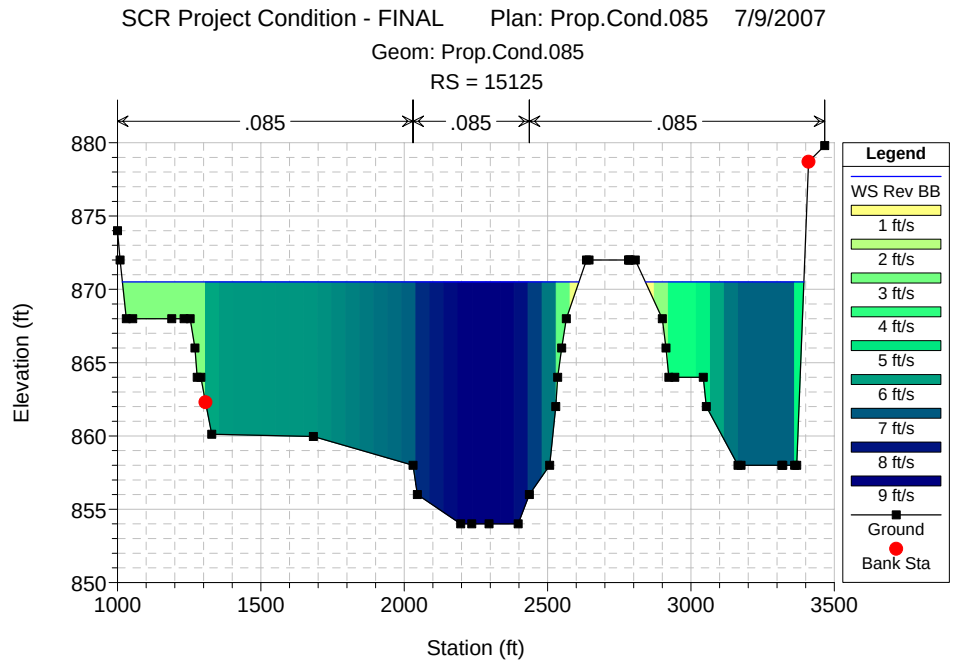
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 15125
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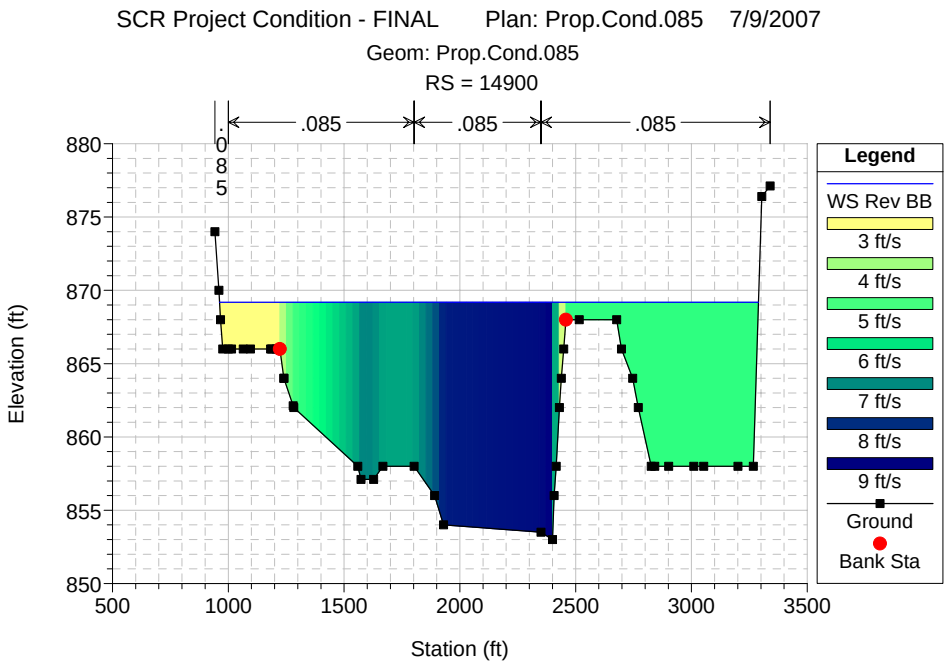
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta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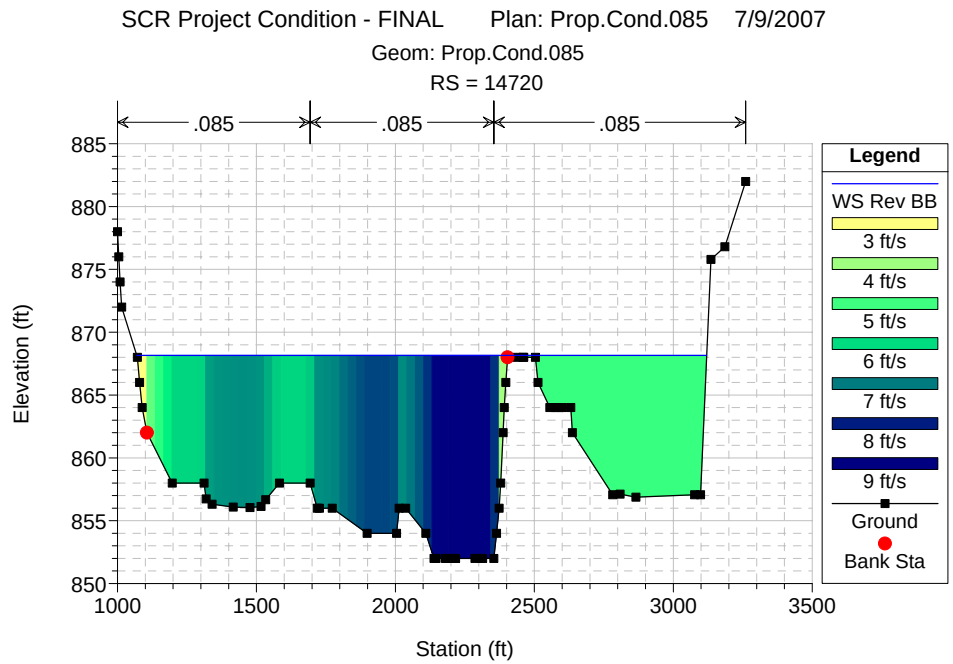
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
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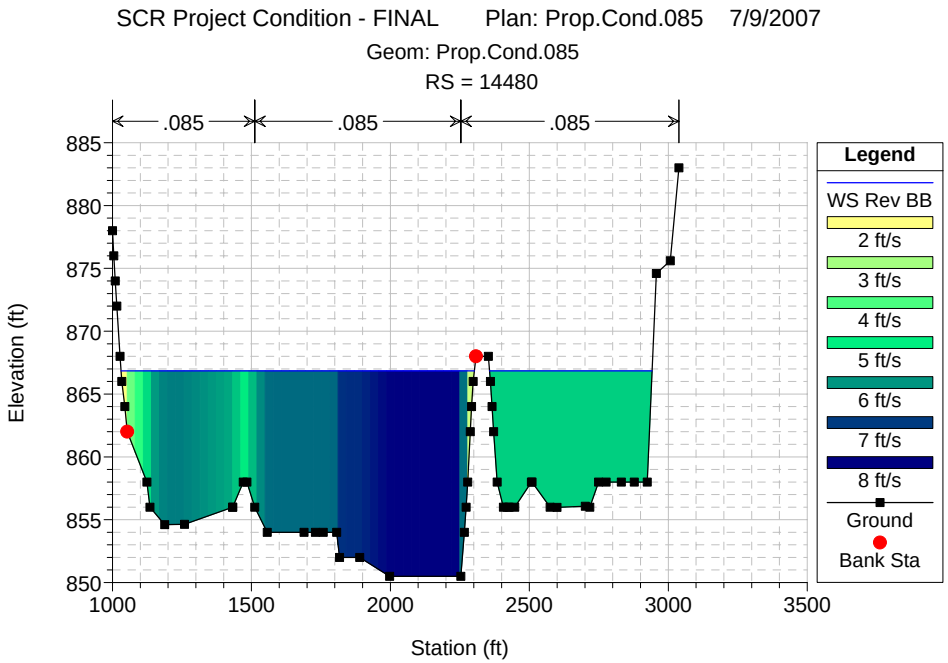
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
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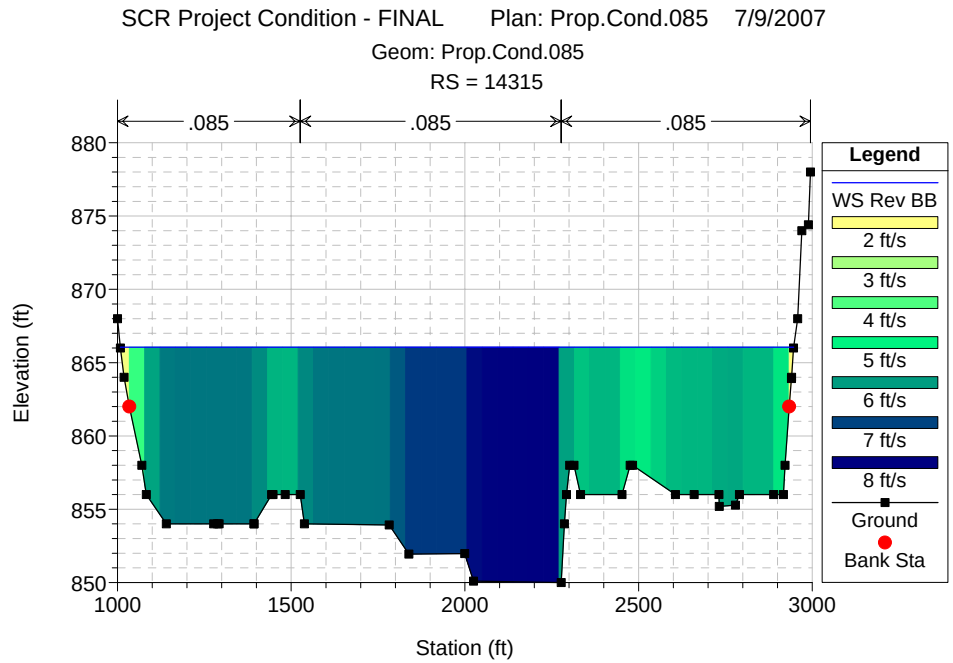
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
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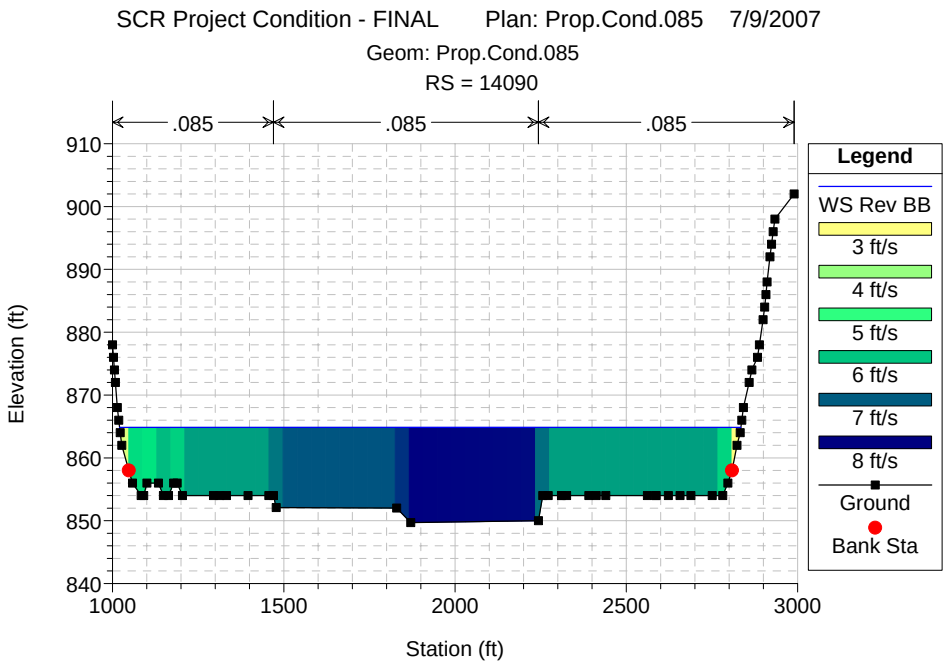
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
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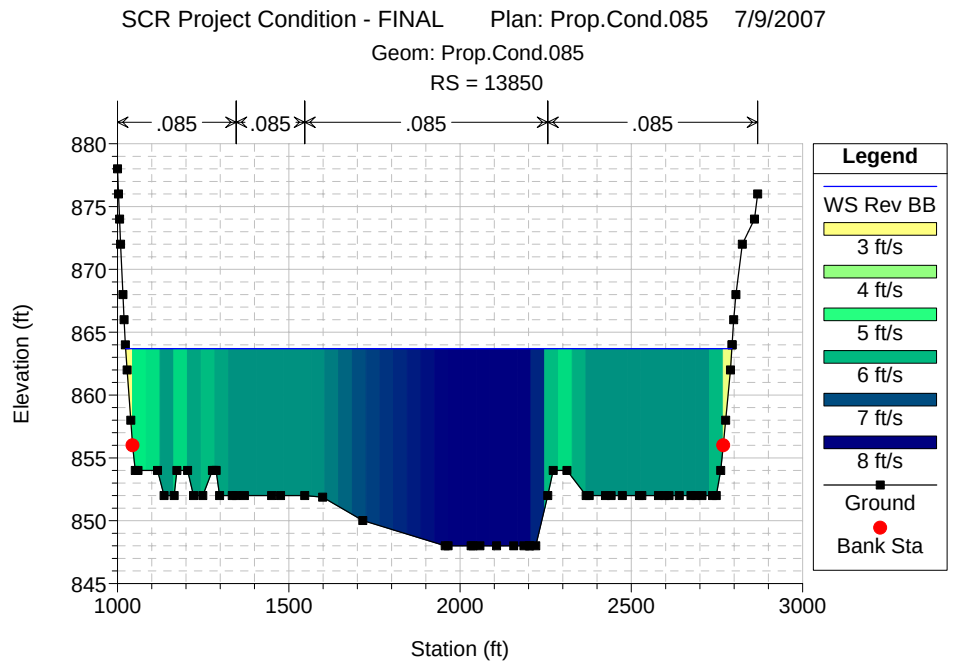
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.085 7/9/2007
Geom: Prop.Cond.085
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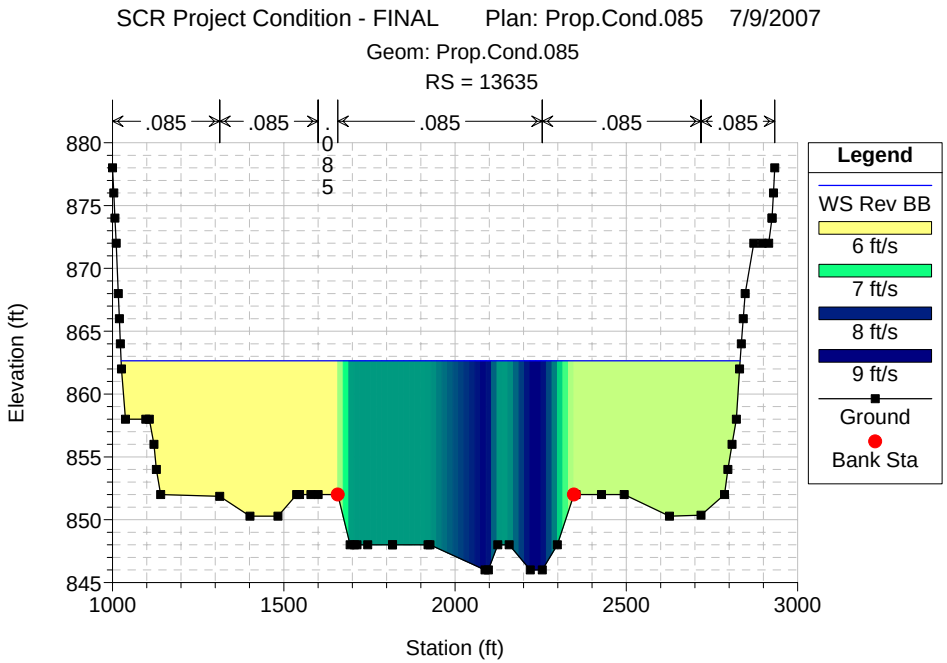
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
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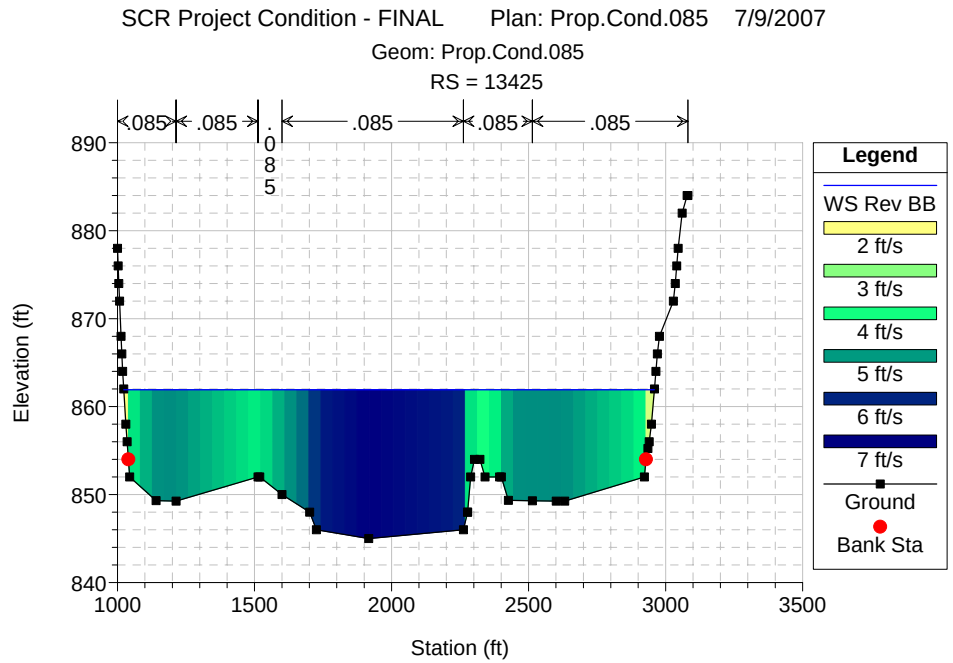
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta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Geom: Prop.Cond.085
RS = 13425
.085
.085
.085
.085
.085
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

Appendix IV: Q_{cap} Proposed Project Condition HEC-RAS Model (n = 0.025); Summary Table, Profile & Cross-Sections

HEC-RAS Plan: Pr.025 River: SCR Reach: Project Profile: Rev BB

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Project	39755	Rev BB	115111.00	994.00	1007.49	1007.49	1010.91	0.003375	15.34	8272.58	1251.57	0.88
Project	39605	Rev BB	115111.00	993.00	1004.42	1005.91	1010.00	0.006739	19.35	6391.52	1100.63	1.21
Project	39310	Rev BB	115111.00	992.00	1004.42	1004.44	1007.98	0.003504	15.99	8184.69	1204.83	0.90
Project	39100	Rev BB	115111.00	990.00	1004.09	1002.13	1006.32	0.001898	12.37	10137.34	1294.75	0.67
Project	38925	Rev BB	115111.00	989.50	1003.99	1001.39	1005.92	0.001609	11.40	10622.57	1181.24	0.62
Project	38710	Rev BB	115111.00	988.00	1003.86	1000.08	1005.55	0.001174	10.64	11255.45	1043.10	0.54
Project	38475	Rev BB	115111.00	986.00	999.95	999.95	1004.77	0.004258	17.75	6650.88	755.44	1.00
Project	38300	Rev BB	115111.00	985.50	995.32	997.52	1003.33	0.010251	22.72	5066.81	688.08	1.48
Project	38065	Rev BB	115111.00	984.00	998.22	995.71	1001.30	0.002055	14.10	8164.49	678.34	0.72
Project	37810	Rev BB	115111.00	983.00	995.23	995.23	1000.37	0.004290	18.18	6331.06	622.24	1.00
Project	37655	Rev BB	115111.00	982.00	992.29	994.10	999.27	0.008546	21.19	5432.65	735.91	1.37
Project	37390	Rev BB	115111.00	981.00	987.96	990.42	996.37	0.013013	23.27	4946.27	776.20	1.62
Project	37135	Rev BB	115111.00	980.00	989.60	989.61	994.02	0.004494	16.87	6821.82	779.23	1.01
Project	36930	Rev BB	115111.00	978.00	985.97	987.60	992.58	0.008395	20.63	5578.89	761.77	1.34
Project	36735	Rev BB	115111.00	977.00	987.09	987.09	991.23	0.004553	16.33	7048.39	855.95	1.00
Project	36515	Rev BB	115111.00	975.00	987.21	985.43	989.76	0.002360	12.82	8978.99	957.44	0.74
Project	36374	Rev BB	115111.00	974.11	987.20	985.06	989.36	0.002074	11.80	9751.82	1066.97	0.69
Project	36299		Bridge									
Project	36240	Rev BB	115111.00	974.11	984.12	985.19	989.12	0.008115	17.94	6416.29	1043.80	1.28
Project	36080	Rev BB	116236.00	973.00	984.69	984.69	988.17	0.004869	14.98	7759.31	1128.02	1.01
Project	35845	Rev BB	116236.00	971.00	981.57	982.91	986.60	0.007645	18.00	6458.64	1306.45	1.43
Project	35725	Rev BB	116236.00	970.00	982.70	982.70	985.86	0.003758	14.34	8254.67	1337.67	0.99
Project	35515	Rev BB	116236.00	969.00	981.08	981.71	984.96	0.004304	16.70	7957.45	1356.69	1.01
Project	35245	Rev BB	116236.00	968.00	979.46	980.48	983.66	0.005111	17.04	7489.72	1334.93	1.10
Project	35040	Rev BB	116236.00	967.00	977.63	978.98	982.49	0.005562	19.65	7377.96	1354.28	1.14
Project	34860	Rev BB	116236.00	966.00	975.94	977.40	981.25	0.008719	18.49	6287.84	1284.82	1.47
Project	34720	Rev BB	116236.00	965.50	974.73	976.17	979.95	0.009149	18.35	6335.91	1411.23	1.53
Project	34495	Rev BB	116236.00	964.00	972.85	974.30	977.92	0.008663	18.07	6434.14	1277.26	1.42
Project	34310	Rev BB	116236.00	963.00	971.59	972.90	976.49	0.006350	18.39	6989.69	1331.97	1.19
Project	34090	Rev BB	116236.00	962.00	970.51	971.50	974.93	0.006621	16.87	6892.08	1305.31	1.29
Project	33880	Rev BB	116236.00	960.00	970.37	970.45	973.56	0.004147	14.32	8115.76	1331.49	1.02
Project	33710	Rev BB	116236.00	959.00	968.46	969.30	972.58	0.006457	16.29	7133.35	1366.53	1.26
Project	33500	Rev BB	116236.00	958.00	967.46	968.41	971.16	0.005963	15.91	7817.59	1472.94	1.10
Project	33310	Rev BB	116236.00	957.00	966.06	967.01	969.98	0.006436	15.89	7314.77	1744.44	1.37
Project	33115	Rev BB	116236.00	956.00	964.73	965.60	968.46	0.008511	15.51	7495.51	1573.90	1.25
Project	32795	Rev BB	116236.00	954.00	964.61	964.61	967.24	0.003576	13.02	8929.57	1724.22	1.01
Project	32605	Rev BB	116236.00	952.00	963.02	963.61	966.36	0.005006	14.68	7917.35	1686.29	1.17
Project	32265	Rev BB	140776.00	950.00	960.46	961.32	964.38	0.006428	15.88	8865.50	1853.33	1.28
Project	31875	Rev BB	140776.00	949.00	959.37	959.37	961.75	0.005331	12.37	11386.18	2422.84	1.00

HEC-RAS Plan: Pr.025 River: SCR Reach: Project Profile: Rev BB (Continued)

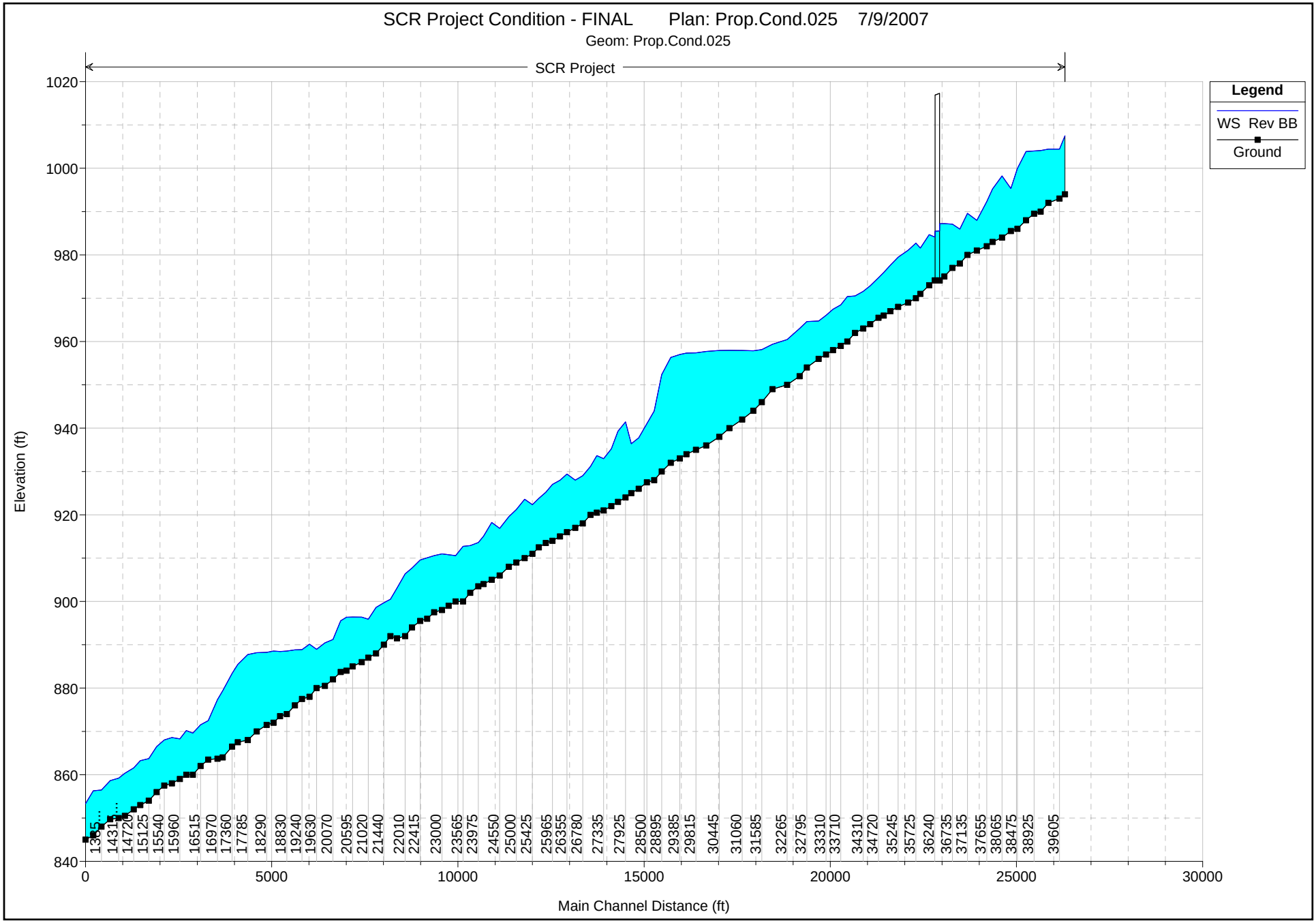
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Project	31585	Rev BB	140776.00	946.00	958.12	956.99	959.81	0.002355	10.43	13499.28	2185.09	0.74
Project	31360	Rev BB	140776.00	944.00	957.86	955.41	959.33	0.001450	9.76	14621.12	1884.49	0.60
Project	31060	Rev BB	140776.00	942.00	957.92	953.29	958.88	0.000718	7.86	17904.86	1711.49	0.43
Project	30720	Rev BB	140776.00	940.00	957.97	951.33	958.61	0.000397	6.39	22014.08	1891.74	0.33
Project	30445	Rev BB	140776.00	938.00	957.93	949.57	958.49	0.000299	6.03	23365.90	1783.72	0.29
Project	30095	Rev BB	140776.00	936.00	957.71	947.93	958.38	0.000278	6.61	21923.87	1730.68	0.28
Project	29815	Rev BB	140776.00	935.00	957.38	948.10	958.27	0.000356	7.68	19649.17	1675.75	0.32
Project	29565	Rev BB	140776.00	934.00	957.34	947.27	958.17	0.000325	7.37	20213.16	1717.96	0.32
Project	29385	Rev BB	140776.00	933.00	956.99	948.98	958.07	0.000447	8.49	18050.31	1675.58	0.37
Project	29140	Rev BB	140776.00	932.00	956.33	950.99	957.89	0.000773	10.05	14559.97	1558.26	0.50
Project	28895	Rev BB	140776.00	930.00	952.36	952.36	957.25	0.002409	19.72	9132.66	1056.57	0.82
Project	28695	Rev BB	140776.00	928.00	943.96	947.96	955.72	0.008765	27.52	5115.54	544.93	1.58
Project	28500	Rev BB	140776.00	927.50	941.05	945.12	953.77	0.010387	28.61	4919.80	503.66	1.61
Project	28280	Rev BB	140776.00	926.00	937.77	941.83	951.33	0.011162	29.67	4853.38	549.29	1.63
Project	28080	Rev BB	140776.00	925.00	936.42	940.05	948.68	0.011256	28.14	5027.86	547.57	1.61
Project	27925	Rev BB	140776.00	924.00	941.45	939.47	946.43	0.002376	17.95	7989.60	612.66	0.80
Project	27725	Rev BB	140776.00	923.00	939.31	939.31	945.73	0.003230	20.54	7126.85	587.11	0.93
Project	27545	Rev BB	140776.00	922.00	935.22	937.81	944.62	0.006843	24.72	5836.45	613.02	1.30
Project	27335	Rev BB	140776.00	921.00	932.95	936.24	942.99	0.008302	25.48	5614.37	691.02	1.43
Project	27155	Rev BB	140776.00	920.50	933.67	935.86	940.99	0.005312	22.28	6835.52	856.57	1.15
Project	26990	Rev BB	140776.00	920.00	931.16	933.81	939.67	0.010073	23.47	6088.61	1008.20	1.60
Project	26780	Rev BB	140776.00	918.00	929.02	931.71	937.61	0.009552	23.95	6331.61	1131.52	1.49
Project	26575	Rev BB	140776.00	917.00	928.01	929.99	934.86	0.012755	21.02	6700.13	1216.41	1.57
Project	26355	Rev BB	140776.00	916.00	929.41	929.41	933.07	0.003472	15.85	9549.60	1282.25	0.93
Project	26170	Rev BB	140776.00	915.00	927.98	928.71	932.31	0.003973	17.93	9224.18	1348.01	0.97
Project	25965	Rev BB	140776.00	914.00	927.01	927.71	931.48	0.004040	17.89	8977.31	1288.45	0.98
Project	25785	Rev BB	140776.00	913.50	925.21	926.51	930.52	0.005492	19.53	8268.26	1336.97	1.12
Project	25600	Rev BB	140776.00	912.50	923.79	925.46	929.42	0.006074	20.55	8276.35	1596.56	1.22
Project	25425	Rev BB	140776.00	911.00	922.33	924.32	928.17	0.007950	20.02	7793.11	1773.88	1.45
Project	25215	Rev BB	140776.00	910.00	923.59	923.59	926.64	0.003427	14.56	10627.78	1747.25	0.91
Project	25000	Rev BB	140776.00	909.00	921.22	922.50	925.58	0.005495	17.41	9141.39	2096.94	1.17
Project	24795	Rev BB	140776.00	908.00	919.57	920.96	924.30	0.006595	18.71	9085.52	2218.33	1.28
Project	24550	Rev BB	140776.00	906.00	916.88	918.53	922.41	0.008875	21.18	8315.29	2098.95	1.58
Project	24335	Rev BB	140776.00	905.00	918.22	918.22	920.85	0.003242	14.59	11686.20	1993.83	0.88
Project	24115	Rev BB	140776.00	904.00	915.06	916.30	919.61	0.008205	19.11	8862.93	1961.37	1.30
Project	23975	Rev BB	140776.00	903.50	913.60	914.88	918.23	0.008529	19.34	8647.14	1913.02	1.39
Project	23755	Rev BB	140776.00	902.00	912.90	913.54	916.36	0.005695	16.79	9875.16	1935.25	1.16
Project	23565	Rev BB	140776.00	900.00	912.70	912.70	915.32	0.003894	14.50	11300.55	2039.39	0.98
Project	23365	Rev BB	140776.00	900.00	910.57	911.37	914.27	0.006142	17.50	9643.29	1983.95	1.19

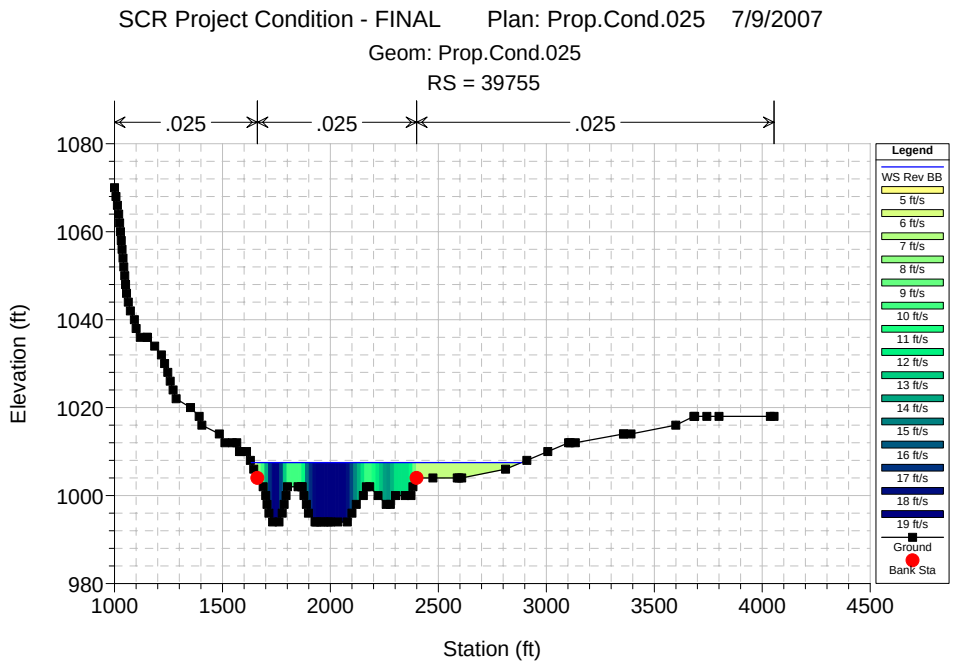
HEC-RAS Plan: Pr.025 River: SCR Reach: Project Profile: Rev BB (Continued)

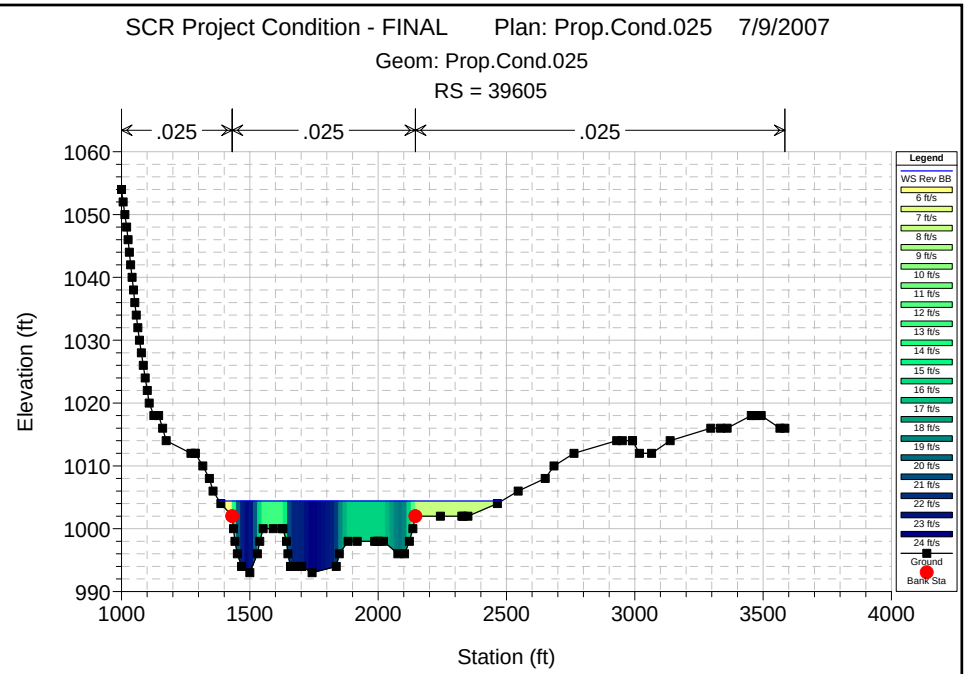
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Project	23180	Rev BB	140776.00	899.00	910.77	909.92	912.74	0.002179	13.47	13420.89	2051.02	0.72
Project	23000	Rev BB	140776.00	898.00	910.99	908.39	912.22	0.001312	8.91	15878.22	2054.16	0.56
Project	22790	Rev BB	140776.00	897.50	910.57	908.15	911.92	0.001363	9.35	15109.43	1949.00	0.58
Project	22600	Rev BB	140776.00	896.00	910.06	907.78	911.63	0.001473	11.36	14637.33	1865.20	0.62
Project	22415	Rev BB	140776.00	895.50	909.56	907.11	911.33	0.001596	11.77	13743.40	1705.57	0.65
Project	22195	Rev BB	141426.00	894.00	907.70	906.79	910.76	0.002704	14.10	10265.40	1322.23	0.83
Project	22010	Rev BB	141426.00	892.00	906.38	906.38	910.15	0.003030	15.99	9665.26	1328.02	0.87
Project	21790	Rev BB	141426.00	891.50	903.07	904.87	909.03	0.005884	19.68	7429.50	1145.71	1.16
Project	21615	Rev BB	141426.00	892.00	900.50	903.04	907.59	0.010112	21.40	6678.16	1161.25	1.52
Project	21440	Rev BB	141426.00	890.00	899.69	901.59	905.74	0.007634	20.12	7633.81	1574.63	1.29
Project	21225	Rev BB	141426.00	888.00	898.62	900.27	903.89	0.007531	19.45	8509.78	2217.71	1.27
Project	21020	Rev BB	141426.00	887.00	895.89	897.85	902.14	0.008670	20.80	7679.38	1676.42	1.37
Project	20845	Rev BB	141426.00	886.00	896.38	897.38	900.20	0.005503	17.06	9859.46	2334.87	1.13
Project	20595	Rev BB	141426.00	885.00	896.39	896.38	898.86	0.002688	13.93	12669.04	2467.71	0.81
Project	20435	Rev BB	141426.00	884.00	896.35	895.77	898.32	0.002074	12.70	14046.56	2533.41	0.70
Project	20280	Rev BB	141426.00	883.70	895.55	895.55	897.90	0.002979	14.05	12868.36	2524.30	0.83
Project	20070	Rev BB	141426.00	882.00	891.20	892.99	896.60	0.009090	20.27	8181.71	1767.11	1.38
Project	19855	Rev BB	141426.00	880.50	890.42	891.56	894.68	0.005975	17.86	9375.65	1973.80	1.14
Project	19630	Rev BB	141426.00	880.00	888.94	890.05	893.31	0.006258	17.88	9064.03	1835.73	1.18
Project	19440	Rev BB	141426.00	878.00	890.14	889.11	892.07	0.001971	11.94	13616.44	2095.41	0.70
Project	19240	Rev BB	141426.00	877.50	888.88	888.88	891.51	0.003105	13.93	11703.45	2091.41	0.88
Project	19050	Rev BB	141426.00	876.00	888.83	887.49	890.48	0.001823	11.00	14329.30	2159.93	0.67
Project	18830	Rev BB	141426.00	874.00	888.53	886.81	890.08	0.001598	10.72	14721.75	2093.61	0.64
Project	18650	Rev BB	141426.00	873.50	888.46	885.64	889.78	0.001099	9.93	16197.24	2022.38	0.53
Project	18475	Rev BB	141426.00	872.00	888.54	884.74	889.50	0.000781	8.09	18139.62	1943.25	0.45
Project	18290	Rev BB	141426.00	871.50	888.24	884.50	889.34	0.000840	8.72	17128.71	1842.60	0.48
Project	18025	Rev BB	141426.00	870.00	888.17	882.91	889.10	0.000578	7.85	18435.02	1610.68	0.40
Project	17785	Rev BB	141426.00	868.00	887.74	882.81	888.92	0.000796	8.73	16333.15	1417.15	0.45
Project	17510	Rev BB	141426.00	867.50	885.45	883.58	888.42	0.001934	13.92	10567.38	1260.29	0.75
Project	17360	Rev BB	141426.00	866.50	883.38	883.38	887.88	0.003639	17.04	8326.11	942.17	1.00
Project	17110	Rev BB	141426.00	864.00	879.38	881.61	886.44	0.006267	21.67	7150.73	1328.50	1.26
Project	16970	Rev BB	141426.00	863.70	877.34	880.02	885.33	0.008147	22.88	6461.31	1126.40	1.47
Project	16720	Rev BB	141426.00	863.50	872.47	875.46	882.23	0.018403	25.14	5738.60	1404.71	1.99
Project	16515	Rev BB	141426.00	862.00	871.52	873.65	878.33	0.012313	21.44	7012.94	1622.83	1.67
Project	16305	Rev BB	141426.00	860.00	869.61	871.41	875.64	0.011133	21.47	7605.24	1812.84	1.64
Project	16130	Rev BB	141426.00	860.00	870.19	870.71	873.47	0.005288	16.06	10041.21	1945.19	1.17
Project	15960	Rev BB	141426.00	859.00	868.27	869.21	872.12	0.010630	15.80	8985.98	2180.88	1.37
Project	15745	Rev BB	141426.00	858.00	868.57	867.78	870.42	0.002993	10.93	12976.33	2278.99	0.82
Project	15540	Rev BB	141426.00	857.50	868.02	867.17	869.78	0.002749	11.12	13435.58	2328.69	0.79

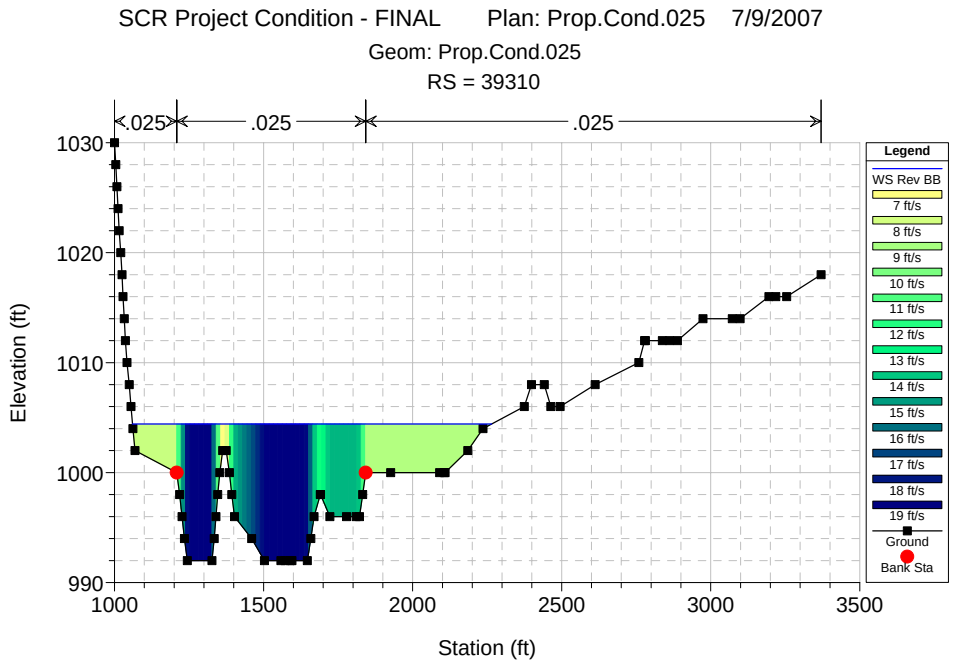
HEC-RAS Plan: Pr.025 River: SCR Reach: Project Profile: Rev BB (Continued)

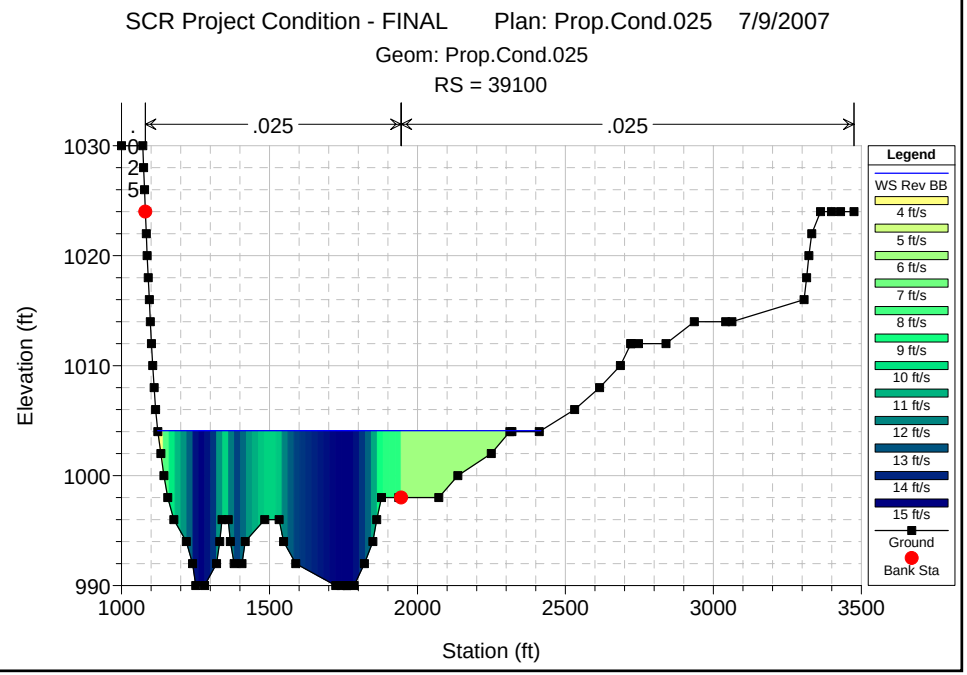
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Project	15335	Rev BB	141426.00	856.00	866.50	866.50	868.98	0.004715	12.66	11192.19	2290.58	1.01
Project	15125	Rev BB	142475.00	854.00	863.71	864.52	867.70	0.006263	16.04	8890.70	1576.43	1.19
Project	14900	Rev BB	142475.00	853.00	863.24	863.29	866.31	0.004322	14.68	10311.20	1700.78	1.01
Project	14720	Rev BB	142475.00	852.00	861.59	862.23	865.30	0.006723	16.00	9348.29	1729.06	1.16
Project	14480	Rev BB	142475.00	850.50	860.35	860.80	863.79	0.005371	15.48	9891.47	1753.73	1.05
Project	14315	Rev BB	142475.00	850.00	859.21	859.83	862.80	0.006608	15.20	9370.31	1866.40	1.20
Project	14090	Rev BB	142475.00	849.71	858.64	858.64	861.61	0.004702	13.81	10317.81	1766.56	1.01
Project	13850	Rev BB	142475.00	848.00	856.46	857.10	860.22	0.006677	15.56	9158.34	1727.36	1.19
Project	13635	Rev BB	142475.00	846.00	856.30	856.30	859.30	0.003835	15.47	10750.36	1691.63	0.93
Project	13425	Rev BB	142475.00	845.00	853.32	854.56	857.95	0.009216	17.27	8249.80	1854.41	1.44

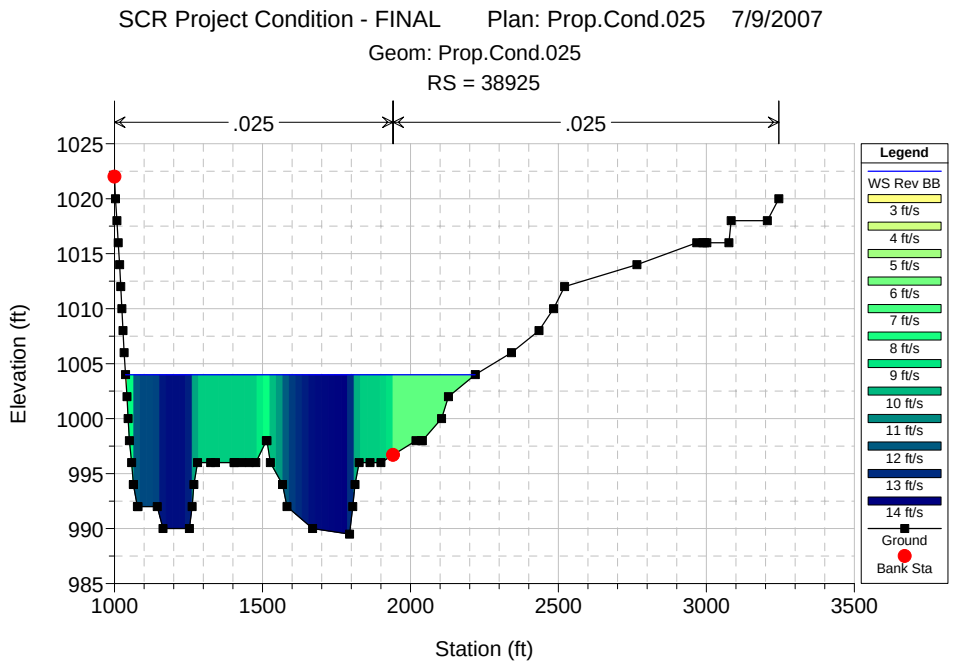

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
SCR Project
Legend
WS Rev BB
Ground
Elevation (ft)
Main Channel Distance (ft)
1020
1000
980
960
940
920
900
880
860
840
0
5000
10000
15000
20000
25000
30000
13805...
14310...
14720
15125
15540
15960
16515
16970
17360
17785
18290
18830
19240
19630
20070
20595
21020
21440
22010
22415
23000
23565
23975
24550
25000
25425
25965
26355
26780
27335
27925
28500
28895
29385
29815
30445
31060
31585
32265
32795
33310
33710
34310
34720
35245
35725
36240
36735
37135
37655
38065
38475
38925
39605

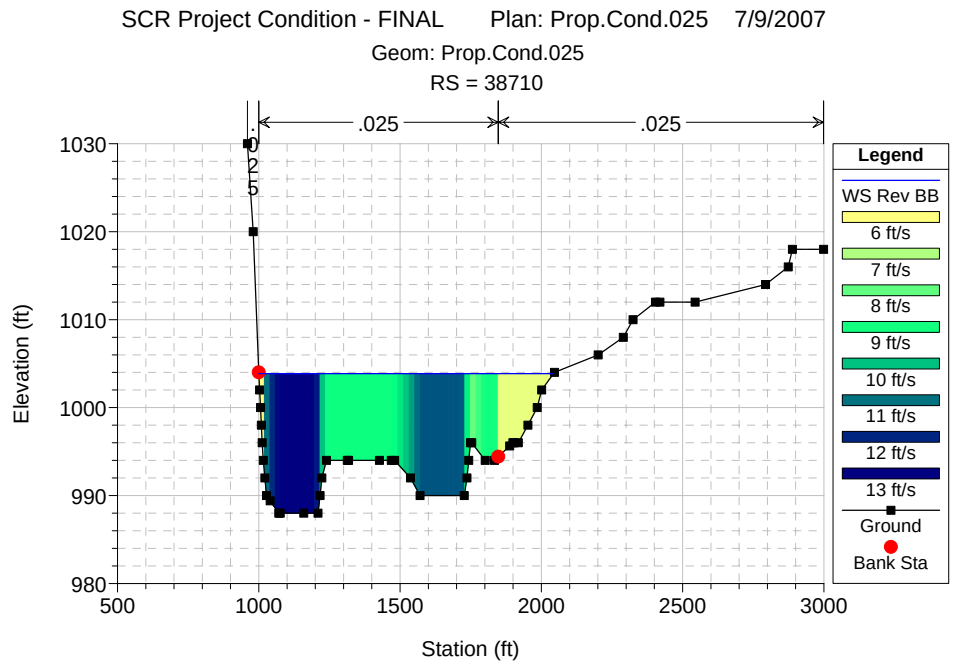

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 39755
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
Ground
Bank Sta

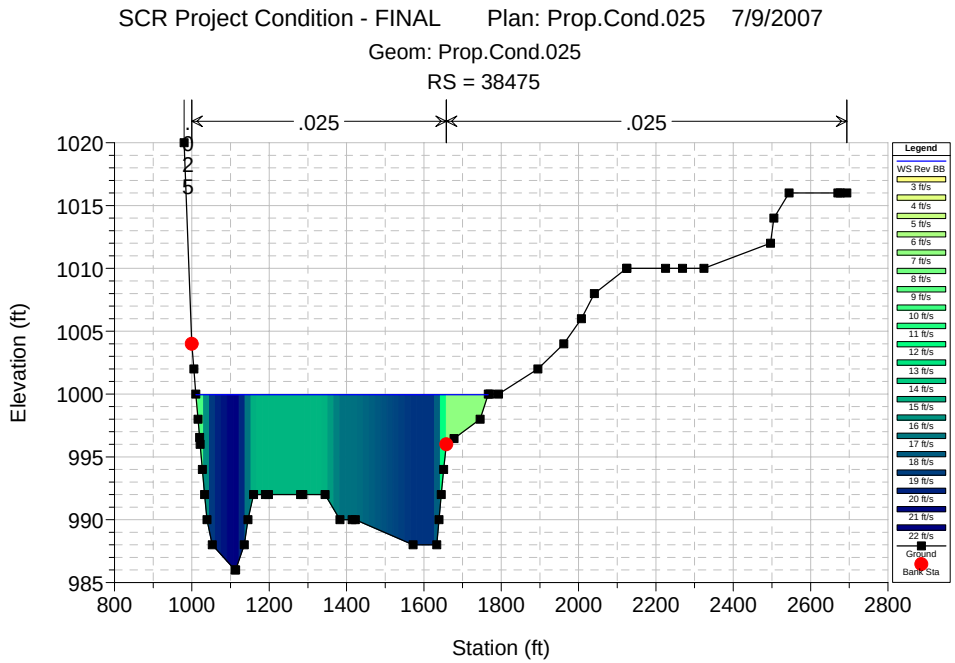

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 39605
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
20 ft/s
21 ft/s
22 ft/s
23 ft/s
24 ft/s
Ground
Bank Sta

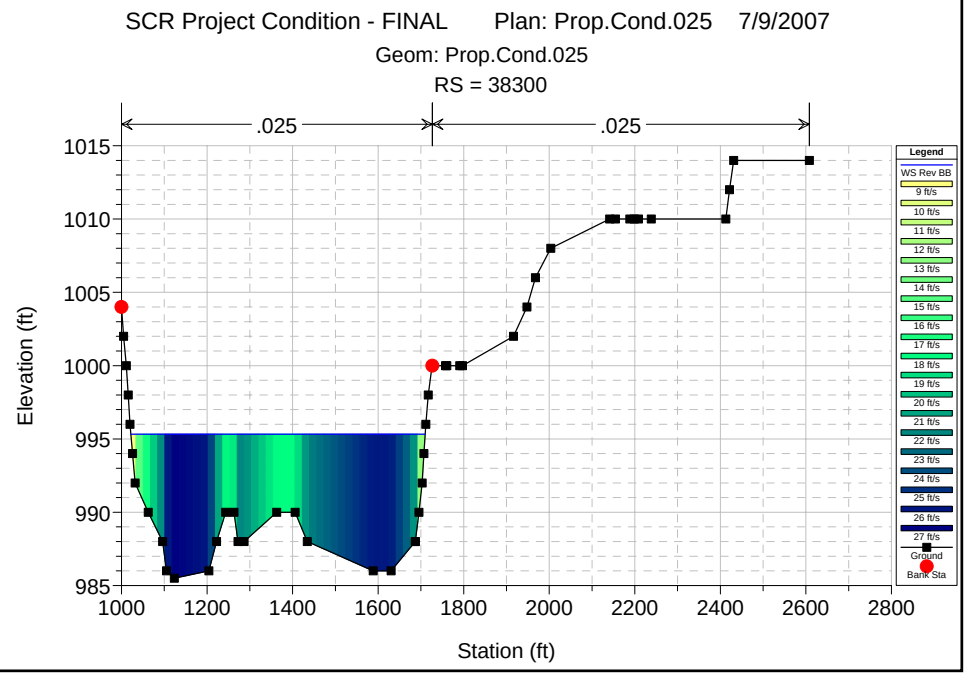

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 39310
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 39100
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 38925
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 38710
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta

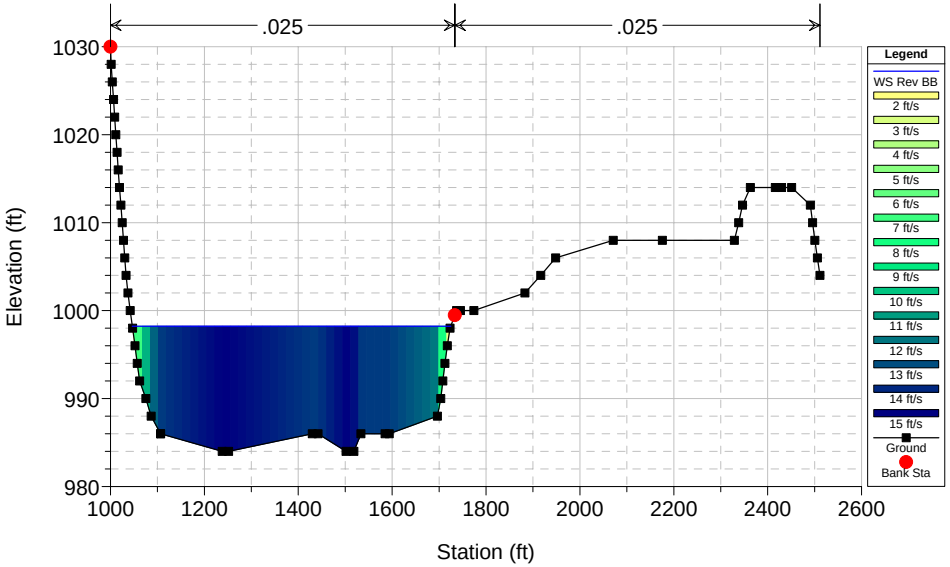

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 38475
.025
.025
Elevation (ft)
Station (ft)
Legend


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 38300
.025
.025
Elevation (ft)
Station (ft)
Legend

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

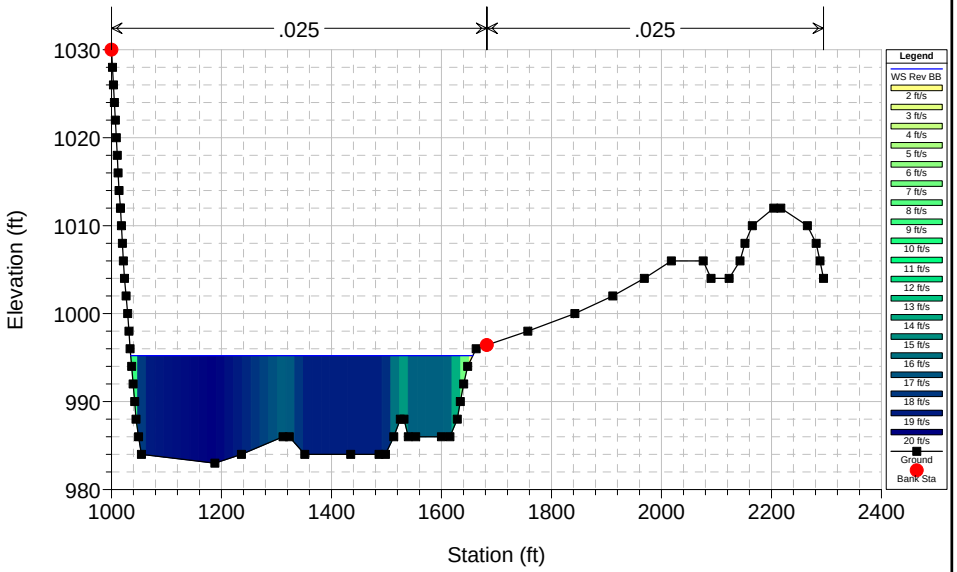
RS = 38065



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

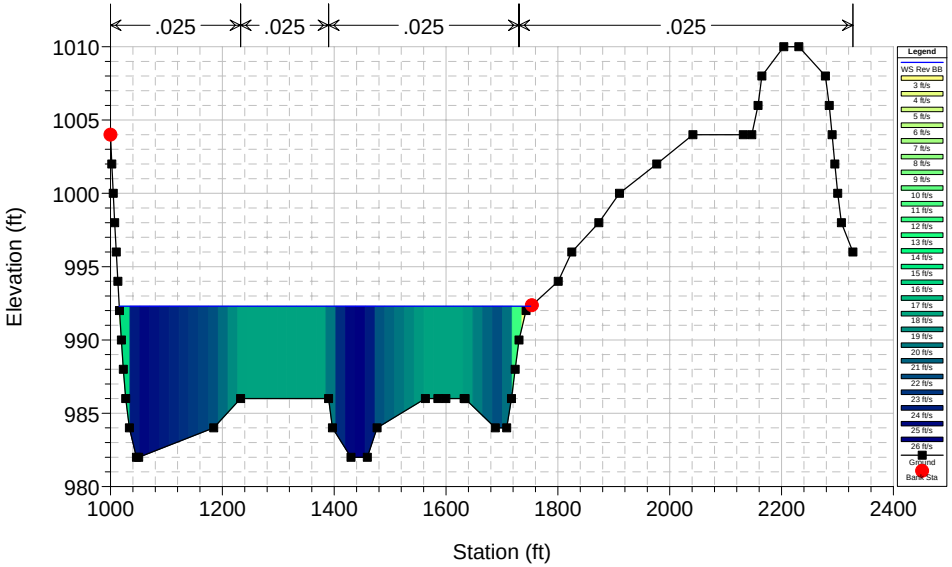
RS = 37810



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

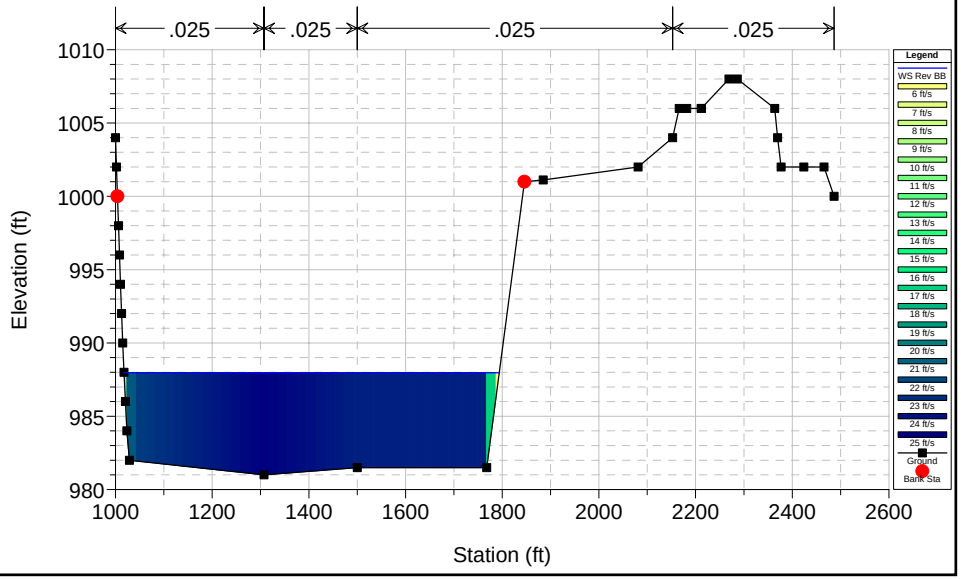
RS = 37655



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

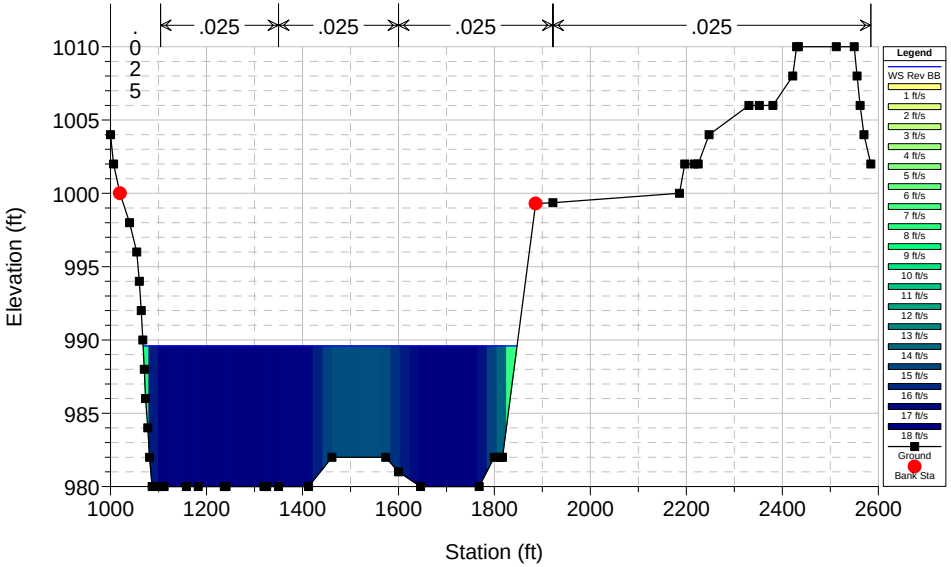
RS = 37390



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

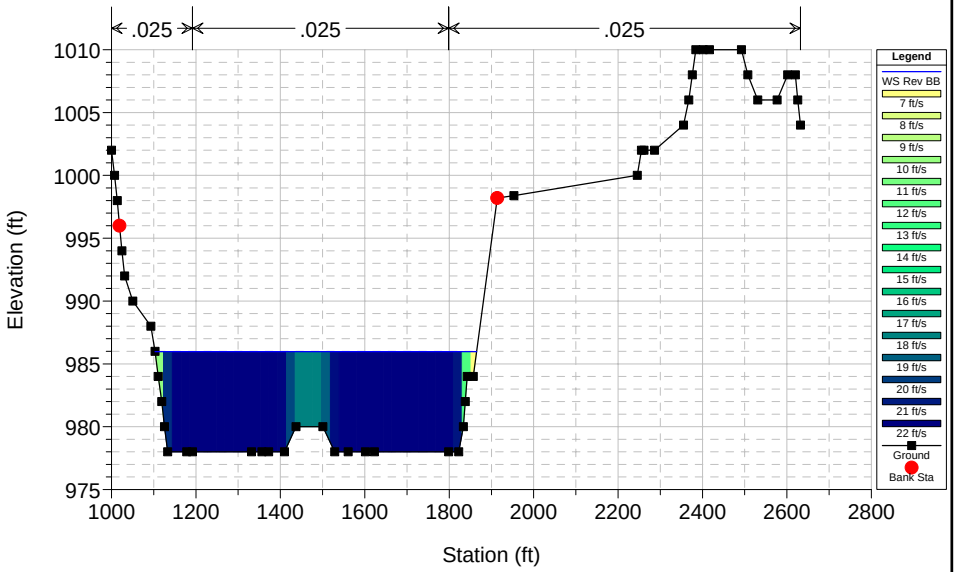
RS = 37135



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

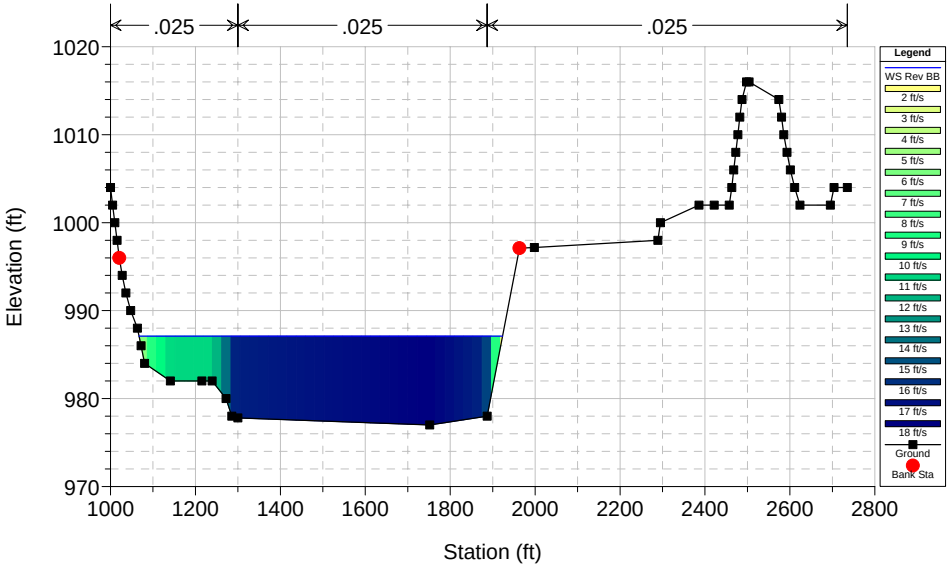
RS = 36930



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

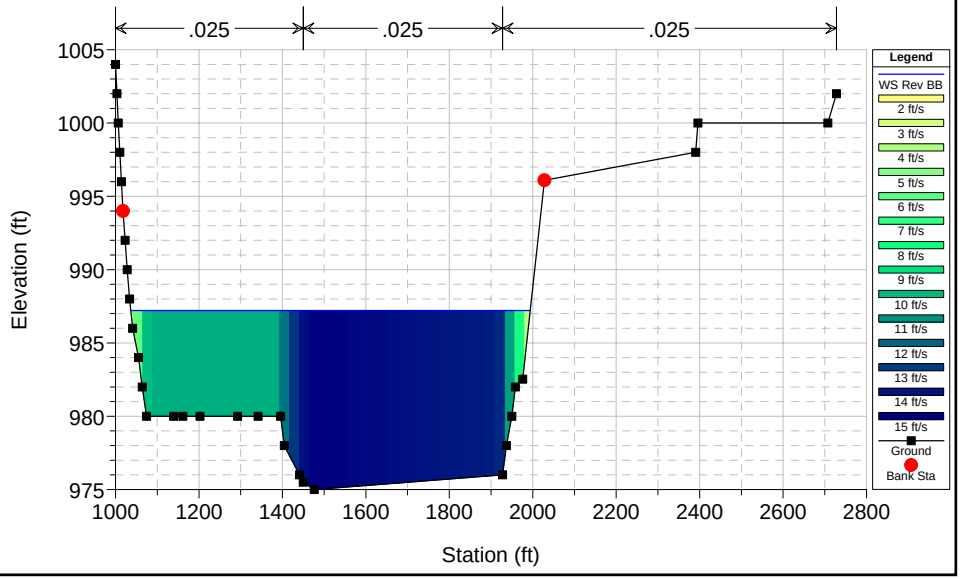
RS = 36735

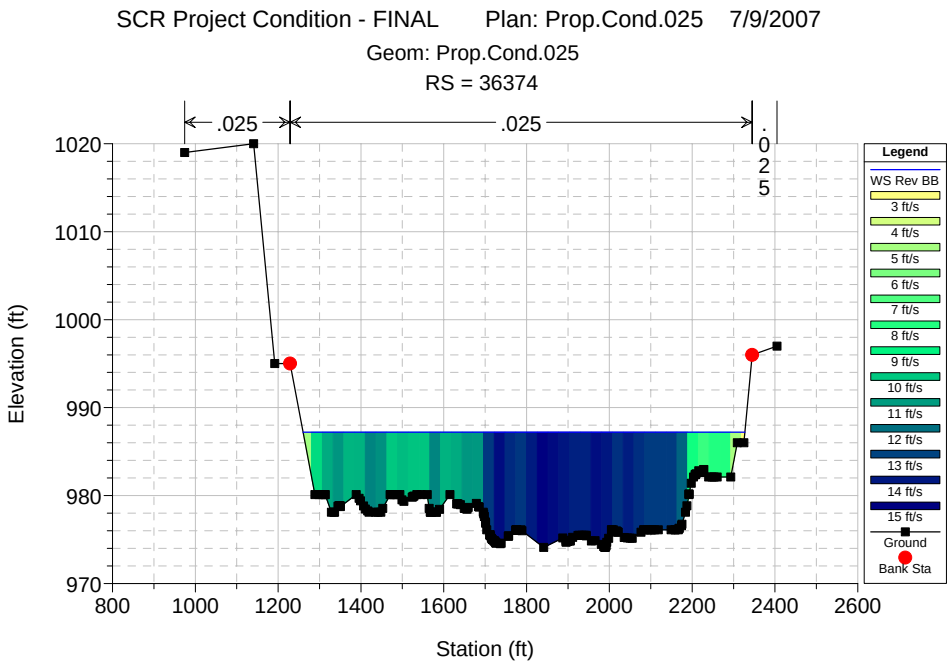


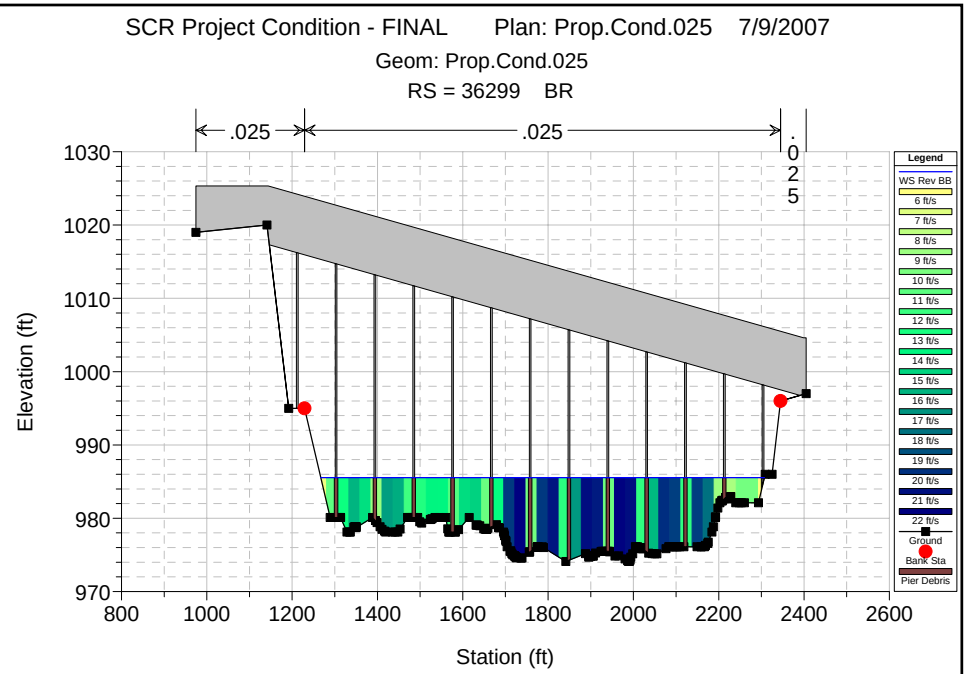
SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

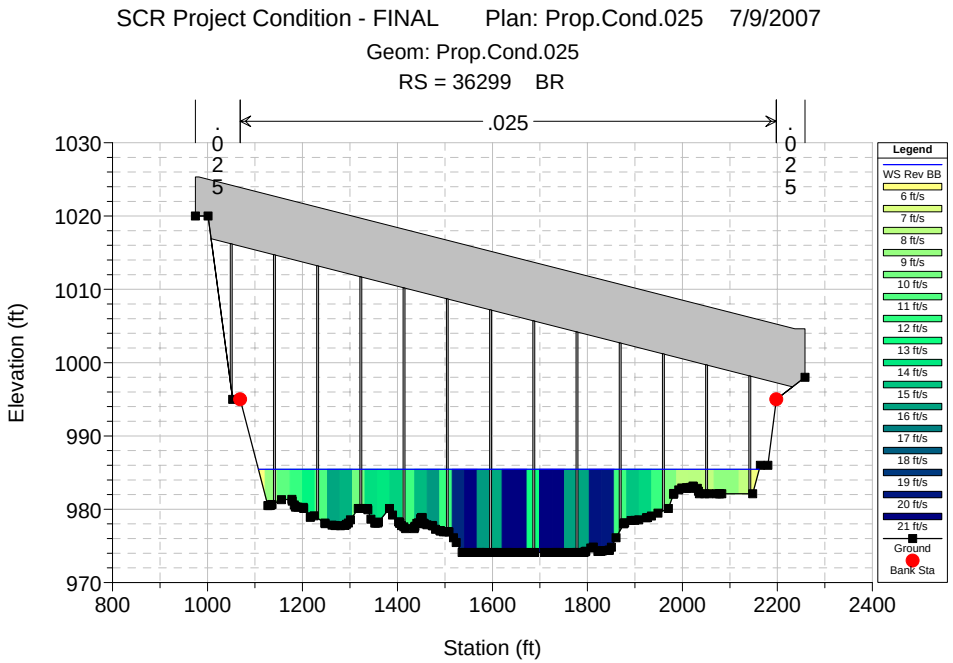
Geom: Prop.Cond.025

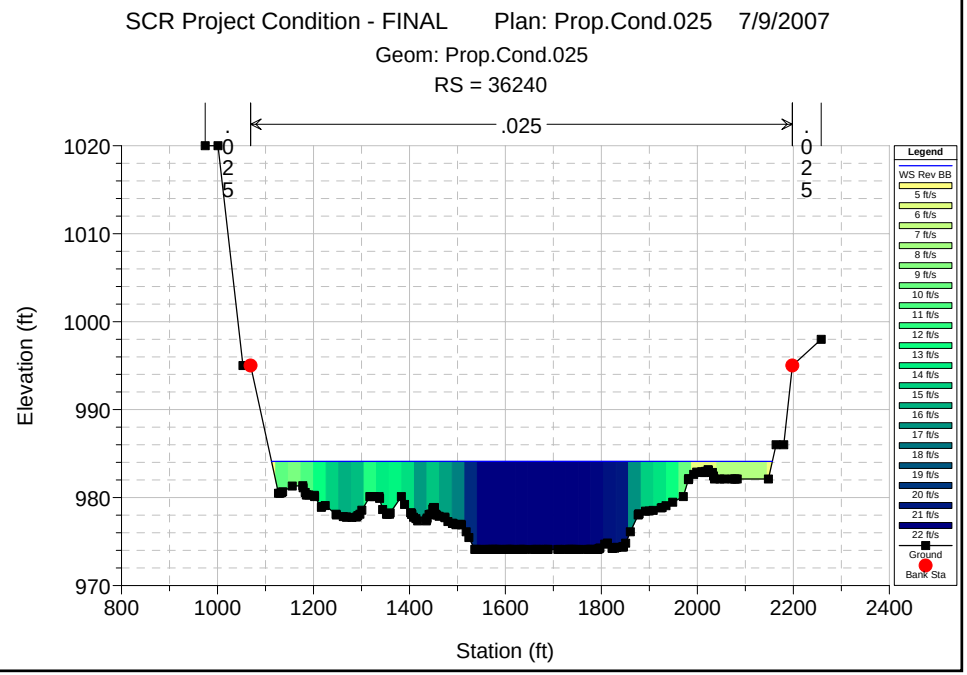
RS = 36515




SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 36374
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 36299 BR
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
20 ft/s
21 ft/s
22 ft/s
Ground
Bank Sta
Pier Debris

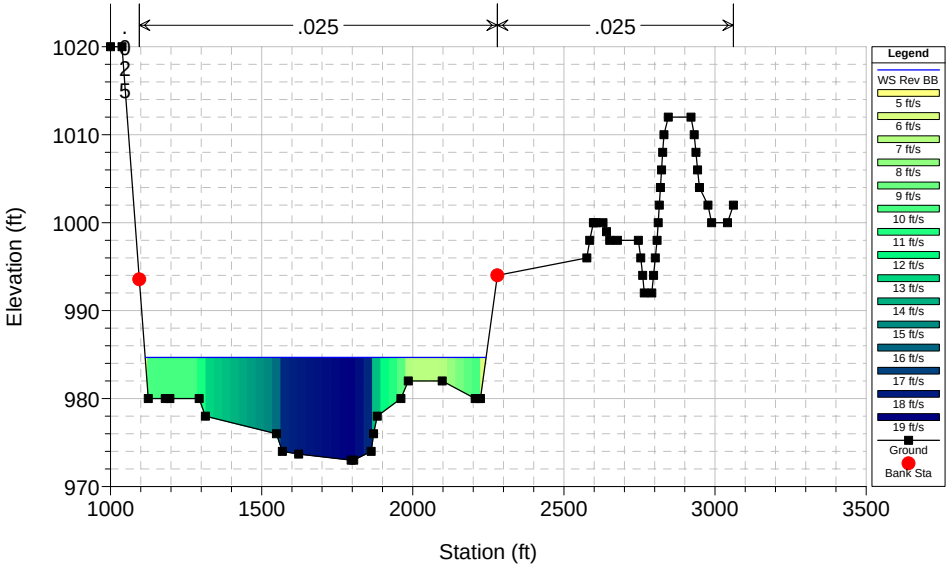

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 36299 BR
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
20 ft/s
21 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 36240
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
20 ft/s
21 ft/s
22 ft/s
Ground
Bank Sta

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

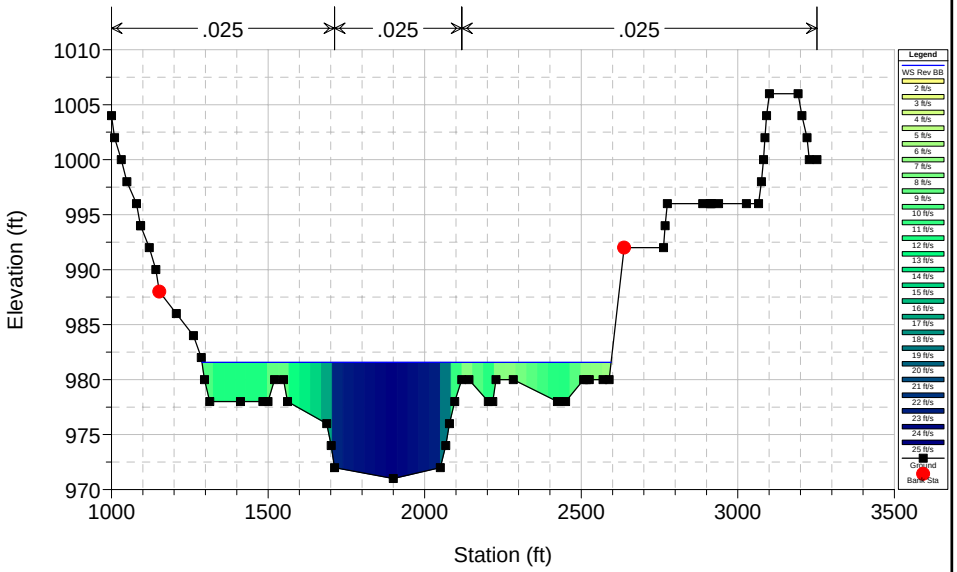
RS = 36080



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

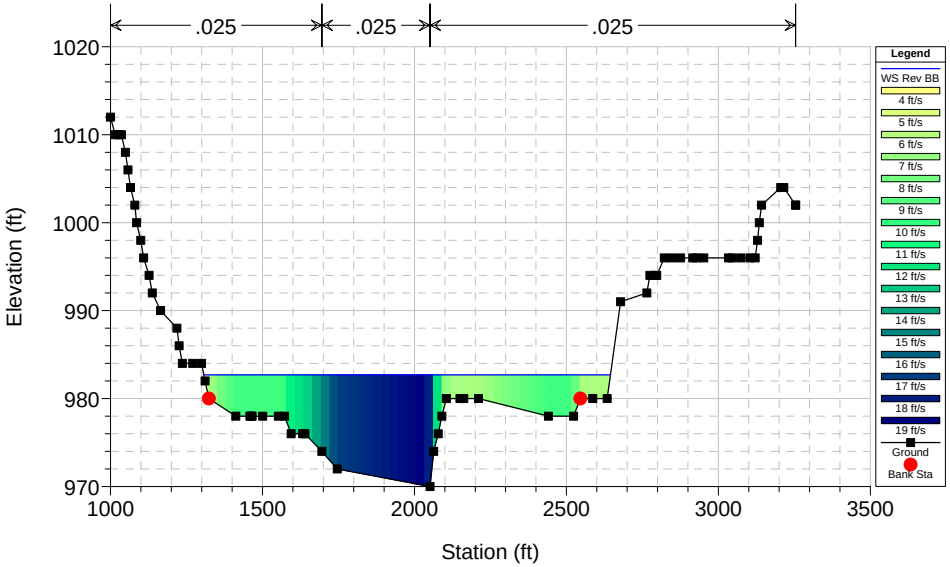
RS = 35845



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

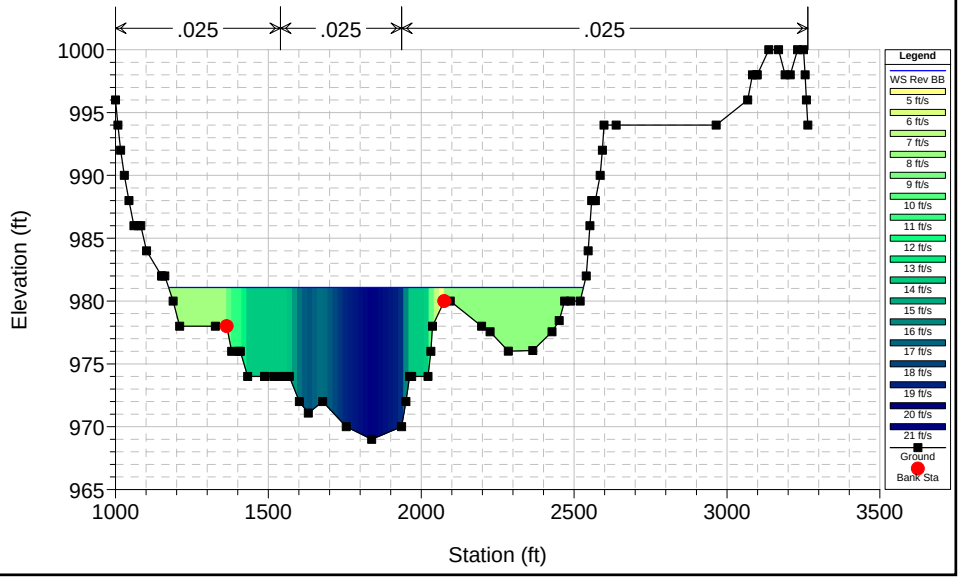
RS = 35725



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

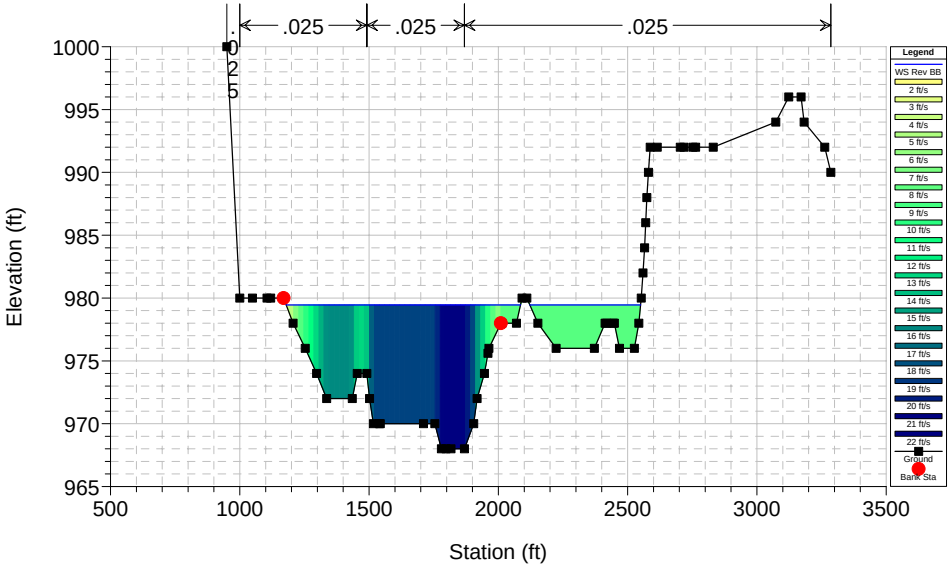
RS = 35515



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

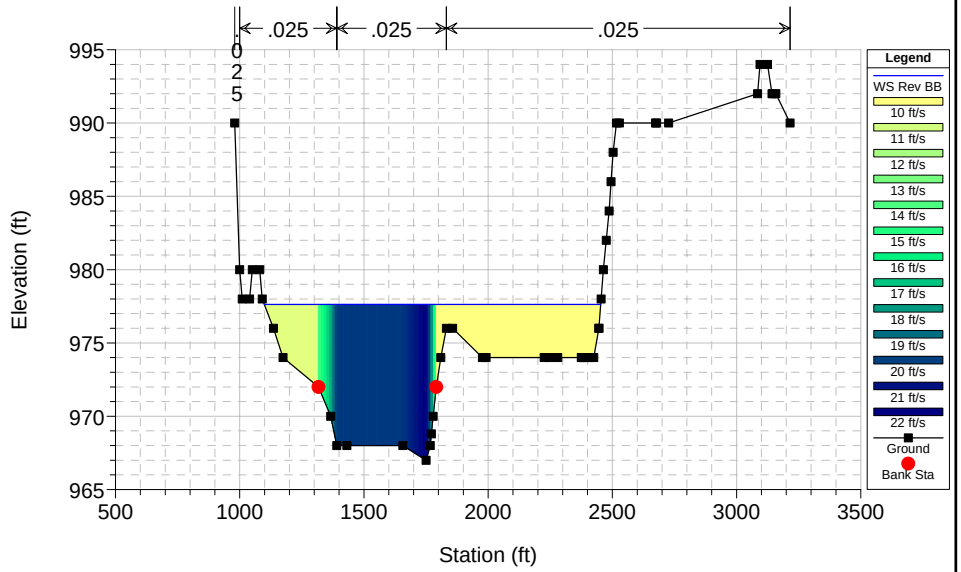
RS = 35245



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

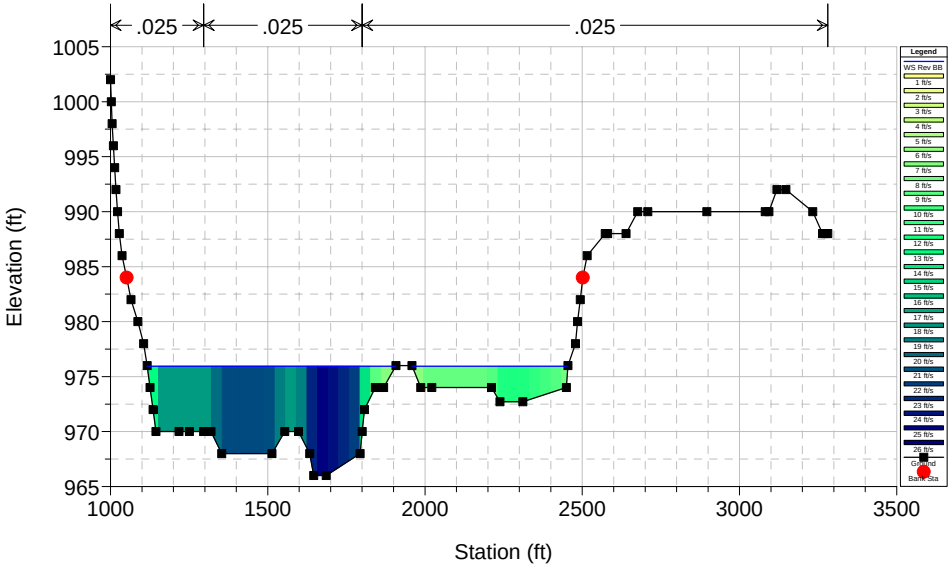
RS = 35040



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

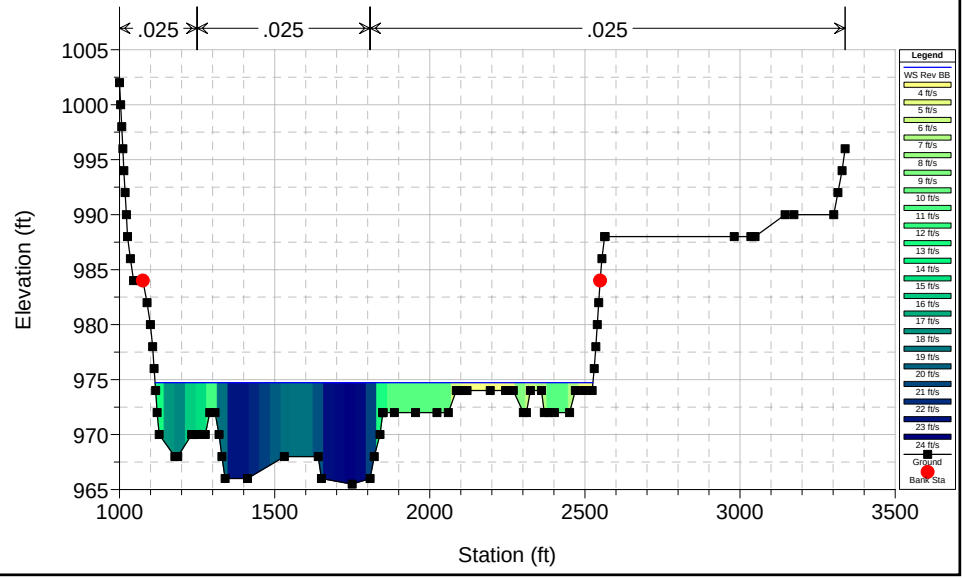
RS = 34860

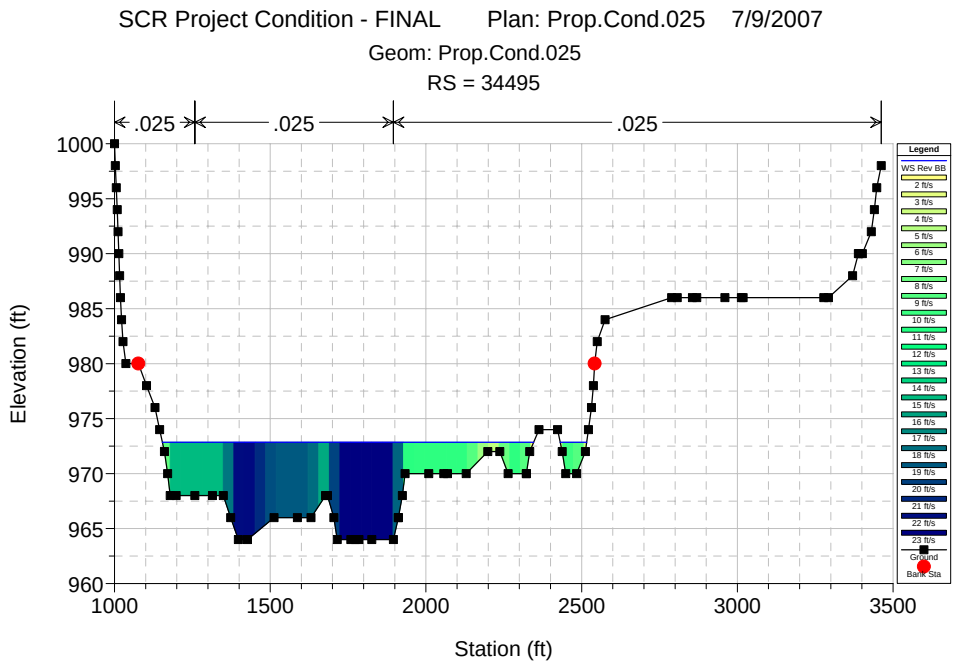


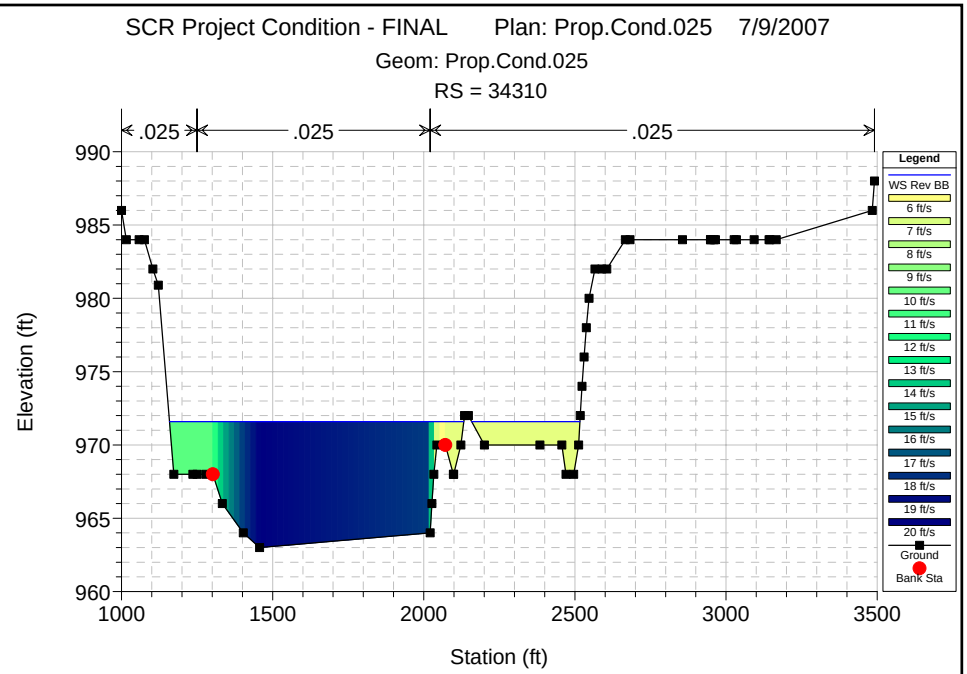
SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

