MEMORIAL PARK DETENTION BASIN PROJECT

Attachment 3 - Work Plan

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Memorial Park Photos

1.0 Introduction

1.1 Goals and Objectives

The Memorial Park Detention Basin Project is an important component of the greater Ross Valley Flood Reduction and Watershed Management Program (Program). The Program goal is to substantially reduce the flood hazard in Ross Valley. Program objectives integrate restoration of creek ecological function and other public resource enhancements with the primary objective of flood protection. Specific objectives of the Program include providing a 100-year level flood protection throughout Ross Valley; improving riparian and aquatic habitat, particularly to aid in the recovery of special-status anadromous salmonids; and, enhancing access and public enjoyment of the creek.

Funding for Program projects and activities will partially derive from a drainage fee that was approved by voters of Ross Valley in 2007 following the disastrous flood of December 31, 2005 (an approximate 100-year flood). The drainage fee will generate about $40 million over the period 2007 to 2027 years. Marin County Flood Control and Water Conservation District, Flood Zone 9 (MCFCWCDFZ9) will administer the Program. MCFCWCDFZ9 intends to seek additional sources of funding, such as grants, to supplement the drainage fee in order to implement all Program projects and activities.

The guiding planning document for the Program is the Ross Valley Flood Reduction and Creek Management Capital Improvement Plan Study (Stetson Engineers, et al, May, 2011).[1] The Capital Improvement Plan Study identifies five flood detention basins for capturing and attenuating flood flows and over 180 in-channel improvements watershed-wide that simultaneously increase flood conveyance capacity and improve the ecological function of Corte Madera Creek and its tributaries (see Figure 1). These detention basins and in-channel capacity improvements work together to provide 100-year flood protection to homes and businesses in flood-prone Ross Valley. The Capital Improvement Plan Study provides engineering analysis, preliminary designs and costs for the Memorial Park Detention Basin Project.

Memorial Park, located in San Anselmo along Sorich Creek (a tributary to flood-prone San Anselmo Creek and currently passes through the park in a deeply buried concrete culvert), is owned, managed, and maintained by the Town of San Anselmo. The proposed Memorial Park detention basin is one of the keystones of the Program owing to its sizable attenuation capacity and substantial effect in reducing flood flows delivered to the flood-prone San Anselmo Creek and the downstream Corte Madera Creek.[2]

Building the detention basin involves converting the existing eight acre public park into a duel-purpose park and flood control detention basin. The detention basin is formed by an excavated basin bounded along the southern and western sides by concrete wall structures

[1] Document can be viewed and downloaded from the website, http://www.marinwatersheds.org/.

[2] The Phoenix Lake detention basin is another keystone of the Program and the Phoenix Lake IRWM Retrofit project was awarded in the 1st round application for the Proposition 1E Stormwater Flood Management Grant.

and along the northern and eastern sides by cut slopes. To provide necessary storage capacity for floodwater detention, the park floor will be excavated and lowered by an average of 10 ft below existing grade. To accommodate the lower park floor, the Town's Alderney storm drain, Ross Valley Sanitation District's sewer line, and Marin Municipal Water District's water transmission line that currently pass beneath the park will be removed and relocated. To provide improved riparian and aquatic habitat as well as public access and recreational opportunities, Sorich Creek, which is now contained in a buried culvert, will be daylighted along its current alignment through the park.

A large, gated outlet culvert (i.e., low-level outlet) will be placed beneath the embankment at the southern end of the basin. This outlet will normally be kept open to allow unimpeded passage of a range of flows (less than 5-year flood peak flow), as well as sediment, woody debris, and wildlife. The basin will normally be kept empty to allow the park to serve as a public recreational facility. During unusually heavy storms when streamflow monitoring indicates that flooding downstream in downtown San Anselmo is imminent,[3] the gate on the low-level outlet will be closed and water will back-up and begin to fill the basin for floodwater detention. In extreme floods when the basin becomes full (approx. >100-year flood), flow will spill over an internal semi-circular glory hole type spillway and pass on through to the existing culverted reach of Sorich Creek below the detention basin (Note: Sorich Creek joins San Anselmo Creek about 0.5 mile downstream of Memorial Park). When full to the spillway crest, water depths will reach a maximum of 14 feet at the southern end and the basin will inundate 7 acres and detain 79 acre-feet of floodwater.

In order to build the detention basin and allow for continued recreational use as a public park, the public playfield will need to be reconstructed. Tennis and basketball courts will be replaced at their approximate current location. The kids play area will be relocated on site. The historical Log Cabin will be unaffected. Since flood detention operations will occur only during very heavy storms, recreational activities at the site will rarely be affected.

Concomitant with the above-described flood damage reduction facilities are other physical and operational features that are needed to better utilize this valuable, multi-purpose public asset in ways that are compatible, and even synergistic, with flood damage reduction functions. An on-site subsurface drainage system will be constructed to keep the new playfield drier for public recreation during the wet season. A groundwater collection system will be installed to provide a reliable and self-sustaining water supply for irrigating the rehabilitated park and, in turn, reduce dependency on the water supplies from the local retail purveyor, Marin Municipal Water District (MMWD). A trash rack and storm water quality improvement device will be installed at the inlet of the replaced and rerouted Alderney storm drain to improve stormwater quality. The daylighted Sorich Creek will be vegetated to restore the creek ecosystem and improve stormwater quality and enhance the aesthetics of the creek environment. The park will be rehabilitated to extend wet-weather functionality and provide enhanced recreation and public access.

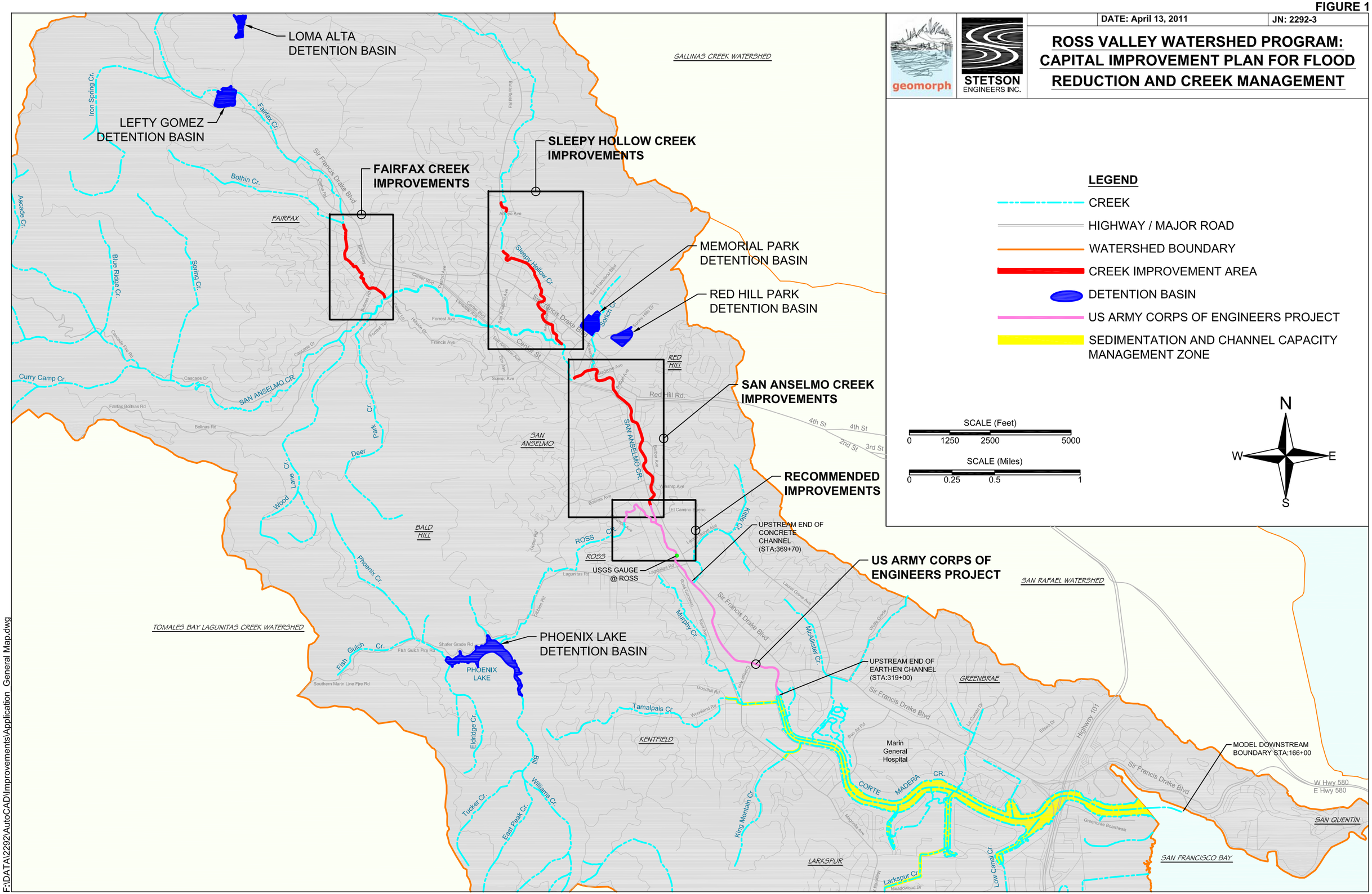
[3] Downtown San Anselmo floods at flood magnitudes of about the 5- to 8-year recurrence interval.

FIGURE 1

DATE: April 13, 2011 | JN: 2292-3

geomorph | STETSON ENGINEERS INC.

ROSS VALLEY WATERSHED PROGRAM: CAPITAL IMPROVEMENT PLAN FOR FLOOD REDUCTION AND CREEK MANAGEMENT



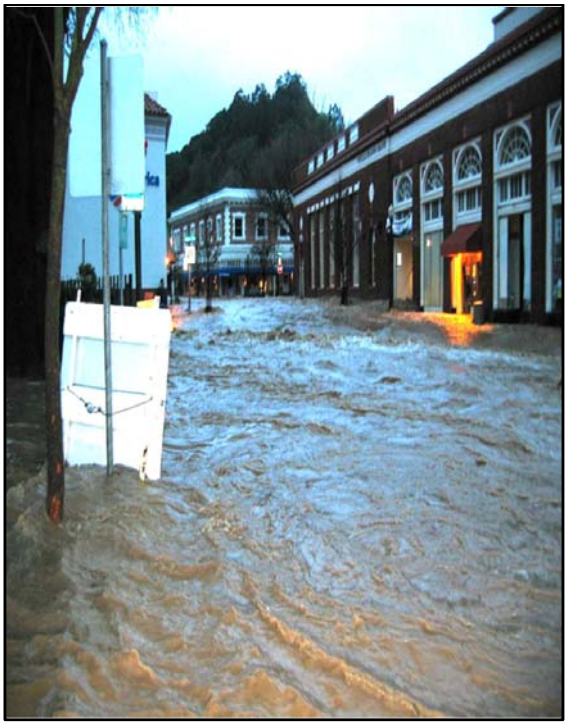
F:\DATA\2292\AutoCAD\Improvements\Application_General Map.dwg

1.2 Purpose and Need

There is a need to reduce the frequency and severity of flooding in Ross Valley for the protection of property and public safety. The current capacity of San Anselmo Creek below the Sorich Creek confluence is about 2,800 cfs and the current capacity of Corte Madera Creek at the USGS streamflow gage in Ross (which is below Ross Creek confluence) is about 3,600 cubic feet per second (cfs), which correspond to about the 20 percent-annual-chance flood (i.e., 5-year flood) and the 17 percent-annual-chance flood (i.e., 6-year flood), respectively. It is clear that the creek capacity is inadequate to protect property and public safety.

Several times in recent history Corte Madera Creek has flooded Ross Valley with varying degrees of severity. Prior to establishment in 1951 of the USGS streamflow gaging station on Corte Madera Creek in Ross, flooding was reported in calendar years 1914, 1925, 1937, and 1942. Since 1951 flood flows have been recorded in calendar years 1951, 1955, 1958, 1967, 1969, 1970, 1982, 1983, 1986, 1994 , 2005, and 2012. Of these, the two most severe floods occurred in 1982 and 2005, with peak discharges of approximately 7,200 cfs and 6,800 cfs; the annual-chances of which were approximately 0.6-percent and 1-percent, respectively.

Historical flooding has caused extensive property damage and economic hardship to residents, businesses, and local governments, and has threatened the lives of those living in the floodplain, with at least one recorded death occurring in the 1955 flood and at least one rescue by Urban Search and Rescue personnel during the 2005 flood (see photo below showing floodwaters rage through downtown San Anselmo during the 2005 flood).



Flood waters rage through downtown San Anselmo during December 31, 2005 flood.

The towns of San Anselmo and Ross are particularly prone to flooding and flood damage. Both towns are downstream of Memorial Park and, therefore, both would directly benefit from this project. According to FEMA:

- ***San Anselmo ranks 7th among all communities in California for NFIP claims paid.*** In San Anselmo there are about 487 flood insurance policies in force, and policyholders pay an average annual premium of $1,100 – that's over $500,000 per year. Since joining the National Flood Insurance Program (NFIP) there have been 255 claims in San Anselmo totaling $11,265,000 in flood losses.
- ***Ross ranks 10th among all communities in California for NFIP claims paid.*** In Ross, there are over 200 policies in force, and policyholders pay an average annual premium of $1,400 per year -- that's over $280,000 per year. Since the start of the NFIP program there have been 237 claims in the Ross totaling $9,562,272 in flood losses.

The Memorial Park Detention Basin Project would also provide flood reduction to other flood prone communities farther downstream, including the unincorporated Kentfield and Greenbrae areas and the cities of Larkspur and Corte Madera.

In accordance with its Congressional authorization for flood control along the lower reach of Corte Madera Creek, the Army Corps of Engineers has plans to increase creek conveyance capacity below the Ross Creek confluence to about 5,400 cfs (about the 4-percent-annual-chance or 25-year recurrence flood). Even though this is clearly a major improvement, the Ross Valley community desires a higher level of protection – a level that is on par with most communities in California. In order to increase the effectiveness of the Corps' design and achieve the desired 1-percent-annual-chance level of flood protection (i.e., 100-year recurrence flood protection), the 100-year flood discharge at the Ross Creek confluence needs to be reduced by 1,400 cfs, from 6,800 cfs down to 5,400 cfs. This reduction is achievable through detention basins, and the proposed Memorial Park detention basin is critical because it alone can reduce the 100-year flood discharge by about 200 cfs.

Without the Memorial Park Detention Basin Project, the lower reach of San Anselmo Creek through downtown San Anselmo and Corte Madera Creek will be limited to about the 4-percent-annual-chance level of flood protection. Public safety and property downstream in downtown San Anselmo and below the Ross Creek confluence in the communities of Ross, Kentfield, Larkspur and Greenbrae will remain at an unacceptably high risk of flooding.

There is a need to reduce water demand and thereby improve the reliability of the MMWD supply. MMWD's reliable water supply is less than the current water demand, particularly during drought periods. MMWD supplies come from local sources and imported water from the Russian River purchased from the Sonoma County Water Agency. If Marin County experiences another drought similar to that of 1976–77, water supplies may not be adequate to meet current demands. MMWD has begun to implement an aggressive water conservation program, investing $3.3 million in 2008–09 to support a

wide range of conservation program activities. In combination with implementation of the California Plumbing Code at customer sites, these activities are projected to save enough water to meet the needs of the projected future MMWD customers until 2025. Reducing its water demand would provide MMWD with much needed water supply reliability, particularly during droughts. The Memorial Park Detention Basin Project includes installation of a groundwater collection system to provide supply for irrigation of the rehabilitated park and, thus, reduce the water demand from MMWD by an average of about 7 acre-ft per year. Without the Memorial Park Detention Basin project, the reliability of MMWD's water supply will remain at its current less-than adequate level, and MMWD will continue to explore other more costly options to meet its water supply reliability goals.

There is a need to improve stormwater quality in storm water discharges to Corte Madera Creek and its tributaries. Urban stormwater runoff has been cited as a major contributor to nonpoint source pollution. Typical pollutants associated with the urban stormwater are trash and debris, sediment, nutrients, bacteria and viruses, oil and grease, metals, organics, and pesticides. The 2006 adopted Basin Plan amendment for the San Francisco Bay region has established a water quality attainment strategy and Total Maximum Daily load (TMDL) for diazinon and pesticide-related toxicity in the Region's urban creeks, including actions and monitoring necessary to implement the strategy.[4] Diazinon is the only pollutant in Corte Madera Creek that was included in the proposed 2006 CWA section 303(d) list of water quality limited segments.[5] Diazinon is a cholinesterase-inhibiting organophosphate pesticide, and has been associated with runoff from urban watersheds where pesticides have been historically used. In the proposed 2010 CWA section 303(d) list, trash was added for the central San Francisco Bay shoreline, which is affected by Corte Madera Creek and other streams that discharge to the bay. The Memorial Park Detention Basin Project will improve the stormwater quality of the Alderney storm drain discharge to Sorich Creek, which is a tributary to San Anselmo/Corte Madera Creek. The existing Alderney storm drain collects urban stormwater from a 23-acre drainage area upstream of Memorial Park. The storm drain runs beneath Memorial Park and discharges to the Sorich Creek culvert. The Alderney storm drain under the park will be removed and replaced along a new alignment beneath the park. A CONTECH's CDS® hydrodynamic separation device (or similar device) will be installed at the inlet of the replaced Alderney storm drain to remove trash/debris and improve stormwater quality, including removal of sediment and oil and grease. Removing sediment will also remove sediment-bound diazinon. Without the Memorial Park Detention Basin project water quality in Sorich Creek and San Anselmo/Corte Madera Creek will remain suboptimal with respect to supporting the designated beneficial uses.

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[4] San Francisco Regional Water Quality Control Board, 2006 San Francisco Bay Basin Plan amendment. http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/urbancrksdiazinon/approvedbpa.pdf. Accessed on January 15, 2013.

[5] San Francisco Bay Regional Water Control Board, Proposed 2006 CWA Section List of Water Quality Limited Segments. http://www.waterboards.ca.gov/tmdl/docs/303dlists2006/final/r2_final303dlist.pdf. Accessed on January 15, 2013.

There is a need to restore the ecological health and function of Corte Madera Creek watershed. The Corte Madera Creek watershed provides important habitat that support threatened and endangered species and is considered an "anchor stream" in the NMFS recovery plans for coho salmon and steelhead trout. The Basin Plan for the San Francisco Bay Region (2010) designates beneficial uses for San Anselmo Creek and Corte Madera Creek including COLD, MIGR, RARE, SPWN [6]and others. Although overall ecosystem functions of the creek are still essentially intact, the freshwater aquatic and creek riparian habitats have been reduced and degraded by human activities and the ongoing presence of development. By the late 1800s, cattle grazing, deforestation, and dredging for navigation began directly modifying creek corridors and increasing the severity of rainfall and sediment-laden runoff. Railroad prisms, bridges, and other permanent infrastructure were installed flanking and spanning the creeks, often creating grade breaks or otherwise altering the creek bed making it difficult for native fish to pass through. In the 1900s, encroachment by urban development gradually filled in along the edges of the creek corridors eliminating portions of the riparian canopy and natural creek bank vegetation and encouraging invasion by non-native vegetation. All of these factors have contributed to today's sub-optimal aquatic and riparian habitat conditions of the creek.

The Memorial Park Detention Basin Project will daylight and restore Sorich Creek, which is currently contained in a buried culvert along its reach through the park. The daylighted Sorich Creek will be vegetated to restore the creek ecosystem and improve stormwater quality with respect to nutrients, pesticides (like sediment-bound diazinon), and heavy metals through the processes of plant uptake and natural filtration. The Memorial Park Detention Basin Project will also remove the 70-ft long Los Angeles Street culvert. The culvert will be replaced with a pre-fabricated, single lane vehicle/pedestrian bridge, resulting in an additional reach of daylighted creek with increased hydraulic capacity and improved riparian and aquatic habitat.

Improving the stormwater discharge water quality by treating the discharge of the replaced and rerouted Alderley storm drain and vegetating the daylighted Sorich Creek will enhance the ecological health and function of San Anselmo Creek below Sorich Creek confluence and the downstream Corte Madera Creek. Without the Memorial Park Detention Basin Project recovery of target anadromous salmonids and other species will continue to be challenged by suboptimal riparian and aquatic habitat conditions.

There is a need to create opportunities and enhance public enjoyment of the creek setting. Sorich Creek is currently inaccessible because it is contained in a buried culvert along its reach through the park which precludes opportunities for public enjoyment of the creek setting. Memorial Park itself is well used and functional, but improvements have not kept up with current safety and ADA accessibility standards and many park elements are in bad repair, exacerbating maintenance needs. Although the Town of San Anselmo’s General Fund supports the maintenance and upkeep of the park, the park has

[6] COLD = cold fresehwater habitat; MIGR = fish migration; RARE = rare and endangered species; SPWN = fish spawning.

suffered through heavy usage and deferred maintenance. Capital improvement funds are insufficient to cover the many upgrades needed.

The Memorial Park Detention Basin Project will daylight and restore Sorich Creek. Access to the creek will be encouraged by providing pathways leading to the creek, and the creek will placed in a "nature grove" so as to integrate it into the overall park recreational area. An upgraded field and drainage system will increase public use of the park by allowing the expanded sports programs and use of the fields for longer periods throughout the year while reducing field upkeep and maintenance costs. Pathways and park elements will be ADA accessible, accommodating to a larger extent people with disabilities compared to the current park. All these improvements will aim to enhance public access, safety, aesthetics, and overall public enjoyment. Without the Memorial Park Detention Basin Project, access and opportunities for public enjoyment of the park will remain at current levels.

1.3 Project List [and Elements]

This proposal contains a single project, the Memorial Park Detention Basin Project. The project is composed of the following four functional elements which are located at Memorial Park or in the immediate vicinity:

1) Detention basin, earthen embankments, walls, and hydraulic control structures – to control and detain floodwaters;
2) Subsurface drainage features and stormwater BMPs, groundwater irrigation supply system, and wet utilities relocations – to control seepage into the park, provide irrigation water supply, and improve stormwater quality;
3) Creek daylighting and restoration – to restore the ecological health and function of the creek while providing public access and enhanced recreation; and
4) Park rehabilitation – to enhance public recreation.

All elements have been assessed and evaluated and are currently at the Concept (30%) Design stage.

Memorial Park Detention Basin Project Elements, Completed Work, and Status		
Project Elements	**Abstract**	**Status**
Detention basin, earthen embankments, walls, and hydraulic control structures	Construction of the detention basin to control and detain the floodwaters, including excavation of the park floor by an average of 10 ft below existing grade; construction of concrete wall structures along the southern and western sides and cut slopes along the northern and eastern sides; installation of hydraulic control structures and construction of an emergency spillway.	At Concept (30%) Design stage. Geotechnical studies of geotechnical issues have been completed using existing data supplemented by recent exploratory drilling, lab testing, groundwater monitoring and pump testing. Initial informal consultation with DSOD regarding concept designs and flood operations has been initiated. Concept (30%) designs and costs have been completed. Further geotechnical investigation, including add'l exploratory drilling, is needed. Final design to be performed based on results of further geotechnical investigation and consultation with DSOD.
Subsurface drainage features and stormwater BMPs, groundwater irrigation supply system, and wet utilities relocations	Construction of an on-site subsurface drainage system to keep the new athletic play fields dry and useable for public recreation, particularly during the wet season. Installation of a groundwater collection system for irrigation supply to provide self-irrigation for the rehabilitated park. Removal and relocation of the existing Alderney storm drain beneath the park to accommodate excavation of the lowered park floor; installation of a CONTECH's CDS® hydrodynamic separation device (or similar device) at the enlarged inlet of the replaced storm drain to alleviate local flooding and improve stormwater quality. Relocation of Ross Valley Sanitary District (RVSD) and MMWD wet utility lines to accommodate excavation of the lowered park floor.	At Concept (30%) Design stage. Geotechnical studies related to subsurface drainage and groundwater collection/supply have been completed using existing data supplemented by recent exploratory drilling, lab testing, groundwater monitoring and pump testing. The need to relocate wet utilities to accommodate the excavated basin has been evaluated and conceptual relocation plans and cost estimates have been prepared. The existing buried Sorich Creek culvert downstream of the park has been video-inspected by the Town Engineer and been found to be in good condition and no need for repair. Concept (30%) designs and costs have been completed.
Creek daylighting and restoration	Daylighting of the buried culverted reach of Sorich Creek within the park and restoration of the daylighted creek. Removal of the Los Angeles Street culvert and daylighting/replacement with a new pre-fabricated vehicle/pedestrian bridge to restore creek and increase hydraulic capacity.	At Concept (30%) Design stage. Hydrologic/hydraulic analysis and geomorphic assessment of Sorich Creek has been completed. Concept (30%) designs and costs have been completed.
Park rehabilitation	Re-establishment of the athletic play fields, picnic areas, tennis and basketball courts, restrooms and other park support features; establishment of ADA-accessible pathways; integration of the restored creek into the park.	At Concept (30%) Design stage. Concept (30%) designs and costs have been completed. Three public meetings have been held to get public input on park rehabilitation; additional meetings are anticipated; final design after public meetings are done.

1.3.1 Detention Basin, Earthen Embankments, Walls, and Hydraulic Control Structures

The goal of this project element is to enable Memorial Park to also function as a flood detention basin. The objective of flood detention operations is to attenuate flows produced in the upper Sorich Creek watershed sufficiently to reduce the peak discharge to lower Sorich Creek and, hence, lower San Anselmo Creek and downstream Corte Madera Creek. Peak discharge will be reduced during the 1-percent-chance-annual flood (or 100-year flood) by about 200 cfs.[7] In order to achieve this objective, the Memorial Park detention basin needs to have a storage capacity of at least 79 acre-feet.

To provide 79 acre-feet of storage capacity, the park floor will be excavated and lowered by an average of 10 ft below existing grade, and concrete wall structures will be constructed along the southern and western sides. A large, gated culvert (i.e., low-level outlet) will be placed beneath the embankment at the southern end of the basin in order to pass flows to the existing buried culverted reach of Sorich Creek immediately downstream of the detention basin. The basin will normally be empty by keeping the gate open to allow unimpeded passage of flows (as well as sediment, woody debris, and wildlife). During unusually heavy storms when flooding downstream in downtown San Anselmo is imminent[8], the gate will be closed and the captured floodwaters will back up the channel and eventually fill the basin for floodwater detention. In extreme floods when the basin becomes full (approx. >100-year flood), overflow will spill over an internal semi-circular glory hole type spillway and pass to the discharge culvert. An external emergency spillway will provide redundancy to pass any additional overflow that exceeds the capacity of the internal glory hole spillway. Once the storm has passed and storm flows farther downstream have subsided, the basin will be emptied by opening the gate and releasing the detained water to the Sorich Creek culvert downstream of the park.

1.3.2 Subsurface Drainage Features and Stormwater BMPs, Groundwater Irrigation Supply System, and Wet Utilities Relocations

The goal of this project element is to keep the new athletic play fields dry for public recreation, particularly during the wet season, improve stormwater quality, and reduce water demands on MMWD and thereby enhance MMWD water supply reliability.

With park floor re-established at a lower elevation below the groundwater table, groundwater seepage will need to be controlled in order to keep the new athletic play fields dry and useable. A subsurface drainage system will be constructed to intercept and collect subsurface seepage entering from around and beneath the park floor. During the dry season, the intercepted seepage will be conveyed to storage tanks and used to irrigate

[7] Memorial Park detention basin can also reduce peak flows for smaller floods. The amounts of peak flow reduction at the Ross streamflow gage for the 50-year, 25-year, and 10-year floods are estimated to be approximately 180 cfs, 160 cfs, and 120 cfs, respectively.

[8] Downtown San Anselmo floods at flood magnitudes of about the 5- to 8-year recurrence interval.

the athletic fields and meet other in-park irrigation needs. Intercepted seepage that is not used for irrigation will be conveyed to the Sorich Creek discharge culvert.

The Alderney storm drain drains about 23 acres of residential area above Memorial Park. Currently the inlet to the storm drain near the park boundary frequently floods due to inadequate capacity. The inlet will be enlarged to increase its capacity and alleviate the flooding problem. A CONTECH's CDS® hydrodynamic separation device (or similar device) will be installed at the enlarged inlet to remove trash/debris and improve stormwater discharge quality. Downstream of the inlet the storm drain, which passes beneath the park, will be removed and re-located following an alignment that will provide adequate cover with the lowered park floor.

To provide water for irrigation and restroom toilets at the rehabilitated park and, thereby reduce water supply demand on MMWD, a groundwater irrigation system will be installed. Water supply for the system will come from seepage intercepted by the subsurface drainage system supplemented by groundwater pumped from three new wells to be constructed within the park. Using groundwater for irrigation and restroom toilet supply will reduce demand on MMWD's water supply by about 7 acre-ft per year on average.

A Ross Valley Sanitary District (RVSD) sewer line and a MMWD water line currently pass beneath the park. This project element also includes removal and relocation of these lines following alignments that will provide adequate cover with the lowered park floor.

1.3.3 Sorich Creek Daylighting and Restoration

The goal of this project element is to re-establish an open, fully functioning, geomorphically stable Sorich Creek and restore the riparian and aquatic habitat conditions. This will be accomplished by daylighting the 580 ft-long buried culverted reach and stabilizing bed and bank by placing rock and using biotechnical treatments using native vegetation.

This project element also includes removing the undersized 70-ft long Los Angeles Street culvert and replacing it with a new, single span and single lane, pre-fabricated vehicular/pedestrian bridge. This daylighted reach will be planted with native vegetation.
.

1.3.4 Park Rehabilitation

The goal of this project element is to enhance public access and safety, aesthetics, and overall recreational enjoyment of the creek and park. To achieve this goal, access to the creek will be encouraged by providing pathways leading to the creek, and the creek will set in a "nature grove" so as to integrate it into the overall park recreational area. An upgraded field and drainage system will increase public use of the park by allowing the expanded sports programs and use of the fields for longer periods throughout the year while reducing field upkeep and maintenance costs. Pathways and park elements will be ADA accessible, accommodating to a larger extent people with disabilities compared to

the current park. All these improvements will aim to enhance public access, safety, aesthetics, and overall public enjoyment.

Interpretive signage will be placed in the "nature grove" along the restored creek to inform the public about the restored creek ecosystem and foster stewardship for preserving and protecting the health of the creek.

1.4 Integrated Elements of Project

The component project elements comprising the Memorial Park Detention Basin Project work synergistically to enhance function and add value to each other. For example, seepage that is intercepted by the subsurface drainage system for keeping the playfield dry for public recreation also provides water supply for irrigation of the park. Similarly, the stormwater BMPs improve the water quality of stormwater discharges while also simultaneously enhancing the aquatic ecosystem of Sorich Creek and the mainstem San Anselmo/Corte Madera Creek. There are other similar examples of multiple project synergies. The table below explains how each element provides a benefit to its primary project element (in red) as well as enhanced function and added value to other project elements (in black).

Element	Benefit					
	Flood Damage Reduction	**Water Supply**	**Water Quality**	**Ecosystem Restoration**	**Recreation /Public Access**	**Explanation**
Detention basin, earthen embankments, walls, and hydraulic control structures	X				X	Enables storage of floodwaters for peak flow attenuation and flood reduction; walls can enhance recreational use of the tennis courts (bounce-back walls) and provide rock climbing walls; embankments can be used for spectator viewing of athletic events.
Subsurface drainage features and stormwater BMPs, groundwater irrigation supply system, and wet utilities relocations	X	X	X	X	X	Enables keeping new playfields dry for recreational use, particularly during the wet season; provides water supply for irrigation and toilets and reduces demand on MMWD; enhances stormwater quality; enhanced stormwater quality improves ecosystem functions of Sorich/San Anselmo/Corte Madera Creek below the park; new enlarged Alderney storm drain inlet reduces nuisance flooding for nearby residences.
Creek daylighting and restoration		X	X	X	X	Enables re-establishment of an open creek and restoration of creek habitat and ecosystem functions; enhances stormwater quality via natural processes of plant uptake and filtration; enhances recreation opportunities by providing access to the creek and improved creek aesthetics; allows for recharge of groundwater through natural infiltration through the daylighted creek bottom.
Park rehabilitation		X			X	Enables improvement of recreational facilities, expanded public access for recreation, enhanced park aesthetics; new irrigation system will use water more efficiently and use of drought-tolerant turf grass will reduce water use.

X (red) denotes primary project benefit; X (black) denotes enhanced function, added value, and other secondary project benefits.

1.5 Regional Map

Figure 2 is a regional map showing the location of the Memorial Park Detention Basin Project, major drainages, water bodies, and flood infrastructure, and relevant active faults. The location of the Project relative to the State Plan of Flood Control (SPFC) is also shown.

1.6 Project Specifics

The tables in sections 1.3 and 1.4 above describe the various component project elements comprising the Memorial Park Detention Basin Project. The Project's function and relation to the greater Ross Valley Flood Reduction and Watershed Management Program is explained in Section 1.9 below.

The Memorial Park Detention Basin Project is not a part of the SPFC as shown in Figure 2b, which shows the location of the Memorial Park Detention Basin Project in relation to the SPFC. The figure shows that the Project and the SPFC are located more than 50 miles apart in different hydrologic regions and otherwise not related.

FIGURE 2a

J:\jn2367\RegionalMap.mxd

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REGIONAL MAP SHOWING MEMORIAL PARK DETENTION BASIN PROJECT, MAJOR WATER BODIES, AND THE ARMY CORPS FLOOD CONTROL CHANNEL

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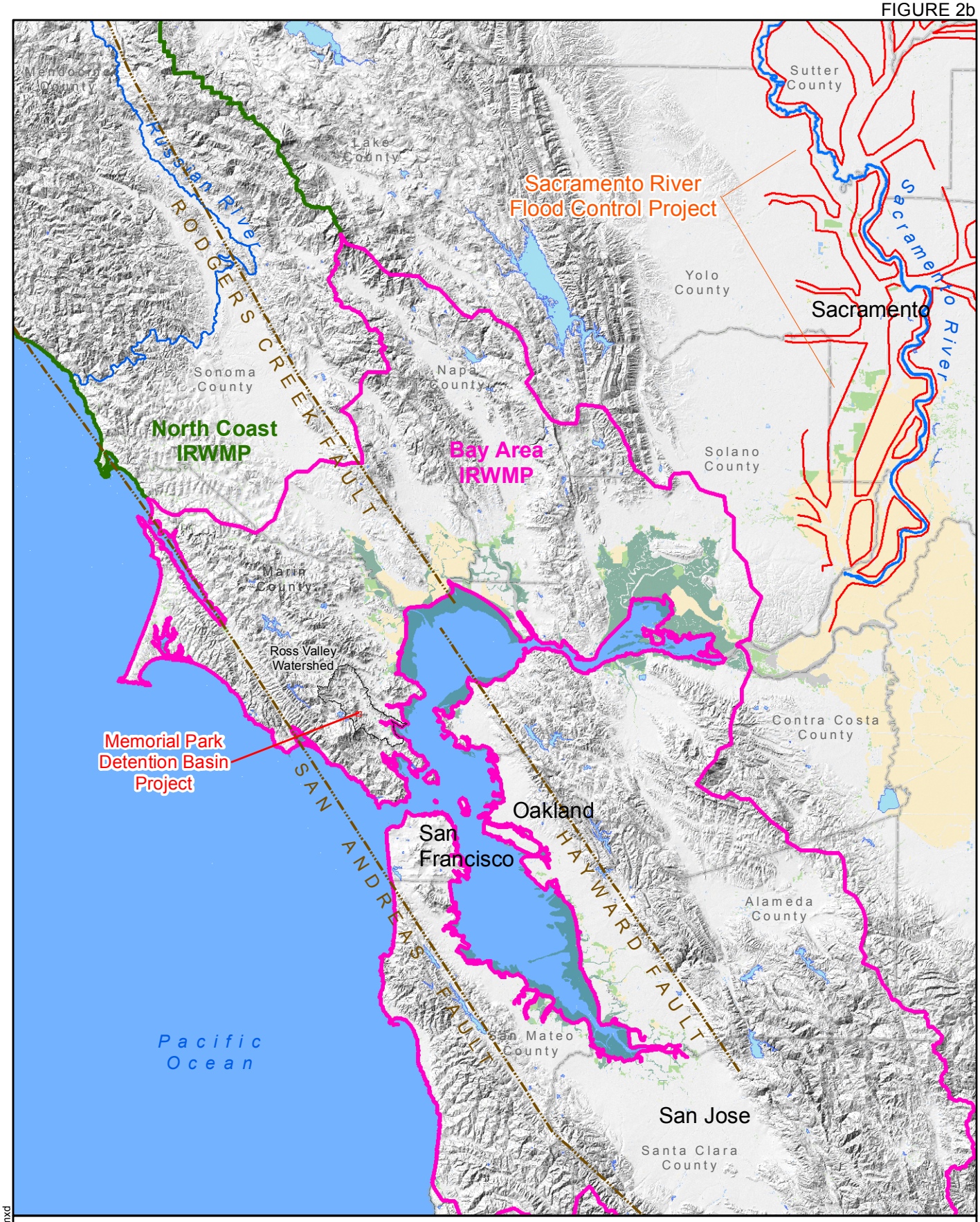
FIGURE 2b



STETSON ENGINEERS INC.

