QUESTA
ENGINEERING CORP.

Design Report for Medea Creek Restoration Project, City of Agoura Hills, California

Prepared for:

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October 2013

Civil,
Environmental
& Water
Resources

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INTRODUCTION

Questa Engineering Corporation has been contracted by the City of Agoura Hills to complete design plans for the Medea Creek Restoration Project, located between Kanan Road and Chumash Park. This project consists of demolition of approximately 425 feet of concrete trapazoidal channel and construction of a natural channel stabilized with native vegetation, boulders, and log structures. In addition, public access improvements will increase pedestrian connectivity between Chumash Park and Kanan Road.

This report presents the results of Questa's investigation and analysis of the baseline conditions, discusses the design contraints of the site, and details proposed project design features. The purpose of these studies was to gather and analyze all necessary background information that will lead to a successful restoration strategy. The report describes the constraints and realities of the project such as existing infrastructure and utility issues.

There are three primary design issues that this report will address:

- ***Trunk Sewer Line***: There is a major trunk line that drains a significant portion of the City of Agoura Hills. It parallels the existing channel along the west and presents constraints in widening the floodplain of the creek.
- ***Geologic Conditions***: If the concrete channel is removed and the channel and floodplain are expanded to the west, the underlying bedrock of the adjacent hillside will provide a constraint. Site geology and its design implications are evaluated.
- ***Flood Control***: The revegetation and restoration of the channel will impact the design flood control conditions in the channel.

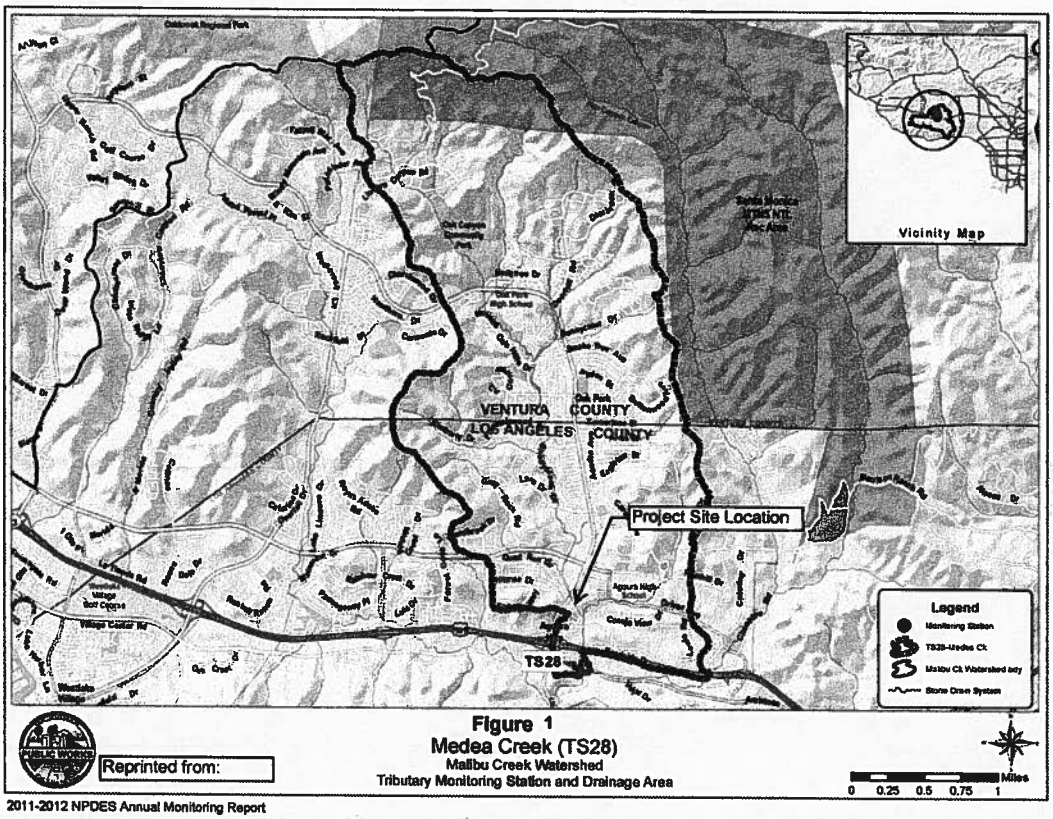
SITE DESCRIPTION

The Medea Creek watershed is located in the northwestern portion of Los Angeles County and the southern portion of Ventura County (**Figure 1**). Medea Creek has its headwaters in the Santa Monica Mountains National Recreation Area and drains through the cities of Oak Park and Agoura Hills. Land use in the Medea Creek subwatershed contains a mix of open space area (61%), residential use (31%) and commercial use (3%). Medea Creek has a total length of 7.56 miles and a drainage area of 6.3 square miles. The project site is located in the lower reaches of the watershed shortly before its intersection with Palo Comado, Cheseboro, and Lindero Creeks which are part of the Malibu Creek watershed, flowing into Malibu Lake and later into the Pacific Ocean. Climate in the vicinity is Mediterranean, characterized by warm summers, cool winters, and markedly seasonal rainfall. Average annual precipitation in the southern portion of the Malibu Creek watershed is 24 inches due to topographical influences of the Santa Monica Mountains and 14 inches in the northern portion of the watershed where the project site is located. Nearly all rain falls from late autumn to early spring; virtually no precipitation falls during the summer.

The project site is located along Medea Creek, just downstream from Kanan Road and adjacent to Chumash Park (**Figure 2**). The site consists of a 425 foot concrete trapazoidal channel with a

steep concrete box culvert draining under Kanan Road on the upstream extent of the site and a relatively natural channel reach at the downstream extent consisting of riparian vegetation and pool habitat.

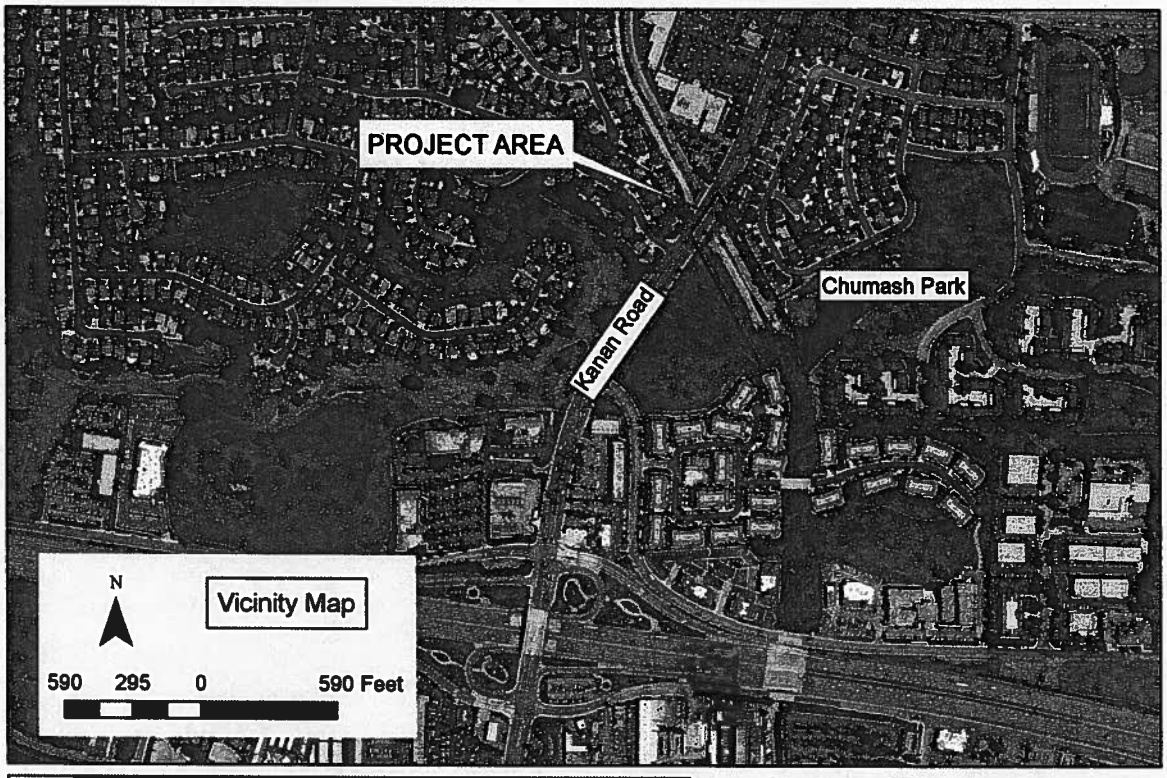
Figure 1. Medea Creek Watershed Map

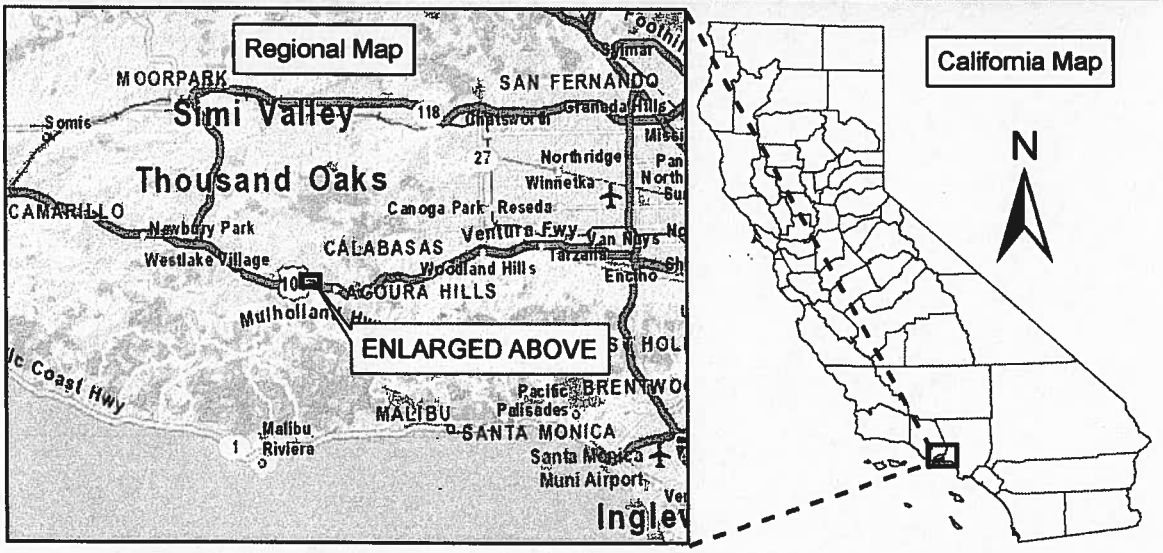


2011-2012 NPDES Annual Monitoring Report

Currently, there is an informal trail along the edge of existing fence lines that connects Chumash Park to Kanan Road. This trail is unimproved consisting of dirt surfacing with steep gradients. It crosses private residential property along the rear portion of the parcels adjacent to the project area.

Figure 2. Project Area Vicinity Map





QUESTA ENGINEERING CORP. *Civil Environmental & Water Resources* (510) 236-6114 FAX (510) 236-3423 questa@questaeco.com P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807	Figure 2 Medea Creek **Vicinity Map**	Drawn : JM Reviewed : ST Date: 7/31/2013 Job #: 1300042

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HYDROLOGIC AND HYDRAULIC ANALYSIS

Design Hydrology

The Medea Creek watershed upstream of the project site is approximately 4,000 acres. Hydrologic flow data was determined from the FEMA Flood Insurance Study (FIS) for Los Angeles County dated September 26, 2008. The flow data from the FIS is summarized in Table 1. The flow was taken downstream of Ventura Highway, approximately 800 feet downstream from the project area making this flow data conservative for project design purposes. These flows have implications for the restoration project and the hydraulic capacity of the channel as discussed in the following paragraphs.

Table 1. Design Discharges

River Reach	Recurrent Interval			
	10 yr flow (cfs)	50 yr flow (cfs)	100 yr flow (cfs)	500 yr flow (cfs)
Medea Creek Downstream of Ventura Highway	2,560	2,645	7,200	11,270

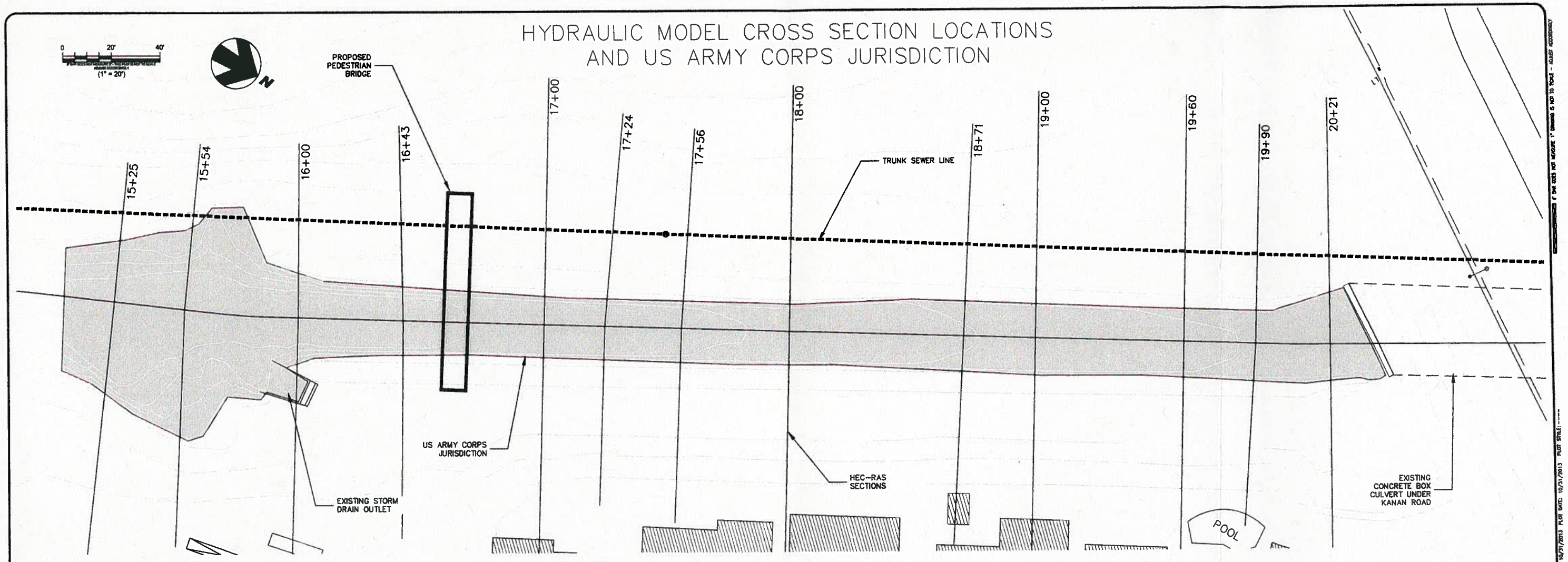
Hydraulic Analysis

The term "hydraulics" is used to describe the way water flows through the channel. Hydraulic analysis is used to determine how high, how fast, and how much force the flowing water is exerting on the channel bed and banks. Any proposed restoration that would modify existing channel geometry, roughness or hydraulic structures would alter the hydraulic properties of the channel. It is essential that any proposed projects not cause or worsen flooding to the surrounding properties. Removing the concrete channel and restoring the bed would alter several basic aspects of the channel. The slope would be reduced in a series of steps within the channel. The friction resistance of the channel would be increased through re-establishment of vegetation. Frictional resistance would increase incrementally over time as the vegetative planting becomes mature. The increased frictional resistance of the channel would change flooding depths and impact the velocity of water moving through the channel.

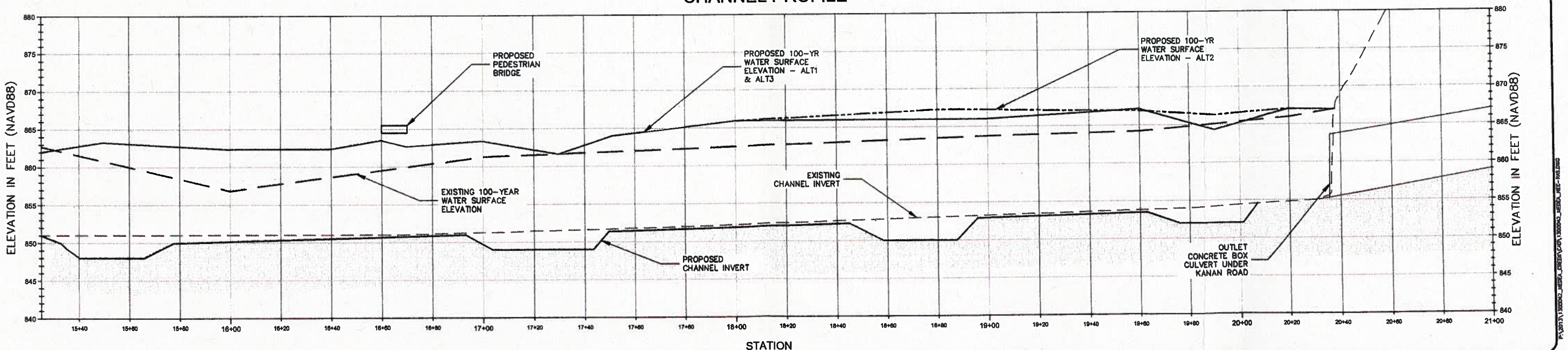
Using a range of potential flows from 100 cfs to 11,270 cfs, hydraulic modeling was performed with the U.S. Army Corps of Engineers' HEC-RAS program. The Medea Creek channel geometry was imported into HEC-RAS using aerial and ground survey provided to Questa by MNS Engineers Incorporated completed in July 2013.

The site topography and channel profile are shown in the Design Plans in Appendix B. The HEC-RAS sections locations and US Army Corps jurisdiction is shown on **Figure 3**. For the existing conditions model, a Manning's "n" value of 0.011 was chosen for the entire concrete-lined channel and a value of 0.035 was used for the floodplain. The two downstream cross sections had increased "n" values of 0.045 (channel) and 0.055 (floodplain) and 0.055 (channel)

HYDRAULIC MODEL CROSS SECTION LOCATIONS AND US ARMY CORPS JURISDICTION



CHANNEL PROFILE



MEDEA CREEK RESTORATION

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FIGURE 3 - HEC-RAS SECTIONS & 100-YR WATER ELEVATIONS

AGOURA HILLS, LOS ANGELES COUNTY

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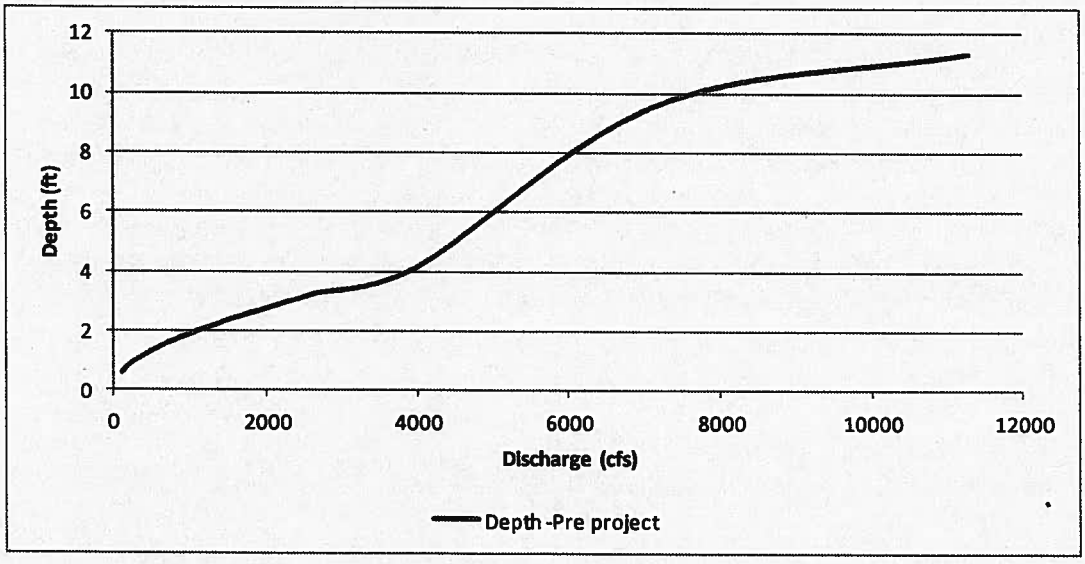
and 0.055 (floodplain) respectively as the channel becomes more naturally vegetated farther downstream from the trapezoidal channel. A mixed flow regime was chosen for the analysis and normal depth upstream and downstream boundary conditions were used with the exception of the 100-year flow which used a known downstream water surface elevation listed in the FIS of 863 feet (NAVD88).

In addition, to determine existing conditions, the HEC-RAS model was utilized to provide an analysis of the impact of restoring the channel to a more natural condition. Two different channel scenarios were modeled: 1) proposed conditions—right after construction, and 2) proposed conditions—with full vegetation established. Post-project model results predicted shear forces within the channel which were a critical component in the design of channel stabilization features. This will be discussed in more detail in a later section of the report titled **Hydraulic Analysis of Alternatives**.

The hydraulic model outputs for selected flow profiles are attached to this report as **Appendix C.** The results for two key variables are summarized below.

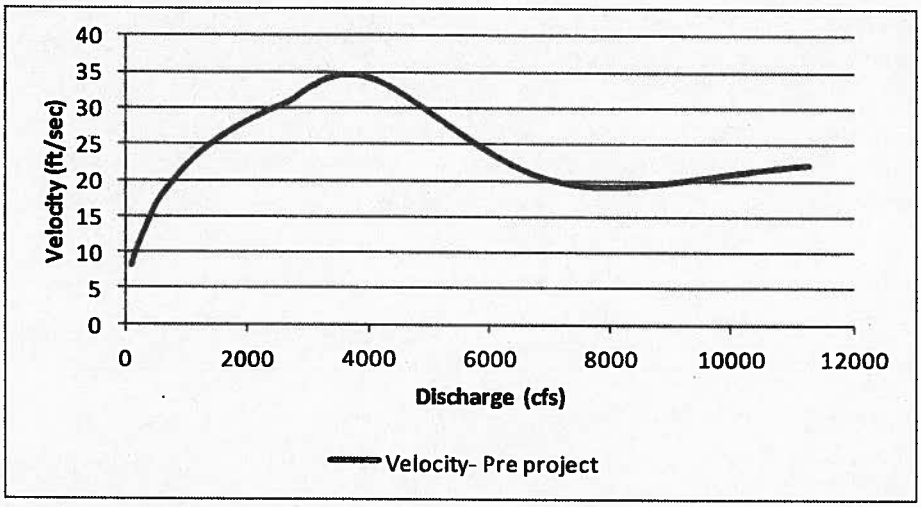
Channel Capacity. The existing channel is very efficient. The graph below shows a depth versus discharge curve for the channel (**Figure 4**). The channel is approximately 10 feet high from the channel bottom to the top of the bank. The existing conditions hydraulic model predicts a maximum depth of 9 to 10 feet within the channel at 100-year flow listed in the current FIS of 7,200 cfs. Thus, there is not much of extra depth under the 100 year discharge rate. Extra capacity in the channel that would allow the incorporation of vegetation planting will have to be gained from channel cross section enlargements and structures to prevent flooding outside of current flood control ROW. Initial modeling indicates that restoring the channel with fully matured vegetation would cause water surface elevations to rise above the current top of bank elevations although they would still be far below all of improvements on adjacent properties.

Figure 4. Depth vs Discharge



Channel Velocities. Existing flow velocities within the channel are very high due to the low frictional resistance within the concrete-lined trapezoidal channel and the steep slope. **Figure 5** shows average channel velocity versus discharge for the existing channel. These high velocities are an important constraint because the erosion potential of the channel can be linked to the velocity of the water moving through the channel. Once the channel is planted with or colonized by vegetation, velocities will be reduced. The design of the restoration project has to take into account that prior to this vegetation being established, the channel will have lower frictional resistance, thus making channel erosion a serious concern during the establishment period.

Figure 5. Velocity vs Discharge



Groundwater Conditions

Based on the riparian vegetation and generally porous thin soils over bedrock, groundwater levels are expected to be generally commensurate with the channel invert. Most of the water flow in the channel during the dry summer months is generated from urban sources.

GEOMORPHIC ANALYSIS

Background and History

The geomorphology of Medea Creek has highly been affected by anthropogenic activities. The air photo sequence shown below highlights the human development that has taken place within the watershed.

Figure 6. Medea Creek Air Photo 1959

Figure 7. Medea Creek Air Photo 1977

Figure 8. Medea Creek Air Photo 1989

Figure 9. Medea Creek Air Photo 2004

Figure 10. Medea Creek Air Photo 2012

Existing Channel Description

The 425-foot proposed restoration reach is comprised of a concrete-lined trapezoidal channel with a slope of 1%. Upstream from the concrete trapezoidal channel, there is a three-barreled box culvert under Kanan Road with 180-foot length, 36-foot width, 8-foot height and 5.8% slope. The channel upstream of Kanan Road is also trapezoidal and concrete-lined.

The naturalized channel downstream from the project area was used as a reference reach to help determine appropriate channel dimensions and determine the level of annual high flow. The channel is characterized by a single low-flow channel, gently sloping terraces, and vegetated side slopes.

Trees within the downstream channel reach are primarily willow ranging from 5 to 15 inches in diameter. Woody debris has collected around the base of some of the trees growing along the lower banks which has established channel roughness and decreases flow velocities. The transition from the trapezoidal concrete to natural channel creates a hydraulic jump or standing

wave during high flows. This has led to the formation of a long pool with a depth of up to 3 feet through portions of the downstream channel reach. The channel slope throughout this reach is very flat (less than 0.5%). In some locations, fine sediment including silts and sands has deposited behind debris and vegetation along the channel banks. Channel bed material is also quite fine consisting mostly of sands and silts, with some cobble material. Given the urbanized nature of the watershed, sediment supply and input into the system is expected to be limited. The long-term stability of the channel bed and its interaction with low sediment supply is an important design element.

Evaluation of Bankfull Discharge

Peak flow with a recurrence interval of 1.5 to 2 years is considered to be "bankfull discharge," meaning the flow that is primarily responsible for the delineation or shaping of streambeds and banks. This bankfull discharge is basically the discharge that has a 50 percent chance of being exceeded in any given year. It is important in designing a stable channel to develop a reasonable estimation of the bankfull peak flow. This discharge is important from a design perspective because it generally represents the flow at which bedload becomes mobilized and channel features such as point bars and scour holes are developed and maintained. This discharge is one of the primary starting points of the channel design process.

Bankfull discharge was evaluated and determined using two methodologies. First, channel observations were used to identification physical scour lines to determine bankfull depths. Scour lines are used by the U.S. Army Corps of Engineers to determine the Ordinary High Water Mark (OHWM) for use in delineation of Corps jurisdiction over waters of the United States. The Army Corps definition of OHWM as "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas," is used here to apply to scour line identification in the field to determine bankfull widths and depths.

Scour lines were readily observable in Medea Creek downstream from the project reach, usually due to the presence of a clear line on the bank, terrace shelving, and/or destruction of terrestrial vegetation. Bankfull discharge rates were estimated by examining which discharge rates from the HEC-RAS model yielded the field measured bankfull water depths.

The second method for evaluation bankfull discharge was a Peak Flow Frequency Regression Analysis completed using the 10-, 100- and 500-year flows listed in the FEMA FIS (Table 2).

Both of these techniques resulted in an estimated bankfull discharge of approximately 500 cfs.

Width/Depth Ratios

The width/depth ratio is defined as the ratio of the bankfull surface width to the mean depth of the bankfull channel. The width/depth ratio is key to understanding the distribution of energy

within a channel, and the ability of various discharges occurring within the channel to move sediment.

Width/depth ratios were calculated for the creek downstream of the concrete trapezoidal channel. The ratio within the downstream channel was approximately 15 to 20.

Channel Bed Grain Size Analysis

Bedload observations were made downstream of the concrete trapezoidal channel. Based on field observations, the bed sediments are dominated by smaller sized material including sand and silt. This indicates that coarse gravel and cobble type material is not readily available to the creek system. It is also likely that the amount of channel bank armor and urban development upstream has significantly reduced the quantity and size of material being transported as bedload. Given these findings, a key component of the restoration project will be to armor the channel bed to reduce erosion and scour potential that could occur due to the lack of sediment supply. Conversely, it is unlikely that excessive sediment deposition or bedload transport will negatively impact the project. The bedrock beneath the channel should limit excessive degradation through the reach.

PROJECT CONSTRAINTS AND DESIGN ISSUES

Flood Control

The FEMA FIS provided information on peak flows for the 10-, 50-, 100- and 500-year storm events. Of particular concern is the flow volume of the 100-year event of 7,200 cfs. The existing channel was designed to be very efficient in conveying this flow through the project reach. The concrete channel is vegetation free, and hence, has low frictional resistance. It can convey high flows in a small area. The restoration will significantly alter the efficiency of the channel to convey flow and will raise flood levels. Initial modeling shows that water surface elevations could rise above existing top of bank elevations on the western and eastern sides. This would cause shallow flooding along the maintenance access road to the east of the channel and along the lower portion of the hill slope. The resulting minor flooding of at the base of the slope is on private property although houses and other structures are located significantly above the flood elevations. However, in order to prevent even minor flooding of private property, a low flood/retaining wall along the eastern side of access road should be considered. This wall would prevent flooding and also allow for a reduction in the gradient of the slope above it resulting in increased revegetation success on the hillside. The wall could also facilitate privacy for the adjacent property owners.

Adjacent Parcel Ownership

Property on the east side of the channel is privately held and no channel widening is proposed along this bank. However, the west side of the channel is an open space area and channel widening or bank top modifications may be incorporated into the design to expand in this

direction. However, additional land and/or easement right-of-ways may need to be secured by the City of Agoura Hills.

Fish Passage

Currently, there are no known migratory fish within the project area. The Ringe Dam downstream on Malibu creek prevents fish migration to this area. However, there are resident rainbow trout living in the channel segment downstream from the project reach. High velocities and shallow depth would prevent fish from gaining access upstream of the project site through the Kanan Road box culvert. The project will create additional habitat area and no new fish passage barriers will be constructed.

