APPENDIX I

DRAINAGE MASTER PLAN

BROOKFIELD RESIDENTIAL

Amoruso Ranch Specific Plan Area

February 2016

DRAINAGE MASTER PLAN

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Amoruso Ranch Specific Plan Area

Drainage Master Plan

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INTRODUCTION

The Amoruso Ranch Specific Plan (ARSP) Area Drainage Master Plan (Plan) has been prepared at the request of Brookfield Residential Properties, Inc. (Brookfield) to meet the City of Roseville's (City) drainage requirements and in support of the Amoruso Ranch Specific Plan process.

DRAINAGE MASTER PLAN PURPOSE

The purpose of this Plan is to document the various existing constraints, known issues and criteria associated with stormwater within the proposed ARSP project and to provide a preliminary assessment of the impacts and mitigations related to the overall drainage of the site. The Plan addresses multiple drainage issues including flood levels, significant drainage features, and stormwater quality and hydromodification management. The key objectives of this Plan are to demonstrate the off-site flooding effects as a result of the proposed project, to protect the proposed project from flooding, and to show that stormwater quality requirements emphasizing the use of Low Impact Development (LID) techniques in site design are met. Prior to subsequent approvals for small lot tentative maps and construction of facilities, a project specific drainage plan will be developed to address actual conditions.

ARSP AREA LOCATION AND DESCRIPTION

Project Vicinity

The ARSP Area consists of approximately 694.4-acres located in the northwest edge of the City of Roseville; this total includes the 20 acre Wagner Parcel. Prior to the Specific Plan's adoption, most of the Plan Area was within the City's Sphere of Influence and was recognized as a logical growth extension for the City. The Specific Plan Area is bounded on the west by the Al Johnson Wildlife Area, to the south by the Creekview Specific Plan Area, to the east by the future proposed Placer Ranch Specific Plan Area and to the north by the existing Toad Hill Ranches #1 area. The ARSP project vicinity is shown on Figure 1.

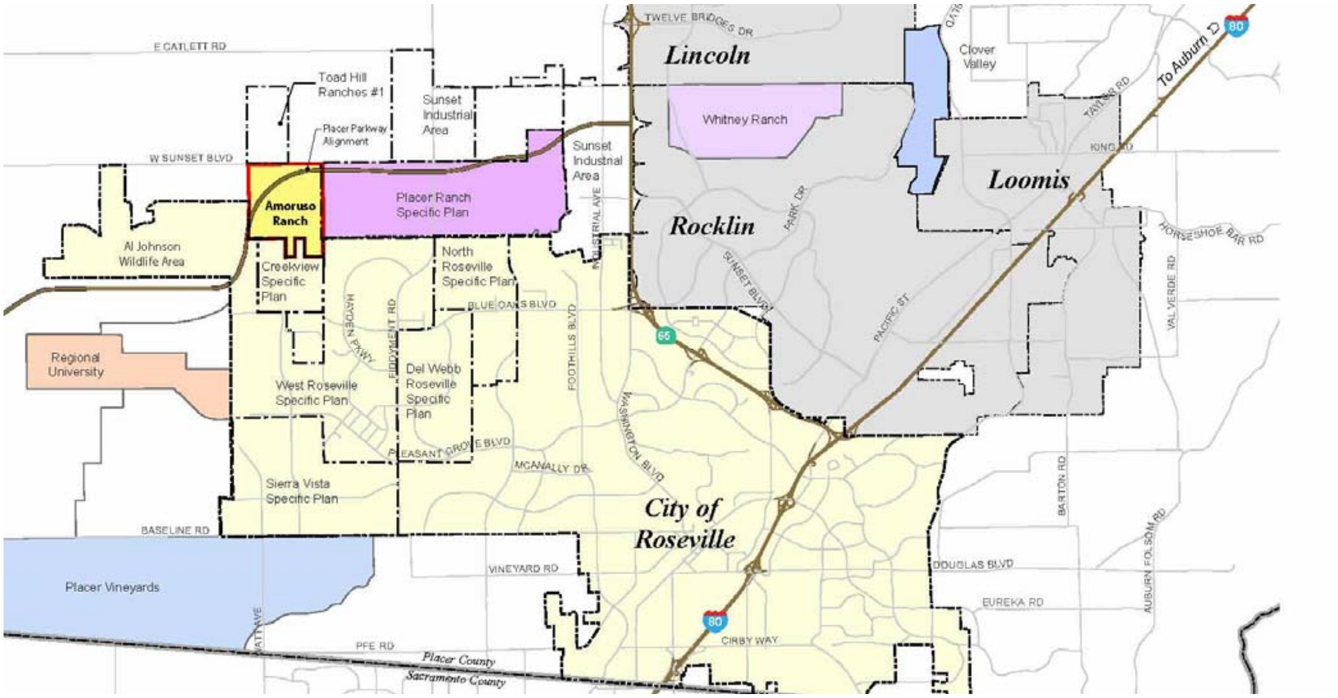


Figure 1 - ARSP Area Project Vicinity

Pre-Development Conditions

In the pre-development conditions the ARSP Area was used as a cattle ranch. The primary use was open grazing land, but included a small ranch house and out buildings. The land is gently rolling terrain generally trending to the west and south. Minor drainages flow in a radial pattern from a slight rise in the northeast quadrant of the property. The elevation changes gently from the northeast down to the southwest.

The site vegetation is generally limited to short, seasonal grasses. There are several oak trees located along University Creek and a number of non-native trees located around the former ranch house. Wetland conditions and their associated flora and fauna are located in small areas typically along the drainage corridors and in flats along the southern boundary. Figure 2 highlights the ARSP Area pre-development conditions.

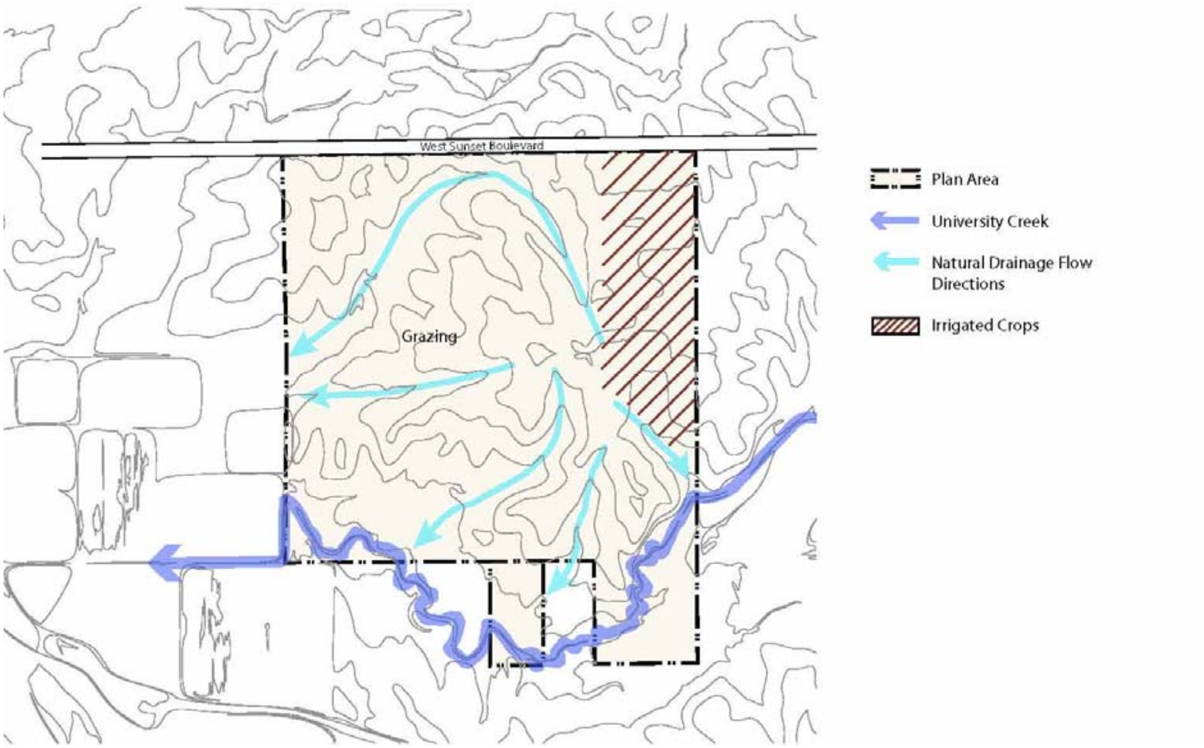


Figure 2 - ARSP Area Pre-Development Conditions

ARSP Area Land Use Plan

The ARSP Area provides for a mix of land uses to achieve the desired community form and objectives. These land use designations include low-, medium- and high density residential uses; commercial and office uses; which in some cases are sited with one another and/or with residential uses; public and quasi-public uses for the schools and civic activities such as a fire station; parks and open space uses; and an urban reserve.

At buildout, the ARSP Area will provide for 2,827 dwelling units, adds approximately 51 acres of commercial retail and office land uses, and provide approximately 22-acres of parks and 146-acres of open space. The ARSP Area Land Use Plan is shown in Figure 3.

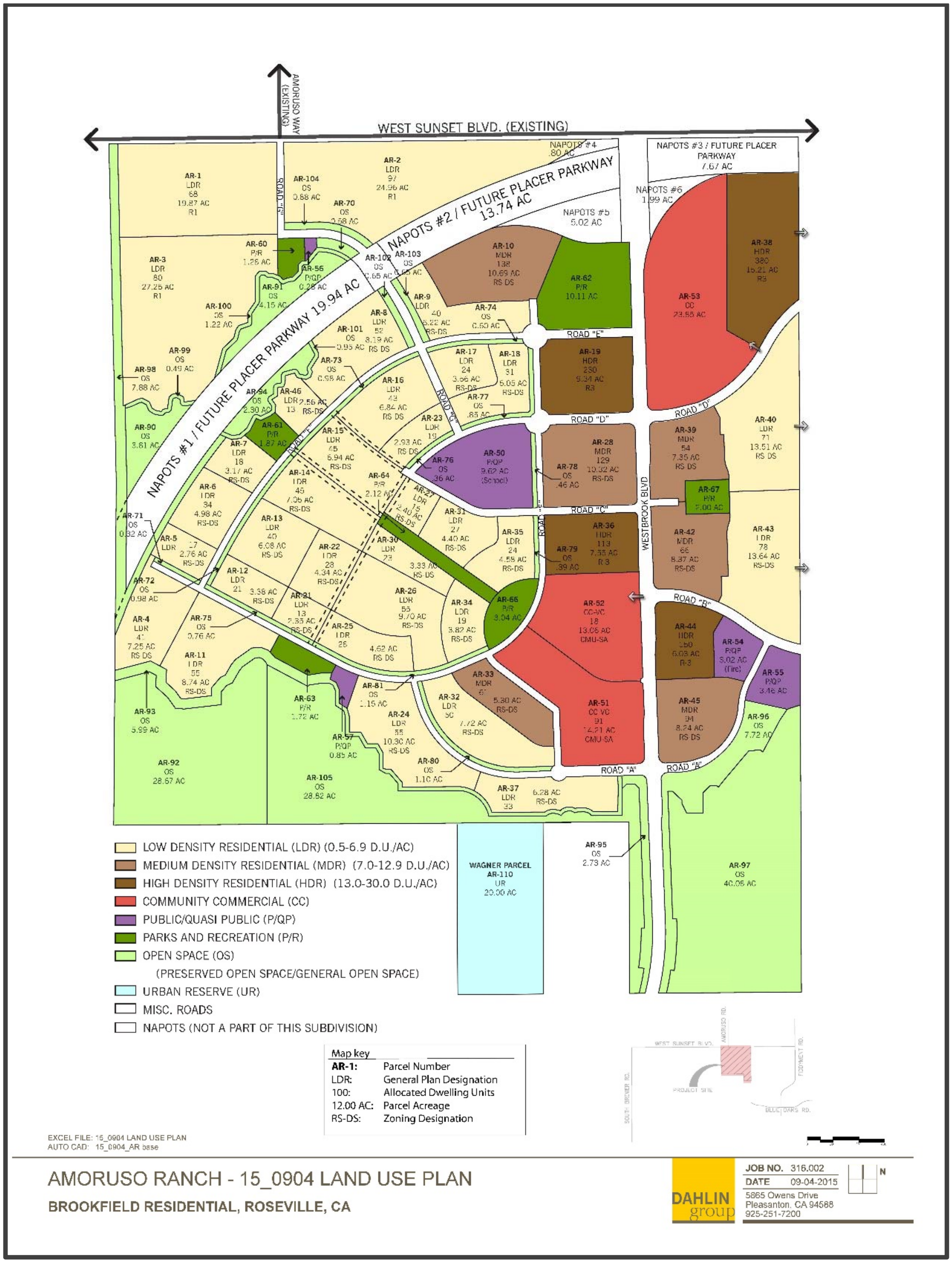


Figure 3 - ARSP Area Land Use Plan

Existing Drainage Setting

The Amoruso Ranch Development project site covers approximately 1.05 square miles of mostly undeveloped land located in Placer County just west of the City of Roseville (City) in the lower portion of the Pleasant Grove Creek watershed. The project site, in reference to the Pleasant Grove Creek watershed is illustrated in Exhibit 1. The project site is mostly located in an area identified as being within the PL10Q and PL10N sub-watersheds on historic drainage area maps. The northern corners of the project site are within the PL11B, PL11C and PL11D sub-watersheds. The existing development on the project site includes a single-family residential home and two barn structures that store farm related equipment/supplies. The site has historically been used as a grazing area for livestock.

University Creek, an intermittent stream tributary to Pleasant Grove Creek meanders westerly near the southern boundary of the property, crossing both the southeast and southwest corners of the site. University Creek joins the main branch of Pleasant Grove Creek west of the ARSP area. The Pleasant Grove Creek watershed is located in the larger Natomas Cross Canal watershed of northwestern Placer County and southeastern Sutter County. The Pleasant Grove Creek watershed drains to the Pleasant Grove Canal, to the Natomas Cross Canal, and then to the Sacramento River.

An area around and including this tributary is covered by an Approximate Zone A on the currently effective Flood Insurance Rate Map (FIRM) panel 06061C0400F dated June 8, 1998 as shown in Exhibit 2a. FEMA is in the process of updating the FIRM with a Digital FIRM (DFIRM) for Placer County. At the time of this report, the DFIRM development was not complete. The base model for the hydrology presented in this report is the model developed by FEMA as part of the FEMA DFIRM update as revised by the City of Roseville and provided by the City for this analysis in May 2015. The revised model includes upstream development, revised overland flow lengths, and revised land uses not originally included in the FEMA Cooperating Technical Partner (CTP). The base model used here is referred to as the "FEMA CTP Revised Model". A Letter of Map Revision (LOMR) dated September 26, 2006 revised a portion of the Approximate Zone A area on University Creek (Exhibit 2b). The southern portion of the project site drains to University Creek. The peak discharges in University Creek are largely controlled by runoff from about four square-miles of upstream areas that are for the most part, currently undeveloped. Much of this upstream area is expected to be developed as part of the Sunset Industrial area, Placer Ranch, and West Roseville Specific Plan areas. Immediately downstream from the project area, University Creek has been previously redirected to the south around agricultural (rice) fields, and then turns due west to its confluence with Pleasant Grove Creek. University Creek, near the southwest corner of the project area, is shown in Photograph 1.

Photograph 1: University Creek near the southwest corner of the Amoruso Ranch project area.

The area of rice fields west of the project site is the City of Roseville Al Johnson Wildlife Area site, described in the Reason Farms Retention Basin Final Environmental Impact Report (EIR) dated January 10, 2003. This EIR refers to University Creek as “Northern Tributary Two”.

Approximately 45 percent of the project site drains from the northeast to southwest toward the center of the western boundary of the project site. This area, identified as PL10Q1 on the project area watershed map included as Exhibit 4, was part of the historic sub-watershed area identified as PL10Q because it drained to the same stream as the rest of the PL10Q sub-watershed area according to streamlines on USGS topographic mapping. The detailed project area topographic mapping indicates that a berm on City-owned property and a drainage ditch on a privately held property have redirected the low flows to the north around rice fields just west of the site boundary to drain to the tributary to Pleasant Grove Creek that receives runoff from the sub-watershed area identified as PL11D. Analysis based on detailed topographic data shows that the capacity of the ditch is limited, and high flows would spill over the berm to the south into the rice fields. Photographs 2, 3, and 4 show the western edge of the project site. More detailed discussion of the drainage patterns is included in the Existing Site Drainage Patterns section.

Photograph 2: Western edge of project site, looking north showing bermed rice field to the left (west) of the fence.

Photograph 3: Western edge of project site looking west. The berm running through the picture is on City-owned property and directs drainage from the project site into the ditch. Currently during large storm events, flows spill over the berm to the south, onto City-owned property.

Photograph 4: Western edge of project site looking west. Bermed rice field from Photograph 3 is on the left side of the picture. A small ditch runs to the right (north) of the fence. The existing overland release path is along this ditch and over the berm to the left of the picture (south).

Drainage Opportunities and Constraints

The proposed ARSP Area land use plan is influenced by several factors, including the physical setting, land use and circulation conditions, and public policies, including the City of Roseville General Plan Policies and Development Standards. The existing topography, natural resources, soils, adjacent properties and proposed future improvements all provide the ARSP area with a variety of unique project opportunities and constraints. Some of these opportunities and more critical constraints are discussed further in this section of the report.

OPPORTUNITIES

Al Johnson Wildlife Area (Formerly Reason Farms Regional Retention Basin)

The City of Roseville has plans to construct a regional retention facility within the Al Johnson Wildlife Area, formerly known as the Reason Farms Retention Basin. This area is owned by the City and located west of the ARSP area. The property was purchased by the City for the purposes of constructing a flood control/retention basin project to mitigate the City's cumulative flood impacts on downstream communities within the Pleasant Grove Watershed.

The goal is to provide retention storage in two basins, a south basin with 1850 acre-feet of storage and a north basin with 680 acre-feet of storage.

The Reason Farms Retention Basin presents a significant opportunity for the Amoruso Ranch development as the basin provides a regional solution to downstream volumetric impacts resulting from development within the Pleasant Grove Creek watershed. For the analysis presented here, it is assumed that the Amoruso Ranch development will be annexed into a new drainage fee district and pay the City an in-lieu fee in order to mitigate for the downstream volumetric impacts.

Open Space and Resources Preservation

The ARSP Area will support open space and resource preservation by providing permanent open space. In combination with the 1,700-acre open space afforded by the City of Roseville Al Johnson Wildlife Area, this open space provides connectivity with open space within the Creekview Specific Plan Area, south of the ARSP Area, and lands to the east of the ARSP Area (Figure 3).

The Amoruso Ranch Specific Plan will provide an open space corridor that includes a pedestrian and bike path linkage between this major open space area and the City's regional trail system. In addition, the corridor will provide a permanent wetland resources preservation area.

CONSTRAINTS

Topography of Adjacent Parcels

The drainage of the Amoruso Ranch property is controlled by the topography of the adjacent parcels. Future grading will require matching existing edge conditions as well as providing positive drainage paths. Exhibit 1 shows the Amoruso Ranch project within the Pleasant Grove Creek watershed. Exhibit 4 shows the existing conditions drainage patterns.

- East: Runoff from the eastern parcel is limited to the corridor defined by University Creek. No grading is proposed within the University Creek corridor at the project boundary. Existing grading on the parcel to the east causes runoff to flow north and south and does not currently allow run-on to the Amoruso Ranch property.
- South: Runoff from the southern portion of the site drains directly into University Creek. Sub-watersheds PL10K2 and PL10K1 flow onto the parcel to the south before discharging into University Creek. University Creek passes through the project site through sub-watersheds PL10K and PL10M1A, off the project site into the parcel that is part of the future Creekview development, and then back on the project site through PL10N.

- North: PL11B1 discharges offsite to the North through an existing 8-inch culvert. The project site also receives runoff through two 8-inch culverts that drain from a 4.5 acre area that includes a portion of Sunset Boulevard and a residential area.
- Northwest: Sub-watersheds PL11C1 and PL11D1 discharge to the north and west, respectively and into the unnamed tributary to Pleasant Grove Creek. PL11C1 discharges through an 8-inch culvert that drains to a ditch in the existing residential development. PL11D1 sheet flows to the west.
- West: Approximately 45 percent of the project site drains from the northeast to southwest toward the center of the western boundary of the project site (Exhibit 5). The detailed project area topographic mapping indicates that a berm on City-owned property and a drainage ditch on the privately held Gleason property redirect low flows to the north around rice fields just west of the Amoruso Project boundary (see flow arrows on Exhibits 4 and 5). During more frequent storm events, the flow floods the ditch and spills over the berm to the south into the rice fields for most significant storm events. The existing local topography causes an area of ponding, shown approximately on Exhibit 5.

Environmental Issues

Environmental resources such as vernal pools and seasonal wetlands have been identified on site and are concentrated in areas that have been designated as open space adjacent to University Creek and adjacent to the proposed Placer Parkway corridor. Many of the environmental resources are within the existing drainage course.

ECORP has indicated that to maintain the beneficial uses, these environmental resources cannot receive seasonal irrigation flows (car wash runoff, irrigation runoff from hardscape, etc.) or low flows (incremental increase in stormwater volume that will be discharged slowly from LID features). This will require an alternative discharge configuration as these types of flows cannot be discharged into the existing drainage course. This impacts the outfall at the southeast corner of the project. Low flows and seasonal irrigation flows will need to be conveyed under (i.e. piped) or around (i.e. diversion channel) to avoid the environmental resources. A diversion channel could be configured to accommodate the seasonal irrigation flows and low flows while allowing spillage to occur into the natural drainage course during larger storm events.

Ponding Area

As evidenced by USGS topographic mapping prepared in 1967, the historic drainage patterns on the project area have been manipulated by farming practices, including the installation of several berms and ditches to divert and channelize flows in and around the boundaries of the project site. Exhibit 3 shows the historic drainage patterns from the 1967 USGS map. The historic low flow drainage path from Drainage Area PL10Q1 has been redirected to the north of a bermed rice field since 1967. A ditch is located just west of Discharge Point E, but slopes to the east. The highest point along the invert of the ditch is about 81.3 feet. Therefore, runoff is retained onsite until it reaches an elevation of 81.3 feet.

The lowest elevation of the berm adjacent to the ditch is 82.0 feet. The capacity of the ditch at that location is less than 10 cfs, which is less than the 2-year flow rate from the tributary area. Low flows from PL10Q1 flow through the ditch, but runoff from larger storm events in excess of 10 cfs spills over the berm to the south and then continues south and west across the City-owned property towards University Creek and Pleasant Grove Creek. The ponded area onsite can reach a water surface elevation of about 82.5 feet and is controlled by the elevation of the berm and the ditch. The maximum extent of the ponding at elevation 82.5 feet covers an area of about 2.7 acres. Exhibit 5 shows an aerial photo of the ponded area and the ditch that conveys the overland flow.

Placer Parkway

The natural drainage course for the Amoruso Ranch Project site is partially contained within the Placer Parkway corridor area. The preferred drainage alternative for the ARSP will require diversions away from Placer Parkway to avoid environmental impacts until Placer Parkway is constructed.

Without Placer Parkway design details, including stormwater conveyance associated with the Placer Parkway, it is not possible at this time to include stormwater conveyance facilities within the ARSP Area that will accommodate the unknown future conditions with a built-out Placer Parkway. However, the design of the stormwater facilities within the ARSP Area have been proposed so that they can readily be modified, integrated and/or work collaboratively with the ultimate Placer Parkway drainage system when the design is fully developed and advanced beyond its current preliminary status of alignment reservation. The drainage analysis presented in this report includes Placer Parkway under developed conditions.

Geotechnical

A Preliminary Geotechnical Exploration was completed by ENGEO on April 26, 2012. The findings of the exploration indicate that groundwater should not impact site design. Soil conditions are dominated by silts and clays with low permeability and high runoff potential and the entire site is classified with hydrologic soil group D. Limited stormwater infiltration will occur in areas underlain by these soils. Preliminary exploration bores identified zones that have more permeable sandy material more suitable to infiltration. Future testing could identify the potential infiltration rate based on double ring infiltrometer testing, if required.

University Creek Floodplain

University Creek, a 3,477-acre watershed that drains in a southwestern direction, is a tributary to Pleasant Grove Creek. Approximately 95% of the University Creek watershed is undeveloped today. University Creek crosses the southeastern and southwestern corners of the ARSP Area. Approximately 49% of the ARSP Area is tributary to University Creek, under existing conditions. Although 49% of the ARSP Area is located within the University Creek Watershed, the majority of the Watershed lies outside of the ARSP Area (Exhibit 1).

An area around and including University Creek is located in mapped FEMA Zone A, [Flood Insurance Rate Map (FIRM) panel 06061C0400F dated June 8, 1998 as modified by the July 2007 LOMR] (Exhibit 2b). Zone A identifies an approximate special flood hazard area which no Base Flood Elevations (BFE's) have been provided. This area represents a flood zone determined using approximate methodologies and is a general outline of where flooding has the potential to occur during the 100-year storm event. The extent of the Pre-Project University Creek floodplain, determined as part of the analysis presented in this report, and ponding area along the project's western boundary are shown in Exhibits 4 and 5.

In compliance with the National Flood Insurance Program, the City of Roseville will require the project to apply for a Conditional Letter of Map Revision (CLOMR) and a Letter of Map Revision (LOMR). These applications provide the City and FEMA with detailed hydraulic analyses, BFE data, and revised floodplain maps.

Proposed Westbrook Crossing at University Creek

Final design of proposed ARSP crossings will require detailed hydraulic analysis to demonstrate that the hydraulic elevations and peak flow attenuation levels proposed in this document would be maintained under the post-project conditions. The proposed Westbrook Crossing is located near the southern boundary with the Creekview Specific Plan (Exhibit 6). This crossing is included as part of the analyses presented in this report to estimate impacts on the 100-year floodplain as well as downstream impacts, if any.

DRAINAGE PATTERNS AND AREAS

HISTORICAL SITE DRAINAGE PATTERNS

As evidenced by USGS topography conducted in 1967, the historic drainage patterns in the project area have been manipulated by farming practices, including the installation of several berms and ditches to divert and channelize flows in and around the boundaries of the project site. Exhibit 3 shows the historic drainage patterns from the 1967 USGS map.

EXISTING SITE DRAINAGE PATTERNS

Existing stormwater flows drain offsite at several discharge locations as shown on Exhibit 4. The majority of the site generally slopes to the south and west with two small sheds (PL11C1 and PL11B1, exhibit 4) flowing to the north. The Amoruso Ranch project site accepts run-on from an approximately 4.5 acre residential area to the north of Sunset Boulevard through two 8-inch culverts. Flow also enters the site through University Creek on the southeast corner of the site. University Creek flows onto the Creekview property to the south of the project area and back onto the project site near the southwest corner where it continues flowing towards the northwest. After crossing the project's western boundary, the channel turns sharply to the south at Discharge Point E (Exhibit 4).

As previously discussed, the historic low flow drainage path from Drainage Area PL10Q1 has been redirected to the north of a bermed rice field (Exhibits 4 and 5). A ditch is located just west of Discharge Point G, but slopes to the east. The highest point on the invert of the ditch is about 81.3 feet. Runoff is retained onsite until it reaches an elevation of 81.3 feet.

The lowest elevation of the berm adjacent to the ditch is 82.0 feet. The capacity of the ditch at that location is less than 10 cfs, which is less than the 2-year flow rate from the tributary area. Low flows from PL10Q1 flow through the ditch, but runoff from larger storm events in excess of 10 cfs spills over the berm to the south and then continues south and west towards University Creek and Pleasant Grove Creek. The ponded area onsite can reach a water surface elevation of about 82.5 feet and is controlled by the elevation of the berm and the ditch. The maximum extent of the ponding at elevation 82.5 feet covers an area of about 2.7 acres. Exhibit 5 shows an aerial photo of the approximate ponding area and the ditch that conveys the overland flow.

Drainage Area PL10M1A is bounded on the east by a bermed field and accepts flow through the drainage channels as well as University Creek, which flows south from PL10K into PL10M1A. The adjacent areas to the east of the project site are separated by large berms and do not contribute runoff onto the Amoruso project site (Exhibit 4).

Drainage Areas and Discharge Locations

The drainage study area is approximately 675-acres of the 694.4-acre ARSP Area. The existing conditions drainage areas and discharge locations are listed in Table 1 and shown in Exhibit 4.

Table 1 – Existing Drainage Areas

Drainage Area	Area (acres)	Percent Impervious	Impervious Area (acres)	Discharge Location	Description
PL10K	73.4	2.0	1.5	B	Overland flow
PL10K1	27.1	2.0	0.5	C	Overland flow south to University Creek
PL10K2	9.2	2.0	0.2	D	Overland flow south to University Creek
PL10M1A	41.9	2.0	0.8	--	University Creek discharge south to University Creek
PL10N	167.9	2.0	3.4	E	University Creek discharge offsite through channel
PL10Q1	255.6	2.0	5.1	G	Runoff ponds at low point until reaching an elevation of 81.3 feet, then spills west through existing ditch. When the runoff exceeds the capacity of the ditch, flows spill from the ditch to the south over a berm which is at an elevation of 82.0 feet.
PL10Q2	44.5	2.0	0.9	F	24-inch concrete culvert (first few feet of culvert are broken and lined with CMP)
PL11B1	31.6	2.0	0.6	J	Overland flow
PL11C1	13.1	2.0	0.3	I	Overland flow
PL11D1	10.7	2.0	0.2	H	Overland flow
ARSP Total	**675**		***13.5***		
Wagner Parcel	20				
PL10Q1A	4.5	2.0	0.1	G	Offsite drainage through PL10Q1. Not part of ARSP area.

PROPOSED DRAINAGE PATTERNS

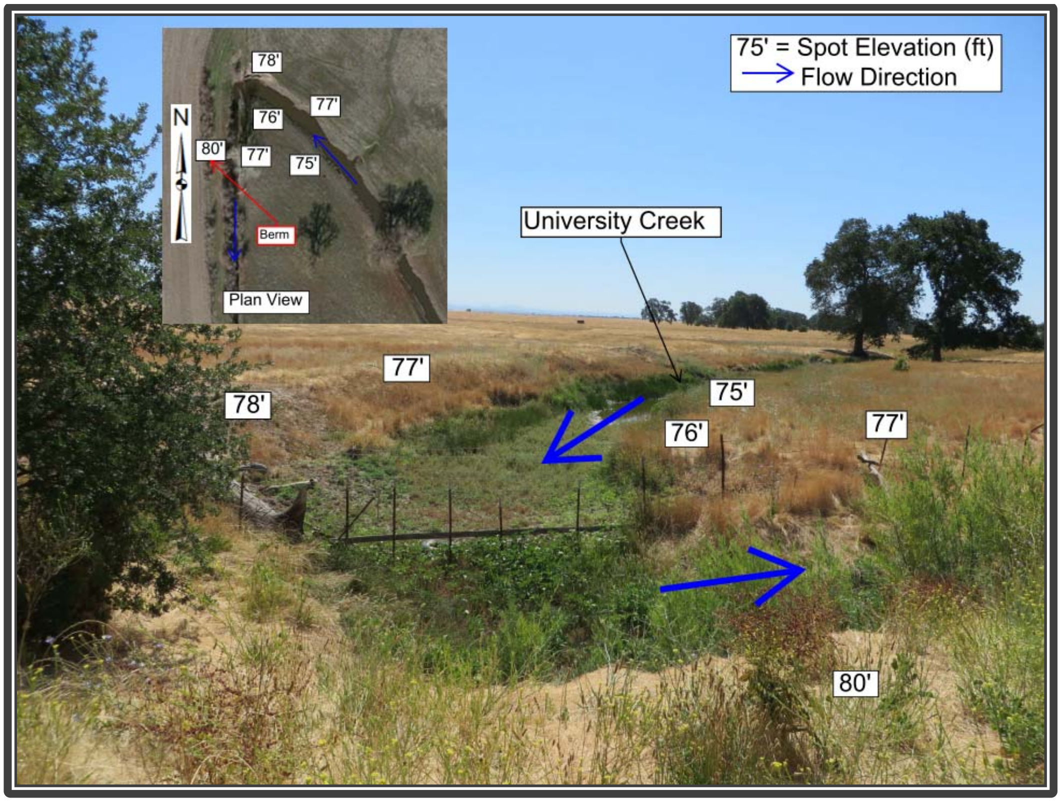
Future Placer Parkway Improvements

The proposed Placer Parkway project, which is currently in the preliminary planning stages and has a completed Tier 1 EIS/Program EIR, runs from the northeast corner of the project site to the west part of the project site (Exhibit 6).

As discussed above, this project is very early in the development phase and the design concepts are outside the complete control of the City and the development team. Due to the uncertainty of the construction schedule of Placer Parkway, the drainage design for Amoruso Ranch considers drainage conditions if Placer Parkway were in place, i.e. increased impervious area, without exact design details.

On-Site Drainage Areas

The proposed onsite drainage system, including drainage areas and drainage collector channels is shown in Exhibit 6, Exhibit 7, and Table 2. The majority of the flow generated by the ARSP project, including the rerouting of nearly 50% of the project area that presently drains to the west and north, will be routed into University Creek and onto the City owned Al Johnson Wildlife Area at the southwestern corner of the project site. The existing “berm” is a minor, elevated area on the west side of University Creek just downstream of the sharp bend in the creek (Photograph 5). The elevated area is only a few feet above the opposite bank.



Photograph 5: Western edge of project site looking east at bend in University Creek where it turns into a small ditch. The existing overland release path is along this ditch and over the minor berm at the bottom of this picture.

The ARSP project proposes to drain the majority of the plan area into channels on the western and southern borders of the ARSP Area. This concept for drainage, also referred to as the "storm drain system", avoids the necessity of multiple direct outlets to University Creek south of the site. Piping drainage to University Creek causes extreme amounts of grading and land disturbance. To avoid this, the channel concept was developed, which combines multiple drainage sheds and results in minimizing the discharge points from the site to two locations. The maintenance plan for these channels is provided later in this report. Due to the use of these channels, the existing berm located on the Reason Farms property and adjacent to University Creek near PL10N1, Exhibit 6, will remain in place and not be removed as part of the ARSP project.

Table 2 – Proposed Drainage Areas

Drainage Area	Area (acres)	Percent Impervious	Impervious Area (acres)	Discharge Location	Comments
PL10K	69.2	46.0	31.8	B	Drains from PL10K
PL10M1A	52.2	7.8	4.1	--	Undeveloped area south of PL10K
PL10N1	17.3	30.8	5.3	--	Developed portion of the area outfalls to onsite channel
PL10N2	106.9	52.1	55.6	--	Developed portion of the area outfalls to onsite channel
PL10N3	53.7	2.0	1.1	--	Undeveloped area at southern portion of development
PL10Q1	211.3	47.6	100.5	--	Outfalls to onsite channel (West Channel)
PL10Q2	23.5	37.9	8.9	--	Outfalls to onsite channel (West Channel)
PL10Q3*	85.7	38.4	33.0	--	Outfalls to onsite channel (West and Northwest Channels)
PL10QPP	33.6	25.1	8.3	--	Western Portion of Proposed Placer Parkway assumed drains to onsite channel (West Channel)
PL10QPP1	21.6	44.3	9.6		Central Portion Proposed Placer Parkway
ARSP Total	***675***	--	***258.1***		
Combination	506.5	44.7	226.4	O	Developed areas PL10N1, PL10N2, PL10Q1, PL10Q2, PL10Q3, PL10QSB, PL10QPP1, and PL10QPP before discharging to University Creek
Combination	681.6	38.6	263.4	E	ARSP Outfall to University Creek (ARSP Total plus PL10QSB)
Wagner Parcel	20	--	--	--	
PL10QSB	6.6	80	5.3	--	Proposed Sunset Boulevard (not part of ARSP) improvements, assumed drains to onsite channel (West and Northwest Channels)

*Contains a portion of Placer Parkway

Discharging seasonal irrigation flows during the spring, summer and fall months into environmental resource areas, including into the existing ditch on the adjacent parcel to the west is a concern. The proposed new collection system layout, incorporating collector channels, provides flexibility to manage seasonal irrigation flow. The system promotes infiltration and evapotranspiration and confines the releases to a single discharge location in the creek to avoid overloading other environmental resources.

In order to minimize disturbance to the natural portion of University Creek, the proposed on-site drainage system will collect and release flows from the ARSP project at the Southwest corner of the development (Appendix F). This proposed channel alignment allows the “minor” berm to remain in place. Necessary erosion and sediment control measures associated with the connection will be incorporated into future project design plans and submitted to the City for review and approval prior to receiving building/grading permits.

It should be noted that in the existing condition, or pre-project condition, various drainage sheds within the Amoruso Ranch Specific Plan area drain to the north, west and south as shown on Exhibit 4. Both the County of Placer and the City of Roseville, as well as neighbors to the north and west have identified that there are existing drainage concerns and potential flooding concerns based on the current pre-development conditions. As a result, this project was requested to look at the feasibility of redirecting flows from the areas of concern (specifically Toad Hill Ranches to the north and the Gleason property to the west).

The proposed project redirects existing flows, that drain towards Toad Hill Ranches and the Gleason Property, as part of the proposed drainage system and overall grading plan (Appendix F).Approximately 360 acres (representing just over 50% of the site), of site stormwater will be redirected and conveyed to the south through the ARSP development ultimately into University Creek at the southwest corner of the project.

Flows from approximately 300-acres of Amoruso Ranch (sheds PL10Q1 and PL10Q2 in Exhibit 4) that currently flow westerly onto the Gleason property would be intercepted by the “west channel” (a proposed open drainage channel along the western property boundary of the Amoruso Ranch) and directed to the south for discharge into University Creek. This would eliminate Discharge Points F and G (Exhibit 4) that currently discharge to the west on or near the Gleason property, resulting in a **decrease** in stormwater runoff onto the Gleason property.

As a result of these proposed improvements, the existing pre-project flows, that were identified as a concern to the neighbors, will be conveyed as part of the overall drainage plan to University Creek and ultimately into Pleasant Grove Creek. As a result, the pre-and post-project drainage sheds are being altered, to the benefit of the neighboring properties (see Tables 1 and 2).

Overland Release Paths

City design standards require that consideration be made for the safe conveyance of overland flow release of the 100-year storm event assuming a total blockage of the storm drain system. The proposed conceptual overland release paths are coincident with the proposed drainage system shown on Exhibits 6, 7, 8a and 8b and outlet in the same location as the storm drain system. The final overland release paths will be further refined as the project progresses into final design. Prior to acceptance and issuance of construction documents, the final design for the storm drainage infrastructure and overland conveyance system will be reviewed by the City's Engineering Department to ensure it complies with the City Improvement Standards and the ARSP Drainage Master Plan.

HYDROLOGY ANALYSES

Site-specific hydrologic modeling was performed for the 2-year, 10-year and 100-year 24-hour storm events using HEC-HMS (Version 4.0) following Placer County methodology as outlined in the Placer County Stormwater Management Manual (SWMM).

PRECIPITATION

2-year, 10-year, and 100-year Storm Events

Precipitation data for the regional and site models were developed using methodology outlined in the SWMM, which requires multiple storm centering scenario analysis. HEC-1 models were prepared using PGCDesktop Tools created by Civil Engineering Solutions, Inc. (CESI) for the FEMA CTP Revised Model. The PGCDesktop tools create HEC-1 input files using the SWMM methodology, including allowing efficient processing of multiple storm scenarios involving multiple recurrence intervals, storm centerings, and storm approach angles. The storm centering that produces the highest runoff rate at a given location is selected as the controlling centering for that location.

Hydrology for the City of Roseville uses a storm centering approach that requires analyzing multiple storm centerings over various watersheds and four angles of rotation and determining which storm centering generates the peak flow at the location of interest. For multiple locations of interest, multiple storm centerings may need to be reviewed. Specific to the ARSP, the storm centering that causes peak flows to occur on University Creek is a storm centered on watershed PL10H at an angle of rotation of 30°. This storm centering was provided by the City and was used for all hydrologic analyses presented in this report.

SOILS AND GROUND COVER

Tabular and spatial soils data showing the SCS hydrologic soil groups were obtained from the Natural Resource Conservation Service (NRCS). ***Table*** 3 describes the hydrologic soil groups.

Table 3 – NRCS SCS Hydrologic Soil Groups

Hydrologic Soil Group	Description
A	Soils having a low runoff potential due to high infiltration rates. These soils consist primarily of deep, well-drained sands and gravel.
B	Soils having a moderately low runoff potential due to moderate infiltration rates. These soils consist primarily of moderately deep to deep, moderately well-drained to well-drained soils with moderately fine to moderately coarse textures.
C	Soils having a moderately high runoff potential due to slow infiltration rates. These soils consist primarily of soils in which a layer exists near the surface that impedes the downward movement of water, or soils with moderately fine to fine texture.
D	Soils having a high runoff potential due to very slow infiltration rates. These soils consist primarily of clays with high water tables, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious parent material.

The project site consists entirely of hydrologic soil group D. Preliminary geotechnical exploration verifies that the soils have high runoff potential and low infiltration rates. Existing ground cover is predominantly grasses. The hydrologic soil groups are summarized in Figure 4.

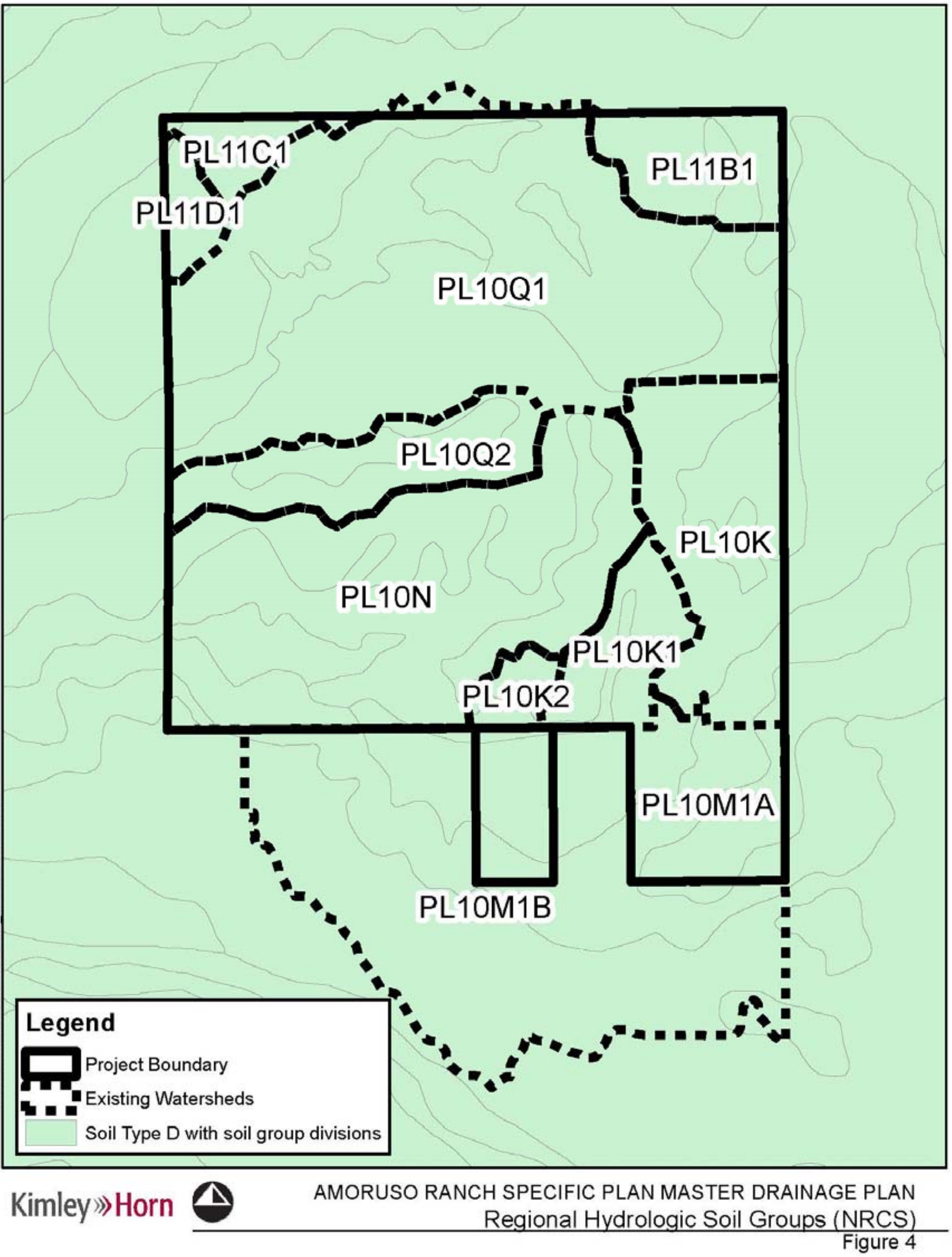


Figure 4 - Regional Hydrologic Soil Groups (NRCS)

INFILTRATION LOSSES

The initial and constant loss method was used for each of the models for the rainfall to runoff transformation. This method uses an initial value and a uniform (constant) value to define infiltration losses. Input parameters include the initial loss in inches, the constant rate in inches per hour and the percent impervious. For undeveloped areas, initial loss was assumed to be 0.1 inches and the constant loss was assumed to be 0.07 inches per hour. These assumed losses correspond to "grass, fair" for hydrologic soil group D of Table 5-3 of the SWMM. For the pervious portion of developed areas such as proposed residential and commercial areas, the constant loss was assumed to be 0.12 inches per hour, which corresponds to "residential or commercial landscaping" for hydrologic soil group D of the previously referenced table. Percent impervious values were determined based on land use (Appendix B).

LAND USE

Existing

For existing conditions, the land use was defined as "Open Space" which corresponds to 2% impervious area for roads and other compacted areas. Also, a 4.5 acre residential area north of Sunset Boulevard drains south onto the project site.

Proposed

Impervious area was defined based on the proposed land use (Appendix B). The proposed land use is summarized in Figure 3 and as part of Exhibits 7 and 8a. Based on the site plan, it is estimated that the ARSP project will add approximately 220-acres of impervious area (Table 2) to the existing 14-acres of impervious area (Table 1) over the approximate 675-acre drainage study area, not including the area reserved for Placer Parkway or Sunset Boulevard. Placer Parkway and Sunset Boulevard are expected to contribute an additional 44 impervious acres. The addition of LID features, as discussed elsewhere in this document, could decrease the directly connected impervious area with features such as pervious pavement, vegetated swales, bio-retention areas and disconnected roof drains.

WATERSHED DELINEATION

The ARSP area is located within the Pleasant Grove Creek watershed (Exhibit 1). Natural watershed boundaries have been modified by development within the watershed, including roadways and agricultural operations. The pre-project watershed boundaries were delineated based on existing drainage areas in the watershed. The pre-project watersheds are summarized in Exhibit 4.

The post-project watershed boundaries were adjusted to conform to the proposed on-site drainage patterns associated with the developed areas (Exhibits 6 and 7).

PRE-PROJECT CONDITIONS HYDROLOGIC MODELING

A Pre-Project HEC-HMS (Version 4.0) model was prepared using the existing drainage areas presented in Table 1 and shown in Exhibit 4. The model used the existing conditions boundaries as shown in Exhibit 4 to allow comparison of discharges at the existing and proposed discharge locations. The basis for the Pre-Project model was the FEMA CTP Revised Model provided by the City of Roseville, May 2015 and includes the Creekview Development (Civil Engineering Solutions, 2010). The parameters for all models are summarized in Appendix B. The ARSP Pre-Project model includes the Placer Parkway corridor alignment in its current state, undeveloped.

Peak flow results for each discharge point (Exhibit 4) from the Pre-Project modeling are shown in ***Table*** 4. ***Table*** 4 presents peak runoff rates with Placer Parkway undeveloped (in the state it exists at the time of this report).