REGIONAL MAP SHOWING THE LOCATION OF THE MEMORIAL PARK DETENTION BASIN PROJECT, BAY AREA IRWMP BOUNDARY, RELEVANT ACTIVE FAULTS, AND THE LOCATION OF THE PROJECT RELATIVE TO THE SPFC

N

0 5 10 Miles

J:\jn2367\RegionalMap2.mxd

1.7 Completed Work and Existing Data and Studies

Completed work, i.e., work that has been completed or is expected to be completed prior to grant award, will be limited to the data that has been collected and the studies, designs, and cost estimates that have already been prepared. Completed work that is related to the project elements is tabulated and described in Section 3.1. No further work will be completed prior to grant award.

1.7.1 Project Review by Regulatory Agencies and Public Outreach

Engineers for the Town of San Anselmo prepared a project briefing memo and submitted it to federal and state environmental regulatory agencies with potential permitting authority over certain elements of the project, including the Army Corps of Engineers (Regulatory Branch), Regional Water Quality Control Board, and Department of Fish and Game. Subsequently on October 17, 2012 in San Rafael, California, Town staff and engineers for the Town held a pre-application meeting in San Rafael with representatives from those agencies to present the project and hear feedback on potential permitting issues. Agency feedback has been addressed in the Concept (30%) design plans.

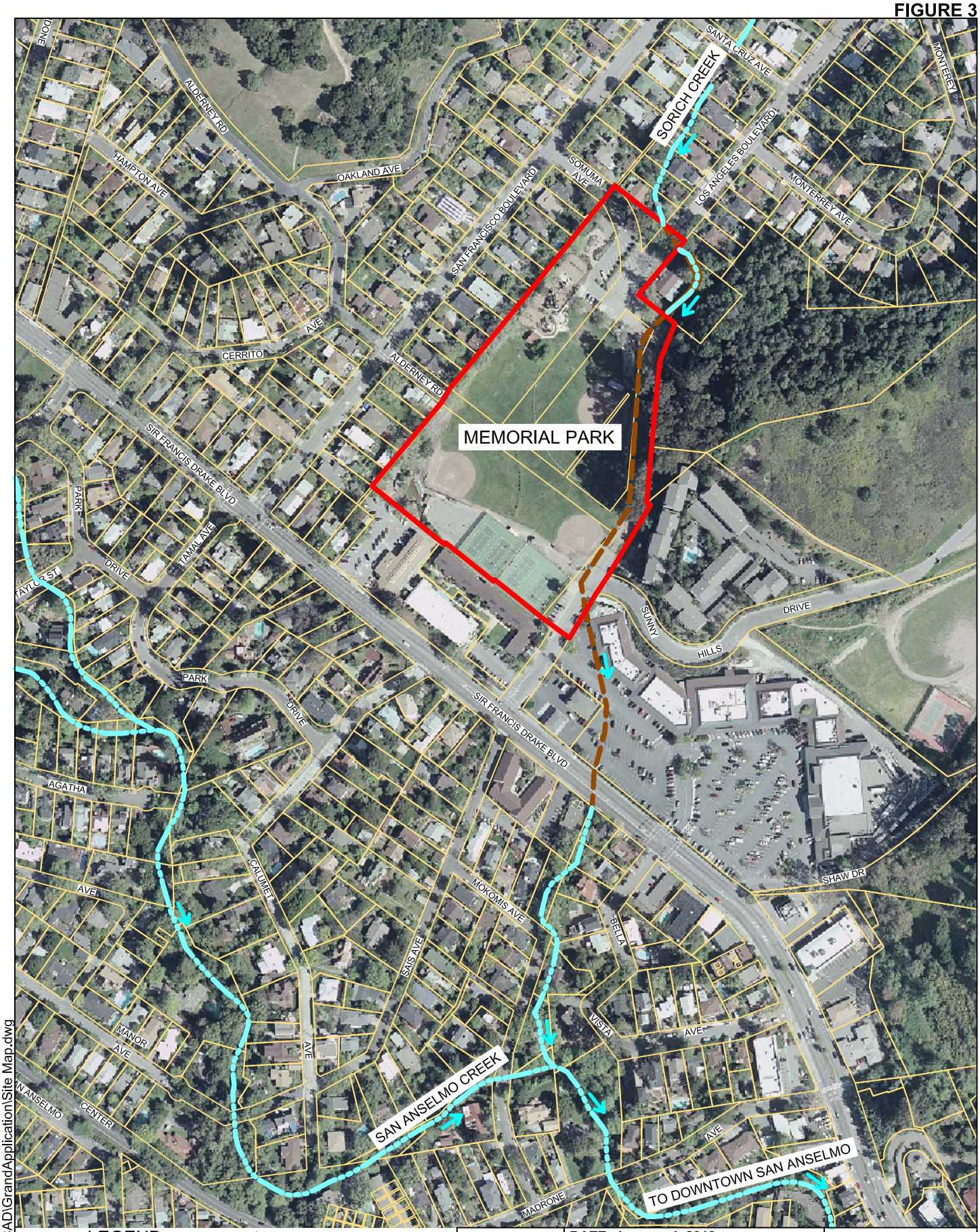
In December 2012 engineers for the Town of San Anselmo prepared a project briefing memo, including Concept (30%) Designs, and submitted it to DWR Division of Safety of Dams (DSOD) because DSOD has permitting authority over dams in California that meet certain size criteria. Engineers for the Town initiated informal consultation with DSOD regarding potential DSOD jurisdiction and design issues, including an informal pre-application consultation teleconference call with DSOD staff on January 22, 2013. DSOD indicated that based of the size of the detention basin DSOD will have jurisdiction over the project, and the Town will need to submit an application to DSOD at the appropriate time. The Town will continue to consult with and request feedback from DSOD as the project moves forward.

The Town of San Anselmo has held three community meetings to present project plans and hear feedback from the public regarding the project. Notices of the meetings were sent out to Town residences in the Town newsletter, posted on the Town's website, and hand-delivered to nearby neighbors of the park. These three community meetings were held in San Anselmo, California on November 3 and December 3, 2012 and February 5, 2013. Attendance at the three meetings combined was approximately 120 persons. At the meetings engineers and Town staff presented information describing the purpose and need for the project, project objectives, and alternative layouts for the rehabilitated park. Individuals asked questions concerning the project and answers were provided as appropriate. The Town prepared a written summary of the questions and answers and has posted it on the Town website. The Town has also posted the alternative layout for the rehabilitated park and other project information. Copies of the meeting notices, agendas, sign-in sheets, and the written summary of the questions and answers raised at the meetings are provided in Appendix 6.

1.8 Project Map

Figure 3 is a local map of Memorial Park Detention Basin Project and the vicinity showing the locations of Sorich Creek and San Anselmo Creek. Figure 4 shows existing topography of Memorial Park and the immediate vicinity as well as the existing buried culverted Sorich Creek. Figure 5 shows existing wet utility lines in the vicinity of the park. Section 3.2 provides details on designs and costs of Project elements. All project elements are located within Memorial Park or in the immediate vicinity.

FIGURE 3



LEGEND
- SITE BOUNDARY
- PARCEL LINE
- OPEN CHANNEL
- CULVERT
- FLOW DIRECTION

NOTE:
1. SOURCE OF AERIAL PHOTO IS MARIN COUNTY, 2004.

N W E S

SCALE (Feet)
0 150 300

STETSON ENGINEERS INC.

DATE: January 4, 2013

JN: 2438

MEMORIAL PARK LOCATION MAP

F:\DATA\2438\AutoCAD\GrandApplication\Site Map.dwg

F:\DATA\2438\AutoCAD\GrandApplication\ExistingTopo&WetUtilities.dwg

NOTES:

1. SOURCE OF TOPOGRAPHY IS LIDAR SURVEY BY DELTA GEOMATICS, SEPTEMBER 2009.
2. SOURCE OF AERIAL PHOTO IS MARIN COUNTY, 2004.
3. VERTICAL DATUM IS NAVD88.

LEGEND:

- EXISTING TOPOGRAPHIC 2-FT CONTOURS
- PARCEL LINE
- EXISTING SORICH CREEK CULVERT
- EXISTING SORICH CREEK WOODEN OPEN BOX CHANNEL
- SORICH CREEK CENTERLINE

N W E S

SCALE (FEET) 0 50 100

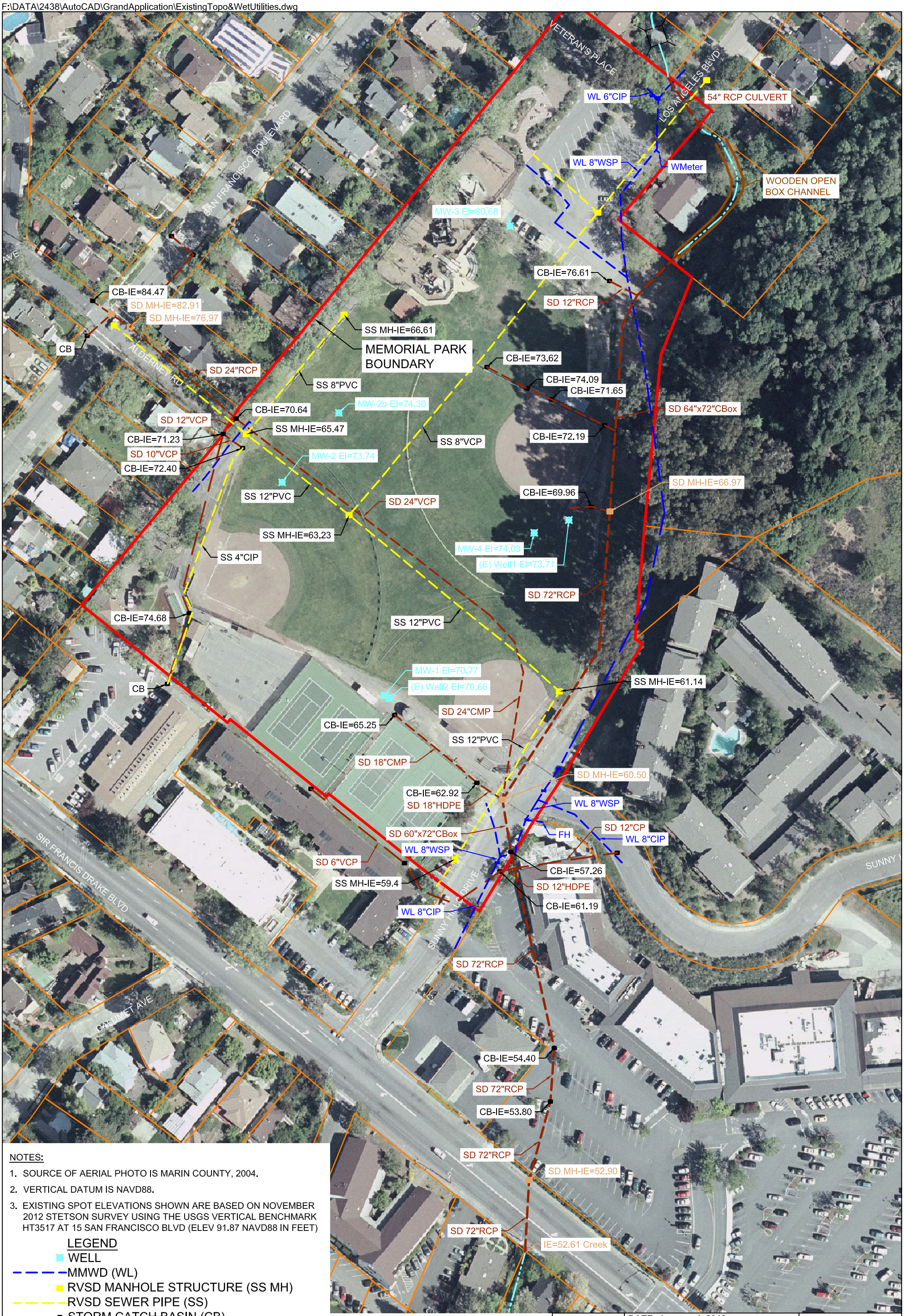
STETSON ENGINEERS INC.

DATE: January 4, 2013 | JN: 2438

EXISTING TOPOGRAPHIC MAP AND SORICH CREEK EXISTING CONDITION

FIGURE 4

F:\DATA\2438\AutoCAD\GrandApplication\ExistingTopo&WetUtilities.dwg



NOTES:

1. SOURCE OF AERIAL PHOTO IS MARIN COUNTY, 2004.
2. VERTICAL DATUM IS NAVD88.
3. EXISTING SPOT ELEVATIONS SHOWN ARE BASED ON NOVEMBER 2012 STETSON SURVEY USING THE USGS VERTICAL BENCHMARK HT3517 AT 15 SAN FRANCISCO BLVD (ELEV 91.87 NAVD88 IN FEET)

LEGEND

- WELL
- MMWD (WL)
- RVSD MANHOLE STRUCTURE (SS MH)
- RVSD SEWER PIPE (SS)
- STORM CATCH BASIN (CB)
- STORM MANHOLE (SD MH)
- STORM DRAIN CHANNEL
- STORM DRAIN PIPE (SD)
- PARCEL LINE
- SORICH CREEK CENTERLINE

N W E S

SCALE (FEET) 0 50 100

STETSON ENGINEERS INC.

DATE: January 4, 2013 | JN: 2438

EXISTING WET UTILITIES AND WELLS LOCATIONS

FIGURE 5

1.9 Project Timing and Phasing

Although it is considered the keystone of the greater Ross Valley Flood Reduction and Watershed Management Program, the Memorial Park Detention Basin Project is geographically and physically isolated, so it can be implemented and operated as a stand-alone project with independent utility, function, and benefits. Acting alone, the Project can substantially reduce flooding in San Anselmo, Ross, Kentfield, Greenbrae, and Larkspur; provide irrigation of the rehabilitated park and, thus, reduce water demand to the MMWD system; provide better stormwater discharge quality to San Anselmo Creek and Corte Madera Creek and thereby improve downstream aquatic and riparian habitat; restore aquatic habitat of the Sorich Creek; and, enhance overall public access and enjoyment of the park.

However, it should be pointed out that the benefits of the Project will be enhanced, synergistically, through completion of the Army Corps of Engineers' project farther downstream in Corte Madera Creek. The Army Corps project is scheduled for completion in 2014. The Army Corps project is planned to include, at a minimum, removal of an existing timber bulkhead/fish ladder, which historically has acted as an impediment to fish passage and migration, and other in-channel improvements aimed at increasing the capacity of Corte Madera Creek to 5,400 cfs. These improvements will enhance fish passage and allow migrating Coho and steelhead better access into San Anselmo Creek below the Sorich Creek confluence. Working in concert, projects identified in the Ross Valley Flood Reduction and Watershed Management Program, including the keystone Memorial Park Detention Basin Project, and the Army Corps project can provide a 100-year level of flood protection to Ross Valley and substantially restore the ecological function of San Anselmo Creek/Corte Madera Creek.

The Memorial Park Detention Basin Project will be implemented as a stand-alone project. Due to the synergies between its project elements, all of the project elements will be implemented in concert, including environmental review and regulatory permitting, design, and construction. Attachment 5, Schedule, provides details on timing of implementation. Once construction of the Project is completed in 2016, the Memorial Park Detention Basin will be operated for flood damage reduction, water supply, water quality, ecosystem restoration, and public recreation in a coordinated fashion. A Coordinated Operations Plan (COP), establishing the rules and criteria for operating the detention basin in a manner that achieves the Project's multi-use benefits will be developed that is mutually acceptable for Town of San Anselmo and the MCFCWCDFZ9. Monitoring, assessment, and performance measurements will also be conducted in a coordinated fashion as well.

1.10 Relationship of the Memorial Park Detention Basin Project to the Adopted Bay Area IRWMP

The Memorial Park Detention Basin Project advances many of the goals and objectives of the adopted Bay Area IRWMP. The table below, which is derived from the adopted

Bay Area IRWMP, identifies specific goals and objectives advanced by the project elements.

Goals and Objectives of the Bay Area IRWMP Advanced by the Memorial Park Detention Basin Project					
	Project element number assignments used in the four columns to the right: 1) Detention basin, earthen embankments, walls, and hydraulic control structures; 2) Subsurface drainage features and stormwater BMPs, groundwater irrigation supply system, and wet utilities relocations; 3) Creek daylighting and restoration; and 4) Park rehabilitation.	Project Element 1	Project Element 2	Project Element 3	Project Element 4
Regional Goal	**Objectives**				
A. Contribute to the promotion of economic, social, and environmental sustainability	**Contribute to:**				
	1. Avoiding, minimizing, and mitigating net impacts to environment	x	x	x	x
	2. Maintaining and promoting economic and environmental sustainability through sound water resources management practices	x	x	x	x
	3. Maximizing external support and partnerships	x	x	x	x
	4. Maximizing ability to get outside funding	x	x	x	x
	5. Maximizing economies of scale and governmental efficiencies	x	x	x	x
	6. Providing trails and recreation opportunities				x
	7. Protecting cultural resources	x			
	8. Increasing community outreach and education for watershed health			x	x
	9. Maximizing community involvement and stewardship				x
	10.Reducing energy use and/or use renewable resources where appropriate		x		x
	11.Minimizing solid waste generation/maximize reuse				
	12.Engaging public agencies, businesses, and the public in stormwater pollution prevention and watershed management, including decision -making		x		
	13.Achieving community awareness of local flood risks, including potential risks in areas protected by existing projects	x			x
	14.Considering and addressing disproportionate community impacts				
	15.Balancing needs for all beneficial uses of water	x	x	x	x
	16.Securing funds to implement solutions	x	x	x	x
B. Contribute to improved supply reliability	**Contribute to:**				
	1. Meeting future and dry year demands		x		x
	2. Maximizing water use efficiency		x		x
	3. Minimizing vulnerability of infrastructure to catastrophes and security breaches	x			
	4. Maximizing control within the Bay Area region				
	5. Preserving highest quality supplies for highest use		x	x	x
	6. Protecting against overdraft			x	
	7. Providing for groundwater recharge while maintaining groundwater resources			x	
	8. Increasing opportunities for recycled water use consistent with health and safety		x	x	x
	9. Maintaining a diverse portfolio of water supplies to maximize flexibility		x		x
	10.Securing funds to implement solutions	x	x	x	x
C. Contribute to the protection and	**Contribute to:**				
	1. Protecting, restoring, and rehabilitating natural watershed processes			x	x
	2. Controlling excessive erosion and managing sedimentation	x	x	x	

improvement of hydrologic function	3. Maintaining or improving in-stream flow conditions		x	x	
	4. Improving floodplain connectivity			x	x
	5. Preserving land perviousness and infiltration capacity	x	x	x	x
	6. Securing funds to implement solutions	x	x	x	x
D. Contribute to the protection and improvement of the quality of water resources	**Contribute to:**				
	1. Minimizing point and non-point source pollution		x	x	
	2. Reducing salinity-related problems				
	3. Reducing mass loading of pollutants to surface waters		x	x	
	4. Minimizing taste and odor problems				
	5. Preserving natural stream buffers and floodplains to improve filtration of point and non-point source pollutants			x	
	6. Maintaining health of whole watershed, upland vegetation and land cover to reduce runoff quantity and improve runoff quality		x	x	
	7. Protecting surface and groundwater resources from pollution and degradation		x	x	
	8. Anticipating emerging contaminants		x		
	9. Eliminating non-stormwater pollutant discharges to storm drains				
	10.Reducing pollutants in runoff to the maximum extent practicable		x	x	
	11.Periodically evaluating beneficial uses				
	12.Continuously improving stormwater pollution prevention methods				
	13.Securing funds to implement solutions	x	x	x	
E. Contribute to the protection of public health, safety, and property	**Contribute to:**				
	1. Providing clean, safe, reliable drinking water		x		
	2. Minimizing variability for treatment		x		
	3. Advancing technology through feasibility studies/demonstrations				
	4. Meeting promulgated and expected drinking water quality standards				
	5. Managing floodplains to reduce flood damages to homes, businesses, schools, and transportation				
	6. Minimizing health impacts associated with polluted waterways				
	7. Achieving effective floodplain management by encouraging wise use and management of flood-prone areas				
	8. Maintaining performance of flood protection and stormwater facilities	x	x		
	9. Partnering with municipalities to prepare mitigation action plans that reduce flood risks to the community				
	10.Coordinating resources and mutual aid between agencies to enhance agency effectiveness	x	x	x	x
	11.Securing funds to implement solutions	x	x	x	x
F. Contribute to the creation, protection, enhancement, and maintenance of environmental resources and habitats	**Contribute to:**				
	1. Providing net benefits to environment	x	x	x	x
	2. Conserving and restoring habitat for species protection		x	x	
	3. Acquiring, protecting and/or restoring wetlands, streams, and riparian areas			x	x
	4. Enhancing wildlife populations and biodiversity (species richness)			x	x
	5. Providing lifecycle support (shelter, reproduction, feeding)			x	
	6. Protecting and recovering fisheries (natural habitat and harvesting)			x	
	7. Protecting wildlife movement/wildlife corridors			x	x
	8. Managing pests and invasive species				
	9. Recovering at-risk native and special status species			x	
	10.Improving structural complexity (riparian and channel)			x	
	11.Designing and constructing natural flood protection and stormwater facilities				
	12.Securing funds to implement solutions	x	x	x	x

1.11 Data Management and Deliverables

As part of implementation of the Bay Area IRWMP, data will be collected to support assessment of the performance of Memorial Park Detention Basin Project, as well as in meeting the regional goals and objectives identified in the Bay Area IRWMP. Details on the monitoring program, including the data that will be collected under the Memorial Park Detention Basin Project, are described in Attachment 6, Monitoring, Assessment, and Performance Measures. To facilitate the data management and deliverables, MCFCWCDFZ9 will assign a database coordinator to oversee the collection, storage, and dissemination of data and to ensure that the data management and deliverables are consistent with the Bay Area IRWMP standards.

Data collection will be ensured to be comparable with the statewide data collection programs, such as the Surface Water Ambient Monitoring Program (SWAMP). Upon completion of the performance assessment, the collected data, along with its associated quality assurance/quality control information, will be provided to the State in a format that can be easily integrated into statewide data collection and tracking programs. As appropriate, the collected data will be contributed to the following statewide data programs:

- California Environmental Resources Evaluation System (CERES), an information system developed by the California Resources Agency to facilitate access to natural resource data; and,
- California Environmental Data Exchange Network (CEDEN), a website developed by the State for coordinated data sharing.

2.0 Tasks

This chapter describes tasks that will be performed to implement the component project elements comprising the Memorial Park Detention Basin Project. These tasks are consistent with those used in Attachment 4, Budget, and Attachment 5, Schedule.

Given that all the project elements comprising the Memorial Park Detention Basin Project are linked geographically, functionally and institutionally (i.e., between the Town of San Anselmo and MCFCWCDFZ9) as one project, it is anticipated that the approach to environmental review will be a single, combined environmental document for the project (e.g., Environmental Impact Report/Environmental Impact Statement (EIR/EIS) or Initial Study/Environmental Assessment (IS/EA)). This combined environmental document will analyze the environmental impacts and provide mitigation measures, if needed, for the whole Memorial Park Detention Basin Project.

It is anticipated that the work will be primarily performed using contractors under several contracts, with administration and oversight performed by the Town of San Anselmo. The contract work is summarized in the table below.

Summary of Contractors for Memorial Park Detention Basin Project

Phase	Task	Project Element No.	Contractor
Pre-Construction	Site Survey		Surveyor - contractor
	Pre-Design Geotechnical Investigation	1	Geotechnical engineering consultant-contractor
	Design	1, 2, 3	Engineering consultant-contractor
	Combined CEQA/NEPA Documentation	All Project Elements	Environmental consultant-contractor
	Permitting	All Project Elements	Environmental consultant-contractor
	Environmental Compliance Workplan	All Project Elements	Environmental consultant-contractor
	Stormwater Pollution Prevention Plan (SWPPP)	All Project Elements	Environmental consultant-contractor
	Coordinated Operations Plan	1, 2, 3, 4	Engineering consultant-contractor
	Design	4	Engineering/Architect consultant-contractor
Construction	Construction	1, 2, 3, 4	Engineering construction contractor
	Construction Management	1, 2, 3, 4	Engineering consultant-contractor

Project Element Number Assignments:

1 - Detention basin, earthen embankments, walls, and hydraulic control structures
2 - Subsurface drainage features and stormwater BMPs, groundwater irrigation supply system, and wet utilities relocations
3 - Creek daylighting and restoration
4 - Park rehabilitation

2.1 Task 1: Administration

This task consists of administration of all Project-related activities that will be performed by the Town of San Anselmo staff, Town contractors, and MCFCWCDFZ9 staff. Project-related activities will primarily include, but will not be limited to, pre-construction studies, planning, environmental review and permitting, and design work and construction and testing work. The Town will be the lead agency under CEQA and will be the contracting party on all work performed by contractors. Administration will cover work performed by Town of San Anselmo staff that is incidental but directly related to the above-described Project-related activities.

Administration will also involve administrative work related to administering the DWR grant, including work in finalizing the DWR grant contract.

Administration will also cover preparation of a Memorandum of Agreement (MOA) between the Town of San Anselmo and MCFCWCDFZ9 concerning cost sharing and joint use and operation of the Memorial Park detention basin for flood control and public recreation. It is anticipated that a Coordinated Operations Plan (to be developed under Task 4 Assessment and Evaluation) that sets forth details for the joint use of the park will be incorporated into the MOA. Preparation of the MOA will involve engineering, management, and legal staff from the Town of San Anselmo. Administration will also cover activities that will be performed by MCFCWCDFZ9 staff in developing the MOA and administering funding of their portion of the Project cost.

Deliverables: Submission of invoices and other deliverables as required by DWR Grant Agreement; MOA between Town and MCFCWCDFZ9; submission of invoices and other deliverables as required by Town/MCFCWCDFZ9 MOA; preparation of contracts with and payments of invoices to contractors.

2.2 Task 2: Labor Compliance Program

This task consists of providing the required information to the newly instituted Compliance Monitoring Unit (CMU) of the California Department of Industrial Relations (DIR) Division of Labor Standards Enforcement (DLSE). Implementation will involve the Town preparing and inserting provisions in all contracts requiring contractors to comply with the requirements of the CMU. Details on the specific role of the Town in the CMU will be provided by the DLSE.

Deliverable: Submission of required information to DLSE CMU.

2.3 Task 3: Reporting

This task consists of preparing quarterly, annual, and final progress reports for the whole Memorial Park Detention Basin Project. The progress reports will describe all grant-funded activities, expenditures vs. budget, and other information for the reporting period as specified in the Grant Agreement. As detailed in Attachment 5, Schedule, the Project is planned to occur over a three-year period, from final grant award on August 15, 2013 to August 15, 2016. Accordingly, it is anticipated that the Town will prepare 12 quarterly reports, three annual reports, and one final progress report.

Deliverable: Submission of quarterly, annual, and final reports as specified in the DWR Grant Agreement.

2.4 Task 4: Assessment and Evaluation

Completed work on the Project is summarized in Section 3.1. The completed work includes a Project Assessment and Evaluation Memorandum, Concept (30%) Design Memorandum, and prior hydrologic, hydraulic, and geotechnical studies and a recreational assessment report. The completed hydrologic/hydraulic studies and recreational assessment have adequately verified the feasibility and viability of the Project with regard to flood reduction and public recreation; therefore, no further assessment and evaluation in hydrology/hydraulics or recreational study work is needed.

However, further assessment and evaluation is needed to address geotechnical issues concerning the Project. The primary geotechnical issues concerning the Project include strong seismic ground shaking, slope instability, settlement, and erosion. Additional subsurface exploration, laboratory testing, and geotechnical engineering assessment and evaluation will be required to (1) determine the depth at which historical slide movement has occurred along the eastern side of the park and prepare geotechnical design criteria for a new retaining structure; and (2) to develop more precise soil parameters and settlement magnitude and rate estimates for areas adjacent to the southern and western project boundaries (refer to Appendix 4; Miller Pacific, January 2013; p. 10). This additional data will support further analyses of the geotechnical issues of this Project, as well as provide the geotechnical information needed for final design.

Further subsurface exploration, laboratory testing, and assessment and evaluation work in geotechnical engineering will have three main elements: (1) consultation with DWR/DSOD to determine the project-specific field exploratory drilling, testing and geotechnical engineering analyses that will be required; (2) perform the required field exploratory drilling and testing; and (3) perform the required geotechnical engineering analyses and prepare a Pre-Design Geotechnical Investigation Report.

For purposes of this grant application, it is anticipated that the required field exploratory drilling and testing work will include a combination of cone penetration tests (10-20) and

exploratory borings (5-10) along the southern and western sides of the basin; three (3) borings in the interior of the basin; three (3) borings in the landslide along the eastern side; and laboratory testing of the boring materials, including moisture density, strength (TXCU/pp), PI, consolidation and grain size. It is anticipated that the required geotechnical engineering analyses will include slope stability, settlement, foundation options and retaining wall types. All work, including field data, testing, and analyses, findings, recommendations, design criteria and conclusions verifying feasibility and viability of the geotechnical aspects of the Project will be documented in a Pre-Design Geotechnical Investigation Report.

It is anticipated that this work will be performed by geotechnical engineering consultant-contractor with review and oversight by Town of San Anselmo staff.

A Coordinated Operations Plan (COP), establishing the rules and criteria for operating the detention basin in a manner that achieves the park's new multi-use benefits, particularly joint use for flood detention and public recreation, will be developed that is mutually acceptable to the Town of San Anselmo and MCFCWCDFZ9.

It is anticipated that this work will be performed by an engineering consultant-contractor with review and oversight by Town of San Anselmo staff.

Deliverables: Pre-Design Geotechnical Investigation Report;
Coordinated Operations Plan.

2.5 Task 5: Final Design

For purposes of this grant application and based on information in Section 3.1, the Project is currently at the Concept (30%) design stage. Further work will be needed to complete Final Design.

Design plans will be prepared at three stages, based on the design stage definitions given in the PSP, for review, comment, and approval by Town of San Anselmo: 60% design, 90% (Pre-final) design, and 100% (Final) design. Preparation of the 60% design will start after completion of the Pre-Design Geotechnical Investigation Report (see Task 4 above) as this report will establish the final design criteria. The 100% (Final) design will include the design package and contract that will be advertised for award for construction. It is anticipated that a single design package and contract that is suitable for bidding, combining all four elements of the Project, will be advertised and awarded for construction to a single contractor. It is anticipated that the design of all elements of the Project will be performed by an engineering consultant-contractor and a geotechnical engineering consultant-contractor, except for design of the recreation element which will be performed by a landscape architect, with review and oversight by Town of San Anselmo.

Deliverables: 60% design, 90% (Pre-final) design, and 100% (Final) design package

2.6 Task 6: Environmental Documentation

The Memorial Park Detention Basin Project will be subject to environmental review under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). It is anticipated the Town of San Anselmo and the U.S. Army Corps of Engineers will be the lead agencies under CEQA and NEPA, respectively. Given that the elements comprising the Memorial Park Detention Basin Project are linked geographically, functionally and institutionally (i.e., between Town of San Anselmo and MCFCWCDFZ9) as one project, it is anticipated that the approach to environmental review will be a combined Environmental Impact Report/Environmental Impact Statement (EIR/EIS) or Initial Study/Environmental Assessment (IS/EA). This combined environmental document will analyze the environmental impacts and provides mitigation measures, if/as needed, for the whole Memorial Park Detention Basin Project.

It is anticipated that environmental review will proceed concurrently with regulatory permitting. This approach offers flexibility and expands opportunities for comprehensively mitigating impacts associated with the individual project elements. Conceivably, impacts in one location within the geographic footprint of the Project can be mitigated elsewhere in the geographic footprint. It can also streamline and reduce the overall costs (e.g., special studies) associated with the environmental review and permitting processes.

It is anticipated that this work will be performed by an environmental consultant-contractor with review and oversight by Town of San Anselmo.

Deliverables: Approved and adopted combined CEQA/NEPA documentation.

2.7 Task 7: Permitting

The Memorial Park Detention Basin Project will be subject to the regulatory permitting authority of several federal and state agencies. The table below identifies the permits that are expected to be required.

It is anticipated that environmental regulatory permitting will proceed concurrently with environmental review. This approach offers flexibility and expands opportunities for mitigating impacts associated with individual project elements. Conceivably, impacts in one location within the geographic footprint of the Project can be mitigated elsewhere in the geographic footprint. It can also streamline and reduce the overall costs (e.g., special studies) of the environmental review and permitting processes.

DSOD encourages applicants with projects under its jurisdiction to engage them at the early stages of project development. Accordingly, it is anticipated that the DSOD permitting process will proceed concurrently with the Pre-Design Geotechnical

Investigation (in Assessment and Evaluation), 60% design, 90% (Pre-final) design, and 100% (Final) Design. DSOD permitting will conclude upon its approval of the 100% (Final) Design.

It is anticipated that special studies will be required to support the applications identified in the table below, including delineations of waters of the U.S. and State; vegetation surveys at affected areas; and biological surveys for special-status species. These special studies will be used to support both the permitting and environmental review processes.

It is anticipated that permitting work in connection with the applications to DSOD and Marin County will be performed by an engineering consultant-contractor and the remaining environmental regulatory permitting work will be performed by environmental consultant-contractor with review and oversight by Town of San Anselmo.