Biologic Issues

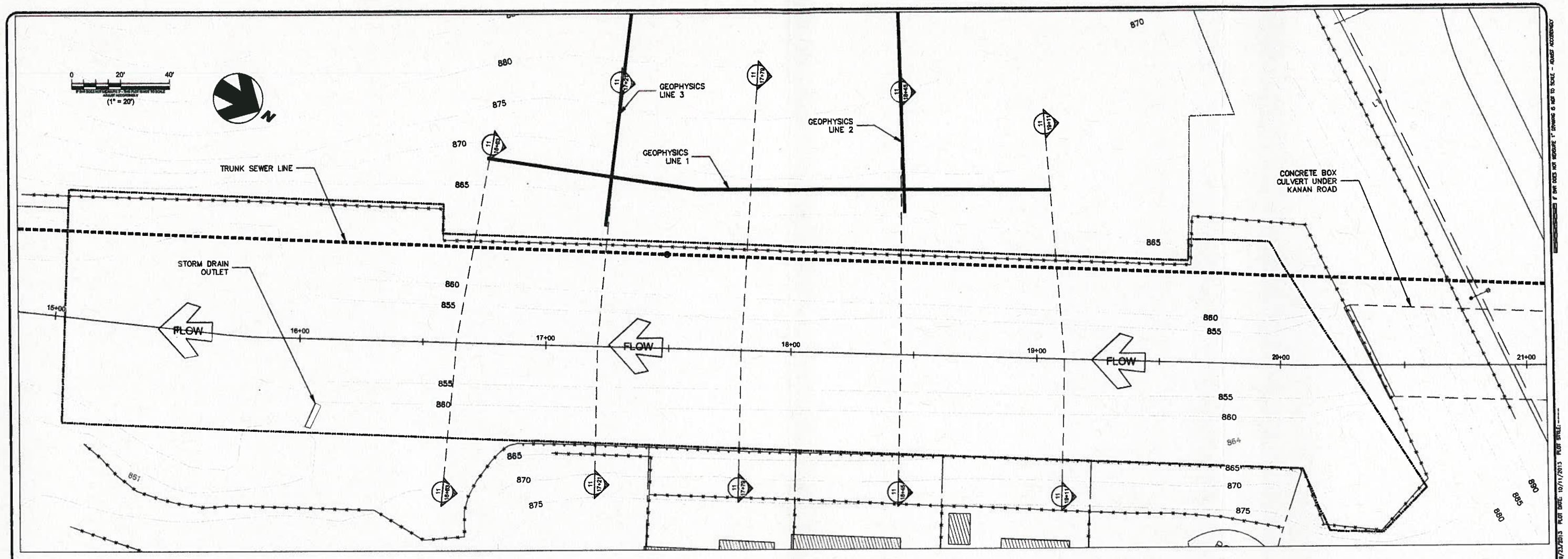
A biologic reconnaissance was been completed for the project and is included in Appendix A. No significant issues were identified. Some vegetation clearing will be needed for the project although it will be a very small amount and the final project outcome will more than compensate for any riparian or wildlife habitat impacts.

Cultural Issues

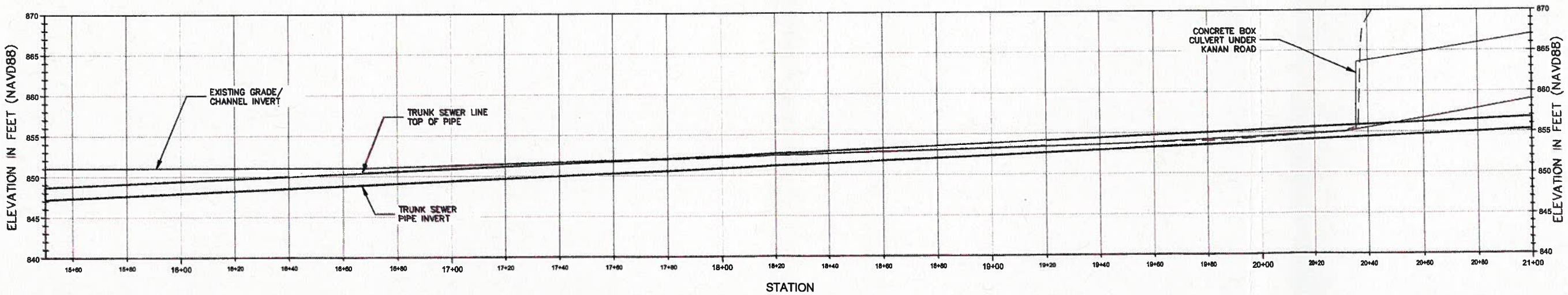
The project site is located less than one mile from a known cultural site. The site was mapped and excavated in late 1960's. The project site was not surveyed at that time nor has it been ground surveyed for this project. Because of the site's proximity to the known village and burial sites, it is recommended that additional ground surveys should be completed prior to and during construction. However, because of the site's high disturbance history, and shallow bedrock, it is unlikely that cultural issues will cause significant project permitting or construction issues.

Bedrock Geology

The underlying geology is composed of Conejo Volcanics that generally consist of hard basalt and andesite rocks. Andesitic flows and breccias of the Conejo Volcanics are exposed along the southwestern slope in the vicinity of the proposed project corridor. This rock is hard and is not rippable with a bulldozer. Excavation into this material will require an excavator equipped with rock bits and ram hoes. Excavation will likely be slow and time consuming. In order to determine the location of the subsurface bedrock, a geophysical study was completed to map the bedrock contact immediately west of the channel. The location of the geophysical survey and results are shown on **Figures 11** and **12**. Generally, there is a layer of shallow rocky soils that overlays the bedrock. The soil layer varies in thickness, but is believed to be 10 to 12 feet thick adjacent to channel and 2 to 3 feet thick beneath the channel. **Figure 12** shows where we believe the bedrock contact is located adjacent to the channel. The contact between the soil and bedrock is critical in determining the feasibility of relocation of any sewer lines discussed below.



EXISTING CHANNEL AND SEWER LINE PROFILE



MEDEA CREEK RESTORATION

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FIGURE 11 - GEOPHYSICAL SURVEY & SEWER LINE PROFILE

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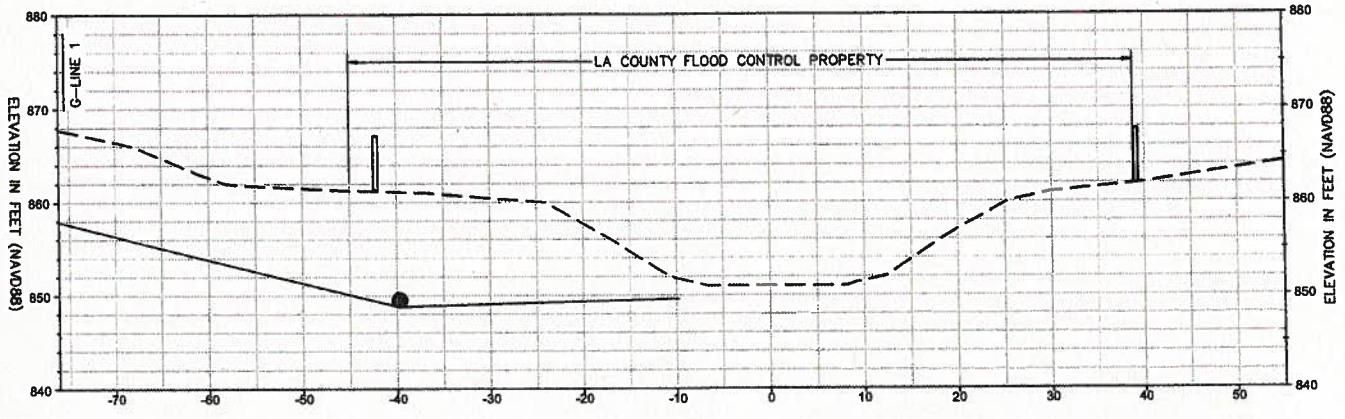

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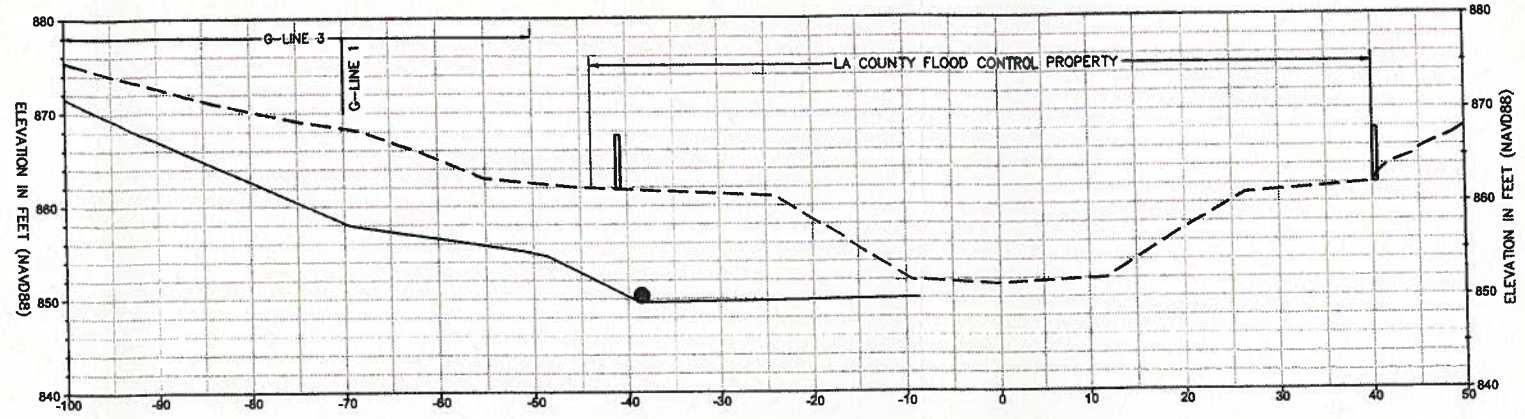

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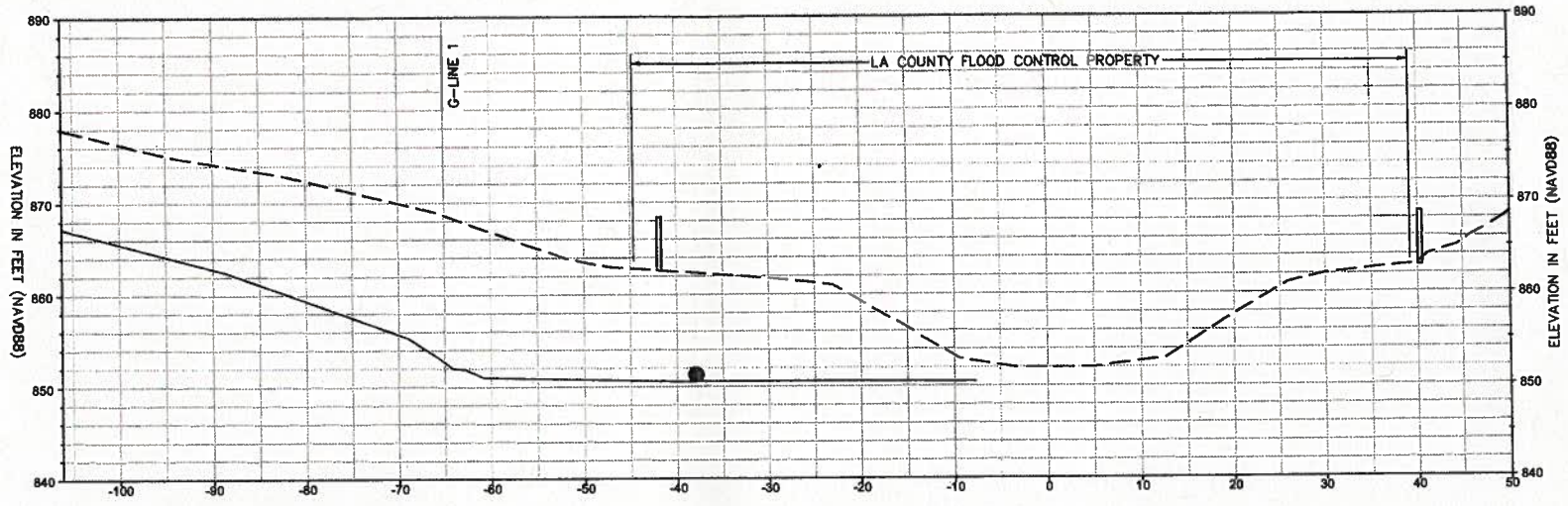

LEGEND

- EXISTING GROUND SURFACE
- BEDROCK CONTACT
- 18" DIAMETER TRUNK SEWER LINE
- EXISTING FENCE LINE

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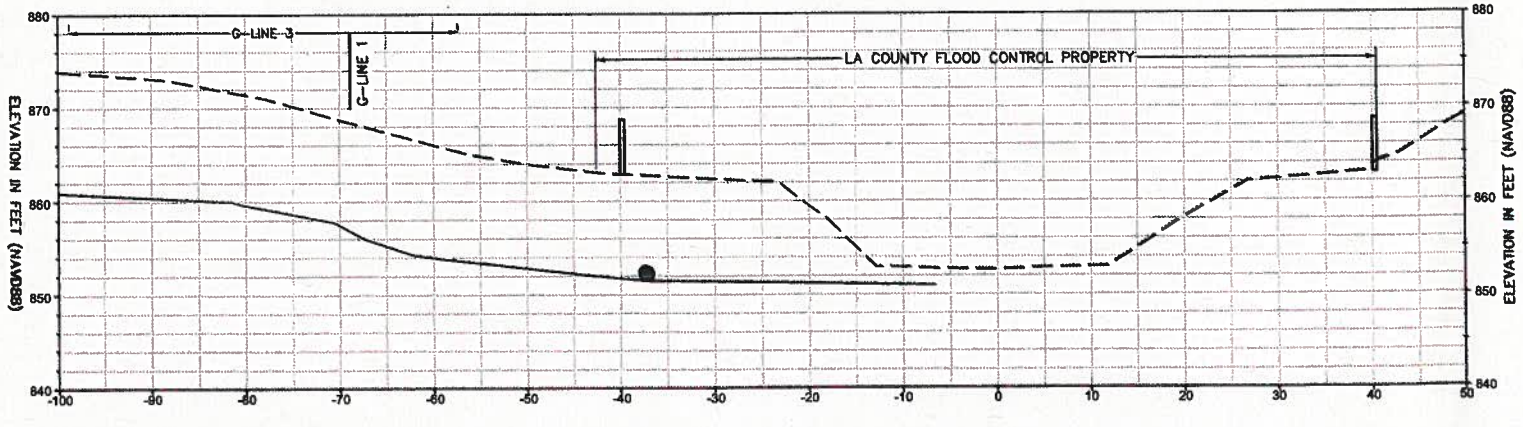

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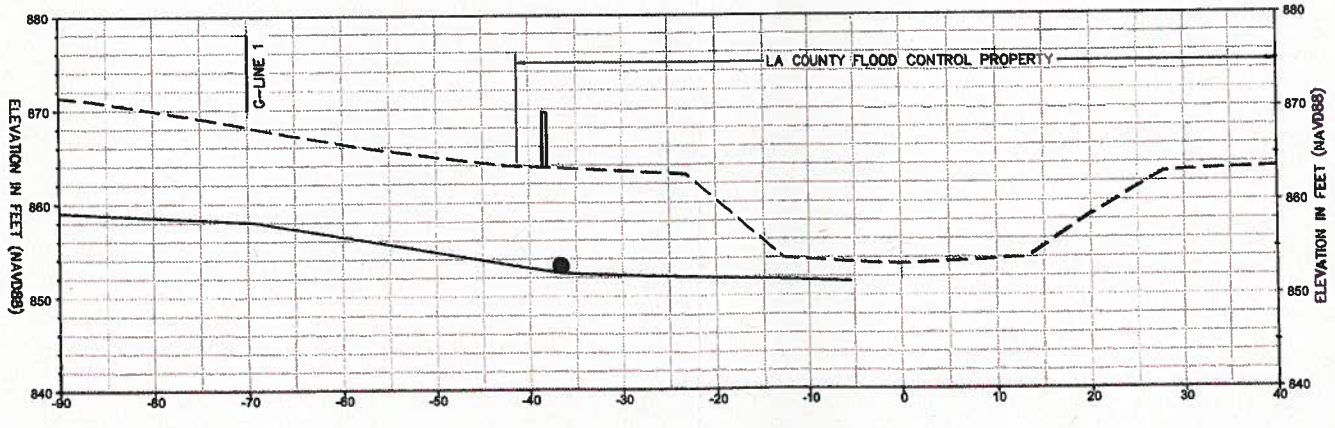

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FIGURE 12 - EXISTING SECTIONS - BEDROCK AND SEWER LINE

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Utilities

The project reach is in a very urban location with residential development on the east side of the channel. Thus, utilities within the project area either have to be avoided or relocated to accommodate the channel restoration. **Sheet 2 and 3** shows the existing location of these utilities. On the site are the following:

- Trunk Sewer Line
- Storm Drains

A major trunk sewer line draining a significant portion of Agoura Hills parallels the existing channel and presents a constraint in widening the floodplain of the creek. If the trunk sewer line can be moved or protected in a safe and cost-effective way, it could be feasible to significantly widen the floodplain. Questa has researched the as-built drawings of this pipe and the sewer line is at a depth that is commensurate with the bottom of the channel as shown in **Figure 11.**

DESIGN CONSTRAINTS ANALYSIS

The primary design constraint for this project is the bed rock geology and its impact on the potential to relocate the existing sewer line.

Adding additional floodplain area and a gentle meander pattern to the creek alignment is more feasible if the sewer line can be moved. The bedrock was located very near the channel between stations 15+50 and 17+50, making sewer relocation in this area difficult. Based on analysis of bedrock elevations it appeared feasible to move the sewer line approximately 20 feet to the west between stations 17+50 to 20+00. This does not allow for extensive floodplain creation but would add some flow capacity and habitat value.

If the sewer line is left in its current position then the options for restoration are more limited. Under this scenario, an elevated floodplain terrace could be created on the west side of the channel. The terrace would maintain 3 to 4 feet of cover over the sewer line and extensive rock armoring would protect the sewer line from channel scour during large flow events.

Regarding the storm drains, the box culvert that carries Medea Creek flows under Kanan road will have to be protected from scour if the concrete channel downstream is removed. This will require a concrete cutoff wall to be constructed at the upstream extent of the restored channel segment.

In addition, there is a second significant storm drain entering the channel near the downstream extent of the site which will also require some type of outlet scour protection depending on how the proposed restoration work and grading transitions into the natural topography in this location.

DESCRIPTION OF ALTERNATIVES

The restoration alternatives that were examined for this project have four main components: 1) concrete channel removal, 2) sewer line relocation, 3) confluence restoration, and 4) trail

alignments. For all of the alternatives, the trail alignments are the same. Options such as specific trail alignments, stairways and trail connections will be determined later. The alternatives discussed in this report focus on the treatments to the concrete channel and utilities in the project reach. In all of the alternatives the concrete channel lining is removed and a naturalized channel is reestablished. All of the alternatives include the construction of a new retaining wall along the eastern bank. This retaining wall will prevent 100-year flooding from impacting residential property as well reducing the bank slope allowing for better plant establishment. The alternatives vary in whether the sewer line is relocated and the tributary confluence is day-lighted.

Alternative 1: Concrete Channel Removal

This alternative would remove the entire concrete channel lining and secure the existing sewer in place. A minimum of 3 feet of cover and 10 feet lateral distance to active channel will be maintained. We expect that sewer line is nearly sitting on bedrock. If that is the case then rock scour protection shown on the section drawings may be scaled back and concrete anchors could be designed to secure the sewer line. Under this alternative, the downstream culvert outlet of the tributary channel would remain at its current location.

Alternative 2: Concrete Channel Removal and Sewer line Relocation

This alternative assumes that the concrete channel will be removed and the sewer will be relocated approximately 20 feet to the west for the upper 250 feet of the channel. Relocating the sewer line allows the channel and floodplain to be widened by 20 feet and provides more space for habitat reestablishment. This alternative has additional grading and construction logistics and expenses.

Alternative 3: Concrete Channel Removal and Tributary Restoration

This alternative is very similar to Alternative 1 but would daylight a 20 to 30 foot portion of the tributary storm drainage. Day-lighting this section allows the re-contouring and construction a more natural channel confluence. This will increase the riparian restoration area as well provide additional aquatic habitat.

HYDRAULIC ANALYSIS OF ALTERNATIVES

In addition to determine existing conditions, the HEC-RAS model was utilized to provide an analysis of the impact of restoring the channel to a more natural condition. The three restoration alternatives listed above were modeled. The existing and proposed conditions water surface elevations are shown on **Figure 3**. Differences between the Alternatives 1 & 3 water surface elevations were indiscernible at the scale of the graphic.

Alternative 2 resulted in water surface elevations that were approximately 1 foot higher than the other alternatives between stations 18+40 and 19+20. This is likely due to the flow contracting into the smaller downstream cross sections. **Tables 2** and **3** below summarize the velocities and shear stress for each alternative during different flow regimes. These model outputs are a result of Manning's "n" values of 0.04 and 0.065 for the channel and floodplains respectively. In

addition, a fourth scenario was modeled which included Alternative 1 with minimal vegetation established on the banks. This simulates the first few years after construction of the project. For this model run, the "n" value for the floodplains was also set at 0.04.

Table 2: Summary of Flow Velocities

			Alternative 1		Alternative 2		Alternative 3		Alternative 1 - No Floodplain Vegetation	
River Station	Profile	Q Total	Vel Chnl	Overbank Velocity	Vel Chnl	Overbank Velocity	Vel Chnl	Overbank Velocity	Vel Chnl	Overbank Velocity
		(cfs)	(ft/s)	(ft/s)	(ft/s)	(ft/s)	(ft/s)	(ft/s)	(ft/s)	(ft/s)
Total Sta 1900 to Sta 2000 (Directly Dowstrea fro Box Culvert)	2-yr	500	6.5	1.	6.4	1.0	6.5	1.2	6.4	2.1
	10-yr	2560	22.2	5.7	20.5	.7	22.0	4.1	2 .7	9.8
	50-yr	2645	22.4	5.8	20.7	4.0	22.2	4.	24.0	10.0
	100-yr	7200	17.1	5.7	1 .6	4.5	15.5	5.1	20.	11.2
Total Sta 1700 to Sta 1900 (Middle Channel Se ent)	2-yr	500	5.9	1.	5.8	1.	5.9	1.	5.8	2.0
	10-yr	2560	10.8	.8	10.4	.7	11.0	.9	10.	5.8
	50-yr	2645	11.0	.9	10.5	.8	11.2	.9	10.4	5.9
	100-yr	7200	16.7	5.9	15.9	5.7	16.7	5.9	15.7	9.0
Total 1500 to 1700 (Downstrea Channel Se ent)	2-yr	500	5.4	1.5	5.4	1.5	5.	1.5	5.	2.
	10-yr	2560	9.7	.5	9.7	.6	9.5	.7	9.1	5.
	50-yr	2645	9.9	.6	9.9	.6	9.6	.7	9.2	5.4
	100-yr	7200	1 .9	5.1	1 .7	5.0	12.9	4.9	12.6	7.6

Table 3. Summary of Shear Stresses

			Alternative 1		Alternative 2		Alternative 3		Alternative 1 – No Floodplain Vegetation	
River Station	Profile	Q Total	Shear Chan	Overbank Shear	Shear Chan	Overbank Shear	Shear Chan	Overbank Shear	Shear Chan	Overbank Shear
		(cfs)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)
Total Sta 1900 to Sta 2000 (Directly Dowstrea fro Box Culvert)	2-yr	500	1.5	0.	1.4	0.2	1.5	0.2	1.4	0.2
	10-yr	2560	16.0	.9	15.4	2.2	16.2	2.5	17.4	4.
	50-yr	2645	16.2	4.0	15.6	2.4	16.4	2.6	17.7	4.5
	100-yr	7200	6.1	2.	.8	1.4	4.7	1.8	9.1	.8
Total Sta 1700 to Sta 1900 (Middle Channel Se ent)	2-yr	500	1.1	0.2	1.1	0.2	1.1	0.2	1.1	0.2
	10-yr	2560	2.8	1.2	2.6	1.2	2.9	1.2	2.6	1.1
	50-yr	2645	2.8	1.2	2.7	1.2	2.9	1.	2.6	1.1
	100-yr	7200	5.7	2.5	5.	2.	5.7	2.5	5.2	2.
Total Sta 1500 to Sta 1700 (Downstrea Channel Se ent)	2-yr	500	1.0	0.	1.0	0.	1.0	0.	1.0	0.
	10-yr	2560	2.4	1.1	2.4	1.1	2.	1.2	2.1	0.9
	50-yr	2645	2.5	1.1	2.5	1.1	2.	1.2	2.2	1.0
	100-yr	7200	4.0	1.9	.9	1.8	.4	1.7	.4	1.6

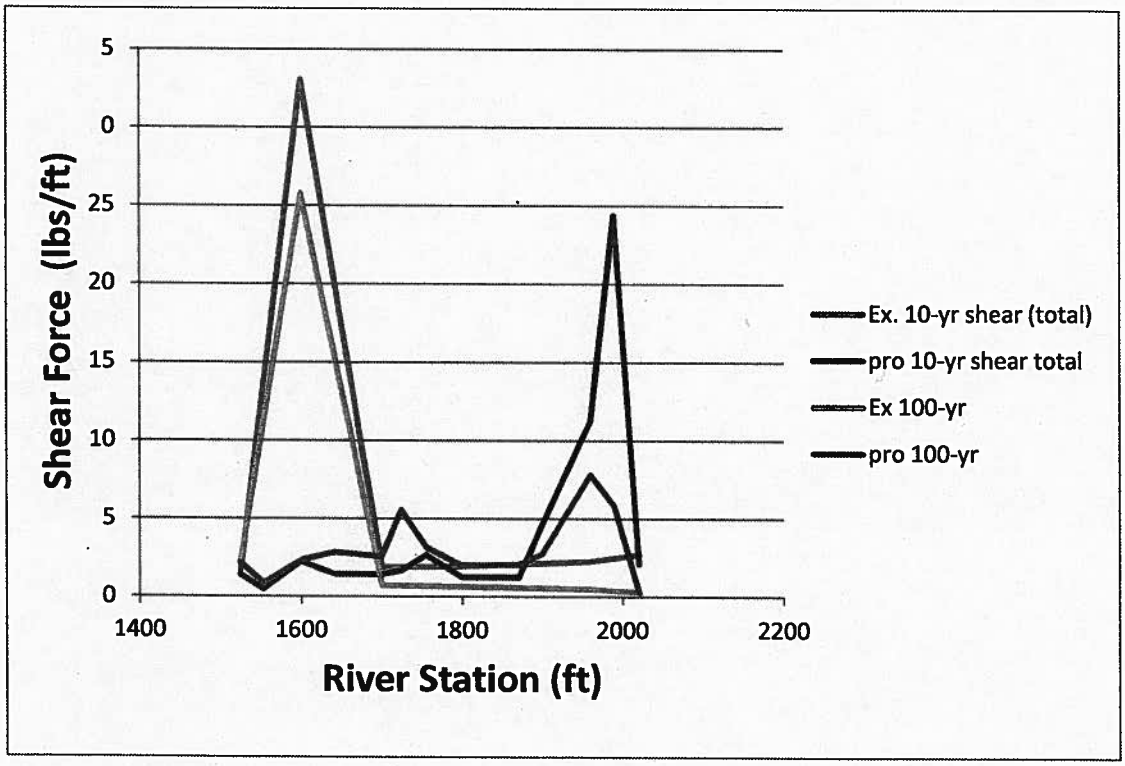
Velocities and Shear Stress

Overall, the channel velocities and shear stresses shown in **Tables 2** and **3** are quite high throughout the new channel reach with the highest rates occurring in the upstream channel segment immediately downstream of the box culvert under Kanan Road. In this area, it will be critical to use significant volumes of riprap rock for energy dissipation. In addition, throughout the project reach, areas of large rock will be needed to stabilize the channel.

Overbank velocities and shear stresses are generally much lower than those within the channel. However, under the fourth scenario simulating the first few years after channel construction without established vegetation, the velocities and shear stresses are noticeably higher. Thus, it will be important to install temporary roughness and bank stabilization features along the lower banks and floodplains to avoid potential scour damage from a large storm event that occurs within the first few years after construction.

Figure 13 compares the pre- and post-project shear stresses along the channel reach. The proposed project increases shear near the Kanan Road culvert outlet (station 2000) but actually decreases shear at the downstream extent of the project where the current concrete channel transitions into a natural channel.

Figure 13: Pre and Post Project Shear Stress Comparison



SUMMARY AND COST OF ALTERNATIVES

In summary, all of the alternatives will remove the concrete channel and reestablish riparian habitat throughout the project area. The modeling of alternatives shows that flows in excess of the 10-year event have high velocities and shear stresses. The upper portion of the channel is the most exposed and thus bank stabilization and the channel bed will have to be designed with large rock energy dissipation regardless of the alternative.

Bedrock is a considerable constraint for widening the floodplain and presents numerous difficulties in relocating the sewer line. The sewer line can only be relocated for about 250 feet under Alternative 2 which allows for widening of the channel in that area.

The third alternative entails restoring the confluence. This would mean removing existing headwalls and a length of storm drain to expose an additional 20 to 30 feet of open channel. Though a small length of additional channel, it would remove a structural element from the immediate creek bank vicinity. Once the concrete channel is removed this current culvert outlet is likely to appear out of place. Removing a portion of the pipe and re-contouring the slope will give the project a much more natural feel and will have a considerably better appearance from all perspectives. The overall project cost as well as the cost for each alternative is detailed on **Table 4.**

Table 4. Cost of Alternatives

Medea Restoration Initial Cost Estimate - October, 2013

		Alternative 1			
No.	Item	Cost	Quantity	Units	Total Cost
1	Survey and Stakeout	$ 10,000	1	LS	$ 10,000
2	Mobilization	$ 60,000	1	LS	$ 60,000
3	Dewatering	$ 10,000	1	LS	$ 10,000
4	Site Protection ESA/silt fence	$ 4	1800	LF	$ 7,200
5	Demolition	$ 100	1500	TN	$ 150,000
6	Grading (Balance on site)	$ 40	5000	CY	$ 200,000
7	Willow Planted Boulder Revetment at Box Culvert Outlet	$ 110	500	TN	$ 55,000
8	Willow Planted Boulder Revetment for Trunk Sewer Line Protection	$ 110	300	TN	$ 33,000
9	Willow Planted Boulder Grade Control Structures	$ 110	850	TN	$ 93,500
10	Constructed Riffles	$ 110	750	TN	$ 82,500
11	Boulder cluster (10 TN rock per structure)	$ 2,000	7	each	$ 14,000
12	Coir Bio-block Revetment (3 layers)	$ 75	750	LF	$ 56,250
13	Large Wood Habitat Structure	$ 3,000	8	each	$ 24,000
14	Willow Stakes	$ 5	500	each	$ 2,500
15	Bridge/Abutments	$ 2,250	80	FT	$ 180,000
16	ADA Trail (3" AC/ 12" AB)	$ 7	6000	SF	$ 42,000
17	DG Trail (4" stabilized)	$ 4	4000	SF	$ 16,000
18	Concrete Steps/Railings	$ 1,500	30	CY	$ 45,000
19	Railroad Tie Steps	$ 5,000	1	LS	$ 5,000
20	Retaining Wall	$ 125	375	LF	$ 46,875
21	Seeding	$ 2,500	2	AC	$ 5,000
22	Planting	$ 100	400	each	$ 40,000
23	Irrigation	$ 20,000	1	LS	$ 20,000
24	Erosion Control	$ 10,000	1	LS	$ 10,000
25	Construction Management	$ 50,000	1	LS	$ 50,000
				Subtotal:	$ 1,257,825
				Contingency (20%)	$ 251,565
				Total Project Cost:	$ 1,509,390

		Additional Costs Alternative 2:			
No.	Item	Cost	Quantity	Units	Total Cost
26	Survey and Stakeout	$ 5,000	1	LS	$ 5,000
27	Mobilization	$ 5,000	1	LS	$ 5,000
28	Grading (Balance on site)	$ 40	1000	CY	$ 40,000
29	Willow Planted Boulder Revetment for Trunk Sewer Line Protection	$ 110	200	TN	$ 22,000
30	Move/Replace Sewer Line	$ 400	180	LF	$ 72,000
31	Construction Management	$ 10,000	1	LS	$ 10,000
				Subtotal:	$ 154,000
				Contingency (20%)	$ 30,800
				Total Project Cost:	$ 184,800

		Additional Costs Alternative 3:			
No.	Item	Cost	Quantity	Units	Total Cost
32	Survey and Stakeout	$ 2,500	1	LS	$ 2,500
33	Mobilization	$ 5,000	1	LS	$ 5,000
34	Demolition	$ 100	200	TN	$ 20,000
35	Grading (Balance on site)	$ 40	250	CY	$ 10,000
36	Willow Planted Boulder Revetment at Culvert Outlet	$ 70	200	TN	$ 14,000
37	Move/Replace Outlet Structure	$ 1,500	40	CY	$ 60,000
38	Large Wood Habitat Structure	$ 3,000	1	LS	$ 3,000
39	Construction Management	$ 5,000	1	LS	$ 5,000
				Subtotal:	$ 119,500
				Contingency (20%)	$ 23,900
				Total Project Cost:	$ 143,400

PROJECT DESCRIPTION

The project team concluded that Alternative 3 is the preferred alternative. This alternative entails removing the concrete channel, keeping the sewer line in its current location, and restoring the drainage confluence at the downstream extent of the project.