Table 4 – Pre-Project Peak Flow and Runoff Volume Results

Discharge Point	HMS Model Location	Description	Peak Flow (cfs) [24-hr Runoff Volume, ac-ft]		
			2-year 24-hour	10-year 24-hour	100-year 24-hour
A	YPL10J	Flow in University Creek upstream of ARSP	110 [72]	391 [228]	847 [448]
B	YPL10K	Flow in University Creek Downstream of PL10K, PL10K1, and PL10K2	112 [73]	399 [235]	866 [466]
C	PL10K1	Flow out of PL10K1	1.2 [0.8]	5.8 [2.6]	14 [5.3]
D	PL10K2	Flow out of PL10K2	0.4 [0.3]	2.8 [0.9]	4.9 [1.8]
E	YPL10N	Flow in University Creek exiting ARSP	127 [73]	446 [281]	970 [589]
F	PL10Q2	Flow out of PL10Q2	2.2 [1.4]	7.8 [3.7]	22 [8.1]
G	PL10Q1	Flow out of PL10Q1	12 [7.7]	43 [21]	120 [46]
H	PL11D1	Flow out of PL11D1	0.5 [0.3]	1.7 [0.8]	4.8 [1.9]
I	PL11C1	Flow out of PL11C1	0.7 [0.4]	2.3 [1.1]	6.5 [2.4]
J	PL11B1	Flow out of PL11B1	1.6 [1.0]	6.7 [2.9]	17 [6.1]
K	YPL10O	Flow in University Creek upstream of confluence with Pleasant Grove Creek	127 [63]	447 [262]	972 [574]
L	YPLTE1	Flow in Pleasant Grove Creek upstream of confluence with University Creek	1017 [794]	2020 [1542]	4336 [3050]
M	YPL10E	Flow in Pleasant Grove Creek downstream of confluence with University Creek	1115 [857]	2440 [1805]	5279 [3624]
N	YPL12	Flow in Pleasant Grove Creek at Al Johnson Wildlife Area	1192 [722]	2663 [1731]	5747 [3802]

PROPOSED CONDITIONS HYDROLOGIC MODELING

Proposed Conditions (Post-Project without Onsite Storage)

The 100-year, 24-hour Proposed Conditions hydrologic model (also referred to as the Post-Project without Onsite Storage model) includes Placer Parkway if it were developed, Sunset Boulevard if it were developed, and the Creekview Planned Development (Civil Engineering Solutions, 2010). The basis for all the Post-Project models is the FEMA CTP Revised Model provided by the City of Roseville. The **100-year, 24-hour Post-Project without Onsite Storage model** was prepared using the drainage areas shown in Table 2 and Exhibit 6. Impervious area was defined based on the land use; these parameters are summarized in Appendix B. The 100-year, 24-hour Post-Project without Onsite Storage flows for discharge points common to the Pre-Project model (Exhibit 6) are summarized in ***Table*** 5. Also included in ***Table*** 5 are the net changes in peak flows between the Post-Project without Onsite Storage and Pre-Project models.

The peak flows exiting the site under Post-Project without Onsite Storage conditions exceed the Pre-Project peak flows for the 2-year and 10-year events. Peak flows in Pleasant Grove Creek downstream of the confluence do not increase under Post-Project without Onsite Storage 100-year, 24-hour conditions. However, flow volumes exiting the watershed increase under Post-Project without Onsite Storage conditions. (see Section below titled Volumetric Impacts).

A Post-Project with Onsite Storage model was developed for the 100-year, 24-hour event to evaluate impacts of onsite storage. Three one-acre detention basins were added to the Post-Project without Onsite Storage model to create the Post-Project with Onsite Storage model. The detention basins were added downstream of shed PL10K and junctions YPL10Q3 and YPL10N1. The results are summarized in ***Table*** 5 and ***Table*** 6. Although onsite storage reduces flow volume (numbers not presented here), onsite storage causes higher peak flows than those under the Post-Project without Onsite Storage condition. This is due to peak flow timing. As seen in ***Table*** 7, the flows due to the proposed development, including those associated with the Creekview Development, peak before the flows on University Creek and Pleasant Grove Creek. Detaining the peak flows with onsite storage brings them closer in timing to those associated with University Creek and Pleasant Grove Creek.

Table 5 – Comparison of peak Post-Project without Onsite Storage flows, to pre-project peak flows

Discharge Point	HMS Model Location	Description	Peak Flow (cfs) [Net Flow Difference]			
			2-year, 24-hour	10-year, 24-hour	100-year, 24-hour without Onsite Storage	100-year, 24-hour with Onsite Storage
A	YPL10J	Flow in University Creek upstream of ARSP	110 [0]	391 [0]	847 [0]	847 [0]
B	YPL10K	Flow in University Creek Downstream of PL10K	111 [-1]	393 [-6]	851 [-15]	860 [-6]
E	YPL10N	Flow in University Creek exiting ARSP	133 [+6]	452 [+6]	970 [0]	990 [+20]
K	YPL10O	Flow in University Creek upstream of confluence with Pleasant Grove Creek	134 [+7]	453 [+7]	972 [0]	992 [+20]
L	YPLTE1	Flow in Pleasant Grove Creek upstream of confluence with University Creek	1017 [0]	2020 [0]	4336 [0]	4336 [0]
M	YPL10E	Flow in Pleasant Grove Creek downstream of confluence with University Creek	1123 [+8]	2442 [+2]	5276 [-3]	5294 [+15]
N	YPL12	Flow in Pleasant Grove Creek at Al Johnson Wildlife Area	1194 [+2]	2647 [-16]	5704 [-43]	5715 [-32]
O	VPL10N1	Flow from ARSP on-site Channels (Pre-Project PL10N)	58 [+50]	151 [+119]	394 [+310]	359 [+275]

Table 6 –Post-Project without Onsite Storage 24-hour Runoff Volume

Discharge Point	HMS Model Location	Description	Runoff Volume (ac-ft)			
			2-year, 24-hour	10-year, 24-hour	100-year, 24-hour without Onsite Storage	100-year, 24-hour with Onsite Storage
A	YPL10J	Flow in University Creek upstream of ARSP	72	228	448	448
B	YPL10K	Flow in University Creek Downstream of PL10K	75	235	462	460
E	YPL10N	Flow in University Creek exiting ARSP	108	332	671	656
K	YPL10O	Flow in University Creek upstream of confluence with Pleasant Grove Creek	95	313	655	640
L	YPLTE1	Flow in Pleasant Grove Creek upstream of confluence with University Creek	794	1542	3050	3050
M	YPL10E	Flow in Pleasant Grove Creek downstream of confluence with University Creek	889	1855	3705	3689
N	YPL12	Flow in Pleasant Grove Creek at Al Johnson Wildlife Area	743	1752	3819	3800
O	VPL10N1	Flow from ARSP on-site Channels	34	60	105	92

Table 7 – Pre-Project versus Post-Project without Onsite Storage 100-year, 24-hour Peak Flow Timing of Hydrologic Analysis

HMS Model Location	Description	Peak Flow Timing (hh:mm)	
		Pre-Project	Post-Project without Onsite Storage
YPL10J	Flow in University Creek upstream of ARSP	16:50	16:50
PL10K	Flow into University Creek from PL10K	14:05	12:35
PL10L	Flow into University Creek from PL10L	13:50	13:50
YPLM1H	Flow into University Creek from PL10M Sheds (Includes Creekview Development)	12:40	12:40
VPL10M	Flow in University Creek just upstream of ARSP	18:25	18:25
Pre: PL10N Post: VPL10N1	Flow in University Creek from ARSP Area (Post-Project Includes ARSP Development Sheds)	14:20	12:50
YPL10N	Flow in University Creek exiting ARSP (Includes Creekview Development and ARSP)	18:20	18:25
YPL10O	Flow in University Creek upstream of confluence with Pleasant Grove Creek	19:05	19:05
YPLTE1	Flow in Pleasant Grove Creek upstream of confluence with University Creek	18:20	18:20
YPL10E	Flow in Pleasant Grove Creek downstream of confluence with University Creek	18:30	18:35
YPL12	Flow in Pleasant Grove Creek at Al Johnson Wildlife Area	19:45	19:45

Post-Project without Onsite Storage, Sheds PL11B1 and PL11C1 Flowing North

Under Pre-Project conditions, drainage areas PL11B1 and PL11C1 (Exhibit 4), flow to the north. The Post-Project without Onsite Storage model was revised to maintain these flow directions. A new exhibit was not generated to reflect this. In this scenario, PL11B1, 13.1 acres, is in the northeast corner of the project site and PL11C1, 5.1 acres, is in the northwest corner of the project site. The flows for the common discharge points for the 100-year, 24-hour event are summarized in ***Table*** 8 along with the net change from Pre-Project conditions. The peak flows are slightly less than those from the Post-Project without Onsite Storage model.

Table 8 – Post-Project without Onsite Storage, with PL11C1 and PL11B1 Flowing North, Peak Flow Results

Discharge Point	HMS Model Location	Description	Peak Flow (cfs) [Net Change from Pre-Project] 100-year 24-hour
A	YPL10J	Flow in University Creek upstream of ARSP	847 [0]
B	YPL10K	Flow in University Creek Downstream of PL10K, PL10K1, and PL10K2	851 [-15]
E	YPL10N	Flow in University Creek exiting ARSP	968 [-2]
I	PL11C1	Flow out of PL11C1	6.5 [0]
J	PL11B1	Flow out of PL11B1	17 [0]
K	YPL10O	Flow in University Creek upstream of confluence with Pleasant Grove Creek	970 [-2]
L	YPLTE1	Flow in Pleasant Grove Creek upstream of confluence with University Creek	4336 [0]
M	YPL10E	Flow in Pleasant Grove Creek downstream of confluence with University Creek	5273 [-6]
N	YPL12	Flow in Pleasant Grove Creek at Al Johnson Wildlife Area	5703 [-44]

Future-Fully Developed without Onsite Storage and with ARSP Model

A Future-Fully Developed without Onsite Storage and with ARSP model was developed by taking the Future-Fully Developed model provided by the City of Roseville in May 2015 and adding the ARSP development. The Future-Fully Developed model provided by the City, which is used here as a basis for the Future-Fully Developed without Onsite Storage and with ARSP model, includes the Creekview, Placer Ranch, and West Roseville Plans as incorporated by the City. The flows for the common discharge points are summarized in ***Table*** 9.

Table 9 – Future-Fully Developed without Onsite Storage and with ARSP 100-year, 24-hour Peak Flow Results

Discharge Point	HMS Model Location	Description	Peak Flow (cfs)
A	YPL10J	Flow in University Creek upstream of ARSP	844
B	YPL10K	Flow in University Creek Downstream of PL10K	848
E	YPL10N	Flow in University Creek exiting ARSP	929
K	YPL10O	Flow in University Creek upstream of confluence with Pleasant Grove Creek	931
L	YPLTE1	Flow in Pleasant Grove Creek upstream of confluence with University Creek	4513
M	YPL10E	Flow in Pleasant Grove Creek downstream of confluence with University Creek	5332

PEAK FLOW RESPONSE

In Figure 5 through Figure 9 the peak flow responses (flood frequency curves) have been plotted for the Pre-Project, Post-Project without Onsite Storage, and the Post-Project with Onsite Storage Conditions for the following points: University Creek upstream of Westbrook Crossing, University Creek exiting ARSP, University Creek upstream of Pleasant Grove Creek, Pleasant Grove Creek downstream of University Creek, and Pleasant Grove Creek at Al Johnson Wildlife Area. The response for the following events is provided in the graphs: 2-year, 10-year, 25-year, 50-year, 100-year, and 200-year. The graphs demonstrate that peak flow increases under Post-Project without Onsite Storage conditions will not occur for the full range of events. Adding onsite storage increases peak flows in University Creek over the range of events.

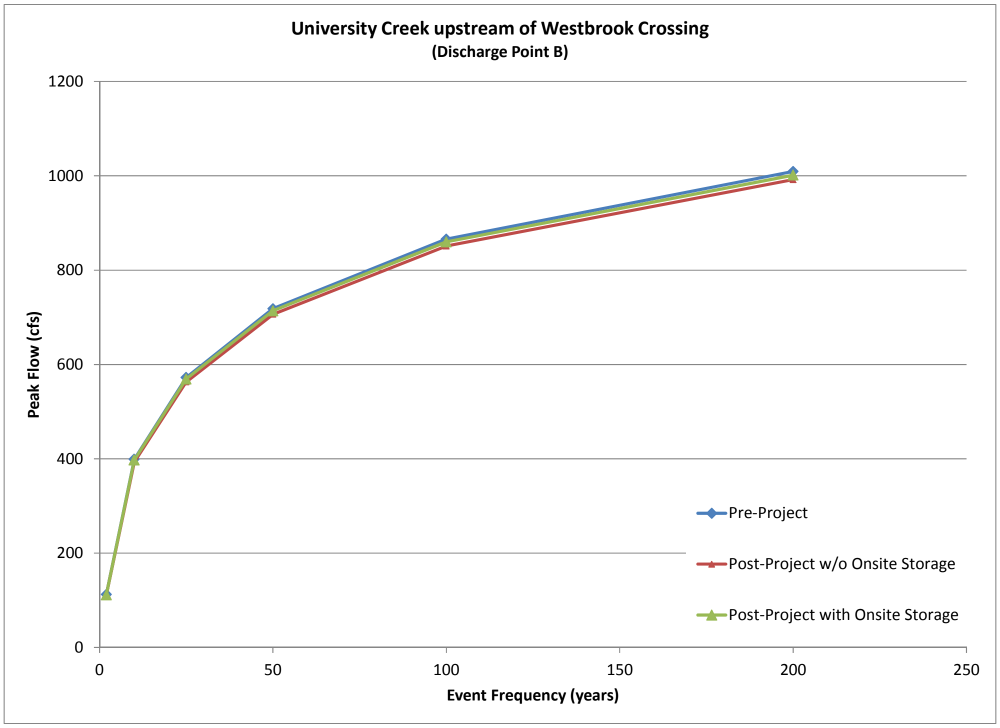


Figure 5 – Peak flowrate comparisons in University Creek upstream of Westbrook Crossing (Discharge Point B)

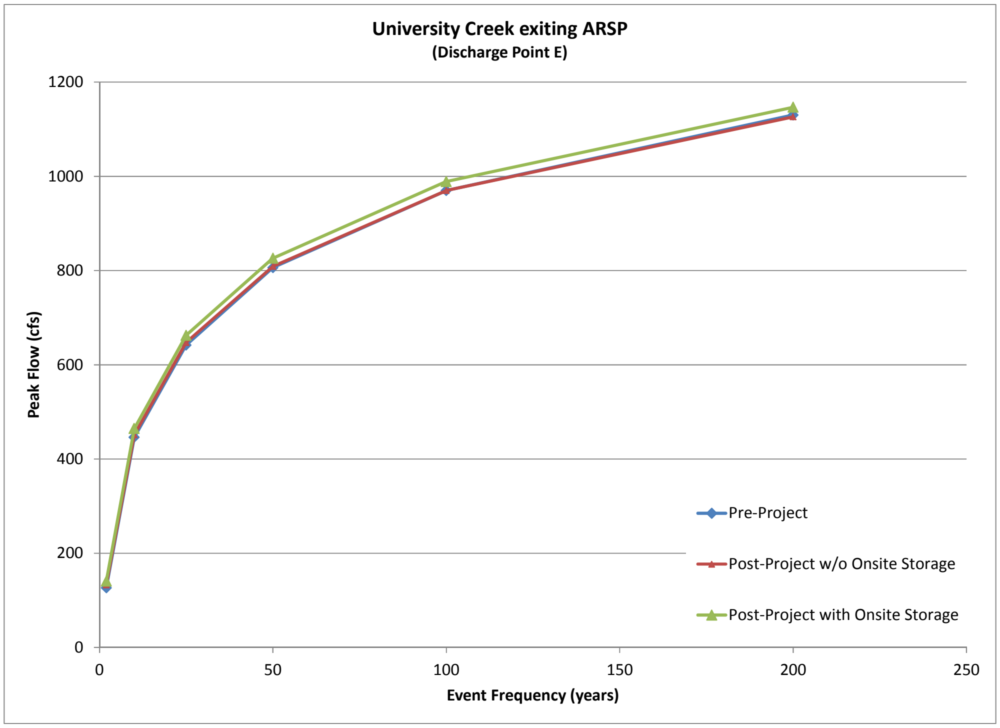


Figure 6 – Peak flowrate comparisons in University Creek exiting ARSP (Discharge Point E)

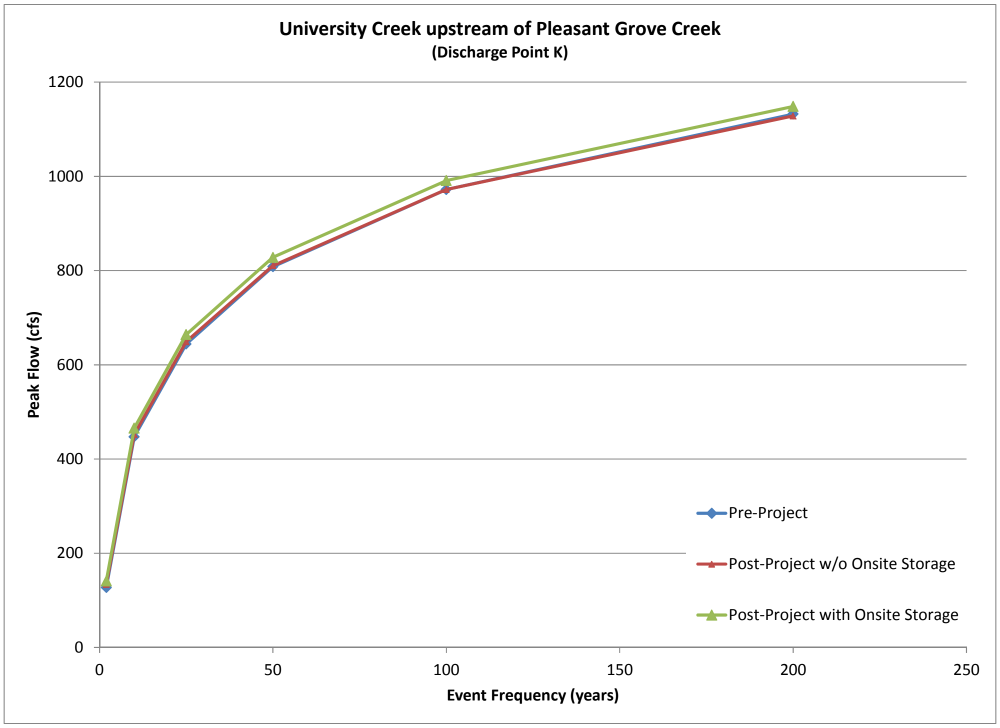


Figure 7 – Peak flowrate comparisons in University Creek upstream of Pleasant Grove Creek (Discharge Point K)

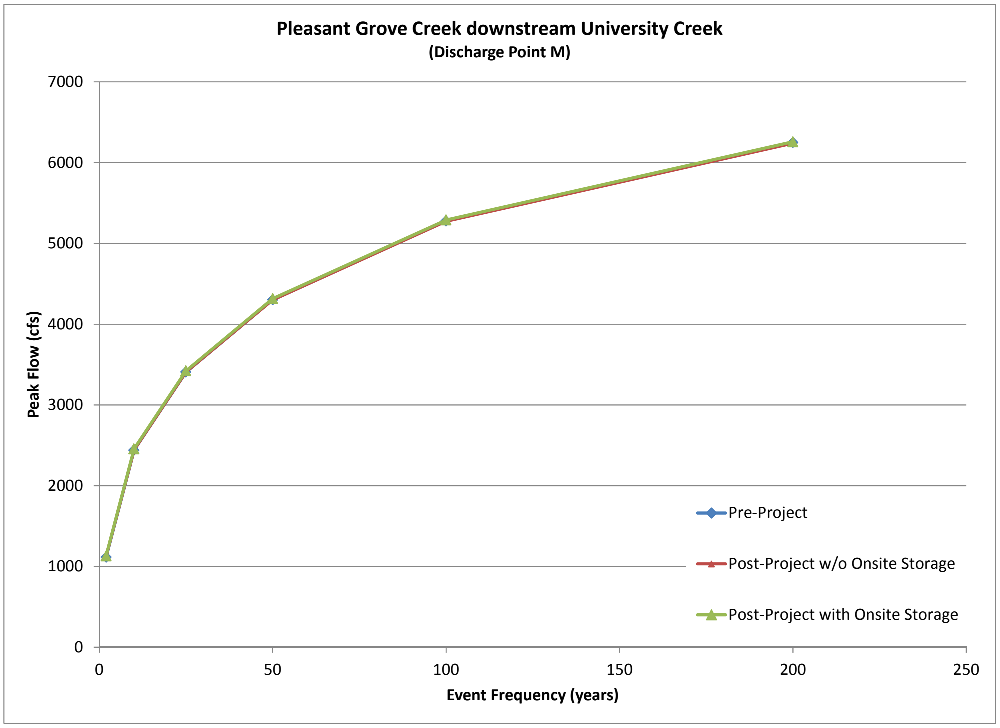


Figure 8 – Peak flowrate comparisons in Pleasant Grove Creek downstream of University Creek (Discharge Point M)

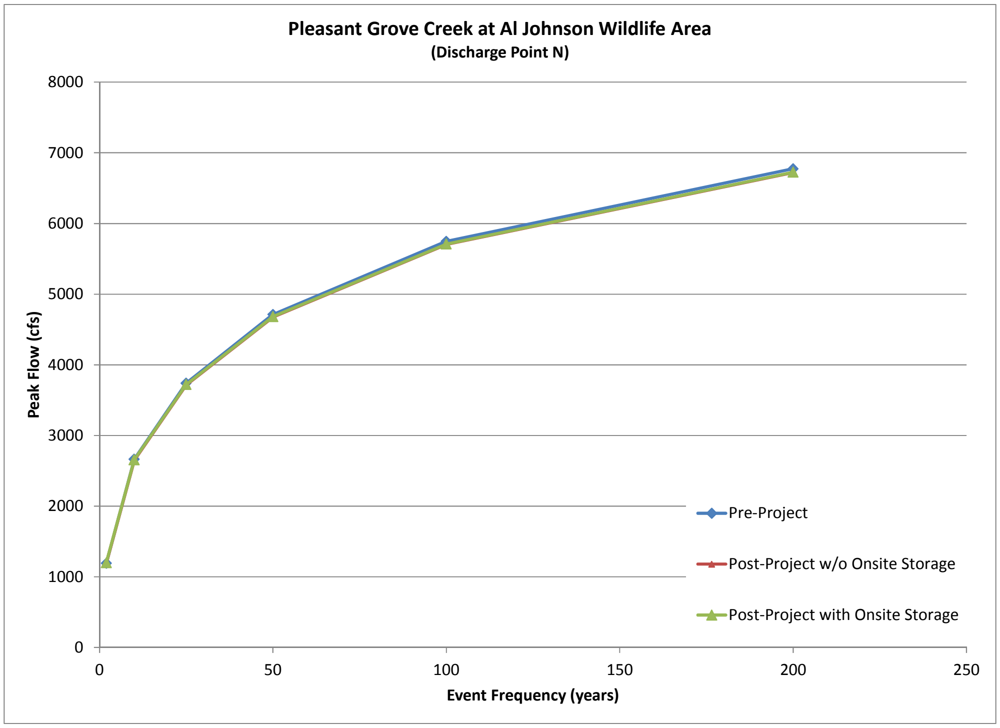


Figure 9 – Peak flowrate comparisons in Pleasant Grove Creek at Al Johnson Wildlife Area (Discharge Point N)

HYDROLOGY ANALYSIS - SUMMARY OF FINDINGS

The peak flows from the Pre-Project, Post-Project without Onsite Storage, Post-Project with Onsite Storage, Post-Project without Onsite Storage with PL11B1 and PL11C1 Flowing North, and the Future-Fully Developed without Onsite Storage and with ARSP models are summarized in ***Table*** 4 through ***Table*** 9. All models are provided on disc. A discussion of the flow impacts on University Creek and Pleasant Grove Creek are provided below and in the Hydraulic Analysis Section.

100-year Flow Interactions with Pleasant Grove Creek and University Creek, without Onsite Storage Flow Analysis

The southern portion of the project site drains to University Creek, in the existing condition (Exhibit 4). The peak discharges in University Creek are largely controlled by runoff from about four square-miles of upstream area that are for the most part, currently undeveloped. Much of this upstream area is expected to be developed as part of the Sunset Industrial area, Placer Ranch and West Roseville Specific Plan areas. Immediately downstream from the project area University Creek has been modified as a result of past farming activities and redirected to the south within a drainage ditch which then turns due west to its confluence with

Pleasant Grove Creek. Under existing conditions, this ditch, which is downstream of ARSP, often overtops.

Under the ARSP proposed conditions, the majority of on-site drainage will be collected in on-site channels that merge and outlet to University Creek at Discharge Point O as shown on Exhibit 6. The outlet is located within the ARSP project area and discharges into the existing University Creek which drains through the Al Johnson Wildlife Area. The on-site channel outlet will be designed to minimize erosion and provide stormwater management. The final design will be evaluated prior to construction plan approval. These channels are further discussed in the Hydraulic Analyses section.

To better understand the interactions of 100-year peak flows from the proposed ARSP project in Pleasant Grove Creek, hydrology models for Pre-Project and Post-Project conditions were generated.

The 100-year peak flows generated from the Post-Project without Onsite Storage condition are less than the Pre-Project flows that naturally occur within University Creek. Hydrographs in Pleasant Grove Creek downstream of University Creek are plotted in Figure 10. As illustrated in Figure 10, there is little difference between the Pre-Project and Post-Project without Onsite Storage conditions in Pleasant Grove Creek downstream of University Creek.

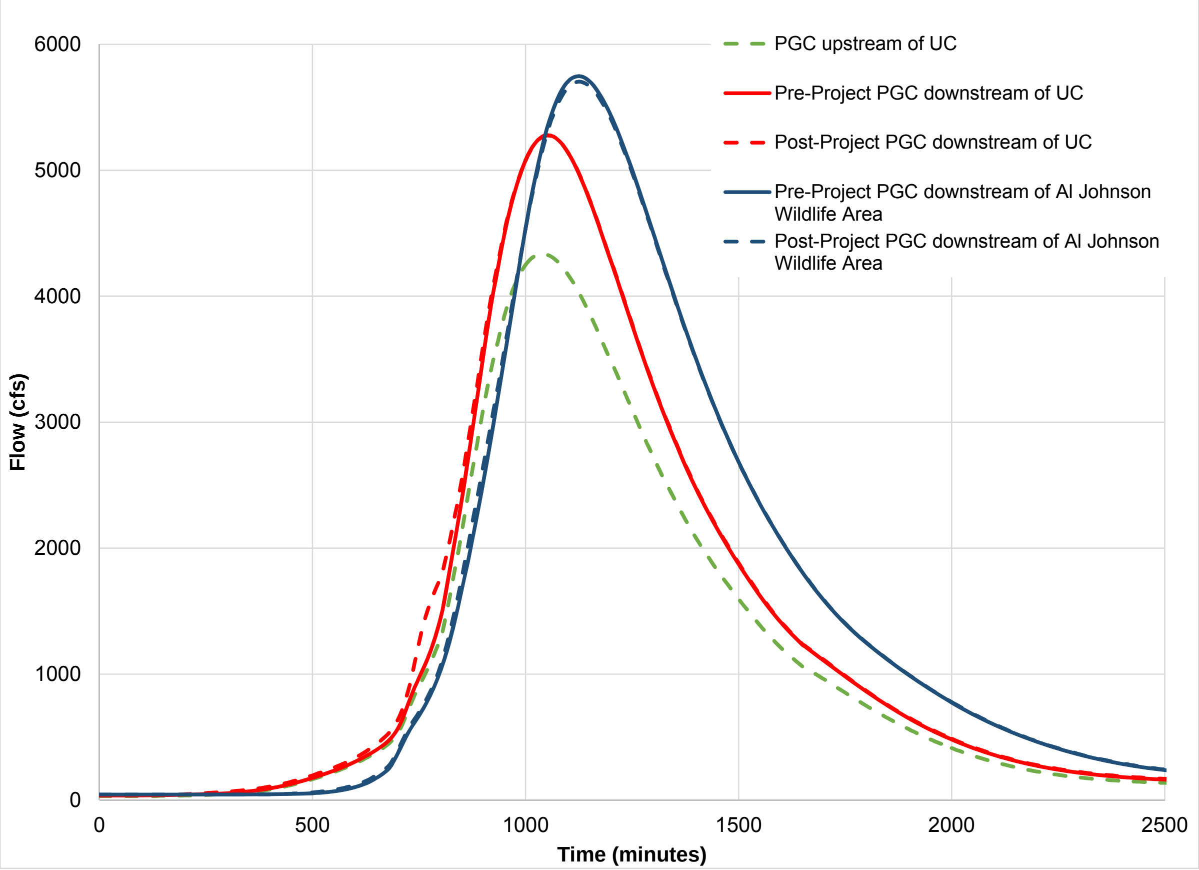


Figure 10 – Pleasant Grove Creek (PGC) HEC-HMS Hydrographs for the 100-year Event (UC = University Creek).

When reviewing peak flow timing, the results indicate that the 100-year storm runoff from the ARSP project (***Table*** 7) occurs hours before both University Creek and Pleasant Grove Creek peak. The peak from ARSP occurs at 12:50 while the peak in University Creek just upstream of ARSP occurs at 18:25 and the peak in Pleasant Grove Creek just upstream of the confluence with University Creek occurs at 18:20 (5.5 hours later). There is an approximate 5.5-hour delay between the 100-year peak of the Amoruso Ranch flows and both the University Creek and Pleasant Grove Creek flows for these conditions.

Delaying ARSP flows using onsite detention causes an **INCREASE** in the 100-year peak flows in University Creek where it exits ARSP, in Pleasant Grove Creek downstream of the confluence with University Creek, and downstream of the Al Johnson Wildlife Area (***Table*** 5).

Since the 100-year peak flow in both University Creek and Pleasant Grove Creek lags the 100-year peak from the ARSP site on the order of hours, there is no increase in the 100-year peak flow existing ARSP under the proposed conditions (Proposed Project without Onsite

Storage), therefore onsite storage is not required to mitigate 100-year peak flow increases. **Based on this analysis, onsite storage is not necessary to mitigate 100-year peak flow increases and is not proposed as a part of the ARSP project. The Post-Project without Onsite Storage condition is recommended as the Proposed Project.**

Peak Flow Response

As discussed above, Figure 5 through Figure 9 illustrate that the Post-Project without Onsite Storage peak flows for the range of events studied, are at, or below those that would be expected under Pre-Project conditions. The peak flows for the Post-Project with Onsite Storage are above those that would be expected under Pre-Project conditions. **The Post-Project without Onsite Storage condition is recommended as the Proposed Project.**

VOLUMETRIC IMPACTS

The Amoruso Ranch Specific Plan area drains via University Creek. Runoff from the property ultimately passes through Pleasant Grove Creek and through the Natomas Cross Canal before entering the Sacramento River. The Cross Canal Watershed Study prepared by CH2MHILL (1992-1994) identified that development within these watersheds could exacerbate existing flooding issues in Sutter County by increasing runoff volumes.

Increased urban/suburban development results in additional impervious surfaces created by the construction of roads, parking lots, structures, and hardscape elements. With conventional development, stormwater runoff from impervious surfaces is collected through a storm drain system and conveyed to a drainage channel or creek outfall. The ultimate stormwater discharge rates from a watershed are based on several factors including the length of the drainage elements, slope of the topography, the intensity of the rainfall event, and the runoff coefficient associated with the roughness of the watershed surfaces. These factors affect the time of concentration and the characteristics associated with the discharge from the site.

To mitigate downstream volumetric impact of local development within the City of Roseville, the City has planned a regional solution to address the volumetric stormwater impacts. To fund these improvements, the City has implemented a drainage fee to collect funds that will be utilized to develop a regional stormwater retention facility currently planned at the City owned Reason Farms site, also known as the Al Johnson Wildlife Area.

The Pleasant Grove Watershed Mitigation Fee has established the parameters shown in Table 10 for development in Type D Soils. The total computed impact for the ARSP proposed project is 75.3 acre-feet of storage volume for the 8-day, 100-year event. This impact will be mitigated at the City of Roseville’s proposed retention facility once it is constructed.

Table 10 – Volumetric Impact Rates in Type D Soils

Land Use	Land Use Abbreviation	% Impervious	Soil Impact Rate	Land Use Area	Volumetric Storage Requirement
Low Density Residential	LDR	40	0.072	248.77	17.91
Medium Density Residential	MDR	50	0.126	50.27	6.33
High Density Residential	HDR	60	0.206	38.13	7.85
Commercial	CC	70	0.233	51.12	11.91
Parks and Recreation	P / R	5	-0.115	22.14	-2.55
Public / Quasi Public	P / QP	50	0.126	17.28	2.18
Roadways	ROW	85	0.313	101.20	31.68
Urban Reserve	UR	2	0	20.00	0
Open Space	OS	2	0	145.53	0
				Total	**75.31**

HYDRAULIC ANALYSES

Hydraulic modeling of University Creek through the ARSP area was completed using both a steady-state and unsteady-state HEC-RAS model, Version 4.1.0, for both the University Creek and Pleasant Grove Creek Watersheds. The steady-state model was used to develop the 100-year Pre-Project, Post-Project without Onsite Storage, and Future-Fully developed without Onsite Storage and with ARSP, on-site and off-site floodplains. The unsteady-state model was used to evaluate peak flow timing and potential erosion impacts downstream of ARSP.

Manning's 'n' values in University Creek were 0.06 for the overbanks and 0.08 for the main channel.

The steady-state and unsteady state HEC-RAS models which extend downstream to the Al Johnson Wildlife Area, were used to evaluate project impacts in University Creek and Pleasant Grove Creek downstream of the ARSP area. The proposed Westbrook Crossing is included in the models to account for Post-Project conditions. Peak flows and hydrographs from the Pre-Project and Post-Project without Onsite Storage hydrology models were used as input.

100-YEAR PRE-PROJECT, POST-PROJECT WITHOUT ONSITE STORAGE, AND FUTURE-FULLY DEVELOPED WITHOUT ONSITE STORAGE AND WITH ARSP ON-SITE AND OFF-SITE FLOODPLAINS

Kimley-Horn created a Pre-Project, on-site, 100-year floodplain delineation using detailed site topography and the University Creek Model. This model was completed using more exact methods than those used by FEMA and represents a more precise representation of flood risk.

The Pre-Project, Post-Project without Onsite Storage, and Future Fully Developed without Onsite Storage and with ARSP peak flows determined as part of the hydrologic analyses for the 100-year, 24-hour event were input into the steady-state University Creek HEC-RAS Model to create the on-site Pre-Project, Post-Project without Onsite Storage, and Future Fully Developed without Onsite Storage and with ARSP floodplains (Exhibits 9 through 12).

Pre-Project and Post-Project without Onsite Storage off-site floodplains, Exhibits 13 through 15, were developed using the steady-state HEC-RAS and peak flows from the hydrologic analyses for the 100-year, 24-hour event.

These floodplain maps were developed using HEC-geoRAS. To determine the floodplain areas, a triangulated irregular network (TIN) was created from the on-site topography (developed from LiDAR flown in 2011) and geoRAS was used to create a TIN based on the water surface elevations at each HEC-RAS cross-section. The two TINs were then converted to 2-foot grids and the difference between the TINs was used to estimate the area of inundation.

There is no rise in the 100-year water surface elevation, based on peak flow rates from the Post-Project without Onsite Storage condition downstream of Westbrook Crossing in University Creek to the confluence of Pleasant Grove Creek and in Pleasant Grove Creek downstream to the Al Johnson Wildlife Area (Exhibits 11 and 15, Appendix C). **Thus, flooding from the 100-year, 24-hour storm into the Al Johnson Wildlife Area would not occur as a result of the ARSP project and water surface elevations in the Al Johnson Wildlife Area would not be increased as a result of the ARSP project. Therefore, no onsite mitigation is needed.**

There is a rise in the 100-year water surface elevation upstream of this crossing, but it is contained within the open space area that is a part of the ARSP area. This increase in the water surface elevation would have no impact downstream of the proposed Westbrook Crossing.

The proposed ARSP project area lies outside the Future-Fully Developed without Onsite Storage floodplain, Exhibit 12.

PROPOSED WESTBROOK CROSSING AT UNIVERSITY CREEK

The steady-state HEC-RAS model was used as a tool for the preliminary evaluation of the proposed crossing over University Creek near the southern boundary with the Creekview Specific Plan.

A 9’ high by 70’ wide arch culvert passes the 100-year flow at water surface elevation of about 86.0 feet (NAVD 88) and 150% of the 100-year flow at an elevation of 86.1 feet (NAVD 88). City design standards require the minimum freeboard to the lowest travel lane should be 1-foot above the water surface elevation generated by the 150% of the 100-year flow. Thus, the lowest travel lane could be at an elevation of 87.1 feet (NAVD 88); final elevations will be determined as part of final design. Compared to pre-project conditions, the crossing increases the water surface elevation upstream to the east project boundary. Upstream from the east project boundary, there is no impact on the upstream water surface elevation. Other configurations of road elevations and culverts, including multiple smaller culverts, are possible and will be evaluated as part of final design.

EVALUATION OF DOWNSTREAM IMPACTS IN PLEASANT GROVE CREEK AND AL JOHNSON WILDLIFE AREA

The unsteady HEC-RAS model was run utilizing the Pre-Project and Post-Project without Onsite Storage 100-year hydrographs determined as part of the hydrologic analyses discussed previously. The purpose of this analysis is to evaluate impacts of the project on Pleasant Grove Creek.

The unsteady HEC-RAS model predicts little difference between the Pre-Project and Post-Project without Onsite Storage peak flows in Pleasant Grove Creek (Figure 11).

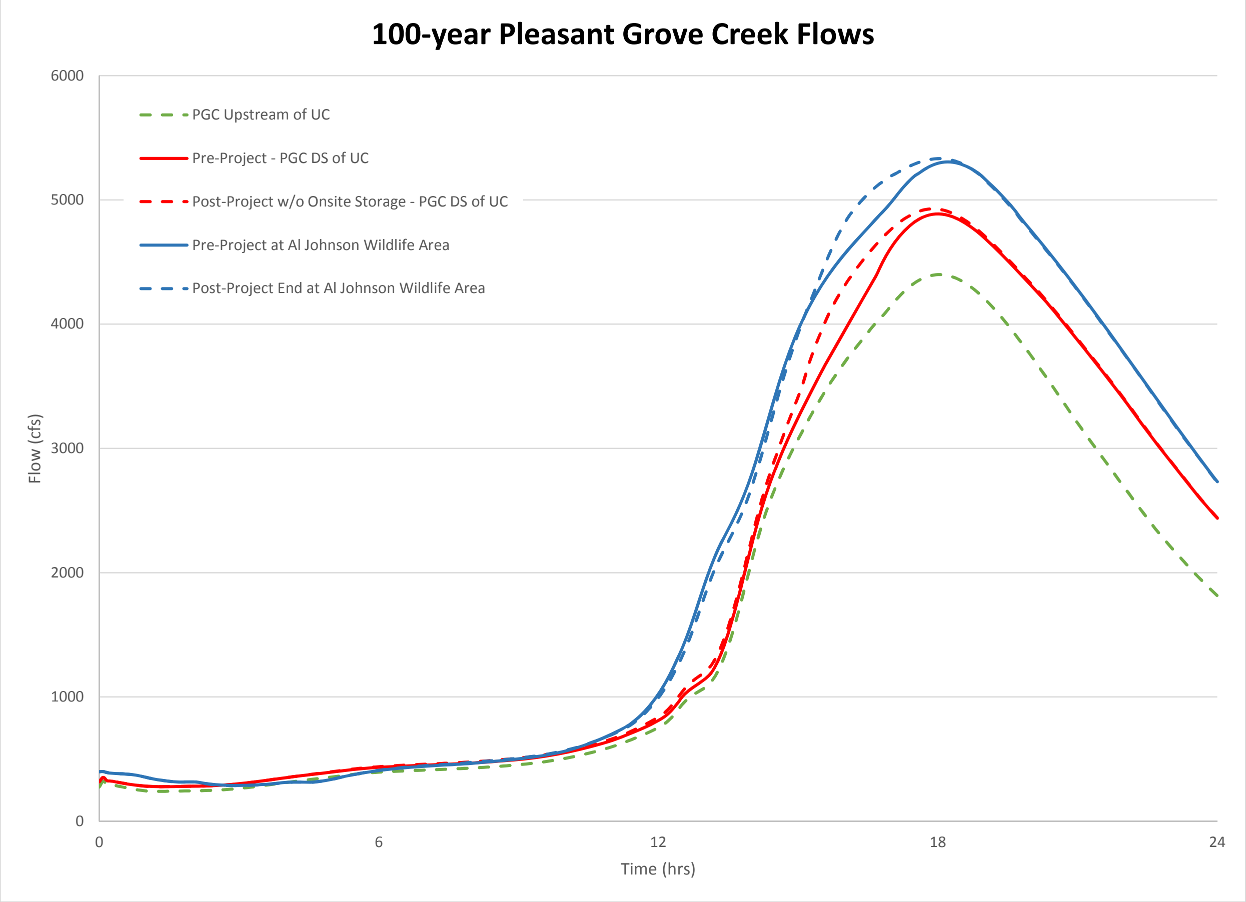


Figure 11 – 100-year Flows in Pleasant Grove Creek (PGC) downstream of University Creek (UC) and at the Al Johnson Wildlife Area (results are based on the Unsteady HEC-RAS model).

ON-SITE STORM DRAIN SYSTEM

The preliminary design and sizing of the onsite drainage system (Exhibit 7), including the collector channels, was analyzed using CS Drainage Studio software developed by Civil Engineering Solutions. The built in option of the software was used to estimate the runoff using the City of Roseville jurisdictional files. These files are set up to generate the 10-, 25-, and 100-year runoff from the proposed land use in accordance with City of Roseville standards. The results of the model runs are located in Appendix D. The models are included on disc.

This preliminary storm drainage system has been developed to meet the needs of the ARSP and the requirements of the City of Roseville.

The stormwater design requirements as set forth by the City of Roseville include:

- Residential lots adjacent to the City's Regulatory Floodplain shall have pad elevations a minimum of two feet above the 100-year unmitigated build-out floodplain.
- All drainage must enter and leave the improved area at its original horizontal and vertical alignment unless an agreement, approved by the City Attorney, has been executed with the affected property owners.
- Calculate 10, 25, and 100-year peak discharge and submit calculations with the plans for proposed drainage systems.
- Hydraulic grade line for the 10-year discharge shall be a minimum of one foot below all grates, manhole covers and all other drainage structures in the system.
- Cross culverts shall be designed for a 25-year storm event with no head on the inlets. They shall also be sized such that no serious damage will be incurred due to ponding as a result of a 100-year event. A flood easement shall be provided for all areas impacted due to upstream ponding in the 100-year event. Culverts across arterials shall be sized for the 100-year storm with a minimum of one foot of freeboard below the lowest travel lane. Minimum diameter of cross culverts shall be 18 inches. To account for debris collection, a clogging factor of 150% shall be applied to all storm frequencies in the design of bridges or culverts that cross a channel or stream with a drainage area that exceeds 300 acres.
- Onsite peak flow mitigation to reduce post-project 100-year peak flows to pre-project levels.

This storm drainage system, as shown in Exhibit 7, has been analyzed to account for the 10-year, 25-year and 100-year storms by the CS-DRAINAGE STUDIO software program.

Per City of Roseville standards, the pipes have been sized for one foot of freeboard below manhole and drain inlet rim elevations in the 10-year event. Storm drain pipes have also been sized to convey the 100-year flow downstream of arterial road crossings. The final overland release paths will be identified as the project progresses into final design.

A preliminary mass grading plan was developed and analyzed with the development of the storm drain system as it was used to establish manhole rim elevations, open channel flows and satisfy minimum pipe cover requirements. The storm drain system generally follows the northeast to southwest grading scheme and discharges at several locations along the southern and western portions of the project (see Exhibits 7, 8a and 8b). In the southeast corner, the proposed system discharges from a traditional outfall and headwall through a traditional swale and into University Creek. All of the other proposed system discharge locations outlet into the proposed natural open channel system that ultimately discharges into University Creek. The plan also provides for continuous overland release for events larger than the capacity of the underground pipe system.

It should be noted that **an update to this drainage plan, a final Master Drainage Plan, will be required as the project progresses into final design.** This plan will need to be included as part of the final design documents that will be submitted to and reviewed by the City. A detailed analysis of the proposed permanent and construction activities Best Management Practices shall be included in this updated plan or as a separate water quality BMP plan.

Onsite Channel Freeboard Analysis

The preliminary design and sizing of the onsite drainage system, including the collector channels, were analyzed using the CS Drainage Studio software developed by Civil Engineering Solutions.

To evaluate the available freeboard within the on-site channels (Exhibits 7, 8a, and 8b), which were sized using the CS Drainage Studio software, the on-site channels were modeled using HEC-RAS with the Post-Project without Onsite Storage hydrology 100-year, 24-hour peak flow as input. The results are summarized in Table 11 and Appendix C. The onsite channels have greater than 1-foot of freeboard under 100-year, 24-hour Post-Project without Onsite Storage peak flow conditions.

Table 11 – Freeboard Summary for Onsite Channels

Onsite Channel	HEC-RAS Reach	Station (ft)	Maximum Channel Elevation (ft)	Water Surface Elevation (ft)	Freeboard (ft)	Flow (cfs)	Appendix F Cross-Section
Northwest	Northwest_1_2_3	4038.73	85.34	82.9	2.44	109.8	Appendix F Section B
Northwest	Northwest_1_2_3	3519.31	84.82	82.58	2.24	109.8	Appendix F Section C
Northwest	Northwest_1_2_3	2726.68	84.02	82.25	1.77	109.8	Appendix F Section D
Northwest	Northwest_1_2_3	1834.34	83.14	82.06	1.08	109.8	Appendix F Section D
Northwest	Northwest_4	942	82.74	81.40	1.34	341.4	Appendix F Section E
Northwest	Northwest_4	675	82.5	81.12	1.38	341.4	Appendix F Section E
Northwest	Northwest_5	421.21	82.22	80.9	1.32	394.7	Appendix F Section F
Northwest Outfall to University Creek	Northwest_5	100	81.73	80.58	1.15	394.7	Appendix F Section F
West	West	1223.7	83.87	82.69	1.18	328.9	Appendix F Section G
West Outfall	West	550	83.19	82.08	1.11	303	Appendix F Section G
East	East_2_3	2224.27	84.34	82.04	2.3	169.5	Appendix F Section H
East	East_2_3	1600	83.72	81.58	2.14	169.5	Appendix F Section H
East	East_2_3	1042	83.16	81.24	1.92	169.5	Appendix F Section H
East Outfall to Northwest Channel	East_2_3	513484.85	82.6	81.09	1.51	115.7	Appendix F Section H

Drainage Channel Maintenance and Access

The proposed drainage channel system is composed of a series of three channels that will have a point of confluence at the southwesterly corner of the development area (see Exhibit 7 and Appendix F). The channels are proposed to be primarily natural channels with provisions for allowing access and maintenance of the channels. An option could be to incorporate armor flex pans or other design features for the bottom of the channels that will facilitate ease of maintenance. The exact features will be determined as part of final design. The channels will be trapezoidal in shape and will be constructed in a “cut” grading configuration, that is, construction of the channels will be at or below the existing grades and they will not require construction of above grade levees. The top width of the channels will vary depending on the site topography and the required bottom width of the channel. The top width for the channels is estimated to range between 42- and 72-feet. The westerly channel, which will also provide a buffer between the Gleason’s property and the Amoruso Ranch development, provides a top channel width of approximately 42-64 feet (See Appendix F).