Approvals and Permits Required for the Memorial Park Detention Basin Project

Agency	Trigger	Approval	Submittal
US Army Corps of Engineers (USACE)	Discharge of fill within ordinary high water mark of Sorich Creek	Section 404/10 Permit (Nationwide Permit or an Individual Permit)	Application
National Marine Fisheries Service (NOAA Fisheries) US Fish and Wildlife Service	Effects on federally-listed threatened or endangered species, if any are present	Biological Opinion through a Section 7 Consultation with USACE	Biological Assessment
San Francisco Bay Regional Water Quality Control Board (RWQCB)	Section 404 Permit through USACE; discharge to Sorich Creek of groundwater intercepted/collected during construction de-watering and post-construction during non-irrigation season; Construction disturbance of land	Section 401 Water Quality Certification through Section 404 Permit with USACE; NPDES permit; General construction permit	Applications; Stormwater Pollution Prevention Plan (SWPPP)
California Department of Fish and Game (DFG)	Work in waters of the State; effects on State listed threatened or endangered species	Lake and Streambed Alteration Agreement	CEQA document
State Historic Preservation Officer (SHPO)	Effects on cultural or archeological resources, e.g., Log Cabin, others if present	SHPO review and concurrence of inventory/evaluation report	CEQA/NEPA document
Department of Water Resources/Division of Safety of Dams (DSOD)	Construction of dam	Approval of design plans and specifications for dam	Application
Marin County Dept. of Environmental Health	Well drilling; use of groundwater in restroom toilets	Well permit	Application
Town of San Anselmo	Construction, earthwork, work in a watercourse	Grading Permit, Building Permit, Watercourse Permit	Application; CEQA document

Deliverables: Permit applications for Army Corps 404, Regional Board 401 Certification, Regional Board NPDES, and Fish and Game Stream/Lake Alteration, including requisite supporting special studies; permit application for County well drilling permit; permit applications for County permits to use collected/pumped groundwater in restroom toilets; permit application for DSOD approval of plans and specifications; permit application for Town of San Anselmo grading/building/watercourse permit.

2.8 Task 8: Construction Contracting

This task covers activities associated with construction contracting, including advertisement for bids; answering questions from contractors and preparing addendums to the design package during the bidding period; pre-bid contractors meeting; evaluation of bids; and award of contract. Town of San Anselmo will carry out the advertisement and award of contract work, and will be assisted by an engineering consultant-contractor in the other work.

Deliverables: Bid advertisement; written answers to questions during bidding; addendums to contract, if/as needed; meeting notes from pre-bid meeting with contractors; documented evaluation of bids and recommendation for award.

2.9 Task 9: Construction

As indicated above in section 2.1.5, it is anticipated that a single design package and contract, combining all elements of the Project, will be advertised and awarded for construction. Construction is divided into three categories: mobilization and site preparation; project construction; and performance testing and demobilization.

Following major construction work, further work will be performed on the monitoring system. It is anticipated that this work will be performed by a consulting hydrographer-contractor.

2.9.1 Mobilization and Site Preparation

This category of work includes several items as described in the table below.

Mobilization and Site Preparation Work	
Staging area	Establish the on-site work staging area and support facilities (e.g., office, water tank, electrical power)
Stockpile area	Establish stockpile area for temporary storage of excavated material
Mobilization	Mobilize equipment to the site
Erosion Control	Set up erosion control
Dewatering and water management	Install dewatering wells and/or temporary or permanent subdrains and seepage collection system; install seepage collection and piping to sedimentation treatment tanks; install pumping and piping to discharge treated seepage to Sorich Creek

2.9.2 Project Construction

This category of work includes several items as described in the table below.

Project Construction Work	
Demolition	Secure site; remove structures, pavements, and vegetation; remove Sorich Creek culverts
Earthwork	Mass excavate detention basin, stockpile and haul material to off-site disposal site; rough grade site
Utilities, storm drain, outlet works	Remove and replace RVSD sewer line and MMWD water line; remove and replace Alderney storm drain, including enlarging inlet and installing stormwater quality device
Retaining wall structures	Stabilize landslide on eastern side of basin; construct retaining walls on eastern and southern sides w/tie-backs founded on grade beams and drilled piers; construct retaining walls along raised Sunny Hills Drive
Compacted fill, finish grading, and daylighting creek	Place compacted fill at outlet embankment, along raised Sunny Hills Drive, and other locations; restore daylighted Sorich Creek, including installation of pre-fab bridge, placement of rock and bank stabilization; finish grade detention basin/park area.
Subdrain and wells; water supply system	Install subdrain groundwater interception/collection system; drill wells; install groundwater supply system for irrigation/restrooms
Recreational features	Install recreational facilities, including grass areas, athletic fields and play/picnic areas, pathways, restrooms, courts, lighting, sprinkler/irrigation distribution system
Mechanical	Install slide gate and motor controls on outlet culvert
Electrical	Install electrical panel(s), controls, emergency generators; complete hook-ups to end uses
Monitoring	Install monitoring devices

2.9.3 Performance Testing and Demobilization

This category of work includes several items as tabulated below relating to the construction contract.

Performance Testing and Demobilization Work (Construction Contract)	
Performance testing	Test performance of mechanical and electrical systems, including emergency generators, motor-controlled gates, and monitoring components
Demobilization	Demobilize equipment and remove support facilities and temporary hookups from the site

2.9.4 Monitoring System Work

This category of work includes several items as described in the table below relating to the monitoring system.

Post-Construction Monitoring System Work	
Monitoring	Install a streamflow gage immediately upstream of the detention basin (above effect of basin backwater) to measure Sorich Creek flood inflows to the basin
Monitoring	Develop creek water level vs. discharge rating curve for the gage
Monitoring	Install a water meter in the pipeline to irrigation and toilet distribution to measure irrigation and toilet water usage
Monitoring	Conduct stormwater quality monitoring at the Alderney stormdrain inflow and outflow of the water quality treatment device to measure performance of the device.

2.10 Task 10: Environmental Compliance, Mitigation, Enhancement

It is anticipated that an outcome of environmental review under CEQA and NEPA and regulatory permitting will be various environmental compliance, mitigation, and enhancement measures that will be required pre-, during, and post-construction. Since the environment review has not been initiated, it is impossible at this time to predict exactly what measures will be required but, for purposes of this grant application, the following measures are anticipated.

Environmental Compliance, Mitigation and Enhancement	
Environmental Compliance Workplan	Preparation of an written Environmental Compliance Workplan (ECW) for the Memorial Park Detention Basin Project[9] which will identify special-status species and other sensitive biological resources occurring in the Project area; describe pre-construction biological surveys and avoidance measures (e.g., exclusionary fencing); describe construction avoidance measures (e.g., construction season, exclusionary fencing) and monitoring; describe post-construction restoration and mitigation measures; describe post-construction mitigation monitoring; prepare a stormwater pollution prevention plan (SWPPP) that describes pre- , during, and post-construction water quality protection measures and monitoring;
Pre-construction biological surveys	Perform pre-construction biological surveys as required in the ECW
Construction monitoring	Perform stormwater quality monitoring as called for in the SWPPP.
Restoration and mitigation (in addition to normal construction site restoration req'd by construction contractor)	Restore daylighted Sorich Creek as required in ECW
Initial monitoring (initial verification monitoring only – not long term)	Perform initial monitoring to verify and document initial installation of restoration and mitigation as required in the ECW

[9] It is anticipated that the ECW will cover the whole Memorial Park Detention Basin Project. The cost for the ECW has been split according to each project's pro-rata construction cost, as reflected in Attachment 4, Budget.

It is anticipated that this work will be performed by environmental consultant-contractor with review and oversight by Town of San Anselmo staff.

Deliverables: Environmental Compliance Workplan Report; Stormwater Pollution Prevention Plan (SWPPP); pre-construction biological survey report; construction monitoring reports; initial monitoring (initial verification) report.

2.11 Task 11: Construction Administration

This task covers activities associated with administering and managing construction of the Project. Specifically this task includes collecting, reviewing, and filing all documentation, bonding, and certifications required from the contractor before work can begin; holding a pre-construction meeting with the contractor; field-inspecting the work of the contractor, including review of required materials certifications and earthwork testing; monitoring of construction activities to ensure compliance with the ECW; review of contractors submittals, including shop drawings; preparation of change orders; review of contractors progress invoices and recommendations for payment of progress invoices; inspection of performance testing; review of contractors final invoice and recommendation for payment.

Also included is construction inspection and monitoring, which will consist of performing continuous, on-site inspection and monitoring on construction activities by an on-site resident engineer during all phases of construction and a biologist during periods of work near sensitive areas (e.g., creek) to ensure conformance with the contract plans and specifications and compliance with the ECW.

Town of San Anselmo will carry out collecting, reviewing, and filing all documentation, insurance and bonding, and certifications as required from the contractor and payment of invoices. Town of San Anselmo anticipates that the other work described above will be performed by an engineering consultant-contractor and environmental consultant-contractor with review and oversight by Town of San Anselmo.

Deliverables: Meeting notes on pre-construction meeting; field-inspection reports; field monitoring reports; documented materials certifications and earthwork testing results; review/approved shop drawings, if/as needed; review/approved change orders, if/as needed; documented review and recommendations for progress and final payments to contractors.

2.12 Right-of-Way Acquisition

Nearly all features of the Project will be built on property owned by the Town of San Anselmo. However, small portions of some Project features will have minor encroachments on adjacent properties. Consequently, in order to accommodate these

features there will be a need for encroachment permit, easement, or other form of right-of-way acquisition.

There will be a need for encroachment permit, easement, or other form of right-of-way acquisition to accommodate the following features of the Project;

- Emergency spillway and steps on the south corner of the Project may encroach on to apartment building property.
- Modification of wooden box culvert and installation of water collection/pumping system at the north end of the Project will occur on Log Cabin property.
- Subsurface tie-backs to support retaining wall structures at tennis courts at the south end of the Project may extend/encroach on to public housing property.
- Retaining wall structure associated with raising Sunny Hills Drive at the south end of the Project will encroach on to shopping center property.

Deliverables: Rights-of-way for Project encroachments

3.0 Supporting Documents

3.1 Project Assessment and Evaluation Memorandum

3.2 Project Concept (30%) Design and Cost Memorandum

3.2.1 Detention Basin, Earthen Embankments, Walls, and Hydraulic Control Structures

3.2.2 Subsurface Drainage Features and Stormwater BMPs, Groundwater Irrigation/Non-Potable Supply System, and Wet Utilities Relocations

3.2.3 Creek Daylighting and Restoration

3.2.4 Park Rehabilitation

Appendices

Appendix 1: HEC-HMS Hydrologic Modeling Analysis of Memorial Park Detention Basin in Peak Flow Reduction

Appendix 2: Preliminary Coordinated Operations Plan for Memorial Park Detention Basin

Appendix 3: Lower Sorich Creek Culvert Inspection

Appendix 4: Geotechnical Evaluations

- Initial Evaluation
- Supplemental Evaluation

Appendix 5: Recreation Facility Assessment

Appendix 6: Public Meetings Information

3.1 Project Assessment and Evaluation Memorandum

Project Name:
Memorial Park Detention Basin Project

Project Element(s):

- Detention Basin, Earthen Embankments, Walls, and Hydraulic Control Structures
- Subsurface Drainage Features and Stormwater BMPs, Groundwater Irrigation/Non-Potable Supply System, and Wet Utilities Relocations
- Creek Daylighting and Restoration
- Park Rehabilitation

Project Purpose and Need:

1) Flood Damage Reduction

There is a need to reduce the frequency and severity of flooding in Ross Valley for the protection of property and public safety. The current capacity of San Anselmo Creek below the Sorich Creek confluence is about 2,800 cfs and the current capacity of Corte Madera Creek at the USGS streamflow gage (which is below Ross Creek confluence) is about 3,600 cfs (see Figure 1), which correspond to about the 20 percent-annual-chance flood (i.e., 5-year flood) and the 17 percent-annual-chance flood (i.e., 6-year flood), respectively.

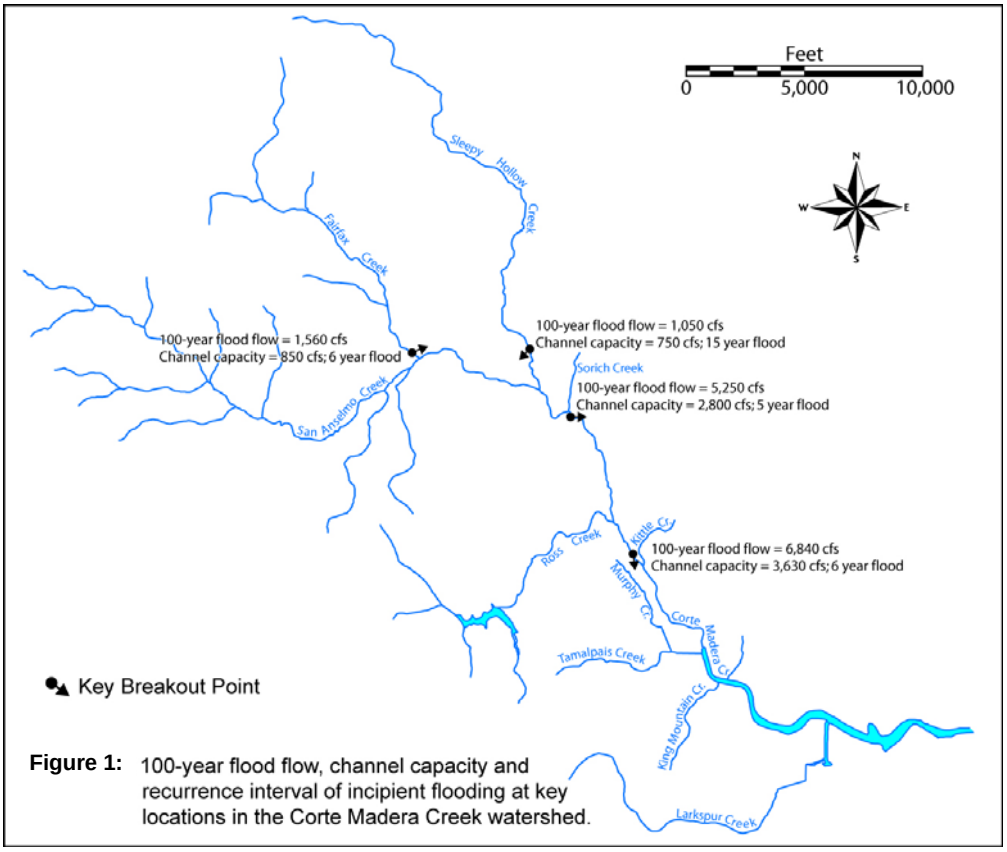


Figure 1: 100-year flood flow, channel capacity and recurrence interval of incipient flooding at key locations in the Corte Madera Creek watershed.

Several times in recent history the Ross Valley has been flooded by overflow from Corte Madera Creek with varying degrees of severity. Prior to establishment in 1951 of the USGS streamflow gaging station on Corte Madera Creek in Ross, flooding was reported in calendar years 1914, 1925, 1937, and 1942. Since the Corte Madera Creek streamflow gage in Ross has been in operation, flood flows have been recorded in calendar years 1951, 1955, 1958, 1967, 1969, 1970, 1982, 1983, 1986, 1994 , and 2005. Of these, the two most severe floods occurred in 1982 and 2005, with peak discharges of approximately 7,200 cfs and 6,800 cfs at the Ross streamflow gage (see Figure 2); the percent-annual-chances of which were approximately 0.6 percent and 1 percent, respectively. Historical flooding has caused extensive property damage and economic hardship to residents, businesses, and local governments, and has threatened the lives of those living in the floodplain, with at least one recorded death occurring in the 1955 flood and at least one rescue by Urban Search and Rescue personnel during the 2005 disastrous flood (an approximate 100-year flood).

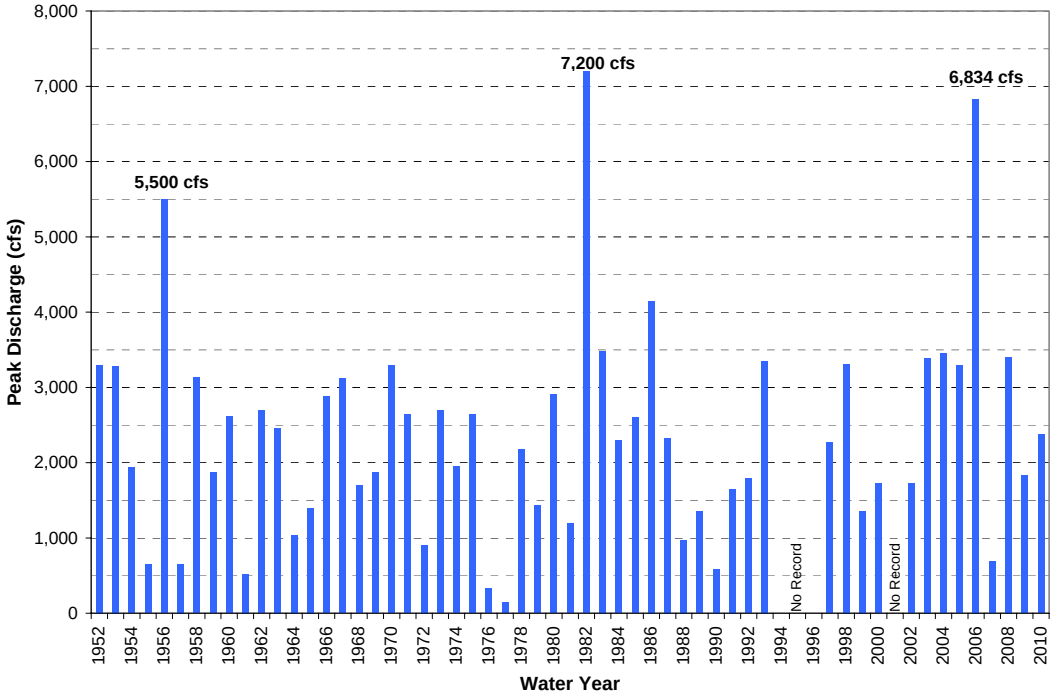


Figure 2 Historical Annual Peak Discharges Recorded at the Flood Zone 9 Streamflow Gage in Ross, Corte Madera Creek

In accordance with its Congressional authorization, the Army Corps of Engineers has plans to increase creek conveyance capacity below the Ross Creek confluence to about 5,400 cfs, or about the 4 percent-annual-chance flood (i.e., 25-year flood). This is considered a major improvement but the Ross Valley community desires a further reduction in the flood hazard. In order to increase the effectiveness of the Corps' design and achieve a more appropriate 1 percent-annual-chance level of flood protection (i.e., 100-year flood protection), the 100-year flood discharge at the Ross streamflow gage needs to be reduced by 1,400 cfs, from 6,800 cfs down to 5,400 cfs. This reduction is achievable through detention basins, and the Memorial Park Detention Basin Project could reduce the 100-year flood discharge by about 200 cfs. Without the Memorial Park Detention Basin Project, the lower reach of San Anselmo Creek through downtown San Anselmo and Corte Madera Creek will be limited to about the 4-percent-annual-chance level of flood protection. Public safety and property downstream in downtown San Anselmo and below the Ross Creek confluence in the communities of Ross, Kentfield, Larkspur and Greenbrae will remain at an unacceptably high risk of flooding.

2) Water Supply

There is a need to reduce water demand and thereby improve the reliability of the MMWD supply. MMWD reliable water supply is less than the current water demand. MMWD supplies come from local sources and imported water from the Russian River purchased from the Sonoma County Water Agency. If Marin County experiences another drought similar to that of 1976–77, water supplies may not be adequate to meet current demands. MMWD has begun to implement an aggressive water conservation program, investing $3.3 million in 2008–09 to support a wide range of conservation program activities. In combination with implementation of the California Plumbing Code, these activities are projected to save enough water to meet the needs of the projected future MMWD customers until 2025. Decreasing water demand would provide MMWD with much needed water supply reliability and flexibility, particularly during droughts. The Memorial Park Detention Basin Project will install a groundwater irrigation/non-potable supply system to provide self-irrigation for the rehabilitated park and restroom toilets and, thus, reduce the water supply from MMWD by about 7 acre-ft per year on average. Without the Memorial Park Detention Basin project, the reliability of MMWD's water supply will remain at its current less-than adequate level, and MMWD will continue to explore other more costly options to meet its water supply reliability goals.

3) Water Quality

There is a need to improve stormwater quality in storm water discharges to Sorich/ San Anselmo/Corte Madera Creek. Urban stormwater runoff has been cited as a major contributor to nonpoint source pollution. Typical pollutants associated with the urban stormwater are trash/debris, sediment, nutrients, bacteria and viruses, oil and grease, metals, organics, and pesticides[10]. The 2006 adopted Basin Plan amendment for the San

[10] The sediment is typically originated from the construction of roads and parking lots, the disturbance of landscapes, and the removal of vegetation covers. The organic compounds are secondary products of

Francisco Bay region has established a water quality attainment strategy and Total Maximum Daily load (TMDL) for diazinon and pesticide-related toxicity in the Region's urban creeks, including actions and monitoring necessary to implement the strategy.[11] Diazinon is the only pollutant in Corte Madera Creek that was included in the proposed 2006 CWA section 303(d) list of water quality limited segments.[12] Diazinon is a cholinesterase-inhibiting organophosphate pesticide**.** In the proposed 2010 CWA section 303(d) list, trash was added for the central San Francisco Bay shoreline.

The Memorial Park Detention Basin Project will improve the stormwater quality of the Alderney storm drain discharge. The existing Alderney storm drain passes beneath Memorial Park and collects urban stormwater from a nearby 23-acre residential drainage area. The collected stormwater directly discharges to the existing culverted reach of Sorich Creek below the detention basin. During the park floor excavation process the Alderney storm drain under the park will be removed and rerouted, and a CONTECH's CDS® hydrodynamic separation device (or similar device) will be installed at the inlet of the rerouted Alderney storm drain to remove trash/debris and improve stormwater quality, including removal of suspended sediment (and sediment-binding diazinon and other pollutants) and oil and grease. Without the Memorial Park Detention Basin project water quality in Sorich Creek and San Anselmo/Corte Madera Creek will remain suboptimal with respect to supporting the designated beneficial uses.

4) Ecosystem Restoration

The Corte Madera Creek watershed provides important habitat that support threatened and endangered species and is considered an "anchor stream" in the NMFS recovery plans for coho salmon and steelhead trout. The Basin Plan for the San Francisco Bay Region (2010) designates beneficial uses for San Anselmo Creek and Corte Madera Creek including COLD, MIGR, RARE, SPWN [13]and others. Although overall ecosystem functions of the creek are still essentially intact, the freshwater aquatic and creek riparian habitats have been reduced and degraded by human activities and the ongoing presence of development. By the late 1800s, cattle grazing, deforestation, and dredging for navigation began directly modifying creek corridors and increasing the severity of rainfall and sediment-laden runoff. Railroad prisms, bridges, and other permanent infrastructure were installed flanking and spanning the creeks, often creating grade breaks

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automotive fluids, pesticides, and herbicides, whereas, nutrients (i.e., nitrogen and phosphorus) are mainly from organic litter, fertilizers, food waste, sewage, and sediment. Sources of trace metals include motor vehicles, roofing and construction materials, and chemicals. Pet waste and solid waste disposal areas contribute bacteria and viruses and motor vehicles are the dominant source of oil and grease compounds.

[11] San Francisco Regional Water Quality Control Board, 2006 San Francisco Bay Basin Plan amendment. http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/urbancrksdiazinon/approvedbpa.pdf. Accessed on January 15, 2013.

[12] San Francisco Bay Regional Water Control Board, Proposed 2006 CWA Section List of Water Quality Limited Segments. http://www.waterboards.ca.gov/tmdl/docs/303dlists2006/final/r2_final303dlist.pdf. Accessed on January 15, 2013.

[13] COLD = cold fresehwater habitat; MIGR = fish migration; RARE = rare and endangered species; SPWN = fish spawning.

or otherwise altering the creek bed making it difficult for native fish to pass through. In the 1900s, encroachment by urban development gradually filled in along the edges of the creek corridors eliminating portions of the riparian canopy and natural creek bank vegetation and encouraging invasion by non-native vegetation. All of these factors have contributed to today's sub-optimal aquatic and riparian habitat conditions of the creek.

The Memorial Park Detention Basin Project will daylight and restore Sorich Creek, which is currently contained in a buried culvert along its reach through the park. The daylighted Sorich Creek will be vegetated to restore the creek ecosystem and improve stormwater quality with respect to nutrients, pesticides (like sediment-bound diazinon), and heavy metals through the processes of plant uptake and natural filtration. The Memorial Park Detention Basin Project will also remove the 70-ft long Los Angeles Street culvert. The culvert will be replaced with a pre-fabricated, single lane vehicle/pedestrian bridge, resulting in an additional reach of daylighted creek with increased hydraulic capacity and improved riparian and aquatic habitat.

Improving the stormwater discharge water quality by treating the discharge of the rerouted Alderley storm drain and vegetating the daylighted Sorich Creek will enhance the ecological health and function of San Anselmo Creek below Sorich Creek confluence and the downstream Corte Madera Creek. Without the Memorial Park Detention Basin Project recovery of target anadromous salmonids and other species will continue to be challenged by suboptimal riparian and aquatic habitat conditions.

5) Recreation and Public Access

Sorich Creek is currently inaccessible because it is contained in a buried culvert along its reach through the park which precludes opportunities for public enjoyment of the creek setting. Memorial Park itself is well used and functional, but improvements have not kept up with current safety and ADA accessibility standards and many park elements are in bad repair, exacerbating maintenance needs. Although the Town of San Anselmo's General Fund supports the maintenance and upkeep of the park, the park has suffered through heavy usage and deferred maintenance. Capital improvement funds are insufficient to cover the many upgrades needed.

The Memorial Park Detention Basin Project will daylight and restore Sorich Creek. Access to the creek will be encouraged by providing pathways leading to the creek, and the creek will placed in a "nature grove" so as to integrate it into the overall park recreational area. An upgraded field and drainage system will increase public use of the park by allowing the expanded the sports programs and use the fields for longer periods throughout the year while reducing field upkeep and maintenance costs. Pathways and park elements will be ADA accessible, accommodating to a larger extent people with disabilities compared to the current park. All these improvements will aim to enhance public access, safety, aesthetics, and overall public enjoyment. Without the Memorial Park Detention Basin Project, access and opportunities for public enjoyment of the park will remain at current levels.

Interpretive signage will be placed along the restored creek to inform the public about the restored creek ecosystem and foster stewardship for preserving and protecting the health of the creek.

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Summary of Completed Work, Existing Data and Studies:

	Description	Reference	Purpose
Completed Work	Concept (30%) designs of all facility elements	Project Concept (30%) Design Memorandum	• To evaluate the feasibility of the flood detention project • To prepare project layout; design/size project features/ facilities/components • To estimate construction costs
Existing Data	1) Hydrologic Data	Stetson in-house database; Marin County website; USGS database	• Observed rainfall runoff data were used to develop and calibrate the HEC-HMS hydrologic model for the entire Corte Madera Creek watershed, including the Sorich Creek drainage. • Observed annual peak discharge data for the streamflow gage in Ross were used to develop flood frequency curve.
	2) Hydraulic Data	Stetson in-house database; Marin County website	• Observed stage-discharge data were used to update the rating curve of the Ross streamflow gage in Corte Madera Creek. • Surveyed channel geometry and bridge/culvert geometry data were used to develop the in-channel component of the MIKE FLOOD hydraulic model for Corte Madera Creek and major tributaries • Surveyed topographic data of the Ross Valley floodplain were used to develop the floodplain component of the MIKE FLOOD hydraulic model • Surveyed high water marks data for the 1982 and 2005 floods were used to calibrate the MIKE FLOOD hydraulic model
	3) Geotechnical Data	Miller Pacific database	• Historical earthquakes data were used to demonstrate that the project is located within the seismic active region. • Subsurface exploration data, groundwater measurements and pump test data from monitoring well drilling/testing in 2012 were used to identify geotechnical issues, develop mitigation measures and preliminary design criteria
Existing Studies	1) HEC-HMS Hydrologic Modeling Analysis of Memorial Park Detention Basin in Peak Flow Reduction	Appendix 1	• To evaluate the effectiveness of the detention basin for reducing peak flows and flooding
	2) Preliminary Coordinated Operations Plan for Memorial Park Detention Basin	Appendix 2	• To provide an operations plan for using Memorial Park Detention Basin as a duel use facility for flood detention and public recreation
	3) Lower Sorich Creek Culvert Assessment	Appendix 3	• To assess the condition of the lower Sorich Creek culvert downstream of the park and evaluate the need for repairs/improvements
	4) Geotechnical Evaluations (2)	Appendix 4	• To investigate the geotechnical feasibility of converting the park into a dual purpose facility for flood detention and recreation • To identify geotechnical issues, develop mitigation measures and preliminary design criteria for the project • To investigate the aquifer hydrologic and hydraulic characteristics and analyze the availability of groundwater for irrigation/non-potable supply
	5) Recreation Facility Assessment	Appendix 5	• To assess the condition of the park facility and identify current needs and opportunities for improvement • To evaluate the adequacy of the park to meet current needs and opportunities • To develop plans for park improvements that would meet the

			identified needs and accommodate duel use as a detention basin • To prepare project layout; design/size project features/ facilities/components • To estimate construction cost of the park improvements
	6) Hydraulic Modeling and Floodplain Mapping Using MIKE FLOOD	See Appendix 1 to Attachment 7	• To analyze the effectiveness of the detention basin for reducing the spatial extent and depth of flooding

Findings:

1) HEC-HMS hydrologic modeling analysis of Memorial Park Detention Basin peak flow reduction indicates that:
   - the detention basin would effectively reduce 100-year peak flows (by about 200 cfs from 6,840 cfs to 6,640 cfs at the Ross streamflow gage) along San Anselmo Creek below the Sorich Creek confluence and the downstream Corte Madera Creek, including key breakout points in San Anselmo and Ross (see Appendix 1); and
   - it would take about 8 hours for the low-level outlet to drain the detention basin from an initially full condition and accounting for winter baseflows entering the basin from the upper Sorich Creek watershed (see Appendix 1).

2) MIKE FLOOD hydraulic modeling analysis of Corte Madera Creek and its tributaries and floodplains indicates that the spatial extent and depth of flooding in the floodplain downstream of Memorial Park would be reduced by the attenuation effect of the detention basin (see Appendix 1 to Attachment 7).

3) The lower Sorich Creek culvert inspection and assessment found that the culvert is in good condition and there is no need for repairs/improvements (see Appendix 3)

4) Geotechnical evaluations have found that the Memorial Park Detention Basin project is feasible from a geotechnical perspective. The primary considerations during project design and planning are appropriate design of permanent cut slopes, effective subdrainage for the new, lowered fields and associated facilities, appropriate design of new retaining structures and floodwalls, and adequate dewatering of excavations during construction properties (see Appendix 4).

5) Geotechnical evaluations, specifically well pump testing of existing irrigation wells and a new monitoring well, have found that the groundwater aquifer at Memorial Park can yield up to 4 gallons per minute per well on a sustained basis. The three wells included in the Project supplemented with seepage that is intercepted and collected by the subsurface drain system should be adequate to supply the irrigation and restroom toilet needs of the park (see Appendix 4).

6) During preliminary informal consultations with DSOD, DSOD indicated that the agency will have jurisdiction over the project and, as such, DSOD approval of the final design plans will be required. DSOD reviewed the submitted conceptual plans and detention basin operations and found no fatal flaws or problems with the

Memorial Park Detention Basin project based on this review. The Town of San Anselmo will continue to consult with DSOD and seek DSOD feedback as the design plans are further developed.

7) The recreational assessment has found that:
   - Memorial Park itself is well used and functional, but improvements have not kept up with current safety and ADA accessibility standards and many park elements are in bad repair, exacerbating maintenance needs. Although the Town of San Anselmo's General Fund supports the maintenance and upkeep of the park, the park has suffered through heavy usage and deferred maintenance. Capital improvements are needed to maintain recreational functionality of the park, but Town funds are insufficient to cover the many upgrades needed; and,
   - The Memorial Park Detention Basin Project recreational rehabilitation is feasible and will enhance public access, safety, aesthetics, and overall public enjoyment of the park for years to come (see Appendix 5).

3.2 Project Concept (30%) Design Memorandum

Project Name:
Memorial Park Detention Basin Project

Project Element(s):
- Detention Basin, Earthen Embankments, Walls, and Hydraulic Control Structures
- Subsurface Drainage Features and Stormwater BMPs, Groundwater Irrigation Supply System, and Wet Utilities Relocations
- Creek Daylighting and Restoration
- Park Rehabilitation

3.2.1 Detention Basin, Earthen Embankments, Walls, and Hydraulic Control Structures

1) Design Objective
The goal of this project element is to enable Memorial Park to function as a duel use flood detention basin and public recreation park. The objective of flood detention operations is to attenuate flows produced in the upper Sorich Creek watershed sufficiently to reduce the peak discharge to lower Sorich Creek, and hence lower San Anselmo Creek as well as the downstream Corte Madera Creek, during the 1-percent-chance-annual flood (or 100-year flood) by about 200 cfs. The detention basin will also be operated to reduce floods less than the 100-year flood.[14]

2) Design Criteria and Other Design Considerations:
In order to achieve the design objective, the Memorial Park detention basin needs to provide about 79 acre-feet of flood storage capacity. To create this storage capacity, the park floor will be excavated and lowered by an average of 10 ft below existing grade, and concrete wall structures will be constructed along the southern and western sides. A large, gated culvert (i.e., low-level outlet) will pass beneath the embankment at the southern end of the basin in order to pass floodwaters to the existing buried culverted reach of Sorich Creek below the detention basin. The gate will normally be kept open to allow unimpeded passage of flows (as well as sediment, woody debris, and wildlife) and the basin will normally be kept empty. During unusually heavy storms when flooding downstream in downtown San Anselmo is imminent[15], the gate will be closed and Sorich Creek flows will back up and fill the basin for floodwater detention. In extreme floods when the basin becomes full (approx. >100-year flood), overflow will spill over an internal semi-circular glory hole type spillway and drop into the discharge culvert. An external emergency spillway will provide redundancy to pass any additional overflow that exceeds the capacity of the internal glory hole spillway.

[14] Memorial Park detention basin can also reduce peak flows for smaller floods. The amounts of peak flow reduction at the Ross streamflow gage for the 50-year, 25-year, and 10-year floods are estimated to be approximately 180 cfs, 160 cfs, and 120 cfs, respectively.

[15] Downtown San Anselmo floods at flood magnitudes of about the 5- to 8-year recurrence interval.

The internal glory hole spillway needs to be designed to provide a minimum residual freeboard of 1.5 ft to meet the DSOD requirement during the design 1,000-year flood event (with a peak inflow of about 270 cfs). The selected 1,000-year flood event for the spillway design is based on the hazard assessment of the structure in accordance with the DSOD hydrologic analysis guidelines for design/evaluation of spillways (see the table below).

Damage Potential Rating of the Proposed Memorial Park Detention Basin

Evaluation Factors	Damage Potential Rating			
	Extreme	**High**	**Moderate**	**Low**
Capacity (AF)	≥100,000	1,000-99,000	100-999	15-99
(circle weight)	6	4	2	**(0)**
Height (Ft)	≥150	100-149	50-99	6-49
(circle weight)	6	4	2	**(0)**
Estimated Evacuation	≥1,000	100-999	1-99	None
(circle weight)	12	8	4	**(0)**
Potential D/S Damage	High	Moderate	Low	None
(circle weight)	12	8	**(4)**	0

1) Total class weight (TCW) = 4.
2) Conclusion: Use the DSOD required minimum 1,000-year flood discharge (about 270 cfs) for the spillway design.