The sewer line will be left in place considering that the existing bedrock severely limited the possibility of relocation. Overall, moving the sewer line gains little advantage in terms additional habitat value and adds significant expense to the project. In addition, by widening only a portion of the channel, water surface elevations actually increased through a portion of the project.

Also, to increase the habitat value of the project, the project team decided to include a confluence restoration component. A 20 to 30 foot portion of the tributary storm drain line will be day-lighted allowing for re-contouring and construction of a more natural channel confluence. This will increase the riparian area restored as well provide additional aquatic habitat. The following project components and features will be included in the project design. **Sheets 1-16** included in **Appendix B** depict the 60% design efforts for the project.

Demolition of Existing Concrete Channel

The majority of the existing concrete channel and asphalt access roads will be demolished and the rubble will be off-hauled to an appropriate refuse disposal facility as shown on **Sheet 4** in **Appendix B.** A 30-foot length of concrete channel directly downstream from the Kanan Road culvert will be left in place and a concrete cutoff wall will be constructed as shown on **Sheet 7** in **Appendix B.**

Sewer Line Protection

The trunk sewer line will be protected from scour as shown on **Sheet 6** in **Appendix B** with grouted riprap rock placed adjacent and on top of the line at locations where the creek channel is within 10 to 15 feet of the sewer line.

Channel Gradient Control

The first restoration component involves the slope of the channel. The current channel has a slope of approximately 1% with an elevation drop of approximately 4 feet over the 425-foot project reach. If the concrete was to be removed and the existing slope maintained, then flow velocities would be high, turbulent flow would dominate, and the channel bed would likely undergo significant bed degradation. Typically, in streams with similar gradients the channel bed consists of pool riffle sequences.

In the case of Medea Creek, we are proposing a series of pools and riffles with rock weirs constructed throughout the sequences to insure that the channel features are maintained over time. Varying the number of rock weirs and their vertical drop heights allows for

numerous options; however, to accommodate passage of the Rainbow Trout that inhabit the downstream channel, we have limited the drop heights to **less than 1 foot.** It is essential that the grade control weir structures be keyed deeply into the banks of the creek so that flow would not "flank" or go around the structures, making them ineffective as a gradient control.

The grade control structures will reduce sediment transport of the constructed riffles, encourage bar and floodplain development, and increase the chances of developing a stable low flow channel and associated floodplain channel morphology for the creek. In addition to the gradient control weirs and constructed riffles will be installed using a variety of rock sizes to mimic a natural channel riffle, as shown on **Sheets 7** and **11** in **Appendix B.**

The bankfull channel banks along the riffles and grade control structures would be planted with willow stakes to ensure that vegetation cover becomes part of the overall channel structure. Willow will be planted in the deep trenches associated with the weir and keyway construction. The trenches would be of sufficient depth so that willow planting could have access to underflow and groundwater resources. Additional riparian planting would be completed on the flood plains and channel banks to insure long term stability of the channel.

Bank Slope Configuration

The existing concrete bank slopes are currently 1.5 (Horizontal) to 1 (Vertical). At this slope, planting and establishing riparian vegetation will be difficult. For the restoration of the bank slopes to be successful, the angle of the slope should be reduced. Typically, a slope of 2:1 or flatter is recommended for revegetation. Steeper slopes such as 1.75:1 can be revegetated but require greater effort; colonization and growth can be slower, as well. The project has been designed with a minimum bank slope of 2:1 with most slopes at least 2.5:1 or flatter.

Erosion Control

Effective erosion control within the channel is mandatory. The channel erosion potential would change over time as the vegetation matures. Typically the erosion potential of the channel and banks decreases as the project ages, and mature stable vegetation is established. One key to any restoration project is to reduce erosion during the initial phases of the project construction and establishment. How the project is protected from erosion can vary depending on forces in the channel and the constraints of the site. Erosion control design strives to determine an appropriate level of protection.

Softer "bio-technical" approaches that integrate vegetation, and biodegradable products such fiber blankets, logs, and coir products will be used. These are effective but under certain flow conditions their strength and resistance to erosion is limited. The biodegradable products are used to provide temporary erosion protection and allow for the vegetation to mature and provide the primary erosion control within 3 to 5 years.

These types of installations are rated by shear stress and generally can be used for up to 3 lbs/ft^2 shear stresses for short duration. The table below illustrates predicted strengths of some techniques immediately after and within 3-5 years after installation.

Table 5. Shear Tolerance of Bank Slope Protection

Treatment Approach	Directly after Installation		After three to four growing seasons	
	(N/m^2)	(lb/ft^2)	(N/m^2)	(lb/ft^2)
Turf /Grass	10	0.2	100	2.1
Reed Plantings	5	0.1	30	0.6
Reed Rolls, biologs	30	0.6	60	1.3
Live fascine	60	1.3	80	1.7
Willow brush layer	20	0.4	140	2.9
Willow mat	50	1.0	300	6.3
Hard wood plantings	20	0.4	120	2.5
Branch packing, brush mattress	100	2.1	300	6.3
Small rock revetment with live stakes	200	4.2	300	6.3
Boulder sized rip-rap, unplanted	-	-	250	5.2
Concrete wall, cement blocks	-	-	600	12.5
Gabion structures, planted	400	8.4	500	10.4

***H.M. Schiechtl and R.Stern. 1997. Water Bioengineering Techniques for Watercourse Bank and Shoreline Protection. Blackwell Science Ltd.**

Our calculations show that storm events immediately after project construction would create average shear stress forces that would exceed the design thresholds for all but the most stout erosion control fabrics and biotechnical installations.

We anticipate that erosive flow conditions would occur between the 5- and 10-year recurrence interval flow events. The hydraulic model indicates that shear forces in the 2 to 4 lbs/ft^2 range can be expected during these events through much of the restored channel. In other words, there could be a 10 percent chance in any given year within the first 3 to 5 years that this flow would be met or exceeded. Given the grade control structures, planted rock toe protection, and sewer line protection measures proposed for the project, it is unlikely that significant damage to the channel banks or sewer line would occur. It is more likely that the low flow channel would be altered and portions of the revegetation planting and irrigation network would have to be replaced.

In order to provide short term erosion control but also not construct an entirely riprap-lined channel, Questa has developed a design that combines rock placement with other "softer" erosion control and habitat features. The floodplain terrace would be covered with an erosion control blanket that would be made of biodegradable coir fiber. Typically, the fiber begins to degrade within 2 to 3 years but takes up to 10+ years to fully disintegrate. The bank slope would be hydroseeded with an appropriate woody and grass seed mixture, and a biodegradable erosion control blanket would be installed on top of all exposed slopes. Bank slope planting would be completed by cutting holes within the blanket and installing appropriate tree and shrub species. Anchored logs would be incorporated into the pools and grade control structures to dissipate erosive energy and create habitat complexity. These logs would anchored using large stone counter weights.

In addition, Coir bio-blocks would be installed along the bankfull channel edge in association with willow stakes. This technique has been used by Questa on similar projects and provides channel stability and an excellent growing medium for the willow.

Confluence Restoration

The confluence area at the downstream portion of the project will be treated with many of the same channel stabilization and habitat enhancement techniques utilized throughout the rest of the project. Near the outflow of the storm drain pipe, riprap rock armoring will be installed to dissipate the energy of flows exiting the drain. Farther downstream, a small pool, two rock grade control structures, and large wood habitat features will create a smooth transition into the main channel as shown on **Sheet 7** in **Appendix B.**

Flood Control

Flood control aspects of the channel are critical. Because the project has increased frictional resistance in the channel, predicted water surface elevations show that flooding could affect small portions of private property (although predicted water surface elevations pose no threat to any improvements or structures). In order to eliminate flooding of private property, a 4-foot high retaining wall will be constructed adjacent to the private parcels on the eastern side of the project as shown on **Sheet 7** in **Appendix B.**

Public Access

Improving public access is a priority because the project site is located adjacent to Chumash Park. A pedestrian bridge and trail compliant with the American Disability Act (ADA) is proposed to connect the park with Kanan Road. The pedestrian bridge will be installed with a minimum of 1 foot of freeboard above the 100-year flood elevation with a low chord at approximately 865 feet (NAVD88).

In addition, a trail is proposed accessing the "confluence area" at the downstream extent of the project site and an additional connection to Kanan Road via concrete steps is also being considered.

Preliminary Planting Plan

Full vegetation establishment within the restored channel and entire project will be a key component of the restoration project's success. Planting for the project area would be divided into three different planting zones: a) floodplain and lower bank, b) mid-bank slope, and c) uplands. This will allow site-specific native species selection. Willow staking of the rock weirs, rock revetment, and coir bio-blocks have been previously discussed. A temporary irrigation system would need to be installed to ensure adequate irrigation during the vegetation establishment period.

Appendix A
BIOLOGICAL AND CULTURAL ASSESSMENTS

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July 18, 2013
Project Number 13-00990

Sydney Temple, P.E.
Principal
Questa Engineering Corporation
1220 Brickyard Cove Road, Suite 206
Point Richmond, CA 94801-4171
stemple@questaec.com

Subject: Biological Constraints Analysis for the Medea Creek Restoration Project, Agoura Hills, Los Angeles County, California

Dear Mr. Temple:

Rincon Consultants, Inc. (Rincon) was retained by the City of Agoura Hills to provide a Biological Constraints Analysis for the Medea Creek Restoration Project, Agoura Hills, Los Angeles County, California. The purpose of this report is to identify potential "fatal flaws" or items associated with biological resources that may cause an exceptional cost or significant project delays, establish baseline conditions for purposes of CEQA and project permitting, and recommend further studies or mitigation measures, if any, that will be appropriate for the project.

PROJECT LOCATION AND DESCRIPTION

The Medea Creek Restoration project site (project site) is generally located within the City of Agoura Hills (City) in western Los Angeles County. The City of Agoura Hills is in the eastern Conejo Valley between the Simi Hills and the Santa Monica Mountains. The site is depicted in Township 1 North, Range 18 West of the U.S. Geographical Survey (USGS) Thousand Oaks 7.5-minute topographic quadrangle. The project site is specifically located between Canwood Street and Thousand Oaks Boulevard on the east side of Kanan Road. The project site includes an approximately 450 foot reach of Medea Creek and its associated access roads and right-of-way, located between Kanan Road and Chumash Park. Land uses surrounding the project site consist of residential single-family housing and Chumash Park to the east, Kanan Road and commercial mixed-use developments to the north, open space to the west, and a naturalized portion of Medea Creek to the south abutted by residential high-density housing development. The proposed activities will include removing the concrete-lined flood channel containing Medea Creek, reestablishing a native riparian corridor, and providing pedestrian connectivity from Chumash Park to Kanan Road.

METHODOLOGY

The Biological Resources Assessment for the proposed project consisted of a review of relevant literature followed by a field reconnaissance survey. The literature review included information on sensitive resource occurrences within a five mile buffer around the project site from the California Department of Fish and Wildlife (CDFW) California Natural Diversity Data Base (CNDDB), Biogeographic Information and Observation System (BIOS – www.bios.dfg.ca.gov), and U.S. Fish and Wildlife Service (USFWS) Critical Habitat Portal (http://criticalhabitat.fws.gov). Site plans provided by the client, aerial photographs, and topographic maps were also examined.

Rincon Senior Biologist, Julie Broughton and Biologist Lindsay Griffin, conducted field reconnaissance surveys to document existing site conditions and the potential presence of sensitive biological resources, including sensitive plant and wildlife species, sensitive plant communities, jurisdictional waters and wetlands, and habitat for nesting birds. The survey area included the project site, the adjacent open space parcel to the west of the project site, the shoulder associated with Kanan Road between Canwood Street and Thousand Oaks Boulevard, and adjacent portions of Chumash Park and the naturalized portions of Medea Creek. Existing biological conditions (e.g. vegetative communities, potential presence of sensitive species and/or habitats, and presence of potentially jurisdictional waters) within the project site and survey buffer were documented. The purpose of the surveys was to identify potential sensitive biological resources and constraints for the restoration project.

The potential presence of sensitive species is based on a literature review and field surveys designed to assess habitat suitability only. Definitive surveys to confirm the presence or absence of special-status species were not performed. Definitive surveys for sensitive plant and wildlife species generally require specific survey protocols requiring extensive field survey time to be conducted only at certain times of the year. The findings and opinions conveyed in this report are based on this methodology.

EXISTING SITE CONDITIONS

The field surveys were conducted on June 18, 2013, between the hours of 1200 and 1500, and July 1, 2013, between the hours of 1000 and 1200. Weather conditions during both surveys included an average temperature of 75 degrees Fahrenheit, with winds between 1 and 3 miles per hour and minimal cloud cover.

Medea Creek flows from under Kanan Road via a concrete-lined channel that continues south for approximately 500 feet until it transitions to a natural bottom channel covered by a dense native riparian vegetated canopy. The adjacent western parcel boundary is a hillside with native trees including Valley oak (*Quercus lobata*), Coast live oak (*Quercus agrifolia*), and California sycamore (*Platanus racemosa*). The remainder of the parcel is dominated by several alliances of coastal sage scrub habitat including *Eriogonum fasciculatum* Shrubland Alliance (California buckwheat scrub), *Opuntia littoralis* Shrubland Alliance (coast prickly pear scrub), *Salvia mellifera* Shrubland Alliance (black sage scrub), *Baccharis pilularis* Shrubland Alliance (coyote brush scrub), and interspersed with an herbaceous California semi-natural stands. Along the eastern side of the channel adjacent to the residential

housing are non-native landscape trees including myoporum (*Myoporum laetum*), palm trees (*Phoenix* sp.), and oleander (*Nerium oleander*).

Wildlife activity during the site visit was very low. California ground squirrel (*Otospermophilus beecheyi*) was observed on the hillside. Approximately six house finch (*Haemorhous mexicanus*) were observed perched on the chainlink fence on the west side of the channel. Three northern mockingbirds (*Mimus polyglottos*) were observed foraging in the coyote bush on the hillside. Western gull (*Larus occidentalis*) were observed flying overhead. One red-tailed hawk (*Buteo jamaicensis*) was observed perched on top of a coast live oak on the hillside. Two killdeer (*Charadrius vociferous*) and two black phoebe (*Sayornis nigricans*) were observed in the concrete-lined portion of the channel. One downy woodpecker (*Picoides pubescens*) was observed foraging in a sycamore tree (*Platanus occidentalis*).

SENSITIVE BIOLOGICAL RESOURCES DISCUSSION AND IMPACT ANALYSIS

The CNDDB has records for 11 sensitive plant species, 3 sensitive plant communities, and 10 sensitive wildlife species within the USGS topographic quadrangle that contains the project site. Sensitive plant and wildlife species typically have very specific habitat requirements and the majority of these species are not expected to occur on the project site or within the surrounding area. The following discusses those species with potential to occur on the project site.

Sensitive Plant Species. The project site within the open space hillside does contain suitable soil to sustain Lyon's pentachaeta; however, the species was not observed within anticipated impact areas on the project site. Although definitive surveys to confirm the presence or absence of rare plant species were not performed, Lyon's pentachaeta (*Pentachaeta lyonii*) was observed at two reference sites less than a mile from the project site and therefore, would be blooming on-site if the species was present. No effects to sensitive plant species are expected to occur from this project.

Sensitive Plant Communities. No sensitive plant communities were observed onsite. *Quercus agrifolia* Woodland Alliance (coast live oak woodland) is present on the north facing slopes. Valley oak is also found on the project site but are represented by only three individual trees. Seven of the oak trees located along the shoulder of Kanan Road, in addition to California sycamore, are a result of landscaping as determined by the presence of supportive tree stakes. Although native oak species are present, they do not form a sensitive community because they are not contiguous with the riparian canopy that occurs to the south of the parcel boundary. Native riparian vegetation is present to the south of the project boundary, within the naturalized portion of Medea Creek, and includes arroyo willow (*Salix lasiolepis*), California sycamore and black cottonwood (*Populus trichocarpa*). Construction effects would occur at the northern fringe of this riparian habitat, but in the long term, effects would be beneficial.

Sensitive Wildlife Species. The CNDDB contains several records for sensitive wildlife species within the vicinity of the project site, many of which are associated with the Las Virgenes Creek. The project site is channelized and not suitable for most species of wildlife.

Marginally suitable habitat for western pond turtle (*Emys marmorata*) occurs within the naturalized section of Medea Creek, south of the project site. This species typically prefers larger areas of suitable habitat with basking sites, sandy banks, and nearby upland soils suitable for egg laying. As the project site lacks larger pools, sandy banks, and suitable upland habitat, this species is not expected to occur onsite except potentially as a transitional individual moving between suitable habitat locations. Western pond turtle was not observed onsite during surveys. Therefore, minimal effects to sensitive wildlife species are expected to occur from this project.

Nesting Birds. The California Fish and Game Code (CFGC) Section 3503 and the Migratory Bird Treaty Act (MBTA) protect native birds and their nests. No nests or breeding/nesting behavior such as courtship displays, copulation, vegetation or food carries, presence of fledglings, or territorial displays (e.g. singing or aggression) was observed during the survey. No evidence of raptor nesting was observed during the site visits; however, one red-tailed hawk was observed perched on top of a coast live oak. However, suitable nesting habitat occurs within and directly adjacent to the project site. Therefore, the project has the potential to affect nesting birds if construction occurs during the nesting season.

Jurisdictional Drainages and Wetlands. Although channelized, Medea Creek is subject to the jurisdiction of the U.S. Army Corps of Engineers (USACE), Los Angeles Regional Water Quality Control Board (RWQCB), and California Department of Fish and Wildlife (CDFW). As the project includes restoration and creation of wetlands, it will have long-term beneficial impacts by creating wetlands. However, restoration will also have temporary impacts on jurisdictional waters, and as such is subject to permits from the agencies listed above.

Protected Trees. The *City of Agoura Hills Appendix A- Oak Tree Preservation Guidelines* prescribes avoiding impacts to all oak trees unless compelling reasons justify the removal of such trees. Valley oak and coast live oak, both protected species, were found on the project site. Although project activities are not proposed in areas where these trees occur, final design plans could require the encroachment of or removal of trees. Should the project impact protected trees, an oak tree permit may be needed pursuant to the provisions of sections 9657 through 9657.5 of the City Zoning Ordinance.

CONCLUSIONS AND RECOMMENDATIONS

The project site does not contain suitable habitat for sensitive plant species, sensitive wildlife or sensitive plant communities where project impacts are anticipated to occur. Therefore, impacts to these sensitive resources as a result of the proposed project are not expected to occur and no further actions with respect to these resources are recommended unless project impacts extend beyond what is currently anticipated.

Nesting Birds. The project site and adjoining area contains habitat suitable for nesting birds. If project activities will occur during the avian nesting season (typically February to September), a survey of the project site and surrounding area for active nests should be conducted by a qualified biologist 1 to 2 weeks prior to construction. If active nest(s) are located, an appropriate buffer shall be established surrounding the nest(s) and shall be

flagged for avoidance. The avoidance buffer shall be determined by the monitoring biologist based upon the species nesting and the activity being conducted. Alternatively, construction within the buffer area may be conducted at the discretion of a qualified biological monitor. The biologist shall monitor the active nest(s) during initial disturbance activities and/or development activities to determine if the recommended avoidance buffers are adequate and that the nests are not being stressed or jeopardized

Jurisdictional Drainages and Wetlands. A Section 404 permit of the Clean Water Act will be required from the ACOE for alteration of Medea Creek. A water quality certification will be required from the RWQCB. Additionally, a Streambed Alteration Agreement will be required from the CDFW. Compliance with the requirements of the appropriate ACOE, CDFW, and RWQCB permits and implementation of any mitigation therein, will reduce impacts to wetlands to a less than significant level.

Protected Trees. If project activities will impact any oak tree, regardless of the size of the tree, a permit from the City of Agoura Hills Department of Planning and Community Development is required. Encroachment, cutting, pruning, the physical removal or relocation of a tree or causing of the death of a tree through damaging, poisoning or other direct or indirect action shall constitute an impact. The protected zone of an oak tree is defined in the *City of Agoura Hills Appendix A- Oak Tree Preservation Guidelines* as the point five (5) feet outside of the dripline that extends inwards to the trunk of the tree and shall be less than fifteen (15) feet from the trunk of an oak tree.

Please do not hesitate to contact Rincon Consultants if you have any questions regarding this biological constraints analysis or the above recommendations.

Sincerely,
RINCON CONSULTANTS, INC.

Lindsay Griffin
Associate Biologist

Lacrissa Davis, MESM
Principal

Nancy Fox-Fernandez, MS
Biologist/Project Manager

Rincon Consultants, Inc.
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Ventura, California 93003

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July 12, 2013
Project Number 13-00990

Sydney Temple, P.E.
Principal
Questa Engineering Corporation
1220 Brickyard Cove Road, Suite 206
Point Richmond, CA 94801-4171
stemple@questaec.com

Subject: Cultural Resources Study for the Medea Creek Restoration Project, Agoura Hills, Los Angeles County, California

Dear Mr. Temple:

Rincon Consultants, Inc. (Rincon) was retained by Questa Engineering Corporation to provide cultural resources services for the Medea Creek Restoration Project, Agoura Hills, Los Angeles County, California. Specifically, Rincon was tasked with conducting a cultural resources records search and summarizing the findings in a brief letter report. Because a U.S. Army Corps of Engineers (USACE) 404 Permit may be required, this analysis has been performed in accordance with the requirements of Section 106 of the National Historic Preservation Act (NHPA). This project is also subject to the California Environmental Quality Act (CEQA).

Area of Potential Effects

The project Area of Potential Effects (APE) is located within the City of Agoura Hills in western Los Angeles County. The project APE is depicted in Township 1 North, Range 18 West of the U.S. Geographical Survey (USGS) Thousand Oaks 7.5-minute topographic quadrangle (Figure 1). The City of Agoura Hills is in the eastern Conejo Valley between the Simi Hills and the Santa Monica Mountains. The project site, located between Kanan Road and Chumash Park, includes an approximately 450-foot concrete-lined reach of Medea Creek and its associated access roads and right-of-way. The APE is generally bounded by Kanan Road to the northwest, a modern residential tract to the northeast, Chumash Park to the east and southeast, and undeveloped open space to the west and southwest. Based on the currently proposed site design, project impacts will extend into this open space.

The proposed activities will include removing the concrete-lined flood channel containing Medea Creek, reestablishing a native riparian corridor, and providing pedestrian connectivity from Chumash Park to Kanan Road.

Cultural Resources Records Search

Methods

On June 12, 2013, Rincon requested a search of the California Historical Resources Information System (CHRIS) at the South Central Coastal Information Center (SCCIC) located at California State University, Fullerton. The search was conducted to identify all previously conducted cultural resources work within a 0.5-mile radius of the project APE, as well as to identify previously recorded cultural resources within a 0.5-mile radius of the project APE. The CHRIS search included a review of the National Register of Historic Places (NRHP), the California Register of Historical Resources (CRHR), the California Points of Historical Interest list, the California Historical Landmarks list, the Archaeological Determinations of Eligibility list, and the California State Historic Resources Inventory list. The records search also included a review of all available historic USGS 7.5- and 15-minute quadrangle maps.

Findings

The SCCIC records search identified a total of 44 previous studies (Table 1 in Attachment A), of which 16 included all or part of the project APE. Eight of the 16 studies included pedestrian surveys. Two of the studies (LA-1791 and LA-1916) cover the majority of the project APE, but no previous studies have been conducted within the last five years.

A total of six previously recorded cultural resources were identified within 0.5 mile of the project APE (Table 2 in Attachment B). One of these resources (P-19-000243) is located within the APE.

P-19-000243

Prehistoric archaeological site P-19-000243 (CA-LAN-243), also known as the Medea Creek Village Site and the Medea Creek Cemetery, was first recorded by R. Crabtree, C. King, and T. Blackburn in 1963. In 1966, a road cut by the Metropolitan Development Corporation and excavation by amateur archaeologist Dwain R. Write exposed an estimated 22 burials. The cemetery was completely excavated by UCLA Archaeological Survey in 1966. The village site was excavated in 1969 by UCLA Archaeological Survey. The cemetery contained approximately 400 human burials and the occupation area with numerous artifacts such as mortars, clam shell disc beads, and lithic artifacts. According to the site record, the remaining portions of the Medea Creek Village Site were destroyed in 1969 by housing construction.

Native American Scoping

Rincon Consultants requested a search of the Sacred Lands File (SLF) at the Native American Heritage Commission (NAHC) on June 12, 2013. The NAHC faxed a response on June 13, 2013 which stated that "a record search of the NAHC Sacred Lands File failed to indicate the presence of Native American traditional cultural places in the project site submitted." The NAHC also provided a contact list of 8 Native American tribes and individuals who may have information regarding the project area. Rincon prepared and mailed letters to these contacts on June 24, 2013.

Mr. Freddie Romero responded via telephone on July 1, 2013, on behalf of the Santa Ynez Band of Chumash Indians Elders Council. Mr. Romero stated that the Elders Council did not have comments regarding this project but wanted to confirm that Rincon sent letters to all the contacts on the NAHC-provided list. Kevin Hunt confirmed for Mr. Romero that letters were sent to all the provided contacts.

As of July 11, 2013, Rincon has not received any additional responses to the letters or phone calls.

Discussion

Based on the results of the background research and cultural resources survey, the proposed project has the potential to affect cultural resources. CA-LAN-243 was recorded within the northeastern corner of the APE. Although the site has been destroyed by excavation and residential construction, subsurface deposits may nonetheless still be present within the APE. Based on the proposed site design, project disturbance extends into the open space to the west, including widening the floodplain of the creek and developing pedestrian footpaths. No evidence was found that the open space area has been surveyed for cultural resources in the last five years. Because of the lack of a recent survey and the apparent significance of CA-LAN-243, Rincon recommends a Phase I Cultural Resources Survey of the exposed ground portions of the APE. In addition, due to the sensitivity of the area and the previous presence of CA-LAN-243 and human remains, Rincon recommends archaeological and Native American monitoring of any project-related ground disturbance.

Intensive Pedestrian Cultural Resources Survey
A cultural resources survey of the open space area should be conducted under the direction of an archaeologist meeting the Secretary of Interior's (1983) professional qualification standards. Any cultural resources that are encountered should be recorded on State of California Department of Parks and Recreation (DPR) Series 523 forms, and the potential for project-related impacts to such sites should be considered. Any historic-age (over 45 years old) buildings, structures, objects, or landscapes within the project area should be evaluated for NRHP/CRHR eligibility to assess the potential of the project to impact to these resources.

Cultural Resources Technical Report
A cultural resources technical report should be prepared that incorporates the results of this constraints analysis, the survey, and any NRHP/CRHR-eligibility evaluations. It should describe the methods and results of the literature review, Native American consultation, intensive pedestrian survey, and the evaluations of built environment resources for NRHP/CRHR eligibility. It should also provide recommendations for the management of cultural resources within and adjacent to the APE. The report should include maps depicting the area surveyed for cultural resources, the locations of cultural resources identified during the survey, and site records or updates for cultural resources encountered during the survey. The report should be prepared in accordance with the Office of Historic Preservation's Archaeological Resource Management Reports (ARMR) guidelines (OHP 1990). As such, it should include an environmental setting and detailed cultural setting that includes prehistoric, ethnographic, and historic period subsections.

Cultural Resources Mitigation Monitoring and Reporting Plan
Prior to project ground-disturbance an archaeologist who meets the Secretary of the Interior's Professional Qualifications Standards for prehistoric archaeology (qualified archaeologist) should be retained to prepare a cultural resources mitigation monitoring and reporting plan (CRMMP). The purpose of the CRMMP is to establish a clearly defined plan for the NRHP/CRHR eligibility evaluation and treatment of any archaeological materials identified during project implementation. The CRMPP should include: a discussion of the previously identified archaeological resources present within the project APE (specifically, CA-LAN-243); a research design including prehistoric cultural context, research questions and potential data sources, and data collection procedures; a discussion of the cultural resources mitigation measures for the project and how they will be complied with; an unanticipated discovery plan that clearly defines how archaeological resources will be evaluated for NRHP/CRHR eligibility and standards for eligibility, possible avoidance measures in the case significant (NRHP/CRHR eligible) resources are encountered, a data recovery plan to exhaust the data potential for any significant resources that cannot be avoided, including a curation plan; and the standards for a cultural resources report that will present the results of these efforts and how they reduced the level of impacts to cultural resources to less than significant under the Section

106 of NHPA or the State CEQA Guidelines. The CRMPP will include a plan for archaeological and Native American monitoring as well as a detailed course of action for the treatment of unanticipated discovery of cultural resources and human remains. Brief discussions of these key components of the mitigation and monitoring program are presented below.

Archaeological and Native American Monitoring
Based on the results of the records search, the high sensitivity of CA-LAN-243, and the results of the NAHC Sacred Lands File search, Rincon recommends full-time archaeological and Native American monitoring of all project related ground disturbing activities. Archaeological monitoring should be conducted under the direction of a qualified archaeologist.

Discovery of Human Remains
If human remains are found, State of California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the county coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. In accordance with this code, in the event of an unanticipated discovery of human remains, the Los Angeles County coroner must be notified immediately. If the human remains are determined to be prehistoric, the coroner will notify the Native American Heritage Commission, which will determine and notify a most likely descendant (MLD). The MLD would complete the inspection of the site within 48 hours of notification and may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials.

Please do not hesitate to contact Rincon Consultants if you have any questions regarding this cultural resources survey or the above recommendations.

Sincerely,
RINCON CONSULTANTS, INC.