Where the channels converge at the southwesterly corner of development they will connect into the existing University Creek, as shown on Exhibit 7 and Appendix F. At this point, University Creek is a man-made ditch and does not follow the historical alignment of the University Creek. University Creek was altered, within what is today the AJWA, due to the farming operations that have occurred on the property. The creek is a naturally flowing creek up to this point as it flows from the south and into the Amoruso Ranch Development area. As University Creek flows through the Amoruso Ranch Area and then to the west, it makes a transition into the excavated ditch on its way towards connection with Pleasant Grove Creek. Just after this transition occurs is where the proposed Amoruso Ranch channels have been designed to discharge into University Creek, as shown on Exhibit 7 and Appendix F. The grading for the transition between the Amoruso channel system and University Creek is depicted in Appendix F.

The drainage channel design will be developed to minimize future maintenance and ensure proper flow of stormwater within the constructed storm drain channels. This includes access along the channels and ramp access into the channels for maintenance.

Routine maintenance and removal of accumulated sediment and over-grown vegetation that could impede stormwater flow will be accomplished with the use of both mechanical and hand operations and will optimize stormwater conveyance, in accordance with the deign parameters. As noted in the discussions of the channel system, the design is utilizing a conservative Manning’s “n” Value of 0.085 for the side slopes, which accounts for a natural and vegetated condition. It is not the intent of the design to have perfectly “manicured” channels; thereby reducing the maintenance requirements for proper operation.

The frequency of maintenance would be based upon several factors including, but not limited to, routine inspections, risk management, and/or maintenance history. Inspections of the channel system are recommended on a quarterly-basis with one of the inspections occurring just prior to the initiation of the rainy season. Maintenance frequencies are expected to typically occur at two- to three-year intervals.

Maintenance Methodologies and Techniques

The maintenance methodologies and techniques will be limited to the amount of vegetation and sediment removal required to allow the system to effectively convey stormwater in accordance with the design parameters. Keep in mind that the design has been developed based on well vegetated conditions, reducing the maintenance requirements. The maintenance methodology will ultimately be guided by the results of individual assessments of the channel performance over time.

In most cases, maintenance techniques are expected to utilize mechanized equipment, as described below, to reduce cost and the duration of activities conducted within a channel. However, in some cases, vegetation removal requirements may allow crews to carry and use hand tools to conduct maintenance activities. An integrated approach to maintenance will balance the methodology recommended to effectively convey stormwater runoff (e.g. vegetation removal only) with the prescribed technique (e.g. use of hand tools) to minimize impacts and budget.

Equipment and Maintenance Types

Heavy Equipment – Mechanical Maintenance

The types of heavy mechanical, earth-moving equipment commonly anticipated to be used in the course of maintenance will include, but is not limited to, skid-steers or Bobcats and dump trucks. The drainage channel system has been designed based on a minimum six-foot bottom width to facilitate access by small maintenance equipment.

For the channel system within the ARSP Area smaller equipment such as skid-steers is ideal due to the narrow width and relatively shorter length of the channels. We do not anticipate larger equipment being required. Maintenance equipment will utilize the proposed access from the residential areas. A minimum of two access points for each of the channels is anticipated to be included as part of the final design plans.

In most cases, maintenance is expected to occur along the bottom of the facilities and typically not more than about two feet up the adjacent banks. Removal of vegetation on the slopes may be necessary to ensure the ability to transport stormwater in the event that vegetated growth begins impeding stormwater conveyance beyond the design parameters.

The amount of vegetation and sediment removed from the bottom of the stormwater facilities will be determined through historic performance of the system; and could be supplemented by hydrology and hydraulic studies before any maintenance occurs within a stormwater facility. Whenever possible, vegetation will be cleared in a manner that allows a portion of the vegetation to remain in the facility, consistent with the original design and to provide aesthetic value.

Hand-Tools - Non-mechanical Maintenance

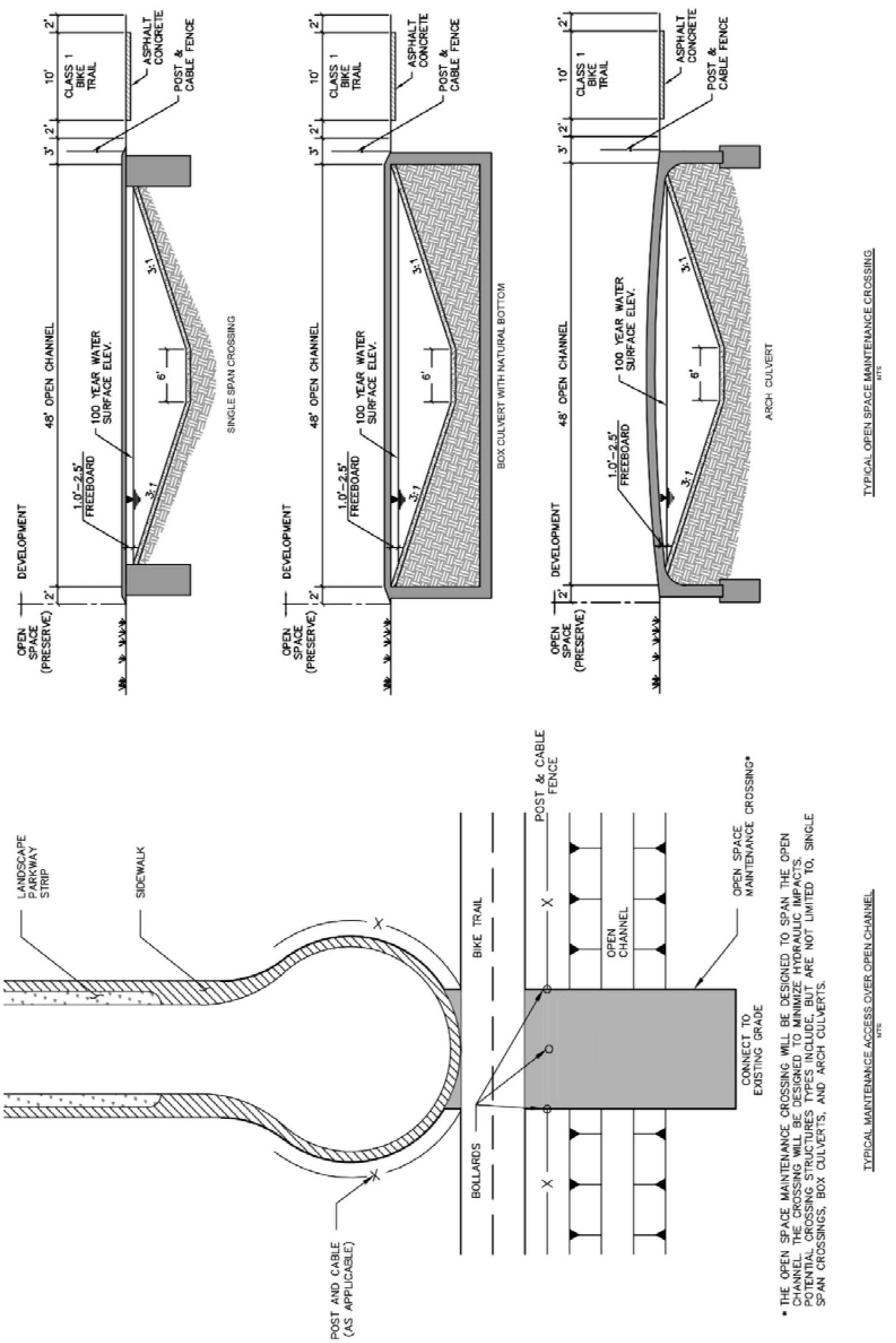
Channel maintenance can also be performed manually by crews using hand tools such as chain saws, weed whips, clippers and hand-carried buckets/bales when equipment operation within the channel is not ideal or the methodology recommends vegetation trimming or removal. This type of maintenance is limited to small-scale vegetation removal or trash/debris removal conducted by a workforce of one or more crew members.

Over grown vegetation will be trimmed, cut at its base or to the high-water mark, leaving the plant roots in place. If it is determined that the trimmed vegetation does not interfere with channel conveyance capacity (grasses, etc.), it will be left in place, unless it is determined that the vegetation is invasive. In this event, the invasive vegetation will be collected, hauled out by hand, and disposed of off-site. Above-ground removal will not be used when leaving the roots of invasive plants in place could promote their regrowth and downstream colonization. Determination as to the invasiveness of a plant species can be based on the most current California Invasive Plant Council's Invasive Plant Inventory.

Access

The final design of the channel system will designate specific access points to the channel system with an anticipation of a minimum of two access points to each of the channels. Access locations will be determined in collaboration with City staff and by selecting locations to limit disturbance to adjacent properties as well as provide safe access for maintenance crews. It is anticipated that access will occur directly from adjacent streets, cul-de-sacs or paved areas as the channels are located within the urban location of the ARSP Area (Appendix F). Maintenance will be able to be conducted from the designated access points and BMPs will be part of the standard maintenance activities.

Access across the southern channel into the open space/preserve area will also be provided. **Error! Reference source not found.** Figure 12 provides a typical plan view of an access point to the preserve system from a cul-de-sac. It is important to note several key aspects of the access diagram:



* THE OPEN SPACE MAINTENANCE CROSSING WILL BE DESIGNED TO SPAN THE OPEN CHANNEL. THE CROSSING WILL BE DESIGNED TO MINIMIZE HYDRAULIC IMPACTS. POTENTIAL CROSSING STRUCTURES TYPES INCLUDE, BUT ARE NOT LIMITED TO, SINGLE SPAN CROSSINGS, BOX CULVERTS, AND ARCH CULVERTS.

Figure 12 – Typical Open Space/Preserve Access Point

- Fencing is proposed to separate the channels from the development. The type, style and height of the fencing will be coordinated with the City and is intended to meet the functionality requirements while also blending with the overall community character.
- An access control feature (gate, chain or …) will be provided at points of access. Again, the means and methods of the access points will be coordinated with the City requirements.
- Where access is required across the drainage channel, to the preserve area for example, an access road will be provided. It is anticipated that the channel will transition through a reinforced box or pipe at these locations to support the maintenance road and vehicular access.
- At the points of access, space will be accommodated for the maintenance crew parking and off-loading of equipment such as a skid-steer.

Vector Control

Vector Control actions are anticipated to be consistent with the practices described in the California Mosquito-borne Virus Surveillance and Response Plan and Best Management Practices for Mosquito Control in California. Open channel systems have a potential for increased vector control requirements. To minimize vectors, the following measures will be part of the design:

- Eliminate artificial sources of standing water to the extent practicable;
- Design the channel system in a manner that following storm events the surface water in the channel system drains within 72 hours to prevent adult mosquitoes from developing (it should be noted that a much shorter duration time for draining the channel is desired; however, 72 hours is the maximum for vector control);
- Design the channel system so seasonal irrigation flows from the development area entering the channel system should drain and/or infiltrate with 72 hours (the ability for infiltration along the channel is anticipated as part of the ultimate channel design); and
- Use appropriate biological control methods that are available. Additional alternatives to using pesticides for managing mosquitoes are listed in the Best Management Practices for Mosquito Control in California.

The open channel system within the ARSP will utilize the following in order to adhere to the measures above:

- Design the channel system with longitudinal slopes that create velocities that minimize the likelihood of standing water (slopes will be between approximately 0.001 and 0.005 ft/ft); and
- Provide underdrains within channels where longitudinal slopes are relatively flat and/or provide the ability for natural infiltration of “nuisance” flows to minimize standing water.

WATER QUALITY

This Drainage Master Plan evaluates how the ARSP project would meet the intent of the State Order to comply with the National Pollutant Discharge Elimination System (NPDES) for construction activities and for post construction stormwater management. The ARSP would conform to the State NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities, which require the preparation of a Stormwater Pollution and Prevention Plan (SWPPP) specific to the ARSP development. The ARSP would also comply with the Waste Discharge Requirements for Stormwater Discharges from MS4s and/or the State permits for stormwater management that are applicable at the time of development. The General Permit(s) issued by the State set forth practices for stormwater management during construction activities, post construction BMP requirements, and specifies criteria for the design and analysis of LID measures and hydromodification requirements.

STORMWATER MANAGEMENT DURING CONSTRUCTION ACTIVITIES

The release of stormwater runoff from a site during construction activities is regulated by the State General Construction Permit issued by the Regional Water Quality Control Board for all commercial and residential construction sites greater than one acre. The Construction General Permit requires the development and implementation of a SWPPP to prevent the transport of pollution and sediments from the site by runoff. The SWPPP document addresses the necessary filing of information with the jurisdictional Water Board, permit registration documents, retention of records, construction site monitoring program, and suitable Best Management Practices (BMPs) during construction.

The SWPPP is an evolving document that reacts to the changes experienced in the field during the course of construction and identifies permit registration documents such as the Erosion Control Plan (ECP) which shows the construction site perimeter, existing and proposed buildings, lots, roadways, stormwater collection and discharge points, general topography both before and after construction, along with drainage patterns across the project site. The ECP also identifies the BMPs that will be used to protect stormwater runoff and the placement of the BMPs that will be implemented before, during, and after construction. Erosion and sediment control BMPs typically include measures such as the use of fiber rolls and silt fences, drain inlet protection, stabilized construction accesses, and the application of hydroseed and or straw mulch to areas that have been disturbed by construction activities. The SWPPP also requires identification of construction site pollutant sources and the methods of control and protection so that stormwater runoff is not exposed to or mobilizes those materials.

The SWPPP for the ARSP project will be developed to correspond to the development of the project and the associated construction activities. The developed SWPPP will select and describe specific BMPs that will be used to prevent erosion and clean site discharge prior to entering local or regional drainage systems, and ultimately state waters specific to the Amoruso development and proposed construction activities. All construction related BMP improvements will comply with the NPDES General Permit for Stormwater Discharges Associated with Construction Activities, NPDES No. CAS000002, Order No. 99-08DWQ, and its applicable supplemental amendments.

POST CONSTRUCTION STORMWATER MANAGEMENT

All new development within the City of Roseville is subject to the State Water Resources Control Boards General Order (Order No. 2013-0001-DWQ) for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) adopted on February 5, 2013 (the MS4 Permit). The MS4 permit requires development projects within the City to develop a Stormwater Management Plan (SWMP) that meets the intent of the permit. SWMP's will be developed for each Drainage Management Area (DMA) with future entitlement requests, with final SWMP's being approved prior to the approval of final construction plans to demonstrate conformance with the objectives of the State MS4 permit.

The intent of a SWMP is to identify measures that will control stormwater runoff and address hydromodification through source control, runoff reduction, and treatment control measures to meet the City's stormwater requirements as outlined in the City's Stormwater Quality Manual.

The SWMP follows the general steps of:

- Site Assessment – understanding the natural environment and determine requirements
- Select Stormwater Control Measures – treat and control post-development runoff
- Establish Long Term Maintenance

The SWMP also requires permanent BMPs to treat the onsite stormwater runoff in order to reduce or eliminate pollutants from the site development. Permanent BMPs within the ARSP will help reduce the pollutants from any urban stormwater runoff and prevent the contamination of receiving waters. Examples of permanent treatment control BMPs include detention basins, infiltration areas, Austin-type sand filters, flow-through stormwater planters, vegetated swales or filter strips, and proprietary stormwater devices.

Site Assessment

During the early planning stages of the project, a site assessment was completed prior to the layout of site improvements. Developing a site layout for stormwater management can provide reductions in cost while also improving the effectiveness of the project's stormwater control measures. For example, stormwater runoff from impervious areas should be routed to landscaped or natural areas, rather than conveyed directly to a discharge location.

The purpose of the site assessment is to develop the site layout for the capture and treatment of stormwater runoff. The incorporation of stormwater features is more effective, and often less costly, when site conditions such as soils, vegetation and drainage characteristics are considered when determining the placement of buildings, paved areas, drainage facilities and other improvements. Site assessments consist of the collection and evaluation of data from a variety of sources including surveys, topographic maps, geotechnical investigations, ground water, and site specific measurements and field observations. The site assessment evaluated the following key site characteristics:

- Soils, Geology, and Groundwater;
- Topography, Hydrology, and Drainage Characteristics;
- Existing Vegetation and Natural Areas;
- Contaminated Soil or Groundwater; and
- Existing Improvements and Easements

Stormwater Control Measures

Stormwater control or Low Impact Development (LID) measures include source control, runoff reduction, and treatment control. Source control measures seek to minimize the potential of generating or mixing stormwater pollutants with stormwater runoff from the source. Source control measures can include both structural and operational measures. Structural controls include a physical or structural component for controlling the pollutant source such as installing an efficient irrigation system that prevents overspray and off-site runoff, or by covering trash enclosures or fuel dispensing operations. Operational controls involve practices such as stormwater management training, trash management and litter control practices, and general good housekeeping practices. When implemented correctly, source controls are effective in preventing pollution from entering stormwater. Other examples of source control measures include storm drain marking and signs, limiting or having dedicated vehicle or equipment wash areas, covered waste management areas, minimizing landscape chemicals such as pesticides and fertilizers, etc.

The purpose of runoff reduction measures is to reduce runoff wherever possible to reduce the potential for downstream erosion and habitat impairment. The main ways to reduce runoff are to promote infiltration, minimize impervious surfaces, and disconnect impervious surfaces. Examples include porous pavement, disconnected roof drains, and green roofs.

Treatment control measures are required for projects above a certain size threshold. Providing runoff reduction measures can reduce or possibly eliminate the required treatment. Treatment is accomplished by either detaining runoff long enough for pollutants to settle out or by filtering runoff through sand or soil. Example treatment control measures include detention basins, infiltration trenches, and vegetated swales.

LOW IMPACT DEVELOPMENT (LID) STRATEGIES

LID is an approach to stormwater management that seeks to control stormwater at the source, using small-scale integrated site design and management practices to mimic the site's natural hydrology. LID implementation can help development meet stormwater management requirements and support a variety of watershed and community goals by mitigating a development's impacts to land, water, and air.

With conventional construction methods, increased impervious areas lead to a proportional increase in peak discharge from the site, exacerbated by a storm drain system that efficiently conveys flows to an outfall location. These increased peak discharges generate more frequent and intense scour conditions in the receiving natural channels, leading to bank erosion and disruption of riparian equilibrium. LID strategies can be implemented throughout a development to mitigate the effects associated with increased impervious surfaces. LID implementation designed to promote localized infiltration, reduce stormwater runoff velocities, increase the time of concentration, and reduce the runoff coefficient can help reduce volumetric impacts on an outfall by outfall basis.

The intent of LID measures is to slow, clean, infiltrate and evapotranspire runoff, to ultimately reduce the quantity of urban runoff entering storm drain systems. The added opportunities for infiltration offered by the use of LID can add water or maintain natural flows to local aquifers, or increasing water reuse. LID focuses on sustainable practices that benefit water quality protection, stream stability and natural water supply levels. Unlike traditional stormwater management, which collects and conveys stormwater runoff through storm drains, pipes, or other conveyances to a centralized stormwater facility, LID within ARSP will use site design elements to minimize changes to the site's pre-development runoff rates and volumes. ARSP LID elements will assist with the goal of optimizing the site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to where it originates.

Key principals of low impact development for ARSP include the following:

- Decentralize stormwater runoff collection systems
- Integrate stormwater management techniques throughout the Amoruso site
- Preserve the existing ecosystem's natural hydrology functions and cycles
- Account for a site's topographic features in stormwater runoff management
- Slow runoff wherever possible to provide additional infiltration opportunities
- Reduce impervious ground covers and maximize infiltration onsite

Hydromodification

For the purposes of testing the potential hydromodification benefits of the proposed LID measures, for the **2-year, 24-hour Proposed Conditions without Onsite Storage and with Hydromodification Management hydrologic model** was prepared. The purpose of this model is to evaluate the impacts of LID components which will contribute to retention and infiltration of stormwater, and their effect on the pre/post comparison of the 2-year hydrograph to address hydromodification. This model includes the impervious area modifications for LID improvements by land use. Impervious area reductions are based on the Required Volume Reductions and are identical to the reductions utilized in the Creekview Specific Plan (Civil Engineering Solutions, 2010). The impervious reductions in Table 12 are discounted only for LID elements that will produce improved infiltration and evapotranspiration throughout runoff events. To create the model, the 2-year, 24-hour Post-Project without Onsite Storage model was used as a base. Timing and runoff passing through LID measures was not adjusted. However, the percent impervious for each ARSP shed in the urban plane was adjusted to reflect LID modifications. The reductions are summarized in Table 13 and details provided in

Appendix B. To address the hydromodification impacts solely on the ARSP project, the Post-Project without Onsite Storage and with Hydromodification model includes the Placer Parkway and Sunset Boulevard areas under **undeveloped** conditions.

Table 12 – Impervious Area Reduction for LID Measures

Land Use	Non-modified Average Impervious (%)	Modified for LID Average Impervious (%)
LDR	40	9
MDR	50	12
HDR	60	19
CC	70	20
P/QP	40	9
P/R	5	2
Roads	85	26

Table 13 – LID Corrected Percent Impervious

Drainage Area	Total (acres)	Impervious Percent
PL10K	8.3	12.0
PL10M1A	1.9	3.7
PL10N1	1.3	7.3
PL10N2	15.1	14.1
PL10Q1	22.6	10.7
PL10Q2	2.2	9.5
PL10Q3	7.9	9.2

Table 14 – Peak Flows for Post-Project without Onsite Storage and with Hydromodification (LID)

			Peak Flow (cfs) [Net Change from Pre-Project]
Discharge Point	**HMS Model Location**	**Description**	**2-year, 24-hour with LID**
A	YPL10J	Flow in University Creek upstream of ARSP	110 [0]
B	YPL10K	Flow in University Creek Downstream of PL10K	110 [-2]
E	YPL10N	Flow in University Creek exiting ARSP	126 [-1]
K	YPL10O	Flow in University Creek upstream of confluence with Pleasant Grove Creek	126 [-1]
L	YPLTE1	Flow in Pleasant Grove Creek upstream of confluence with University Creek	1017 [0]
M	YPL10E	Flow in Pleasant Grove Creek downstream of confluence with University Creek	1113 [-2]
N	YPL12	Flow in Pleasant Grove Creek at Al Johnson Wildlife Area	1183 [-9]

Hydromodification Evaluation

Hydromodification is the modification of hydrologic pathways and change to streams (surface runoff, infiltration, erosion, sediment transport, habitat degradation) that can result in negative impacts to watershed health and functions due to the impacts of development on runoff from relatively frequent storms. The Small MS4 Hydromodification Standard required by the Phase II Small MS4 General Permit (2013-0001-DWQ) as of July 1, 2015 is, "*that post-project runoff shall not exceed estimated pre-project flow rate for the 2-year, 24-hour storm.*"

Low Impact Development (LID) strategies and the use of acceptable Best Management Practices (BMP) methods (discussed in the Water Quality section of this report) will be employed as part of the ARSP project to minimize the changes in runoff from the prescribed design storm.

To test the Hydromodification Standard, the **2-year, 24-hour Proposed Conditions without Onsite Storage and with Hydromodification Management hydrologic model** was developed. The purpose of this model is to evaluate the impacts of LID components which will contribute to retention and infiltration of stormwater, reducing runoff. The model includes the impervious area modifications for LID improvements. The reductions are summarized in Table 13. To address the hydromodification impacts solely on the ARSP project, the Post-Project without Onsite Storage and with Hydromodification model includes the Placer Parkway and Sunset Boulevard areas under **undeveloped** conditions.

As seen in Table 14, the post-project peak runoff does not exceed estimated pre-project flow rate for the 2-year, 24-hour storm with hydromodification management (LID) in place. The 2-year Pre-Project and Post-Project with LID hydrographs in University Creek exiting ARSP are illustrated in Figure 13. With LID in place, the Post-Project flows exceed the Pre-Project flows for a portion of the rising limb. However, the flow from approximately 360 acres (representing just over 50% of the site), and representing a large portion of Pre-Project flows will be re-directed under Post-Project conditions. The 2-year, 24-hour hydrograph for the condition where the flows are not re-directed is also provided and follows the Pre-Project hydrograph closely. To illustrate the downstream impacts of LID, the 2-year hydrographs in Pleasant Grove Creek downstream of University Creek and Pleasant Grove Creek at the Al Johnson Wildlife Area are also provided (Figure 14 and Figure 15). In both cases, the Post-Project runoff hydrograph matches the estimated Pre-Project hydrograph for the 2-year, 24-hour storm.

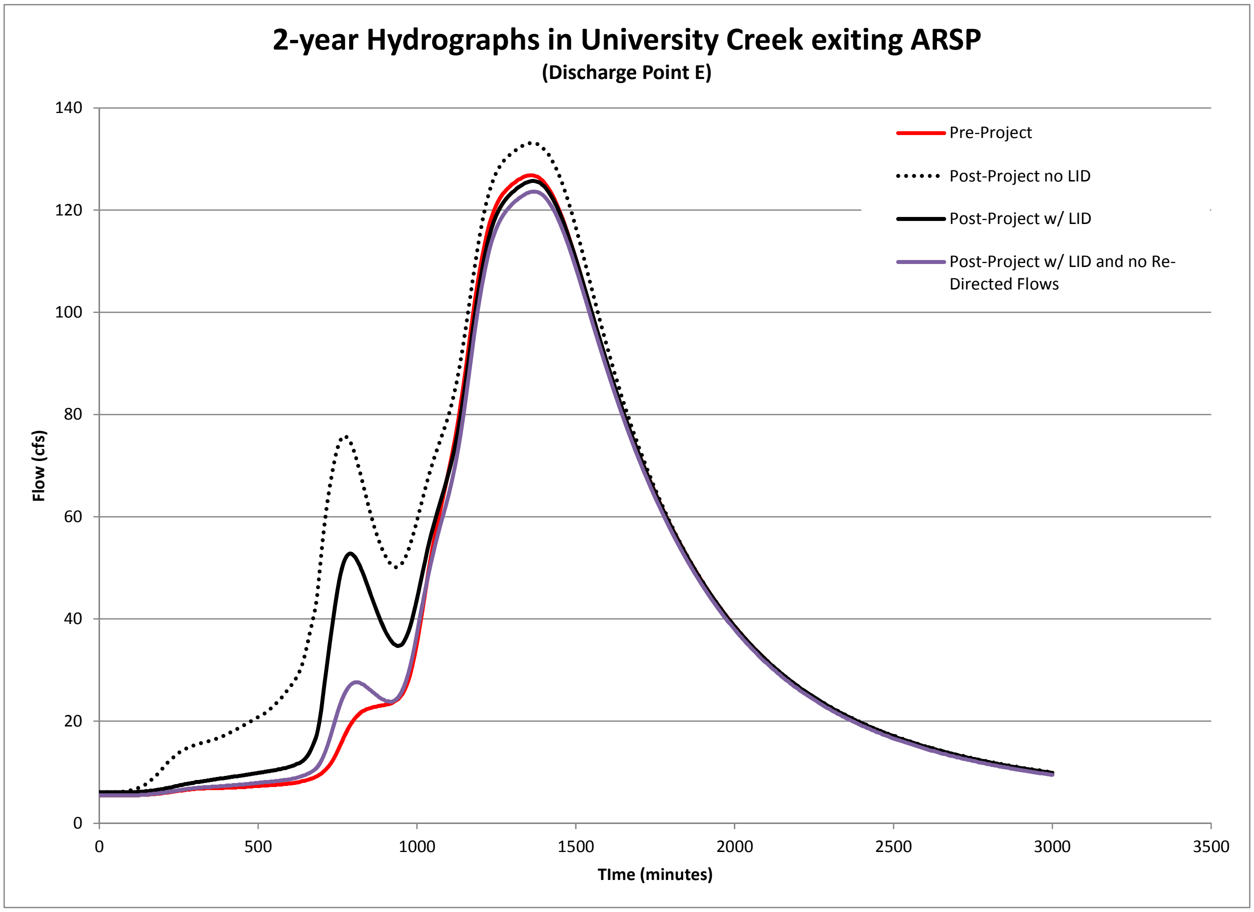


Figure 13 – 2-year, 24-hour Hydrographs in University Creek existing ARSP for the Pre-Project, Post-Project no LID, Post-Project with LID, and Post-Project with LID and no Re-directed flows.

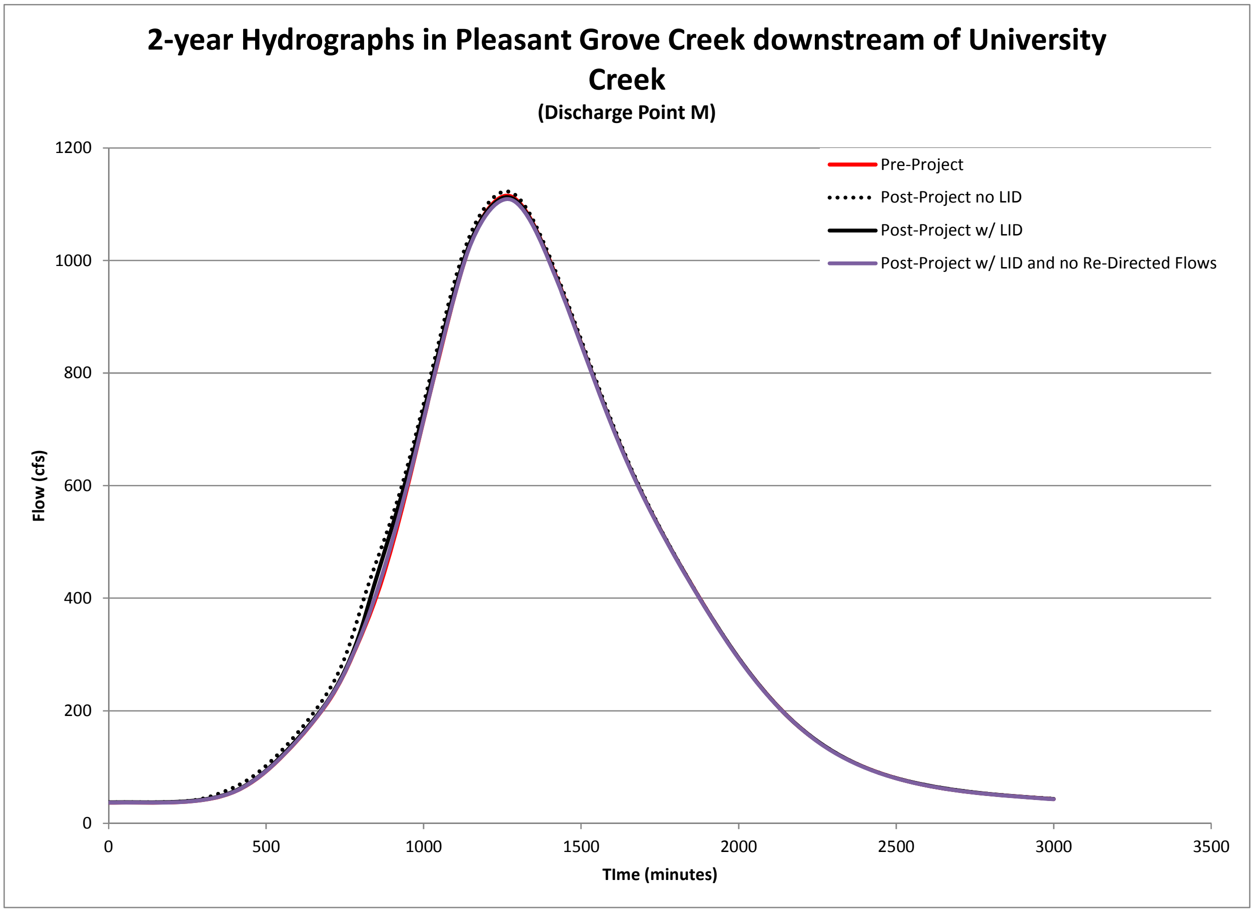


Figure 14 - 2-year, 24-hour Hydrographs in Pleasant Grove Creek downstream of University Creek for the Pre-Project, Post-Project no LID, Post-Project with LID, and Post-Project with LID and no Re-directed flows. This point is upstream of Shed Q (Exhibit 6).

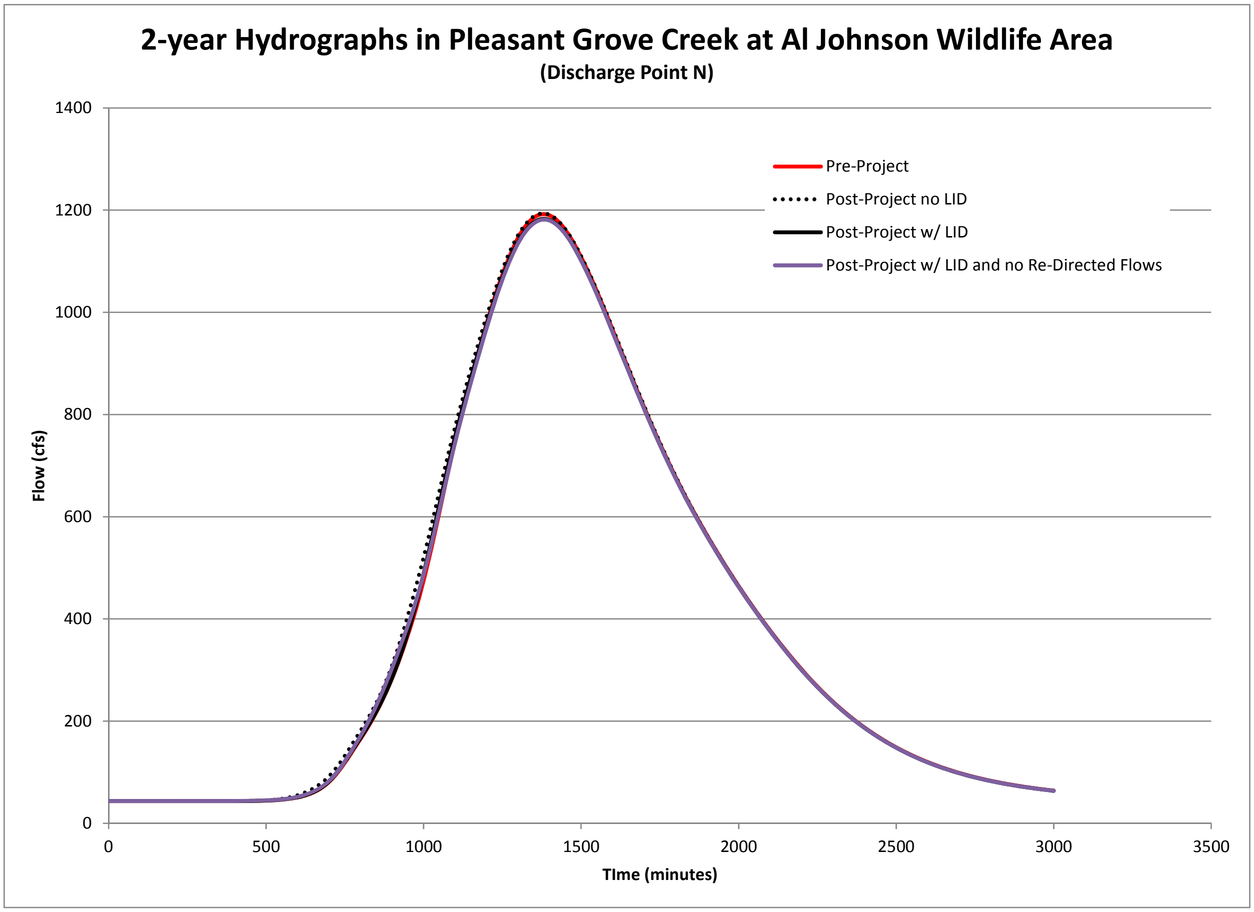


Figure 15 - 2-year, 24-hour Hydrographs in Pleasant Grove Creek downstream of University Creek for the Pre-Project, Post-Project no LID, Post-Project with LID, and Post-Project with LID and no Re-directed flows. This point is just downstream of Shed Q (Exhibit 6).

In addition to the 2-year, 24-hour hydrograph analysis presented above, a “flow duration analysis” was conducted to evaluate the downstream impacts of the project with regards to erosion and sediment transport. In this case, design events were measured against hydromodification performance standards to determine the relative impact of the project. The intent of the performance standards is to limit the potential for new development and redevelopment projects to cause accelerated erosion of stream banks and streambed material in the local watershed by matching the post-project hydrograph to the pre-project hydrograph for the range of flows that are likely to generate significant amounts of erosion within the creek. To do this, the hydrographs for the Pre-Project and Post-Project without Onsite Storage and Hydromodification Management and design events were measured to determine the duration of exceedance for certain flow rates. The design events studied include the 2-, 10-, 25-, 50-, 100-, and 200-year, 24-hour events. The flow rates for the duration analysis include the range of flows between 25% of the 2-year peak flow and the 10-year peak flow. The effects of hydromodification are most onerous for flows in this range. The results of the flow duration analysis are summarized in Figure 16 through Figure 18. Figure 16 shows that the flow duration for a portion of the flows is somewhat larger than Pre-Project conditions in University Creek downstream of ARSP. Thus, there is the potential for the project to cause accelerated erosion in University Creek downstream of ARSP. Prior to the onset of any construction and/or earth moving within the Specific Plan, a monitoring plan would be developed to evaluate changes in University Creek, downstream of ARSP. The purpose of the monitoring plan is to identify whether ARSP causes increased erosion during for the range of flows between 25% of the 2-year peak flow and the 10-year peak flow. If increased erosion due to ARSP is identified, typical stream bed or bank stabilization methods could be implemented. Examples include increased plantings to stabilize the existing stream banks, rock stabilization, placement of gabions, silt fences, and straw waddles to minimize erosion.

There is almost no difference in duration in Pleasant Grove Creek downstream of University Creek.

In addition to the flow duration analysis, the unsteady HEC-RAS model was used to compare the velocities resulting from the Pre-Project and Post-Project without Onsite Storage conditions in University Creek downstream of ARSP for the 2-year, 10-year, and 100-year events. The results are summarized in Exhibits 16a through 17c. The purpose of the velocity analysis is to evaluate the erosive potential of the project downstream of ARSP. As illustrated in these figures, there is no significant increase in velocity in University Creek downstream of ARSP and all the differences in peak velocities are below the City drainage standards. For erosion control, the maximum velocity must be lower than the permissible velocity in earth-lined channels. Drainage standards for the City state that the permissible velocity for fine sand lined channels is 2.5 ft/sec and 6.0 ft/sec for hard pan lined channels. The difference in peak velocities in University Creek for all three design storms is well below these standards.

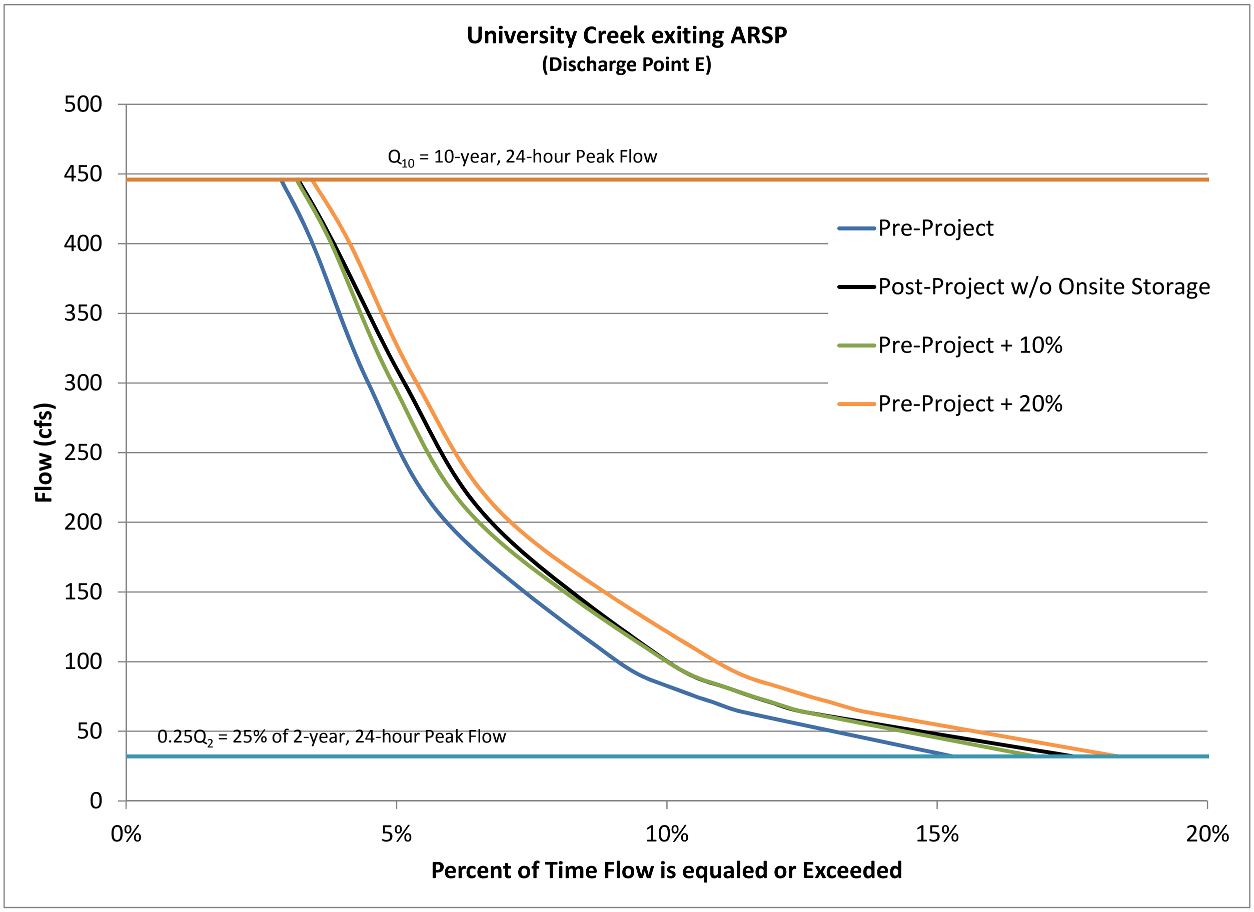


Figure 16 – Flow duration comparison in University Creek exiting ARSP.

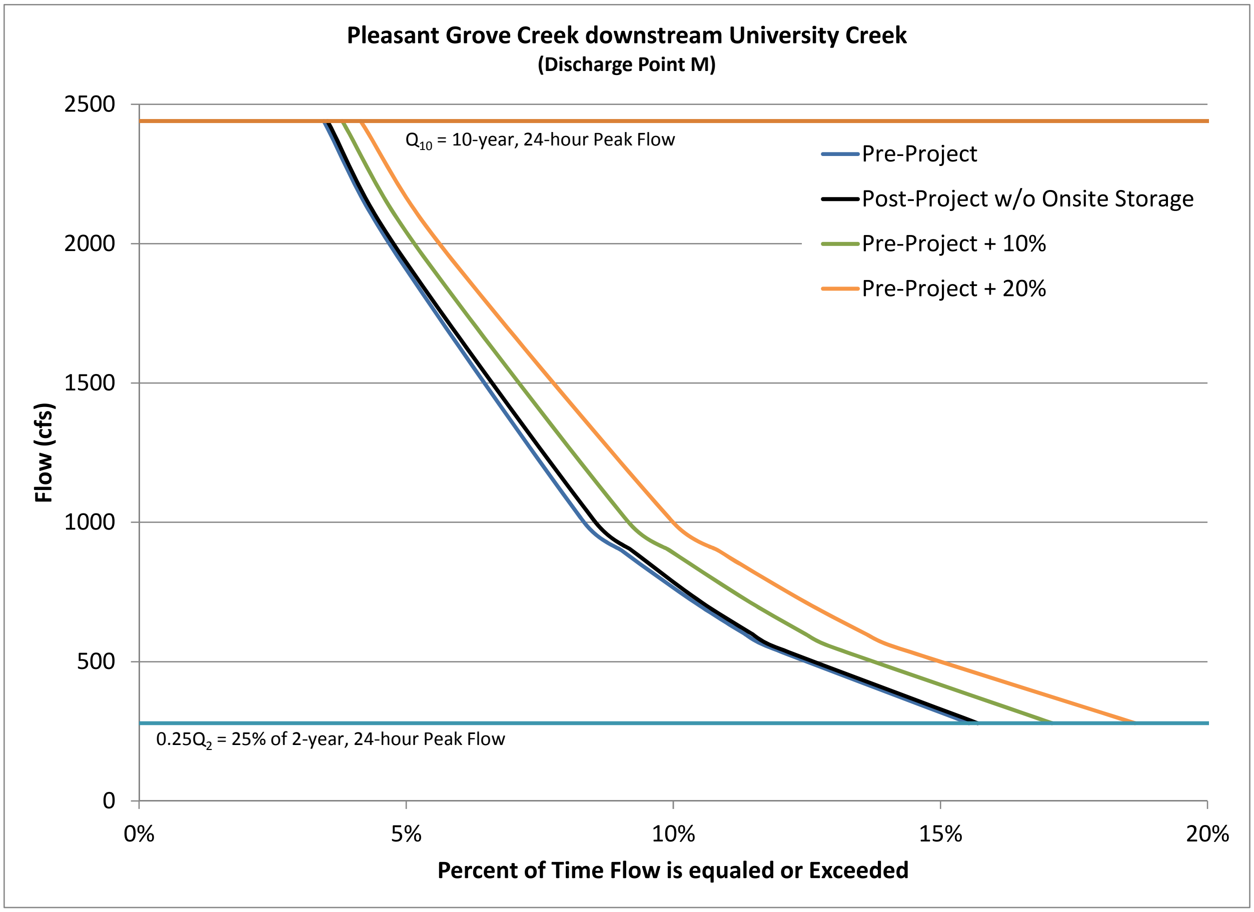


Figure 17 – Flow duration comparison in Pleasant Grove Creek downstream of University Creek.

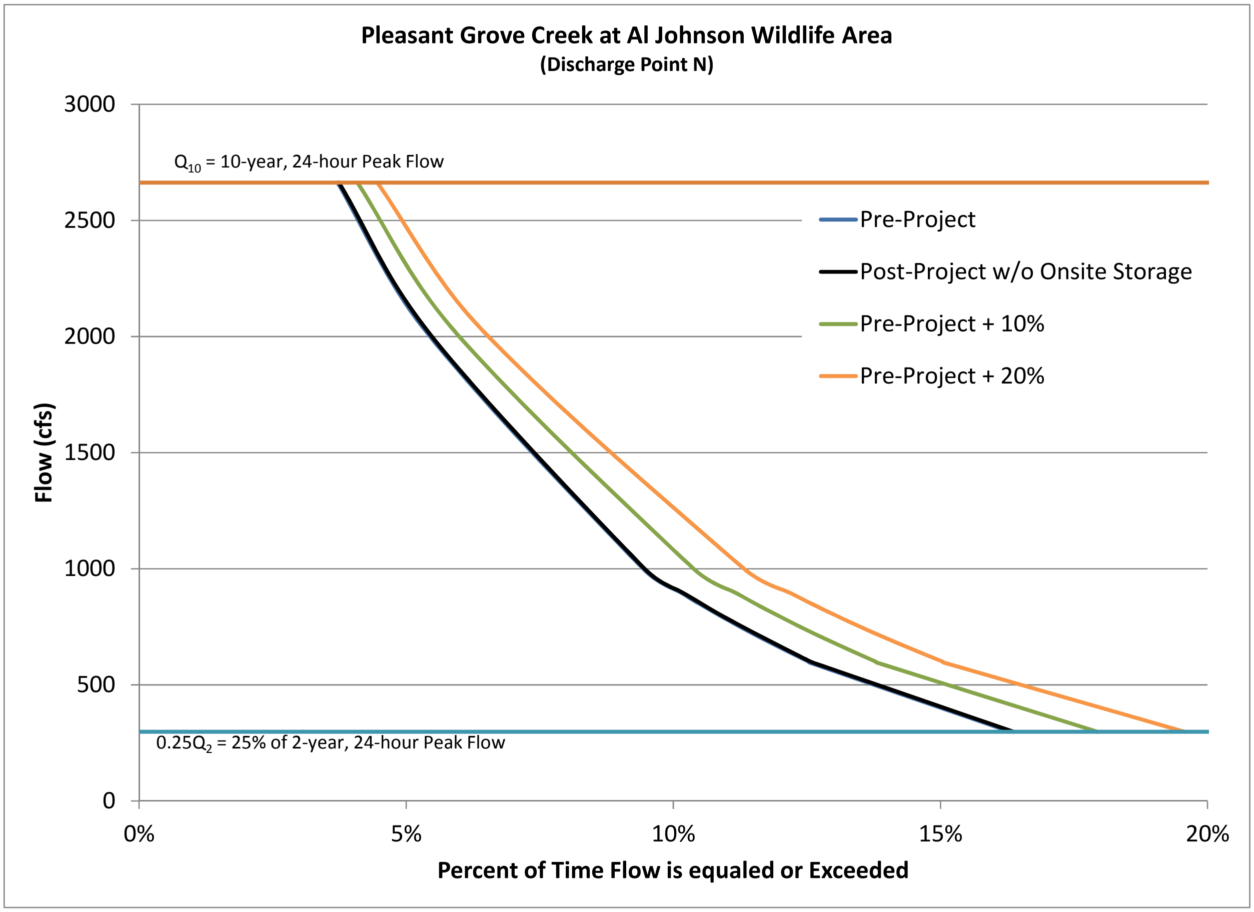


Figure 18 – Flow duration comparison in Pleasant Grove Creek at Al Johnson Wildlife Area.