3) Design Description:

The Conceptual (30%) designs call for 1) excavating the park floor; 2) constructing earthen embankments on the southern side; 3) constructing concrete wall structures/retaining walls on the southern and western sides; and 4) installing hydraulic control structures including a gate, low-level outlet culvert, glory hole spillway, and emergency spillway.

4) List of Design Drawing(s):

- Figure E1.1: Detention Basin Earth Embankments, Walls and Hydraulic Control Structures
- Figure E1.2: Memorial Park Detention Basin Cross-Sections
- Figure E1.3: Memorial Park Detention Basin Longitudinal Profile
- Figure E1.4: Earthen Embankment Cross-Section A-A
- Figure E1.5: Earthen Embankment Cross-Section B-B
- Figure E1.6: Concrete Walls Cross-Section Details
- Figure E1.7: Spillway Semi-Circle Glory Hole Type Detail – Plan View
- Figure E1.8: Spillway Semi-Circle Glory Hole Type Detail – Profile View

5) Engineers Cost Estimate:

Total Construction Cost = 5,630,500

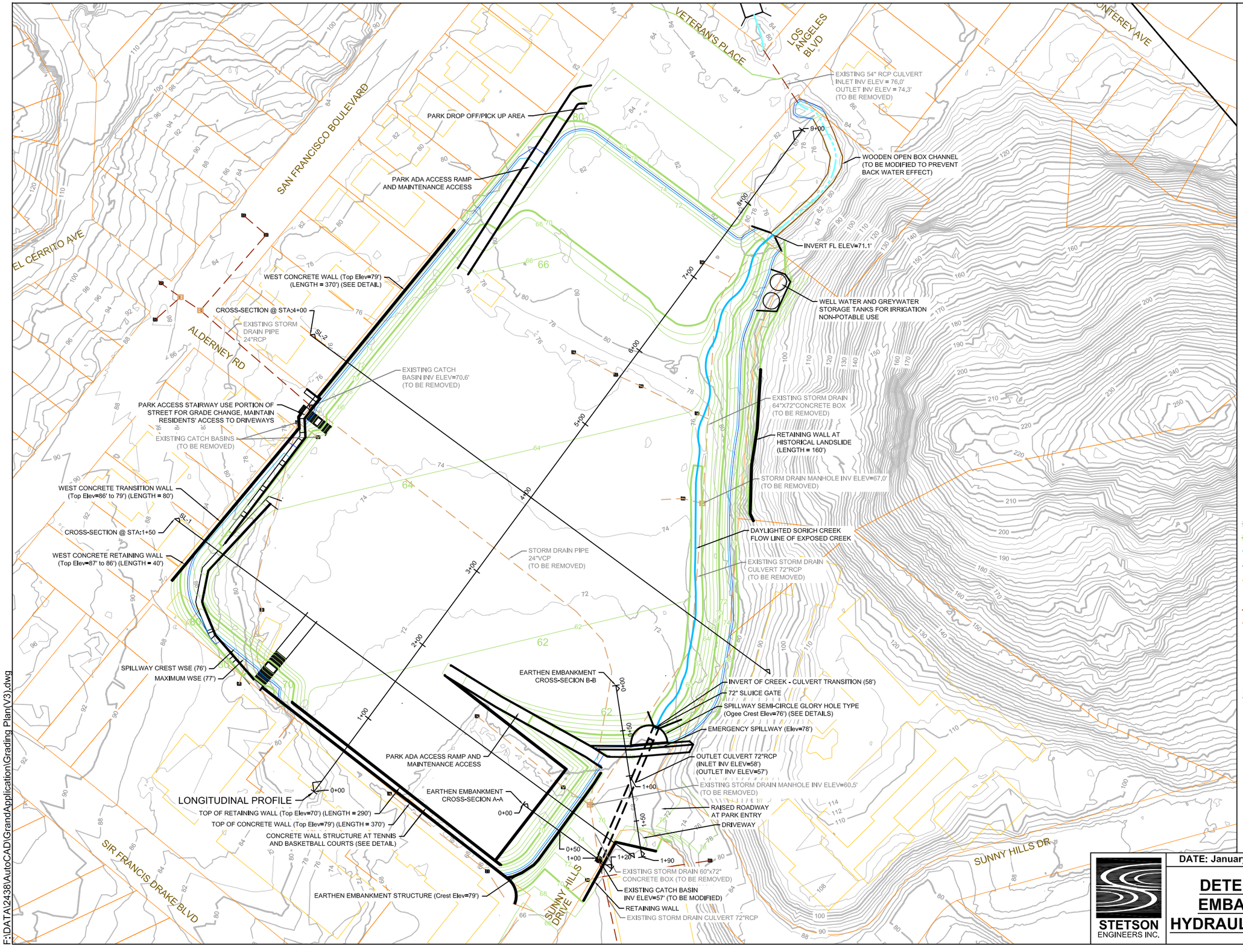
Construction Cost Estimation for Project Element 1
Detention basin, earthen embankments, walls, and hydraulic control structures

Item	Description	Quantity	Unit	Unit Cost	Total Cost
1.1	**Detention basin**				
	1.1.01 Mobilization/Demobilization	1	LS	$ 74,000	$ 74,000
	1.1.02 Demolition - Removal existing facilities				
	a. Play Area	1	LS	$ 10,000	$ 10,000
	b. Existing Wells	2	EA	$ 5,000	$ 10,000
	c. Buildings	1	LS	$ 10,000	$ 10,000
	d. Existing stormwater pipes	1	LS	$ 20,000	$ 20,000
	1.1.03 Clearing and grubbing (Inc eucalyptus tree removal)	1	LS	$ 20,000	$ 20,000
	1.1.04 Dewatering surface water	1	LS	$ 25,000	$ 25,000
	1.1.05 Dewatering subsurface water for excavation				
	a. Trench excavation	700	CY	$ 30	$ 21,000
	b. 10" Interceptor drain pipelines	1,900	FT	$ 20	$ 38,000
	c. Gravel layer	700	CY	$ 35	$ 24,500
	d. Sump pit & pumping	1	LS	$ 10,000	$ 10,000
	1.1.06 Excavation	115,200	CY	$ 20	$ 2,304,000
	1.1.07 Soil Hauling & Disposal (<10 miles)	109,500	CY	$ 10	$ 1,095,000
	1.1.08 Erosion control for stabilization of excavation slope	4,000	SY	$ 25	$ 100,000
	Sub-Total construction cost				**$ 3,761,500**
1.2	**Earthen Embankments**				
	1.2.01 Mobilization/Demobilization	1	LS	$ 9,000	$ 9,000
	1.2.02 Demolition - Sunny Hills Dr.	1	LS	$ 28,000	$ 28,000
	1.2.03 Clearing and Grubbing	1	LS	$ 5,000	$ 5,000
	1.2.04 Dewatering	1	LS	$ 5,000	$ 5,000
	1.2.05 Traffic Control	1	LS	$ 5,000	$ 5,000
	1.2.06 Relocate electric control panel @ Sunny Hills Dr.	1	LS	$ 10,000	$ 10,000
	1.2.07 Retaining wall on South East side of Sunny Hills Dr.				
	a. Earthworks	100	CY	$ 80	$ 8,000
	b. Concrete wall and footing	50	CY	$ 1,000	$ 50,000
	c. 12" Concrete piers (10 ft deep)	24	EA	$ 1,000	$ 24,000
	d. 6" Tie backs (20 ft long)	4	EA	$ 2,000	$ 8,000
	1.2.08 Raise Sunny Hills Dr.				
	a. Compacted fill	4,400	CY	$ 20	$ 88,000
	b. Road base	200	CY	$ 80	$ 16,000
	c. Asphalt pavement	140	TN	$ 300	$ 42,000
	d. Concrete curb and gutter	50	CY	$ 500	$ 25,000
	e. Painting & signs	1	LS	$ 5,000	$ 5,000
	f. Driveway road	1	LS	$ 20,000	$ 20,000
	1.2.09 Earthen embankment structure				
	a. Key trench excavation	100	CY	$ 80	$ 8,000
	b. Compacted fill	1,300	CY	$ 20	$ 26,000
	c. Structural Reinforced outside slope	1,800	SF	$ 25	$ 45,000
	d. Inside slope stabilization	400	SY	$ 25	$ 10,000
	Sub-Total construction cost				**$ 437,000**

Construction Cost Estimation for Project Element 1
Detention basin, earthen embankments, walls, and hydraulic control structures

Item	Description	Quantity	Unit		Unit Cost		Total Cost
1.3	**Walls**						
	1.3.01 Mobilization/Demobilization	1	LS	$	17,000	$	17,000
	1.3.02 Demolition - Removal existing facilities	1	LS	$	10,000	$	10,000
	1.3.03 Clearing and grubbing	1	LS	$	5,000	$	5,000
	1.3.04 Dewatering	1	LS	$	5,000	$	5,000
	1.3.05 Concrete wall at tennis and basketball courts						
	a. Earthworks	1,000	CY	$	40	$	40,000
	b. Concrete wall and footing	460	CY	$	500	$	230,000
	c. 12" Concrete piers (10 ft deep)	100	EA	$	1,000	$	100,000
	d. 6" Tie backs (20 ft long)	32	EA	$	2,000	$	64,000
	1.3.06 South West concrete retaining wall (L=40ft, h(avg)=8')						
	a. Earthworks	25	CY	$	80	$	2,000
	b. Concrete wall and footing	20	CY	$	1,000	$	20,000
	c. 12" Concrete piers (10 ft deep)	8	EA	$	2,000	$	16,000
	d. 6" Tie backs (20 ft long)	4	EA	$	4,000	$	16,000
	1.3.07 West concrete transition wall (L=80ft, h(avg)=6')						
	a. Earthworks	50	CY	$	80	$	4,000
	b. Concrete wall and footing	30	CY	$	1,000	$	30,000
	c. 12" Concrete piers (10 ft deep)	16	EA	$	1,000	$	16,000
	d. 6" Tie backs (20 ft long)	8	EA	$	2,000	$	16,000
	1.3.08 North West concrete retaining wall (L=370ft, h(avg)=4')						
	a. Earthworks	125	CY	$	80	$	10,000
	b. Concrete wall and footing	80	CY	$	1,000	$	80,000
	c. 12" Concrete piers (10 ft deep)	70	EA	$	1,000	$	70,000
	1.3.09 Retaining wall at historical landslide (L=160ft, h(avg)=3')						
	a. Earthworks	50	CY	$	80	$	4,000
	b. Concrete wall and footing	30	CY	$	1,000	$	30,000
	c. 12" Concrete piers (10ft deep)	32	EA	$	1,000	$	32,000
	d. 6" Tie backs (20 ft long)	16	EA	$	2,000	$	32,000
	Sub-Total construction cost					**$**	**849,000**
1.4	**Hydraulic control structures**						
	1.4.01 Mobilization/Demobilization	1	LS	$	11,000	$	11,000
	1.4.02 Clearing and Grubbing	1	LS	$	5,000	$	5,000
	1.4.03 Dewatering	1	LS	$	5,000	$	5,000
	1.4.04 Spillway semi circle glory hole						
	a. Earthworks	250	CY	$	80	$	20,000
	b. Ogee crest concrete structure	400	CY	$	800	$	320,000
	c. Concrete wing walls	15	CY	$	1,000	$	15,000
	d. Concrete emergency spillway	30	CY	$	1,000	$	30,000
	e. Steel trash rack	1	EA	$	3,000	$	3,000
	f. Steel grate catwalk w/handrails	1	EA	$	5,000	$	5,000
	g. Rip-rap	30	TN	$	200	$	6,000
	1.4.05 72" Sluice gate and opener	1	EA	$	45,000	$	45,000
	1.4.06 72" RCP outlet culvert						
	a. Earthworks	300	CY	$	80	$	24,000
	b. 72" RCP culvert	160	FT	$	400	$	64,000
	c. Downstream manhole structure	1	LS	$	20,000	$	20,000
	Sub-Total construction cost					**$**	**573,000**
1.5	**Streamflow gage**					**$**	**10,000**
Project Element 1 total construction cost						**$**	**5,630,500**

FIGURE E1.1



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Earthwork Estimated Quantities

Cut	115,200	CY
Fill	5,700	CY
Net	109,500	CY (Excess Material)

Detention Basin Estimated Elevations, Areas & Capacities

Elevations	
Bottom Elev Varies from	60.0 to 72.0 Feet
Top of Wall/Levee Elev	79.0 Feet
Spillway Crest WSE	76.0 Feet
Maximum WSE	77.0 Feet
Emergency Spillway Elev	78.0 Feet
Freeboard to Top of Wall/Levee	
@ Spillway Crest WSE	3.0 Feet
@ Maximum WSE	2.0 Feet
Areas	
Bottom Area	6.00 Acres
@ Spillway Crest WSE	7.14 Acres
@ Maximum WSE	7.24 Acres
Capacities	
@ Spillway Crest WSE	78.79 Acre-feet
@ Maximum WSE	85.97 Acre-feet
Others	
Daylighted Sorich Creek Length	577 Feet
Glory Hole Spillway Length	63 Feet
Emergency Spillway Length	100 Feet

LEGEND:

- (E) 2 FT CONTOURS
- (N) PROPOSED 2 FT CONTOURS
- SPILLWAY CREST WSE (76')
- MAXIMUM WSE (77')
- PARCEL LINE
- (E) BUILDING
- (E) STORMWATER PIPE
- (E) STORMWATER PIPE (To be removed)
- (E) STORMWATER MANHOLE
- (E) STORMWATER CATCH BASIN

NOTES:

1. SOURCE OF TOPOGRAPHY IS LIDAR SURVEY BY DELTA GEOMATICS, SEPTEMBER 2009.
2. SOURCE OF AERIAL PHOTO IS MARIN COUNTY, 2004.
3. VERTICAL DATUM IS NAVD88.
4. EXISTING SPOT ELEVATIONS SHOWN ARE BASED ON NOVEMBER 2012 STETSON SURVEY USING THE USGS VERTICAL BENCHMARK HT3517 AT 15 SAN FRANCISCO BLVD (ELEV 91.87 NAVD88 IN FEET)

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DETENTION BASIN, EARTHEN EMBANKMENTS, WALLS, AND HYDRAULIC CONTROL STRUCTURES

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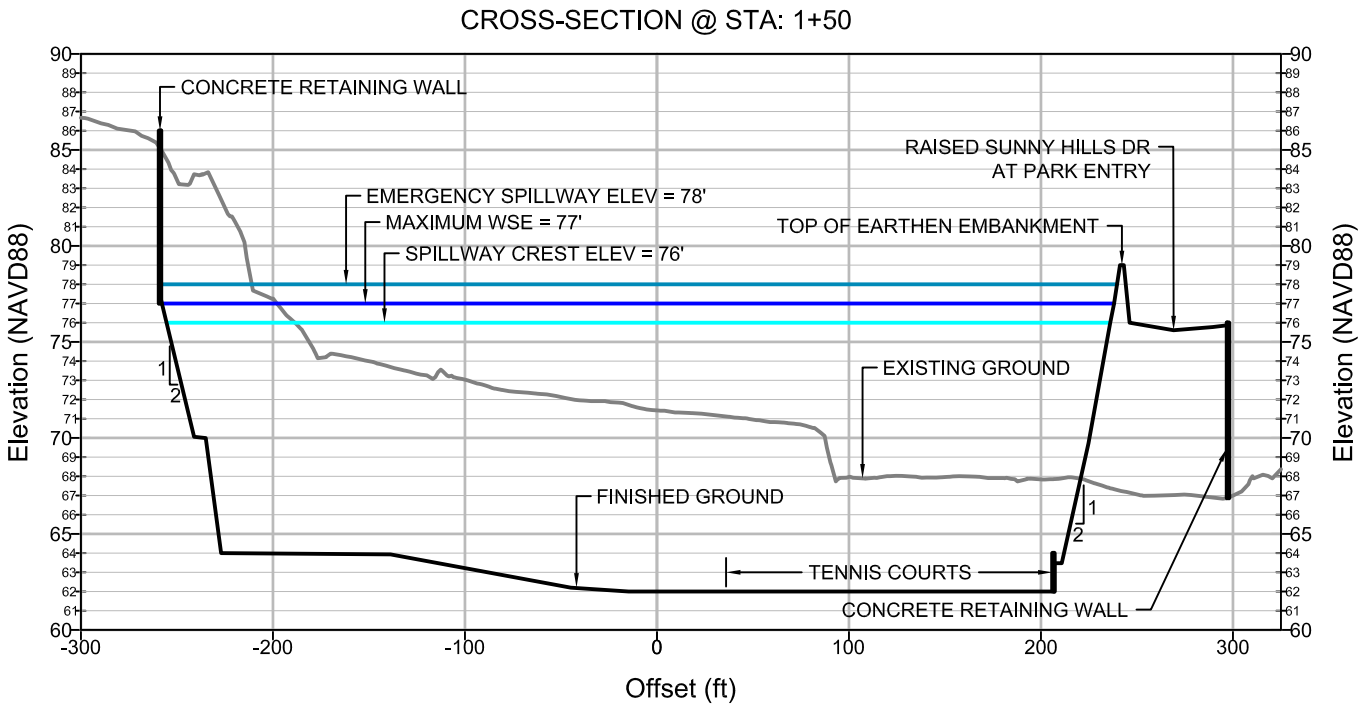
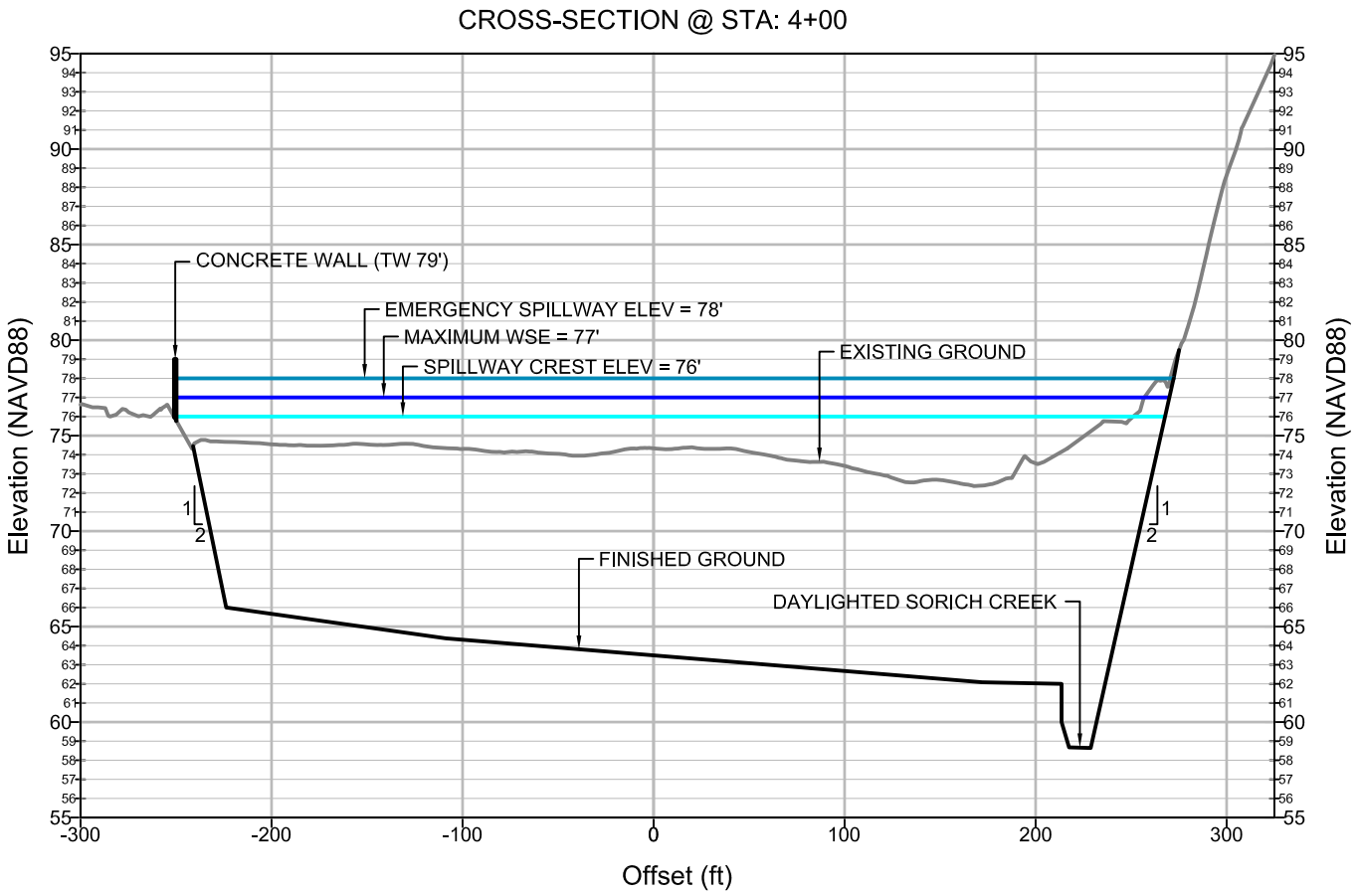
FIGURE E1.2





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MEMORIAL PARK DETENTION BASIN CROSS-SECTIONS

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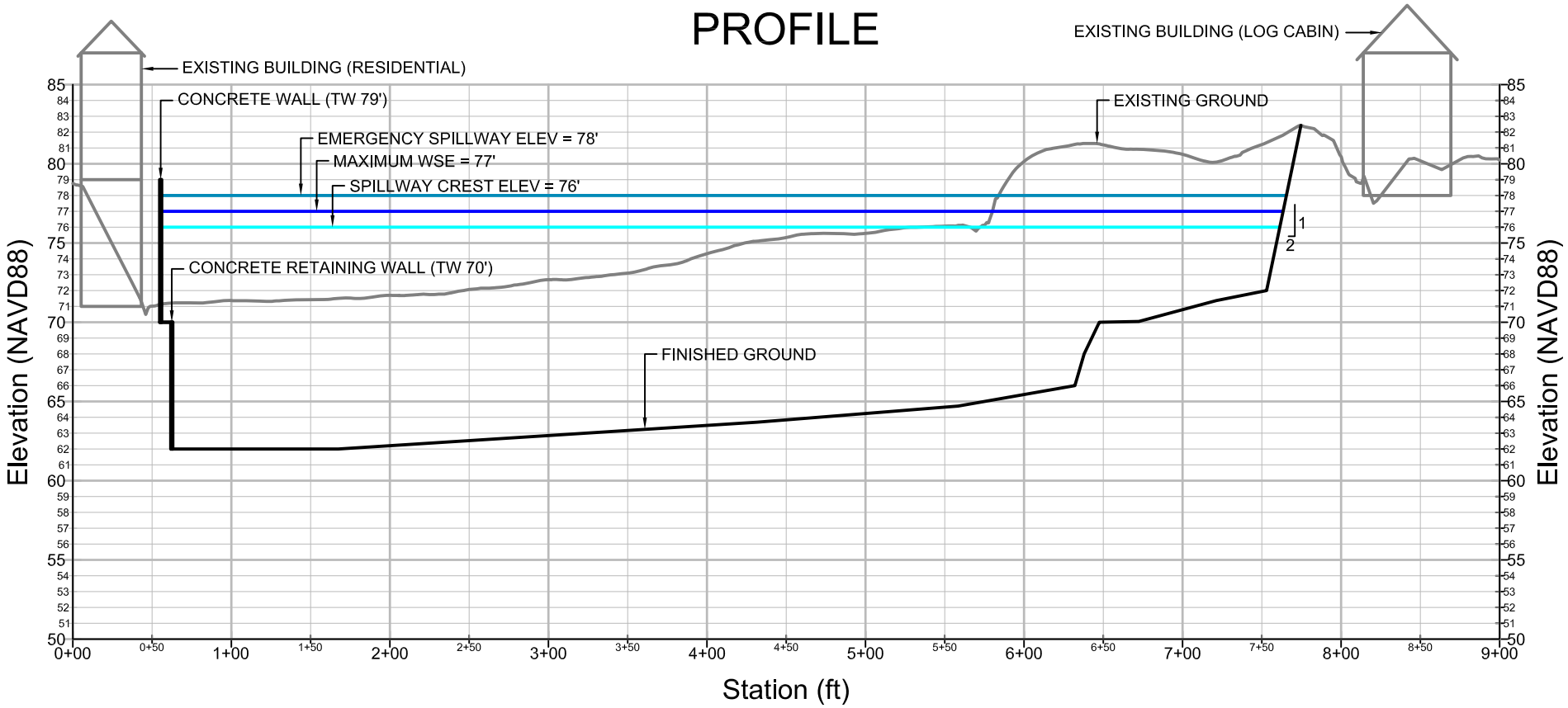

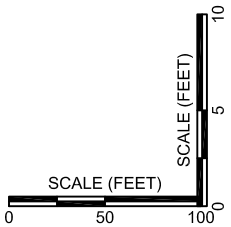

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MEMORIAL PARK DETENTION BASIN LONGITUDINAL PROFILE

FIGURE E1.3

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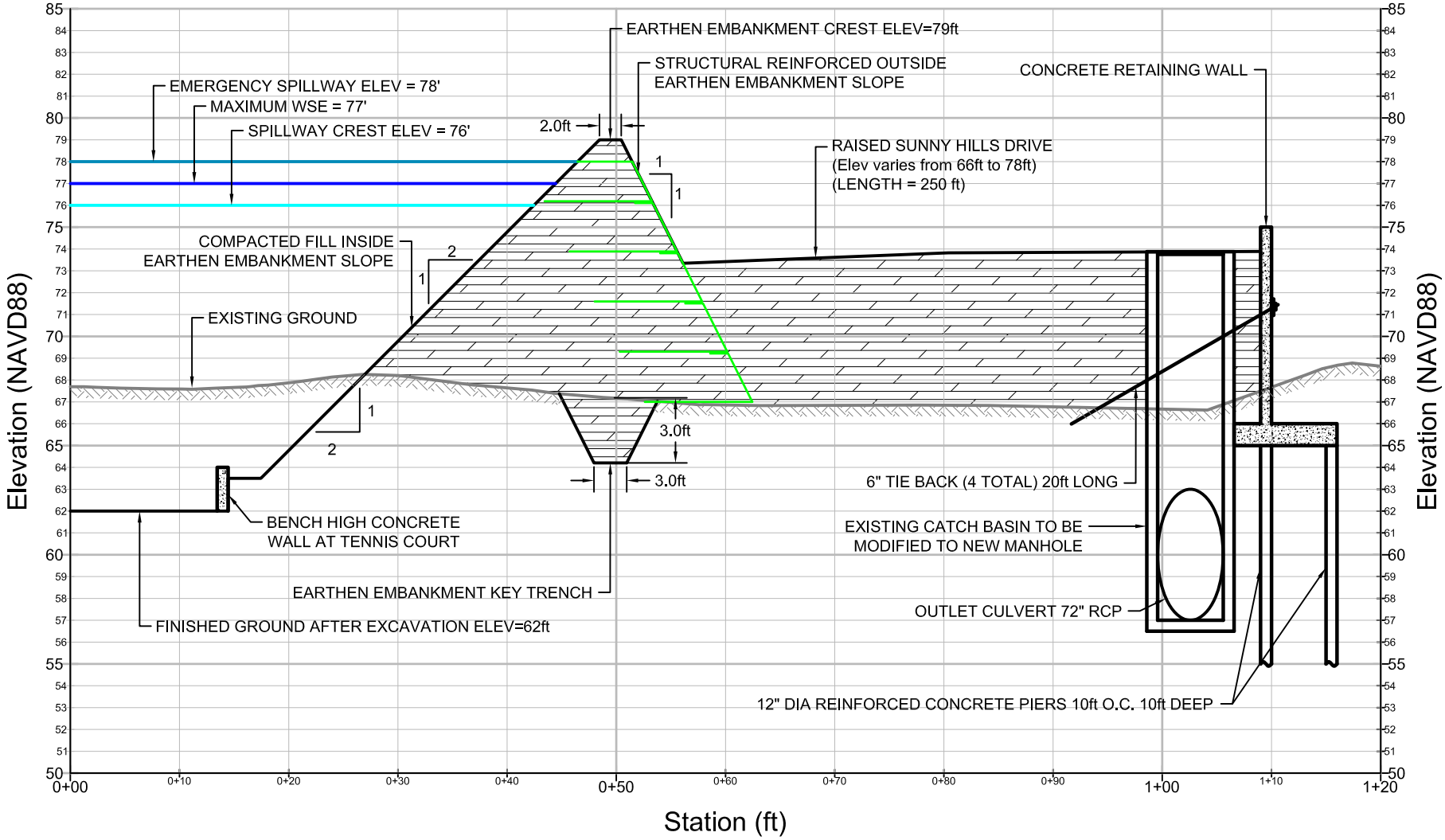
EARTHEN EMBANKMENT CROSS-SECTION A-A



ESTIMATED QUANTITIES

EARTHEN EMBANKMENT LENGTH = 160 ft

KEY TRENCH EXCAVATION VOLUME = 100 CY

COMPACTED FILL VOLUME = 1,300 CY

OUTSIDE EARTHEN EMBANKMENT VERTICAL AREA = 1,800 SF

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JN: 2438

EARTHEN EMBANKMENT CROSS-SECTION A-A

FIGURE E1.4

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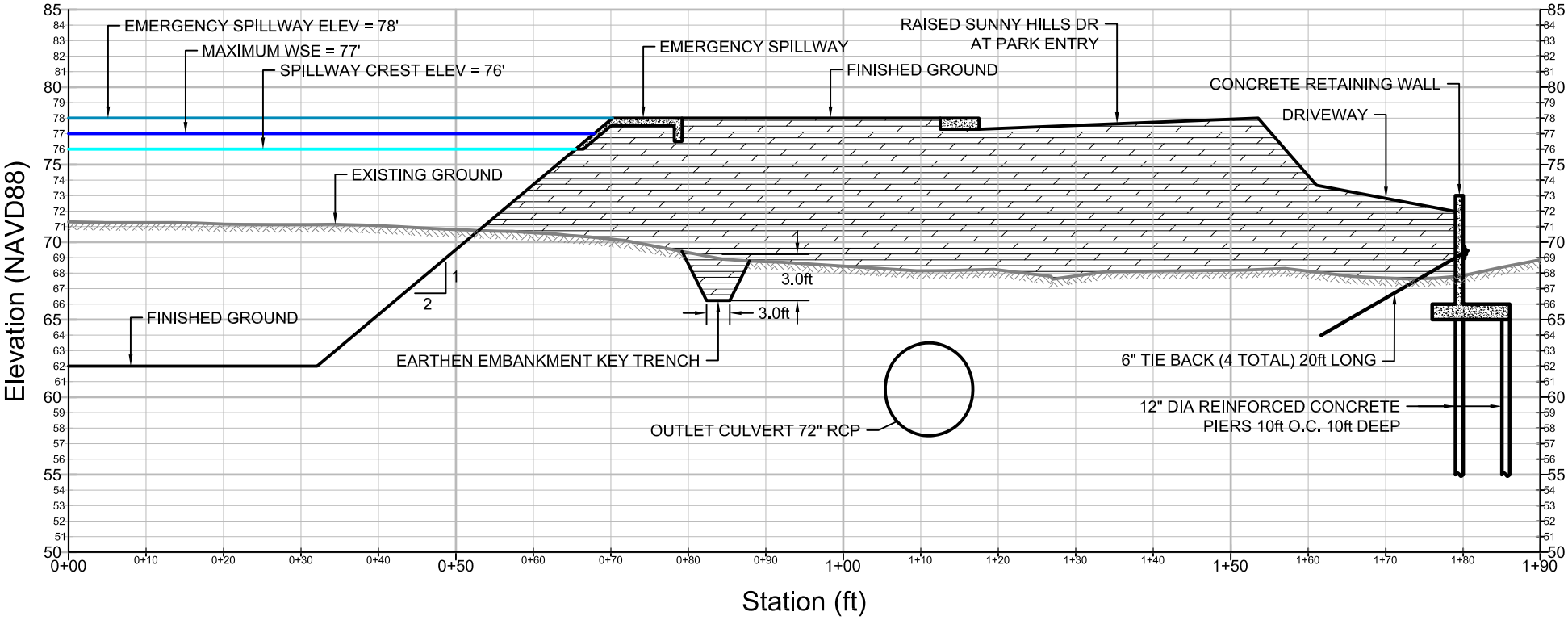
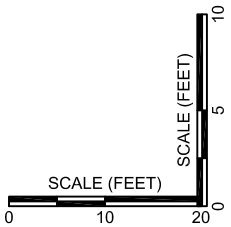
EARTHEN EMBANKMENT CROSS-SECTION B-B