Hannah Haas, B.A.
Cultural Resource Specialist

Robert Ramirez, M.A., RPA
Principal Investigator

Duane Vander Pluym, D. Env.
Vice-President

Attachments:
Figure 1. Project Location Map
Attachment A. Table 1- Previous Studies within 0.5 Mile of the APE
Attachment B. Table 2- Previously Recorded Cultural Resources within 0.5 Mile of the APE
Confidential Attachment C. Map of Study Area with Resource and Previous Study Locations

Imagery provided by ESRI and its licensors, 2013. USGS Topo, Copyright:© 2013 National Geographic Society, i-cubed, Calabasas and Thousand Oaks Quadrangles. The topographic representation depicted in this map may not portray all of the features currently found in the vicinity today and/or features depicted in this map may have changed since the original topographic map was assembled.

Project Boundary
One-Half Mile Buffer

N

0 1,000 2,000 Feet

0 250 500 Meters

1:24,000

Project Location

Figure 1

Table 1
Previous Studies Within 0.5 Mile of the APE

SCCIC Report No.	Author	Year	Study	Relationship to Project APE
LA-00081	Rosen, Martin D.	1975	Evaluation of the Archaeological Resources for the Areawide Facilities Plan for the Las Virgenes Municipal District	Within
LA-00126	Wlodarski, Robert J.	1988	An Archaeological Assessment of CA-LAN-1352, (the Lundin Site) Agoura Hills, Los Angeles County, California	Outside
LA-00393	Clewlow, William C. Jr.	1978	An Archaeological Resource Survey and Impact Assessment of Tract 7661, Agoura, Los Angeles County, California	Outside
LA-00530	Clewlow, William C. Jr.	1977	An Archaeological Resource Survey and Impact Assessment of the Morrison Ranch Property, Agoura, California	Outside
LA-00531	Rose, Martin D.	1979	An Archaeological Resource Survey and Impact Assessment of the Reclaimed Water Distribution System of the Las Virgenes Municipal Water District	Outside
LA-00595	Wessel, Richard L.	1979	Assessment of the Impact Upon Cultural Resources by the Proposed Development of Tentative Tract 36303 in Rancho Las Virgenes	Outside
LA-00725	King, Linda B.	1969	The Medea Creek Cemetery (LAN-243): Social Organization and Mortuary Practices	Within
LA-0747	Gibson, Robert O. and Singer, Clay A.	1969	The Medea Creek Village Site 4-LAN-243v: a Functional Lithic Analysis	Within
LA-00819	Leach, Melinda	1980	An Archaeological Resources Assessment of the Proposed Medical Office Facility Site Located North of Canwood Street and West of Kanan Road, Agoura, California	Outside
LA-00829	Tartaglia, Louis J.	1980	Cultural Resource Survey of Tentative Tract Number 35354, Agoura, California	Outside
LA-00926	D'Atlroy, Terence N.	1976	Assessment of the Impact on Archaeological Resources of the Proposed Development of Two Parcels of Land West of Agoura, Los Angeles County	Outside
LA-01168	King, Linda B.	1982	Medea Creek Cemetery: Inland Canalino Patterns of Social Organization, Exchange, and Welfare	Within
LA-01768	Singer, Clay A. and John E. Etwood	1989	Cultural Resources Survey and Impact Assessment for the Proposed Agoura Canyon Ranch Center in the City of Agoura Hills	Outside
LA-01791	Hatheway, Roger and Jeanette McKenna	1989	Archaeological, Historical, Architectural, and Paleontological Investigation of the Kanan Road Interchange at Route 101 Project Area	Within

Table 1
Previous Studies Within 0.5 Mile of the APE

SCCIC Report No.	Author	Year	Study	Relationship to Project APE
LA-01916	McKenna, Jeanette A., Roger G. Hatheway, and Paul E. Langewalter II	1989	Historic Property Survey Report: the Kanan Road Interchange at Route 101 (Ventura Freeway) Project Area	Within
LA-02409	Stelle, Kenneth and Albert Galiardo	1982	For Improvements of the Operational Characteristics of Route 101, the Ventura Freeway in Los Angeles and Ventura Counties, Between Route 405 in Los Angeles, and the Santa Clara River in Oxnard	Outside
LA-02559	King, Chester	1992	Native American Placenames in the Santa Monica Mountains: First Draft	Within
LA-03256	Singer, Clay A.	1968	The Archaeological Survey, UCLA Announces a Volunteer Excavation at the Medea Creek Village Site (LAN-243)	Within
LA-03529	Barbey, Linda L., Linda Hasten, R. W. Sussman, Joseph L. Chartkoff, Jim Toney, and Donald S. Miller	1966	UCAS-137 Excavation of LAN-243 Medea Creek, Los Angeles County	Within
LA-03543	Boyer, Jackie	1967	UCAS-256 Boyer's Undergraduate Project at Medea Creek: Research of Raw Material for Artifacts	Within
LA-03546	Wlodarski, Robert J.	1996	A Phase I Archaeological Study Bikeway Gap Closure Project Cities of Calabasas, Agoura Hills, Westlake Village and Unincorporated Los Angeles County	Outside
LA-03555	King, Thomas and N. Nelson Leanard III	1973	UCAS-306 Evaluation of the Archaeological Resources of Charmlee County Park, Vasquez Rocks Park, Agoura County Park, Los Angeles County	Within
LA-03557	Singer, Clay A., Thomas F. King, and James N. Hill	1969	UCAS-325 Excavation of the Medea Creek Village Site (4-LAN-243)	Within
LA-03587	King, Chester	1994	Prehistoric Native American Cultural Sites in the Santa Monica Mountains	Within
LA-03642	King, Linda B.	1969	The Medea Creek Cemetery (LAN-243): an Investigation of Social Organization From Mortuary Practices	Within
LA-03742	Romani, John F.	1982	Archaeological Survey Report for the 07-LA/VEN 101 Project P.M. 171-38.2/0.0-22.7 07351 - 076620	Outside
LA-03766	Irvine, Kenneth C.	N/A	Do Chumash Burials Demonstrate Status Difference Among Children? Medea Creek Cemetery Revisited	Within

Table 1
Previous Studies Within 0.5 Mile of the APE

SCCIC Report No.	Author	Year	Study	Relationship to Project APE
LA-04246	Wlodarski, Robert J.	1998	A Phase I Archaeological Study: Agoura Hills Riverwalk EIR Project, City of Agoura Hills, County of Los Angeles, California	Within
LA-06601	King, Chester and Parsons, Jeff	2000	Archaeological Record of Settlement Activity in the Simi Hills Malu'liwini	Within
LA-07675	Singer, Clay A.	2004	Phase II Archaeological Investigations at CA-LAN-41, a Prehistoric Deposit in the City of Agoura Hills, Los Angeles County, California	Outside
LA-07676	Singer, Clay A.	2004	Cultural Resources Survey Reevaluation of Archaeological Site CA-LAN-1352, and Impact Assessment for the Cornerstone @ Agoura Village Project in the City of Agoura Hills, Los Angeles County, California	Outside
LA-07677	Bonner, Wayne H.	2003	Cultural Resources Survey Results for the Cingular Wireless Facility Candidate Vy-343-02 (Agoura), 28545 West Driver Avenue, Agoura Hills, Los Angeles County, California	Outside
LA-07678	Budinger, Fred E., Jr.	2002	Proposed Wireless Device Monopole and Equipment Cabinet; Idle Site, 28545 Driver Avenue, Agoura Hills, CA 91301	Outside
LA-07679	Wlodarski, Robert J.	2004	A Phase I Archaeological Study for 29515 Canwood Street City of Agoura Hills, County of Los Angeles, California	Outside
LA-08119	McKenna, Jeanette A.	2006	A Phase I Cultural Resources Investigation of the Waring-Agoura LLC Tract 7661 in the City of Agoura Hills, Los Angeles County, California	Outside
LA-09752	Gonzalez, Matthew, and Kyle Garcia	2009	Results of the Cultural Resource Assessment for the Southern California Edison Replacement of Deteriorated Pole Nos. 1330735E; Los Angeles County, California; WO 6035-4800, 9-4827	Outside
LA-10092	Singer, Clay A.	2000	Cultural Resources Survey and Impact Assessment for an ~18 Acre Property at the Junction of Kanan Road and Agoura Road in the City of Agoura Hills, Los Angeles County, California: A Status Report on Archaeological Site CA-LAN-41	Outside
LA-10208	Sylvia, Barbara	2001	Negative Archaeological Survey Report: Metal Beam Guardrail (MBGR) Along Sections of Route 1010 From Route 134 to the Ventura County Line	Outside
LA-10475	Toren, A. George and Gwen R. Romani	2010	Phase I Archaeological Survey: The Las Virgenes Municipal Water District 1235 ft. Backbone System Improvement Program: Agoura Hills Pipeline Alignment	Outside

Table 1
Previous Studies Within 0.5 Mile of the APE

SCCIC Report No.	Author	Year	Study	Relationship to Project APE
LA-10778	King, Chester	2010	Archaeological Backhoe Test Excavation Program to Determine if Cultural Deposits Exist beneath Agoura Road in the Areas of CA-LAN-41 and CA-LAN-467, Las Virgenes Municipal Water District (LVMWD) Backbone System Improvement Program	Outside
LA-10785	Romani, John F.	2010	Phase I Archaeological Site Status Update: Cornerstone Mixed Use Project Corner of Agoura Road and Cornell Road, Agoura Hills, California	Outside
LA-11835	Grimes, Teresa and Dory, Elysha	2011	Agoura Road Widening, 29008 Agoura Road, Agoura Hills, CA Historic Resource Report	Outside
LA-11836	GPA Environmental	2012	Agoura Road Widening, Draft Initial Study and Mitigated Negative Declaration	Outside
LA-12027	McKenna, Jeanette	2013	A Cultural Resources Investigation for the Proposed Kanan Road-Agoura Road Roundabout Project in the City of Agoura Hills, Los Angeles County, California	Outside

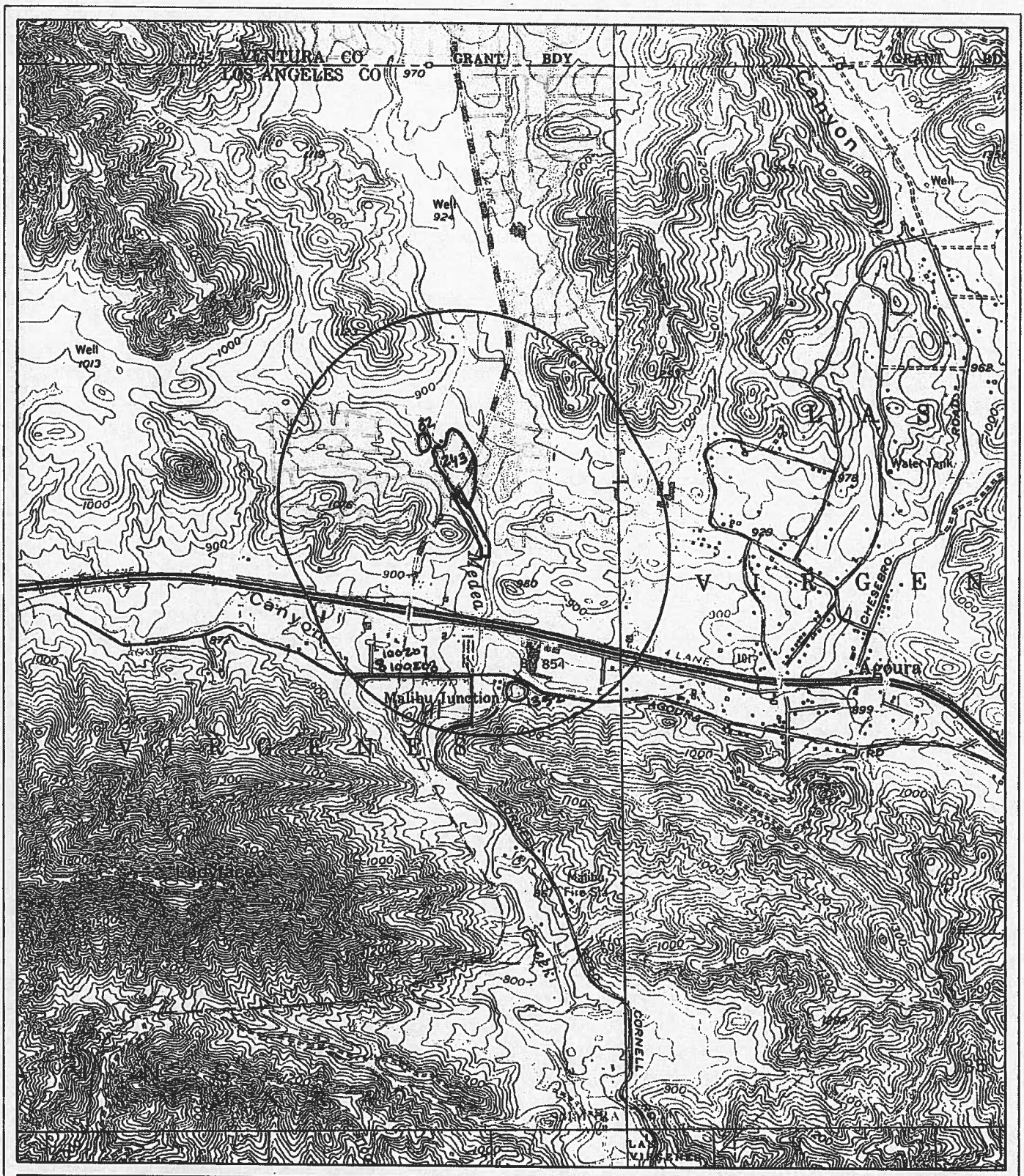
South Central Coastal Information Center, June 2013

Table 2
Previously Recorded Cultural Resources Within 0.5-mile of the APE

Primary Number	Description	NRHP/CRHR Eligibility Status	Recorded/Updated By and Year	Relationship to Project APE
P-19-000032	Sparse prehistoric artifact scatter	Insufficient information	C. King and C.A. Singer 1967	Outside
P-19-000041	Prehistoric village Site; Paramount Ranch	Presumed NRHP/CRHR eligible	S.L. Peak 1951; E. Chandonet, T. Blackburn, and C. King 1961; C. Singer 2000; J. Parsons and C. King 2010	Outside
P-19-000243	Prehistoric village site with approximately 400 burials	Significant resource reportedly completely excavated and eliminated	R. Crabtree, C. King, T. Blackburn, and C. Singer 1963	Within
P-19-001352	Prehistoric midden deposit	Recommended eligible for CRHR	R. L. Wessel 1987; R. Turner 2011	Outside
P-19-100207	Prehistoric isolate	Presumed ineligible	J. McKenna 1989	Outside
P19-100208	Prehistoric isolate	Presumed ineligible	J. McKenna 1989	Outside

South Central Coastal Information Center, June 2013

CONFIDENTIAL
Appendix C
NOT FOR PUBLIC DISTRIBUTION



Miles
0 0.15 0.3 0.6

Kilometers
0 0.2 0.4 0.8

N
W E
S

South Central Coastal Information Center

Medea Creek Restoration Project

Thousand Oaks, CA
USGS 7.5'
PR: 1981 | 1:24,000
Inv. #13140
June 2013

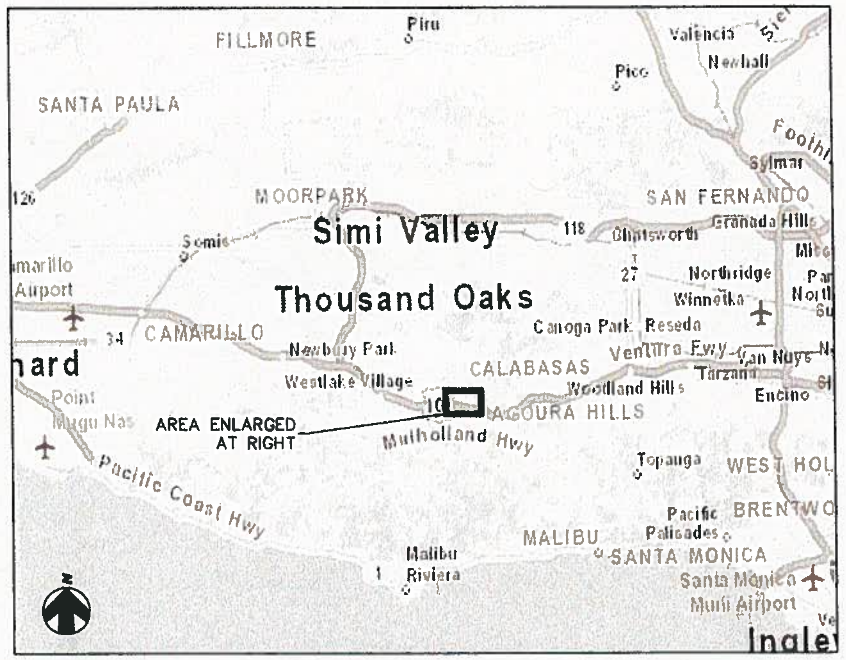
May contain confidential information, NOT for public distribution

Map 1 of 6

Appendix B
60% DESIGN PLANS

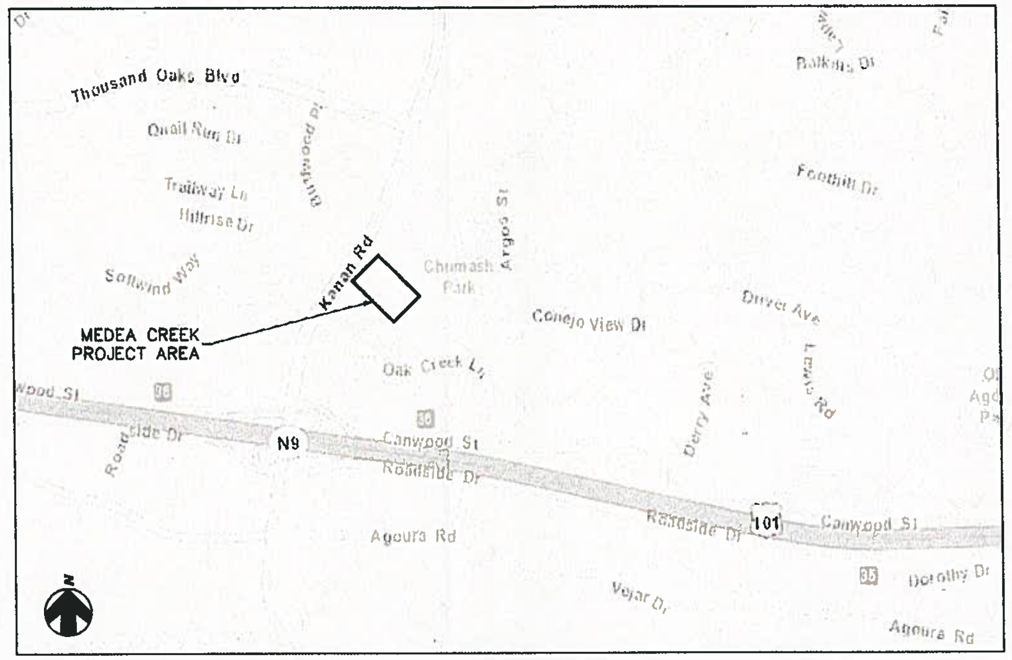
MEDEA CREEK RESTORATION PROJECT

CITY OF AGOURA HILLS



AREA MAP

N.T.S.



VICINITY MAP

N.T.S.

PRELIMINARY CONSTRUCTION QUANTITIES:

EARTHWORK CUT: 4,500 CY
EARTHWORK FILL: 4,500 CY
OFFHAUL: 650 CY CONCRETE RUBBLE
IMPORT: 1,960 CY RIPRAP;

GENERAL NOTES

1. **DESIGN INTENT:** THESE PLANS AND SPECIFICATIONS REPRESENT THE DESIGN INTENT OF QUESTA ENGINEERING CORPORATION (THE ENGINEER), AS APPROVED BY THE OWNER, CITY OF AGOURA HILLS. THE CONTRACTOR IS RESPONSIBLE FOR ALL ITEMS SHOWN ON THESE PLANS AND SPECIFICATIONS AND SHALL BE RESPONSIBLE FOR ANY DEVIATIONS FROM THESE PLANS AND ASSOCIATED RISK AND EXPENSE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING A COPY OF THE APPROVED PLANS AND SPECIFICATIONS AND ANY ADDENDA AT THE JOB SITE AT ALL TIMES. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY CITY OF PASADENA OF ANY UNFORESEEN CIRCUMSTANCES OR CONDITIONS THAT WOULD ALTER THESE PLANS AND SPECIFICATIONS FOR APPROVAL OF MODIFICATIONS TO THE INTENDED DESIGN.

2. **BASE MAP:** THE PROPOSED IMPROVEMENTS SHOWN ON THESE DRAWINGS ARE SUPERIMPOSED ON A BASE MAP. THIS BASE MAP IS COMPILED FROM AERIAL AND GROUND SURVEYS, AND OTHER DATA AS MADE AVAILABLE TO THE ENGINEER, WHO SHALL NOT BE HELD LIABLE FOR CHANGES, INACCURACIES, OMISSIONS OR OTHER ERRORS ON THESE DOCUMENTS. THE COMPOSITE BASE MAP IS PROVIDED AS AN AID ONLY AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR REVIEWING THESE DOCUMENTS AND INCORPORATING/INTEGRATING ALL CONSTRUCTION AS REQUIRED TO ACCOMMODATE THE SAME. NONE OF THE INCLUDED DRAWINGS DEPICT A BOUNDARY SURVEY ALTHOUGH A PARTIAL ALTA SURVEY WAS PERFORMED ALONG A PORTION OF THE UP ROW. BOUNDARY LINES SHOWN ARE APPROXIMATE AND FOR INFORMATIONAL PURPOSES ONLY.

3. **DISCREPANCIES:** IN THE EVENT THAT SUBGRADE OBSTRUCTIONS ARE ENCOUNTERED OR DISCREPANCIES ARE FOUND BETWEEN THE DRAWINGS AND FIELD CONDITIONS, NOTIFY ENGINEER OR CITY OF AGOURA HILLS FOR DIRECTIONS. DO NOT PROCEED WITH THE WORK WITHOUT DIRECTION FROM THE ENGINEER.

4. **PRECONSTRUCTION MEETING:** A PRECONSTRUCTION MEETING ATTENDED BY THE CONTRACTOR, CITY OF AGOURA HILLS REPRESENTATIVE, AND OTHERS AS APPROPRIATE, WILL BE HELD WITHIN FIFTEEN (15) DAYS OF AWARD OF CONTRACT TO DISCUSS THE WORK. SUBMIT ALL REQUIRED DOCUMENTS, REQUESTS, AND PROPOSALS AT THIS MEETING FOR DISCUSSION.

5. **UTILITIES:** CONTRACTOR SHALL NOTIFY ALL PUBLIC AND PRIVATE UTILITY COMPANIES IN THE PROJECT AREA A MINIMUM OF THREE (3) WORKING DAYS PRIOR TO COMMENCEMENT OF WORK. CONTRACTOR MUST INVESTIGATE AND VERIFY THE LOCATION OF ANY EXISTING UTILITIES WITHIN THE PROJECT AREA. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO IDENTIFY, LOCATE, AND PROTECT ALL UNDERGROUND UTILITIES. ANY UNDERGROUND UTILITIES SHOWN ON THE PLANS ARE CONSIDERED TENTATIVE AND APPROXIMATIONS AND THEREFORE, NO WARRANTY EXPRESSED OR IMPLIED IS MADE AS TO THE COMPLETENESS OR CORRECTNESS OF THEIR LOCATION. THE UTILITY COMPANIES ARE THOUGHT TO BE MEMBERS OF THE UNDERGROUND SERVICE ALERT (U.S.A.) ON-CALL PROGRAM. THE CONTRACTOR SHALL NOTIFY U.S.A. 72-HOURS IN ADVANCE OF PERFORMING EXCAVATION WORK AT 811 FROM 7:00 AM TO 5:00 PM, MONDAY THROUGH FRIDAY. EXISTING PUBLIC UTILITIES SHALL BE KEPT IN SERVICE AT ALL TIMES. UTILITIES THAT INTERFERE WITH THE WORK TO BE PERFORMED SHALL BE PROTECTED AS REQUIRED BY CITY OF AGOURA HILLS' AND ALL OTHER AFFECTED ENTITIES. DAMAGE TO UTILITIES SHALL BE REPAIRED OR REPLACED AT NO ADDITIONAL COST TO EBRPD AND TO THE SATISFACTION OF THE ENGINEER AND OWNER. POTHOLING IS REQUIRED. ANY EXCAVATION WITHIN FIVE (5) FEET OF THE EXISTING GAS TRANSMISSION PIPE SHALL BE DUG BY HAND IN THE PRESENCE OF UTILITY INSPECTOR.

6. **RESOURCE PROTECTION:** THE CONTRACTOR IS ADVISED OF THE PRESENCE OF SENSITIVE RESOURCES LOCATED NEAR PROJECT WORK AREAS. THE TRAIL ALIGNMENT, FENCING, STAGING AREAS AND ALL OTHER PROJECT FACILITIES HAVE BEEN CAREFULLY LOCATED TO MINIMIZE DISTURBANCE OF SENSITIVE RESOURCES. THE LIMITS OF WORK ARE SHOWN ON THE DRAWINGS. ALL CONTRACTOR ACTIVITIES, INCLUDING, BUT NOT LIMITED TO, CONSTRUCTION ACTIVITIES, VEHICLE MAINTENANCE, AND MATERIALS AND EQUIPMENT STORAGE AND STAGING, MUST BE STRICTLY CONFINED TO THE WORK AREAS SHOWN ON THE DRAWINGS. THE LIMITS OF WORK WILL BE CAREFULLY LOCATED IN THE FIELD BY THE CONTRACTOR AND ENGINEER OF RECORD, AND ALL WORK LIMIT AREAS WILL BE PROTECTED BY STRAW WATTLES, CONSTRUCTION BARRIER FENCING, OR SILT FENCING AS SHOWN ON THE DRAWINGS.

7. **BIOLOGICAL AND CULTURAL RESOURCE MONITOR:** CITY OF AGOURA HILLS WILL PROVIDE A QUALIFIED BIOLOGICAL/ARCHEOLOGICAL MONITOR THAT WILL INITIALLY REVIEW SITE CONSTRUCTION PROTOCOLS WITH ALL CONSTRUCTION CONTRACTOR EMPLOYEES AT A PRE-CONSTRUCTION MEETING THAT WILL BE SPECIFICALLY HELD ON RESOURCE PROTECTION. EACH EMPLOYEE ASSIGNED TO THIS PROJECT MUST PARTICIPATE IN THIS PRE-CONSTRUCTION MEETING AND DISCUSSION OF ADJACENT SENSITIVE RESOURCES, AND SIGN A STATEMENT INDICATING THAT THEY HAVE READ AND UNDERSTOOD THE PROTOCOLS AND AGREE TO ADHERE TO THEM. SIGNIFICANT BREACHES OF PROTOCOL AND FAILURE TO ADEQUATELY PROVIDE THE DEGREE OF RESOURCE PROTECTION REQUIRED BY THIS PROJECT WILL RESULT IN THE ISSUANCE OF A STOP WORK ORDER BY THE ENGINEER OR BY THE MONITOR. CITY OF AGOURA HILLS PROVIDED MONITOR WILL CAREFULLY INSPECT ALL WORK AREAS FOR THE PRESENCE OF WILDLIFE OR CULTURAL RESOURCES PRIOR TO INSTALLATION OF PROTECTIVE BARRIER FENCING AND FIELD FENCING, AND PRIOR TO INITIATION OF CONSTRUCTION EACH DAY. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY PENALTIES AND ALL REPAIRS AND MITIGATIONS IMPOSED DUE TO BREACH OF PROTOCOL AND UNAUTHORIZED INTRUSION INTO SENSITIVE RESOURCE AREAS.

8. **CONTRACTOR RESPONSIBILITY:** BY ENTERING INTO THIS CONTRACT WITH CITY OF AGOURA HILLS, THE CONTRACTOR AGREES TO HAVING EXAMINED THE SITE, COMPARING THE SITE CONDITIONS WITH THE DRAWINGS AND SPECIFICATIONS AND HAS CAREFULLY EXAMINED ALL OF THE CONTRACT DOCUMENTS AND IS SATISFIED AS TO THE CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED. NO ALLOWANCE SHALL BE MADE SUBSEQUENTLY ON BEHALF OF THE CONTRACTOR DUE TO FAILURE TO BE ACQUAINTED WITH THE CONDITIONS OF THE SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH SUBCONTRACTORS AS REQUIRED TO ACCOMPLISH ALL CONSTRUCTION OPERATIONS. CONTRACTOR SHALL PROTECT ALL EXISTING ON-SITE AND OFF-SITE IMPROVEMENTS AGAINST DAMAGE RESULTING FROM OPERATIONS. RESPONSIBILITY EXTENDS TO THE CONTRACTOR'S WORKERS, SUBCONTRACTORS AND OTHERS PROVIDING SERVICES. CONTRACTOR SHALL REPAIR AND/OR REPLACE DAMAGE AT THEIR OWN EXPENSE AND TO THE SATISFACTION OF THE ENGINEER AND CITY OF AGOURA HILLS. THE CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD CITY OF AGOURA HILLS AND THE ENGINEER (QUESTA ENGINEERING CORPORATION) HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPT FROM LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF CITY OF AGOURA HILLS OR THE ENGINEER. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.

9. **JOB SITE CONDITIONS:** CONTRACTOR SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION, INCLUDING THE SAFETY OF ALL PERSONS AND PROPERTY, TRAFFIC CONTROL, ACCESS TO AND FROM ADJOINING DRIVEWAYS AND STREETS, AND ANY LANE CLOSURES. TRASH GENERATED BY THIS WORK (CONSTRUCTION DEBRIS, PAPER, BOTTLES, CIGARETTES, ETC) SHALL BE REMOVED ON A DAILY BASIS. CONTRACTOR SHALL CONTROL DUST AT ALL TIMES WITH WATER.

10. **SAFETY AND TRAFFIC CONTROL:** ALL WORK SHALL BE IN COMPLIANCE WITH APPLICABLE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS AS SET FORTH BY THE FEDERAL DEPARTMENT OF LABOR AND/OR THE STATE OF CALIFORNIA AND CITY OF RICHMOND. ALL TRAFFIC CONTROL SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE CALTRANS MANUAL OF TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE OF WORK ZONES. ALL SIGNS SHALL BE APPROPRIATELY CONSTRUCTED WITH REFLECTIVE MATERIAL ON A BACKING OF METAL OR FABRIC (NO WOOD OR PLASTIC ALLOWED) AND SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION TO PROVIDE PROPER VISIBILITY, PER SECTION 12 OF THE CALTRANS SPECIAL PROVISIONS. THE CONTRACTOR SHALL MAINTAIN REASONABLE ACCESS TO ALL ROADWAYS DURING CONSTRUCTION

11. **SPECIFICATIONS:** REFER TO THE SPECIFICATIONS THAT ARE A PART OF THESE CONTRACT DOCUMENTS. COMPLY WITH ALL REGULATIONS AND CODES GOVERNING WORK PERFORMED UNDER THIS CONTRACT. REFER TO CALTRANS STANDARD PLANS AND SPECIFICATIONS AS REQUIRED.