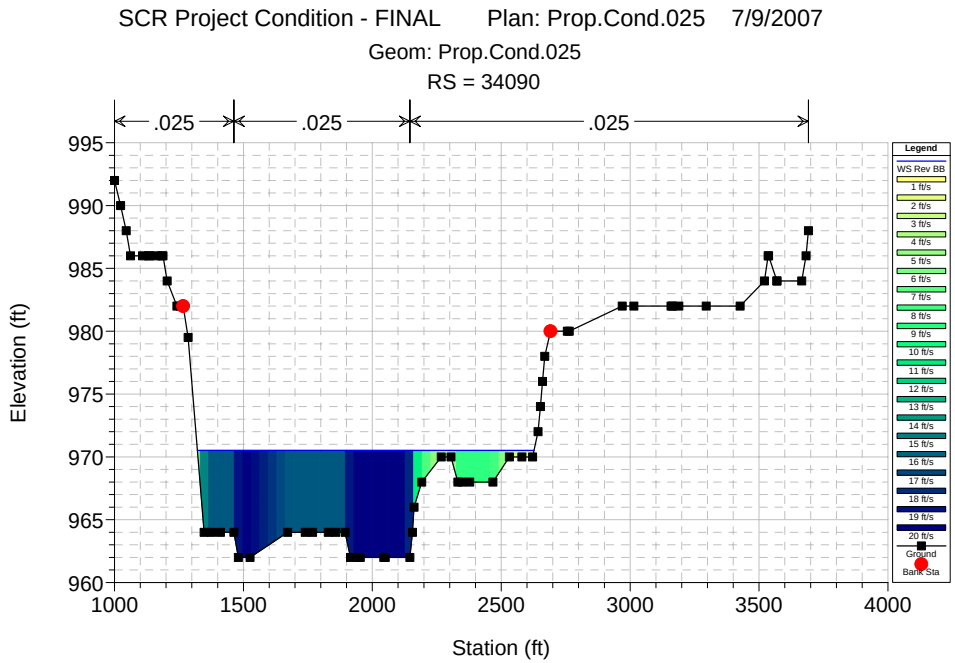
Geom: Prop.Cond.025

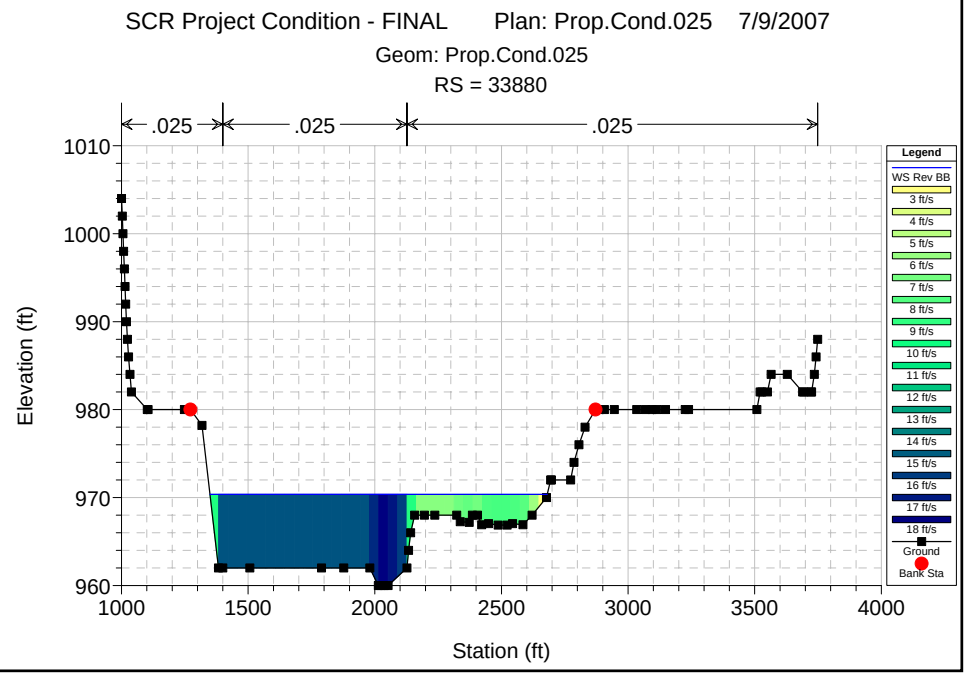
RS = 34720




SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 34495
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
20 ft/s
21 ft/s
22 ft/s
23 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 34310
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
20 ft/s
Ground
Bank Sta

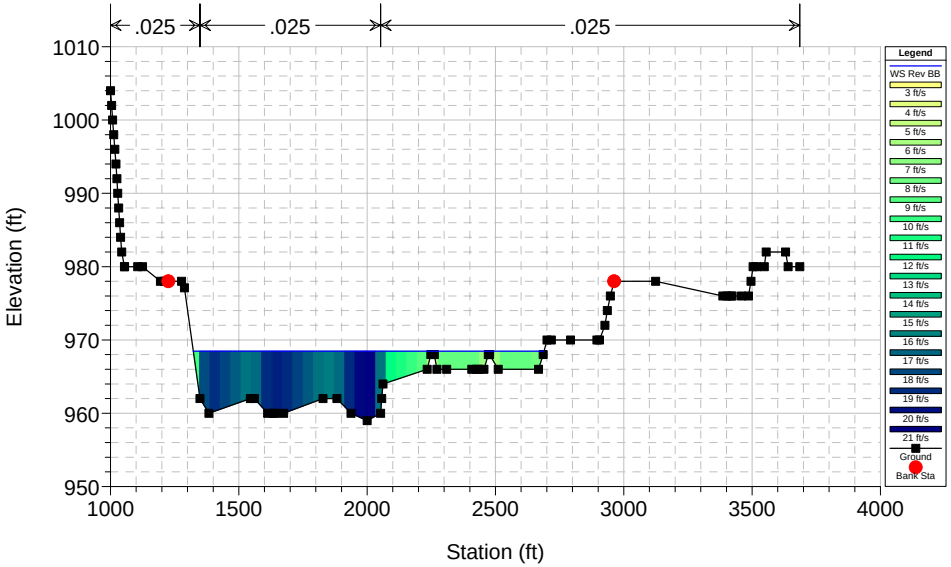

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 34090
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
20 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 33880
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
Ground
Bank Sta

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

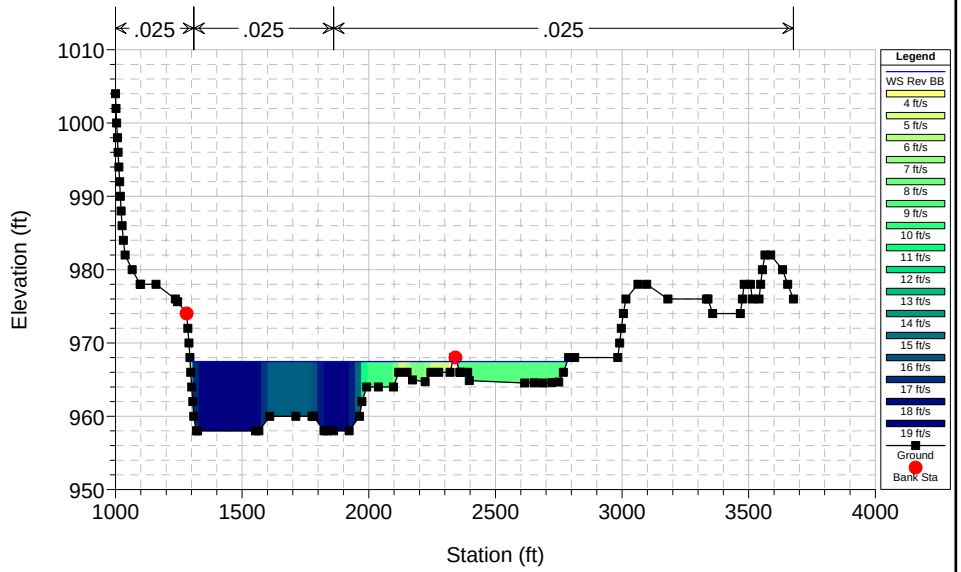
RS = 33710



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

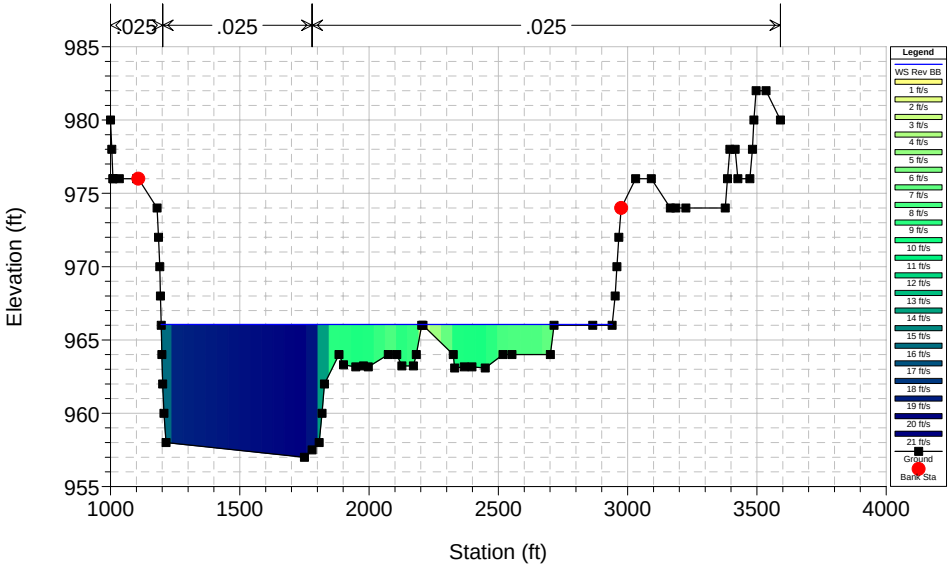
RS = 33500



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

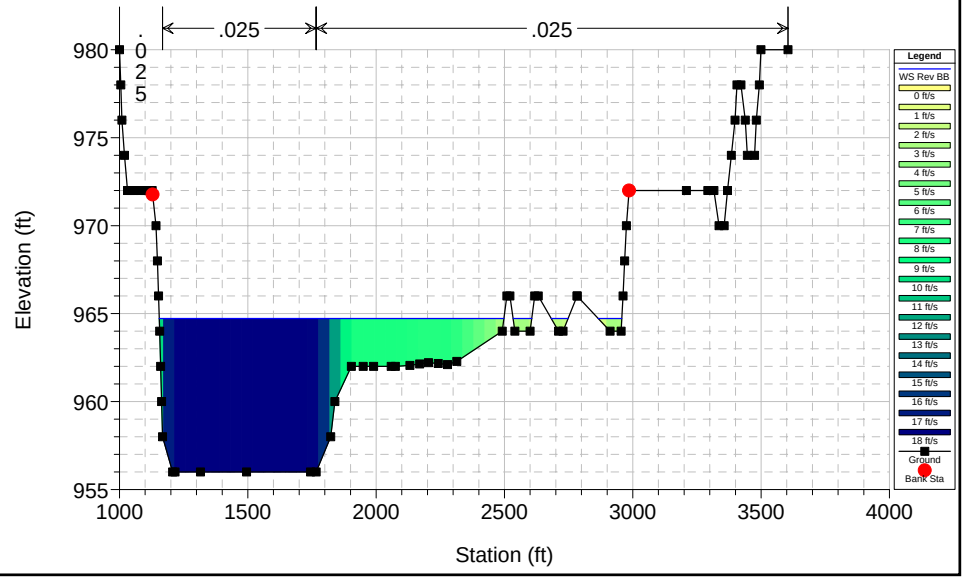
RS = 33310

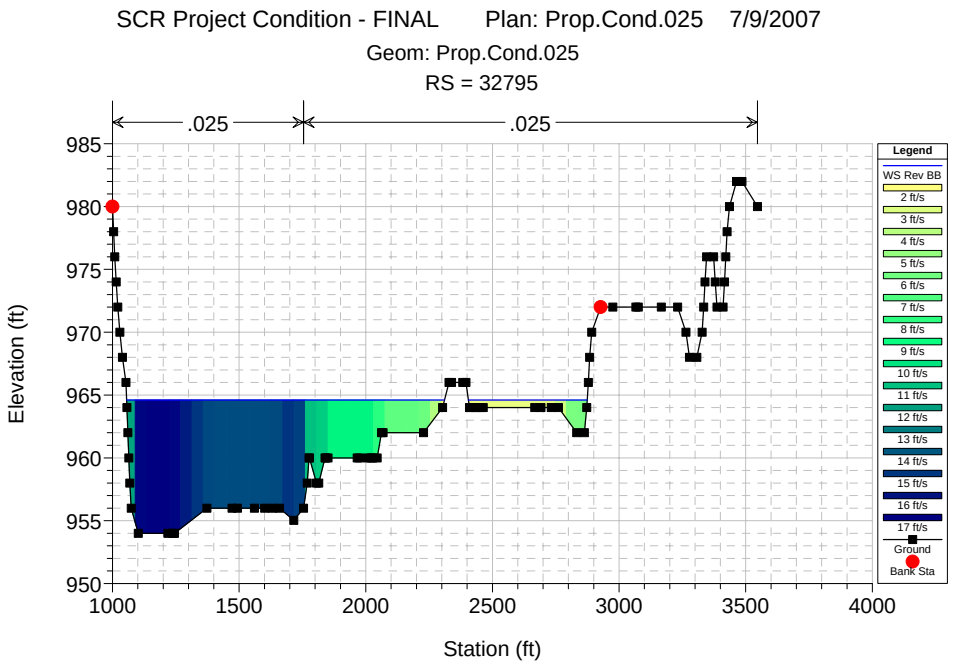


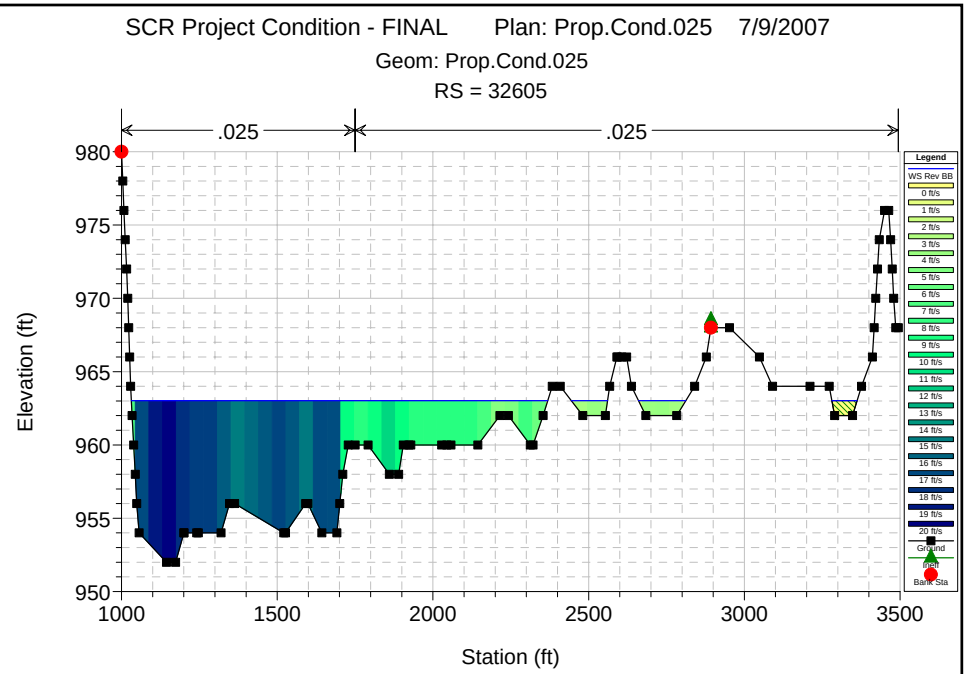
SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

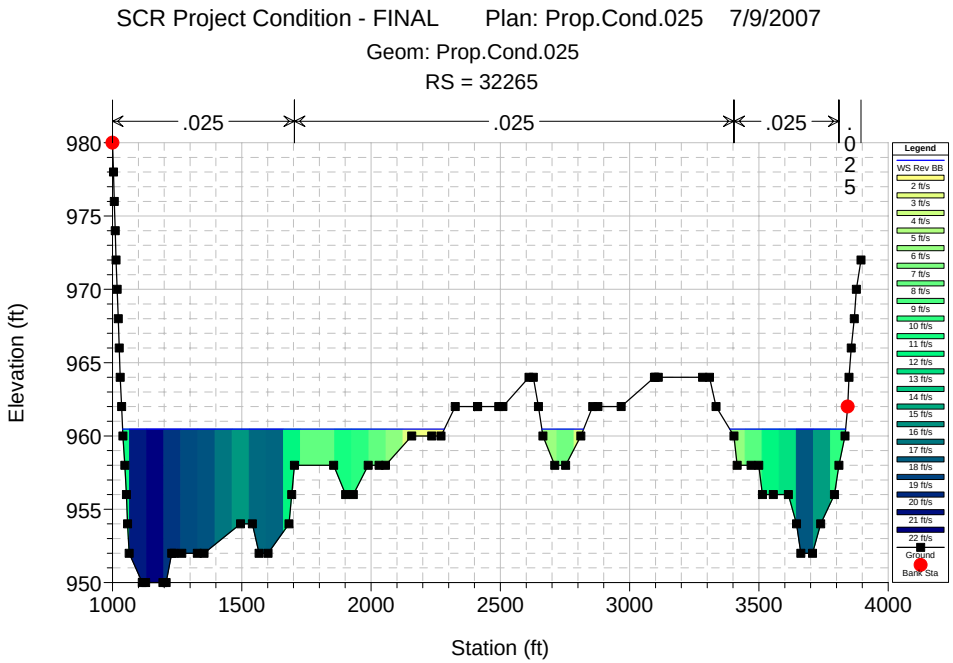
Geom: Prop.Cond.025

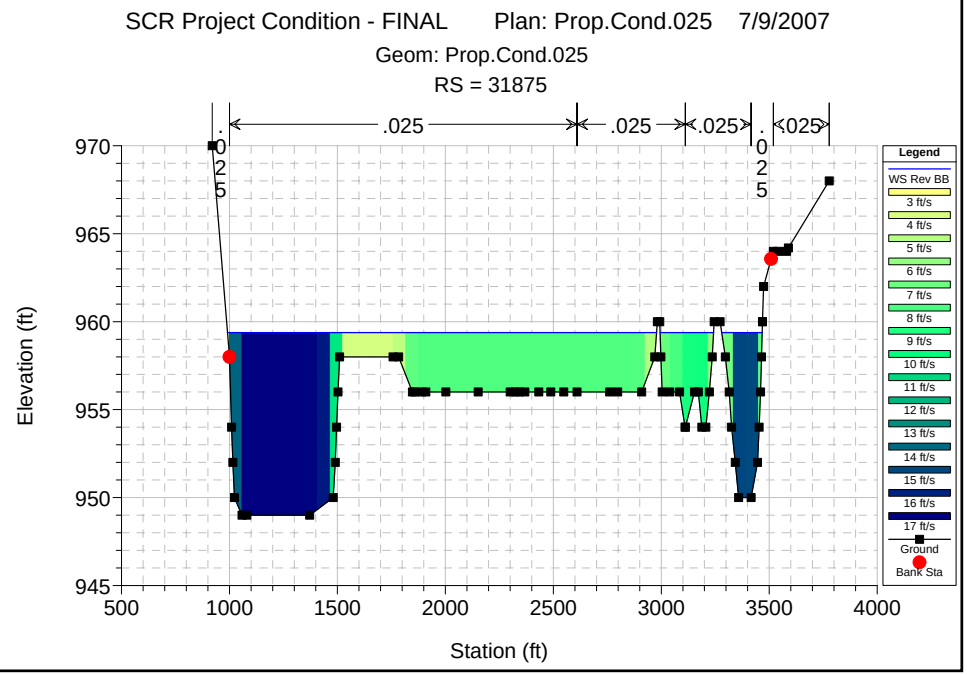
RS = 33115

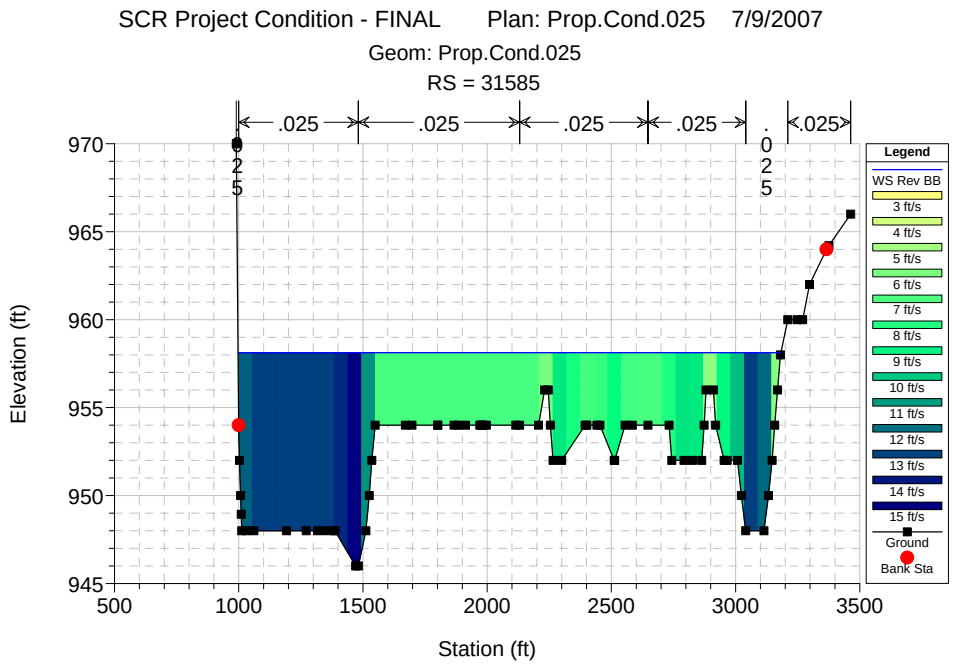


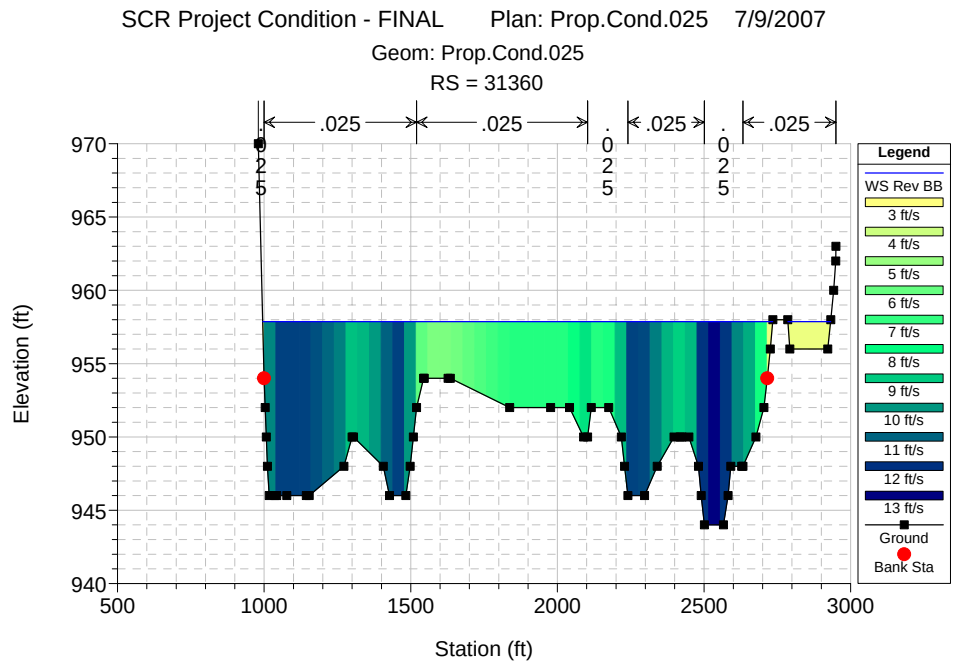

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 32795
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
Ground
Bank Sta

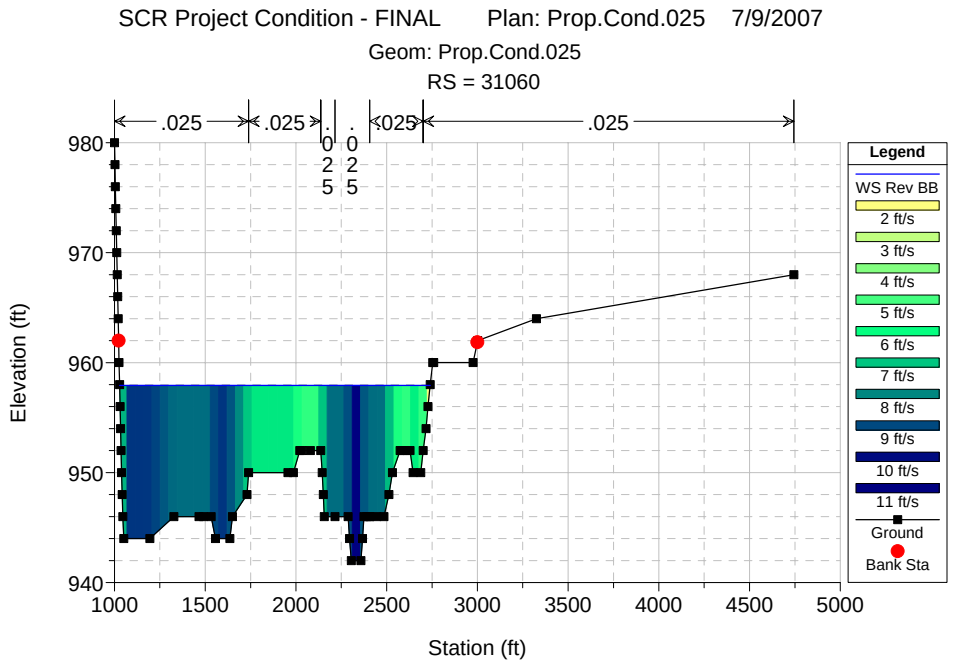

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 32605
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
20 ft/s
Ground
Bank Sta

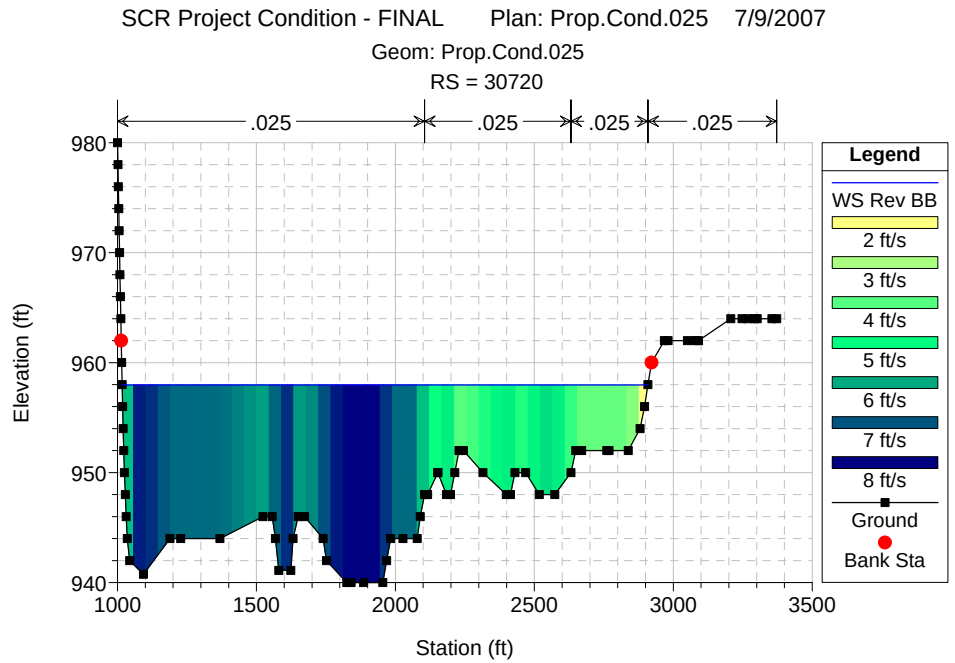

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 32265
.025
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
20 ft/s
21 ft/s
22 ft/s
Ground
Bank Sta

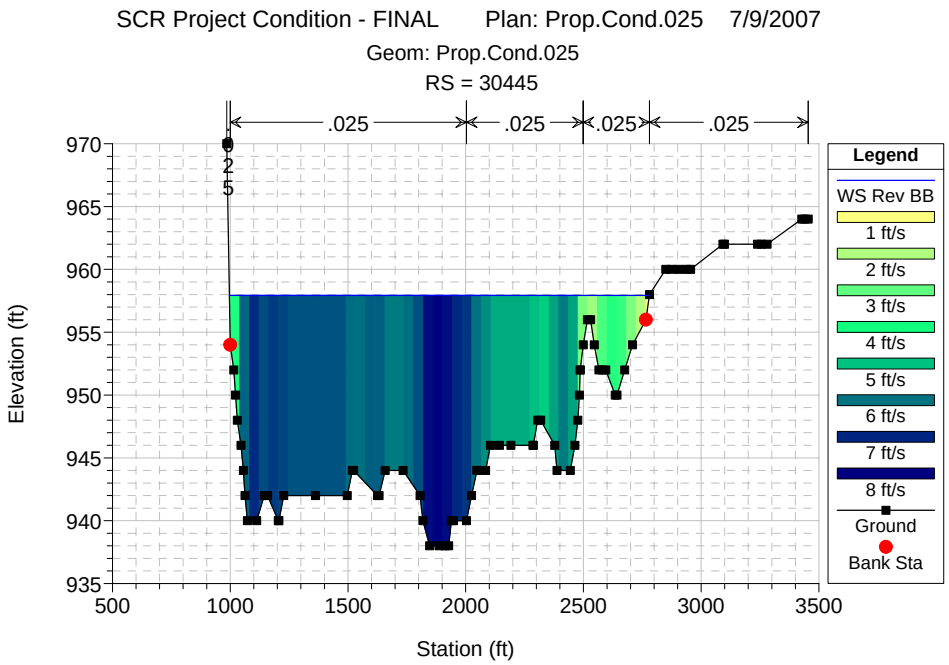

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 31875
.025
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
Ground
Bank Sta

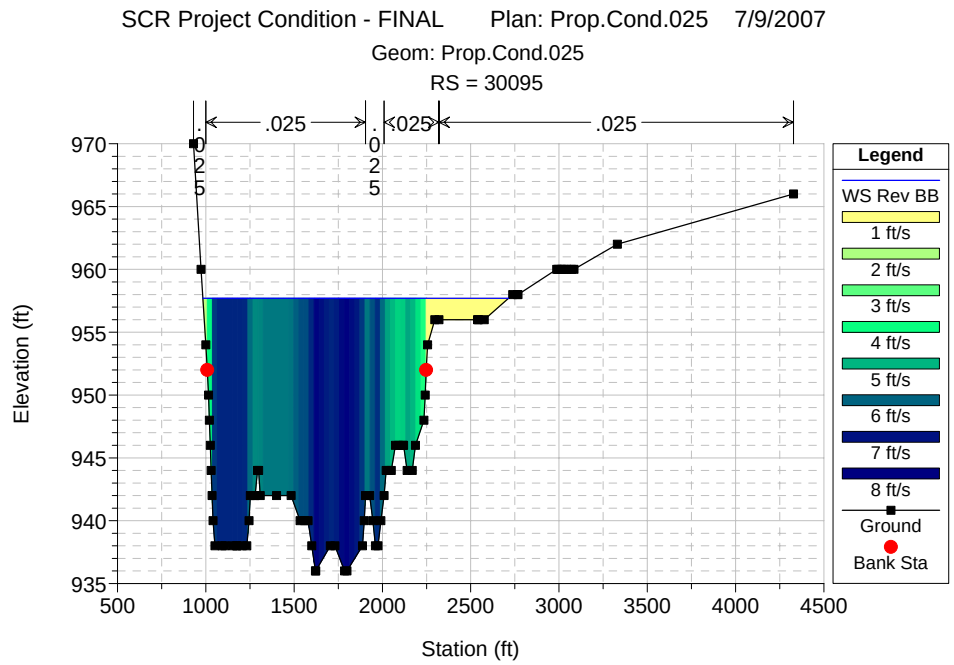

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 31585
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
Ground
Bank Sta

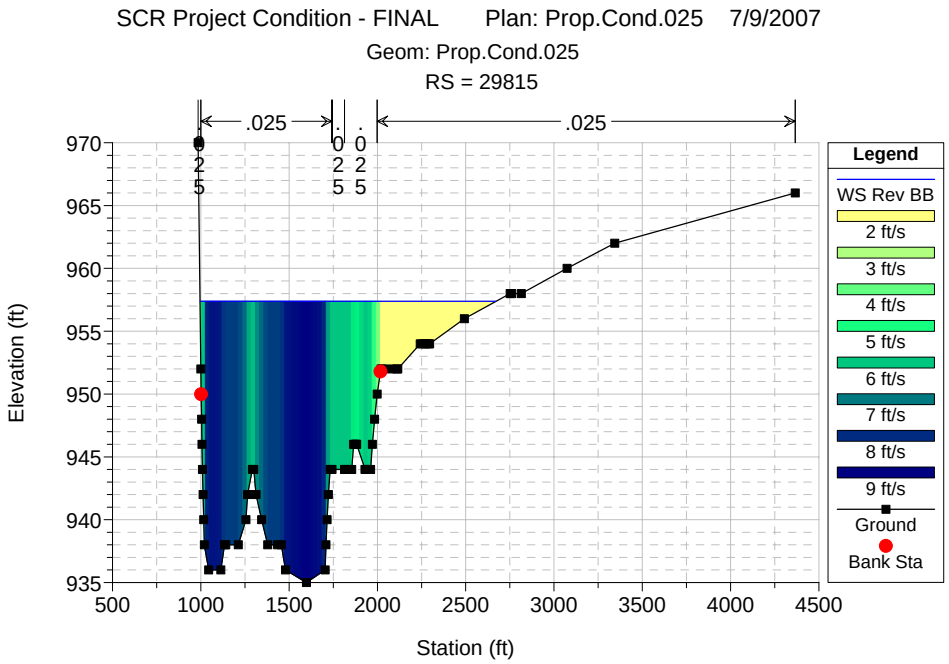

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 31360
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta

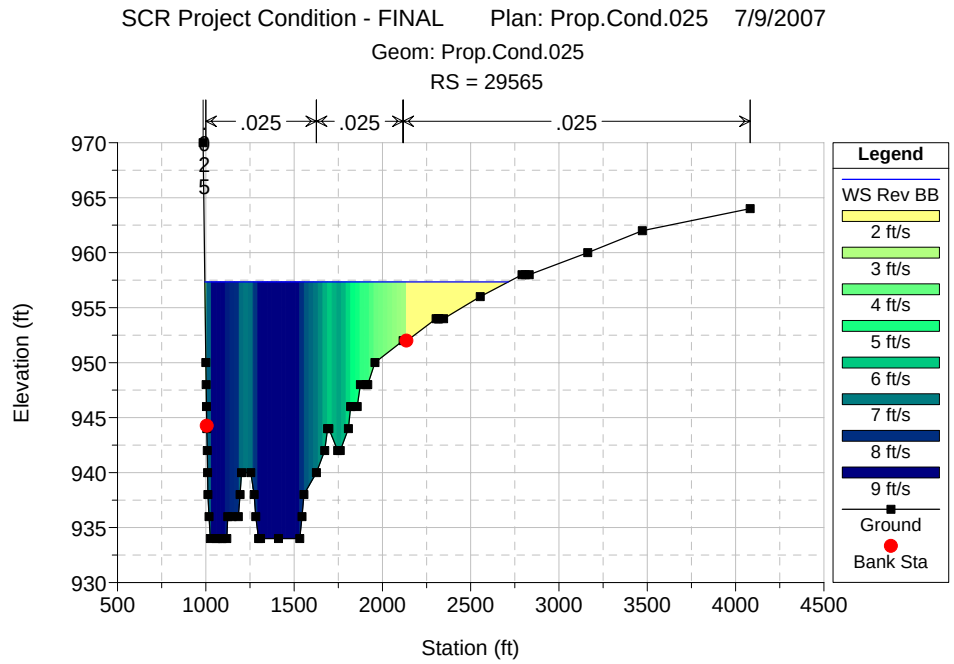

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 31060
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta

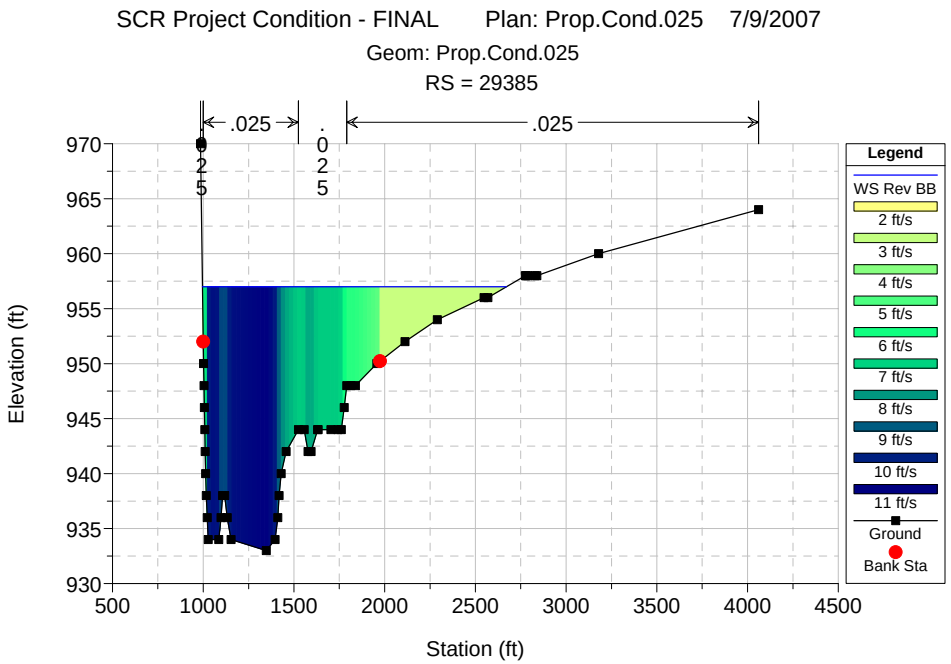

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 30720
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 30445
.025
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 30095
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 29815
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 29565
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 29385
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
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4 ft/s
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6 ft/s
7 ft/s
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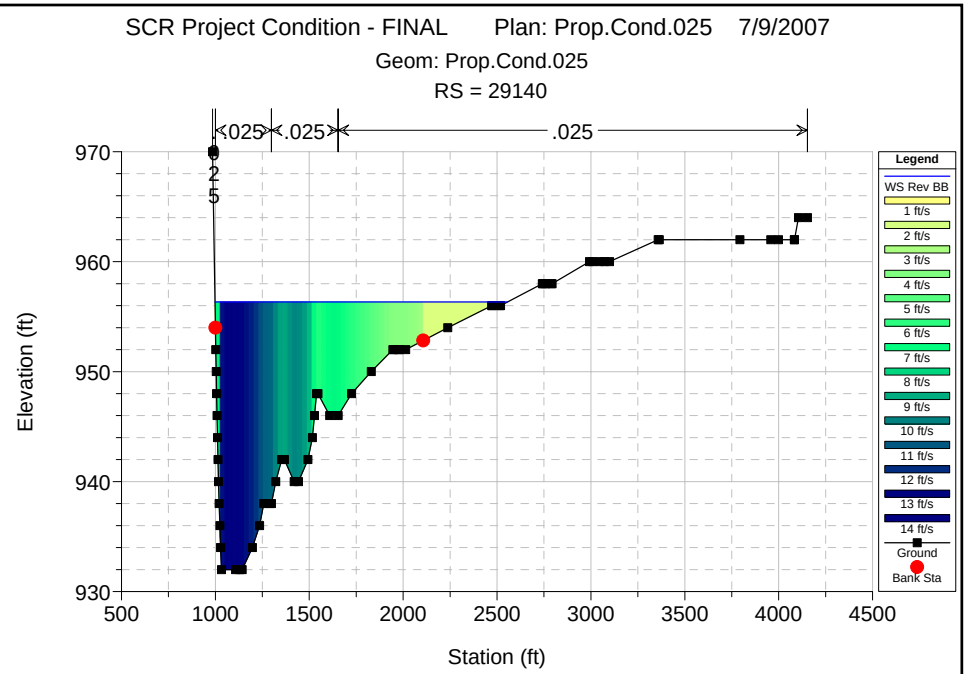
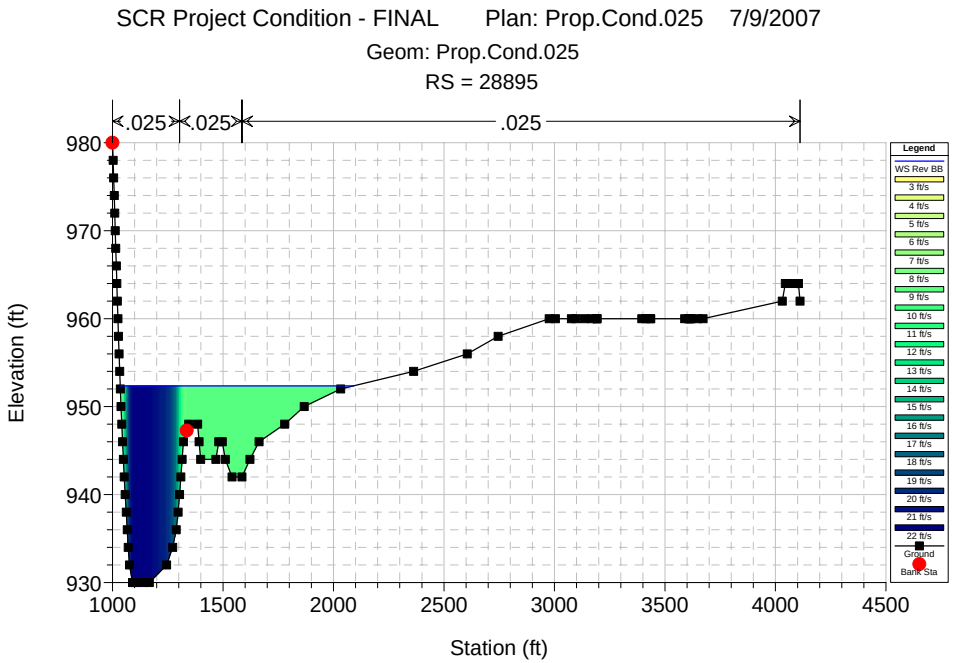
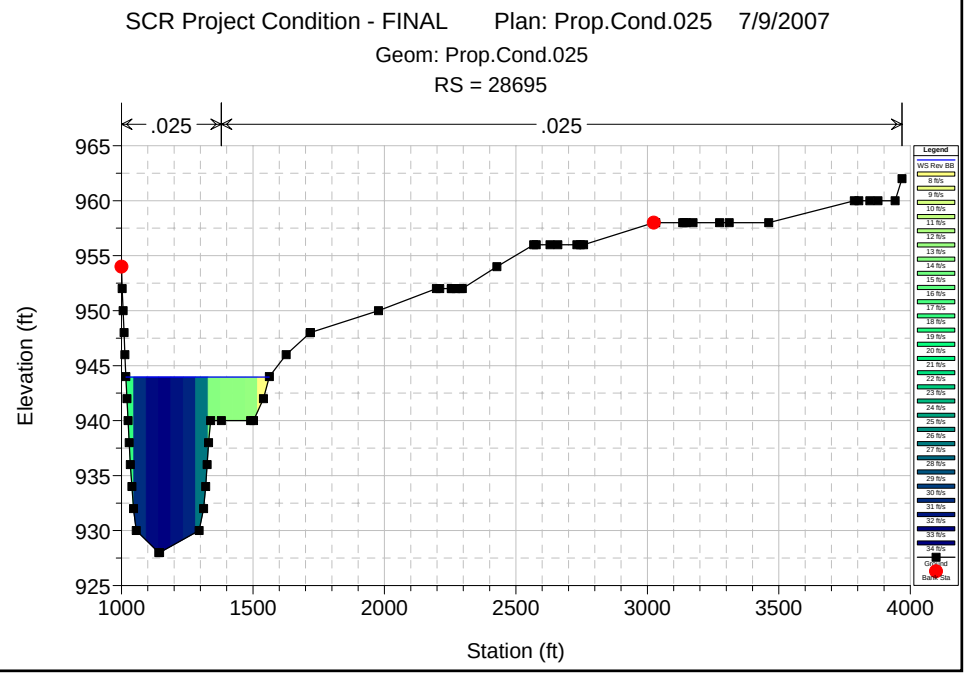
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 29140
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
Ground
Bank Sta

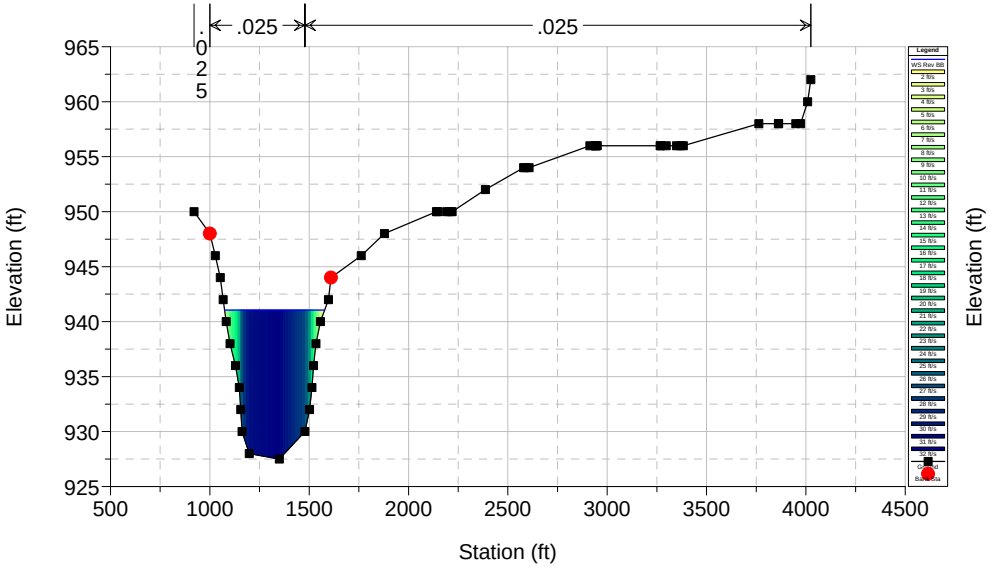

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 28895
.025
.025
.025
Elevation (ft)
Station (ft)
Legend


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 28695
.025
.025
Elevation (ft)
Station (ft)
Legend

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

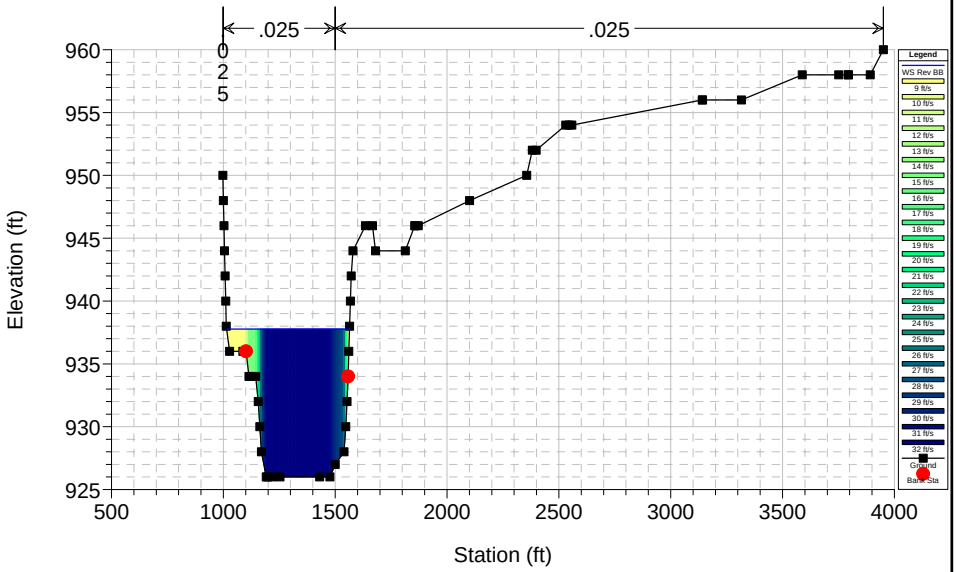
RS = 28500



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

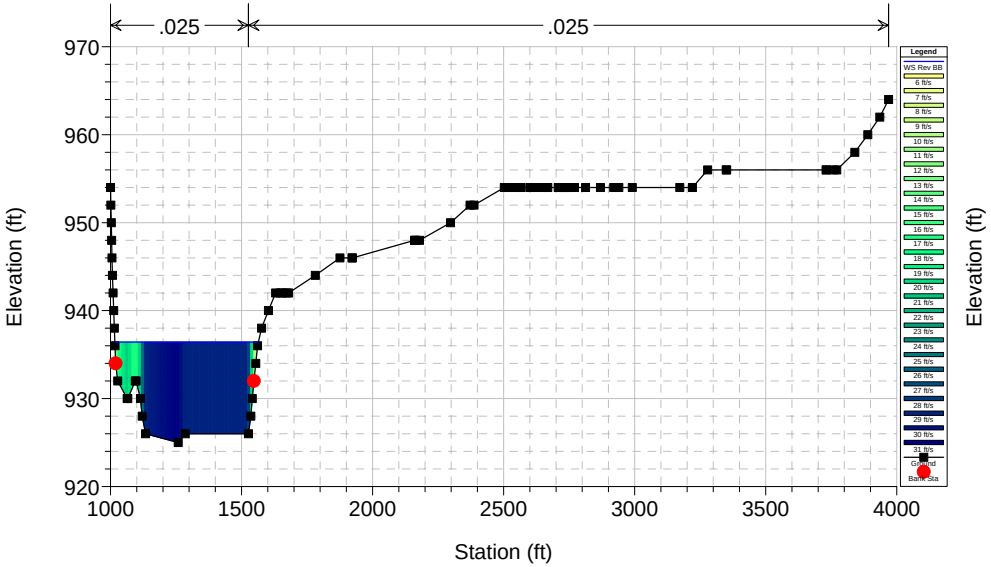
RS = 28280



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

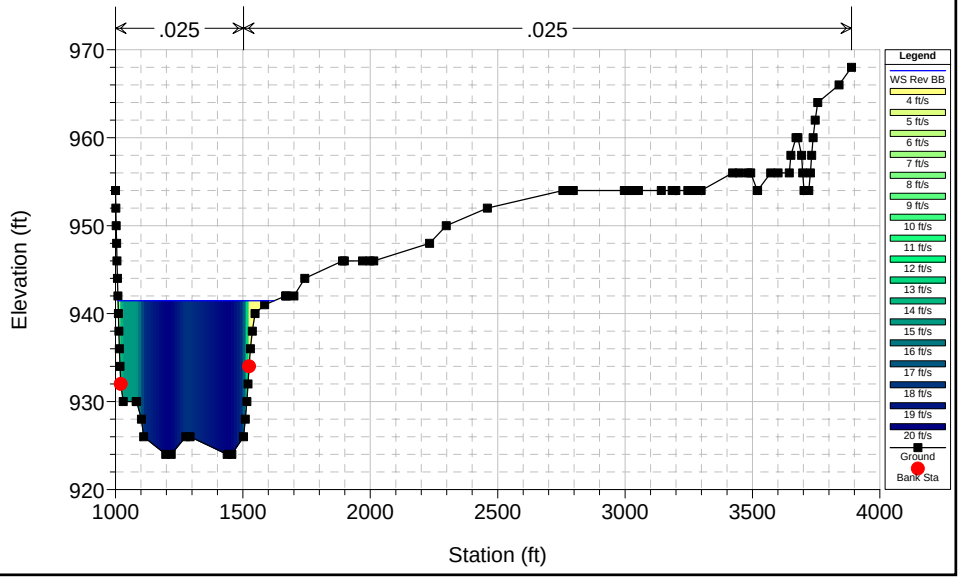
RS = 28080



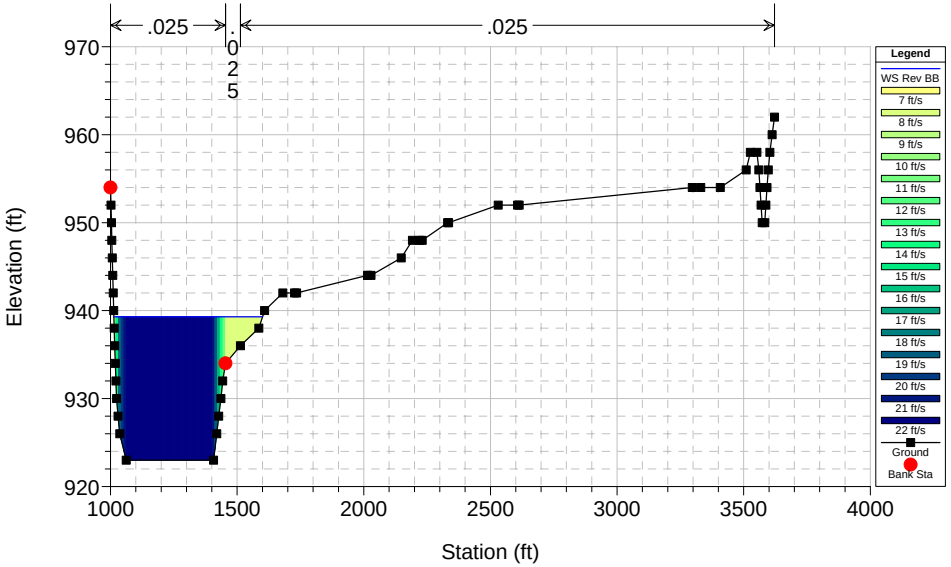
SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

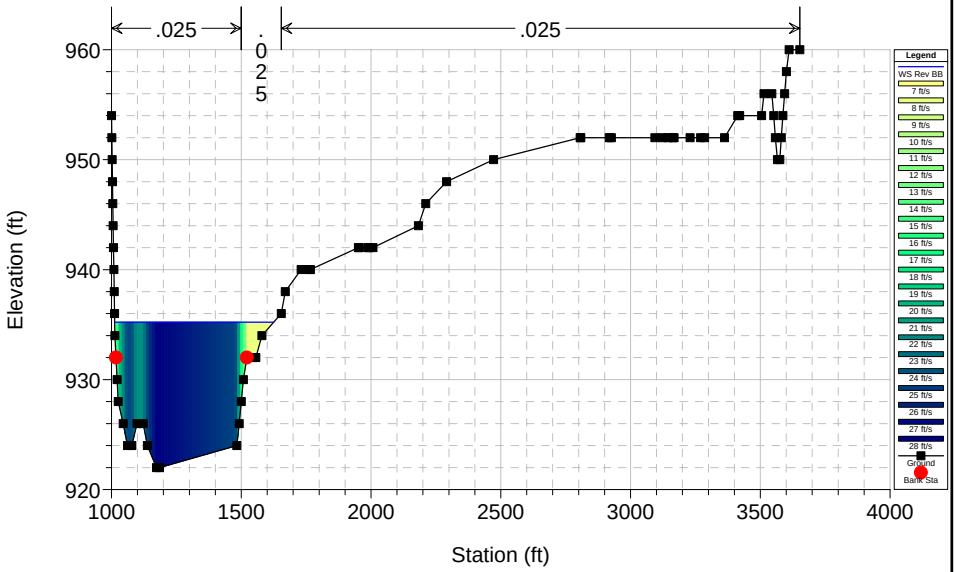
RS = 27925



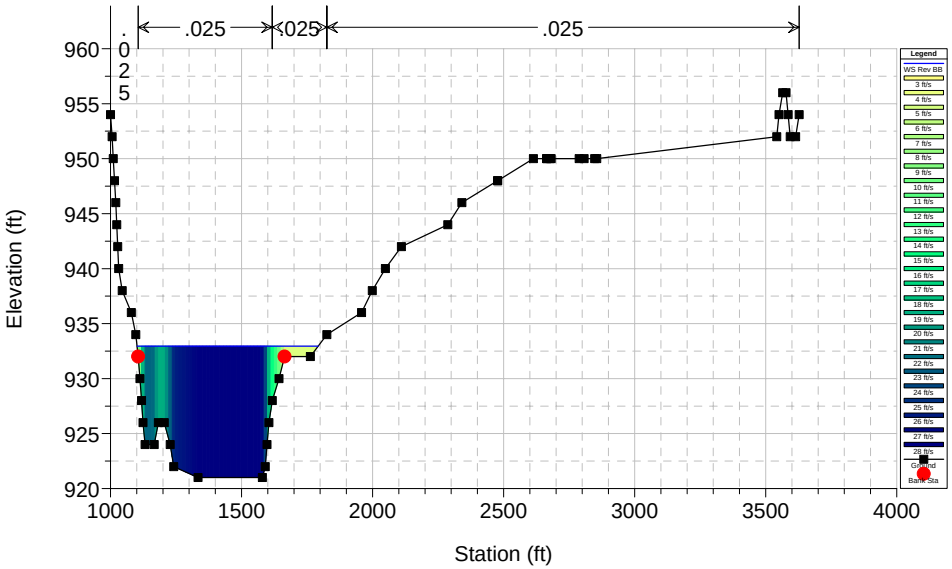
SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 27725



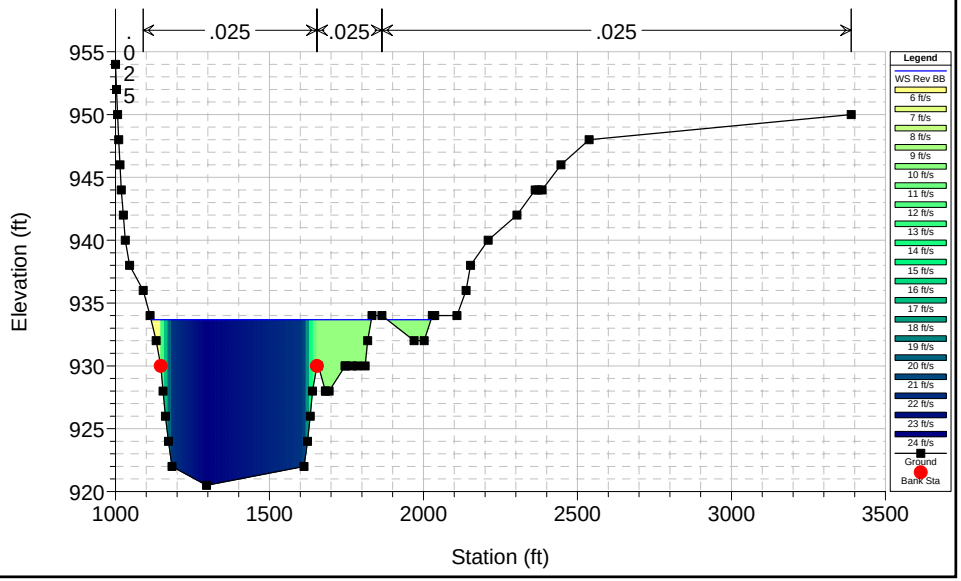
SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 27545



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 27335



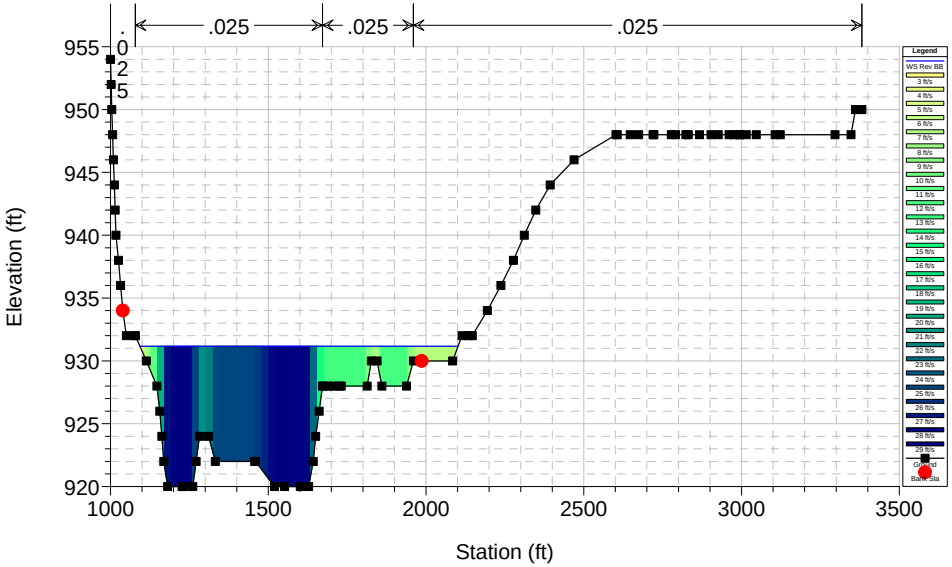
SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 27155



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

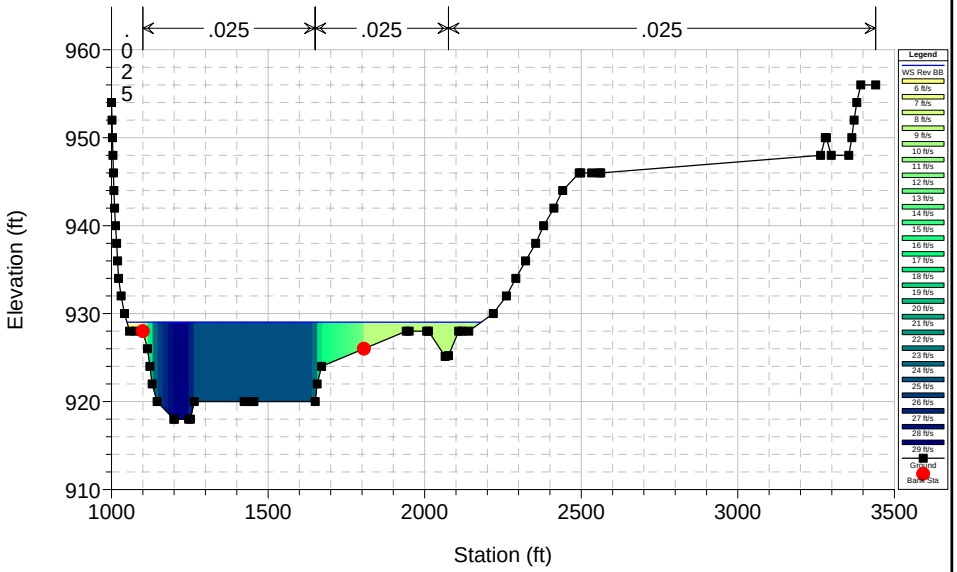
RS = 26990



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

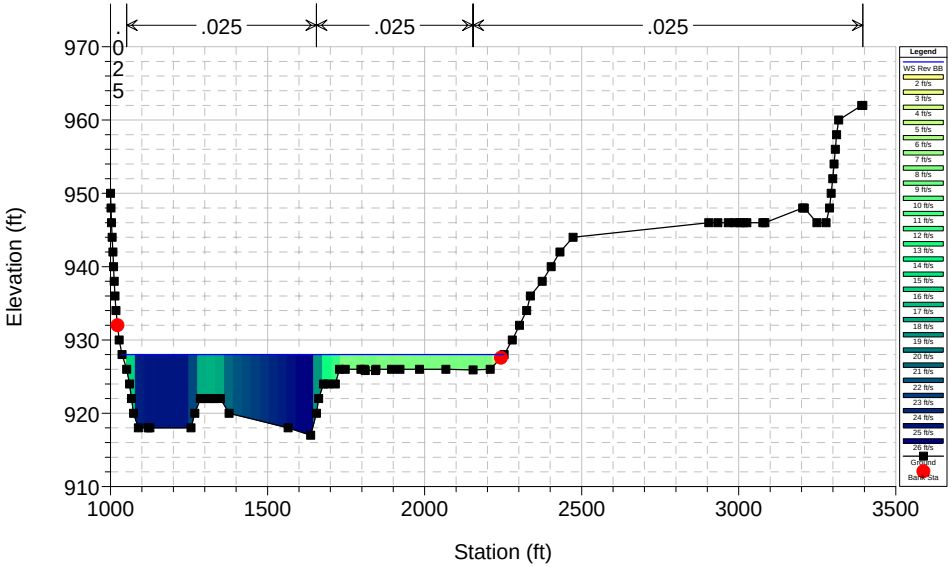
RS = 26780



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

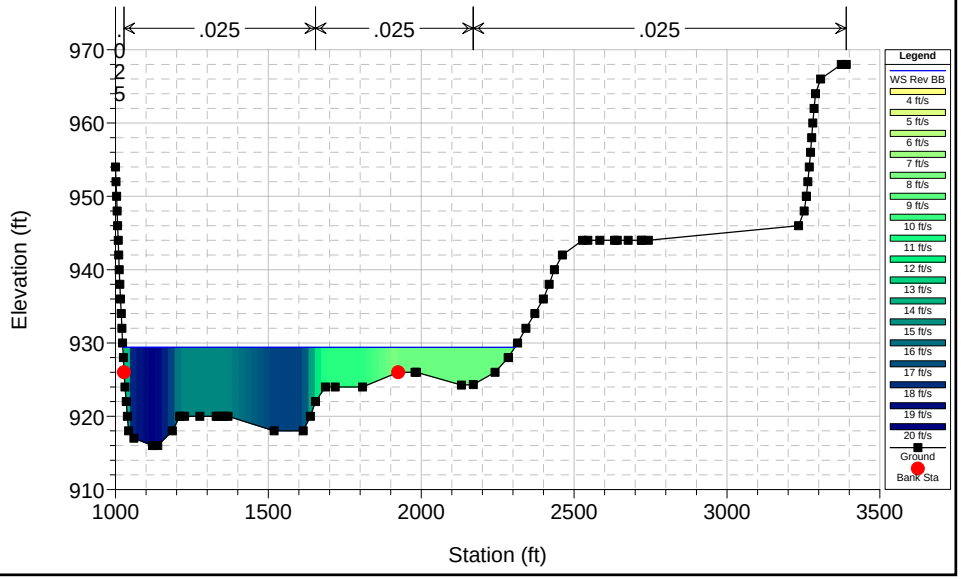
RS = 26575

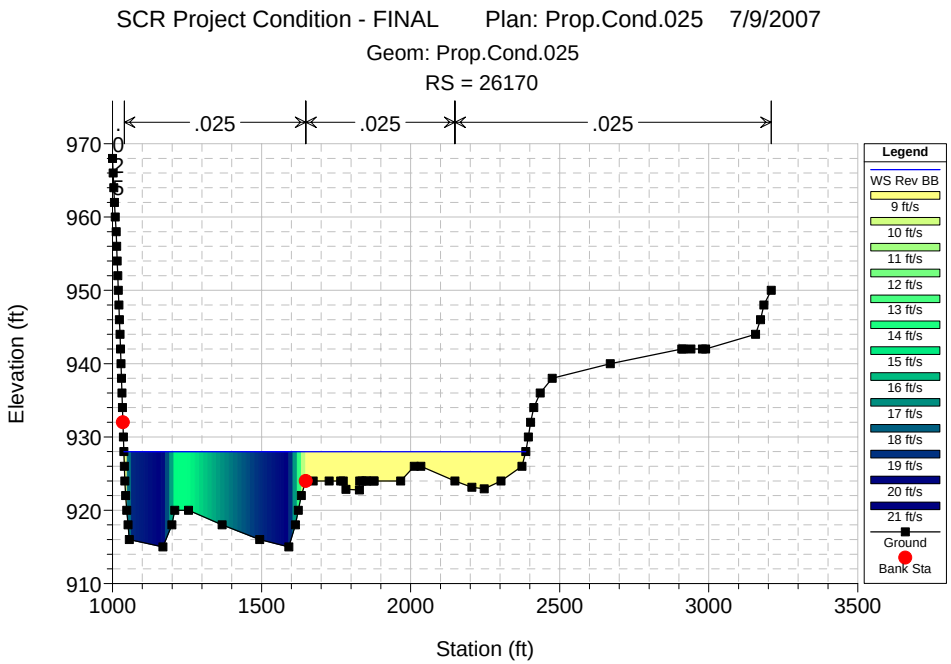


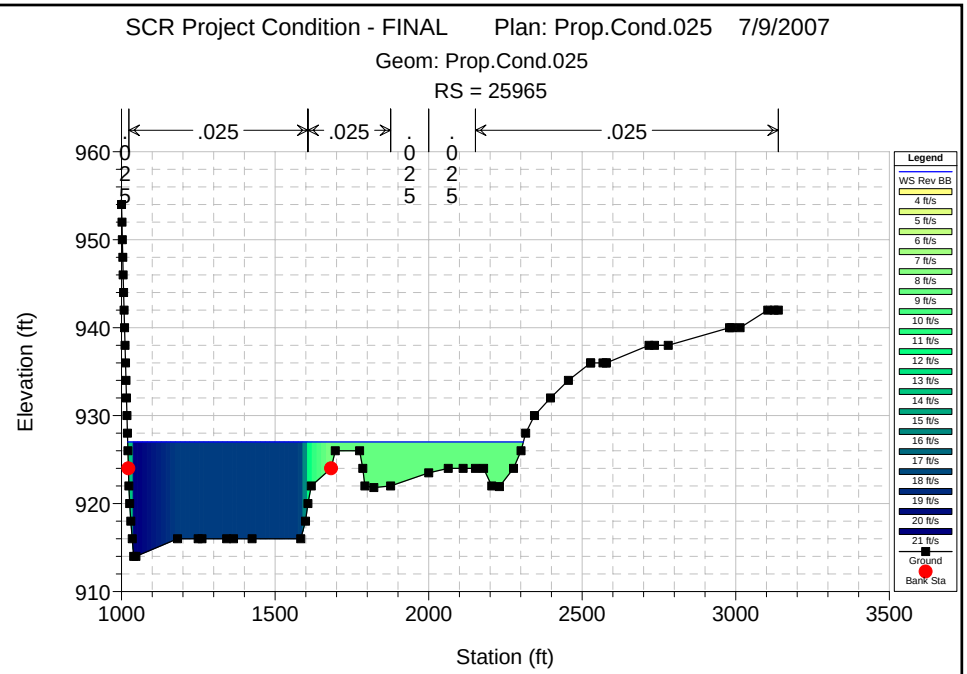
SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

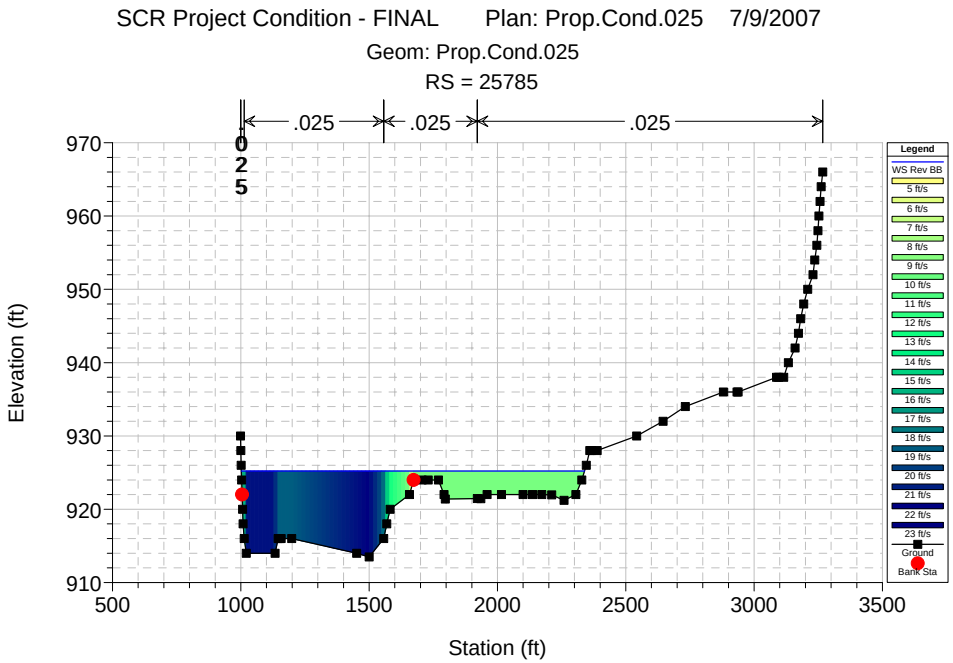
Geom: Prop.Cond.025

RS = 26355




SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 26170
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
20 ft/s
21 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 25965
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
20 ft/s
21 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 25785
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.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
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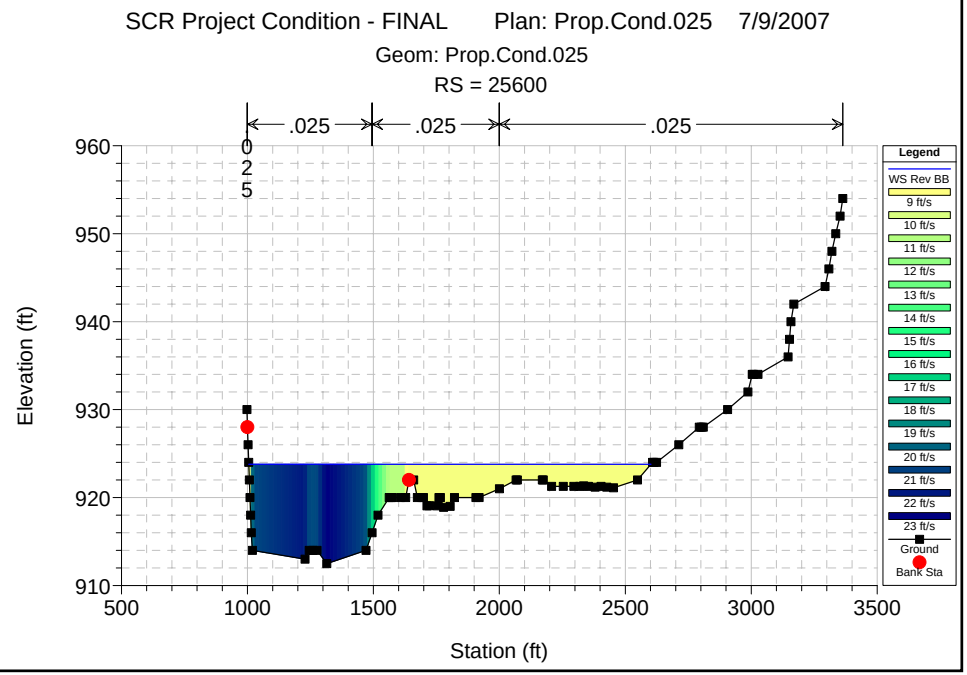
19 ft/s
20 ft/s
21 ft/s
22 ft/s
23 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 25600
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
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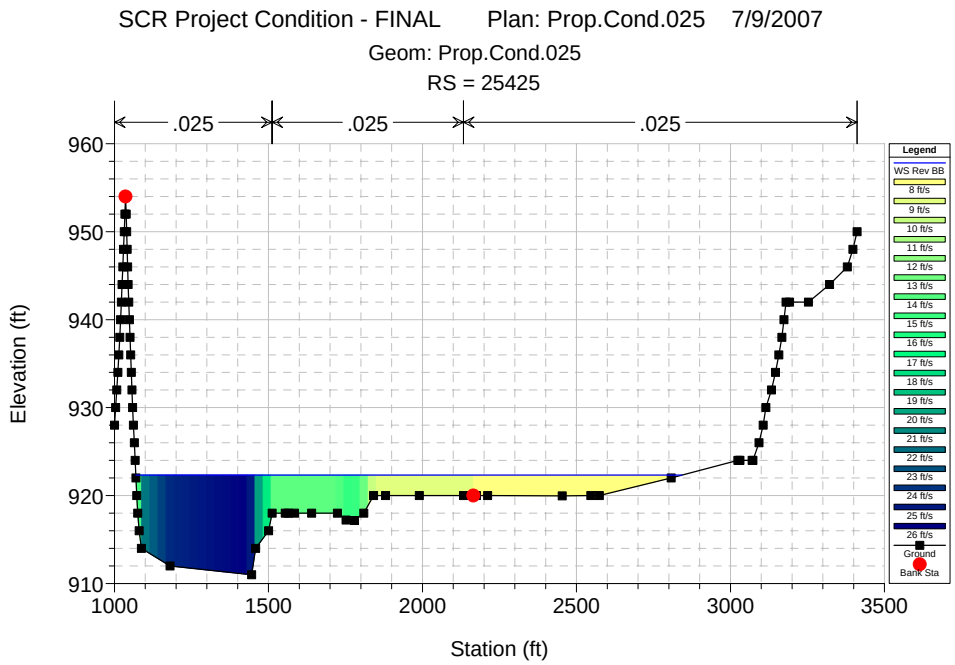
18 ft/s
19 ft/s
20 ft/s
21 ft/s
22 ft/s
23 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 25425
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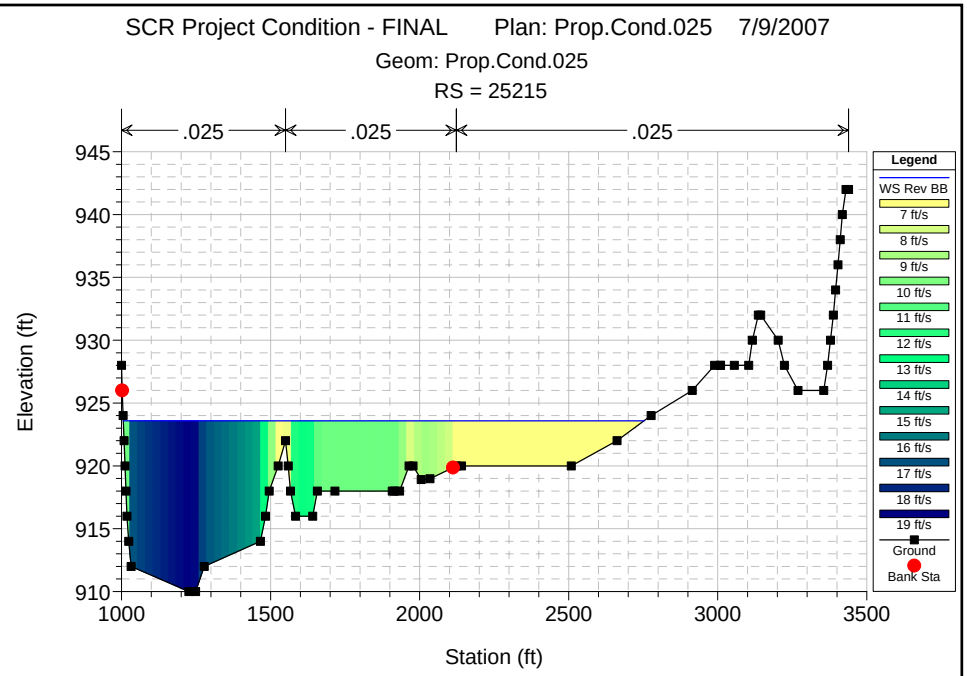
Elevation (ft)
Station (ft)
Legend
WS Rev BB
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
20 ft/s
21 ft/s
22 ft/s
23 ft/s
24 ft/s
25 ft/s
26 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 25215
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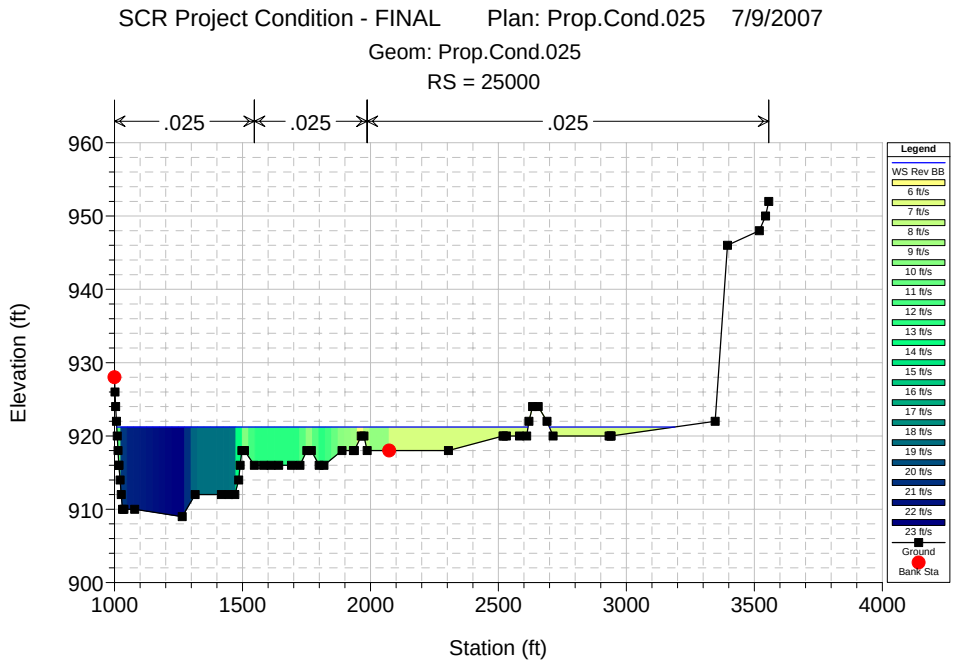
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 25000
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
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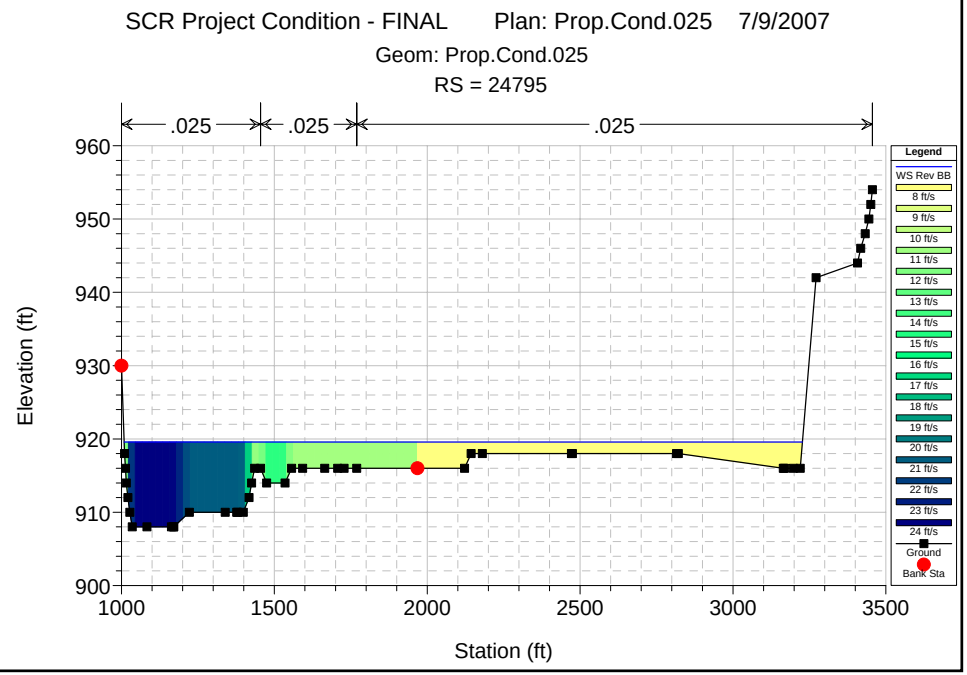
19 ft/s
20 ft/s
21 ft/s
22 ft/s
23 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 24795
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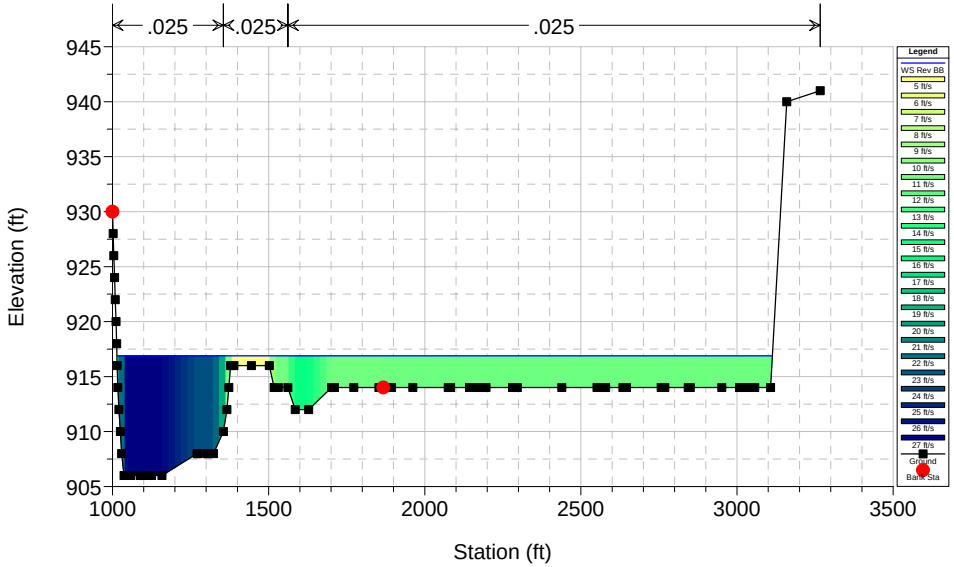
Elevation (ft)
Station (ft)
Legend
WS Rev BB
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
20 ft/s
21 ft/s
22 ft/s
23 ft/s
24 ft/s
Ground
Bank Sta

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

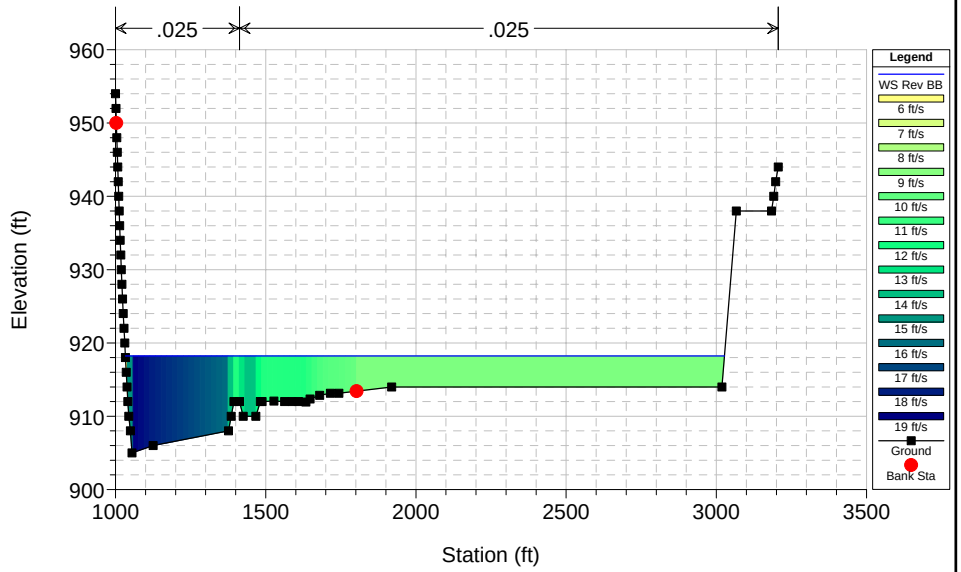
RS = 24550



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

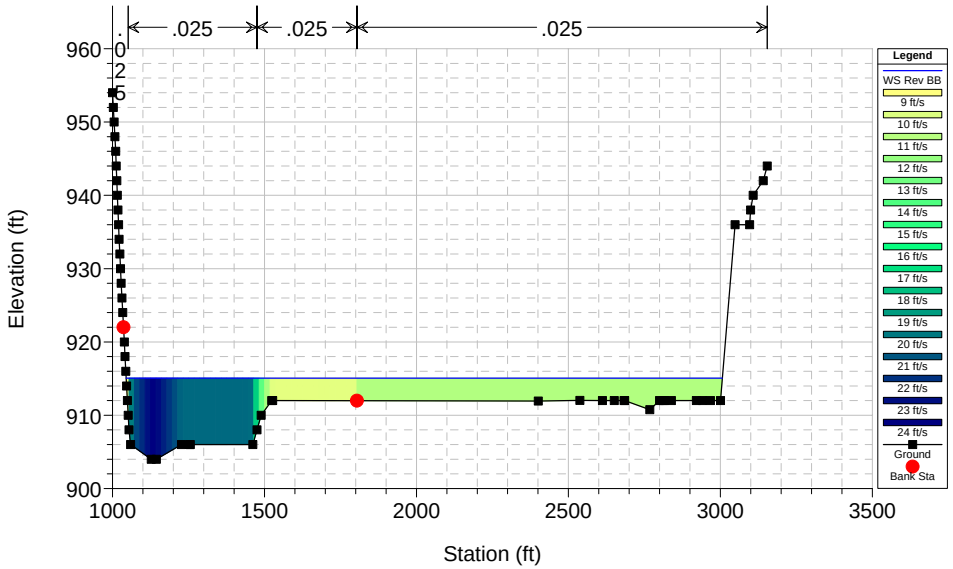
RS = 24335



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

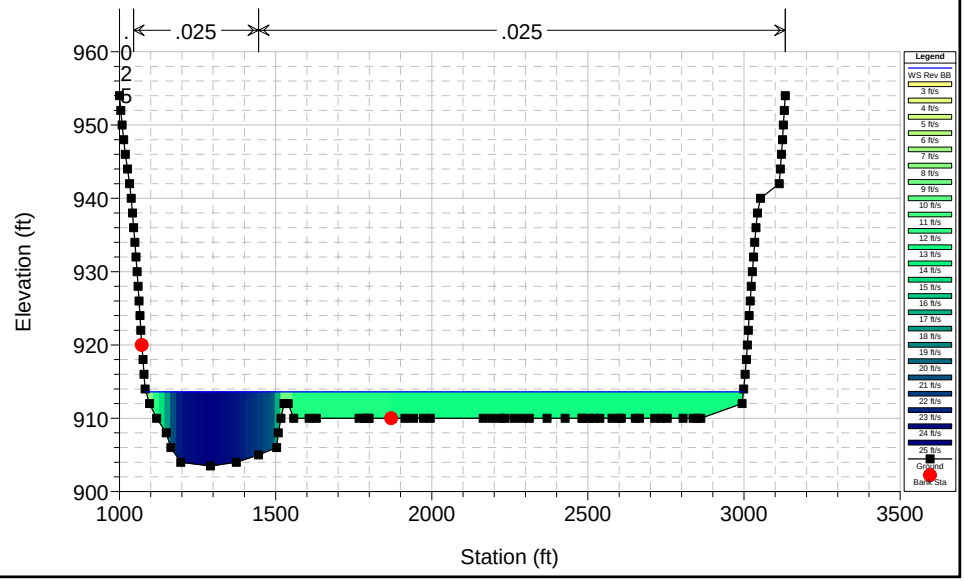
RS = 24115

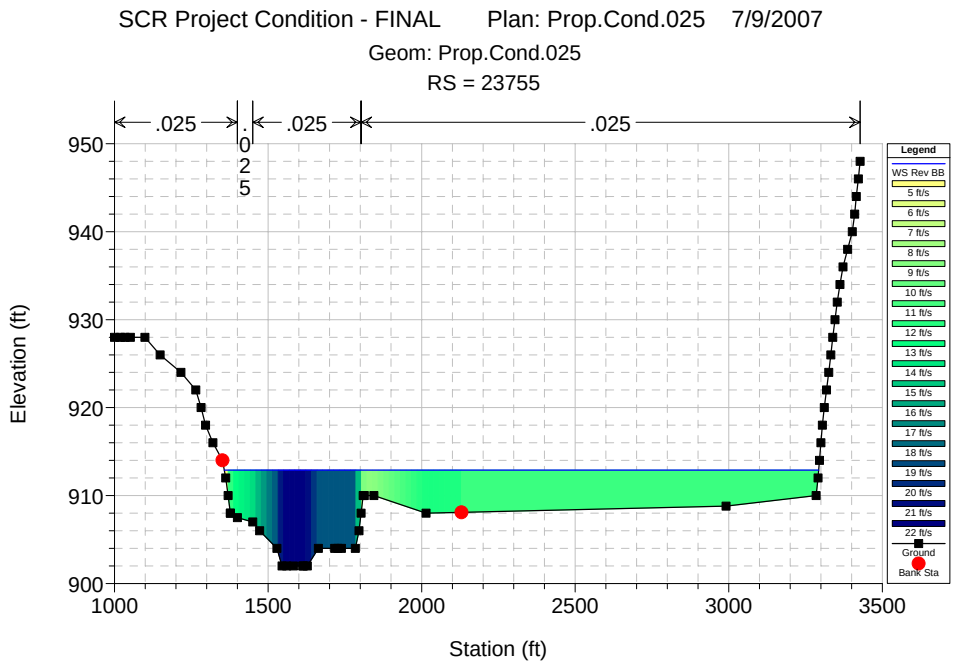


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

RS = 23975




SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 23755
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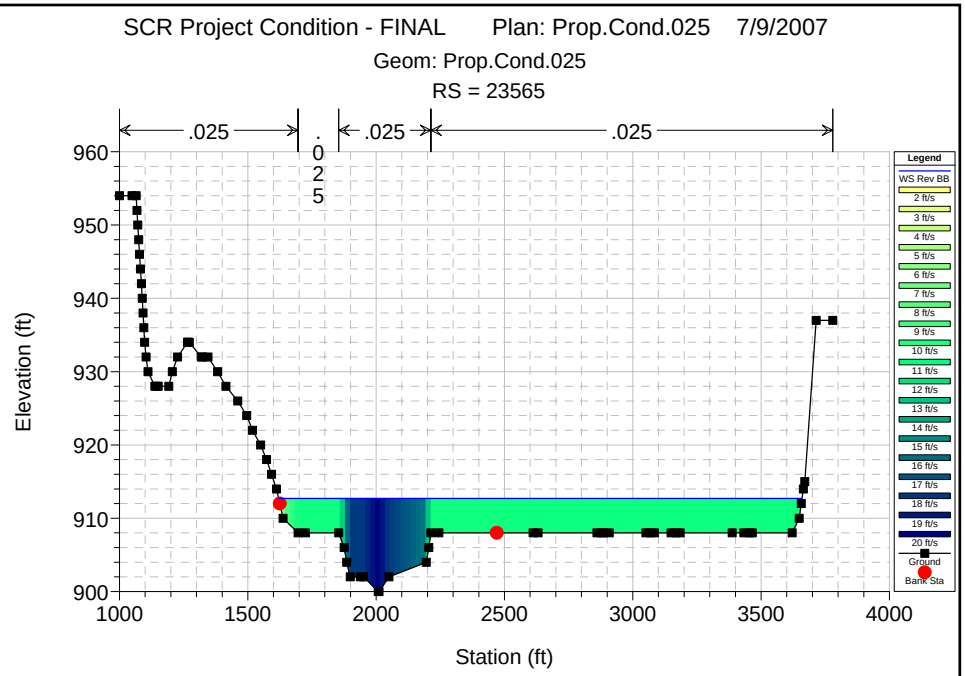
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
20 ft/s
21 ft/s
22 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 23565
.025
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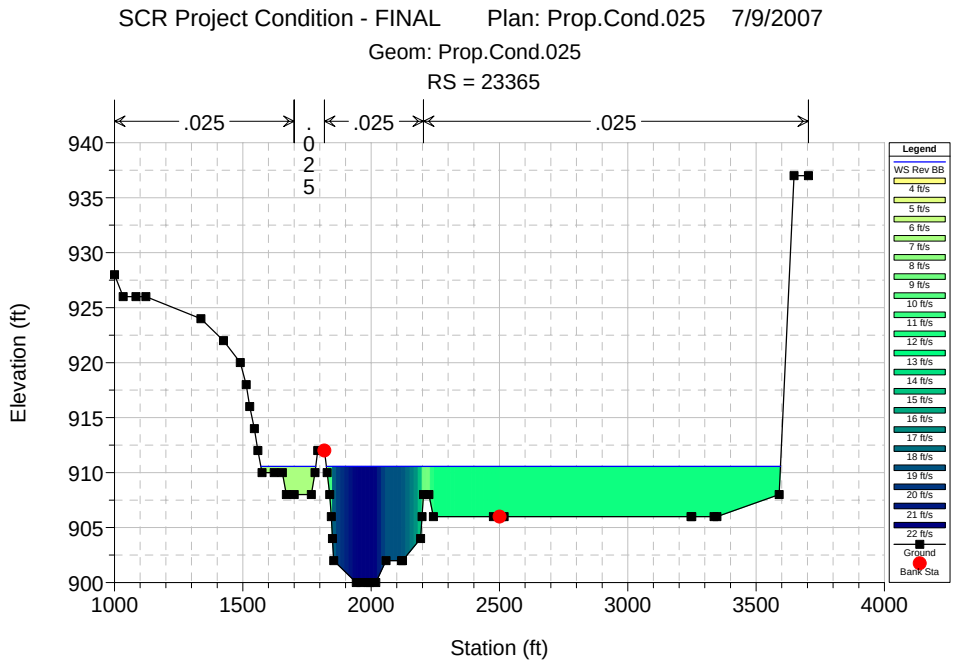
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
20 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 23365
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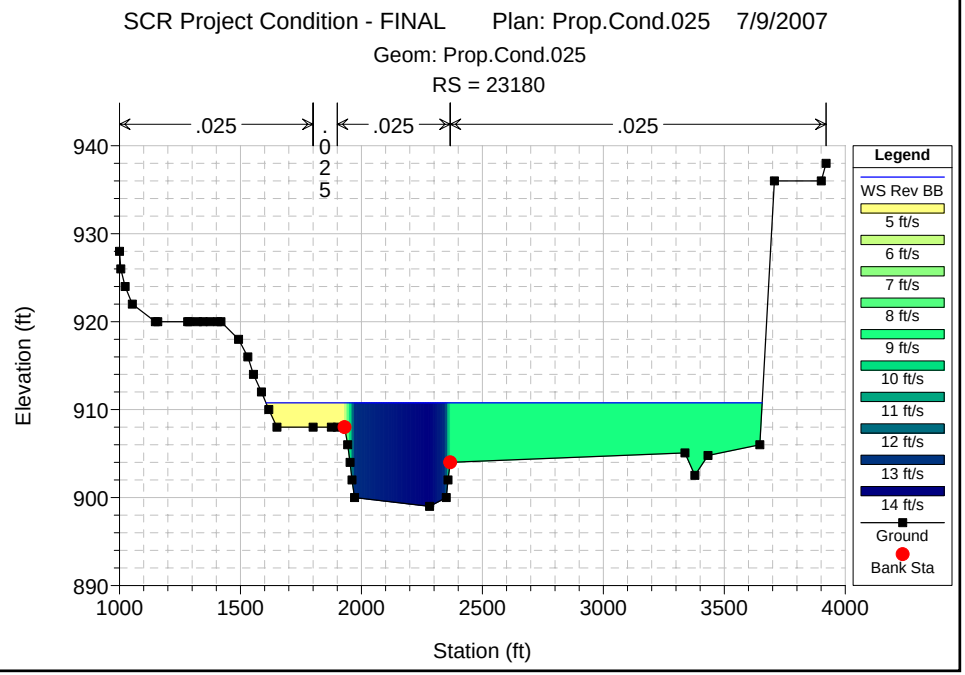
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
20 ft/s
21 ft/s
22 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 23180
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.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
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9 ft/s
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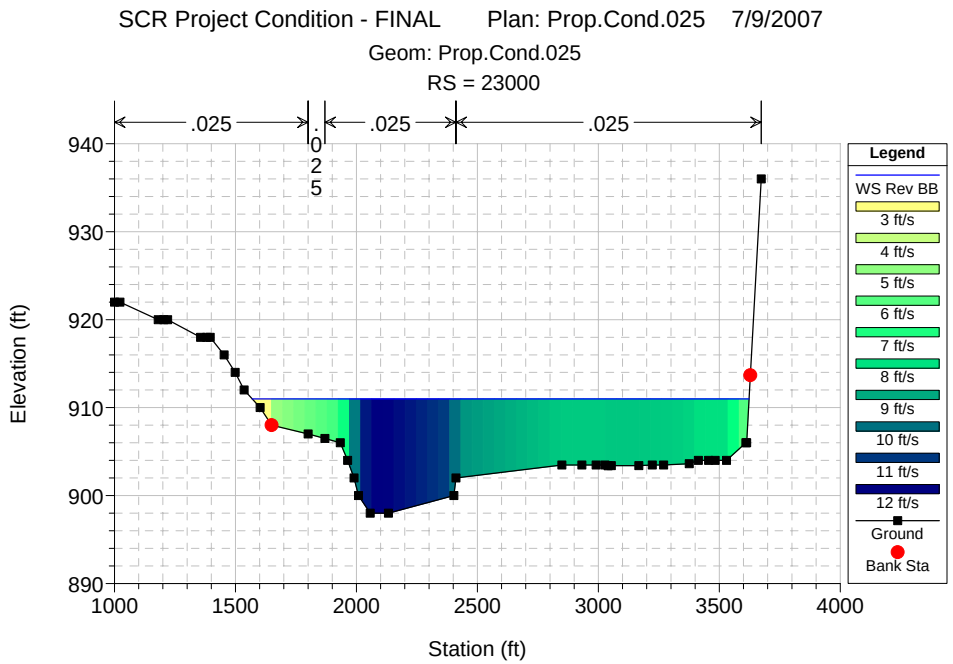
13 ft/s
14 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 23000
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.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
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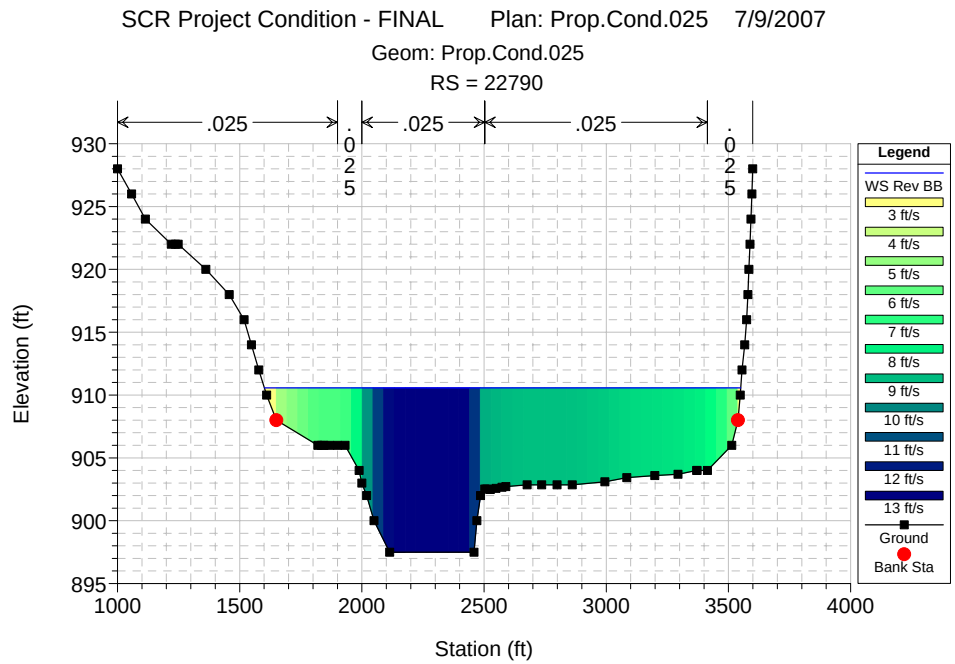
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 22790
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.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
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8 ft/s
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10 ft/s
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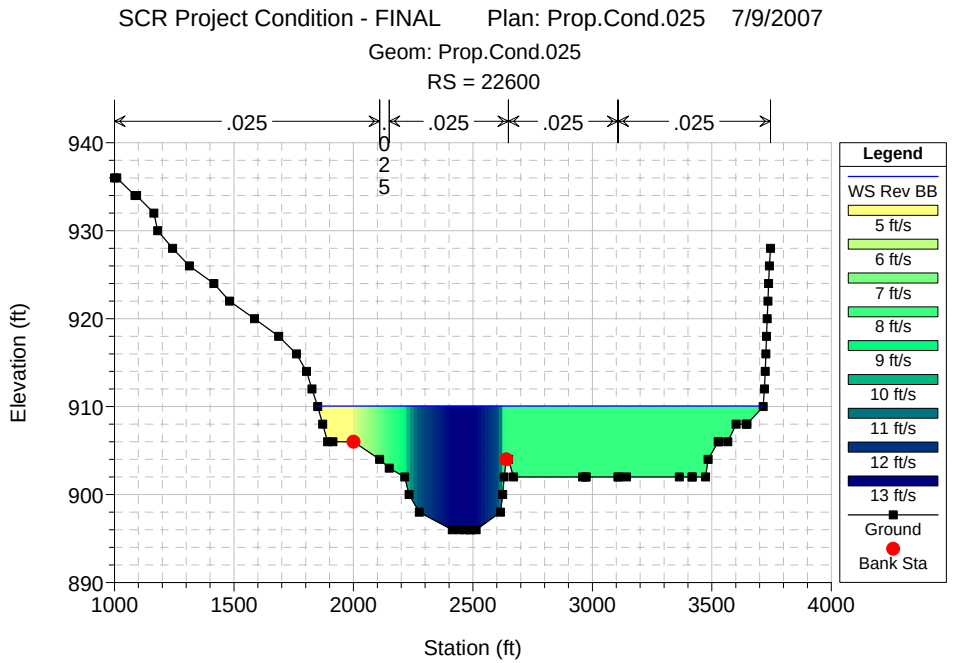
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 22600
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.025
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
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7 ft/s
8 ft/s
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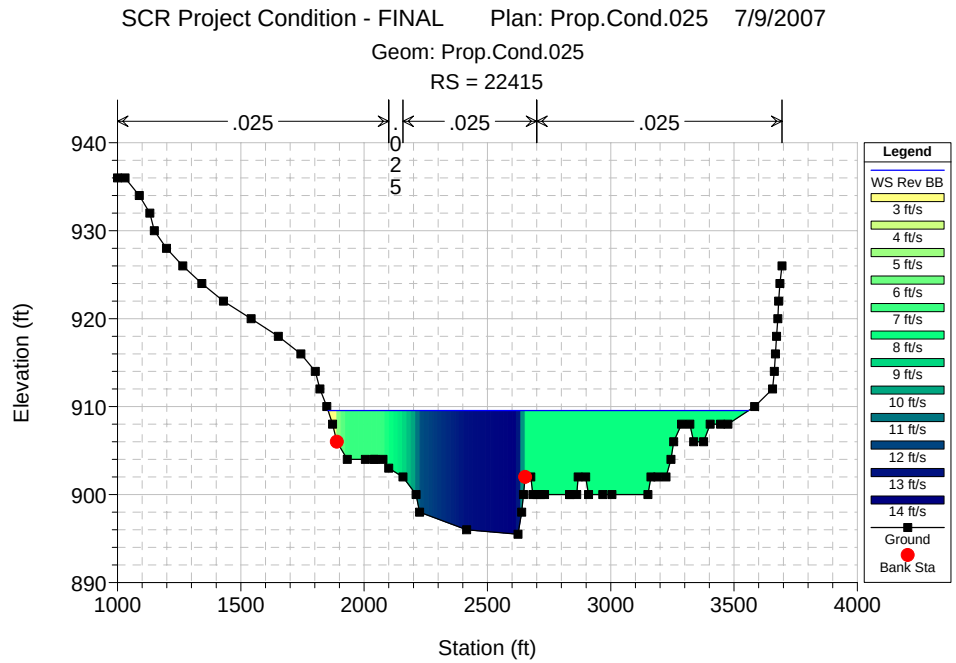
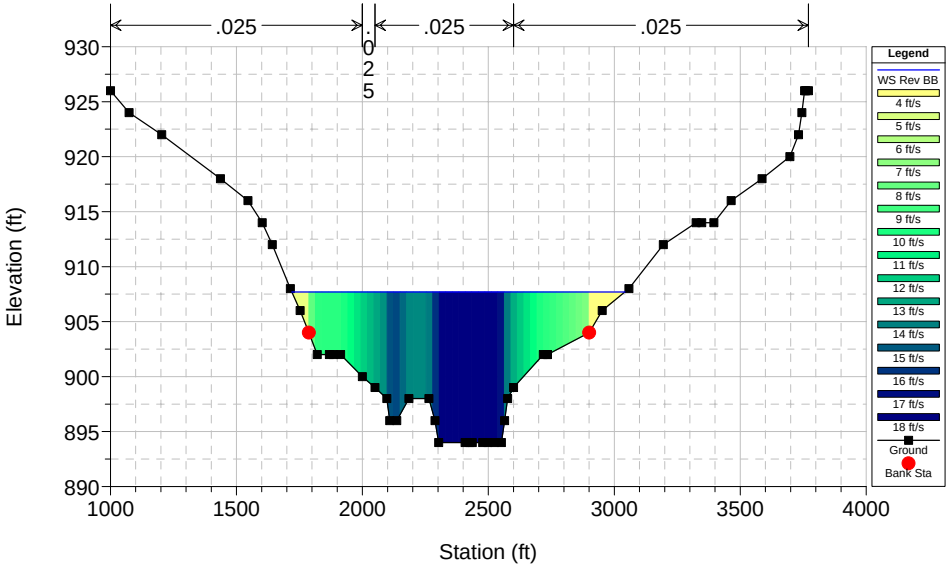
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 22415
.025
.025
.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
Ground
Bank Sta

SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

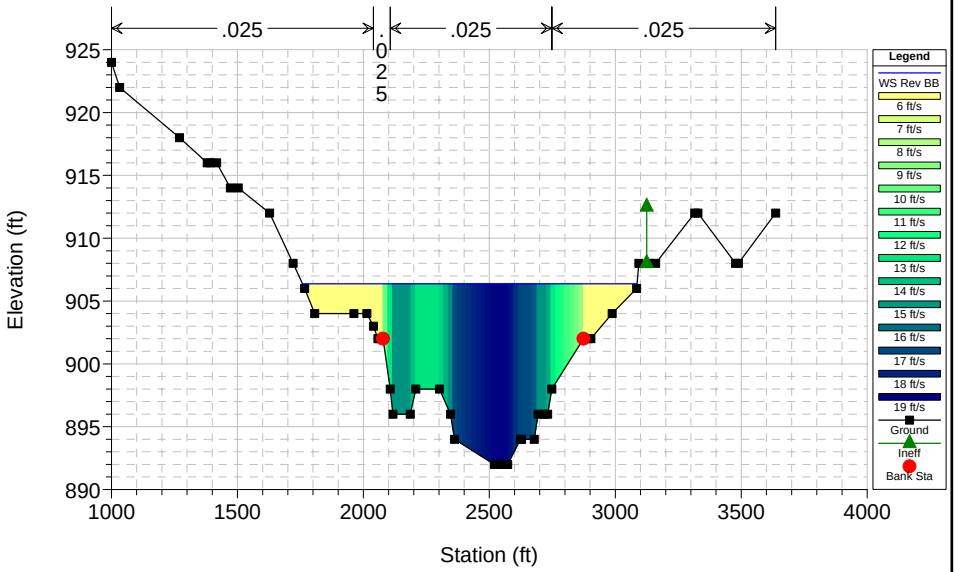
RS = 22195



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

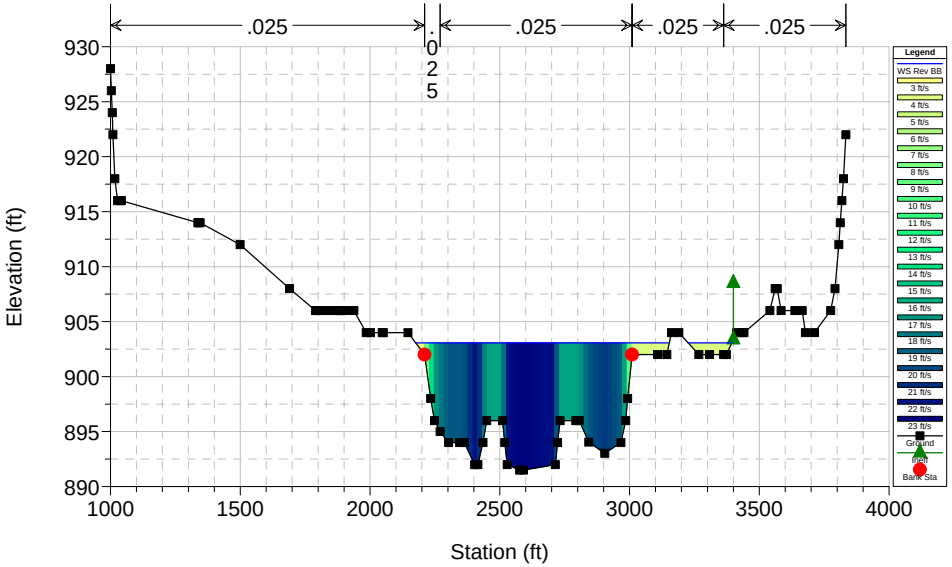
RS = 22010



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

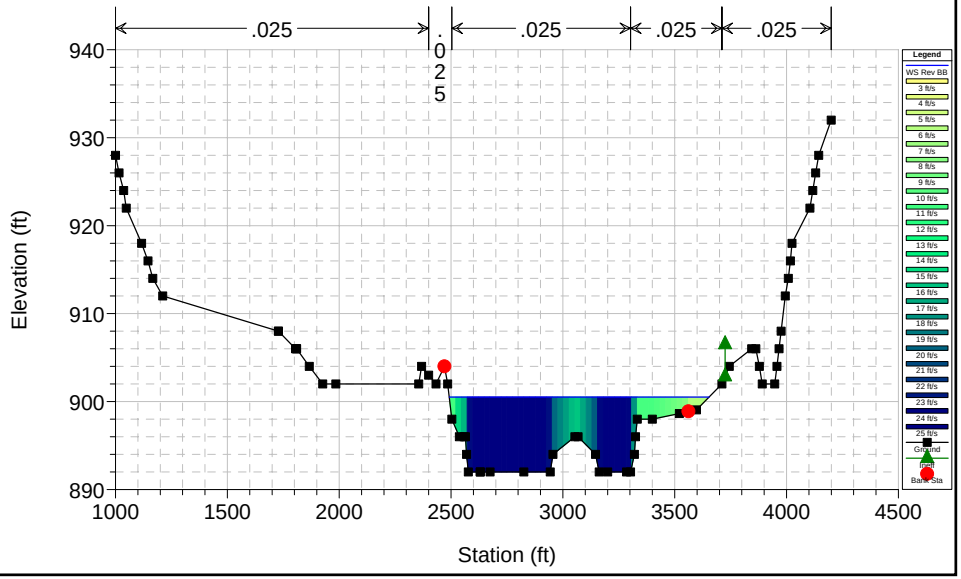
RS = 21790



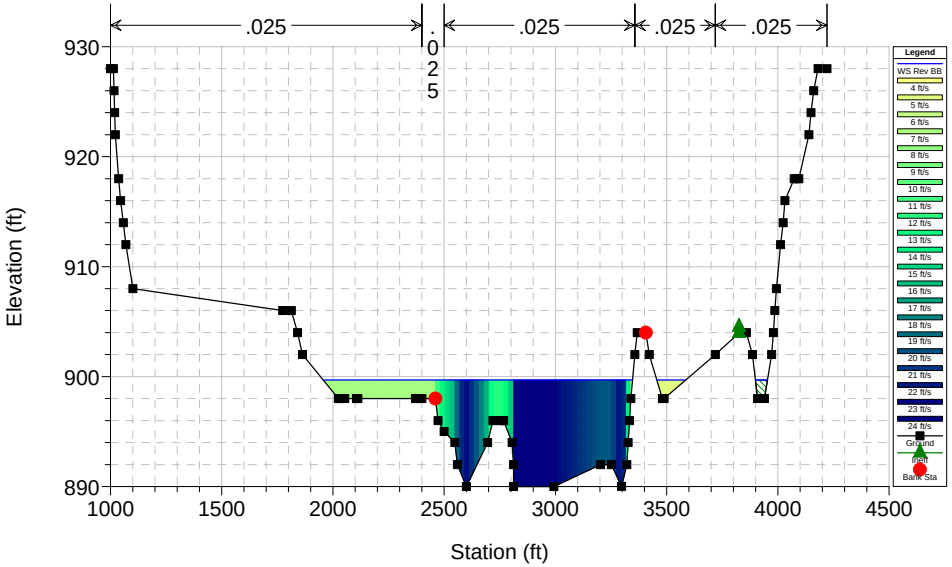
SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007

Geom: Prop.Cond.025

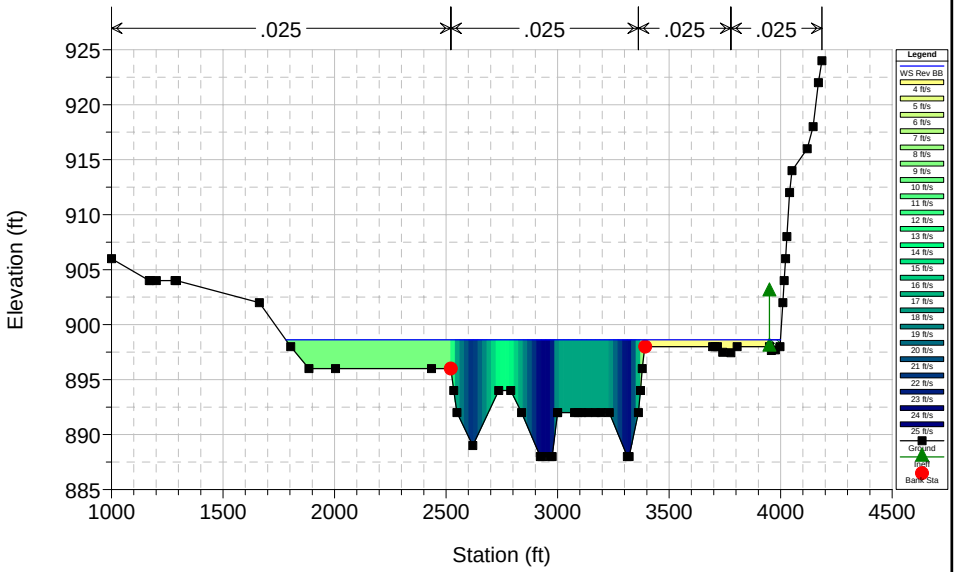
RS = 21615



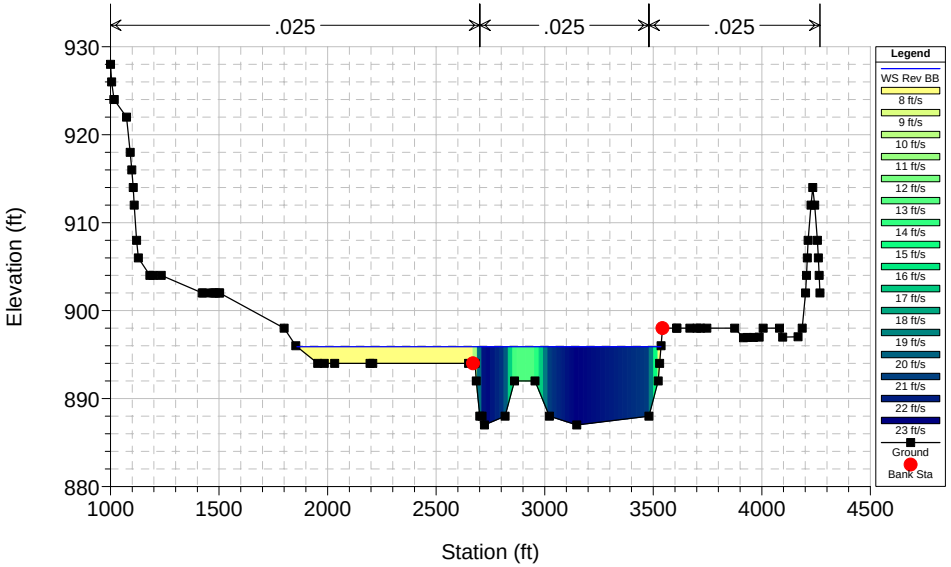
SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 21440



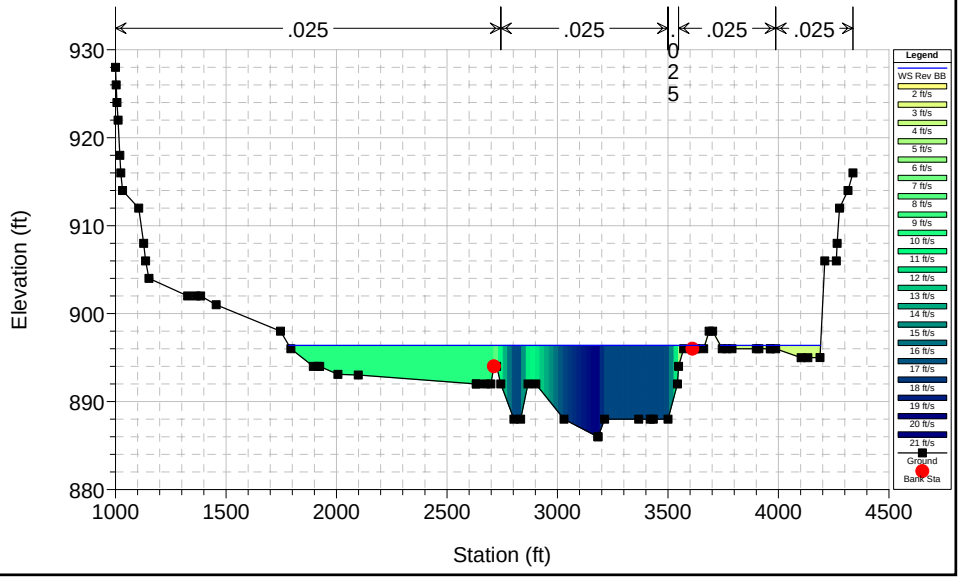
SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 21225

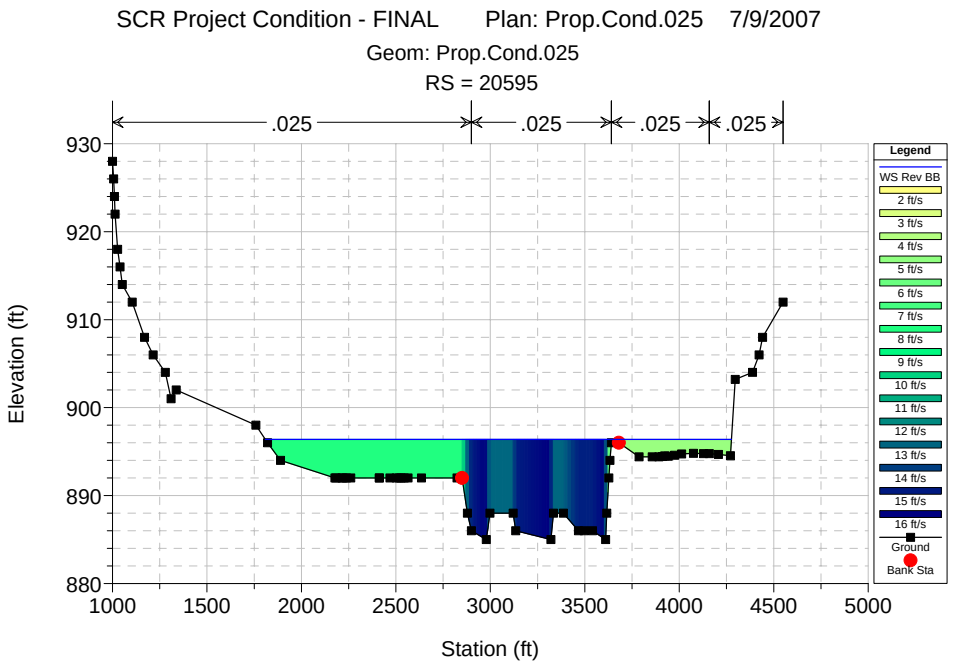


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 21020



SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 20845




SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 20595
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.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
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11 ft/s
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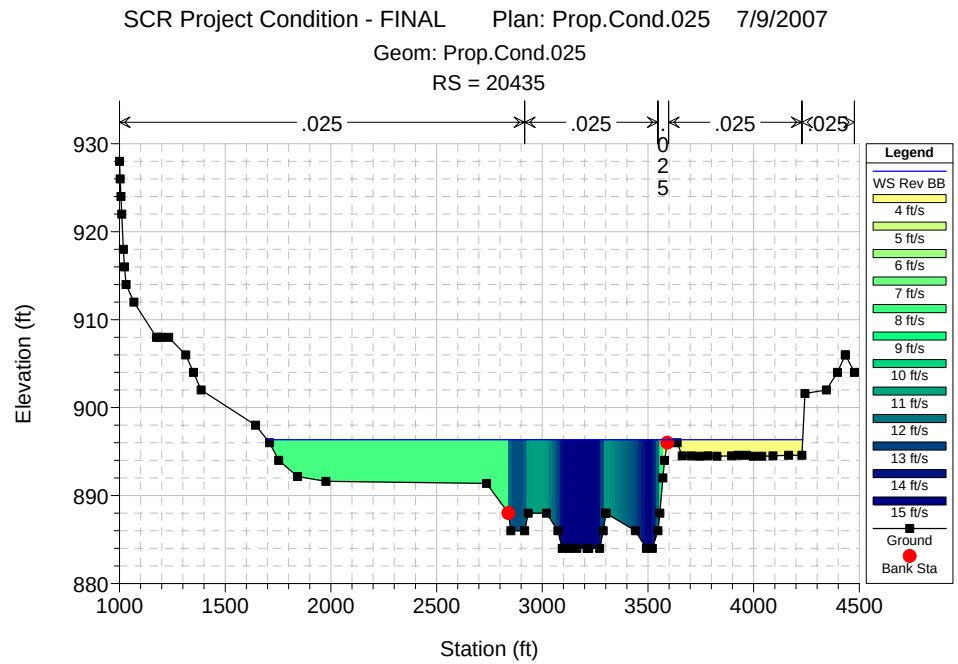
16 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 20435
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.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
4 ft/s
5 ft/s
6 ft/s
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10 ft/s
11 ft/s
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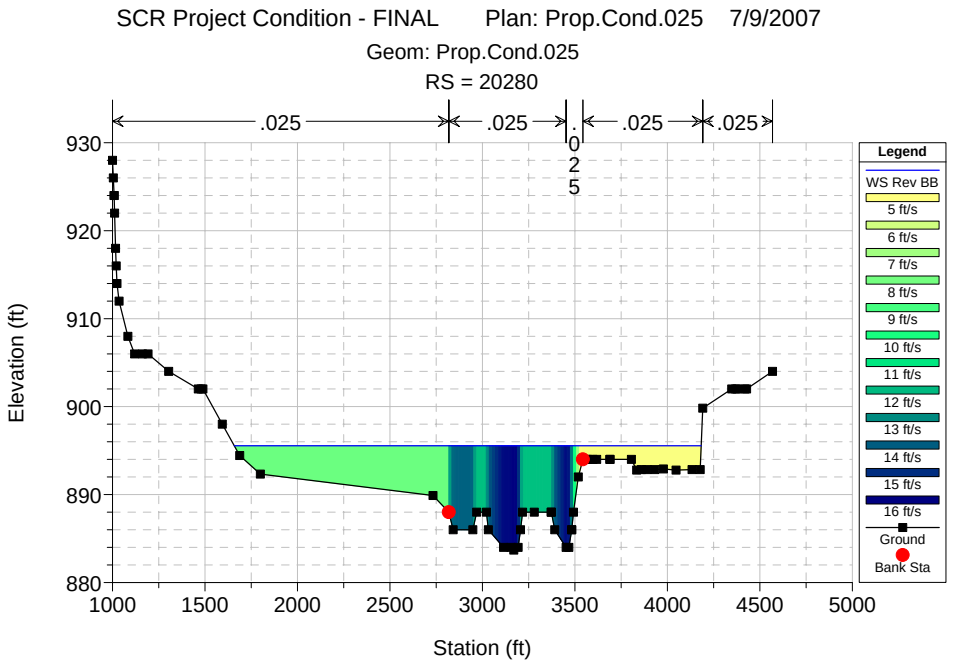
15 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 20280
.025
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.025
.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
6 ft/s
7 ft/s
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11 ft/s
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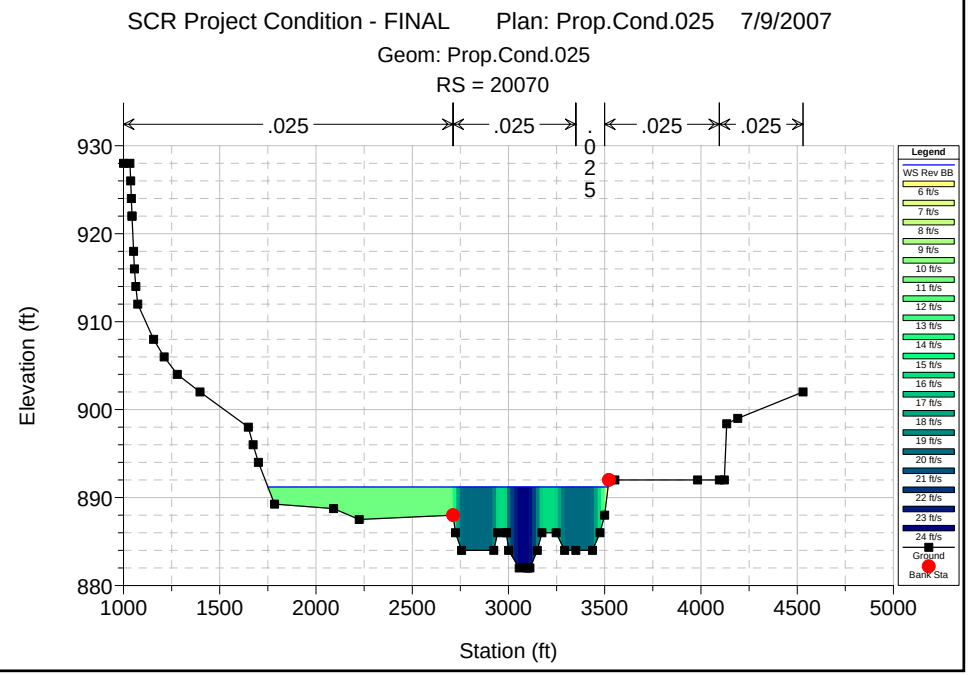
16 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 20070
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.025
Elevation (ft)
Station (ft)
Legend
WS Rev BB
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
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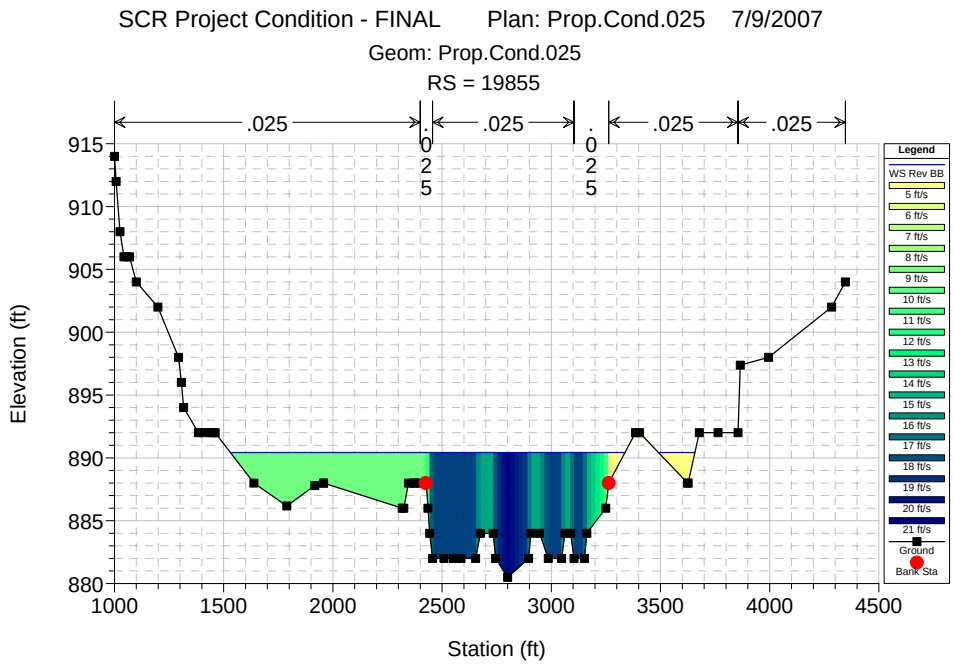
24 ft/s
Ground
Bank Sta


SCR Project Condition - FINAL Plan: Prop.Cond.025 7/9/2007
Geom: Prop.Cond.025
RS = 19855
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Elevation (ft)
Station (ft)
Legend
WS Rev BB
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
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12 ft/s
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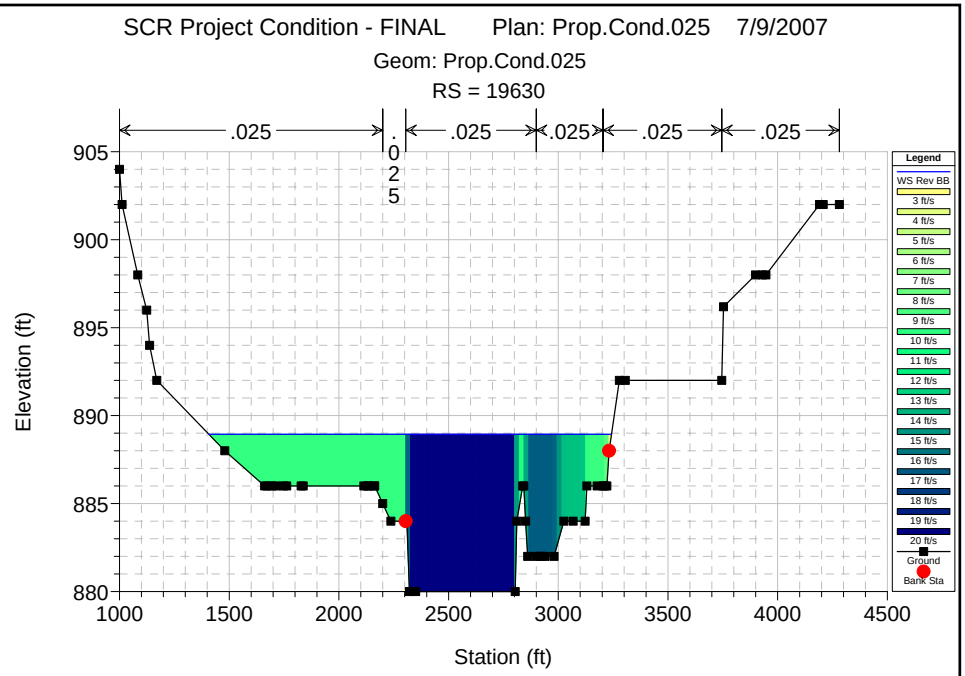
Ground
Bank Sta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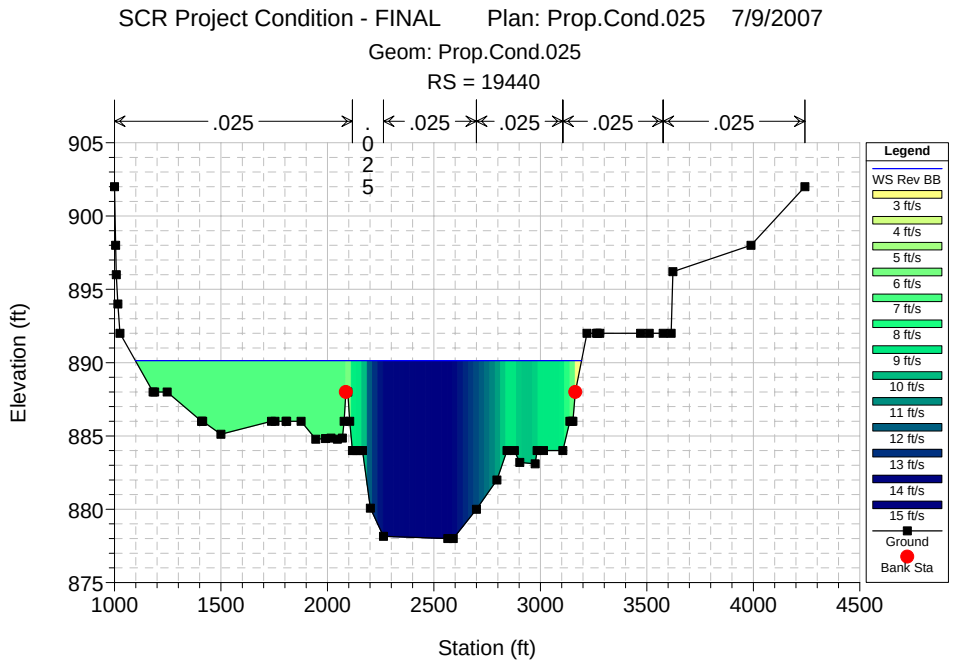
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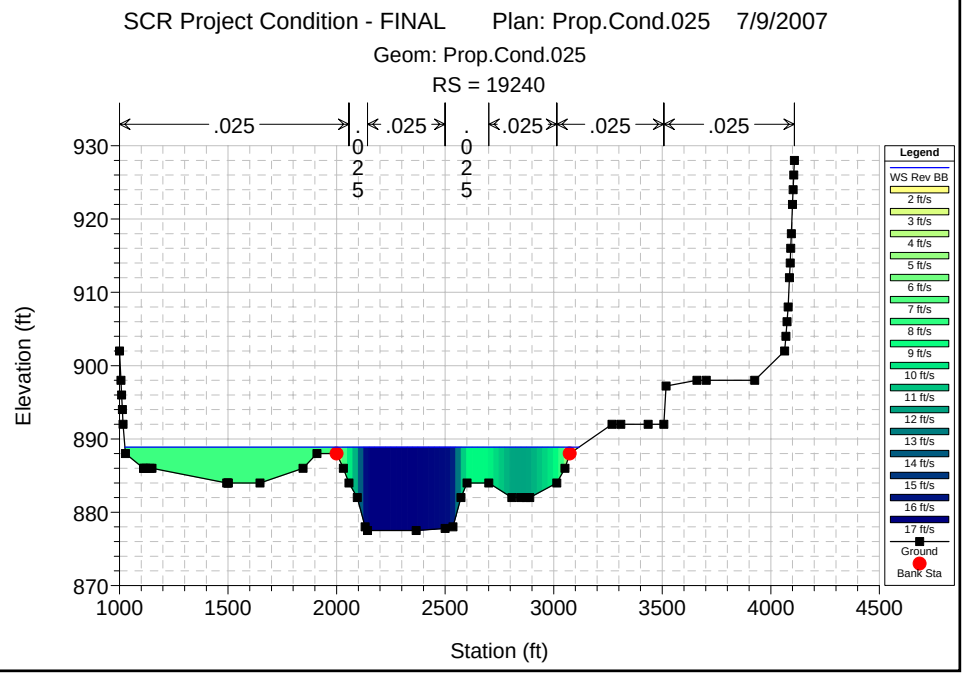
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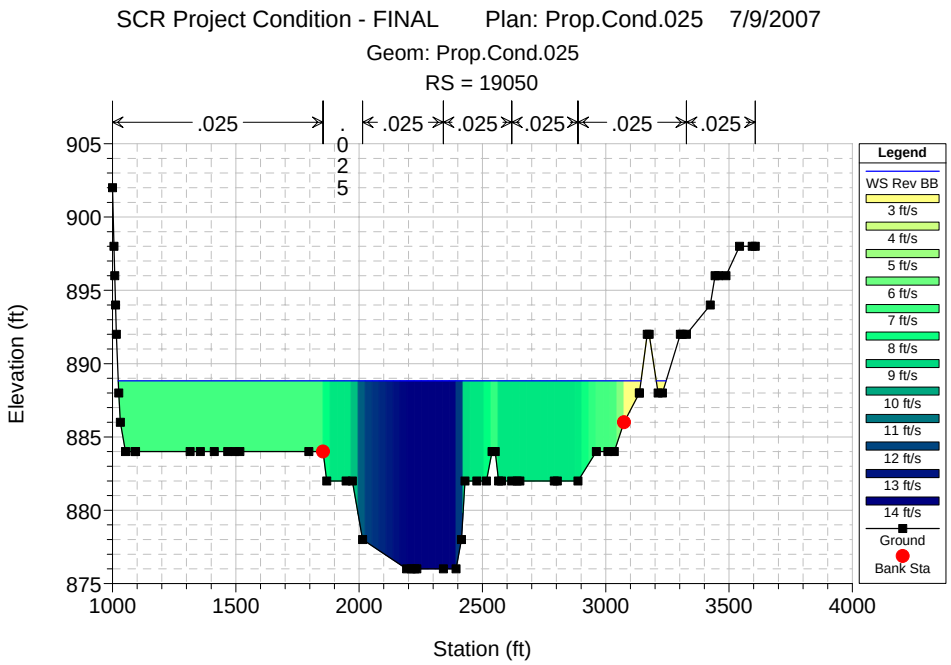
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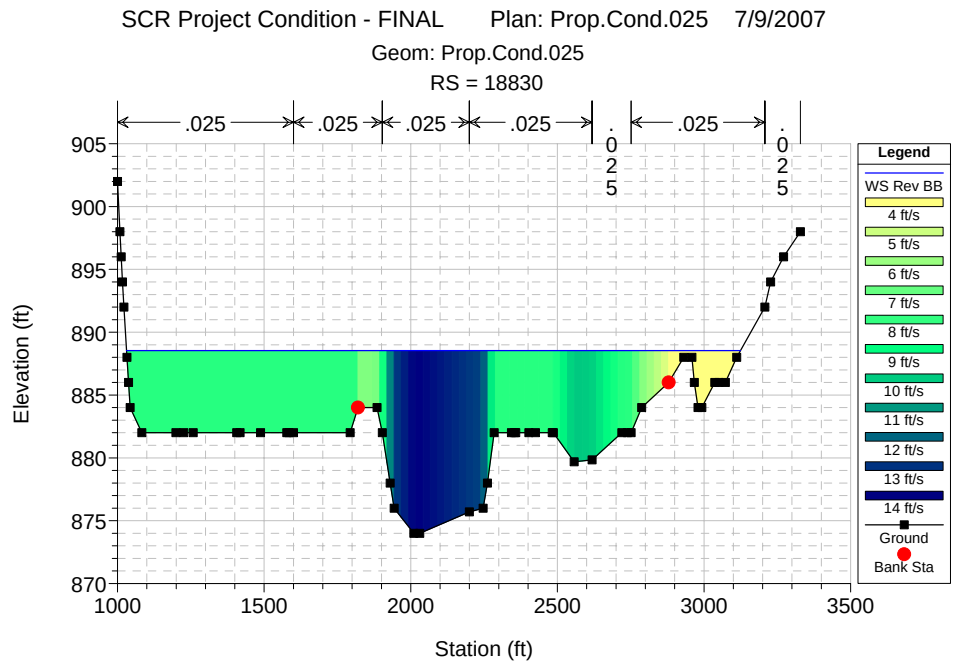
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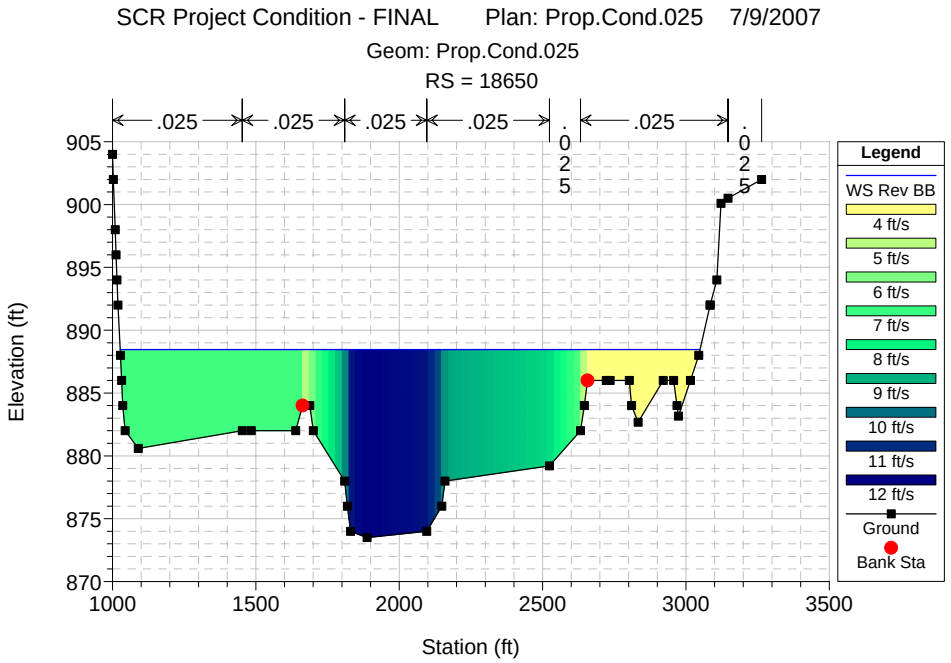
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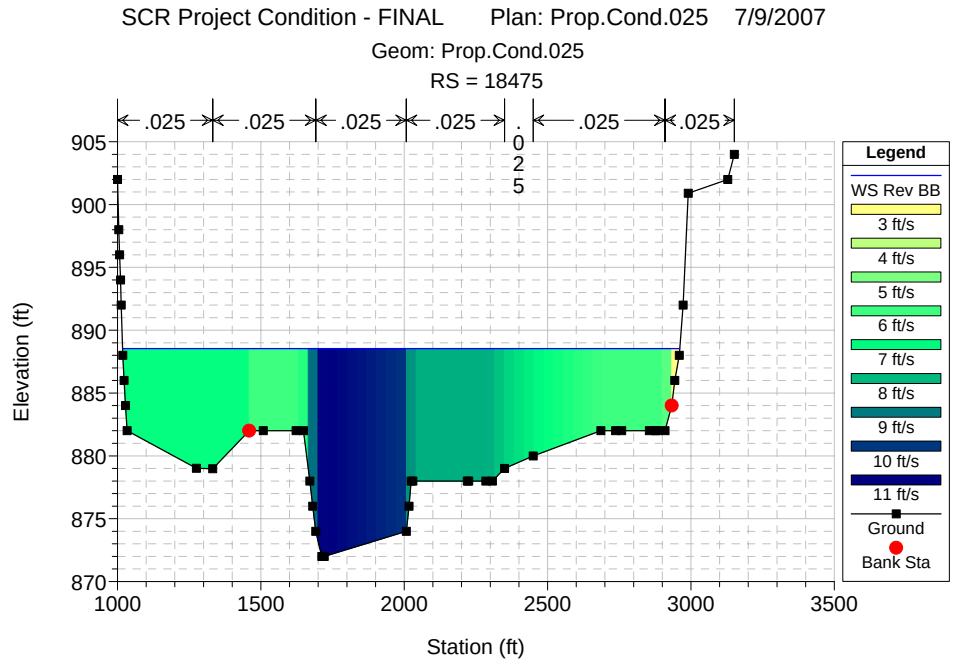
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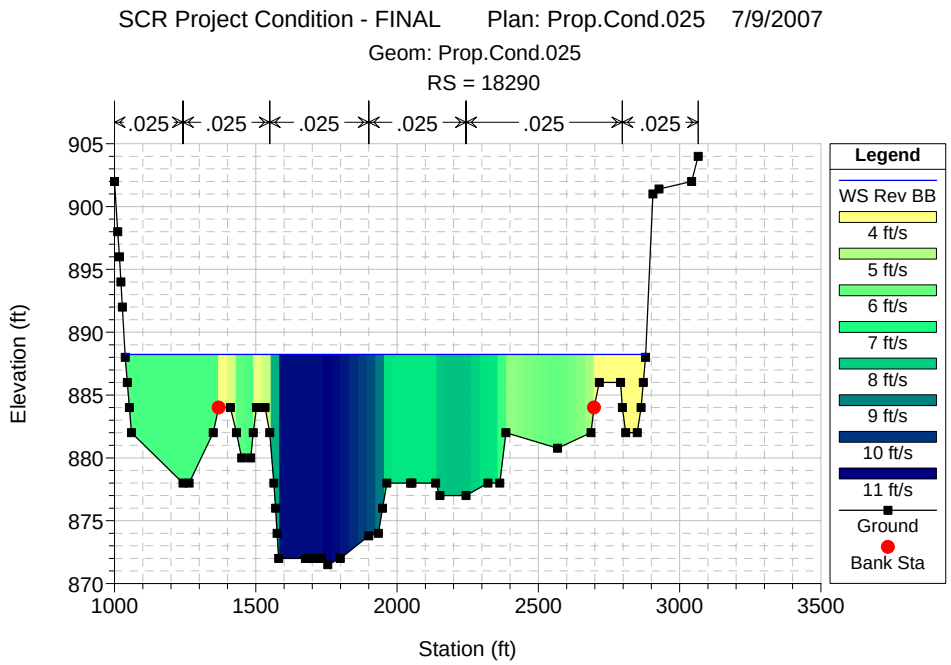
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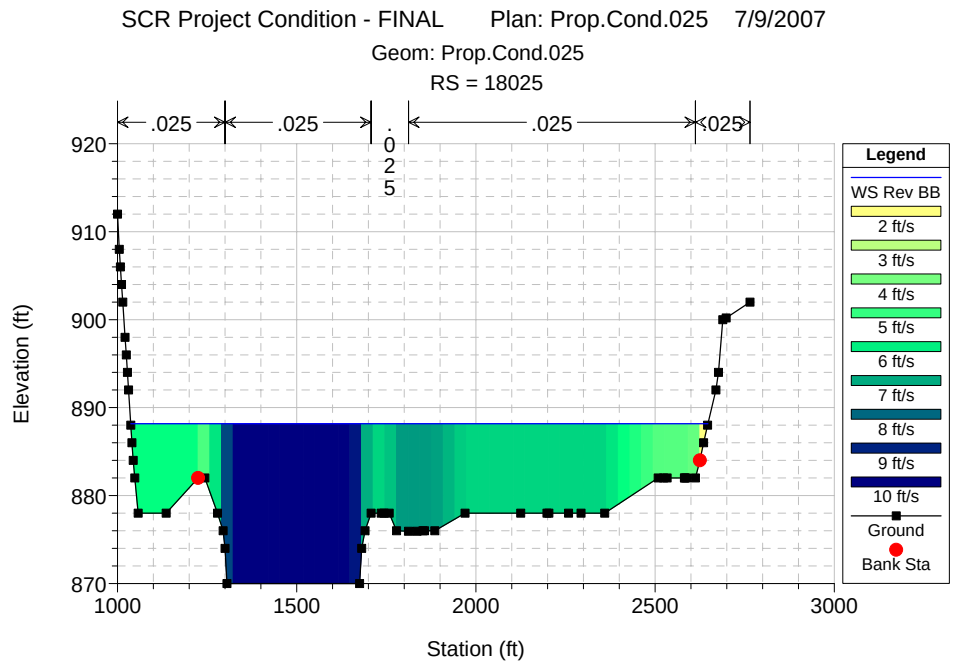
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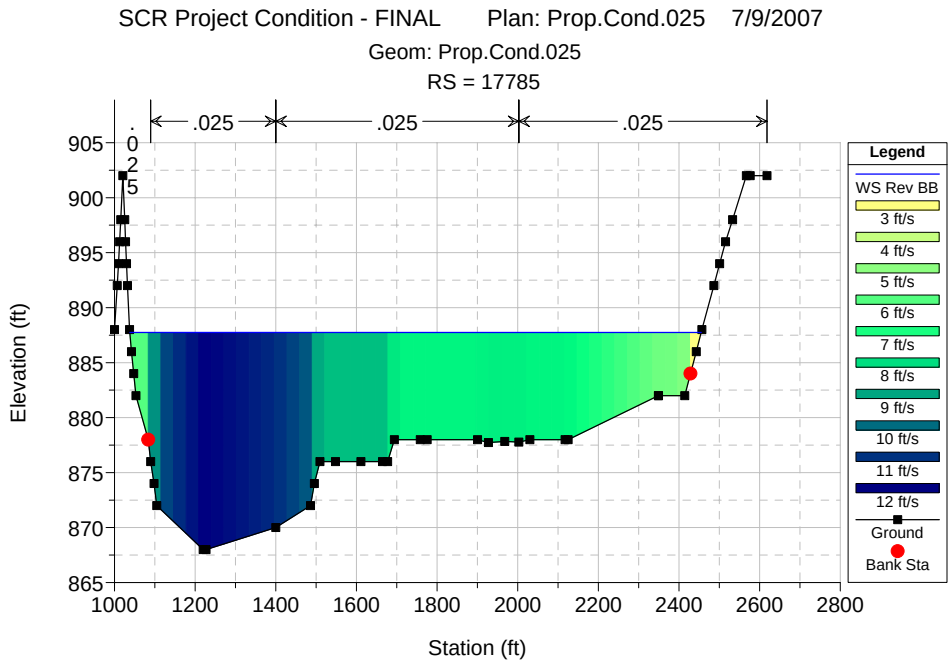
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Legend
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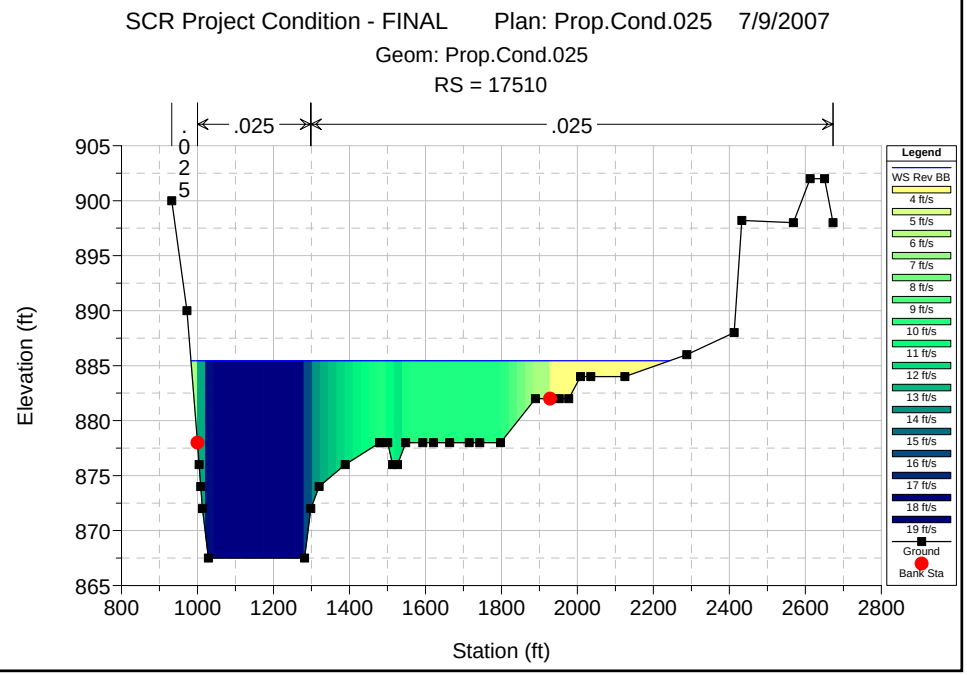
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Ground
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Geom: Prop.Cond.025

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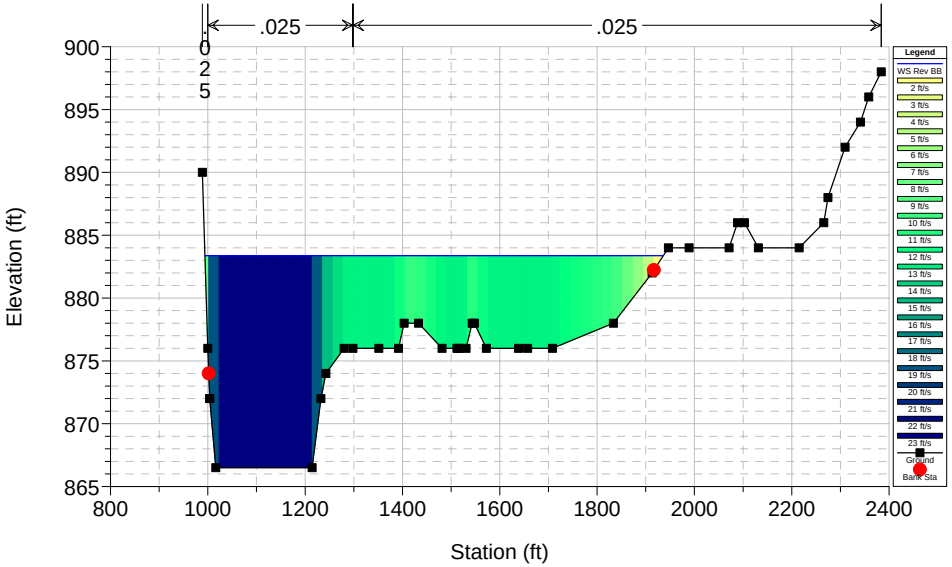

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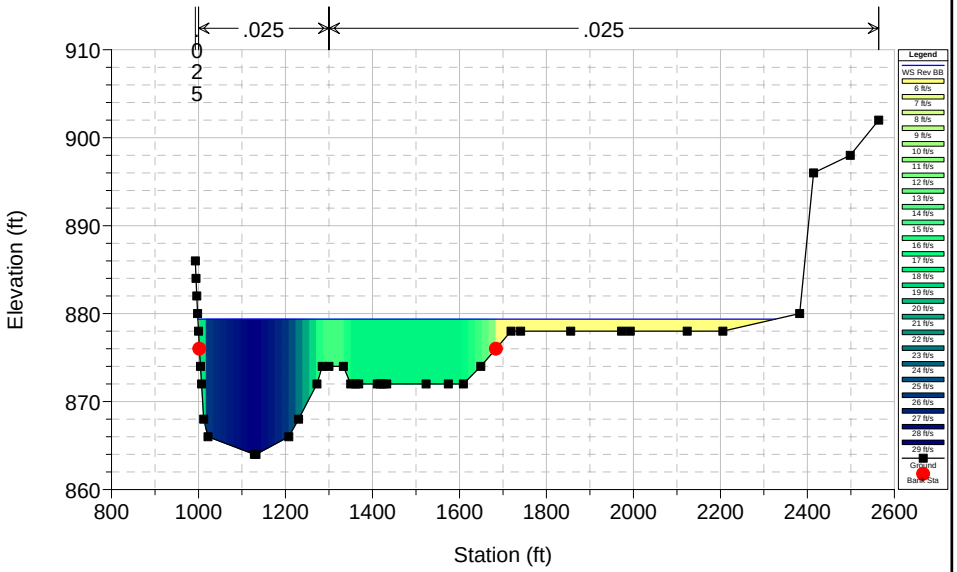

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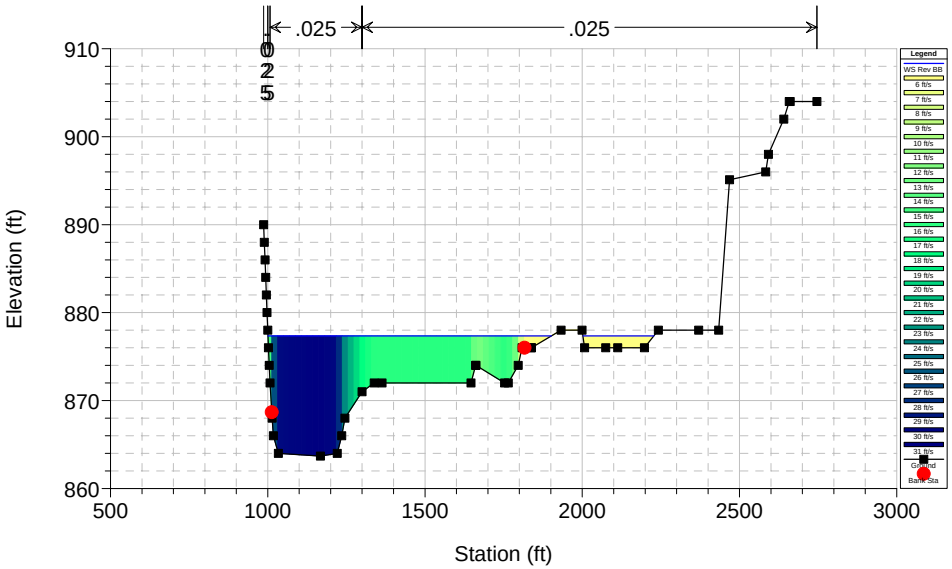

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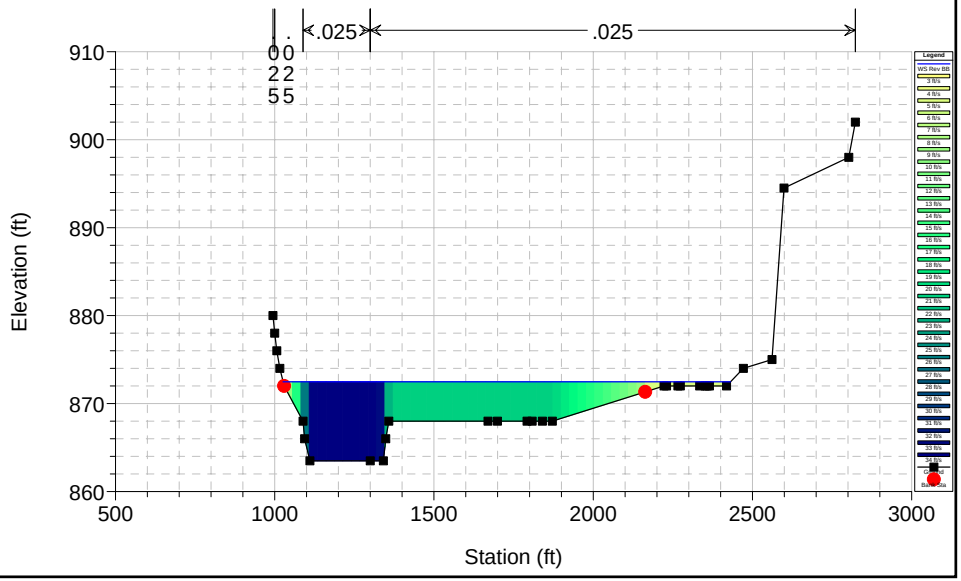

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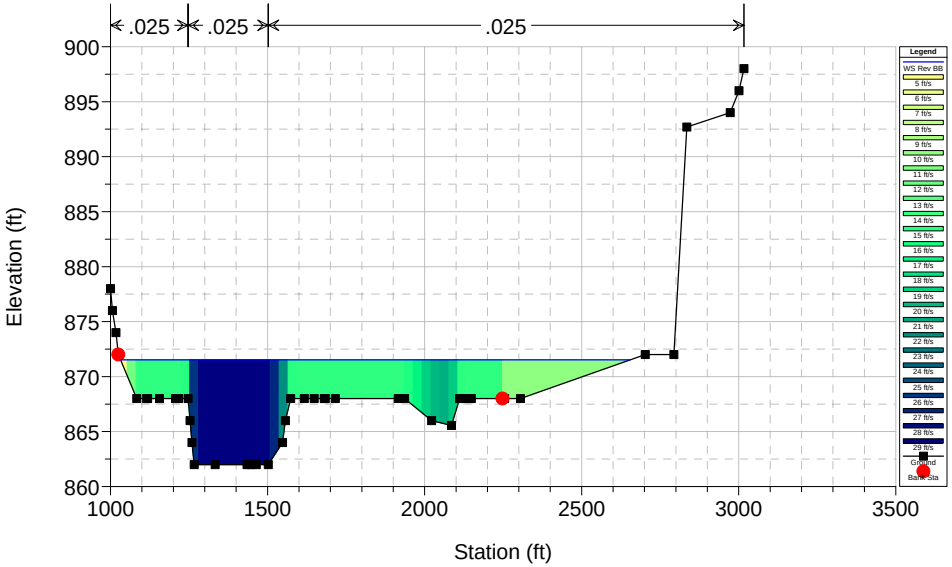

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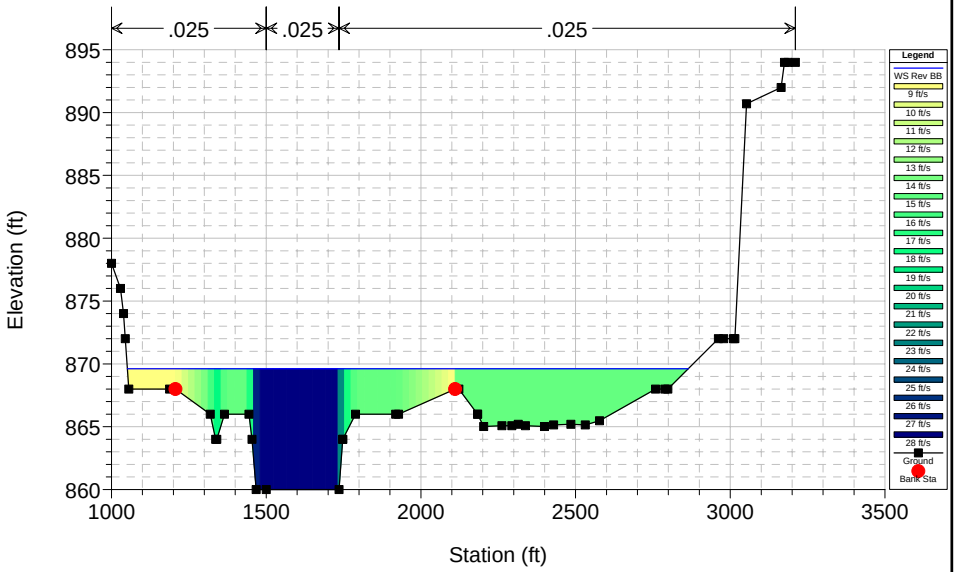

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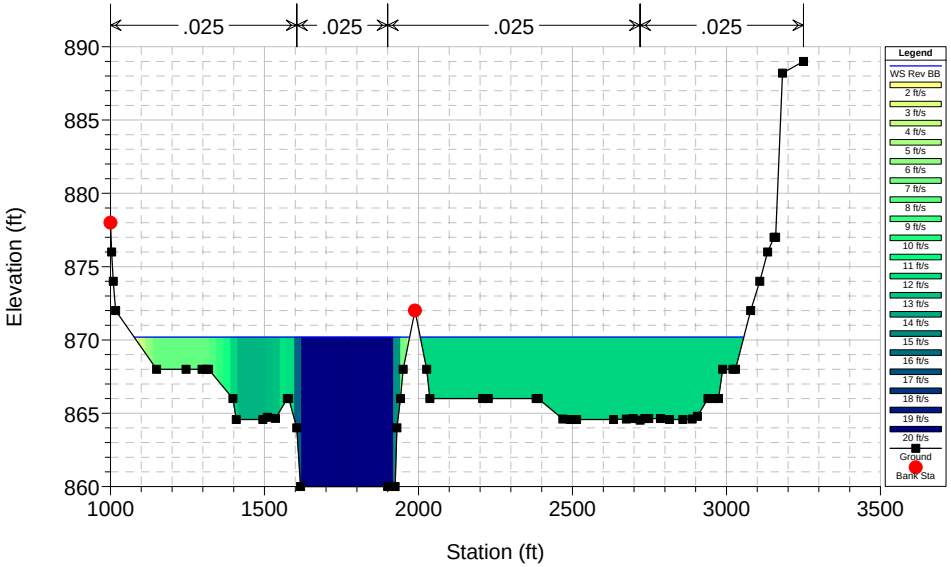

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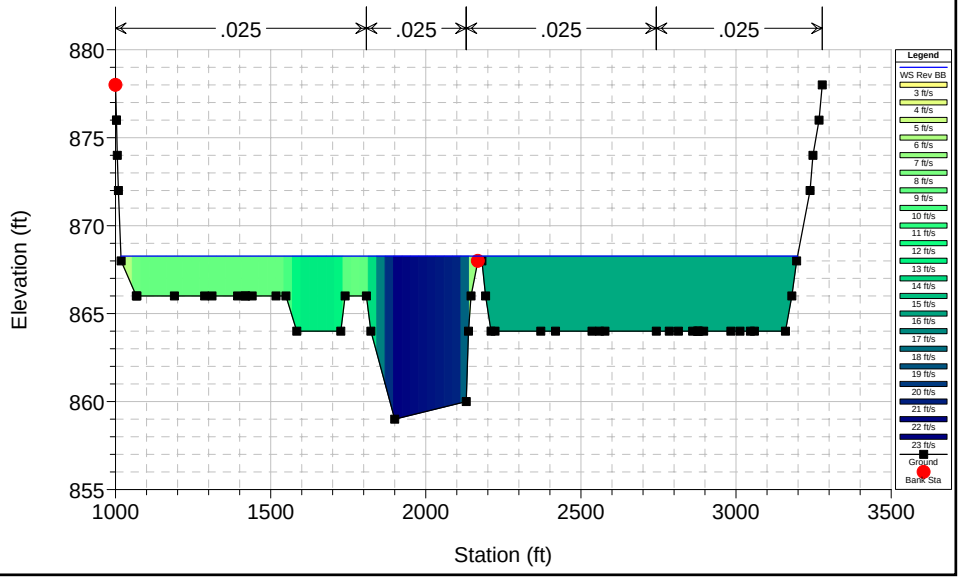

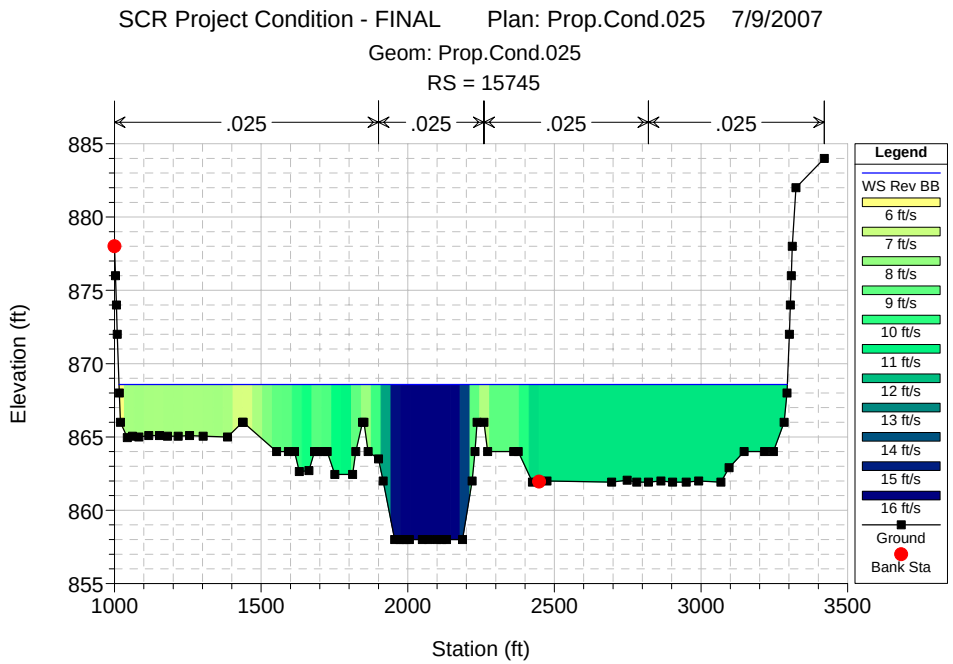
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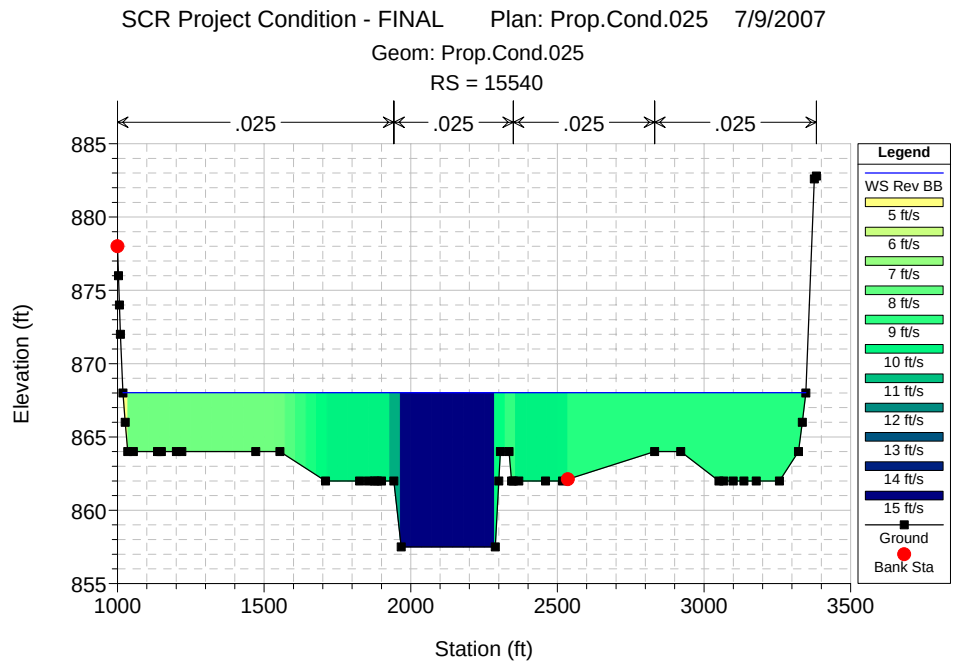
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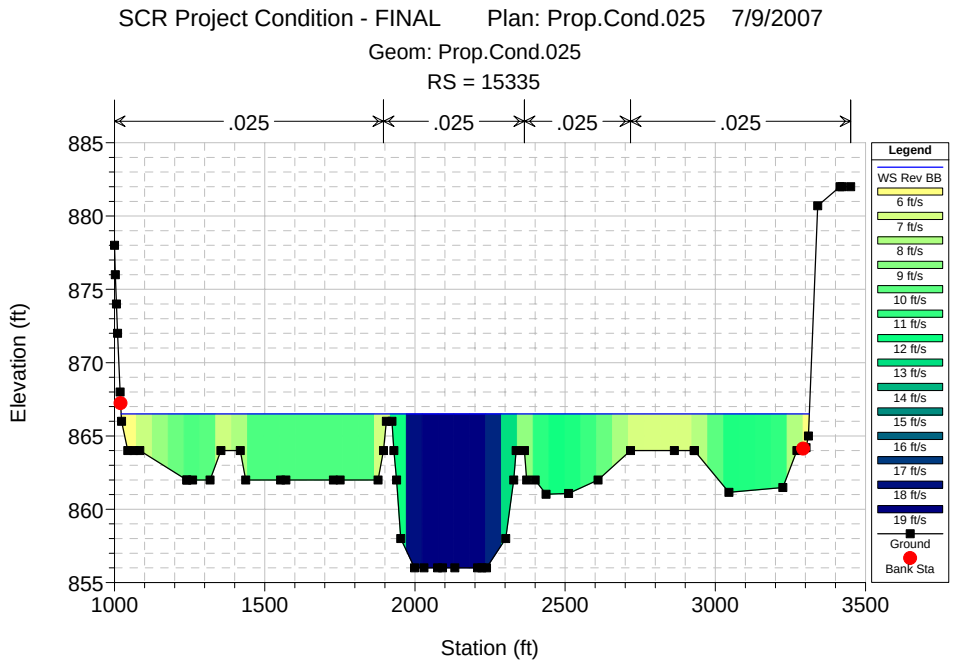
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Ground
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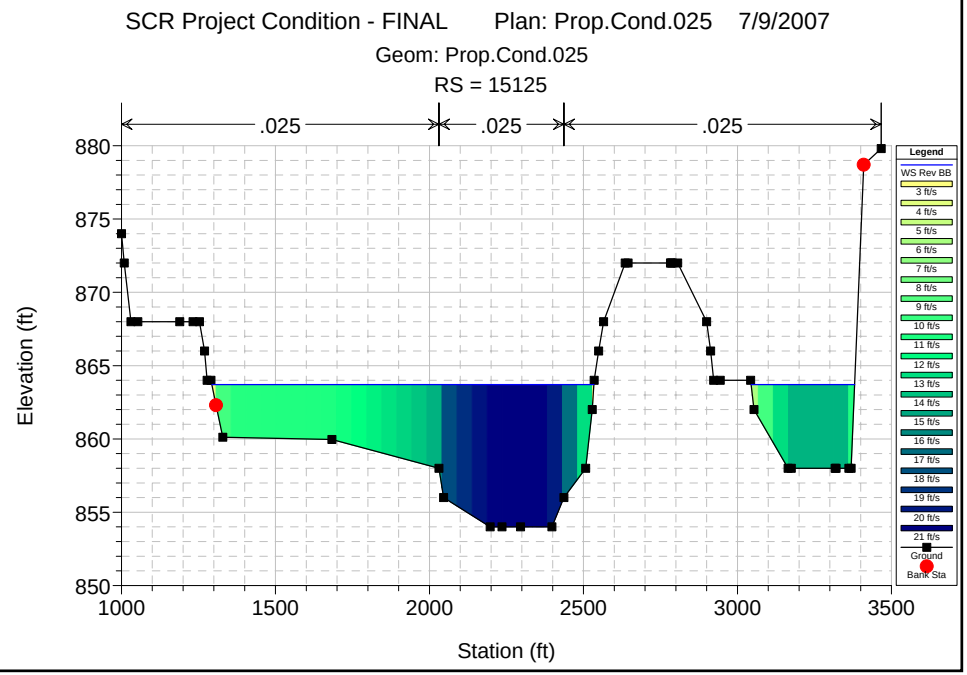
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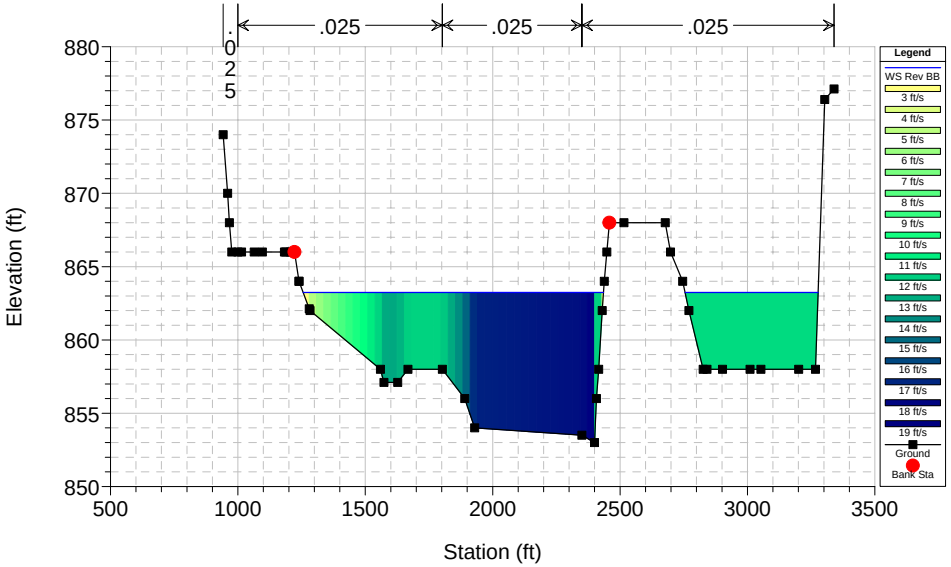

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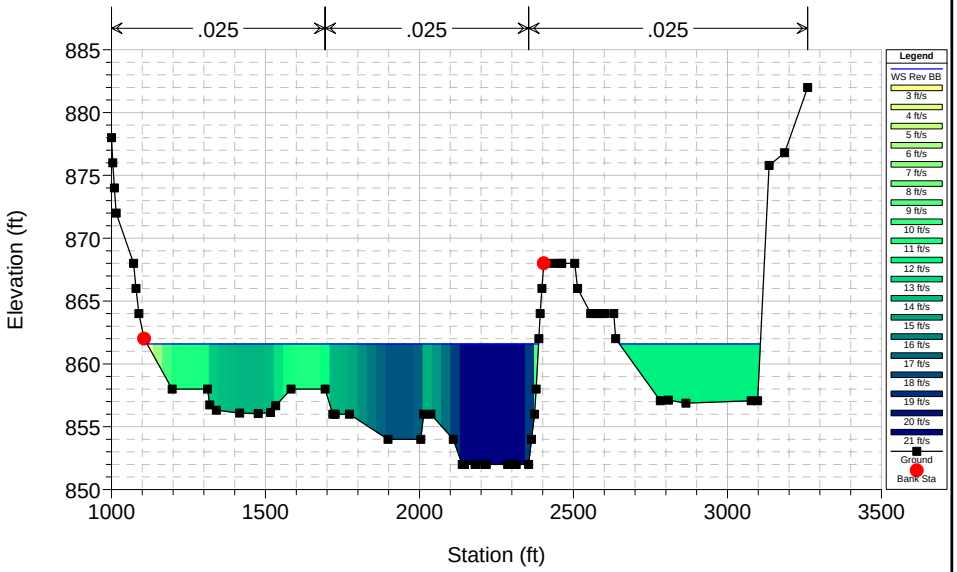

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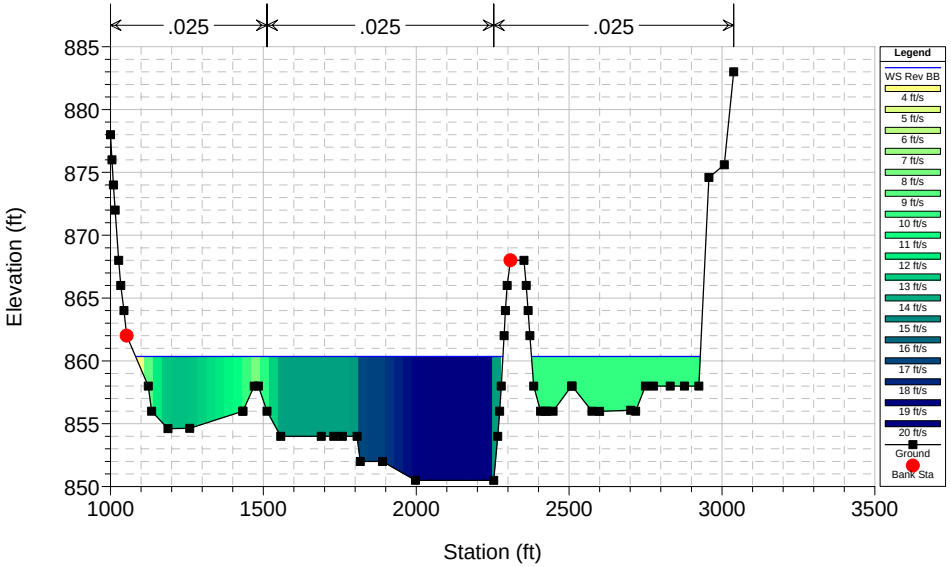

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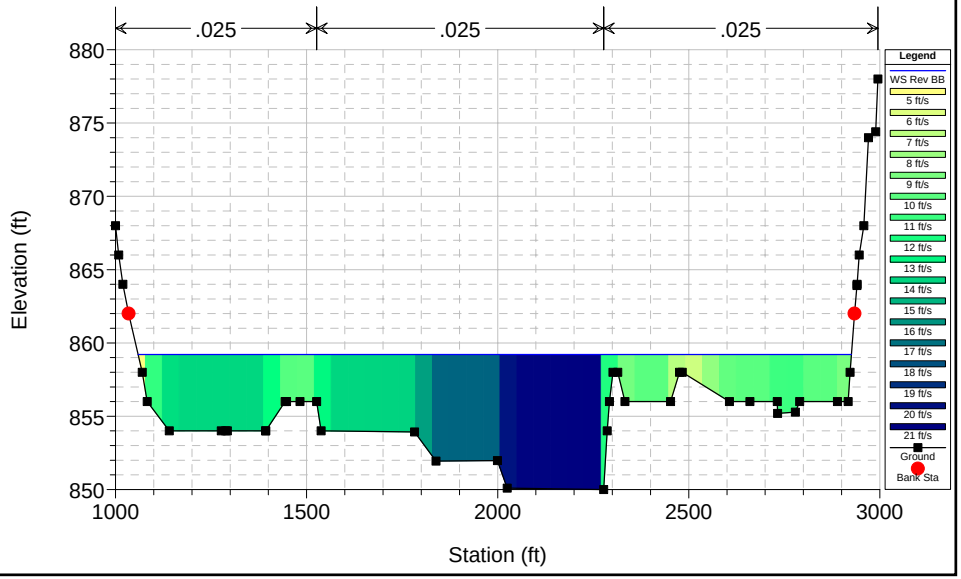

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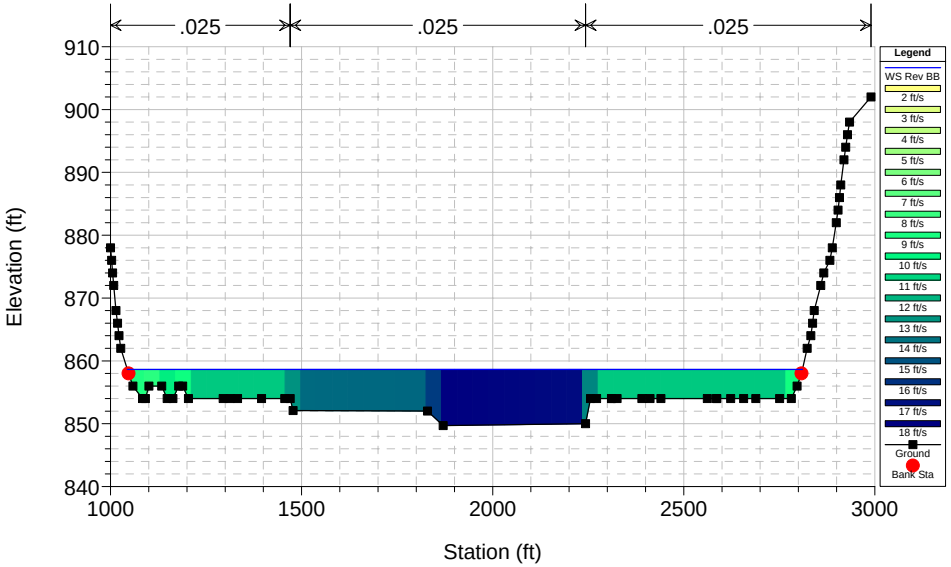

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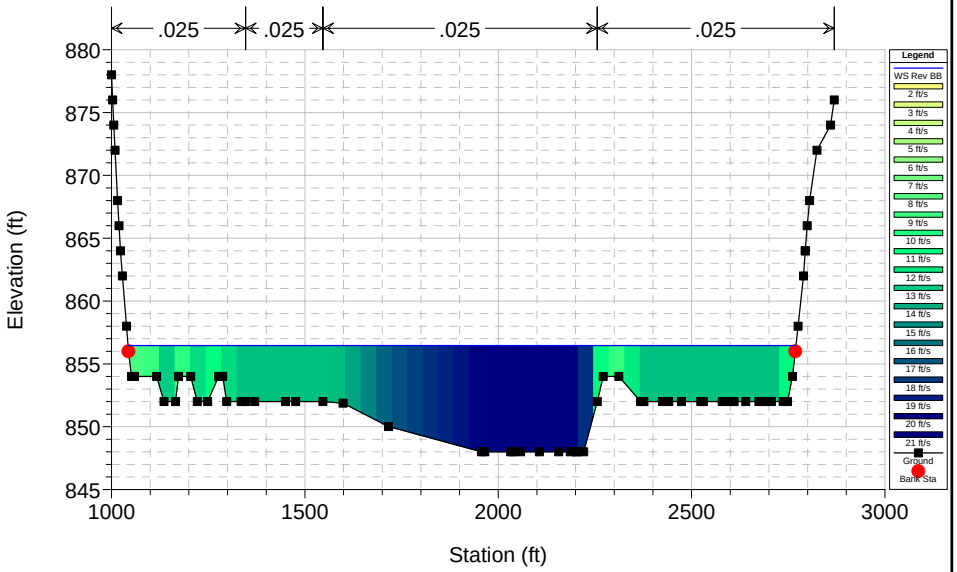

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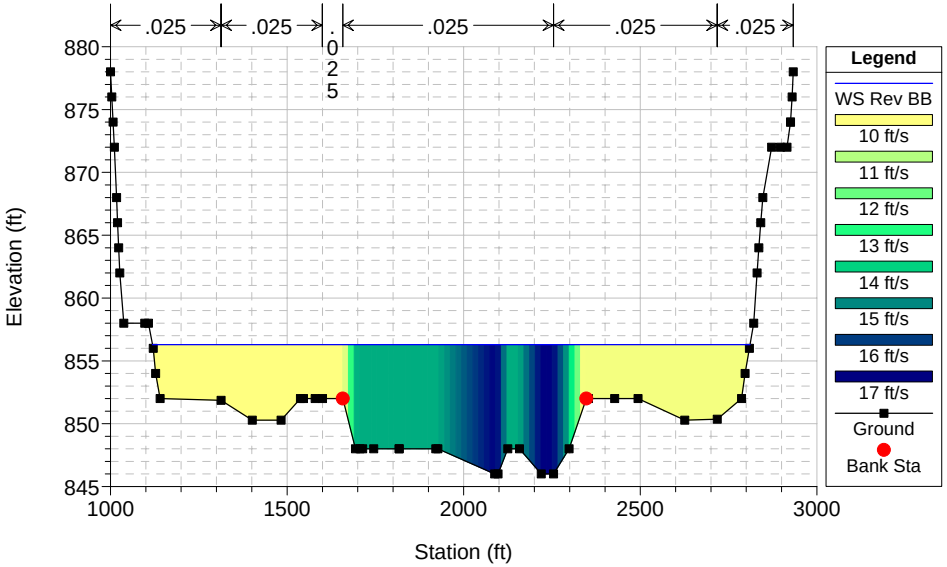

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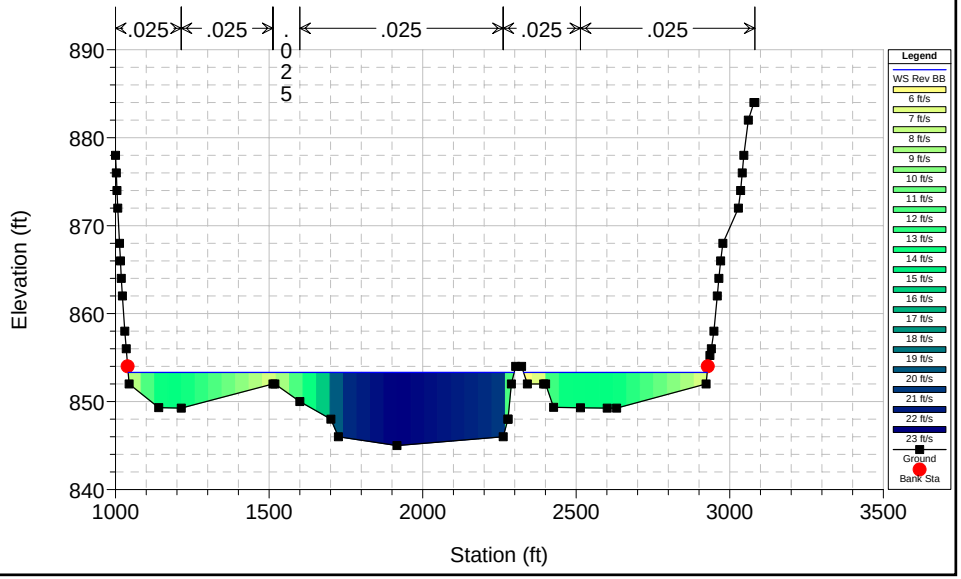


Appendix V: "Newhall Ranch River Fluvial Study"

- Phase 1 Final Draft
- LACDPW Fluvial Approval letter dated April 18, 2006
- Table 8: "Santa Clara River Summary of Maximum Proposed Toe-down & Free Board"
- Tables for Freeboard and Toe-down values

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

COPY

D L. WOLFE, Director

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
www.ladpw.org

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

April 18, 2006

IN REPLY PLEASE REFER TO FILE: LD-0

Mr. Mark Subbotin
Vice President of Community Development
Newhall Land/Lennar
23823 Valencia Boulevard
Valencia, CA 91355-2194

Dear Mr. Subbotin:

**HEC-RAS AND PHASE 1 FLUVIAL ANALYSIS FOR:
CASTAIC CREEK I-5 TO SANTA CLARA RIVER CONFLUENCE
SANTA CLARA RIVER I-5 TO VENTURA COUNTY LINE**

This letter has been prepared to memorialize and clarify the conclusions and approvals of the County of Los Angeles Department Public Works relative to the completed review of the following reports prepared by PACE, Inc.

- Newhall Ranch Santa Clara River HEC-RAS Modeling Report dated December 2005 (I-5 to Ventura County Line).
- Castaic Creek HEC-RAS Modeling Report dated December 2005 (I-5 to Hwy 126).
- Newhall Ranch–Santa Clara River Phase 1 Fluvial Study dated March 6, 2006, (final date pending).
- Castaic Creek Phase 1 Fluvial Study dated January 20, 2006.

Based on our review of the reports provided to date, we will regard the following items as approved:

1) Reestablishment of a revised Capital Floodplain HEC-RAS model and water surface profile for design and ML map revision (n=0.06 per the approved reports).

2) The proposed bank protection horizontal alignment, as presented in the reports, for Newhall Ranch–Santa Clara River (I-5 to Ventura County line) and Castaic Creek (I-5 to Santa Clara River) confluence.

3) The top and toe elevations of the bank protection for Castaic Creek from I-5 to the Santa Clara River confluence and for the Santa Clara River from I-5 to the Chiquito Canyon Creek confluence (Landmark, Entrada, Mission Village, and Commerce Center). Refer to the enclosed exhibit for proposed bank protection

locations. The approved toe-down depth for these proposed bank protection projects is the greater (deeper) of the Los Angeles County Hydraulic Design Manual or the Los Angeles County Hydrology and Sedimentation Manual (utilizing the results of the Phase 1 Fluvial Study long-term aggradations/degradation analysis and the SAM model general degradation modeling results). In addition, the top of bank elevation for these proposed projects is as determined by the results of the approved Phase 1 Fluvial Analysis.

The remaining proposed projects within Newhall Ranch, where the top and toe elevations are not approved, will require further analysis of the Newhall Ranch Development within the tributary drainage areas and the evaluation of the resulting fluvial impacts (if any) to the Santa Clara River as related to changes in tributary sediment delivery pre- versus post-development condition.

The final design and permitting for each individual development requiring bank protection will be based upon the final results as concluded in the aforementioned reports and the Phase 2 Fluvial Studies. The procedure for the use of these reports and bank protection project construction phasing will be as follows:

1) Conceptual Design Report–Public Works approval
2) Hydrology (Final Design Report)–Public Works approval
3) Construction Plans and Specifications–Public Works approval
4) County ML Map Revisions–County Conditional and Final Approval

Please confirm that you are in agreement with the conclusions and approvals noted above. If you have any further questions, please contact Mr. Steven Sheridan of my staff at (626) 458-7151.