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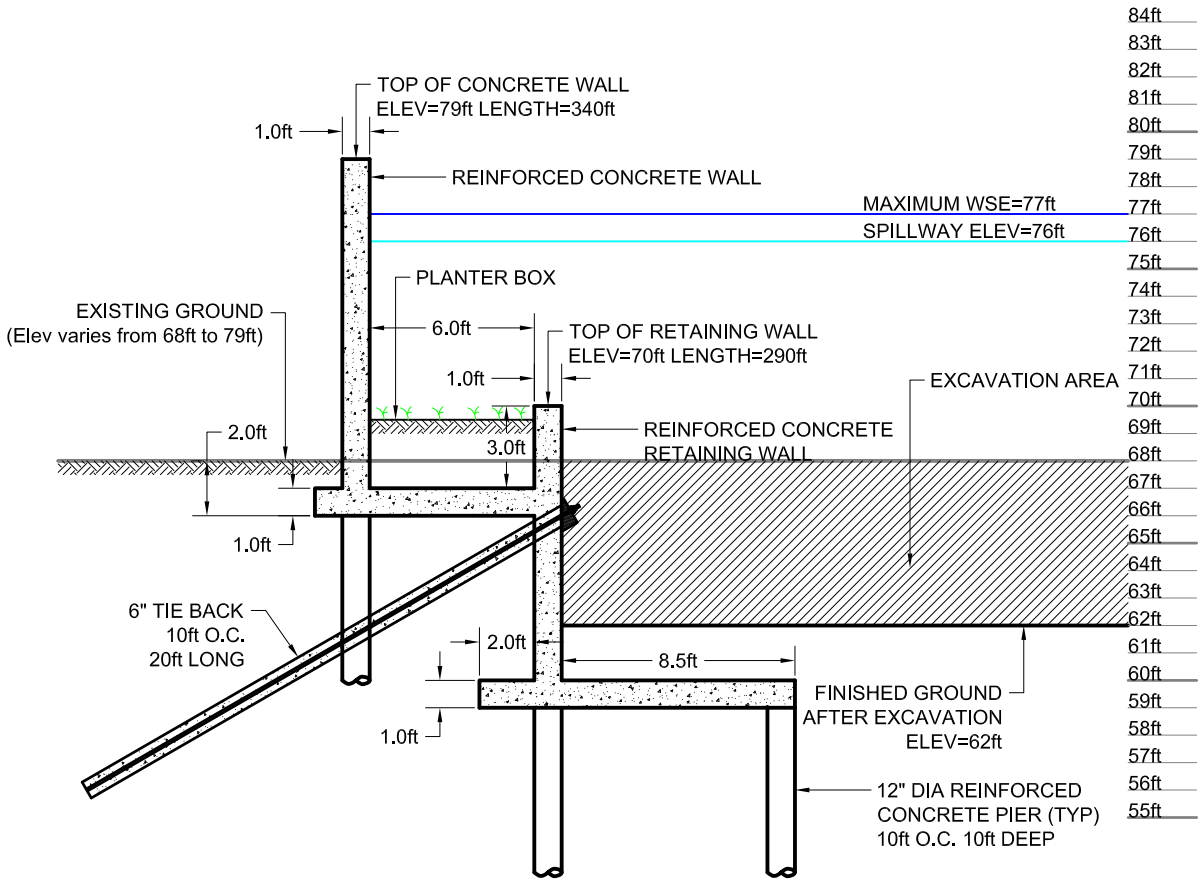
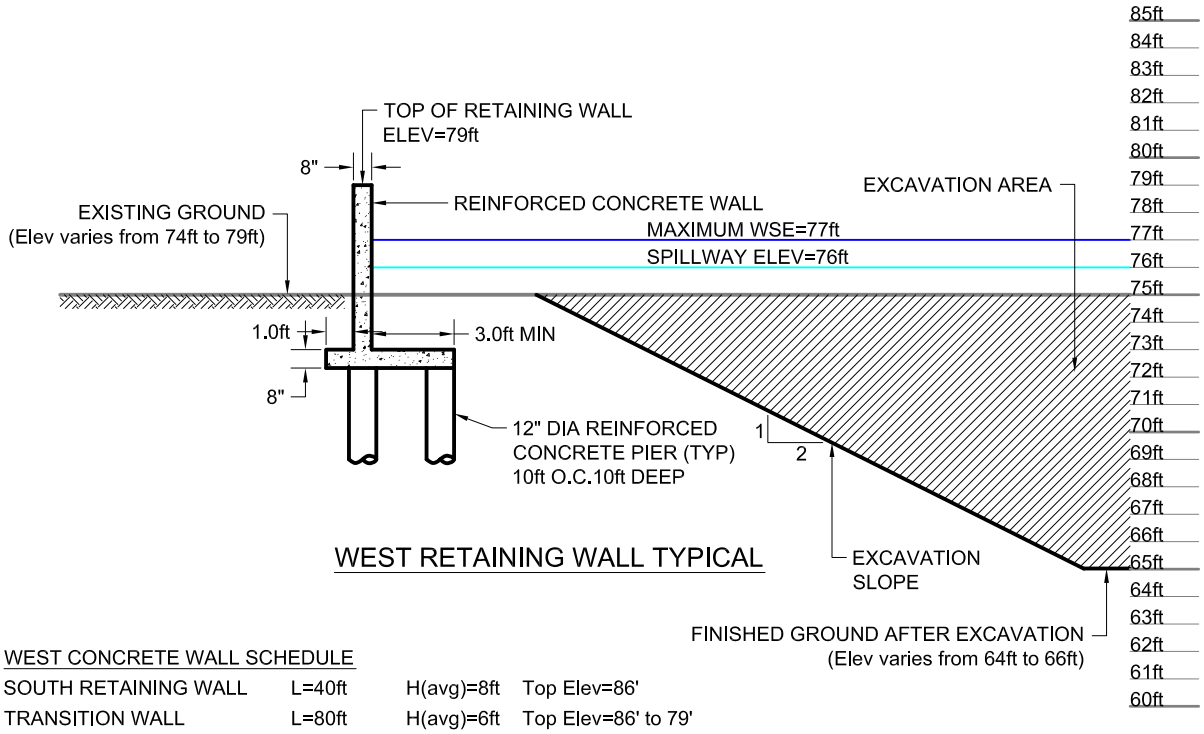
EARTHEN EMBANKMENT CROSS-SECTION B-B

FIGURE E1.5

FIGURE E1.6



CONCRETE WALL AT TENNIS AND BASKETBALL COURTS TYPICAL
WALL LENGTH = 340 ft



WEST RETAINING WALL TYPICAL

WEST CONCRETE WALL SCHEDULE

SOUTH RETAINING WALL	L=40ft	H(avg)=8ft	Top Elev=86'
TRANSITION WALL	L=80ft	H(avg)=6ft	Top Elev=86' to 79'
NORTH RETAINING WALL	L=370ft	H(avg)=4ft	Top Elev=79'

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CONCRETE WALLS CROSS-SECTION DETAILS

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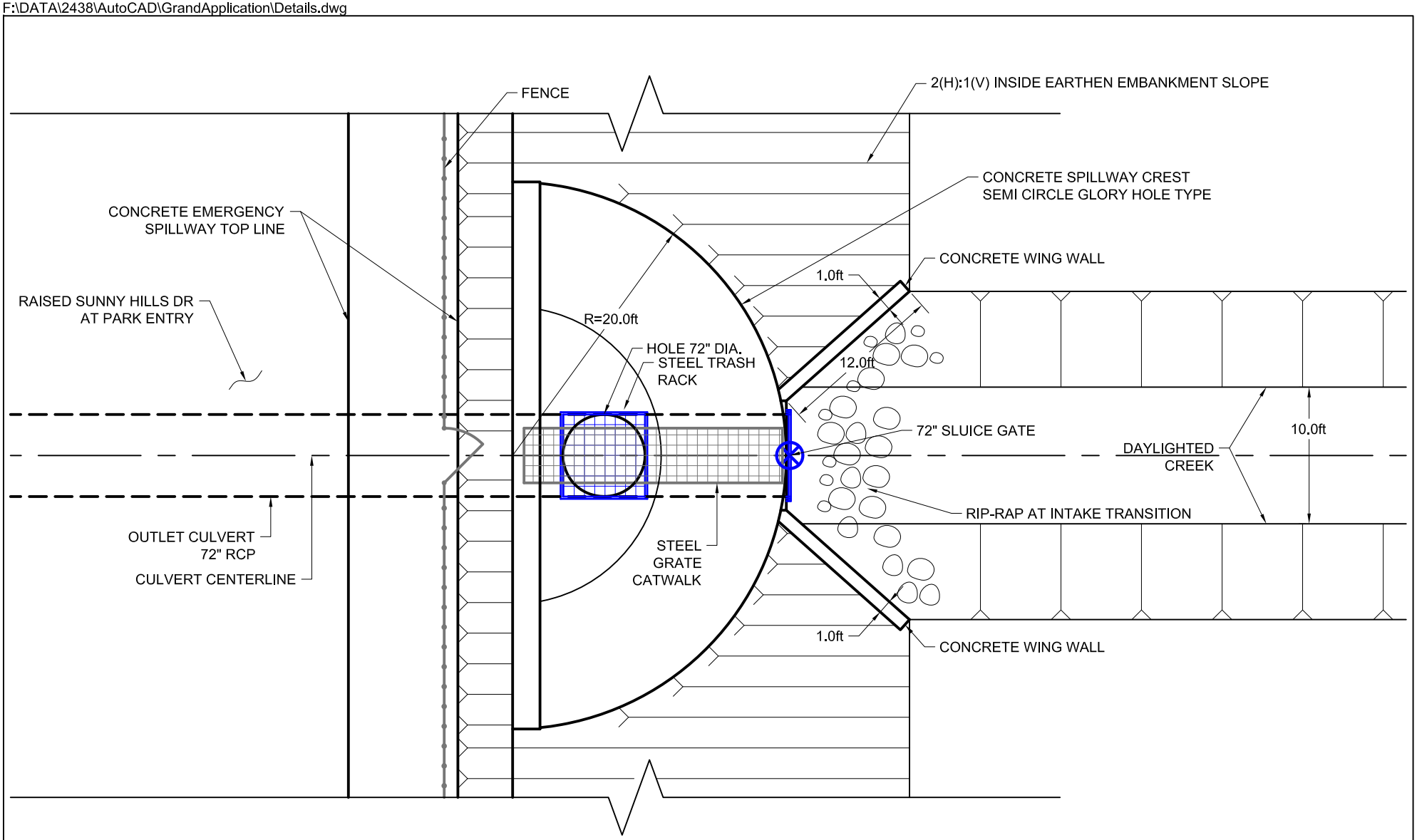

SCALE (Feet)
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SPILLWAY SEMI-CIRCLE GLORY HOLE TYPE DETAIL - PLAN VIEW

FIGURE E1.7

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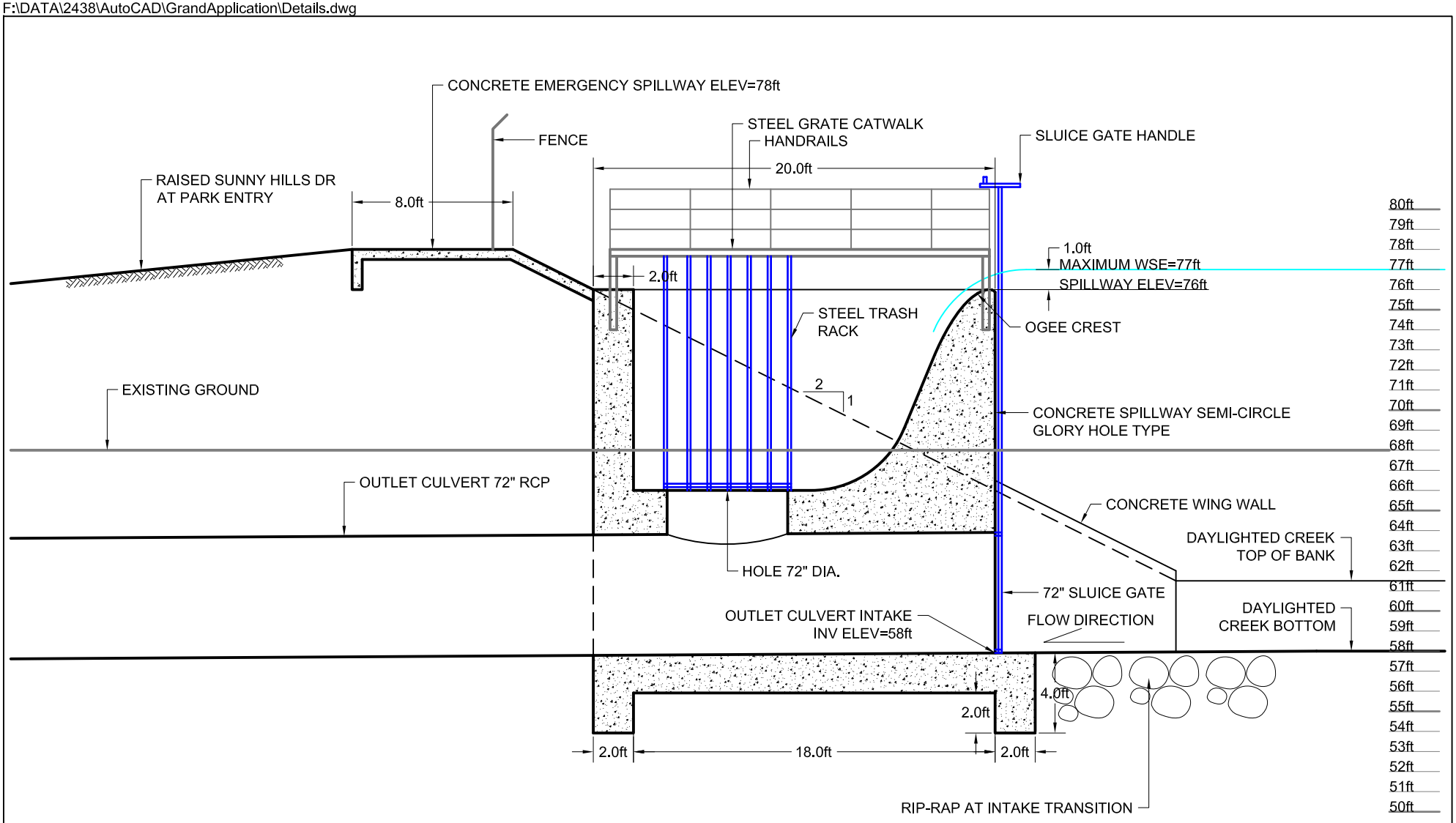

SCALE (Feet)
0 3.5 7

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SPILLWAY SEMI-CIRCLE GLORY HOLE TYPE DETAIL - PROFILE VIEW

FIGURE E1.8

3.2.2 Subsurface Drainage Features and Stormwater BMPs, Groundwater Irrigation Supply System, and Wet Utilities Relocations

1) Design Objective

The objective of this project element is to keep the new athletic play fields dry for public recreation, particularly during the wet season, improve stormwater discharge water quality, and reduce water demand on MMWD and thereby enhance MMWD's water supply reliability.

2) Design Criteria and Other Design Considerations:

In order to keep the new athletic play fields dry for public recreation, an on-site subsurface drainage system will be constructed to collect subsurface seepage entering from around the detention basin (Note: The detention basin will be excavated below the groundwater table). Some of the intercepted seepage will be collected and used for irrigation during the dry season and restroom toilets year round. The remainder of the collected seepage, if any, will be discharged to Sorich Creek, particularly during the wet season when irrigation and restroom toilet demands are low.

The Alderney storm drain, which passes beneath the park and drains a residential area of about 23 acres, will be removed and replaced. The drain inlet at the edge of the park will be enlarged to alleviate localized flooding that occurs during heavy storms. A CONTECH CDS® hydrodynamic separation device (or similar device) will be installed at the enlarged inlet to remove trash/debris and improve stormwater discharge quality. The design flow for the device is estimated to be about 3 cfs using the flow-based method documented in the California BMP Handbook (California Stormwater Quality Association, 2003).

To provide water supply for irrigation of the rehabilitated park playfields and restroom toilets and thereby reduce water demand on MMWD, a groundwater supply system will be installed. The system will collect seepage water that is intercepted by the subdrain system and convey the water to storage tanks. Groundwater pumped from three new wells, each with a design pumping capacity of 4 gallons per minute, will supplement the supply. Use of groundwater will reduce demand on MMWD's water supply by about 7 acre-ft per year on average.

This project element also includes relocation of a Ross Valley Sanitary District (RVSD) sewer line and an MMWD water line which pass beneath the park and need to be relocated to accommodate the lowered park floor.

3) Design Description:

Designs include 1) installation of subsurface drainage facilities, including interceptors along the basin bottom perimeters along the north, east, and south sides and drainage pipes beneath the basin bottom; 2) installation of a CONTECH CDS® hydrodynamic separation device at the enlarged Alderney storm drain inlet to remove trash/debris, suspended sediment (and sediment-binding pollutants), and oil and grease; 3) construction of groundwater irrigation supply facilities, including construction of three

groundwater wells each, with a design pumping rate of 4 gallons per minute, and installation of raw groundwater delivery pipeline to two new storage tanks, booster pumps, and pipes; 4) relocation of wet utilities.

4) List of Design Drawing(s):

- Figure E2.1: Aldernery Main Catch Basin Drainage Area and Existing Strom Drain Features
- Figure E2.2: Surface Drainage Features and Stormwater BMPs
- Figure E2.3: Subsurface Drainage Features
- Figure E2.4: Subsurface Drainage Features Cross-Section Detail
- Figure E2.5: Groundwater Irrigation/Non-Potable Supply System Plan View
- Figure E2.6: Site Plan, Ross Valley Sanitary District (RVSD)
- Figure E2.7: San Anslemo Memorial Park, Marin Municipal Water District (MMWD)

5) Engineers Cost Estimate:

Total Construction Cost = 2,504,410

Construction Cost Estimation for Project Element 2

Subsurface drainage features and stormwater BMPs, groundwater irrigation supply system, and wet utilities relocations

Item	Description	Quantity	Unit		Unit Cost		Total Cost
2.1	**Surface and subsurface drainage features and stormwater BMPs**						
2.1.01	Mobilization/Demobilization	1	LS	$	20,000	$	20,000
2.1.02	Dewatering	1	LS	$	5,000	$	5,000
2.1.03	Traffic Control	1	LS	$	2,000	$	2,000
2.1.04	Excavation for subsurface drain system	9,700	CY	$	20	$	194,000
2.1.05	Soil Hauling & Disposal (<10 miles)	9,700	CY	$	10	$	97,000
2.1.06	4" Drain lateral pipelines w/gravel & geofabric	10,000	FT	$	6	$	60,000
2.1.07	10" Collector drain pipeline						
	a. Trench excavation	100	CY	$	30	$	3,000
	b. 10" Collector drain pipelines	500	FT	$	20	$	10,000
	c. Gravel layer	100	CY	$	35	$	3,500
2.1.08	6" Sand layer for drainage system	4,800	CY	$	25	$	120,000
2.1.09	6" Topsoil layer over sand drainage system	4,800	CY	$	35	$	168,000
2.1.10	Surface catch basins	20	EA	$	1,200	$	24,000
2.1.11	Water Quality Device	1	EA	$	45,000	$	45,000
2.1.12	42" Stormwater pipe	265	FT	$	180	$	47,700
2.1.13	30" Stormwater pipe	340	FT	$	100	$	34,000
2.1.14	Manholes	2	EA	$	5,000	$	10,000
2.1.15	12" Stormwater pipe	1,050	FT	$	40	$	42,000
2.1.16	Storm drainage system (non-parking lot)	1	LS	$	60,000	$	60,000
2.1.17	6" PVC (To drain from Bio Retention Areas to ex. Inlet)	130	LF	$	22	$	2,860
2.1.18	Bio Retention Area, (soil, drainage, planting, irrigation)	1,500	SF	$	20	$	30,000
2.1.19	3'x3' Inlets	2	EA	$	1,500	$	3,000
2.1.20	Surface and subsurface catch sump	1	LS	$	20,000	$	20,000
2.1.21	Improve storm drain system at Log Cabin area	1	LS	$	10,000	$	10,000
	Sub-Total construction cost					**$**	**1,011,060**
2.2	**Groundwater and greywater irrigation supply system**						
2.2.01	Mobilization/Demobilization	1	LS	$	9,000	$	9,000
2.2.02	Dewatering	1	LS	$	5,000	$	5,000
2.2.03	Retaining Wall for tanks						
	a. Earthworks	150	CY	$	80	$	12,000
	b. Concrete wall and footing	30	CY	$	1,000	$	30,000
	c. Concrete slab	30	CY	$	500	$	15,000
	d. 12" Concrete piers (10 ft deep)	8	EA	$	1,000	$	8,000
	e. 6" Tie backs (20 ft long)	4	EA	$	2,000	$	8,000
2.2.04	Irrigation Tanks (8,000 gallons each)	2	EA	$	10,000	$	20,000
2.2.05	Pipeline from sump to tanks	520	FT	$	50	$	26,000
2.2.06	Pump (Sump to tanks)	1	EA	$	6,000	$	6,000
2.2.07	Groundwater wells	3	EA	$	15,000	$	45,000
2.2.08	Groundwater pumps	3	EA	$	11,000	$	33,000
2.2.09	Irrigation booster pump at tanks	1	EA	$	8,000	$	8,000
2.2.10	Pipeline from wells to tanks	460	FT	$	50	$	23,000
2.2.11	Irrigation supply lines	120	FT	$	50	$	6,000
2.2.12	Controller, Master Valve, Flow Sensor	1	EA	$	10,000	$	10,000
2.2.13	Backflow Preventer and Enclosure	1	EA	$	4,000	$	4,000

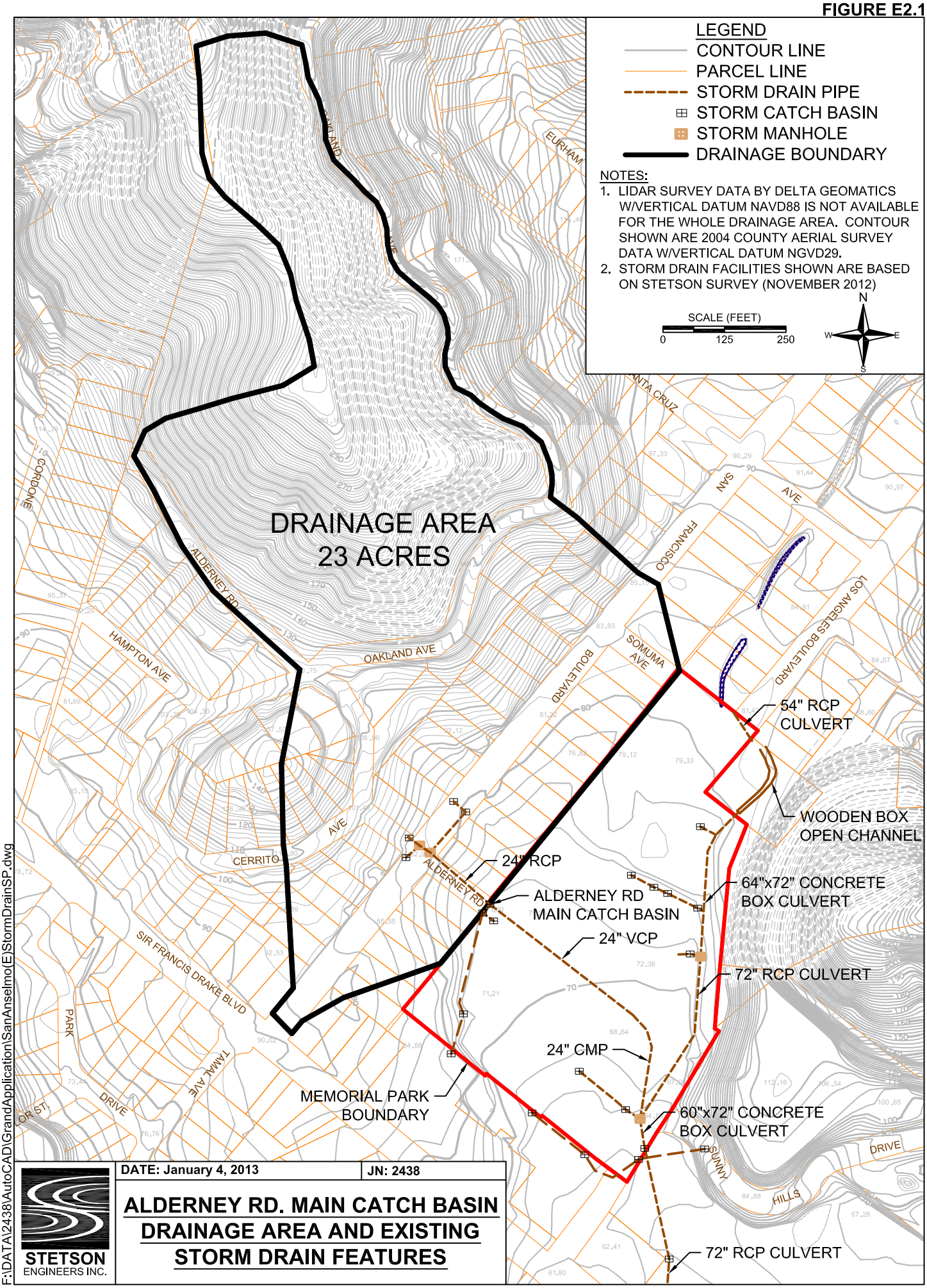
Construction Cost Estimation for Project Element 2

Subsurface drainage features and stormwater BMPs, groundwater irrigation supply system, and wet utilities relocations

Item	Description	Quantity	Unit		Unit Cost		Total Cost
2.2.14	Mainline and Control Wire	1,500	LF	$	10	$	15,000
2.2.15	Remote Control Valves	40	EA	$	375	$	15,000
2.2.16	Laterals	5,000	LF	$	4	$	20,000
2.2.17	Tree Bubblers	150	EA	$	30	$	4,500
2.2.18	Rotors at turf areas	90	EA	$	100	$	9,000
2.2.19	Shrub Bubblers	9,000	EA	$	12	$	108,000
2.2.20	Water Meter	1	EA	$	500	$	500
	Sub-Total construction cost					**$**	**440,000**
2.3	**Wet utilities relocation**						
2.3.01	RVSD sewer lines relocation						
	a. Mobilization/Demobilization	1	LS	$	21,360	$	21,360
	b. Trenching, Sheeting, Shoring per Labor Code Sec 6700-6708	1	LS	$	20,740	$	20,740
	c. Remove and replace 8-inch C900 SDR 18	650	FT	$	160	$	104,000
	d. Remove and replace 16-inch C900 SDR 18	945	FT	$	450	$	425,250
	e. Remove and replace 4-inch laterals	13	FT	$	4,000	$	52,000
	f. Remove and replace sanitary sewer manhole with new District standard sewer manhole	10	EA	$	10,000	$	100,000
	g. Abandon partial sewer and reconnect lateral on Sunnyhills Drive	1	LS	$	10,000	$	10,000
	Sub-Total RVSD construction cost					$	733,350
2.3.02	MMWD water lines relocation	1,600	LF	$	200	$	320,000
	Sub-Total construction cost					**$**	**1,053,350**

Project element 2 total construction cost **$ 2,504,410**

FIGURE E2.1



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ALDERNEY RD. MAIN CATCH BASIN DRAINAGE AREA AND EXISTING STORM DRAIN FEATURES

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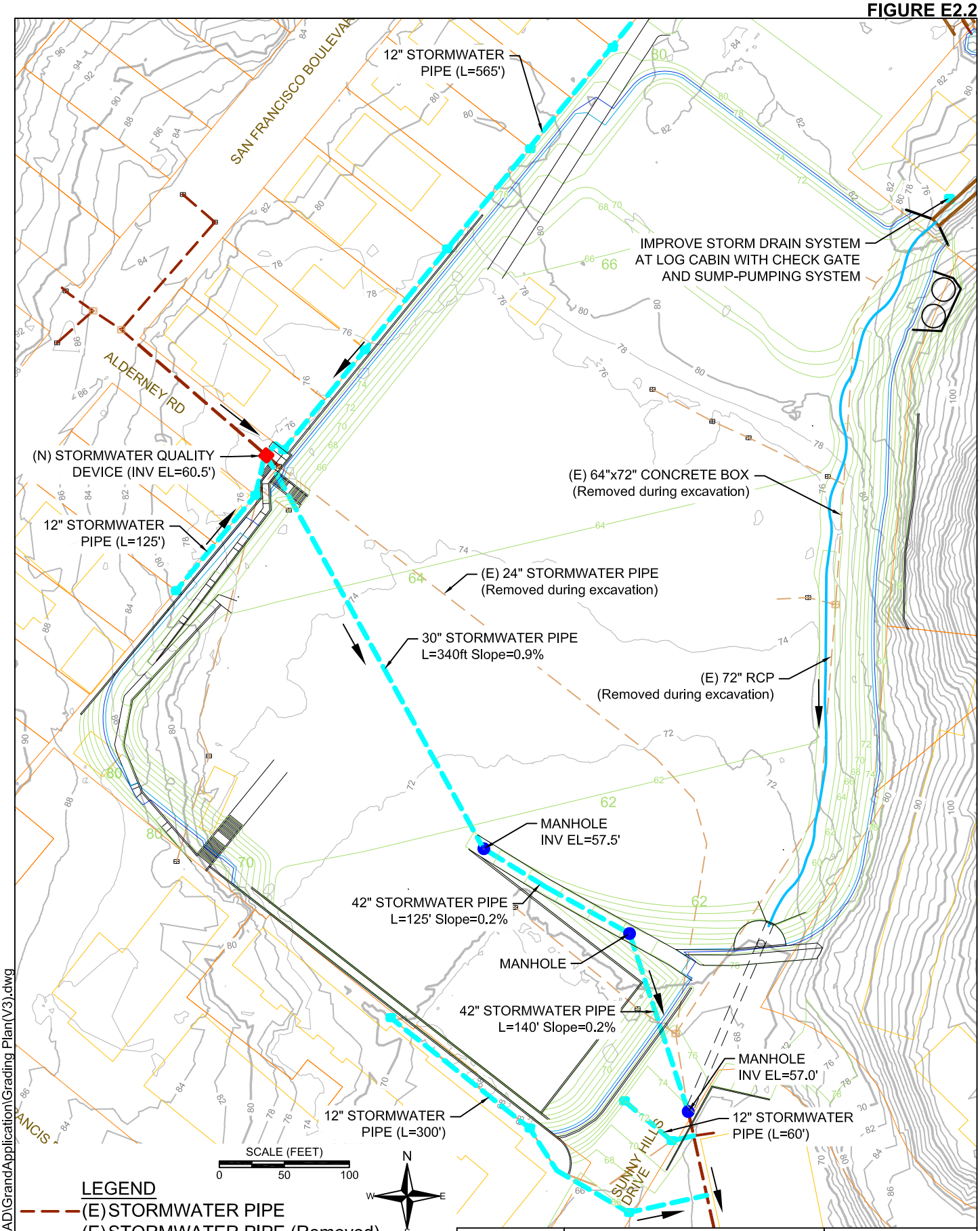
FIGURE E2.2



LEGEND

- (E) STORMWATER PIPE
- (E) STORMWATER PIPE (Removed)
- (N) DAYLIGHTING CREEK
- (N) STORMWATER PIPE
- (N) SURFACE CATCH BASIN
- (N) ENLARGED INLET W/ STORMWATER QUALITY DEVICE

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SURFACE DRAINAGE FEATURES AND STORMWATER BMPs

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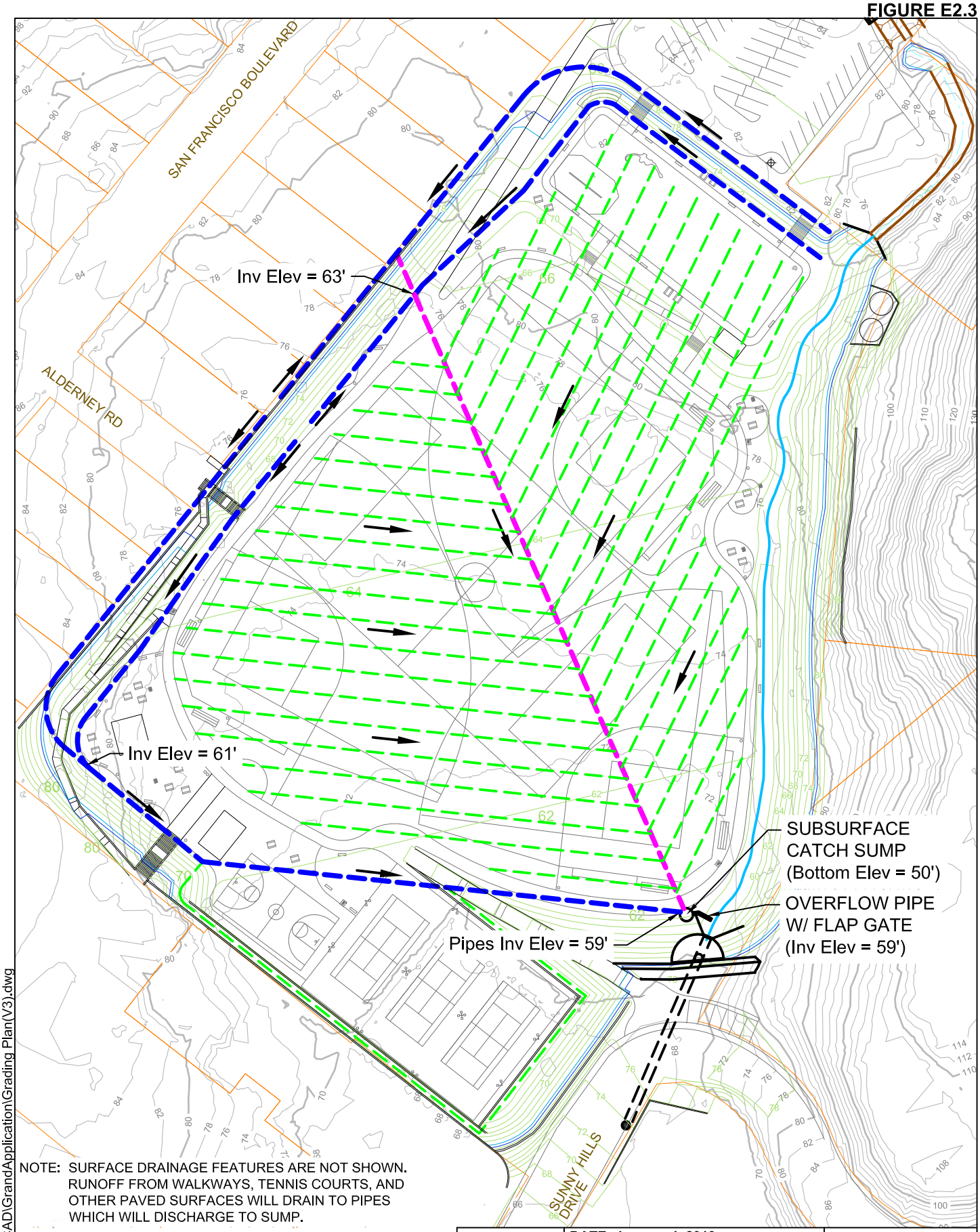
FIGURE E2.3



NOTE: SURFACE DRAINAGE FEATURES ARE NOT SHOWN. RUNOFF FROM WALKWAYS, TENNIS COURTS, AND OTHER PAVED SURFACES WILL DRAIN TO PIPES WHICH WILL DISCHARGE TO SUMP.

LEGEND

- INTERCEPTOR DRAIN PIPE
- COLLECTOR DRAIN PIPE
- LATERAL DRAIN PIPE
- DAYLIGHTED CREEK

N W E S

SCALE (FEET) 0 50 100

STETSON ENGINEERS INC.