12. **MISCELLANEOUS:** WRITTEN DIMENSIONS ALWAYS TAKE PRECEDENCE OVER SCALED DIMENSIONS IF THERE IS A CONFLICT. THE CONTRACTOR SHALL CONTACT CITY OF AGOURA HILLS TO OBTAIN ADDITIONAL CLARIFICATION. NO DEVIATION OR SUBSTITUTION SHALL BE ALLOWED WITHOUT OBTAINING PRIOR WRITTEN APPROVAL FROM CITY OF AGOURA HILLS AND THE ENGINEER.

DRAWING INDEX

DETAIL DRAWING DESIGNATION

DETAIL NO.
SHEET NO.

60% DESIGN
NOT FOR CONSTRUCTION

QUESTA ENGINEERING CORP
Civil
Environmental
& Water Resources
(510) 236-6114
FAX (510) 236-2423
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

Sht	Rev	Date	By	Description	Appr'd

LEGEND

- EXISTING ROCK REVETMENT
- SUMMER TIME FLOW EXTENT
- ASPHALT ACCESS ROAD
- CONCRETE CHANNEL
- EASEMENTS
- EXISTING FENCE
- EXTENT OF LA COUNTY FLOOD CONTROL PROPERTY
- OTHER PARCEL BOUNDARIES
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED SILT/BIO FENCE
- TEMPORARY DIVERSION PIPE

OAK TREES

OAK TREES

OPEN SPACE
TRACT NO
53752

KANAN ROAD

CONCRETE BOX CULVERT OUTLET

8' WIDE EASEMENT OF LOS VIRGENES MUNICIPAL WATER DISTRICT PER O.R. D-3366 FOR SANITARY SEWER PURPOSES

8' WIDE EASEMENT OF LOS VIRGENES MUNICIPAL WATER DISTRICT PER O.R. D-3366 FOR SANITARY SEWER PURPOSES (R1)

SMH
RIM=863.27'

MEDEA CREEK

FLOW

POOL

PRIVATE PROPERTY

FUTURE EASEMENT TO THE COUNTY OF LOS ANGELES FOR FLOOD CONTROL PURPOSES PER TRACT MAP No. 30907 IN BOOK 799, PAGE 27 (R1)

8" WILLOW
5" WILLOW
4" WILLOW
12"WILLOW
15"WILLOW
10",12" DBL WILLOW
5" DBL WILLOW
10",14" DBL WILLOW

STORM DRAIN OUTLET

SMH
RIM=861.79'

CL ROCK TREE DR

MONUMENT 302
FOUND SPIKE 0.2' BELOW GRADE

RESIDENTIAL BUILDINGS

EASEMENT TO THE COUNTY OF LOS ANGELES FOR STORM DRAIN PURPOSES (R1)

CHUMASH PARK
BASEBALL FIELD

EASEMENT TO THE LOS ANGELES COUNTY FLOOD CONTROL DISTRICT FOR STORM DRAIN AND INGRESS & EGRESS PURPOSES (R1)

CL MEDEA VALLEY DR

N 50°26'12" W 248.59' MEASURED (248.53' RECORD)
BASIS OF BEARINGS

MONUMENT 301
FOUND SPIKE 0.2' BELOW GRADE

0 30' 60'
(1" = 30')

N

SURVEY DATUM:

HORIZONTAL: ASSUMED LOCAL DATUM BASED ON SUBDIVISION MAP
VERTICAL: NAVD88

SURVEY CONTROL POINTS:

POINT #	NORTHING	EASTING	ELEVATION
301	50193.2022	50377.1177	872.63
302	50351.5000	50185.5188	874.19

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MEDEA CREEK RESTORATION

CITY OF AGOURA HILLS

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EXISTING CONDITIONS - PLAN VIEW

AGOURA HILLS, LOS ANGELES COUNTY

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Scale: AS NOTED
Date: 2013-10-31
Sheet: 2 OF 16

LSF SHEET: 10/30/2013 PLOT DATE: 10/30/2013 PLOT STYLE: ----
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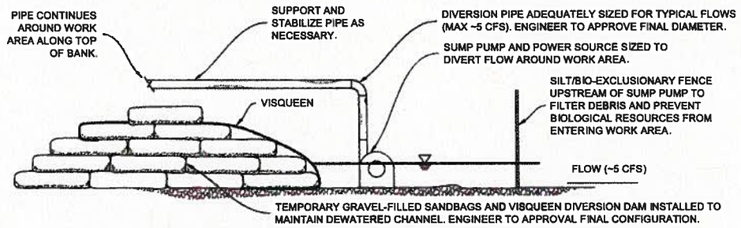
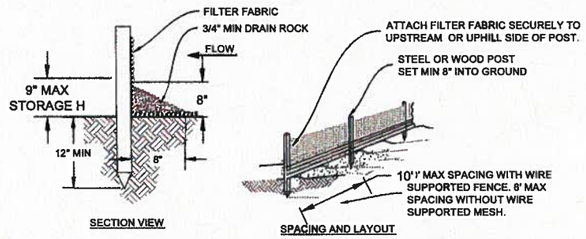


1 TEMPORARY PLASTIC AND SANDBAG COFFER DAM

NTS



2 SILT/BIO-EXCLUSIONARY FENCING

NTS

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DEWATERING & EROSION BMPS

AGOURA HILLS, LOS ANGELES COUNTY

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IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY
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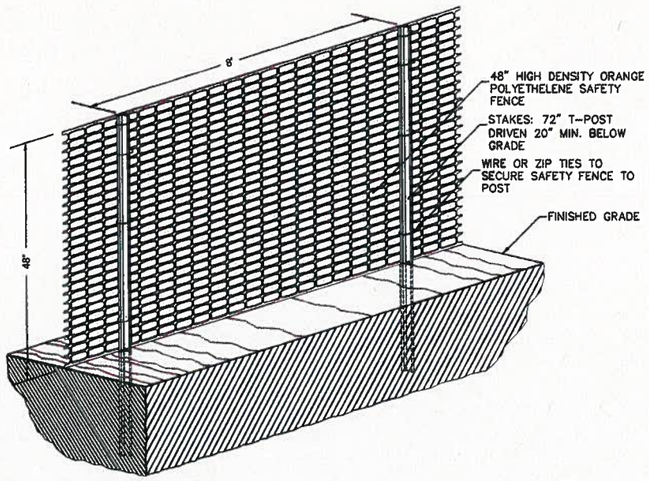
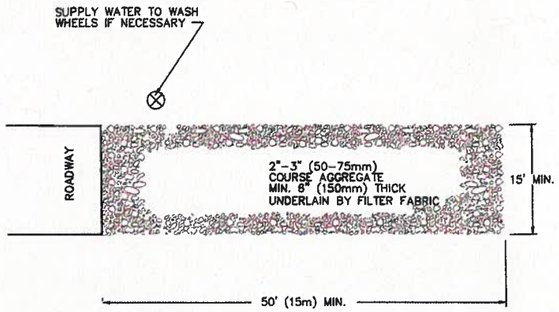


NOTES:

1. ALL SENSITIVE AREAS SHALL BE PROTECTED AS PER PLAN.
2. ALL TREES IN THE CONSTRUCTION AREA NOT SPECIFICALLY DESIGNATED FOR REMOVAL SHALL BE PRESERVED AND PROTECTED WITH HIGH VISIBILITY FENCE AS PER PLAN.
3. WHEN PRACTICABLE, INSTALL HIGH VISIBILITY 3 FEET OUTSIDE OF THE DRIP LINE OF THE TREE.
4. SAFETY FENCE SHOULD BE FASTENED SECURELY TO THE T-POSTS.
5. THE FENCING MUST REMAIN IN PLACE DURING ALL PHASES OF CONSTRUCTION; ANY CHANGE OF THE PROTECTIVE FENCING MUST BE APPROVED.

1 CONSTRUCTION BARRIER FENCE
NTS



PLAN

NOTES:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

2 TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT
NTS

LEGEND

- EXISTING ROCK REVETMENT
- SUMMER TIME FLOW EXTENT
- ASPHALT ACCESS ROAD
- CONCRETE CHANNEL
- EASEMENTS
- EXISTING FENCE
- EXTENT OF LA COUNTY FLOOD CONTROL PROPERTY
- OTHER PARCEL BOUNDARIES
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED SILT/BIO FENCE
- TEMPORARY DIVERSION PIPE

60% DESIGN
NOT FOR CONSTRUCTION

MEDEA CREEK RESTORATION

CITY OF AGOURA HILLS

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DEMOLITION

AGOURA HILLS, LOS ANGELES COUNTY

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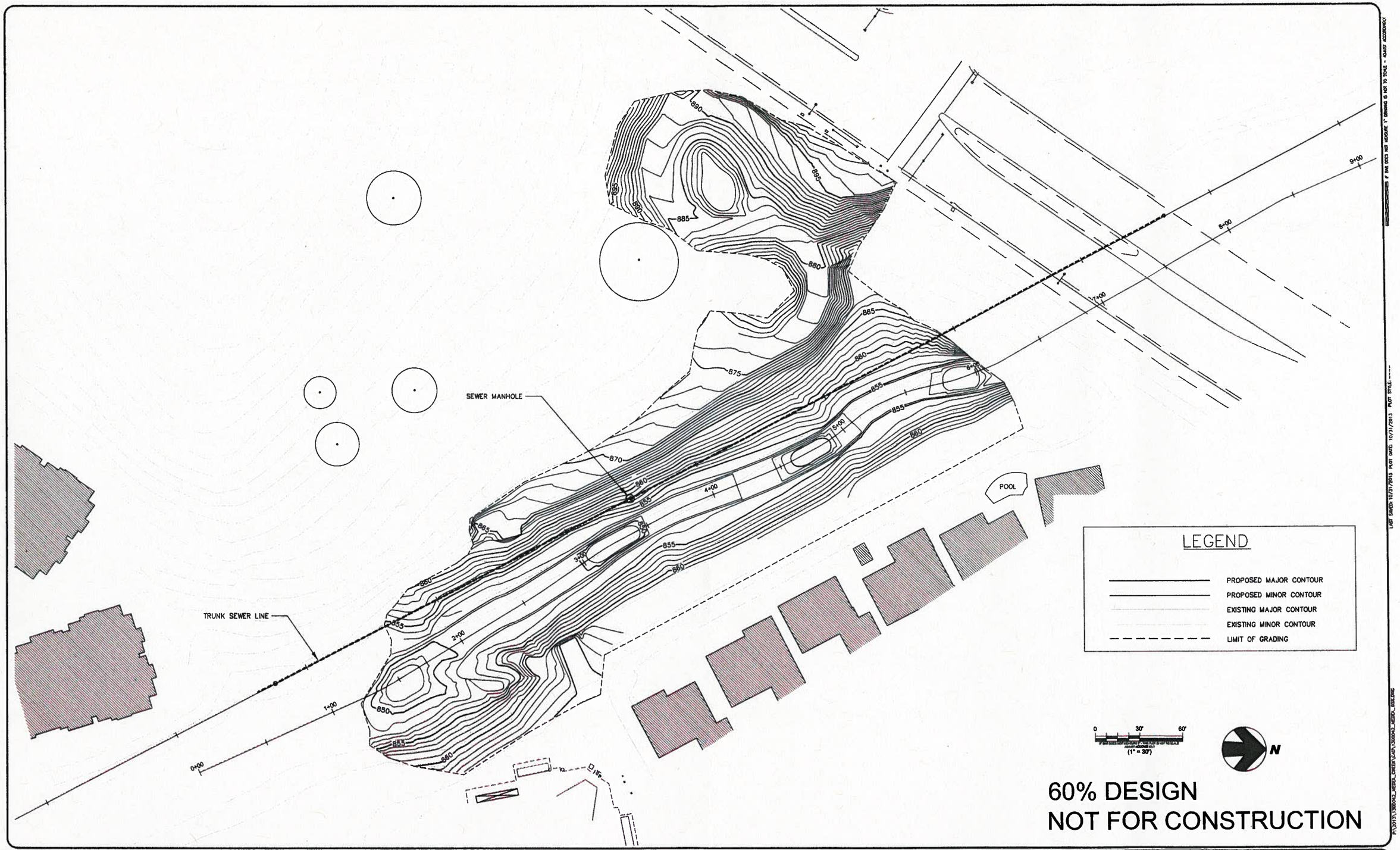
Sheet: 4 OF 16



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CHANNEL GRADING

AGOURA HILLS, LOS ANGELES COUNTY

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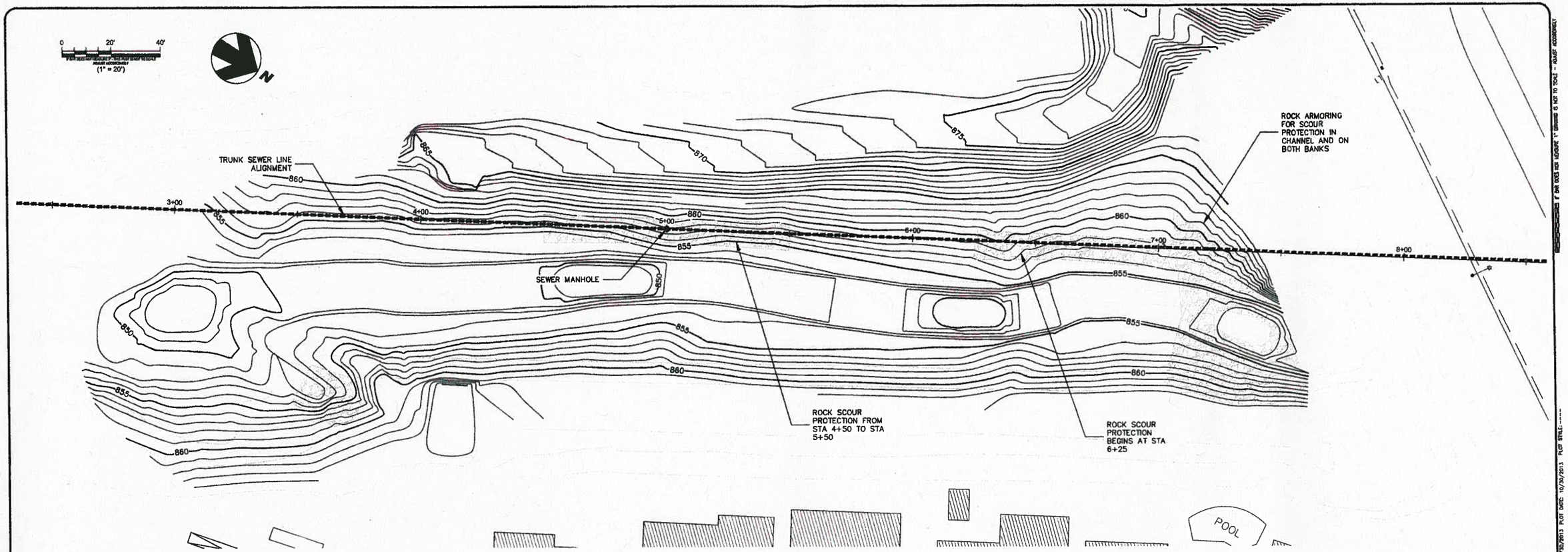
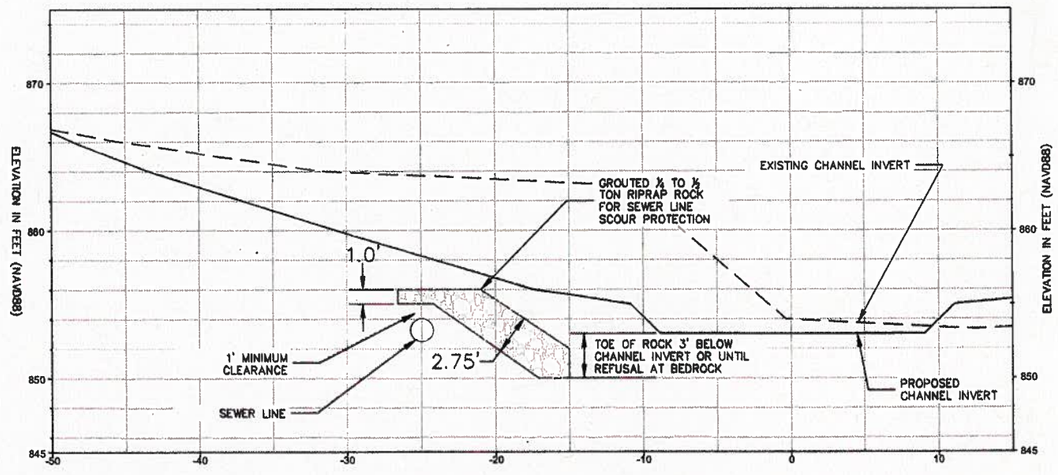


TYPICAL SEWER LINE PROTECTION CROSS SECTION



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SEWER LINE PROTECTION PLAN

AGOURA HILLS, LOS ANGELES COUNTY

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Sheet: 6 OF 16

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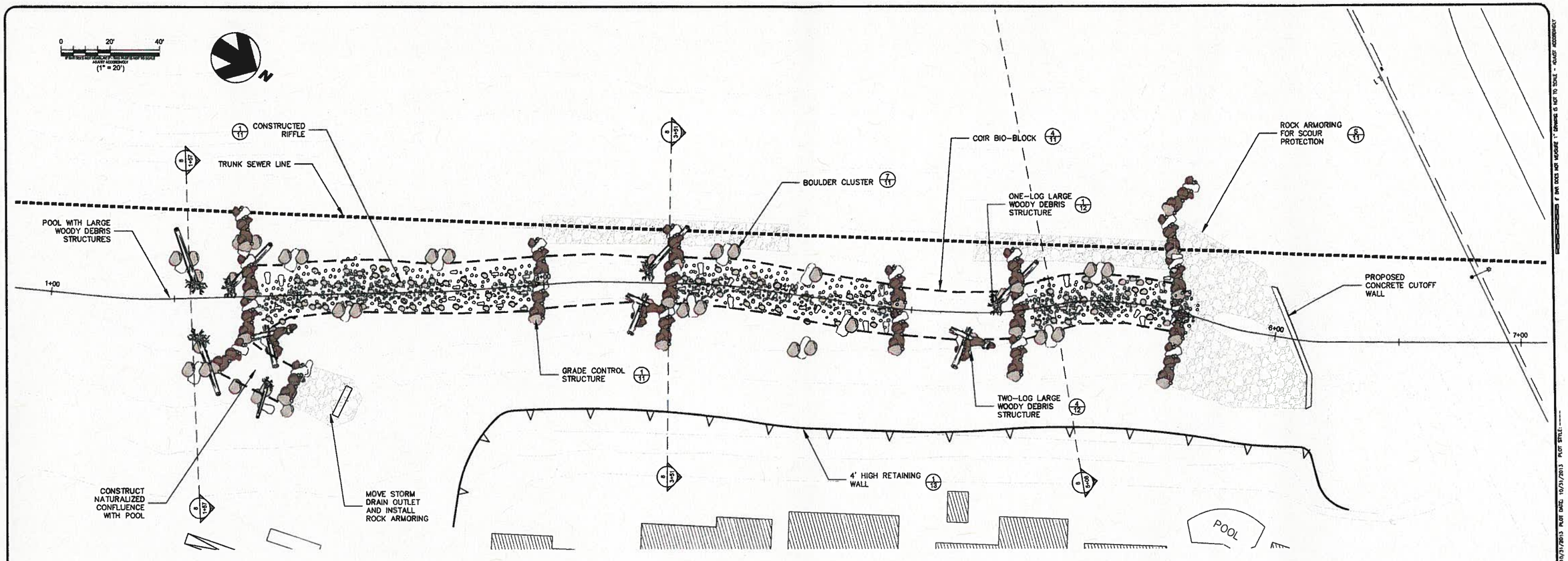

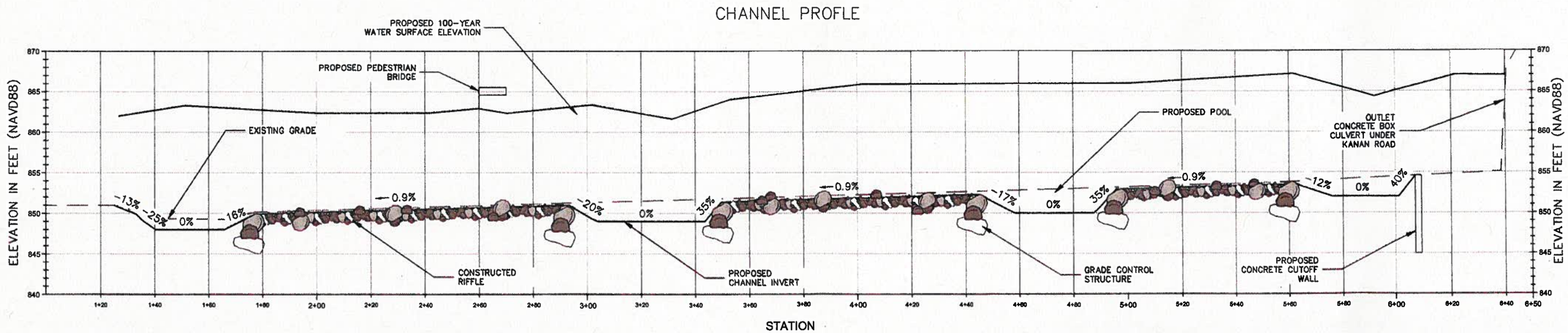

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CHANNEL FEATURES PLAN & PROFILE

AGOURA HILLS, LOS ANGELES COUNTY

Size D | Project 1300042
Scale: AS NOTED
Date: 2013-10-31
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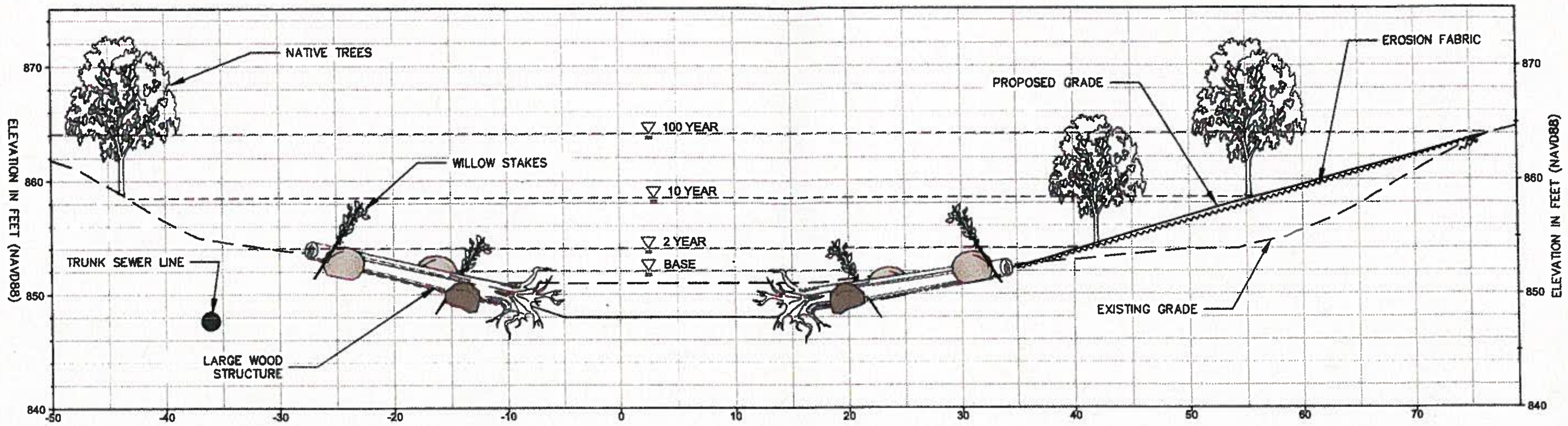
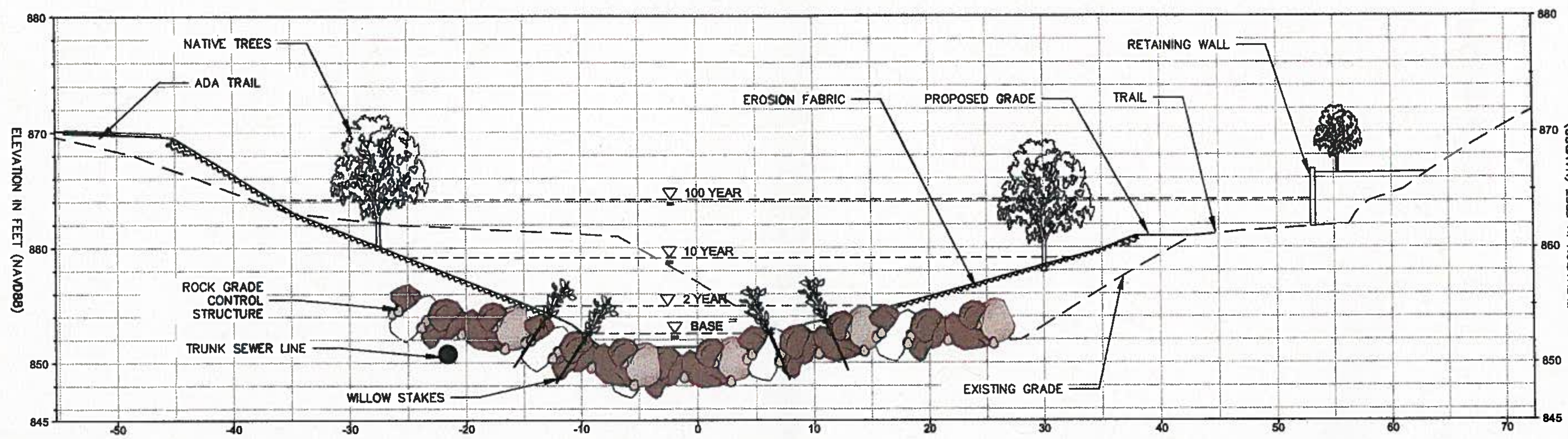
STA 1+57

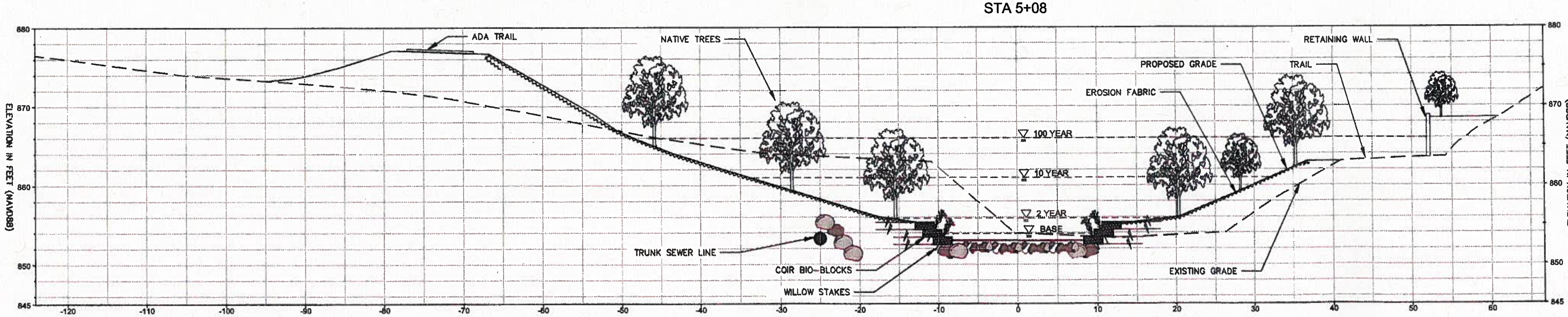


STA 3+51



60% DESIGN
NOT FOR
CONSTRUCTION

STA 5+08



MEDEA CREEK RESTORATION

CITY OF AGOURA HILLS

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PROPOSED CHANNEL SECTIONS

AGOURA HILLS, LOS ANGELES COUNTY

Size: D
Project: 1300042
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Sheet: 8 OF 16

POSSIBLE START OF OUTLOOK TRAIL

12" DIAMETER DRAINAGE PIPE

N42° 43' 19.71"E 59.71'

CROSS WALK ON KANAN ROAD

6+00

7+00

7+30

L=152.941
Δ=211.3978
R=41.452

S0° 09' 38.04"E 37.50'

L=56.955
Δ=79.8847
R=40.860

5+00

L=103.780
Δ=146.7961
R=40.506

12" DIAMETER DRAINAGE PIPE

4+00

N50° 24' 10.78"W 55.40'

4+45

L=21.282
Δ=26.4322
R=46.132

L=102.446
Δ=9.8251
R=597.417

L=22.917
Δ=14.0936
R=93.166

4+00

L=31.865
Δ=12.7733
R=142.935

(4/15) ADA COMPLIANT (MAX 5% GRADE) TRAIL TO KANAN ROAD

3+00

CONCRETE STAIRS WITH LANDING (1/14)

L=113.439
Δ=12.1784
R=533.698

L=80.370
Δ=12.7978
R=359.818

L=36.990
Δ=5.3092
R=399.188

POSSIBLE CONNECTION TO OAK CREEK TRAIL

L=26.131
Δ=83.3281
R=17.968

2+00

N27° 55' 31.78"W 39.86'

POOL

DG TRAIL (5/15)

2+00

(1/15) 80' LENGTH X 10' WIDTH PEDESTRIAN BRIDGE, HIGH CHORD 865.5'

S62° 21' 30.75"W 137.30'

INTERPRETIVE SIGN

PARK BENCH

1+00

L=33.467
Δ=8.7594
R=218.909

1+00

L=93.264
Δ=11.4653
R=466.070

L=8.325
Δ=34.5501
R=13.806

L=27.386
Δ=24.1472
R=64.934

0+00

0+00

(2/13) CREEK ACCESS TRAIL WITH RAILROAD TIE STAIRCASE PATHWAY

CHUMASH PARK BASEBALL FIELD

0 30' 60'
(1" = 30')

N

60% DESIGN
NOT FOR CONSTRUCTION

REFERENCES: F:\AR USES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY

LAST SAVED: 10/31/2013 PLOT DATE: 10/31/2013 PLOT STYLE: ----

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MEDEA CREEK RESTORATION

CITY OF AGOURA HILLS

QUESTA ENGINEERING CORP.
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questa@questaec.com

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PUBLIC ACCESS FEATURES

AGOURA HILLS, LOS ANGELES COUNTY

Size: D
Project: 1300042
Scale: AS NOTED
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IRRIGATION SYMBOLOGY AND MATERIALS