LID Measures

One of the key parts of LID measures is to slow, clean, infiltrate and capture urban runoff in order to reduce water pollution to receiving waters. LID measures within ARSP will use various site design techniques and implement measures that minimize changes to the site's pre-development runoff flows and volumes.

Examples of LID measures to be considered throughout the ARSP project include:

- Disconnected down spouts
- Disconnected pavement and sidewalks
- Vegetated swales
- Bioretention systems
- Infiltration planters
- Reduced roadway surfaces

- Pervious/porous paving systems
- Rain gardens
- Soil amendments
- Tree planting
- The use of mulch in planting areas
- Stormwater retention areas
- Restricted storm drain outfalls
- In-pipe detention of storm system flows
- Site grading to minimize surface runoff

The SQDM as adopted by the City of Roseville specifies criteria for the design and analysis of LID measures for use in the City of Roseville. The ARSP will incorporate these criteria as part of the LID strategy for the site.

Volume Reductions from LID Measures

LID measures provide opportunities for stormwater treatment at or near the source of runoff that in turn can substantially reduce the amount of post construction treatment BMPs required to mitigate the site improvements. ARSP will incorporate principles of LID site development and implement measures that will likely include a combination of disconnected roof drains, interceptor tree planting, soil amendments in landscaped areas and planters, alternative driveways, porous pavement strategies, and vegetated swales.

Table 15 below provides assumed quantities of individual LID measures needed to obtain land use Required Volume Reductions (RVR) standard for the ARSP. Individual projects within the ARSP development may adjust the types and quantities of the measures shown in Table 15, but will likely use a combination of these design strategies to achieve the total necessary RVR for the ARSP area. The RVR values in Table 15 are minimum requirements and the use of higher RVR values using LID measures is encouraged where practicable.

Disconnected roof drains can be used throughout all types of residential, commercial, public, and park land uses. Water running off of the impervious roofs is treated by biological filtration between the roof leader outfall and where it enters a storm drain system. Disconnected sections may also provide the stormwater runoff with an opportunity to partially infiltrate into the native soils.

Separated sidewalks, disconnected pavement, and the elimination of impervious paving areas allow for stormwater runoff to be treated and infiltrated into adjoining landscape areas before entering a conventional storm drain system. The use of pervious materials for walks and pavement can also provide a way for stormwater runoff to be detained by providing storage in a porous sub-base.

Interceptor trees create canopy that reduces the rate and amount of total stormwater runoff impacting the surrounding surfaces. Interceptor trees are also selected for their rooting habits that promote infiltration of surface runoff by breaking the surface tension of the soil and providing a route deeper into the soil matrix. The addition of soil amendments in the interceptor tree and landscaped areas can also add voids that can absorb stormwater runoff and prevent it from entering a conventional storm drain system. In residential areas soil amendments may be added to a landscape strip adjacent to the street or pavement areas where runoff can be intercepted from adjoining areas. In commercial areas soil amendments can be part of stormwater planter BMPs, whereas along roadways it can be used where flows are diverted into landscaped areas. Finally, vegetated swales allow for additional infiltration and biological uptake opportunities before discharge into an adjacent storm drain system.

Additional project design elements within the open space areas may also provide hydrograph modification benefits by allowing additional floodplain storage capacity for the site, added infiltration opportunities, and areas of evapotranspiration, nutrient uptake, biological filtering, and buffers between urban development and natural features.

Table 15 – LID Measure Land Use Summary

Land Use	Disconnected Roof Drains [1]	Separated Sidewalks, Disconnected Pavement and Elimination of Impervious Paving Areas	Interceptor Trees [2]	Soil Amendments in Landscaped Area	Vegetated Swales [3]	Required Volume Reduction (RVR)
Low Density Residential	95%	8%	3 per lot	1.5%	-	80.5%
Medium Density Residential	80%	8%	1 per lot	1.5%	-	78.6%
High Density Residential	50%	15%	1 per unit	1.5%	-	70.8%
Commercial	50%	15%	20 per acre	2.0%	-	74.2%
Parks and Recreation	50%	20&	5 per acre	0.5%	-	100%
Public / Quasi Public	10%	20%	10 per acre	1.5%	-	81.6%
Roadways	-	50%	10 per acre	1.0%	-	71.4%
Urban Reserve	95%	8%	3 per lot	1.5%	-	80.5%

[1] Disconnected roof drains will likely be implemented 100% for developments that use this measure.

[2] Interceptor trees are assumed to be 50% evergreen and 50% deciduous in this example.

[3] Vegetated swales, or a natural open channel system that will provide stormwater treatment, will be used at each outfall and the minimum design will generate a RVR of 100% for each outfall (End of Pipe Treatment).

TREATMENT CONTROL

Treatment control measures mitigate pollutants after pollutants have encountered and been incorporated into the site stormwater runoff. These measures seek to filter out stormwater pollutants prior to the stormwater runoff leaving the site. Treatment control measures may include vegetated swales, bioretention facilities, flow-through stormwater planters, vegetated filter strips, and/or structural BMPs. The ARSP will implement treatment control BMPs before stormwater is discharged from the site and enters the surrounding preserve or the natural creek system.

Treatment control facilities are designed to infiltrate, evapotranspire, and/or provide bioretention so that the stormwater is treated and run off is managed similar to the LID principles. Depending on the site's characteristics, infiltrating, or flow-through, bioretention facilities or end of pipe treatment are typically used to meet this requirement. These types of BMPs provide pollutant removal through several mechanisms including sedimentation, filtration, and biological processes. In addition, they also reduce runoff volumes and peak flow rates to mitigate the potential hydromodification effects of development. In the event that the required runoff reduction has not been achieved, detention facilities may be utilized as an alternative option in order to meet hydromodification requirements.

The on-site storm drain system map is shown in Exhibit 7 which identifies the storm drain outfall locations and grassy swales. Treatment facilities (BMPs) would be required upstream of discharge to University Creek or any other Regulated Water of the State such as wetlands. Based on the plan shown in Exhibit 7, treatment consisting of a section of Vegetated Swale would be the most common form of outfall BMP. The minimum design length of each Vegetated Swale is computed as the minimum length needed to achieve a Runoff Volume Reduction (RVR) of 100%. When space constraints prevent the construction of a 100% RVR Vegetated Swale, a supplemental treatment, which could include but is not limited to measures such as bio-retention facilities, ponding, and infiltration wells would be used in combination with the swale to achieve 100% treatment per the City's requirements, assuming LID is ineffective.

The optimum design length of the Vegetated Swales and the associated calculations are provided in Table 17 and shown on Exhibit 7. The design lengths represented in table 17 assume complete treatment via the Vegetated Swale, as if LID and source control measures were ineffective. These would be further refined to comply with the then current State Storm Water Management permit and the most recent design criteria prior to the issuance of a grading permit or plan approval of the project.

All BMPs will be required to be designed to comply with the requirements of the local Mosquito/Vector Abatement District.

Information regarding the storm drain watershed areas tributary to each outfall location is included in Exhibit 7.

Table 16 – BMP Sizing at Outfalls – Non-Reduced for LID

Outfall Location	Total Area (acres)	Total % Imperv	C Value	Volume (ft^3)	Reserve Volume (ft^3)	Total Volume (ft^3)	Design Flow Rate (cfs)	Min. Swale Length (ft)	Min. Swale Width (ft)	Velocity (fps)	Slope (ft/ft)
Outfall 1	107.2	52.0	0.35	98719	4936	103655	7.55	239	30.6	0.57	0.005
Outfall 2	16.3	32.5	0.24	10169	508	10677	0.78	172	6.0	0.41	0.005
Outfall 3	24.2	36.6	0.26	16483	824	17308	1.26	203	6.0	0.48	0.005
Outfall 4	241.2	44.7	0.31	193393	9670	203063	14.80	242	60.3	0.58	0.005
NW Outfall 3	63.8	40.0	0.28	46637	2332	48969	3.57	232	14.2	0.55	0.005
NW Outfall 2	31.8	38.0	0.27	22343	1117	23460	3.42	232	13.6	0.55	0.005
NW Outfall 1	11.6	34.2	0.25	7538	377	7915	1.15	197	6.0	0.47	0.005
SE Outfall 1	69.2	46.0	0.31	56855	2843	59698	8.70	240	35.3	0.57	0.005

Table 17 – Minimum Vegetated Swale Sizing at Outfalls for RVR=100% in LID

Outfall Location	Total Area (acres)	Imperv Area (acres)	C Value	Volume (ft^3)	Reserve Volume (ft^3)	Total Volume (ft^3)	Design Flow Rate (cfs)	Min. Swale Length (ft)	Min. Swale Width (ft)	Velocity (fps)	Slope (ft/ft)
Outfall 1	107.2	55.8	0.13	35662	1783	37445	2.73	229	10.8	0.54	0.005
Outfall 2	16.3	5.3	0.09	3768	188	3956	0.29	126	5.3	0.30	0.005
Outfall 3	24.2	8.8	0.10	6162	308	6470	0.47	144	6.0	0.34	0.005
Outfall 4	241.2	107.8	0.12	73264	3663	76927	5.61	237	22.6	0.56	0.005
NW Outfall 3	63.8	25.5	0.10	17492	875	18366	1.34	207	6.0	0.49	0.005
NW Outfall 2	31.8	12.1	0.10	8388	419	8808	1.28	205	6.0	0.49	0.005
NW Outfall 1	11.6	4.0	0.09	2740	137	2877	0.42	139	6.0	0.33	0.005
SE Outfall 1	69.2	31.8	0.11	20785	1039	21825	3.18	231	12.6	0.55	0.005

*Vegetated Swales built to this minimum length complete the RVR to 100% for LID, but do not complete the total treatment requirements of the project, and additional BMP's will be required to obtain the treatment objectives.

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Amoruso Ranch Specific Plan Area

Drainage Master Plan

Appendix A

Amoruso Ranch Specific Plan Area

Drainage Master Plan

Appendix A

Exhibit 16a – Pre-Project vs. Post Project 2-year and 10-year Velocities Downstream of ARSP

Exhibit 16b – Pre-Project vs. Post Project 2-year and 10-year Velocities Downstream of ARSP

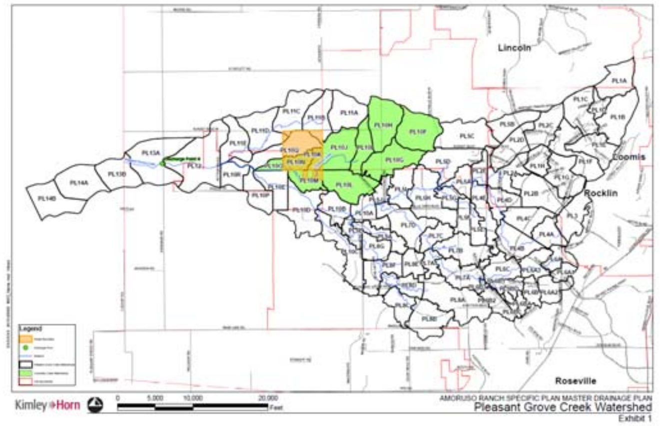
Exhibit 16c – Pre-Project vs. Post Project 2-year and 10-year Velocities Downstream of ARSP

Exhibit 17a – Pre-Project vs. Post Project 100-year Velocities Downstream of ARSP

Exhibit 17b – Pre-Project vs. Post Project 100-year Velocities Downstream of ARSP

Exhibit 17c – Pre-Project vs. Post Project 100-year Velocities Downstream of ARSP

Appendix A Index Sheet



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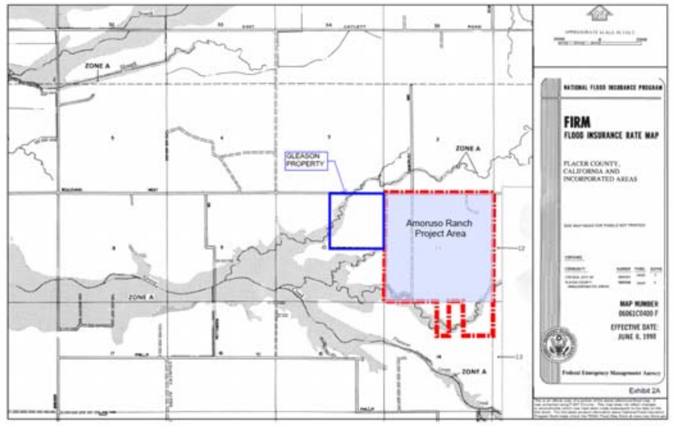

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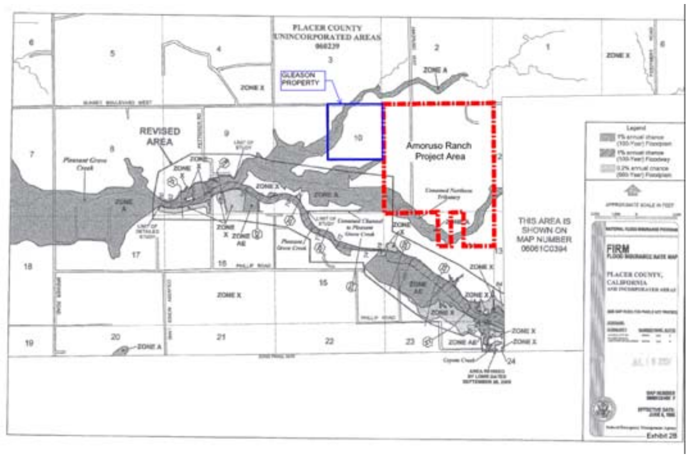

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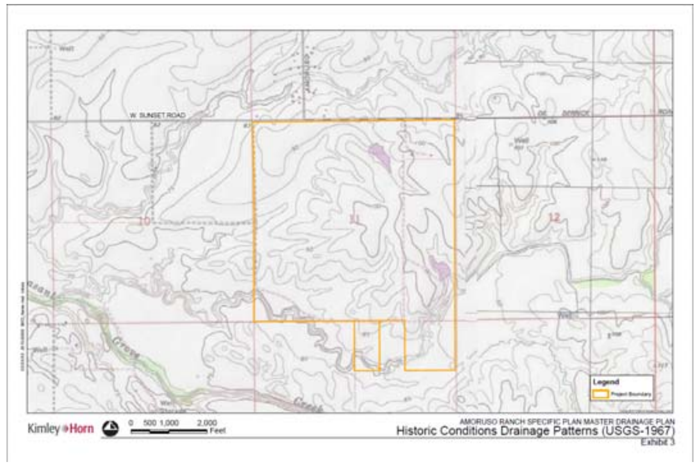

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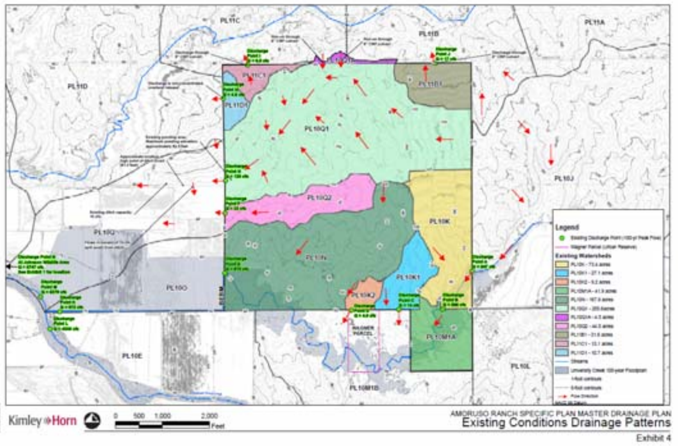

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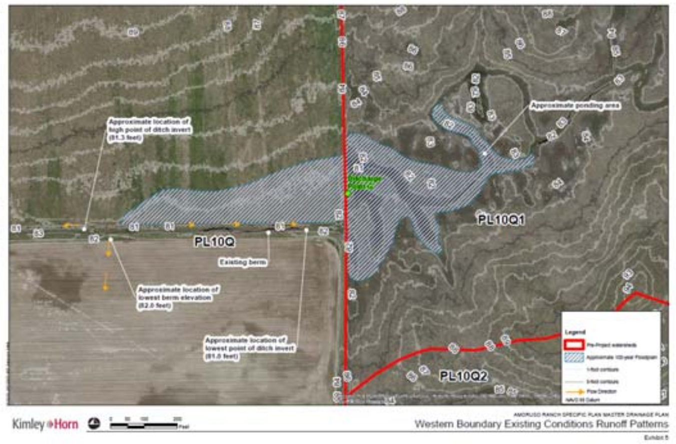

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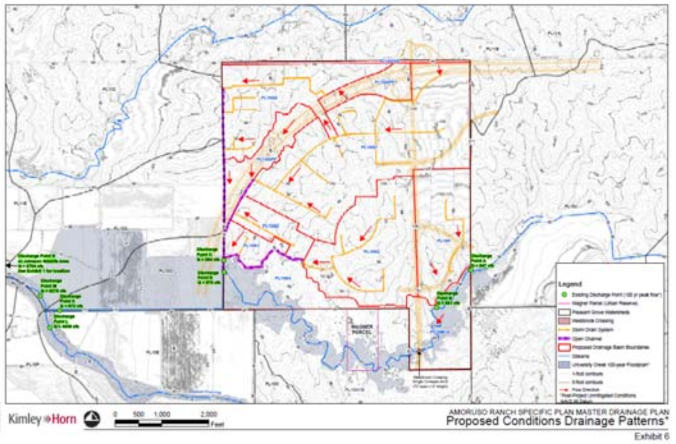
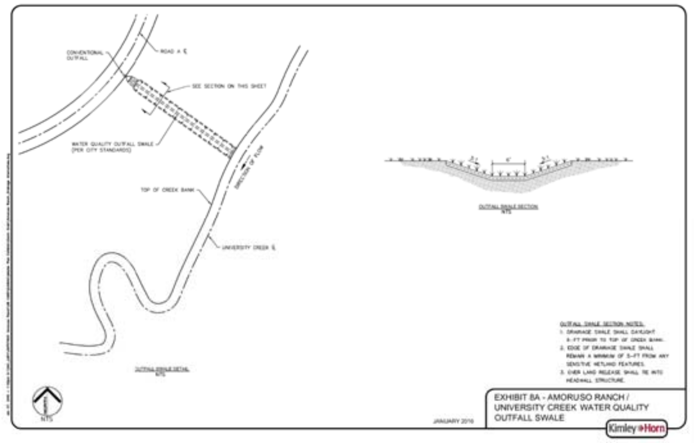


Exhibit 6

Exhibit 7



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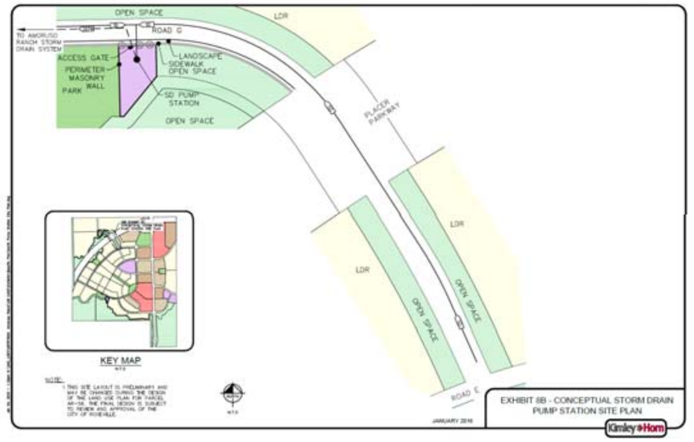

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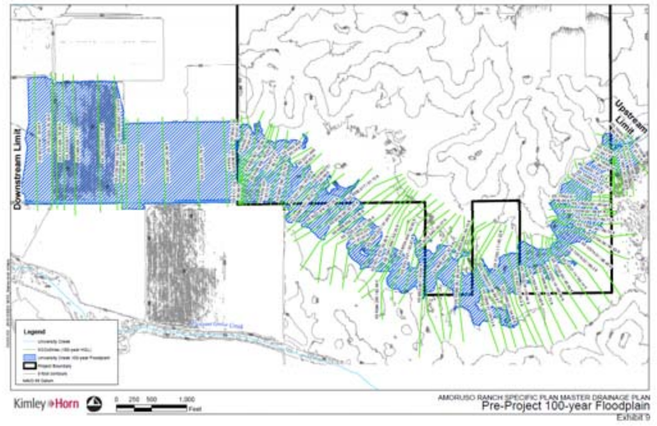

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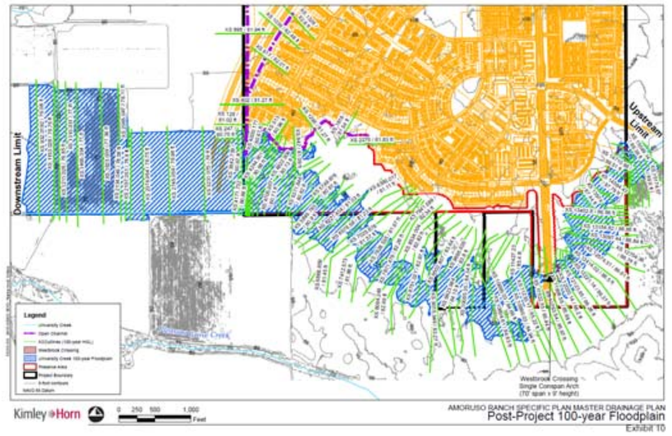

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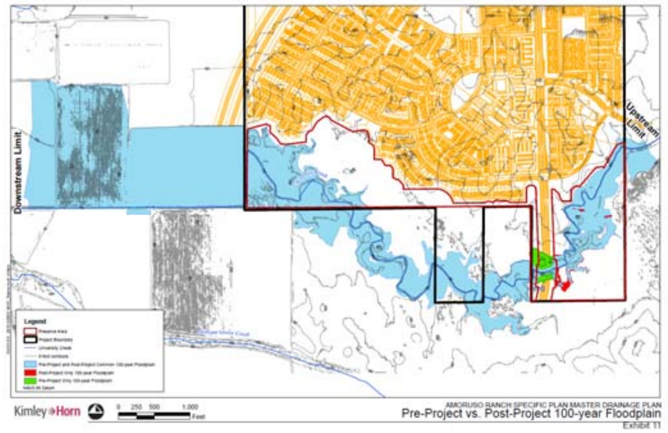

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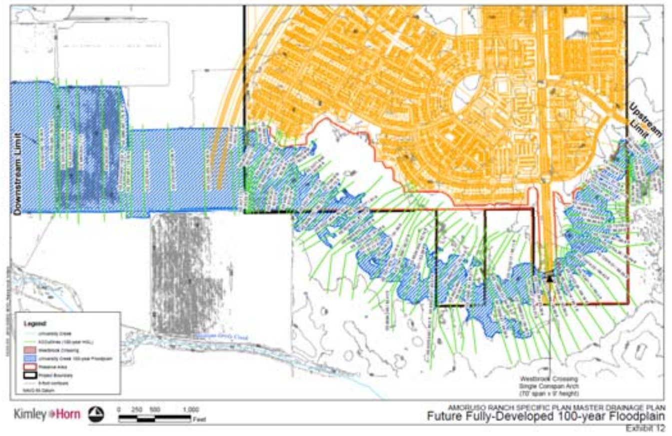

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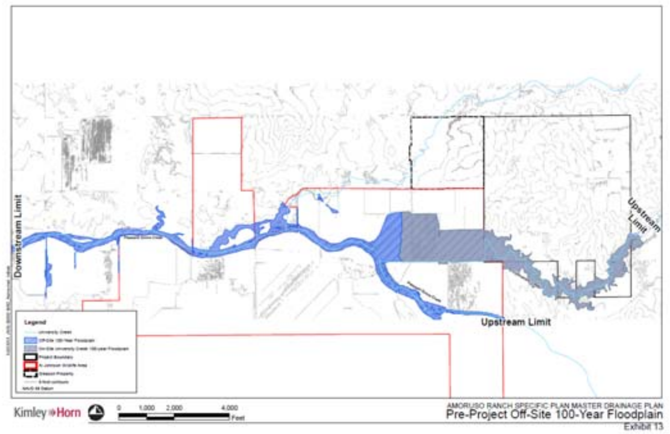

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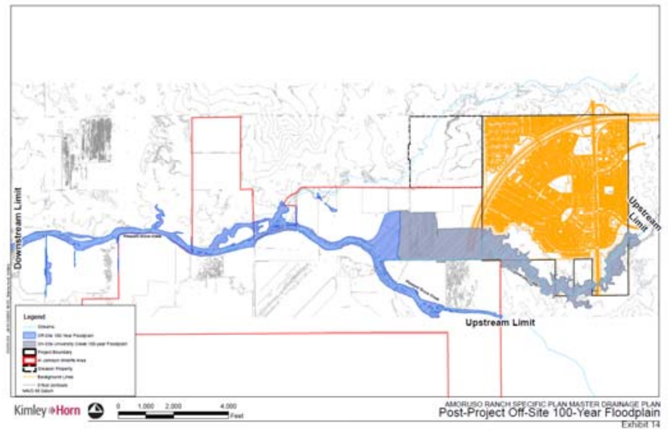

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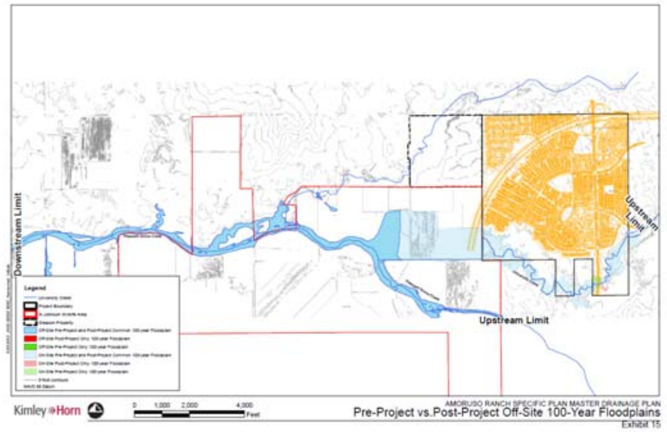

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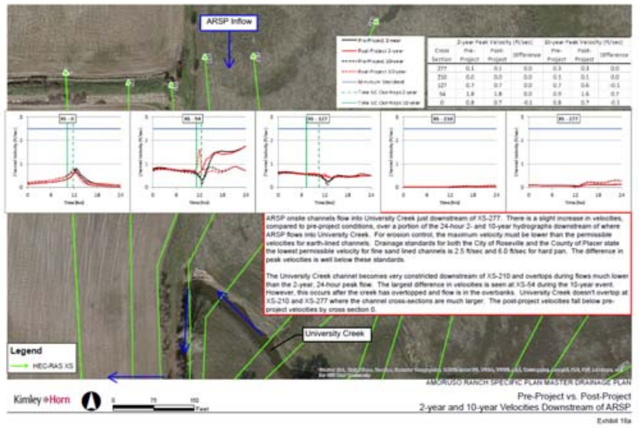

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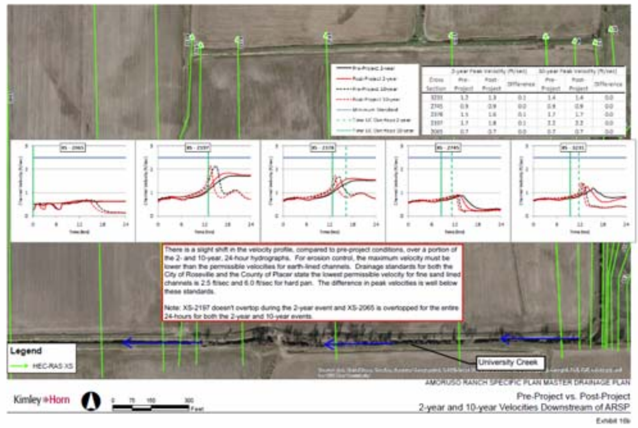

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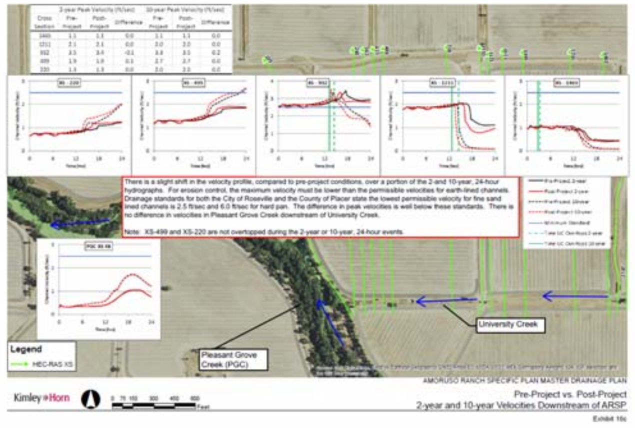

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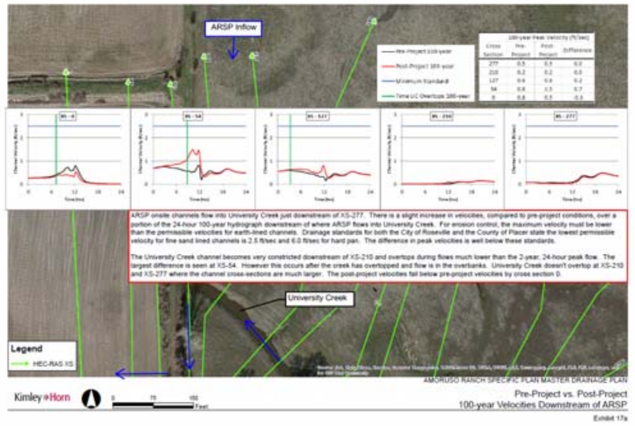

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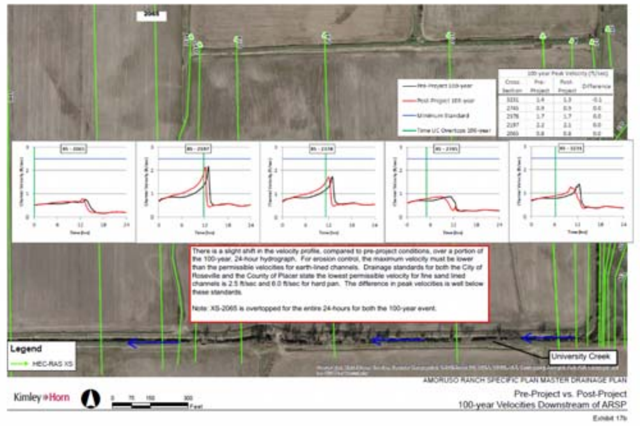

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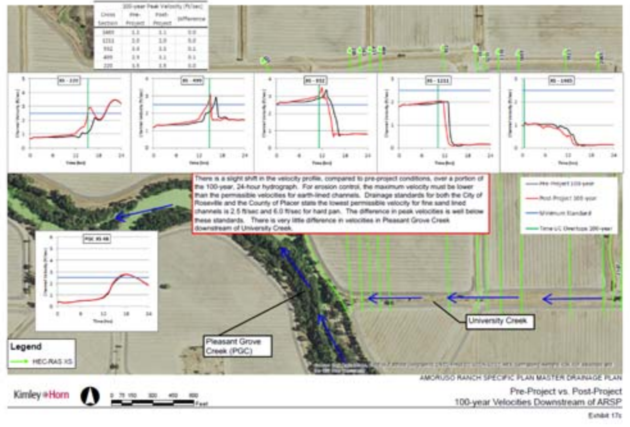


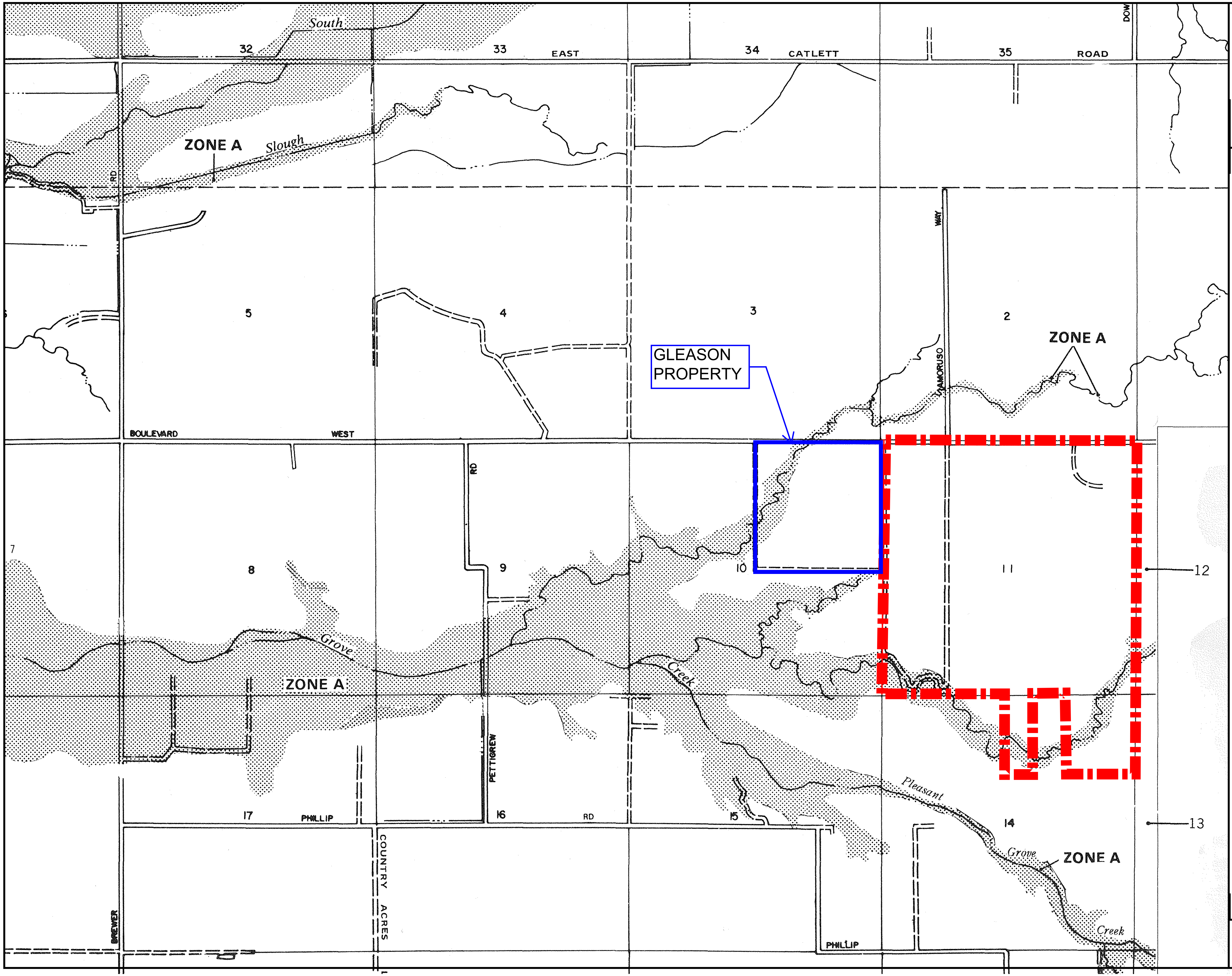
Exhibit 17c

Kimley»Horn

AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

Pleasant Grove Creek Watershed

Exhibit 1



APPROXIMATE SCALE IN FEET

2000 0 2000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

PLACER COUNTY,
CALIFORNIA AND
INCORPORATED AREAS

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

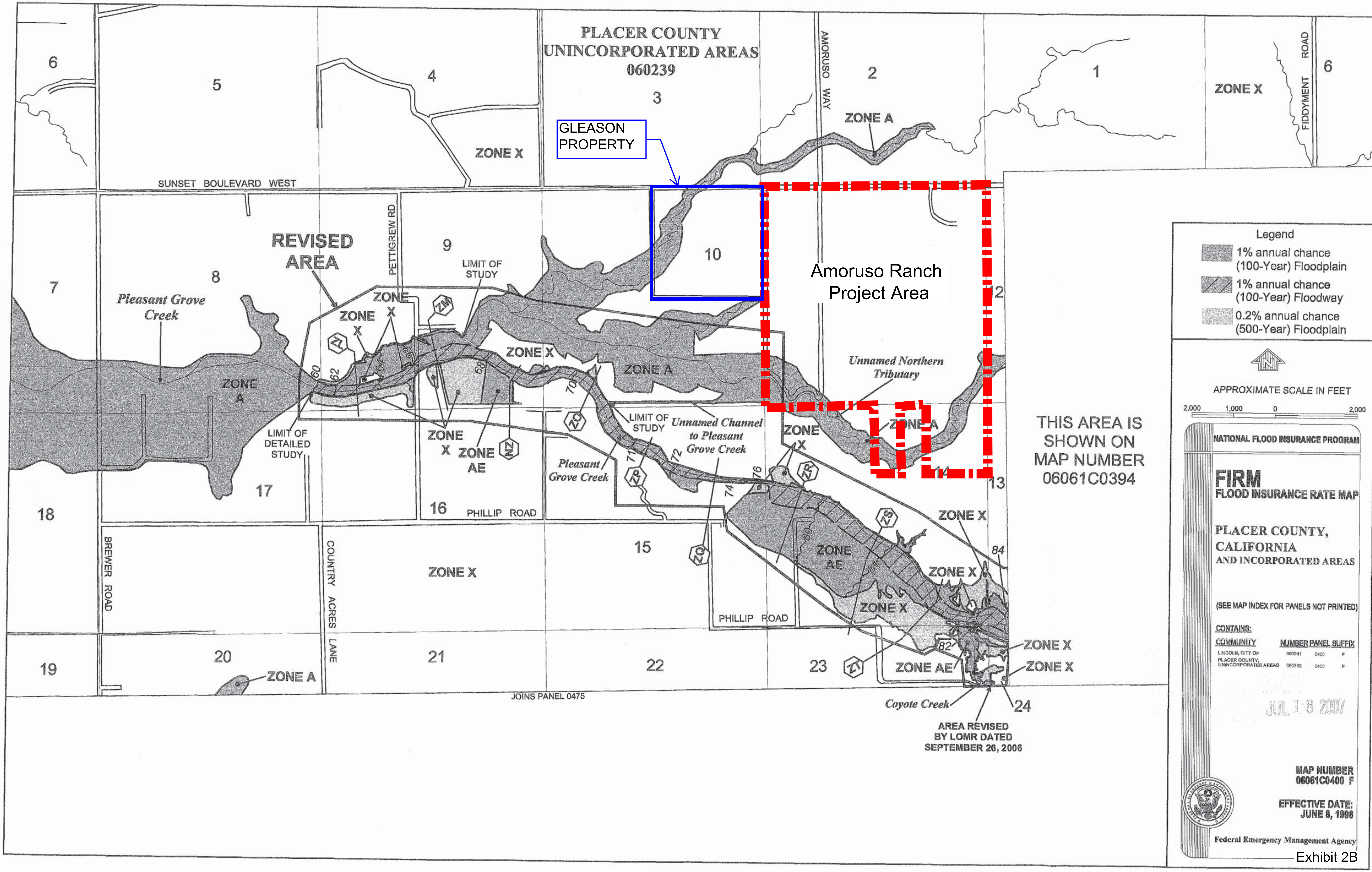
COMMUNITY	NUMBER	PANEL	SUFFIX
LINCOLN, CITY OF	060241	0400	F
PLACER COUNTY UNINCORPORATED AREAS	060239	0400	F

MAP NUMBER
06061C0400 F

EFFECTIVE DATE:
JUNE 8, 1998

Federal Emergency Management Agency

Exhibit 2A



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

PLACER COUNTY,
CALIFORNIA
AND INCORPORATED AREAS

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LINCOLN, CITY OF	060241	0400	F
PLACER COUNTY, UNINCORPORATED AREAS	060239	0400	F

JUL 1 8 2007

MAP NUMBER
06061C0400 F

EFFECTIVE DATE:
JUNE 8, 1998

Federal Emergency Management Agency

Exhibit 2B

0 500 1,000 2,000
Feet

AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

Historic Conditions Drainage Patterns (USGS-1967)

Exhibit 3

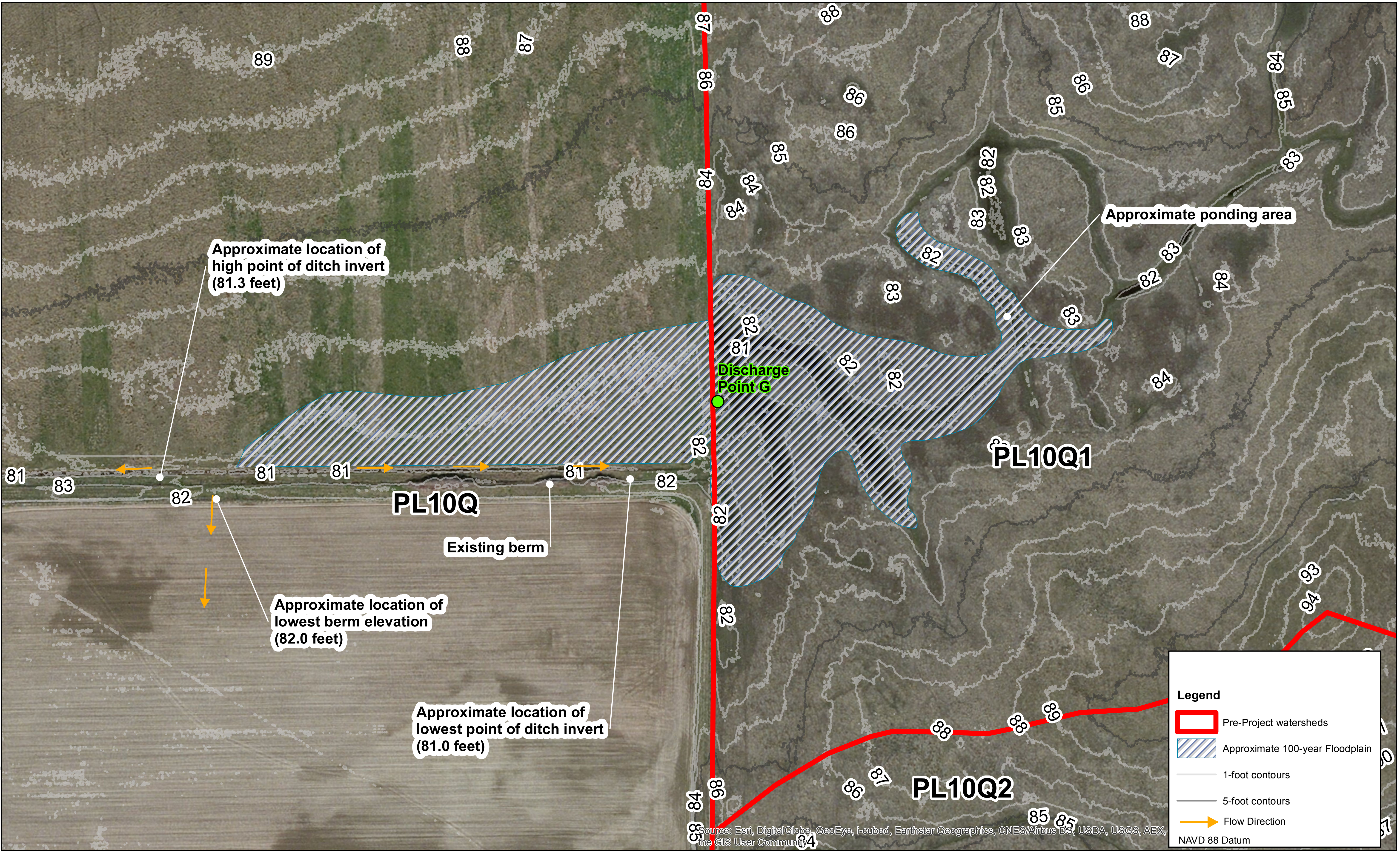
Kimley»Horn

0 500 1,000 2,000
Feet

AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

Existing Conditions Drainage Patterns

Exhibit 4



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, the GIS User Community

XX/XX/XX JN10-00000 MXD Name.mxd Initials

AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

Western Boundary Existing Conditions Runoff Patterns

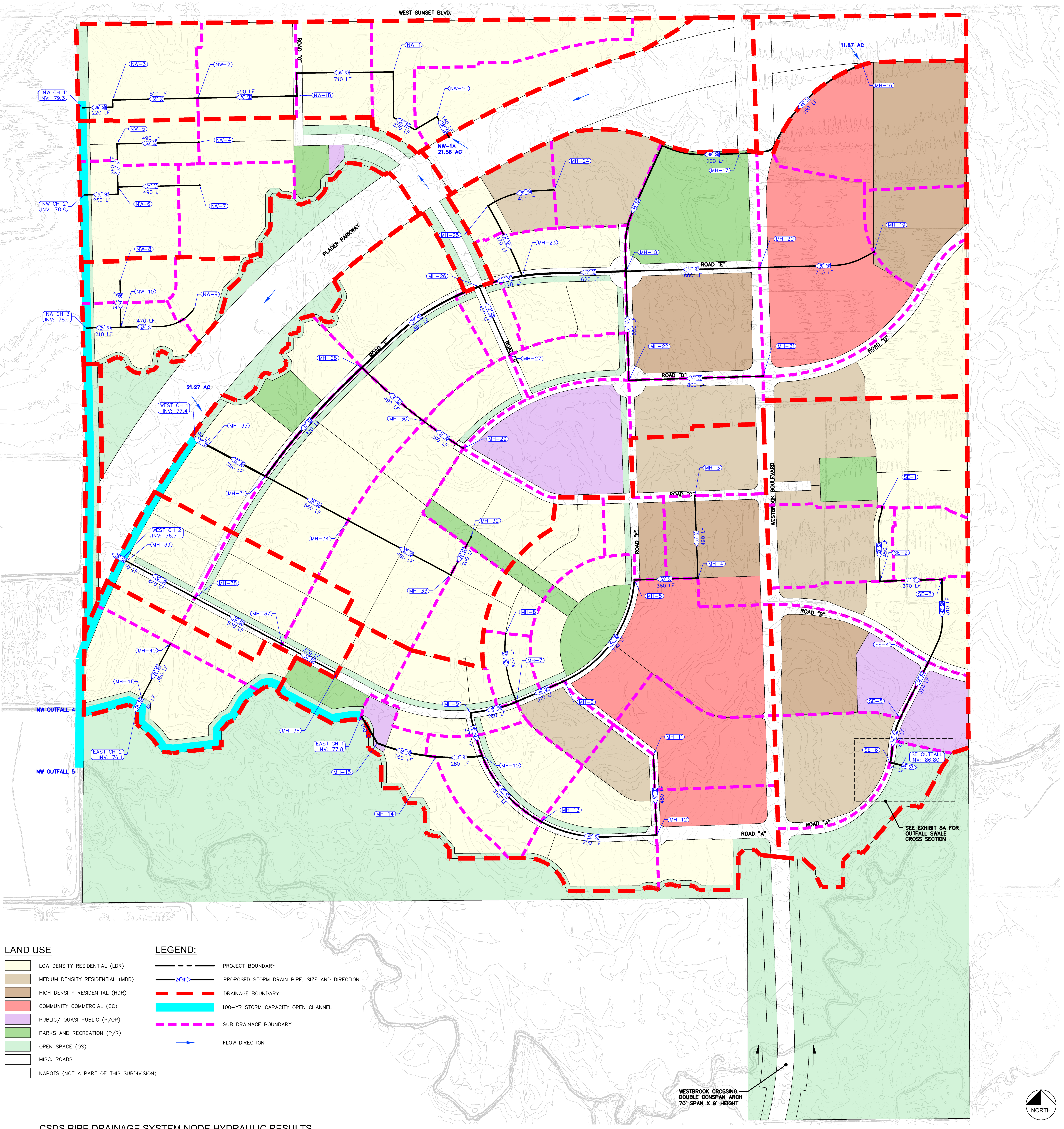
Exhibit 5

Kimley»Horn

AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

Proposed Conditions Drainage Patterns*

Exhibit 6



LAND USE

▭	LOW DENSITY RESIDENTIAL (LDR)
▭	MEDIUM DENSITY RESIDENTIAL (MDR)
▭	HIGH DENSITY RESIDENTIAL (HDR)
🟥	COMMUNITY COMMERCIAL (CC)
🟪	PUBLIC/ QUASI PUBLIC (P/QP)
🟩	PARKS AND RECREATION (P/R)
🟩	OPEN SPACE (OS)
▭	MISC. ROADS
▭	NAPOTS (NOT A PART OF THIS SUBDIVISION)