DATE: January 4, 2013 | JN: 2438

SUBSURFACE DRAINAGE FEATURES

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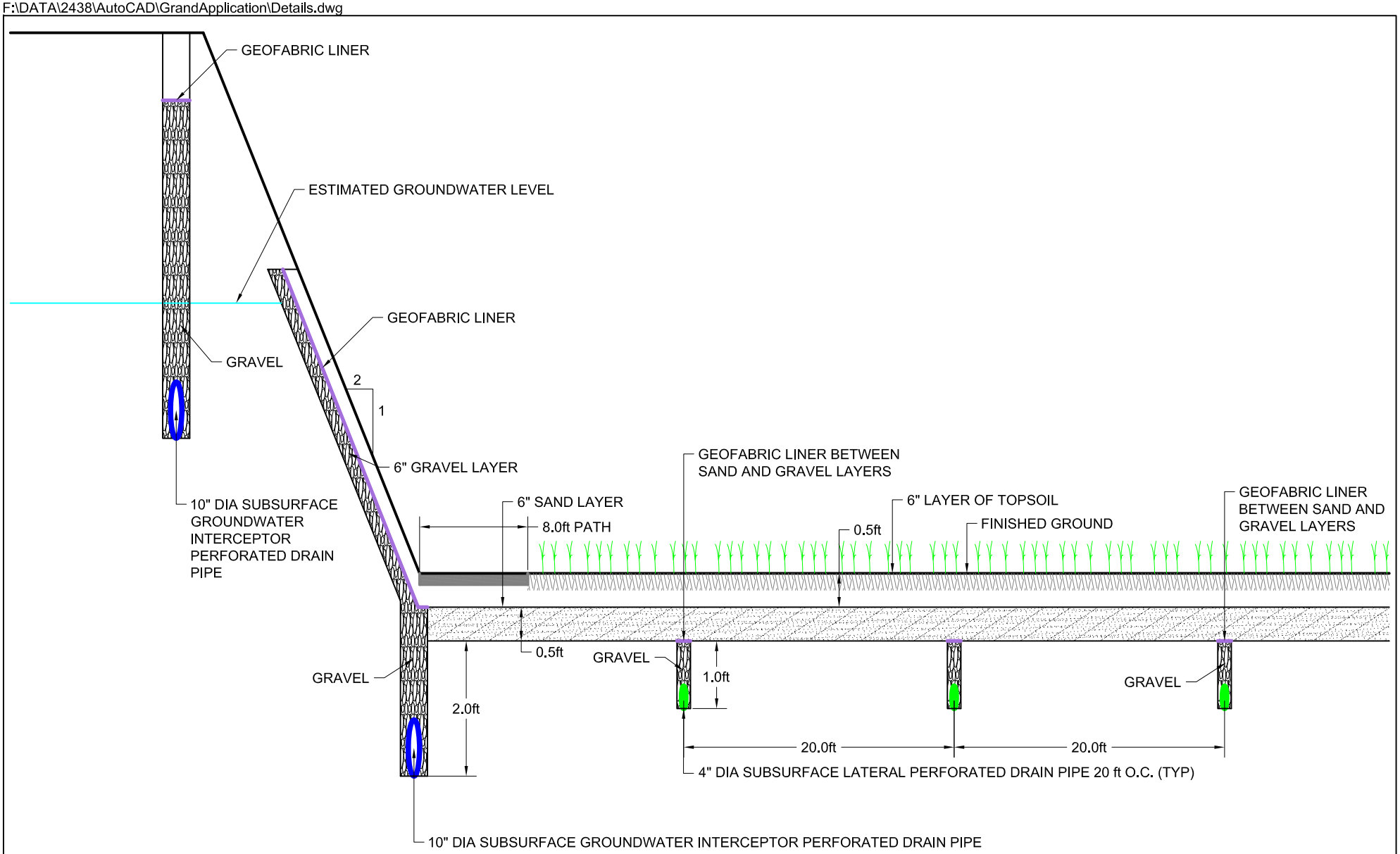


SCALE (Feet)
0 5 10

SCALE (Feet)
0 1 2

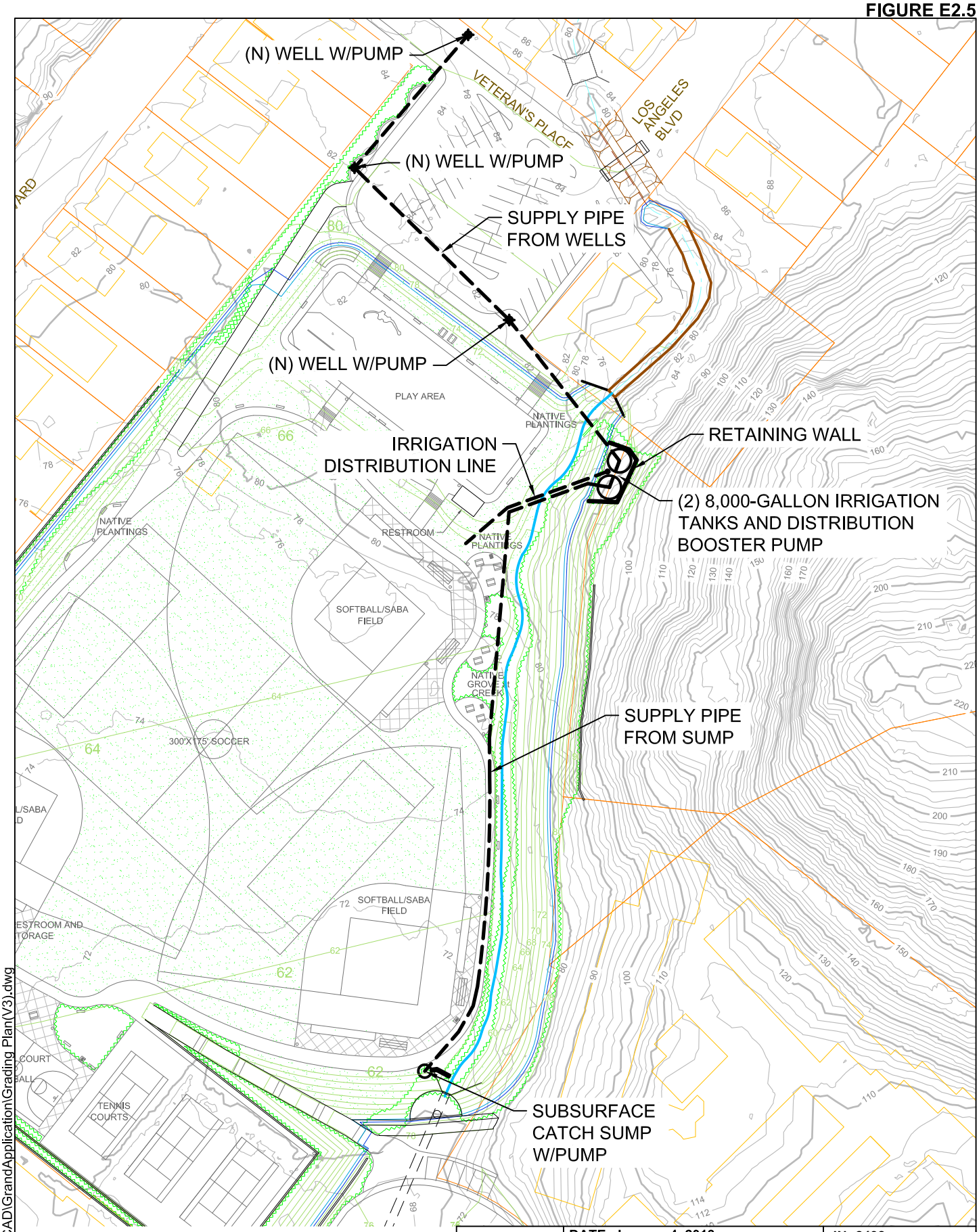
STETSON ENGINEERS INC.

DATE: January 4, 2013 | JN: 2438

SUBSURFACE DRAINAGE FEATURES CROSS-SECTION DETAIL

FIGURE E2.4

FIGURE E2.5



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N
W E
S

SCALE (FEET)
0 50 100

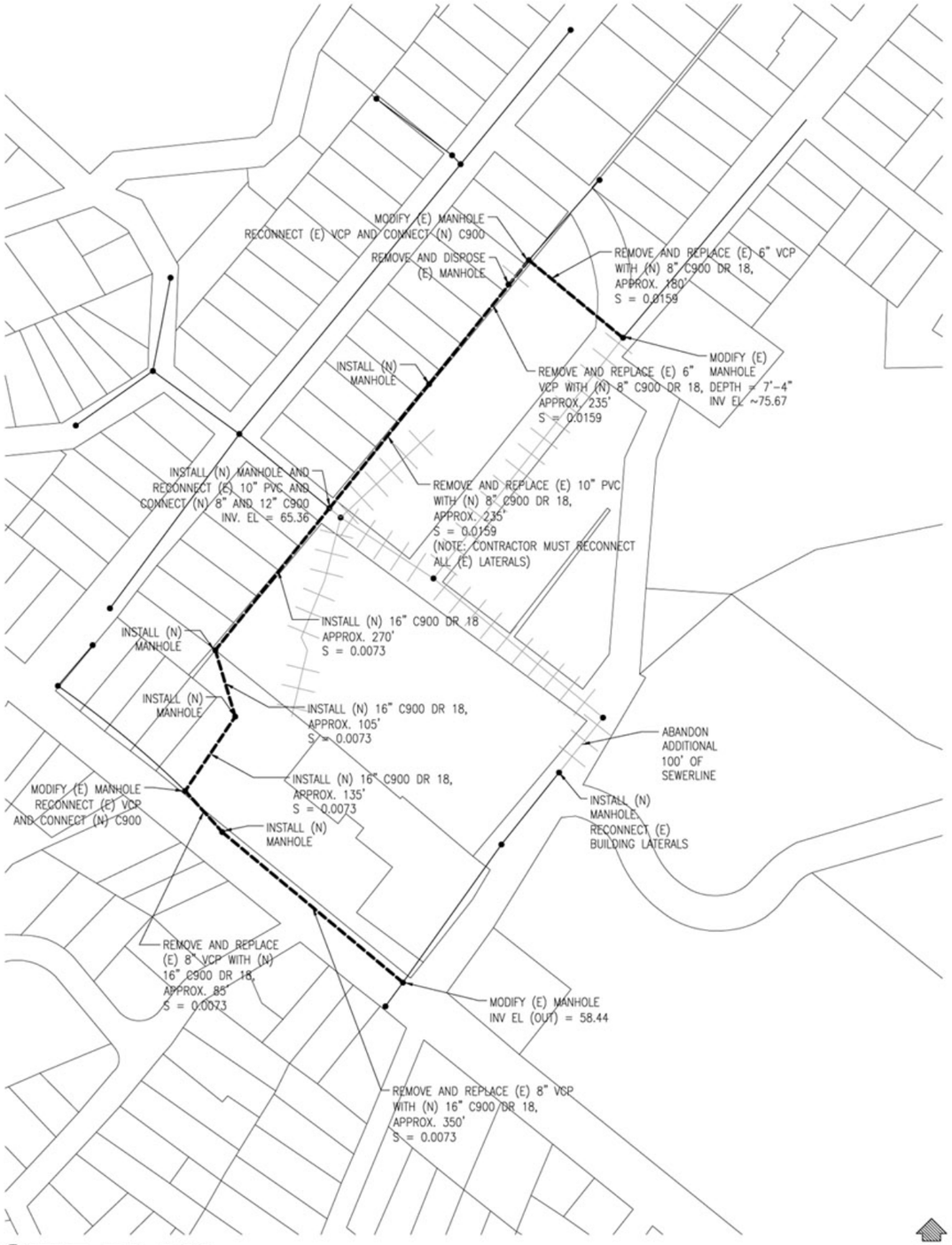
STETSON ENGINEERS INC.

DATE: January 4, 2013

JN: 2438

GROUNDWATER IRRIGATION SUPPLY SYSTEM PLAN VIEW

FIGURE E2.6



SITE PLAN

SCALE: 1" = 100'-0"

GENERAL PROJECT NOTES:

1. THE CONTRACTOR SHALL CONTACT "UNDERGROUND SERVICE ALERT" AT 811 AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION.

2. THE CONTRACTOR AGREES THAT, IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, THE CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.

3. THE CONTRACTOR SHALL POST EMERGENCY TELEPHONE NUMBERS FOR POLICE, FIRE, AMBULANCE, AND THOSE AGENCIES RESPONSIBLE FOR MAINTENANCE OF UTILITIES IN THE VICINITY OF JOBSITE.

4. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL OF THE WORK PERFORMED BY HIS/HER SUBCONTRACTORS, WITHOUT EXCEPTION.

5. THE CONTRACTOR SHALL IDENTIFY A RESPONSIBLE CONTACT PERSON, WHO IS AN EMPLOYEE OF THE CONTRACTOR, AND A 24-HOUR TELEPHONE NUMBER TO CALL TO RESOLVE PROBLEMS WITH NOISE, DUST, OR OTHER CONSTRUCTION-RELATED ISSUES.

6. THE CONTRACTOR SHALL BE REQUIRED TO KEEP ALL CONSTRUCTION ACTIVITIES WITHIN THE RIGHTS-OF-WAY AND EASEMENTS OBTAINED FOR THIS PROJECT UNLESS OTHERWISE SHOWN. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO, VEHICLES AND EQUIPMENT, LIMITS OF TRENCH EXCAVATIONS, AND STOCKPILED NEW MATERIAL.

7. THE CONTRACTOR SHALL PROVIDE PROTECTION DEVICES INCLUDING BARRICADES, FENCING, WARNING SIGNS, LIGHTS, FLAGGERS, OR OTHER ITEMS NECESSARY TO ENSURE PUBLIC SAFETY WITHIN THE PROJECT SITE. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.

8. THE CONTRACTOR SHALL EXERCISE DUE CAUTION DURING CONSTRUCTION TO PROTECT ANY EXISTING LANDSCAPING, FIXTURES, EQUIPMENT, CONCRETE SIDEWALK, CONCRETE DRIVEWAY, CONCRETE CURB & GUTTER, AND AC PAVING TO REMAIN. ANY DAMAGE RESULTING FROM CONTRACTOR OPERATIONS SHALL BE REPAIRED AS DIRECTED BY THE DISTRICT'S REPRESENTATIVE, AT NO ADDITIONAL COST TO THE DISTRICT.

9. THE CONTRACTOR SHALL PRESERVE ALL SURVEY MARKERS AND MONUMENTATION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OR ANY EXISTING FEDERAL, STATE, COUNTY, AND PRIVATE LAND SURVEY MARKER REQUIRING RESETTING PRIOR TO ANY DISTURBANCE.

10. THE CONTRACTOR SHALL RESTORE ALL EXISTING PRIVATE AND PUBLIC IMPROVEMENTS TO THEIR EXISTING CONDITION OR BETTER. THIS INCLUDES, BUT IS NOT LIMITED TO ALL LANDSCAPING, IRRIGATION, DRIVEWAYS, AC PAVING, CONCRETE WORK, AND UTILITIES UNLESS NOTED OR DIRECTED OTHERWISE BY THE DISTRICT'S REPRESENTATIVE.

11. THE CONTRACTOR SHALL PREPARE A WRITTEN NOTIFICATION OF THE STARTING AND ENDING DATES OF THE WORK AND DELIVER TO HOMES AND BUSINESSES IN THE VICINITY OF THE PROJECT AT LEAST TWO WEEKS IN ADVANCE OF THE WORK.

12. THE CONTRACTOR SHOULD MAKE HIS/HER OWN INVESTIGATIONS OF THE PAVEMENT THICKNESS.

13. ALL ELEVATIONS ON THE DRAWINGS REFER TO NAVD 88, UNLESS NOTED OTHERWISE.

14. HORIZONTAL AND VERTICAL DIMENSIONS PROVIDED ON THE DRAWINGS ARE APPROXIMATE. FIELD MEASUREMENTS MAY VARY FROM THOSE ON THE DRAWINGS. ADJUSTMENTS TO LINE AND GRADE MAY BE MADE BY THE DISTRICT REPRESENTATIVE DURING CONSTRUCTION.

15. SHOULD IT APPEAR THAT THE WORK TO BE DONE OR ANY MATTER RELATIVE THERETO, IS INSUFFICIENTLY OR INCORRECTLY DETAILED OR EXPLAINED ON THESE PLANS, CONTRACTOR SHALL CONTACT THE DISTRICT'S REPRESENTATIVE FOR SUCH FURTHER EXPLANATIONS AS MAY BE NECESSARY.

16. THE CONTRACTOR SHALL NOTIFY THE DISTRICT'S REPRESENTATIVE IMMEDIATELY, UPON DISCOVERY OF ANY POTENTIAL FIELD CONFLICTS.

17. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN ALL PERMITS NECESSARY TO PERFORM THE WORK SHOWN IN THESE PLANS FROM THE LOCAL JURISDICTION, AS WELL AS FROM OTHER PERTINENT REGULATORY AGENCIES, PRIOR TO COMMENCING WORK.

18. THE CONTRACTOR SHALL COMPLY WITH ALL SOUND CONTROL AND NOISE LEVEL RULES, REGULATIONS, AND ORDINANCES WHICH APPLY TO ANY WORK PERFORMED UNDER THE CONTRACT. EACH INTERNAL COMBUSTION ENGINE USED ON THE PROJECT SHALL BE EQUIPPED WITH A MUFFLER RECOMMENDED BY THE MANUFACTURER. NO INTERNAL COMBUSTION ENGINE SHALL BE OPERATED ON THE PROJECT WITHOUT SAID MUFFLER. NOISE LEVELS SHALL BE TO THE SATISFACTION OF THE CITY ENGINEER, COUNTY ENGINEER, OR DISTRICT ENGINEER.

19. THE DISTRICT AND ITS ENGINEER MAKE NO GUARANTEE THAT THE LOCATIONS OF UTILITIES ENCOUNTERED WILL NOT BE DIFFERENT THAN THOSE SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AND MAKING HIS/HER OWN DETERMINATION OF LOCATIONS OF EXISTING UTILITIES BY POTHOLING (HAND EXCAVATING) POTENTIAL CONFLICTS IN ADVANCE OF CONSTRUCTION.

20. LOCATIONS OF ALL UTILITY LATERALS & SERVICES ARE NOT ALL SHOWN. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING LOCATIONS OF SERVICE LATERALS AND FOR PROTECTING AND/OR COORDINATING THE RELOCATION OF EACH BY THE UTILITY COMPANY, AS NECESSARY.

21. THE OVERHEAD ELECTRIC AND TELEPHONE DISTRIBUTION SYSTEMS AND INDIVIDUAL SERVICE LINES EXIST IN THE VICINITY OF THE WORK AREA AND ARE NOT ALL SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL EXERCISE CAUTION WHILE WORKING NEAR OR UNDER ALL ELECTRIC LINES.

22. MARIN COUNTY AND THE CITY OF LARKSPUR MAY REQUIRE ADDITIONAL WORK OR FACILITIES IN THE COURSE OF THE FINAL APPROVAL AND OF THE CONSTRUCTION OF PROJECT IN ORDER FOR THE IMPROVEMENTS TO REASONABLY PROVIDE FOR THE INTENDED FUNCTION OR FOR PUBLIC SAFETY.

23. ALL PROPERTY CORNERS AND OTHER PERMANENT MONUMENTS DISTURBED DURING THE PROCESS OF CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE BEFORE THE FINAL ACCEPTANCE OF THE ROAD BY THE DESIGN

24. NO TREES SHALL BE REMOVED FROM THE SITE PRIOR TO OBTAINING A TREE REMOVAL PERMIT FROM THE CITY PLANNING DEPARTMENT.

25. SIGNS SHALL BE PERMITTED ONLY IN ACCORDANCE WITH CHAPTER 18.60 OF THE CITY OF LARKSPUR MUNICIPAL CODE.

VICINITY MAP N

SCALE: N. T. S.

LEGEND

- EXISTING, (E) PIPES
- (E) PIPES TO BE ABANDONED IN THIS PROJECT
- NEW, (N) PIPES

NOTES:
1. VERTICAL DATUM IS NAVD 88
2. ALL SANITARY SEWER DESIGN, CONSTRUCTION, AND TESTING SHALL CONFORM TO THE THEN-CURRENT RVSD STANDARD SPECIFICATIONS AND DRAWINGS

DRAFT 30%%% DESIGN
NOT FOR
CONSTRUCTION

SCALES
0 — 1"
0 — 25mm
IF THIS BAR IS NOT DIMENSION SHOWN, ADJUST SCALES ACCORDINGLY

SAN ANSELMO MEMORIAL PARK
MARIN COUNTY, CALIFORNIA
SITE PLAN

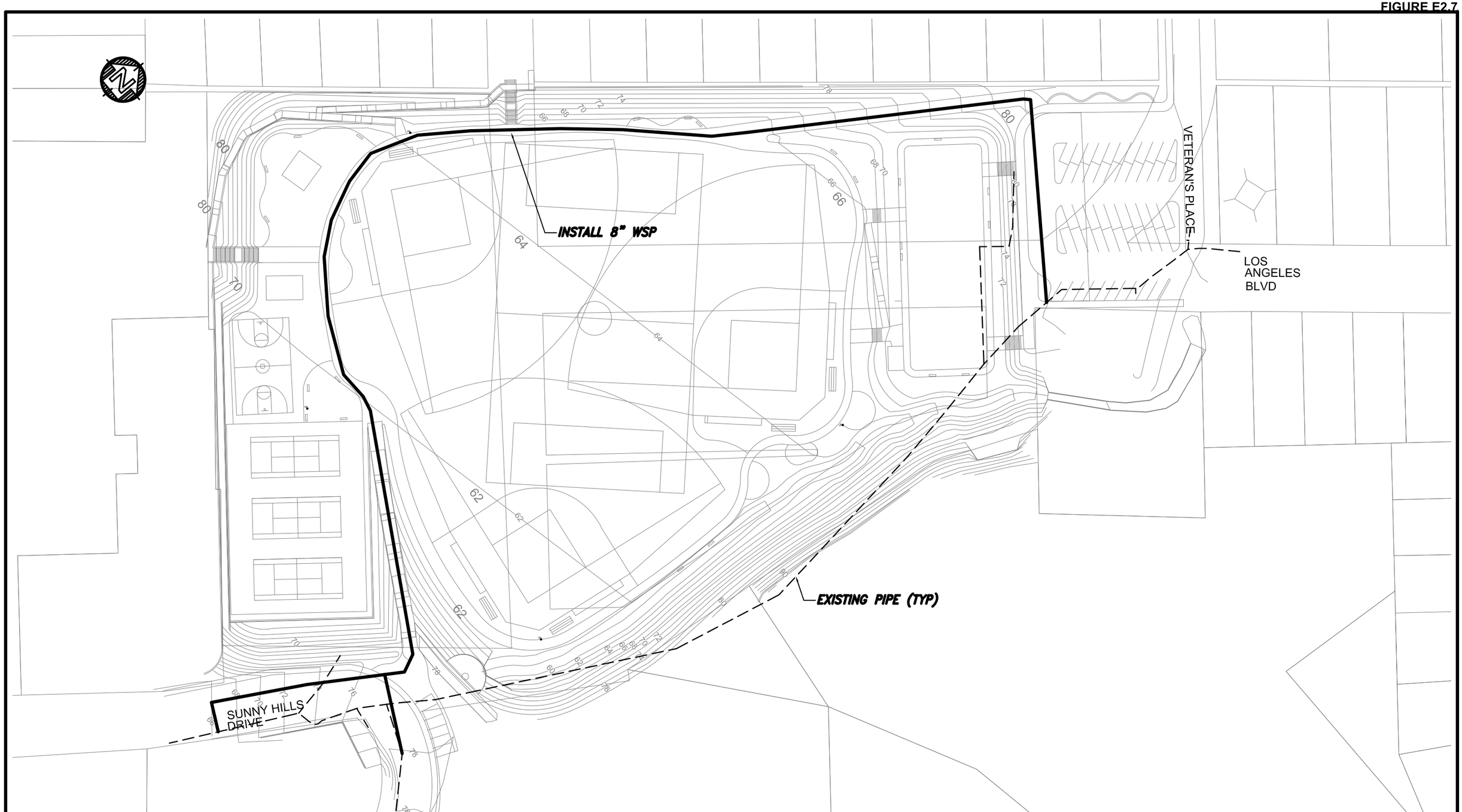
SANITARY DISTRICT NO. 1
1899 - 1999

2960 KERNER BLVD.
SAN RAFAEL, CA 94901
PHONE: (415) 259-2949
FAX: (415) 460-2149
RVSD.ORG

DESIGN ENGINEER: RANDELL Y. ISHII	
LICENSE NO: C 69409	
DRAFTED BY: RVSD	CHECKED BY: RYI
SCALE: AS SHOWN	
DATE: XX	
JOB NO: XXXX-XXXX	
DWG. NO:	
SHEET 1	

S:\Projects\San Anselmo Memorial Park - Sewer Relocation, detention basin\dwg\02-Site Plan.dwg, 2 C2, 1/11/2013 7:54:49 PM, rishii

FIGURE E2.7



NO	REVISION	DRAWN	CHKD	APPRVD	DATE

ENGINEERING SEAL

REGISTERED PROFESSIONAL ENGINEER JON M. LA RAVIE No. 44817 EXPIRES CIVIL STATE OF CALIFORNIA

SCALE AS SHOWN	DESIGN	DRAWN BY JJ	
CADD FILE		DESIGN BY JL	
CONTRACT NO.		CHECKED BY	
DWG DATE	RECOM'D	PROJ. MGR.	
SIGN DATE		PRINCIPAL ENGR.	
CONST COM DATE			

APPROVED CHIEF ENGR. _____

REVIEW: PLANNING, CIVIL DESIGN, OPERATIONS, CORROSION, M&E/CNTRLS, FAC/WTR MGT, ENGR SERV, INSPECTION, WTR QUALITY, RECORDS/SUBD.

MARIN MUNICIPAL WATER DISTRICT
220 NELLEN AVE., CORTE MADERA, CA 94925 (415) 945-1455

SAN ANSELMO MEMORIAL PARK

C1

SHEET NO.
JOB NO.

MMWD.dwg 1/28/13 11:53 AM

3.2.3 Creek Daylighting and Restoration

1) Design Objective

The objective of this project element is to restore the geomorphic function and aquatic habitat condition of Sorich Creek by daylighting the 580 ft culverted reach within the park and the 70-ft long culverted reach at Los Angeles Street.

2) Design Criteria and Other Design Considerations:

To achieve the objective, the existing buried culvert will be removed, the creek will be daylighted and re-graded, and the bed and bank will be stabilized by placing large rocks and installing biotechnical treatments using native vegetation. The daylighted and restored creek will be designed to pass the 5-year flood flow, the flooding threshold of the lower San Anselmo Creek below the Sorich Creek confluence.

This project element also includes removal of the undersized Los Angeles Street culvert to increase creek hydraulic capacity and replacement with a new pre-fabricated single lane vehiclular/pedestrian bridge. This daylighted reach will be stabilized with biotechnical treatments using native vegetation.

3) Design Description:

The designs include 1) daylighting the 580-ft long buried culverted Sorich Creek reach through the park; 2) stabilizing the bed and banks with placed rock and biotechnical treatments using native vegetaton; 3) removing the 70-ft long Los Angeles Street culvert and installing a new pre-fabricated single lane vehiclular/pedestrian bridge; and (4) modifying the wooden box culvert at the Log Cabin to contain flows at higher levels.

4) List of Design Drawing(s):

- Figure E3.1: Sorich Creek Daylighting and Restoration Plan View
- Figure E3.2: Sorich Creek Daylighting and Restoration Profile
- Figure E3.3: Sorich Creek Daylighting and Restoration Sections
- Figure E3.4: Memorial Park Daylighted Sorich Creek Typical Section Detail
- Figure E3.5: Wooden Open Box Channel Modification Cross-Section Detail

5) Engineers Cost Estimate:

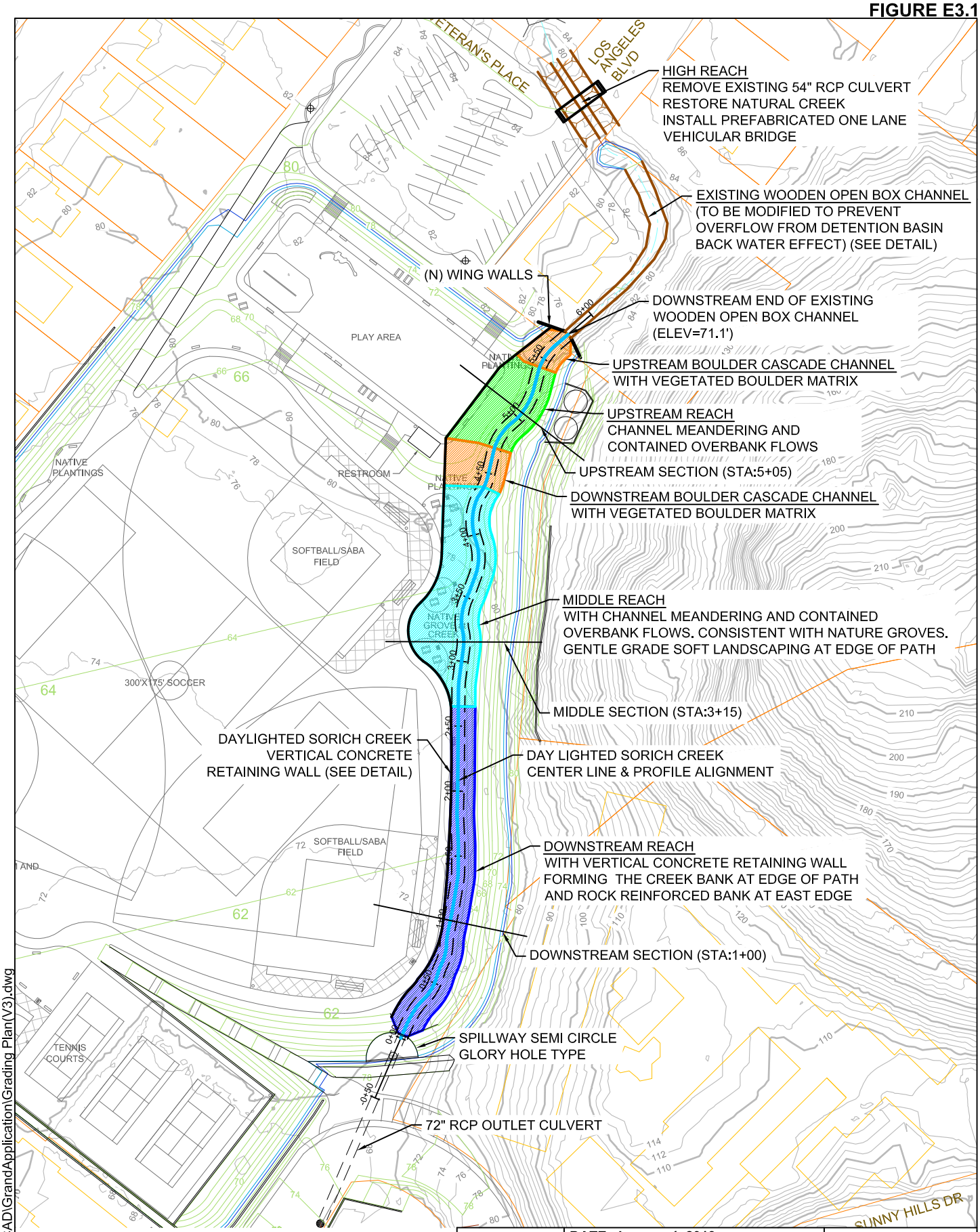
Total Construction Cost = 917,000

Construction Cost Estimation for Project Element 3
Creek daylighting and restoration

Item	Description	Quantity	Unit	Unit Cost	Total Cost
3.1	**Creek day lighting and restoration**				
3.1.01	Mobilization/Demobilization	1	LS	$ 18,000	$ 18,000
3.1.02	Excavation & Removal of existing 54"RCP culvert	500	CY	$ 80	$ 40,000
3.1.03	Clearing and Grubbing	1	LS	$ 5,000	$ 5,000
3.1.04	Dewatering	1	LS	$ 25,000	$ 25,000
3.1.05	Restore natural creek at Los Angeles Blvd.	2,000	SF	$ 35	$ 70,000
3.1.06	Prefabricated one lane bridge installation	400	SF	$ 250	$ 100,000
3.1.07	Wooden open channel modification	160	FT	$ 200	$ 32,000
3.1.08	Daylighted creek upstream wing walls	15	CY	$ 1,000	$ 15,000
3.1.09	Upstream boulder cascade channel				
	a. Rock - 1 Ton class	200	TN	$ 150	$ 30,000
	b. Downstream pool structure	1	LS	$ 15,000	$ 15,000
	c. Slope protection & revegetation	520	SF	$ 25	$ 13,000
3.1.10	Upstream reach creek				
	a. Slope protection & revegetation	1,200	SF	$ 25	$ 30,000
	b. Grade control structures	3	EA	$ 4,000	$ 12,000
3.1.11	Downstream boulder cascade channel				
	a. Rock - 1 Ton class	300	TN	$ 150	$ 45,000
	b. Downstream pool structure	1	LS	$ 20,000	$ 20,000
	c. Slope protection & revegetation	520	SF	$ 25	$ 13,000
3.1.12	Middle reach creek				
	a. Slope protection & revegetation	2,800	SF	$ 25	$ 70,000
	b. Grade control structures	8	EA	$ 4,000	$ 32,000
3.1.13	Downstream reach creek				
	a. Slope protection & revegetation	2,000	SF	$ 25	$ 50,000
	b. Grade control structures	13	EA	$ 2,000	$ 26,000
3.1.14	Vertical concrete retaining wall				
	a. Earthworks	800	CY	$ 80	$ 64,000
	b. Concrete wall	150	CY	$ 800	$ 120,000
	c. 12" Concrete piers (10 ft deep)	60	EA	$ 1,000	$ 60,000
3.1.15	Railing	300	FT	$ 40	$ 12,000

Project element 3 total construction cost **$ 917,000**

FIGURE E3.1



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STETSON ENGINEERS INC.

DATE: January 4, 2013

JN: 2438

SORICH CREEK DAYLIGHTING AND RESTORATION PLAN VIEW

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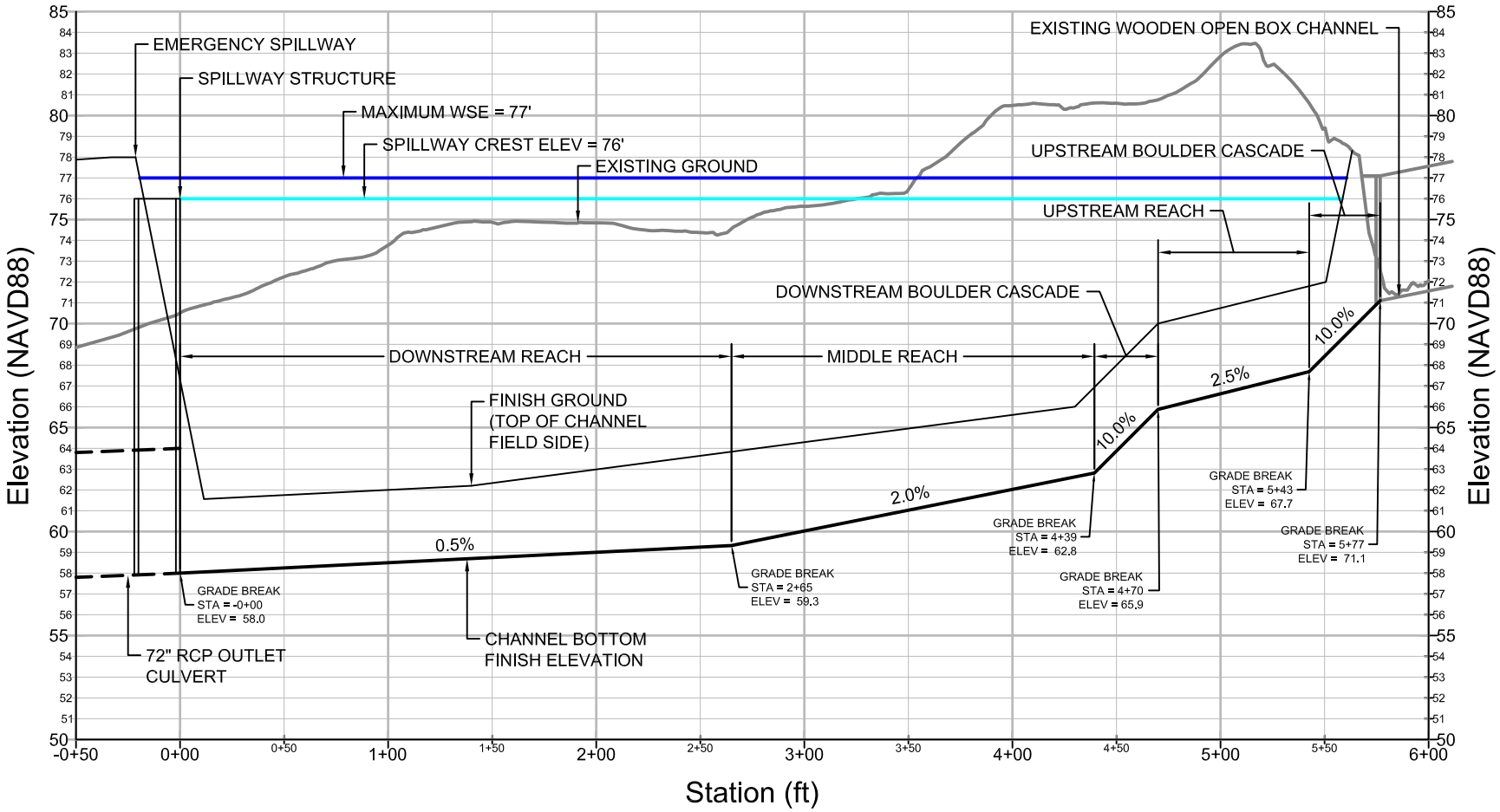
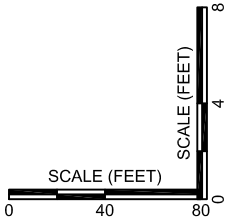
DAYLIGHTED SORICH CREEK PROFILE





STETSON
ENGINEERS INC.