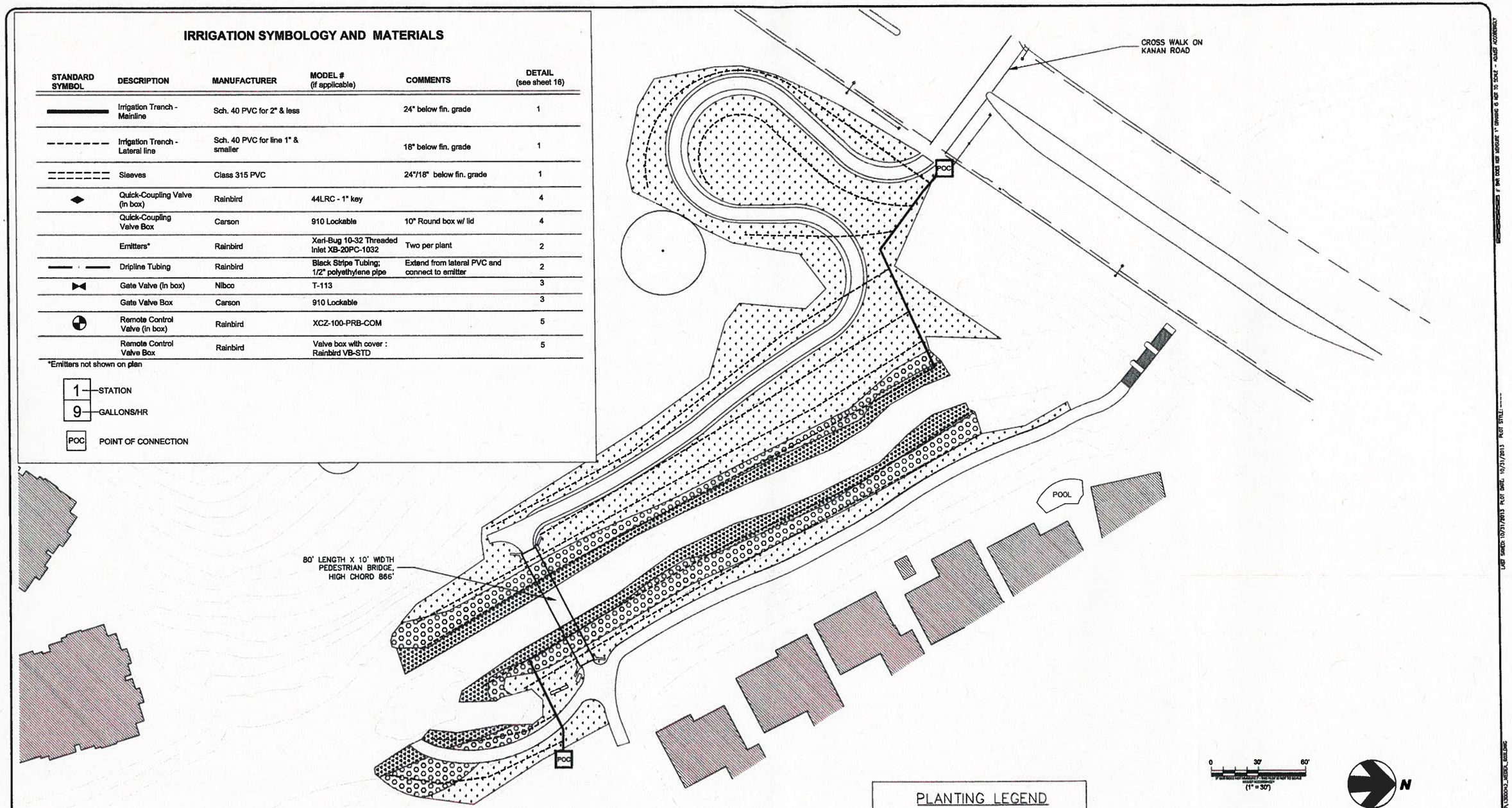
STANDARD SYMBOL	DESCRIPTION	MANUFACTURER	MODEL # (if applicable)	COMMENTS	DETAIL (see sheet 16)
▬▬▬	Irrigation Trench - Mainline	Sch. 40 PVC for 2" & less		24" below fin. grade	1
- - - - - - -	Irrigation Trench - Lateral line	Sch. 40 PVC for line 1" & smaller		18" below fin. grade	1
═══	Sleeves	Class 315 PVC		24"/18" below fin. grade	1
◆	Quick-Coupling Valve (in box)	Rainbird	44LRC - 1" key		4
	Quick-Coupling Valve Box	Carson	910 Lockable	10" Round box w/ lid	4
	Emitters*	Rainbird	Xeri-Bug 10-32 Threaded Inlet XB-20PC-1032	Two per plant	2
——·——	Dripline Tubing	Rainbird	Black Stripe Tubing; 1/2" polyethylene pipe	Extend from lateral PVC and connect to emitter	2
⋈	Gate Valve (in box)	Nibco	T-113		3
	Gate Valve Box	Carson	910 Lockable		3
◓	Remote Control Valve (in box)	Rainbird	XCZ-100-PRB-COM		5
	Remote Control Valve Box	Rainbird	Valve box with cover : Rainbird VB-STD		5

*Emitters not shown on plan

1 — STATION

9 — GALLONS/HR

POC — POINT OF CONNECTION



PLANTING LEGEND

- PLANTING ZONE A: RIPARIAN SPECIES LOWER BANK AND FLOODPLAIN AREAS
- PLANTING ZONE B: UPPER BANK TRANSITION ZONE AREAS
- PLANTING ZONE C: UPLAND SPECIES IN HOT DRY AREAS

0 30' 60'
(1" = 30')

N

60% DESIGN
NOT FOR CONSTRUCTION

MEDEA CREEK RESTORATION

CITY OF AGOURA HILLS

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Civil
Environmental
& Water Resources
(510) 236-6114
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questa@questaec.com
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PLANTING & IRRIGATION PLAN

AGOURA HILLS, LOS ANGELES COUNTY

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Sheet: 10 OF 16

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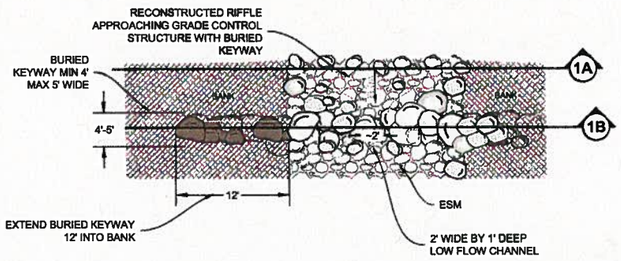
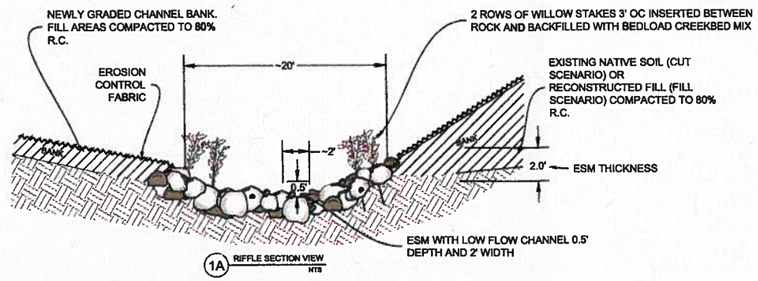
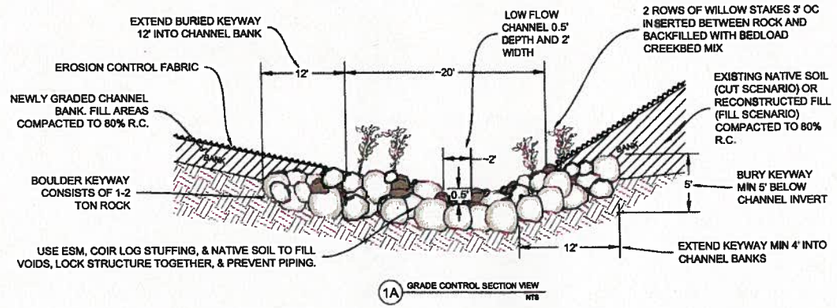
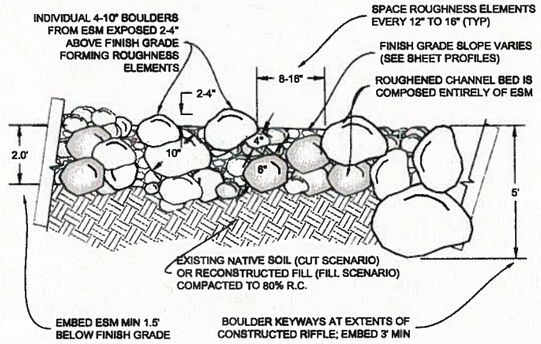






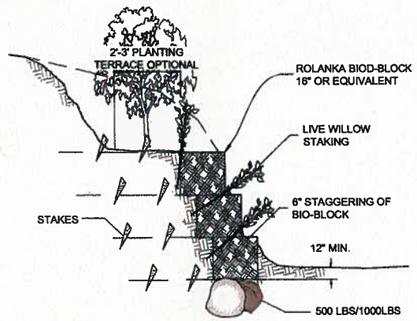
1 CONSTRUCTED RIFFLE AND GRADE CONTROL STRUCTURE PLAN AND SECTIONS

NTS



2 CONSTRUCTED RIFFLE AND GRADE CONTROL PROFILE

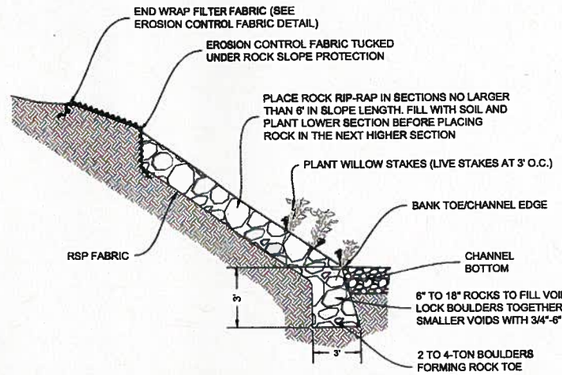
NTS



NOTE: KEY IN BIO-BLOCK UPSTREAM AND DOWNSTREAM EXTENT WITH BOULDER CLUSTER OR LARGE WOOD STRUCTURE

4 BANK STABILIZATION COIR BIO-BLOCK DETAIL

NTS



5 PLANTED ROCK REVETMENT DETAIL

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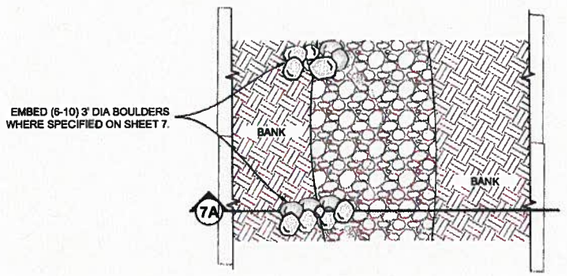

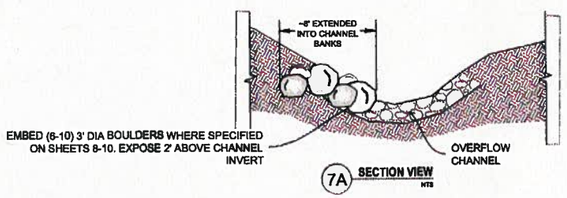

NOTE: WHERE SHOWN ON THE PLANS, INCORPORATE ONE LOG INTO BOULDER CLUSTER PER SHEET 10 DETAILS 4 & 5

7 BOULDER CLUSTER DETAIL

NTS

FEATURE	ROCK SIZE	ROCK WEIGHT AND VOLUME
BOULDERS CLUSTER	½ - 3 TON, 18" - 65"	TOTAL: 35 CY; 70 TN
ANCHOR BOULDERS FOR LWD	2 - 4 TON, 40" - 72"	TOTAL: 45 CY; 90 TN
RSP CULVERT OUTLETS	½ - 3 TON, 18" - 54"	TOTAL: 470 CY; 940 TN
SEWER LINE ARMORING	½ - 1 TON, 12" - 30"	TOTAL: 180 CY; 360 TN
CONSTRUCTED RIFFLE	SEE "ESM" DESCRIPTION AT RIGHT	TOTAL: 480 CY; 960 TN
GRADE CONTROL STRUCTURE	½ - 4 TON, 18" - 72"	TOTAL: 750 CY; 1500 TN

ENGINEERED STREAMBED MATERIAL (ESM)*

SIZE (INCHES)	%PASSING
D84	15"-18"
D50	10"
D30	6"
D16	1"
D0	SAND

*ESM SHALL CONTAIN A MIN OF 10% AND MAX OF 15% NATIVE ON-SITE SOIL

6 ROCK SIZING AND VOLUMES

NTS

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CONSTRUCTION DETAILS 1

AGOURA HILLS, LOS ANGELES COUNTY

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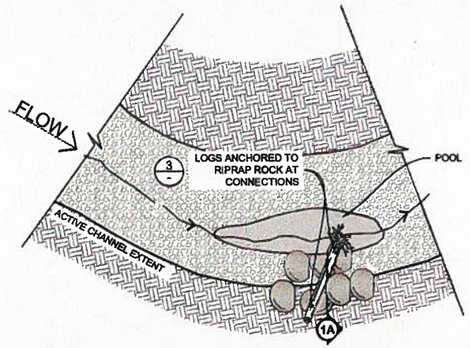
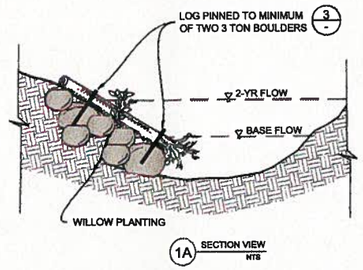
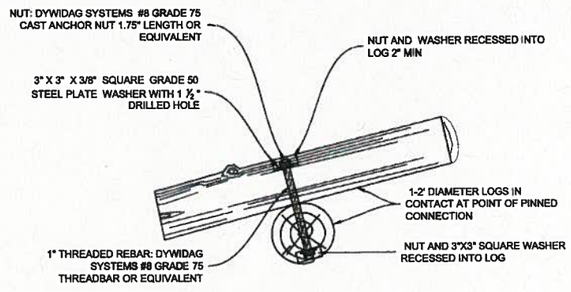
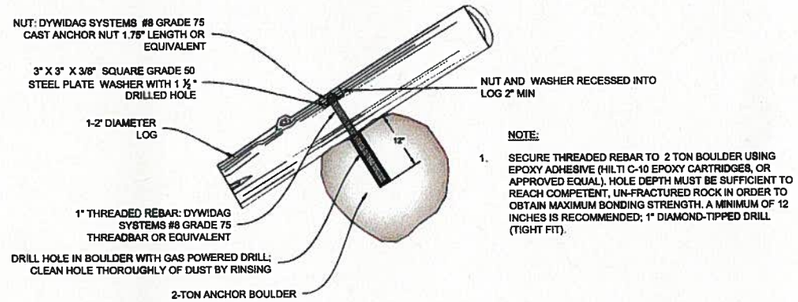




1 ROCK REVETMENT ENHANCEMENT LARGE WOOD STRUCTURE

NTS



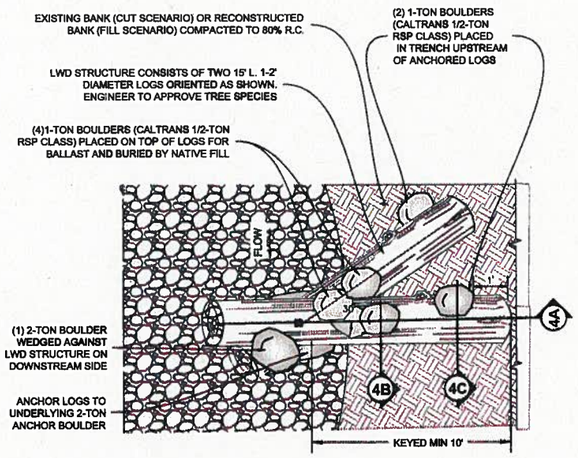


NOTE:

1. SECURE THREADED REBAR TO 2 TON BOULDER USING EPOXY ADHESIVE (HILTI C-10 EPOXY CARTRIDGES, OR APPROVED EQUAL). HOLE DEPTH MUST BE SUFFICIENT TO REACH COMPETENT, UN-FRACTURED ROCK IN ORDER TO OBTAIN MAXIMUM BONDING STRENGTH. A MINIMUM OF 12 INCHES IS RECOMMENDED; 1" DIAMOND-TIPPED DRILL (TIGHT FIT).

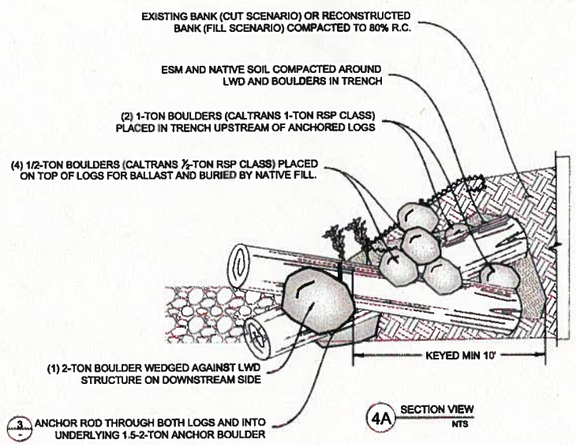
2 LOG-LOG ANCHORING

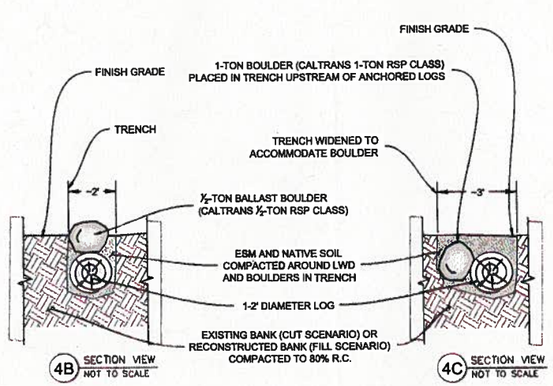
NTS



3 LOG-BOULDER ANCHORING

NTS





4 2-LOG LARGE WOOD STRUCTURE

NTS

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CITY OF AGOURA HILLS

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CONSTRUCTION DETAILS 2

AGOURA HILLS, LOS ANGELES COUNTY

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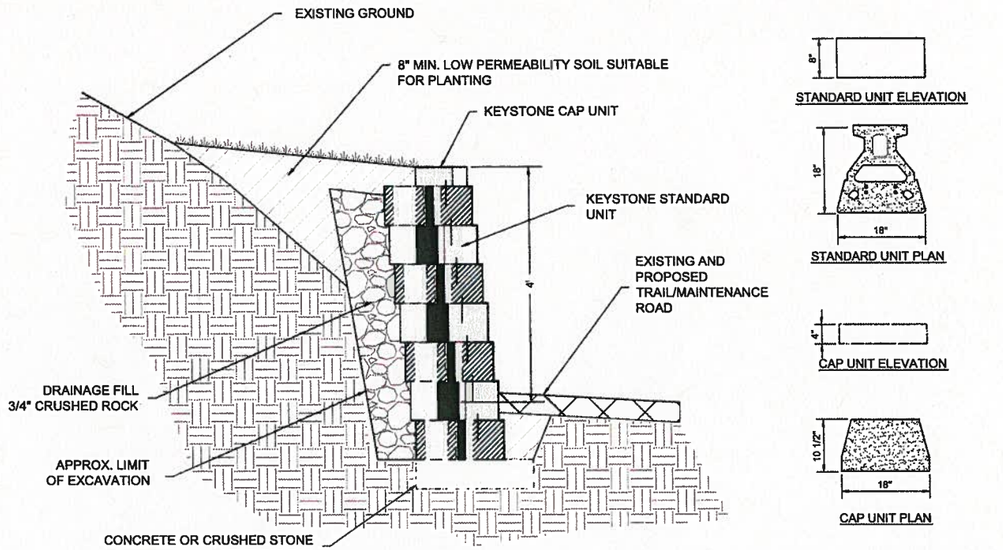
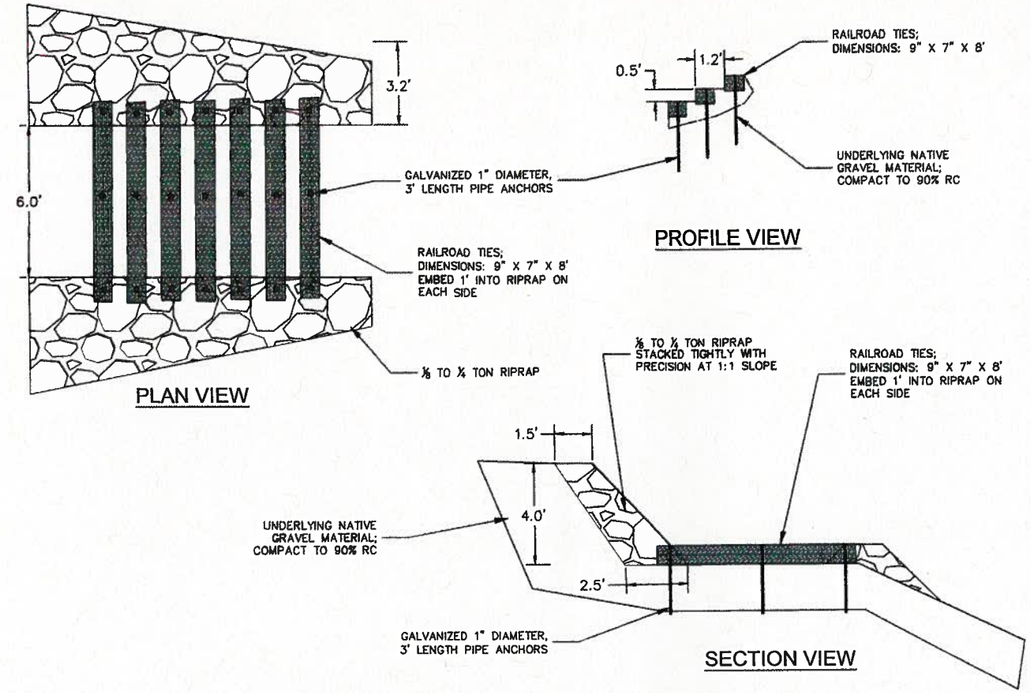


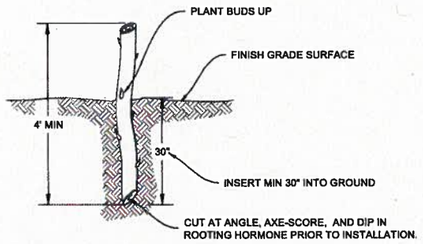
1 KEYSTONE RETAINING WALL

NTS



2 TRAIL STEPS

NTS

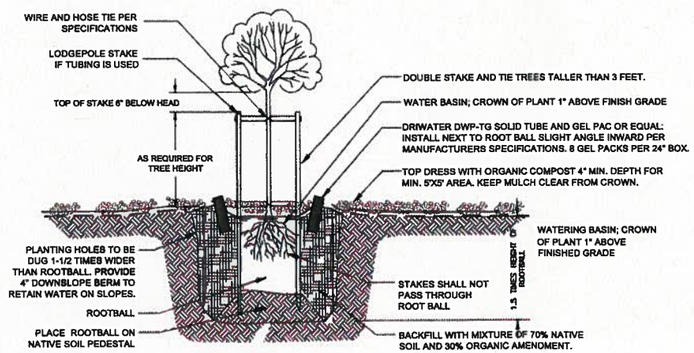


NOTE:

1. WILLOW STAKE SPECIES SHALL BE A MIX OF SPECIES PRESENT AT AND ADJACENT TO THE WORK SITE
2. CONTRACTOR RESPONSIBLE FOR PROVIDING SOURCE DOCUMENTATION TO ENGINEER
3. EACH STAKE SHALL BE 1.5" - 3" DIAMETER AT THE BOTTOM TO FACILITATE ROOT GROWTH AFTER TREATMENT WITH ROOTING HORMONE.
4. INSERT MIN 30" INTO GROUND
5. FOR WILLOW STAKES IN ROCK TOE AND WILLOW PLANTED RSP, INSTALL STAKES AND ROCK CONCURRENTLY AND THEN BACKFILL WITH NATIVE SOIL TO PROMOTE ROOTING

3 LIVE WILLOW CUTTINGS

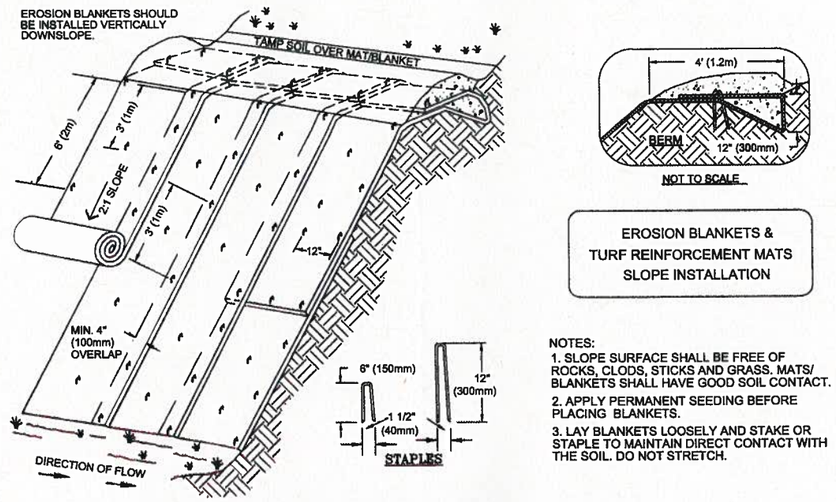
NTS



4 TREE PLANTING

TREE POTS

NTS



NOTES:

1. SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS AND GRASS. MATS/ BLANKETS SHALL HAVE GOOD SOIL CONTACT.
2. APPLY PERMANENT SEEDING BEFORE PLACING BLANKETS.
3. LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.

5 EROSION CONTROL FABRIC

NTS

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CONSTRUCTION DETAILS 3

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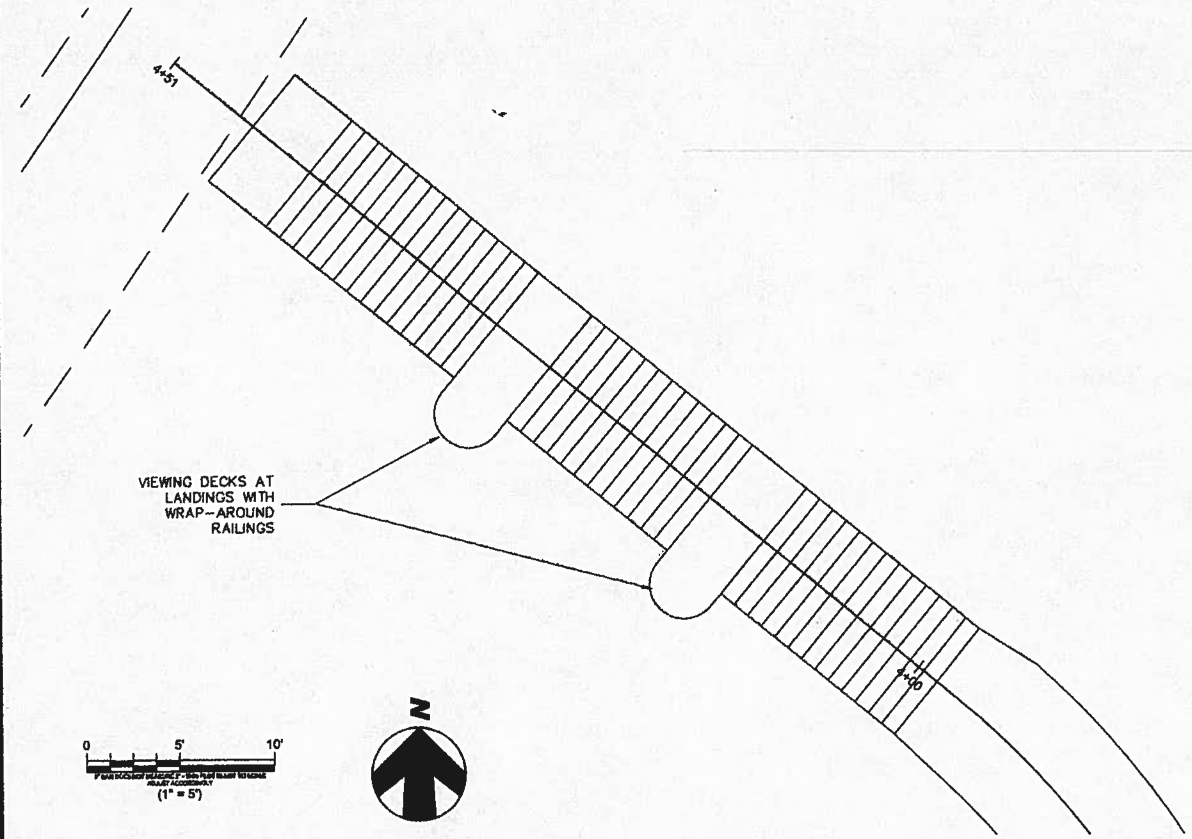
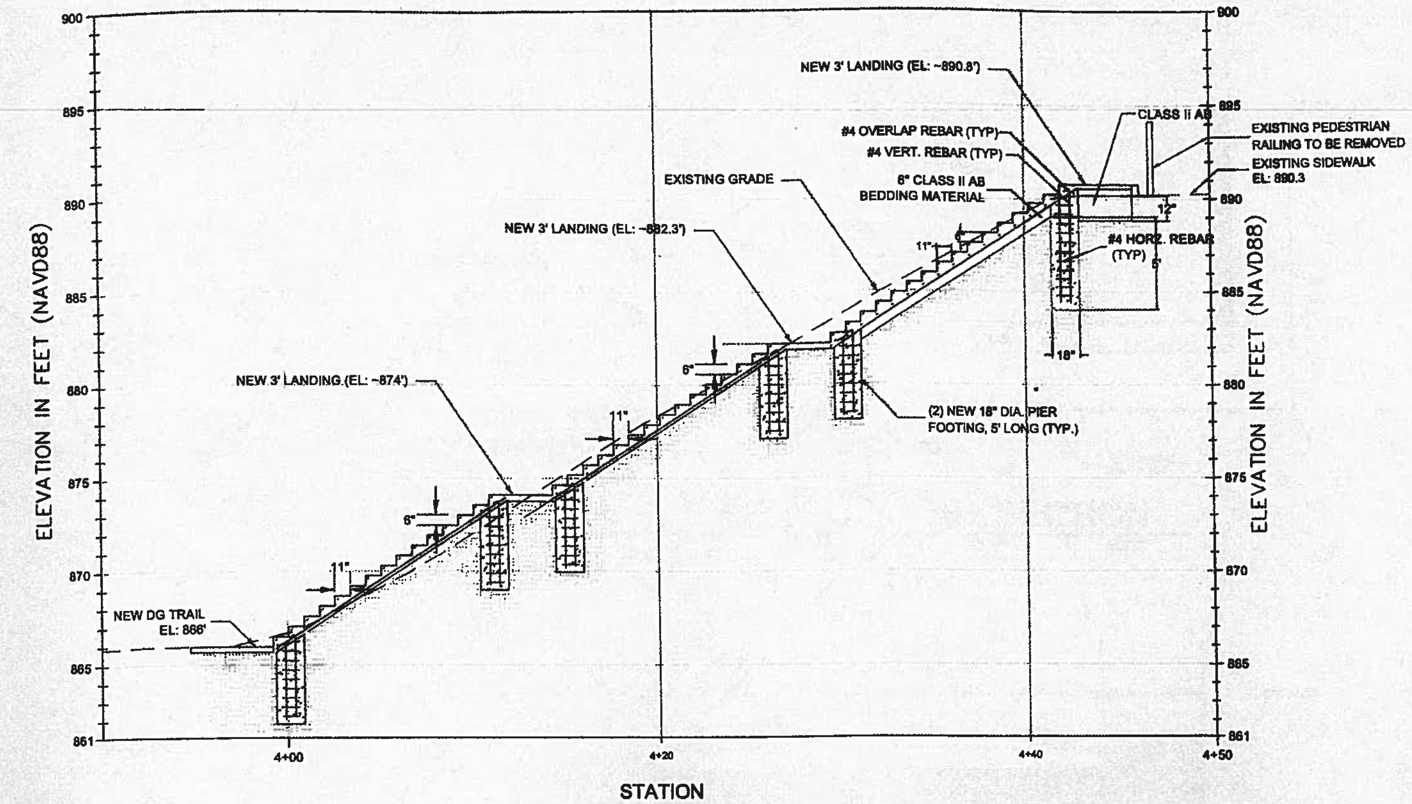
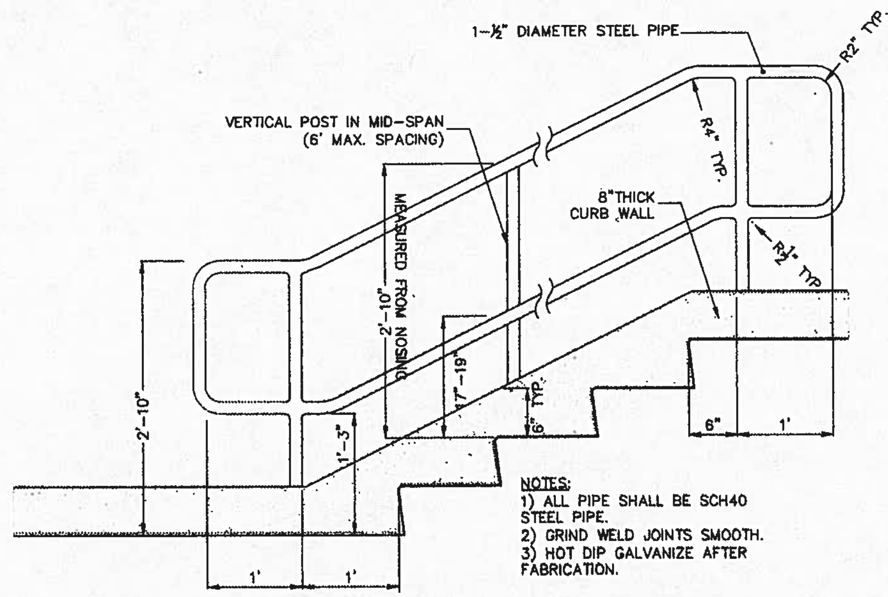