LEGEND:

— - —	PROJECT BOUNDARY
—24"SD—	PROPOSED STORM DRAIN PIPE, SIZE AND DIRECTION
— —	DRAINAGE BOUNDARY
▬	100-YR STORM CAPACITY OPEN CHANNEL
- - -	SUB DRAINAGE BOUNDARY
→	FLOW DIRECTION

CSDS PIPE DRAINAGE SYSTEM NODE HYDRAULIC RESULTS

NODE ID	TRIB. AREA (AC)	TOTAL AREA (AC)	RIM ELEV.	INV. ELEV.	10-YR HGL (FT)	25-YR HGL (FT)	100-YR HGL (FT)	10-YR FLOW (CFS)	25-YR FLOW (CFS)	100-YR FLOW (CFS)
MH - 3	7	7	96.6	89.5	90.54	93.74	96.34	9.73	12.87	16.01
MH - 4	8.6	15.6	95.9	86.3	88.11	92.71	94.73	20.89	26.47	33.43
MH - 5	3.4	19	94.3	83.5	87.19	90.93	91.88	24.48	31.09	39.54
MH - 6	23.1	42.1	90.5	82.3	86.45	89.75	90.14	46.48	59.11	78.98
MH - 8	6.4	6.4	92.9	84.4	86.87	90.56	91.56	8.2	11.08	13.95
MH - 7	6	54.5	90	81.9	85.91	88.95	89.3	55.94	72.14	97.63
MH - 9	6.3	60.8	89.4	81.2	85.3	88.21	88.75	59.6	77.47	105.72
MH - 11	9.3	9.3	93.4	86	87.18	90.56	92.84	13.66	17.84	22.02
MH - 12	8.8	18.1	92.8	82.9	86.4	90.04	92.05	24.46	30.71	38.77
MH - 13	12	30.1	91.2	81.9	85.73	88.98	90.39	35.4	44.04	58.41
MH - 10	4.9	95.8	89.2	80	84.51	87.1	88.15	90.41	118.42	154.92
MH - 14	5	100.8	87.9	79.2	83.7	85.75	87.22	92.02	121.27	154.27
MH - 15	6.4	107.2	87	78.16	82.13	83.87	84.98	93.45	124.35	159.74
MH - 16	28	28	102.9	95	96.57	97.07	97.37	28.13	37.55	46.96
MH - 17	0	28	101.5	92	93.67	93.99	94.32	25.1	33.85	42.63
MH - 19	6.4	6.4	105.5	94.8	96.04	98.05	101.46	9.23	12.1	14.98
MH - 20	19.4	25.8	101.7	92.3	94.59	96.71	99.36	33.37	42.91	54.3
MH - 21	11.1	11.1	107.8	94	95.29	95.98	98.48	14.73	19.72	24.7
MH - 22	5.7	16.8	99.7	90.4	92.53	93.74	94.64	20.95	27.23	34.65
MH - 18	23.7	94.3	98.2	86.4	89.45	90.11	90.79	73.67	100.62	126.74
MH - 24	7	7	98.3	89.9	91.29	91.58	92.4	9.59	12.74	15.88
MH - 25	5.5	12.5	96.4	88.6	90.16	90.52	91.04	15.87	21.26	26.34
MH - 23	10.6	117.4	95.5	85.4	88.25	88.93	89.63	85	117.08	147.83
MH - 27	4.3	4.3	97.4	91.2	92.03	92.17	92.3	5.58	7.51	9.44
MH - 26	2.6	124.3	95	84.68	87.69	88.37	89.06	87.59	121.03	152.85
MH - 29	11.9	11.9	96.8	89	90.26	90.48	90.66	14.05	18.93	23.81
MH - 30	3.7	15.6	93.5	86.5	87.85	88.09	89.01	17.9	24.21	30.32
MH - 28	15.9	155.8	92.8	82.68	85.58	86.24	86.96	99.99	139.92	176.8
MH - 32	7	7	94.4	86.5	88.72	90.49	94.05	8.99	12.14	15.28
MH - 33	5	12	92.4	85.4	88.16	89.46	92.53	14.57	19.98	25.38
MH - 34	14.7	26.7	90.8	84	85.93	87	89.39	28.82	40.57	52.54
MH - 31	14.6	197.1	89.4	79.72	82.63	83.21	84.76	116.25	164.76	207.57
MH - 35	13.6	210.7	87.7	77.78	81.26	82.08	83.78	119.98	171.2	215.93
MH - 36	5.2	5.2	86.7	81.5	83.09	83.5	85.31	6.38	8.72	11.06
MH - 37	3.8	9	87.1	81.3	82.79	83.17	84.81	9.98	13.67	17.67
MH - 38	8	17	85	79.8	81.63	82.09	83.24	17.21	23.29	31.22
MH - 39	7.2	24.2	83.1	78.9	80.41	80.67	81.47	21.9	29.99	41.16
MH - 40	4.6	4.6	86.6	79	81.2	81.68	82.06	5.85	7.92	9.98
MH - 41	11.6	16.2	83	78.2	80.36	80.69	80.75	18.17	25.46	32.74

NODE ID	TRIB. AREA (AC)	TOTAL AREA (AC)	RIM ELEV.	INV. ELEV.	10-YR HGL (FT)	25-YR HGL (FT)	100-YR HGL (FT)	10-YR FLOW (CFS)	25-YR FLOW (CFS)	100-YR FLOW (CFS)
NW-1	10.6	40.7	94.3	88.5	90.09	90.6	91.92	15.38	23.31	31.17
NW-1B	5.9	46.6	93.5	86.8	88.33	88.82	89.8	16.4	25.16	33.7
NW-2	7.7	54.3	90.6	85	86.36	86.75	87	18.09	28.03	37.62
NW-3	9.6	63.9	88	82.1	83.55	83.93	84.24	20.39	31.85	42.94
NW-4	12.4	12.4	89.8	85.5	87.6	89.76	90.72	15.55	20.95	26.34
NW-5	4.2	16.6	87.8	84	86.67	88	88.4	19.01	26.2	33.43
NW-7	7.5	7.5	91.9	87	88.15	89.15	90.97	9.59	12.96	16.33
NW-6	7.7	31.8	87.1	83	85	85.92	86.59	34.87	48.65	62.49
NW-8	3.3	3.3	87.2	81	82.07	83.37	85.11	4.19	5.67	7.16
NW-9	3.4	3.4	91.4	85	85.73	85.85	85.96	4.32	5.85	7.37
NW-10	5.1	11.8	85.9	80	81.34	82.6	83.9	13.91	18.5	23.15
SE 1	17.9	17.9	101.1	96.4	98.05	100.74	101.08	23.52	31.56	39.6
SE 2	7.9	25.8	98.6	93.5	95.75	97.7	98.76	32.98	44.07	55.67
SE 3	4.2	30	97.2	91.6	94.2	95.76	97.11	36.8	49.4	62.89
SE 4	8.1	38.1	94.1	89.4	92.2	92.72	94.09	44.03	59.29	76.21
SE 5	10.9	49	93.8	88.95	91.12	91.49	92.53	55.94	75.53	95.66
SE 6	13.6	62.6	92.5	87.1	89.68	90.24	91.6	69.87	94.36	121.44
NW-1C	8.5	30.1	96.4	89.6	92.22	93.02	94.47	12.6	18.37	24.12
NW-1A	21.6	21.6	N/A	90	93.29	95.27	98.33	9.16	13.28	17.41

HEC-RAS CHANNEL ANALYSIS HYDRAULIC RESULTS*

NODE ID	TRIB. AREA (AC)	TOTAL AREA (AC)	RIM ELEV.	INV. ELEV.	10-YR HGL (FT)	25-YR HGL (FT)	100-YR HGL (FT)	10-YR FLOW (CFS)	25-YR FLOW (CFS)	100-YR FLOW (CFS)
EAST CH 1	N/A	106.9	N/A	77.84	80.62	81.19	82.04	57.6	99.5	169.5
EAST CH 2	N/A	124.2	N/A	76.10	80.16	80.40	81.09	46.2	73.5	115.7
WEST CH 1	N/A	211.3	N/A	77.37	80.85	81.63	82.69	97.4	182.7	328.9
WEST CH 2	N/A	234.8	N/A	76.69	80.53	81.13	82.08	94.7	172.7	303.0
NW CH 1	N/A	113.9	N/A	79.34	81.43	82.08	82.90	38.8	66.6	109.8
NW CH 2	N/A	113.9	N/A	78.82	81.03	81.70	82.58	38.8	66.6	109.8
NW CH 3	N/A	113.9	N/A	78.02	80.69	81.33	82.25	38.8	66.6	109.8
NW CH 4	N/A	382.3	N/A	76.24	80.26	80.63	81.40	119.8	203.5	341.4
NW CH 5	N/A	506.5	N/A	75.72	80.10	80.26	80.90	161.0	264.1	394.7

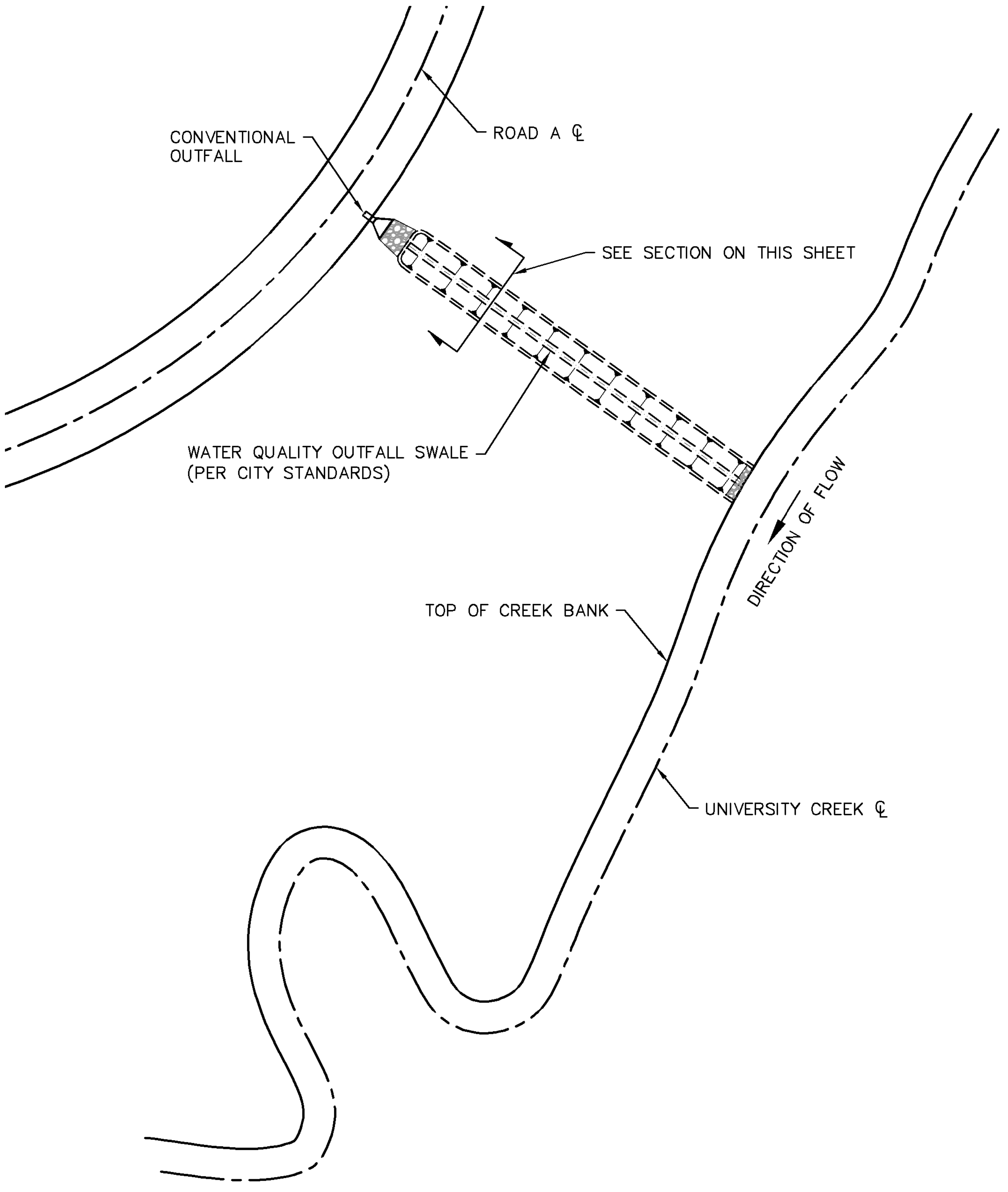
* INFLOWS PROVIDED BY THE HEC-HMS MODEL.

AMORUSO RANCH
EXHIBIT 7 - PROPOSED STORM DRAIN
MASTER PLAN

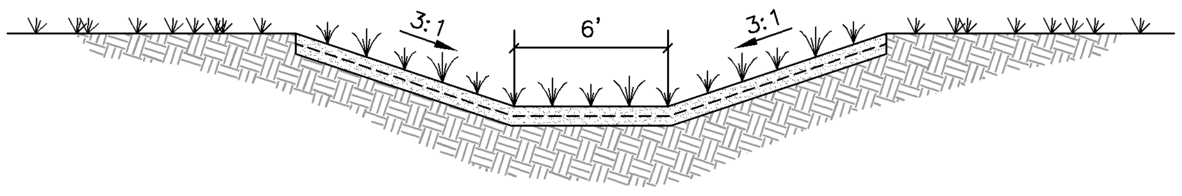
JANUARY 2016

Kimley»Horn

Jan 26, 2016 - 8:07am - USER amelia.whittaker
K:\SAC_LDEV\097679001 Amoruso Ranch\08 CADD\Exhibits\Storm Drain\Storm Master Plan Exhibit\Storm Master Plan Exhibit.dwg



OUTFALL SWALE DETAIL
NTS



OUTFALL SWALE SECTION
NTS

OUTFALL SWALE SECTION NOTES:

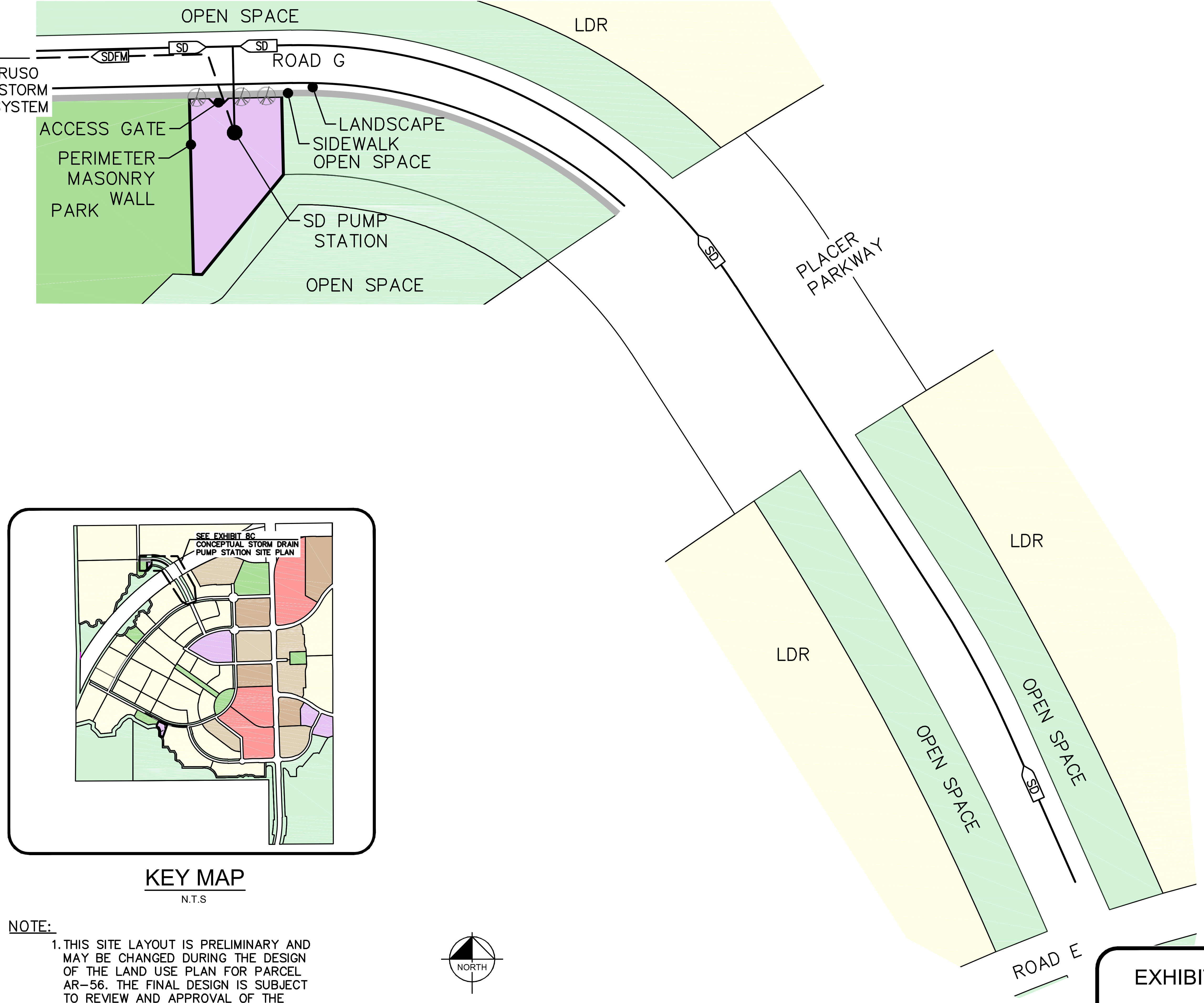
1. DRAINAGE SWALE SHALL DAYLIGHT 5–FT PRIOR TO TOP OF CREEK BANK.
2. EDGE OF DRAINAGE SWALE SHALL REMAIN A MINIMUM OF 5–FT FROM ANY SENSITIVE WETLAND FEATURES.
3. OVER LAND RELEASE SHALL TIE INTO HEADWALL STRUCTURE.

NTS

JANUARY 2016

EXHIBIT 8A - AMORUSO RANCH / UNIVERSITY CREEK WATER QUALITY OUTFALL SWALE

Kimley»Horn



KEY MAP

N.T.S

NOTE:

1. THIS SITE LAYOUT IS PRELIMINARY AND MAY BE CHANGED DURING THE DESIGN OF THE LAND USE PLAN FOR PARCEL AR-56. THE FINAL DESIGN IS SUBJECT TO REVIEW AND APPROVAL OF THE CITY OF ROSEVILLE.

NORTH

N.T.S

JANUARY 2016

EXHIBIT 8B - CONCEPTUAL STORM DRAIN PUMP STATION SITE PLAN

Jan 04, 2016 – 1:32pm K:\SAC_LDEV\097679001 Amoruso Ranch\08 CADD\Exhibits\Specific Plan\North Pump Station Site Plan.dwg

XX/XX/XX JN10-00000 MXD_Name.mxd Initials

Kimley»Horn

AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

Pre-Project 100-year Floodplain

Exhibit 9

XX/XX/XX JN10-00000 MXD_Name.mxd Initials

Kimley»Horn

AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

Post-Project 100-year Floodplain

Exhibit 10

XX/XX/XX JN10-00000 MXD_Name.mxd Initials

AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

Pre-Project vs. Post-Project 100-year Floodplain

Exhibit 11

Kimley»Horn

AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

Future Fully-Developed 100-year Floodplain

Exhibit 12

XX/XX/XX JN10-00000 MXD_Name.mxd Initials

Kimley»Horn

0 1,000 2,000 4,000 Feet

AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

Pre-Project Off-Site 100-Year Floodplain

Exhibit 13

XX/XX/XX JN10-00000 MXD_Name.mxd Initials

AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

Post-Project Off-Site 100-Year Floodplain

Exhibit 14

XX/XX/XX JN10-00000 MXD_Name.mxd Initials

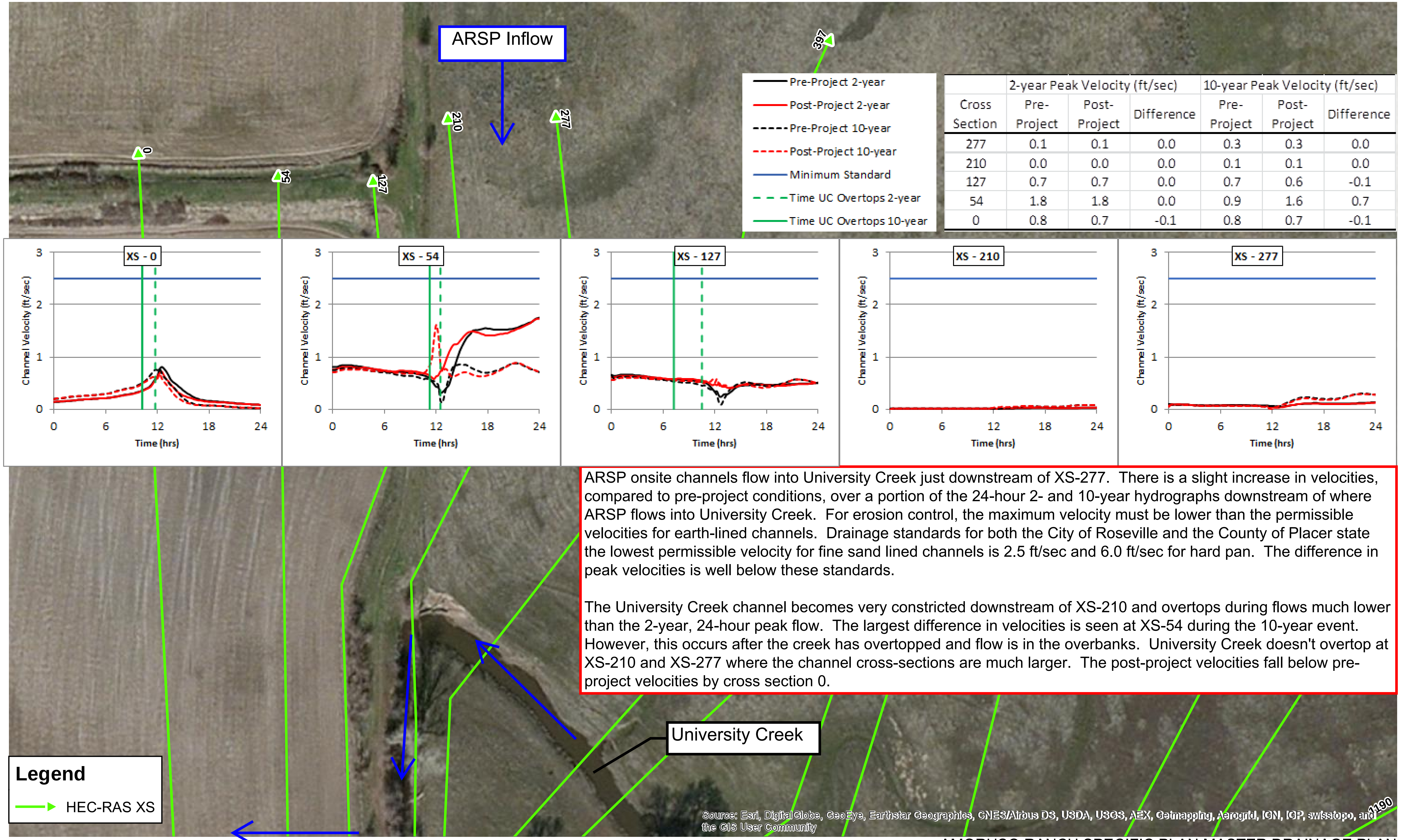
Kimley»Horn

0 1,000 2,000 4,000
Feet

AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

Pre-Project vs.Post-Project Off-Site 100-Year Floodplains

Exhibit 15



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

	2-year Peak Velocity (ft/sec)			10-year Peak Velocity (ft/sec)		
Cross Section	Pre-Project	Post-Project	Difference	Pre-Project	Post-Project	Difference
277	0.1	0.1	0.0	0.3	0.3	0.0
210	0.0	0.0	0.0	0.1	0.1	0.0
127	0.7	0.7	0.0	0.7	0.6	-0.1
54	1.8	1.8	0.0	0.9	1.6	0.7
0	0.8	0.7	-0.1	0.8	0.7	-0.1

ARSP onsite channels flow into University Creek just downstream of XS-277. There is a slight increase in velocities, compared to pre-project conditions, over a portion of the 24-hour 2- and 10-year hydrographs downstream of where ARSP flows into University Creek. For erosion control, the maximum velocity must be lower than the permissible velocities for earth-lined channels. Drainage standards for both the City of Roseville and the County of Placer state the lowest permissible velocity for fine sand lined channels is 2.5 ft/sec and 6.0 ft/sec for hard pan. The difference in peak velocities is well below these standards.

The University Creek channel becomes very constricted downstream of XS-210 and overtops during flows much lower than the 2-year, 24-hour peak flow. The largest difference in velocities is seen at XS-54 during the 10-year event. However, this occurs after the creek has overtopped and flow is in the overbanks. University Creek doesn't overtop at XS-210 and XS-277 where the channel cross-sections are much larger. The post-project velocities fall below pre-project velocities by cross section 0.

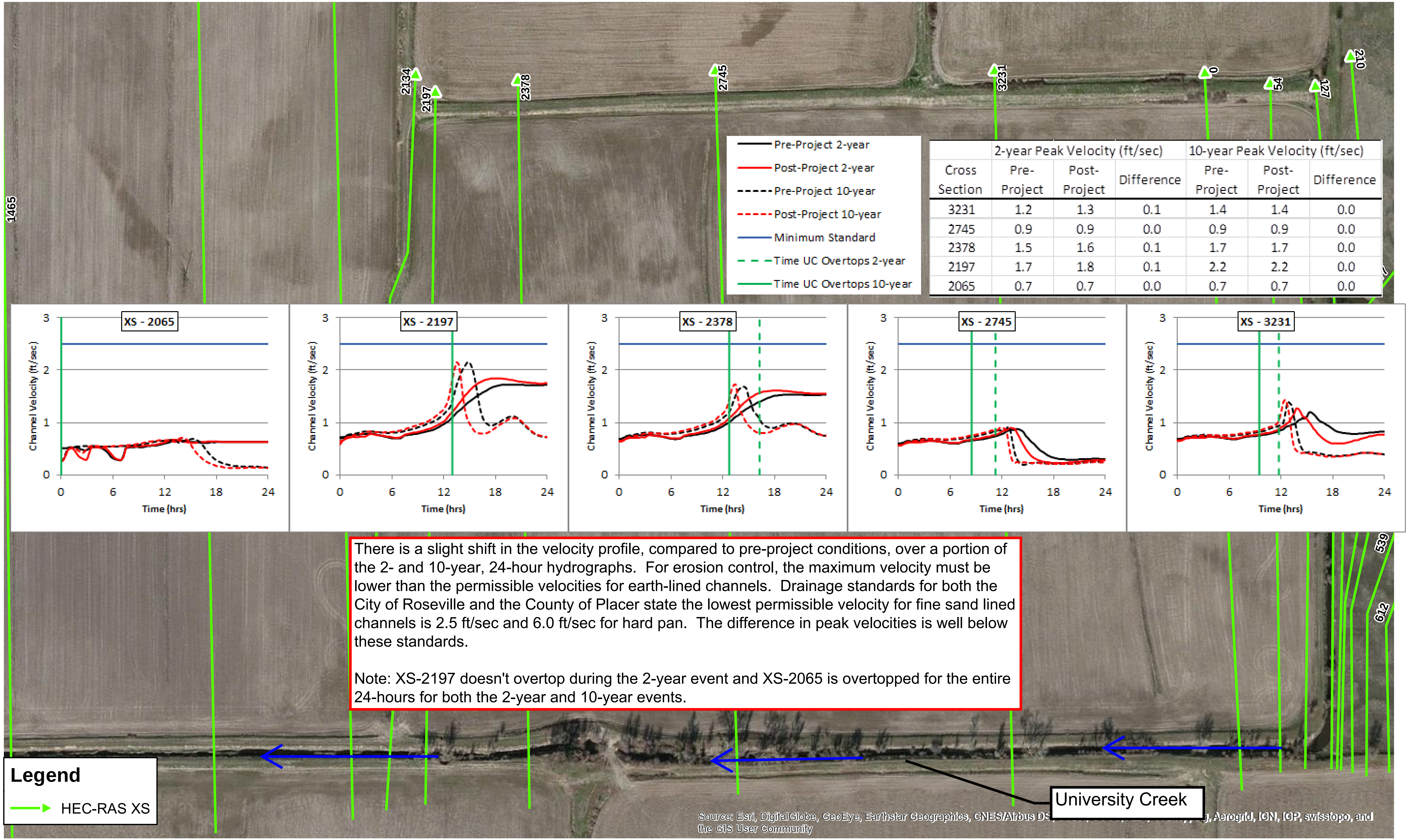
Kimley»Horn

0 75 150
Feet

AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

Pre-Project vs. Post-Project
2-year and 10-year Velocities Downstream of ARSP

Exhibit 16a



	2-year Peak Velocity (ft/sec)			10-year Peak Velocity (ft/sec)		
Cross Section	Pre-Project	Post-Project	Difference	Pre-Project	Post-Project	Difference
3231	1.2	1.3	0.1	1.4	1.4	0.0
2745	0.9	0.9	0.0	0.9	0.9	0.0
2378	1.5	1.6	0.1	1.7	1.7	0.0
2197	1.7	1.8	0.1	2.2	2.2	0.0
2065	0.7	0.7	0.0	0.7	0.7	0.0

There is a slight shift in the velocity profile, compared to pre-project conditions, over a portion of the 2- and 10-year, 24-hour hydrographs. For erosion control, the maximum velocity must be lower than the permissible velocities for earth-lined channels. Drainage standards for both the City of Roseville and the County of Placer state the lowest permissible velocity for fine sand lined channels is 2.5 ft/sec and 6.0 ft/sec for hard pan. The difference in peak velocities is well below these standards.

Note: XS-2197 doesn't overtop during the 2-year event and XS-2065 is overtopped for the entire 24-hours for both the 2-year and 10-year events.

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, [illegible], Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

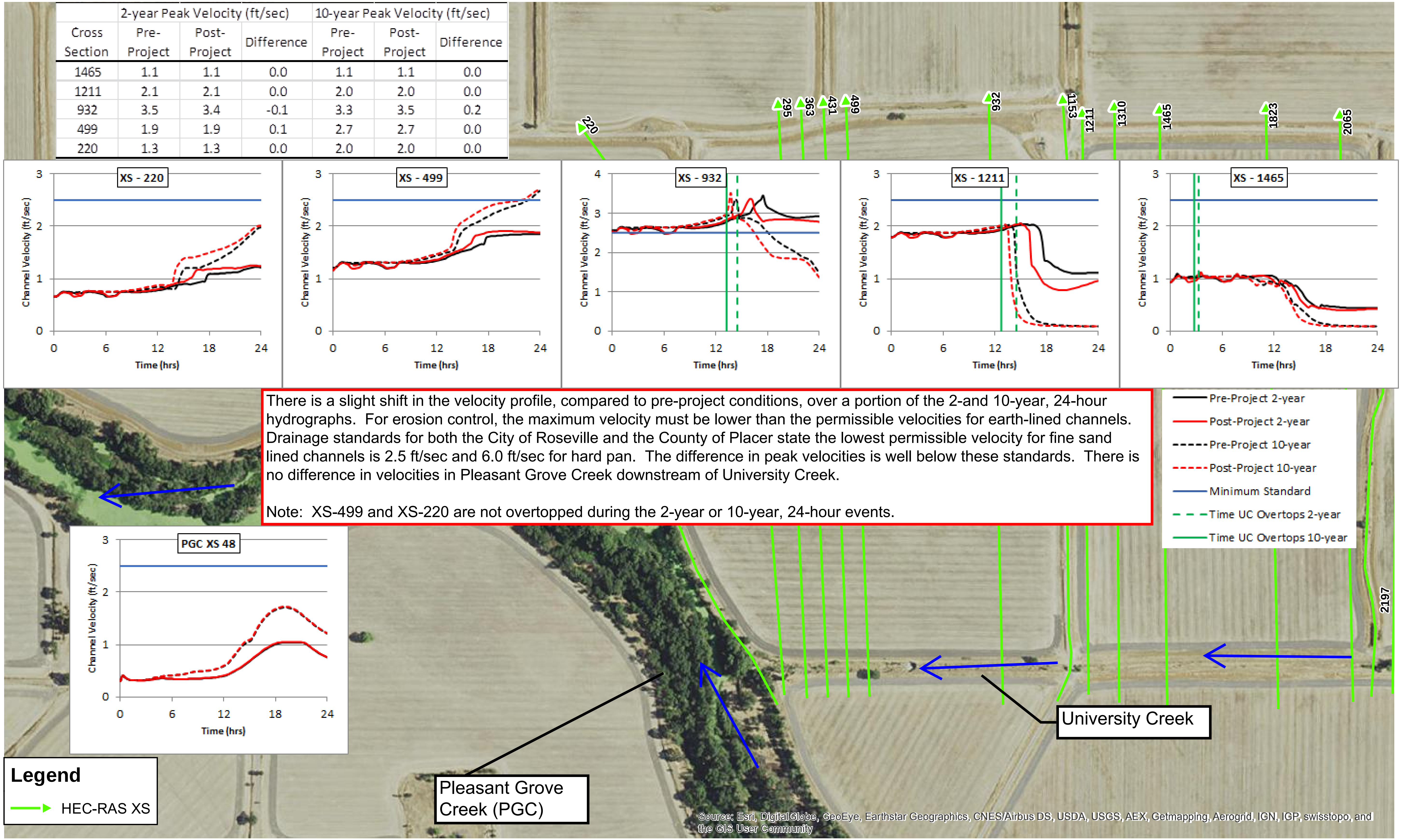
Kimley»Horn

0 75 150 300
Feet

Pre-Project vs. Post-Project
2-year and 10-year Velocities Downstream of ARSP

Exhibit 16b

Cross Section	2-year Peak Velocity (ft/sec)			10-year Peak Velocity (ft/sec)		
	Pre-Project	Post-Project	Difference	Pre-Project	Post-Project	Difference
1465	1.1	1.1	0.0	1.1	1.1	0.0
1211	2.1	2.1	0.0	2.0	2.0	0.0
932	3.5	3.4	-0.1	3.3	3.5	0.2
499	1.9	1.9	0.1	2.7	2.7	0.0
220	1.3	1.3	0.0	2.0	2.0	0.0



There is a slight shift in the velocity profile, compared to pre-project conditions, over a portion of the 2-and 10-year, 24-hour hydrographs. For erosion control, the maximum velocity must be lower than the permissible velocities for earth-lined channels. Drainage standards for both the City of Roseville and the County of Placer state the lowest permissible velocity for fine sand lined channels is 2.5 ft/sec and 6.0 ft/sec for hard pan. The difference in peak velocities is well below these standards. There is no difference in velocities in Pleasant Grove Creek downstream of University Creek.

Note: XS-499 and XS-220 are not overtopped during the 2-year or 10-year, 24-hour events.

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

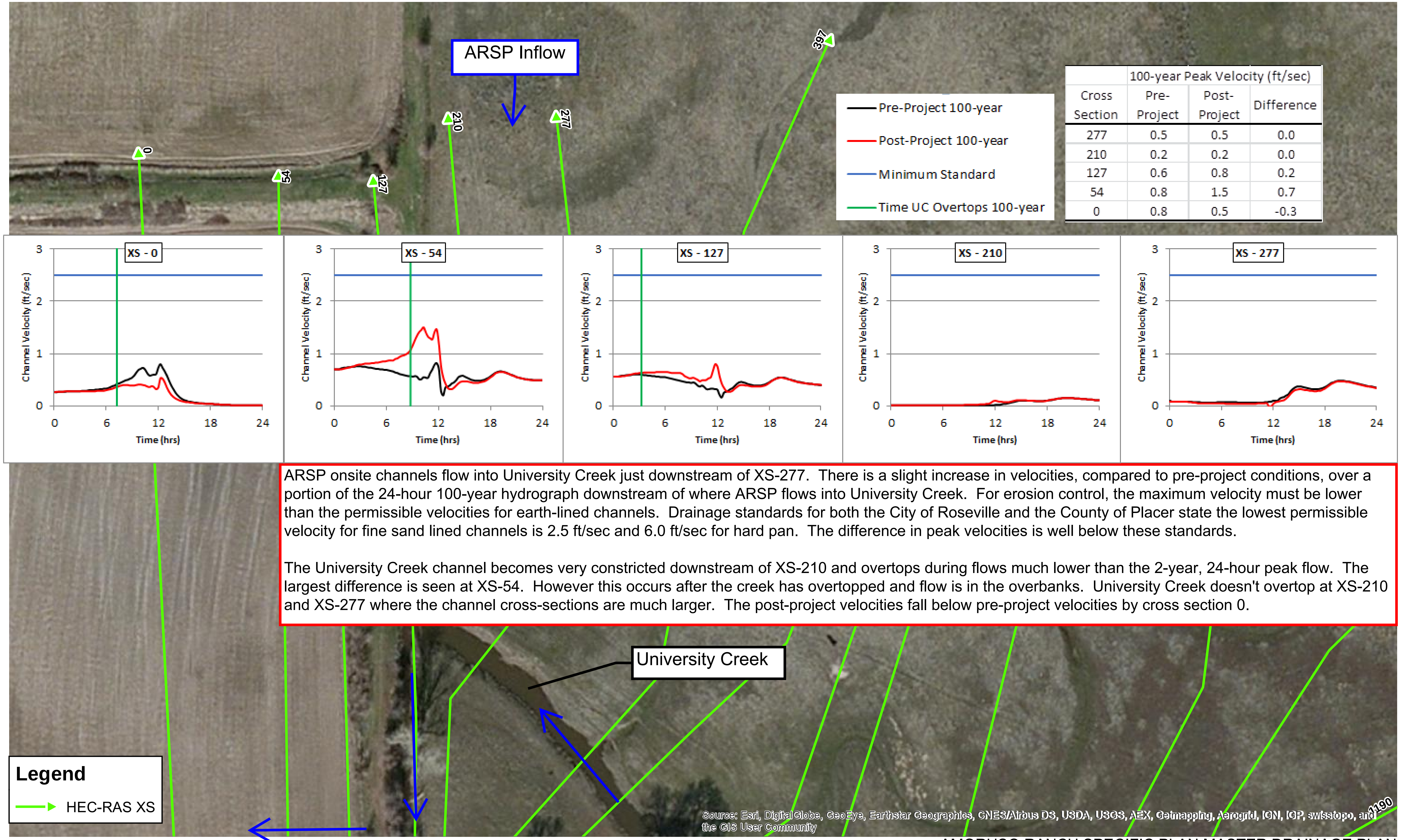
AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

Kimley»Horn

0 75 150 300 450 600
Feet

Pre-Project vs. Post-Project
2-year and 10-year Velocities Downstream of ARSP

Exhibit 16c



Cross Section	100-year Peak Velocity (ft/sec) Pre-Project	Post-Project	Difference
277	0.5	0.5	0.0
210	0.2	0.2	0.0
127	0.6	0.8	0.2
54	0.8	1.5	0.7
0	0.8	0.5	-0.3

ARSP onsite channels flow into University Creek just downstream of XS-277. There is a slight increase in velocities, compared to pre-project conditions, over a portion of the 24-hour 100-year hydrograph downstream of where ARSP flows into University Creek. For erosion control, the maximum velocity must be lower than the permissible velocities for earth-lined channels. Drainage standards for both the City of Roseville and the County of Placer state the lowest permissible velocity for fine sand lined channels is 2.5 ft/sec and 6.0 ft/sec for hard pan. The difference in peak velocities is well below these standards.

The University Creek channel becomes very constricted downstream of XS-210 and overtops during flows much lower than the 2-year, 24-hour peak flow. The largest difference is seen at XS-54. However this occurs after the creek has overtopped and flow is in the overbanks. University Creek doesn't overtop at XS-210 and XS-277 where the channel cross-sections are much larger. The post-project velocities fall below pre-project velocities by cross section 0.

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

Kimley»Horn

0 75 150 Feet

Pre-Project vs. Post-Project
100-year Velocities Downstream of ARSP

Exhibit 17a

	100-year Peak Velocity (ft/sec)		
Cross Section	Pre-Project	Post-Project	Difference
3231	1.4	1.3	-0.1
2745	0.9	0.9	0.0
2378	1.7	1.7	0.0
2197	2.2	2.1	0.0
2065	0.8	0.8	0.0

There is a slight shift in the velocity profile, compared to pre-project conditions, over a portion of the 100-year, 24-hour hydrograph. For erosion control, the maximum velocity must be lower than the permissible velocities for earth-lined channels. Drainage standards for both the City of Roseville and the County of Placer state the lowest permissible velocity for fine sand lined channels is 2.5 ft/sec and 6.0 ft/sec for hard pan. The difference in peak velocities is well below these standards.

Note: XS-2065 is overtopped for the entire 24-hours for both the 100-year event.

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

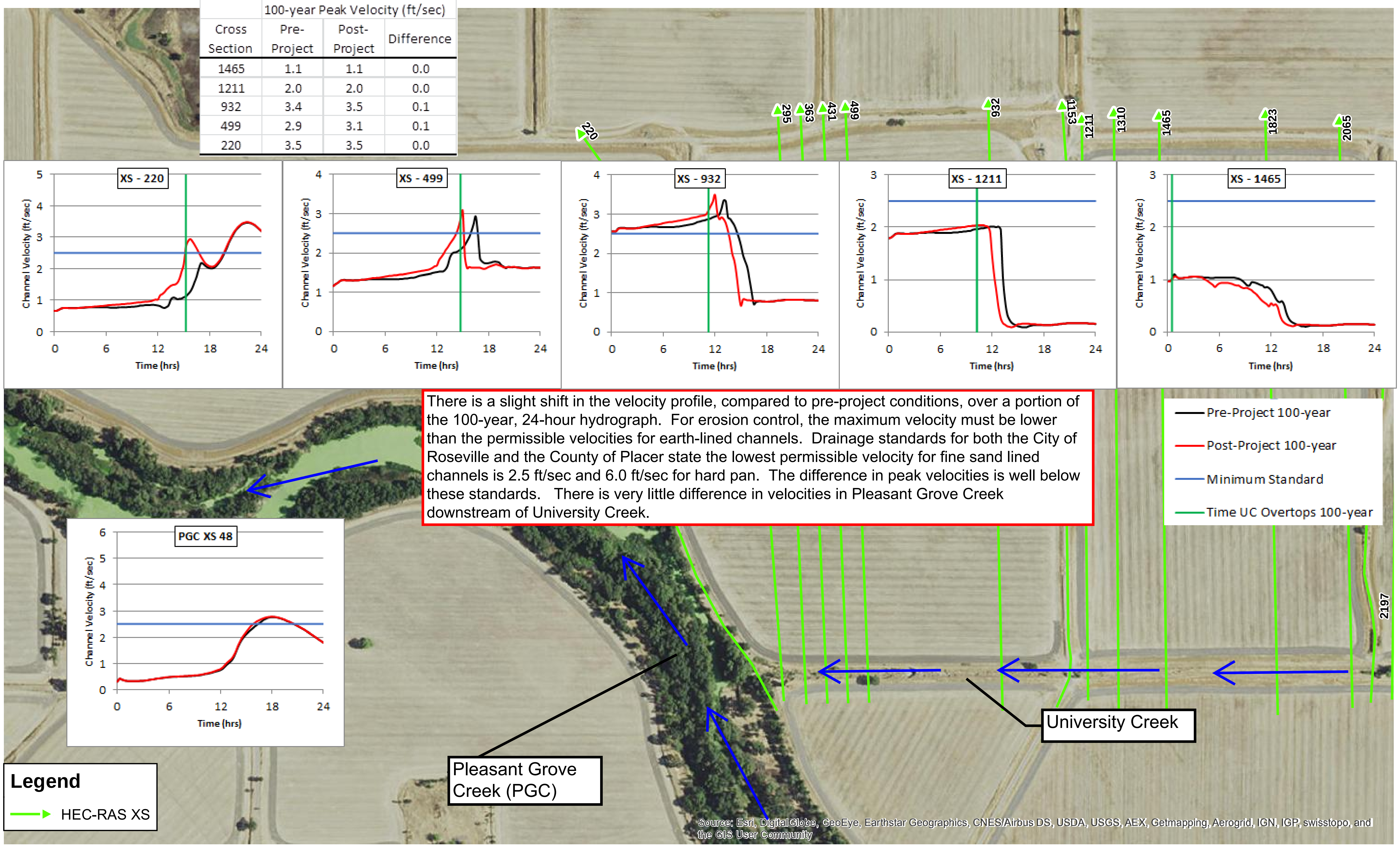
Kimley»Horn

AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

Pre-Project vs. Post-Project
100-year Velocities Downstream of ARSP

Exhibit 17b

	100-year Peak Velocity (ft/sec)		
Cross Section	Pre-Project	Post-Project	Difference
1465	1.1	1.1	0.0
1211	2.0	2.0	0.0
932	3.4	3.5	0.1
499	2.9	3.1	0.1
220	3.5	3.5	0.0



There is a slight shift in the velocity profile, compared to pre-project conditions, over a portion of the 100-year, 24-hour hydrograph. For erosion control, the maximum velocity must be lower than the permissible velocities for earth-lined channels. Drainage standards for both the City of Roseville and the County of Placer state the lowest permissible velocity for fine sand lined channels is 2.5 ft/sec and 6.0 ft/sec for hard pan. The difference in peak velocities is well below these standards. There is very little difference in velocities in Pleasant Grove Creek downstream of University Creek.