DATE: January 4, 2013

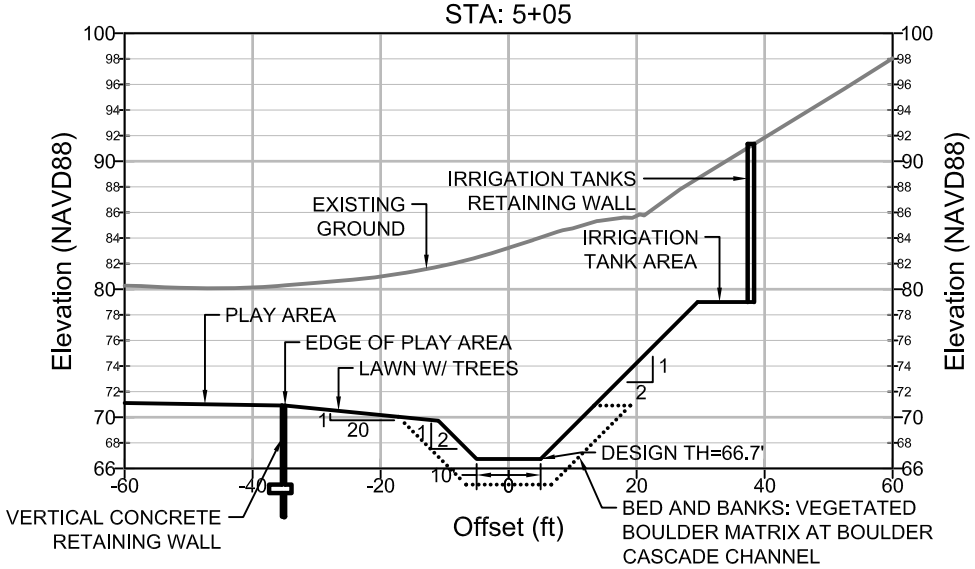
JN: 2438

SORICH CREEK DAYLIGHTING AND RESTORATION PROFILE

FIGURE E3.2

FIGURE E3.3

UPSTREAM SECTION
STA: 5+05

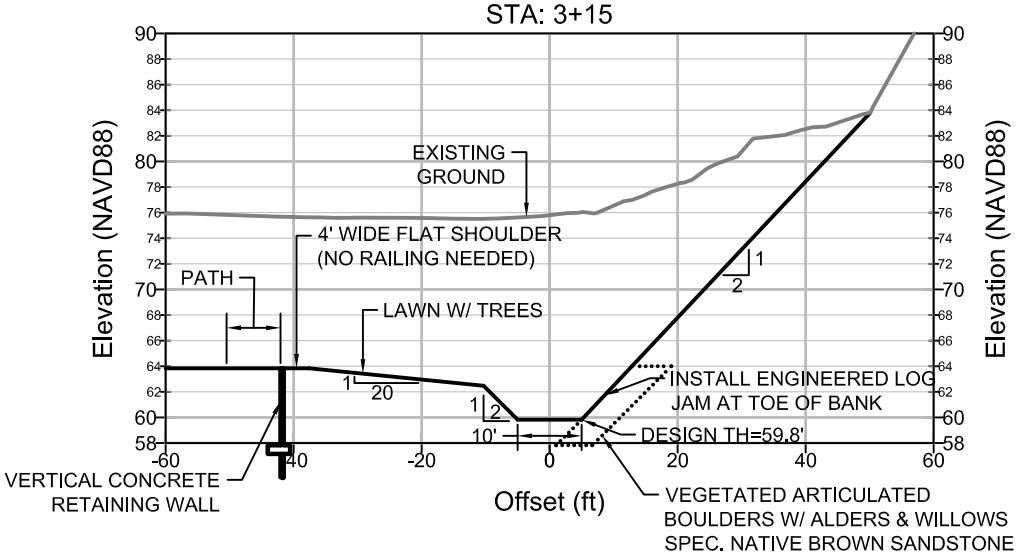


UPSTREAM BOULDER CASCADE
SLOPE = 10.0%
LENGTH = 34 FT

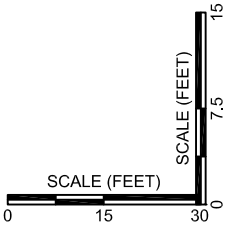
UPSTREAM REACH
SLOPE = 2.5%
LENGTH = 73 FT

DOWNSTREAM BOULDER CASCADE
SLOPE = 10.0%
LENGTH = 31 FT

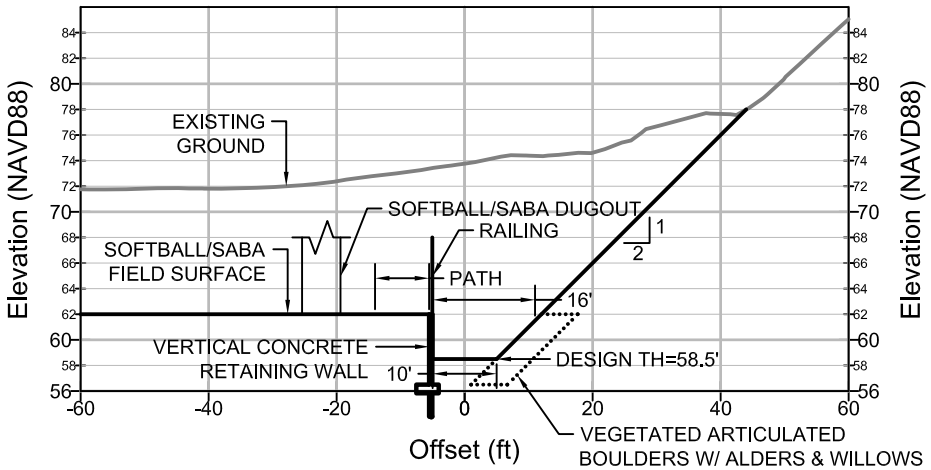
MIDDLE SECTION
STA: 3+15



MIDDLE REACH
SLOPE = 2.0%
LENGTH = 174 FT



DOWNSTREAM SECTION
STA: 1+00



DOWNSTREAM REACH
SLOPE = 0.5%
LENGTH = 265 FT

TOTAL DAY LIGHTED SORICH CREEK
MEAN SLOPE = 2.3%
TOTAL LENGTH = 577 FT

NOTES:
1. ALL SECTIONS ARE LOOKING UPSTREAM.

STETSON ENGINEERS INC.

DATE: January 4, 2013 | JN: 2438

SORICH CREEK DAYLIGHTING AND RESTORATION SECTIONS

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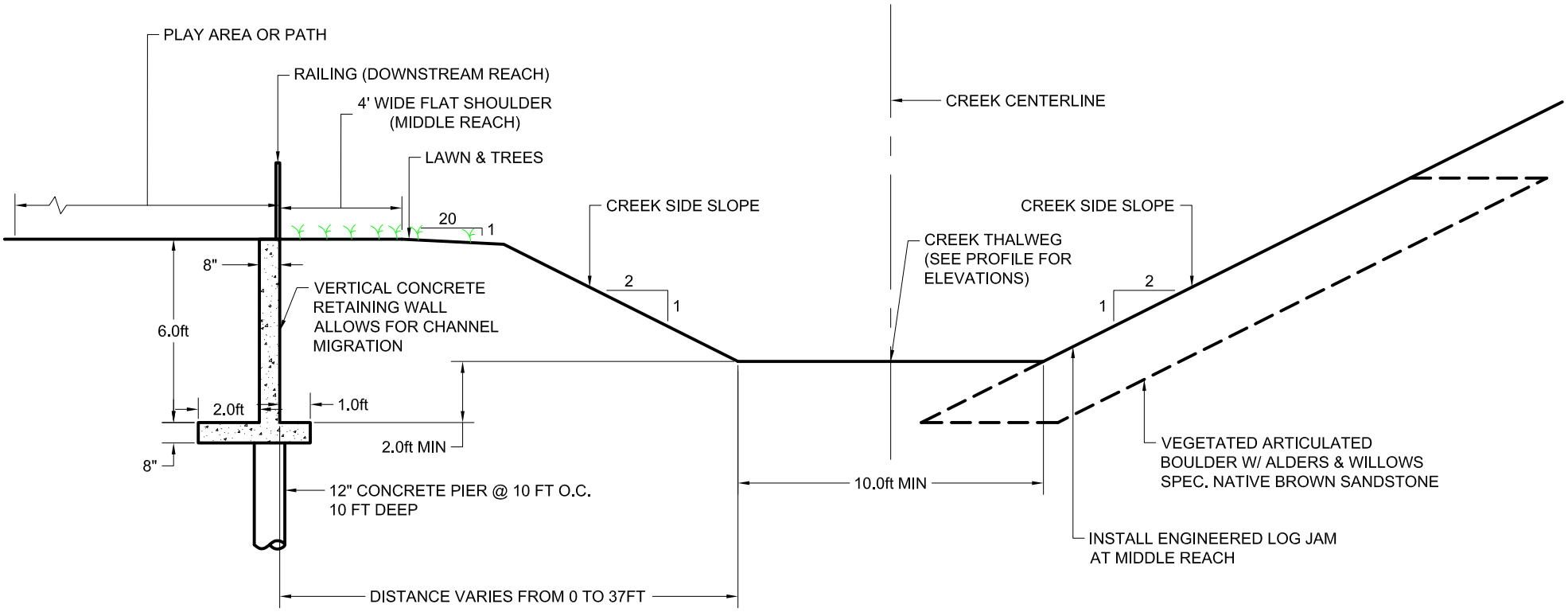

NOTES:
1. SECTION IS LOOKING UPSTREAM.

SCALE (Feet)
0 2.5 5

STETSON
ENGINEERS INC.

DATE: January 4, 2013 | JN: 2438

MEMORIAL PARK
DAYLIGHTED SORICH CREEK
TYPICAL SECTION DETAIL

FIGURE E3.4

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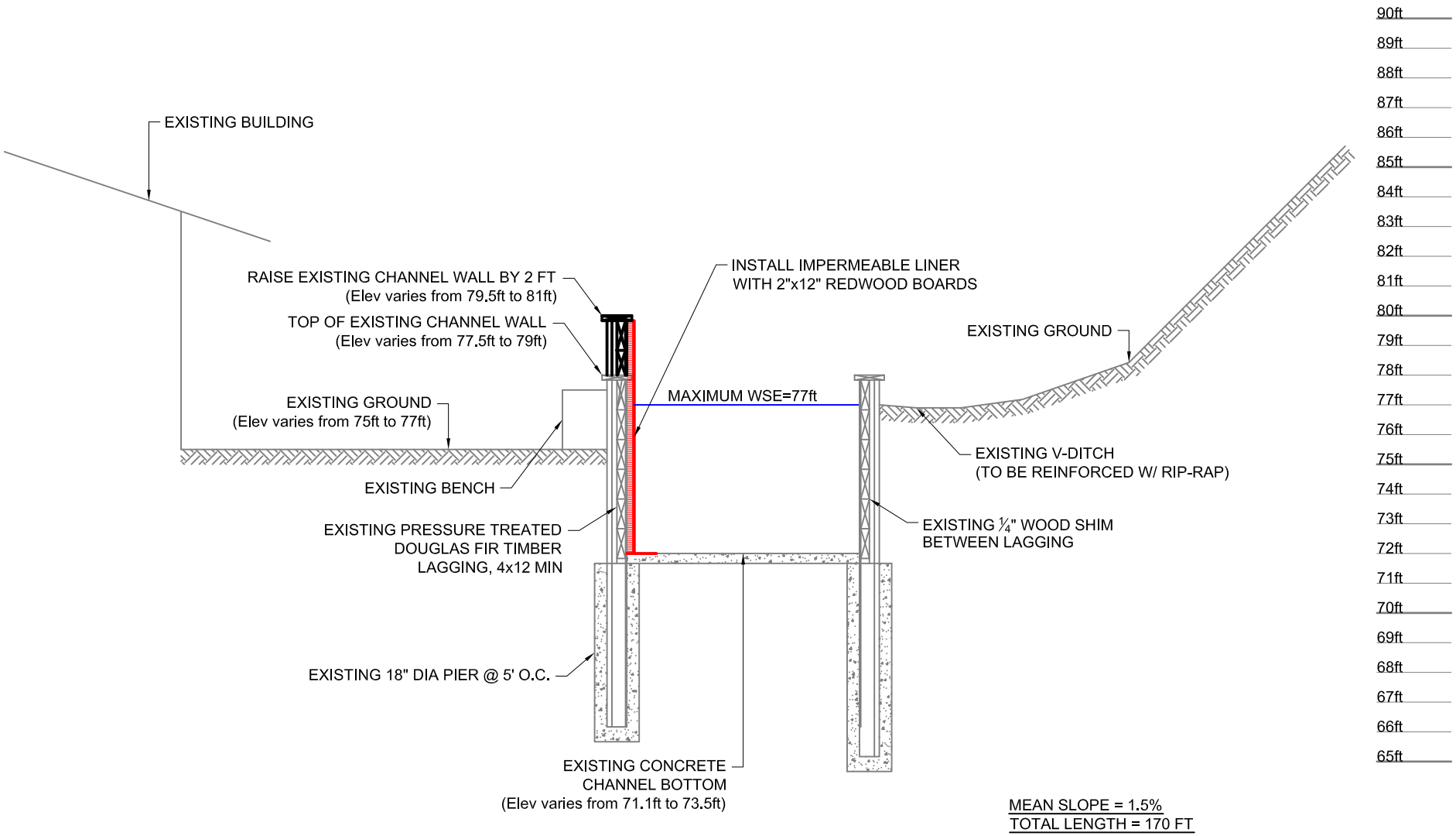


NOTES:

1. SECTION IS LOOKING UPSTREAM.
2. EXISTING WOODEN BOX CHANNEL IS BASED ON SHEET 4 OF SET OF PLANS FOR SORICH CREEK REPAIR AMERICAN LEGION POST 179, PREPARED BY MILLER PACIFIC ENGINEERING GROUP, DATED 8/1/08.
3. ELEVATIONS ARE BASED ON STETSON ENGINEERS SURVEY, NOVEMBER 2012.
4. ELEVATIONS SHOWN ARE RELATIVE TO NAVD 88 DATUM.

SCALE (Feet)
0 2.5 5

STETSON ENGINEERS INC.

DATE: January 4, 2013 | JN: 2438

WOODEN OPEN BOX CHANNEL MODIFICATION CROSS-SECTION DETAIL

FIGURE E3.5

3.2.4 Park Rehabilitation

1) Design Objective
The objective of this project element is to enhance public access, safety, aesthetic, and recreational opportunities in the park.

2) Design Criteria and Other Design Considerations:
To achieve the objective, the detention basin will be seeded with turf grass and the athletic play fields and athletic courts will be re-established with improved state-of-the art facilities. Improved ADA compliant pathways will be installed to encourage access to the creek and expand access throughout the park to more people. The daylighted and restored Sorich Creek, an adjacent "nature grove," and picnic area will be integrated into the park as added recreational features. Interpretive signage will be placed along the restored creek to inform the public about the restored creek ecosystem and foster stewardship for preserving and protecting the health of the creek. The paving/surfacing of re-established play areas will be integrated with the subsurface drainage system.

3) Design Description:
The designs include 1) park layout plan and architectural rendering; 2) planting plan; 3) improved recreational facilities including concession building, restroom building, backstops, bleachers, basketball board, picnic tables and BBQ grills, drinking fountains, play equipment, trash receptacles, play area paving and surfacing; and 4) fencing.

4) List of Design Drawing(s):
- Figure E4.1: Park Layout Plan
- Figure E4.2: Architectural Rendering
- Figure E4.3: Park Planting Plan
- Figure E4.4: Concession Building
- Figure E4.5: Restroom Building
- Figure E4.6: Restroom/Storage
- Figure E4.7: Backstop and Bleacher with Shade Cover
- Figure E4.8: Basketball Board
- Figure E4.9: Picnic Table and BBQ Grill
- Figure E4.10: Drinking Fountain
- Figure E4.11: Play Equipment
- Figure E4.12: Trash Receptacles
- Figure E4.13: Play Area Paving/Surfacing
- Figure E4.14: Chain Link Fencing
- Figure E4.15: Post & Rail Fence

5) Engineers Cost Estimate:

Total Construction Cost = 3,595,000

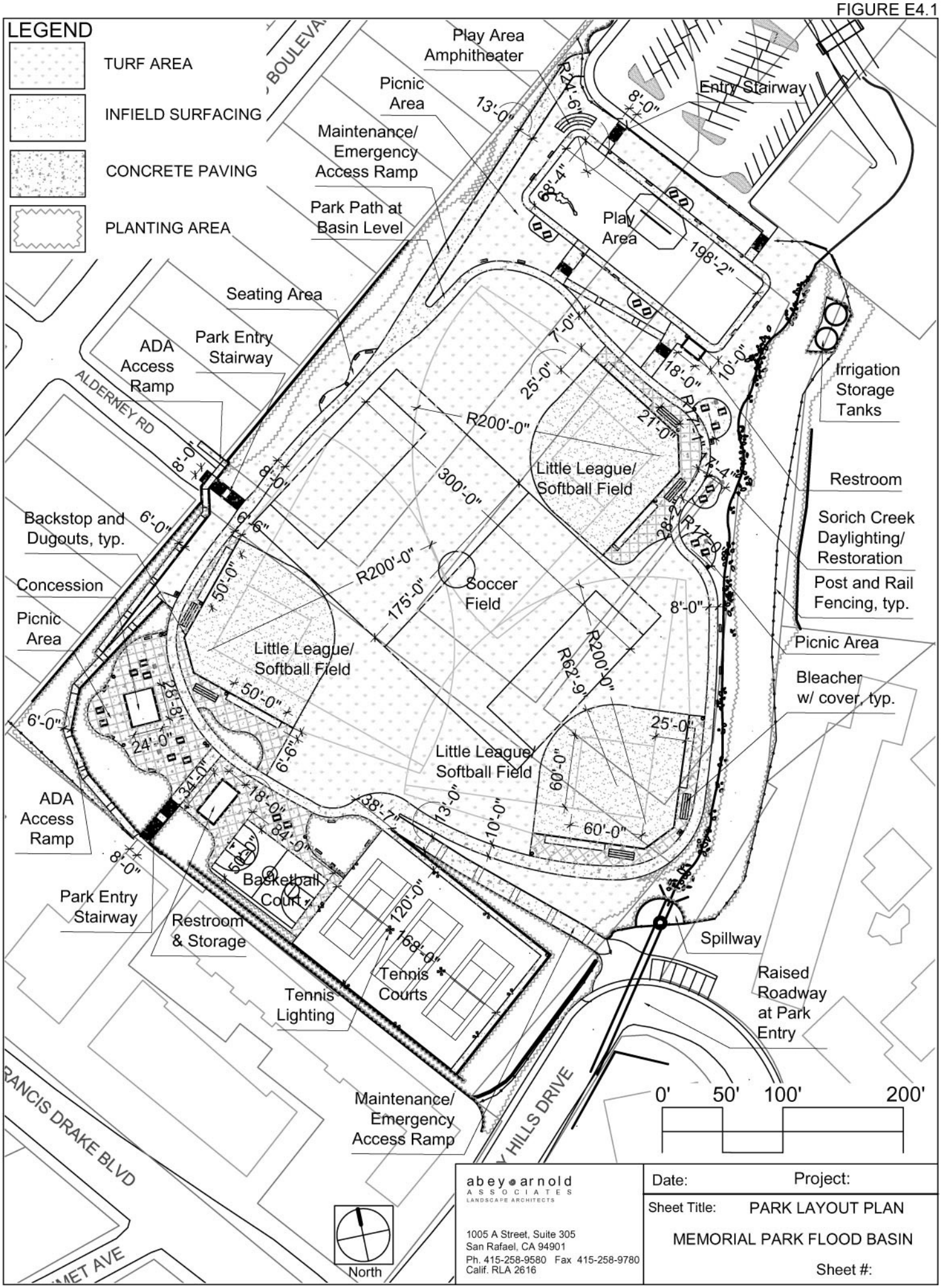
Construction Cost Estimation for Project Element 4
Park rehabilitation

Item	Description	Quantity	Unit		Unit Cost		Total Cost
4.1	**Park rehabilitation- Fields/Planting**						
4.1.01	Mobilization/Demobilization	1	LS	$	9,000	$	9,000
4.1.02	Turf Sod for softball/saba & soccer fields	103,000	SF	$	0.75	$	77,250
4.1.03	Turf Sod for Sloped Viewing Areas	27,500	SF	$	1.00	$	27,500
4.1.04	Infield surfacing for softball/saba fields	36,750	SF	$	2.50	$	91,875
4.1.05	Soil Preparation, (horticultural)	185,000	SF	$	0.35	$	64,750
4.1.06	Planting - Understory shrubs/ground cover	54,500	SF	$	2.00	$	109,000
4.1.07	Planting - Trees (24" box)	140	EA	$	275	$	38,500
4.1.08	Mulch, 3" Depth	54,500	SF	$	0.35	$	19,075
	Sub-Total construction cost					**$**	**436,950**
4.2	**Park rehabilitation- Paving/Access Ramps/Courts**						
4.2.01	Mobilization/Demobilization	1	LS	$	21,000	$	21,000
4.2.02	Access Ramps, 13' wide (paving,curbs,rails)	5,800	SF	$	20	$	116,000
4.2.03	Access Ramps, 6' wide (paving,curbs,rails)	3,325	SF	$	30	$	99,750
4.2.04	ADA Ramps Concrete Walls	1	LS	$	20,000	$	20,000
4.2.05	Park stairways, (steps, rails)	1,350	SF	$	50	$	67,500
4.2.06	Concrete Paths and walkways	15,500	SF	$	10	$	155,000
4.2.07	Concrete seat/retaining wall at tennis court	285	LF	$	200	$	57,000
4.2.08	Tennis courts	3	EA	$	80,000	$	240,000
4.2.09	Basketball court	1	EA	$	100,000	$	100,000
4.2.10	Baseball/softball plaza	20,400	SF	$	10	$	204,000
	Sub-Total construction cost					**$**	**1,080,250**
4.3	**Park rehabilitation- Play Area**						
4.3.01	Mobilization/Demobilization	1	LS	$	10,000	$	10,000
4.3.02	Containment Curbing	800	LF	$	25	$	20,000
4.3.03	Resilient Surfacing	10,000	SF	$	16.50	$	165,000
4.3.04	School Aged Play Area	1	EA	$	105,000	$	105,000
4.3.05	PreSchool Aged Play Area	1	EA	$	65,000	$	65,000
4.3.06	Relocate Existing Features(Dinosaur,Tower,Fount.)	1	lump	$	40,000	$	40,000
4.3.07	Climbing Wall	1	EA	$	35,000	$	35,000
4.3.08	Amphitheater, (seating,relocate existing artwork)	1	EA	$	45,000	$	45,000
4.3.09	Sand Play Area	800	SF	$	15	$	12,000
	Sub-Total construction cost					**$**	**497,000**
4.4	**Park rehabilitation- Site Furnishings/Signage**						
4.4.01	Mobilization/Demobilization	1	LS	$	4,000	$	4,000
4.4.02	Benches, 6' with backs	25	EA	$	1,000	$	25,000
4.4.03	Benches, 6' no backs (dugouts, tennis)	26	EA	$	750	$	19,500
4.4.04	Picnic Table- 6'	25	EA	$	1,200	$	30,000
4.4.05	Picnic Table- 6' - ADA	5	EA	$	1,500	$	7,500
4.4.06	5 Row Bleachers	6	EA	$	6,000	$	36,000
4.4.07	BBQ's	5	EA	$	1,200	$	6,000
4.4.08	Trash Receptacles	24	EA	$	700	$	16,800
4.4.09	Drinking Fountains	4	EA	$	4,000	$	16,000
4.4.10	Basketball Standards	2	EA	$	3,500	$	7,000

Construction Cost Estimation for Project Element 4
Park rehabilitation

Item	Description	Quantity	Unit		Unit Cost		Total Cost
	4.4.11 Main Park Signs	4	EA	$	3,000	$	12,000
	4.4.12 Park Rules	4	EA	$	500	$	2,000
	4.4.13 Flood Warning Signs	30	EA	$	150	$	4,500
	4.4.14 Field ID Signs	3	EA	$	1,000	$	3,000
	Sub-Total construction cost					**$**	**189,300**
4.5	**Park rehabilitation- Buildings/Structures/Lighting/Fencing**						
	4.5.01 Mobilization/Demobilization	1	LS	$	21,000	$	21,000
	4.5.02 Building- Restroom	1	EA	$	80,000	$	80,000
	4.5.03 Building- Restroom/Storage	1	EA	$	150,000	$	150,000
	4.5.04 Building- Concession	1	EA	$	200,000	$	200,000
	4.5.05 Dugout Covers	6	EA	$	7,500	$	45,000
	4.5.06 Lighting- Pathway 12' Pole Lights	14	EA	$	3,000	$	42,000
	4.5.07 Lighting- Tennis Courts, Fixtures	24	EA	$	1,000	$	24,000
	4.5.08 Lighting- Tennis Courts- Poles/Footings	10	EA	$	2,500	$	25,000
	4.5.09 Fencing- Access Gates at park entries	6	EA	$	3,000	$	18,000
	4.5.10 Fencing- Baseball/Softball, Backstop	3	EA	$	25,000	$	75,000
	4.5.11 Fencing- Baseball/Softball, Dugouts-Foul lines	825	LF	$	100	$	82,500
	4.5.12 Fencing- Tennis Courts, 10' hgt	580	LF	$	125	$	72,500
	4.5.13 Fencing- Wood Privacy at Residences, 6' hgt	515	LF	$	75	$	38,625
	4.5.14 Fencing- Preschool Play Area, 4' hgt.	200	LF	$	65	$	13,000
	4.5.15 Fencing- Post & Rail access restriction, 4' hgt	1,350	LF	$	80	$	108,000
	4.5.16 Shade Structures at Bleachers	6	EA	$	7,500	$	45,000
	4.5.17 Flood Lights, Power Lines & Backup Generator	1	LS	$	30,000	$	30,000
	Sub-Total construction cost					**$**	**1,069,625**
4.6	**Parking Lot**						
	4.6.01 Mobilization/Demobilization	1	LS	$	6,000.00	$	6,000
	4.6.02 Remove (E) AC Parking Lot	25,000	SF	$	3.00	$	75,000
	4.6.03 Trucking and Disposal	50	CY	$	100.00	$	5,000
	4.6.04 Rough Grading	1,600	CY	$	5.00	$	8,000
	4.6.05 Finished Grading	25,000	SF	$	0.25	$	6,250
	4.6.06 3" AC/10" AB Paving	25,000	SF	$	7.00	$	175,000
	4.6.07 Standard County Vertical Curb	600	LF	$	20.00	$	12,000
	4.6.08 6' Sidewalk	3,300	SF	$	10.00	$	33,000
	4.6.09 New Parking Space Striping	1,100	LF	$	0.75	$	825
	4.6.10 New Parking Space Handicap Symbols	4	EA	$	200.00	$	800
	Sub-Total construction cost					**$**	**321,875**
Project Element 4 total construction cost						**$**	**3,595,000**

FIGURE E4.1


LEGEND
TURF AREA
INFIELD SURFACING
CONCRETE PAVING
PLANTING AREA
Play Area Amphitheater
Picnic Area
Maintenance/ Emergency Access Ramp
Park Path at Basin Level
Entry Stairway
Play Area
Seating Area
Park Entry Stairway
ADA Access Ramp
ALDERNEY RD
Irrigation Storage Tanks
Little League/ Softball Field
Restroom
Sorich Creek Daylighting/ Restoration
Post and Rail Fencing, typ.
Backstop and Dugouts, typ.
Concession
Picnic Area
Soccer Field
Little League/ Softball Field
Picnic Area
Bleacher w/ cover, typ.
Little League/ Softball Field
ADA Access Ramp
Park Entry Stairway
Basketball Court
Restroom & Storage
Tennis Courts
Tennis Lighting
Spillway
Raised Roadway at Park Entry
Maintenance/ Emergency Access Ramp
RANCIS DRAKE BLVD
HILLS DRIVE
MET AVE
North
0' 50' 100' 200'
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Calif. RLA 2616
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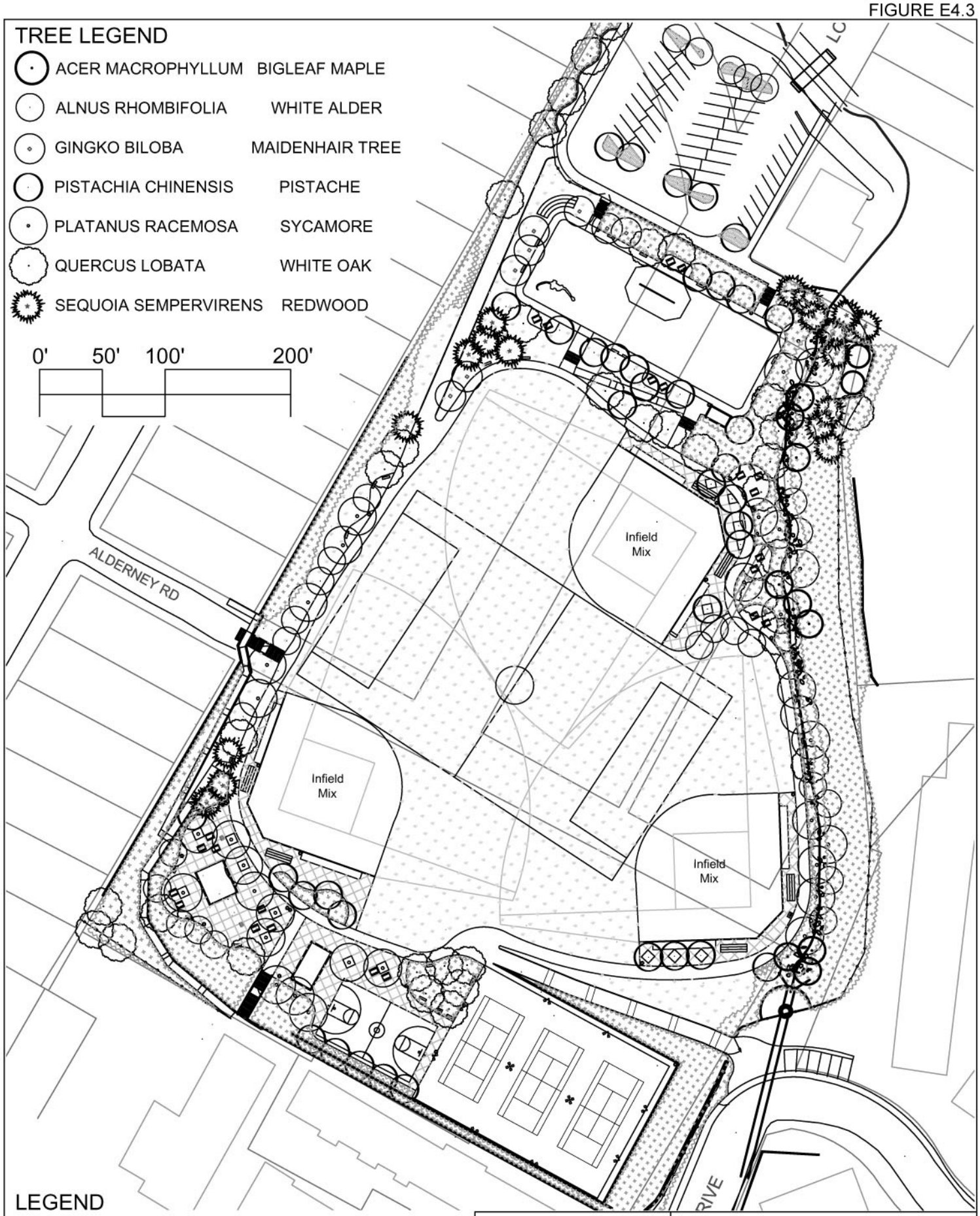
Project:
Sheet Title: PARK LAYOUT PLAN
MEMORIAL PARK FLOOD BASIN
Sheet #:

FIGURE E4.2

Memorial Park at Flood Control Basin
Conceptual Design
Abey Arnold Associates, Landscape Architects
October 17, 2012 415-258-9580 rla-2616

FIGURE E4.3



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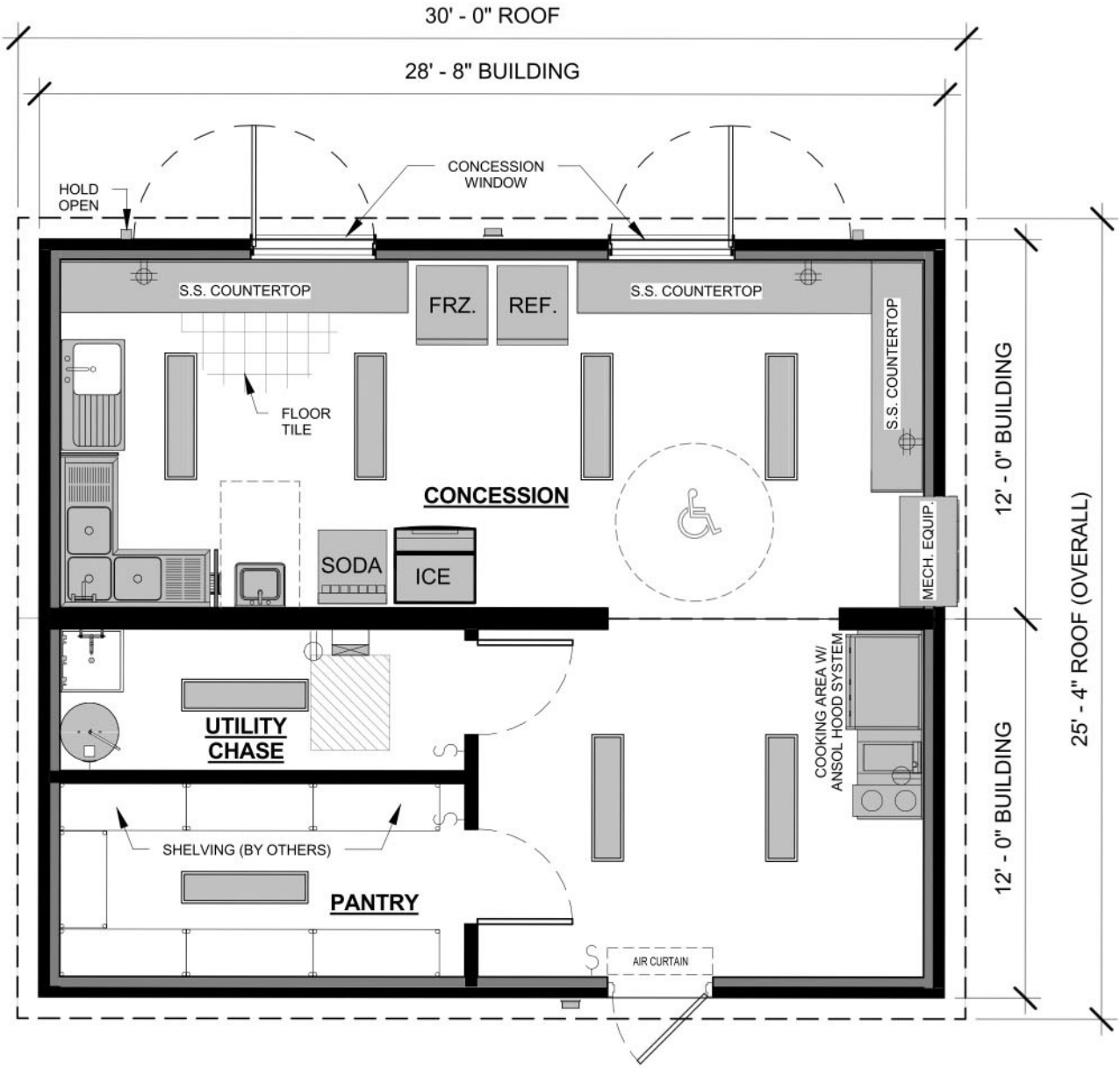
PARK
MEMORIAL PARK FLOOD BASIN
PLANTING PLAN