1 **STAIRS - PLAN VIEW**



2 **STAIRS - PROFILE VIEW**



3 **STAIRS - RAILING DETAIL**

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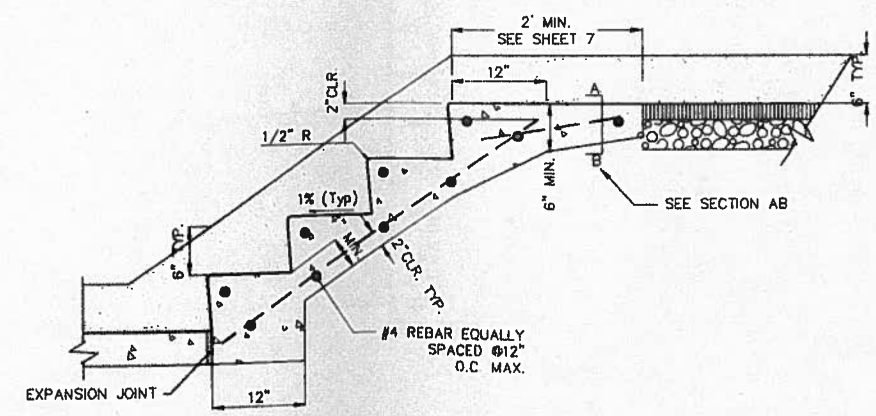

4 **STAIRS - STEP CONSTRUCTION DETAIL**

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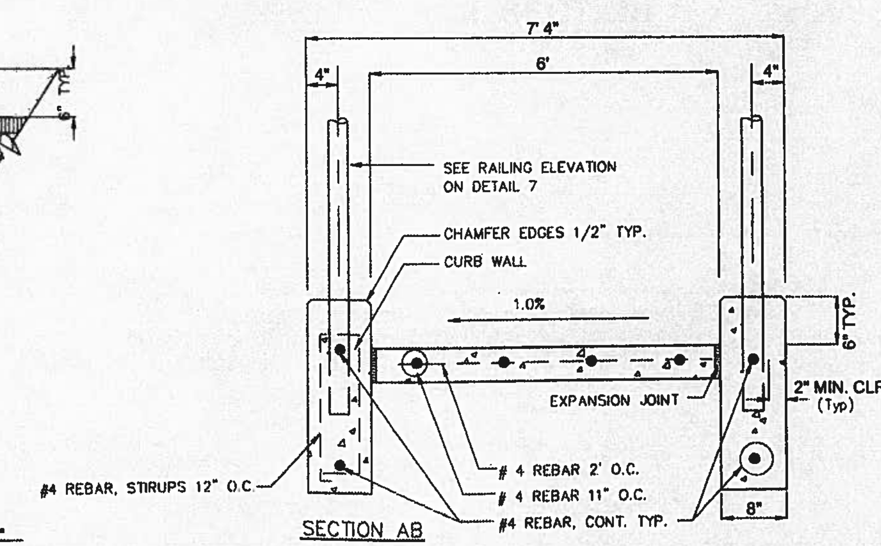

5 **STAIRS - CROSS SECTION DETAIL**

NTS

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MEDEA CREEK RESTORATION	CONSTRUCTION DETAILS 4	Size: D; Project: 1300042
CITY OF AGOURA HILLS	AGOURA HILLS, LOS ANGELES COUNTY	Scale: AS NOTED
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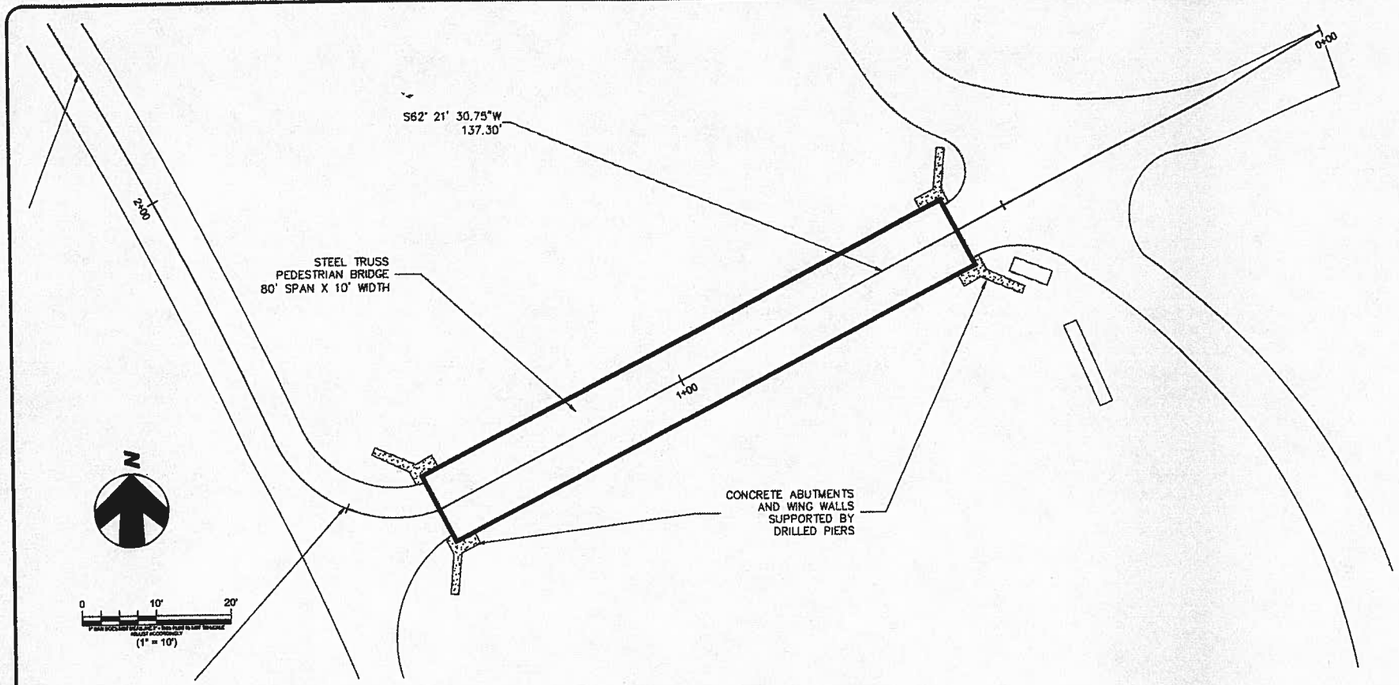
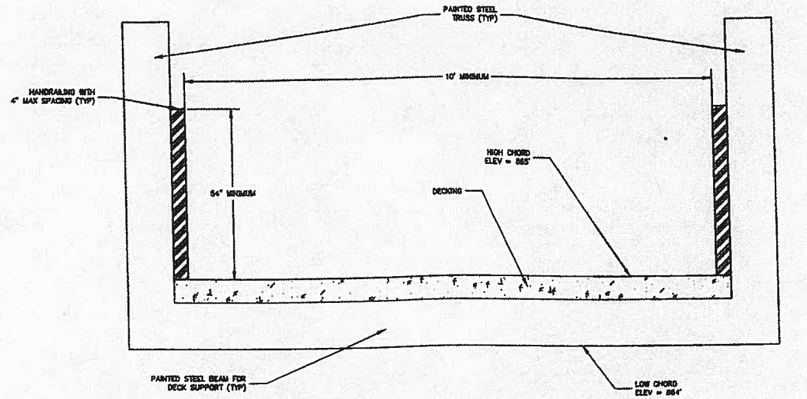


1 BRIDGE - PLAN VIEW



2 BRIDGE CROSS SECTION

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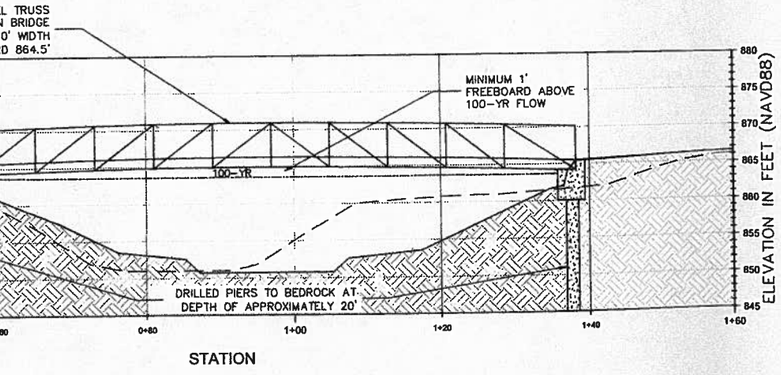
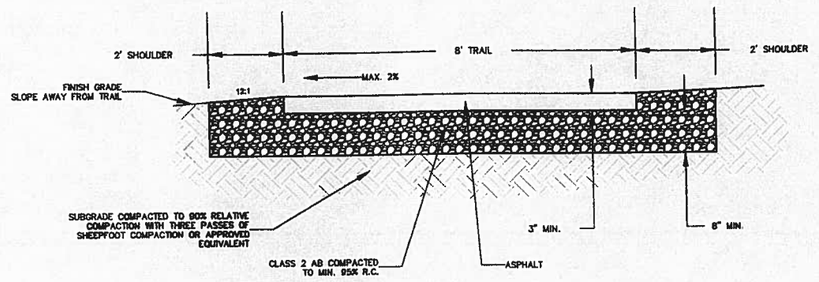


3 TRAIL PROFILE AT PEDESTRIAN BRIDGE

NTS



4 ASPHALT TRAIL SECTION

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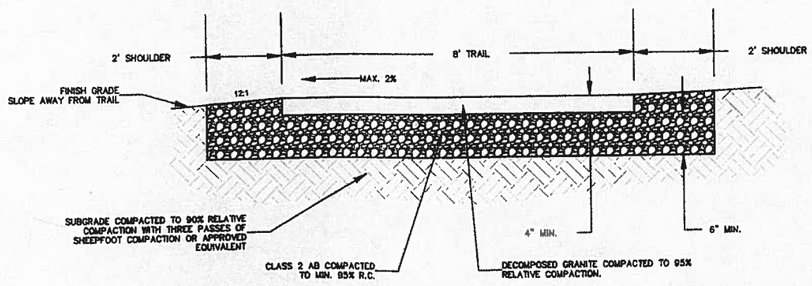

5 DECOMPOSED GRANITE TRAIL SECTION

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CONSTRUCTION DETAILS 5

AGOURA HILLS, LOS ANGELES COUNTY

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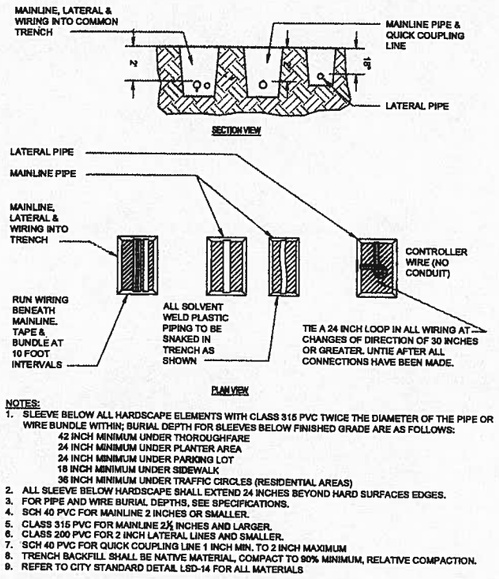
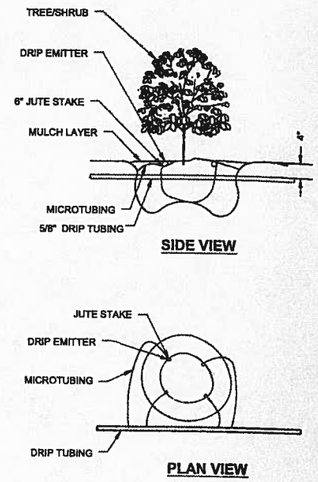


NOTES:
1. SLEEVE BELOW ALL HARDSCAPE ELEMENTS WITH CLASS 315 PVC TWICE THE DIAMETER OF THE PIPE OR WIRE BUNDLE WITHIN; BURIAL DEPTH FOR SLEEVES BELOW FINISHED GRADE ARE AS FOLLOWS:
   - 42 INCH MINIMUM UNDER THOROUGHFARE
   - 24 INCH MINIMUM UNDER PLANTER AREA
   - 24 INCH MINIMUM UNDER PARKING LOT
   - 18 INCH MINIMUM UNDER SIDEWALK
   - 36 INCH MINIMUM UNDER TRAFFIC CIRCLES (RESIDENTIAL AREAS)
2. ALL SLEEVE BELOW HARDSCAPE SHALL EXTEND 24 INCHES BEYOND HARD SURFACES EDGES.
3. FOR PIPE AND WIRE BURIAL DEPTHS, SEE SPECIFICATIONS.
4. SCH 40 PVC FOR MAINLINE 2 INCHES OR SMALLER.
5. CLASS 315 PVC FOR MAINLINE 2½ INCHES AND LARGER.
6. CLASS 200 PVC FOR 2 INCH LATERAL LINES AND SMALLER.
7. SCH 40 PVC FOR QUICK COUPLING LINE 1 INCH MIN. TO 2 INCH MAXIMUM
8. TRENCH BACKFILL SHALL BE NATIVE MATERIAL, COMPACT TO 90% MINIMUM, RELATIVE COMPACTION.
9. REFER TO CITY STANDARD DETAIL LSD-14 FOR ALL MATERIALS

1 TRENCHING DETAILS

NTS



2 DRIP IRRIGATION

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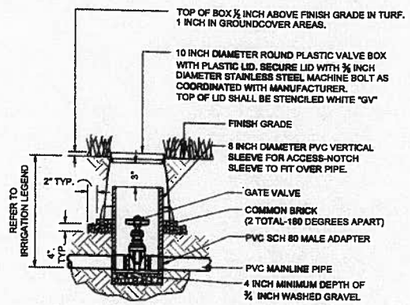

3 GATE VALVE DETAIL

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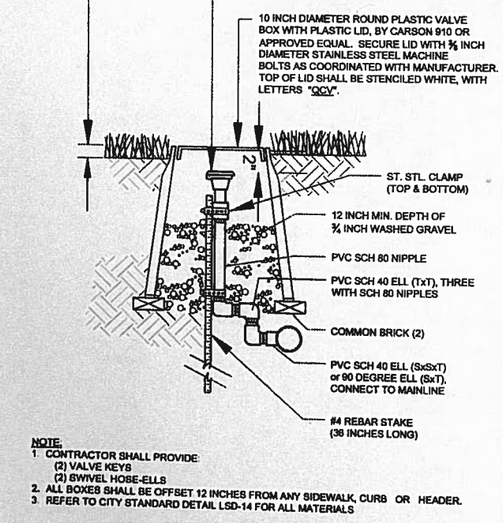
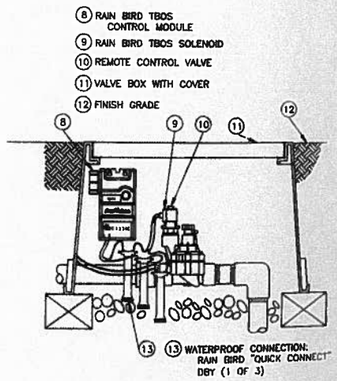


NOTE:
1. CONTRACTOR SHALL PROVIDE:
   - (2) VALVE KEYS
   - (2) SWIVEL HOSE-ELLS
2. ALL BOXES SHALL BE OFFSET 12 INCHES FROM ANY SIDEWALK, CURB OR HEADER.
3. REFER TO CITY STANDARD DETAIL LSD-14 FOR ALL MATERIALS

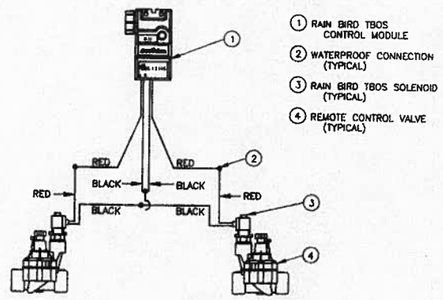
4 QUICK CONNECT FAUCET AND VALVE

NTS



5 THREE PROGRAM BATTERY OPERATED CONTROLLER

NTS



6 CONTROLLER WIRING

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CONSTRUCTION DETAILS 6

AGOURA HILLS, LOS ANGELES COUNTY

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Appendix C
HYDRAULIC MODEL OUTPUT

HEC-RAS Plan: Plan 02 River: HEC-RAS ALIGNMEN Reach: MEDEA EXISTING

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)	
MEDEA EXISTING	2321.83	1	100.00	866.45	866.97	867.27	868.05	0.010008	8.34	11.99	28.31	2.26
MEDEA EXISTING	2321.83	2	200.00	866.45	867.19	867.70	869.02	0.010008	10.86	18.41	29.16	2.41
MEDEA EXISTING	2321.83	2-yr	500.00	866.45	867.67	868.63	871.28	0.010008	15.25	32.78	30.98	2.61
MEDEA EXISTING	2321.83	4	750.00	866.45	867.98	869.24	872.81	0.010009	17.65	42.50	32.15	2.70
MEDEA EXISTING	2321.83	5	1000.00	866.45	868.24	869.77	874.16	0.010008	19.53	51.21	33.16	2.77
MEDEA EXISTING	2321.83	6	1300.00	866.45	868.53	870.33	875.63	0.010008	21.38	60.80	34.24	2.83
MEDEA EXISTING	2321.83	PF 7	1800.00	866.45	868.94	871.15	877.80	0.010008	23.88	75.39	35.83	2.90
MEDEA EXISTING	2321.83	10-yr	2560.00	866.45	869.49	872.23	880.66	0.010009	26.82	95.44	37.89	2.98
MEDEA EXISTING	2321.83	50-yr	2645.00	866.45	869.54	872.34	880.96	0.010009	27.11	97.56	38.11	2.99
MEDEA EXISTING	2321.83	PF 10	4000.00	866.45	870.34	873.92	885.21	0.010010	30.94	129.28	41.15	3.08
MEDEA EXISTING	2321.83	100-yr	7200.00	866.45	890.96	877.51	891.15	0.000012	3.59	2466.65	151.27	0.15
MEDEA EXISTING	2321.83	500-yr	11270.00	866.45	894.28	879.36	894.62	0.000018	4.76	3007.85	169.81	0.18
MEDEA EXISTING	2233.5	1	100.00	865.60	865.93	866.22	867.01	0.014099	8.34	11.99	36.45	2.56
MEDEA EXISTING	2233.5	2	200.00	865.60	866.10	866.58	867.97	0.014140	10.97	18.23	36.56	2.74
MEDEA EXISTING	2233.5	2-yr	500.00	865.60	866.48	867.39	870.23	0.013712	15.55	32.16	36.81	2.93
MEDEA EXISTING	2233.5	4	750.00	865.60	866.74	867.95	871.77	0.013273	18.00	41.66	36.97	2.99
MEDEA EXISTING	2233.5	5	1000.00	865.60	866.97	868.44	873.14	0.012908	19.93	50.17	37.12	3.02
MEDEA EXISTING	2233.5	6	1300.00	865.60	867.22	868.98	874.61	0.012515	21.81	59.59	37.29	3.04
MEDEA EXISTING	2233.5	PF 7	1800.00	865.60	867.61	869.78	876.79	0.011967	24.32	74.02	37.54	3.05
MEDEA EXISTING	2233.5	10-yr	2560.00	865.60	868.13	870.88	879.69	0.011375	27.28	93.85	37.89	3.05
MEDEA EXISTING	2233.5	50-yr	2645.00	865.60	868.19	871.00	879.99	0.011318	27.56	95.96	37.92	3.05
MEDEA EXISTING	2233.5	PF 10	4000.00	865.60	869.02	872.67	884.27	0.010561	31.34	127.64	38.46	3.03
MEDEA EXISTING	2233.5	100-yr	7200.00	865.60	890.83	877.06	891.14	0.000022	4.62	2175.86	152.61	0.18
MEDEA EXISTING	2233.5	500-yr	11270.00	865.60	894.07	879.53	894.59	0.000032	6.13	2686.93	158.43	0.22
MEDEA EXISTING	2100		Culvert									
MEDEA EXISTING	2020.64	1	100.00	854.84	855.18	855.57	857.65	0.057021	12.59	7.94	37.34	4.81
MEDEA EXISTING	2020.64	2	200.00	854.84	855.29	855.93	859.69	0.060320	16.83	11.88	37.61	5.28
MEDEA EXISTING	2020.64	2-yr	500.00	854.84	855.53	856.72	864.44	0.058889	23.97	20.86	37.94	5.70
MEDEA EXISTING	2020.64	4	750.00	854.84	855.75	857.26	865.90	0.043331	25.56	29.34	38.26	5.14
MEDEA EXISTING	2020.64	5	1000.00	854.84	855.93	857.73	867.65	0.038110	27.47	36.40	38.51	4.98
MEDEA EXISTING	2020.64	6	1300.00	854.84	856.14	858.25	869.48	0.033893	29.31	44.35	38.78	4.83
MEDEA EXISTING	2020.64	PF 7	1800.00	854.84	856.46	859.03	871.94	0.028830	31.57	57.02	39.15	4.61
MEDEA EXISTING	2020.64	10-yr	2560.00	854.84	856.92	860.08	874.97	0.024066	34.09	75.09	39.47	4.36
MEDEA EXISTING	2020.64	50-yr	2645.00	854.84	856.97	860.19	875.27	0.023658	34.33	77.04	39.50	4.33
MEDEA EXISTING	2020.64	PF 10	4000.00	854.84	857.72	861.80	879.43	0.019091	37.39	106.99	40.21	4.04
MEDEA EXISTING	2020.64	100-yr	7200.00	854.84	866.01	866.01	869.29	0.000973	14.55	498.32	80.57	1.00
MEDEA EXISTING	2020.64	500-yr	11270.00	854.84	868.40	868.40	872.61	0.000846	16.52	715.54	99.99	0.98
MEDEA EXISTING	1960.49	1	100.00	853.96	854.44	854.83	855.90	0.013177	9.68	10.33	23.98	2.60

HEC-RAS Plan: Plan 02 River: HEC-RAS ALIGNMEN Reach: MEDEA EXISTING (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)	
MEDEA EXISTING	1960.49	2	200.00	853.96	854.62	855.29	857.48	0.017090	13.56	14.75	25.05	3.11
MEDEA EXISTING	1960.49	2-yr	500.00	853.96	854.98	856.29	861.68	0.023117	20.78	24.06	26.89	3.87
MEDEA EXISTING	1960.49	4	750.00	853.96	855.28	856.95	863.63	0.020414	23.19	32.35	27.75	3.78
MEDEA EXISTING	1960.49	5	1000.00	853.96	855.53	857.53	865.54	0.019566	25.39	39.39	28.41	3.80
MEDEA EXISTING	1960.49	6	1300.00	853.96	855.81	858.15	867.51	0.018644	27.45	47.36	29.15	3.79
MEDEA EXISTING	1960.49	PF 7	1800.00	853.96	856.24	859.06	870.15	0.017161	29.94	60.13	30.28	3.74
MEDEA EXISTING	1960.49	10-yr	2560.00	853.96	856.83	860.25	873.38	0.015515	32.64	78.42	31.82	3.66
MEDEA EXISTING	1960.49	50-yr	2645.00	853.96	856.89	860.37	873.69	0.015364	32.89	80.41	31.99	3.66
MEDEA EXISTING	1960.49	PF 10	4000.00	853.96	857.81	862.10	878.02	0.013530	36.08	110.86	34.44	3.54
MEDEA EXISTING	1960.49	100-yr	7200.00	853.96	864.23	865.49	869.07	0.001704	17.65	408.10	80.04	1.36
MEDEA EXISTING	1960.49	500-yr	11270.00	853.96	866.21	867.81	872.35	0.001420	19.95	602.30	116.69	1.31
MEDEA EXISTING	1900	1	100.00	853.87	854.47	854.69	855.21	0.005168	6.90	14.49	27.58	1.68
MEDEA EXISTING	1900	2	200.00	853.87	854.62	855.12	856.42	0.009221	10.76	18.59	27.96	2.33
MEDEA EXISTING	1900	2-yr	500.00	853.87	854.94	856.09	860.03	0.016184	18.11	27.60	28.78	3.26
MEDEA EXISTING	1900	4	750.00	853.87	855.21	856.73	862.09	0.016188	21.05	35.63	29.50	3.37
MEDEA EXISTING	1900	5	1000.00	853.87	855.44	857.29	864.03	0.016498	23.52	42.53	30.10	3.49
MEDEA EXISTING	1900	6	1300.00	853.87	855.70	857.88	866.04	0.016434	25.81	50.37	30.77	3.55
MEDEA EXISTING	1900	PF 7	1800.00	853.87	856.10	858.77	868.80	0.015817	28.60	62.95	31.81	3.58
MEDEA EXISTING	1900	10-yr	2560.00	853.87	856.66	859.93	872.15	0.014793	31.58	81.06	33.26	3.56
MEDEA EXISTING	1900	50-yr	2645.00	853.87	856.72	860.05	872.48	0.014684	31.86	83.03	33.41	3.56
MEDEA EXISTING	1900	PF 10	4000.00	853.87	857.60	861.76	876.95	0.013235	35.31	113.29	35.69	3.49
MEDEA EXISTING	1900	100-yr	7200.00	853.87	863.66	865.12	868.92	0.001926	18.40	391.25	76.73	1.43
MEDEA EXISTING	1900	500-yr	11270.00	853.87	865.44	867.32	872.20	0.001803	20.87	547.99	95.18	1.45
MEDEA EXISTING	1800	1	100.00	852.89	853.48	853.79	854.55	0.007762	8.31	12.03	23.51	2.05
MEDEA EXISTING	1800	2	200.00	852.89	853.74	854.27	855.57	0.007903	10.85	18.44	24.35	2.20
MEDEA EXISTING	1800	2-yr	500.00	852.89	854.21	855.33	858.50	0.010553	16.63	30.07	25.74	2.71
MEDEA EXISTING	1800	4	750.00	852.89	854.52	856.01	860.48	0.011239	19.59	38.29	26.72	2.88
MEDEA EXISTING	1800	5	1000.00	852.89	854.78	856.60	862.33	0.011903	22.04	45.37	27.56	3.03
MEDEA EXISTING	1800	6	1300.00	852.89	855.07	857.23	864.29	0.012328	24.38	53.33	28.48	3.14
MEDEA EXISTING	1800	PF 7	1800.00	852.89	855.50	858.16	867.06	0.012484	27.29	65.97	29.85	3.23
MEDEA EXISTING	1800	10-yr	2560.00	852.89	856.09	859.36	870.47	0.012303	30.43	84.12	31.72	3.29
MEDEA EXISTING	1800	50-yr	2645.00	852.89	856.15	859.48	870.81	0.012270	30.72	86.09	31.92	3.30
MEDEA EXISTING	1800	PF 10	4000.00	852.89	857.06	861.22	875.41	0.011693	34.38	116.36	34.83	3.31
MEDEA EXISTING	1800	100-yr	7200.00	852.89	862.52	864.36	868.63	0.002183	19.83	363.03	70.27	1.54
MEDEA EXISTING	1800	500-yr	11270.00	852.89	864.23	866.50	871.91	0.002270	22.24	512.46	95.50	1.62
MEDEA EXISTING	1700	1	100.00	851.87	852.44	852.79	853.67	0.009543	8.92	11.21	23.03	2.25
MEDEA EXISTING	1700	2	200.00	851.87	852.71	853.28	854.71	0.008901	11.33	17.66	23.89	2.32
MEDEA EXISTING	1700	2-yr	500.00	851.87	853.23	854.34	857.44	0.010106	16.47	30.36	25.52	2.66
MEDEA EXISTING	1700	4	750.00	851.87	853.56	855.03	859.33	0.010596	19.29	38.88	26.55	2.81