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Kimley»Horn

0 75 150 300 450 600
Feet

AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

Pre-Project vs. Post-Project
100-year Velocities Downstream of ARSP

Exhibit 17c

Amoruso Ranch Specific Plan Area

Drainage Master Plan

Appendix B

Hydrologic Data

Amoruso Ranch Landuse

Land Use	% Impervious
Low Density Residential (LDR)	40%
Medium Density Residential (MDR)	50%
High Density Residential (HDR)	60%
Commercial (Comm)	70%
Park	5%
Park/Quasi Public	50%
Roadway	85%
Placer Parkway	40%

Base Model: Pleasant Grove Creek Watershed FEMA CTP Hydrologic Factors

Shed	Area (mi^2)	Hydrologic Data for Plane 1						
		Initial Infiltration (in/hr)	Constant Infiltration (in/hr)	Percent Impervious	Overland Length (ft)	Overland Slope (ft/ft)	Overland n-value	Percent of Watershed
PL10K	0.1599	0.1	0.07	2	600	0.001	0.4	100
PL10M1	0.0318	0.1	0.07	2	350	0.001	0.4	100
PL10M2	0.233	0.1	0.07	2	350	0.001	0.4	100
PL10N	0.275	0.1	0.07	2	350	0.001	0.4	100
PL10Q	0.8124	0.1	0.07	2.008	350	0.001	0.4	100
PL11B	0.6485	0.1	0.07	2.001	350	0.001	0.4	100
PL11C	0.7831	0.1	0.07	9.535	350	0.0074	0.4	100
PL11D	0.8108	0.1	0.07	2	350	0.001	0.4	100

Base Model: Pleasant Grove Creek Watershed FEMA CTP Hydrologic Factors

Shed	Area (mi^2)	Hydrologic Data for Plane 2						
		Initial Infiltration (in/hr)	Constant Infiltration (in/hr)	Percent Impervious	Overland Length (ft)	Overland Slope (ft/ft)	Overland n-value	Percent of Watershed
PL10K	0.1599	0	0	0	0	0	0	0
PL10M1	0.0318	0	0	0	0	0	0	0
PL10M2	0.233	0	0	0	0	0	0	0
PL10N	0.275	0	0	0	0	0	0	0
PL10Q	0.8124	0	0	0	0	0	0	0
PL11B	0.6485	0	0	0	0	0	0	0
PL11C	0.7831	0	0	0	0	0	0	0
PL11D	0.8108	0	0	0	0	0	0	0

Pre-Project Model Hydrologic Factors

Shed	Area (mi^2)	Hydrologic Data for Plane 1						
		Initial Infiltration (in/hr)	Constant Infiltration (in/hr)	Percent Impervious	Overland Length (ft)	Overland Slope (ft/ft)	Overland n-value	Percent of Watershed
PL11B	0.5991	0.1	0.07	2.001	350	0.001	0.4	100
PL11B1	0.0493	0.1	0.07	2	350	0.001	0.4	100
PL11C	0.7627	0.1	0.07	9.535	350	0.0074	0.4	100
PL11C1	0.0205	0.1	0.07	2	350	0.001	0.4	100
PL11D	0.7941	0.1	0.07	2	350	0.001	0.4	100
PL11D1	0.0167	0.1	0.07	2	350	0.001	0.4	100
PL10K	0.1147	0.1	0.07	2	600	0.001	0.4	100
PL10K1	0.0423	0.1	0.07	2	400	0.001	0.4	100
PL10K2	0.0144	0.1	0.07	2	400	0.001	0.4	100
PL10M1A	0.0655	0.1	0.07	2	350	0.001	0.4	100
PL10M1B	0.1675	0.1	0.07	2	350	0.001	0.4	100
PL10N	0.261	0.1	0.07	2	350	0.001	0.4	100
PL10Q	0.3434	0.1	0.07	2.008	350	0.001	0.4	100
PL10Q1	0.3993	0.1	0.07	2	350	0.001	0.4	100
PL10Q1A	0.0070	0.1	0.07	2	100	0.001	0.4	100
PL10Q2	0.0696	0.1	0.07	2	350	0.001	0.4	100

Pre-Project Model Hydrologic Factors

Shed	Area (mi^2)	Hydrologic Data for Plane 2						
		Initial Infiltration (in/hr)	Constant Infiltration (in/hr)	Percent Impervious	Overland Length (ft)	Overland Slope (ft/ft)	Overland n-value	Percent of Watershed
PL11B	0.5991	0	0	0	0	0	0	0
PL11B1	0.0493	0	0	0	0	0	0	0
PL11C	0.7627	0	0	0	0	0	0	0
PL11C1	0.0205	0	0	0	0	0	0	0
PL11D	0.7941	0	0	0	0	0	0	0
PL11D1	0.0167	0	0	0	0	0	0	0
PL10K	0.1147	0	0	0	0	0	0	0
PL10K1	0.0423	0	0	0	0	0	0	0
PL10K2	0.0144	0	0	0	0	0	0	0
PL10M1A	0.0655	0	0	0	0	0	0	0
PL10M1B	0.1675	0	0	0	0	0	0	0
PL10N	0.261	0	0	0	0	0	0	0
PL10Q	0.3434	0	0	0	0	0	0	0
PL10Q1	0.3993	0	0	0	0	0	0	0
PL10Q1A	0.0070	0	0	0	0	0	0	0
PL10Q2	0.0696	0	0	0	0	0	0	0

Post-Project without Onsite Storage Model Hydrologic Factors

Shed	Area (mi^2)	Hydrologic Data for Plane 1						
		Initial Infiltration (in/hr)	Constant Infiltration (in/hr)	Percent Impervious	Overland Length (ft)	Overland Slope (ft/ft)	Overland n-value	Percent of Watershed
PL10K	0.108	0.1	0.07	2	150	0.001	0.4	12
PL10M1A	0.0815	0.1	0.07	2	350	0.001	0.4	77
PL10M1B	0.1675	0.1	0.07	2	350	0.001	0.4	100
PL10N1	0.02707	0.1	0.07	2	150	0.001	0.4	21
PL10N2	0.167	0.1	0.08	3	150	0.001	0.4	21
PL11N3	0.0841	0.1	0.07	2	350	0.001	0.4	100
PL10Q	0.3434	0.1	0.07	2.008	350	0.001	0.4	100
PL10Q1	0.3301	0.1	0.08	5	150	0.001	0.4	12
PL10Q2	0.0368	0.1	0.08	5	150	0.001	0.4	12
PL10Q3	0.134	0.1	0.08	5	150	0.001	0.4	3
PL10QPP	0.1097	0.1	0.08	2	150	0.001	0.4	42
PL10QPP1	0.0337	0.1	0.08	2	150	0.001	0.4	16
PL10QSB	0.0104	0.1	0.12	80	60	0.01	0.3	100

Post-Project without Onsite Storage Model Hydrologic Factors

Shed	Area (mi^2)	Hydrologic Data for Plane 2						
		Initial Infiltration (in/hr)	Constant Infiltration (in/hr)	Percent Impervious	Overland Length (ft)	Overland Slope (ft/ft)	Overland n-value	Percent of Watershed
PL10K	0.108	0.1	0.12	52	146	0.01	0.3	88
PL10M1A	0.0815	0.1	0.1	27.1	150	0.01	0.3	23
PL10M1B	0.1675	0	0	0	0	0	0	0
PL10N1	0.02707	0.1	0.12	38.5	146	0.01	0.3	79
PL10N2	0.167	0.1	0.12	65.1	146	0.01	0.3	79
PL11N3	0.0841	0	0	0	0	0	0	0
PL10Q	0.3434	0	0	0	0	0	0	0
PL10Q1	0.3301	0.1	0.12	53.4	146	0.01	0.3	88
PL10Q2	0.0368	0.1	0.12	42.4	146	0.01	0.3	88
PL10Q3	0.134	0.1	0.12	39.5	146	0.01	0.3	97
PL10QPP	0.1097	0.1	0.12	41	146	0.01	0.3	58
PL10QPP1	0.0337	0.1	0.12	43	146	0.01	0.3	84
PL10QSB	0.0104	0	0	0	0	0	0	0

Post-Project without Onsite Storage with PL11C1 and PL11B1 Flowing North Model Hydrologic Factors

Shed	Area (mi^2)	Hydrologic Data for Plane 1						
		Initial Infiltration (in/hr)	Constant Infiltration (in/hr)	Percent Impervious	Overland Length (ft)	Overland Slope (ft/ft)	Overland n-value	Percent of Watershed
PL11B	0.5991	0.1	0.07	2.001	350	0.001	0.4	100
PL11B1	0.0205	0.1	0.08	2	150	0.001	0.4	12
PL11C	0.7627	0.1	0.07	9.535	350	0.0074	0.4	100
PL11C1	0.008	0.1	0.08	5	150	0.001	0.4	3
PL10K	0.108	0.1	0.07	2	150	0.001	0.4	12
PL10M1A	0.0815	0.1	0.07	2	350	0.001	0.4	77
PL10M1B	0.1675	0.1	0.07	2	350	0.001	0.4	100
PL10N1	0.02707	0.1	0.07	2	150	0.001	0.4	21
PL10N2	0.167	0.1	0.08	3	150	0.001	0.4	21
PL11N3	0.0841	0.1	0.07	2	350	0.001	0.4	100
PL10Q	0.3434	0.1	0.07	2.008	350	0.001	0.4	100
PL10Q1	0.310	0.1	0.08	5	150	0.001	0.4	12
PL10Q2	0.0368	0.1	0.08	5	150	0.001	0.4	12
PL10Q3	0.126	0.1	0.08	5	150	0.001	0.4	3
PL10QPP	0.0516	0.1	0.08	2	150	0.001	0.4	42
PL10QPP1	0.0337	0.1	0.08	2	150	0.001	0.4	16
PL10QSB	0.0104	0.1	0.12	80	60	0.01	0.3	100

Post-Project without Onsite Storage with PL11C1 and PL11B1 Flowing North Model Hydrologic Factors

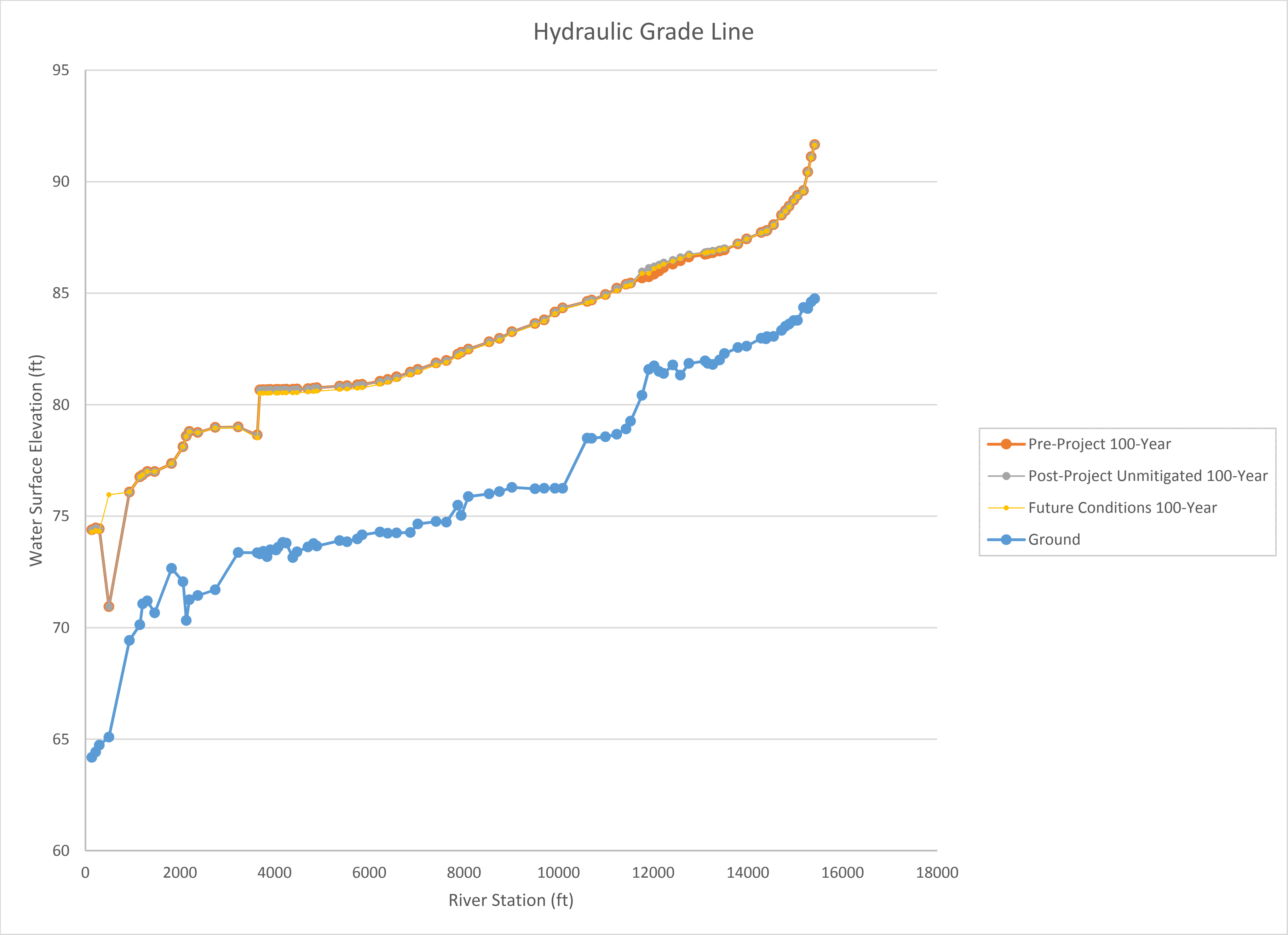
Shed	Area (mi^2)	Hydrologic Data for Plane 2						
		Initial Infiltration (in/hr)	Constant Infiltration (in/hr)	Percent Impervious	Overland Length (ft)	Overland Slope (ft/ft)	Overland n-value	Percent of Watershed
PL11B	0.5991	0	0	0	0	0	0	0
PL11B1	0.0205	0.1	0.12	60.9	146	0.01	0.3	88
PL11C	0.7627	0	0	0	0	0	0	0
PL11C1	0.008	0.1	0.12	41.1	146	0.01	0.3	97
PL10K	0.108	0.1	0.12	52	146	0.01	0.3	88
PL10M1A	0.0815	0.1	0.1	27.1	150	0.01	0.3	23
PL10M1B	0.1675	0	0	0	0	0	0	0
PL10N1	0.02707	0.1	0.12	38.5	146	0.01	0.3	79
PL10N2	0.167	0.1	0.12	65.1	146	0.01	0.3	79
PL11N3	0.0841	0	0	0	0	0	0	0
PL10Q	0.3434	0	0	0	0	0	0	0
PL10Q1	0.310	0.1	0.12	48.4	146	0.01	0.3	88
PL10Q2	0.0368	0.1	0.12	42.4	146	0.01	0.3	88
PL10Q3	0.126	0.1	0.12	37	146	0.01	0.3	97
PL10QPP	0.0516	0.1	0.12	41	146	0.01	0.3	58
PL10QPP1	0.0337	0.1	0.12	43	146	0.01	0.3	84
PL10QSB	0.0104	0	0	0	0	0	0	0

Amoruso Ranch Specific Plan Area

Drainage Master Plan

Appendix C

Hydraulic Data


Hydraulic Grade Line
Water Surface Elevation (ft)
95
90
85
80
75
70
65
60
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
River Station (ft)
Pre-Project 100-Year
Post-Project Unmitigated 100-Year
Future Conditions 100-Year
Ground

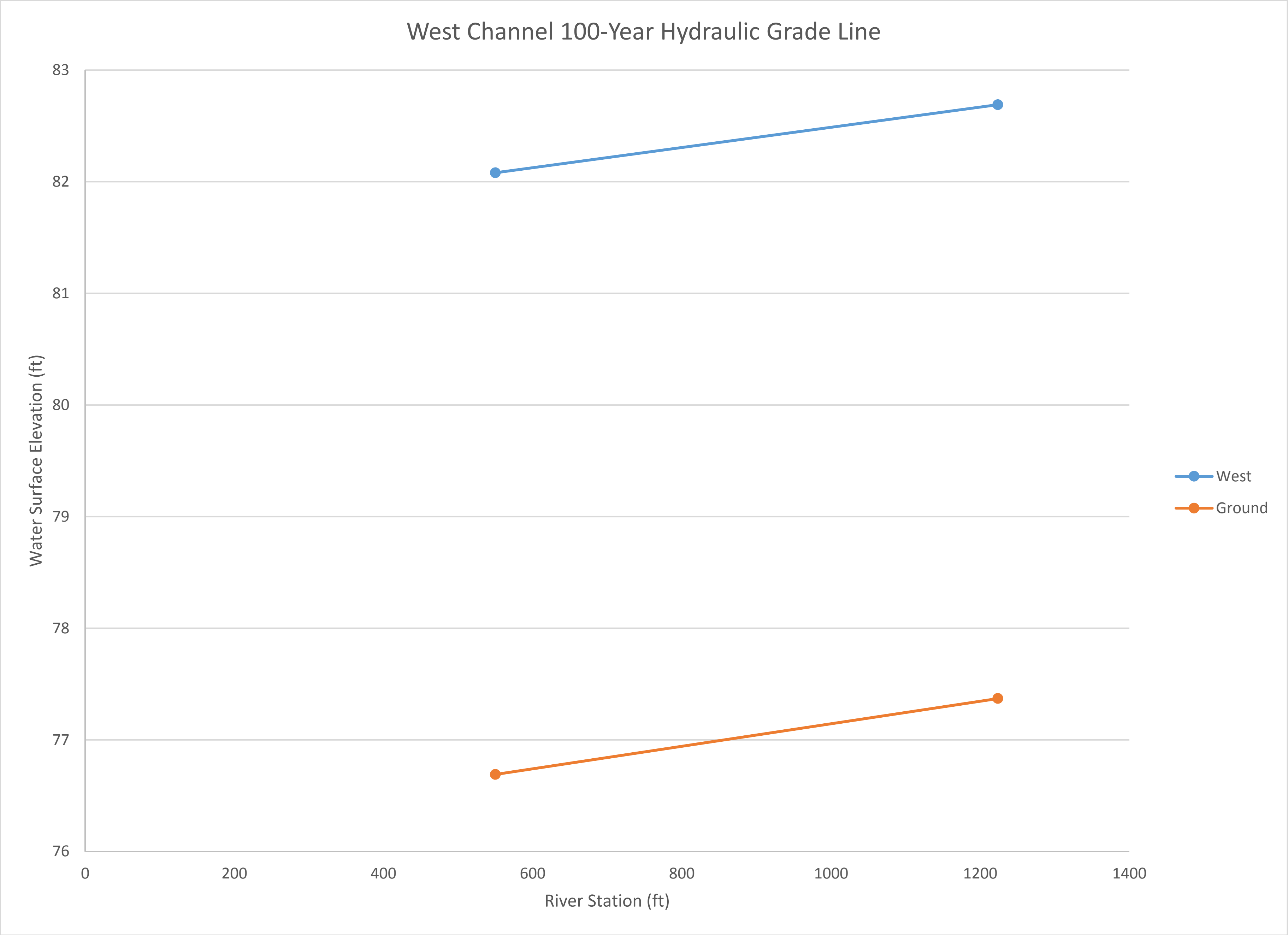
University Creek Steady State Hydraulics Modeling

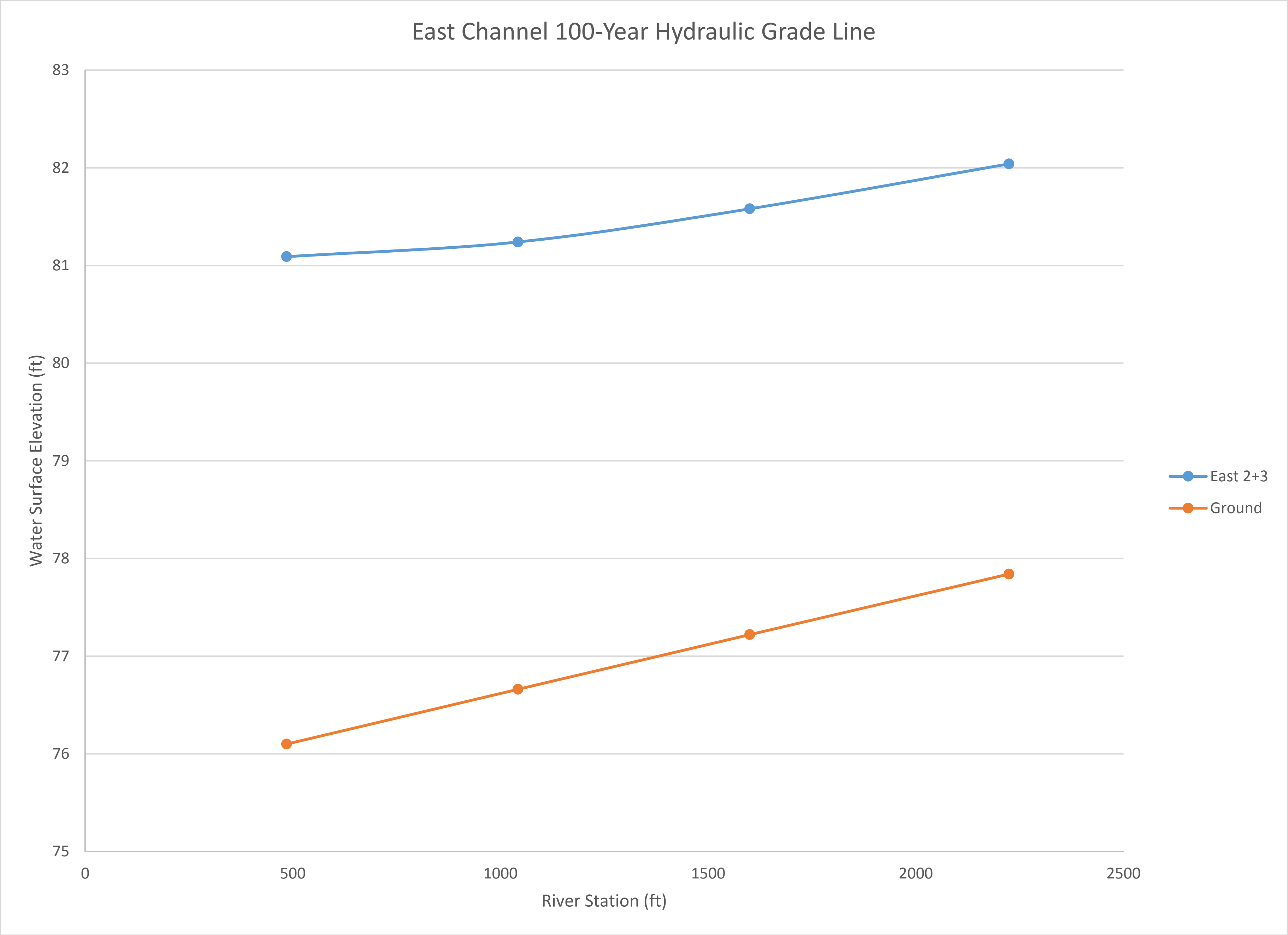
Reach	River Sta	Min Ch El	Pre-Project 100-Year	Post-Project 100-Year	Future Fully-Developed 100-Year	Difference Between Post-Project and Pre-Project Water Surface Elevations
			W.S. Elev	W.S. Elev	W.S. Elev	
		(ft)	(ft)	(ft)	(ft)	
Tributary_PL10D	15411.86	84.75	91.66	91.66	91.63	0
Tributary_PL10D	15338.7	84.61	91.12	91.12	91.07	0
Tributary_PL10D	15265.62	84.31	90.44	90.44	90.39	0
Tributary_PL10D	15174.57	84.36	89.6	89.6	89.55	0
Tributary_PL10D	15049.14	83.78	89.38	89.38	89.33	0
Tributary_PL10D	14969.56	83.77	89.17	89.17	89.13	0
Tributary_PL10D	14871.43	83.61	88.9	88.9	88.86	0
Tributary_PL10D	14794.1	83.51	88.7	88.7	88.67	0
Tributary_PL10D	14710.98	83.33	88.5	88.51	88.47	0.01
Tributary_PL10D	14544.54	83.06	88.07	88.07	88.04	0
Tributary_PL10D	14405	83.05	87.81	87.82	87.79	0.01
Tributary_PL10D	14384.43	82.95	87.79	87.79	87.77	0
Tributary_PL10D	14283.6	82.98	87.72	87.72	87.7	0
Tributary_PL10D	13974	82.62	87.43	87.44	87.42	0.01
Tributary_PL10D	13790.32	82.56	87.21	87.23	87.21	0.02
Tributary_PL10D	13505.96	82.29	86.94	87.01	86.98	0.07
Tributary_PL10D	13402.8	82	86.89	86.96	86.93	0.07
Tributary_PL10D	13259.09	81.8	86.81	86.9	86.86	0.09
Tributary_PL10D	13154.82	81.85	86.77	86.86	86.83	0.09
Tributary_PL10D	13097.44	81.96	86.74	86.84	86.8	0.1
Tributary_PL10D	12754.36	81.85	86.62	86.74	86.69	0.12
Tributary_PL10D	12574.51	81.32	86.45	86.61	86.55	0.16
Tributary_PL10D	12414.02	81.78	86.3	86.49	86.43	0.19
Tributary_PL10D	12221.14	81.4	86.14	86.37	86.3	0.23
Tributary_PL10D	12123.85	81.49	85.99	86.28	86.19	0.29
Tributary_PL10D	12020.14	81.74	85.85	86.2	86.1	0.35
Tributary_PL10D	11906.55	81.58	85.73	86.13	85.88	0.4
WESTBROOK CROSSING						
Tributary_PL10D	11763.54	80.42	85.68	85.97	85.88	0.29

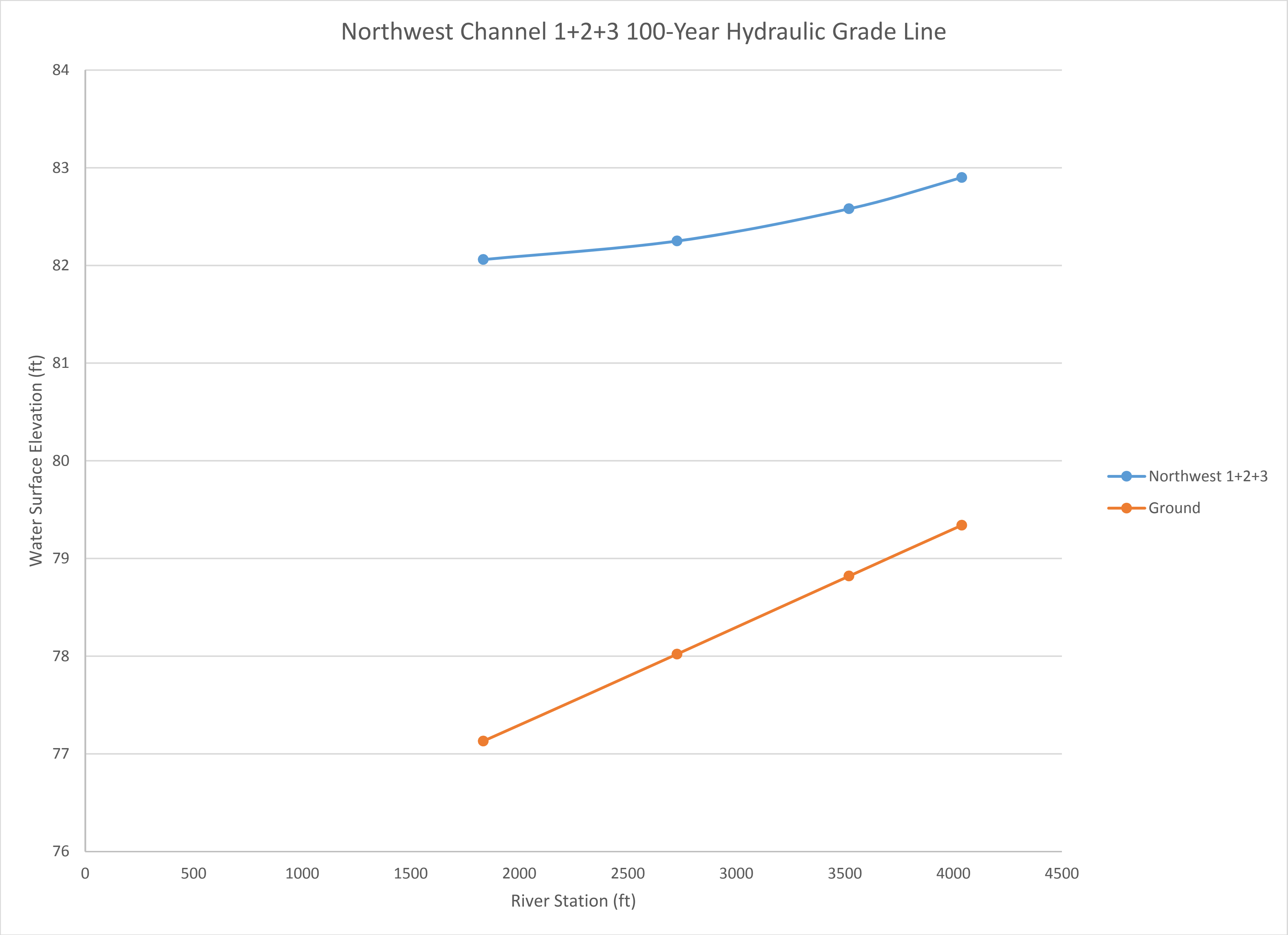
University Creek Steady State Hydraulics Modeling

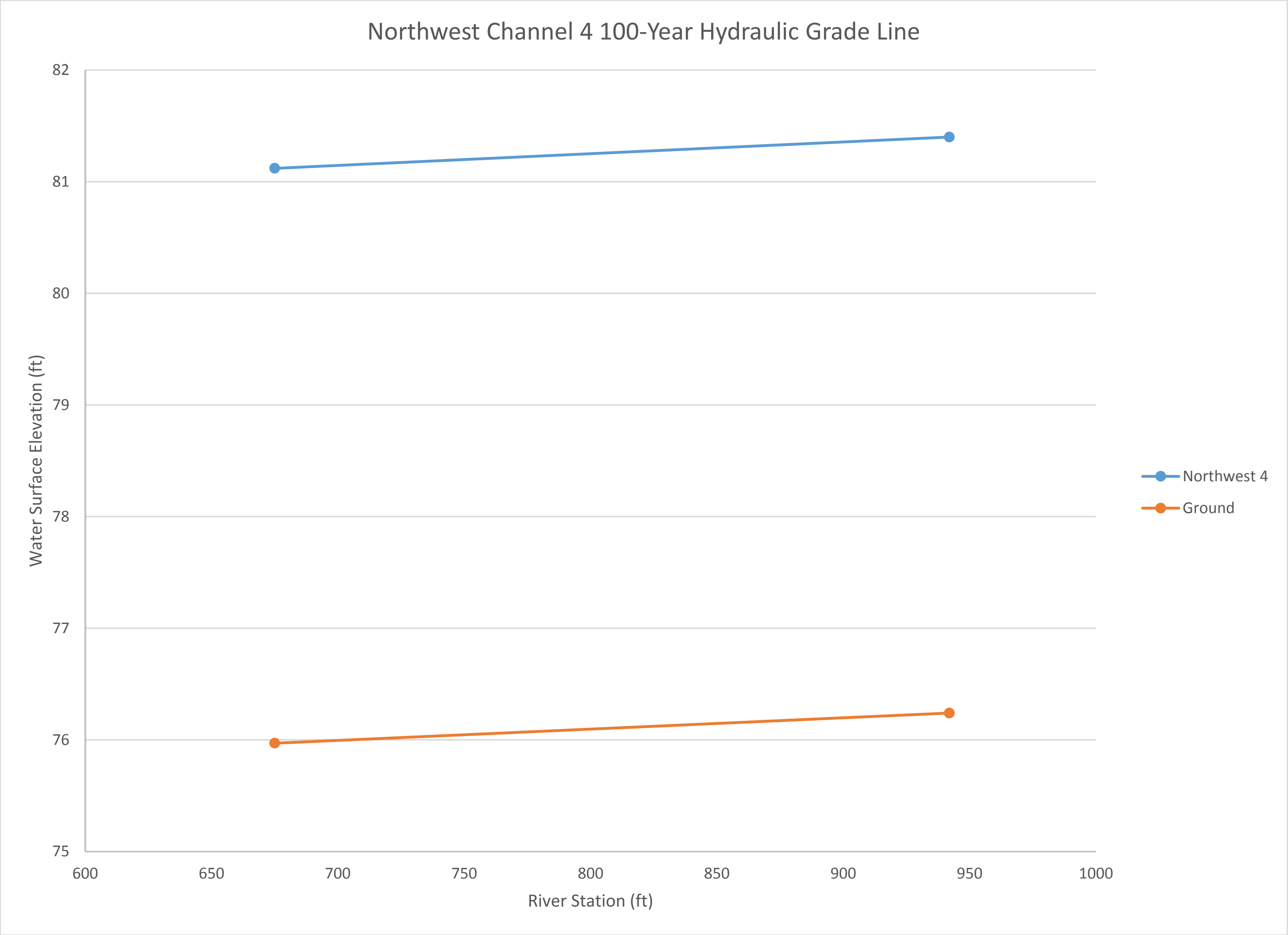
Reach	River Sta	Min Ch El	Pre-Project 100-Year	Post-Project 100-Year	Future Fully-Developed 100-Year	Difference Between Post-Project and Pre-Project Water Surface Elevations
			W.S. Elev	W.S. Elev	W.S. Elev	
		(ft)	(ft)	(ft)	(ft)	
Tributary_PL10D	11522.55	79.26	85.45	85.44	85.36	-0.01
Tributary_PL10D	11427.23	78.91	85.4	85.4	85.31	0
Tributary_PL10D	11230.17	78.67	85.22	85.22	85.11	0
Tributary_PL10D	10990.03	78.56	84.94	84.94	84.85	0
Tributary_PL10D	10699.03	78.49	84.69	84.69	84.62	0
Tributary_PL10D	10604.61	78.5	84.63	84.63	84.56	0
Tributary_PL10D	10085.35	76.25	84.34	84.34	84.27	0
Tributary_PL10D	9923.984	76.25	84.15	84.15	84.08	0
Tributary_PL10D	9695.635	76.25	83.8	83.8	83.74	0
Tributary_PL10D	9502.807	76.23	83.64	83.64	83.57	0
Tributary_PL10D	9015.549	76.29	83.27	83.27	83.2	0
Tributary_PL10D	8751.021	76.1	82.97	82.97	82.89	0
Tributary_PL10D	8534.004	76	82.82	82.82	82.74	0
Tributary_PL10D	8094.248	75.88	82.49	82.49	82.41	0
Tributary_PL10D	7941.599	75.03	82.35	82.34	82.27	-0.01
Tributary_PL10D	7871.479	75.49	82.26	82.26	82.18	0
Tributary_PL10D	7628.535	74.73	81.98	81.97	81.89	-0.01
Tributary_PL10D	7412.573	74.76	81.87	81.86	81.77	-0.01
Tributary_PL10D	7025.678	74.65	81.58	81.57	81.48	-0.01
Tributary_PL10D	6868.859	74.27	81.46	81.45	81.35	-0.01
Tributary_PL10D	6576.58	74.25	81.25	81.23	81.13	-0.02
Tributary_PL10D	6390.017	74.23	81.13	81.11	81	-0.02
Tributary_PL10D	6227.404	74.29	81.05	81.03	80.92	-0.02
Tributary_PL10D	5849.783	74.16	80.91	80.9	80.76	-0.01
Tributary_PL10D	5749.678	73.98	80.89	80.87	80.74	-0.02
Tributary_PL10D	5531.288	73.85	80.85	80.84	80.7	-0.01
Tributary_PL10D	5371.846	73.9	80.83	80.82	80.68	-0.01
Tributary_PL10D	4891.786	73.66	80.76	80.75	80.61	-0.01
Tributary_PL10D	4822.906	73.77	80.74	80.73	80.59	-0.01

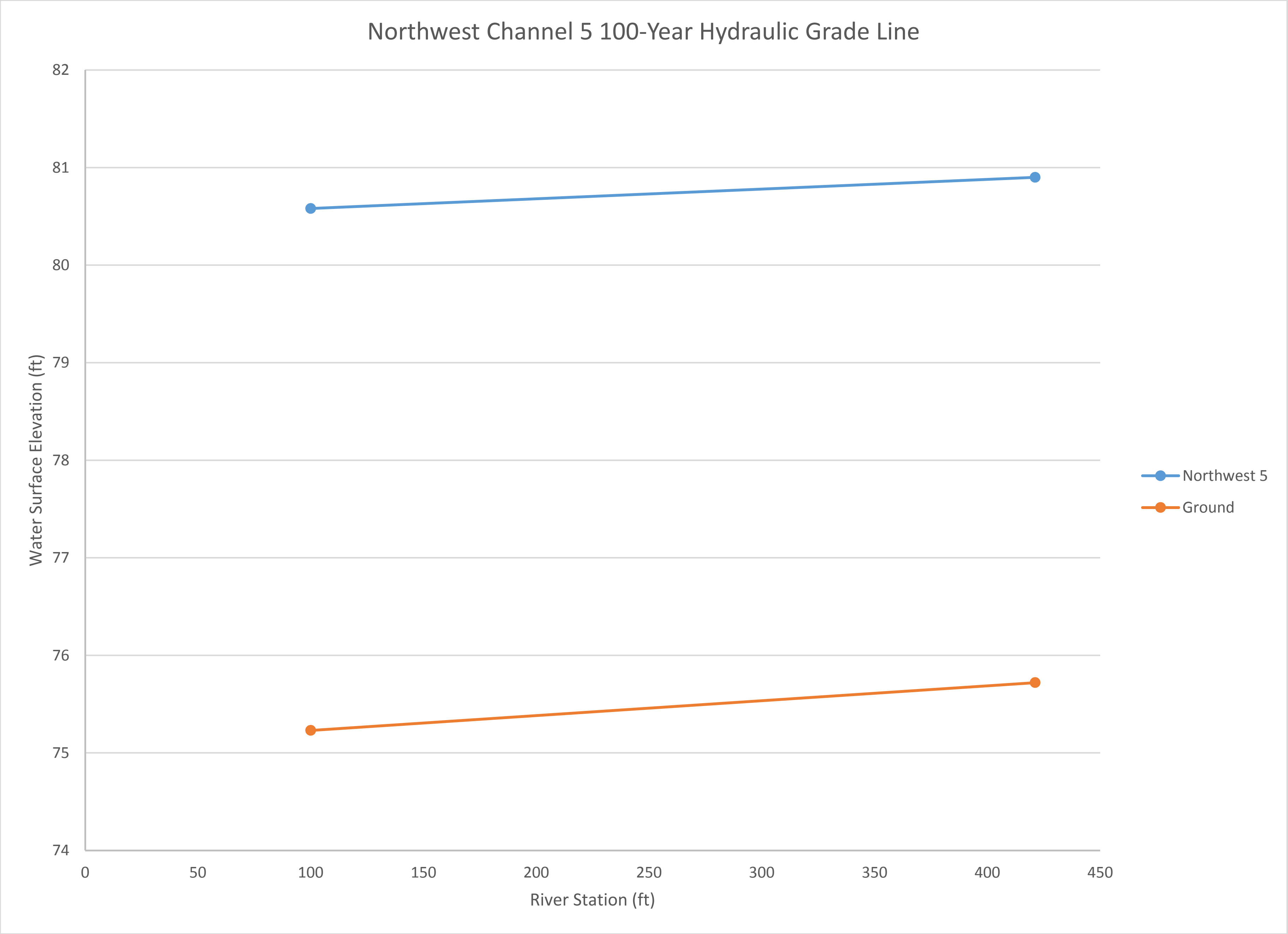
University Creek Steady State Hydraulics Modeling						
Reach	River Sta	Min Ch El	Pre-Project 100-Year	Post-Project 100-Year	Future Fully-Developed 100-Year	Difference Between Post-Project and Pre-Project Water Surface Elevations
			W.S. Elev	W.S. Elev	W.S. Elev	
		(ft)	(ft)	(ft)	(ft)	
Tributary_PL10D	4705.007	73.62	80.72	80.71	80.57	-0.01
Tributary_PL10D	4472.81	73.4	80.7	80.69	80.54	-0.01
Tributary_PL10D	4384.466	73.14	80.69	80.68	80.53	-0.01
Tributary_PL10D	4244.901	73.79	80.69	80.68	80.53	-0.01
Tributary_PL10D	4171.732	73.82	80.68	80.68	80.53	0
Tributary_PL10D	4076.361	73.61	80.68	80.67	80.52	-0.01
Tributary_PL10D	4030.171	73.48	80.68	80.67	80.52	-0.01
Tributary_PL10D	3909.755	73.49	80.68	80.67	80.52	-0.01
Tributary_PL10D	3842.739	73.18	80.67	80.67	80.51	0
Tributary_PL10D	3760.464	73.42	80.67	80.66	80.51	-0.01
Tributary_PL10D	3687.542	73.31	80.66	80.66	80.51	0
Tributary_PL10D	3633.079	73.36	78.64	78.64	78.51	0
Tributary_PL10D	3231.075	73.37	79	79	78.97	0
Tributary_PL10D	2745.059	71.7	78.98	78.98	78.95	0
Tributary_PL10D	2378.054	71.44	78.75	78.75	78.74	0
Tributary_PL10D	2197.051	71.25	78.8	78.8	78.79	0
Tributary_PL10D	2134.046	70.32	78.59	78.58	78.57	-0.01
Tributary_PL10D	2065.047	72.06	78.11	78.11	78.11	0
Tributary_PL10D	1823.039	72.66	77.36	77.36	77.36	0
Tributary_PL10D	1465.034	70.66	77	77	77	0
Tributary_PL10D	1310.031	71.2	77	77	77	0
Tributary_PL10D	1211.026	71.07	76.85	76.85	76.85	0
Tributary_PL10D	1153.028	70.13	76.76	76.76	76.76	0
Tributary_PL10D	932.0192	69.43	76.08	76.08	76.08	0
Tributary_PL10D	499.0089	65.09	70.94	70.94	75.96	0
Tributary_PL10D	295.0068	64.73	74.43	74.43	74.32	0
Tributary_PL10D	220.0018	64.42	74.47	74.47	74.35	0
Tributary_PL10D	138.0036	64.18	74.39	74.39	74.28	0


West Channel 100-Year Hydraulic Grade Line
Water Surface Elevation (ft)
83
82
81
80
79
78
77
76
0
200
400
600
800
1000
1200
1400
River Station (ft)
West
Ground


East Channel 100-Year Hydraulic Grade Line
83
82
81
80
79
78
77
76
75
Water Surface Elevation (ft)
0
500
1000
1500
2000
2500
River Station (ft)
East 2+3
Ground


Northwest Channel 1+2+3 100-Year Hydraulic Grade Line
Water Surface Elevation (ft)
84
83
82
81
80
79
78
77
76
0
500
1000
1500
2000
2500
3000
3500
4000
4500
River Station (ft)
Northwest 1+2+3
Ground


Northwest Channel 4 100-Year Hydraulic Grade Line
82
81
80
79
78
77
76
75
Water Surface Elevation (ft)
600
650
700
750
800
850
900
950
1000
River Station (ft)
Northwest 4
Ground


Northwest Channel 5 100-Year Hydraulic Grade Line
Water Surface Elevation (ft)
82
81
80
79
78
77
76
75
74
0
50
100
150
200
250
300
350
400
450
River Station (ft)
Northwest 5
Ground

Amoruso Ranch Onsite Channels Hydraulics Modeling

River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	Max Ch El (ft)	W.S. Elev (ft)	**Freeboard (ft)**
Northwest_1_2_3	Northwest_1_2_3	4038.73	100-yr_post	109.8	79.34	85.34	82.9	2.44
Northwest_1_2_3	Northwest_1_2_3	3519.31	100-yr_post	109.8	78.82	84.82	82.58	2.24
Northwest_1_2_3	Northwest_1_2_3	2726.68	100-yr_post	109.8	78.02	84.02	82.25	1.77
Northwest_1_2_3	Northwest_1_2_3	1834.34	100-yr_post	109.8	77.13	83.14	82.06	1.08
Northwest_4	Northwest_4	942	100-yr_post	341.4	76.24	82.74	81.4	1.34
Northwest_4	Northwest_4	675	100-yr_post	341.4	75.97	82.5	81.12	1.38
Northwest_5	Northwest_5	421.21	100-yr_post	394.7	75.72	82.22	80.9	1.32
Northwest_5	Northwest_5	100	100-yr_post	394.7	75.23	81.73	80.58	1.15
West	West	1223.7	100-yr_post	328.9	77.37	83.87	82.69	1.18
West	West	550	100-yr_post	303	76.69	83.19	82.08	1.11
East	East	2224.27	100-yr_post	169.5	77.84	84.34	82.04	2.3
East	East	1600	100-yr_post	169.5	77.22	83.72	81.58	2.14
East	East	1042	100-yr_post	169.5	76.66	83.16	81.24	1.92
East	East	484.85	100-yr_post	115.7	76.10	82.6	81.09	1.51

Amoruso Ranch Specific Plan Area

Drainage Master Plan

Appendix D

CS Drainage Studio 10-Year Hydraulics & Hydrology Report
CS Drainage Studio 25-Year Hydraulics & Hydrology Report
CS Drainage Studio 100-Year Hydraulics & Hydrology Report

CS DRAINAGE STUDIO

Combined Hydraulics & Hydrology for Unit Peak Discharge Methods Software Package

A Civil Solutions Product

OUTPUT RESULTS FOR FILE	K:\SAC_LDEV\097679001 Amoruso Ranch\06 Reports\Drainage\CSDS\2015-10\Amoruso 10yr v10 10_27_2015_rev
PROJECT DESCRIPTION	
PRINTED ON DATE	10-28-2015
PRINTED BY USER	

This Printout Report Contains :

1) Jurisdiction File Information (hydrology basis)
2) Contributing Areas Information
3) Cumulative Areas Information
4) Node Connection Outline Information
5) Conveyance Description Information
6) Conveyance Profiles Information
7) Node Results Summary
8) Convey Results Summary

****

CONVERGENCE CONTROL VARIABLES :
This software requires the use of several control variables to force the system of calculations to be convergent. These need to be adjusted for each system, to meet jur. requirements, and to provide accurate results. The variables used in this analysis are described below.

****

DESCRIPTION:	Variable Value	Unit
Horizontal Length Increment used for Backwater Calculations	20	Feet
Computational Time Interval for Hydrograph Calculations	5	Min.
Backwater Calculations Depth Tolerance	.002	Feet
Backwater Calculations Distance Tolerance	.01	Feet
Tolerance for Flow based Calculations	.005	cfs
Tolerance for Froud based Calculations	.005	
Maximum Travel Time Allowed Between Two Connected Nodes (Tt)	5	Min.
Minimum Flow Percentage in Parallel Conveyances to Contribute to Tt	35	%
Maximum Number of Iterations Allowed at any Iterative Calculation	200	
Convergence Tr Test Tolerance	0.05	min.
Flow Diversion Calculations were DISABLED for this calculation.		