Sheet #:

FIGURE E4.4



FLOORPLAN
by
PUBLIC RESTROOM COMPANY
SCALE-3/16"=1'-0"

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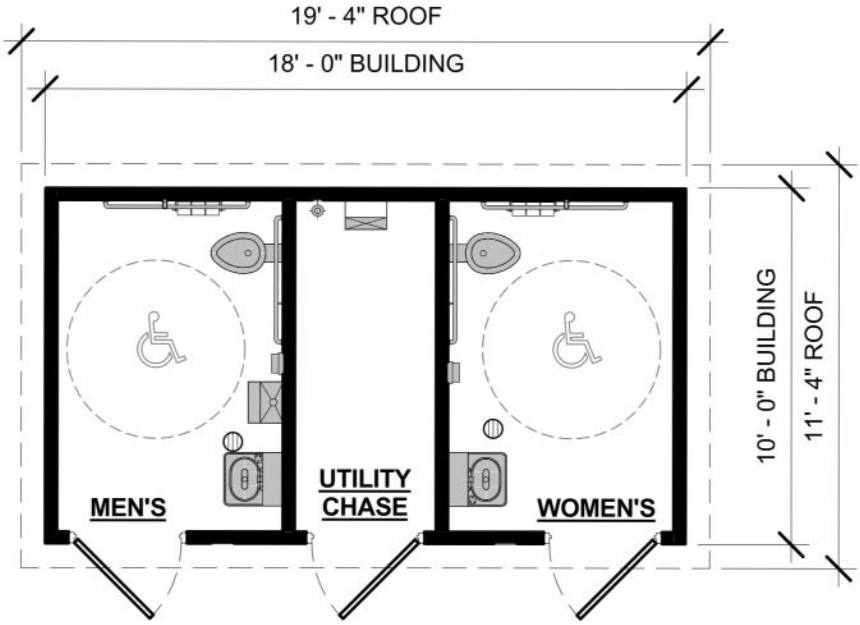
Sheet Title: CONCESSION BUILDING

MEMORIAL PARK FLOOD BASIN

Sheet #:



1 FLOOR PLAN
3/16" = 1'-0"

FLOORPLAN
by
PUBLIC RESTROOM COMPANY

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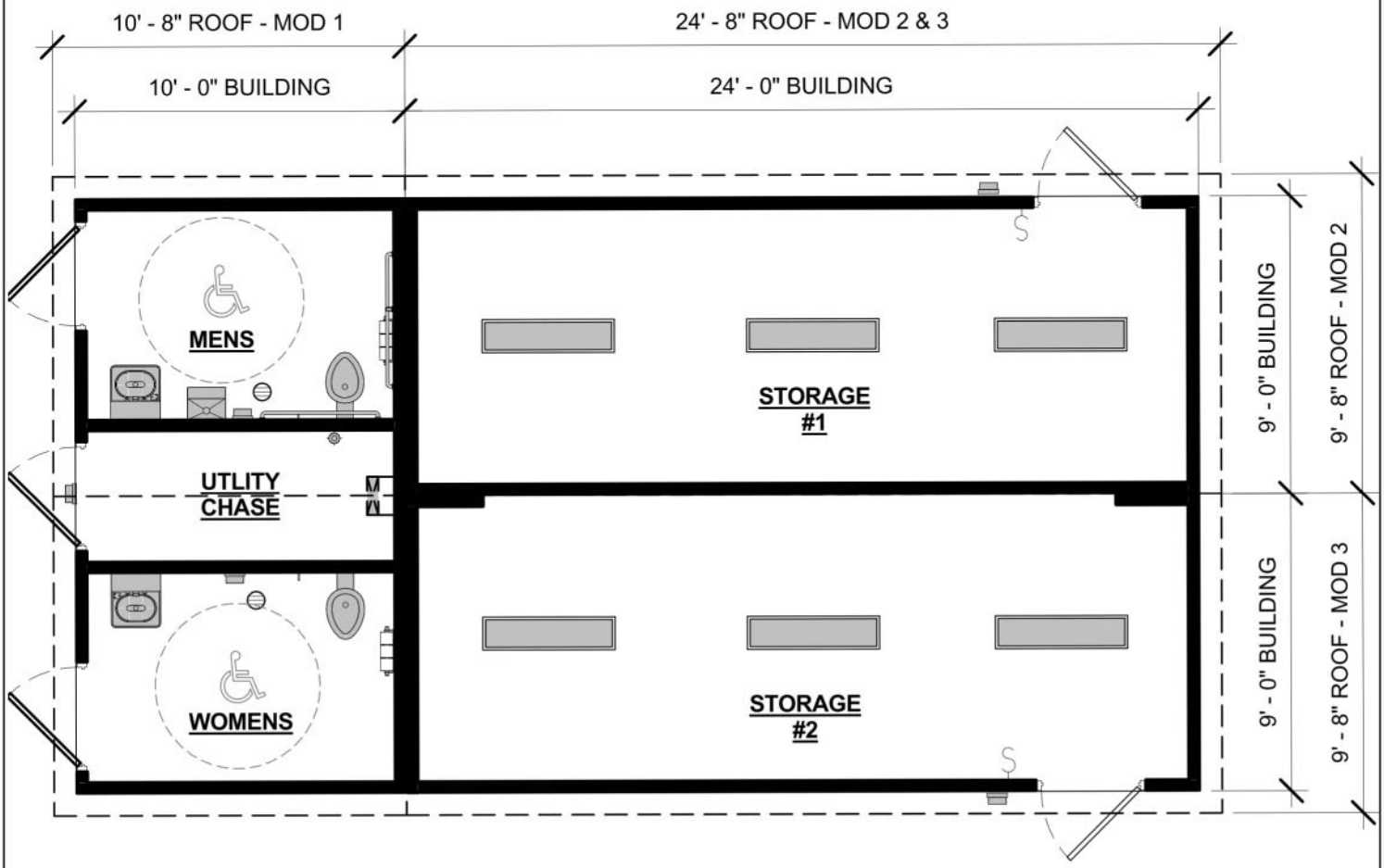
Sheet Title: RESTROOM BUILDING

MEMORIAL PARK FLOOD BASIN

Sheet #:



1 FLOOR PLAN
3/16" = 1'-0"

FLOORPLAN
by
PUBLIC RESTROOM COMPANY

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Sheet Title: RESTROOM/STORAGE

MEMORIAL PARK FLOOD BASIN

Sheet #:

BACKSTOP

BLEACHER WITH SHADE COVER

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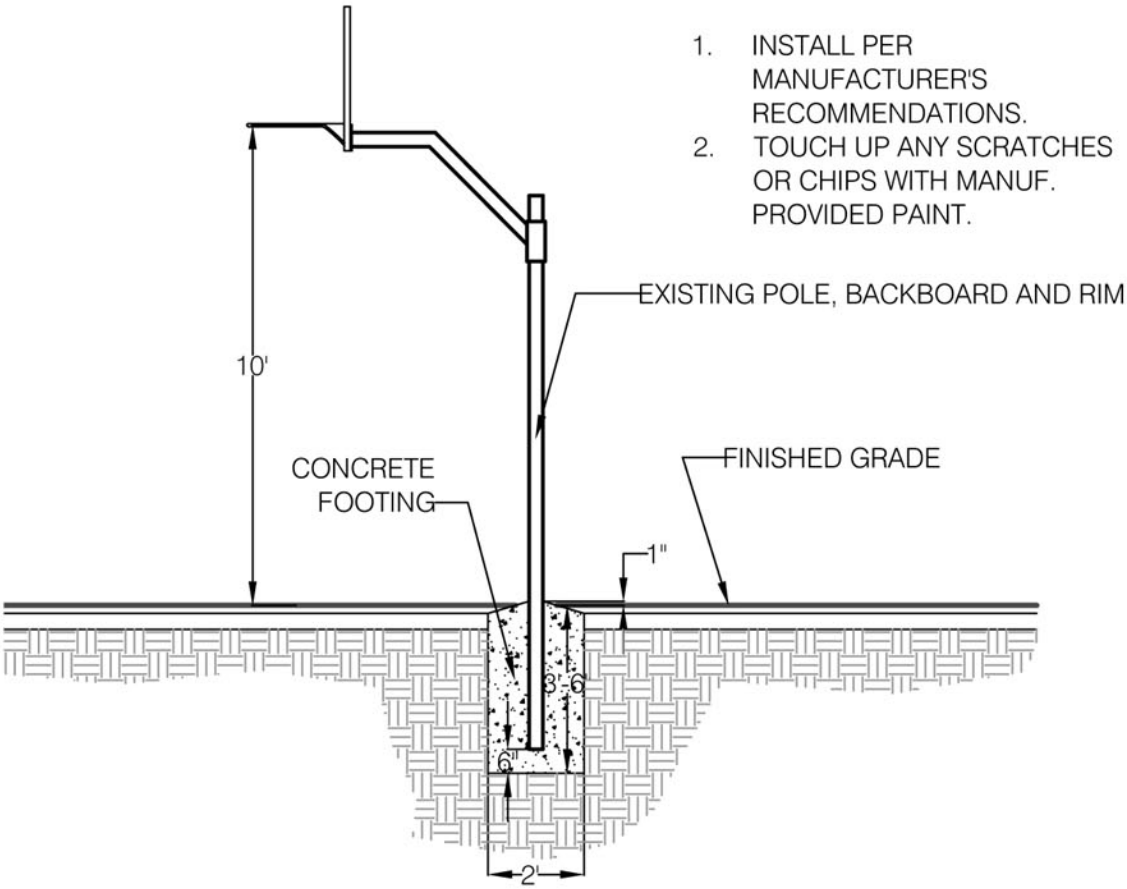
Sheet Title: SITE FURNISHINGS

MEMORIAL PARK FLOOD BASIN

Sheet #:

NOTES:

1. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.
2. TOUCH UP ANY SCRATCHES OR CHIPS WITH MANUF. PROVIDED PAINT.



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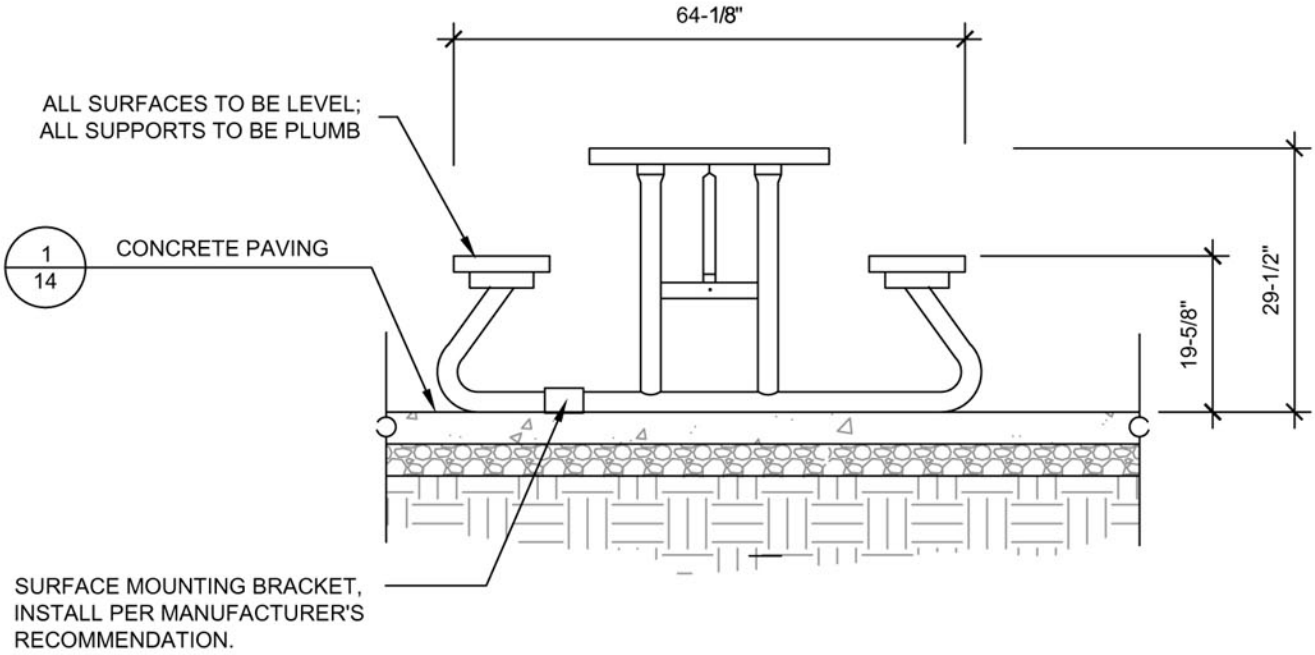
Project:

Sheet Title: BASKETBALL BACKBOARD/STANDARD MEMORIAL PARK FLOOD BASIN

Sheet #:

NOTES

1. 6' RECTANGULAR PICNIC TABLE AND 8' RECTANGULAR ADA PICNIC TABLE BY WABASH OR EQUAL.
2. ALL INSTALLATIONS SHALL FOLLOW MANUFACTURER'S RECOMMENDED INSTALLATION PROCEDURES.
3. TO ESTABLISH HEIGHTS OF TABLES AND SEATS, MEASURE FROM THE MIDPOINT OF FURNISHING AND HOLD ALL SEATS EQUAL IN HEIGHT AND LEVEL.



PICNIC TABLE

GROUP BBQ

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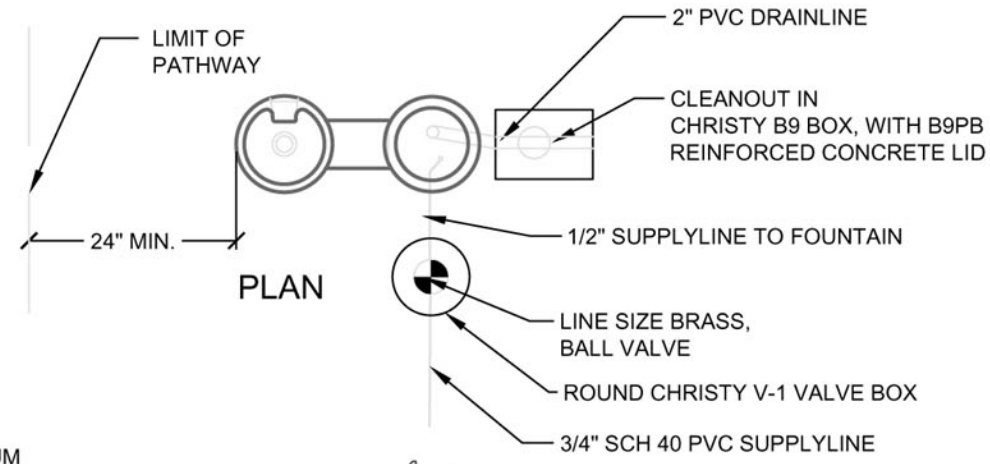
Sheet Title: SITE FURNISHINGS

MEMORIAL PARK FLOOD BASIN

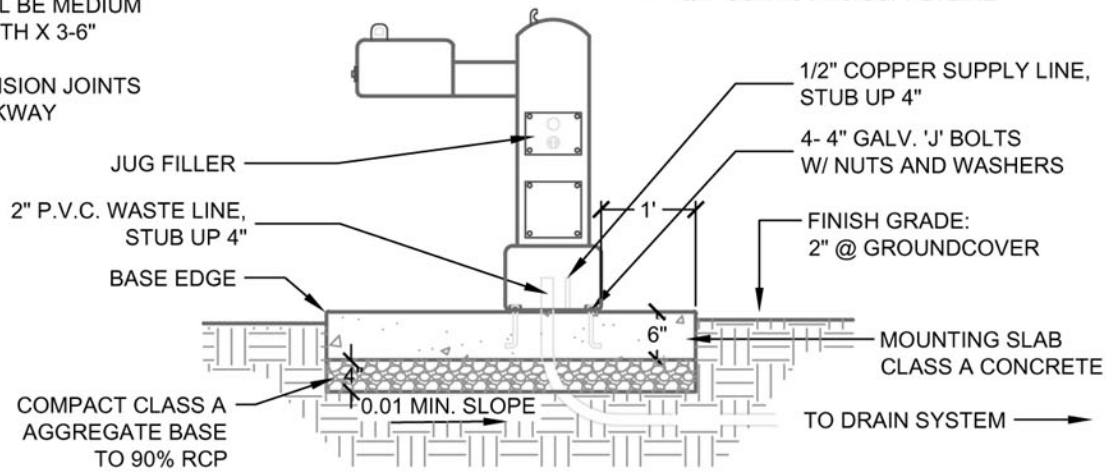
Sheet #:

NOTE

1. MINIMUM 24" CLEARANCE, TYP.
2. DRINKING FOUNTAIN SHALL MEET ALL ADA DIMENSIONAL STANDARDS
3. MDF MODEL #440SS, STAINLESS STEEL, W/ JUG FILLER.
4. PLACEMENT OF DRINKING FOUNTAIN SHALL BE APPROVED BY THE CITY ENGINEER PRIOR TO INSTALLATION
5. FOUNTAIN SLAB SHALL BE MEDIUM BROOM FINISH, 2' WIDTH X 3-6" LENGTH X 6" THICK MIN. AND WITH EXPANSION JOINTS WHERE JOINING WALKWAY



PLAN



ELEVATION

ADA DRINKING FOUNTAIN

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Sheet Title: DRINKING FOUNTAIN

MEMORIAL PARK FLOOD BASIN

Sheet #:

FIGURE E4.11

SCHOOL AGED PLAY EQUIPMENT

PRE-SCHOOL AGED EQUIPMENT

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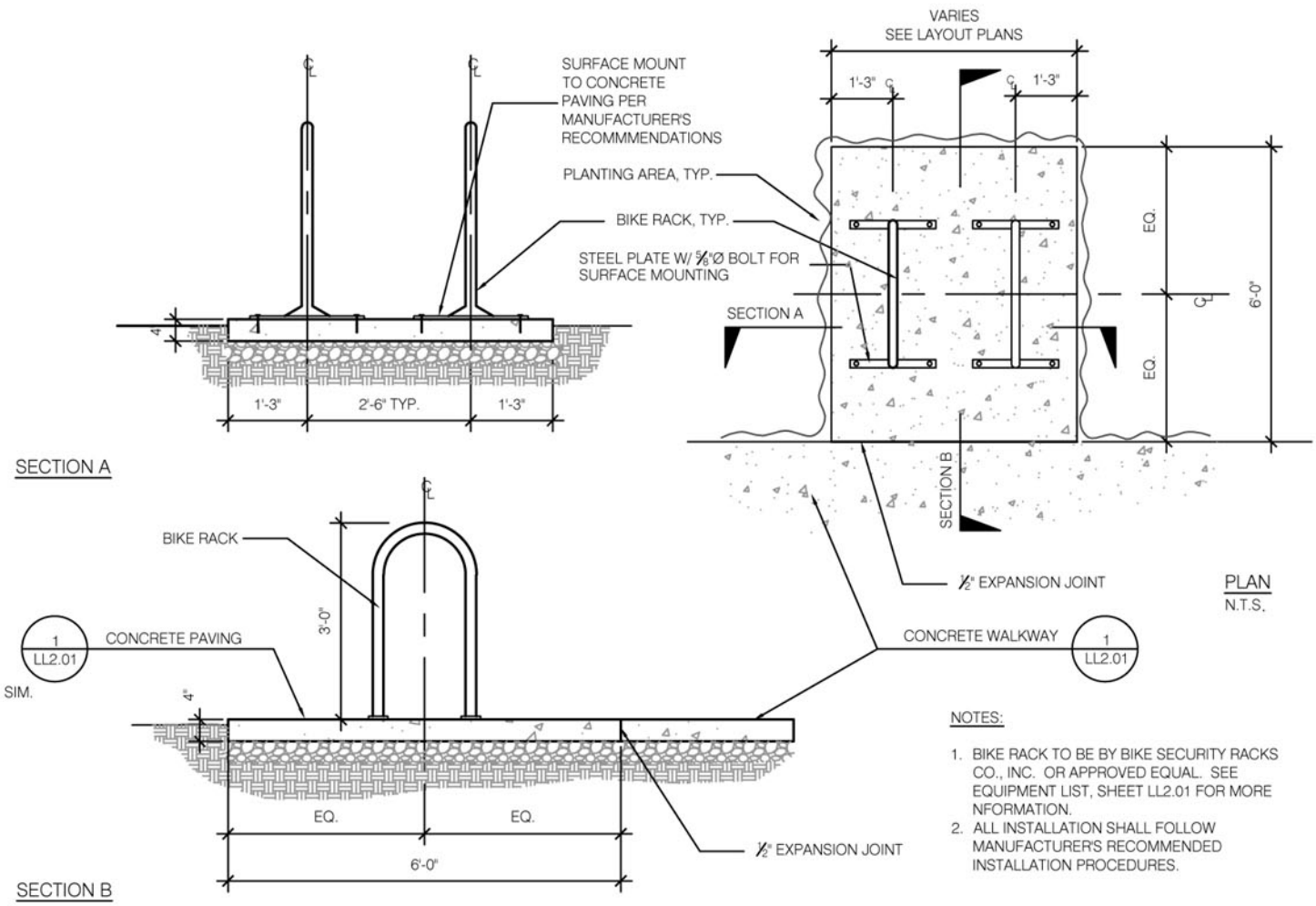
Sheet Title: PLAY EQUIPMENT

MEMORIAL PARK FLOOD BASIN

Sheet #:



NOTES:

1. BIKE RACK TO BE BY BIKE SECURITY RACKS CO., INC. OR APPROVED EQUAL. SEE EQUIPMENT LIST, SHEET LL2.01 FOR MORE NFORMATION.
2. ALL INSTALLATION SHALL FOLLOW MANUFACTURER'S RECOMMENDED INSTALLATION PROCEDURES.

BICYCLE HOOP RACK

TRASH RECEPTACLES

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MEMORIAL PARK FLOOD BASIN

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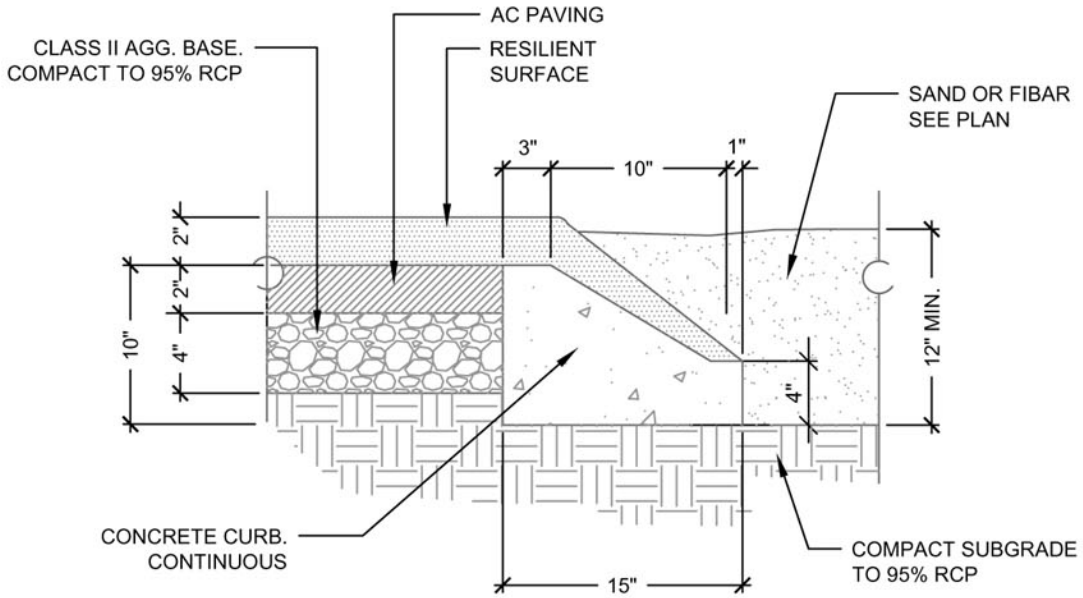
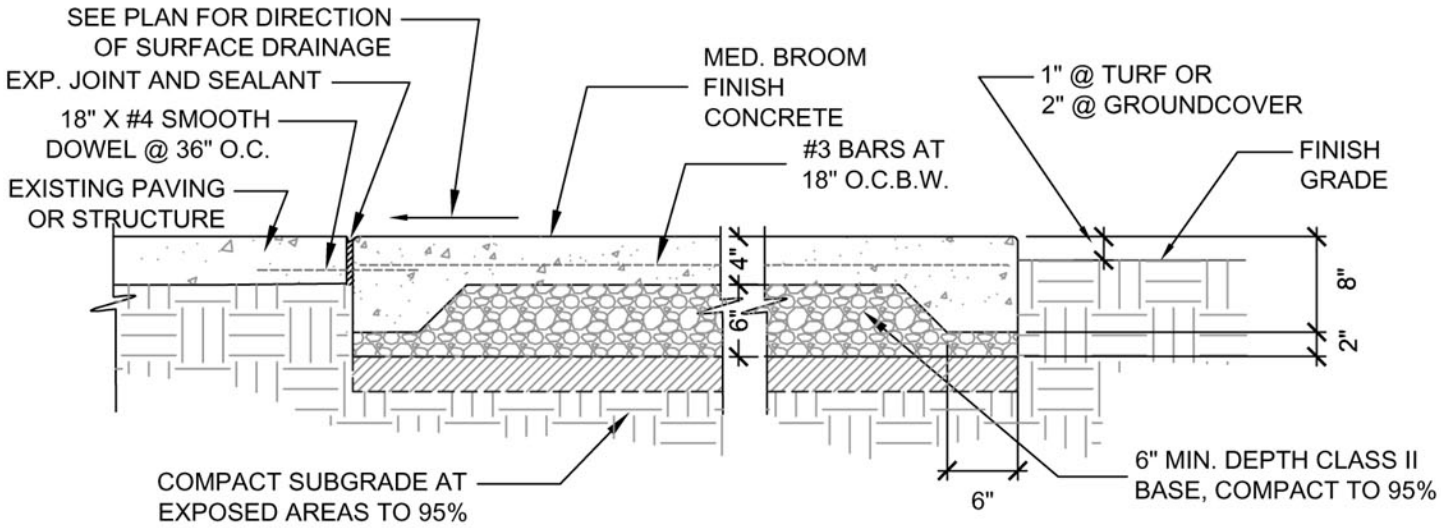


PLAY AREA SURFACING

NOTES

1. ALL SURFACES TO BE BROOM FINISH PERPENDICULAR TO THE FLOW OF TRAFFIC.
2. EXPANSION JOINTS WITH SEALANT AT 20' ON CENTER MAXIMUM.
3. SCORE JOINTS @ 5' O.C. MINIMUM, SEE PLANS FOR PATTERN.
4. ALL CONCRETE SHALL BE CLASS B, 2500 P.S.I. MINIMUM.
5. USE $\frac{1}{2}$" EXPANSION JOINT WHERE WALKWAY PAVING MEETS ADJACENT CONCRETE PAVING OR STRUCTURE.



CONCRETE PAVING

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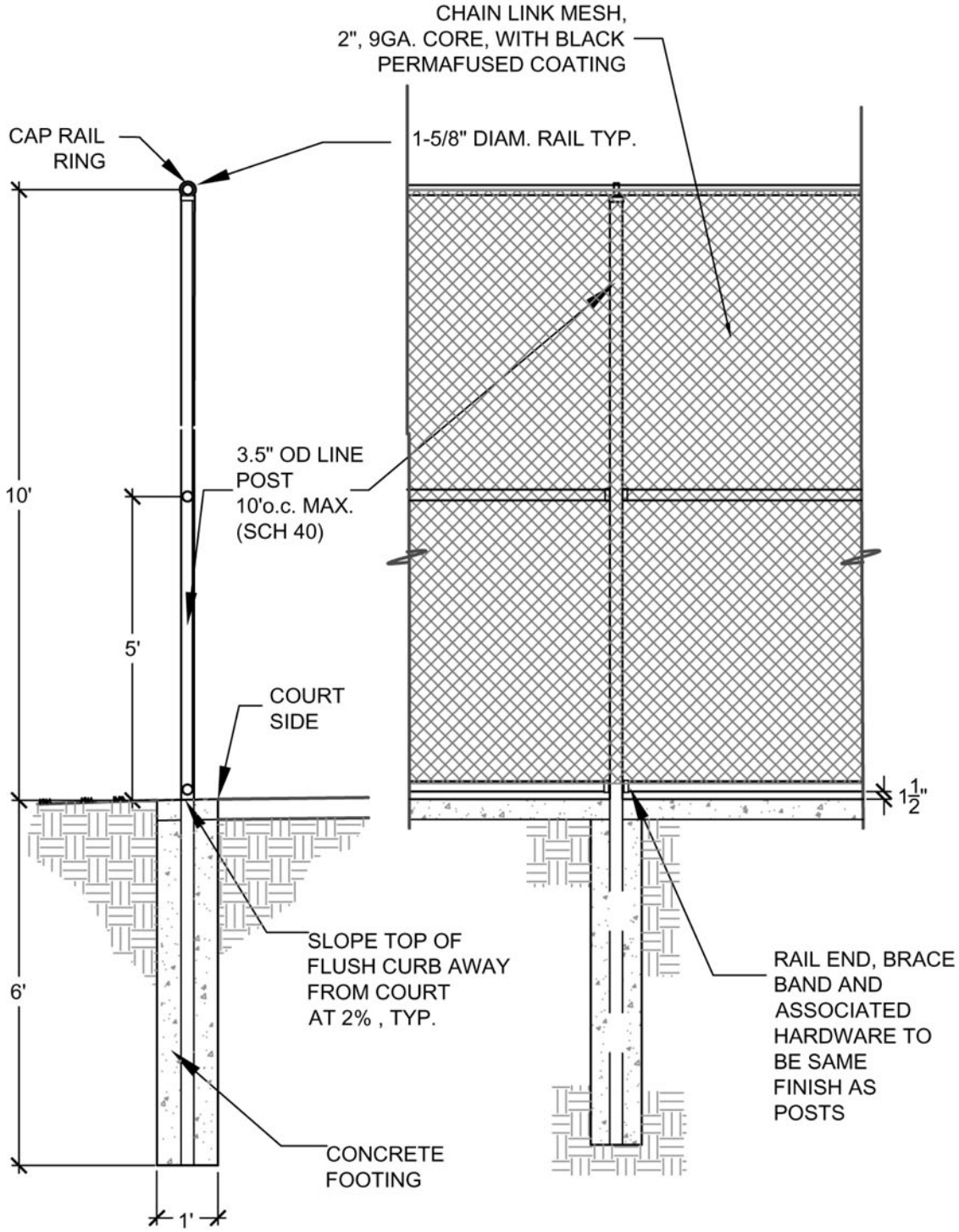
Sheet Title: PAVING/SURFACING

MEMORIAL PARK FLOOD BASIN

Sheet #:



SECTION

ELEVATION

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Sheet Title: CHAIN LINK FENCING

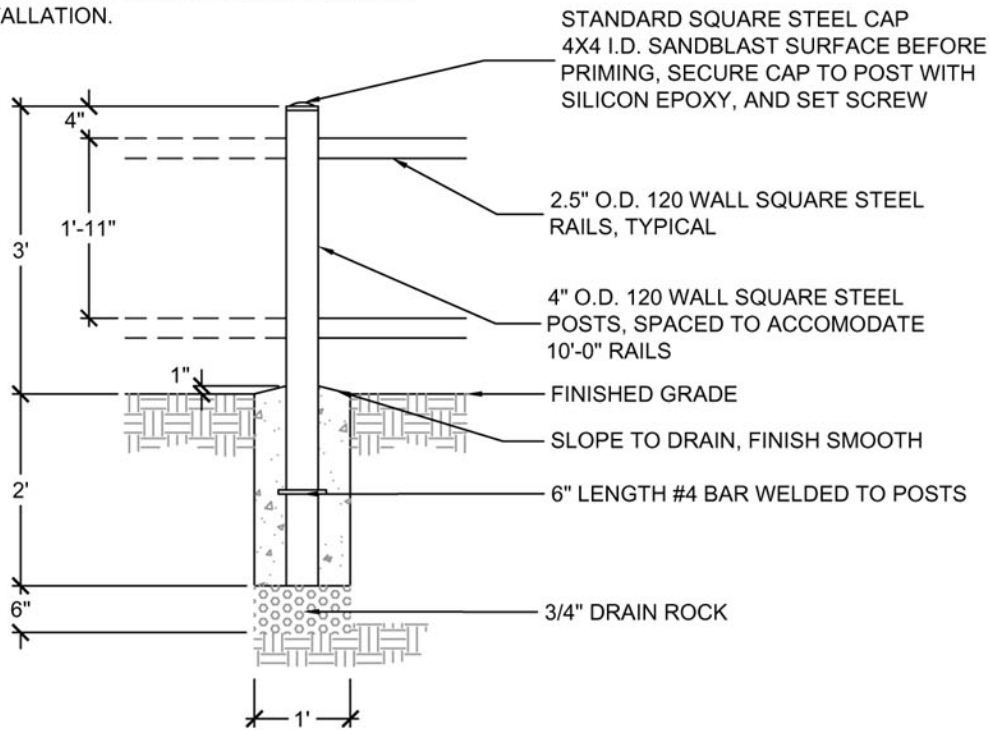
MEMORIAL PARK FLOOD BASIN

Sheet #:

NOTES

1. ALL POSTS, CAPS, AND RAILS SHALL BE PRIMED WITH ONE COAT OF RED ZINC OXIDE, AND PAINTED WITH TWO COATS OF INDUSTRIAL ENAMEL AFTER INSTALLATION.

2. PRIME POST FOOTING SECTION PRIOR TO INSTALLATION.



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Date: Project:

Sheet Title: POST & RAIL FENCE

MEMORIAL PARK FLOOD BASIN

Sheet #:

Appendices

Appendix 1: HEC-HMS Hydrologic Modeling Analysis of Memorial Park Detention Basin in Peak Flow Reduction

Appendix 2: Preliminary Coordinated Operations Plan for Memorial Park Detention Basin

Appendix 3: Lower Sorich Creek Culvert Assessment

Appendix 4: Geotechnical Evaluations

- Initial Evaluation
- Supplemental Evaluation

Appendix 5: Recreation Facility Assessment

Appendix 6: Public Meetings Information