Very truly yours,

DONALD L. WOLFE
Director of Public Works

Dennis Hunter

DENNIS HUNTER
Assistant Deputy Director
Land Development Division

SDS:la
P:\ldpub\NEWHALL\Fluvial Analysis - Phase 11.doc

Enc.

cc: PACE Engineering (Mark Krebs)

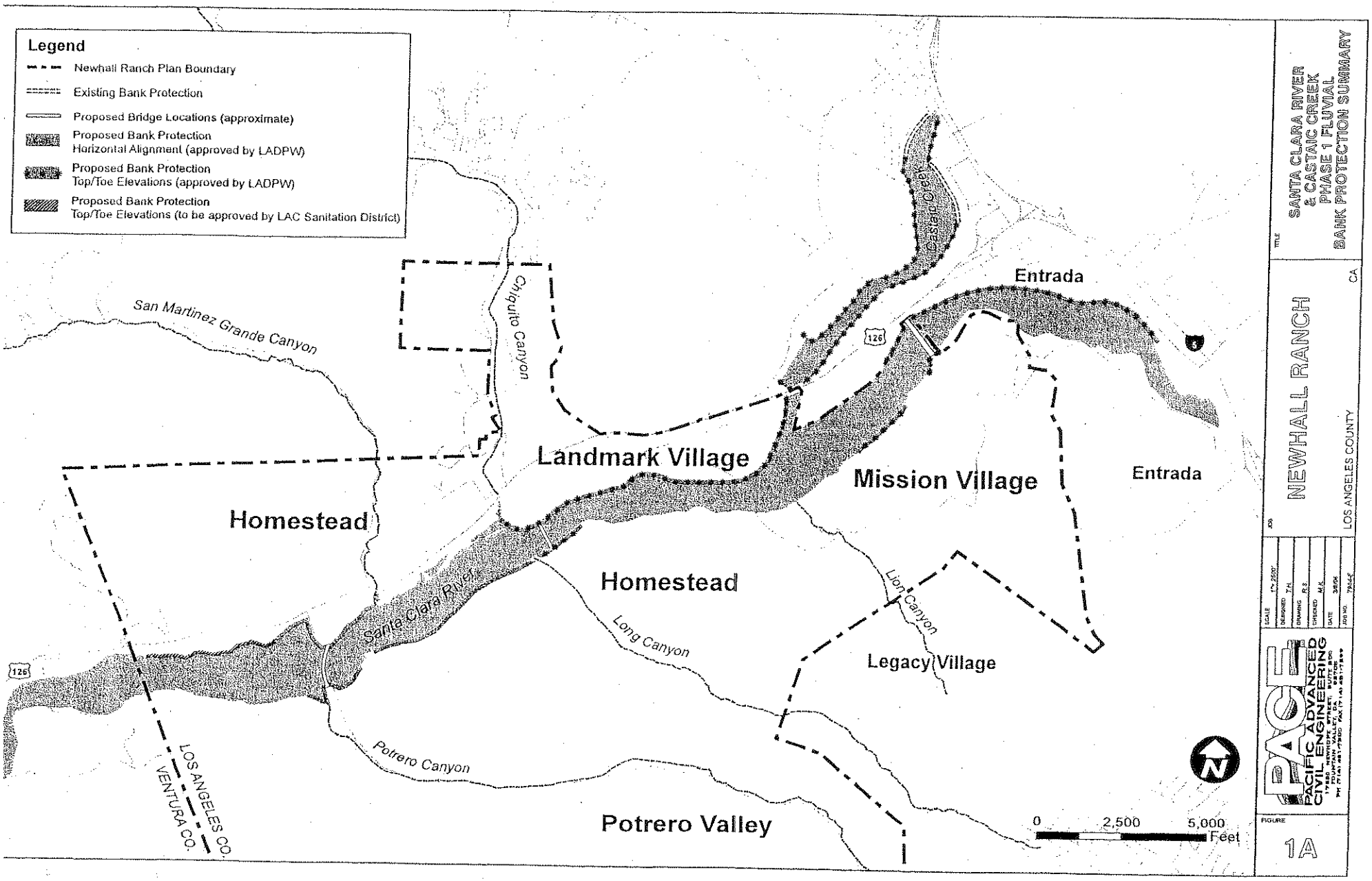

Legend
Newhall Ranch Plan Boundary
Existing Bank Protection
Proposed Bridge Locations (approximate)
Proposed Bank Protection Horizontal Alignment (approved by LADPW)
Proposed Bank Protection Top/Toe Elevations (approved by LADPW)
Proposed Bank Protection Top/Toe Elevations (to be approved by LAC Sanitation District)
San Martinez Grande Canyon
Chiquito Canyon
Castaic Creek
Entrada
Landmark Village
Mission Village
Entrada
Homestead
Homestead
Santa Clara River
Long Canyon
Lion Canyon
Legacy Village
Potrero Canyon
Potrero Valley
LOS ANGELES CO.
VENTURA CO.
126
5
0
2,500
5,000
Feet
N
SANTA CLARA RIVER & CASTAIC CREEK PHASE 1 FLUVIAL BANK PROTECTION SUMMARY
NEWHALL RANCH
LOS ANGELES COUNTY
CA
PACIFIC ADVANCED CIVIL ENGINEERING
FIGURE
1A

Table 8: Santa Clara River Summary of Maximum Proposed Toe-down & Freeboard (ft)

Subreach	HEC-RAS Section	Z_{99} [2]	Outside Curved Reach		Straight-Inside Curved Reach		WSE	Outside Curved Reach		Straight-Inside Curved Reach	
			Maximum Total Degradation [3]	Proposed Toe-down Elevation [1,4]	Maximum Total Degradation [3]	Proposed Toe-down Elevation [1,4]		Maximum Total Freeboard [3]	Proposed Top of Levee Elevation [1]	Maximum Total Freeboard [3]	Proposed Top of Levee Elevation [1]
SRA1	46195	1035.0	14.0	1021.0	14.0	1021.0	1063.1	3.1	1066.3	3.1	1066.3
	46020	1032.0	14.0	1018.0	14.0	1018.0	1062.0	3.0	1065.0	3.0	1065.0
	45545	1030.0	14.0	1016.0	14.0	1016.0	1057.9	3.4	1061.3	3.4	1061.3
	45030	1025.0	14.0	1011.0	14.0	1011.0	1054.2	3.0	1057.3	3.0	1057.3
	44585	1022.0	14.0	1008.0	14.0	1008.0	1050.6	3.2	1053.8	3.2	1053.8
	44210	1020.0	14.0	1006.0	14.0	1006.0	1047.8	2.9	1050.8	2.9	1050.8
SRA2	43820	1018.0	15.4	1002.6	15.4	1002.6	1042.1	3.9	1046.0	3.9	1046.0
	43610	1017.0	17.0	1000.0	17.0	1000.0	1038.3	4.0	1042.2	4.0	1042.2
	43410	1016.0	15.8	1000.2	15.8	1000.2	1035.8	3.6	1039.4	3.6	1039.4
	43200	1014.0	16.3	997.7	16.3	997.7	1033.2	3.5	1036.7	3.5	1036.7
	42975	1012.0	15.5	996.5	15.5	996.5	1031.0	2.9	1033.8	2.7	1033.7
	42815	1011.0	15.5	995.5	15.5	995.5	1029.7	2.5	1032.2	2.5	1032.2
	42590	1010.0	21.0	989.0	14.7	995.3	1028.4	2.5	1030.9	2.5	1030.9
	42430	1008.0	21.0	987.0	15.3	992.7	1027.5	2.5	1030.0	2.5	1030.0
	42215	1006.0	21.0	985.0	14.7	991.3	1026.7	2.5	1029.2	2.5	1029.2
	41940	1005.0	15.0	990.0	11.9	993.1	1025.6	2.5	1028.1	2.5	1028.1
	41730	1004.0	15.0	989.0	12.0	992.0	1024.6	2.5	1027.1	2.5	1027.1
	41460	1002.0	15.0	987.0	11.9	990.1	1023.2	2.5	1025.7	2.5	1025.7
SRA3	41280	1001.0	12.5	988.5	12.5	988.5	1021.8	2.5	1024.3	2.5	1024.3
	41080	1000.0	14.0	986.0	14.0	986.0	1020.5	2.5	1023.0	2.5	1023.0
	40825	999.5	21.0	978.5	14.0	985.5	1019.3	2.5	1021.8	2.5	1021.8
	40585	998.0	18.0	980.0	12.5	985.5	1018.3	2.5	1020.8	2.5	1020.8
	40335	996.0	15.0	981.0	10.0	986.0	1017.4	2.5	1019.9	2.5	1019.9
	40130	995.0	15.0	980.0	10.0	985.0	1016.6	2.5	1019.1	2.5	1019.1
	39945	994.0	15.0	979.0	10.0	984.0	1015.9	2.5	1018.4	2.5	1018.4
	39755	994.0	12.5	981.5	12.5	981.5	1014.6	2.5	1017.1	2.5	1017.1
	39605	993.0	14.0	979.0	14.0	979.0	1013.7	2.5	1016.2	2.5	1016.2
	39310	992.0	18.0	974.0	12.5	979.5	1012.2	2.5	1014.7	2.5	1014.7
	39100	990.0	14.0	976.0	14.0	976.0	1011.1	2.5	1013.6	2.5	1013.6
	38925	989.5	10.0	979.5	10.0	979.5	1010.3	2.5	1012.8	2.5	1012.8
SRA4	38710	988.0	10.0	978.0	10.0	978.0	1009.2	2.5	1011.7	2.5	1011.7
	38475	986.0	12.5	973.5	12.5	973.5	1007.0	2.6	1009.5	2.6	1009.5
	38300	985.5	14.0	971.5	14.0	971.5	1005.8	2.5	1008.3	2.5	1008.3
	38065	984.0	10.0	974.0	10.0	974.0	1004.1	2.5	1006.6	2.5	1006.6
	37810	983.0	14.0	969.0	14.0	969.0	1001.4	2.8	1004.2	2.8	1004.2
	37655	982.0	14.0	968.0	14.0	968.0	999.9	2.6	1002.5	2.6	1002.5
	37390	981.0	14.0	967.0	14.0	967.0	998.5	2.5	1001.0	2.5	1001.0
	37135	980.0	12.5	967.5	12.5	967.5	996.8	2.5	999.3	2.5	999.3
	36930	978.0	14.0	964.0	14.0	964.0	995.7	2.5	998.2	2.5	998.2
	36735	977.0	12.5	964.5	12.5	964.5	994.6	2.5	997.1	2.5	997.1
	36515	975.0	15.0	960.0	10.0	965.0	993.6	2.5	996.1	2.5	996.1
	36265	974.0	15.0	959.0	10.0	964.0	992.3	2.5	994.8	2.5	994.8
SRB1	36080	973.0	22.9	950.1	22.0	951.0	990.6	2.5	993.1	2.5	993.1
	35845	971.0	15.0	956.0	10.0	961.0	989.1	2.5	991.6	2.5	991.6
	35725	970.0	15.0	955.0	10.0	960.0	988.3	2.5	990.8	2.5	990.8
	35515	969.0	18.0	951.0	12.5	956.5	986.9	2.5	989.4	2.5	989.4
	35245	968.0	18.0	950.0	12.5	955.5	985.0	2.5	987.5	2.5	987.5
	35040	967.0	21.0	946.0	14.0	953.0	983.6	2.5	986.1	2.5	986.1
	34860	966.0	21.0	945.0	14.0	952.0	982.3	2.5	984.8	2.5	984.8
	34720	965.5	21.0	944.5	14.0	951.5	981.3	2.5	983.8	2.5	983.8
	34495	964.0	18.0	946.0	12.5	951.5	979.7	2.5	982.2	2.5	982.2
	34310	963.0	18.0	945.0	12.5	950.5	978.4	2.5	980.9	2.5	980.9
	34090	962.0	18.0	944.0	12.5	949.5	977.0	2.5	979.5	2.5	979.5
SRB2	33880	960.0	18.0	942.0	12.5	947.5	975.7	2.5	978.2	2.5	978.2
	33710	959.0	18.0	941.0	12.5	946.5	974.6	2.5	977.1	2.5	977.1
	33500	958.0	18.0	940.0	12.5	945.5	973.3	2.5	975.8	2.5	975.8
	33310	957.0	18.0	939.0	12.5	944.5	972.3	2.5	974.8	2.5	974.8
	33115	956.0	15.0	941.0	10.0	946.0	971.4	2.5	973.9	2.5	973.9
	32795	954.0	15.0	939.0	10.0	944.0	969.7	2.5	972.2	2.5	972.2
	32605	952.0	15.0	937.0	10.0	942.0	968.7	2.5	971.2	2.5	971.2
SRC1	32265	950.0	18.0	932.0	12.5	937.5	967.2	2.5	969.7	2.5	969.7
	31875	949.0	15.0	934.0	10.0	939.0	965.6	2.5	968.1	2.5	968.1
	31585	946.0	15.0	931.0	10.0	936.0	964.7	2.5	967.2	2.5	967.2
	31360	944.0	15.0	929.0	10.0	934.0	963.9	2.5	966.4	2.5	966.4
	31060	942.0	12.0	930.0	8.0	934.0	963.2	2.5	965.7	2.5	965.7
	30720	940.0	12.0	928.0	8.0	932.0	962.5	2.5	965.0	2.5	965.0
	30445	938.0	12.0	926.0	8.0	930.0	962.1	2.5	964.6	2.5	964.6
	30095	936.0	12.0	924.0	8.0	928.0	961.5	2.5	964.0	2.5	964.0
	29815	935.0	12.0	923.0	8.0	927.0	960.8	2.5	963.3	2.5	963.3
	29565	934.0	12.0	922.0	8.0	926.0	960.3	2.5	962.8	2.5	962.8
	29385	933.0	12.0	921.0	8.0	925.0	959.6	2.5	962.1	2.5	962.1
SRC2	29140	932.0	12.0	920.0	9.1	922.9	958.4	2.5	960.9	2.5	960.9
	28895	930.0	21.0	909.0	14.0	916.0	953.8	4.8	958.6	4.7	958.5
	28695	928.0	15.0	913.0	15.0	913.0	952.9	2.5	955.4	2.5	955.4
	28500	927.5	14.7	912.8	14.7	912.8	950.5	3.1	953.5	2.9	953.4
	28280	926.0	21.0	905.0	14.0	912.0	949.8	2.5	952.3	2.5	952.3
	28080	925.0	15.0	910.0	10.0	915.0	949.1	2.5	951.6	2.5	951.6
	27925	924.0	10.3	913.7	10.3	913.7	948.1	2.5	950.6	2.5	950.6
	27725	923.0	14.0	909.0	14.0	909.0	946.1	2.9	949.0	2.9	949.0
	27545	922.0	15.0	907.0	15.0	907.0	944.3	3.1	947.4	3.1	947.4
	27335	921.0	14.1	906.9	14.1	906.9	943.0	2.7	945.7	2.6	945.6
	27155	920.5	14.0	906.5	14.0	906.5	941.5	2.9	944.4	2.8	944.2
SRC3	26990	920.0	21.0	899.0	14.0	906.0	940.4	2.5	942.9	2.5	942.9
	26780	918.0	21.0	897.0	14.0	904.0	939.3	2.5	941.8	2.5	941.8
	26575	917.0	21.0	896.0	14.0	903.0	938.5	2.5	941.0	2.5	941.0
	26355	916.0	18.0	898.0	12.5	903.5	937.6	2.5	940.1	2.5	940.1
	26170	915.0	18.0	897.0	12.5	902.5	936.9	2.5	939.4	2.5	939.4
	25965	914.0	21.0	893.0	14.0	900.0	936.2	2.6	938.8	2.5	938.7
	25785	913.5	21.0	892.5	14.0	899.5	935.5	2.7	938.2	2.5	938.0
	25600	912.5	21.0	891.5	14.0	898.5	934.8	2.5	937.3	2.5	937.3
	25425	911.0	21.0	890.0	14.0	897.0	934.1	2.5	936.7	2.5	936.6
	25215	910.0	15.0	895.0	10.0	900.0	933.3	2.5	935.8	2.5	935.8
	25000	909.0	15.0	894.0	10.0	899.0	932.5	2.5	935.0	2.5	935.0
SRC4	24795	908.0	15.0	893.0	10.0	898.0	931.5	3.7	935.2	3.4	934.9
	24550	906.0	18.0	888.0	12.5	893.5	930.1	3.6	933.6	3.3	933.4
	24335	905.0	21.0	884.0	14.0	891.0	928.5	3.9	932.4	3.6	932.1
	24115	904.0	21.0	883.0	14.0	890.0	927.0	3.8	930.8	3.5	930.5
	23975	903.5	21.0	882.5	14.0	889.5	926.1	3.5	929.7	3.3	929.4
	23755	902.0	21.0	881.0	14.0	888.0	924.7	3.2	927.9	3.1	927.8
	23565	900.0	21.0	879.0	14.0	886.0	923.6	3.7	927.3	3.4	927.0
	23365	900.0	21.0	879.0	14.0	886.0	922.4	3.5	925.9	3.2	925.6
	23180	899.0	21.0	878.0	14.0	885.0	921.5	3.2	924.6	3.0	924.4
	23000	898.0	21.0	877.0	14.0	884.0	920.0	3.3	923.3	3.0	923.0
	22790	897.5	26.8	870.7	23.0	874.5	917.5	3.1	920.6	3.0	920.5
	22600	896.0	21.0	875.0	14.0	882.0	915.8	3.2	919.0	2.9	918.7
	22415	895.5	21.0	874.5	14.0	881.5	914.4	3.2	917.6	2.9	917.4

1 - Phase 1 Analysis, see end note

2 - Minimum 1999 Bed Elevation

3 - Toe-down and Freeboard based on max of LA County Hydrology & Sedimentation Manual (with SAM general aggradation) and LA County Design Manual, as per Hydrology & Sedimentation Manual

4 - Values at bridges are approxmiate. Final design of levee at bridge locations will include detailed bridge analysis

Table 8: Santa Clara River Summary of Proposed Toe-down & Freeboard (ft) continued

Subreach	HEC-RAS Section	Z_{99} [2]	Outside Curved Reach		Straight-Inside Curved Reach		WSE	Outside Curved Reach		Straight-Inside Curved Reach	
			Maximum Total Degradation [3]	Proposed Toe-down Elevation [1,4]	Maximum Total Degradation [3]	Proposed Toe-down Elevation [1,4]		Maximum Total Freeboard [3]	Proposed Top of Levee Elevation [1]	Maximum Total Freeboard [3]	Proposed Top of Levee Elevation [1]
SRD1	22195	894.0	15.0	879.0	10.0	884.0	913.1	2.5	915.6	2.5	915.6
	22010	892.0	18.0	874.0	12.5	879.5	911.4	2.5	913.9	2.5	913.9
	21790	891.5	21.0	870.5	14.0	877.5	909.9	2.6	912.6	2.5	912.4
	21615	892.0	21.0	871.0	14.0	878.0	908.9	2.6	911.5	2.5	911.4
	21440	890.0	18.0	872.0	12.5	877.5	907.8	2.5	910.3	2.5	910.3
	21225	888.0	21.0	867.0	14.0	874.0	906.7	2.5	909.2	2.5	909.2
	21020	887.0	21.0	866.0	14.0	873.0	905.6	2.5	908.1	2.5	908.1
	20845	886.0	18.0	868.0	12.5	873.5	904.7	2.5	907.2	2.5	907.2
	20595	885.0	15.0	870.0	10.0	875.0	903.6	2.5	906.1	2.5	906.1
	20435	884.0	15.0	869.0	10.0	874.0	902.8	2.5	905.3	2.5	905.3
	20280	883.7	18.0	865.7	12.5	871.2	901.8	2.5	904.3	2.5	904.3
	20070	882.0	21.0	861.0	14.0	868.0	900.6	2.5	903.1	2.5	903.1
SRD2	19855	880.5	21.0	859.5	14.0	866.5	899.6	3.0	902.6	2.9	902.5
	19630	880.0	21.0	859.0	14.0	866.0	898.6	2.9	901.5	2.9	901.5
	19440	878.0	15.0	863.0	10.0	868.0	897.9	3.0	900.8	3.0	900.8
	19240	877.5	18.0	859.5	12.5	865.0	896.9	3.4	900.3	3.4	900.2
	19050	876.0	21.0	855.0	14.0	862.0	896.2	4.1	900.3	4.1	900.3
	18830	874.0	15.0	859.0	10.0	864.0	895.4	4.1	899.4	4.0	899.4
	18650	873.5	15.0	858.5	10.0	863.5	894.7	4.0	898.7	4.0	898.7
	18475	872.0	13.6	858.4	8.0	864.0	894.3	3.4	897.6	3.4	897.6
	18290	871.5	14.1	857.4	8.0	863.5	893.6	3.2	896.8	3.2	896.8
	18025	870.0	8.0	862.0	8.0	862.0	892.9	3.1	895.9	3.1	895.9
	17785	868.0	8.0	860.0	8.0	860.0	892.0	3.2	895.2	3.2	895.2
SRD3	17510	868.0	10.0	858.0	10.0	858.0	890.4	2.5	892.9	2.5	892.9
	17360	868.0	12.5	855.5	12.5	855.5	888.3	2.5	890.8	2.5	890.8
	17110	864.0	14.0	850.0	14.0	850.0	885.5	2.5	888.0	2.5	888.0
	16970	863.7	14.0	849.7	14.0	849.7	884.0	2.5	886.5	2.5	886.5
	16720	863.5	14.0	849.5	14.0	849.5	882.3	2.5	884.8	2.5	884.8
	16515	862.0	14.0	848.0	14.0	848.0	881.2	2.5	883.7	2.5	883.7
	16305	860.0	10.0	850.0	10.0	850.0	880.4	2.5	882.9	2.5	882.9
	16130	860.0	12.5	847.5	12.5	847.5	879.4	2.5	881.9	2.5	881.9
	15960	859.0	12.5	846.5	12.5	846.5	878.6	2.5	881.1	2.5	881.1
	15745	858.0	10.0	848.0	10.0	848.0	877.6	2.5	880.1	2.5	880.1
	15540	857.5	10.0	847.5	10.0	847.5	876.7	2.5	879.2	2.5	879.2
	15335	856.0	12.5	843.5	12.5	843.5	874.8	2.5	877.3	2.5	877.3
SRE1	15125	854.0	26.1	827.9	26.1	827.9	872.0	2.5	874.5	2.5	874.5
	14900	853.0	14.0	839.0	14.0	839.0	869.7	2.5	872.2	2.5	872.2
	14720	852.0	21.0	831.0	14.0	838.0	868.4	2.5	870.9	2.5	870.9
	14480	850.5	21.0	829.5	14.0	836.5	866.9	2.5	869.4	2.5	869.4
	14315	850.0	15.0	835.0	10.0	840.0	866.0	2.5	868.5	2.5	868.5
	14090	850.0	15.0	835.0	10.0	840.0	864.8	2.5	867.3	2.5	867.3
	13850	848.0	15.0	833.0	10.0	838.0	863.6	2.5	866.1	2.5	866.1
	13635	846.0	18.0	828.0	12.5	833.5	862.5	2.5	865.0	2.5	865.0
	13425	845.0	21.0	824.0	14.0	831.0	861.8	2.5	864.3	2.5	864.3
	13190	844.0	15.0	829.0	10.0	834.0	861.1	2.5	863.6	2.5	863.6
SRE2	13030	843.0	15.0	828.0	10.0	833.0	860.6	4.2	864.8	4.1	864.8
	12835	842.0	10.0	832.0	10.0	832.0	860.0	4.7	864.7	4.6	864.7
	12615	841.0	10.0	831.0	10.0	831.0	859.3	5.2	864.6	5.2	864.6
	12395	840.0	10.0	830.0	10.0	830.0	858.7	5.1	863.8	5.1	863.8
	12195	839.0	10.0	829.0	10.0	829.0	858.1	4.2	862.3	4.2	862.3
	11995	837.0	10.0	827.0	10.0	827.0	857.3	4.1	861.4	4.1	861.4
	11780	836.0	10.0	826.0	10.0	826.0	856.6	4.0	860.5	4.0	860.5
	11605	835.5	10.0	825.5	10.0	825.5	855.8	4.0	859.8	4.0	859.8
	11405	834.0	10.0	824.0	10.0	824.0	854.6	3.9	858.6	3.9	858.6
	11180	833.0	12.5	820.5	12.5	820.5	852.7	3.9	856.6	3.9	856.6
SRE3	11015	831.5	14.0	817.5	14.0	817.5	850.2	3.8	854.0	3.8	854.0
	10835	831.0	14.0	817.0	14.0	817.0	848.1	3.7	851.8	3.7	851.8
	10575	830.0	14.0	816.0	14.0	816.0	846.1	3.8	849.9	3.8	849.9
	10390	828.0	14.0	814.0	14.0	814.0	845.1	3.1	848.2	3.1	848.2
	10225	827.5	12.5	815.0	12.5	815.0	844.1	3.1	847.2	3.1	847.2
	10000	826.0	10.0	816.0	10.0	816.0	842.6	3.1	845.7	3.1	845.7
	9820	824.0	14.0	810.0	14.0	810.0	841.4	3.1	844.5	3.1	844.5
	9595	823.8	10.0	813.8	10.0	813.8	839.9	3.1	843.0	3.1	843.0
	9385	823.0	18.0	805.0	12.5	810.5	838.6	3.1	841.7	3.1	841.7
	9220	822.0	18.0	804.0	12.5	809.5	837.6	3.1	840.7	3.1	840.7
	9025	821.0	18.0	803.0	12.5	808.5	836.6	3.1	839.7	3.1	839.7

1 - Phase 1 Analysis, see end note

2 - Minimum 1999 Bed Elevation

3 - Toe-down and Freeboard based on max of LA County Hydrology & Sedimentation Manual (with SAM general aggradation) and LA County Design Manual, as per Hydrology & Sedimentation Manual

4 - Values at bridges are approxmiate. Final design of levee at bridge locations will include detailed bridge analysis

CALCULATIONS FOR TOTAL FREEBOARD BY INDIVIDUAL ADJUSTMENT COMPONENT BASED ON LACH&SM - SANTA CLARA RIVER PROPOSED CONDITIONS OUTSIDE CURVED REACH Q_{CAP} n=0.085

SECTION	Y_{MAX}	Y_{TOT}=	V (FPS)	FLOW DEPTH (FT)	Y_{AGG}+	Y_{GA}+	CHANNEL TYPE	BOTTOM WIDTH (FT)	TOP WIDTH (FT)	Y_{SE}+	BEND COEFF	SIDE SLOPE	RADIUS	H/2	Y_{DM}
46195	**3.1**	3.1	10.7	28.1	1.0	0.6	2	215.7	750.8	0.0	1	1.5	9000	1.5	2.5
46020	**3.0**	3.0	10.2	30.0	1.0	0.6	2	162.7	570.2	0.0	1	1.5	9000	1.4	2.5
45545	**3.4**	3.4	11.6	27.8	1.0	0.6	2	151.3	524.2	0.0	1	1.5	9000	1.8	2.5
45030	**3.0**	3.0	10.3	29.2	1.0	0.6	2	222.6	558.0	0.0	1	1.5	9000	1.4	2.5
44585	**3.2**	3.2	10.7	28.6	1.0	0.6	2	163.7	654.4	0.0	1	1.5	9000	1.6	2.5
44210	**2.9**	2.9	10.0	27.8	1.0	0.6	2	204.3	620.0	0.0	1	1.5	9000	1.3	2.5
43820	**3.9**	3.9	14.2	24.1	1.0	0.2	2	207.8	528.7	0.0	1	1.5	9000	2.7	2.5
43610	**4.0**	4.0	14.4	21.3	1.0	0.2	2	242.1	536.9	0.0	1	1.5	9000	2.8	2.5
43410	**3.6**	3.6	13.3	19.8	1.0	0.2	2	312.8	729.1	0.0	1	1.5	9000	2.4	2.5
43200	**3.5**	3.5	13.0	19.2	1.0	0.2	2	308.4	779.5	0.0	1	1.5	9000	2.3	2.5
42975	**2.9**	2.9	10.7	19.0	1.0	0.2	2	410.5	955.8	0.1	1	1.5	9000	1.5	2.5
42815	**2.5**	2.4	9.1	18.7	1.0	0.2	2	380.4	1120.8	0.1	1	1.5	9000	1.1	2.5
42590	**2.5**	2.0	7.7	18.4	1.0	0.2	2	451.9	1230.7	0.1	1	1.5	9000	0.8	2.5
42430	**2.5**	2.0	7.6	19.5	1.0	0.2	2	445.9	1334.9	0.1	1	1.5	9000	0.8	2.5
42215	**2.5**	1.8	6.6	20.7	1.0	0.2	2	493.2	1374.6	0.0	1	1.5	9000	0.6	2.5
41940	**2.5**	1.8	6.4	20.6	1.0	0.2	2	454.2	1327.0	0.0	1	1.5	9000	0.5	2.5
41730	**2.5**	1.9	6.9	20.6	1.0	0.2	2	404.1	1221.5	0.0	1	1.5	9000	0.6	2.5
41460	**2.5**	2.0	7.4	21.2	1.0	0.2	2	365.7	1121.0	0.0	1	1.5	9000	0.7	2.5
41280	**2.5**	2.1	8.7	20.8	1.0	0.0	2	342.4	1193.2	0.1	1	1.5	9000	1.0	2.5
41080	**2.5**	2.1	8.6	20.5	1.0	0.0	2	429.5	1136.8	0.1	1	1.5	9000	1.0	2.5
40825	**2.5**	1.8	7.3	19.8	1.0	0.0	2	426.6	1213.0	0.1	1	1.5	9000	0.7	2.5
40585	**2.5**	1.7	7.1	20.3	1.0	0.0	2	404.3	1247.2	0.0	1	1.5	9000	0.7	2.5
40335	**2.5**	1.5	6.1	21.4	1.0	0.0	2	397.2	1288.6	0.0	1	1.5	9000	0.5	2.5
40130	**2.5**	1.6	6.6	21.6	1.0	0.0	2	311.3	1264.5	0.0	1	1.5	9000	0.6	2.5
39945	**2.5**	1.7	6.8	21.9	1.0	0.0	2	293.8	1212.3	0.0	1	1.5	9000	0.6	2.5
39755	**2.5**	2.0	8.6	20.6	1.0	0.0	2	296.7	1088.1	0.1	1	1.5	9000	1.0	2.5
39605	**2.5**	2.0	8.5	20.7	1.0	0.0	2	348.8	1074.7	0.1	1	1.5	9000	1.0	2.5
39310	**2.5**	2.0	8.4	20.2	1.0	0.0	2	323.4	977.3	0.1	1	1.5	9000	1.0	2.5
39100	**2.5**	1.9	8.2	21.1	1.0	0.0	2	436.5	831.5	0.0	1	1.5	9000	0.9	2.5
38925	**2.5**	1.9	7.8	20.8	1.0	0.0	2	422.3	906.7	0.1	1	1.5	9000	0.8	2.5
38710	**2.5**	2.0	8.1	21.2	1.0	0.1	2	394.9	844.1	0.0	1	1.5	9000	0.9	2.5
38475	**2.6**	2.6	10.4	21.0	1.0	0.1	2	375.1	695.3	0.0	1	1.5	9000	1.5	2.5
38300	**2.5**	2.3	9.6	20.3	1.0	0.1	2	407.6	716.8	0.0	1	1.5	9000	1.2	2.5
38065	**2.5**	2.3	9.6	20.1	1.0	0.1	2	569.0	691.3	0.0	1	1.5	9000	1.2	2.5
37810	**2.8**	2.8	11.3	18.4	1.0	0.1	2	546.8	648.4	0.0	1	1.5	9000	1.7	2.5
37655	**2.6**	2.6	10.6	17.9	1.0	0.1	2	348.9	738.9	0.0	1	1.5	9000	1.5	2.5
37390	**2.5**	2.0	8.2	17.5	1.0	0.1	2	803.3	869.1	0.0	1	1.5	9000	0.9	2.5
37135	**2.5**	2.1	8.7	16.8	1.0	0.1	2	564.0	863.7	0.0	1	1.5	9000	1.0	2.5
36930	**2.5**	2.1	8.3	17.7	1.0	0.1	2	708.3	923.7	0.1	1	1.5	9000	0.9	2.5
36735	**2.5**	2.1	8.1	17.6	1.0	0.1	2	633.8	963.2	0.1	1	1.5	9000	0.9	2.5
36515	**2.5**	1.9	7.4	18.6	1.0	0.1	2	532.1	1032.7	0.1	1	1.5	9000	0.7	2.5
36265	**2.5**	1.8	7.1	18.3	1.0	0.1	2	359.0	1176.0	0.0	1	1.5	9000	0.7	2.5
36080	**2.5**	1.9	7.8	17.6	1.0	0.0	2	326.3	1176.0	0.0	1	1.5	9000	0.8	2.5
35845	**2.5**	1.7	7.0	18.1	1.0	0.0	2	376.2	1512.8	0.0	1	1.5	9000	0.7	2.5
35725	**2.5**	1.9	8.0	18.3	1.0	0.0	2	378.2	1488.9	0.1	1	1.5	9000	0.9	2.5
35515	**2.5**	2.0	8.5	17.9	1.0	0.0	2	379.3	1501.0	0.1	1	1.5	9000	1.0	2.5
35245	**2.5**	2.0	8.3	17.0	1.0	0.0	2	414.3	1580.3	0.1	1	1.5	9000	0.9	2.5
35040	**2.5**	2.1	8.8	16.6	1.0	0.0	2	440.9	1491.6	0.1	1	1.5	9000	1.0	2.5
34860	**2.5**	1.9	7.7	16.3	1.0	0.0	2	432.9	1431.5	0.1	1	1.5	9000	0.8	2.5
34720	**2.5**	1.8	7.4	15.8	1.0	0.0	2	545.6	1449.9	0.1	1	1.5	9000	0.7	2.5
34495	**2.5**	1.8	7.2	15.7	1.0	0.0	2	504.6	1461.5	0.1	1	1.5	9000	0.7	2.5
34310	**2.5**	2.0	8.1	15.4	1.0	0.0	2	684.5	1384.9	0.1	1	1.5	9000	0.9	2.5
34090	**2.5**	1.9	7.5	15.0	1.0	0.0	2	787.5	1371.0	0.1	1	1.5	9000	0.8	2.5
33880	**2.5**	2.0	7.3	15.7	1.0	0.2	2	761.0	1482.9	0.1	1	1.5	9000	0.7	2.5
33710	**2.5**	1.9	7.0	15.6	1.0	0.2	2	719.2	1637.9	0.1	1	1.5	9000	0.7	2.5
33500	**2.5**	1.9	7.0	15.3	1.0	0.2	2	666.4	1755.5	0.1	1	1.5	9000	0.7	2.5
33310	**2.5**	1.8	6.2	15.3	1.0	0.2	2	609.9	1828.2	0.1	1	1.5	9000	0.5	2.5
33115	**2.5**	1.7	5.8	15.4	1.0	0.2	2	667.8	1927.1	0.0	1	1.5	9000	0.4	2.5
32795	**2.5**	1.8	6.3	15.7	1.0	0.2	2	697.6	1920.8	0.1	1	1.5	9000	0.5	2.5
32605	**2.5**	1.7	6.1	16.7	1.0	0.2	2	652.8	2407.4	0.1	1	1.5	9000	0.5	2.5
32265	**2.5**	2.2	5.5	17.2	1.0	0.8	2	651.0	2840.2	0.0	1	1.5	9000	0.4	2.5
31875	**2.5**	2.2	5.3	16.6	1.0	0.8	2	562.0	2593.1	0.0	1	1.5	9000	0.4	2.5
31585	**2.5**	2.2	5.0	18.7	1.0	0.8	2	619.5	2377.5	0.0	1	1.5	9000	0.3	2.5
31360	**2.5**	2.2	5.5	19.9	1.0	0.8	2	672.2	1959.5	0.0	1	1.5	9000	0.4	2.5
31060	**2.5**	2.2	5.1	21.2	1.0	0.8	2	955.0	1975.9	0.1	1	1.5	9000	0.3	2.5
30720	**2.5**	2.1	4.6	22.5	1.0	0.8	2	772.7	1911.5	0.0	1	1.5	9000	0.3	2.5
30445	**2.5**	2.1	4.6	24.1	1.0	0.8	2	700.9	1841.8	0.0	1	1.5	9000	0.3	2.5

DEFINITIONS

Y_{MAX} = GREATER OF THE DM AND S&H HEIGHTS
Y_{TOT}=TOTAL EMBANKMENT PROTECTION IN FEET BASED ON THE H&S
V(FPS) =VELOCITY IN FEET PER SECOND
FLOW DEPTH=WATER DEPTH IN CHANNEL IN FEET
Y_{AGG}=LONG TERM AGGRADATION IN FEET
Y_{GA}=GENERAL AGGRADATION IN FEET FROM SAM
CHANNEL TYPE=CHANNEL SHAPE/FLOW FACTOR:
IF Fr<1, RECTANGULAR = 0; IF Fr>1, RECTANGULAR = 1;
IF Fr<1, TRAPEZOIDAL = 2; IF Fr>1, TRAPEZOIDAL = 3.
Y_{SE}=SUPER ELEVATION IN FEET
BEND COEFF=BEND COEFFICIENT; IF NO BEND=0, BEND=1
SIDE SLOPE=CHANNEL SIDE SLOPE (H:V), UNITLESS
BOTTOM WIDTH=CHANNEL BOTTOM WIDTH IN FEET, $Q_{2\text{-}YEAR}$ TOP WIDTH
RADIUS=RADIUS OF CURVATURE TO CENTERLINE IN FEET
H/2=HALF BEDFORM HEIGHT IN FEET, LIMITED TO FLOW DEPTH,
AFTER KENNEDY (1963)
Y_{DM} = EMBANKMENT PROTECTION REQUIRED BY THE LACFCDDM IN FEET

GENERAL

THIS SPREADSHEET IS DESIGNED TO CALCULATE TOP PROTECTION (FREE BOARD) BASED ON LACDWP COUNTY HYDROLOGY MANUAL (1991) PAGES 5.8-5.9 AND ASSOCIATED APPENDICES (SEDIMENTATION MANUAL). ALL VELOCITIES ARE IN FPS, WITH NO MAXIMUM VALUE. THE USER SHOULD CONSIDER A PRACTICAL MAXIMUM OF APPROXIMATELY 20-30 FPS. THE PRESENT VERSION (8/05) WILL CALCULATE UP TO 100 VELOCITIES AT ONE TIME. LONG TERM AGGRADATION IS USER SUPPLIED. GENERAL AGGRADATION IS ALSO USER SUPPLIED. SUPER ELEVATION AT BENDS IS BASED ON LACFCDDM EQUATIONS FOUND IN C-3.1. BEDFORM HEIGHT, LIMITED TO FLOW DEPTH AFTER KENNEDY (1963), IS BASED ON EQUATIONS IN APPENDIX Q13. IF FLOW IS SUPERCRITICAL SPREADSHEET REPORTS LACFCDDM TOTAL WALL HEIGHT INSTEAD OF FREEBOARD. LOS ANGELES COUNTY FLOOD CONTROL DISTRICT DESIGN MANUAL (LACFCDDM) VALUES ARE PRESENTED AS A PART OF LACH&SM CALCULATIONS. THE SPREADSHEET CALCULATES THE GREATER OF THE TWO METHODOLOGIES. BOTTOM WIDTH IS BASED ON THE 2-YEAR WATER SURFACE AFTER ACOE PROCEDURES.

COLOR CODES

OUTPUT
DATA FROM HEC-RAS
USER SUPPLIED DATA
INTERMEDIATE CALCULATIONS (INDIVIDUAL SHEETS ONLY)

DESIGNED BY DAVID A JAFFE, PHD, PE
PACIFIC ADVANCED CIVIL ENGINEERING, INC
AUGUST, 2005

CALCULATIONS FOR TOTAL FREEBOARD BY INDIVIDUAL ADJUSTMENT COMPONENT BASED ON LACH&SM - SANTA CLARA RIVER PROPOSED CONDITIONS OUTSIDE CURVED REACH Q_{CAP} n=0.085

SECTION	Y_{MAX}	Y_{TOT}=	V (FPS)	FLOW DEPTH (FT)	Y_{AGG}+	Y_{GA}+	CHANNEL TYPE	BOTTOM WIDTH (FT)	TOP WIDTH (FT)	Y_{SE}+	BEND COEFF	SIDE SLOPE	RADIUS	H/2	Y_{DM}
30095	2.5	2.2	5.2	25.5	1.0	0.8	2	617.1	1637.3	0.0	1	1.5	9000	0.4	2.5
29815	2.5	2.3	6.1	25.8	1.0	0.8	2	551.1	1445.2	0.0	1	1.5	9000	0.5	2.5
29565	2.5	2.3	6.0	26.3	1.0	0.8	2	461.8	1334.9	0.0	1	1.5	9000	0.5	2.5
29385	2.5	2.5	6.8	26.6	1.0	0.8	2	381.5	1249.1	0.0	1	1.5	9000	0.6	2.5
29140	2.5	1.9	7.9	26.4	1.0	0.0	2	217.2	1095.0	0.0	1	1.5	9000	0.8	2.5
28895	4.8	4.8	16.5	23.8	1.0	0.0	2	201.9	978.0	0.1	1	1.5	9000	3.7	2.5
28695	2.5	2.3	9.4	24.9	1.0	0.0	2	269.6	951.6	0.1	1	1.5	9000	1.2	2.5
28500	3.1	3.1	12.0	23.0	1.0	0.0	2	326.0	1039.5	0.1	1	1.5	9000	1.9	2.5
28280	2.5	2.1	8.7	23.8	1.0	0.0	2	379.1	1003.9	0.1	1	1.5	9000	1.0	2.5
28080	2.5	2.0	8.3	24.1	1.0	0.0	2	416.6	945.4	0.1	1	1.5	9000	0.9	2.5
27925	2.5	2.2	9.6	24.1	1.0	0.0	2	402.0	884.9	0.0	1	1.5	9000	1.2	2.5
27725	2.9	2.9	11.9	23.1	1.0	0.0	2	386.2	811.8	0.0	1	1.5	9000	1.9	2.5
27545	3.1	3.1	12.4	22.3	1.0	0.0	2	409.6	852.5	0.0	1	1.5	9000	2.1	2.5
27335	2.7	2.7	10.9	22.0	1.0	0.0	2	422.5	937.2	0.1	1	1.5	9000	1.6	2.5
27155	2.9	2.9	11.4	21.0	1.0	0.0	2	452.4	978.1	0.1	1	1.5	9000	1.8	2.5
26990	2.5	2.3	9.4	20.4	1.0	0.0	2	440.9	1020.9	0.1	1	1.5	9000	1.2	2.5
26780	2.5	2.1	8.8	21.3	1.0	0.0	2	527.5	1106.5	0.1	1	1.5	9000	1.0	2.5
26575	2.5	1.9	7.3	21.5	1.0	0.0	2	513.5	1243.6	0.2	1	1.5	3000	0.7	2.5
26355	2.5	2.0	7.4	21.6	1.0	0.0	2	601.4	1294.5	0.2	1	1.5	3000	0.9	2.5
26170	2.5	2.3	7.7	21.9	1.0	0.0	2	457.8	1301.2	0.2	1	1.5	3000	1.1	2.5
25965	2.6	2.6	7.5	22.2	1.0	0.0	2	568.4	1313.2	0.2	1	1.5	3000	1.3	2.5
25785	2.7	2.7	7.5	22.0	1.0	0.0	2	550.9	1256.9	0.3	1	1.5	3000	1.4	2.5
25600	2.5	2.5	7.8	22.3	1.0	0.0	2	478.1	1149.9	0.2	1	1.5	3000	1.3	2.5
25425	2.5	2.5	7.3	23.1	1.0	0.0	2	399.8	1138.3	0.2	1	1.5	3000	1.3	2.5
25215	2.5	2.4	7.3	23.3	1.0	0.0	2	444.6	1133.6	0.2	1	1.5	3000	1.2	2.5
25000	2.5	2.5	7.3	23.5	1.0	0.0	2	453.1	1093.8	0.2	1	1.5	3000	1.3	2.5
24795	3.7	3.7	8.0	23.5	1.9	0.2	2	391.4	986.5	0.3	1	1.5	3000	1.3	2.5
24550	3.6	3.6	8.9	24.1	1.9	0.2	2	334.0	887.1	0.3	1	1.5	3000	1.2	2.5
24335	3.9	3.9	9.9	23.5	1.9	0.2	2	337.2	800.3	0.3	1	1.5	3000	1.5	2.5
24115	3.8	3.8	10.0	23.0	1.9	0.2	2	422.7	793.2	0.3	1	1.5	3000	1.4	2.5
23975	3.5	3.5	9.7	22.6	1.9	0.2	2	354.1	828.2	0.2	1	1.5	3000	1.2	2.5
23755	3.2	3.2	9.9	22.7	1.9	0.2	2	333.9	939.2	0.2	1	1.5	3000	1.0	2.5
23565	3.7	3.7	9.4	23.6	1.9	0.2	2	322.2	941.5	0.3	1	1.5	3000	1.3	2.5
23365	3.5	3.5	9.4	22.4	1.9	0.2	2	329.4	987.4	0.3	1	1.5	3000	1.1	2.5
23180	3.2	3.2	9.6	22.5	1.9	0.2	2	400.7	975.5	0.2	1	1.5	3000	0.9	2.5
23000	3.3	3.3	9.5	22.0	1.9	0.2	2	407.6	784.0	0.3	1	1.5	3000	0.9	2.5
22790	3.1	3.1	10.6	20.0	1.9	0.2	2	425.5	784.0	0.2	1	1.5	3000	0.9	2.5
22600	3.2	3.2	10.2	19.8	1.9	0.2	2	386.7	1050.2	0.3	1	1.5	3000	0.8	2.5
22415	3.2	3.2	9.3	18.9	1.9	0.2	2	422.3	1091.6	0.2	1	1.5	3000	0.8	2.5
22195	2.5	2.4	8.4	19.1	1.4	0.0	2	371.3	1464.0	0.3	1	1.5	3000	0.8	2.5
22010	2.5	2.5	9.8	19.4	1.4	0.0	2	471.8	1735.1	0.3	1	1.5	3000	0.8	2.5
21790	2.6	2.6	9.0	18.4	1.4	0.0	2	549.9	1778.4	0.2	1	1.5	3000	1.0	2.5
21615	2.6	2.6	8.0	16.9	1.4	0.0	2	563.1	1687.7	0.3	1	1.5	3000	0.9	2.5
21440	2.5	2.4	8.2	17.8	1.4	0.0	2	638.9	1653.0	0.2	1	1.5	3000	0.8	2.5
21225	2.5	2.4	8.0	18.7	1.4	0.0	2	352.4	1600.8	0.2	1	1.5	3000	0.7	2.5
21020	2.5	2.3	7.8	18.6	1.4	0.0	2	675.0	1607.4	0.2	1	1.5	3000	0.7	2.5
20845	2.5	2.3	7.9	18.7	1.4	0.0	2	613.7	1605.1	0.2	1	1.5	3000	0.8	2.5
20595	2.5	2.1	7.5	18.6	1.4	0.0	2	744.5	1600.4	0.1	1	1.5	3000	0.6	2.5
20435	2.5	2.1	7.9	18.8	1.4	0.0	2	765.2	1613.5	0.1	1	1.5	3000	0.6	2.5
20280	2.5	2.1	8.7	18.1	1.4	0.0	2	439.6	1636.3	0.1	1	1.5	3000	0.6	2.5
20070	2.5	1.9	8.3	18.6	1.4	0.0	2	602.4	1797.8	0.1	1	1.5	3000	0.5	2.5
19855	3.0	3.0	7.7	19.1	1.0	1.4	2	585.9	1809.6	0.1	1	1.5	3000	0.5	2.5
19630	2.9	2.9	7.4	18.6	1.0	1.4	2	634.2	1833.7	0.0	1	1.5	3000	0.5	2.5
19440	3.0	3.0	7.2	19.9	1.0	1.4	2	536.3	1986.1	0.0	1	1.5	3000	0.6	2.5
19240	3.4	3.4	7.6	19.4	1.0	1.4	2	445.4	1738.0	0.0	1	1.5	3000	1.0	2.5
19050	4.1	4.1	6.7	20.2	1.0	1.4	2	418.1	1753.4	0.0	1	1.5	3000	1.7	2.5
18830	4.1	4.1	6.8	21.4	1.0	1.4	2	338.9	1684.0	0.0	1	1.5	3000	1.6	2.5
18650	4.0	4.0	6.7	21.2	1.0	1.4	2	339.7	1686.2	0.0	1	1.5	3000	1.6	2.5
18475	3.4	3.4	5.8	22.3	1.0	1.4	2	336.6	1665.9	0.0	1	1.5	3000	1.0	2.5
18290	3.2	3.2	6.3	22.1	1.0	1.4	2	365.1	1631.9	0.0	1	1.5	3000	0.8	2.5
18025	3.1	3.1	5.8	22.9	1.0	1.4	2	380.4	1557.4	0.0	1	1.5	17000	0.7	2.5
17785	3.2	3.2	6.4	24.0	1.0	1.4	2	389.3	1444.1	0.0	1	1.5	17000	0.8	2.5
17510	2.5	1.7	8.4	22.4	1.0	0.0	2	326.3	1398.9	0.0	1	1.5	17000	0.7	2.5
17360	2.5	1.7	11.1	20.3	1.0	0.0	2	223.6	1303.3	0.0	1	1.5	17000	0.7	2.5
17110	2.5	1.6	11.0	21.5	1.0	0.0	2	228.7	1229.6	0.0	1	1.5	17000	0.6	2.5
16970	2.5	2.1	10.7	20.3	1.0	0.0	2	235.7	1196.0	0.0	1	1.5	17000	1.1	2.5
16720	2.5	2.3	8.5	18.8	1.0	0.0	2	260.0	1182.0	0.0	1	1.5	17000	1.3	2.5
16515	2.5	2.1	7.7	19.2	1.0	0.0	2	296.5	1303.8	0.0	1	1.5	17000	1.1	2.5

CALCULATIONS FOR TOTAL FREEBOARD BY INDIVIDUAL ADJUSTMENT COMPONENT BASED ON LACH&SM - SANTA CLARA RIVER PROPOSED CONDITIONS OUTSIDE CURVED REACH Q_{CAP} n=0.085

SECTION	Y_{MAX}	Y_{TOT}=	V (FPS)	FLOW DEPTH (FT)	Y_{AGG}+	Y_{GA}+	CHANNEL TYPE	BOTTOM WIDTH (FT)	TOP WIDTH (FT)	Y_{SE}+	BEND COEFF	SIDE SLOPE	RADIUS	H/2	Y_{DM}
16305	**2.5**	2.0	7.1	20.4	1.0	0.0	2	304.6	1395.5	0.0	1	1.5	17000	1.0	2.5
16130	**2.5**	1.7	7.7	19.4	1.0	0.0	2	323.4	1368.9	0.0	1	1.5	17000	0.7	2.5
15960	**2.5**	1.6	7.1	19.6	1.0	0.0	2	294.6	1437.6	0.0	1	1.5	17000	0.6	2.5
15745	**2.5**	1.6	7.0	19.6	1.0	0.0	2	295.8	1401.3	0.0	1	1.5	17000	0.6	2.5
15540	**2.5**	1.6	6.6	19.2	1.0	0.0	2	344.9	2361.2	0.0	1	1.5	17000	0.6	2.5
15335	**2.5**	1.7	8.9	18.8	1.0	0.0	2	348.6	1064.1	0.0	1	1.5	17000	0.7	2.5
15125	**2.5**	1.4	9.8	18.0	1.0	0.0	2	437.3	1053.5	0.0	1	1.5	17000	0.4	2.5
14900	**2.5**	1.4	8.8	16.7	1.0	0.0	2	584.1	2233.1	0.0	1	1.5	17000	0.4	2.5
14720	**2.5**	1.5	8.5	16.4	1.0	0.0	2	532.9	2020.9	0.0	1	1.5	17000	0.5	2.5
14480	**2.5**	1.5	7.4	16.4	1.0	0.0	2	819.8	1851.8	0.0	1	1.5	17000	0.5	2.5
14315	**2.5**	1.6	6.8	16.0	1.0	0.0	2	1014.4	1944.1	0.0	1	1.5	17000	0.6	2.5
14090	**2.5**	1.6	6.7	14.8	1.0	0.0	2	787.4	1816.2	0.0	1	1.5	17000	0.6	2.5
13850	**2.5**	1.6	6.6	15.6	1.0	0.0	2	582.7	1774.9	0.0	1	1.5	17000	0.6	2.5
13635	**2.5**	1.8	7.3	16.5	1.0	0.0	2	631.2	1818.0	0.0	1	1.5	17000	0.7	2.5
13425	**2.5**	1.8	5.7	16.8	1.0	0.0	2	576.3	1936.1	0.0	1	1.5	17000	0.7	2.5
13190	**2.5**	1.9	5.6	17.1	1.0	0.0	2	713.9	1911.1	0.0	1	1.5	17000	0.8	2.5
13030	**4.2**	4.2	6.0	17.6	1.0	2.1	2	712.9	1863.7	0.1	1	1.5	17000	1.0	2.5
12835	**4.7**	4.7	6.2	18.0	1.0	2.1	2	799.4	1775.1	0.1	1	1.5	17000	1.5	2.5
12615	**5.2**	5.2	6.5	18.3	1.0	2.1	2	741.8	1566.5	0.0	1	1.5	17000	2.1	2.5
12395	**5.1**	5.1	6.7	18.7	1.0	2.1	2	738.1	1543.0	0.0	1	1.5	17000	2.0	2.5
12195	**4.2**	4.2	6.5	19.1	1.0	2.1	2	990.8	1463.7	0.0	1	1.5	17000	1.1	2.5
11995	**4.1**	4.1	7.4	20.3	1.0	2.1	2	589.4	1448.5	0.0	1	1.5	17000	1.0	2.5
11780	**4.0**	4.0	7.3	20.6	1.0	2.1	2	590.4	1460.8	0.0	1	1.5	17000	0.9	2.5
11605	**4.0**	4.0	7.9	20.3	1.0	2.1	2	587.6	1417.5	0.0	1	1.5	17000	0.9	2.5
11405	**3.9**	3.9	8.7	20.6	1.0	2.1	2	579.7	1144.9	0.0	1	1.5	17000	0.8	2.5
11180	**3.9**	3.9	10.7	19.7	1.0	2.1	2	580.2	1009.2	0.0	1	1.5	17000	0.8	2.5
11015	**3.8**	3.8	12.6	18.7	3.1	0.0	2	519.8	851.0	0.0	1	1.5	17000	0.7	2.5
10835	**3.7**	3.7	12.2	17.1	3.1	0.0	2	510.4	1073.0	0.0	1	1.5	17000	0.6	2.5
10575	**3.8**	3.8	9.1	16.1	3.1	0.0	2	534.5	1322.2	0.0	1	1.5	17000	0.7	2.5
10390	**3.1**	3.1	8.6	17.1	3.1	0.0	2	598.1	1517.0	0.0	1	1.5	17000	0.0	2.5
10225	**3.1**	3.1	8.0	16.6	3.1	0.0	2	606.9	1543.4	0.0	1	1.5	17000	0.0	2.5
10000	**3.1**	3.1	8.1	16.6	3.1	0.0	2	685.3	1626.0	0.0	1	1.5	17000	0.0	2.5
9820	**3.1**	3.1	7.9	17.4	3.1	0.0	2	773.4	1648.8	0.0	1	1.5	17000	0.0	2.5
9595	**3.1**	3.1	7.8	16.1	3.1	0.0	2	698.1	1719.6	0.0	1	1.5	17000	0.0	2.5
9385	**3.1**	3.1	7.2	15.6	3.1	0.0	2	694.0	1799.3	0.0	1	1.5	17000	0.0	2.5
9220	**3.1**	3.1	6.8	15.6	3.1	0.0	2	645.1	1853.4	0.0	1	1.5	17000	0.0	2.5
9025	**3.1**	3.1	7.0	15.6	3.1	0.0	2	537.6	1822.9	0.0	1	1.5	17000	0.0	2.5
MAX=	**5.2**	5.2			3.1					0.3				3.7	2.5
MIN=	**2.5**	1.4			1.0					0.0				0.0	2.5

CALCULATIONS FOR TOTAL FREEBOARD BY INDIVIDUAL ADJUSTMENT COMPONENT BASED ON LACH&SM - SANTA CLARA RIVER PROPOSED CONDITIONS STRAIGHT-INSIDE CURVED REACH Q_{CAP} n=0.085

SECTION	Y_{MAX}	Y_{TOT}=	V (FPS)	FLOW DEPTH (FT)	Y_{AGG}+	Y_{GA}+	CHANNEL TYPE	BOTTOM WIDTH (FT)	TOP WIDTH (FT)	Y_{SE}+	BEND COEFF	SIDE SLOPE	RADIUS	H/2	Y_{DM}
46195	**3.1**	3.1	10.7	28.1	1.0	0.6	2	215.7	750.8	0.0	0	1.5	9000	1.5	2.5
46020	**3.0**	3.0	10.2	30.0	1.0	0.6	2	162.7	570.2	0.0	0	1.5	9000	1.4	2.5
45545	**3.4**	3.4	11.6	27.8	1.0	0.6	2	151.3	524.2	0.0	0	1.5	9000	1.8	2.5
45030	**3.0**	3.0	10.3	29.2	1.0	0.6	2	222.6	558.0	0.0	0	1.5	9000	1.4	2.5
44585	**3.2**	3.2	10.7	28.6	1.0	0.6	2	163.7	654.4	0.0	0	1.5	9000	1.6	2.5
44210	**2.9**	2.9	10.0	27.8	1.0	0.6	2	204.3	620.0	0.0	0	1.5	9000	1.3	2.5
43820	**3.9**	3.9	14.2	24.1	1.0	0.2	2	207.8	528.7	0.0	0	1.5	9000	2.7	2.5
43610	**4.0**	4.0	14.4	21.3	1.0	0.2	2	242.1	536.9	0.0	0	1.5	9000	2.8	2.5
43410	**3.6**	3.6	13.3	19.8	1.0	0.2	2	312.8	729.1	0.0	0	1.5	9000	2.4	2.5
43200	**3.5**	3.5	13.0	19.2	1.0	0.2	2	308.4	779.5	0.0	0	1.5	9000	2.3	2.5
42975	**2.7**	2.7	10.7	19.0	1.0	0.2	2	410.5	955.8	0.0	0	1.5	9000	1.5	2.5
42815	**2.5**	2.3	9.1	18.7	1.0	0.2	2	380.4	1120.8	0.0	0	1.5	9000	1.1	2.5
42590	**2.5**	2.0	7.7	18.4	1.0	0.2	2	451.9	1230.7	0.0	0	1.5	9000	0.8	2.5
42430	**2.5**	2.0	7.6	19.5	1.0	0.2	2	445.9	1334.9	0.0	0	1.5	9000	0.8	2.5
42215	**2.5**	1.8	6.6	20.7	1.0	0.2	2	493.2	1374.6	0.0	0	1.5	9000	0.6	2.5
41940	**2.5**	1.7	6.4	20.6	1.0	0.2	2	454.2	1327.0	0.0	0	1.5	9000	0.5	2.5
41730	**2.5**	1.8	6.9	20.6	1.0	0.2	2	404.1	1221.5	0.0	0	1.5	9000	0.6	2.5
41460	**2.5**	1.9	7.4	21.2	1.0	0.2	2	365.7	1121.0	0.0	0	1.5	9000	0.7	2.5
41280	**2.5**	2.0	8.7	20.8	1.0	0.0	2	342.4	1193.2	0.0	0	1.5	9000	1.0	2.5
41080	**2.5**	2.0	8.6	20.5	1.0	0.0	2	429.5	1136.8	0.0	0	1.5	9000	1.0	2.5
40825	**2.5**	1.7	7.3	19.8	1.0	0.0	2	426.6	1213.0	0.0	0	1.5	9000	0.7	2.5
40585	**2.5**	1.7	7.1	20.3	1.0	0.0	2	404.3	1247.2	0.0	0	1.5	9000	0.7	2.5
40335	**2.5**	1.5	6.1	21.4	1.0	0.0	2	397.2	1288.6	0.0	0	1.5	9000	0.5	2.5
40130	**2.5**	1.6	6.6	21.6	1.0	0.0	2	311.3	1264.5	0.0	0	1.5	9000	0.6	2.5
39945	**2.5**	1.6	6.8	21.9	1.0	0.0	2	293.8	1212.3	0.0	0	1.5	9000	0.6	2.5
39755	**2.5**	2.0	8.6	20.6	1.0	0.0	2	296.7	1088.1	0.0	0	1.5	9000	1.0	2.5
39605	**2.5**	2.0	8.5	20.7	1.0	0.0	2	348.8	1074.7	0.0	0	1.5	9000	1.0	2.5
39310	**2.5**	2.0	8.4	20.2	1.0	0.0	2	323.4	977.3	0.0	0	1.5	9000	1.0	2.5
39100	**2.5**	1.9	8.2	21.1	1.0	0.0	2	436.5	831.5	0.0	0	1.5	9000	0.9	2.5
38925	**2.5**	1.8	7.8	20.8	1.0	0.0	2	422.3	906.7	0.0	0	1.5	9000	0.8	2.5
38710	**2.5**	2.0	8.1	21.2	1.0	0.1	2	394.9	844.1	0.0	0	1.5	9000	0.9	2.5
38475	**2.6**	2.6	10.4	21.0	1.0	0.1	2	375.1	695.3	0.0	0	1.5	9000	1.5	2.5
38300	**2.5**	2.3	9.6	20.3	1.0	0.1	2	407.6	716.8	0.0	0	1.5	9000	1.2	2.5
38065	**2.5**	2.3	9.6	20.1	1.0	0.1	2	569.0	691.3	0.0	0	1.5	9000	1.2	2.5
37810	**2.8**	2.8	11.3	18.4	1.0	0.1	2	546.8	648.4	0.0	0	1.5	9000	1.7	2.5
37655	**2.6**	2.6	10.6	17.9	1.0	0.1	2	348.9	738.9	0.0	0	1.5	9000	1.5	2.5
37390	**2.5**	2.0	8.2	17.5	1.0	0.1	2	803.3	869.1	0.0	0	1.5	9000	0.9	2.5
37135	**2.5**	2.1	8.7	16.8	1.0	0.1	2	564.0	863.7	0.0	0	1.5	9000	1.0	2.5
36930	**2.5**	2.0	8.3	17.7	1.0	0.1	2	708.3	923.7	0.0	0	1.5	9000	0.9	2.5
36735	**2.5**	2.0	8.1	17.6	1.0	0.1	2	633.8	963.2	0.0	0	1.5	9000	0.9	2.5
36515	**2.5**	1.8	7.4	18.6	1.0	0.1	2	532.1	1032.7	0.0	0	1.5	9000	0.7	2.5
36265	**2.5**	1.8	7.1	18.3	1.0	0.1	2	359.0	1176.0	0.0	0	1.5	9000	0.7	2.5
36080	**2.5**	1.8	7.8	17.6	1.0	0.0	2	326.3	1176.0	0.0	0	1.5	9000	0.8	2.5
35845	**2.5**	1.7	7.0	18.1	1.0	0.0	2	376.2	1512.8	0.0	0	1.5	9000	0.7	2.5
35725	**2.5**	1.9	8.0	18.3	1.0	0.0	2	378.2	1488.9	0.0	0	1.5	9000	0.9	2.5
35515	**2.5**	2.0	8.5	17.9	1.0	0.0	2	379.3	1501.0	0.0	0	1.5	9000	1.0	2.5
35245	**2.5**	1.9	8.3	17.0	1.0	0.0	2	414.3	1580.3	0.0	0	1.5	9000	0.9	2.5
35040	**2.5**	2.0	8.8	16.6	1.0	0.0	2	440.9	1491.6	0.0	0	1.5	9000	1.0	2.5
34860	**2.5**	1.8	7.7	16.3	1.0	0.0	2	432.9	1431.5	0.0	0	1.5	9000	0.8	2.5
34720	**2.5**	1.7	7.4	15.8	1.0	0.0	2	545.6	1449.9	0.0	0	1.5	9000	0.7	2.5
34495	**2.5**	1.7	7.2	15.7	1.0	0.0	2	504.6	1461.5	0.0	0	1.5	9000	0.7	2.5
34310	**2.5**	1.9	8.1	15.4	1.0	0.0	2	684.5	1384.9	0.0	0	1.5	9000	0.9	2.5
34090	**2.5**	1.8	7.5	15.0	1.0	0.0	2	787.5	1371.0	0.0	0	1.5	9000	0.8	2.5
33880	**2.5**	1.9	7.3	15.7	1.0	0.2	2	761.0	1482.9	0.0	0	1.5	9000	0.7	2.5
33710	**2.5**	1.9	7.0	15.6	1.0	0.2	2	719.2	1637.9	0.0	0	1.5	9000	0.7	2.5
33500	**2.5**	1.9	7.0	15.3	1.0	0.2	2	666.4	1755.5	0.0	0	1.5	9000	0.7	2.5
33310	**2.5**	1.7	6.2	15.3	1.0	0.2	2	609.9	1828.2	0.0	0	1.5	9000	0.5	2.5
33115	**2.5**	1.6	5.8	15.4	1.0	0.2	2	667.8	1927.1	0.0	0	1.5	9000	0.4	2.5
32795	**2.5**	1.7	6.3	15.7	1.0	0.2	2	697.6	1920.8	0.0	0	1.5	9000	0.5	2.5
32605	**2.5**	1.7	6.1	16.7	1.0	0.2	2	652.8	2407.4	0.0	0	1.5	9000	0.5	2.5
32265	**2.5**	2.2	5.5	17.2	1.0	0.8	2	651.0	2840.2	0.0	0	1.5	9000	0.4	2.5
31875	**2.5**	2.2	5.3	16.6	1.0	0.8	2	562.0	2593.1	0.0	0	1.5	9000	0.4	2.5
31585	**2.5**	2.1	5.0	18.7	1.0	0.8	2	619.5	2377.5	0.0	0	1.5	9000	0.3	2.5
31360	**2.5**	2.2	5.5	19.9	1.0	0.8	2	672.2	1959.5	0.0	0	1.5	9000	0.4	2.5
31060	**2.5**	2.1	5.1	21.2	1.0	0.8	2	955.0	1975.9	0.0	0	1.5	9000	0.3	2.5
30720	**2.5**	2.1	4.6	22.5	1.0	0.8	2	772.7	1911.5	0.0	0	1.5	9000	0.3	2.5
30445	**2.5**	2.1	4.6	24.1	1.0	0.8	2	700.9	1841.8	0.0	0	1.5	9000	0.3	2.5

DEFINITIONS

Y_{MAX} = GREATER OF THE DM AND S&H HEIGHTS

Y_{TOT}=TOTAL EMBANKMENT PROTECTION IN FEET BASED ON THE H&S

V(FPS) =VELOCITY IN FEET PER SECOND

FLOW DEPTH=WATER DEPTH IN CHANNEL IN FEET

Y_{AGG}=LONG TERM AGGRADATION IN FEET

Y_{GA}=GENERAL AGGRADATION IN FEET FROM SAM

CHANNEL TYPE=CHANNEL SHAPE/FLOW FACTOR:
IF Fr<1, RECTANGULAR = 0; IF Fr>1, RECTANGULAR = 1;
IF Fr<1, TRAPEZOIDAL = 2; IF Fr>1, TRAPEZOIDAL = 3.

Y_{SE}=SUPER ELEVATION IN FEET

BEND COEFF=BEND COEFFICIENT; IF NO BEND=0, BEND=1

SIDE SLOPE=CHANNEL SIDE SLOPE (H:V), UNITLESS

BOTTOM WIDTH=CHANNEL BOTTOM WIDTH IN FEET, $Q_{2\text{-}YEAR}$ TOP WIDTH

RADIUS=RADIUS OF CURVATURE TO CENTERLINE IN FEET

H/2=HALF BEDFORM HEIGHT IN FEET, LIMITED TO FLOW DEPTH,
AFTER KENNEDY (1963)

Y_{DM} = EMBANKMENT PROTECTION REQUIRED BY THE LACFCDDM IN FEET

GENERAL

THIS SPREADSHEET IS DESIGNED TO CALCULATE TOP PROTECTION (FREE BOARD) BASED ON LACDWP COUNTY HYDROLOGY MANUAL (1991) PAGES 5.8-5.9 AND ASSOCIATED APPENDICES (SEDIMENTATION MANUAL). ALL VELOCITIES ARE IN FPS, WITH NO MAXIMUM VALUE. THE USER SHOULD CONSIDER A PRACTICAL MAXIMUM OF APPROXIMATELY 20-30 FPS. THE PRESENT VERSION (8/05) WILL CALCULATE UP TO 100 VELOCITIES AT ONE TIME. LONG TERM AGGRADATION IS USER SUPPLIED. GENERAL AGGRADATION IS ALSO USER SUPPLIED. SUPER ELEVATION AT BENDS IS BASED ON LACFCDDM EQUATIONS FOUND IN C-3.1. BEDFORM HEIGHT, LIMITED TO FLOW DEPTH AFTER KENNEDY (1963), IS BASED ON EQUATIONS IN APPENDIX Q13. IF FLOW IS SUPERCRITICAL SPREADSHEET REPORTS LACFCDDM TOTAL WALL HEIGHT INSTEAD OF FREEBOARD. LOS ANGELES COUNTY FLOOD CONTROL DISTRICT DESIGN MANUAL (LACFCDDM) VALUES ARE PRESENTED AS A PART OF LACH&SM CALCULATIONS. THE SPREADSHEET CALCULATES THE GREATER OF THE TWO METHODOLOGIES. BOTTOM WIDTH IS BASED ON THE 2-YEAR WATER SURFACE AFTER ACOE PROCEDURES.

COLOR CODES

OUTPUT

DATA FROM HEC-RAS

USER SUPPLIED DATA

INTERMEDIATE CALCULATIONS (INDIVIDUAL SHEETS ONLY)

DESIGNED BY DAVID A JAFFE, PHD, PE
PACIFIC ADVANCED CIVIL ENGINEERING, INC
AUGUST, 2005

CALCULATIONS FOR TOTAL FREEBOARD BY INDIVIDUAL ADJUSTMENT COMPONENT BASED ON LACH&SM - SANTA CLARA RIVER PROPOSED CONDITIONS STRAIGHT-INSIDE CURVED REACH Q_{CAP} n=0.085

SECTION	Y_{MAX}	Y_{TOT}=	V (FPS)	FLOW DEPTH (FT)	Y_{AGG}+	Y_{GA}+	CHANNEL TYPE	BOTTOM WIDTH (FT)	TOP WIDTH (FT)	Y_{SE}+	BEND COEFF	SIDE SLOPE	RADIUS	H/2	Y_{DM}
30095	2.5	2.2	5.2	25.5	1.0	0.8	2	617.1	1637.3	0.0	0	1.5	9000	0.4	2.5
29815	2.5	2.3	6.1	25.8	1.0	0.8	2	551.1	1445.2	0.0	0	1.5	9000	0.5	2.5
29565	2.5	2.3	6.0	26.3	1.0	0.8	2	461.8	1334.9	0.0	0	1.5	9000	0.5	2.5
29385	2.5	2.4	6.8	26.6	1.0	0.8	2	381.5	1249.1	0.0	0	1.5	9000	0.6	2.5
29140	2.5	1.8	7.9	26.4	1.0	0.0	2	217.2	1095.0	0.0	0	1.5	9000	0.8	2.5
28895	4.7	4.7	16.5	23.8	1.0	0.0	2	201.9	978.0	0.0	0	1.5	9000	3.7	2.5
28695	2.5	2.2	9.4	24.9	1.0	0.0	2	269.6	951.6	0.0	0	1.5	9000	1.2	2.5
28500	2.9	2.9	12.0	23.0	1.0	0.0	2	326.0	1039.5	0.0	0	1.5	9000	1.9	2.5
28280	2.5	2.0	8.7	23.8	1.0	0.0	2	379.1	1003.9	0.0	0	1.5	9000	1.0	2.5
28080	2.5	1.9	8.3	24.1	1.0	0.0	2	416.6	945.4	0.0	0	1.5	9000	0.9	2.5
27925	2.5	2.2	9.6	24.1	1.0	0.0	2	402.0	884.9	0.0	0	1.5	9000	1.2	2.5
27725	2.9	2.9	11.9	23.1	1.0	0.0	2	386.2	811.8	0.0	0	1.5	9000	1.9	2.5
27545	3.1	3.1	12.4	22.3	1.0	0.0	2	409.6	852.5	0.0	0	1.5	9000	2.1	2.5
27335	2.6	2.6	10.9	22.0	1.0	0.0	2	422.5	937.2	0.0	0	1.5	9000	1.6	2.5
27155	2.8	2.8	11.4	21.0	1.0	0.0	2	452.4	978.1	0.0	0	1.5	9000	1.8	2.5
26990	2.5	2.2	9.4	20.4	1.0	0.0	2	440.9	1020.9	0.0	0	1.5	9000	1.2	2.5
26780	2.5	2.0	8.8	21.3	1.0	0.0	2	527.5	1106.5	0.0	0	1.5	9000	1.0	2.5
26575	2.5	1.7	7.3	21.5	1.0	0.0	2	513.5	1243.6	0.0	0	1.5	3000	0.7	2.5
26355	2.5	1.9	7.4	21.6	1.0	0.0	2	601.4	1294.5	0.0	0	1.5	3000	0.9	2.5
26170	2.5	2.1	7.7	21.9	1.0	0.0	2	457.8	1301.2	0.0	0	1.5	3000	1.1	2.5
25965	2.5	2.3	7.5	22.2	1.0	0.0	2	568.4	1313.2	0.0	0	1.5	3000	1.3	2.5
25785	2.5	2.4	7.5	22.0	1.0	0.0	2	550.9	1256.9	0.0	0	1.5	3000	1.4	2.5
25600	2.5	2.3	7.8	22.3	1.0	0.0	2	478.1	1149.9	0.0	0	1.5	3000	1.3	2.5
25425	2.5	2.3	7.3	23.1	1.0	0.0	2	399.8	1138.3	0.0	0	1.5	3000	1.3	2.5
25215	2.5	2.2	7.3	23.3	1.0	0.0	2	444.6	1133.6	0.0	0	1.5	3000	1.2	2.5
25000	2.5	2.3	7.3	23.5	1.0	0.0	2	453.1	1093.8	0.0	0	1.5	3000	1.3	2.5
24795	3.4	3.4	8.0	23.5	1.9	0.2	2	391.4	986.5	0.0	0	1.5	3000	1.3	2.5
24550	3.3	3.3	8.9	24.1	1.9	0.2	2	334.0	887.1	0.0	0	1.5	3000	1.2	2.5
24335	3.6	3.6	9.9	23.5	1.9	0.2	2	337.2	800.3	0.0	0	1.5	3000	1.5	2.5
24115	3.5	3.5	10.0	23.0	1.9	0.2	2	422.7	793.2	0.0	0	1.5	3000	1.4	2.5
23975	3.3	3.3	9.7	22.6	1.9	0.2	2	354.1	828.2	0.0	0	1.5	3000	1.2	2.5
23755	3.1	3.1	9.9	22.7	1.9	0.2	2	333.9	939.2	0.0	0	1.5	3000	1.0	2.5
23565	3.4	3.4	9.4	23.6	1.9	0.2	2	322.2	941.5	0.0	0	1.5	3000	1.3	2.5
23365	3.2	3.2	9.4	22.4	1.9	0.2	2	329.4	987.4	0.0	0	1.5	3000	1.1	2.5
23180	3.0	3.0	9.6	22.5	1.9	0.2	2	400.7	975.5	0.0	0	1.5	3000	0.9	2.5
23000	3.0	3.0	9.5	22.0	1.9	0.2	2	407.6	784.0	0.0	0	1.5	3000	0.9	2.5
22790	3.0	3.0	10.6	20.0	1.9	0.2	2	425.5	784.0	0.0	0	1.5	3000	0.9	2.5
22600	2.9	2.9	10.2	19.8	1.9	0.2	2	386.7	1050.2	0.0	0	1.5	3000	0.8	2.5
22415	2.9	2.9	9.3	18.9	1.9	0.2	2	422.3	1091.6	0.0	0	1.5	3000	0.8	2.5
22195	2.5	2.2	8.4	19.1	1.4	0.0	2	371.3	1464.0	0.0	0	1.5	3000	0.8	2.5
22010	2.5	2.2	9.8	19.4	1.4	0.0	2	471.8	1735.1	0.0	0	1.5	3000	0.8	2.5
21790	2.5	2.4	9.0	18.4	1.4	0.0	2	549.9	1778.4	0.0	0	1.5	3000	1.0	2.5
21615	2.5	2.3	8.0	16.9	1.4	0.0	2	563.1	1687.7	0.0	0	1.5	3000	0.9	2.5
21440	2.5	2.2	8.2	17.8	1.4	0.0	2	638.9	1653.0	0.0	0	1.5	3000	0.8	2.5
21225	2.5	2.1	8.0	18.7	1.4	0.0	2	352.4	1600.8	0.0	0	1.5	3000	0.7	2.5
21020	2.5	2.1	7.8	18.6	1.4	0.0	2	675.0	1607.4	0.0	0	1.5	3000	0.7	2.5
20845	2.5	2.2	7.9	18.7	1.4	0.0	2	613.7	1605.1	0.0	0	1.5	3000	0.8	2.5
20595	2.5	2.0	7.5	18.6	1.4	0.0	2	744.5	1600.4	0.0	0	1.5	3000	0.6	2.5
20435	2.5	2.0	7.9	18.8	1.4	0.0	2	765.2	1613.5	0.0	0	1.5	3000	0.6	2.5
20280	2.5	2.0	8.7	18.1	1.4	0.0	2	439.6	1636.3	0.0	0	1.5	3000	0.6	2.5
20070	2.5	1.9	8.3	18.6	1.4	0.0	2	602.4	1797.8	0.0	0	1.5	3000	0.5	2.5
19855	2.9	2.9	7.7	19.1	1.0	1.4	2	585.9	1809.6	0.0	0	1.5	3000	0.5	2.5
19630	2.9	2.9	7.4	18.6	1.0	1.4	2	634.2	1833.7	0.0	0	1.5	3000	0.5	2.5
19440	3.0	3.0	7.2	19.9	1.0	1.4	2	536.3	1986.1	0.0	0	1.5	3000	0.6	2.5
19240	3.4	3.4	7.6	19.4	1.0	1.4	2	445.4	1738.0	0.0	0	1.5	3000	1.0	2.5
19050	4.1	4.1	6.7	20.2	1.0	1.4	2	418.1	1753.4	0.0	0	1.5	3000	1.7	2.5
18830	4.0	4.0	6.8	21.4	1.0	1.4	2	338.9	1684.0	0.0	0	1.5	3000	1.6	2.5
18650	4.0	4.0	6.7	21.2	1.0	1.4	2	339.7	1686.2	0.0	0	1.5	3000	1.6	2.5
18475	3.4	3.4	5.8	22.3	1.0	1.4	2	336.6	1665.9	0.0	0	1.5	3000	1.0	2.5
18290	3.2	3.2	6.3	22.1	1.0	1.4	2	365.1	1631.9	0.0	0	1.5	3000	0.8	2.5
18025	3.1	3.1	5.8	22.9	1.0	1.4	2	380.4	1557.4	0.0	0	1.5	17000	0.7	2.5
17785	3.2	3.2	6.4	24.0	1.0	1.4	2	389.3	1444.1	0.0	0	1.5	17000	0.8	2.5
17510	2.5	1.7	8.4	22.4	1.0	0.0	2	326.3	1398.9	0.0	0	1.5	17000	0.7	2.5
17360	2.5	1.7	11.1	20.3	1.0	0.0	2	223.6	1303.3	0.0	0	1.5	17000	0.7	2.5
17110	2.5	1.6	11.0	21.5	1.0	0.0	2	228.7	1229.6	0.0	0	1.5	17000	0.6	2.5
16970	2.5	2.1	10.7	20.3	1.0	0.0	2	235.7	1196.0	0.0	0	1.5	17000	1.1	2.5
16720	2.5	2.3	8.5	18.8	1.0	0.0	2	260.0	1182.0	0.0	0	1.5	17000	1.3	2.5
16515	2.5	2.1	7.7	19.2	1.0	0.0	2	296.5	1303.8	0.0	0	1.5	17000	1.1	2.5
16305	2.5	2.0	7.1	20.4	1.0	0.0	2	304.6	1395.5	0.0	0	1.5	17000	1.0	2.5

CALCULATIONS FOR TOTAL FREEBOARD BY INDIVIDUAL ADJUSTMENT COMPONENT BASED ON LACH&SM - SANTA CLARA RIVER PROPOSED CONDITIONS STRAIGHT-INSIDE CURVED REACH Q_{CAP} n=0.085

SECTION	Y_{MAX}	Y_{TOT}=	V (FPS)	FLOW DEPTH (FT)	Y_{AGG}+	Y_{GA}+	CHANNEL TYPE	BOTTOM WIDTH (FT)	TOP WIDTH (FT)	Y_{SE}+	BEND COEFF	SIDE SLOPE	RADIUS	H/2	Y_{DM}
16130	2.5	1.7	7.7	19.4	1.0	0.0	2	323.4	1368.9	0.0	0	1.5	17000	0.7	2.5
15960	2.5	1.6	7.1	19.6	1.0	0.0	2	294.6	1437.6	0.0	0	1.5	17000	0.6	2.5
15745	2.5	1.6	7.0	19.6	1.0	0.0	2	295.8	1401.3	0.0	0	1.5	17000	0.6	2.5
15540	2.5	1.6	6.6	19.2	1.0	0.0	2	344.9	2361.2	0.0	0	1.5	17000	0.6	2.5
15335	2.5	1.7	8.9	18.8	1.0	0.0	2	348.6	1064.1	0.0	0	1.5	17000	0.7	2.5
15125	2.5	1.4	9.8	18.0	1.0	0.0	2	437.3	1053.5	0.0	0	1.5	17000	0.4	2.5
14900	2.5	1.4	8.8	16.7	1.0	0.0	2	584.1	2233.1	0.0	0	1.5	17000	0.4	2.5
14720	2.5	1.5	8.5	16.4	1.0	0.0	2	532.9	2020.9	0.0	0	1.5	17000	0.5	2.5
14480	2.5	1.5	7.4	16.4	1.0	0.0	2	819.8	1851.8	0.0	0	1.5	17000	0.5	2.5
14315	2.5	1.6	6.8	16.0	1.0	0.0	2	1014.4	1944.1	0.0	0	1.5	17000	0.6	2.5
14090	2.5	1.6	6.7	14.8	1.0	0.0	2	787.4	1816.2	0.0	0	1.5	17000	0.6	2.5
13850	2.5	1.6	6.6	15.6	1.0	0.0	2	582.7	1774.9	0.0	0	1.5	17000	0.6	2.5
13635	2.5	1.7	7.3	16.5	1.0	0.0	2	631.2	1818.0	0.0	0	1.5	17000	0.7	2.5
13425	2.5	1.7	5.7	16.8	1.0	0.0	2	576.3	1936.1	0.0	0	1.5	17000	0.7	2.5
13190	2.5	1.8	5.6	17.1	1.0	0.0	2	713.9	1911.1	0.0	0	1.5	17000	0.8	2.5
13030	4.1	4.1	6.0	17.6	1.0	2.1	2	712.9	1863.7	0.0	0	1.5	17000	1.0	2.5
12835	4.6	4.6	6.2	18.0	1.0	2.1	2	799.4	1775.1	0.0	0	1.5	17000	1.5	2.5
12615	5.2	5.2	6.5	18.3	1.0	2.1	2	741.8	1566.5	0.0	0	1.5	17000	2.1	2.5
12395	5.1	5.1	6.7	18.7	1.0	2.1	2	738.1	1543.0	0.0	0	1.5	17000	2.0	2.5
12195	4.2	4.2	6.5	19.1	1.0	2.1	2	990.8	1463.7	0.0	0	1.5	17000	1.1	2.5
11995	4.1	4.1	7.4	20.3	1.0	2.1	2	589.4	1448.5	0.0	0	1.5	17000	1.0	2.5
11780	4.0	4.0	7.3	20.6	1.0	2.1	2	590.4	1460.8	0.0	0	1.5	17000	0.9	2.5
11605	4.0	4.0	7.9	20.3	1.0	2.1	2	587.6	1417.5	0.0	0	1.5	17000	0.9	2.5
11405	3.9	3.9	8.7	20.6	1.0	2.1	2	579.7	1144.9	0.0	0	1.5	17000	0.8	2.5
11180	3.9	3.9	10.7	19.7	1.0	2.1	2	580.2	1009.2	0.0	0	1.5	17000	0.8	2.5
11015	3.8	3.8	12.6	18.7	3.1	0.0	2	519.8	851.0	0.0	0	1.5	17000	0.7	2.5
10835	3.7	3.7	12.2	17.1	3.1	0.0	2	510.4	1073.0	0.0	0	1.5	17000	0.6	2.5
10575	3.8	3.8	9.1	16.1	3.1	0.0	2	534.5	1322.2	0.0	0	1.5	17000	0.7	2.5
10390	3.1	3.1	8.6	17.1	3.1	0.0	2	598.1	1517.0	0.0	0	1.5	17000	0.0	2.5
10225	3.1	3.1	8.0	16.6	3.1	0.0	2	606.9	1543.4	0.0	0	1.5	17000	0.0	2.5
10000	3.1	3.1	8.1	16.6	3.1	0.0	2	685.3	1626.0	0.0	0	1.5	17000	0.0	2.5
9820	3.1	3.1	7.9	17.4	3.1	0.0	2	773.4	1648.8	0.0	0	1.5	17000	0.0	2.5
9595	3.1	3.1	7.8	16.1	3.1	0.0	2	698.1	1719.6	0.0	0	1.5	17000	0.0	2.5
9385	3.1	3.1	7.2	15.6	3.1	0.0	2	694.0	1799.3	0.0	0	1.5	17000	0.0	2.5
9220	3.1	3.1	6.8	15.6	3.1	0.0	2	645.1	1853.4	0.0	0	1.5	17000	0.0	2.5
9025	3.1	3.1	7.0	15.6	3.1	0.0	2	537.6	1822.9	0.0	0	1.5	17000	0.0	2.5
MAX=	**5.2**	5.2			3.1					0.0				3.7	2.5
MIN=	**2.5**	1.4			1.0					0.0				0.0	2.5

CALCULATIONS FOR TOTAL TOE-DOWN BY INDIVIDUAL ADJUSTMENT COMPONENT BASED ON LACH&SM W/ SAM -- SANTA CLARA RIVER PROPOSED CONDITIONS OUTSIDE CURVED REACH Q_{AP} n=0.025

SECTION	Z_{MAX}=	Z_{TOT}=	V (FPS)	FLOW DEPTH (FT)	Z_{DEG}+	Z_{GS}+	PIER TYPE	B	ABUT TYPE	A	SOFT	Z_{LS}+	BEND COEFF	HYD DEPTH	E SLOPE	TOP WIDTH	RADIUS	Z_{BS}+	Z_f+	H/2	Z_{DM}=
46195	14.0	11.1	21.7	18.1	2.8	0.0	0	0.0	1	0.0	0	0.0	1	11.7	0.005	453.0	9000	0.0	2.0	6.3	14.0
46020	14.0	12.7	24.1	18.1	2.8	0.0	0	0.0	1	0.0	0	0.0	1	9.2	0.009	520.9	9000	0.0	2.0	7.9	14.0
45545	14.0	10.4	20.3	19.2	2.8	0.0	0	0.0	1	0.0	0	0.0	1	12.7	0.004	446.7	9000	0.0	2.0	5.6	14.0
45030	14.0	13.1	26.1	16.5	2.8	0.0	0	0.0	1	0.0	0	0.0	1	9.0	0.011	492.5	9000	0.0	2.0	8.3	14.0
44585	14.0	9.8	19.2	21.1	2.8	0.0	0	0.0	1	0.0	0	0.0	1	11.3	0.004	531.9	9000	0.0	2.0	5.0	14.0
44210	14.0	12.5	26.2	15.4	2.8	0.0	0	0.0	1	0.0	0	0.0	1	9.7	0.009	452.6	9000	0.0	2.0	7.7	14.0
43820	15.4	15.4	19.9	19.5	8.1	0.0	0	0.0	1	0.0	0	0.0	1	12.1	0.004	476.5	9000	0.0	2.0	5.3	14.0
43610	17.0	17.0	26.7	13.8	8.1	0.0	0	0.0	1	0.0	0	0.0	1	9.6	0.010	450.6	9000	0.0	2.0	6.9	14.0
43410	15.8	15.8	28.8	11.3	8.1	0.0	0	0.0	1	0.0	0	0.0	1	7.4	0.011	583.4	9000	0.0	2.0	5.7	14.0
43200	16.3	16.3	26.1	12.4	8.1	0.0	0	0.0	1	0.0	0	0.0	1	6.7	0.011	689.2	9000	0.0	2.0	6.2	14.0
42975	15.5	15.5	26.6	10.8	8.1	0.0	0	0.0	1	0.0	0	0.0	1	5.9	0.016	735.1	9000	0.0	2.0	5.4	14.0
42815	15.5	15.5	23.9	10.7	8.1	0.0	0	0.0	1	0.0	0	0.0	1	5.6	0.016	864.3	9000	0.0	2.0	5.4	14.0
42590	21.0	15.1	22.4	9.2	8.1	0.0	0	0.0	1	0.0	0	0.0	1	5.2	0.014	1013.1	9000	0.4	2.0	4.6	21.0
42430	21.0	15.4	19.6	10.7	8.1	0.0	0	0.0	1	0.0	0	0.0	1	6.4	0.009	915.8	9000	0.1	2.0	5.2	21.0
42215	21.0	15.2	18.5	11.2	8.1	0.0	0	0.0	1	0.0	0	0.0	1	6.1	0.009	1019.0	9000	0.5	2.0	4.6	21.0
41940	15.0	13.4	11.6	14.3	8.1	0.0	0	0.0	1	0.0	0	0.0	1	7.7	0.002	1284.2	9000	1.4	2.0	1.8	15.0
41730	15.0	13.2	11.8	14.7	8.1	0.0	0	0.0	1	0.0	0	0.0	1	8.2	0.002	1190.9	9000	1.2	2.0	1.9	15.0
41460	15.0	12.8	11.6	16.2	8.1	0.0	0	0.0	1	0.0	0	0.0	1	9.1	0.002	1093.5	9000	0.9	2.0	1.8	15.0
41280	12.5	10.9	16.4	14.4	5.2	0.1	0	0.0	1	0.0	0	0.0	1	8.3	0.004	852.3	9000	0.0	2.0	3.6	12.5
41080	14.0	12.7	19.9	12.1	5.2	0.1	0	0.0	1	0.0	0	0.0	1	6.7	0.008	874.1	9000	0.0	2.0	5.4	14.0
40825	21.0	12.2	18.0	11.5	5.2	0.1	0	0.0	1	0.0	0	0.0	1	6.2	0.007	1040.4	9000	0.5	2.0	4.4	21.0
40585	18.0	11.6	17.0	11.7	5.2	0.1	0	0.0	1	0.0	0	0.0	1	6.8	0.006	1005.8	9000	0.4	2.0	3.9	18.0
40335	15.0	10.2	10.5	15.1	5.2	0.1	0	0.0	1	0.0	0	0.0	1	8.8	0.002	1249.6	9000	1.4	2.0	1.5	15.0
40130	15.0	10.3	11.3	15.5	5.2	0.1	0	0.0	1	0.0	0	0.0	1	8.8	0.002	1195.6	9000	1.3	2.0	1.7	15.0
39945	15.0	10.2	11.0	16.3	5.2	0.1	0	0.0	1	0.0	0	0.0	1	9.3	0.002	1173.3	9000	1.3	2.0	1.6	15.0
39755	12.5	11.0	16.5	13.3	5.2	0.1	0	0.0	1	0.0	0	0.0	1	8.1	0.004	894.5	9000	0.0	2.0	3.7	12.5
39605	14.0	12.5	19.7	11.5	5.2	0.1	0	0.0	1	0.0	0	0.0	1	7.1	0.007	849.7	9000	0.0	2.0	5.2	14.0
39310	18.0	11.2	16.5	12.7	5.2	0.1	0	0.0	1	0.0	0	0.0	1	8.1	0.004	931.1	9000	0.2	2.0	3.7	18.0
39100	14.0	12.5	20.9	10.4	5.2	0.1	0	0.0	1	0.0	0	0.0	1	7.2	0.009	761.1	9000	0.0	2.0	5.2	14.0
38925	10.0	9.5	12.8	14.3	5.2	0.1	0	0.0	1	0.0	0	0.0	1	10.3	0.002	873.5	9000	0.0	2.0	2.2	10.0
38710	10.0	6.7	12.0	15.6	2.7	0.0	0	0.0	1	0.0	0	0.0	1	11.7	0.002	820.3	9000	0.0	2.0	2.0	10.0
38475	12.5	9.0	17.9	14.0	2.7	0.0	0	0.0	1	0.0	0	0.0	1	9.8	0.004	659.7	9000	0.0	2.0	4.3	12.5
38300	14.0	9.8	22.5	10.3	2.7	0.0	0	0.0	1	0.0	0	0.0	1	7.7	0.010	666.3	9000	0.0	2.0	5.1	14.0
38065	10.0	7.6	14.5	14.0	2.7	0.0	0	0.0	1	0.0	0	0.0	1	12.0	0.002	658.4	9000	0.0	2.0	2.9	10.0
37810	14.0	9.2	18.2	12.2	2.7	0.0	0	0.0	1	0.0	0	0.0	1	10.2	0.004	618.2	9000	0.0	2.0	4.5	14.0
37655	14.0	10.0	20.9	10.5	2.7	0.0	0	0.0	1	0.0	0	0.0	1	7.8	0.008	706.7	9000	0.0	2.0	5.3	14.0
37390	14.0	8.0	23.7	6.5	2.7	0.0	0	0.0	1	0.0	0	0.0	1	5.9	0.015	823.8	9000	0.0	2.0	3.3	14.0
37135	12.5	8.4	16.6	9.3	2.7	0.0	0	0.0	1	0.0	0	0.0	1	8.5	0.005	821.4	9000	0.0	2.0	3.7	12.5
36930	14.0	8.8	19.8	8.1	2.7	0.0	0	0.0	1	0.0	0	0.0	1	7.2	0.008	812.4	9000	0.0	2.0	4.1	14.0
36735	12.5	8.2	16.1	9.8	2.7	0.0	0	0.0	1	0.0	0	0.0	1	8.0	0.005	896.9	9000	0.0	2.0	3.5	12.5
36515	15.0	7.3	12.9	12.0	2.7	0.0	0	0.0	1	0.0	0	0.0	1	9.0	0.002	994.7	9000	0.4	2.0	2.2	15.0
36265	15.0	7.7	12.3	12.5	2.7	0.0	0	0.0	1	0.0	0	0.0	1	7.9	0.003	1176.0	9000	0.9	2.0	2.1	15.0
36080	22.9	22.9	14.7	11.6	3.2	0.7	0.9	2.0	1	0.0	0	13.3	1	6.7	0.006	1176.0	9000	0.9	2.0	2.9	15.0
35845	15.0	9.2	11.0	13.6	3.2	0.7	0	0.0	1	0.0	0	0.0	1	7.9	0.002	1401.7	9000	1.7	2.0	1.6	15.0
35725	15.0	10.7	15.0	13.0	3.2	0.7	0	0.0	1	0.0	0	0.0	1	6.5	0.004	1377.9	9000	1.8	2.0	3.0	15.0
35515	18.0	11.5	17.1	12.0	3.2	0.7	0	0.0	1	0.0	0	0.0	1	6.0	0.005	1354.8	9000	1.7	2.0	3.9	18.0
35245	18.0	11.4	17.3	11.3	3.2	0.7	0	0.0	1	0.0	0	0.0	1	5.5	0.006	1328.3	9000	1.5	2.0	4.0	18.0
35040	21.0	12.7	19.6	10.7	3.2	0.7	0	0.0	1	0.0	0	0.0	1	5.5	0.006	1354.8	9000	1.7	2.0	5.2	21.0
34860	21.0	11.6	18.4	10.0	3.2	0.7	0	0.0	1	0.0	0	0.0	1	4.9	0.009	1285.7	9000	1.2	2.0	4.6	21.0
34720	21.0	11.8	18.4	9.2	3.2	0.7	0	0.0	1	0.0	0	0.0	1	4.5	0.009	1411.2	9000	1.4	2.0	4.6	21.0
34495	18.0	10.9	17.4	9.0	3.2	0.7	0	0.0	1	0.0	0	0.0	1	5.2	0.009	1283.9	9000	1.0	2.0	4.1	18.0
34310	18.0	10.8	16.8	9.3	3.2	0.7	0	0.0	1	0.0	0	0.0	1	5.9	0.005	1308.5	9000	1.2	2.0	3.8	18.0
34090	18.0	10.8	17.0	8.6	3.2	0.7	0	0.0	1	0.0	0	0.0	1	5.3	0.007	1295.5	9000	1.0	2.0	3.9	18.0
33880	18.0	10.2	16.6	9.3	3.4	0.0	0	0.0	1	0.0	0	0.0	1	5.3	0.007	1318.4	9000	1.2	2.0	3.7	18.0
33710	18.0	9.9	15.4	9.7	3.4	0.0	0	0.0	1	0.0	0	0.0	1	5.5	0.005	1372.1	9000	1.3	2.0	3.2	18.0
33500	18.0	10.4	16.2	9.3	3.4	0.0	0	0.0	1	0.0	0	0.0	1	5.1	0.007	1496.0	9000	1.5	2.0	3.5	18.0
33310	18.0	10.9	15.8	9.0	3.4	0.0	0	0.0	1	0.0	0	0.0	1	4.2	0.006	1770.4	9000	2.1	2.0	3.4	18.0
33115	15.0	9.0	10.4	10.6	3.4	0.0	0	0.0	1	0.0	0	0.0	1	6.1	0.003	1847.3	9000	2.1	2.0	1.4	15.0
32795	15.0	9.9	13.0	10.6	3.4	0.0	0	0.0	1	0.0	0	0.0	1	5.2	0.004	1735.6	9000	2.3	2.0	2.3	15.0
32605	15.0	10.5	14.4	11.1	3.4	0.0	0	0.0	1	0.0	0	0.0	1	5.0	0.005	1699.9	9000	2.3	2.0	2.8	15.0
32265	18.0	9.9	15.9	10.5	2.0	0.0	0	0.0	1	0.0	0	0.0	1	4.8	0.006	1853.2	9000	2.5	2.0	3.4	18.0
31875	15.0	9.1	12.4	10.4	2.0	0.0	0	0.0	1	0.0	0	0.0	1	4.7	0.006	2409.2	9000	3.0	2.0	2.1	15.0
31585	15.0	8.6	10.9	11.9	2.0	0.0	0	0.0	1	0.0	0	0.0	1	5.9	0.003	2182.2	9000	3.0	2.0	1.6	15.0
31360	15.0	8.3	10.3	13.5	2.0	0.0	0	0.0	1	0.0	0	0.0	1	7.4	0.002	1878.7	9000	2.8	2.0	1.4	15.0
31060	12.0	7.5	8.2	15.5	2.0	0.0	0	0.0	1	0.0	0	0.0	1	10.1	0.001	1708.2	9000	2.6	2.0	0.9	12.0
30720	12.0	7.9	6.7	17.5	2.0	0.0	0	0.0	1	0.0	0	0.0	1	11.2	0.001	1888.6	9000	3.3	2.0	0.6	12.0
30445	12.0	7.9	6.3	19.5	2.0	0.0	0	0.0	1	0.0	0	0.0	1	12.7	0.000	1779.7	9000	3.3	2.0	0.5	12.0
30095	12.0	8.1	6.7	21.3	2.0	0.0	0	0.0	1	0.0	0	0.0	1	13.4	0.000	1622.7	9000	3.5	2.0	0.6	12.0
29815	12.0	7.7	7.7	21.9	2.0	0.0	0	0.0	1	0.0	0	0.0	1	13.5	0.000	1433.2	9000	2.9	2.0	0.8	12.0
29565	12.0	7.1	7.4	22.9	2.0	0.0	0	0.0	1	0.0	0	0.0	1	14.8	0.000	1323.8	9000	2.4	2.0	0.7	12.0
29385	12.0	7.0	8.3	23.6	2.0	0.0	0	0.0	1	0.0	0	0.0	1	14.4	0.000	1237.4	9000	2.1	2.0	0.9	12.0
29140	12.0	10.4	9.2	24.1	4.4	1.6	0	0.0	1	0.0	0	0.0	1	14.1	0.001	1087.2	9000	1.2	2.0	1.1	12.0
28895	21.0	13.5	18.8	22.5	4.4	1.6	0	0.0	1	0.0	0	0.0	1	9.9	0.002	972.1	9000	0.8	2.0	4.8	21.0
28695	15.0	15.0	28.9	14.0	4.4	1.6	0	0.0	1	0.0	0	0.0	1	5.4	0.025	899.4	9000	0.0	2.0	7.0	14.0
28500	14.7	14.7	22.4	16.1	4.4	1.6	0	0.0	1	0.0	0	0.0	1	11.4	0.006	552.2	9000	0.0	2.0	6.8	14.0
28280	21.0	13.6	29.6	10.8	4.4	1.6	0	0.0	1	0.0	0	0.0	1	5.8	0.013	944.5	9000	0.3	2.0	5.4	21.0
28080	15.0	9.9	11.3	19.1	4.4	1.6	0	0.0	1	0.0	0	0.0	1	14.7	0.001	926.4	9000	0.2	2.0	1.7	15.0
27925	10.3	10.3	13.1	19.3	4.4	1.6	0	0.0	1	0.0	0	0.0	1	13.8	0.001	866.6	9000	0.0	2.0	2.3	10.0
27725	14.0	12.9	19.0	16.7	4.4	1.6	0	0.0	1	0.0	0	0.0	1	10.4	0.003	786.6	9000	0.0	2.0	4.9	14.0
27545	15.0	15.0	22.9	14.1	4.4	1.6	0	0.0	1	0.0	0	0.0	1	9.9	0.005	643.2	9000	0.0	2.0	7.0	14.0
27335	14.1	14.1	24.6	12.3	4.4	1.6	0	0.0	1	0.0	0	0.0	1	8.3	0.008	703.5	9000	0.0	2.0	6.2	14.0
27155	14.0	12.9	19.1	14.8	4.4	1.6	0	0.0	1	0.0	0	0.0	1	9.2	0.003	888.4	9000	0.0	2.0	4.9	14.0
26990	21.0	11.2	22.6	11.5	2.0	1.3	0	0.0	1	0.0	0	0.0	1	6.8	0.011	922.3	9000	0.1	2.0	5.7	21.0
26780	21.0	11.6	23.1	11.3	2.0	1.3	0	0.0	1	0.0	0	0.0	1	6.2	0.009	1043.3	9000	0.6	2.0	5.6	21.0
26575	21.0	16.0	20.7	11.1	2.0	1.3	0	0.0	1	0.0	0	0.0	1	5.7	0.012	1187.3	3000	5.2	2.0	5.6	21.0
26355	18.0	15.4	15.9	13.4	2.0	1.3	0	0.0	1	0.0	0	0.0	1	7.5	0.004	1260.4	3000	6.7	2.0	3.4	18.0
26170	18.0	16.6	17.0	13.5	2.0	1.3	0	0.0	1	0.0	0	0.0	1	7.6	0.003	1269.0	3000	7.4	2.0	3.9	18.0
25965	21.0	17.1	18.2	12.9	2.0	1.3	0	0.0	1	0.0	0	0.0	1	6.9	0.004	1281.3	3000	7.3	2.0	4.5	21.0
25785	21.0	16.7	18.9	12.1	2.0	1.3	0	0.0	1	0.0	0	0.0	1	6.9	0.005	1219.7	3000	6.5	2.0	4.8	21.0

DEFINITIONS

V(FPS) =VELOCITY IN FEET PER SECOND
Z_{TOT}=TOTAL POTENTIAL VERTICAL ADJUSTMENT IN FEET
Z_{DEG}=LONG TERM DEGRADATION IN FEET
Z_{GS}=GENERAL SCOUR IN FEET FROM SAM
Z_{LS}=LOCAL SCOUR IN FEET
PIER TYPE=PIER SHAPE FACTOR; IF NO PIERS=**0**
1.0=SQUARE NOSE; **0.9** ROUND NOSE; **0.9** CYLINDER;
0.8 SHARP NOSE; **0.9** GROUP OF CYLINDERS
FLOW DEPTH=WATER DEPTH IN CHANNEL IN FEET
B=WIDTH OF PIERS IN FEET; NO PIER=0
ABUT TYPE=VERT WALL FACTOR; IF VERT=**2**; NON VERT=**1**
A=ABUTMENT PROTRUSION INTO FLOW PATH IN FEET
SOFT = SOFT BOTTOM AT A BRIDGE OR AN ABUTMENT
0 = HARD BOTTOM; **1** = SOFT BOTTOM
Z_{BS}=BEND SCOUR IN FEET
BEND COEFF=BEND COEFFICIENT; IF NO BEND=0, BEND=1
HYD DEPTH=HYDRAULIC DEPTH IN FEET
E SLOPE=ENERGY SLOPE, UNITLESS
TOP WIDTH=CHANNEL TOP WIDTH IN FEET
RADIUS=RADIUS OF CURVATURE TO CENTERLINE IN FEET
Z_f=LOW-FLOW INCISEMENT IN FEET, MEASURED OR 2'; VALUE **NOT LESS THAN 2'**
H=BEDFORM HEIGHT IN FEET, LIMITED TO FLOW DEPTH AFTER KENNEDY (1963)
Z_{DM}=CUT OFF DEPTH REQUIRED BY LACFCDDM

GENERAL

THIS SPREADSHEET IS DESIGNED TO CALCULATE SCOUR PROTECTION (TOE DOWN) BASED ON LADPW COUNTY HYDROLOGY MANUAL (1991) PAGES 5.2-5.8 AND ASSOCIATED APPENDICES (SEDIMENTATION MANUAL). ALL VELOCITIES ARE IN FPS, WITH A MAXIMUM VALUE LIMITED BY THE EQUATION. THE PRESENT VERSION (10/04) WILL CALCULATE UP TO 50 VELOCITIES AT ONE TIME. LONG TERM DEGRADATION IS USER SUPPLIED. GENERAL SCOUR IS TAKEN FROM APPENDIX Q3, INTERPOLATED. LOCAL SCOUR AT BENDS AND ABUTMENTS ARE BASED ON LADWP EQUATIONS FOUND IN APP Q12. BEND SCOUR IS BASED ON EQUATIONS IN APPENDIX Q12. A LONGITUDINAL EXTENT BASED ON SECONDARY CURRENTS IS NOT INCLUDED. BEDFORM HEIGHT IS BASED ON EQUATIONS IN APPENDIX Q13. JULY 2005 REVISION INCLUDES CALCULATION FOR CUT OFF DEPTH BASED ON LOS ANGELES COUNTY FLOOD CONTROL DISTRICT DESIGN MANUAL. THE CALCULATION DOES NOT CONSIDER ADJUSTMENTS TO CUT OFF DEPTH BASED ON TABLE F-06 THE OCTOBER 2005 REVISION INCLUDES ADDITIONAL TOEDOWN AT BRIDGES/ABUTMENTS WITH SOFT BOTTOMS.