HEC-RAS Plan: Plan 02 River: HEC-RAS ALIGNMEN Reach: MEDEA EXISTING (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)	
MEDEA EXISTING	1700	5	1000.00	851.87	853.83	855.62	861.09	0.011100	21.63	46.23	27.40	2.93
MEDEA EXISTING	1700	6	1300.00	851.87	854.12	856.26	863.00	0.011492	23.91	54.36	28.32	3.04
MEDEA EXISTING	1700	PF 7	1800.00	851.87	854.56	857.18	865.74	0.011736	26.83	67.09	29.69	3.15
MEDEA EXISTING	1700	10-yr	2560.00	851.87	855.15	858.38	869.17	0.011721	30.04	85.21	31.54	3.22
MEDEA EXISTING	1700	50-yr	2645.00	851.87	855.21	858.51	869.51	0.011705	30.34	87.17	31.74	3.23
MEDEA EXISTING	1700	PF 10	4000.00	851.87	856.12	860.23	874.17	0.011300	34.09	117.34	34.61	3.26
MEDEA EXISTING	1700	100-yr	7200.00	851.87	861.17	863.42	868.30	0.002245	21.43	335.91	58.26	1.57
MEDEA EXISTING	1700	500-yr	11270.00	851.87	862.88	865.46	871.55	0.002944	23.64	480.29	98.44	1.81
MEDEA EXISTING	1600	1	100.00	851.00	852.47	851.83	852.57	0.004578	2.62	38.18	29.51	0.41
MEDEA EXISTING	1600	2	200.00	851.00	853.07	852.28	853.25	0.006866	3.38	59.11	41.99	0.50
MEDEA EXISTING	1600	2-yr	500.00	851.00	854.18	853.31	854.51	0.007053	4.61	108.40	47.19	0.54
MEDEA EXISTING	1600	4	750.00	851.00	852.95	853.83	855.96	0.125855	13.92	53.88	40.80	2.13
MEDEA EXISTING	1600	5	1000.00	851.00	853.10	854.29	857.41	0.164310	16.68	59.96	42.08	2.46
MEDEA EXISTING	1600	6	1300.00	851.00	853.26	854.77	859.09	0.197909	19.38	67.08	42.87	2.73
MEDEA EXISTING	1600	PF 7	1800.00	851.00	853.52	855.48	861.69	0.237198	22.93	78.49	44.15	3.03
MEDEA EXISTING	1600	10-yr	2560.00	851.00	853.90	856.61	865.11	0.270794	26.88	95.25	45.94	3.29
MEDEA EXISTING	1600	50-yr	2645.00	851.00	853.94	856.69	865.46	0.273300	27.25	97.08	46.13	3.31
MEDEA EXISTING	1600	PF 10	4000.00	851.00	854.53	857.85	870.33	0.295140	31.90	125.41	48.79	3.51
MEDEA EXISTING	1600	100-yr	7200.00	851.00	857.04	860.00	867.29	0.130835	25.69	280.32	78.33	2.39
MEDEA EXISTING	1600	500-yr	11270.00	851.00	866.84	861.87	867.88	0.002772	8.36	1463.55	166.23	0.42
MEDEA EXISTING	1525	1	100.00	851.00	852.14	851.56	852.20	0.005002	1.94	51.67	50.40	0.34
MEDEA EXISTING	1525	2	200.00	851.00	852.70	851.88	852.79	0.005005	2.47	80.88	54.47	0.36
MEDEA EXISTING	1525	2-yr	500.00	851.00	853.84	852.58	854.02	0.005003	3.39	147.49	61.51	0.39
MEDEA EXISTING	1525	4	750.00	851.00	854.56	853.03	854.79	0.005002	3.89	192.85	65.22	0.40
MEDEA EXISTING	1525	5	1000.00	851.00	855.17	853.42	855.45	0.005001	4.28	233.50	68.13	0.41
MEDEA EXISTING	1525	6	1300.00	851.00	855.80	853.84	856.14	0.005007	4.68	277.57	70.63	0.42
MEDEA EXISTING	1525	PF 7	1800.00	851.00	856.73	854.45	857.16	0.005001	5.22	344.92	74.19	0.43
MEDEA EXISTING	1525	10-yr	2560.00	851.00	857.94	855.26	858.47	0.005000	5.86	436.88	78.49	0.44
MEDEA EXISTING	1525	50-yr	2645.00	851.00	858.06	855.34	858.60	0.004994	5.92	446.57	78.95	0.44
MEDEA EXISTING	1525	PF 10	4000.00	851.00	859.66	856.54	860.41	0.005004	6.98	577.56	86.00	0.46
MEDEA EXISTING	1525	100-yr	7200.00	851.00	862.70	858.78	863.91	0.005004	8.82	881.93	116.40	0.48
MEDEA EXISTING	1525	500-yr	11270.00	851.00	865.84	861.01	867.54	0.005000	10.53	1285.16	150.78	0.51

HEC-RAS Plan: Plan 08 River: HEC-RAS ALIGNMEN Reach: MEDEA PROPOSED

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)	
MEDEA PROPOSED	2321.83	1	100.00	866.45	866.97	867.27	868.05	0.010008	8.34	11.99	28.31	2.26
MEDEA PROPOSED	2321.83	2	200.00	866.45	867.19	867.70	869.02	0.010008	10.86	18.41	29.16	2.41
MEDEA PROPOSED	2321.83	2-yr	500.00	866.45	867.67	868.63	871.28	0.010008	15.25	32.78	30.98	2.61
MEDEA PROPOSED	2321.83	4	750.00	866.45	867.98	869.24	872.81	0.010009	17.65	42.50	32.15	2.70
MEDEA PROPOSED	2321.83	5	1000.00	866.45	868.24	869.77	874.16	0.010008	19.53	51.21	33.16	2.77
MEDEA PROPOSED	2321.83	6	1300.00	866.45	868.53	870.33	875.63	0.010008	21.38	60.80	34.24	2.83
MEDEA PROPOSED	2321.83	PF 7	1800.00	866.45	868.94	871.15	877.80	0.010008	23.88	75.39	35.83	2.90
MEDEA PROPOSED	2321.83	10-yr	2560.00	866.45	869.49	872.23	880.66	0.010009	26.82	95.44	37.89	2.98
MEDEA PROPOSED	2321.83	50-yr	2645.00	866.45	869.54	872.34	880.96	0.010009	27.11	97.56	38.11	2.99
MEDEA PROPOSED	2321.83	PF 10	4000.00	866.45	870.34	873.92	885.21	0.010010	30.94	129.28	41.15	3.08
MEDEA PROPOSED	2321.83	100-yr	7200.00	866.45	890.88	876.95	891.15	0.000017	4.49	2455.63	151.14	0.17
MEDEA PROPOSED	2321.83	500-yr	11270.00	866.45	894.14	879.49	894.63	0.000026	6.03	2984.89	169.81	0.21
MEDEA PROPOSED	2233.5	1	100.00	865.59	865.98	866.26	867.02	0.013397	8.17	12.24	36.90	2.50
MEDEA PROPOSED	2233.5	2	200.00	865.59	866.15	866.62	867.98	0.013907	10.86	18.42	36.98	2.71
MEDEA PROPOSED	2233.5	2-yr	500.00	865.59	866.53	867.43	870.24	0.013698	15.47	32.33	37.15	2.92
MEDEA PROPOSED	2233.5	4	750.00	865.59	866.78	867.98	871.78	0.013303	17.93	41.82	37.26	2.98
MEDEA PROPOSED	2233.5	5	1000.00	865.59	867.01	868.47	873.14	0.012962	19.87	50.33	37.37	3.02
MEDEA PROPOSED	2233.5	6	1300.00	865.59	867.26	869.00	874.61	0.012573	21.75	59.76	37.48	3.04
MEDEA PROPOSED	2233.5	PF 7	1800.00	865.59	867.64	869.81	876.80	0.012063	24.28	74.14	37.66	3.05
MEDEA PROPOSED	2233.5	10-yr	2560.00	865.59	868.17	870.92	879.68	0.011444	27.23	94.03	37.90	3.05
MEDEA PROPOSED	2233.5	50-yr	2645.00	865.59	868.23	871.03	879.98	0.011386	27.51	96.14	37.92	3.05
MEDEA PROPOSED	2233.5	PF 10	4000.00	865.59	869.06	872.71	884.26	0.010629	31.29	127.82	38.31	3.02
MEDEA PROPOSED	2233.5	100-yr	7200.00	865.59	890.70	876.13	891.13	0.000033	5.81	2152.71	151.71	0.21
MEDEA PROPOSED	2233.5	500-yr	11270.00	865.59	893.85	879.91	894.60	0.000050	7.77	2649.07	158.43	0.26
MEDEA PROPOSED	2100		Culvert									
MEDEA PROPOSED	2020.64	1	100.00	854.78	855.23	855.55	856.58	0.021825	9.31	10.75	38.58	3.11
MEDEA PROPOSED	2020.64	2	200.00	854.78	855.26	855.89	859.65	0.062430	16.82	11.89	38.60	5.34
MEDEA PROPOSED	2020.64	2-yr	500.00	854.78	855.49	856.68	864.41	0.060808	23.96	20.87	38.74	5.75
MEDEA PROPOSED	2020.64	4	750.00	854.78	855.71	857.21	865.82	0.044354	25.51	29.40	38.88	5.17
MEDEA PROPOSED	2020.64	5	1000.00	854.78	855.89	857.69	867.60	0.039079	27.45	36.43	38.99	5.00
MEDEA PROPOSED	2020.64	6	1300.00	854.78	856.10	858.20	869.41	0.034623	29.28	44.40	39.11	4.84
MEDEA PROPOSED	2020.64	PF 7	1800.00	854.78	856.42	858.98	871.86	0.029356	31.53	57.09	39.31	4.61
MEDEA PROPOSED	2020.64	10-yr	2560.00	854.78	857.10	860.03	871.61	0.017329	30.57	83.73	39.73	3.71
MEDEA PROPOSED	2020.64	50-yr	2645.00	854.78	857.15	860.14	871.87	0.017035	30.79	85.92	39.76	3.69
MEDEA PROPOSED	2020.64	PF 10	4000.00	854.78	857.99	861.76	875.38	0.013681	33.47	119.51	40.28	3.42
MEDEA PROPOSED	2020.64	100-yr	7200.00	854.78	866.86	865.21	869.88	0.000533	14.02	569.18	87.93	0.76
MEDEA PROPOSED	2020.64	500-yr	11270.00	854.78	868.69	868.69	873.77	0.000742	18.37	743.47	101.13	0.92
MEDEA PROPOSED	1990.04	1	100.00	852.00	855.09	853.03	855.13	0.000568	1.58	63.39	24.63	0.17

HEC-RAS Plan: Plan 08 River: HEC-RAS ALIGNMEN Reach: MEDEA PROPOSED (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)	
MEDEA PROPOSED	1990.04	2	200.00	852.00	855.89	853.60	855.98	0.001000	2.39	83.87	26.97	0.24
MEDEA PROPOSED	1990.04	2-yr	500.00	852.00	857.42	854.82	857.66	0.001646	3.96	132.29	34.81	0.32
MEDEA PROPOSED	1990.04	4	750.00	852.00	853.67	855.61	862.77	0.270205	24.21	30.98	21.04	3.52
MEDEA PROPOSED	1990.04	5	1000.00	852.00	853.99	856.27	864.84	0.263422	26.43	37.83	21.94	3.55
MEDEA PROPOSED	1990.04	6	1300.00	852.00	854.34	857.00	866.93	0.253966	28.48	45.65	22.85	3.55
MEDEA PROPOSED	1990.04	PF 7	1800.00	852.00	854.88	858.03	869.71	0.236194	30.91	58.23	24.12	3.51
MEDEA PROPOSED	1990.04	10-yr	2560.00	852.00	855.88	859.40	870.41	0.164666	30.58	83.73	26.94	3.03
MEDEA PROPOSED	1990.04	50-yr	2645.00	852.00	855.97	859.54	870.68	0.162145	30.78	86.01	27.45	3.01
MEDEA PROPOSED	1990.04	PF 10	4000.00	852.00	857.19	861.56	874.38	0.125276	33.42	124.41	34.19	2.79
MEDEA PROPOSED	1990.04	100-yr	7200.00	852.00	866.14	866.14	869.78	0.007178	16.68	630.49	99.04	0.80
MEDEA PROPOSED	1990.04	500-yr	11270.00	852.00	869.17	868.95	873.31	0.006929	18.77	956.97	117.60	0.82
MEDEA PROPOSED	1960.49	1	100.00	853.15	854.87	854.39	855.07	0.006639	3.56	28.05	20.71	0.54
MEDEA PROPOSED	1960.49	2	200.00	853.15	855.54	854.94	855.89	0.007465	4.73	42.31	22.96	0.60
MEDEA PROPOSED	1960.49	2-yr	500.00	853.15	856.87	856.22	857.53	0.007385	6.67	85.53	39.30	0.65
MEDEA PROPOSED	1960.49	4	750.00	853.15	857.65	857.02	858.49	0.007353	7.69	118.36	44.33	0.67
MEDEA PROPOSED	1960.49	5	1000.00	853.15	856.53	857.65	860.01	0.044118	15.17	72.76	37.15	1.56
MEDEA PROPOSED	1960.49	6	1300.00	853.15	856.78	858.28	861.56	0.055118	17.91	82.20	38.75	1.77
MEDEA PROPOSED	1960.49	PF 7	1800.00	853.15	857.19	859.20	863.89	0.067388	21.45	98.41	41.35	2.00
MEDEA PROPOSED	1960.49	10-yr	2560.00	853.15	858.07	860.34	865.58	0.058989	23.23	137.23	46.98	1.94
MEDEA PROPOSED	1960.49	50-yr	2645.00	853.15	858.13	860.46	865.85	0.059744	23.59	140.12	47.38	1.96
MEDEA PROPOSED	1960.49	PF 10	4000.00	853.15	859.01	862.16	869.78	0.068438	28.43	184.30	53.00	2.16
MEDEA PROPOSED	1960.49	100-yr	7200.00	853.15	867.03	865.52	868.98	0.005006	14.11	902.03	129.41	0.68
MEDEA PROPOSED	1960.49	500-yr	11270.00	853.15	870.64		872.46	0.003870	14.53	1426.52	151.87	0.62
MEDEA PROPOSED	1900	1	100.00	852.90	853.88	853.88	854.33	0.025573	5.43	18.43	20.34	1.00
MEDEA PROPOSED	1900	2	200.00	852.90	854.42	854.42	855.12	0.022729	6.72	29.77	21.45	1.00
MEDEA PROPOSED	1900	2-yr	500.00	852.90	855.63	855.63	856.81	0.018224	8.72	58.71	29.36	0.98
MEDEA PROPOSED	1900	4	750.00	852.90	856.45	856.45	857.83	0.014924	9.55	86.44	36.89	0.93
MEDEA PROPOSED	1900	5	1000.00	852.90	857.14	857.11	858.67	0.013293	10.22	113.21	41.43	0.90
MEDEA PROPOSED	1900	6	1300.00	852.90	857.95	857.78	859.54	0.011230	10.63	148.88	46.80	0.86
MEDEA PROPOSED	1900	PF 7	1800.00	852.90	859.06	858.71	860.80	0.009670	11.33	204.95	54.17	0.82
MEDEA PROPOSED	1900	10-yr	2560.00	852.90	860.48	859.95	862.37	0.008339	12.15	288.03	62.48	0.79
MEDEA PROPOSED	1900	50-yr	2645.00	852.90	860.62	860.07	862.53	0.008235	12.24	297.10	63.28	0.79
MEDEA PROPOSED	1900	PF 10	4000.00	852.90	859.90	861.75	865.78	0.028243	21.17	252.85	59.25	1.44
MEDEA PROPOSED	1900	100-yr	7200.00	852.90	865.98		868.57	0.006472	15.56	753.35	103.84	0.77
MEDEA PROPOSED	1900	500-yr	11270.00	852.90	868.95		872.04	0.006362	17.72	1084.54	120.49	0.79
MEDEA PROPOSED	1870.9	1	100.00	850.00	853.61	851.25	853.66	0.000614	1.72	58.23	20.14	0.18
MEDEA PROPOSED	1870.9	2	200.00	850.00	854.47	851.92	854.58	0.001142	2.62	76.32	21.86	0.25
MEDEA PROPOSED	1870.9	2-yr	500.00	850.00	856.04	853.36	856.33	0.001977	4.40	124.47	37.78	0.35
MEDEA PROPOSED	1870.9	4	750.00	850.00	856.93	854.26	857.36	0.002431	5.43	160.15	42.86	0.39

HEC-RAS Plan: Plan 08 River: HEC-RAS ALIGNMEN Reach: MEDEA PROPOSED (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)	
MEDEA PROPOSED	1870.9	5	1000.00	850.00	857.66		858.22	0.002758	6.26	193.26	47.09	0.43
MEDEA PROPOSED	1870.9	6	1300.00	850.00	858.42		859.12	0.003066	7.09	230.38	51.42	0.46
MEDEA PROPOSED	1870.9	PF 7	1800.00	850.00	859.48		860.39	0.003444	8.21	288.33	57.53	0.50
MEDEA PROPOSED	1870.9	10-yr	2560.00	850.00	860.83		862.00	0.003821	9.55	370.96	65.27	0.54
MEDEA PROPOSED	1870.9	50-yr	2645.00	850.00	860.96		862.16	0.003853	9.67	379.94	66.05	0.54
MEDEA PROPOSED	1870.9	PF 10	4000.00	850.00	862.82	860.56	864.43	0.004370	11.55	513.39	79.81	0.59
MEDEA PROPOSED	1870.9	100-yr	7200.00	850.00	866.11		868.29	0.004738	14.16	822.39	102.14	0.64
MEDEA PROPOSED	1870.9	500-yr	11270.00	850.00	868.97		871.79	0.005279	16.78	1137.91	118.41	0.70
MEDEA PROPOSED	1800	1	100.00	851.83	853.34		853.54	0.006403	3.55	28.18	20.42	0.53
MEDEA PROPOSED	1800	2	200.00	851.83	854.07		854.40	0.006579	4.59	43.96	25.51	0.57
MEDEA PROPOSED	1800	2-yr	500.00	851.83	855.57	854.72	856.09	0.005386	6.03	100.25	44.19	0.57
MEDEA PROPOSED	1800	4	750.00	851.83	856.50	855.49	857.11	0.004891	6.71	143.06	48.65	0.56
MEDEA PROPOSED	1800	5	1000.00	851.83	857.27		857.96	0.004624	7.26	182.35	52.40	0.56
MEDEA PROPOSED	1800	6	1300.00	851.83	858.07		858.85	0.004477	7.85	225.59	56.25	0.56
MEDEA PROPOSED	1800	PF 7	1800.00	851.83	859.19		860.11	0.004370	8.69	291.85	61.61	0.57
MEDEA PROPOSED	1800	10-yr	2560.00	851.83	860.57		861.69	0.004384	9.80	381.38	68.03	0.59
MEDEA PROPOSED	1800	50-yr	2645.00	851.83	860.71		861.85	0.004389	9.91	390.87	68.68	0.59
MEDEA PROPOSED	1800	PF 10	4000.00	851.83	862.53		864.09	0.004862	11.84	525.35	83.23	0.64
MEDEA PROPOSED	1800	100-yr	7200.00	851.83	865.87		867.90	0.004852	14.22	844.10	103.85	0.67
MEDEA PROPOSED	1800	500-yr	11270.00	851.83	868.74		871.36	0.005202	16.70	1160.28	116.47	0.72
MEDEA PROPOSED	1755.92	1	100.00	851.41	852.51	852.51	853.01	0.024930	5.70	17.55	17.57	1.00
MEDEA PROPOSED	1755.92	2	200.00	851.41	853.11	853.11	853.87	0.022330	6.96	28.73	19.31	1.01
MEDEA PROPOSED	1755.92	2-yr	500.00	851.41	854.47	854.47	855.65	0.015624	8.78	60.89	31.67	0.93
MEDEA PROPOSED	1755.92	4	750.00	851.41	855.29	855.29	856.69	0.013641	9.75	88.87	36.71	0.91
MEDEA PROPOSED	1755.92	5	1000.00	851.41	855.94	855.94	857.55	0.012996	10.63	113.94	40.70	0.91
MEDEA PROPOSED	1755.92	6	1300.00	851.41	856.63	856.63	858.44	0.012271	11.43	143.78	44.99	0.91
MEDEA PROPOSED	1755.92	PF 7	1800.00	851.41	857.62	857.62	859.70	0.011599	12.54	190.98	51.05	0.91
MEDEA PROPOSED	1755.92	10-yr	2560.00	851.41	858.85	858.85	861.27	0.011015	13.87	258.52	58.02	0.91
MEDEA PROPOSED	1755.92	50-yr	2645.00	851.41	858.97	858.97	861.43	0.011015	14.02	265.30	58.60	0.92
MEDEA PROPOSED	1755.92	PF 10	4000.00	851.41	860.68	860.68	863.64	0.010619	15.85	373.03	66.76	0.93
MEDEA PROPOSED	1755.92	100-yr	7200.00	851.41	863.99	863.99	867.48	0.009225	18.21	656.05	94.85	0.92
MEDEA PROPOSED	1755.92	500-yr	11270.00	851.41	866.67	866.67	870.90	0.009351	20.90	928.03	107.63	0.95
MEDEA PROPOSED	1724.45	1	100.00	849.00	852.30	850.24	852.36	0.000847	1.89	52.78	20.44	0.21
MEDEA PROPOSED	1724.45	2	200.00	849.00	853.06	850.92	853.19	0.001600	2.89	69.20	22.74	0.29
MEDEA PROPOSED	1724.45	2-yr	500.00	849.00	854.41	852.37	854.77	0.002867	4.89	110.13	37.30	0.41
MEDEA PROPOSED	1724.45	4	750.00	849.00	855.13	853.26	855.69	0.003669	6.13	138.30	41.05	0.48
MEDEA PROPOSED	1724.45	5	1000.00	849.00	855.73	854.09	856.47	0.004272	7.13	164.08	44.25	0.53
MEDEA PROPOSED	1724.45	6	1300.00	849.00	856.36	854.87	857.31	0.004823	8.13	193.08	47.44	0.57
MEDEA PROPOSED	1724.45	PF 7	1800.00	849.00	857.27	855.90	858.52	0.005488	9.49	238.34	52.01	0.62

HEC-RAS Plan: Plan 08 River: HEC-RAS ALIGNMEN Reach: MEDEA PROPOSED (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)	
MEDEA PROPOSED	1724.45	10-yr	2560.00	849.00	858.42	857.23	860.08	0.006221	11.15	301.24	57.77	0.68
MEDEA PROPOSED	1724.45	50-yr	2645.00	849.00	858.54	857.36	860.24	0.006284	11.32	308.06	58.36	0.69
MEDEA PROPOSED	1724.45	PF 10	4000.00	849.00	860.22	859.20	862.51	0.006962	13.44	413.33	66.82	0.74
MEDEA PROPOSED	1724.45	100-yr	7200.00	849.00	861.55	863.08	866.93	0.014250	20.88	510.98	84.40	1.09
MEDEA PROPOSED	1724.45	500-yr	11270.00	849.00	866.81	865.75	870.18	0.006386	17.98	1036.25	111.74	0.77
MEDEA PROPOSED	1700	1	100.00	849.52	852.25	850.88	852.33	0.001479	2.22	45.13	22.13	0.27
MEDEA PROPOSED	1700	2	200.00	849.52	852.98	851.48	853.14	0.002310	3.23	61.91	24.99	0.35
MEDEA PROPOSED	1700	2-yr	500.00	849.52	854.28	852.75	854.69	0.003483	5.20	107.87	42.33	0.46
MEDEA PROPOSED	1700	4	750.00	849.52	855.00	853.60	855.59	0.004154	6.35	139.60	46.03	0.52
MEDEA PROPOSED	1700	5	1000.00	849.52	855.62	854.36	856.36	0.004593	7.26	168.77	49.19	0.56
MEDEA PROPOSED	1700	6	1300.00	849.52	856.27	855.01	857.18	0.004944	8.14	201.84	52.54	0.59
MEDEA PROPOSED	1700	PF 7	1800.00	849.52	857.20	855.96	858.36	0.005326	9.32	253.44	57.27	0.63
MEDEA PROPOSED	1700	10-yr	2560.00	849.52	858.40	857.13	859.88	0.005705	10.75	325.66	63.27	0.67
MEDEA PROPOSED	1700	50-yr	2645.00	849.52	858.53	857.25	860.04	0.005733	10.88	333.51	63.89	0.67
MEDEA PROPOSED	1700	PF 10	4000.00	849.52	860.30	858.94	862.25	0.005973	12.67	454.98	72.80	0.71
MEDEA PROPOSED	1700	100-yr	7200.00	849.52	863.30	862.64	866.11	0.006624	15.90	723.30	100.68	0.78
MEDEA PROPOSED	1700	500-yr	11270.00	849.52	867.02	865.17	869.89	0.005340	16.90	1129.96	119.54	0.73
MEDEA PROPOSED	1660		Bridge									
MEDEA PROPOSED	1642.68	1	100.00	850.45	851.97		852.15	0.006036	3.43	29.13	21.32	0.52
MEDEA PROPOSED	1642.68	2	200.00	850.45	852.54		852.90	0.007770	4.82	42.08	27.08	0.62
MEDEA PROPOSED	1642.68	2-yr	500.00	850.45	853.60	853.33	854.36	0.009669	7.23	82.02	44.74	0.74
MEDEA PROPOSED	1642.68	4	750.00	850.45	854.21	854.01	855.22	0.010472	8.53	110.18	48.10	0.80
MEDEA PROPOSED	1642.68	5	1000.00	850.45	854.72	854.55	855.94	0.010913	9.53	135.79	50.98	0.83
MEDEA PROPOSED	1642.68	6	1300.00	850.45	855.27	855.13	856.71	0.011171	10.49	164.78	54.04	0.86
MEDEA PROPOSED	1642.68	PF 7	1800.00	850.45	856.08	855.94	857.82	0.011330	11.76	210.33	58.53	0.89
MEDEA PROPOSED	1642.68	10-yr	2560.00	850.45	857.17	857.03	859.25	0.011136	13.16	277.17	64.59	0.91
MEDEA PROPOSED	1642.68	50-yr	2645.00	850.45	857.28	857.13	859.40	0.011099	13.29	284.55	65.22	0.91
MEDEA PROPOSED	1642.68	PF 10	4000.00	850.45	858.95	858.70	861.47	0.010361	14.92	401.30	74.58	0.91
MEDEA PROPOSED	1642.68	100-yr	7200.00	850.45	862.37	861.03	865.36	0.008527	17.03	694.26	100.52	0.88
MEDEA PROPOSED	1642.68	500-yr	11270.00	850.45	865.23	864.84	868.81	0.008266	19.39	1024.99	129.36	0.89
MEDEA PROPOSED	1600	1	100.00	850.06	851.82		851.94	0.003577	2.84	35.34	28.91	0.41
MEDEA PROPOSED	1600	2	200.00	850.06	852.34		852.60	0.005231	4.12	51.97	35.67	0.51
MEDEA PROPOSED	1600	2-yr	500.00	850.06	853.42		853.96	0.006622	6.18	103.58	62.50	0.62
MEDEA PROPOSED	1600	4	750.00	850.06	854.17		854.76	0.005935	6.77	151.89	66.43	0.61
MEDEA PROPOSED	1600	5	1000.00	850.06	854.80		855.45	0.005549	7.25	194.98	69.82	0.61
MEDEA PROPOSED	1600	6	1300.00	850.06	855.46		856.18	0.005258	7.74	242.63	73.38	0.60
MEDEA PROPOSED	1600	PF 7	1800.00	850.06	856.41		857.23	0.005024	8.48	315.13	79.45	0.61
MEDEA PROPOSED	1600	10-yr	2560.00	850.06	857.66		858.61	0.004777	9.36	419.15	87.93	0.61

HEC-RAS Plan: Plan 08 River: HEC-RAS ALIGNMEN Reach: MEDEA PROPOSED (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)	
MEDEA PROPOSED	1600	50-yr	2645.00	850.06	857.79		858.75	0.004755	9.45	430.49	88.87	0.61
MEDEA PROPOSED	1600	PF 10	4000.00	850.06	859.63		860.78	0.004485	10.63	606.90	103.95	0.62
MEDEA PROPOSED	1600	100-yr	7200.00	850.06	863.36		864.62	0.003460	11.70	1050.02	128.48	0.57
MEDEA PROPOSED	1600	500-yr	11270.00	850.06	866.28		868.03	0.003900	14.22	1449.76	161.55	0.63
MEDEA PROPOSED	1553.83	1	100.00	848.00	851.88		851.89	0.000105	0.87	128.54	49.69	0.08
MEDEA PROPOSED	1553.83	2	200.00	848.00	852.47		852.50	0.000240	1.45	159.18	54.62	0.13
MEDEA PROPOSED	1553.83	2-yr	500.00	848.00	853.66		853.76	0.000582	2.68	231.15	68.36	0.21
MEDEA PROPOSED	1553.83	4	750.00	848.00	854.39		854.55	0.000791	3.41	284.10	75.77	0.25
MEDEA PROPOSED	1553.83	5	1000.00	848.00	855.02		855.23	0.000956	4.00	333.31	82.04	0.27
MEDEA PROPOSED	1553.83	6	1300.00	848.00	855.67		855.95	0.001102	4.58	388.45	85.67	0.30
MEDEA PROPOSED	1553.83	PF 7	1800.00	848.00	856.63		856.99	0.001283	5.36	472.80	90.94	0.33
MEDEA PROPOSED	1553.83	10-yr	2560.00	848.00	857.88		858.36	0.001462	6.29	590.46	97.28	0.36
MEDEA PROPOSED	1553.83	50-yr	2645.00	848.00	858.01		858.50	0.001478	6.38	603.02	97.93	0.36
MEDEA PROPOSED	1553.83	PF 10	4000.00	848.00	859.85		860.51	0.001668	7.61	792.87	108.63	0.40
MEDEA PROPOSED	1553.83	100-yr	7200.00	848.00	863.48		864.41	0.001755	9.39	1227.25	129.73	0.43
MEDEA PROPOSED	1553.83	500-yr	11270.00	848.00	866.40		867.79	0.002152	11.70	1633.91	157.42	0.49
MEDEA PROPOSED	1525	1	100.00	850.12	851.76	851.35	851.87	0.005003	2.71	39.61	42.96	0.47
MEDEA PROPOSED	1525	2	200.00	850.12	852.28	851.73	852.46	0.005004	3.53	62.89	47.32	0.50
MEDEA PROPOSED	1525	2-yr	500.00	850.12	853.35	852.53	853.70	0.005000	5.00	117.98	55.67	0.54
MEDEA PROPOSED	1525	4	750.00	850.12	854.01	853.06	854.48	0.005003	5.81	156.56	60.00	0.56
MEDEA PROPOSED	1525	5	1000.00	850.12	854.58	853.52	855.14	0.005001	6.46	191.47	63.01	0.58
MEDEA PROPOSED	1525	6	1300.00	850.12	855.18	854.01	855.85	0.005006	7.11	230.03	65.91	0.59
MEDEA PROPOSED	1525	PF 7	1800.00	850.12	856.05	854.73	856.88	0.005000	8.00	288.90	69.47	0.61
MEDEA PROPOSED	1525	10-yr	2560.00	850.12	857.18	855.65	858.23	0.005001	9.10	370.34	74.37	0.63
MEDEA PROPOSED	1525	50-yr	2645.00	850.12	857.30	855.75	858.37	0.005001	9.20	379.02	74.87	0.63
MEDEA PROPOSED	1525	PF 10	4000.00	850.12	858.96	857.12	860.36	0.005002	10.70	510.04	82.61	0.66
MEDEA PROPOSED	1525	100-yr	7200.00	850.12	862.15	859.68	864.22	0.005001	13.30	809.87	111.34	0.69
MEDEA PROPOSED	1525	500-yr	11270.00	850.12	864.97	862.98	867.57	0.004994	15.40	1155.63	131.64	0.72