RESPONSE time Solved By : Tr at merge nodes solved by largest Contributing Area

****

Jurisdiction File Information:
(used for hydrology basis)

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Description:	Variable Value
Computer Model Analysis Type	ROSEVILL
Jurisdiction Name	Roseville - Peak 10 Yr. Storm
Jurisdiction Title	ROSEV10
Jurisdiction Description	Based on Unit Peak Discharge Method - Based on Section 10 Roseville Improvement Standards.
Jurisdiction Date	July 22, 1997
Jurisdiction Location	City of Roseville
Jurisdiction State	California
Jurisdiction File Created By	Civil Solutions

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FLOW CALCULATION PARAMETERS AS FOLLOWS:

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DESCRIPTION	UNIT	Return Period	% Impervious	Perv. Infiltration (in/hr)
Highways & Parking :	Acre	10	95	.06
Commercial Offices :	Acre	10	90	.18
Intensive Industrial :	Acre	10	85	.18
Apartments HDR :	Acre	10	80	.18
Mobile Home Park :	Acre	10	75	.25
Condominiums, MDR :	Acre	10	70	.25
Residential: 8-10 du/acre, Ext Indust :	Acre	10	60	.18
Residential: 6-8 du/acre, LDR, School :	Acre	10	50	.25
Residential: 4-6 du/acre :	Acre	10	40	.25
Residential 3-4 du/acre :	Acre	10	30	.25
Residential: 2-3 du/acre :	Acre	10	25	.24
Residential: 1-2 du/acre :	Acre	10	20	.25
Residential: 0.5-1 du/acre :	Acre	10	15	.25
Residential: 0.2-0.5 du/acre, Ag. Res :	Acre	10	10	.25
Residential: <0.2 du/acre, Recreation :	Acre	10	5	.25
Open Space, Grassland, Ag. :	Acre	10	2	.2
Open Space, Woodland, Natural :	Acre	10	1	.2
Dense Oak, Shrubs, Vines :	acre	10	1	.25

****
Node Contributing Areas Information:
****

#	Node Name	Total Trib. Area		Trib. Area	Contrib. Area by type
1	MH - 3	7.		5.9	Condominiums, MDR :
				1.1	Highways & Parking :
2	MH - 4	8.6		5.9	Apartments HDR :
				1.5	Commercial Offices :
				1.2	Highways & Parking :
3	MH - 5	3.4		1.6	Apartments HDR :
				0.9	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				0.7	Highways & Parking :
4	MH - 6	23.1		14.	Commercial Offices :
				3.4	Residential: 6-8 du/acre, LDR, School :
				3.7	Open Space, Woodland, Natural :
				2.	Highways & Parking :
5	MH - 7	6.		2.3	Residential: 6-8 du/acre, LDR, School :
				2.9	Condominiums, MDR :
				0.2	Dense Oak, Shrubs, Vines :
				0.6	Highways & Parking :
6	MH - 8	6.4		5.5	Residential: 6-8 du/acre, LDR, School :
				0.5	Dense Oak, Shrubs, Vines :
				0.4	Highways & Parking :
7	MH - 9	6.3		4.8	Residential: 6-8 du/acre, LDR, School :
				0.6	Dense Oak, Shrubs, Vines :
				0.9	Highways & Parking :
8	MH - 10	4.9		4.1	Residential: 6-8 du/acre, LDR, School :
				0.5	Dense Oak, Shrubs, Vines :
				0.3	Highways & Parking :
9	MH - 11	9.3		8.5	Commercial Offices :
				0.8	Highways & Parking :
10	MH - 12	8.8		3.3	Commercial Offices :
				2.6	Residential: 6-8 du/acre, LDR, School :
				2.	Highways & Parking :
				0.9	Dense Oak, Shrubs, Vines :
11	MH - 13	12.		7.2	Residential: 6-8 du/acre, LDR, School :
				2.4	Condominiums, MDR :
				1.1	Dense Oak, Shrubs, Vines :
				1.3	Highways & Parking :
12	MH - 14	5.		4.4	Residential: 6-8 du/acre, LDR, School :
				0.1	Dense Oak, Shrubs, Vines :
				0.5	Highways & Parking :
13	MH - 15	6.4		0.1	Highways & Parking :
				1.	Dense Oak, Shrubs, Vines :
				5.3	Residential: 6-8 du/acre, LDR, School :
14	MH - 16	28.		6.8	Commercial Offices :
				9.6	Apartments HDR :
				11.6	Residential: 6-8 du/acre, LDR, School :
16	MH - 18	23.7		9.3	Apartments HDR :
				10.1	Open Space, Woodland, Natural :
				4.3	Highways & Parking :
17	MH - 19	6.4		5.6	Apartments HDR :
				0.4	Commercial Offices :
				0.4	Highways & Parking :
18	MH - 20	19.4		16.7	Commercial Offices :
				0.1	Apartments HDR :
				2.6	Highways & Parking :
19	MH - 21	11.1		1.8	Condominiums, MDR :
				7.8	Residential: 6-8 du/acre, LDR, School :
				1.5	Highways & Parking :
20	MH - 22	5.7		4.4	Condominiums, MDR :
				1.3	Highways & Parking :
21	MH - 23	10.6		9.2	Residential: 6-8 du/acre, LDR, School :
				1.4	Highways & Parking :
22	MH - 24	7.		7.	Condominiums, MDR :
23	MH - 25	5.5		3.7	Condominiums, MDR :
				1.8	Residential: 6-8 du/acre, LDR, School :
24	MH - 26	2.6		1.6	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Woodland, Natural :
				0.8	Highways & Parking :

25	MH - 27	4.3		3.1	Residential: 6-8 du/acre, LDR, School :
				0.6	Open Space, Woodland, Natural :
				0.6	Highways & Parking :
26	MH - 28	15.9		14.2	Residential: 6-8 du/acre, LDR, School :
				0.9	Open Space, Woodland, Natural :
				0.8	Highways & Parking :
27	MH - 29	11.9		9.6	Residential: 6-8 du/acre, LDR, School :
				0.5	Open Space, Woodland, Natural :
				1.8	Highways & Parking :
28	MH - 30	3.7		2.9	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
				0.4	Highways & Parking :
29	MH - 31	14.6		13.1	Residential: 6-8 du/acre, LDR, School :
				1.	Open Space, Woodland, Natural :
				0.5	Highways & Parking :
30	MH - 32	7.		5.1	Residential: 6-8 du/acre, LDR, School :
				1.2	Open Space, Woodland, Natural :
				0.7	Highways & Parking :
31	MH - 33	5.		5.	Residential: 6-8 du/acre, LDR, School :
32	MH - 34	14.7		14.7	Residential: 6-8 du/acre, LDR, School :
33	MH - 35	13.6		9.5	Residential: 6-8 du/acre, LDR, School :
				3.2	Open Space, Woodland, Natural :
				0.9	Highways & Parking :
34	MH - 36	5.2		2.	Residential: 6-8 du/acre, LDR, School :
				2.9	Open Space, Woodland, Natural :
				0.3	Highways & Parking :
35	MH - 37	3.8		3.1	Residential: 6-8 du/acre, LDR, School :
				0.3	Open Space, Woodland, Natural :
				0.4	Highways & Parking :
36	MH - 38	8.		6.4	Residential: 6-8 du/acre, LDR, School :
				0.8	Open Space, Woodland, Natural :
				0.8	Highways & Parking :
37	MH - 39	7.2		5.4	Residential: 6-8 du/acre, LDR, School :
				1.	Open Space, Woodland, Natural :
				0.8	Highways & Parking :
38	MH - 40	4.6		4.1	Residential: 6-8 du/acre, LDR, School :
				0.5	Open Space, Woodland, Natural :
39	MH - 41	11.6		8.9	Residential: 6-8 du/acre, LDR, School :
				2.7	Open Space, Woodland, Natural :
41	EAST CH 3	1.4		1.4	Residential: 6-8 du/acre, LDR, School :
43	WEST CH 1	29.9		10.	Open Space, Woodland, Natural :
				19.9	Residential: 6-8 du/acre, LDR, School :
46	WEST CH 4	3.3		3.3	Residential: 6-8 du/acre, LDR, School :
50	NW-1	10.6		10.6	Residential: 6-8 du/acre, LDR, School :
51	NW-1B	5.9		5.4	Residential: 6-8 du/acre, LDR, School :
				0.5	Highways & Parking :
52	NW-2	7.7		7.4	Residential: 6-8 du/acre, LDR, School :
				0.3	Highways & Parking :
53	NW-3	9.6		8.7	Residential: 6-8 du/acre, LDR, School :
				0.9	Open Space, Woodland, Natural :
54	NW-4	12.4		4.2	Residential: 6-8 du/acre, LDR, School :
				4.5	Open Space, Woodland, Natural :
				3.7	Highways & Parking :
55	NW-5	4.2		3.8	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
56	NW-6	7.7		6.8	Residential: 6-8 du/acre, LDR, School :
				0.9	Open Space, Woodland, Natural :
57	NW-7	7.5		7.1	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
58	NW-8	3.3		2.9	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
59	NW-9	3.4		3.	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
60	NW-10	5.1		4.	Residential: 6-8 du/acre, LDR, School :
				1.1	Open Space, Woodland, Natural :
64	SE 1	17.9		6.3	Condominiums, MDR :
				8.5	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
				1.1	Highways & Parking :
65	SE 2	7.9		6.2	Condominiums, MDR :
				1.1	Residential: 6-8 du/acre, LDR, School :
				0.6	Highways & Parking :
66	SE 3	4.2		4.2	Residential: 6-8 du/acre, LDR, School :

67	SE 4	8.1		5.5	Residential: 6-8 du/acre, LDR, School :
				1.3	Condominiums, MDR :
				1.3	Highways & Parking :
68	SE 5	10.9		6.	Apartments HDR :
				3.	Residential: 6-8 du/acre, LDR, School :
				1.9	Highways & Parking :
69	SE 6	13.6		8.2	Condominiums, MDR :
				3.5	Residential: 6-8 du/acre, LDR, School :
				1.9	Highways & Parking :
70	SE Outlet	0.		0.9	Highways & Parking :
				5.4	Open Space, Woodland, Natural :
71	NW-1A	21.6		21.6	Residential: 6-8 du/acre, LDR, School :
72	NW-1C	8.5		8.5	Residential: 6-8 du/acre, LDR, School :

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Node Cumulative Areas Information:

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#	Node Name	Total Cumulative Area		Cumulative Area by Type	Cumulative Area by type
1	MH - 3	7.		1.1	Highways & Parking :
				5.9	Condominiums, MDR :
2	MH - 4	15.6		2.3	Highways & Parking :
				1.5	Commercial Offices :
				5.9	Apartments HDR :
				5.9	Condominiums, MDR :
3	MH - 5	19.		3.	Highways & Parking :
				1.5	Commercial Offices :
				7.5	Apartments HDR :
				5.9	Condominiums, MDR :
				0.9	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
4	MH - 6	42.1		5.	Highways & Parking :
				15.5	Commercial Offices :
				7.5	Apartments HDR :
				5.9	Condominiums, MDR :
				4.3	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
5	MH - 7	54.5		6.	Highways & Parking :
				15.5	Commercial Offices :
				7.5	Apartments HDR :
				8.8	Condominiums, MDR :
				12.1	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				0.7	Dense Oak, Shrubs, Vines :
6	MH - 8	6.4		0.4	Highways & Parking :
				5.5	Residential: 6-8 du/acre, LDR, School :
				0.5	Dense Oak, Shrubs, Vines :
7	MH - 9	60.8		6.9	Highways & Parking :
				15.5	Commercial Offices :
				7.5	Apartments HDR :
				8.8	Condominiums, MDR :
				16.9	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				1.3	Dense Oak, Shrubs, Vines :
8	MH - 10	95.8		11.3	Highways & Parking :
				27.3	Commercial Offices :
				7.5	Apartments HDR :
				11.2	Condominiums, MDR :
				30.8	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				3.8	Dense Oak, Shrubs, Vines :
9	MH - 11	9.3		0.8	Highways & Parking :
				8.5	Commercial Offices :
10	MH - 12	18.1		2.8	Highways & Parking :
				11.8	Commercial Offices :
				2.6	Residential: 6-8 du/acre, LDR, School :
				0.9	Dense Oak, Shrubs, Vines :
11	MH - 13	30.1		4.1	Highways & Parking :
				11.8	Commercial Offices :
				2.4	Condominiums, MDR :
				9.8	Residential: 6-8 du/acre, LDR, School :
				2.	Dense Oak, Shrubs, Vines :
12	MH - 14	100.8		11.8	Highways & Parking :
				27.3	Commercial Offices :
				7.5	Apartments HDR :
				11.2	Condominiums, MDR :
				35.2	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				3.9	Dense Oak, Shrubs, Vines :
13	MH - 15	107.2		11.9	Highways & Parking :

				27.3	Commercial Offices :
				7.5	Apartments HDR :
				11.2	Condominiums, MDR :
				40.5	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				4.9	Dense Oak, Shrubs, Vines :
14	MH - 16	28.		6.8	Commercial Offices :
				9.6	Apartments HDR :
				11.6	Residential: 6-8 du/acre, LDR, School :
15	MH - 17	28.		6.8	Commercial Offices :
				9.6	Apartments HDR :
				11.6	Residential: 6-8 du/acre, LDR, School :
16	MH - 18	94.3		10.1	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				6.2	Condominiums, MDR :
				19.4	Residential: 6-8 du/acre, LDR, School :
				10.1	Open Space, Woodland, Natural :
17	MH - 19	6.4		0.4	Highways & Parking :
				0.4	Commercial Offices :
				5.6	Apartments HDR :
18	MH - 20	25.8		3.	Highways & Parking :
				17.1	Commercial Offices :
				5.7	Apartments HDR :
19	MH - 21	11.1		1.5	Highways & Parking :
				1.8	Condominiums, MDR :
				7.8	Residential: 6-8 du/acre, LDR, School :
20	MH - 22	16.8		2.8	Highways & Parking :
				6.2	Condominiums, MDR :
				7.8	Residential: 6-8 du/acre, LDR, School :
21	MH - 23	117.4		11.5	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				30.4	Residential: 6-8 du/acre, LDR, School :
				10.1	Open Space, Woodland, Natural :
22	MH - 24	7.		7.	Condominiums, MDR :
23	MH - 25	12.5		10.7	Condominiums, MDR :
				1.8	Residential: 6-8 du/acre, LDR, School :
24	MH - 26	124.3		12.9	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				35.1	Residential: 6-8 du/acre, LDR, School :
				10.9	Open Space, Woodland, Natural :
25	MH - 27	4.3		0.6	Highways & Parking :
				3.1	Residential: 6-8 du/acre, LDR, School :
				0.6	Open Space, Woodland, Natural :
26	MH - 28	155.8		15.9	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				61.8	Residential: 6-8 du/acre, LDR, School :
				12.7	Open Space, Woodland, Natural :
27	MH - 29	11.9		1.8	Highways & Parking :
				9.6	Residential: 6-8 du/acre, LDR, School :
				0.5	Open Space, Woodland, Natural :
28	MH - 30	15.6		2.2	Highways & Parking :
				12.5	Residential: 6-8 du/acre, LDR, School :
				0.9	Open Space, Woodland, Natural :
29	MH - 31	197.1		17.1	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				99.7	Residential: 6-8 du/acre, LDR, School :
				14.9	Open Space, Woodland, Natural :
30	MH - 32	7.		0.7	Highways & Parking :
				5.1	Residential: 6-8 du/acre, LDR, School :
				1.2	Open Space, Woodland, Natural :
31	MH - 33	12.		0.7	Highways & Parking :
				10.1	Residential: 6-8 du/acre, LDR, School :
				1.2	Open Space, Woodland, Natural :

32	MH - 34	26.7		0.7	Highways & Parking :
				24.8	Residential: 6-8 du/acre, LDR, School :
				1.2	Open Space, Woodland, Natural :
33	MH - 35	210.7		18.	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				109.2	Residential: 6-8 du/acre, LDR, School :
				18.1	Open Space, Woodland, Natural :
34	MH - 36	5.2		0.3	Highways & Parking :
				2.	Residential: 6-8 du/acre, LDR, School :
				2.9	Open Space, Woodland, Natural :
35	MH - 37	9.		0.7	Highways & Parking :
				5.1	Residential: 6-8 du/acre, LDR, School :
				3.2	Open Space, Woodland, Natural :
36	MH - 38	17.		1.5	Highways & Parking :
				11.5	Residential: 6-8 du/acre, LDR, School :
				4.	Open Space, Woodland, Natural :
37	MH - 39	24.2		2.3	Highways & Parking :
				16.9	Residential: 6-8 du/acre, LDR, School :
				5.	Open Space, Woodland, Natural :
38	MH - 40	4.6		4.1	Residential: 6-8 du/acre, LDR, School :
				0.5	Open Space, Woodland, Natural :
39	MH - 41	16.2		13.	Residential: 6-8 du/acre, LDR, School :
				3.2	Open Space, Woodland, Natural :
40	EAST CH 2	107.2		11.9	Highways & Parking :
				27.3	Commercial Offices :
				7.5	Apartments HDR :
				11.2	Condominiums, MDR :
				40.5	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				4.9	Dense Oak, Shrubs, Vines :
41	EAST CH 3	108.6		11.9	Highways & Parking :
				27.3	Commercial Offices :
				7.5	Apartments HDR :
				11.2	Condominiums, MDR :
				41.9	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				4.9	Dense Oak, Shrubs, Vines :
42	EAST CH 4	124.8		11.9	Highways & Parking :
				27.3	Commercial Offices :
				7.5	Apartments HDR :
				11.2	Condominiums, MDR :
				54.9	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				6.9	Open Space, Woodland, Natural :
				4.9	Dense Oak, Shrubs, Vines :
43	WEST CH 1	240.6		18.	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				129.1	Residential: 6-8 du/acre, LDR, School :
				28.1	Open Space, Woodland, Natural :
44	WEST CH 2	240.6		18.	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				129.1	Residential: 6-8 du/acre, LDR, School :
				28.1	Open Space, Woodland, Natural :
45	WEST CH 3	264.8		20.3	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				146.	Residential: 6-8 du/acre, LDR, School :
				33.1	Open Space, Woodland, Natural :
46	WEST CH 4	268.1		20.3	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				149.3	Residential: 6-8 du/acre, LDR, School :
				33.1	Open Space, Woodland, Natural :

47	NW CH 4	375.6		24.8	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				243.3	Residential: 6-8 du/acre, LDR, School :
				42.1	Open Space, Woodland, Natural :
48	NW CH 5	500.4		36.7	Highways & Parking :
				51.2	Commercial Offices :
				32.1	Apartments HDR :
				28.1	Condominiums, MDR :
				298.2	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				49.	Open Space, Woodland, Natural :
				4.9	Dense Oak, Shrubs, Vines :
49	Creek	500.4		36.7	Highways & Parking :
				51.2	Commercial Offices :
				32.1	Apartments HDR :
				28.1	Condominiums, MDR :
				298.2	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				49.	Open Space, Woodland, Natural :
				4.9	Dense Oak, Shrubs, Vines :
50	NW-1	40.7		40.7	Residential: 6-8 du/acre, LDR, School :
51	NW-1B	46.6		0.5	Highways & Parking :
				46.1	Residential: 6-8 du/acre, LDR, School :
52	NW-2	54.3		0.8	Highways & Parking :
				53.5	Residential: 6-8 du/acre, LDR, School :
53	NW-3	63.9		0.8	Highways & Parking :
				62.2	Residential: 6-8 du/acre, LDR, School :
				0.9	Open Space, Woodland, Natural :
54	NW-4	12.4		3.7	Highways & Parking :
				4.2	Residential: 6-8 du/acre, LDR, School :
				4.5	Open Space, Woodland, Natural :
55	NW-5	16.6		3.7	Highways & Parking :
				8.	Residential: 6-8 du/acre, LDR, School :
				4.9	Open Space, Woodland, Natural :
56	NW-6	31.8		3.7	Highways & Parking :
				21.9	Residential: 6-8 du/acre, LDR, School :
				6.2	Open Space, Woodland, Natural :
57	NW-7	7.5		7.1	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
58	NW-8	3.3		2.9	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
59	NW-9	3.4		3.	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
60	NW-10	11.8		9.9	Residential: 6-8 du/acre, LDR, School :
				1.9	Open Space, Woodland, Natural :
61	NW CH-1	63.9		0.8	Highways & Parking :
				62.2	Residential: 6-8 du/acre, LDR, School :
				0.9	Open Space, Woodland, Natural :
62	NW CH-2	95.7		4.5	Highways & Parking :
				84.1	Residential: 6-8 du/acre, LDR, School :
				7.1	Open Space, Woodland, Natural :
63	NW CH-3	107.5		4.5	Highways & Parking :
				94.	Residential: 6-8 du/acre, LDR, School :
				9.	Open Space, Woodland, Natural :
64	SE 1	17.9		1.1	Highways & Parking :
				6.3	Condominiums, MDR :
				8.5	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
65	SE 2	25.8		1.7	Highways & Parking :
				12.5	Condominiums, MDR :
				9.6	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
66	SE 3	30.		1.7	Highways & Parking :
				12.5	Condominiums, MDR :
				13.8	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
67	SE 4	38.1		3.	Highways & Parking :
				13.8	Condominiums, MDR :
				19.3	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
68	SE 5	49.		4.9	Highways & Parking :

				6.	Apartments HDR :
				13.8	Condominiums, MDR :
				22.3	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
69	SE 6	62.6		6.8	Highways & Parking :
				6.	Apartments HDR :
				22.	Condominiums, MDR :
				25.8	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
70	SE Outlet	68.9		7.7	Highways & Parking :
				6.	Apartments HDR :
				22.	Condominiums, MDR :
				25.8	Residential: 6-8 du/acre, LDR, School :
				7.4	Open Space, Woodland, Natural :
71	NW-1A	21.6		21.6	Residential: 6-8 du/acre, LDR, School :
72	NW-1C	30.1		30.1	Residential: 6-8 du/acre, LDR, School :

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                                                  |<--MH - 3
                                              |<--MH - 4
                                          |<--MH - 5
                                      |<--MH - 6
                                      |<--MH - 8
                                  |<--MH - 7
                              |<--MH - 9
                              |       |<--MH - 11
                              |   |<--MH - 12
                              |<--MH - 13
                          |<--MH - 10
                      |<--MH - 14
                  |<--MH - 15
              |<--EAST CH 2
          |<--EAST CH 3
          |   |<--MH - 40
          |<--MH - 41
      |<--EAST CH 4
      |                                               |<--MH - 16
      |                                           |<--MH - 17
      |                                           |   |<--MH - 19
      |                                           |<--MH - 20
      |                                           |   |<--MH - 21
      |                                           |<--MH - 22
      |                                       |<--MH - 18
      |                                       |   |<--MH - 24
      |                                       |<--MH - 25
      |                                   |<--MH - 23
      |                                   |<--MH - 27
      |                               |<--MH - 26
      |                               |   |<--MH - 29
      |                               |<--MH - 30
      |                           |<--MH - 28
      |                           |       |<--MH - 32
      |                           |   |<--MH - 33
      |                           |<--MH - 34
      |                       |<--MH - 31
      |                   |<--MH - 35
      |               |<--WEST CH 1
      |           |<--WEST CH 2
      |           |           |<--MH - 36
      |           |       |<--MH - 37
      |           |   |<--MH - 38
      |           |<--MH - 39
      |       |<--WEST CH 3
      |   |<--WEST CH 4
      |   |               |<--NW-4
      |   |           |<--NW-5
      |   |           |<--NW-7
      |   |       |<--NW-6
      |   |       |                       |<--NW-1A
      |   |       |                   |<--NW-1C
      |   |       |               |<--NW-1
      |   |       |           |<--NW-1B
      |   |       |       |<--NW-2
      |   |       |   |<--NW-3
      |   |       |<--NW CH-1
      |   |   |<--NW CH-2
      |   |   |   |<--NW-8
      |   |   |   |<--NW-9
      |   |   |<--NW-10
      |   |<--NW CH-3
      |<--NW CH 4
  |<--NW CH 5
--Creek
                      |<--SE 1
                  |<--SE 2
              |<--SE 3
          |<--SE 4
      |<--SE 5
  |<--SE 6
--SE Outlet
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*************************************
 Conveyance Description Information:
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 1      MH - 3 to MH - 4    MH - 3    MH - 4    PIPE      30  Inch   'n'= .015   'Z'= 2
P- 1    MH - 3 to MH - 4    MH - 3    MH - 4    Composite Open Channel
 2      MH - 4 to MH - 5    MH - 4    MH - 5    PIPE      30  Inch   'n'= .015   'Z'= 2
P- 2    MH - 4 to MH - 5    MH - 4    MH - 5    Composite Open Channel
 3      MH - 5 to MH - 6    MH - 5    MH - 6    PIPE      42  Inch   'n'= .015   'Z'= 2
P- 3    MH - 5 to MH - 6    MH - 5    MH - 6    Composite Open Channel
 4      MH - 6 to MH - 7    MH - 6    MH - 7    PIPE      48  Inch   'n'= .015   'Z'= 2
P- 4    MH - 6 to MH - 7    MH - 6    MH - 7    Composite Open Channel
 5      MH - 8 to MH - 7    MH - 8    MH - 7    PIPE      24  Inch   'n'= .015   'Z'= 2
P- 5    MH - 8 to MH - 7    MH - 8    MH - 7    Composite Open Channel
 6      MH - 7 to MH - 9    MH - 7    MH - 9    PIPE      48  Inch   'n'= .015   'Z'= 2
P- 6    MH - 7 to MH - 9    MH - 7    MH - 9    Composite Open Channel
 7      MH - 9 to MH - 10   MH - 9    MH - 10   PIPE      48  Inch   'n'= .015   'Z'= 2
P- 7    MH - 9 to MH - 10   MH - 9    MH - 10   Composite Open Channel
 8      MH - 11 to MH - 12  MH - 11   MH - 12   PIPE      36  Inch   'n'= .015   'Z'= 2
P- 8    MH - 11 to MH - 12  MH - 11   MH - 12   Composite Open Channel
 9      MH - 12 to MH - 13  MH - 12   MH - 13   PIPE      42  Inch   'n'= .015   'Z'= 2
P- 9    MH - 12 to MH - 13  MH - 12   MH - 13   Composite Open Channel
 10     MH - 13 to MH - 10  MH - 13   MH - 10   PIPE      42  Inch   'n'= .015   'Z'= 2
P- 10   MH - 13 to MH - 10  MH - 13   MH - 10   Composite Open Channel
 11     MH - 10 to MH - 14  MH - 10   MH - 14   PIPE      54  Inch   'n'= .015   'Z'= 2
P- 11   MH - 10 to MH - 14  MH - 10   MH - 14   Composite Open Channel
 12     MH - 14 to MH - 15  MH - 14   MH - 15   PIPE      54  Inch   'n'= .015   'Z'= 2
P- 12   MH - 14 to MH - 15  MH - 14   MH - 15   Composite Open Channel
 13     MH - 15 to EAST CH 2          MH - 15   EAST CH 2           PIPE       54  Inch   'n'= .015   'Z'= 2
P- 13   MH - 15 to EAST CH 2          MH - 15   EAST CH 2           RECTANGULAR     50  Ft.     'n'= .015   'Z'= 2
 14     MH - 16 to MH - 17  MH - 16   MH - 17   PIPE      48  Inch   'n'= .015   'Z'= 2
 15     MH - 17 to MH - 18  MH - 17   MH - 18   PIPE      48  Inch   'n'= .015   'Z'= 2
 16     MH - 19 to MH - 20  MH - 19   MH - 20   PIPE      30  Inch   'n'= .015   'Z'= 2
P- 16   MH - 19 to MH - 20  MH - 19   MH - 20   Composite Open Channel
 17     MH - 20 to MH - 18  MH - 20   MH - 18   PIPE      36  Inch   'n'= .015   'Z'= 2
P- 17   MH - 20 to MH - 18  MH - 20   MH - 18   Composite Open Channel
 18     MH - 21 to MH - 22  MH - 21   MH - 22   PIPE      30  Inch   'n'= .015   'Z'= 2
P- 18   MH - 21 to MH - 22  MH - 21   MH - 22   Composite Open Channel
 19     MH - 22 to MH - 18  MH - 22   MH - 18   PIPE      36  Inch   'n'= .015   'Z'= 2
P- 19   MH - 22 to MH - 18  MH - 22   MH - 18   Composite Open Channel
 20     MH - 18 to MH - 23  MH - 18   MH - 23   PIPE      72  Inch   'n'= .015   'Z'= 2
P- 20   MH - 18 to MH - 23  MH - 18   MH - 23   Composite Open Channel
 21     MH - 24 to MH - 25  MH - 24   MH - 25   PIPE      30  Inch   'n'= .015   'Z'= 2
P- 21   MH - 24 to MH - 25  MH - 24   MH - 25   Composite Open Channel
 22     MH - 25 to MH - 23  MH - 25   MH - 23   PIPE      36  Inch   'n'= .015   'Z'= 2
P- 22   MH - 25 to MH - 23  MH - 25   MH - 23   Composite Open Channel
 23     MH - 23 to MH - 26  MH - 23   MH - 26   PIPE      72  Inch   'n'= .015   'Z'= 2
P- 23   MH - 23 to MH - 26  MH - 23   MH - 26   Composite Open Channel
 24     MH - 27 to MH - 26  MH - 27   MH - 26   PIPE      24  Inch   'n'= .015   'Z'= 2
P- 24   MH - 27 to MH - 26  MH - 27   MH - 26   Composite Open Channel
 25     MH - 26 to MH - 28  MH - 26   MH - 28   PIPE      72  Inch   'n'= .015   'Z'= 2
P- 25   MH - 26 to MH - 28  MH - 26   MH - 28   Composite Open Channel
 26     MH - 29 to MH - 30  MH - 29   MH - 30   PIPE      30  Inch   'n'= .015   'Z'= 2
P- 26   MH - 29 to MH - 30  MH - 29   MH - 30   Composite Open Channel
 27     MH - 30 to MH - 28  MH - 30   MH - 28   PIPE      36  Inch   'n'= .015   'Z'= 2
P- 27   MH - 30 to MH - 28  MH - 30   MH - 28   Composite Open Channel
 28     MH - 28 to MH - 31  MH - 28   MH - 31   PIPE      72  Inch   'n'= .015   'Z'= 2
P- 28   MH - 28 to MH - 31  MH - 28   MH - 31   Composite Open Channel
 29     MH - 32 to MH - 33  MH - 32   MH - 33   PIPE      24  Inch   'n'= .015   'Z'= 2
P- 29   MH - 32 to MH - 33  MH - 32   MH - 33   Composite Open Channel
 30     MH - 33 to MH - 34  MH - 33   MH - 34   PIPE      30  Inch   'n'= .015   'Z'= 2
P- 30   MH - 33 to MH - 34  MH - 33   MH - 34   Composite Open Channel
 31     MH - 34 to MH - 31  MH - 34   MH - 31   PIPE      36  Inch   'n'= .015   'Z'= 2
P- 31   MH - 34 to MH - 31  MH - 34   MH - 31   Composite Open Channel
 32     MH - 31 to MH - 35  MH - 31   MH - 35   PIPE      72  Inch   'n'= .015   'Z'= 2
P- 32   MH - 31 to MH - 35  MH - 31   MH - 35   Composite Open Channel
 33     MH - 35 to WEST CH 1          MH - 35   WEST CH 1           PIPE       72  Inch   'n'= .015   'Z'= 2
P- 33   MH - 35 to WEST CH 1          MH - 35   WEST CH 1           Composite Open Channel
 34     MH - 36 to MH - 37  MH - 36   MH - 37   PIPE      30  Inch   'n'= .015   'Z'= 2
P- 34   MH - 36 to MH - 37  MH - 36   MH - 37   Composite Open Channel
 35     MH - 37 to MH - 38  MH - 37   MH - 38   PIPE      30  Inch   'n'= .015   'Z'= 2
P- 35   MH - 37 to MH - 38  MH - 37   MH - 38   Composite Open Channel
 36     MH - 38 to MH - 39  MH - 38   MH - 39   PIPE      36  Inch   'n'= .015   'Z'= 2
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P- 36     MH - 38 to MH - 39  MH - 38   MH - 39   Composite Open Channel
 37       MH - 39 to WEST CH 3          MH - 39   WEST CH 3           PIPE      36  Inch  'n'= .015 'Z'= 2
P- 37     MH - 39 to WEST CH 3          MH - 39   WEST CH 3           RECTANGULAR         20  Ft.   'n'= .015 'Z'= 2
 38       MH - 40 to MH - 41  MH - 40   MH - 41   PIPE      24  Inch  'n'= .015 'Z'= 2
P- 38     MH - 40 to MH - 41  MH - 40   MH - 41   Composite Open Channel
 39       MH - 41 to EAST CH 4          MH - 41   EAST CH 4           PIPE      24  Inch  'n'= .015 'Z'= 2
P- 39     MH - 41 to EAST CH 4          MH - 41   EAST CH 4           RECTANGULAR         30  Ft.   'n'= .015 'Z'= 2
 40       Convey  43          EAST CH 2           EAST CH 3           TRAPEZOIDAL         6  Ft.    'n'= .085 'Z'= 3
 41       Convey  44          EAST CH 3           EAST CH 4           TRAPEZOIDAL         6  Ft.    'n'= .085 'Z'= 3
 42       Convey  45          EAST CH 4           NW CH 5 TRAPEZOIDAL 6  Ft.    'n'= .085 'Z'= 3
 43       Convey  46          WEST CH 1           WEST CH 2           TRAPEZOIDAL         6  Ft.    'n'= .085 'Z'= 3
 44       Convey  47          WEST CH 2           WEST CH 3           TRAPEZOIDAL         6  Ft.    'n'= .085 'Z'= 3
 45       Convey  48          WEST CH 3           WEST CH 4           TRAPEZOIDAL         6  Ft.    'n'= .085 'Z'= 3
 46       Convey  49          WEST CH 4           NW CH 4 TRAPEZOIDAL 6  Ft.    'n'= .085 'Z'= 3
 47       Convey  50          NW CH 4   NW CH 5   TRAPEZOIDAL         8  Ft.    'n'= .085 'Z'= 3
 48       Convey  51          NW CH 5   Creek     TRAPEZOIDAL         10  Ft.   'n'= .085 'Z'= 3
 49       NW-1 to NW-1B       NW-1      NW-1B     PIPE      36  Inch  'n'= .015 'Z'= 2
P- 49     NW-1 to NW-1B       NW-1      NW-1C     Composite Open Channel
 50       NW-1B to NW-2       NW-1B     NW-2      PIPE      36  Inch  'n'= .015 'Z'= 2
P- 50     NW-1B to NW-2       NW-1C     NW-2      Composite Open Channel
 51       NW-2 to NW-3        NW-2      NW-3      PIPE      36  Inch  'n'= .015 'Z'= 2
P- 51     NW-2 to NW-3        NW-2      NW-3      Composite Open Channel
 52       NW-3 to NW CH-1     NW-3      NW CH-1   PIPE      36  Inch  'n'= .015 'Z'= 2
P- 52     NW-3 to NW CH-1     NW-3      NW CH-1   RECTANGULAR         30  Ft.   'n'= .015 'Z'= 2
 53       NW-4 to NW-5        NW-4      NW-5      PIPE      30  Inch  'n'= .015 'Z'= 2
P- 53     NW-4 to NW-5        NW-4      NW-5      Composite Open Channel
 54       NW-5 to NW-6        NW-5      NW-6      PIPE      30  Inch  'n'= .015 'Z'= 2
P- 54     NW-5 to NW-6        NW-5      NW-6      Composite Open Channel
 55       NW-7 to NW-6        NW-7      NW-6      PIPE      24  Inch  'n'= .015 'Z'= 2
P- 55     NW-7 to NW-6        NW-7      NW-6      Composite Open Channel
 56       NW-6 to NW CH-2     NW-6      NW CH-2   PIPE      30  Inch  'n'= .015 'Z'= 2
P- 56     NW-6 to NW CH-2     NW-6      NW CH-2   RECTANGULAR         20  Ft.   'n'= .015 'Z'= 2
 57       NW-8 to NW-10       NW-8      NW-10     PIPE      24  Inch  'n'= .015 'Z'= 2
P- 57     NW-8 to NW-10       NW-8      NW-10     Composite Open Channel
 58       NW-9 to NW-10       NW-9      NW-10     PIPE      24  Inch  'n'= .015 'Z'= 2
P- 58     NW-9 to NW-10       NW-9      NW-10     Composite Open Channel
 59       NW-10 to NW CH-3    NW-10     NW CH-3   PIPE      24  Inch  'n'= .015 'Z'= 2
P- 59     NW-10 to NW CH-3    NW-10     NW CH-3   RECTANGULAR         20  Ft.   'n'= .015 'Z'= 2
 60       NW Channel 1        NW CH-1   NW CH-2   TRAPEZOIDAL         6  Ft.    'n'= .085 'Z'= 3
 61       NW Channel 2        NW CH-2   NW CH-3   TRAPEZOIDAL         6  Ft.    'n'= .085 'Z'= 3
 62       NW Channel 3        NW CH-3   NW CH 4   TRAPEZOIDAL         6  Ft.    'n'= .085 'Z'= 3
 63       SE 1 to SE 2        SE 1      SE 2      PIPE      30  Inch  'n'= .015 'Z'= 2
P- 63     SE 1 to SE 2        SE 1      SE 2      Composite Open Channel
 64       SE 2 to SE 3        SE 2      SE 3      PIPE      36  Inch  'n'= .015 'Z'= 2
P- 64     SE 2 to SE 3                            Composite Open Channel
 65       SE 3 to SE 4        SE 3      SE 4      PIPE      42  Inch  'n'= .015 'Z'= 2
P- 65     SE 3 to SE 4                            Composite Open Channel
 66       SE 4 to SE 5        SE 4      SE 5      PIPE      54  Inch  'n'= .015 'Z'= 2
P- 66     SE 4 to SE 5                            Composite Open Channel
 67       SE 5 to SE 6        SE 5      SE 6      PIPE      54  Inch  'n'= .015 'Z'= 2
P- 67     SE 5 to SE 6                            Composite Open Channel
 68       SE 6 to SE Outlet   SE 6      SE Outlet PIPE      54  Inch  'n'= .015 'Z'= 2
P- 68     SE 6 to SE Outlet                       RECTANGULAR         20  Ft.   'n'= .015 'Z'= 2
 69       NW-1C to NW-1       NW-1C     NW-1      PIPE      30  Inch  'n'= .015 'Z'= 2
P- 69     NW-1C to NW-1       NW-1C     NW-1      Composite Open Channel
 70       NW-1A to NW-1C      NW-1A     NW-1C     PIPE      18  Inch  'n'= .015 'Z'= 2
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Conveyance Profile Information:
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#	Convey Name	Distance	Invert Elevation
1	MH - 3 to MH - 4	0.	89.5
1		490.	86.3
P - 1		0.	98.
P - 1		490.	96.
2	MH - 4 to MH - 5	0.	86.3
2		380.	84.5
P - 2		0.	96.
P - 2		380.	95.
3	MH - 5 to MH - 6	0.	83.5
3		770.	82.8
P - 3		0.	95.
P - 3		770.	90.
4	MH - 6 to MH - 7	0.	82.3
4		310.	81.9
P - 4		0.	90.
P - 4		310.	89.
5	MH - 8 to MH - 7	0.	84.4
5		420.	82.9
P - 5		0.	94.
P - 5		420.	89.
6	MH - 7 to MH - 9	0.	81.9
6		280.	81.2
P - 6		0.	89.
P - 6		280.	88.
7	MH - 9 to MH - 10	0.	81.2
7		270.	80.5
P - 7		0.	88.
P - 7		270.	87.5
8	MH - 11 to MH - 12	0.	86.
8		480.	83.5
P - 8		0.	93.
P - 8		480.	92.
9	MH - 12 to MH - 13	0.	82.9
9		700.	81.9
P - 9		0.	92.
P - 9		700.	91.
10	MH - 13 to MH - 10	0.	81.9
10		540.	81.
P - 10		0.	91.
P - 10		540.	87.5
11	MH - 10 to MH - 14	0.	80.
11		280.	79.2
P - 11		0.	87.5
P - 11		280.	87.
12	MH - 14 to MH - 15	0.	79.2
12		360.	78.16
P - 12		0.	87.
P - 12		360.	86.5
13	MH - 15 to EAST CH 2	0.	78.16
13		190.	77.5
P - 13		0.	86.5
P - 13		190.	85.
14	MH - 16 to MH - 17	0.	95.
14		950.	92.
15	MH - 17 to MH - 18	0.	92.
15		1260.	88.3
16	MH - 19 to MH - 20	0.	94.8
16		700.	92.8
P - 16		0.	105.5
P - 16		720.	102.5
17	MH - 20 to MH - 18	0.	92.3
17		800.	89.3
P - 17		0.	102.5
P - 17		800.	99.
18	MH - 21 to MH - 22	0.	94.
18		800.	90.9
P - 18		0.	104.5
P - 18		800.	100.

19	MH - 22 to MH - 18	0.	90.4
19		650.	89.3
P - 19		0.	100.
P - 19		650.	99.
20	MH - 18 to MH - 23	0.	86.4
20		620.	85.4
P - 20		0.	99.
P - 20		620.	97.
21	MH - 24 to MH - 25	0.	89.9
21		410.	89.1
P - 21		0.	97.5
P - 21		410.	96.5
22	MH - 25 to MH - 23	0.	88.6
22		470.	87.4
P - 22		0.	97.5
P - 22		470.	96.5
23	MH - 23 to MH - 26	0.	85.4
23		270.	84.68
P - 23		0.	97.
P - 23		270.	96.
24	MH - 27 to MH - 26	0.	91.2
24		450.	87.7
P - 24		0.	97.5
P - 24		450.	96.
25	MH - 26 to MH - 28	0.	84.68
25		860.	82.68
P - 25		0.	96.
P - 25		870.	92.
26	MH - 29 to MH - 30	0.	89.
26		290.	87.
P - 26		0.	97.
P - 26		290.	93.
27	MH - 30 to MH - 28	0.	86.5
27		490.	84.4
P - 27		0.	93.
P - 27		490.	92.
28	MH - 28 to MH - 31	0.	82.68
28		870.	79.72
P - 28		0.	92.
P - 28		870.	89.
29	MH - 32 to MH - 33	0.	86.5
29		260.	85.9
P - 29		0.	94.5
P - 29		260.	92.5
30	MH - 33 to MH - 34	0.	85.4
30		690.	84.5
P - 30		0.	92.5
P - 30		690.	90.
31	MH - 34 to MH - 31	0.	84.
31		560.	81.5
P - 31		0.	90.
P - 31		560.	89.
32	MH - 31 to MH - 35	0.	79.72
32		390.	77.78
P - 32		0.	89.
P - 32		390.	88.
33	MH - 35 to WEST CH 1	0.	77.78
33		90.	77.5
P - 33		0.	88.
P - 33		90.	87.8
34	MH - 36 to MH - 37	0.	81.5
34		370.	81.
P - 34		0.	88.
P - 34		370.	87.
35	MH - 37 to MH - 38	0.	81.3
35		590.	80.3
P - 35		0.	87.
P - 35		590.	86.
36	MH - 38 to MH - 39	0.	79.8
36		460.	78.9
P - 36		0.	86.
P - 36		460.	84.
37	MH - 39 to WEST CH 3	0.	78.9

37		30.	78.6
P - 37		0.	84.
P - 37		30.	83.5
38	MH - 40 to MH - 41	0.	79.
38		360.	78.2
P - 38		0.	84.
P - 38		360.	81.
39	MH - 41 to EAST CH 4	0.	78.2
39		60.	77.85
P - 39		0.	81.
P - 39		60.	80.5
40	Convey 43	0.	78.
40		1400.	76.4
41	Convey 44	0.	76.4
41		250.	76.1
42	Convey 45	0.	76.1
42		300.	75.55
43	Convey 46	0.	77.8
43		300.	77.4
44	Convey 47	0.	77.4
44		600.	76.7
45	Convey 48	0.	76.7
45		350.	76.25
46	Convey 49	0.	76.25
46		180.	76.07
47	Convey 50	0.	76.07
47		450.	75.55
48	Convey 51	0.	75.55
48		500.	75.23
49	NW-1 to NW-1B	0.	88.5
49		710.	86.8
P - 49		0.	94.5
P - 49		710.	93.5
50	NW-1B to NW-2	0.	86.8
50		590.	85.
P - 50		0.	93.5
P - 50		590.	91.
51	NW-2 to NW-3	0.	85.
51		510.	82.1
P - 51		0.	91.
P - 51		510.	87.5
52	NW-3 to NW CH-1	0.	82.1
52		220.	79.32
P - 52		0.	87.5
P - 52		220.	87.
53	NW-4 to NW-5	0.	85.5
53		490.	84.
P - 53		0.	91.
P - 53		490.	88.
54	NW-5 to NW-6	0.	84.
54		260.	83.
P - 54		0.	88.
P - 54		260.	86.5
55	NW-7 to NW-6	0.	87.
55		490.	84.
P - 55		0.	92.
P - 55		490.	86.5
56	NW-6 to NW CH-2	0.	83.
56		250.	78.76
P - 56		0.	87.1
P - 56		250.	86.6
57	NW-8 to NW-10	0.	81.
57		270.	80.
P - 57		0.	86.
P - 57		270.	85.
58	NW-9 to NW-10	0.	85.
58		470.	80.
P - 58		0.	90.
P - 58		470.	85.
59	NW-10 to NW CH-3	0.	80.
59		210.	77.92
P - 59		0.	85.
P - 59		210.	84.5

60	NW Channel 1	0.	79.3
60		560.	78.8
61	NW Channel 2	0.	78.8
61		840.	78.
62	NW Channel 3	0.	78.
62		1850.	76.07
63	SE 1 to SE 2	0.	96.4
63		450.	94.
P - 63		0.	101.
P - 63		450.	98.5
64	SE 2 to SE 3	0.	93.5
64		370.	92.1
P - 64		0.	98.5
P - 64		370.	97.5
65	SE 3 to SE 4	0.	91.6
65		580.	90.4
P - 65		0.	97.5
P - 65		580.	95.
66	SE 4 to SE 5	0.	89.4
66		320.	88.95
P - 66		0.	95.
P - 66		320.	94.
67	SE 5 to SE 6	0.	88.95
67		270.	87.1
P - 67		0.	94.
P - 67		270.	92.
68	SE 6 to SE Outlet	0.	87.1
68		70.	86.8
P - 68		0.	92.5
P - 68		70.	92.2
69	NW-1C to NW-1	0.	89.6
69		570.	89.
P - 69		0.	96.4
P - 69		570.	94.3
70	NW-1A to NW-1C	0.	90.
70		140.	89.6