COLOR CODES

OUTPUT
DATA FROM HEC-RAS
USER SUPPLIED DATA
INTERMEDIATE CALCULATIONS (INDIVIDUAL SHEETS ONLY)

DESIGNED BY DAVID A JAFFE, PHD, PE
PACIFIC ADVANCED CIVIL ENGINEERING, INC
OCTOBER, 2004
OCTOBER 2005, REVISED

CALCULATIONS FOR TOTAL TOE-DOWN BY INDIVIDUAL ADJUSTMENT COMPONENT BASED ON LACH&SM W/ SAM -- SANTA CLARA RIVER PROPOSED CONDITIONS OUTSIDE CURVED REACH Q_{AP} n=0.025

SECTION	Z_{MAX}=	Z_{TOT}=	V (FPS)	FLOW DEPTH (FT)	Z_{DEG}+	Z_{OS}+	PIER TYPE	B	ABUT TYPE	A	SOFT	Z_{LS}+	BEND COEFF	HYD DEPTH	E SLOPE	TOP WIDTH	RADIUS	Z_{BS}+	Z_L+	H/2	Z_{DM}=
25600	21.0	15.9	18.5	12.4	2.0	1.3	0	0.0	1	0.0	0	0.0	1	7.6	0.005	1109.4	3000	6.0	2.0	4.6	21.0
25425	21.0	15.1	18.3	12.5	2.0	1.3	0	0.0	1	0.0	0	0.0	1	7.1	0.007	1082.2	3000	5.3	2.0	4.5	21.0
25215	15.0	14.0	14.3	14.7	2.0	1.3	0	0.0	1	0.0	0	0.0	1	9.0	0.003	1097.3	3000	6.0	2.0	2.7	15.0
25000	15.0	13.7	13.2	15.5	2.0	1.3	0	0.0	1	0.0	0	0.0	1	10.1	0.002	1062.4	3000	6.0	2.0	2.3	15.0
24795	15.0	12.3	14.1	15.6	2.0	0.0	0	0.0	1	0.0	0	0.0	1	10.5	0.002	957.4	3000	5.6	2.0	2.7	15.0
24550	18.0	12.4	15.1	16.5	2.0	0.0	0	0.0	1	0.0	0	0.0	1	11.0	0.003	856.1	3000	5.4	2.0	3.1	18.0
24335	21.0	13.0	18.2	15.0	2.0	0.0	0	0.0	1	0.0	0	0.0	1	10.1	0.004	764.8	3000	4.5	2.0	4.5	21.0
24115	21.0	13.5	20.0	13.8	2.0	0.0	0	0.0	1	0.0	0	0.0	1	9.4	0.006	754.2	3000	4.1	2.0	5.4	21.0
23975	21.0	13.9	20.8	12.9	2.0	0.0	0	0.0	1	0.0	0	0.0	1	8.7	0.007	783.2	3000	4.1	2.0	5.8	21.0
23755	21.0	13.2	18.1	14.7	2.0	0.0	0	0.0	1	0.0	0	0.0	1	9.7	0.004	815.7	3000	4.8	2.0	4.4	21.0
23565	21.0	14.5	20.2	14.3	2.0	0.0	0	0.0	1	0.0	0	0.0	1	8.2	0.007	850.9	3000	4.9	2.0	5.5	21.0
23365	21.0	14.3	18.4	14.3	2.0	0.0	0	0.0	1	0.0	0	0.0	1	8.7	0.004	939.0	3000	5.7	2.0	4.6	21.0
23180	21.0	15.8	21.9	12.6	2.0	0.0	0	0.0	1	0.0	0	0.0	1	8.0	0.005	916.6	3000	5.5	2.0	6.3	21.0
23000	21.0	13.0	22.0	11.3	2.0	0.0	0	0.0	1	0.0	0	0.0	1	8.2	0.010	784.0	3000	3.4	2.0	5.6	21.0
22790	26.8	26.8	17.9	13.0	2.0	0.0	0.9	2.0	1	0.0	0	14.7	1	10.0	0.005	784.0	3000	3.7	2.0	4.3	18.0
22600	21.0	14.8	19.8	12.8	2.0	0.0	0	0.0	1	0.0	0	0.0	1	7.6	0.006	999.0	3000	5.5	2.0	5.3	21.0
22415	21.0	14.0	21.3	10.8	2.0	0.0	0	0.0	1	0.0	0	0.0	1	6.6	0.010	1039.1	3000	4.6	2.0	5.4	21.0
22195	15.0	13.3	13.6	14.0	2.0	0.2	0	0.0	1	0.0	0	0.0	1	8.7	0.003	1309.6	3000	6.6	2.0	2.5	15.0
22010	18.0	15.3	16.1	14.3	2.0	0.2	0	0.0	1	0.0	0	0.0	1	7.6	0.003	1254.1	3000	7.6	2.0	3.5	18.0
21790	21.0	15.3	19.7	11.6	2.0	0.2	0	0.0	1	0.0	0	0.0	1	6.5	0.006	1144.5	3000	5.9	2.0	5.2	21.0
21615	21.0	12.5	21.3	8.5	2.0	0.2	0	0.0	1	0.0	0	0.0	1	5.8	0.011	1163.0	3000	4.1	2.0	4.3	21.0
21440	18.0	14.1	17.5	11.0	2.0	0.2	0	0.0	1	0.0	0	0.0	1	6.9	0.005	1286.1	3000	5.8	2.0	4.1	18.0
21225	21.0	16.3	18.1	11.7	2.0	0.2	0	0.0	1	0.0	0	0.0	1	5.6	0.005	1559.0	3000	7.7	2.0	4.4	21.0
21020	21.0	12.6	20.3	9.7	2.0	0.2	0	0.0	1	0.0	0	0.0	1	7.8	0.007	903.0	3000	3.6	2.0	4.9	21.0
20845	18.0	15.2	15.1	12.7	2.0	0.2	0	0.0	1	0.0	0	0.0	1	6.7	0.003	1563.7	3000	7.9	2.0	3.1	18.0
20595	15.0	14.1	12.4	13.4	2.0	0.2	0	0.0	1	0.0	0	0.0	1	8.3	0.002	1548.8	3000	7.8	2.0	2.1	15.0
20435	15.0	14.4	12.1	14.3	2.0	0.2	0	0.0	1	0.0	0	0.0	1	8.8	0.001	1528.3	3000	8.3	2.0	2.0	15.0
20280	18.0	15.4	15.6	12.8	2.0	0.2	0	0.0	1	0.0	0	0.0	1	6.8	0.003	1531.3	3000	8.0	2.0	3.3	18.0
20070	21.0	16.8	19.3	11.1	2.0	0.2	0	0.0	1	0.0	0	0.0	1	5.2	0.006	1526.6	3000	7.5	2.0	5.0	21.0
19855	21.0	14.5	20.6	10.2	2.0	0.0	0	0.0	1	0.0	0	0.0	1	6.0	0.008	1205.4	3000	5.4	2.0	5.1	21.0
19630	21.0	12.3	20.6	8.9	2.0	0.0	0	0.0	1	0.0	0	0.0	1	6.6	0.009	1060.3	3000	3.8	2.0	4.4	21.0
19440	15.0	12.2	13.1	13.4	2.0	0.0	0	0.0	1	0.0	0	0.0	1	9.2	0.002	1194.5	3000	5.9	2.0	2.3	15.0
19240	18.0	13.0	15.9	11.9	2.0	0.0	0	0.0	1	0.0	0	0.0	1	7.4	0.004	1216.9	3000	5.6	2.0	3.4	18.0
19050	21.0	14.1	18.8	10.5	2.0	0.0	0	0.0	1	0.0	0	0.0	1	5.8	0.009	1321.4	3000	5.4	2.0	4.8	21.0
18830	15.0	14.5	13.3	14.6	2.0	0.0	0	0.0	1	0.0	0	0.0	1	7.4	0.003	1531.5	3000	8.1	2.0	2.4	15.0
18650	15.0	14.7	12.1	15.0	2.0	0.0	0	0.0	1	0.0	0	0.0	1	8.0	0.002	1604.5	3000	8.8	2.0	2.0	15.0
18475	13.6	13.6	8.9	16.9	2.0	0.0	0	0.0	1	0.0	0	0.0	1	9.9	0.001	1621.5	3000	8.5	2.0	1.1	12.0
18290	14.1	14.1	9.8	16.9	2.0	0.0	0	0.0	1	0.0	0	0.0	1	9.4	0.001	1594.2	3000	8.9	2.0	1.3	12.0
18025	8.0	4.8	7.9	18.5	2.0	0.0	0	0.0	1	0.0	0	0.0	1	11.9	0.001	1520.2	17000	0.0	2.0	0.8	8.0
17785	8.0	5.0	8.5	20.2	2.0	0.0	0	0.0	1	0.0	0	0.0	1	12.0	0.001	1398.1	17000	0.0	2.0	1.0	8.0
17510	10.0	6.9	11.0	19.2	2.0	1.3	0	0.0	1	0.0	0	0.0	1	10.2	0.001	1350.7	17000	0.0	2.0	1.6	10.0
17360	12.5	9.2	17.1	15.9	2.0	1.3	0	0.0	1	0.0	0	0.0	1	8.8	0.004	943.2	17000	0.0	2.0	3.9	12.5
17110	14.0	12.0	22.3	15.2	2.0	1.3	0	0.0	1	0.0	0	0.0	1	5.8	0.007	1175.4	17000	0.0	2.0	6.7	14.0
16970	14.0	12.1	23.1	13.6	2.0	1.3	0	0.0	1	0.0	0	0.0	1	5.9	0.010	1067.0	17000	0.0	2.0	6.8	14.0
16720	14.0	9.9	24.4	9.2	2.0	1.3	0	0.0	1	0.0	0	0.0	1	5.2	0.019	1122.9	17000	0.0	2.0	4.6	14.0
16515	14.0	10.4	19.4	10.4	2.0	1.3	0	0.0	1	0.0	0	0.0	1	5.8	0.010	1249.9	17000	0.0	2.0	5.1	14.0
16305	10.0	7.1	11.6	14.6	2.0	1.3	0	0.0	1	0.0	0	0.0	1	9.4	0.002	1360.5	17000	0.0	2.0	1.8	10.0
16130	12.5	8.6	15.7	12.3	2.0	1.3	0	0.0	1	0.0	0	0.0	1	7.1	0.005	1326.5	17000	0.0	2.0	3.3	12.5
15960	12.5	9.5	17.7	11.0	2.0	1.3	0	0.0	1	0.0	0	0.0	1	5.9	0.008	1386.0	17000	0.0	2.0	4.2	12.5
15745	10.0	7.3	12.3	13.3	2.0	1.3	0	0.0	1	0.0	0	0.0	1	8.4	0.003	1363.9	17000	0.0	2.0	2.0	10.0
15540	10.0	6.8	10.6	13.7	2.0	1.3	0	0.0	1	0.0	0	0.0	1	9.4	0.002	1426.6	17000	0.0	2.0	1.5	10.0
15335	12.5	8.8	16.2	12.1	2.0	1.3	0	0.0	1	0.0	0	0.0	1	8.2	0.006	1064.1	17000	0.0	2.0	3.5	12.5
15125	26.1	26.1	17.9	11.6	2.0	0.4	0.9	4.0	1	0.0	0	17.4	1	8.0	0.007	1000.5	17000	0.0	2.0	4.3	12.5
14900	14.0	9.3	19.3	9.8	2.0	0.4	0	0.0	1	0.0	0	0.0	1	6.3	0.009	1626.5	17000	0.0	2.0	4.9	14.0
14720	21.0	8.9	18.1	9.8	2.0	0.4	0	0.0	1	0.0	0	0.0	1	6.0	0.008	1722.3	17000	0.1	2.0	4.4	21.0
14480	21.0	8.9	19.0	8.9	2.0	0.4	0	0.0	1	0.0	0	0.0	1	5.2	0.010	1726.7	17000	0.1	2.0	4.4	21.0
14315	15.0	7.4	14.0	9.9	2.0	0.4	0	0.0	1	0.0	0	0.0	1	5.8	0.005	1881.0	17000	0.3	2.0	2.6	15.0
14090	15.0	7.3	14.3	8.5	2.0	0.4	0	0.0	1	0.0	0	0.0	1	5.6	0.006	1772.8	17000	0.1	2.0	2.8	15.0
13850	15.0	6.7	12.6	9.7	2.0	0.4	0	0.0	1	0.0	0	0.0	1	6.5	0.004	1741.6	17000	0.1	2.0	2.2	15.0
13635	18.0	7.7	15.5	10.3	2.0	0.4	0	0.0	1	0.0	0	0.0	1	6.3	0.004	1705.8	17000	0.1	2.0	3.2	18.0
13425	21.0	8.6	18.0	7.8	2.0	0.4	0	0.0	1	0.0	0	0.0	1	4.3	0.011	1850.7	17000	0.2	2.0	3.9	21.0
13190	15.0	6.7	12.2	9.5	2.0	0.4	0	0.0	1	0.0	0	0.0	1	6.5	0.003	1847.4	17000	0.3	2.0	2.0	15.0
13030	15.0	6.9	14.2	9.6	2.0	0.0	0	0.0	1	0.0	0	0.0	1	6.5	0.003	1763.0	17000	0.2	2.0	2.7	15.0
12835	10.0	6.4	13.3	10.1	2.0	0.0	0	0.0	1	0.0	0	0.0	1	7.3	0.003	1607.5	17000	0.0	2.0	2.4	10.0
12615	10.0	6.1	12.5	10.9	2.0	0.0	0	0.0	1	0.0	0	0.0	1	8.6	0.002	1470.8	17000	0.0	2.0	2.1	10.0
12395	10.0	6.0	12.3	11.5	2.0	0.0	0	0.0	1	0.0	0	0.0	1	9.0	0.002	1438.1	17000	0.0	2.0	2.0	10.0
12195	10.0	5.5	10.6	12.5	2.0	0.0	0	0.0	1	0.0	0	0.0	1	10.3	0.001	1383.7	17000	0.0	2.0	1.5	10.0
11995	10.0	6.2	12.8	13.6	2.0	0.0	0	0.0	1	0.0	0	0.0	1	9.7	0.002	1280.5	17000	0.0	2.0	2.2	10.0
11780	10.0	6.1	12.6	14.4	2.0	0.0	0	0.0	1	0.0	0	0.0	1	9.3	0.001	1422.2	17000	0.0	2.0	2.1	10.0
11605	10.0	6.6	13.9	13.8	2.0	0.0	0	0.0	1	0.0	0	0.0	1	8.6	0.002	1325.5	17000	0.0	2.0	2.6	10.0
11405	10.0	6.3	13.2	15.1	2.0	0.0	0	0.0	1	0.0	0	0.0	1	10.3	0.002	1114.6	17000	0.0	2.0	2.3	10.0
11180	12.5	7.7	16.6	13.9	2.0	0.0	0	0.0	1	0.0	0	0.0	1	10.6	0.003	835.7	17000	0.0	2.0	3.7	12.5
11015	14.0	10.4	19.1	13.3	2.0	1.5	0	0.0	1	0.0	0	0.0	1	11.0	0.004	679.4	17000	0.0	2.0	4.9	14.0
10835	14.0	10.9	21.9	10.9	2.0	1.5	0	0.0	1	0.0	0	0.0	1	8.2	0.007	790.4	17000	0.0	2.0	5.4	14.0
10575	14.0	9.2	24.1	7.5	2.0	1.5	0	0.0	1	0.0	0	0.0	1	5.3	0.016	1108.8	17000	0.0	2.0	3.7	14.0
10390	14.0	9.9	22.7	8.8	2.0	1.5	0	0.0	1	0.0	0	0.0	1	5.8	0.008	1247.0	17000	0.0	2.0	4.4	14.0
10225	12.5	9.8	17.8	9.5	2.0	1.5	0	0.0	1	0.0	0	0.0	1	5.9	0.007	1374.1	17000	0.0	2.0	4.3	12.5
10000	10.0	8.5	14.9	11.1	2.0	1.5	0	0.0	1	0.0	0	0.0	1	6.6	0.004	1488.0	17000	0.0	2.0	3.0	10.0
9820	14.0	10.2	18.6	10.0	2.0	1.5	0	0.0	1	0.0	0	0.0	1	5.7	0.008	1402.3	17000	0.0	2.0	4.7	14.0
9595	10.0	8.4	14.6	10.3	2.0	1.5	0	0.0	1	0.0	0	0.0	1	6.6	0.005	1619.5	17000	0.0	2.0	2.9	10.0
9385	18.0	9.0	15.8	9.5	2.0	1.5	0	0.0	1	0.0	0	0.0	1	5.3	0.006	1770.4	17000	0.2	2.0	3.4	18.0
9220	18.0	9.3	16.4	8.9	2.0	1.5	0	0.0	1	0.0	0	0.0	1	4.9	0.008	1771.4	17000	0.1	2.0	3.6	18.0
9025	18.0	9.0	15.9	8.9	2.0	1.5	0	0.0	1	0.0	0	0.0	1	5.5	0.005	1736.9	17000	0.1	2.0	3.4	18.0
MAX=	26.8	26.8			8.1	1.6					0.0	17.4					17000.0	8.9	2.0	8.3	21.0
MIN=	8.0	4.8			2.0	0.0					0.0	0.0					3000.0	0.0	2.0	0.5	8.0

CALCULATIONS FOR TOTAL TOE-DOWN BY INDIVIDUAL ADJUSTMENT COMPONENT BASED ON LACH&SM W/ SAM -- SANTA CLARA RIVER PROPOSED CONDITIONS STRAIGHT-INSIDE CURVED REACH Q_{CAP} n=0.025

SECTION	Z_{MAX}=	Z_{TOT}=	V (FPS)	FLOW DEPTH (FT)	Z_{DEG}+	Z_{GS}+	PIER TYPE	B	ABUT TYPE	A	SOFT	Z_{LS}+	BEND COEFF	HYD DEPTH	E SLOPE	TOP WIDTH	RADIUS	Z_{BS}+	Z_{I}+	H/2	Z_{DM}=
46195	14.0	11.1	21.7	18.1	2.8	0.0	0	0.0	1	0.0	0	0.0	0	11.7	0.005	453.0	9000	0.0	2.0	6.3	14.0
46020	14.0	12.7	24.1	18.1	2.8	0.0	0	0.0	1	0.0	0	0.0	0	9.2	0.009	520.9	9000	0.0	2.0	7.9	14.0
45545	14.0	10.4	20.3	19.2	2.8	0.0	0	0.0	1	0.0	0	0.0	0	12.7	0.004	446.7	9000	0.0	2.0	5.6	14.0
45030	14.0	13.1	26.1	16.5	2.8	0.0	0	0.0	1	0.0	0	0.0	0	9.0	0.011	492.5	9000	0.0	2.0	8.3	14.0
44585	14.0	9.8	19.2	21.1	2.8	0.0	0	0.0	1	0.0	0	0.0	0	11.3	0.004	531.9	9000	0.0	2.0	5.0	14.0
44210	14.0	12.5	26.2	15.4	2.8	0.0	0	0.0	1	0.0	0	0.0	0	9.7	0.009	452.6	9000	0.0	2.0	7.7	14.0
43820	15.4	15.4	19.9	19.5	8.1	0.0	0	0.0	1	0.0	0	0.0	0	12.1	0.004	476.5	9000	0.0	2.0	5.3	14.0
43610	17.0	17.0	26.7	13.8	8.1	0.0	0	0.0	1	0.0	0	0.0	0	9.6	0.010	450.6	9000	0.0	2.0	6.9	14.0
43410	15.8	15.8	28.8	11.3	8.1	0.0	0	0.0	1	0.0	0	0.0	0	7.4	0.011	583.4	9000	0.0	2.0	5.7	14.0
43200	16.3	16.3	26.1	12.4	8.1	0.0	0	0.0	1	0.0	0	0.0	0	6.7	0.011	689.2	9000	0.0	2.0	6.2	14.0
42975	15.5	15.5	26.6	10.8	8.1	0.0	0	0.0	1	0.0	0	0.0	0	5.9	0.016	735.1	9000	0.0	2.0	5.4	14.0
42815	15.5	15.5	23.9	10.7	8.1	0.0	0	0.0	1	0.0	0	0.0	0	5.6	0.016	864.3	9000	0.0	2.0	5.4	14.0
42590	14.7	14.7	22.4	9.2	8.1	0.0	0	0.0	1	0.0	0	0.0	0	5.2	0.014	1013.1	9000	0.0	2.0	4.6	14.0
42430	15.3	15.3	19.6	10.7	8.1	0.0	0	0.0	1	0.0	0	0.0	0	6.4	0.009	915.8	9000	0.0	2.0	5.2	14.0
42215	14.7	14.7	18.5	11.2	8.1	0.0	0	0.0	1	0.0	0	0.0	0	6.1	0.009	1019.0	9000	0.0	2.0	4.6	14.0
41940	11.9	11.9	11.6	14.3	8.1	0.0	0	0.0	1	0.0	0	0.0	0	7.7	0.002	1284.2	9000	0.0	2.0	1.8	10.0
41730	12.0	12.0	11.8	14.7	8.1	0.0	0	0.0	1	0.0	0	0.0	0	8.2	0.002	1190.9	9000	0.0	2.0	1.9	10.0
41460	11.9	11.9	11.6	16.2	8.1	0.0	0	0.0	1	0.0	0	0.0	0	9.1	0.002	1093.5	9000	0.0	2.0	1.8	10.0
41280	12.5	10.9	16.4	14.4	5.2	0.1	0	0.0	1	0.0	0	0.0	0	8.3	0.004	852.3	9000	0.0	2.0	3.6	12.5
41080	14.0	12.7	19.9	12.1	5.2	0.1	0	0.0	1	0.0	0	0.0	0	6.7	0.008	874.1	9000	0.0	2.0	5.4	14.0
40825	14.0	11.7	18.0	11.5	5.2	0.1	0	0.0	1	0.0	0	0.0	0	6.2	0.007	1040.4	9000	0.0	2.0	4.4	14.0
40585	12.5	11.2	17.0	11.7	5.2	0.1	0	0.0	1	0.0	0	0.0	0	6.8	0.006	1005.8	9000	0.0	2.0	3.9	12.5
40335	10.0	8.8	10.5	15.1	5.2	0.1	0	0.0	1	0.0	0	0.0	0	8.8	0.002	1249.6	9000	0.0	2.0	1.5	10.0
40130	10.0	9.0	11.3	15.5	5.2	0.1	0	0.0	1	0.0	0	0.0	0	8.8	0.002	1195.6	9000	0.0	2.0	1.7	10.0
39945	10.0	8.9	11.0	16.3	5.2	0.1	0	0.0	1	0.0	0	0.0	0	9.3	0.002	1173.3	9000	0.0	2.0	1.6	10.0
39755	12.5	11.0	16.5	13.3	5.2	0.1	0	0.0	1	0.0	0	0.0	0	8.1	0.004	894.5	9000	0.0	2.0	3.7	12.5
39605	14.0	12.5	19.7	11.5	5.2	0.1	0	0.0	1	0.0	0	0.0	0	7.1	0.007	849.7	9000	0.0	2.0	5.2	14.0
39310	12.5	11.0	16.5	12.7	5.2	0.1	0	0.0	1	0.0	0	0.0	0	8.1	0.004	931.1	9000	0.0	2.0	3.7	12.5
39100	14.0	12.5	20.9	10.4	5.2	0.1	0	0.0	1	0.0	0	0.0	0	7.2	0.009	761.1	9000	0.0	2.0	5.2	14.0
38925	10.0	9.5	12.8	14.3	5.2	0.1	0	0.0	1	0.0	0	0.0	0	10.3	0.002	873.5	9000	0.0	2.0	2.2	10.0
38710	10.0	6.7	12.0	15.6	2.7	0.0	0	0.0	1	0.0	0	0.0	0	11.7	0.002	820.3	9000	0.0	2.0	2.0	10.0
38475	12.5	9.0	17.9	14.0	2.7	0.0	0	0.0	1	0.0	0	0.0	0	9.8	0.004	659.7	9000	0.0	2.0	4.3	12.5
38300	14.0	9.8	22.5	10.3	2.7	0.0	0	0.0	1	0.0	0	0.0	0	7.7	0.010	666.3	9000	0.0	2.0	5.1	14.0
38065	10.0	7.6	14.5	14.0	2.7	0.0	0	0.0	1	0.0	0	0.0	0	12.0	0.002	658.4	9000	0.0	2.0	2.9	10.0
37810	14.0	9.2	18.2	12.2	2.7	0.0	0	0.0	1	0.0	0	0.0	0	10.2	0.004	618.2	9000	0.0	2.0	4.5	14.0
37655	14.0	10.0	20.9	10.5	2.7	0.0	0	0.0	1	0.0	0	0.0	0	7.8	0.008	706.7	9000	0.0	2.0	5.3	14.0
37390	14.0	8.0	23.7	6.5	2.7	0.0	0	0.0	1	0.0	0	0.0	0	5.9	0.015	823.8	9000	0.0	2.0	3.3	14.0
37135	12.5	8.4	16.6	9.3	2.7	0.0	0	0.0	1	0.0	0	0.0	0	8.5	0.005	821.4	9000	0.0	2.0	3.7	12.5
36930	14.0	8.8	19.8	8.1	2.7	0.0	0	0.0	1	0.0	0	0.0	0	7.2	0.008	812.4	9000	0.0	2.0	4.1	14.0
36735	12.5	8.2	16.1	9.8	2.7	0.0	0	0.0	1	0.0	0	0.0	0	8.0	0.005	896.9	9000	0.0	2.0	3.5	12.5
36515	10.0	6.9	12.9	12.0	2.7	0.0	0	0.0	1	0.0	0	0.0	0	9.0	0.002	994.7	9000	0.0	2.0	2.2	10.0
36265	10.0	6.8	12.3	12.5	2.7	0.0	0	0.0	1	0.0	0	0.0	0	7.9	0.003	1176.0	9000	0.0	2.0	2.1	10.0
36080	22.0	22.0	14.7	11.6	3.2	0.7	0.9	2.0	1	0.0	0	13.3	0	6.7	0.006	1176.0	9000	0.0	2.0	2.9	10.0
35845	10.0	7.5	11.0	13.6	3.2	0.7	0	0.0	1	0.0	0	0.0	0	7.9	0.002	1401.7	9000	0.0	2.0	1.6	10.0
35725	10.0	8.9	15.0	13.0	3.2	0.7	0	0.0	1	0.0	0	0.0	0	6.5	0.004	1377.9	9000	0.0	2.0	3.0	10.0
35515	12.5	9.8	17.1	12.0	3.2	0.7	0	0.0	1	0.0	0	0.0	0	6.0	0.005	1354.8	9000	0.0	2.0	3.9	12.5
35245	12.5	9.9	17.3	11.3	3.2	0.7	0	0.0	1	0.0	0	0.0	0	5.5	0.006	1328.3	9000	0.0	2.0	4.0	12.5
35040	14.0	11.0	19.6	10.7	3.2	0.7	0	0.0	1	0.0	0	0.0	0	5.5	0.006	1354.8	9000	0.0	2.0	5.2	14.0
34860	14.0	10.4	18.4	10.0	3.2	0.7	0	0.0	1	0.0	0	0.0	0	4.9	0.009	1285.7	9000	0.0	2.0	4.6	14.0
34720	14.0	10.4	18.4	9.2	3.2	0.7	0	0.0	1	0.0	0	0.0	0	4.5	0.009	1411.2	9000	0.0	2.0	4.6	14.0
34495	12.5	10.0	17.4	9.0	3.2	0.7	0	0.0	1	0.0	0	0.0	0	5.2	0.009	1283.9	9000	0.0	2.0	4.1	12.5
34310	12.5	9.6	16.8	9.3	3.2	0.7	0	0.0	1	0.0	0	0.0	0	5.9	0.005	1308.5	9000	0.0	2.0	3.8	12.5
34090	12.5	9.7	17.0	8.6	3.2	0.7	0	0.0	1	0.0	0	0.0	0	5.3	0.007	1295.5	9000	0.0	2.0	3.9	12.5
33880	12.5	9.1	16.6	9.3	3.4	0.0	0	0.0	1	0.0	0	0.0	0	5.3	0.007	1318.4	9000	0.0	2.0	3.7	12.5
33710	12.5	8.6	15.4	9.7	3.4	0.0	0	0.0	1	0.0	0	0.0	0	5.5	0.005	1372.1	9000	0.0	2.0	3.2	12.5
33500	12.5	8.9	16.2	9.3	3.4	0.0	0	0.0	1	0.0	0	0.0	0	5.1	0.007	1496.0	9000	0.0	2.0	3.5	12.5
33310	12.5	8.7	15.8	9.0	3.4	0.0	0	0.0	1	0.0	0	0.0	0	4.2	0.006	1770.4	9000	0.0	2.0	3.4	12.5
33115	10.0	6.8	10.4	10.6	3.4	0.0	0	0.0	1	0.0	0	0.0	0	6.1	0.003	1847.3	9000	0.0	2.0	1.4	10.0
32795	10.0	7.7	13.0	10.6	3.4	0.0	0	0.0	1	0.0	0	0.0	0	5.2	0.004	1735.6	9000	0.0	2.0	2.3	10.0
32605	10.0	8.2	14.4	11.1	3.4	0.0	0	0.0	1	0.0	0	0.0	0	5.0	0.005	1699.9	9000	0.0	2.0	2.8	10.0
32265	12.5	7.4	15.9	10.5	2.0	0.0	0	0.0	1	0.0	0	0.0	0	4.8	0.006	1853.2	9000	0.0	2.0	3.4	12.5
31875	10.0	6.1	12.4	10.4	2.0	0.0	0	0.0	1	0.0	0	0.0	0	4.7	0.006	2409.2	9000	0.0	2.0	2.1	10.0
31585	10.0	5.6	10.9	11.9	2.0	0.0	0	0.0	1	0.0	0	0.0	0	5.9	0.003	2182.2	9000	0.0	2.0	1.6	10.0
31360	10.0	5.4	10.3	13.5	2.0	0.0	0	0.0	1	0.0	0	0.0	0	7.4	0.002	1878.7	9000	0.0	2.0	1.4	10.0
31060	8.0	4.9	8.2	15.5	2.0	0.0	0	0.0	1	0.0	0	0.0	0	10.1	0.001	1708.2	9000	0.0	2.0	0.9	8.0
30720	8.0	4.6	6.7	17.5	2.0	0.0	0	0.0	1	0.0	0	0.0	0	11.2	0.001	1888.6	9000	0.0	2.0	0.6	8.0
30445	8.0	4.5	6.3	19.5	2.0	0.0	0	0.0	1	0.0	0	0.0	0	12.7	0.000	1779.7	9000	0.0	2.0	0.5	8.0
30095	8.0	4.6	6.7	21.3	2.0	0.0	0	0.0	1	0.0	0	0.0	0	13.4	0.000	1622.7	9000	0.0	2.0	0.6	8.0
29815	8.0	4.8	7.7	21.9	2.0	0.0	0	0.0	1	0.0	0	0.0	0	13.5	0.000	1433.2	9000	0.0	2.0	0.8	8.0
29565	8.0	4.7	7.4	22.9	2.0	0.0	0	0.0	1	0.0	0	0.0	0	14.8	0.000	1323.8	9000	0.0	2.0	0.7	8.0
29385	8.0	4.9	8.3	23.6	2.0	0.0	0	0.0	1	0.0	0	0.0	0	14.4	0.000	1237.4	9000	0.0	2.0	0.9	8.0
29140	9.1	9.1	9.2	24.1	4.4	1.6	0	0.0	1	0.0	0	0.0	0	14.1	0.001	1087.2	9000	0.0	2.0	1.1	8.0
28895	14.0	12.7	18.8	22.5	4.4	1.6	0	0.0	1	0.0	0	0.0	0	9.9	0.002	972.1	9000	0.0	2.0	4.8	14.0
28695	15.0	15.0	28.9	14.0	4.4	1.6	0	0.0	1	0.0	0	0.0	0	5.4	0.025	899.4	9000	0.0	2.0	7.0	14.0
28500	14.7	14.7	22.4	16.1	4.4	1.6	0	0.0	1	0.0	0	0.0	0	11.4	0.006	552.2	9000	0.0	2.0	6.8	14.0
28280	14.0	13.4	29.6	10.8	4.4	1.6	0	0.0	1	0.0	0	0.0	0	5.8	0.013	944.5	9000	0.0	2.0	5.4	14.0
28080	10.0	9.7	11.3	19.1	4.4	1.6	0	0.0	1	0.0	0	0.0	0	14.7	0.001	926.4	9000	0.0	2.0	1.7	10.0
27925	10.3	10.3	13.1	19.3	4.4	1.6	0	0.0	1	0.0	0	0.0	0	13.8	0.001	866.6	9000	0.0	2.0	2.3	10.0
27725	14.0	12.9	19.0	16.7	4.4	1.6	0	0.0	1	0.0	0	0.0	0	10.4	0.003	786.6	9000	0.0	2.0	4.9	14.0
27545	15.0	15.0	22.9	14.1	4.4	1.6	0	0.0	1	0.0	0	0.0	0	9.9	0.005	643.2	9000	0.0	2.0	7.0	14.0
27335	14.1	14.1	24.6	12.3	4.4	1.6	0	0.0	1	0.0	0	0.0	0	8.3	0.008	703.5	9000	0.0	2.0	6.2	14.0
27155	14.0	12.9	19.1	14.8	4.4	1.6	0	0.0	1	0.0	0	0.0	0	9.2	0.003	888.4	9000	0.0	2.0	4.9	14.0
26990	14.0	11.0	22.6	11.5	2.0	1.3	0	0.0	1	0.0	0	0.0	0	6.8	0.011	922.3	9000	0.0	2.0	5.7	14.0
26780	14.0	10.9	23.1	11.3	2.0	1.3	0	0.0	1	0.0	0	0.0	0	6.2	0.009	1043.3	9000	0.0	2.0	5.6	14.0
26575	14.0	10.9	20.7	11.1	2.0	1.3	0	0.0	1	0.0	0	0.0	0	5.7	0.012	1187.3	3000	0.0	2.0	5.6	14.0
26355	12.5	8.7	15.9	13.4	2.0	1.3	0	0.0	1	0.0	0	0.0	0	7.5	0.004	1260.4	3000	0.0	2.0	3.4	12.5
26170	12.5	9.2	17.0	13.5	2.0	1.3	0	0.0	1	0.0	0	0.0	0	7.6	0.003	1269.0	3000	0.0	2.0	3.9	12.5
25965	14.0	9.8	18.2	12.9	2.0	1.3	0	0.0	1	0.0	0	0.0	0	6.9	0.004	1281.3	3000	0.0	2.0	4.5	14.0
25785	14.0	10.1	18.9	12.1	2.0	1.3	0	0.0	1	0.0	0	0.0	0	6.9	0.005	1219.7	3000	0.0	2.0	4.8	14.0
25600	14.0	9.9	18.5	12.4	2.0	1.3	0	0.0	1	0.0	0	0.0	0	7.6	0.005	1109.4	3000	0.0	2.0	4.6	14.0

DEFINITIONS

V(FPS) =VELOCITY IN FEET PER SECOND
Z_{TOT}=TOTAL POTENTIAL VERTICAL ADJUSTMENT IN FEET
Z_{DEG}=LONG TERM DEGRADATION IN FEET
Z_{GS}=GENERAL SCOUR IN FEET FROM SAM
Z_{LS}=LOCAL SCOUR IN FEET
PIER TYPE=PIER SHAPE FACTOR; IF NO PIERS=**0**
1.0=SQUARE NOSE; **0.9** ROUND NOSE; **0.9** CYLINDER;
0.8 SHARP NOSE; **0.9** GROUP OF CYLINDERS
FLOW DEPTH=WATER DEPTH IN CHANNEL IN FEET
B=WIDTH OF PIERS IN FEET; NO PIER=0
ABUT TYPE=VERT WALL FACTOR; IF VERT=**2**; NON VERT=**1**
A=ABUTMENT PROTRUSION INTO FLOW PATH IN FEET
SOFT = SOFT BOTTOM AT A BRIDGE OR AN ABUTMENT
0 = HARD BOTTOM; **1** = SOFT BOTTOM
Z_{BS}=BEND SCOUR IN FEET
BEND COEFF=BEND COEFFICIENT; IF NO BEND=0, BEND=1
HYD DEPTH=HYDRAULIC DEPTH IN FEET
E SLOPE=ENERGY SLOPE, UNITLESS
TOP WIDTH=CHANNEL TOP WIDTH IN FEET
RADIUS=RADIUS OF CURVATURE TO CENTERLINE IN FEET
Z_{I}=LOW-FLOW INCISEMENT IN FEET, MEASURED OR 2'; VALUE **NOT LESS THAN 2'**
H=BEDFORM HEIGHT IN FEET, LIMITED TO FLOW DEPTH AFTER KENNEDY (1963)
Z_{DM}=CUT OFF DEPTH REQUIRED BY LACFCDDM

GENERAL

THIS SPREADSHEET IS DESIGNED TO CALCULATE SCOUR PROTECTION (TOE DOWN) BASED ON LADPW COUNTY HYDROLOGY MANUAL (1991) PAGES 5.2-5.8 AND ASSOCIATED APPENDICES (SEDIMENTATION MANUAL). ALL VELOCITIES ARE IN FPS, WITH A MAXIMUM VALUE LIMITED BY THE EQUATION. THE PRESENT VERSION (10/04) WILL CALCULATE UP TO 50 VELOCITIES AT ONE TIME. LONG TERM DEGRADATION IS USER SUPPLIED. GENERAL SCOUR IS TAKEN FROM APPENDIX Q3, INTERPOLATED. LOCAL SCOUR AT BENDS AND ABUTMENTS ARE BASED ON LADWP EQUATIONS FOUND IN APP Q12. BEND SCOUR IS BASED ON EQUATIONS IN APPENDIX Q12. A LONGITUDINAL EXTENT BASED ON SECONDARY CURRENTS IS NOT INCLUDED. BEDFORM HEIGHT IS BASED ON EQUATIONS IN APPENDIX Q13. JULY 2005 REVISION INCLUDES CALCULATION FOR CUT OFF DEPTH BASED ON LOS ANGELES COUNTY FLOOD CONTROL DISTRICT DESIGN MANUAL. THE CALCULATION DOES NOT CONSIDER ADJUSTMENTS TO CUT OFF DEPTH BASED ON TABLE F-06 THE OCTOBER 2005 REVISION INCLUDES ADDITIONAL TOEDOWN AT BRIDGES/ABUTMENTS WITH SOFT BOTTOMS.

COLOR CODES

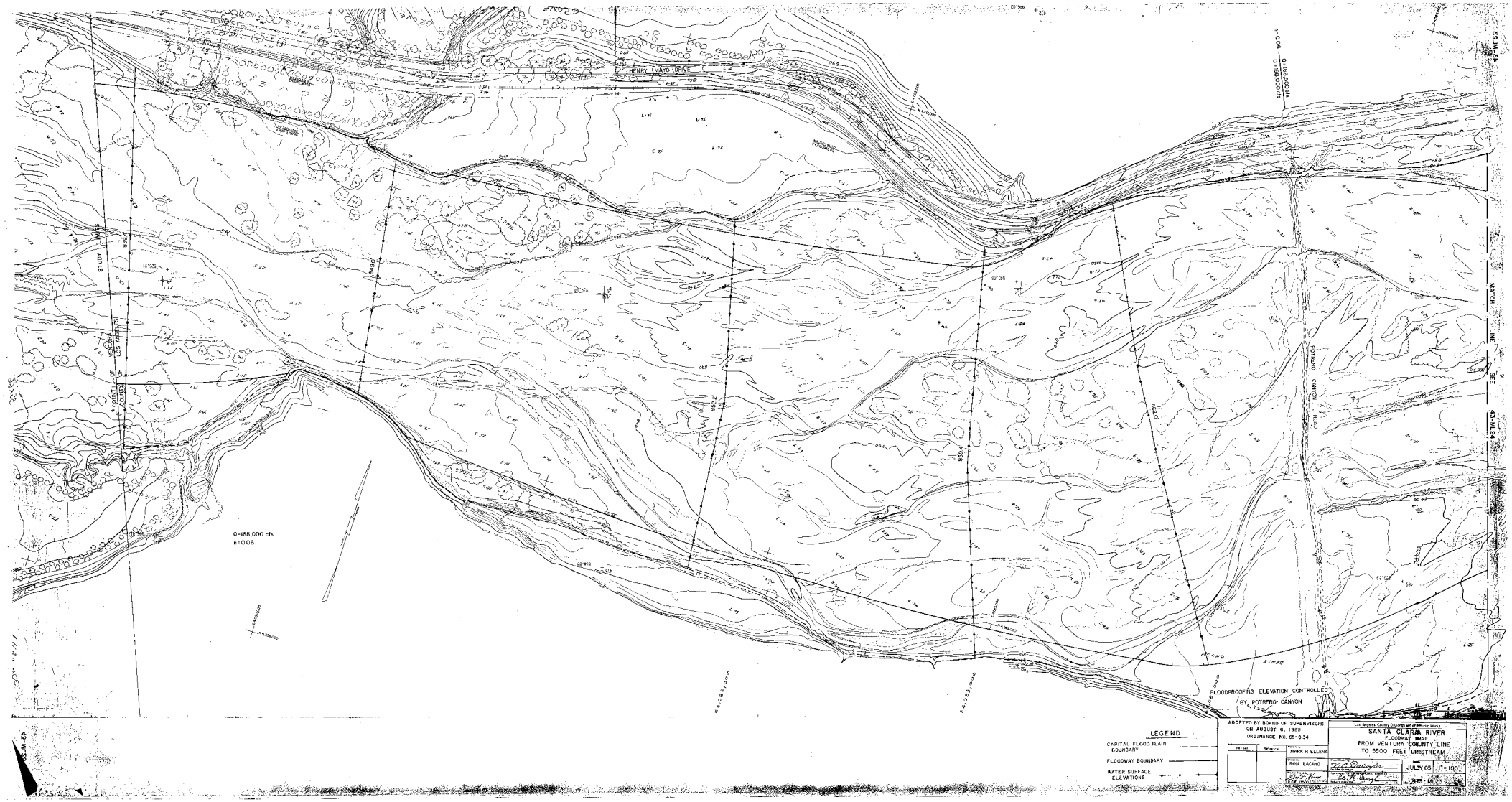
OUTPUT
DATA FROM HEC-RAS
USER SUPPLIED DATA
INTERMEDIATE CALCULATIONS (INDIVIDUAL SHEETS ONLY)

DESIGNED BY DAVID A JAFFE, PHD, PE
PACIFIC ADVANCED CIVIL ENGINEERING, INC
OCTOBER, 2004
OCTOBER 2005, REVISED

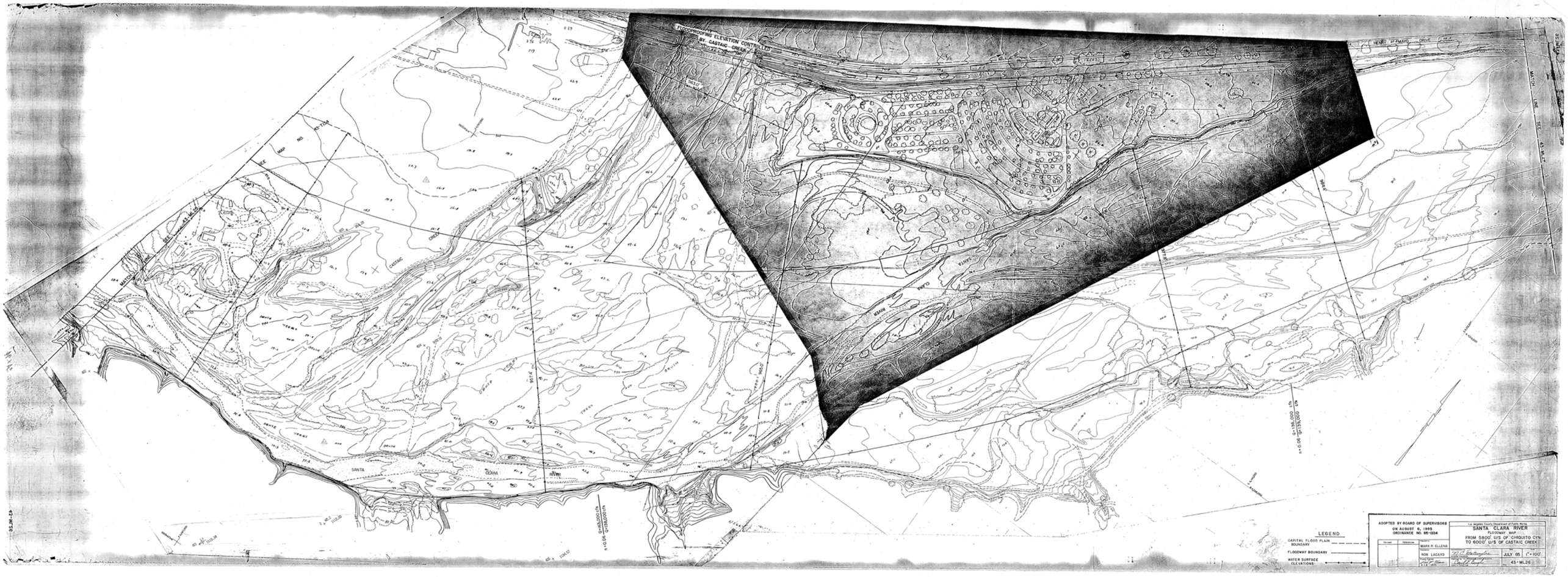
CALCULATIONS FOR TOTAL TOE-DOWN BY INDIVIDUAL ADJUSTMENT COMPONENT BASED ON LACH&SM W/ SAM -- SANTA CLARA RIVER PROPOSED CONDITIONS STRAIGHT-INSIDE CURVED REACH Q_{CAP} n=0.025

SECTION	Z_{MAX}=	Z_{TOT}=	V (FPS)	FLOW DEPTH (FT)	Z_{DEG}+	Z_{GS}+	PIER TYPE	B	ABUT TYPE	A	SOFT	Z_{LS}+	BEND COEFF	HYD DEPTH	E SLOPE	TOP WIDTH	RADIUS	Z_{BS}+	Z_L+	H/2	Z_{DM}=
25425	14.0	9.8	18.3	12.5	2.0	1.3	0	0.0	1	0.0	0	0.0	0	7.1	0.007	1082.2	3000	0.0	2.0	4.5	14.0
25215	10.0	8.0	14.3	14.7	2.0	1.3	0	0.0	1	0.0	0	0.0	0	9.0	0.003	1097.3	3000	0.0	2.0	2.7	10.0
25000	10.0	7.6	13.2	15.5	2.0	1.3	0	0.0	1	0.0	0	0.0	0	10.1	0.002	1062.4	3000	0.0	2.0	2.3	10.0
24795	10.0	6.7	14.1	15.6	2.0	0.0	0	0.0	1	0.0	0	0.0	0	10.5	0.002	957.4	3000	0.0	2.0	2.7	10.0
24550	12.5	7.1	15.1	16.5	2.0	0.0	0	0.0	1	0.0	0	0.0	0	11.0	0.003	856.1	3000	0.0	2.0	3.1	12.5
24335	14.0	8.5	18.2	15.0	2.0	0.0	0	0.0	1	0.0	0	0.0	0	10.1	0.004	764.8	3000	0.0	2.0	4.5	14.0
24115	14.0	9.4	20.0	13.8	2.0	0.0	0	0.0	1	0.0	0	0.0	0	9.4	0.006	754.2	3000	0.0	2.0	5.4	14.0
23975	14.0	9.8	20.8	12.9	2.0	0.0	0	0.0	1	0.0	0	0.0	0	8.7	0.007	783.2	3000	0.0	2.0	5.8	14.0
23755	14.0	8.4	18.1	14.7	2.0	0.0	0	0.0	1	0.0	0	0.0	0	9.7	0.004	815.7	3000	0.0	2.0	4.4	14.0
23565	14.0	9.5	20.2	14.3	2.0	0.0	0	0.0	1	0.0	0	0.0	0	8.2	0.007	850.9	3000	0.0	2.0	5.5	14.0
23365	14.0	8.6	18.4	14.3	2.0	0.0	0	0.0	1	0.0	0	0.0	0	8.7	0.004	939.0	3000	0.0	2.0	4.6	14.0
23180	14.0	10.3	21.9	12.6	2.0	0.0	0	0.0	1	0.0	0	0.0	0	8.0	0.005	916.6	3000	0.0	2.0	6.3	14.0
23000	14.0	9.6	22.0	11.3	2.0	0.0	0	0.0	1	0.0	0	0.0	0	8.2	0.010	784.0	3000	0.0	2.0	5.6	14.0
22790	23.0	23.0	17.9	13.0	2.0	0.0	0.9	2.0	1	0.0	0	14.7	0	10.0	0.005	784.0	3000	0.0	2.0	4.3	12.5
22600	14.0	9.3	19.8	12.8	2.0	0.0	0	0.0	1	0.0	0	0.0	0	7.6	0.006	999.0	3000	0.0	2.0	5.3	14.0
22415	14.0	9.4	21.3	10.8	2.0	0.0	0	0.0	1	0.0	0	0.0	0	6.6	0.010	1039.1	3000	0.0	2.0	5.4	14.0
22195	10.0	6.7	13.6	14.0	2.0	0.2	0	0.0	1	0.0	0	0.0	0	8.7	0.003	1309.6	3000	0.0	2.0	2.5	10.0
22010	12.5	7.7	16.1	14.3	2.0	0.2	0	0.0	1	0.0	0	0.0	0	7.6	0.003	1254.1	3000	0.0	2.0	3.5	12.5
21790	14.0	9.4	19.7	11.6	2.0	0.2	0	0.0	1	0.0	0	0.0	0	6.5	0.006	1144.5	3000	0.0	2.0	5.2	14.0
21615	14.0	8.5	21.3	8.5	2.0	0.2	0	0.0	1	0.0	0	0.0	0	5.8	0.011	1163.0	3000	0.0	2.0	4.3	14.0
21440	12.5	8.3	17.5	11.0	2.0	0.2	0	0.0	1	0.0	0	0.0	0	6.9	0.005	1286.1	3000	0.0	2.0	4.1	12.5
21225	14.0	8.6	18.1	11.7	2.0	0.2	0	0.0	1	0.0	0	0.0	0	5.6	0.005	1559.0	3000	0.0	2.0	4.4	14.0
21020	14.0	9.1	20.3	9.7	2.0	0.2	0	0.0	1	0.0	0	0.0	0	7.8	0.007	903.0	3000	0.0	2.0	4.9	14.0
20845	12.5	7.3	15.1	12.7	2.0	0.2	0	0.0	1	0.0	0	0.0	0	6.7	0.003	1563.7	3000	0.0	2.0	3.1	12.5
20595	10.0	6.3	12.4	13.4	2.0	0.2	0	0.0	1	0.0	0	0.0	0	8.3	0.002	1548.8	3000	0.0	2.0	2.1	10.0
20435	10.0	6.2	12.1	14.3	2.0	0.2	0	0.0	1	0.0	0	0.0	0	8.8	0.001	1528.3	3000	0.0	2.0	2.0	10.0
20280	12.5	7.5	15.6	12.8	2.0	0.2	0	0.0	1	0.0	0	0.0	0	6.8	0.003	1531.3	3000	0.0	2.0	3.3	12.5
20070	14.0	9.2	19.3	11.1	2.0	0.2	0	0.0	1	0.0	0	0.0	0	5.2	0.006	1526.6	3000	0.0	2.0	5.0	14.0
19855	14.0	9.1	20.6	10.2	2.0	0.0	0	0.0	1	0.0	0	0.0	0	6.0	0.008	1205.4	3000	0.0	2.0	5.1	14.0
19630	14.0	8.4	20.6	8.9	2.0	0.0	0	0.0	1	0.0	0	0.0	0	6.6	0.009	1060.3	3000	0.0	2.0	4.4	14.0
19440	10.0	6.3	13.1	13.4	2.0	0.0	0	0.0	1	0.0	0	0.0	0	9.2	0.002	1194.5	3000	0.0	2.0	2.3	10.0
19240	12.5	7.4	15.9	11.9	2.0	0.0	0	0.0	1	0.0	0	0.0	0	7.4	0.004	1216.9	3000	0.0	2.0	3.4	12.5
19050	14.0	8.8	18.8	10.5	2.0	0.0	0	0.0	1	0.0	0	0.0	0	5.8	0.009	1321.4	3000	0.0	2.0	4.8	14.0
18830	10.0	6.4	13.3	14.6	2.0	0.0	0	0.0	1	0.0	0	0.0	0	7.4	0.003	1531.5	3000	0.0	2.0	2.4	10.0
18650	10.0	6.0	12.1	15.0	2.0	0.0	0	0.0	1	0.0	0	0.0	0	8.0	0.002	1604.5	3000	0.0	2.0	2.0	10.0
18475	8.0	5.1	8.9	16.9	2.0	0.0	0	0.0	1	0.0	0	0.0	0	9.9	0.001	1621.5	3000	0.0	2.0	1.1	8.0
18290	8.0	5.3	9.8	16.9	2.0	0.0	0	0.0	1	0.0	0	0.0	0	9.4	0.001	1594.2	3000	0.0	2.0	1.3	8.0
18025	8.0	4.8	7.9	18.5	2.0	0.0	0	0.0	1	0.0	0	0.0	0	11.9	0.001	1520.2	17000	0.0	2.0	0.8	8.0
17785	8.0	5.0	8.5	20.2	2.0	0.0	0	0.0	1	0.0	0	0.0	0	12.0	0.001	1398.1	17000	0.0	2.0	1.0	8.0
17510	10.0	6.9	11.0	19.2	2.0	1.3	0	0.0	1	0.0	0	0.0	0	10.2	0.001	1350.7	17000	0.0	2.0	1.6	10.0
17360	12.5	9.2	17.1	15.9	2.0	1.3	0	0.0	1	0.0	0	0.0	0	8.8	0.004	943.2	17000	0.0	2.0	3.9	12.5
17110	14.0	12.0	22.3	15.2	2.0	1.3	0	0.0	1	0.0	0	0.0	0	5.8	0.007	1175.4	17000	0.0	2.0	6.7	14.0
16970	14.0	12.1	23.1	13.6	2.0	1.3	0	0.0	1	0.0	0	0.0	0	5.9	0.010	1067.0	17000	0.0	2.0	6.8	14.0
16720	14.0	9.9	24.4	9.2	2.0	1.3	0	0.0	1	0.0	0	0.0	0	5.2	0.019	1122.9	17000	0.0	2.0	4.6	14.0
16515	14.0	10.4	19.4	10.4	2.0	1.3	0	0.0	1	0.0	0	0.0	0	5.8	0.010	1249.9	17000	0.0	2.0	5.1	14.0
16305	10.0	7.1	11.6	14.6	2.0	1.3	0	0.0	1	0.0	0	0.0	0	9.4	0.002	1360.5	17000	0.0	2.0	1.8	10.0
16130	12.5	8.6	15.7	12.3	2.0	1.3	0	0.0	1	0.0	0	0.0	0	7.1	0.005	1326.5	17000	0.0	2.0	3.3	12.5
15960	12.5	9.5	17.7	11.0	2.0	1.3	0	0.0	1	0.0	0	0.0	0	5.9	0.008	1386.0	17000	0.0	2.0	4.2	12.5
15745	10.0	7.3	12.3	13.3	2.0	1.3	0	0.0	1	0.0	0	0.0	0	8.4	0.003	1363.9	17000	0.0	2.0	2.0	10.0
15540	10.0	6.8	10.6	13.7	2.0	1.3	0	0.0	1	0.0	0	0.0	0	9.4	0.002	1426.6	17000	0.0	2.0	1.5	10.0
15335	12.5	8.8	16.2	12.1	2.0	1.3	0	0.0	1	0.0	0	0.0	0	8.2	0.006	1064.1	17000	0.0	2.0	3.5	12.5
15125	26.1	26.1	17.9	11.6	2.0	0.4	0.9	4.0	1	0.0	0	17.4	0	8.0	0.007	1000.5	17000	0.0	2.0	4.3	12.5
14900	14.0	9.3	19.3	9.8	2.0	0.4	0	0.0	1	0.0	0	0.0	0	6.3	0.009	1626.5	17000	0.0	2.0	4.9	14.0
14720	14.0	8.8	18.1	9.8	2.0	0.4	0	0.0	1	0.0	0	0.0	0	6.0	0.008	1722.3	17000	0.0	2.0	4.4	14.0
14480	14.0	8.8	19.0	8.9	2.0	0.4	0	0.0	1	0.0	0	0.0	0	5.2	0.010	1726.7	17000	0.0	2.0	4.4	14.0
14315	10.0	7.0	14.0	9.9	2.0	0.4	0	0.0	1	0.0	0	0.0	0	5.8	0.005	1881.0	17000	0.0	2.0	2.6	10.0
14090	10.0	7.2	14.3	8.5	2.0	0.4	0	0.0	1	0.0	0	0.0	0	5.6	0.006	1772.8	17000	0.0	2.0	2.8	10.0
13850	10.0	6.6	12.6	9.7	2.0	0.4	0	0.0	1	0.0	0	0.0	0	6.5	0.004	1741.6	17000	0.0	2.0	2.2	10.0
13635	12.5	7.6	15.5	10.3	2.0	0.4	0	0.0	1	0.0	0	0.0	0	6.3	0.004	1705.8	17000	0.0	2.0	3.2	12.5
13425	14.0	8.3	18.0	7.8	2.0	0.4	0	0.0	1	0.0	0	0.0	0	4.3	0.011	1850.7	17000	0.0	2.0	3.9	14.0
13190	10.0	6.4	12.2	9.5	2.0	0.4	0	0.0	1	0.0	0	0.0	0	6.5	0.003	1847.4	17000	0.0	2.0	2.0	10.0
13030	10.0	6.7	14.2	9.6	2.0	0.0	0	0.0	1	0.0	0	0.0	0	6.5	0.003	1763.0	17000	0.0	2.0	2.7	10.0
12835	10.0	6.4	13.3	10.1	2.0	0.0	0	0.0	1	0.0	0	0.0	0	7.3	0.003	1607.5	17000	0.0	2.0	2.4	10.0
12615	10.0	6.1	12.5	10.9	2.0	0.0	0	0.0	1	0.0	0	0.0	0	8.6	0.002	1470.8	17000	0.0	2.0	2.1	10.0
12395	10.0	6.0	12.3	11.5	2.0	0.0	0	0.0	1	0.0	0	0.0	0	9.0	0.002	1438.1	17000	0.0	2.0	2.0	10.0
12195	10.0	5.5	10.6	12.5	2.0	0.0	0	0.0	1	0.0	0	0.0	0	10.3	0.001	1383.7	17000	0.0	2.0	1.5	10.0
11995	10.0	6.2	12.8	13.6	2.0	0.0	0	0.0	1	0.0	0	0.0	0	9.7	0.002	1280.5	17000	0.0	2.0	2.2	10.0
11780	10.0	6.1	12.6	14.4	2.0	0.0	0	0.0	1	0.0	0	0.0	0	9.3	0.001	1422.2	17000	0.0	2.0	2.1	10.0
11605	10.0	6.6	13.9	13.8	2.0	0.0	0	0.0	1	0.0	0	0.0	0	8.6	0.002	1325.5	17000	0.0	2.0	2.6	10.0
11405	10.0	6.3	13.2	15.1	2.0	0.0	0	0.0	1	0.0	0	0.0	0	10.3	0.002	1114.6	17000	0.0	2.0	2.3	10.0
11180	12.5	7.7	16.6	13.9	2.0	0.0	0	0.0	1	0.0	0	0.0	0	10.6	0.003	835.7	17000	0.0	2.0	3.7	12.5
11015	14.0	10.4	19.1	13.3	2.0	1.5	0	0.0	1	0.0	0	0.0	0	11.0	0.004	679.4	17000	0.0	2.0	4.9	14.0
10835	14.0	10.9	21.9	10.9	2.0	1.5	0	0.0	1	0.0	0	0.0	0	8.2	0.007	790.4	17000	0.0	2.0	5.4	14.0
10575	14.0	9.2	24.1	7.5	2.0	1.5	0	0.0	1	0.0	0	0.0	0	5.3	0.016	1108.8	17000	0.0	2.0	3.7	14.0
10390	14.0	9.9	22.7	8.8	2.0	1.5	0	0.0	1	0.0	0	0.0	0	5.8	0.008	1247.0	17000	0.0	2.0	4.4	14.0
10225	12.5	9.8	17.8	9.5	2.0	1.5	0	0.0	1	0.0	0	0.0	0	5.9	0.007	1374.1	17000	0.0	2.0	4.3	12.5
10000	10.0	8.5	14.9	11.1	2.0	1.5	0	0.0	1	0.0	0	0.0	0	6.6	0.004	1488.0	17000	0.0	2.0	3.0	10.0
9820	14.0	10.2	18.6	10.0	2.0	1.5	0	0.0	1	0.0	0	0.0	0	5.7	0.008	1402.3	17000	0.0	2.0	4.7	14.0
9595	10.0	8.4	14.6	10.3	2.0	1.5	0	0.0	1	0.0	0	0.0	0	6.6	0.005	1619.5	17000	0.0	2.0	2.9	10.0
9385	12.5	8.9	15.8	9.5	2.0	1.5	0	0.0	1	0.0	0	0.0	0	5.3	0.006	1770.4	17000	0.0	2.0	3.4	12.5
9220	12.5	9.1	16.4	8.9	2.0	1.5	0	0.0	1	0.0	0	0.0	0	4.9	0.008	1771.4	17000	0.0	2.0	3.6	12.5
9025	12.5	8.9	15.9	8.9	2.0	1.5	0	0.0	1	0.0	0	0.0	0	5.5	0.005	1736.9	17000	0.0	2.0	3.4	12.5
MAX=	26.1	26.1			8.1	1.6					0.0						17000.0		2.0	8.3	14.0
MIN=	8.0	4.5			2.0	0.0					0.0						3000.0		2.0	0.5	8.0

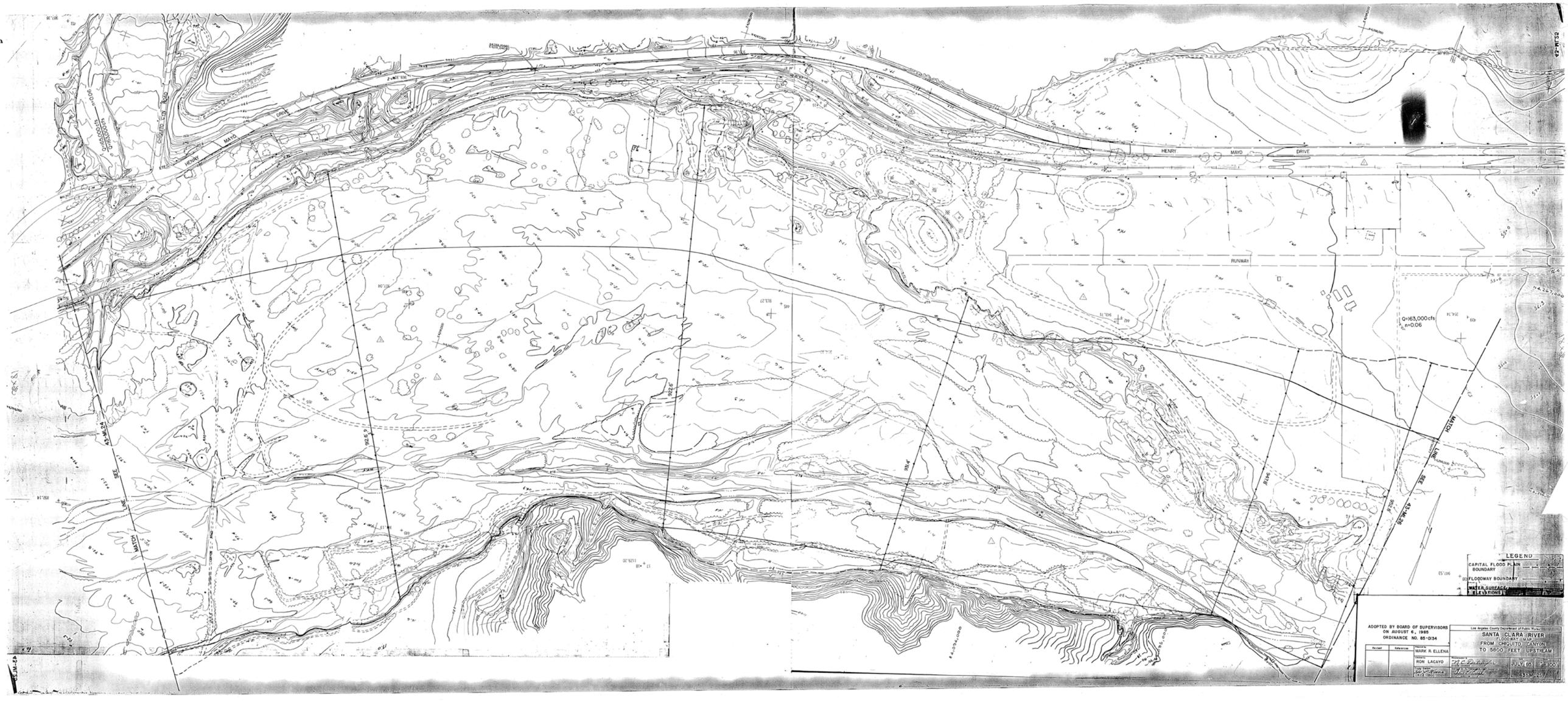
Appendix VI: LACDPW Floodway Maps: 43-MLS23 43-ML24, 43-ML25, 43-ML26 and 43-ML27


HENRY MAYO DRIVE
POTRERO CANYON ROAD
STUDY LIMITS
COUNTY OF LOS ANGELES
COUNTY OF VENTURA
Q=168,000 cfs
n=0.06
FLOODPROOFING ELEVATION CONTROLLED BY POTRERO CANYON
MATCH LINE SEE 43-ML24
LEGEND
CAPITAL FLOOD PLAIN BOUNDARY
FLOODWAY BOUNDARY
WATER SURFACE ELEVATIONS
ADOPTED BY BOARD OF SUPERVISORS ON AUGUST 6, 1985 ORDINANCE NO. 85-0034
Los Angeles County Department of Public Works
SANTA CLARA RIVER
FLOODWAY MAP
FROM VENTURA COUNTY LINE TO 5500 FEET UPSTREAM
MARK R ELLENA
RON LACAYO
JULY 85
1" = 100'
43-ML23

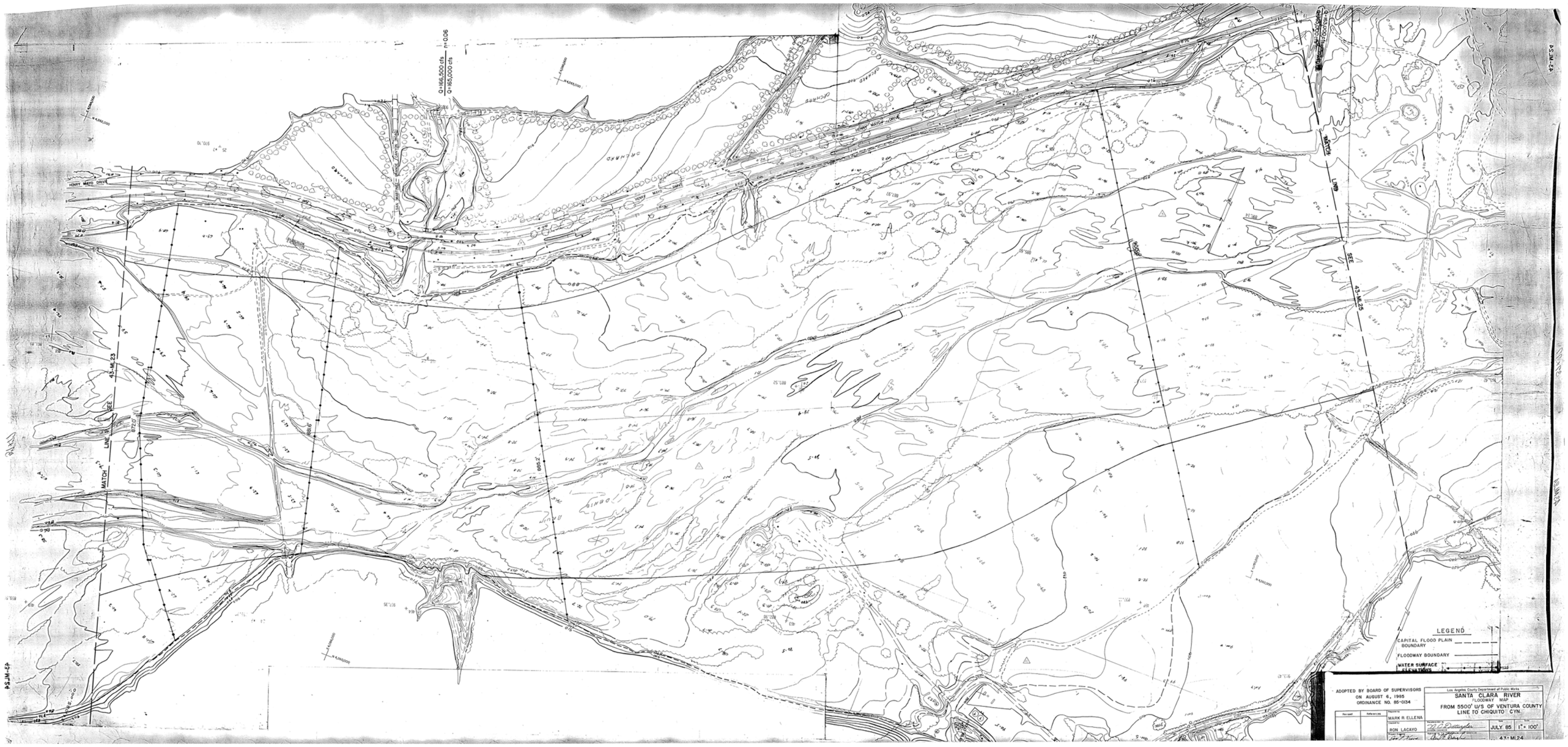
A full-size reproduction of this figure can be found at Impact Sciences.



A full-size reproduction of this figure can be found at Impact Sciences.



A full-size reproduction of this figure can be found at Impact Sciences.



A full-size reproduction of this figure can be found at Impact Sciences.

Appendix VII: Geotechnical Letter Report
"Evaluation of Soil Cement Liner Slope Gradient,"
October 13, 2003, Allen E. Seward
Engineering Geology, Inc.

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants

October 13, 2003 Job No: 03-1702R-4

Newhall Land
23823 West Valencia Boulevard
Valencia, California 91355

Attention: Mr. Keith Herren

Subject: **GEOTECHNICAL LETTER REPORT**
Evaluation of Soil Cement Liner Slope Gradient

Project: Tentative Tract 53108
River Village
Castaic Area, California

Dear Mr. Herren:

1.0 BACKGROUND

We previously addressed the proposed tentative map design (dated June 11, 2000) for the above-referenced site in our report dated September 27, 2000 and Addendum Report dated February 10, 2001. This Tentative Map shows a buried soil cement liner that is proposed at a gradient of 2:1 (H:V).

It is our understanding that Newhall would like to redesign the soil cement liner at a steeper gradient (preferably 1:1) in order to minimize costs and impacts to the river. The purpose of this letter report is to present the results of our Preliminary Geotechnical Evaluation of the steeper slope gradient and associated recommendations for the soil cement liner.

2.0 GEOTECHNICAL ANALYSIS

In order to evaluate potential slope gradients for the soil cement liner, we constructed four draft Geologic Cross Sections at various locations along the proposed bank stabilization where we have subsurface data from our Tentative Map Investigation. We then reviewed the soil types that are anticipated to be exposed in the channel liner backcut, the shear strength

and cohesion of these soils, and existing and historic high ground water levels. This data was then used to determine what slope gradients and heights will be temporarily stable.

Based on our current data, we used the following criteria in our analysis:

1. The native material anticipated to be exposed in the temporary cut-slopes for the channel liner will consist primarily of alluvial deposits of sand and gravely sand.

2. The existing ground water level is above the bottom of the channel liner. For purposes of stability analyses, it was assumed that the ground water will be removed prior to grading by dewatering techniques. If seepage occurs during construction, the recommended backcut slope gradients may need to be modified.

3. Based on laboratory test data from our Tentative Map Investigation, we used a peak shear strength of 200 psf cohesion and 30° phi for the alluvium in our stability analyses.

4. A composite section A-A' was used as the representative section for stability analysis (see attached copy). This section illustrates a typical existing profile and removal depths for construction in relation to the proposed channel liner grades.

3.0 RESULTS OF ANALYSIS

Based on our analyses we conclude the following:

1. Following the maximum anticipated remedial removals for construction, the channel liner backcut will range from approximately 10 to 18 feet in height.

2. 1:1 cut slopes calculate temporarily stable up to a height of only 5 ft. unless seepage can be completely eliminated.

3. Based on our analyses, we recommended the following three (3) preliminary options to steepen the liner gradient:

    a. The backcut for the channel liner can be steepened to a 1.5:1 gradient up to a maximum height of 45 ft. with a factor of safety of >1.25 for temporary stability.

b. A 1:1 slope gradient can be used for the channel liner if the backcut is first constructed at a 1.5:1 gradient down from the remedial removal bottom to an elevation 5 ft. above the bottom of the liner, leaving an equipment width space between the backcut and the proposed liner. The bottom 5 ft of the backcut and the liner can then be constructed at grade at a 1:1 gradient. The channel liner could then be constructed at a 1:1 gradient above the bench either concurrently with fill placement or after fill slope construction at a 1:1 gradient (see attached Cross Section A-A'). The Contractor will need to avoid contamination of the soil cement during fill placement and compaction.

c. As a third alternative, the liner may be constructed at a 1:1 gradient if the native soil is first removed as a 1.5:1 gradient from the remedial removal bottom down to the bottom elevation, leaving a minimum equipment width space behind the proposed liner. A temporary 1:1 fill slope may then be constructed with cohesive soils ($C \geq 300$) up to the proposed grade. The liner can then be constructed against this slope.

4. The temporary cut on the river side of the liner may be cut at a 1.5:1 gradient. The bottom 5 ft. may be steepened to a 1:1 gradient or the bottom 3 ft. maybe cut as a vertical.

The above recommendations are preliminary and may require refinement based on the results of a channel liner-specific investigation.

This opportunity to be of service is greatly appreciated. If you have any questions regarding this report please give us a call.

Respectfully submitted,

Dharmesh Amin

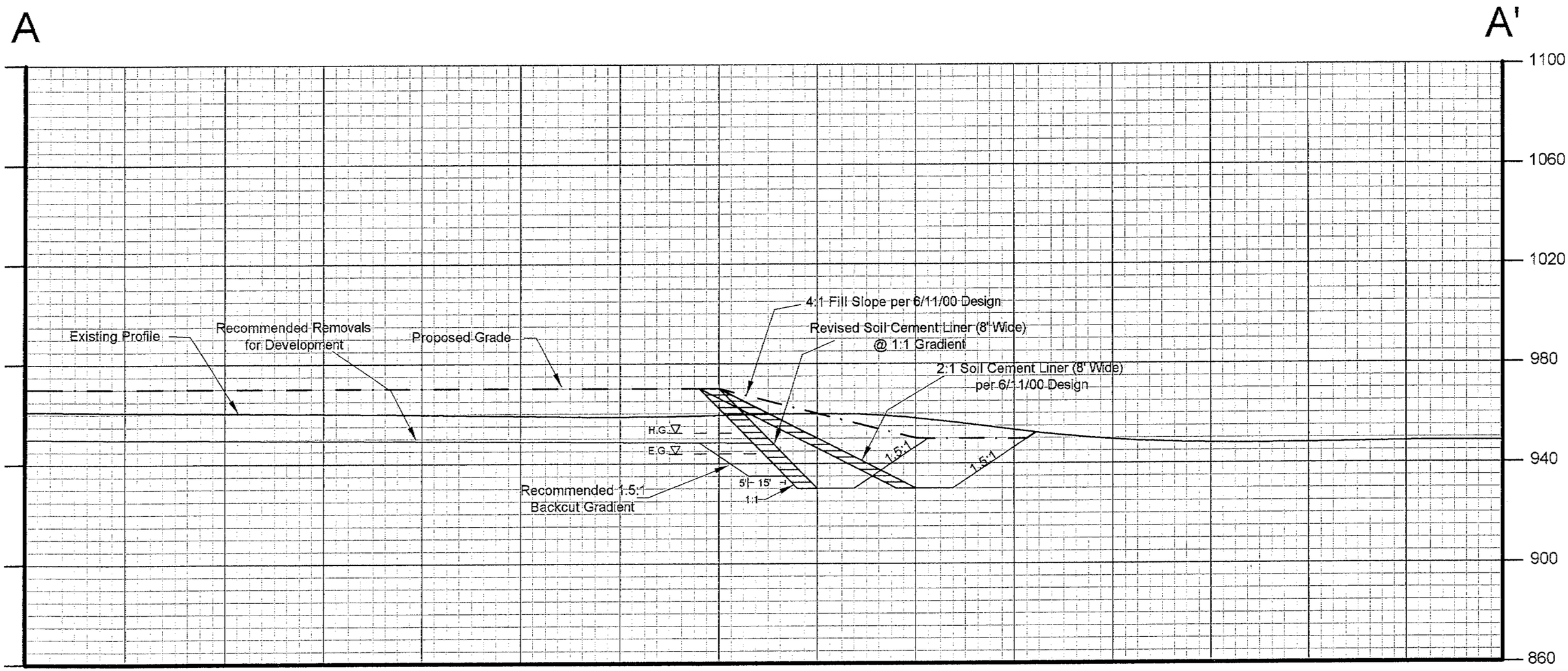
Dharmesh P. Amin, M.S., P.E., GE 2553
Senior Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
DHARMESH P. AMIN
No. 2553
Exp: 12-31-06
GEOTECHNICAL
STATE OF CALIFORNIA

The following attachments complete this report.

Cross Section A-A' (1" = 40')

Distribution: (2) Newhall Land
Attn: Addressee



ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants

CROSS SECTION A-A'

Date: 10/13/03	*Job No.:* 03-1702R-4
Scale: 1" = 40' (H=V)	*CAD File:* CROSS SECTION A-A'

PLATE I	*Geology by:* N/A	*Revised:*
	Drawn by: DGG	

A full-size reproduction of this figure can be found at Impact Sciences.

Appendix VIII: Proposed Commerce Center Drive Bridge

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

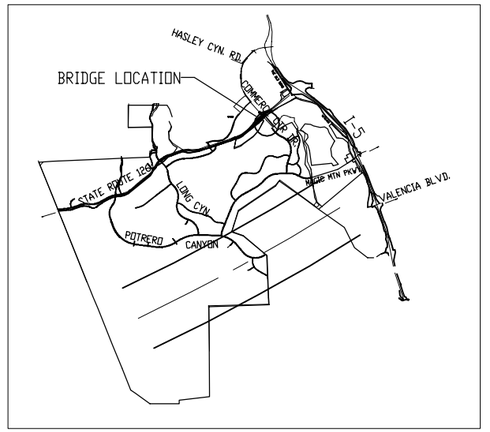
LOCATION, SPAN & CLEARANCE

FOR

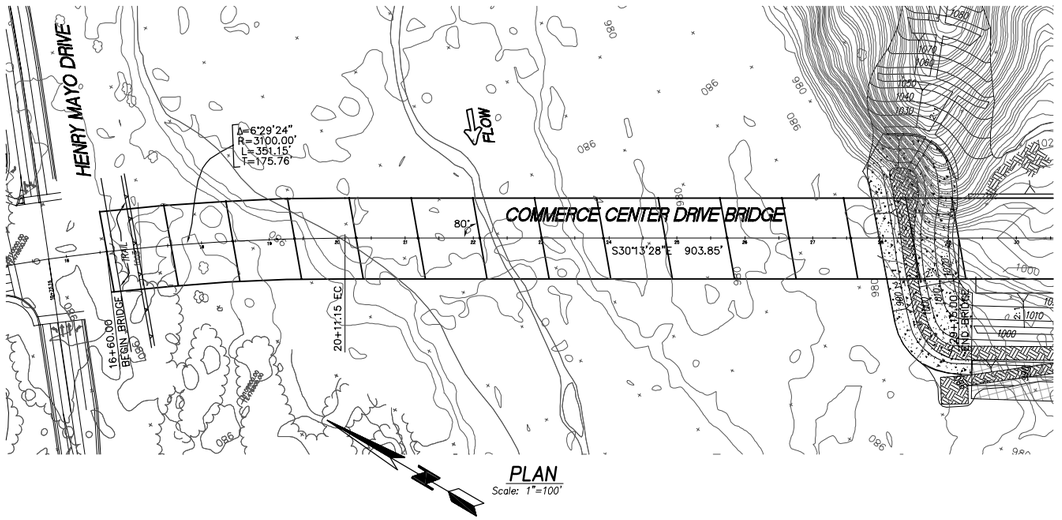
COMMERCE CENTER DRIVE BRIDGE

OVER

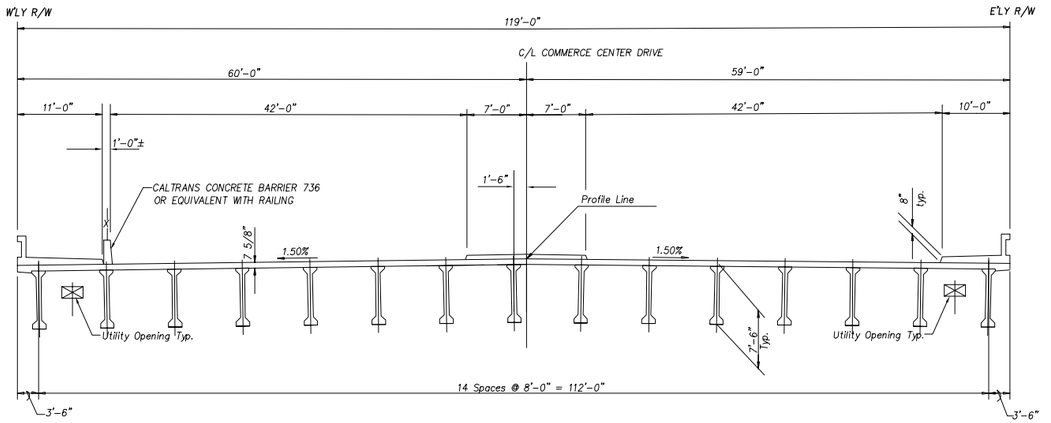
SANTA CLARA RIVER



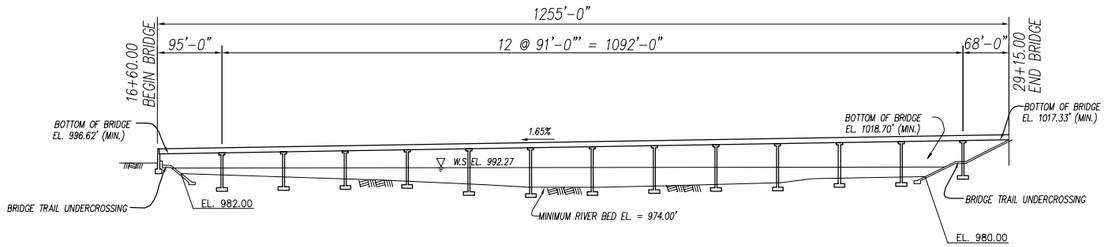
PROJECT LOCATION
No Scale



PLAN
Scale: 1"=100'



SECTION B–B
Scale: 1"=8'



SECTION A–A
Scale: 1"=100'

SIKAND ENGINEERING ASSOCIATES CONSULTING ENGINEERS 15230 BURBANK BLVD., VAN NUYS, CALIFORNIA 91411 (818)787-6550	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS DESIGN DIVISION STRUCTURES SECTION
DESIGNED BY:	COMMERCE CENTER DRIVE BRIDGE OVER SANTA CLARA RIVER LOCATION, SPAN & CLEARANCE
DRAWN BY:	SUBMITTED: DIVISION ENGINEER DATE BRIDGE NO.:
PROJECT ENGINEER:	APPROVED: H. W. STONE DIRECTOR OF PUBLIC WORKS BY: DEPUTY DIRECTOR DATE PROJECT NO.: SHT.: 1 OF: 1 DWG. NO.:

DRAWN | CHECKED | REVISIONS

K:\Sikand\Drainage Concept\BRIDGE-RIVER\Commerce Bridge 08_15_06\Commerce Bridge Span and Clearance_rev1.dwg, Plan Sheet, 10/02/06 13:31:26 by

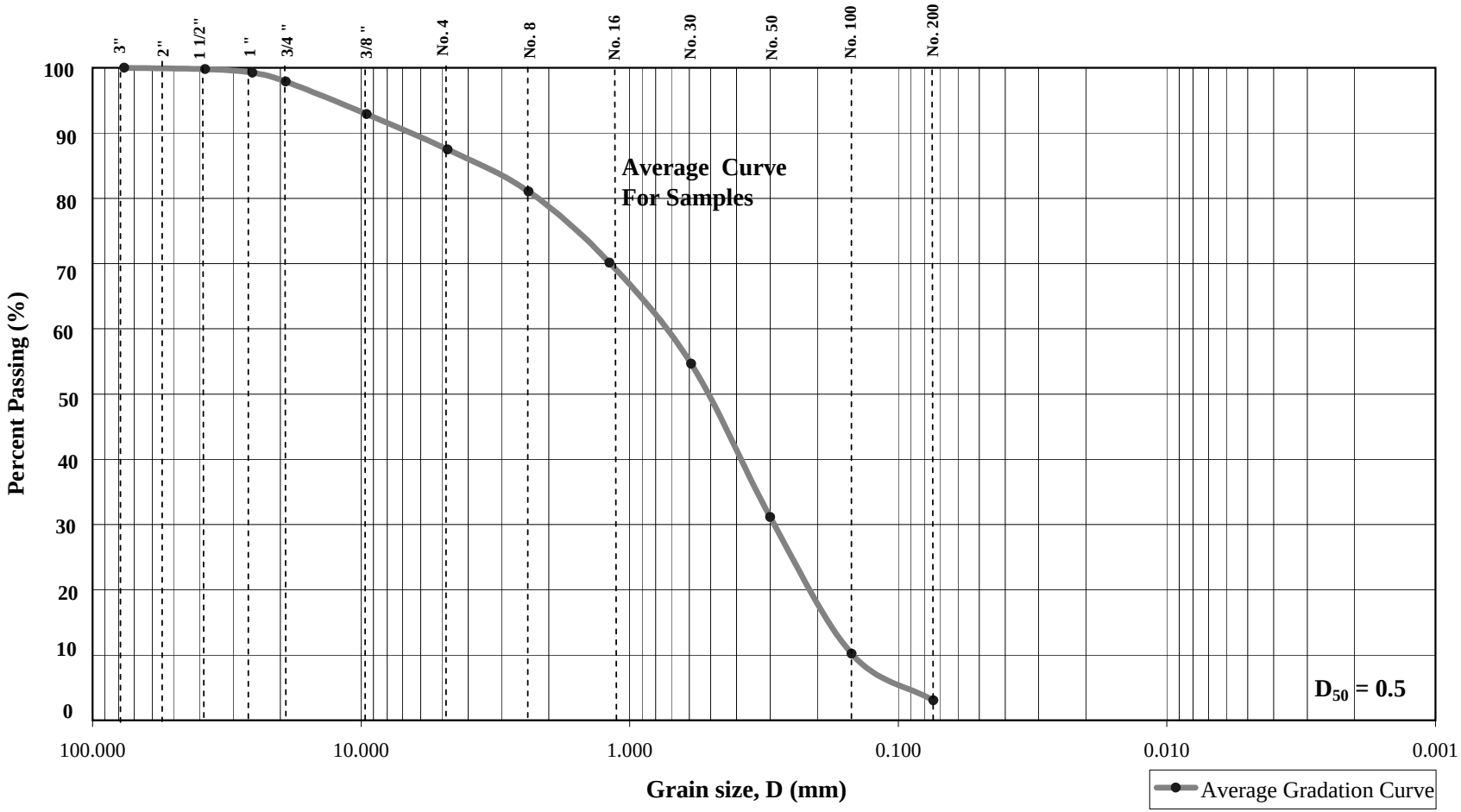


Figure 3.1B. Santa Clara River Reach B Average Gradation Curve

Bridge Scouring and Hydraulic Design Data for Qcap and n=0.025

Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):		9.38	
Approach Velocity (ft/s):		12.82	
Br Average Depth (ft):		7.74	
BR Opening Flow (cfs):		115111.00	
BR Top WD (ft):		944.86	
Grain Size D50 (mm):	0.50	0.50	0.050
Approach Flow (cfs):		115111.00	
Approach Top WD (ft):		957.44	
K1 Coefficient:	0.69	0.69	
Results			
Scour Depth Ys (ft):		1.73	
Critical Velocity (ft/s):		1.92	
Equation:		Live	

Pier Scour

All piers have the same scour depth

Input Data

Pier Shape:	Group of Cylinders
Pier Width (ft):	4.00
Grain Size D50 (mm):	0.50
Depth Upstream (ft):	12.87
Velocity Upstream (ft/s):	14.06
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	119.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.20
Grain Size D90 (mm):	16.00
K4 Armouring Coef:	1.00

Set K1 value to 1.0 because angle > 5 degrees

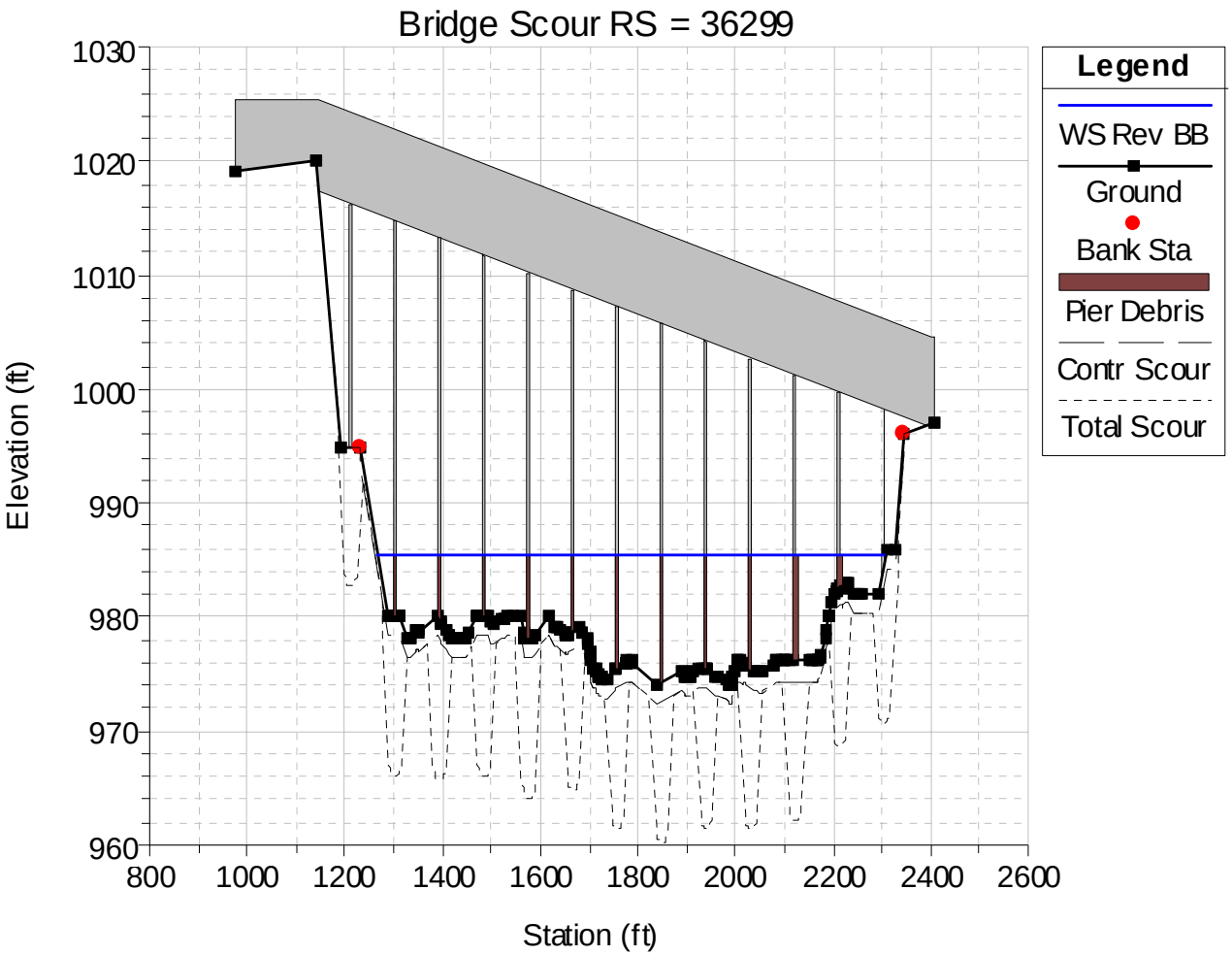
Results

Scour Depth Ys (ft):	12.33
Froude #:	0.66
Equation:	CSU equation

Combined Scour Depths

Pier Scour + Contraction Scour (ft):

Left Bank:	12.33
Channel:	14.05


Bridge Scour RS = 36299
Elevation (ft)
Station (ft)
1030
1020
1010
1000
990
980
970
960
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
Legend
WS Rev BB
Ground
Bank Sta
Pier Debris
Contr Scour
Total Scour

CHAPTER 10

Estimating Scour at Bridges

The computation of scour at bridges within HEC-RAS is based upon the methods outlined in Hydraulic Engineering Circular No. 18 (HEC No. 18, FHWA, 2001). Before performing a scour analysis with the HEC-RAS software, the engineer should thoroughly review the procedures outlined in that report. This chapter presents the methods and equations for computing contraction scour and local scour at piers and abutments. Most of the material in this chapter was taken directly from the HEC No. 18 publication (FHWA, 2001).

For information on how to enter bridge scour data into HEC-RAS, to perform the bridge scour computations, and to view the bridge scour results, see Chapter 11 of the HEC-RAS user's manual.

Contents

- General Modeling Guidelines
- Computing Contraction Scour
- Computing Local Scour at Piers
- Computing Local Scour at Abutments
- Total Scour Depths at Bridge Piers and Abutments

General Modeling Guidelines

In order to perform a bridge scour analysis, the user must first develop a hydraulic model of the river reach containing the bridge to be analyzed. This model should include several cross sections downstream from the bridge, such that any user defined downstream boundary condition does not affect the hydraulic results inside and just upstream of the bridge. The model should also include several cross sections upstream of the bridge, in order to evaluate the long-term effects of the bridge on the water surface profile upstream.

The hydraulic modeling of the bridge should be based on the procedures outlined in Chapter 5 of this manual. If observed data are available, the model should be calibrated to the fullest extent possible. Once the hydraulic model has been calibrated (if observed data are available), the modeler can enter the design events to be used for the scour analysis. In general, the design event for a scour analysis is usually the 100 year (1 percent chance) event. In addition to this event, it is recommended that a 500 year (0.2 percent chance) event also be used to evaluate the bridge foundation under a super-flood condition.

After performing the water surface profile calculations for the design events, the bridge scour can then be evaluated. The total scour at a highway crossing is comprised of three components: long-term aggradation or degradation; contraction scour; and local scour at piers and abutments. The scour computations in the HEC-RAS software allow the user to compute contraction scour and local scour at piers and abutments. The current version of the HEC-RAS software does not allow the user to evaluate long-term aggradation and degradation. Long term aggradation and degradation should be evaluated before performing the bridge scour analysis. Procedures for performing this type of analysis are outlined in the HEC No. 18 report, and are beyond the scope of this discussion. The remaining discussions in this chapter are limited to the computation of contraction scour and local pier and abutment scour.

Computing Contraction Scour

Contraction scour occurs when the flow area of a stream is reduced by a natural contraction or a bridge constricting the flow. At a bridge crossing, many factors can contribute to the occurrence of contraction scour. These factors may include: the main channel naturally contracts as it approaches the bridge opening; the road embankments at the approach to the bridge cause all or a portion of the overbank flow to be forced into the main channel; the bridge abutments are projecting into the main channel; the bridge piers are blocking a significant portion of the flow area; and a drop in the downstream tailwater which causes increased velocities inside the bridge. There are two forms of contraction scour that can occur depending on how much bed material is already being transported upstream of the bridge contraction reach.

The two types of contraction scour are called live-bed contraction scour and clear-water contraction scour. Live-bed contraction scour occurs when bed material is already being transported into the contracted bridge section from upstream of the approach section (before the contraction reach). Clear-water contraction scour occurs when the bed material sediment transport in the uncontracted approach section is negligible or less than the carrying capacity of the flow.

Contraction Scour Conditions

Four conditions (cases) of contraction scour are commonly encountered:

Case 1. Involves overbank flow on a floodplain being forced back to the main channel by the approaches to the bridge. Case 1 conditions include:

a. The river channel width becomes narrower either due to the bridge abutments projecting into the channel or the bridge being located at a narrowing reach of the river.

b. No contraction of the main channel, but the overbank flow area is completely obstructed by the road embankments.

c. Abutments are set back away from the main channel.

Case 2. Flow is confined to the main channel (i.e., there is no overbank flow). The normal river channel width becomes narrower due to the bridge itself or the bridge site is located at a narrowing reach of the river.

Case 3. A relief bridge in the overbank area with little or no bed material transport in the overbank area (i.e., clear-water scour).

Case 4. A relief bridge over a secondary stream in the overbank area with bed material transport (similar to case one).

Determination of Live-Bed or Clear-Water Contraction Scour

To determine if the flow upstream is transporting bed material (i.e., live-bed contraction scour), the program calculates the critical velocity for beginning of motion V_c (for the D_{50} size of bed material) and compares it with the mean velocity V of the flow in the main channel or overbank area upstream of the bridge at the approach section. If the critical velocity of the bed material is greater than the mean velocity at the approach section ($V_c > V$), then clear-water contraction scour is assumed. If the critical velocity of the bed material is less than the mean velocity at the approach section ($V_c < V$), then live-bed contraction scour is assumed. The user has the option of forcing the program to calculate contraction scour by the live-bed or clear-water contraction scour

equation, regardless of the results from the comparison. To calculate the critical velocity, the following equation by Laursen (1963) is used:

$$V_c = K_u \, y_1^{1/6} \, D_{50}^{1/3} \tag{10-1}$$

Where: V_c = Critical velocity above which material of size D_{50} and smaller will be transported, ft/s (m/s)

y_1 = Average depth of flow in the main channel or overbank area at the approach section, ft (m)

D_{50} = Bed material particle size in a mixture of which 50% are smaller, ft (m)

K_u = 11.17 (English Units), 6.19 (S.I. Units)

Live-Bed Contraction Scour

The HEC No. 18 publication recommends using a modified version of Laursen's (1960) live-bed scour equation:

$$y_2 = y_1 \left[\frac{Q_2}{Q_1} \right]^{6/7} \left[\frac{W_1}{W_2} \right]^{k_1} \tag{10-2}$$

$$y_s = y_2 - y_0 \tag{10-3}$$

Where: y_s = Average depth of contraction scour in feet (m).

y_2 = Average depth after scour in the contracted section, feet (m). This is taken as the section inside the bridge at the upstream end in HEC-RAS (section BU).

y_1 = Average depth in the main channel or floodplain at the approach section, feet (m).

y_0 = Average depth in the main channel or floodplain at the contracted section before scour, feet (m).

Q_1 = Flow in the main channel or floodplain at the approach section, which is transporting sediment, cfs (m^3/s).

Q_2 = Flow in the main channel or floodplain at the contracted section, which is transporting sediment, cfs (m^3/s).

W_1 = Bottom width in the main channel or floodplain at the approach section, feet (m). This is approximated as the top width of the active flow area in HEC-RAS.

W_2 = Bottom width of the main channel or floodplain at the contracted section less pier widths, feet (m). This is approximated as the top width of the active flow area.

k_1 = Exponent for mode of bed material transport.

V_* / ω	k_1	Mode of Bed Material Transport
< 0.50	0.59	Mostly contact bed material discharge
0.50 to 2.0	0.64	Some suspended bed material discharge
> 2.0	0.69	Mostly suspended bed material discharge

V_* = $(g\, y_1\, S_1)^{1/2}$, shear velocity in the main channel or floodplain at the approach section, ft/s (m/s).
ω = Fall velocity of bed material based on D_{50}, ft/s (m/s).
g = Acceleration of gravity, ft/s^2 (m/s^2).
S_1 = Slope of the energy grade line at the approach section, ft/ft (m/m).

Clear-Water Contraction Scour

The recommended clear-water contraction scour equation by the HEC No. 18 publication is an equation based on research from Laursen (1963):

$$y_2 = \left[\frac{Q_2^2}{C\, D_m^{2/3}\, W_2^2} \right]^{3/7} \tag{10-4}$$

$$y_s = y_2 - y_0 \tag{10-5}$$

Where D_m = Diameter of the smallest non-transportable particle in the bed material (1.25 D_{50}) in the contracted section, feet (m).
D_{50} = Median diameter of the bed material, feet (m).
C = 130 for English units (40 for metric).

Note: If the bridge opening has overbank area, then a separate contraction scour computation is made for the main channel and each of the overbanks.

Computing Local Scour at Piers

Pier scour occurs due to the acceleration of flow around the pier and the formation of flow vortices (known as the horseshoe vortex). The horseshoe vortex removes material from the base of the pier, creating a scour hole. As the depth of scour increases, the magnitude of the horshoe vortex decreases, thereby reducing the rate at which material is removed from the scour hole. Eventually an equilibrium between bed material inflow and outflow is reached, and the scour hole ceases to grow.

The factors that affect the depth of local scour at a pier are: velocity of the flow just upstream of the pier; depth of flow; width of the pier; length of the pier if skewed to the flow; size and gradation of bed material; angle of attack of approach flow; shape of the pier; bed configuration; and the formation of ice jams and debris.

The HEC No. 18 report recommends the use of the Colorado State University (CSU) equation (Richardson, 1990) for the computation of pier scour under both live-bed and clear-water conditions. The CSU equation is the default equation in the HEC-RAS software. In addition to the CSU equation, an equation developed by Dr. David Froehlich (1991) has also been added as an alternative pier scour equation. The Froehlich equation is not recommended in the HEC No. 18 report, but has been shown to compare well with observed data.

Computing Pier Scour With The CSU Equation

The CSU equation predicts maximum pier scour depths for both live-bed and clear-water pier scour. The equation is:

$$y_s = 2.0 K_1 K_2 K_3 K_4 a^{0.65} y_1^{0.35} Fr_1^{0.43} \qquad (10\text{-}6)$$

Where: y_s = Depth of scour in feet (m)

K_1 = Correction factor for pier nose shape

K_2 = Correction factor for angle of attack of flow

K_3 = Correction factor for bed condition

K_4 = Correction factor for armoring of bed material

a = Pier width in feet (m)

y_1 = Flow depth directly upstream of the pier in feet (m). This is taken from the flow distribution output for the cross section just upstream from the bridge.

Fr_1 = Froude Number directly upstream of the pier. This is taken from the flow distribution output for the cross section just upstream from the bridge.

Note: For round nose piers aligned with the flow, the maximum scour depth is limited as follows:

$y_s \leq 2.4$ times the pier width (a) for $Fr_1 \leq 0.8$
$y_s \leq 3.0$ times the pier width (a) for $Fr_1 > 0.8$

An optional correction factor, Kw for wide piers in shallow water can be applied to the CSU equation.

$$K_w = 2.58\left(\frac{y}{a}\right)^{0.34} F^{0.65} \qquad \text{for } V/V_c < 1$$

$$K_w = 1.0\left(\frac{y}{a}\right)^{0.13} F^{0.25} \qquad \text{for } V/V_c \geq 1$$

Because this correction factor was developed based on limited flume data, it is not automatically accounted for in HEC-RAS. The user, however, can manually apply this factor to the computed scour depth, or can combine it with one of the user-entered correction factors (K_1 through K_4). See section 6.3 of HEC-18.

The correction factor for pier nose shape, K_1, is given in Table 10.1 below:

Table 10.1
Correction Factor, K_1, for Pier Nose Shape

Shape of Pier Nose	K_1
(a) Square nose	1.1
(b) Round nose	1.0
(c) Circular cylinder	1.0
(d) Group of cylinders	1.0
(e) Sharp nose (triangular)	0.9

The correction factor for angle of attack of the flow, K_2, is calculated in the program with the following equation:

$$K_2 = \left(\cos\theta + \frac{L}{a}\sin\theta\right)^{0.65} \qquad (10\text{-}7)$$

Where: L = Length of the pier along the flow line, feet (m)
θ = Angle of attack of the flow, with respect to the pier

Note: If L/a is larger than 12, the program uses L/a = 12 as a maximum in equation 10-7. If the angle of attack is greater than 5 degrees, K_2 dominates and K_1 should be set to 1.0 (the software does this automatically).

The correction factor for bed condition, K_3, is shown in table 10.2.

Table 10.2
Increase in Equilibrium Pier Scour Depth, K_3, For Bed Condition

Bed Condition	Dune Height H feet	K_3
Clear-Water Scour	N/A	1.1
Plane Bed and Antidune Flow	N/A	1.1
Small Dunes	$10 > H \geq 2$	1.1
Medium Dunes	$30 > H \geq 10$	1.1 to 1.2
Large Dunes	$H \geq 30$	1.3

The correction factor K_4 decreases scour depths for armoring of the scour hole for bed materials that have a D_{50} equal to or larger than 0.007 feet (0.002 m) and a D_{95} equal to or larger than 0.066 feet (0.020 m). The correction factor results from recent research by A. Molinas at CSU, which showed that when the velocity (V_1) is less than the critical velocity (V_{c90}) of the D_{90} size of the bed material, and there is a gradation in sizes in the bed material, the D_{90} will limit the scour depth. The equation developed by J. S. Jones from analysis of the data is:

$$K_4 = 0.4(V_R)^{0.15} \tag{10-8}$$

Where:

$$V_R = \left[\frac{V_1 - V_{i50}}{V_{c50} - V_{i95}}\right] \tag{10-9}$$

$$V_{i50} = 0.645\left[\frac{D_{50}}{a}\right]^{0.053} V_{c50} \tag{10-10}$$

$$V_{i95} = 0.645\left[\frac{D_{95}}{a}\right]^{0.053} V_{c95}$$

V_R = Velocity ratio
V_1 = Average velocity in the main channel or overbank area at the cross section just upstream of the bridge, ft/s (m/s)
V_{i50} = Approach velocity required to initiate scour at the pier for grain size D50, ft/s (m/s)
V_{i95} = Approach velocity required to initiate scour at the pier for grain size D95, ft/s (m/s)
V_{c50} = Critical velocity for D_{50} bed material size, ft/s (m/s)
V_{c95} = Critical velocity for D_{95} bed material size, ft/s (m/s)
a = Pier width, ft (m)

$$V_{c50} = K_u\, y^{1/6}\, D_{50}^{1/3} \qquad (10\text{-}11)$$
$$V_{c95} = K_u\, y^{1/6}\, D_{95}^{1/3}$$

Where: y = The depth of water just upstream of the pier, ft (m)
K_u = 11.17 (English Units), 6.19 (S.I. Units)

Limiting K_4 values and bed material size are given in Table 10.3.

Table 10.3
Limits for Bed Material Size and K_4 Values

Factor	Minimum Bed Material Size	Minimum K_4 Value
K_4	$D_{50} \geq 0.006$ ft (0.002 m) $D95 \geq 0.06$ ft (0.02 m)	0.4

Computing Pier Scour With The Froehlich Equation

A local pier scour equation developed by Dr. David Froehlich (Froehlich, 1991) has been added to the HEC-RAS software as an alternative to the CSU equation. This equation has been shown to compare well against observed data (FHWA, 1996). The equation is:

$$y_s = 0.32\phi(a')^{0.62}\, y_1^{0.47}\, Fr_1^{0.22}\, D_{50}^{-0.09} + a \qquad (10\text{-}12)$$

where: ϕ = Correction factor for pier nose shape: $\phi = 1.3$ for square nose piers; $\phi = 1.0$ for rounded nose piers; and $\phi = 0.7$ for

sharp nose (triangular) piers.

a' = Projected pier width with respect to the direction of the flow, feet (m)

Note: This form of Froehlich's equation is use to predict maximum pier scour for design purposes. The addition of one pier width ($+a$) is placed in the equation as a factor of safety. If the equation is to be used in an analysis mode (i.e. for predicting the scour of a particular event), Froehlich suggests dropping the addition of the pier width ($+a$). The HEC-RAS program always includes the addition of the pier width ($+a$) when computing pier scour. The pier scour from this equation is limited to a maximum in the same manner as the CSU equation. Maximum scour $y_s \leq 2.4$ times the pier width (a) for $Fr_1 \leq 0.8$, and $y_s \leq 3.0$ times the pier width (a) for $Fr_1 > 0.8$.

Computing Local Scour at Abutments

Local scour occurs at abutments when the abutment obstructs the flow. The obstruction of the flow forms a horizontal vortex starting at the upstream end of the abutment and running along the toe of the abutment, and forms a vertical wake vortex at the downstream end of the abutment.

The HEC No. 18 report recommends two equations for the computation of live-bed abutment scour. When the wetted embankment length (L) divided by the approach flow depth (y_1) is greater than 25, the HEC No. 18 report suggests using the HIRE equation (Richardson, 1990). When the wetted embankment length divided by the approach depth is less than or equal to 25, the HEC No. 18 report suggests using an equation by Froehlich (Froehlich, 1989).

The HIRE Equation

The HIRE equation is based on field data of scour at the end of spurs in the Mississippi River (obtained by the USACE). The HIRE equation is:

$$y_s = 4\,y_1\left(\frac{K_1}{0.55}\right)K_2\,Fr_1^{0.33} \qquad (10\text{-}13)$$

where: y_s = Scour depth in feet (m)

y_1 = Depth of flow at the toe of the abutment on the overbank or in the main channel, ft (m), taken at the cross section just upstream of the bridge.

K_1 = Correction factor for abutment shape, Table 10.4

K_2 = Correction factor for angle of attack (θ) of flow with abutment. $\theta = 90$ when abutments are perpendicular to the

flow, $\theta < 90$ if embankment points downstream, and $\theta > 90$ if embankment points upstream. $K_2 = (\theta/90)^{0.13}$

Fr_1 = Froude number based on velocity and depth adjacent and just upstream of the abutment toe

Table 10.4
Correction Factor for Abutment Shape, K_1

Description	K_1
Vertical-wall Abutment	1.00
Vertical-wall Abutment with wing walls	0.82
Spill-through Abutment	0.55

The correction factor, K_2, for angle of attack can be taken from Figure 10.1.

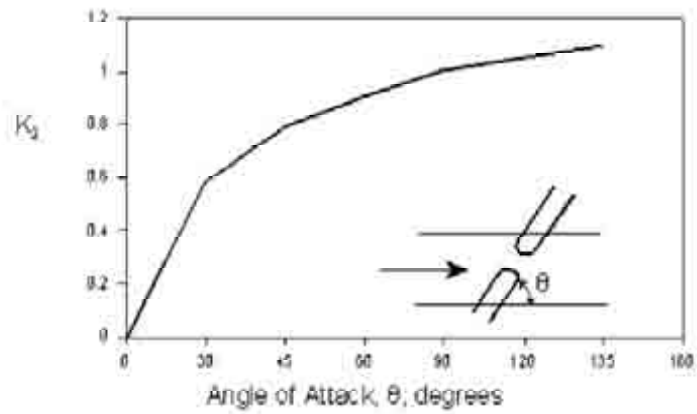


Figure 10.1 Correction Factor for Abutment Skew, K_2

Froehlich's Equation

Froehlich analyzed 170 live-bed scour measurements in laboratory flumes by regression analysis to obtain the following equation:

$$y_s = 2.27 K_1 K_2 (L')^{0.43} y_a^{0.57} Fr^{0.61} + y_a \qquad (10\text{-}14)$$

where: y_s = Scour depth in feet (m)

K_1 = Correction factor for abutment shape, Table 10.4

K_2 = Correction factor for angle of attack (θ) of flow with abutment. $\theta = 90$ when abutments are perpendicular to the

flow, $\theta < 90$ if embankment points downstream, and $\theta > 90$ if embankment points upstream (Figure 10.1). $K_2 = (\theta/90)^{0.13}$

L' = Length of abutment (embankment) projected normal to flow, ft (m)

y_a = Average depth of flow on the floodplain at the approach section, ft (m)

Fr = Froude number of the floodplain flow at the approach section, $Fr = V_e/(gy_a)^2$

V_e = Average velocity of the approach flow $V_e = Q_e/A_e$ ft/s

Q_e = Flow obstructed by the abutment and embankment at the approach section, cfs (m^3/s)

A_e = Flow area of the approach section obstructed by the abutment and embankment, ft^2 (m^2)

Note: The above form of the Froehlich equation is for design purposes. The addition of the average depth at the approach section, y_a, was added to the equation in order to envelope 98 percent of the data. If the equation is to be used in an analysis mode (i.e. for predicting the scour of a particular event), Froehlich suggests dropping the addition of the approach depth ($+y_a$). The HEC-RAS program always calculates the abutment scour with the ($+y_a$) included in the equation.

Clear-Water Scour at Abutments

Clear-water scour can be calculated with equation 9-13 or 9-14 for live-bed scour because clear-water scour equations potentially decrease scour at abutments due to the presence of coarser material. This decrease is unsubstantiated by field data.

Total Scour Depths Inside The Bridge

The total depth of scour is a combination of long-term bed elevation changes, contraction scour, and local scour at each individual pier and abutment. Once the scour is computed, the HEC-RAS software automatically plots the scour at the upstream bridge cross section. An example plot is shown in Figure 10.2 below.

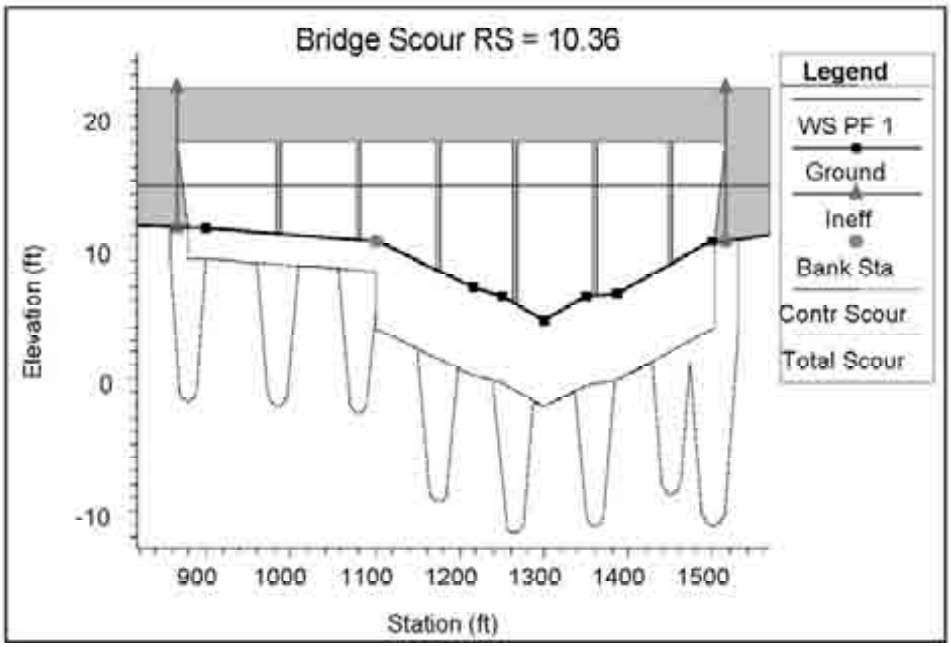


Figure 10.2 Graphic of Contraction and Total Scour at a Bridge

As shown in figure 10.2, the program plots both contraction scour and total local scour. The contraction scour is plotted as a separate line below the existing conditions cross section data. The local pier and abutment scour are added to the contraction scour, and then plotted as total scour depths. The topwidth of the local scour hole around a pier is computed as 2.0 y_s to each side of the pier. Therefore, the total topwidth of the scour hole at a pier is plotted as (4.0 y_s + a). The topwidth of the local scour hole at abutments is plotted as 2.0 y_s around each side of the abutment toe. Therefore, the total topwidth of the scour hole at abutments is plotted as 4.0 y_s.

Appendix IX: Q_{cap} Pre-Project Condition HEC-RAS Model (n = 0.025); Summary Table, Profile & Cross-Sections

HEC-RAS Plan: Pre-Proj.060 River: Reach #1 Reach: SCR Profile: Rev BB FP

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
SCR	39755	Rev BB FP	115111.00	994.00	1010.68	1007.49	1012.19	0.006147	10.48	12580.15	1465.05	0.52
SCR	39605	Rev BB FP	115111.00	993.00	1009.99	1005.91	1011.30	0.004891	9.80	13366.21	1368.00	0.47
SCR	39310	Rev BB FP	115111.00	992.00	1008.43	1004.44	1009.76	0.005112	10.12	13721.07	1595.81	0.48
SCR	39100	Rev BB FP	115111.00	990.00	1007.79	1002.13	1008.78	0.003455	8.43	15334.17	1495.98	0.40
SCR	38925	Rev BB FP	115111.00	989.50	1007.07	1001.39	1008.14	0.003728	8.54	14560.27	1360.92	0.41
SCR	38710	Rev BB FP	115111.00	988.00	1006.15	1000.08	1007.32	0.003749	8.90	13828.73	1210.24	0.41
SCR	38475	Rev BB FP	115111.00	986.00	1003.67	999.95	1005.96	0.007987	12.42	9891.63	949.78	0.60
SCR	38300	Rev BB FP	115111.00	985.50	1002.76	997.52	1004.63	0.005765	11.02	10744.45	925.40	0.51
SCR	38065	Rev BB FP	115111.00	984.00	1001.37	995.71	1003.29	0.005552	11.12	10446.70	810.08	0.51
SCR	37810	Rev BB FP	115111.00	983.00	998.28	995.23	1001.26	0.010686	13.87	8368.85	737.51	0.68
SCR	37655	Rev BB FP	115111.00	982.00	997.04	994.10	999.54	0.009563	12.74	9199.50	851.86	0.65
SCR	37390	Rev BB FP	115111.00	981.00	995.79	990.39	997.43	0.005316	10.29	11182.24	816.64	0.49
SCR	37135	Rev BB FP	115111.00	980.00	993.88	989.60	995.86	0.007043	11.27	10215.49	804.06	0.56
SCR	36930	Rev BB FP	115111.00	978.00	992.85	987.60	994.50	0.005489	10.30	11172.63	864.04	0.50
SCR	36735	Rev BB FP	115111.00	977.00	991.65	987.09	993.33	0.006286	10.41	11057.46	903.13	0.52
SCR	36515	Rev BB FP	115111.00	975.00	990.69	985.42	992.04	0.004853	9.32	12353.35	980.87	0.46
SCR	36265	Rev BB FP	115111.00	974.00	989.35	985.10	990.74	0.005585	9.46	12170.86	1089.05	0.50
SCR	36080	Rev BB FP	116236.00	973.00	987.99	984.61	989.53	0.007362	9.97	11722.31	1175.96	0.55
SCR	35845	Rev BB FP	116236.00	971.00	986.85	982.90	988.00	0.005048	8.61	13633.44	1432.48	0.48
SCR	35725	Rev BB FP	116236.00	970.00	985.99	982.70	987.31	0.006046	9.32	12834.79	1432.33	0.52
SCR	35515	Rev BB FP	116236.00	969.00	984.66	981.71	986.05	0.006031	10.25	13010.11	1452.88	0.52
SCR	35245	Rev BB FP	116236.00	968.00	982.78	980.46	984.27	0.007168	10.44	12560.53	1568.87	0.56
SCR	35040	Rev BB FP	116236.00	967.00	981.26	978.98	982.80	0.006993	11.42	12560.76	1473.48	0.56
SCR	34860	Rev BB FP	116236.00	966.00	979.96	977.39	981.49	0.008091	9.93	11795.28	1397.48	0.59
SCR	34720	Rev BB FP	116236.00	965.50	978.97	976.19	980.35	0.007306	9.42	12382.70	1434.60	0.56
SCR	34495	Rev BB FP	116236.00	964.00	977.44	974.45	978.81	0.006536	9.68	12740.57	1425.59	0.53
SCR	34310	Rev BB FP	116236.00	963.00	976.28	973.01	977.65	0.005765	10.00	12869.21	1322.41	0.51
SCR	34090	Rev BB FP	116236.00	962.00	974.96	971.64	976.32	0.006486	9.37	12407.30	1303.60	0.54
SCR	33880	Rev BB FP	116236.00	960.00	973.59	970.46	974.93	0.006786	9.30	12498.86	1427.95	0.55
SCR	33710	Rev BB FP	116236.00	959.00	972.55	969.23	973.74	0.006397	8.74	13300.90	1602.52	0.53
SCR	33500	Rev BB FP	116236.00	958.00	971.32	968.41	972.43	0.005880	8.91	14258.80	1707.37	0.49
SCR	33310	Rev BB FP	116236.00	957.00	970.43	967.01	971.36	0.004942	7.75	15004.20	1770.85	0.47
SCR	33115	Rev BB FP	116236.00	956.00	969.56	965.60	970.37	0.004682	7.21	16112.70	1830.33	0.43
SCR	32795	Rev BB FP	116236.00	954.00	967.77	964.61	968.76	0.005444	7.96	14608.31	1842.49	0.50
SCR	32605	Rev BB FP	116236.00	952.00	966.63	963.61	967.66	0.005916	8.14	14271.43	2251.57	0.52
SCR	32265	Rev BB FP	140776.00	950.00	964.96	961.33	965.78	0.004999	7.25	19437.63	2824.58	0.49
SCR	31875	Rev BB FP	140776.00	949.00	963.21	959.38	963.92	0.004345	6.74	20945.08	2535.92	0.41
SCR	31585	Rev BB FP	140776.00	946.00	962.35	956.96	962.93	0.002610	6.12	23002.38	2314.83	0.34
SCR	31360	Rev BB FP	140776.00	944.00	961.70	955.41	962.35	0.002380	6.54	22096.28	1957.63	0.33

HEC-RAS Plan: Pre-Proj.060 River: Reach #1 Reach: SCR Profile: Rev BB FP (Continued)

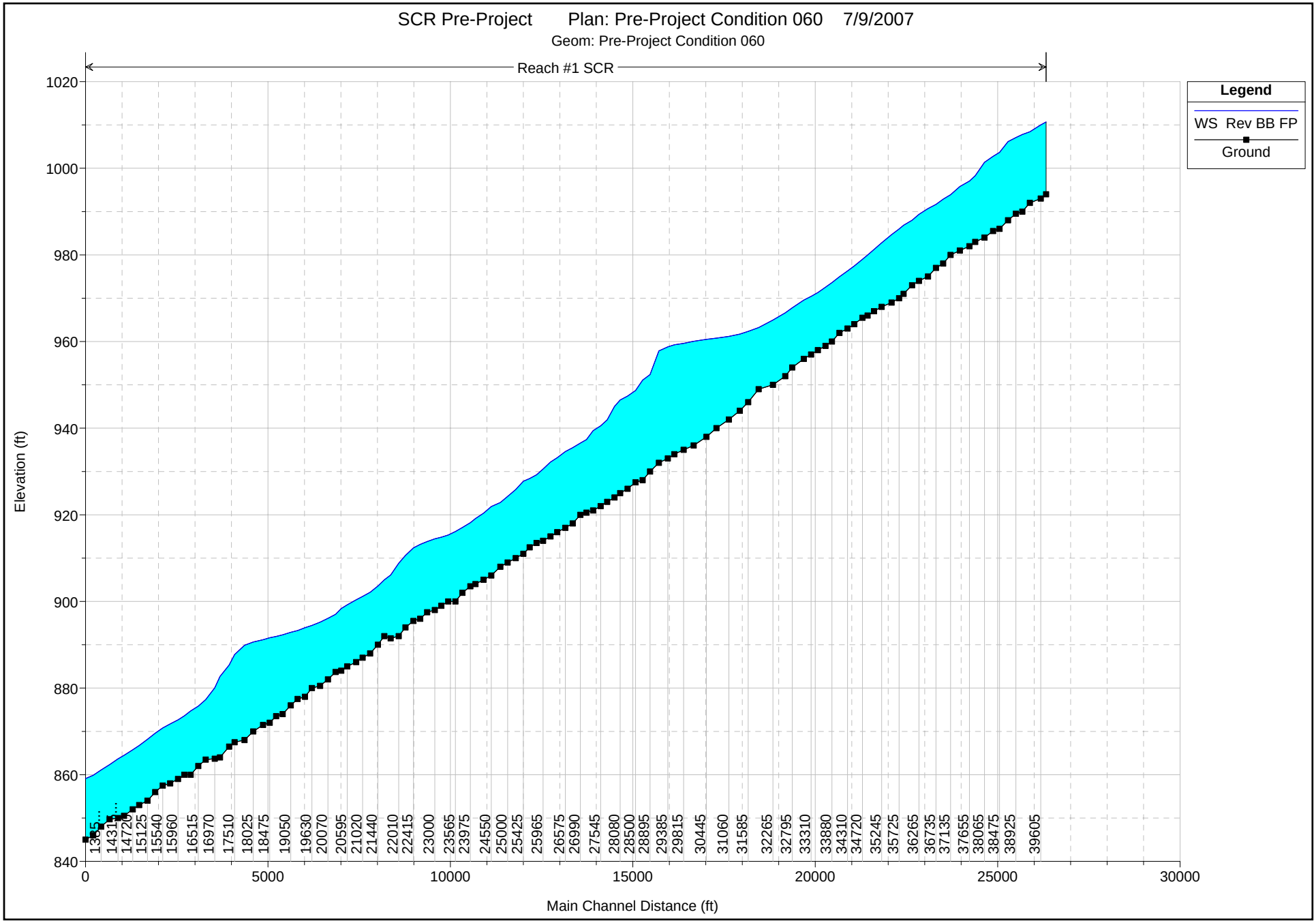
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
SCR	31060	Rev BB FP	140776.00	942.00	961.18	953.29	961.72	0.001734	5.92	23780.65	1967.63	0.30
SCR	30720	Rev BB FP	140776.00	940.00	960.79	951.33	961.20	0.001155	5.14	27379.31	1925.71	0.24
SCR	30445	Rev BB FP	140776.00	938.00	960.51	949.57	960.91	0.000977	5.04	28148.21	1996.42	0.22
SCR	30095	Rev BB FP	140776.00	936.00	960.06	947.93	960.55	0.001009	5.71	26351.58	2118.83	0.23
SCR	29815	Rev BB FP	140776.00	935.00	959.57	948.10	960.22	0.001321	6.64	23723.93	2024.45	0.26
SCR	29565	Rev BB FP	140776.00	934.00	959.25	947.27	959.88	0.001282	6.48	23804.88	2045.65	0.27
SCR	29385	Rev BB FP	140776.00	933.00	958.77	948.98	959.59	0.001772	7.47	21266.39	1975.97	0.31
SCR	29140	Rev BB FP	140776.00	932.00	957.82	950.99	959.01	0.003115	8.84	17006.33	1725.07	0.42
SCR	28895	Rev BB FP	140776.00	930.00	952.36	952.36	957.25	0.013878	19.72	9132.66	1056.57	0.82
SCR	28695	Rev BB FP	140776.00	928.00	951.09	947.96	953.92	0.009196	13.52	10416.23	1092.57	0.77
SCR	28500	Rev BB FP	140776.00	927.50	948.69	945.08	952.05	0.009434	14.87	10048.78	996.52	0.67
SCR	28280	Rev BB FP	140776.00	926.00	947.41	941.85	950.28	0.005996	14.06	11209.99	1031.84	0.56
SCR	28080	Rev BB FP	140776.00	925.00	946.51	940.04	949.05	0.005297	13.05	11838.45	978.08	0.52
SCR	27925	Rev BB FP	140776.00	924.00	945.01	939.47	948.08	0.006558	14.26	10544.04	811.40	0.58
SCR	27725	Rev BB FP	140776.00	923.00	941.92	939.31	946.30	0.010561	17.12	8751.00	667.06	0.72
SCR	27545	Rev BB FP	140776.00	922.00	940.55	937.81	944.29	0.009792	15.90	9437.01	808.15	0.69
SCR	27335	Rev BB FP	140776.00	921.00	939.42	936.22	942.22	0.007576	13.96	11188.74	999.50	0.61
SCR	27155	Rev BB FP	140776.00	920.50	937.38	935.86	940.58	0.009959	15.27	10639.15	1089.01	0.69
SCR	26990	Rev BB FP	140776.00	920.00	936.56	933.79	938.74	0.008364	12.09	12230.60	1218.39	0.62
SCR	26780	Rev BB FP	140776.00	918.00	935.50	931.71	937.16	0.005557	11.05	14288.79	1294.32	0.51
SCR	26575	Rev BB FP	140776.00	917.00	934.60	929.99	935.97	0.005299	9.46	15058.59	1311.98	0.48
SCR	26355	Rev BB FP	140776.00	916.00	933.19	929.39	934.74	0.005715	10.46	14502.88	1340.29	0.52
SCR	26170	Rev BB FP	140776.00	915.00	932.18	928.71	933.71	0.005457	10.89	14925.53	1368.29	0.50
SCR	25965	Rev BB FP	140776.00	914.00	930.57	927.71	932.43	0.006860	11.83	13642.82	1342.49	0.56
SCR	25785	Rev BB FP	140776.00	913.50	929.24	926.49	931.10	0.007329	11.93	13814.28	1484.48	0.57
SCR	25600	Rev BB FP	140776.00	912.50	928.37	925.46	929.74	0.005698	10.63	16128.46	1827.99	0.51
SCR	25425	Rev BB FP	140776.00	911.00	927.76	924.28	928.73	0.004364	8.54	18519.32	2042.82	0.45
SCR	25215	Rev BB FP	140776.00	910.00	925.82	923.53	927.42	0.008028	10.70	14700.88	1899.79	0.59
SCR	25000	Rev BB FP	140776.00	909.00	924.25	922.50	925.66	0.007638	10.37	16062.88	2366.92	0.58
SCR	24795	Rev BB FP	140776.00	908.00	922.84	920.87	924.04	0.006853	9.80	16972.01	2324.33	0.55
SCR	24550	Rev BB FP	140776.00	906.00	921.90	918.41	922.71	0.004158	8.04	19875.21	2246.68	0.44
SCR	24335	Rev BB FP	140776.00	905.00	920.38	918.12	921.60	0.006765	10.02	16596.56	2097.67	0.54
SCR	24115	Rev BB FP	140776.00	904.00	919.13	916.28	920.22	0.006046	9.33	17217.54	2029.24	0.50
SCR	23975	Rev BB FP	140776.00	903.50	918.17	914.88	919.21	0.005446	8.91	17445.12	1932.94	0.48
SCR	23755	Rev BB FP	140776.00	902.00	917.07	913.54	918.04	0.004926	8.63	18062.90	1994.76	0.47
SCR	23565	Rev BB FP	140776.00	900.00	916.15	912.70	917.09	0.004884	8.49	18397.22	2081.59	0.47
SCR	23365	Rev BB FP	140776.00	900.00	915.34	911.36	916.19	0.004101	8.17	19452.44	2083.25	0.43
SCR	23180	Rev BB FP	140776.00	899.00	914.83	909.87	915.50	0.002702	7.74	22214.35	2152.97	0.35
SCR	23000	Rev BB FP	140776.00	898.00	914.44	908.40	915.02	0.002312	6.15	23236.24	2155.79	0.32

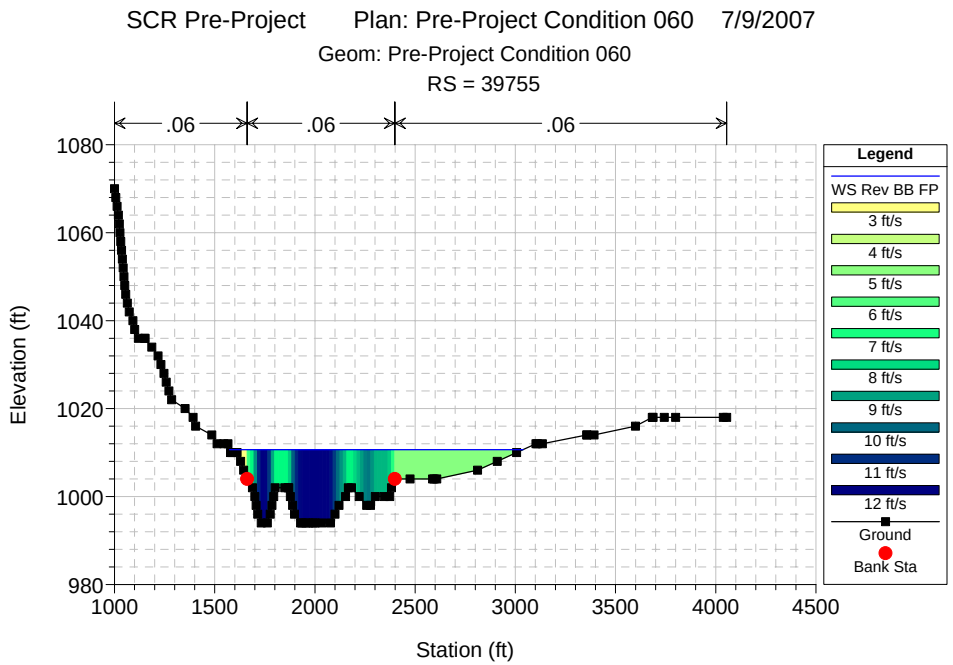
HEC-RAS Plan: Pre-Proj.060 River: Reach #1 Reach: SCR Profile: Rev BB FP (Continued)

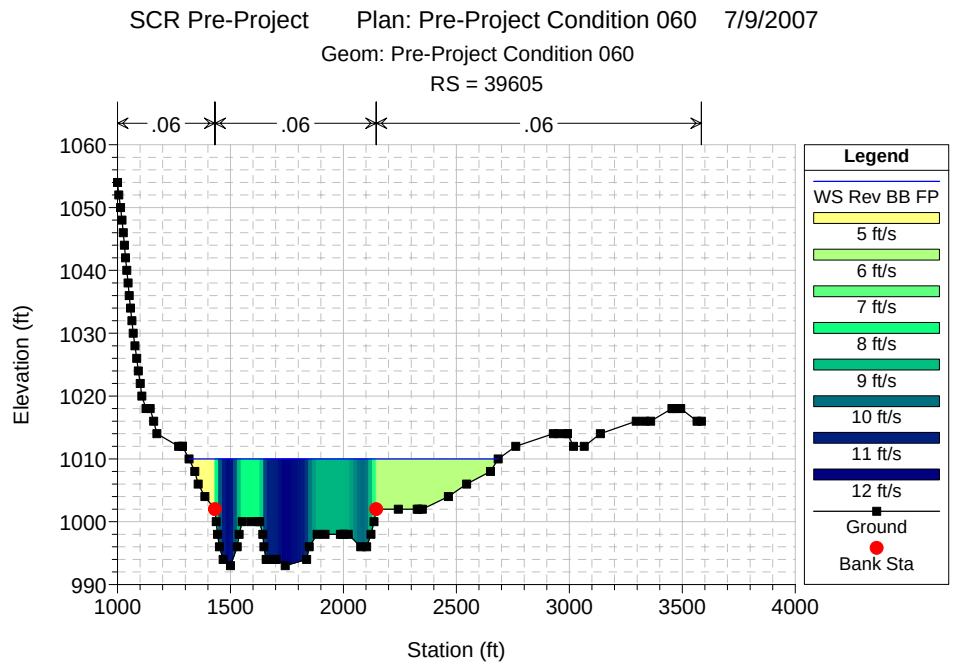
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
SCR	22790	Rev BB FP	140776.00	897.50	913.82	908.15	914.49	0.002643	6.60	21557.06	2014.36	0.35
SCR	22600	Rev BB FP	140776.00	896.00	913.17	907.78	913.94	0.002990	7.89	20501.46	1908.99	0.38
SCR	22415	Rev BB FP	140776.00	895.50	912.37	907.11	913.31	0.003714	8.61	18751.73	1840.12	0.42
SCR	22195	Rev BB FP	141426.00	894.00	910.63	906.79	912.24	0.006033	10.34	14383.84	1480.94	0.53
SCR	22010	Rev BB FP	141426.00	892.00	908.81	906.38	910.92	0.007822	12.21	12996.47	1561.41	0.60
SCR	21790	Rev BB FP	141426.00	891.50	906.10	904.87	908.83	0.011140	13.68	11580.28	1949.55	0.70
SCR	21615	Rev BB FP	141426.00	892.00	904.99	903.04	906.84	0.008623	11.32	13835.67	2046.13	0.62
SCR	21440	Rev BB FP	141426.00	890.00	903.54	901.59	905.31	0.008379	11.42	14303.66	2024.42	0.60
SCR	21225	Rev BB FP	141426.00	888.00	902.11	900.27	903.49	0.007564	10.51	16302.52	2368.75	0.56
SCR	21020	Rev BB FP	141426.00	887.00	901.16	897.78	902.17	0.004676	9.10	19399.07	2632.97	0.46
SCR	20845	Rev BB FP	141426.00	886.00	900.39	897.38	901.29	0.004825	8.72	20025.53	2728.67	0.46
SCR	20595	Rev BB FP	141426.00	885.00	899.21	896.42	900.15	0.004580	8.93	20085.48	2717.12	0.45
SCR	20435	Rev BB FP	141426.00	884.00	898.35	895.77	899.35	0.005019	9.28	19383.80	2673.48	0.47
SCR	20280	Rev BB FP	141426.00	883.70	897.04	895.55	898.34	0.008053	10.64	16892.31	2636.65	0.58
SCR	20070	Rev BB FP	141426.00	882.00	896.09	893.00	897.00	0.004652	8.65	19676.96	2507.77	0.45
SCR	19855	Rev BB FP	141426.00	880.50	895.23	891.50	896.05	0.003895	8.29	21009.22	2626.90	0.41
SCR	19630	Rev BB FP	141426.00	880.00	894.46	890.05	895.23	0.003364	7.84	21650.12	2701.24	0.39
SCR	19440	Rev BB FP	141426.00	878.00	893.92	889.11	894.61	0.002774	7.29	22725.77	2677.81	0.36
SCR	19240	Rev BB FP	141426.00	877.50	893.28	888.88	894.02	0.003095	7.50	21630.17	2495.76	0.38
SCR	19050	Rev BB FP	141426.00	876.00	892.87	887.49	893.47	0.002413	6.67	23395.12	2355.26	0.33
SCR	18830	Rev BB FP	141426.00	874.00	892.31	886.81	892.94	0.002465	6.82	22809.13	2189.48	0.34
SCR	18650	Rev BB FP	141426.00	873.50	891.91	885.64	892.53	0.002136	6.84	23250.96	2064.41	0.32
SCR	18475	Rev BB FP	141426.00	872.00	891.61	884.74	892.15	0.001837	6.05	24134.96	1964.47	0.30
SCR	18290	Rev BB FP	141426.00	871.50	891.15	884.50	891.78	0.002098	6.61	22526.65	1863.74	0.32
SCR	18025	Rev BB FP	141426.00	870.00	890.63	882.91	891.26	0.001812	6.46	22407.92	1628.78	0.30
SCR	17785	Rev BB FP	141426.00	868.00	889.88	882.81	890.72	0.002623	7.38	19389.15	1439.16	0.35
SCR	17510	Rev BB FP	141426.00	867.50	887.74	883.58	889.59	0.005819	11.13	13569.97	1326.12	0.54
SCR	17360	Rev BB FP	141426.00	866.50	885.32	883.37	888.29	0.011400	13.90	10497.55	1226.61	0.74
SCR	17110	Rev BB FP	141426.00	864.00	882.67	881.59	885.45	0.010782	14.20	11574.66	1412.77	0.71
SCR	16970	Rev BB FP	141426.00	863.70	880.06	880.06	883.52	0.015779	15.54	10321.86	1517.94	0.86
SCR	16720	Rev BB FP	141426.00	863.50	877.33	875.45	879.23	0.009849	11.47	13398.44	1714.86	0.65
SCR	16515	Rev BB FP	141426.00	862.00	875.83	873.72	877.30	0.008144	10.23	15061.35	1920.47	0.59
SCR	16305	Rev BB FP	141426.00	860.00	874.73	871.44	875.78	0.005519	9.06	17733.62	2088.74	0.49
SCR	16130	Rev BB FP	141426.00	860.00	873.58	870.71	874.68	0.006452	8.98	16938.20	2091.54	0.54
SCR	15960	Rev BB FP	141426.00	859.00	872.66	869.21	873.55	0.005505	7.63	18687.30	2233.26	0.46
SCR	15745	Rev BB FP	141426.00	858.00	871.73	867.77	872.50	0.004211	6.97	20198.45	2290.77	0.42
SCR	15540	Rev BB FP	141426.00	857.50	870.80	867.17	871.59	0.004535	7.37	19895.75	2339.05	0.44
SCR	15335	Rev BB FP	141426.00	856.00	869.59	866.50	870.52	0.005818	7.76	18301.05	2324.06	0.48
SCR	15125	Rev BB FP	142475.00	854.00	868.18	864.50	869.30	0.005569	8.49	17003.63	2080.42	0.49

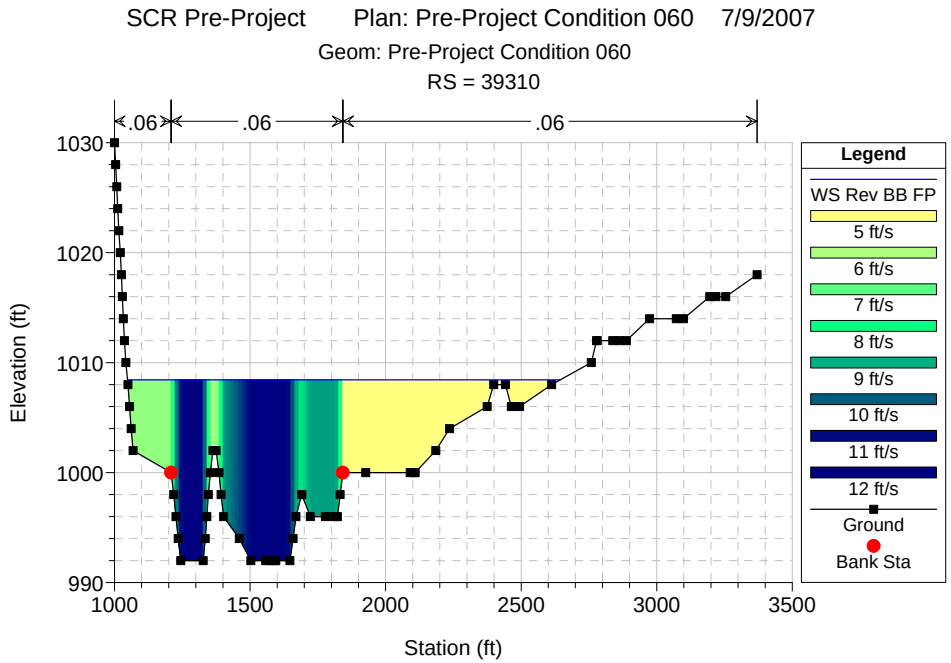
HEC-RAS Plan: Pre-Proj.060 River: Reach #1 Reach: SCR Profile: Rev BB FP (Continued)

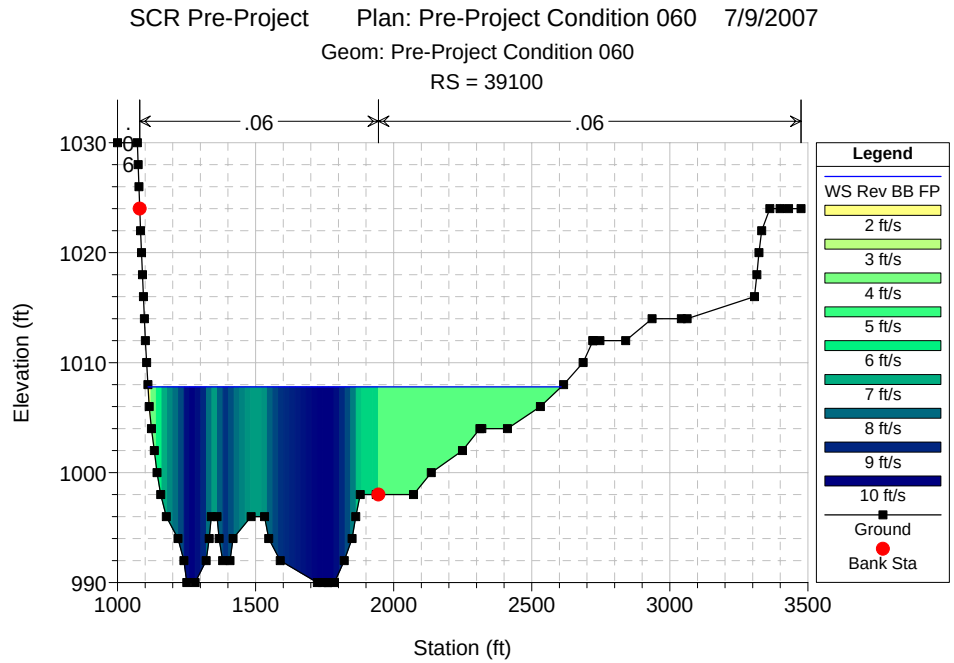
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
SCR	14900	Rev BB FP	142475.00	853.00	866.73	863.42	867.94	0.006250	9.24	16536.96	2097.69	0.52
SCR	14720	Rev BB FP	142475.00	852.00	865.76	862.17	866.85	0.005814	8.76	17360.37	1979.97	0.49
SCR	14480	Rev BB FP	142475.00	850.50	864.47	860.73	865.52	0.005156	8.56	17648.52	1869.17	0.46
SCR	14315	Rev BB FP	142475.00	850.00	863.67	859.81	864.66	0.005069	8.00	17816.17	1917.85	0.46
SCR	14090	Rev BB FP	142475.00	849.71	862.32	858.64	863.43	0.005608	8.47	16872.27	1798.30	0.48
SCR	13850	Rev BB FP	142475.00	848.00	861.10	857.10	862.16	0.005089	8.29	17235.08	1755.83	0.46
SCR	13635	Rev BB FP	142475.00	846.00	859.85	856.30	861.02	0.005383	9.61	16962.23	1792.97	0.49
SCR	13425	Rev BB FP	142475.00	845.00	859.12	854.56	859.97	0.003887	7.41	19281.49	1923.12	0.41


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
Reach #1 SCR
Legend
WS Rev BB FP
Ground
Elevation (ft)
Main Channel Distance (ft)
1020
1000
980
960
940
920
900
880
860
840
0
5000
10000
15000
20000
25000
30000
13605...
14316...
14726
15125
15540
15960
16515
16970
17510
18025
18475
19050
19630
20070
20595
21020
21440
22010
22415
23000
23565
23975
24550
25000
25425
25965
26575
26990
27545
28080
28500
28895
29385
29815
30445
31060
31585
32265
32795
33310
33880
34310
34720
35245
35725
36265
36735
37135
37655
38065
38475
38925
39605

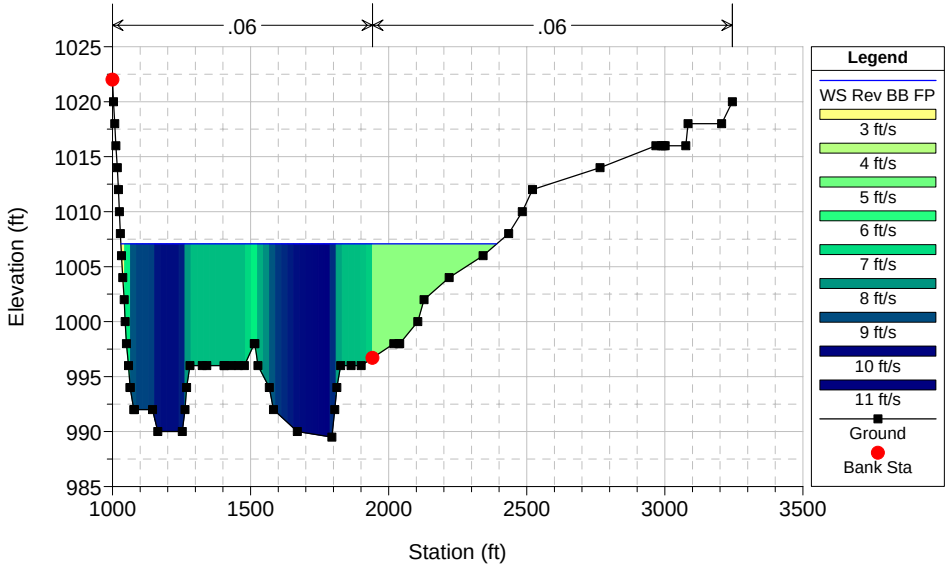

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 39755
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 39605
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta

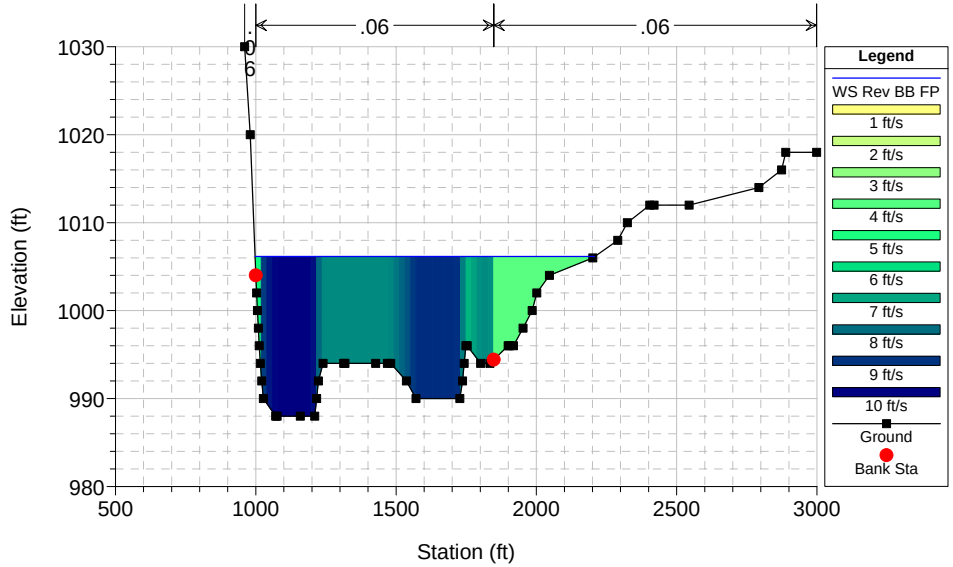

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 39310
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 39100
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta

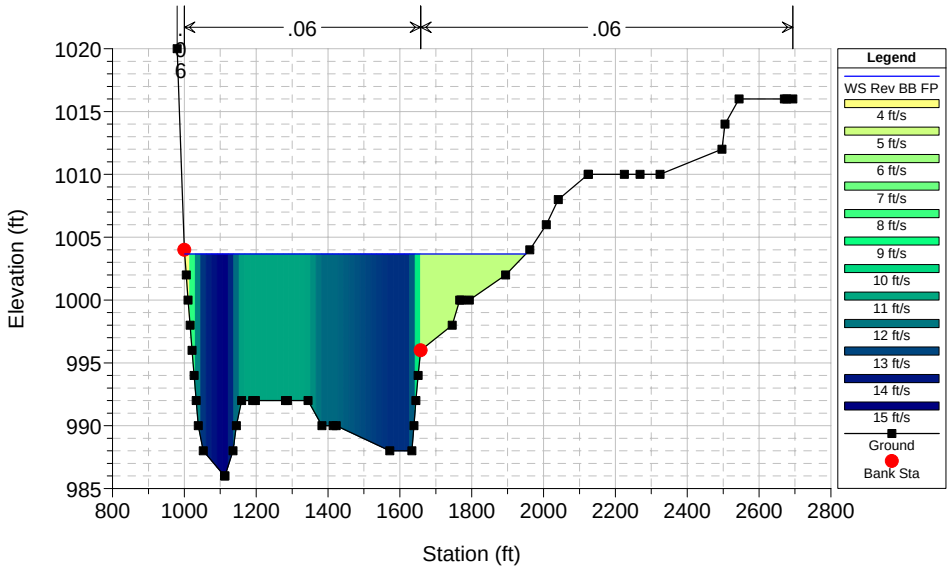
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 38925



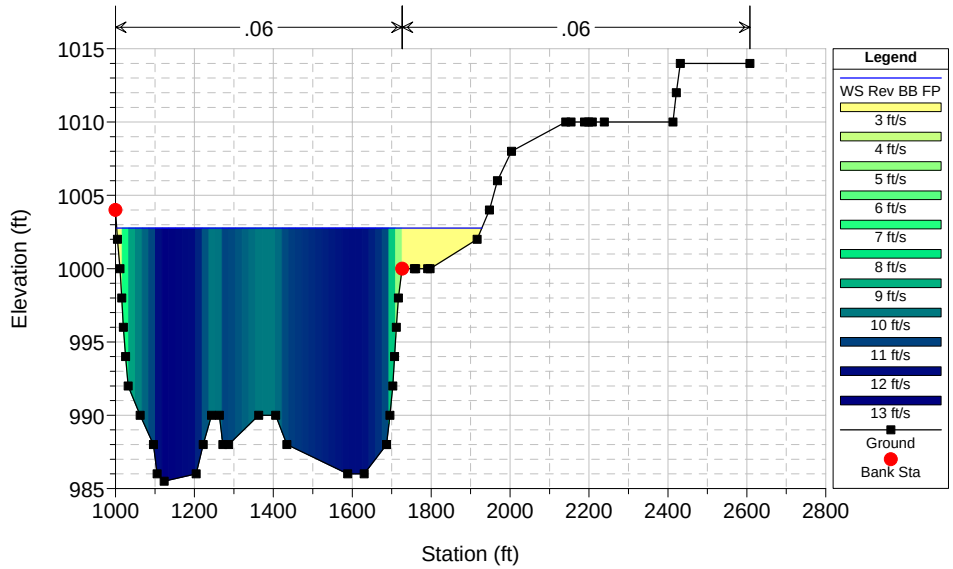
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 38710

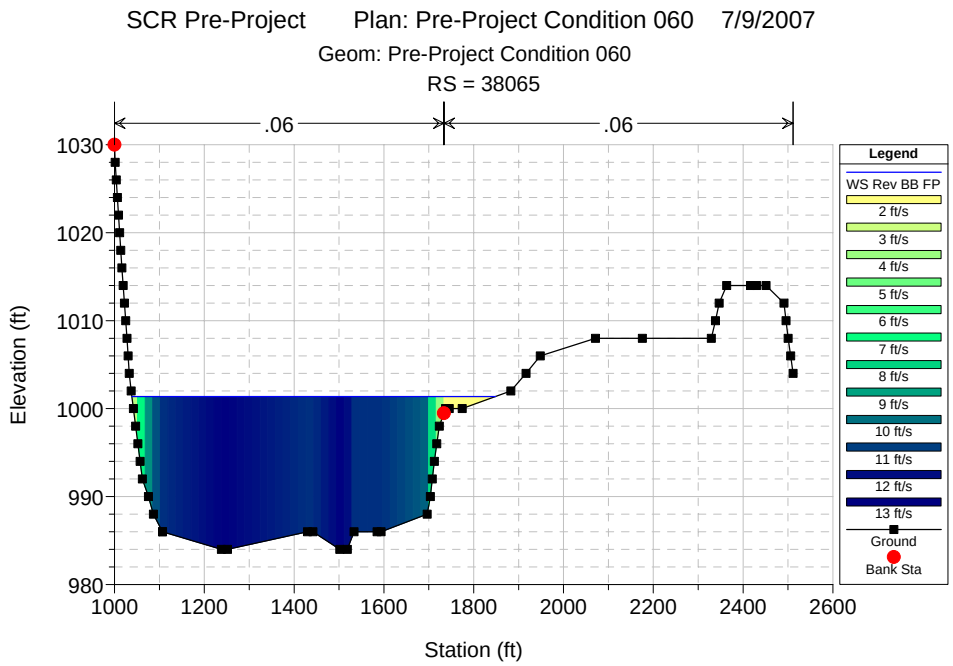


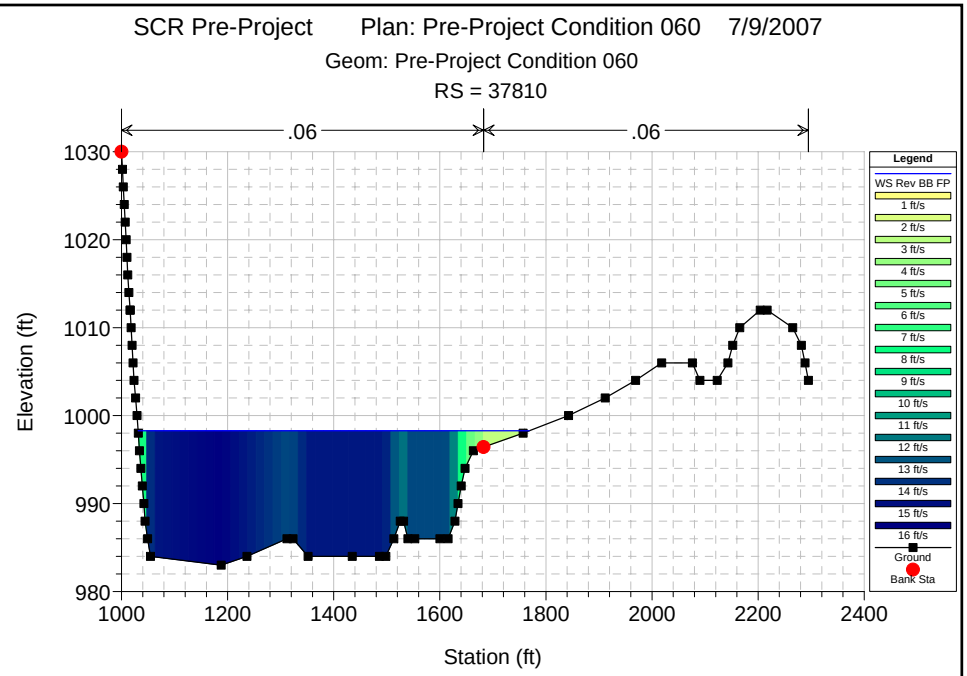
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 38475

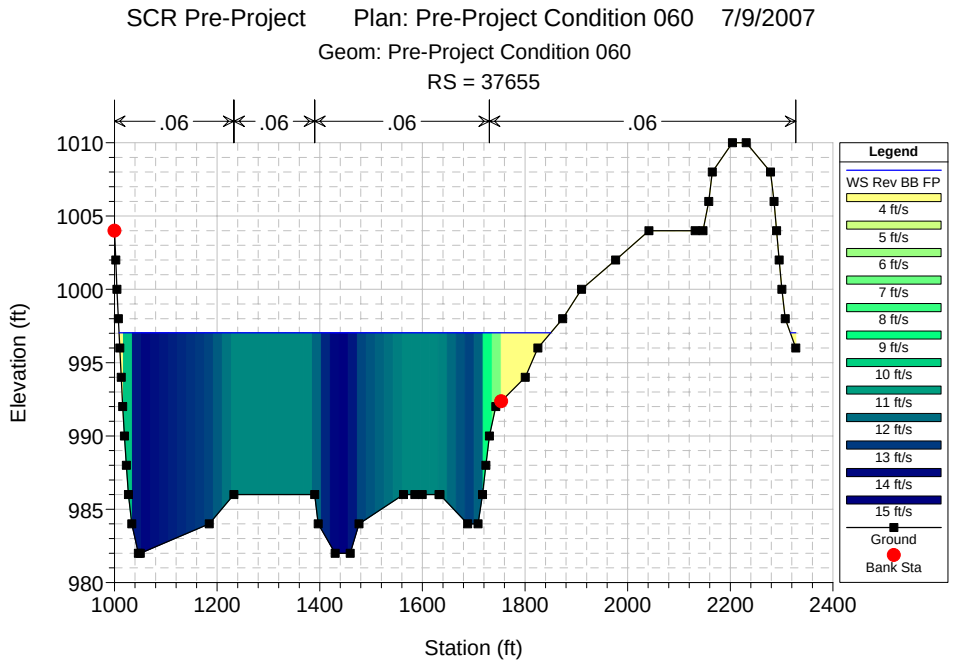


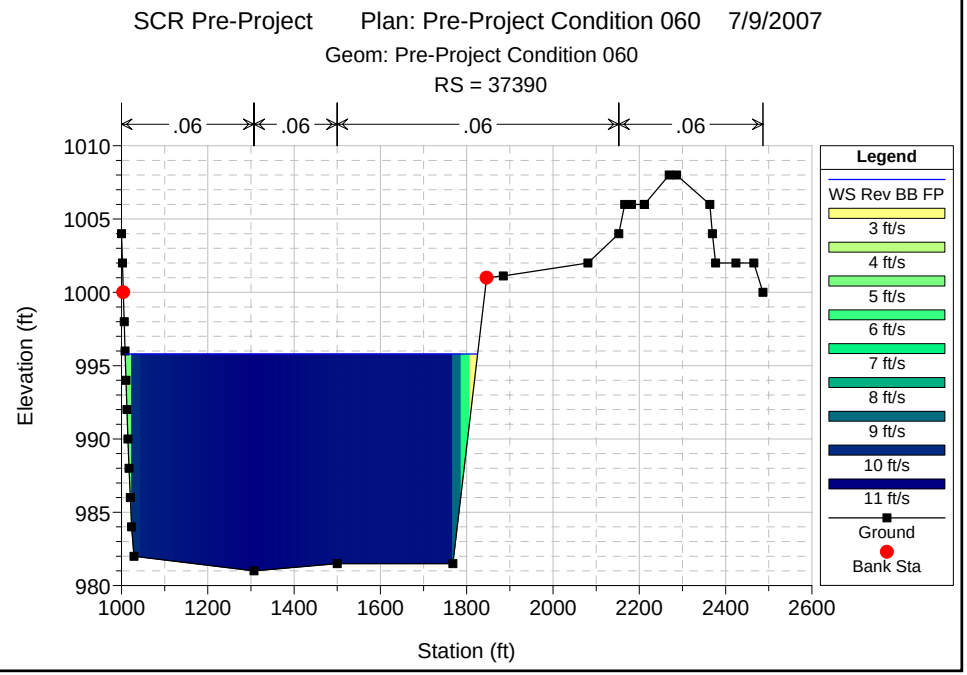
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 38300

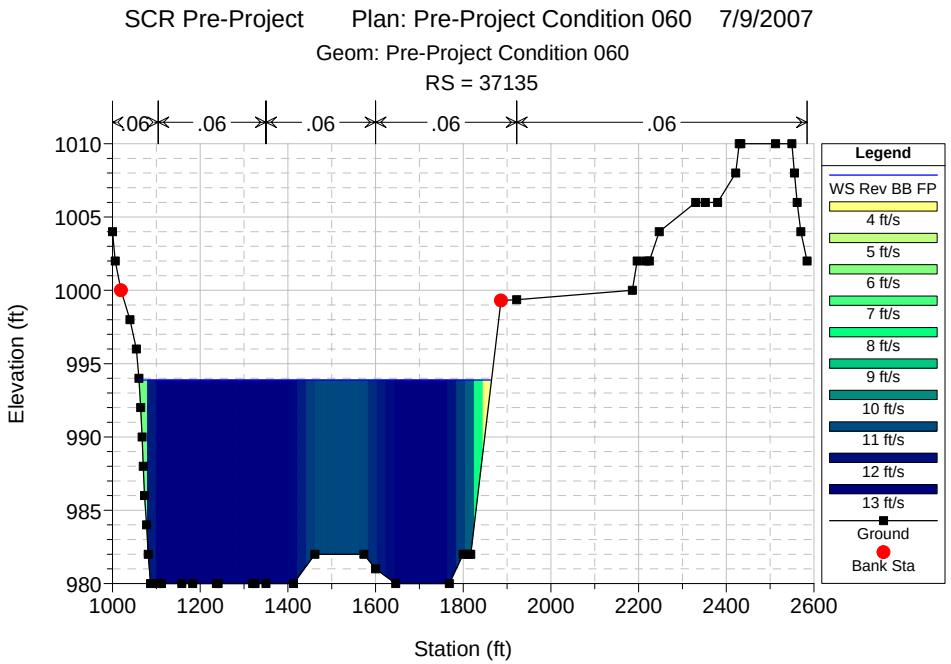


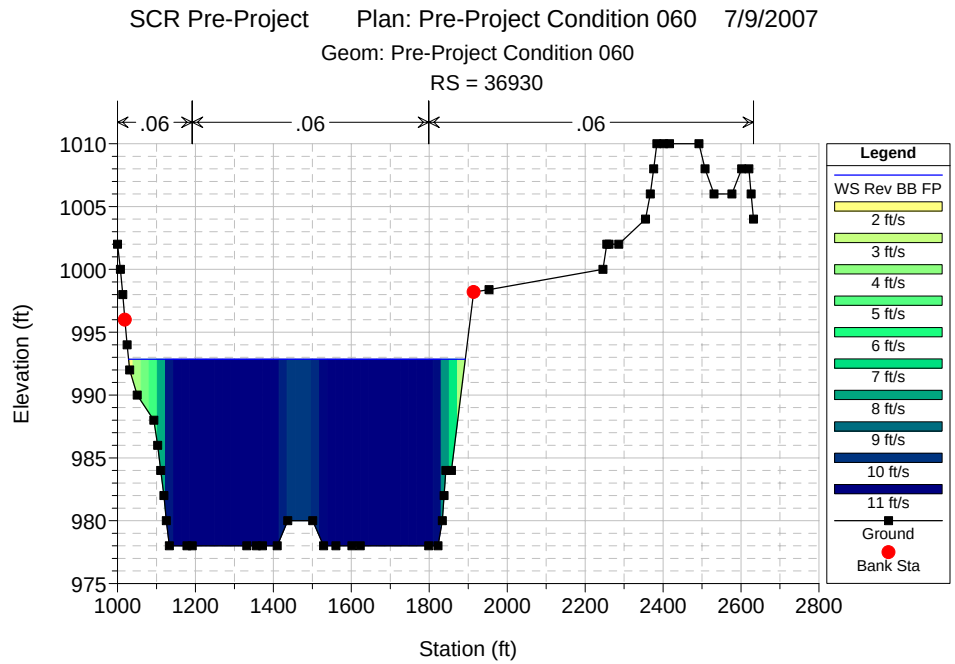

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 38065
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta

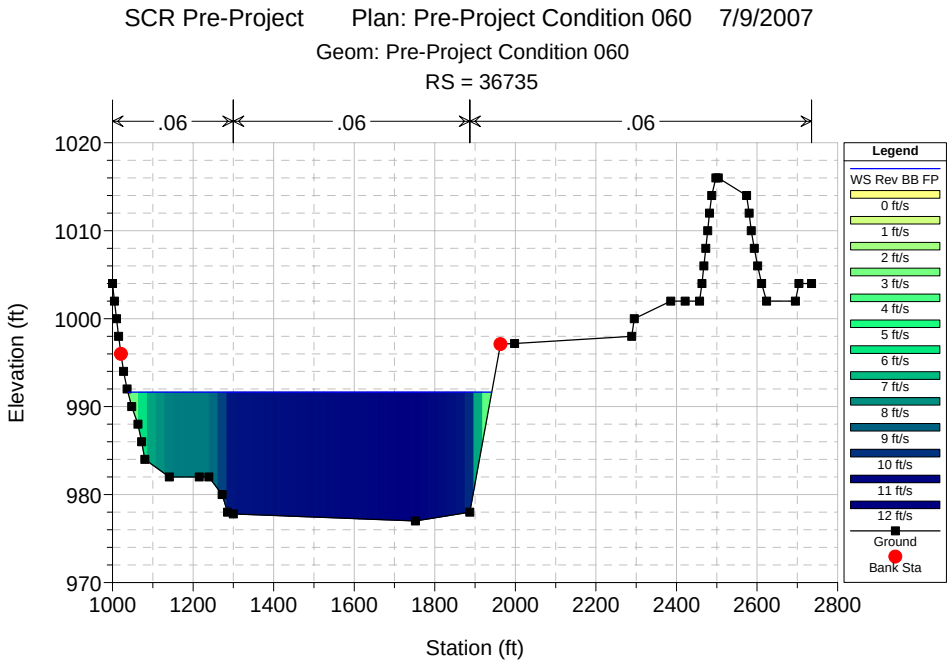

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 37810
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
Ground
Bank Sta

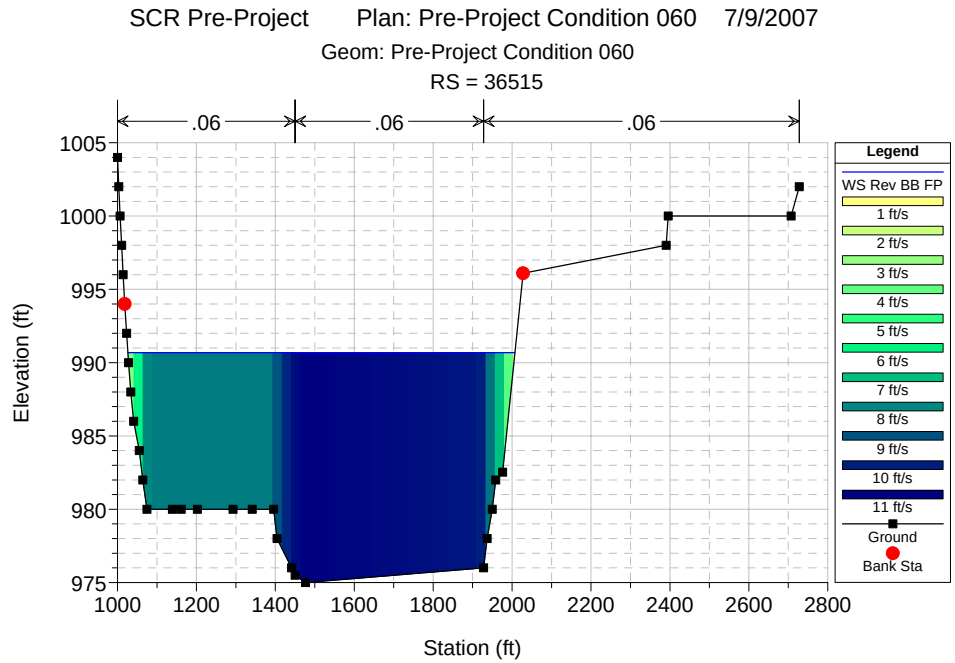

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 37655
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
Ground
Bank Sta

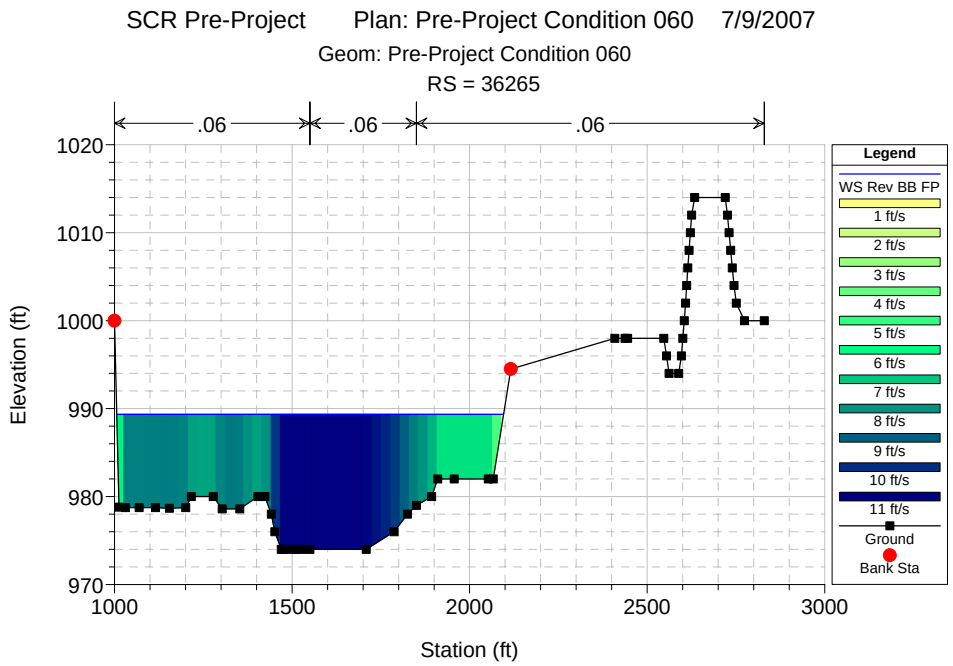

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 37390
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta

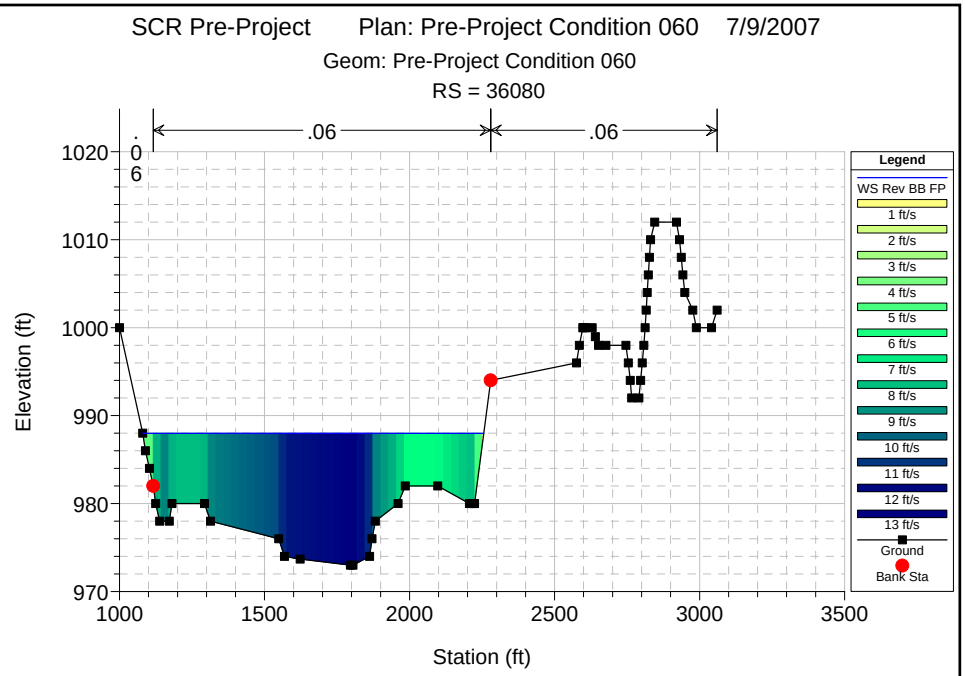

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 37135
.06
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta

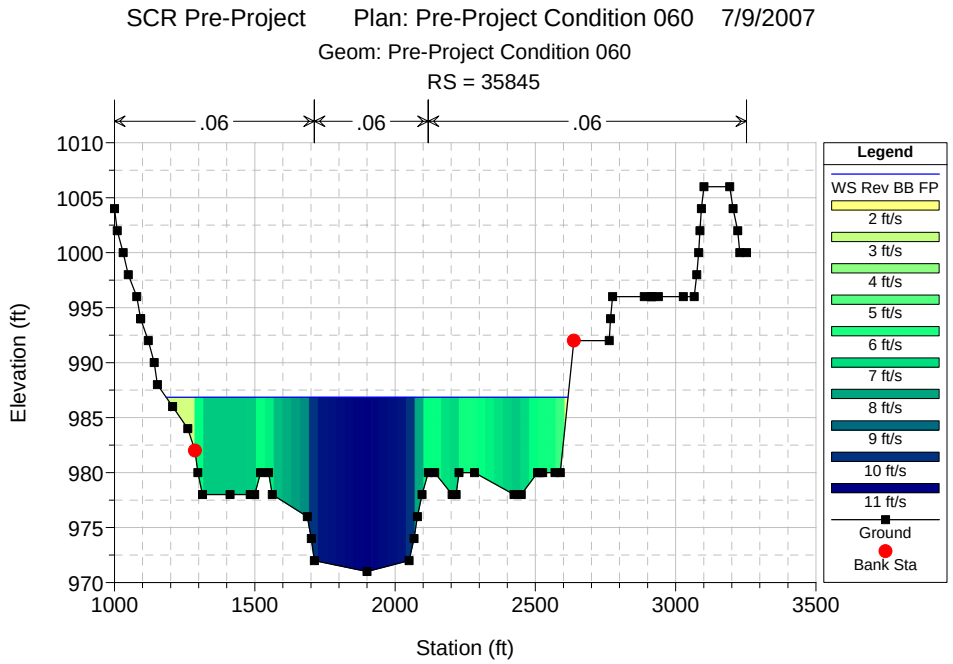

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 36930
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta

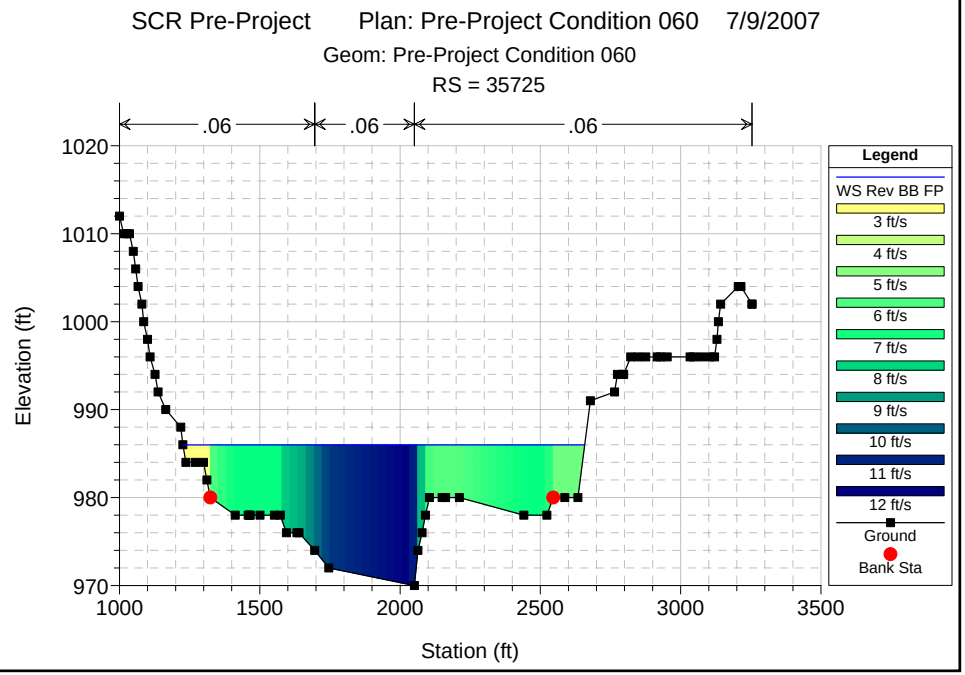

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 36735
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 36515
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta

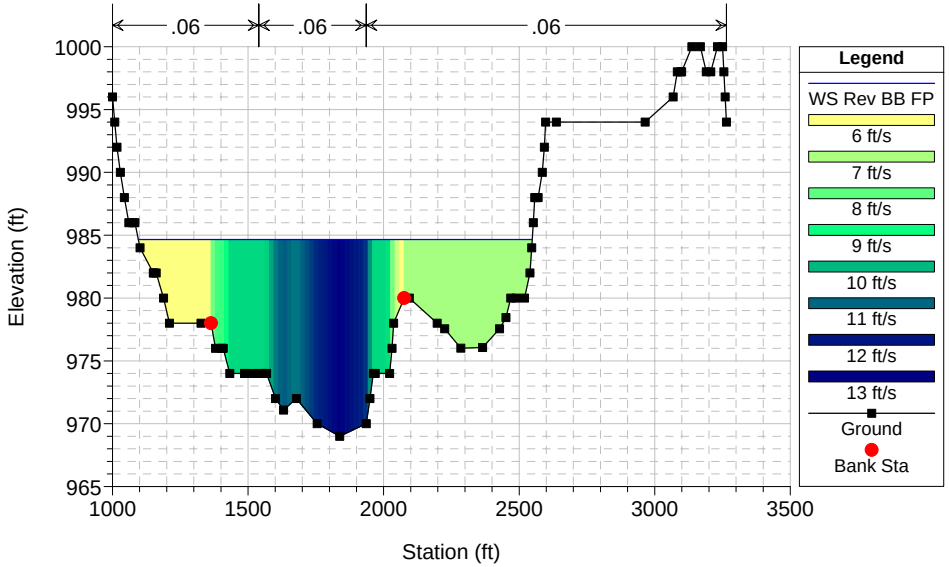

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 36265
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 36080
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta

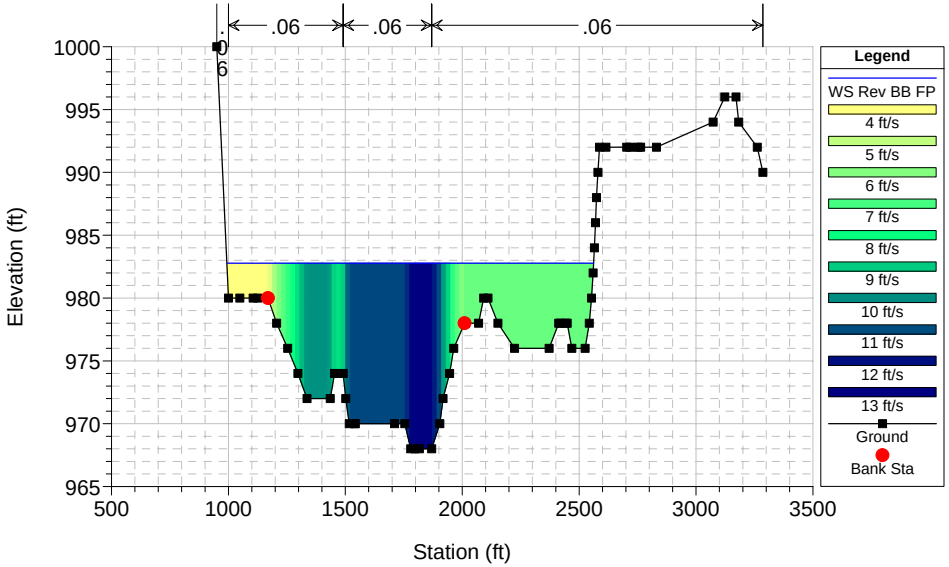

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 35845
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 35725
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta

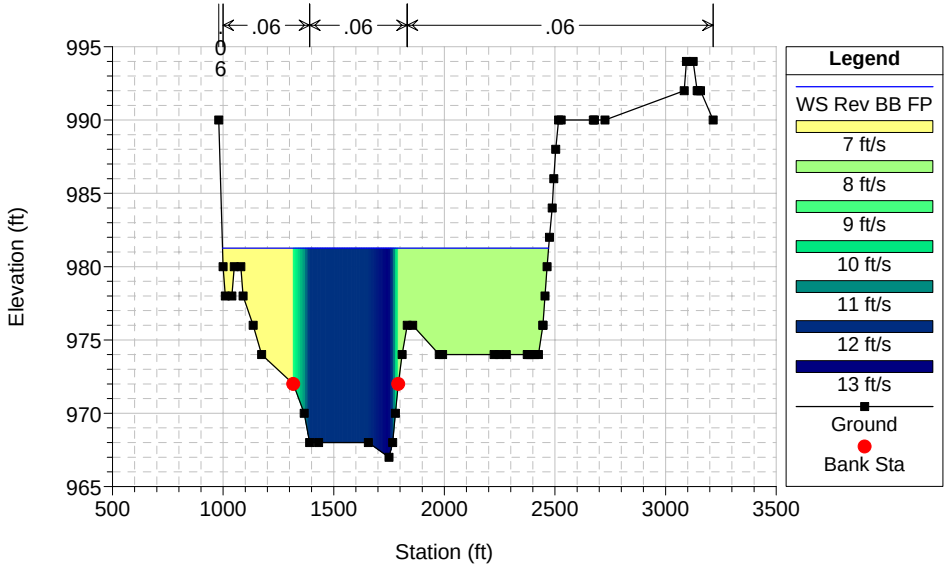
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 35515



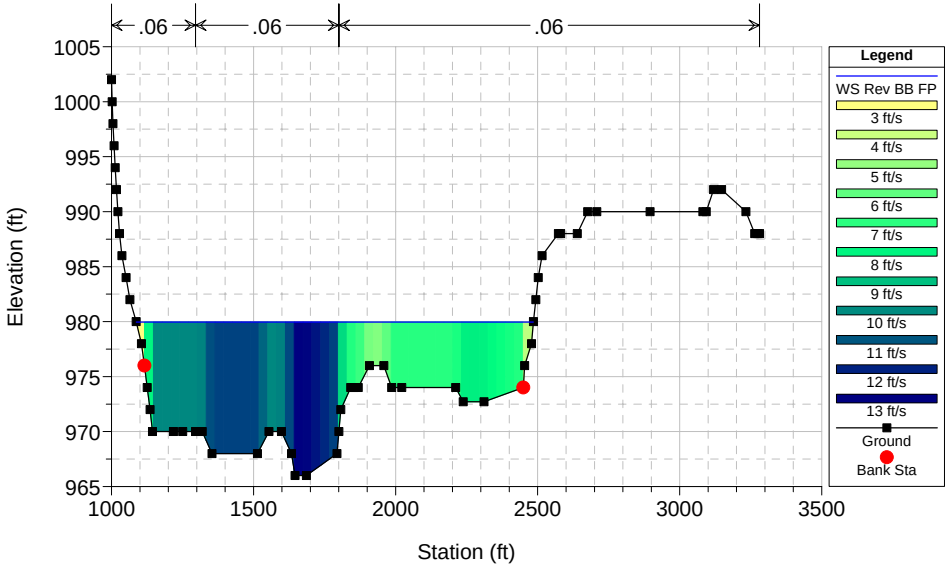
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 35245

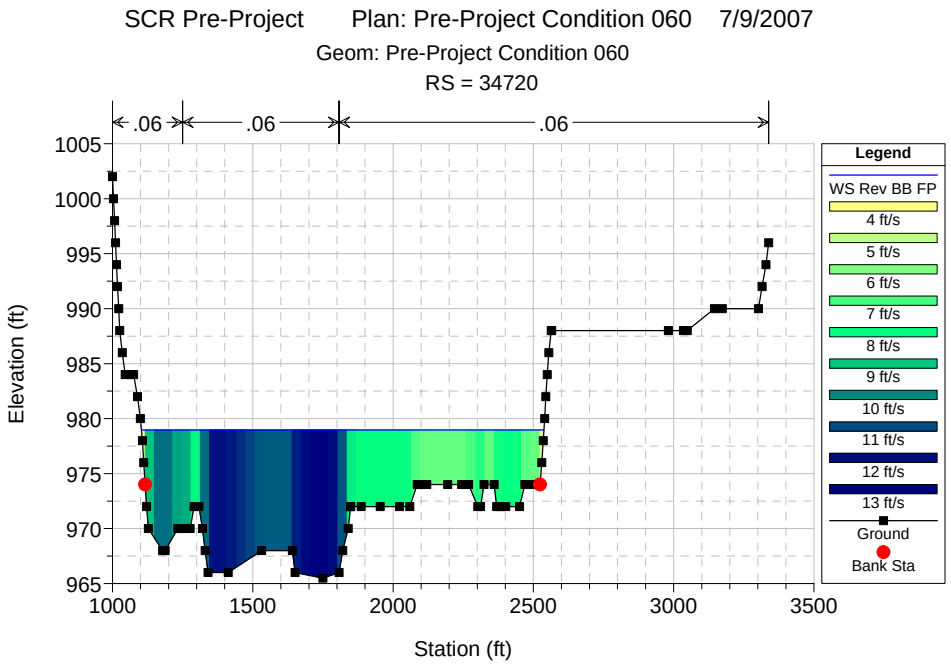


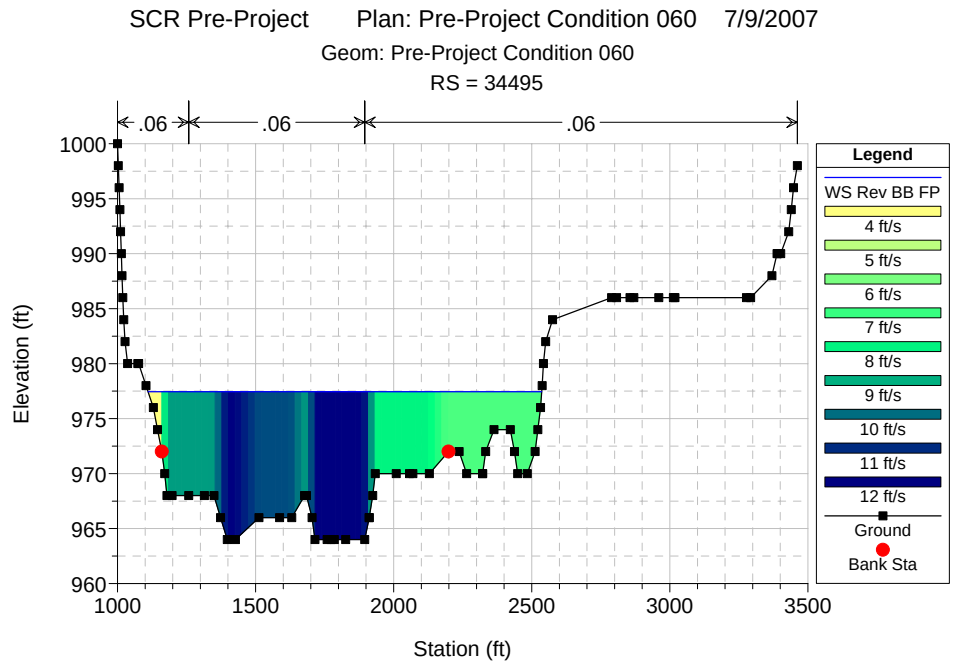
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 35040

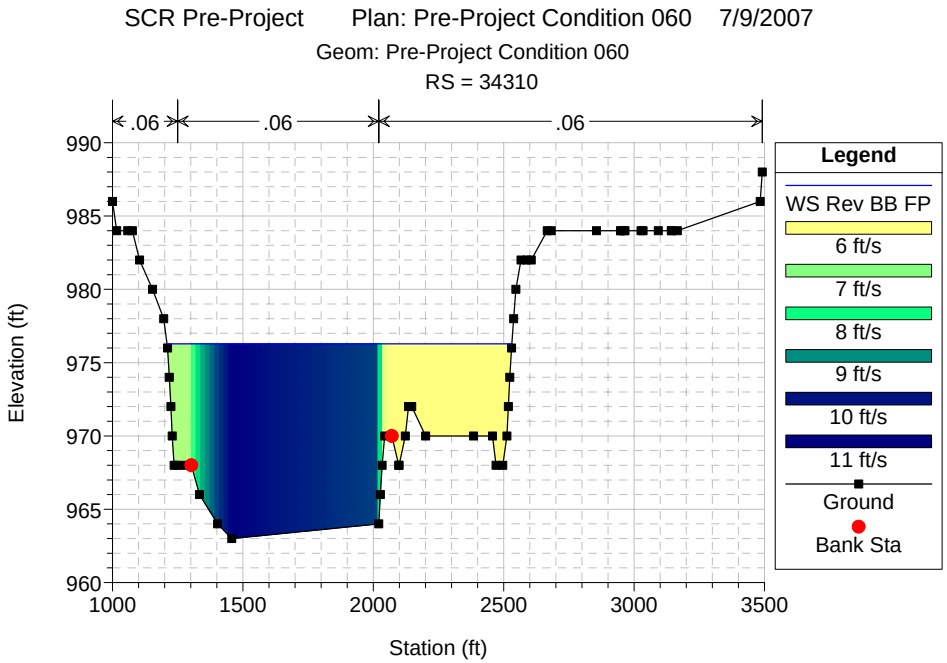


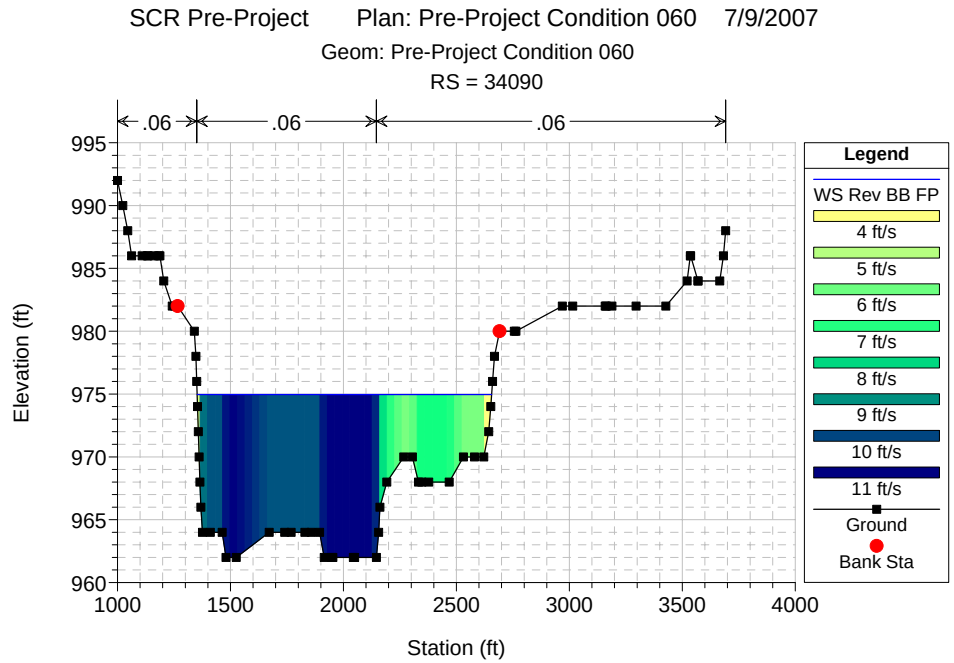
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 34860

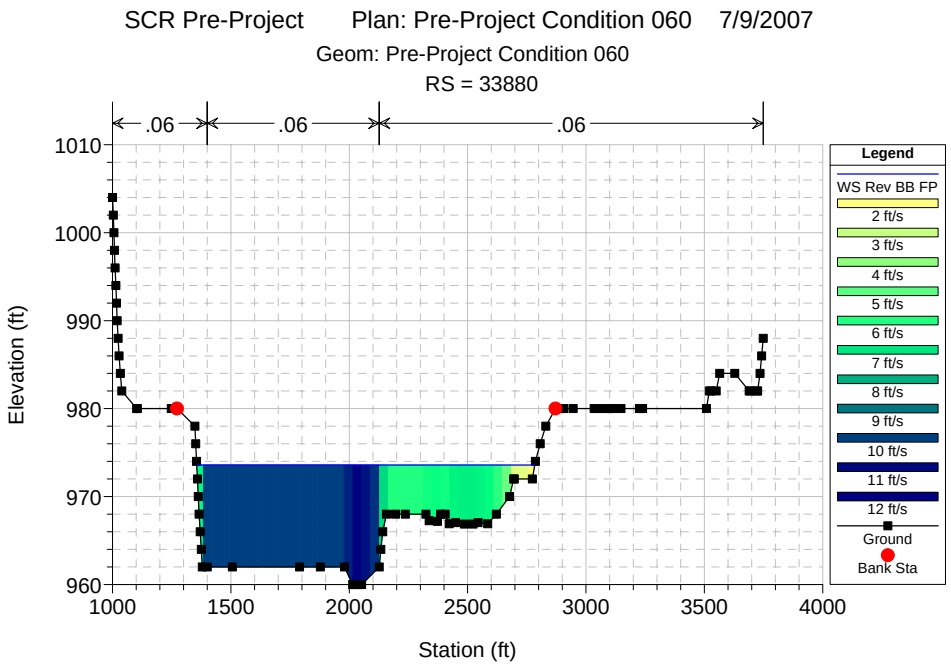


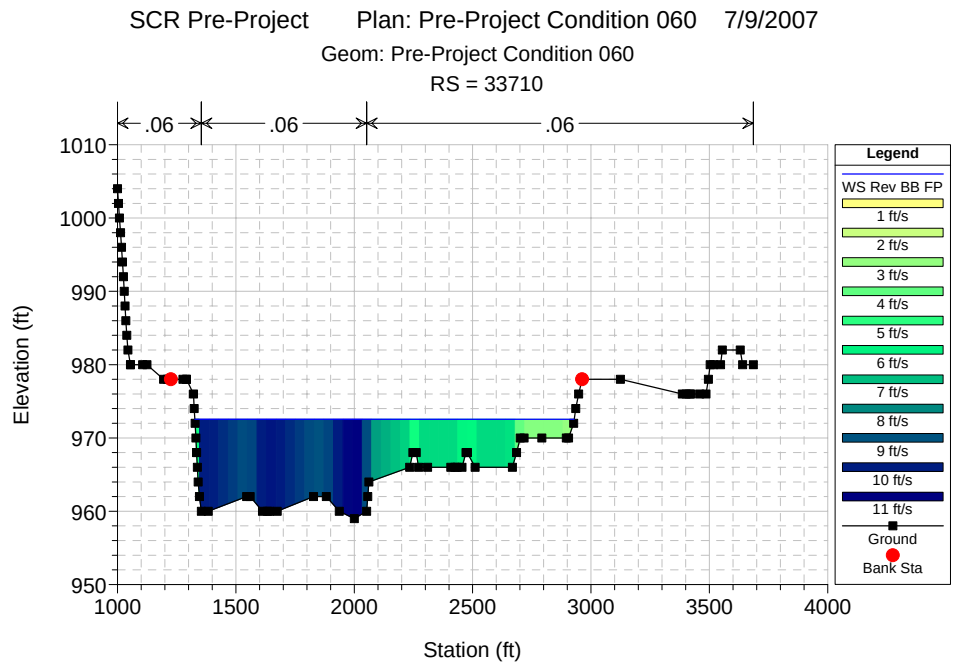

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 34720
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta

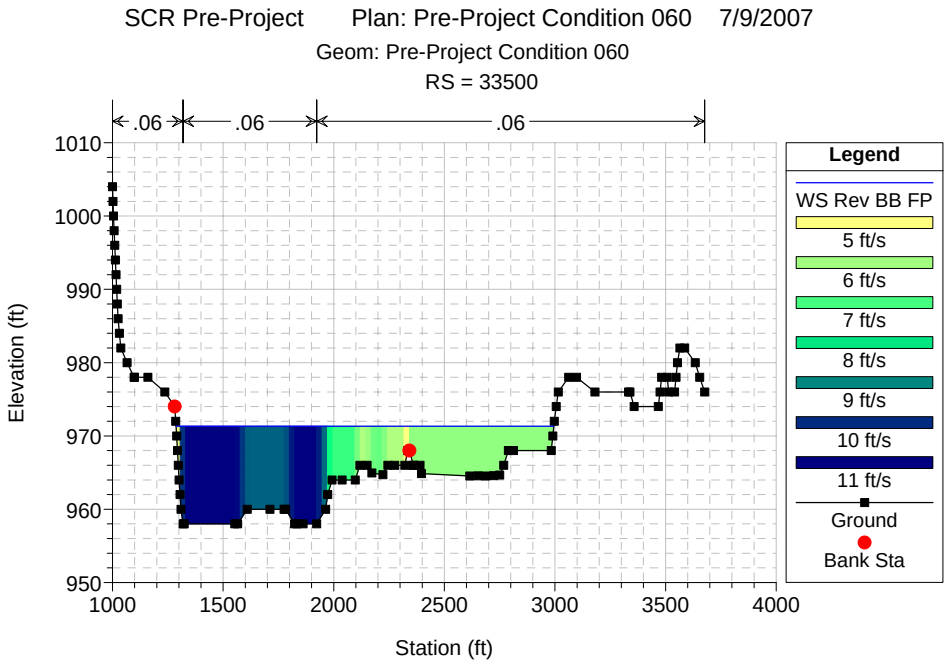

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 34495
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta

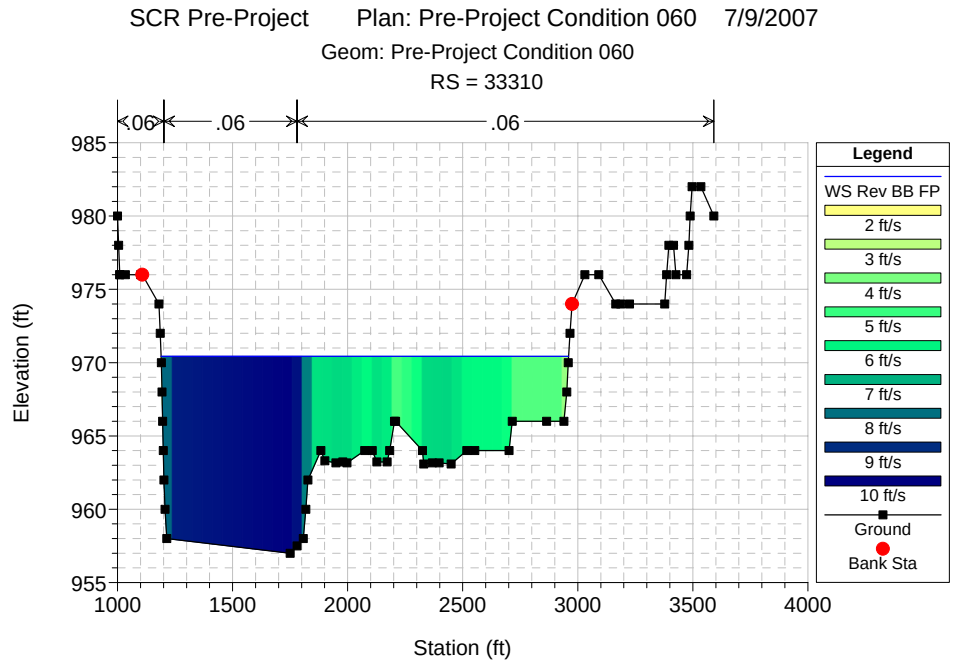

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 34310
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 34090
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta

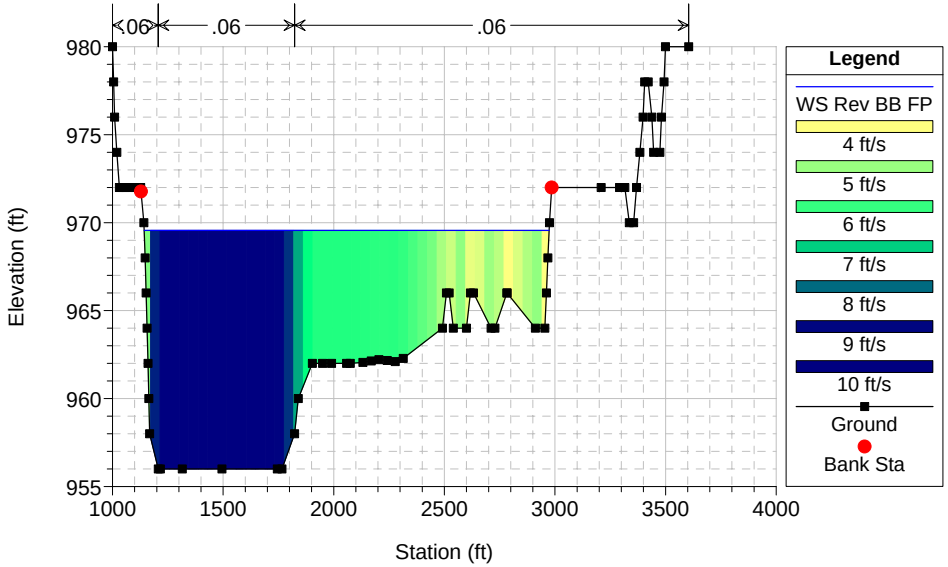

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 33880
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 33710
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta

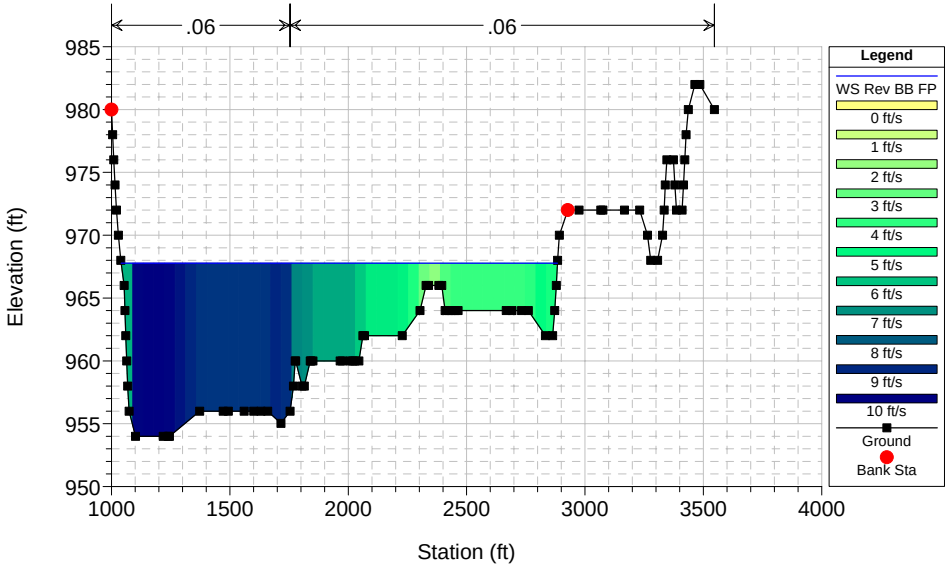

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 33500
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 33310
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta

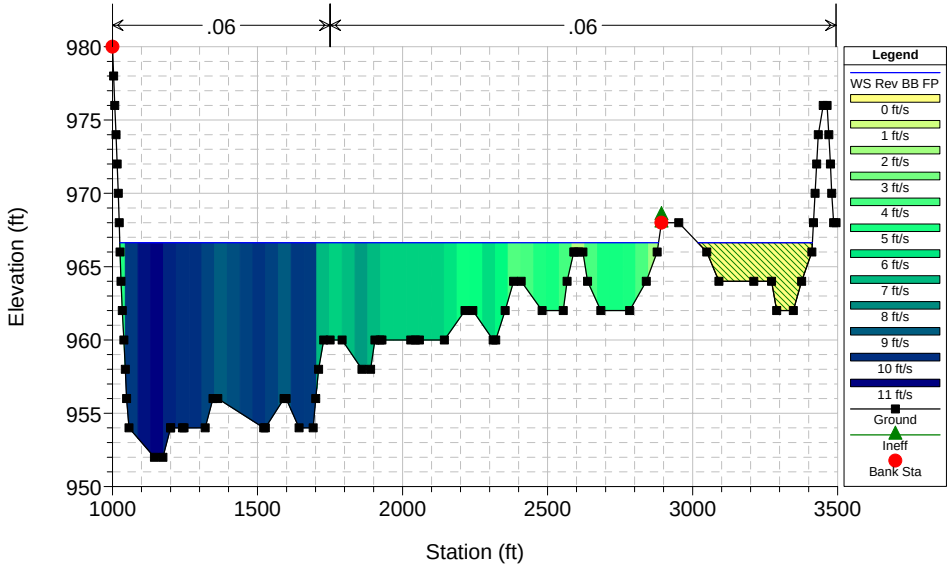
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 33115



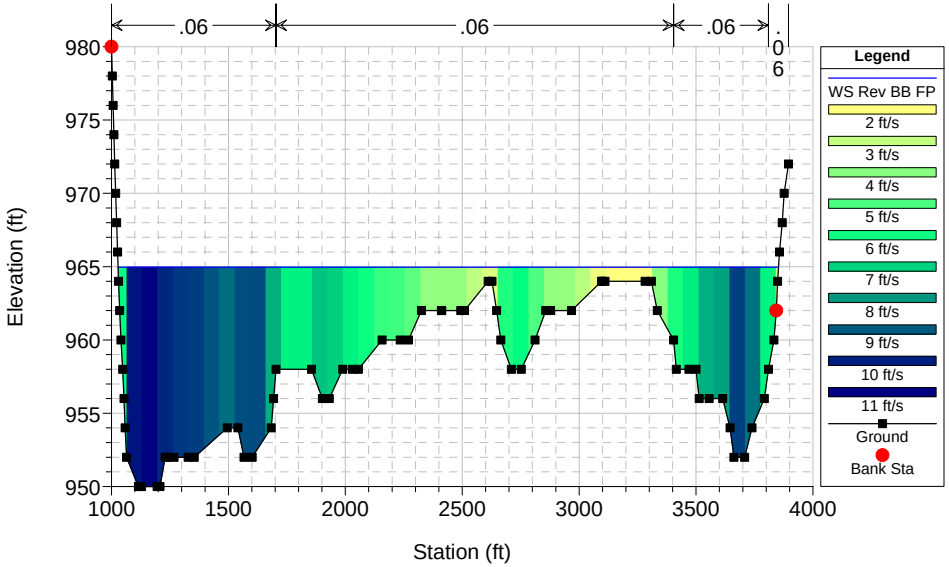
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 32795

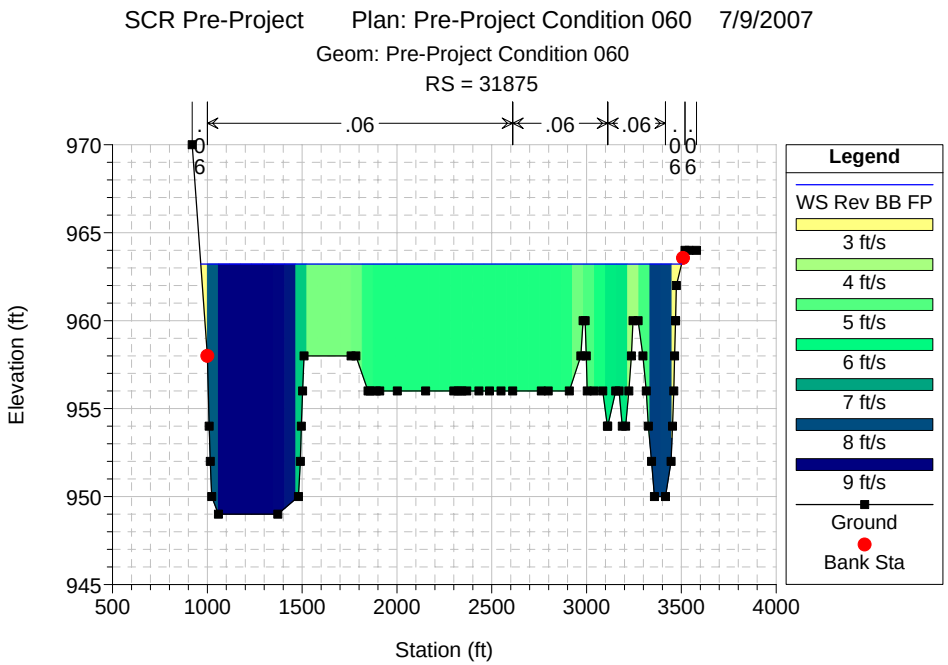


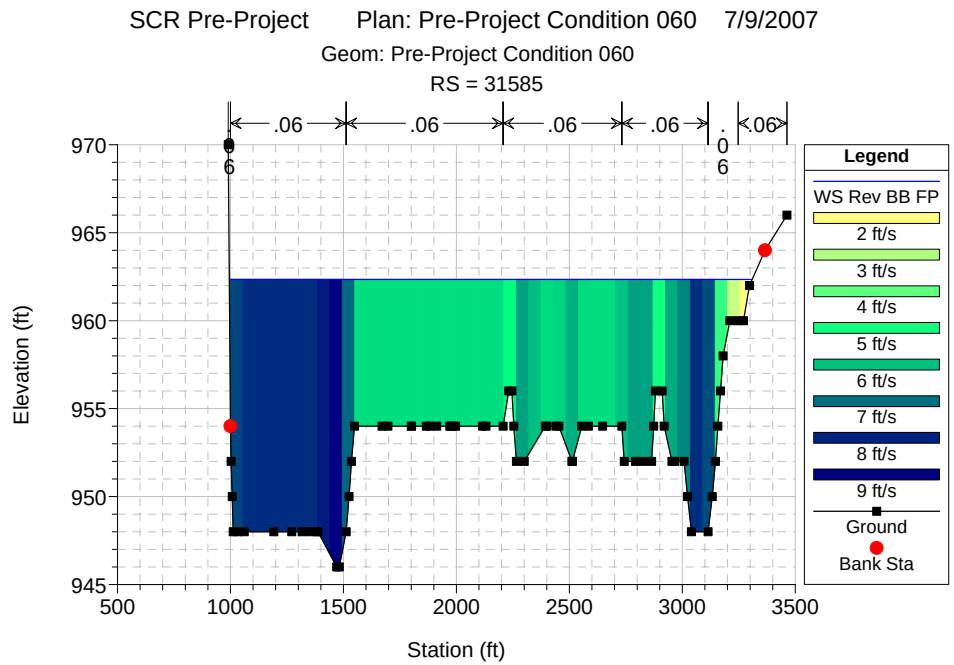
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 32605

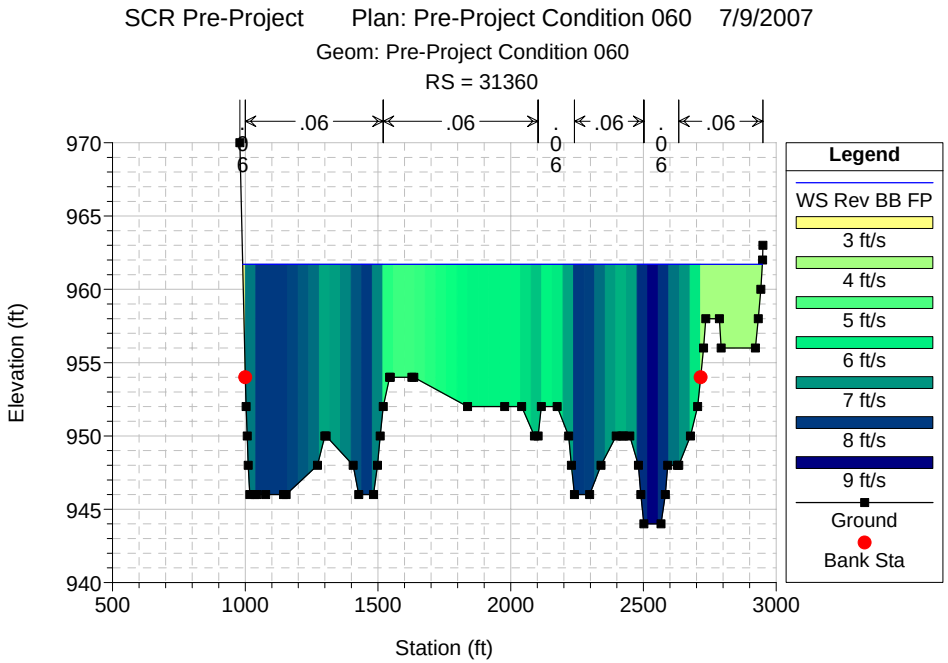


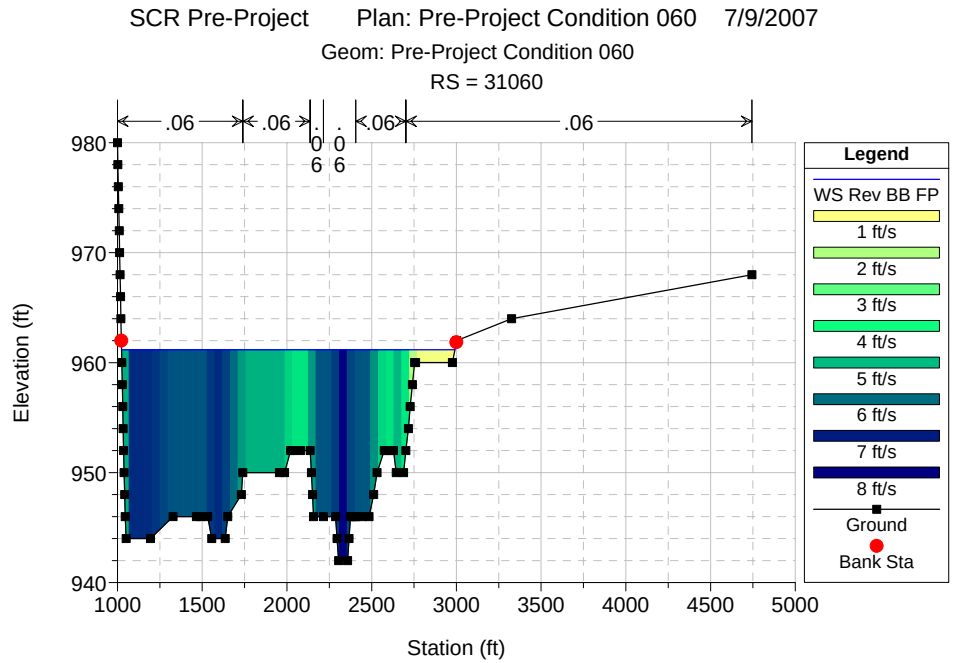
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 32265

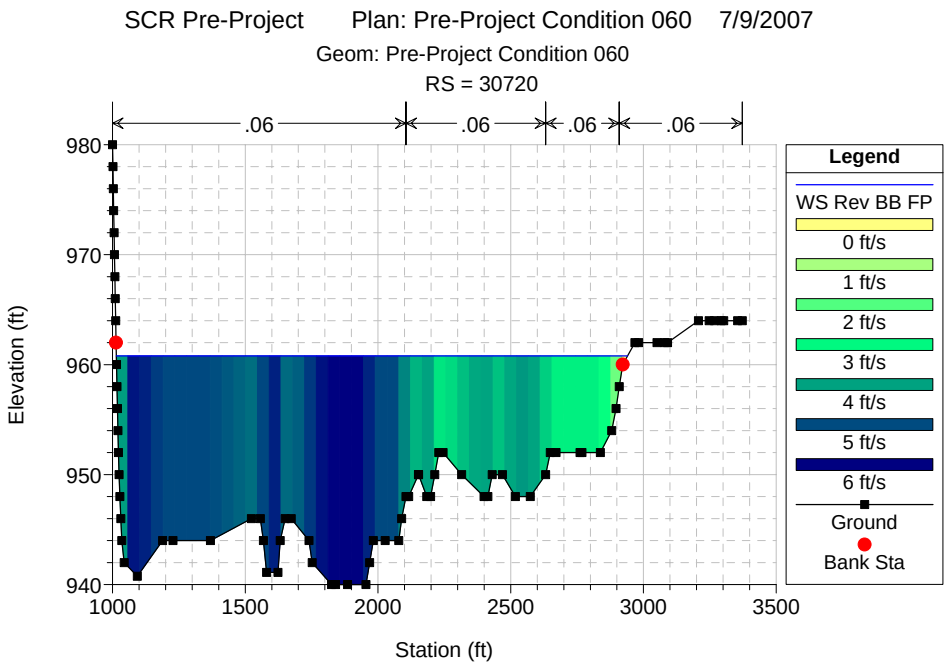


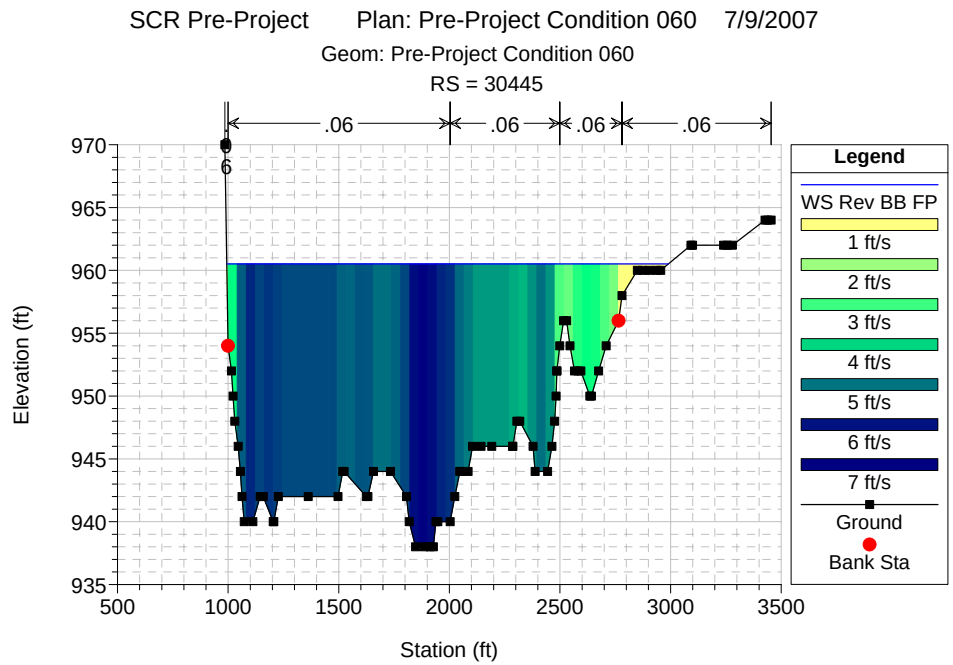

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 31875
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta

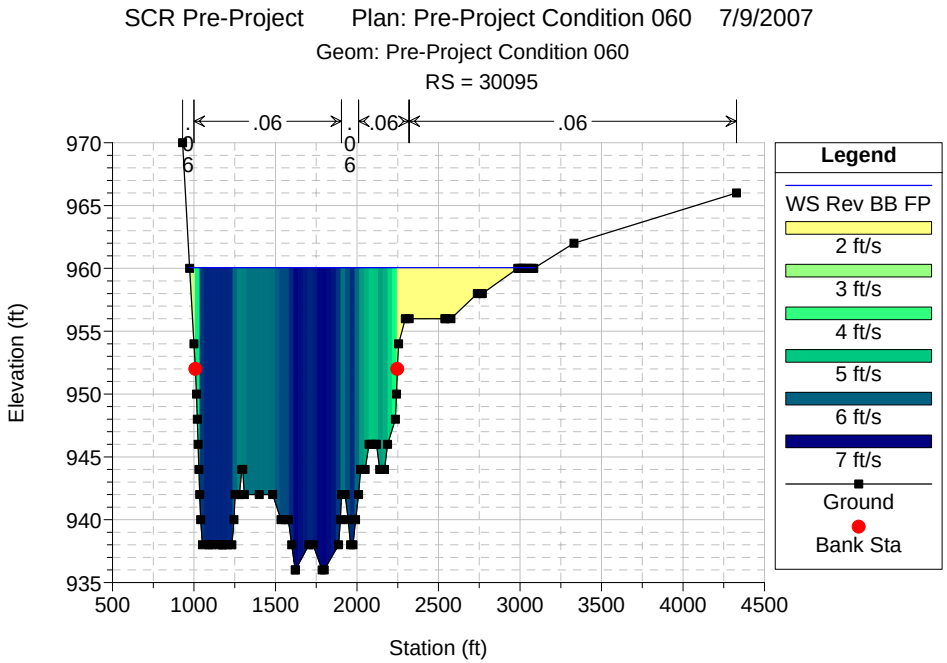

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 31585
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta

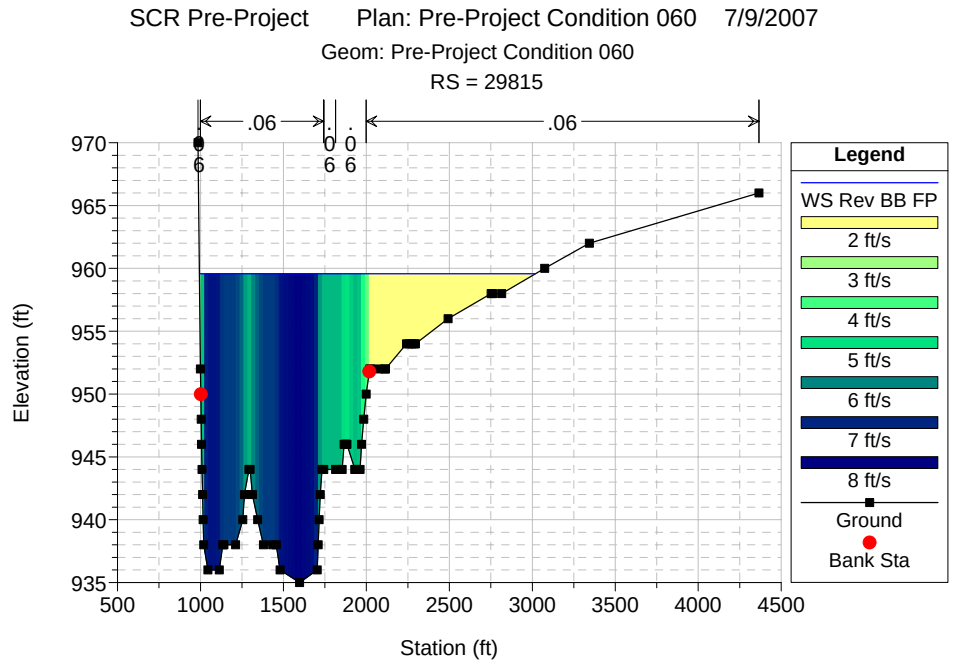

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 31360
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta

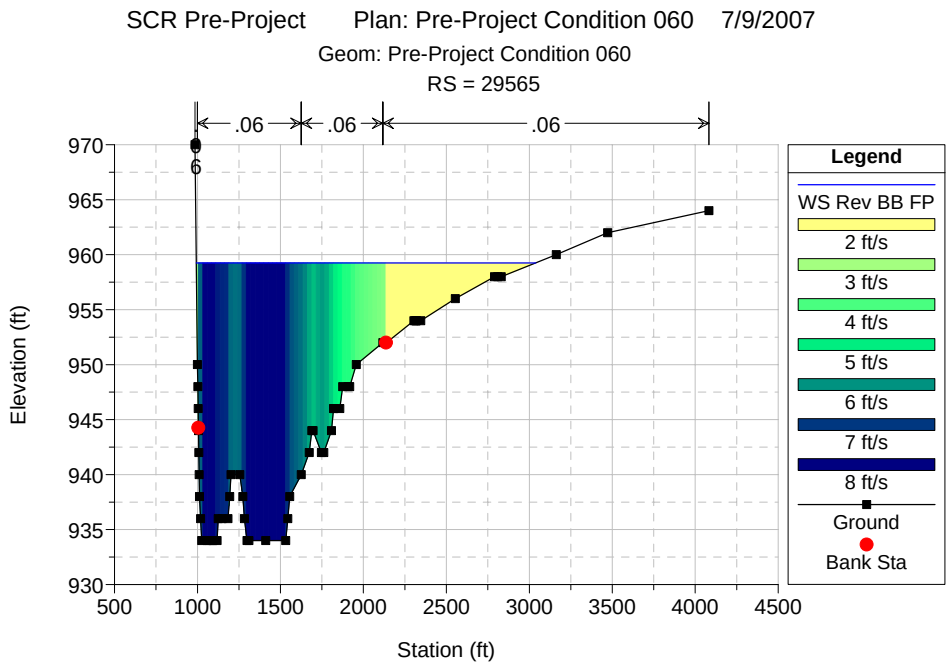

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 31060
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta

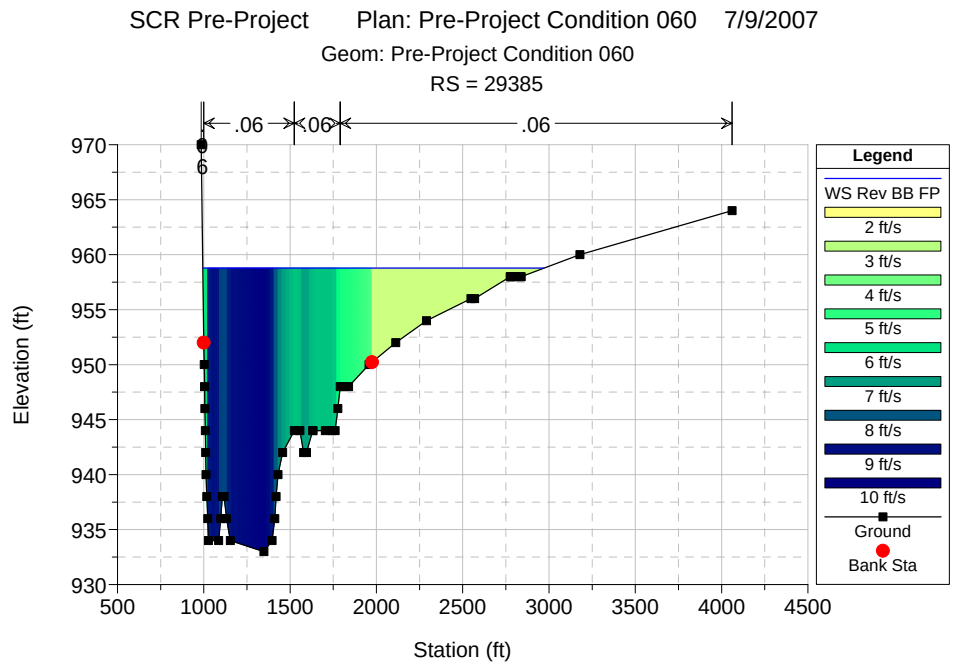

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 30720
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta

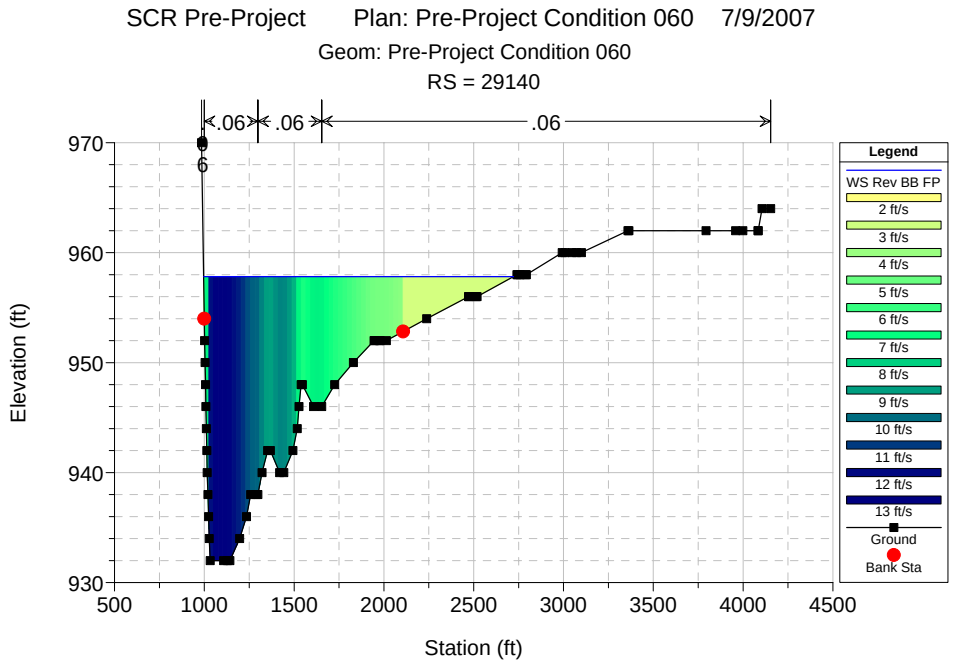

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 30445
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

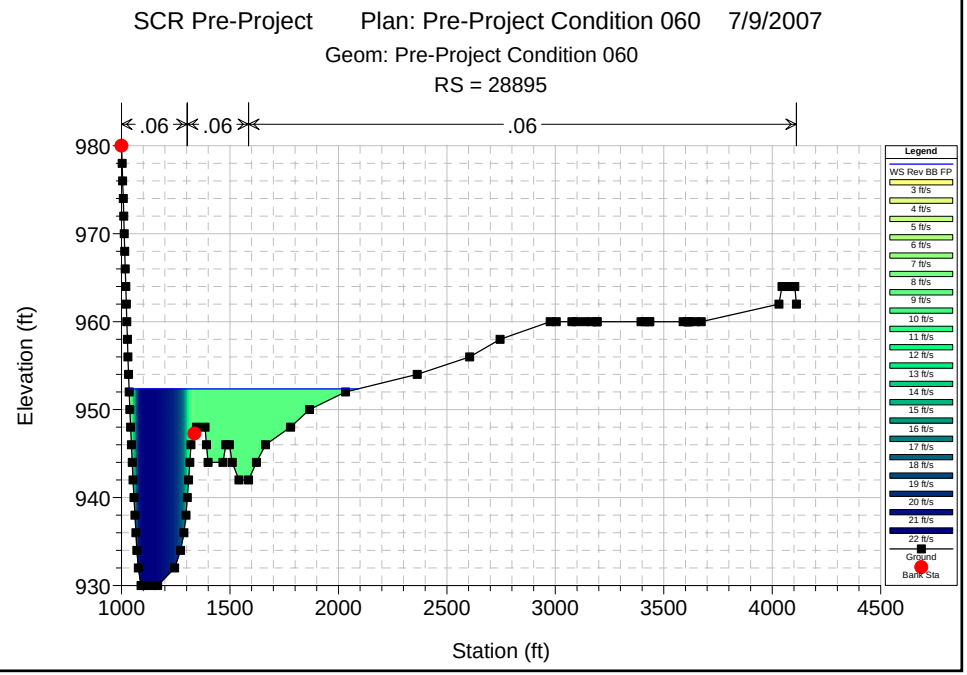

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 30095
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

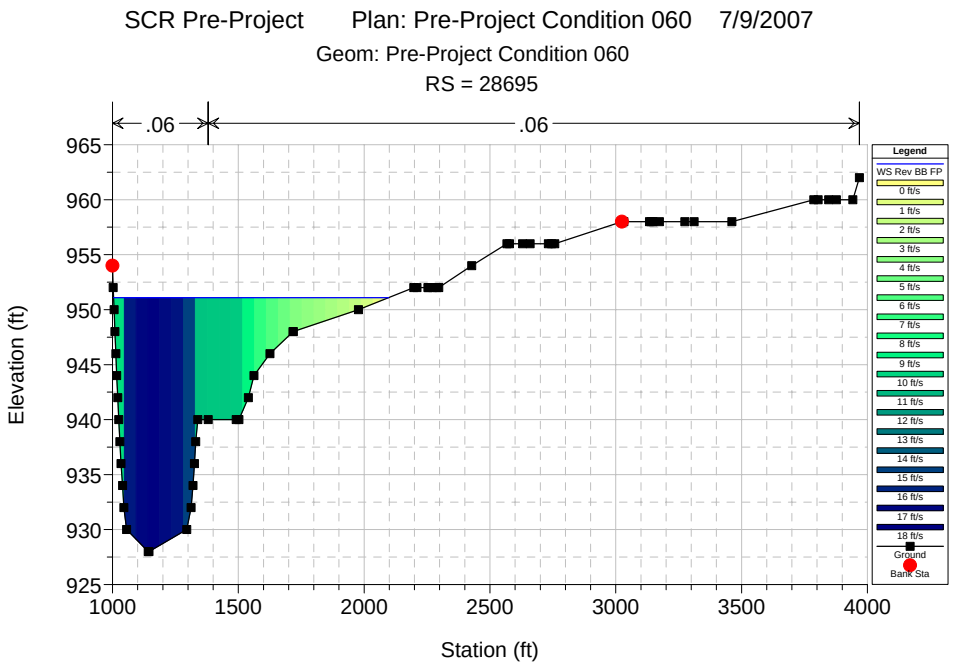

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 29815
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta

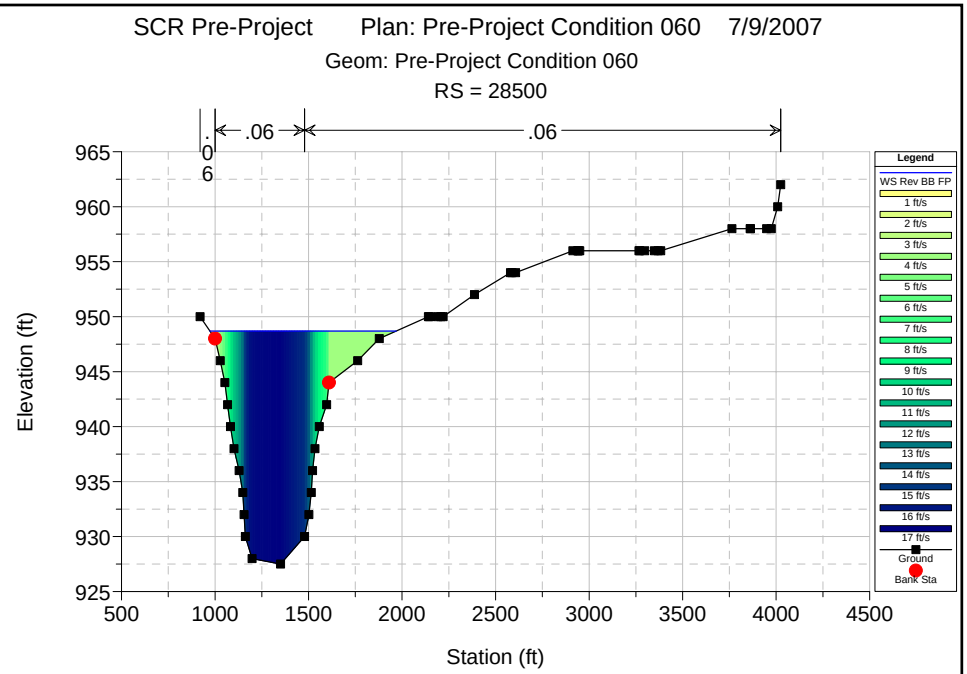

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 29565
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta

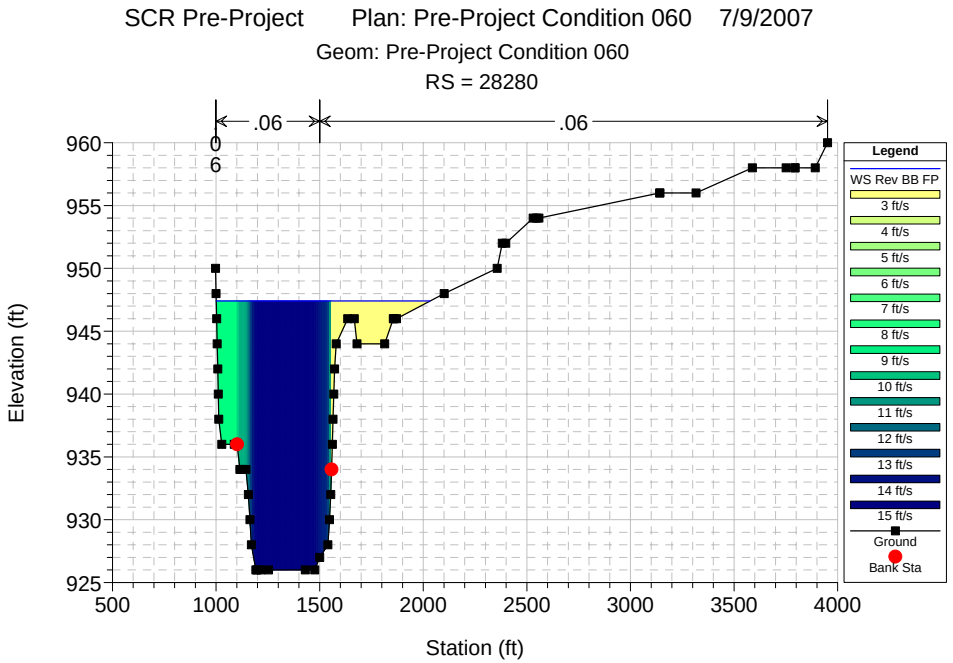

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 29385
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta

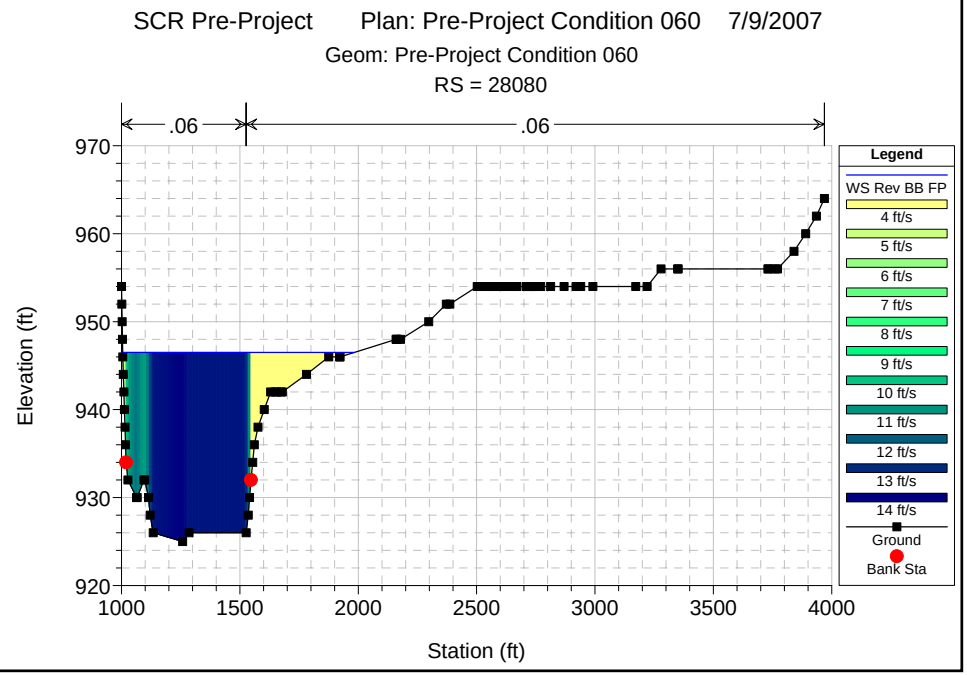

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 29140
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 28895
.06
.06
.06
Elevation (ft)
Station (ft)
Legend

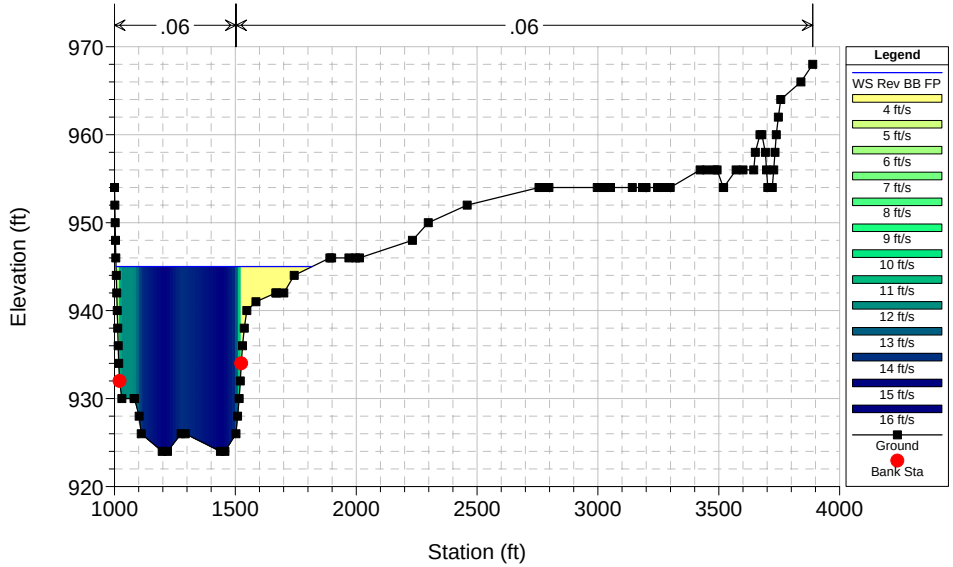

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 28695
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 28500
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
Ground
Bank Sta

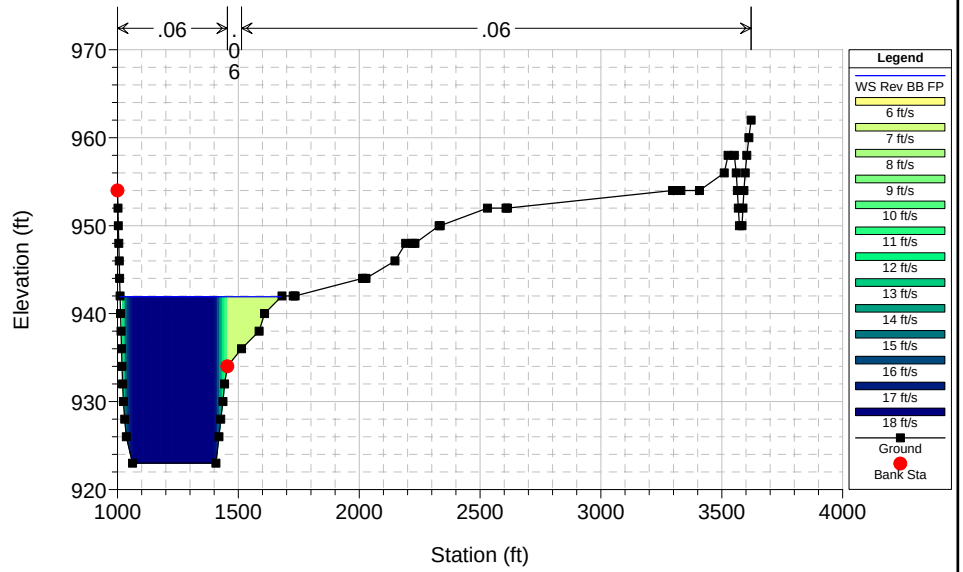

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 28280
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 28080
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
Ground
Bank Sta

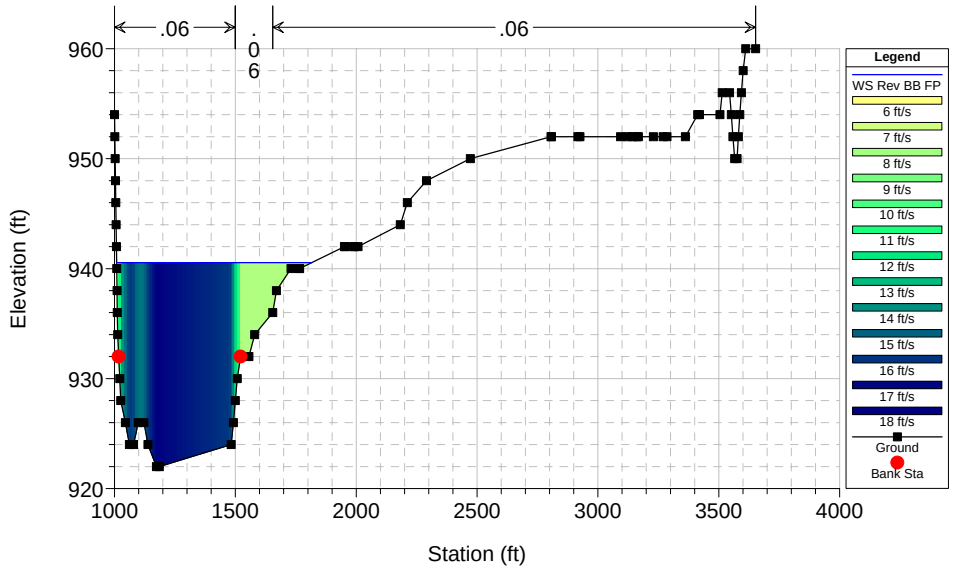
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 27925



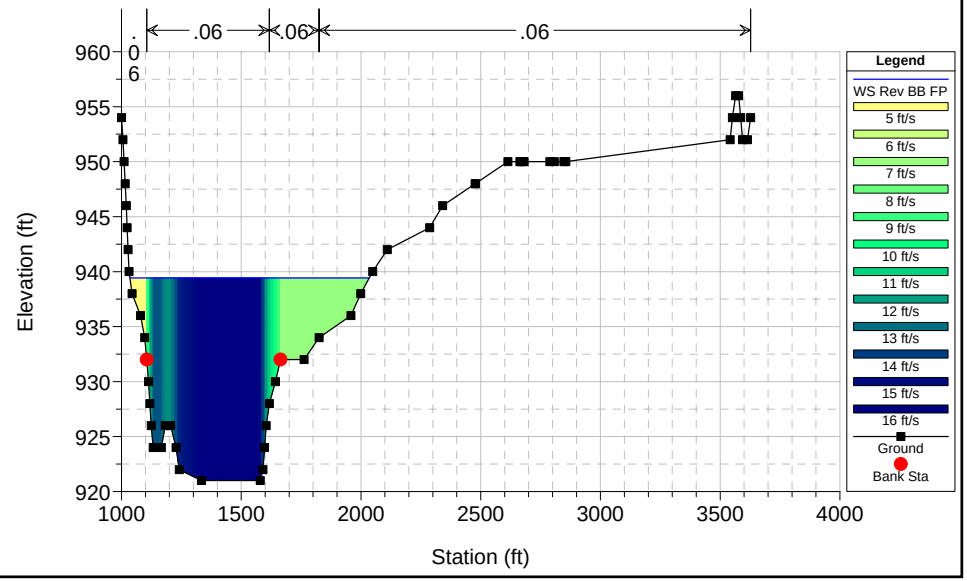
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 27725



SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 27545



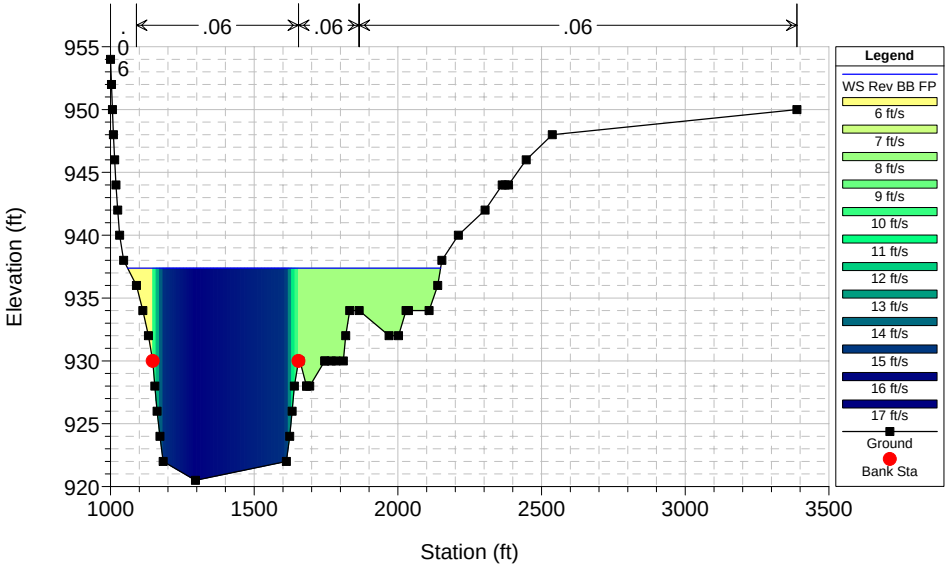
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 27335



SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007

Geom: Pre-Project Condition 060

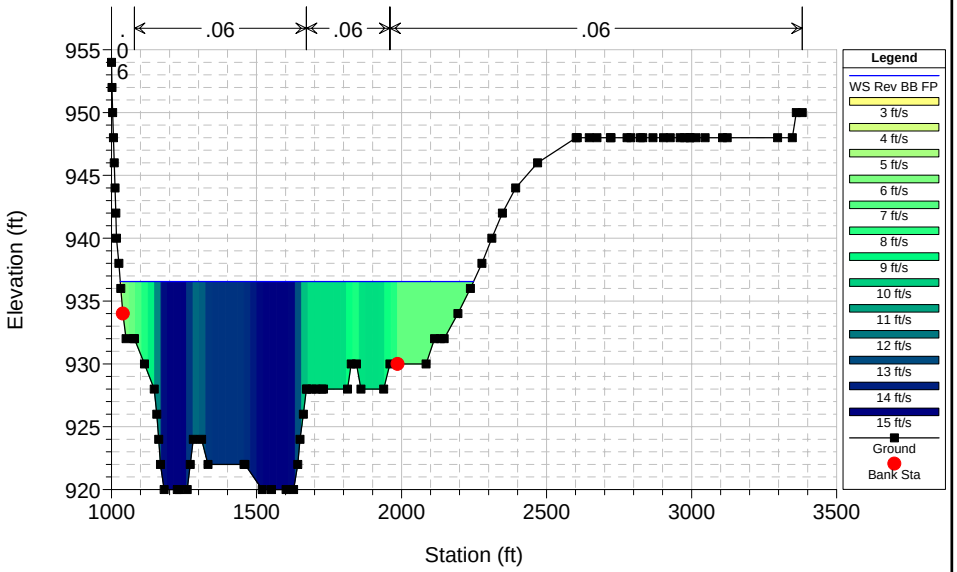
RS = 27155



SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007

Geom: Pre-Project Condition 060

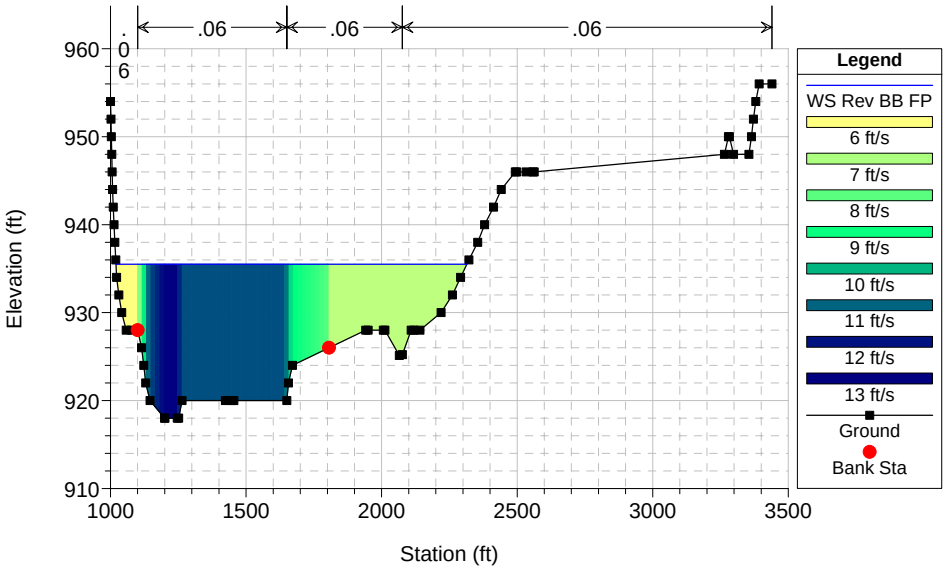
RS = 26990



SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007

Geom: Pre-Project Condition 060

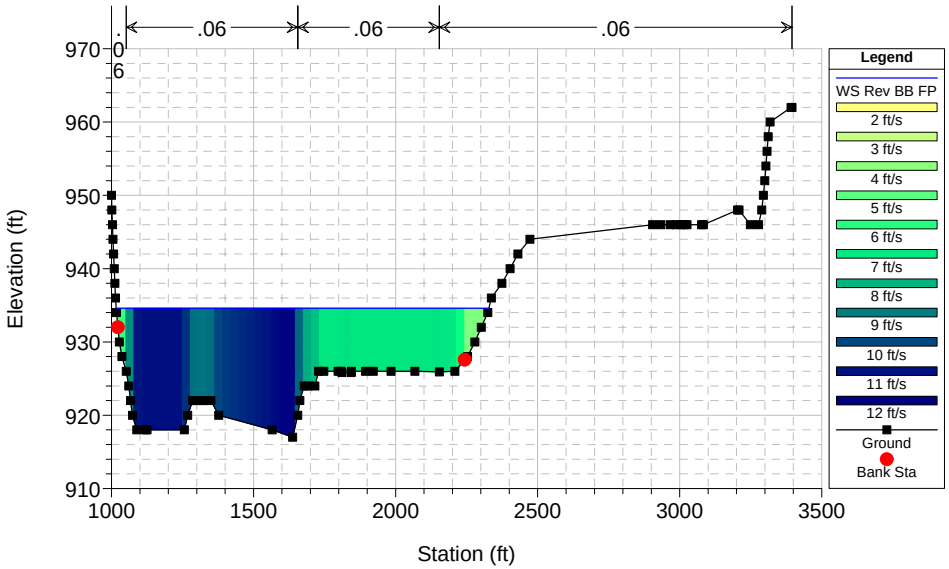
RS = 26780

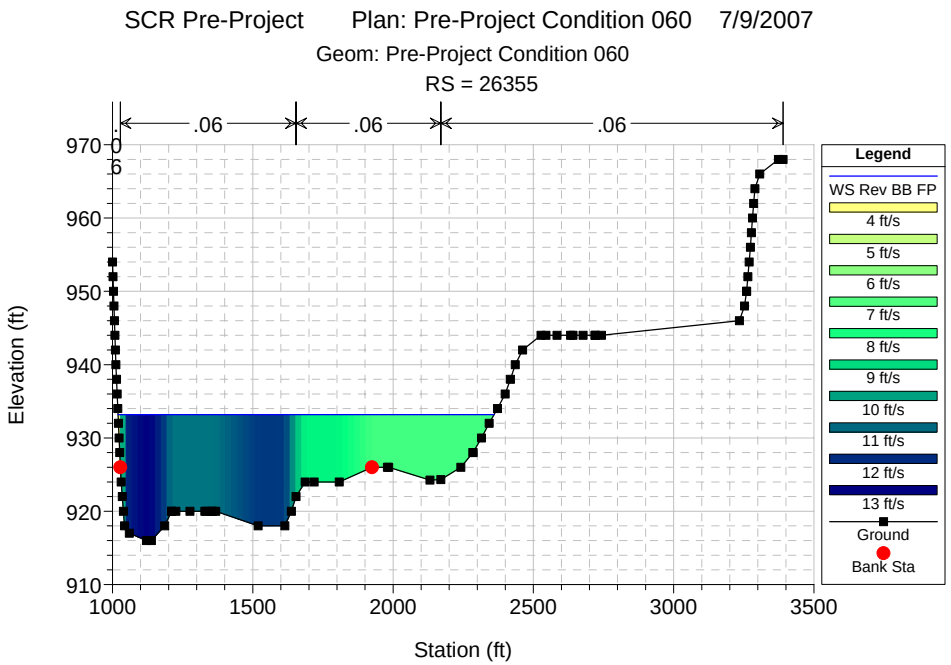


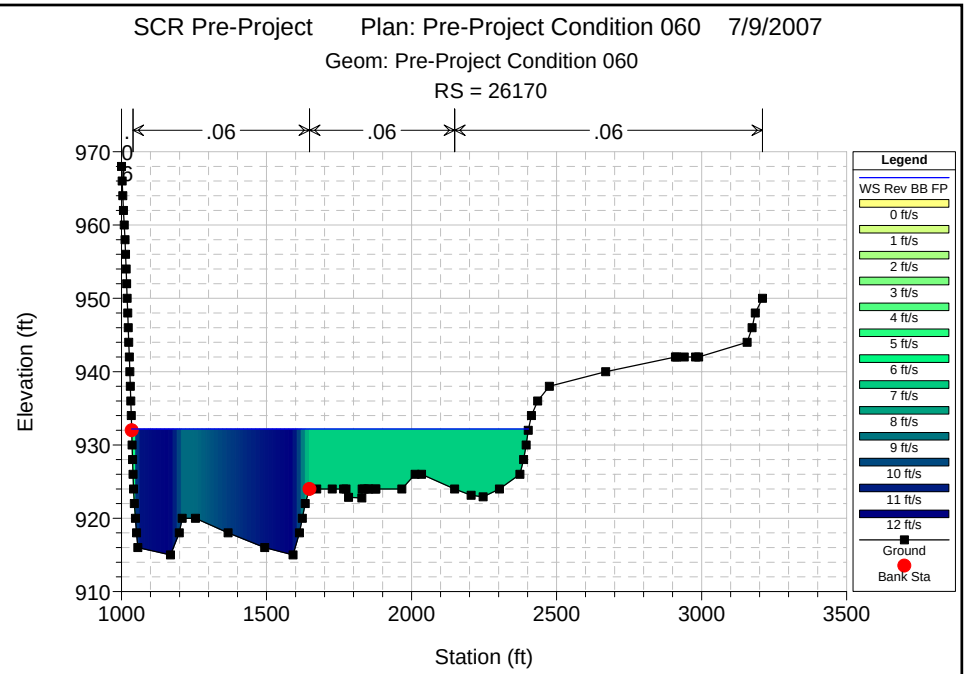
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007

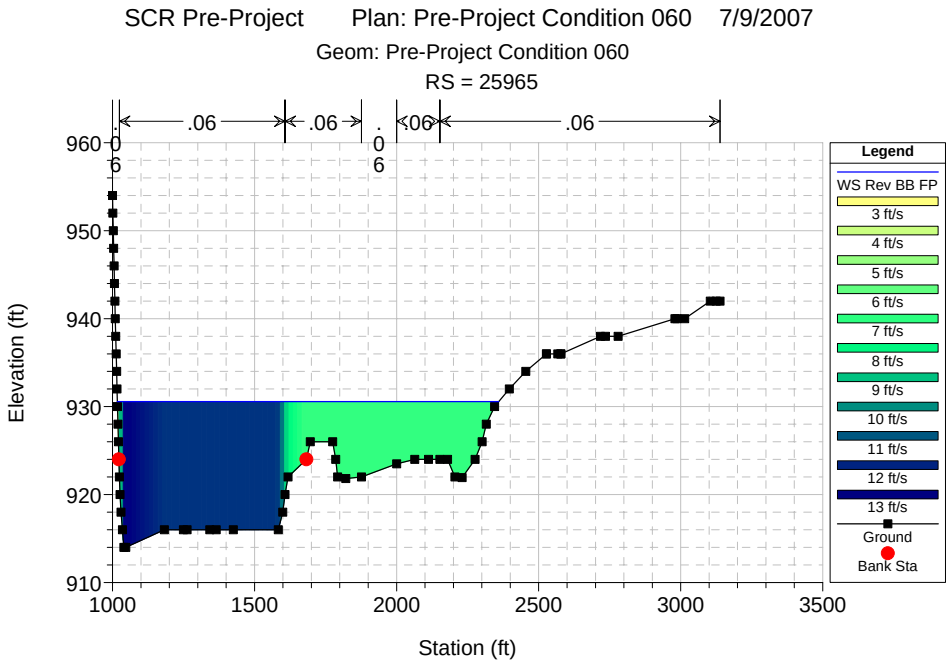
Geom: Pre-Project Condition 060

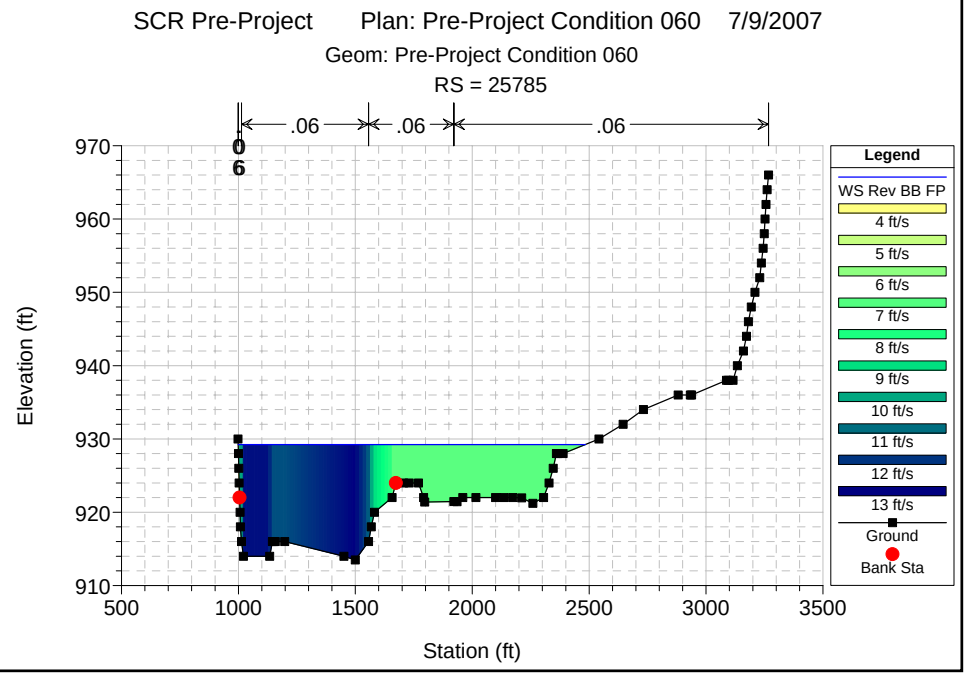
RS = 26575

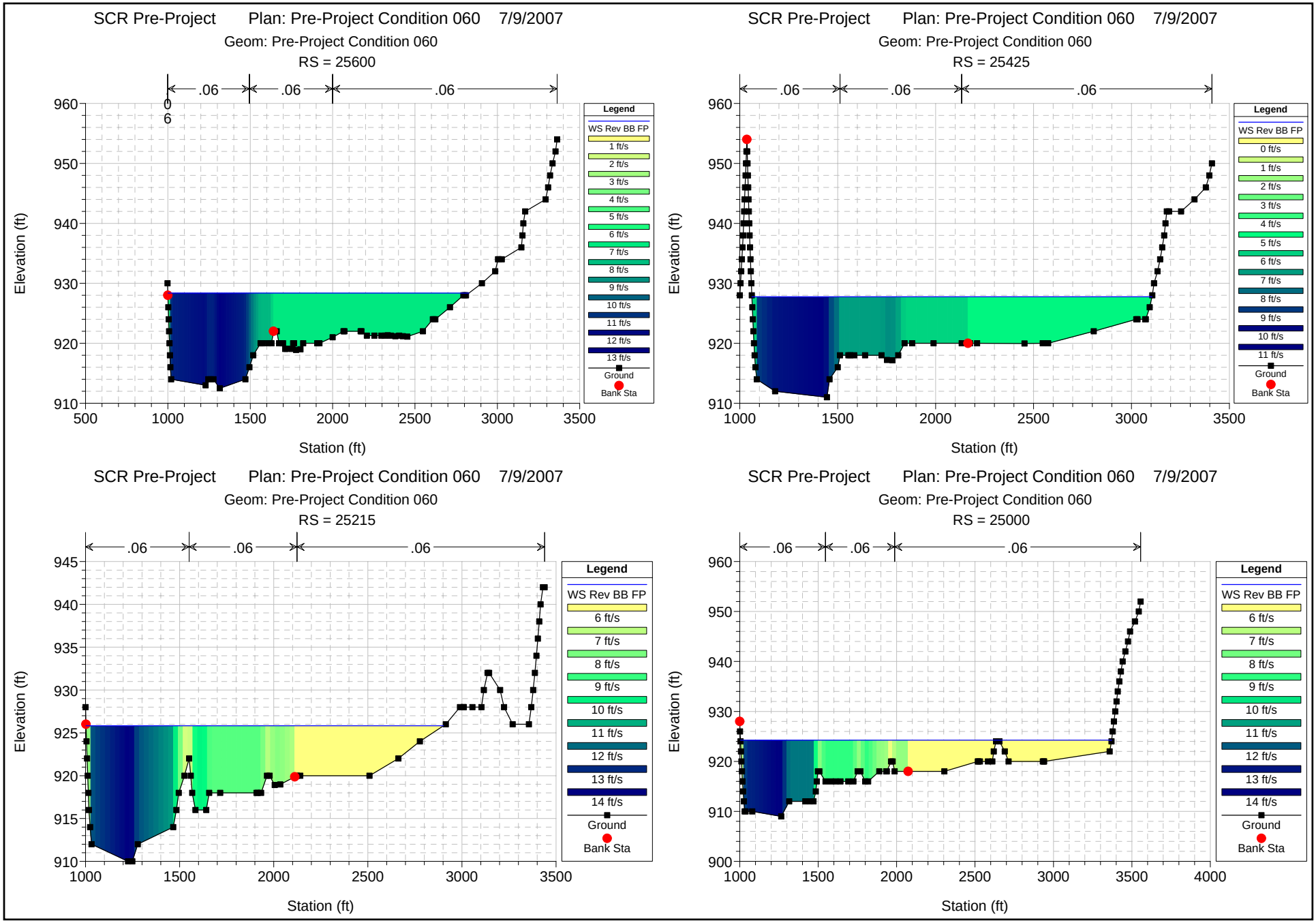


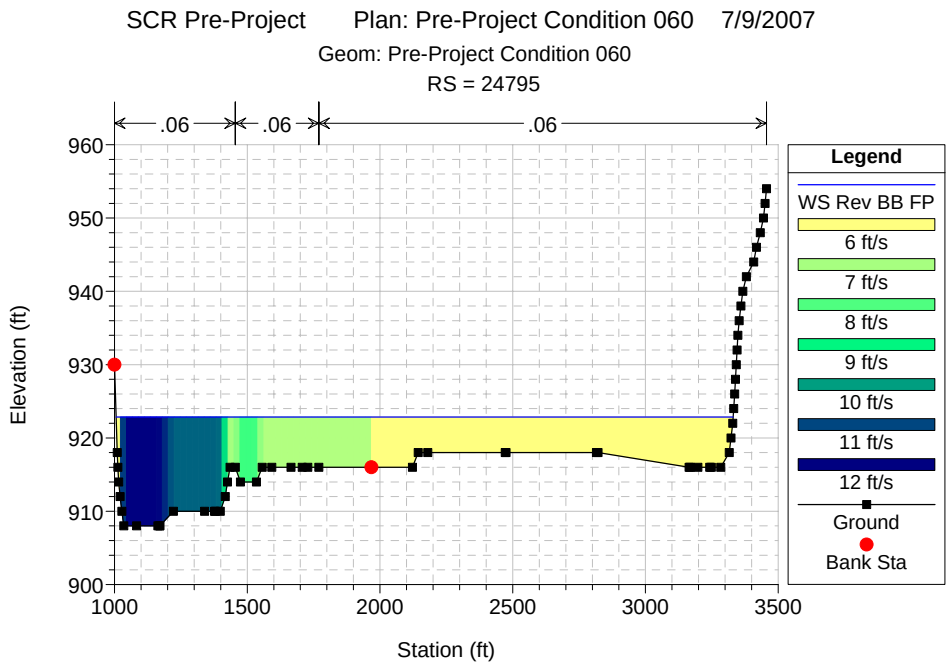

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 26355
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 26170
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 25965
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 25785
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 25600
.06 .06 .06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 25425
.06 .06 .06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 25215
.06 .06 .06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
Ground
Bank Sta
SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 25000
.06 .06 .06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
Ground
Bank Sta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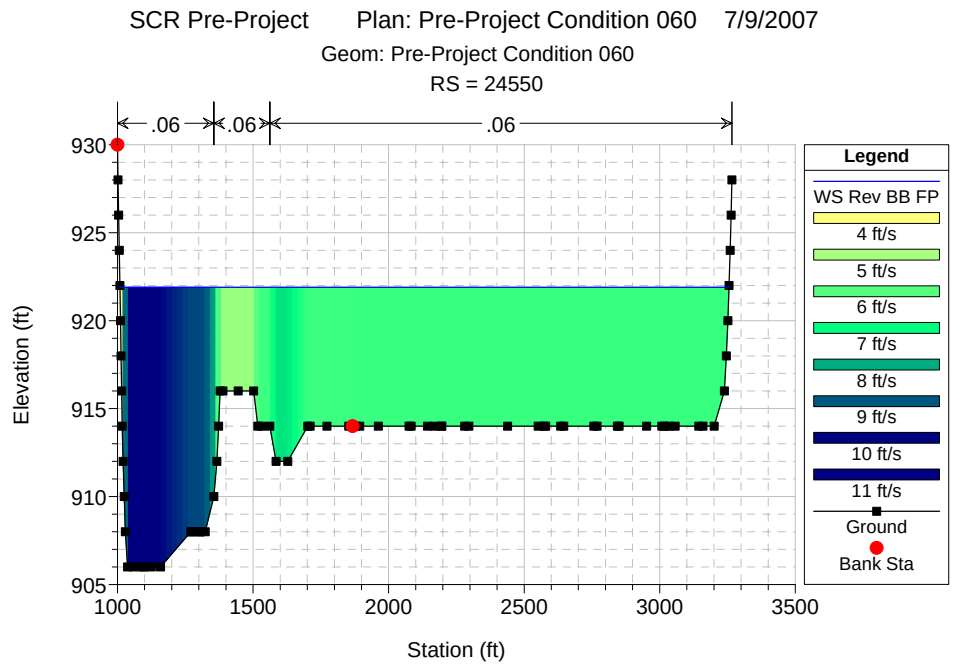
Geom: Pre-Project Condition 060
RS = 24795
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta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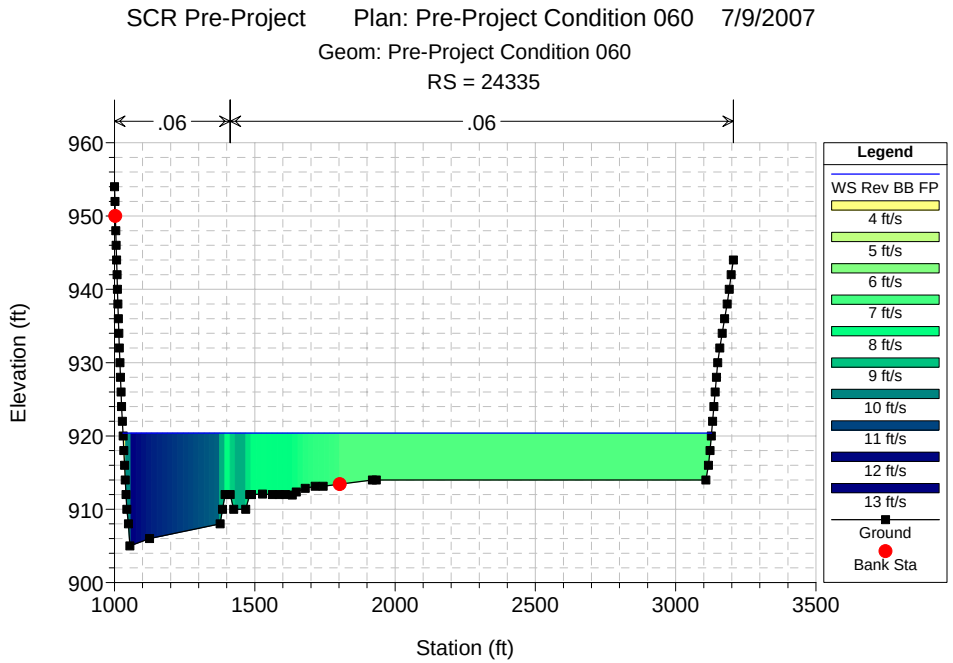
Geom: Pre-Project Condition 060
RS = 24550
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta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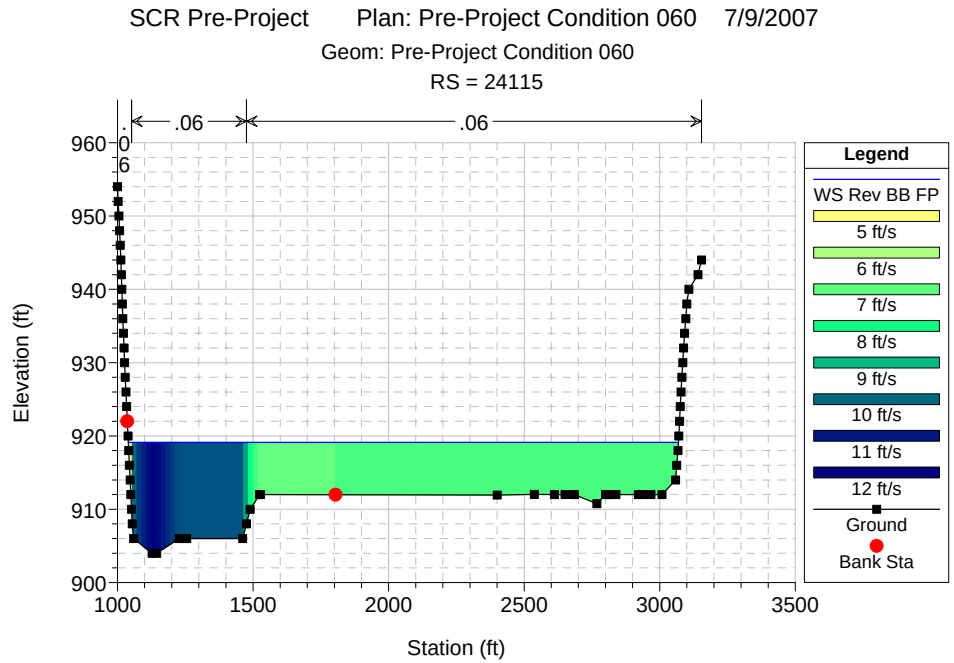
Geom: Pre-Project Condition 060
RS = 24335
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta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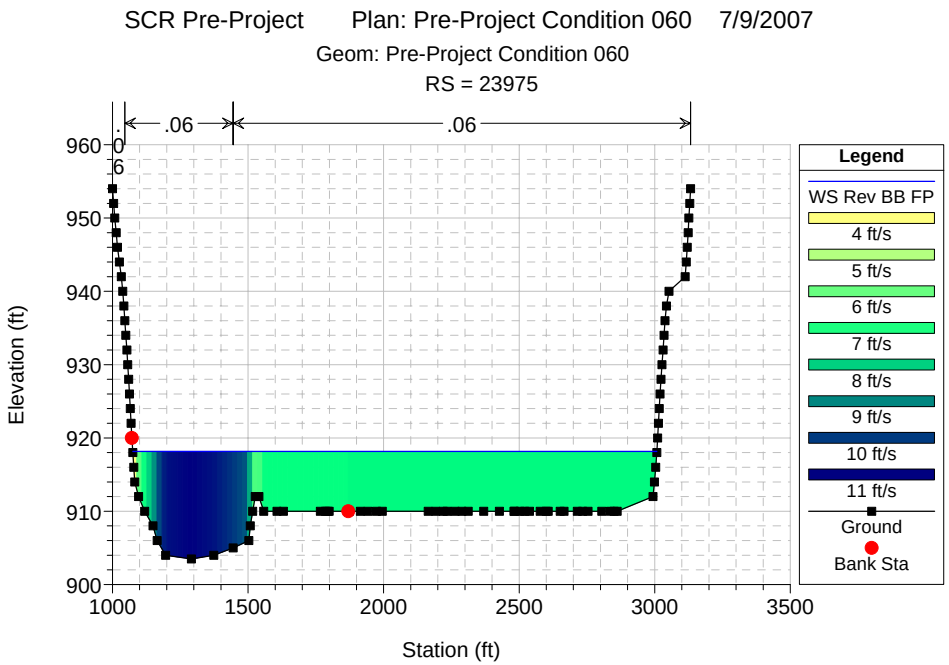
Geom: Pre-Project Condition 060
RS = 24115
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta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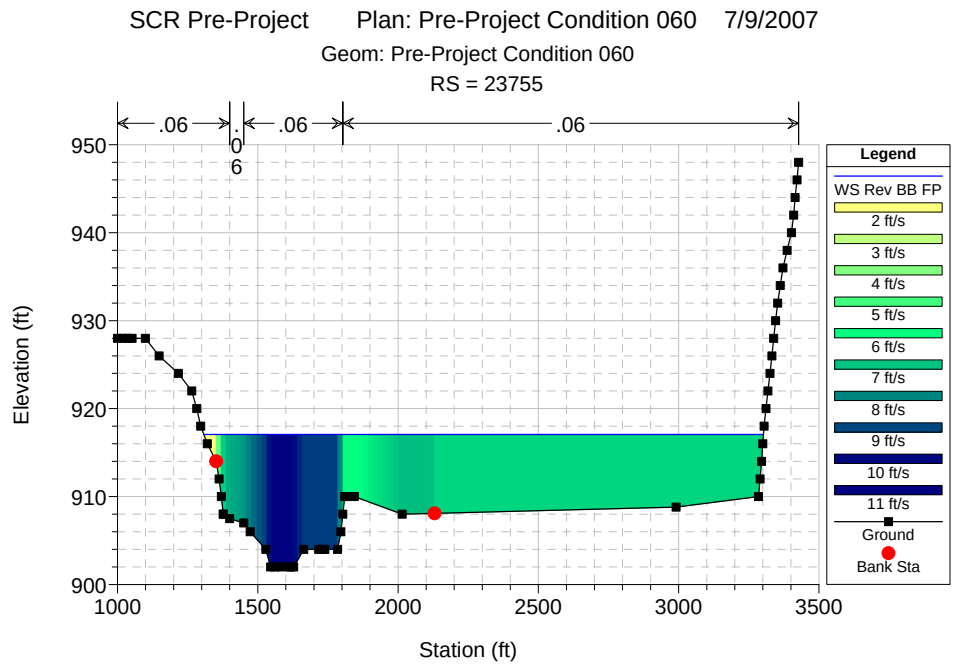
Geom: Pre-Project Condition 060
RS = 23975
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta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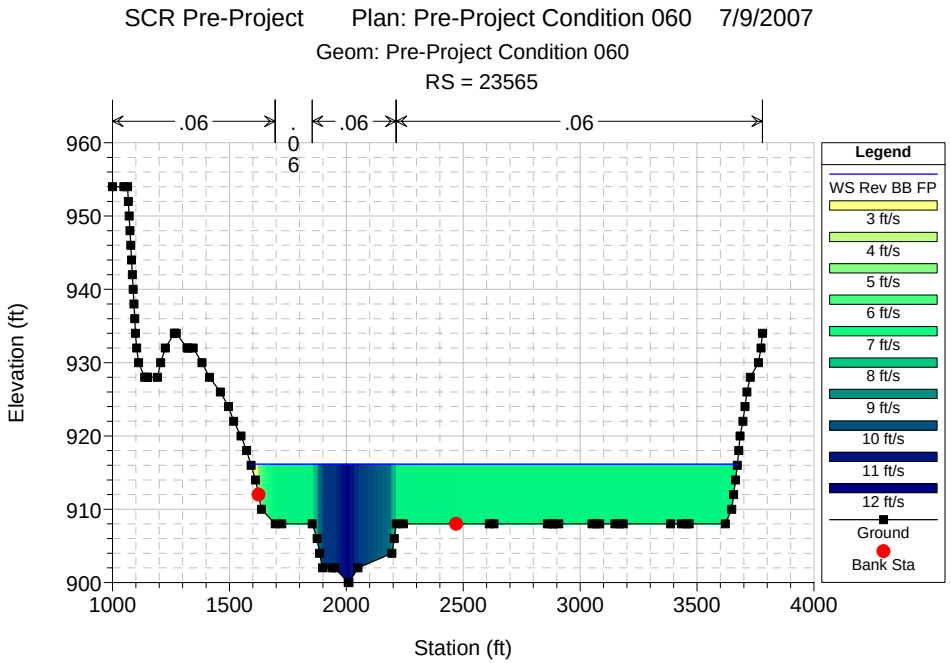
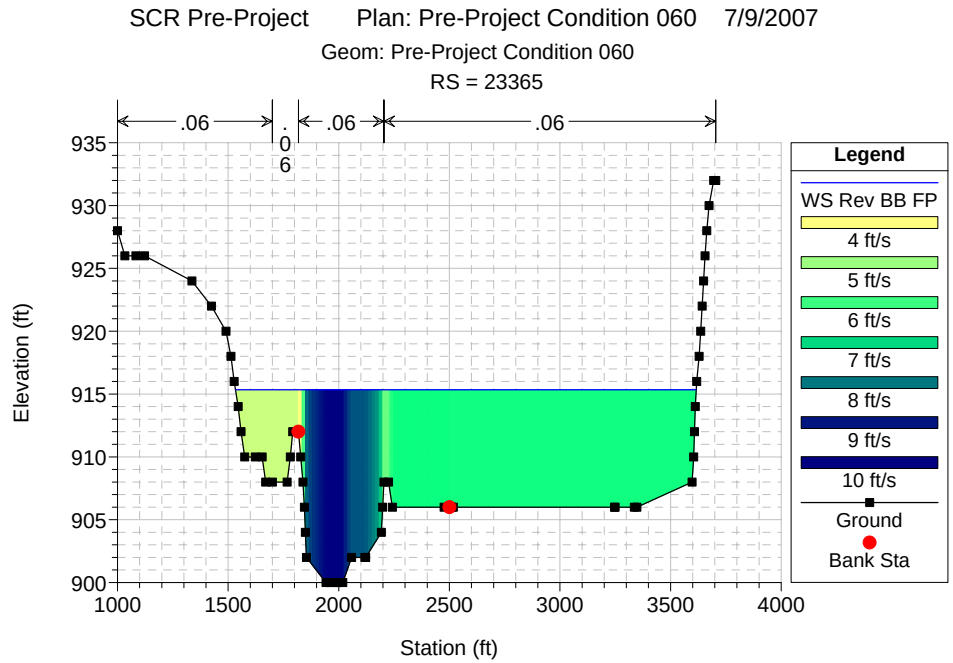
Geom: Pre-Project Condition 060
RS = 23755
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 23565
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta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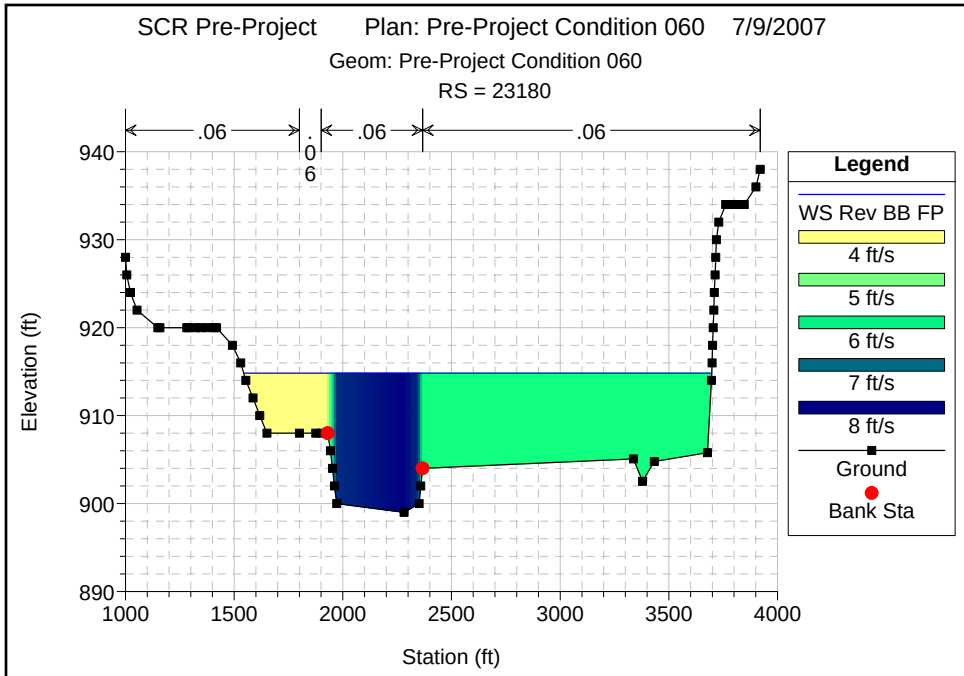
Geom: Pre-Project Condition 060
RS = 23365
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta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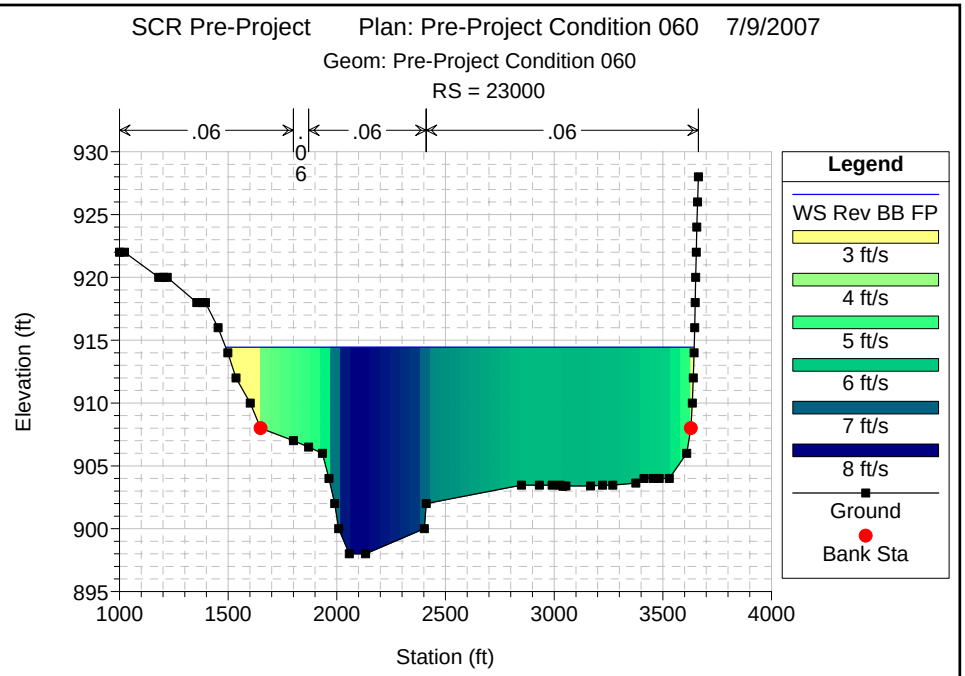
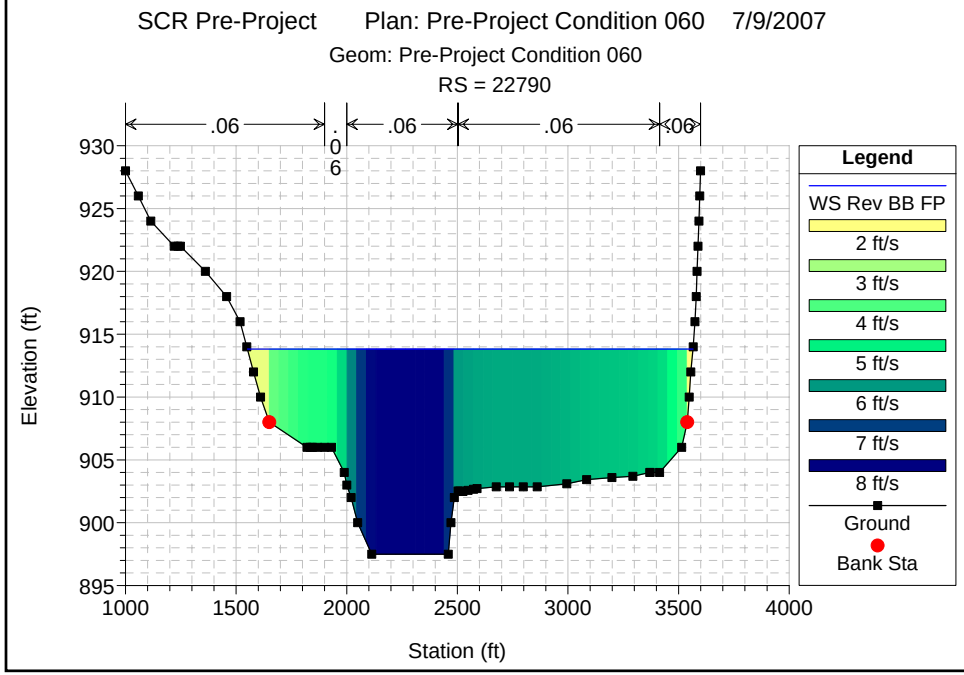
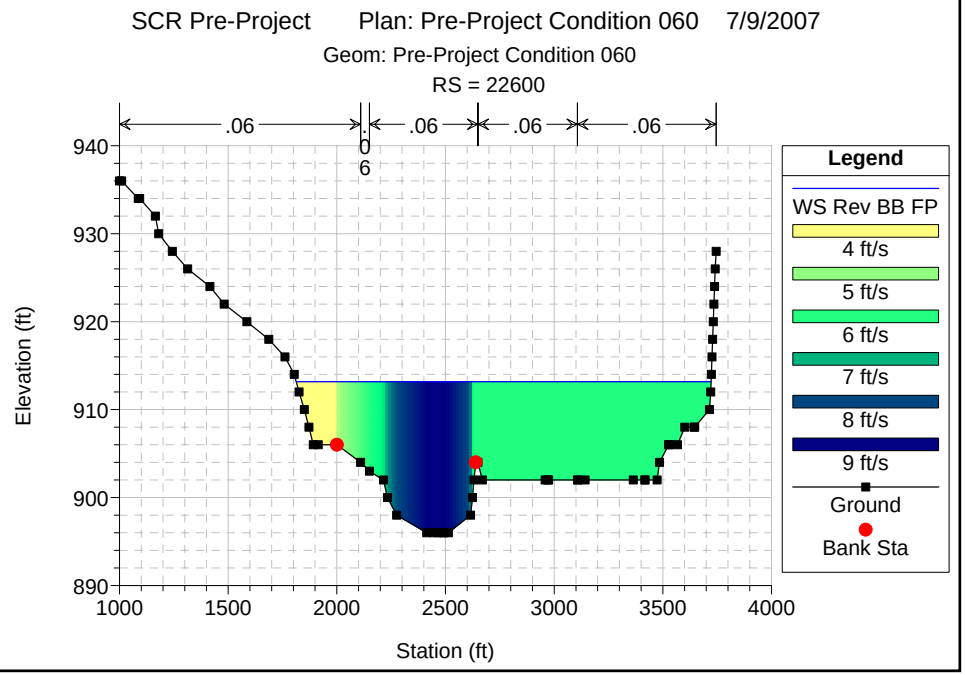
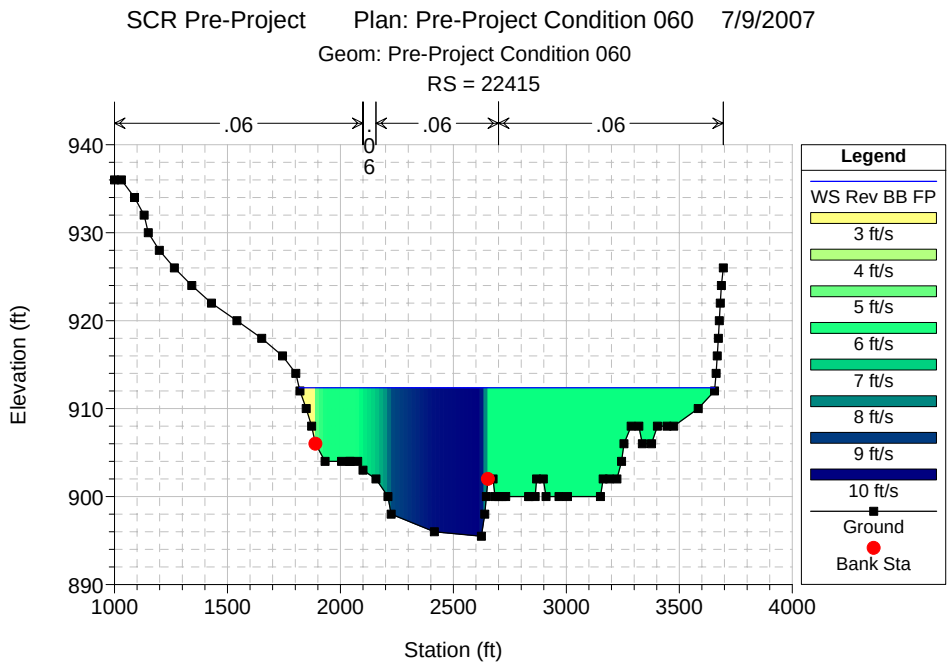
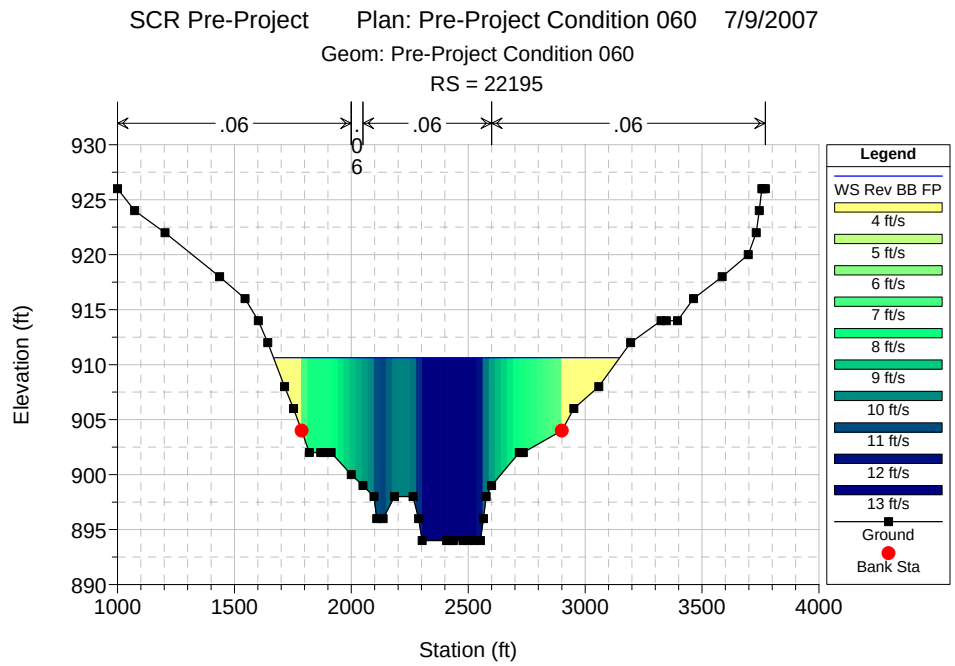
Geom: Pre-Project Condition 060
RS = 23180
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta

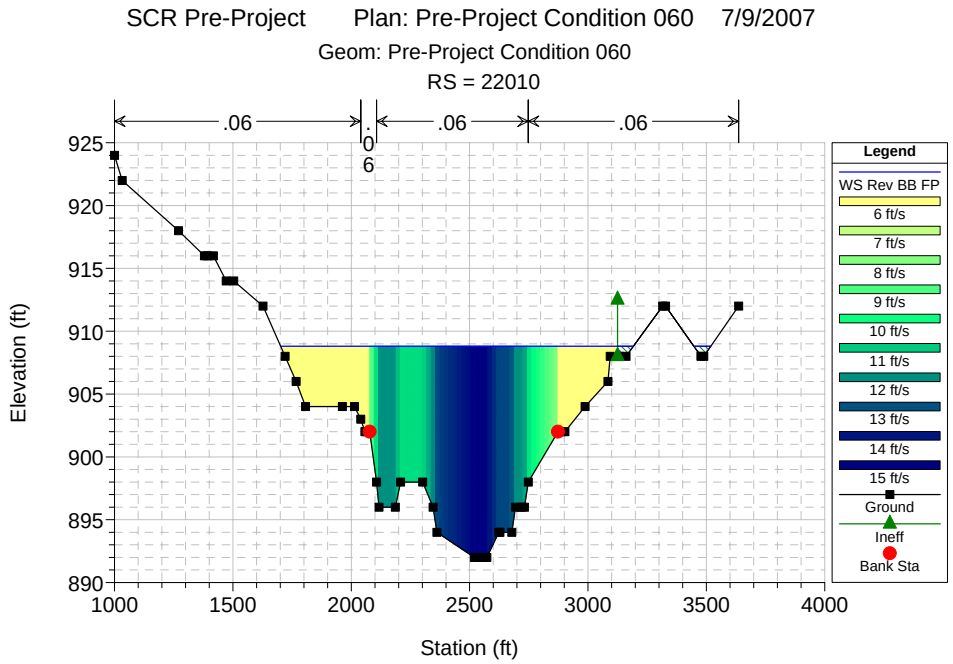

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 23000
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta

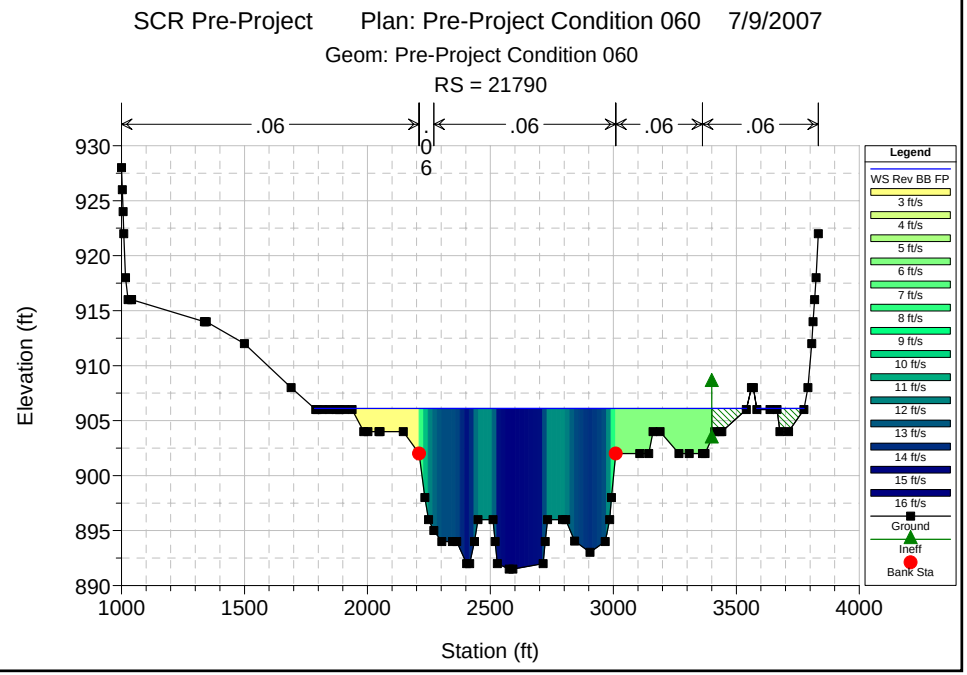

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 22790
.06
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Bank Sta

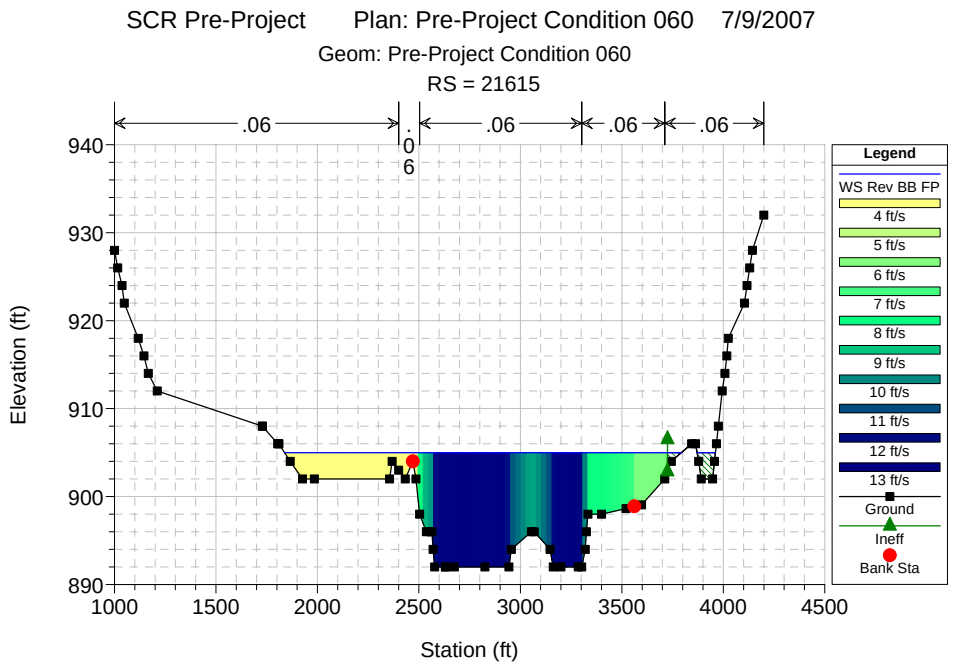

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 22600
.06
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta

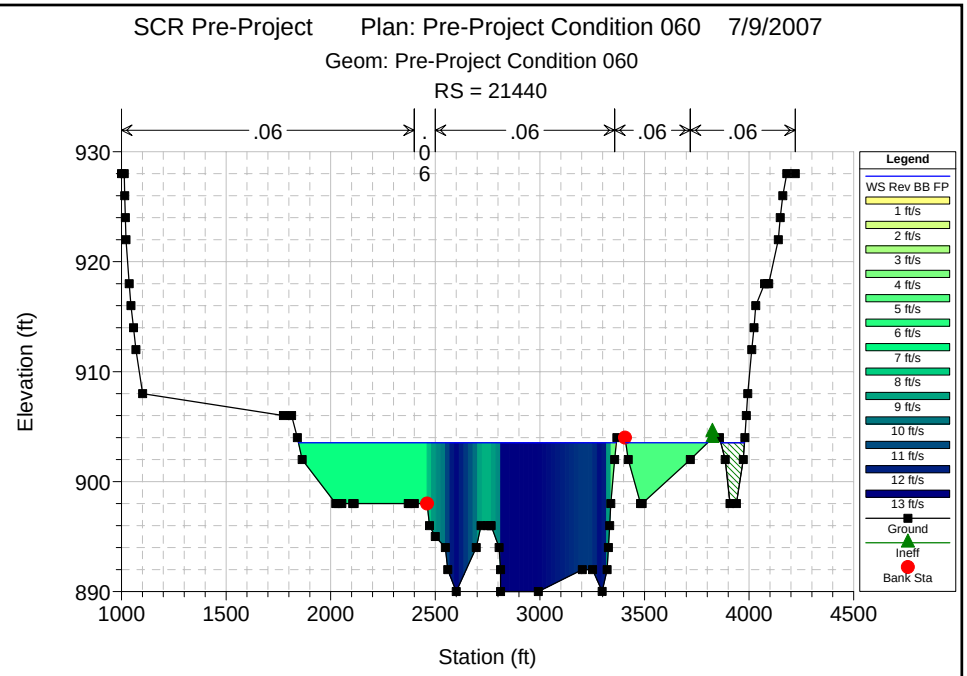

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 22415
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta

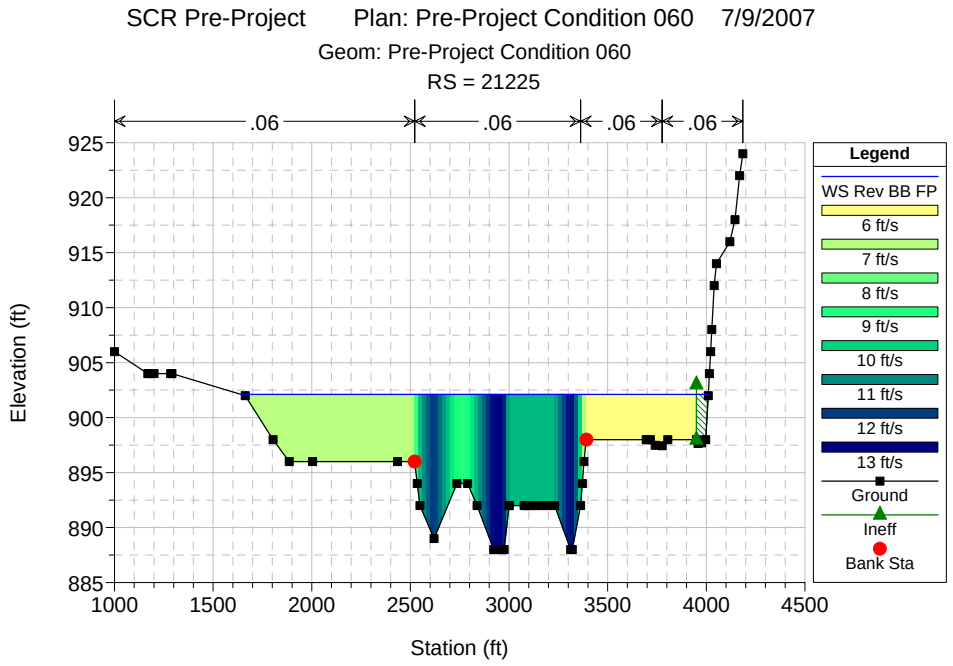

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 22195
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta

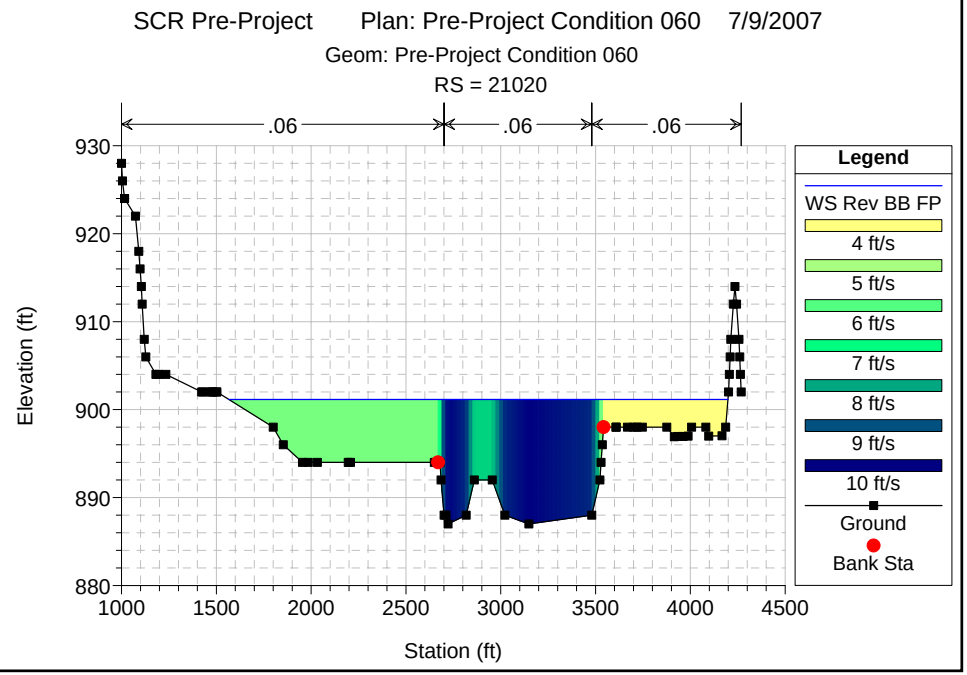

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 22010
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
Ground
Ineff
Bank Sta

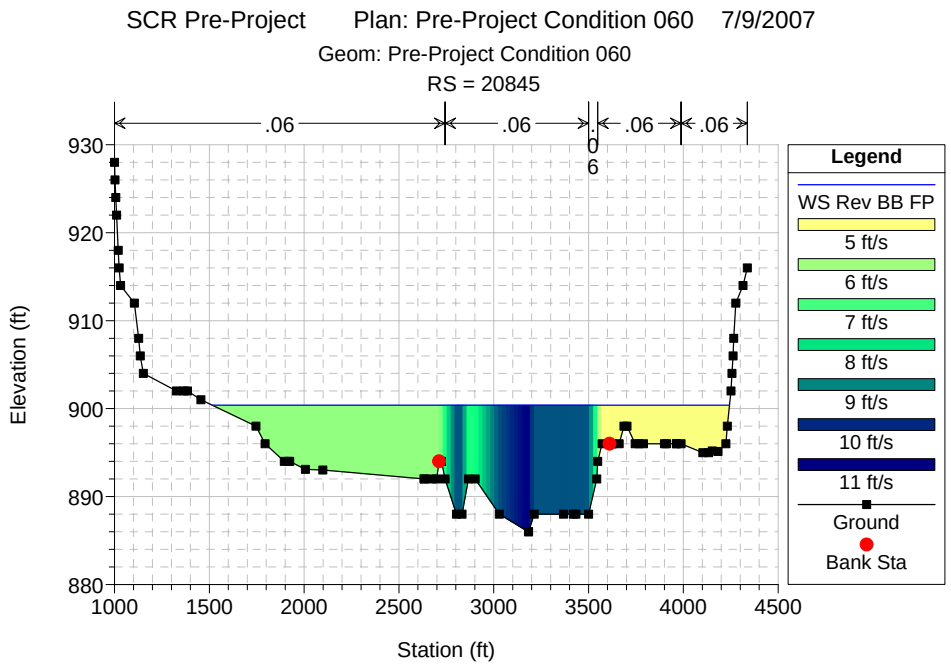

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 21790
.06
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
Ground
Ineff
Bank Sta

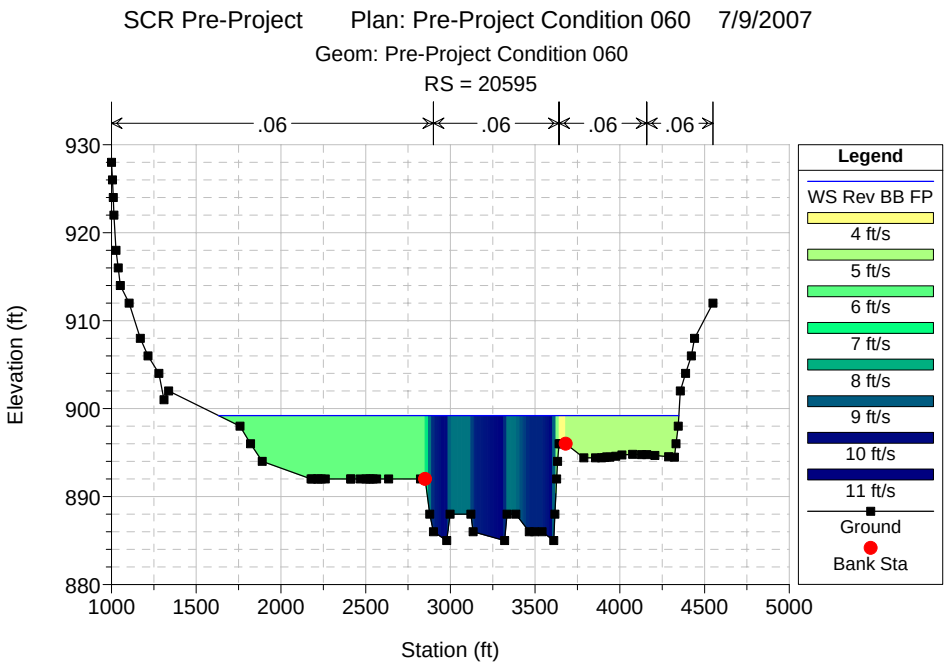

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 21615
.06
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Ineff
Bank Sta

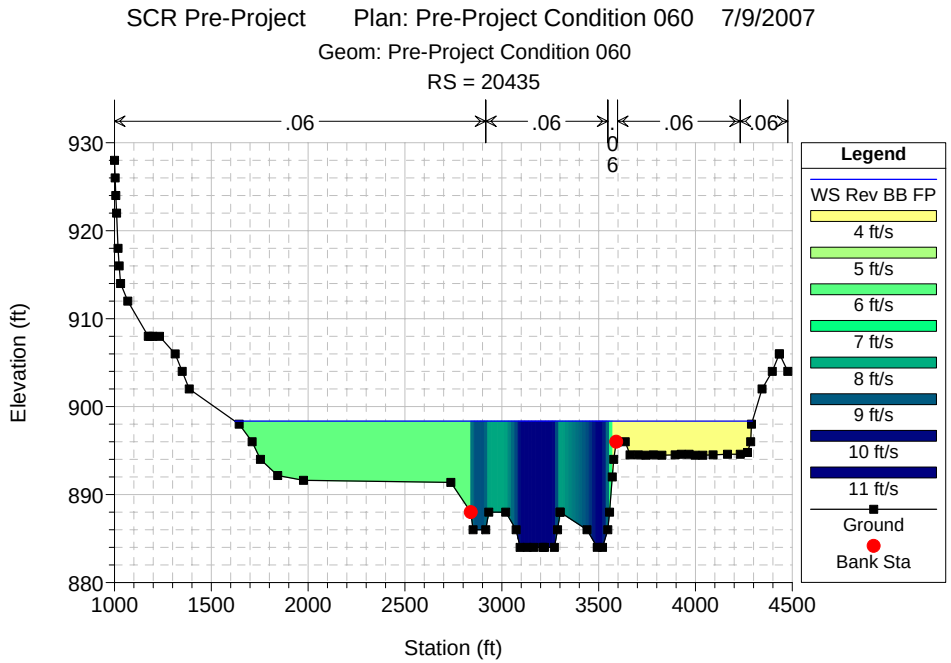

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 21440
.06
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Ineff
Bank Sta

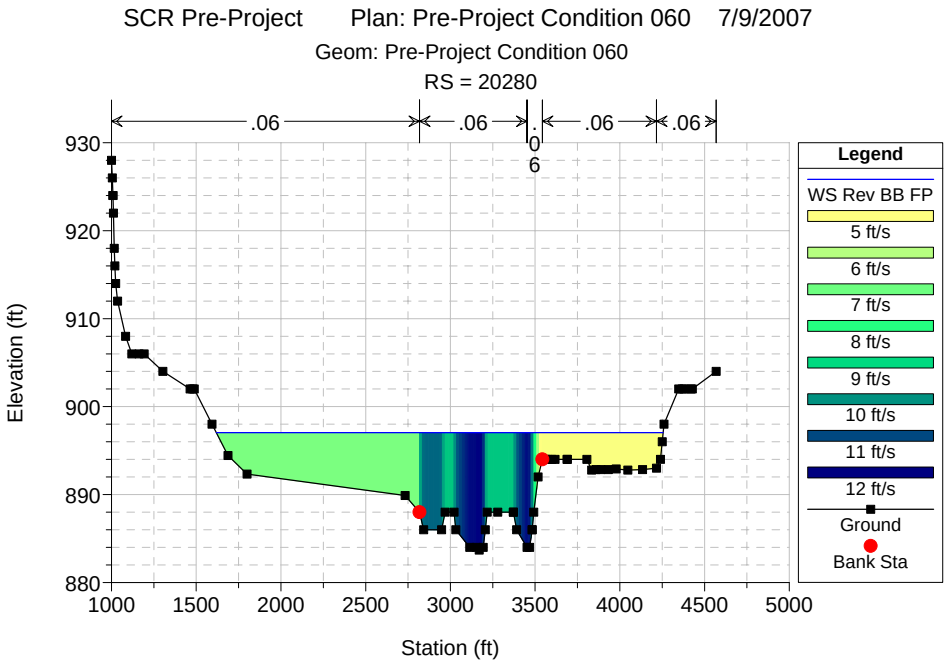

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 21225
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Ineff
Bank Sta

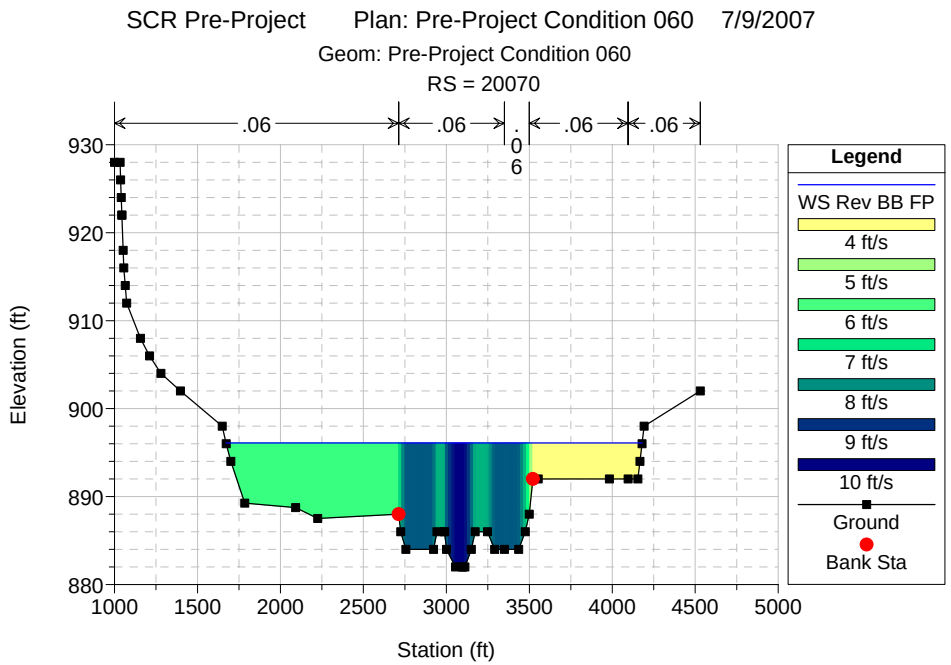

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 21020
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta

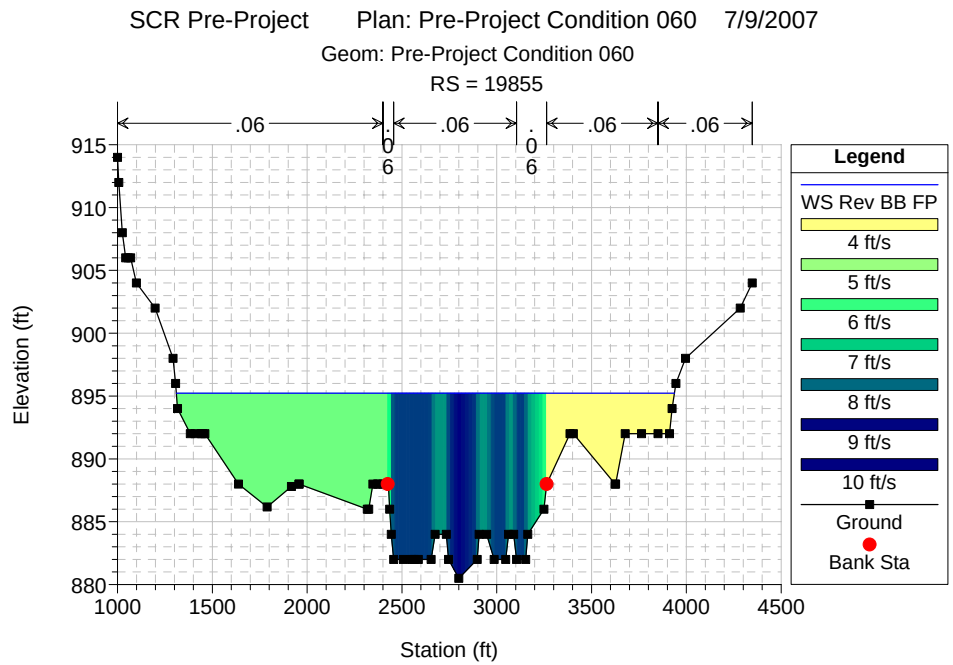

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 20845
.06
.06
.06
.06
Legend
WS Rev BB FP
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)

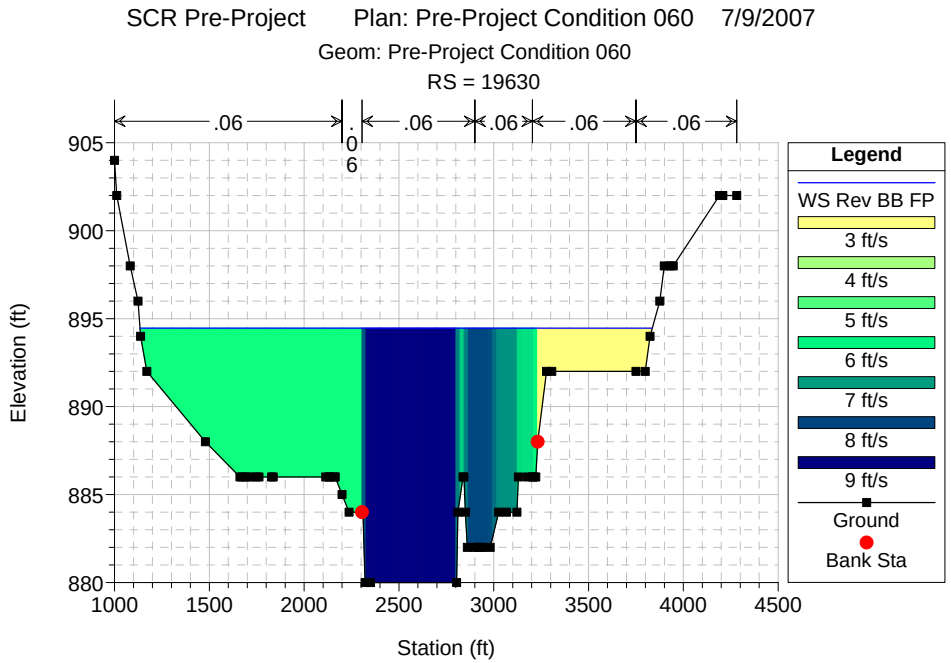

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 20595
.06
.06
.06
.06
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)

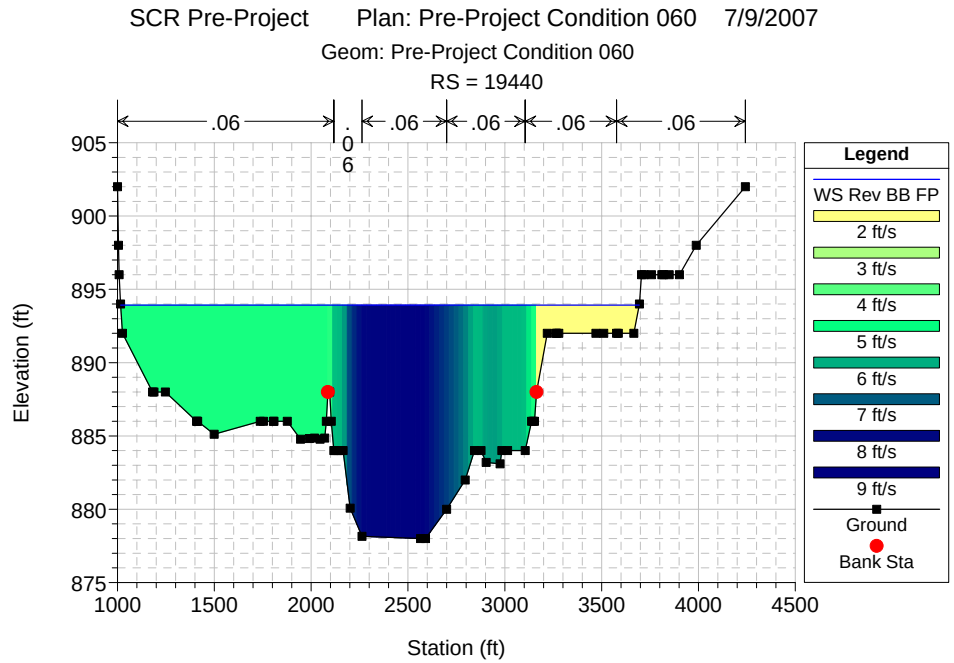

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 20435
.06
.06
.06
.06
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)

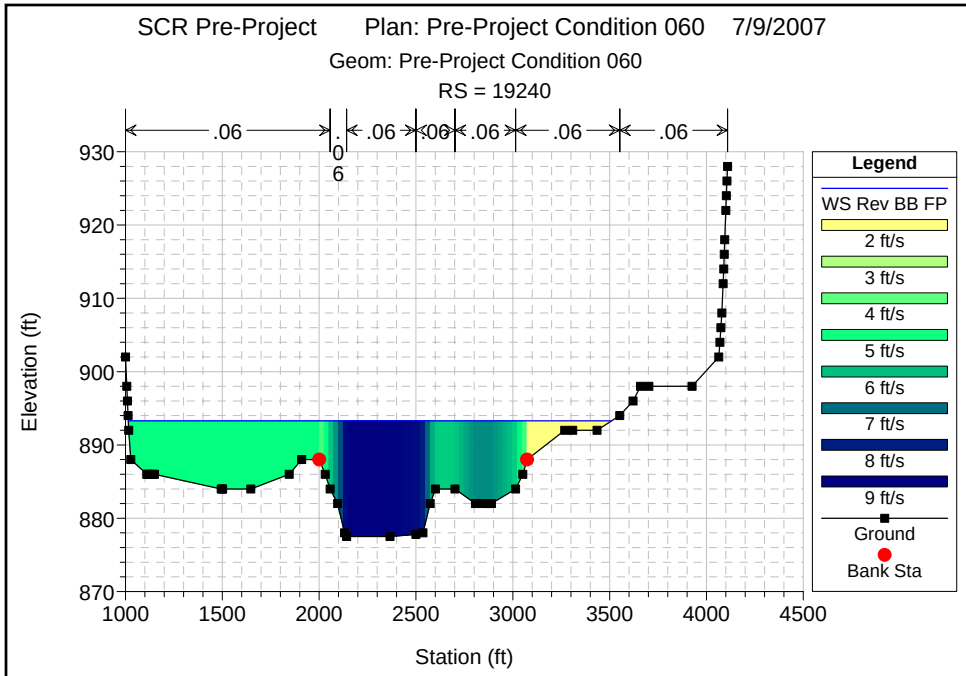

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 20280
.06
.06
.06
.06
Legend
WS Rev BB FP
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Bank Sta
Elevation (ft)
Station (ft)

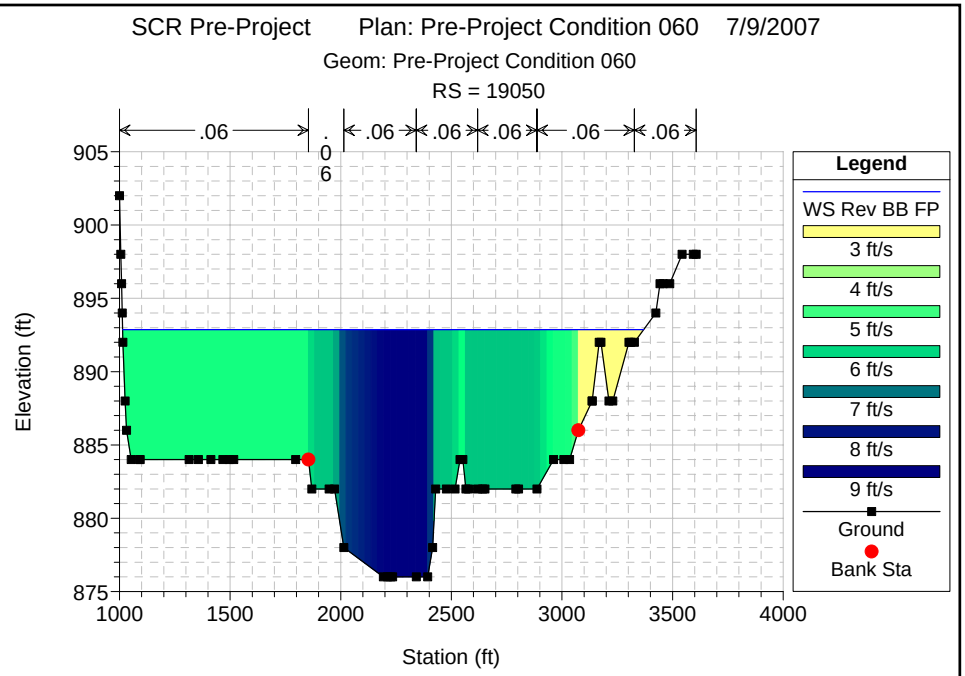

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 20070
.06
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta

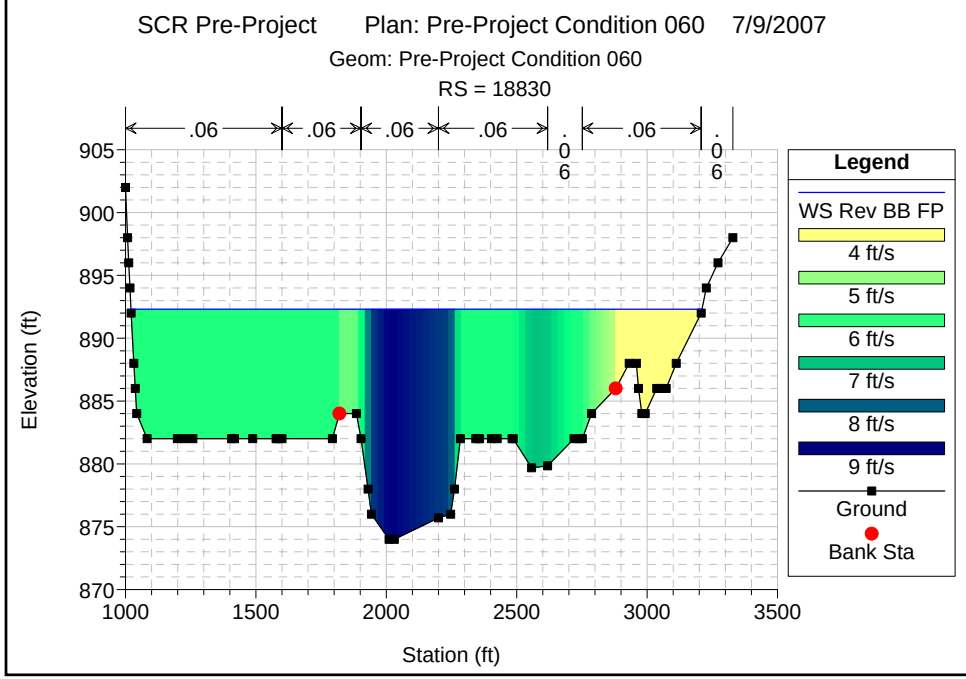

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 19855
.06
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 19630
.06
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 19440
.06
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 19240
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 19050
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta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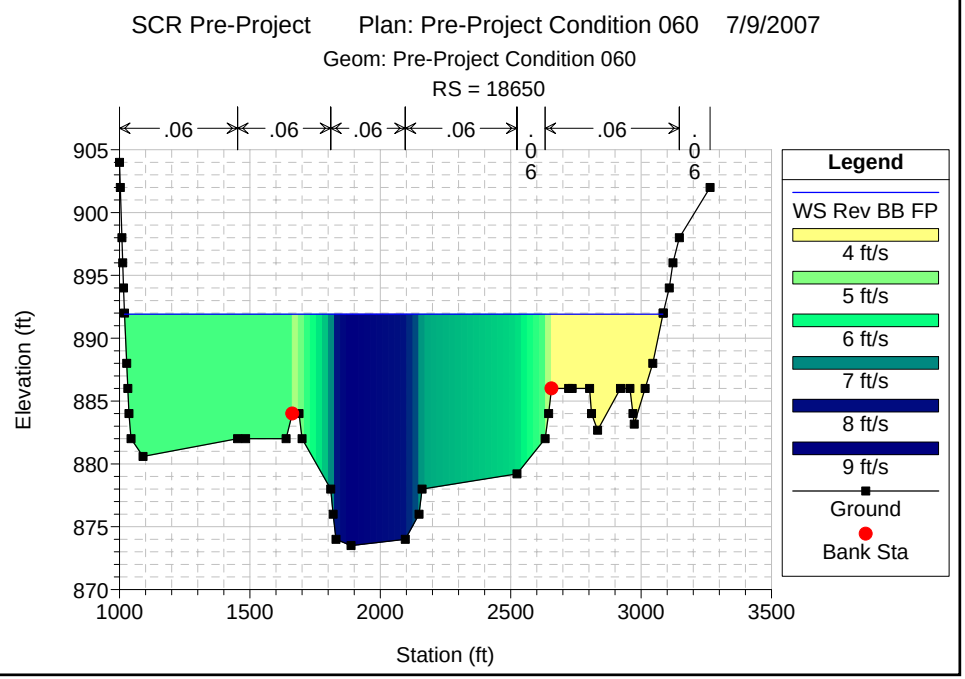
Ground
Bank Sta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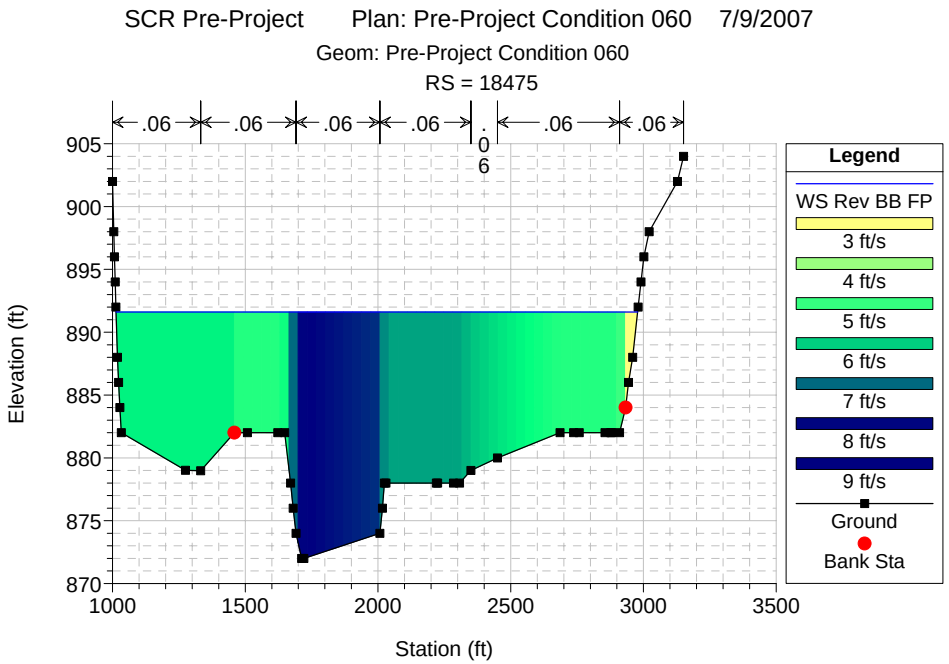
Ground
Bank Sta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Station (ft)
Legend
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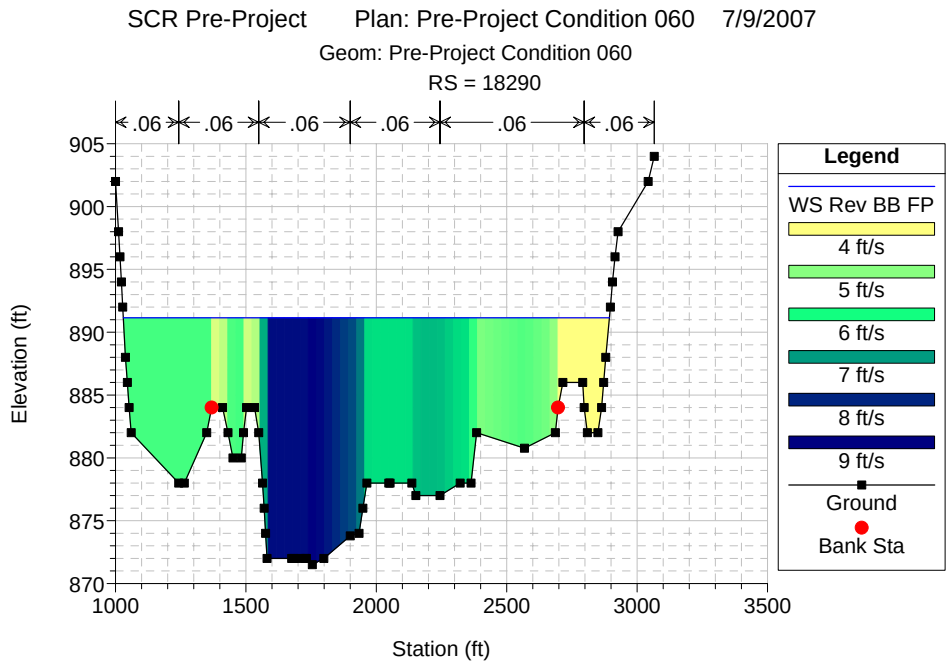
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta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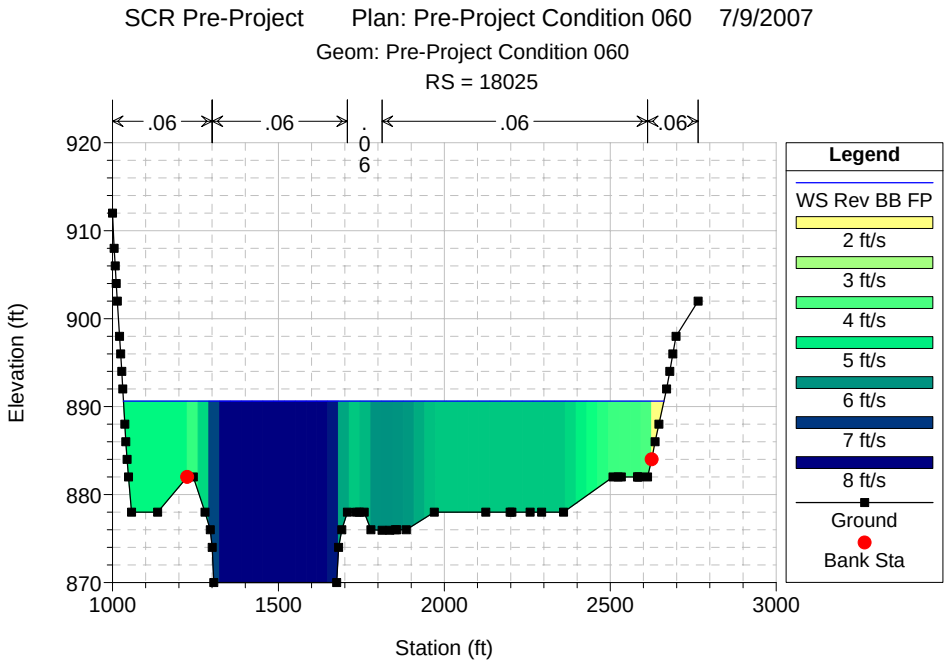
9 ft/s
Ground
Bank Sta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Elevation (ft)
Station (ft)
Legend
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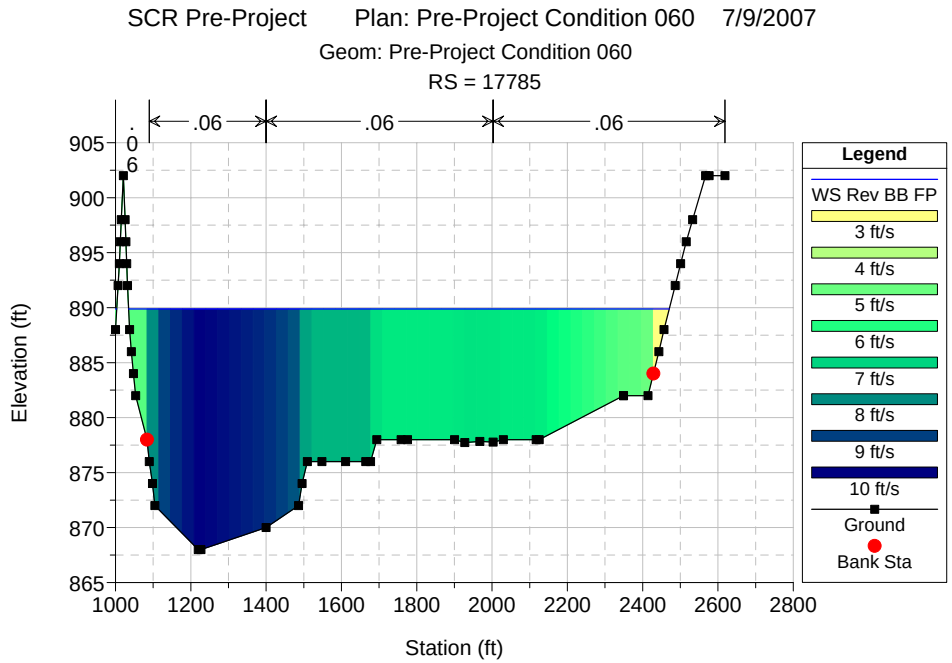
8 ft/s
Ground
Bank Sta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Station (ft)
Legend
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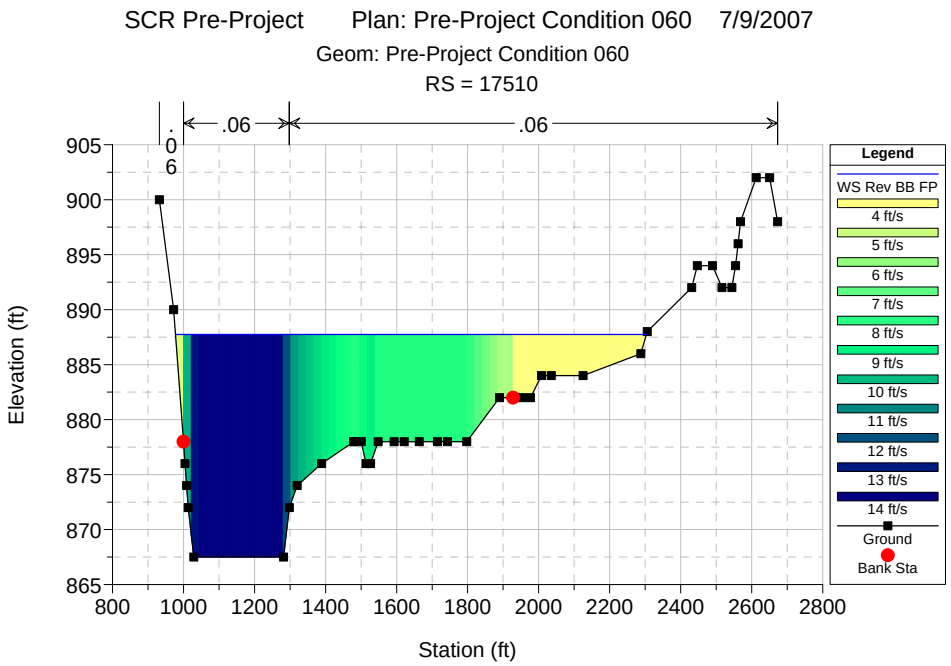
10 ft/s
Ground
Bank Sta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Geom: Pre-Project Condition 060
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Station (ft)
Legend
WS Rev BB FP
4 ft/s
5 ft/s
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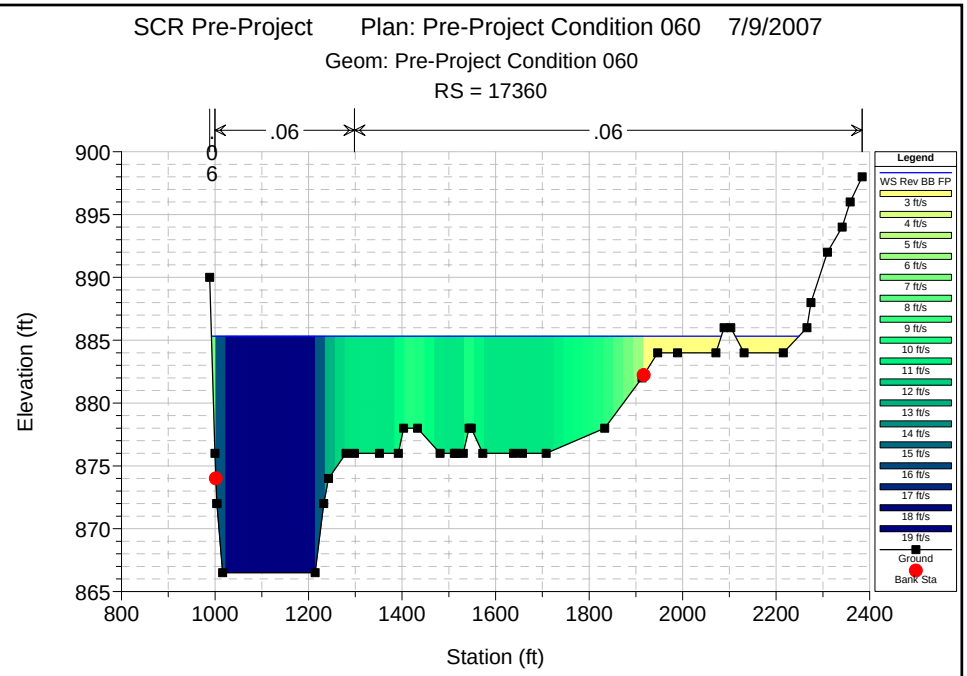
10 ft/s
11 ft/s
12 ft/s
13 ft/s
14 ft/s
Ground
Bank Sta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Geom: Pre-Project Condition 060
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Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
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4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
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14 ft/s
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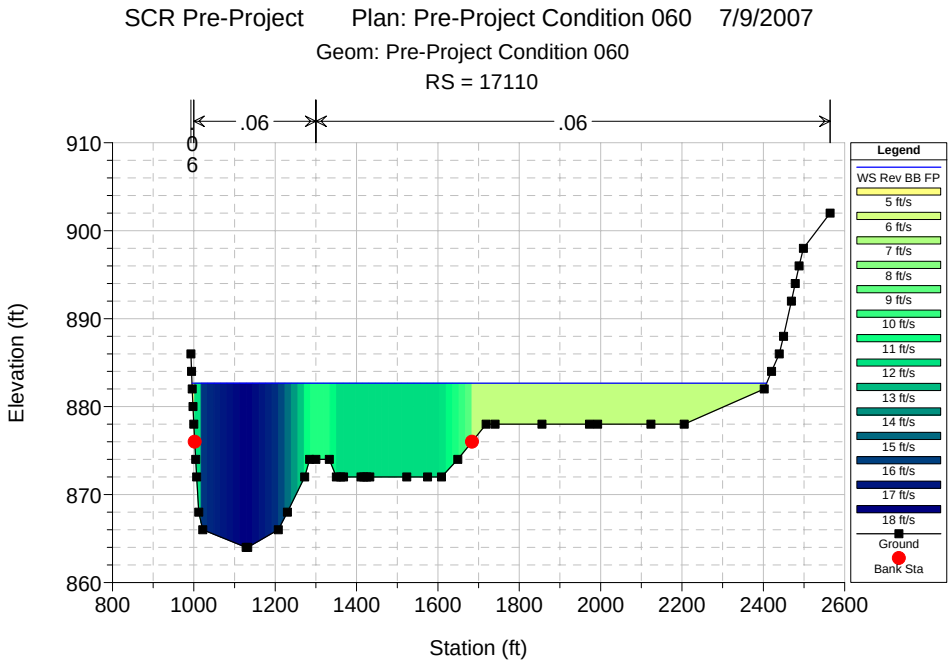
16 ft/s
17 ft/s
18 ft/s
19 ft/s
Ground
Bank Sta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Geom: Pre-Project Condition 060
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Station (ft)
Legend
WS Rev BB FP
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8 ft/s
9 ft/s
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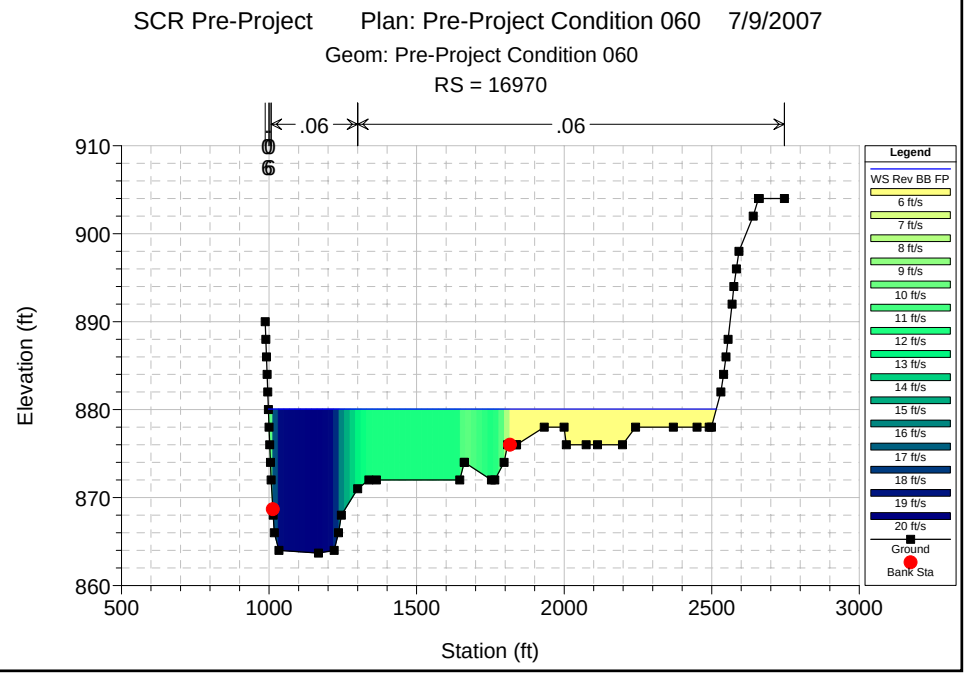
12 ft/s
13 ft/s
14 ft/s
15 ft/s
16 ft/s
17 ft/s
18 ft/s
Ground
Bank Sta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Geom: Pre-Project Condition 060
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Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
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7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
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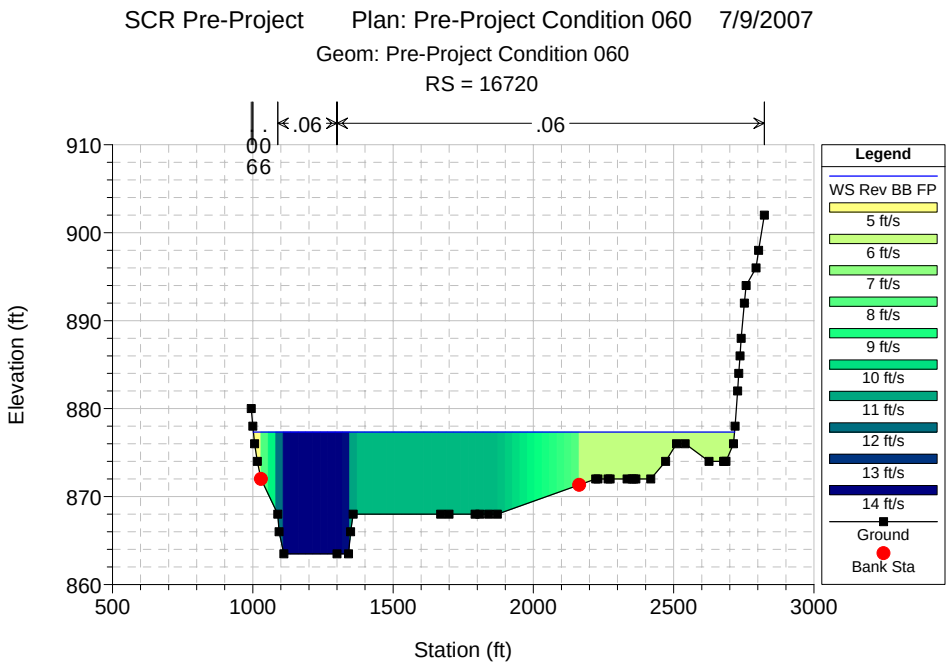
15 ft/s
16 ft/s
17 ft/s
18 ft/s
19 ft/s
20 ft/s
Ground
Bank Sta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Geom: Pre-Project Condition 060
RS = 16720
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Elevation (ft)
Station (ft)
Legend
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12 ft/s
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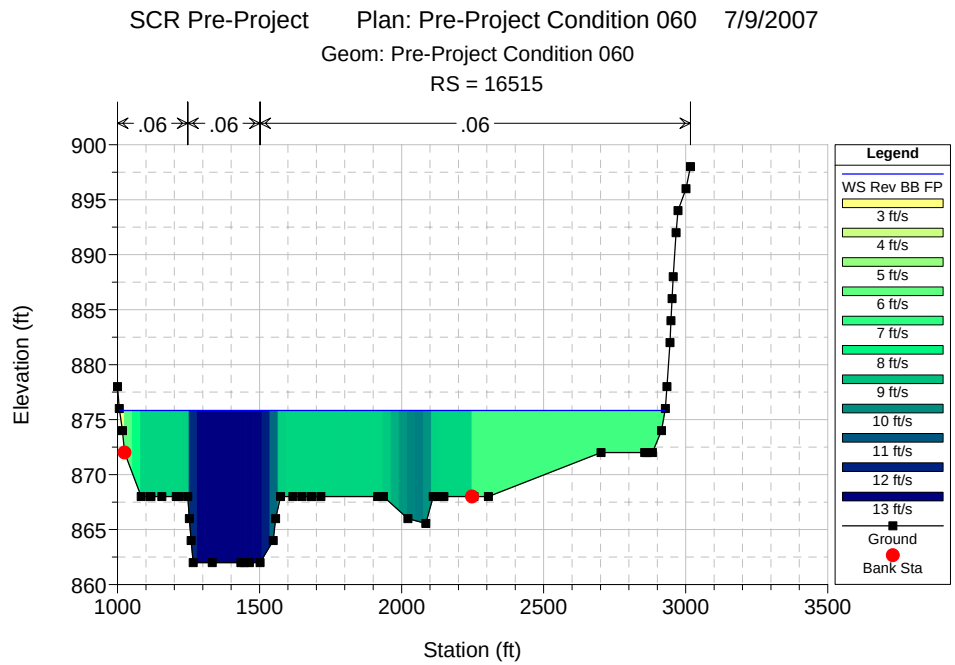
14 ft/s
Ground
Bank Sta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Geom: Pre-Project Condition 060
RS = 16515
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.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
3 ft/s
4 ft/s
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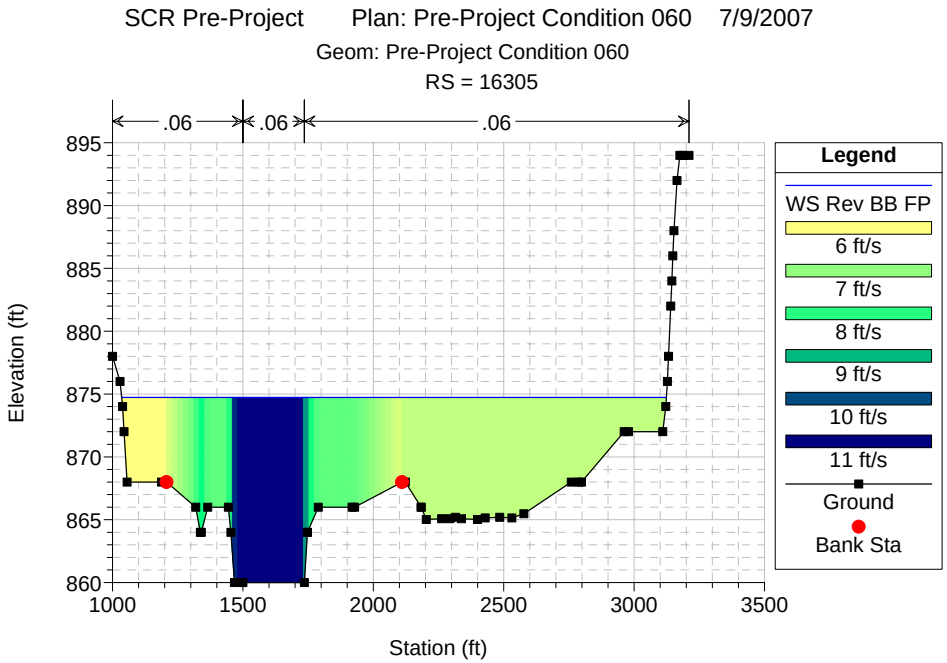
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Bank Sta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Geom: Pre-Project Condition 060
RS = 16305
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Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
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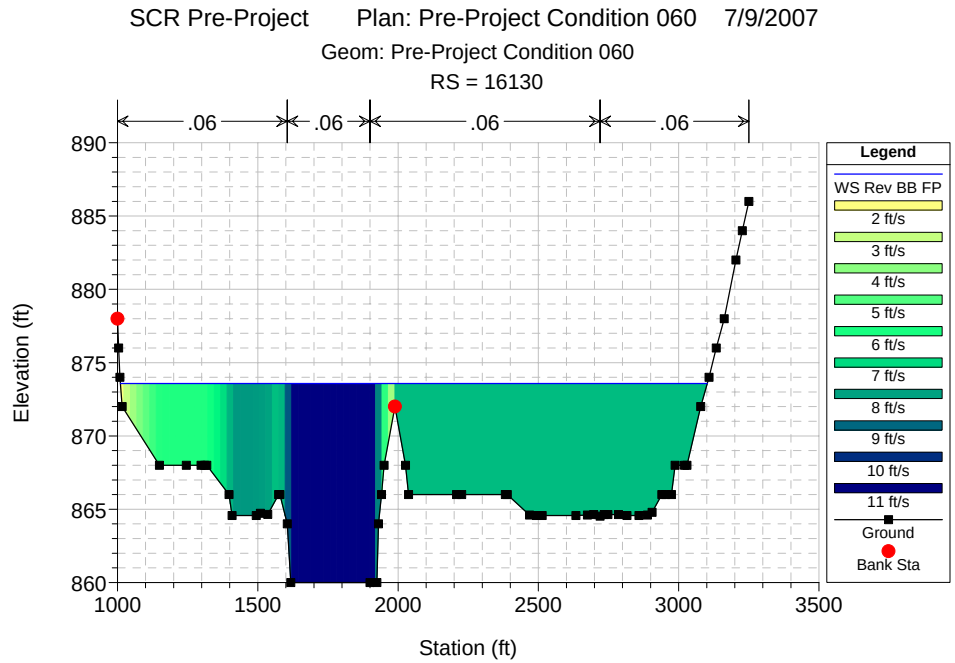
11 ft/s
Ground
Bank Sta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Geom: Pre-Project Condition 060
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.06
.06
Elevation (ft)
Station (ft)
Legend
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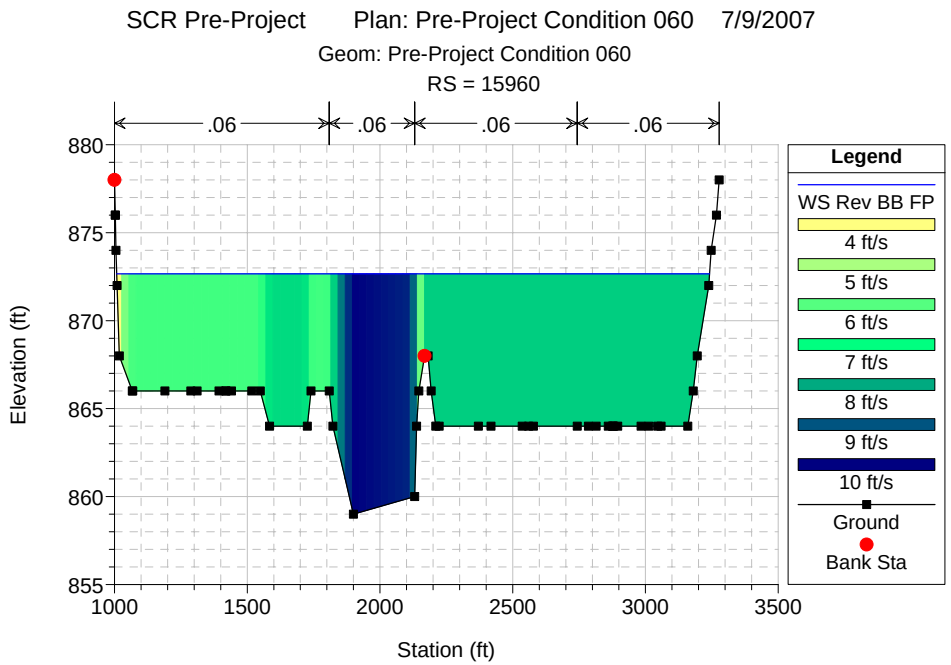
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta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Geom: Pre-Project Condition 060
RS = 15960
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.06
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Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
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5 ft/s
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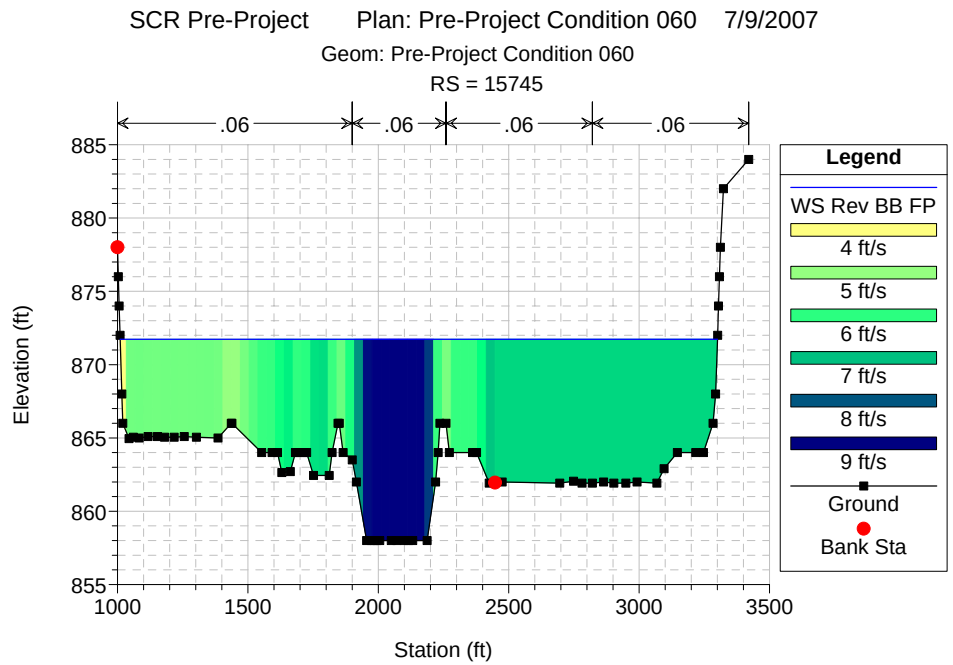
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta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Geom: Pre-Project Condition 060
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.06
.06
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Station (ft)
Legend
WS Rev BB FP
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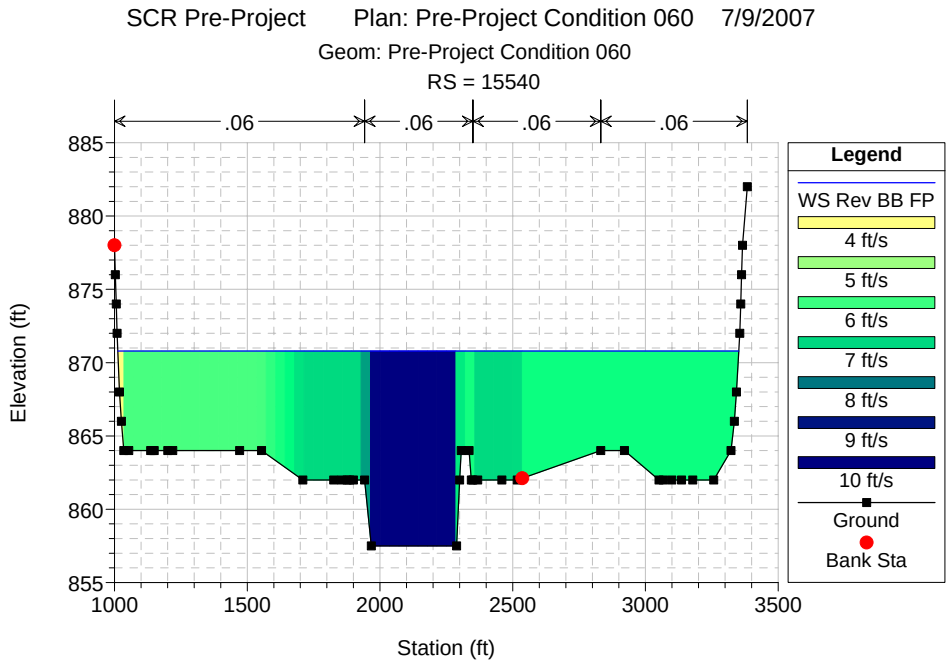
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Bank Sta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Geom: Pre-Project Condition 060
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.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
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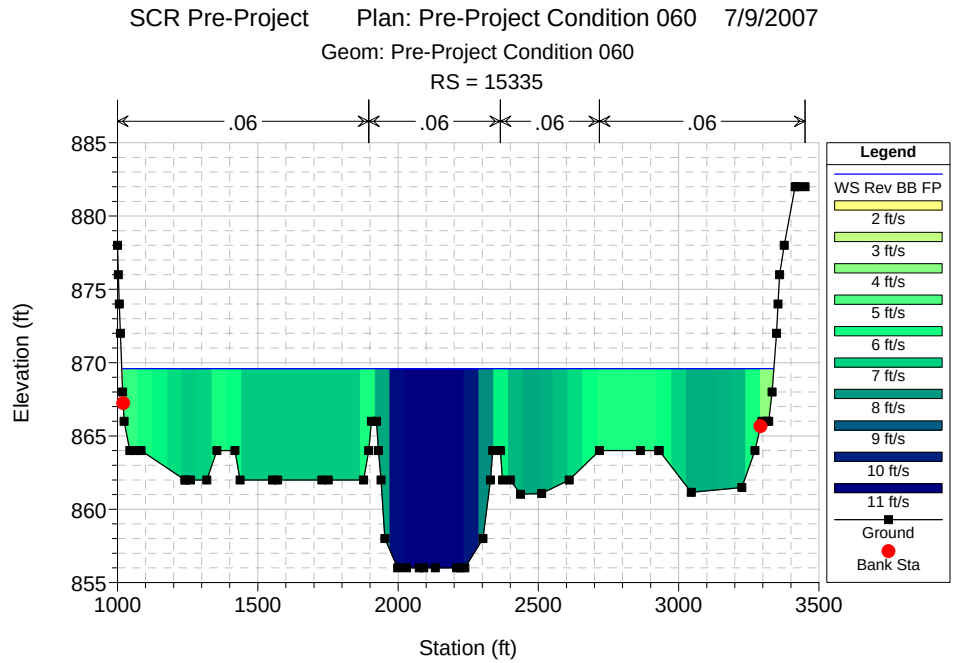
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta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Geom: Pre-Project Condition 060
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.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
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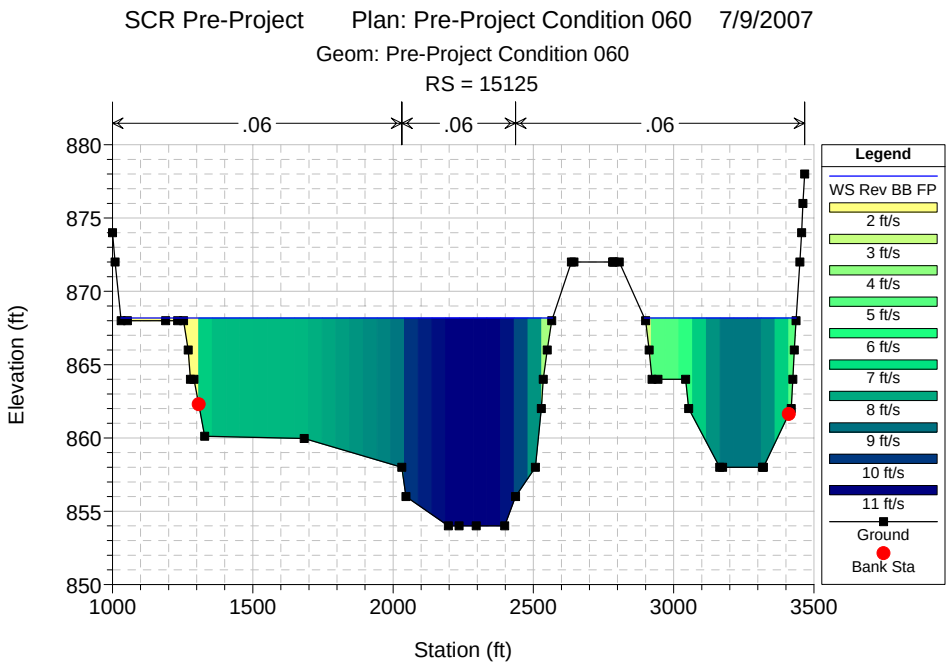
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta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Geom: Pre-Project Condition 060
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Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
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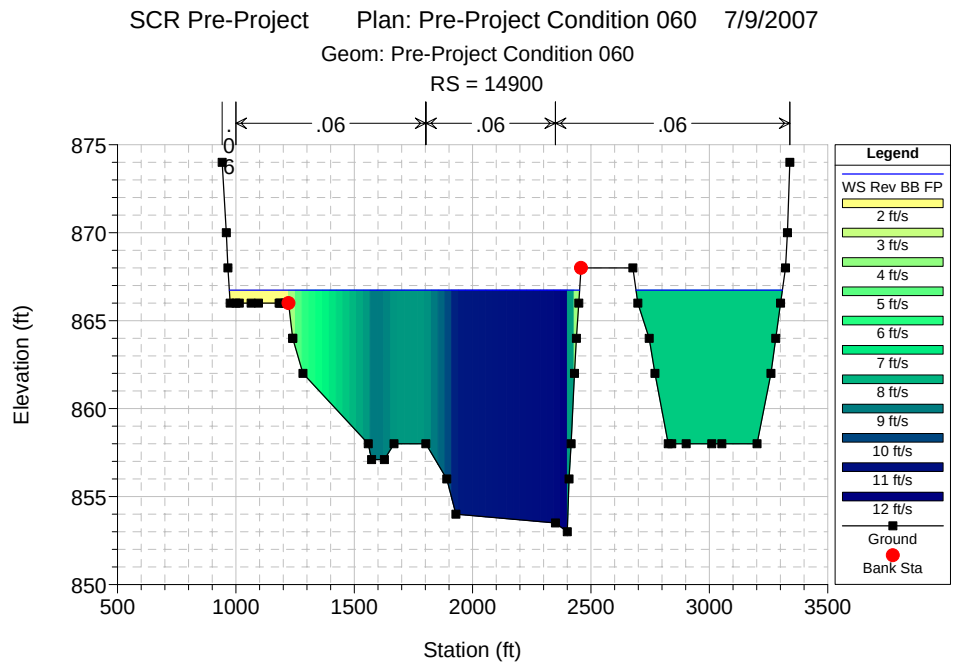
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta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Geom: Pre-Project Condition 060
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Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
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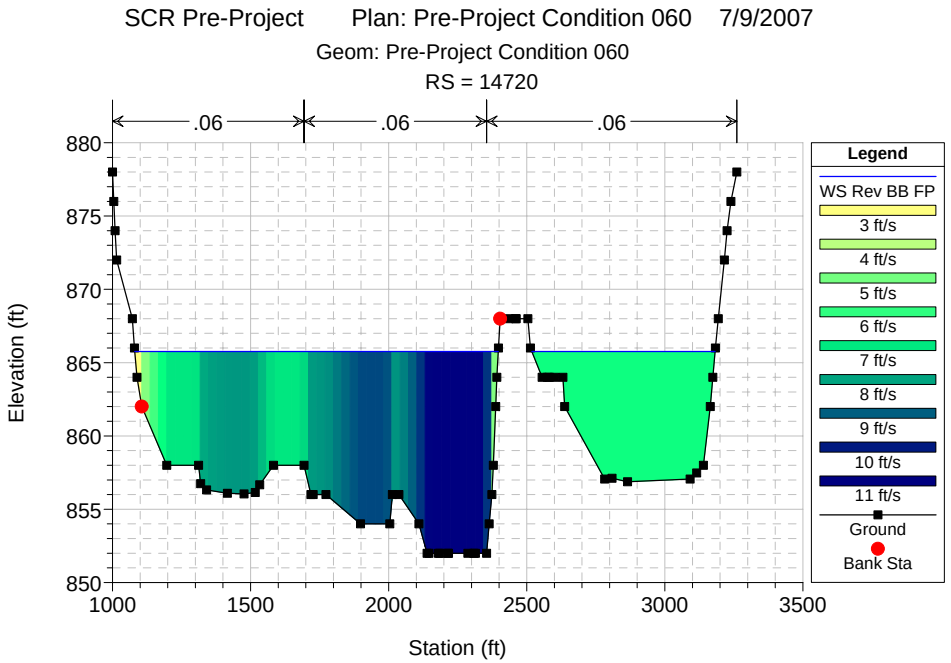
12 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 14720
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.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
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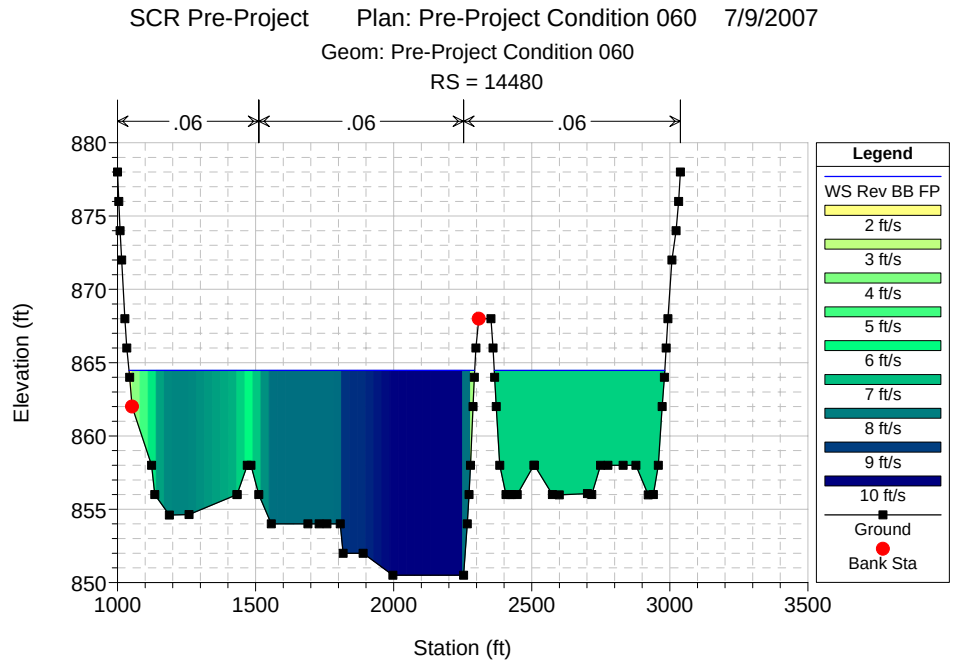
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta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Geom: Pre-Project Condition 060
RS = 14480
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Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
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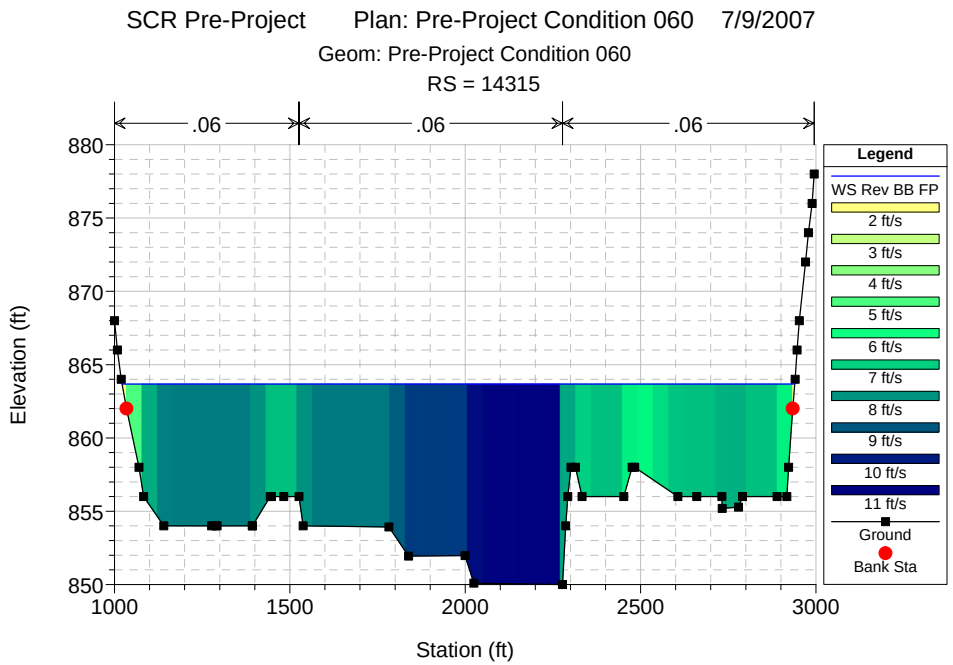
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 14315
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.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
2 ft/s
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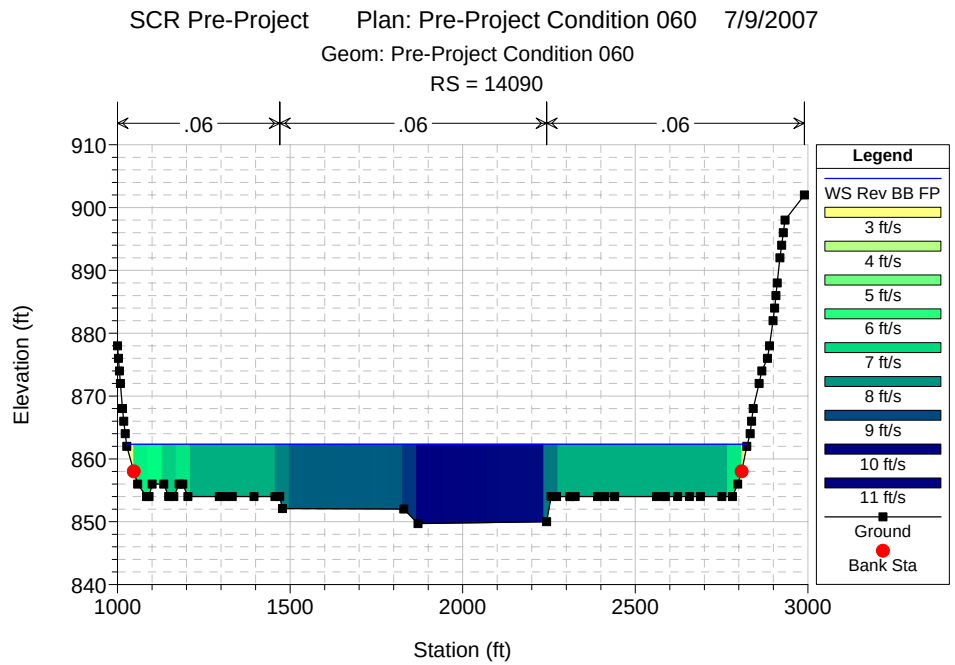
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
RS = 14090
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.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
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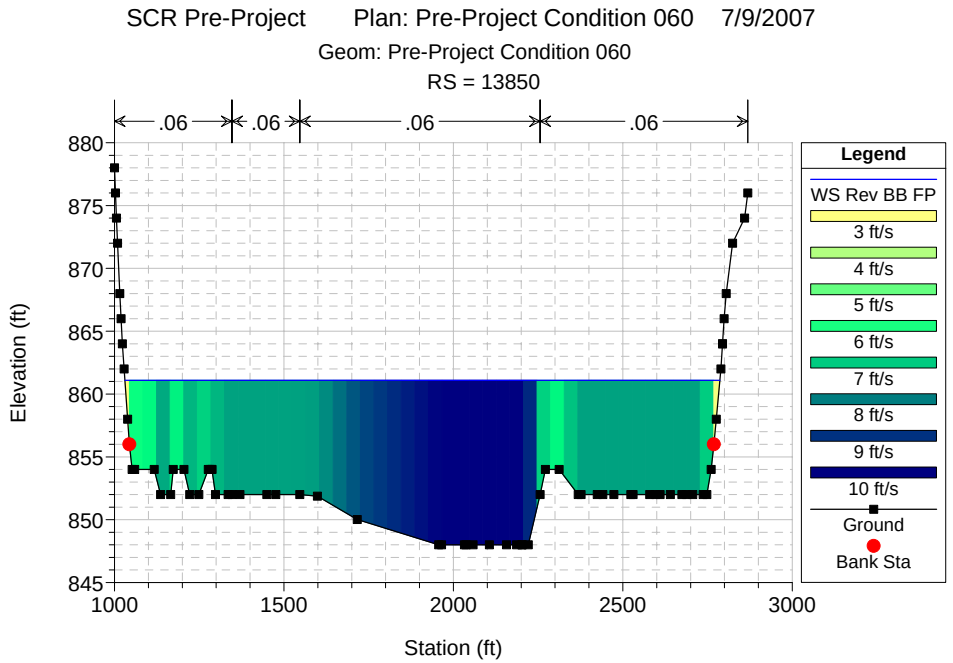
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
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.06
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Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
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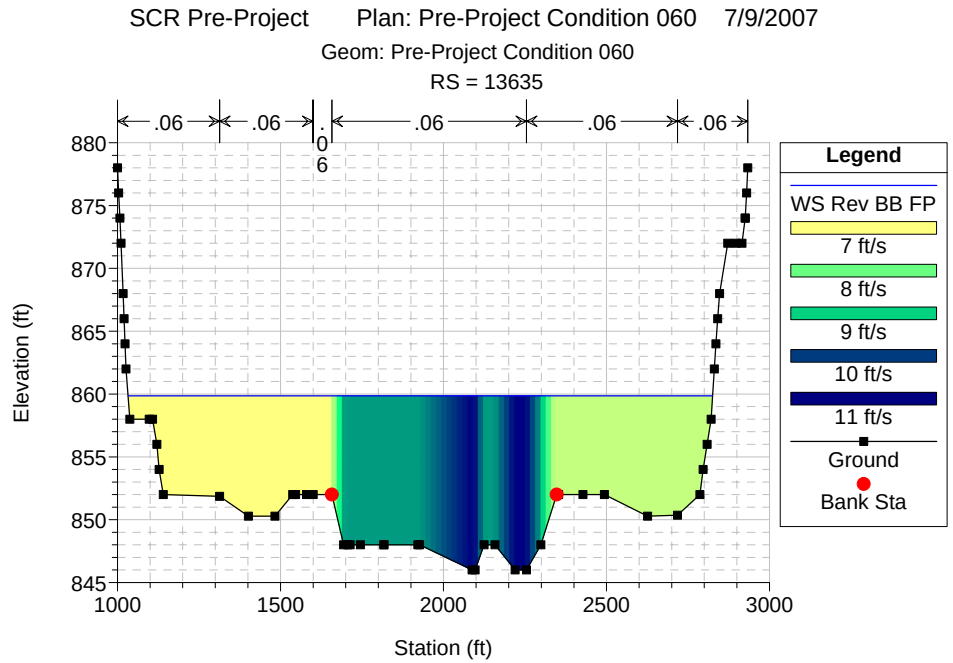
8 ft/s
9 ft/s
10 ft/s
Ground
Bank Sta


SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007
Geom: Pre-Project Condition 060
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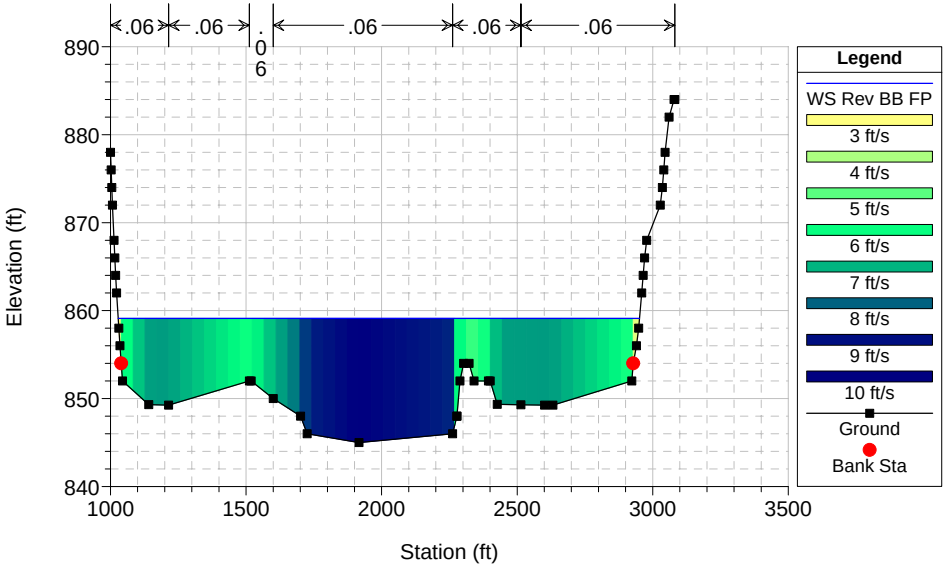
.06
.06
.06
.06
Elevation (ft)
Station (ft)
Legend
WS Rev BB FP
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Bank Sta

SCR Pre-Project Plan: Pre-Project Condition 060 7/9/2007

Geom: Pre-Project Condition 060

RS = 13425



Appendix X: Summary Table

Table Appendix X: Changes in Water Surface Elevation and Velocity for Pre-Project Condition vs. Proposed Project Condition (Q_{cap} and n=0.060)						
HEC-RAS River Section No.	**Pre-Project Cond. WSE (1) (ft)**	**Proposed Cond. WSE (2) (ft)**	**Delta 2& 1 WSE (ft)**	**Pre-Project Cond. Vel.(1) (fps)**	**Proposed Cond. Vel.(2) (fps)**	**Delta 2& 1 Vel. (fps)**
39755	1010.7	1010.7	0.0	10.5	10.5	0.0
39605	1010.0	1010.0	0.0	9.8	9.8	0.0
39310	1008.4	1008.4	0.0	10.1	10.1	0.0
39100	1007.8	1007.8	0.0	8.4	8.4	0.0
38925	1007.1	1007.1	0.0	8.5	8.5	0.0
38710	1006.2	1006.2	0.0	8.9	8.9	0.0
38475	1003.7	1003.7	0.0	12.4	12.4	0.0
38300	1002.8	1002.8	0.0	11.0	11.0	0.0
38065	1001.4	1001.4	0.0	11.1	11.1	0.0
37810	998.3	998.3	0.0	13.9	13.8	-0.1
37655	997.0	997.1	0.1	12.7	12.6	-0.1
37390	995.8	995.9	0.1	10.3	10.2	-0.1
37135	993.9	994.2	0.3	11.3	11.0	-0.3
36930	992.9	993.2	0.3	10.3	10.0	-0.3
36735	991.7	992.2	0.5	10.4	10.0	-0.4
36515	990.7	991.4	0.7	9.3	8.8	-0.5
36374		991.0			8.3	
Bridge - Commerce Center Drive - Proposed						
36240		989.2			9.7	
36080	988.0	988.0	0.0	10.0	10.0	0.0
35845	986.9	986.9	0.0	8.6	8.5	-0.1
35725	986.0	986.0	0.0	9.3	9.3	0.0
35515	984.7	984.7	0.0	10.3	10.3	0.0
35245	982.8	982.8	0.0	10.4	10.4	0.0
35040	981.3	981.3	0.0	11.4	11.4	0.0
34860	980.0	980.0	0.0	9.9	9.9	0.0
34720	979.0	978.9	-0.1	9.4	9.4	0.0
34495	977.4	977.4	0.0	9.7	9.2	-0.5
34310	976.3	976.2	-0.1	10.0	9.7	-0.3
34090	975.0	975.0	0.0	9.4	9.1	-0.3
33880	973.6	973.6	0.0	9.3	9.2	-0.1
33710	972.6	972.6	0.0	8.7	8.7	0.0
33500	971.3	971.3	0.0	8.9	8.9	0.0
33310	970.4	970.4	0.0	7.8	7.8	0.0
33115	969.6	969.6	0.0	7.2	7.2	0.0
32795	967.8	967.8	0.0	8.0	8.0	0.0
32605	966.6	966.6	0.0	8.1	8.1	0.0

(1) Pre-Project Cond. water surface elevations and velocities are based on "n" value of 0.060 for entire width of the river for the Mission Village pre-project improvement; "SR 126 HWY/Commerce Center Interchange Bank" proposed soil cemnet bank protection which is is a part of separate project.

(2) Proposed Project Cond. water surface elevations and velocities are based on "n" value of 0.060 for entire width of the river for Mission Village poposed project improvements.

HEC-RAS Sections in bold for Mission Village proposed project Improvement Reaches

HEC-RAS Sections 36374 and 36240 are Proposed Bridge Sections

Table Appendix X: (Continued) Changes in Water Surface Elevation and Velocity (Q_{cap} and n=0.060)						
HEC-RAS River Section No.	**Pre-Project Cond. WSE (1) (ft)**	**Proposed Cond. WSE (2) (ft)**	**Delta 2& 1 WSE (ft)**	**Pre-Project Cond. Vel.(1) (fps)**	**Proposed Cond. Vel.(2) (fps)**	**Delta 2& 1 Vel. (fps)**
32265	965.0	965.0	0.0	7.3	7.2	-0.1
31875	963.2	963.2	0.0	6.7	6.7	0.0
31585	962.4	962.4	0.0	6.1	6.1	0.0
31360	961.7	961.7	0.0	6.5	6.5	0.0
31060	961.2	961.2	0.0	5.9	5.9	0.0
30720	960.8	960.8	0.0	5.1	5.1	0.0
30445	960.5	960.5	0.0	5.0	5.0	0.0
30095	960.1	960.1	0.0	5.7	5.7	0.0
29815	959.6	959.6	0.0	6.6	6.6	0.0
29565	959.3	959.3	0.0	6.5	6.5	0.0
29385	958.8	958.8	0.0	7.5	7.5	0.0
29140	957.8	957.8	0.0	8.8	8.8	0.0
28895	952.4	952.4	0.0	19.7	19.7	0.0
28695	951.1	951.1	0.0	13.5	13.5	0.0
28500	948.7	948.7	0.0	14.9	14.9	0.0
28280	947.4	947.4	0.0	14.1	14.1	0.0
28080	946.5	946.5	0.0	13.1	13.1	0.0
27925	945.0	945.0	0.0	14.3	14.3	0.0
27725	941.9	941.9	0.0	17.1	17.1	0.0
27545	940.6	940.6	0.0	15.9	15.9	0.0
27335	939.4	939.4	0.0	14.0	14.0	0.0
27155	937.4	937.4	0.0	15.3	15.3	0.0
26990	936.6	936.6	0.0	12.1	12.1	0.0
26780	935.5	935.5	0.0	11.1	11.1	0.0
26575	934.6	934.6	0.0	9.5	9.5	0.0
26355	933.2	933.2	0.0	10.5	10.5	0.0
26170	932.2	932.2	0.0	10.9	10.9	0.0
25965	930.6	930.6	0.0	11.8	11.8	0.0
25600	928.4	928.4	0.0	10.6	10.6	0.0
25425	927.8	927.8	0.0	8.5	8.5	0.0
25215	925.8	925.9	0.1	10.7	10.6	-0.1
25000	924.3	924.4	0.1	10.4	10.1	-0.3
24795	922.8	923.0	0.2	9.8	9.9	0.1
24550	921.9	922.0	0.1	8.0	8.3	0.3
24335	920.4	920.4	0.0	10.0	10.3	0.3
24115	919.1	919.1	0.0	9.3	9.5	0.2
23975	918.2	918.2	0.0	8.9	8.9	0.0

(1) Pre-Project Cond. water surface elevations and velocities are based on "n" value of 0.060 for entire width of the river for the Mission Village pre-project improvement; "SR 126 HWY/Commerce Center Interchange Bank" proposed soil cemnet bank protection which is is a part of separate project.

(2) Proposed Project Cond. water surface elevations and velocities are based on "n" value of 0.060 for entire width of the river for Mission Village poposed project improvements.

HEC-RAS Sections in bold for Mission Village proposed project Improvement Reaches

HEC-RAS Sections 36374 and 36240 are Proposed Bridge Sections

Table Appendix X: (Continued) Changes in Water Surface Elevation and Velocity (Q_{cap} and n=0.060)

HEC-RAS River Section No.	Pre-Project Cond. WSE (1) (ft)	Proposed Cond. WSE (2) (ft)	Delta 2& 1 WSE (ft)	Pre-Project Cond. Vel.(1) (fps)	Proposed Cond. Vel.(2) (fps)	Delta 2& 1 Vel. (fps)
23755	917.1	917.1	0.0	8.6	8.6	0.0
23565	916.2	916.2	0.0	8.5	8.5	0.0
23365	915.3	915.4	0.1	8.2	8.2	0.0
23180	914.8	914.8	0.0	7.7	7.9	0.2
23000	914.4	914.4	0.0	6.2	6.2	0.0
22790	913.8	913.8	0.0	6.6	6.6	0.0
25785	929.2	929.3	0.1	11.9	11.9	0.0
22600	913.2	913.2	0.0	7.9	7.9	0.0
22415	912.4	912.4	0.0	8.6	8.6	0.0
22195	910.6	910.6	0.0	10.3	10.3	0.0
22010	908.8	908.8	0.0	12.2	12.2	0.0
21790	906.1	906.1	0.0	13.7	13.7	0.0
21615	905.0	905.0	0.0	11.3	11.3	0.0
21440	903.5	903.6	0.1	11.4	11.4	0.0
21225	902.1	902.1	0.0	10.5	10.5	0.0
21020	901.2	901.2	0.0	9.1	9.1	0.0
20845	900.4	900.4	0.0	8.7	8.7	0.0
20595	899.2	899.2	0.0	8.9	9.0	0.1
20435	898.4	898.4	0.0	9.3	9.3	0.0
20280	897.0	897.1	0.1	10.6	10.7	0.1
20070	896.1	896.1	0.0	8.7	8.7	0.0
19855	895.2	895.2	0.0	8.3	8.3	0.0
19630	894.5	894.5	0.0	7.8	7.9	0.1
19440	893.9	893.9	0.0	7.3	7.3	0.0
19240	893.3	893.3	0.0	7.5	7.5	0.0
19050	892.9	892.9	0.0	6.7	6.7	0.0
18830	892.3	892.3	0.0	6.8	6.8	0.0
18650	891.9	891.9	0.0	6.8	6.8	0.0
18475	891.6	891.6	0.0	6.1	6.1	0.0
18290	891.2	891.2	0.0	6.6	6.6	0.0
18025	890.6	890.6	0.0	6.5	6.5	0.0
17785	889.9	889.9	0.0	7.4	7.4	0.0
17510	887.7	887.7	0.0	11.1	11.2	0.1
17360	885.3	885.2	-0.1	13.9	14.0	0.1
17110	882.7	882.9	0.2	14.2	13.6	-0.6
16970	880.1	880.0	-0.1	15.5	15.7	0.2
16720	877.3	877.4	0.1	11.5	11.5	0.0

(1) Pre-Project Cond. water surface elevations and velocities are based on "n" value of 0.060 for entire width of the river for the Mission Village pre-project improvement; "SR 126 HWY/Commerce Center Interchange Bank" proposed soil cemnet bank protection which is is a part of separate project.

(2) Proposed Project Cond. water surface elevations and velocities are based on "n" value of 0.060 for entire width of the river for Mission Village poposed project improvements.

HEC-RAS Sections in bold for Mission Village proposed project Improvement Reaches
HEC-RAS Sections 36374 and 36240 are Proposed Bridge Sections

Table Appendix X: (Continued) Changes in Water Surface Elevation and Velocity (Q_{cap} and n=0.060)						
HEC-RAS River Section No.	**Pre-Project Cond. WSE (1) (ft)**	**Proposed Cond. WSE (2) (ft)**	**Delta 2& 1 WSE (ft)**	**Pre-Project Cond. Vel.(1) (fps)**	**Proposed Cond. Vel.(2) (fps)**	**Delta 2& 1 Vel. (fps)**
16515	875.8	875.8	0.0	10.2	10.4	0.2
16305	874.7	874.7	0.0	9.1	9.1	0.0
16130	873.6	873.6	0.0	9.0	9.0	0.0
15960	872.7	872.7	0.0	7.6	7.6	0.0
15745	871.7	871.8	0.1	7.0	7.0	0.0
15540	870.8	870.8	0.0	7.4	7.4	0.0
15335	869.6	869.6	0.0	7.8	7.7	-0.1
15125	868.2	868.2	0.0	8.5	8.6	0.1
14900	866.7	866.8	0.1	9.2	9.0	-0.2
14720	865.8	865.8	0.0	8.8	8.9	0.1
14480	864.5	864.5	0.0	8.6	8.7	0.1
14315	863.7	863.7	0.0	8.0	8.0	0.0
14090	862.3	862.3	0.0	8.5	8.5	0.0
13850	861.1	861.1	0.0	8.3	8.3	0.0
13635	859.9	859.9	0.0	9.6	9.6	0.0
13425	859.1	859.1	0.0	7.4	7.4	0.0

(1) Pre-Project Cond. water surface elevations and velocities are based on "n" value of 0.060 for entire width of the river for the Mission Village pre-project improvement; "SR 126 HWY/Commerce Center Interchange Bank" proposed soil cemnet bank protection which is is a part of separate project.

(2) Proposed Project Cond. water surface elevations and velocities are based on "n" value of 0.060 for entire width of the river for Mission Village poposed project improvements.

HEC-RAS Sections in bold for Mission Village proposed project Improvement Reaches
HEC-RAS Sections 36374 and 36240 are Proposed Bridge Sections