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Node Results Information:
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#	Node Name	Cumul. Area	Pervious Area	Fi	Unit Peak Flow q(cfs/ac)	Cumul. Qp(cfs)	Known WS Elevation	RIM or GRATE Elev.	Node HGL	Node EGL	Cumul. Tr(min)
1	MH - 3	7.00	1.83	0.42	1.50	9.73	N/A	96.60	90.54	90.98	15.00
2	MH - 4	15.60	3.22	0.36	1.41	20.89	N/A	95.90	88.11	88.63	16.83
3	MH - 5	19.00	4.22	0.36	1.37	24.48	N/A	94.30	87.19	87.30	17.96
4	MH - 6	42.10	11.08	0.36	1.20	46.48	N/A	90.50	86.45	86.69	22.25
5	MH - 7	54.50	16.59	0.38	1.14	55.94	N/A	90.00	85.91	86.25	23.51
6	MH - 8	6.40	3.27	0.42	1.50	8.20	N/A	92.90	86.87	86.99	15.00
7	MH - 9	60.80	19.63	0.38	1.10	59.60	N/A	89.40	85.30	85.69	24.42
8	MH - 10	95.80	31.18	0.39	1.07	90.41	N/A	89.20	84.51	85.07	25.28
9	MH - 11	9.30	0.89	0.30	1.50	13.66	N/A	93.40	87.18	87.66	15.00
10	MH - 12	18.10	3.51	0.37	1.42	24.46	N/A	92.80	86.40	86.51	16.60
11	MH - 13	30.10	8.99	0.40	1.30	35.40	N/A	91.20	85.73	85.96	20.31
12	MH - 14	100.80	33.50	0.39	1.04	92.02	N/A	87.90	83.70	84.28	26.05
13	MH - 15	107.20	37.15	0.40	1.01	93.45	N/A	87.00	82.13	82.81	27.07
14	MH - 16	28.00	8.40	0.39	1.12	28.13	N/A	102.90	96.57	97.22	24.00
15	MH - 17	28.00	8.40	0.39	1.01	25.10	N/A	101.50	93.67	94.11	26.97
16	MH - 18	94.30	29.37	0.36	0.89	73.67	N/A	98.20	89.45	89.90	31.14
17	MH - 19	6.40	1.18	0.30	1.50	9.23	N/A	105.50	96.04	96.29	15.00
18	MH - 20	25.80	3.00	0.30	1.33	33.37	N/A	101.70	94.59	95.16	19.08
19	MH - 21	11.10	4.52	0.42	1.50	14.73	N/A	107.80	95.29	95.86	15.00
20	MH - 22	16.80	5.90	0.42	1.39	20.95	N/A	99.70	92.53	92.80	17.32
21	MH - 23	117.40	38.15	0.38	0.85	85.00	N/A	95.50	88.25	88.96	33.18
22	MH - 24	7.00	2.10	0.43	1.50	9.59	N/A	98.30	91.29	91.49	15.00
23	MH - 25	12.50	4.11	0.43	1.41	15.87	N/A	96.40	90.16	90.47	16.94
24	MH - 26	124.30	41.37	0.38	0.83	87.59	N/A	95.00	87.69	88.35	33.90
25	MH - 27	4.30	2.17	0.40	1.50	5.58	N/A	97.40	92.03	92.38	15.00
26	MH - 28	155.80	56.65	0.39	0.78	99.99	N/A	92.80	85.58	86.52	36.30
27	MH - 29	11.90	5.39	0.41	1.37	14.05	N/A	96.80	90.26	90.81	18.00
28	MH - 30	15.60	7.25	0.41	1.34	17.90	N/A	93.50	87.85	88.43	18.79
29	MH - 31	197.10	77.84	0.39	0.75	116.25	N/A	89.40	82.63	83.89	38.36
30	MH - 32	7.00	3.77	0.40	1.50	8.99	N/A	94.40	88.72	88.86	15.00
31	MH - 33	12.00	6.27	0.41	1.43	14.57	N/A	92.40	88.16	88.31	16.51
32	MH - 34	26.70	13.62	0.42	1.29	28.82	N/A	90.80	85.93	86.55	20.39
33	MH - 35	210.70	85.80	0.39	0.73	119.98	N/A	87.70	81.26	82.12	39.31
34	MH - 36	5.20	3.89	0.36	1.50	6.38	N/A	86.70	83.09	83.15	15.00
35	MH - 37	9.00	5.75	0.38	1.35	9.98	N/A	87.10	82.79	82.97	18.47
36	MH - 38	17.00	9.79	0.39	1.24	17.21	N/A	85.00	81.63	81.88	21.45
37	MH - 39	24.20	13.52	0.39	1.12	21.90	N/A	83.10	80.41	81.06	23.94
38	MH - 40	4.60	2.55	0.41	1.50	5.85	N/A	86.60	81.20	81.26	15.00
39	MH - 41	16.20	9.67	0.40	1.36	18.17	N/A	83.00	80.36	80.94	18.22
40	EAST CH 2	107.20	37.15	0.40	0.99	91.48	N/A	N/A	82.29	82.31	27.65
41	EAST CH 3	108.60	37.85	0.40	0.86	78.08	N/A	N/A	80.10	80.12	32.65
42	EAST CH 4	124.80	47.51	0.40	0.77	77.15	N/A	N/A	79.61	79.63	36.98
43	WEST CH 1	240.60	105.65	0.39	0.40	54.73	N/A	N/A	81.11	81.12	78.59
44	WEST CH 2	240.60	105.65	0.39	0.38	50.94	N/A	N/A	80.70	80.72	82.31
45	WEST CH 3	264.80	119.16	0.39	0.36	49.86	N/A	N/A	80.01	80.02	87.31
46	WEST CH 4	268.10	120.81	0.39	0.35	45.91	N/A	N/A	79.62	79.63	92.12
47	NW CH 4	375.60	176.95	0.40	0.34	57.01	N/A	N/A	79.44	79.46	94.84
48	NW CH 5	500.40	224.46	0.40	0.32	73.02	N/A	N/A	78.92	78.94	99.84
49	Creek	500.40	224.46	0.40	0.31	66.44	78.00	N/A	78.00	78.00	104.71
50	NW-1	40.70	20.35	0.43	0.59	15.38	N/A	94.30	90.09	90.37	50.15
51	NW-1B	46.60	23.08	0.42	0.56	16.40	N/A	93.50	88.33	88.68	53.06
52	NW-2	54.30	26.79	0.42	0.54	18.09	N/A	90.60	86.36	86.94	55.26
53	NW-3	63.90	32.03	0.42	0.53	20.39	N/A	88.00	83.55	84.18	56.69
54	NW-4	12.40	6.74	0.36	1.45	15.55	N/A	89.80	87.60	87.81	16.00
55	NW-5	16.60	9.04	0.37	1.35	19.01	N/A	87.80	86.67	86.93	18.51
56	NW-6	31.80	17.27	0.39	1.31	34.87	N/A	87.10	85.00	86.18	19.63
57	NW-7	7.50	3.95	0.42	1.50	9.59	N/A	91.90	88.15	88.60	15.00
58	NW-8	3.30	1.85	0.41	1.50	4.19	N/A	87.20	82.07	82.17	15.00
59	NW-9	3.40	1.90	0.41	1.50	4.32	N/A	91.40	85.73	86.03	15.00
60	NW-10	11.80	6.83	0.40	1.41	13.91	N/A	85.90	81.34	82.00	16.90
61	NW CH-1	63.90	32.03	0.42	0.53	20.17	N/A	N/A	81.75	81.75	57.11
62	NW CH-2	95.70	49.30	0.41	0.49	26.63	N/A	N/A	81.40	81.41	62.11
63	NW CH-3	107.50	56.14	0.41	0.46	26.24	N/A	N/A	80.61	80.62	67.11
64	SE 1	17.90	8.18	0.40	1.50	23.52	N/A	101.10	98.05	98.86	15.00
65	SE 2	25.80	10.62	0.41	1.45	32.98	N/A	98.60	95.75	96.33	16.10

66	SE 3	30.00	12.72	0.41	1.40	36.80	N/A	97.20	94.20	94.60	17.16
67	SE 4	38.10	15.92	0.41	1.33	44.03	N/A	94.10	92.20	92.51	19.09
68	SE 5	49.00	18.72	0.40	1.30	55.94	N/A	93.80	91.12	92.05	20.32
69	SE 6	62.60	23.02	0.41	1.27	69.87	N/A	92.50	89.68	90.63	20.88
70	SE Outlet	58.20	28.41	0.39	1.26	75.45	N/A	N/A	0.00	0.00	21.03
71	NW-1A	21.60	10.80	0.43	0.64	9.16	N/A	N/A	93.29	93.75	46.00
72	NW-1C	30.10	15.05	0.43	0.63	12.60	N/A	96.40	92.22	92.33	46.45

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Convey Results Information:

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#	Convey Name	Upstream Critical Elevation	Upstream HGL	Downstream HGL	Upstream EGL	Downstream EGL	Exit Velocity (fps)	Travel Time (min)	Flow (cfs)
1	MH - 3 to MH - 4	90.54	90.54	88.55	90.98	88.63	2.09	1.91	9.73
P - 1		98.12	90.54	88.55	90.98	88.63	1.31	0.	0.
2	MH - 4 to MH - 5	87.86	88.11	86.99	88.63	87.3	4.26	1.32	20.89
P - 2		96.51	88.11	86.99	88.63	87.3	2.31	0.	0.
3	MH - 5 to MH - 6	85.02	87.19	86.58	87.3	86.69	2.54	5.	24.48
P - 3		95.48	87.19	86.58	87.3	86.69	2.35	0.	0.
4	MH - 6 to MH - 7	84.34	86.45	86.02	86.69	86.26	3.7	1.4	46.48
P - 4		90.07	86.45	86.02	86.69	86.26	0.02	0.	0.
5	MH - 8 to MH - 7	85.42	86.87	86.14	86.99	86.26	2.61	2.68	8.2
P - 5		94.46	86.87	86.14	86.99	86.26	0.83	0.	0.
6	MH - 7 to MH - 9	84.14	85.91	85.35	86.25	85.69	4.45	1.05	55.94
P - 6		89.03	85.91	85.35	86.25	85.69	0.52	0.	0.
7	MH - 9 to MH - 10	83.52	85.3	84.68	85.69	85.07	4.74	0.95	59.6
P - 7		88.24	85.3	84.68	85.69	85.07	1.56	0.	0.
8	MH - 11 to MH - 12	87.17	87.18	86.45	87.66	86.51	1.94	2.53	13.66
P - 8		0.	87.18	86.45	87.66	86.51	3.11	0.	0.
9	MH - 12 to MH - 13	84.42	86.4	85.85	86.51	85.96	2.54	4.59	24.46
P - 9		92.19	86.4	85.85	86.51	85.96	1.56	0.	0.
10	MH - 13 to MH - 10	83.74	85.73	84.83	85.96	85.07	3.68	2.45	35.4
P - 10		0.	85.73	84.83	85.96	85.07	6.07	0.	0.
11	MH - 10 to MH - 14	82.79	84.51	83.72	85.07	84.28	5.68	0.82	90.41
P - 11		87.8	84.51	83.72	85.07	84.28	1.59	0.	0.
12	MH - 14 to MH - 15	82.02	83.7	82.66	84.28	83.24	5.79	0.98	92.02
P - 12		87.4	83.7	82.66	84.28	83.24	2.21	0.	0.
13	MH - 15 to EAST CH 2	81.	82.13	81.68	82.81	82.31	6.07	0.51	93.45
P - 13		86.54	82.13	81.68	82.81	82.31	1.17	0.	0.
14	MH - 16 to MH - 17	96.57	96.57	93.69	97.22	94.22	5.58	2.97	28.13
15	MH - 17 to MH - 18	93.48	93.67	89.78	94.11	90.39	5.93	4.16	25.1
16	MH - 19 to MH - 20	95.81	96.04	95.1	96.29	95.16	1.95	4.11	9.23
P - 16		105.59	96.04	95.1	96.29	95.16	0.01	0.	0.
17	MH - 20 to MH - 18	94.17	94.59	91.17	95.16	92.06	7.18	2.29	33.37
P - 17		102.84	94.59	91.17	95.16	92.06	1.97	0.	0.
18	MH - 21 to MH - 22	95.29	95.29	92.47	95.86	92.83	4.53	2.32	14.73
P - 18		0.	95.29	92.47	95.86	92.83	0.	0.	0.
19	MH - 22 to MH - 18	91.87	92.53	90.77	92.8	91.41	6.07	2.63	20.95
P - 19		100.1	92.53	90.77	92.8	91.41	1.04	0.	0.
20	MH - 18 to MH - 23	88.69	89.45	88.55	89.9	88.96	4.9	2.04	73.67
P - 20		99.41	89.45	88.55	89.9	88.96	0.53	0.	0.
21	MH - 24 to MH - 25	90.93	91.29	90.13	91.49	90.57	5.02	1.94	9.59
P - 21		97.57	91.29	90.13	91.49	90.57	0.99	0.	0.
22	MH - 25 to MH - 23	89.87	90.16	88.67	90.47	89.2	5.55	1.82	15.87
P - 22		97.58	90.16	88.67	90.47	89.2	1.	0.	0.
23	MH - 23 to MH - 26	87.87	88.25	87.77	88.96	88.35	5.79	0.73	85.
P - 23		97.16	88.25	87.77	88.96	88.35	0.04	0.	0.
24	MH - 27 to MH - 26	92.03	92.03	88.76	92.38	88.95	3.3	1.5	5.58
P - 24		0.	92.03	88.76	92.38	88.95	0.	0.	0.
25	MH - 26 to MH - 28	87.2	87.69	86.01	88.35	86.52	5.43	2.39	87.59
P - 25		96.44	87.69	86.01	88.35	86.52	0.67	0.	0.
26	MH - 29 to MH - 30	90.26	90.26	88.21	90.81	88.82	5.94	0.79	14.05
P - 26		97.53	90.26	88.21	90.81	88.82	0.87	0.	0.
27	MH - 30 to MH - 28	87.85	87.85	86.26	88.43	86.52	3.88	1.61	17.9
P - 27		93.29	87.85	86.26	88.43	86.52	1.58	0.	0.
28	MH - 28 to MH - 31	85.37	85.58	83.35	86.52	83.89	5.58	2.06	99.99
P - 28		92.47	85.58	83.35	86.52	83.89	2.31	0.	0.
29	MH - 32 to MH - 33	87.57	88.72	88.17	88.86	88.31	2.86	1.51	8.99
P - 29		94.57	88.72	88.17	88.86	88.31	0.94	0.	0.
30	MH - 33 to MH - 34	87.9	88.16	87.	88.31	87.15	2.97	3.87	14.57
P - 30		92.75	88.16	87.	88.31	87.15	1.56	0.	0.
31	MH - 34 to MH - 31	85.74	85.93	83.24	86.55	84.03	6.78	1.54	28.82
P - 31		90.18	85.93	83.24	86.55	84.03	1.56	0.	0.
32	MH - 31 to MH - 35	82.63	82.63	81.38	83.89	82.12	6.57	0.75	116.25
P - 32		89.19	82.63	81.38	83.89	82.12	1.56	0.	0.
33	MH - 35 to WEST CH 1	80.74	81.26	81.11	82.12	81.89	6.75	0.22	119.98
P - 33		88.2	81.26	81.11	82.12	81.89	1.56	0.	0.
34	MH - 36 to MH - 37	82.34	83.09	82.93	83.15	82.97	1.57	3.54	6.38
P - 34		0.	83.09	82.93	83.15	82.97	2.98	0.	0.

35	MH - 37 to MH - 38	82.36	82.79	81.65	82.97	81.88	3.71	2.94	9.98
P - 35		87.06	82.79	81.65	82.97	81.88	0.84	0.	0.
36	MH - 38 to MH - 39	81.13	81.63	80.85	81.88	81.06	3.55	2.05	17.21
P - 36		86.24	81.63	80.85	81.88	81.06	1.56	0.	0.
37	MH - 39 to WEST CH 3	80.41	80.41	79.93	81.06	80.83	7.26	0.05	21.9
P - 37		0.	80.41	79.93	81.06	80.83	0.	0.	0.
38	MH - 40 to MH - 41	79.86	81.2	80.88	81.26	80.94	1.86	3.22	5.85
P - 38		0.	81.2	80.88	81.26	80.94	0.	0.	0.
39	MH - 41 to EAST CH 4	80.2	80.36	79.85	80.94	80.43	5.78	0.17	18.17
P - 39		81.02	80.36	79.85	80.94	80.43	0.34	0.	0.
40	Convey 43	79.5	82.29	80.09	82.31	80.12	1.45	19.24	91.48
41	Convey 44	77.78	80.1	79.6	80.12	79.63	1.35	3.26	78.08
42	Convey 45	77.47	79.61	78.91	79.63	78.94	1.43	3.67	77.15
43	Convey 46	78.93	81.11	80.7	81.12	80.72	1.04	4.82	54.73
44	Convey 47	78.48	80.7	80.01	80.72	80.02	0.97	10.34	50.94
45	Convey 48	77.77	80.01	79.62	80.02	79.63	0.92	6.25	49.86
46	Convey 49	77.27	79.62	79.45	79.63	79.46	0.84	3.56	45.91
47	Convey 50	77.09	79.44	78.93	79.46	78.94	0.93	8.05	57.01
48	Convey 51	76.6	78.92	77.96	78.94	78.	1.47	6.97	73.02
49	NW-1 to NW-1B	89.75	90.09	88.41	90.37	88.69	3.97	2.93	15.38
P - 49		0.	90.09	88.41	90.37	88.69	10.79	0.	0.
50	NW-1B to NW-2	88.1	88.33	86.65	88.68	86.94	4.11	2.2	16.4
P - 50		93.97	92.22	91.5	92.33	91.61	0.27	0.	0.
51	NW-2 to NW-3	86.36	86.36	83.88	86.94	84.18	4.13	1.43	18.09
P - 51		91.48	86.36	83.88	86.94	84.18	0.11	0.	0.
52	NW-3 to NW CH-1	83.55	83.55	81.75	84.18	81.94	3.33	0.47	20.39
P - 52		87.72	83.55	81.75	84.18	81.94	2.67	0.	0.
53	NW-4 to NW-5	86.83	87.6	86.76	87.81	86.93	3.17	2.51	15.55
P - 53		91.12	87.6	86.76	87.81	86.93	0.02	0.	0.
54	NW-5 to NW-6	85.48	86.67	85.92	86.93	86.18	3.87	1.12	19.01
P - 54		88.03	86.67	85.92	86.93	86.18	0.46	0.	0.
55	NW-7 to NW-6	88.11	88.15	86.02	88.6	86.18	3.05	1.82	9.59
P - 55		0.	88.15	86.02	88.6	86.18	0.	0.	0.
56	NW-6 to NW CH-2	85.	85.	80.38	86.18	82.23	10.36	0.4	34.87
P - 56		87.18	85.	80.38	86.18	82.23	1.56	0.	0.
57	NW-8 to NW-10	81.72	82.07	81.98	82.17	82.01	1.34	2.64	4.19
P - 57		0.	82.07	81.98	82.17	82.01	0.	0.	0.
58	NW-9 to NW-10	85.73	85.73	81.97	86.03	82.01	1.38	1.92	4.32
P - 58		0.	85.73	81.97	86.03	82.01	0.	0.	0.
59	NW-10 to NW CH-3	81.34	81.34	80.28	82.	80.62	4.43	0.62	13.91
P - 59		85.04	81.34	80.28	82.	80.62	1.19	0.	0.
60	NW Channel 1	79.93	81.75	81.4	81.75	81.41	0.56	15.75	20.17
61	NW Channel 2	79.54	81.4	80.6	81.41	80.61	0.74	18.92	26.63
62	NW Channel 3	78.74	80.61	79.45	80.62	79.46	0.48	50.1	26.24
63	SE 1 to SE 2	98.05	98.05	95.94	98.86	96.51	5.75	1.1	23.52
P - 63		101.23	98.05	95.94	98.86	96.51	1.56	0.	0.
64	SE 2 to SE 3	95.37	95.75	94.21	96.33	94.87	6.21	1.05	32.98
P - 64		98.61	93.29	91.87	93.75	92.33	1.31	0.	0.
65	SE 3 to SE 4	93.48	94.2	92.28	94.6	93.12	6.98	1.91	36.8
P - 65		0.	93.29	91.87	93.75	92.33	6.54	0.	0.
66	SE 4 to SE 5	91.31	92.2	91.75	92.51	92.06	4.24	1.26	44.03
P - 66		95.56	93.29	91.87	93.75	92.33	2.33	0.	0.
67	SE 5 to SE 6	91.12	91.12	90.24	92.05	90.63	4.71	0.58	55.94
P - 67		94.09	93.29	91.87	93.75	92.33	1.02	0.	0.
68	SE 6 to SE Outlet	89.54	89.68	89.24	90.63	90.32	7.94	0.16	69.87
P - 68		92.53	93.29	91.87	93.75	92.33	1.05	0.	0.
69	NW-1C to NW-1	92.1	92.22	91.5	92.33	91.61	2.57	3.7	12.6
P - 69		0.	92.22	91.5	92.33	91.61	0.	0.	0.
70	NW-1A to NW-1C	91.5	93.29	91.87	93.75	92.33	5.18	0.45	9.16

	Up Node Name	Down Node Name	Trib. Area at Up Node (acre)	Cumul. Area (acre)	Total Computed Time of Concentration Up Node (min.)	Total Flow at Convey (cfs)	Convey Size (in or ft)	Average Slope (ft/ft)	Total Length (feet)	Full Flow Capacity of Conduit (cfs)	Computed Flow at Convey (cfs)	Exit Velocity (fps)	Travel Time at Convey (min.)	Rim/Grate at Up Node (feet)	Up HGL (feet)	Down HGL (feet)	Up (RIM-HGL) (feet)	Energy Slope (ft/ft)	Up EGL (feet)	Down EGL (feet)	Up Invert (feet)
	MH - 3	MH - 4	7.	7.	15.	9.73	30	0.0065	490.00	28.73	9.73	2.09	1.91	96.60	90.54	88.55	6.06	0.0048	90.98	88.63	89.50
							N/A	0.0041	490.00	N/A	0.00	1.31	0.00	96.60	90.54	88.55	N/A	0.0048	90.98	88.63	98.00
	MH - 4	MH - 5	8.6	15.6	16.83	20.89	30	0.0047	380.00	24.47	20.89	4.26	1.32	95.90	88.11	86.99	7.79	0.0035	88.63	87.30	86.30
							N/A	0.0026	380.00	N/A	0.00	2.31	0.00	95.90	88.11	86.99	N/A	0.0035	88.63	87.30	96.00
	MH - 5	MH - 6	3.4	19.	17.96	24.48	42	0.0009	770.00	26.29	24.48	2.54	5.00	94.30	87.19	86.58	7.11	0.0008	87.30	86.69	83.50
							N/A	0.0065	770.00	N/A	0.00	2.35	0.00	94.30	87.19	86.58	N/A	0.0008	87.30	86.69	95.00
	MH - 6	MH - 7	23.1	42.1	22.25	46.48	48	0.0013	310.00	44.72	46.48	3.70	1.40	90.50	86.45	86.02	4.05	0.0014	86.69	86.26	82.30
							N/A	0.0032	310.00	N/A	0.00	0.02	0.00	90.50	86.45	86.02	N/A	0.0014	86.69	86.26	90.00
	MH - 8	MH - 7	6.4	6.4	15.	8.2	24	0.0036	420.00	11.72	8.20	2.61	2.68	92.90	86.87	86.14	6.03	0.0018	86.99	86.26	84.40
							N/A	0.0119	420.00	N/A	0.00	0.83	0.00	92.90	86.87	86.14	N/A	0.0018	86.99	86.26	94.00
	MH - 7	MH - 9	6.	54.5	23.51	55.94	48	0.0025	280.00	62.25	55.94	4.45	1.05	90.00	85.91	85.35	4.09	0.0020	86.25	85.69	81.90
							N/A	0.0036	280.00	N/A	0.00	0.52	0.00	90.00	85.91	85.35	N/A	0.0020	86.25	85.69	89.00
	MH - 9	MH - 10	6.3	60.8	24.42	59.6	48	0.0026	270.00	63.39	59.60	4.74	0.95	89.40	85.30	84.68	4.10	0.0023	85.69	85.07	81.20
							N/A	0.0019	270.00	N/A	0.00	1.56	0.00	89.40	85.30	84.68	N/A	0.0023	85.69	85.07	88.00
	MH - 11	MH - 12	9.3	9.3	15.	13.66	36	0.0052	480.00	41.72	13.66	1.94	2.53	93.40	87.18	86.45	6.22	0.0024	87.66	86.51	86.00
							N/A	0.0021	480.00	N/A	0.00	3.11	0.00	93.40	87.18	86.45	N/A	0.0024	87.66	86.51	93.00
	MH - 12	MH - 13	8.8	18.1	16.6	24.46	42	0.0014	700.00	32.96	24.46	2.54	4.59	92.80	86.40	85.85	6.40	0.0008	86.51	85.96	82.90
							N/A	0.0014	700.00	N/A	0.00	1.56	0.00	92.80	86.40	85.85	N/A	0.0008	86.51	85.96	92.00
	MH - 13	MH - 10	12.	30.1	20.31	35.4	42	0.0017	540.00	35.60	35.40	3.68	2.45	91.20	85.73	84.83	5.47	0.0016	85.96	85.07	81.90
							N/A	0.0065	540.00	N/A	0.00	6.07	0.00	91.20	85.73	84.83	N/A	0.0016	85.96	85.07	91.00
	MH - 10	MH - 14	4.9	95.8	25.28	90.41	54	0.0029	280.00	91.10	90.41	5.68	0.82	89.20	84.51	83.72	4.69	0.0028	85.07	84.28	80.00
							N/A	0.0018	280.00	N/A	0.00	1.59	0.00	89.20	84.51	83.72	N/A	0.0028	85.07	84.28	87.50
	MH - 14	MH - 15	5.	100.8	26.05	92.02	54	0.0029	360.00	91.60	92.02	5.79	0.98	87.90	83.70	82.66	4.20	0.0029	84.28	83.24	79.20
							N/A	0.0014	360.00	N/A	0.00	2.21	0.00	87.90	83.70	82.66	N/A	0.0029	84.28	83.24	87.00
	MH - 15	EAST CH 2	6.4	107.2	27.07	93.45	54	0.0035	190.00	100.45	93.45	6.07	0.51	87.00	82.13	81.68	4.87	0.0026	82.81	82.31	78.16
							50	0.0079	190.00	N/A	0.00	1.17	0.00	87.00	82.13	81.68	N/A	0.0026	82.81	82.31	86.50
	MH - 16	MH - 17	28.	28.	24.	28.13	48	0.0032	950.00	69.96	28.13	5.58	2.97	102.90	96.57	93.69	6.33	0.0032	97.22	94.22	95.00
	MH - 17	MH - 18	0.	28.	26.97	25.1	48	0.0029	1260.00	67.46	25.10	5.93	4.16	101.50	93.67	89.78	7.83	0.0030	94.11	90.39	92.00
	MH - 19	MH - 20	6.4	6.4	15.	9.23	30	0.0029	700.00	19.00	9.23	1.95	4.11	105.50	96.04	95.10	9.46	0.0016	96.29	95.16	94.80
							N/A	0.0042	720.00	N/A	0.00	0.01	0.00	105.50	96.04	95.10	N/A	0.0016	96.29	95.16	105.50
	MH - 20	MH - 18	19.4	25.8	19.08	33.37	36	0.0038	800.00	35.40	33.37	7.18	2.29	101.70	94.59	91.17	7.11	0.0039	95.16	92.06	92.30
							N/A	0.0044	800.00	N/A	0.00	1.97	0.00	101.70	94.59	91.17	N/A	0.0039	95.16	92.06	102.50
	MH - 21	MH - 22	11.1	11.1	15.	14.73	30	0.0039	800.00	22.13	14.73	4.53	2.32	107.80	95.29	92.47	12.51	0.0038	95.86	92.83	94.00
							N/A	0.0056	800.00	N/A	0.00	0.00	0.00	107.80	95.29	92.47	N/A	0.0038	95.86	92.83	104.50
	MH - 22	MH - 18	5.7	16.8	17.32	20.95	36	0.0017	650.00	23.78	20.95	6.07	2.63	99.70	92.53	90.77	7.17	0.0021	92.80	91.41	90.40
							N/A	0.0015	650.00	N/A	0.00	1.04	0.00	99.70	92.53	90.77	N/A	0.0021	92.80	91.41	100.00
	MH - 18	MH - 23	23.7	94.3	31.14	73.67	72	0.0016	620.00	147.41	73.67	4.90	2.04	98.20	89.45	88.55	8.75	0.0015	89.90	88.96	86.40
							N/A	0.0032	620.00	N/A	0.00	0.53	0.00	98.20	89.45	88.55	N/A	0.0015	89.90	88.96	99.00
	MH - 24	MH - 25	7.	7.	15.	9.59	30	0.0020	410.00	15.70	9.59	5.02	1.94	98.30	91.29	90.13	7.01	0.0023	91.49	90.57	89.90
							N/A	0.0024	410.00	N/A	0.00	0.99	0.00	98.30	91.29	90.13	N/A	0.0023	91.49	90.57	97.50
	MH - 25	MH - 23	5.5	12.5	16.94	15.87	36	0.0026	470.00	29.21	15.87	5.55	1.82	96.40	90.16	88.67	6.24	0.0027	90.47	89.20	88.60
							N/A	0.0021	470.00	N/A	0.00	1.00	0.00	96.40	90.16	88.67	N/A	0.0027	90.47	89.20	97.50
	MH - 23	MH - 26	10.6	117.4	33.18	85.	72	0.0027	270.00	189.54	85.00	5.79	0.73	95.50	88.25	87.77	7.25	0.0023	88.96	88.35	85.40
							N/A	0.0037	270.00	N/A	0.00	0.04	0.00	95.50	88.25	87.77	N/A	0.0023	88.96	88.35	97.00
	MH - 27	MH - 26	4.3	4.3	15.	5.58	24	0.0078	450.00	17.29	5.58	3.30	1.50	97.40	92.03	88.76	5.37	0.0076	92.38	88.95	91.20
							N/A	0.0033	450.00	N/A	0.00	0.00	0.00	97.40	92.03	88.76	N/A	0.0076	92.38	88.95	97.50
	MH - 26	MH - 28	2.6	124.3	33.9	87.59	72	0.0023	860.00	177.00	87.59	5.43	2.39	95.00	87.69	86.01	7.31	0.0021	88.35	86.52	84.68
							N/A	0.0046	870.00	N/A	0.00	0.67	0.00	95.00	87.69	86.01	N/A	0.0021	88.35	86.52	96.00
	MH - 29	MH - 30	11.9	11.9	18.	14.05	30	0.0069	290.00	29.52	14.05	5.94	0.79	96.80	90.26	88.21	6.54	0.0069	90.81	88.82	89.00
							N/A	0.0138	290.00	N/A	0.00	0.87	0.00	96.80	90.26	88.21	N/A	0.0069	90.81	88.82	97.00
	MH - 30	MH - 28	3.7	15.6	18.79	17.9	36	0.0043	490.00	37.84	17.90	3.88	1.61	93.50	87.85	86.26	5.65	0.0039	88.43	86.52	86.50
							N/A	0.0020	490.00	N/A	0.00	1.58	0.00	93.50	87.85	86.26	N/A	0.0039	88.43	86.52	93.00
	MH - 28	MH - 31	15.9	155.8	36.3	99.99	72	0.0034	870.00	214.09	99.99	5.58	2.06	92.80	85.58	83.35	7.22	0.0030	86.52	83.89	82.68
							N/A	0.0034	870.00	N/A	0.00	2.31	0.00	92.80	85.58	83.35	N/A	0.0030	86.52	83.89	92.00
	MH - 32	MH - 33	7.	7.	15.	8.99	24	0.0023	260.00	9.42	8.99	2.86	1.51	94.40	88.72	88.17	5.68	0.0021	88.86	88.31	86.50
							N/A	0.0077	260.00	N/A	0.00	0.94	0.00	94.40	88.72	88.17	N/A	0.0021	88.86	88.31	94.50
	MH - 33	MH - 34	5.	12.	16.51	14.57	30	0.0013	690.00	12.84	14.57	2.97	3.87	92.40	88.16	87.00	4.24	0.0017	88.31	87.15	85.40
							N/A	0.0036	690.00	N/A	0.00	1.56	0.00	92.40	88.16	87.00	N/A	0.0017	88.31	87.15	92.50
	MH - 34	MH - 31	14.7	26.7	20.39	28.82	36	0.0045	560.00	38.62	28.82	6.78	1.54	90.80	85.93	83.24	4.87	0.0045	86.55	84.03	84.00
							N/A	0.0018	560.00	N/A	0.00	1.56	0.00	90.80	85.93	83.24	N/A	0.0045	86.55	84.03	90.00

	Up Node Name	Down Node Name	Trib. Area at Up Node (acre)	Cumul. Area (acre)	Total Computed Time of Concentration Up Node (min.)	Total Flow at Convey (cfs)	Convey Size (in or ft)	Average Slope (ft/ft)	Total Length (feet)	Full Flow Capacity of Conduit (cfs)	Computed Flow at Convey (cfs)	Exit Velocity (fps)	Travel Time at Convey (min.)	Rim/Grate at Up Node (feet)	Up HGL (feet)	Down HGL (feet)	Up (RIM-HGL) (feet)	Energy Slope (ft/ft)	Up EGL (feet)	Down EGL (feet)	Up Invert (feet)
	MH - 31	MH - 35	14.6	197.1	38.36	116.25	72	0.0050	390.00	258.87	116.25	6.57	0.75	89.40	82.63	81.38	6.77	0.0045	83.89	82.12	79.72
							N/A	0.0026	390.00	N/A	0.00	1.56	0.00	89.40	82.63	81.38	N/A	0.0045	83.89	82.12	89.00
	MH - 35	WEST CH 1	13.6	210.7	39.31	119.98	72	0.0031	90.00	204.72	119.98	6.75	0.22	87.70	81.26	81.11	6.44	0.0025	82.12	81.89	77.78
							N/A	0.0022	90.00	N/A	0.00	1.56	0.00	87.70	81.26	81.11	N/A	0.0025	82.12	81.89	88.00
	MH - 36	MH - 37	5.2	5.2	15.	6.38	30	0.0014	370.00	13.07	6.38	1.57	3.54	86.70	83.09	82.93	3.61	0.0005	83.15	82.97	81.50
							N/A	0.0027	370.00	N/A	0.00	2.98	0.00	86.70	83.09	82.93	N/A	0.0005	83.15	82.97	88.00
	MH - 37	MH - 38	3.8	9.	18.47	9.98	30	0.0017	590.00	14.63	9.98	3.71	2.94	87.10	82.79	81.65	4.31	0.0018	82.97	81.88	81.30
							N/A	0.0017	590.00	N/A	0.00	0.84	0.00	87.10	82.79	81.65	N/A	0.0018	82.97	81.88	87.00
	MH - 38	MH - 39	8.	17.	21.45	17.21	36	0.0020	460.00	25.57	17.21	3.55	2.05	85.00	81.63	80.85	3.37	0.0018	81.88	81.06	79.80
							N/A	0.0043	460.00	N/A	0.00	1.56	0.00	85.00	81.63	80.85	N/A	0.0018	81.88	81.06	86.00
	MH - 39	WEST CH 3	7.2	24.2	23.94	21.9	36	0.0100	30.00	57.81	21.90	7.26	0.05	83.10	80.41	79.93	2.69	0.0075	81.06	80.83	78.90
							20	0.0167	30.00	N/A	0.00	0.00	0.00	83.10	80.41	79.93	N/A	0.0075	81.06	80.83	84.00
	MH - 40	MH - 41	4.6	4.6	15.	5.85	24	0.0022	360.00	9.24	5.85	1.86	3.22	86.60	81.20	80.88	5.40	0.0009	81.26	80.94	79.00
							N/A	0.0083	360.00	N/A	0.00	0.00	0.00	86.60	81.20	80.88	N/A	0.0009	81.26	80.94	84.00
	MH - 41	EAST CH 4	11.6	16.2	18.22	18.17	24	0.0058	60.00	14.97	18.17	5.78	0.17	83.00	80.36	79.85	2.64	0.0086	80.94	80.43	78.20
							30	0.0083	60.00	N/A	0.00	0.34	0.00	83.00	80.36	79.85	N/A	0.0086	80.94	80.43	81.00
	EAST CH 2	EAST CH 3	0.	107.2	27.65	91.48	6	0.0011	1400.00	N/A	91.48	1.45	19.24	N/A	82.29	80.09	N/A	0.0016	82.31	80.12	78.00
	EAST CH 3	EAST CH 4	1.4	108.6	32.65	78.08	6	0.0012	250.00	N/A	78.08	1.35	3.26	N/A	80.10	79.60	N/A	0.0020	80.12	79.63	76.40
	EAST CH 4	NW CH 5	0.	124.8	36.98	77.15	6	0.0018	300.00	N/A	77.15	1.43	3.67	N/A	79.61	78.91	N/A	0.0023	79.63	78.94	76.10
	WEST CH 1	WEST CH 2	29.9	240.6	78.59	54.73	6	0.0013	300.00	N/A	54.73	1.04	4.82	N/A	81.11	80.70	N/A	0.0014	81.12	80.72	77.80
	WEST CH 2	WEST CH 3	0.	240.6	82.31	50.94	6	0.0012	600.00	N/A	50.94	0.97	10.34	N/A	80.70	80.01	N/A	0.0012	80.72	80.02	77.40
	WEST CH 3	WEST CH 4	0.	264.8	87.31	49.86	6	0.0013	350.00	N/A	49.86	0.92	6.25	N/A	80.01	79.62	N/A	0.0011	80.02	79.63	76.70
	WEST CH 4	NW CH 4	3.3	268.1	92.12	45.91	6	0.0010	180.00	N/A	45.91	0.84	3.56	N/A	79.62	79.45	N/A	0.0010	79.63	79.46	76.25
	NW CH 4	NW CH 5	0.	375.6	94.84	57.01	8	0.0012	450.00	N/A	57.01	0.93	8.05	N/A	79.44	78.93	N/A	0.0011	79.46	78.94	76.07
	NW CH 5	Creek	0.	500.4	99.84	73.02	10	0.0006	500.00	N/A	73.02	1.47	6.97	N/A	78.92	77.96	N/A	0.0019	78.94	78.00	75.55
	NW-1	NW-1B	10.6	40.7	50.15	15.38	36	0.0024	710.00	28.29	15.38	3.97	2.93	94.30	90.09	88.41	4.21	0.0024	90.37	88.69	88.50
							N/A	0.0014	710.00	N/A	0.00	10.79	0.00	94.30	90.09	88.41	N/A	0.0024	90.37	88.69	94.50
	NW-1B	NW-2	5.9	46.6	53.06	16.4	36	0.0031	590.00	31.93	16.40	4.11	2.20	93.50	88.33	86.65	5.17	0.0030	88.68	86.94	86.80
							N/A	0.0042	590.00	N/A	0.00	0.27	0.00	93.50	92.22	91.50	N/A	0.0012	92.33	91.61	93.50
	NW-2	NW-3	7.7	54.3	55.26	18.09	36	0.0057	510.00	43.59	18.09	4.13	1.43	90.60	86.36	83.88	4.24	0.0054	86.94	84.18	85.00
							N/A	0.0069	510.00	N/A	0.00	0.11	0.00	90.60	86.36	83.88	N/A	0.0054	86.94	84.18	91.00
	NW-3	NW CH-1	9.6	63.9	56.69	20.39	36	0.0126	220.00	64.98	20.39	3.33	0.47	88.00	83.55	81.75	4.45	0.0102	84.18	81.94	82.10
							30	0.0023	220.00	N/A	0.00	2.67	0.00	88.00	83.55	81.75	N/A	0.0102	84.18	81.94	87.50
	NW-4	NW-5	12.4	12.4	16.	15.55	30	0.0031	490.00	19.67	15.55	3.17	2.51	89.80	87.60	86.76	2.20	0.0018	87.81	86.93	85.50
							N/A	0.0061	490.00	N/A	0.00	0.02	0.00	89.80	87.60	86.76	N/A	0.0018	87.81	86.93	91.00
	NW-5	NW-6	4.2	16.6	18.51	19.01	30	0.0038	260.00	22.05	19.01	3.87	1.12	87.80	86.67	85.92	1.13	0.0029	86.93	86.18	84.00
							N/A	0.0058	260.00	N/A	0.00	0.46	0.00	87.80	86.67	85.92	N/A	0.0029	86.93	86.18	88.00
	NW-7	NW-6	7.5	7.5	15.	9.59	24	0.0061	490.00	15.34	9.59	3.05	1.82	91.90	88.15	86.02	3.75	0.0049	88.60	86.18	87.00
							N/A	0.0112	490.00	N/A	0.00	0.00	0.00	91.90	88.15	86.02	N/A	0.0049	88.60	86.18	92.00
	NW-6	NW CH-2	7.7	31.8	19.63	34.87	30	0.0170	250.00	46.29	34.87	10.36	0.40	87.10	85.00	80.38	2.10	0.0158	86.18	82.23	83.00
							20	0.0020	250.00	N/A	0.00	1.56	0.00	87.10	85.00	80.38	N/A	0.0158	86.18	82.23	87.10
	NW-8	NW-10	3.3	3.3	15.	4.19	24	0.0037	270.00	11.93	4.19	1.34	2.64	87.20	82.07	81.98	5.13	0.0006	82.17	82.01	81.00
							N/A	0.0037	270.00	N/A	0.00	0.00	0.00	87.20	82.07	81.98	N/A	0.0006	82.17	82.01	86.00
	NW-9	NW-10	3.4	3.4	15.	4.32	24	0.0106	470.00	20.22	4.32	1.38	1.92	91.40	85.73	81.97	5.67	0.0086	86.03	82.01	85.00
							N/A	0.0106	470.00	N/A	0.00	0.00	0.00	91.40	85.73	81.97	N/A	0.0086	86.03	82.01	90.00
	NW-10	NW CH-3	5.1	11.8	16.9	13.91	24	0.0099	210.00	19.51	13.91	4.43	0.62	85.90	81.34	80.28	4.56	0.0066	82.00	80.62	80.00
							20	0.0024	210.00	N/A	0.00	1.19	0.00	85.90	81.34	80.28	N/A	0.0066	82.00	80.62	85.00
	NW CH-1	NW CH-2	0.	63.9	57.11	20.17	6	0.0009	560.00	N/A	20.17	0.56	15.75	N/A	81.75	81.40	N/A	0.0006	81.75	81.41	79.30
	NW CH-2	NW CH-3	0.	95.7	62.11	26.63	6	0.0010	840.00	N/A	26.63	0.74	18.92	N/A	81.40	80.60	N/A	0.0009	81.41	80.61	78.80
	NW CH-3	NW CH 4	0.	107.5	67.11	26.24	6	0.0010	1850.00	N/A	26.24	0.48	50.10	N/A	80.61	79.45	N/A	0.0006	80.62	79.46	78.00
	SE 1	SE 2	17.9	17.9	15.	23.52	30	0.0053	450.00	25.96	23.52	5.75	1.10	101.10	98.05	95.94	3.05	0.0052	98.86	96.51	96.40
							N/A	0.0056	450.00	N/A	0.00	1.56	0.00	101.10	98.05	95.94	N/A	0.0052	98.86	96.51	101.00
	SE 2	SE 3	7.9	25.8	16.1	32.98	36	0.0038	370.00	35.56	32.98	6.21	1.05	98.60	95.75	94.21	2.85	0.0039	96.33	94.87	93.50
							N/A	0.0027	370.00	N/A	0.00	1.31	0.00	98.60	93.29	91.87	N/A	0.0038	93.75	92.33	98.50

	Up Node Name	Down Node Name	Trib. Area at Up Node (acre)	Cumul. Area (acre)	Total Computed Time of Concentration Up Node (min.)	Total Flow at Convey (cfs)	Convey Size (in or ft)	Average Slope (ft/ft)	Total Length (feet)	Full Flow Capacity of Conduit (cfs)	Computed Flow at Convey (cfs)	Exit Velocity (fps)	Travel Time at Convey (min.)	Rim/Grate at Up Node (feet)	Up HGL (feet)	Down HGL (feet)	Up (RIM-HGL) (feet)	Energy Slope (ft/ft)	Up EGL (feet)	Down EGL (feet)	Up Invert (feet)
	SE 3	SE 4	4.2	30.	17.16	36.8	42	0.0021	580.00	39.66	36.80	6.98	1.91	97.20	94.20	92.28	3.00	0.0025	94.60	93.12	91.60
							N/A	0.0043	580.00	N/A	0.00	6.54	0.00	97.20	93.29	91.87	N/A	0.0024	93.75	92.33	97.50
	SE 4	SE 5	8.1	38.1	19.09	44.03	54	0.0014	320.00	63.91	44.03	4.24	1.26	94.10	92.20	91.75	1.90	0.0014	92.51	92.06	89.40
							N/A	0.0031	320.00	N/A	0.00	2.33	0.00	94.10	93.29	91.87	N/A	0.0044	93.75	92.33	95.00
	SE 5	SE 6	10.9	49.	20.32	55.94	54	0.0069	270.00	141.07	55.94	4.71	0.58	93.80	91.12	90.24	2.68	0.0053	92.05	90.63	88.95
							N/A	0.0074	270.00	N/A	0.00	1.02	0.00	93.80	93.29	91.87	N/A	0.0052	93.75	92.33	94.00
	SE 6	SE Outlet	13.6	62.6	20.88	69.87	54	0.0043	70.00	111.57	69.87	7.94	0.16	92.50	89.68	89.24	2.82	0.0043	90.63	90.32	87.10
							20	0.0043	70.00	N/A	0.00	1.05	0.00	92.50	93.29	91.87	N/A	0.0202	93.75	92.33	92.50
	NW-1C	NW-1	8.5	30.1	46.45	12.6	30	0.0011	570.00	11.53	12.60	2.57	3.70	96.40	92.22	91.50	4.18	0.0013	92.33	91.61	89.60
							N/A	0.0037	570.00	N/A	0.00	0.00	0.00	96.40	92.22	91.50	N/A	0.0013	92.33	91.61	96.40
	NW-1A	NW-1C	21.6	21.6	46.	9.16	18	0.0029	140.00	4.87	9.16	5.18	0.45	N/A	93.29	91.87	N/A	0.0101	93.75	92.33	90.00

CS DRAINAGE STUDIO

Combined Hydraulics & Hydrology for Unit Peak Discharge Methods Software Package

A Civil Solutions Product

OUTPUT RESULTS FOR FILE	K:\SAC_LDEV\097679001 Amoruso Ranch\06 Reports\Drainage\CSDS\2015-10\Amoruso 25yr v10 10_27_2015_rev
PROJECT DESCRIPTION	
PRINTED ON DATE	10-28-2015
PRINTED BY USER	

This Printout Report Contains :

1) Jurisdiction File Information (hydrology basis)
2) Contributing Areas Information
3) Cumulative Areas Information
4) Node Connection Outline Information
5) Conveyance Description Information
6) Conveyance Profiles Information
7) Node Results Summary
8) Convey Results Summary

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CONVERGENCE CONTROL VARIABLES :

This software requires the use of several control variables to force the system of calculations to be convergent. These need to be adjusted for each system, to meet jur. requirements, and to provide accurate results. The variables used in this analysis are described below.

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DESCRIPTION:	Variable Value	Unit
Horizontal Length Increment used for Backwater Calculations	20	Feet
Computational Time Interval for Hydrograph Calculations	5	Min.
Backwater Calculations Depth Tolerance	.002	Feet
Backwater Calculations Distance Tolerance	.01	Feet
Tolerance for Flow based Calculations	.005	cfs
Tolerance for Froud based Calculations	.005	
Maximum Travel Time Allowed Between Two Connected Nodes (Tt)	5	Min.
Minimum Flow Percentage in Parallel Conveyances to Contribute to Tt	35	%
Maximum Number of Iterations Allowed at any Iterative Calculation	200	
Convergence Tr Test Tolerance	0.05	min.
Flow Diversion Calculations were DISABLED for this calculation.		

RESPONSE time Solved By : Tr at merge nodes solved by largest Contributing Area

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Jurisdiction File Information:
(used for hydrology basis)

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Description:	Variable Value
Computer Model Analysis Type	ROSEVILL
Jurisdiction Name	Roseville - Peak 25 Yr. Storm
Jurisdiction Title	ROSEV25
Jurisdiction Description	Based on Unit Peak Discharge Method - Based on Section 10 Roseville Improvement Standards.
Jurisdiction Date	July 22, 1997
Jurisdiction Location	City of Roseville
Jurisdiction State	California
Jurisdiction File Created By	Civil Solutions

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FLOW CALCULATION PARAMETERS AS FOLLOWS:

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DESCRIPTION	UNIT	Return Period	% Impervious	Perv. Infiltration (in/hr)
Highways & Parking :	Acre	25	95	.06
Commercial Offices :	Acre	25	90	.18
Intensive Industrial :	Acre	25	85	.18
Apartments HDR :	Acre	25	80	.18
Mobile Home Park :	Acre	25	75	.25
Condominiums, MDR :	Acre	25	70	.25
Residential: 8-10 du/acre, Ext Indust :	Acre	25	60	.18
Residential: 6-8 du/acre, LDR, School :	Acre	25	50	.25
Residential: 4-6 du/acre :	Acre	25	40	.25
Residential 3-4 du/acre :	Acre	25	30	.25
Residential: 2-3 du/acre :	Acre	25	25	.25
Residential: 1-2 du/acre :	Acre	25	20	.25
Residential: 0.5-1 du/acre :	Acre	25	15	.25
Residential: 0.2-0.5 du/acre, Ag. Res :	Acre	25	10	.25
Residential: <0.2 du/acre, Recreation :	Acre	25	5	.25
Open Space, Grassland, Ag. :	Acre	25	2	.2
Open Space, Woodland, Natural :	Acre	25	1	.2
Dense Oak, Shrubs, Vines :	acre	25	1	.25

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Node Contributing Areas Information:
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#	Node Name	Total Trib. Area		Trib. Area	Contrib. Area by type
1	MH - 3	7.		5.9	Condominiums, MDR :
				1.1	Highways & Parking :
2	MH - 4	8.6		5.9	Apartments HDR :
				1.5	Commercial Offices :
				1.2	Highways & Parking :
3	MH - 5	3.4		1.6	Apartments HDR :
				0.9	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				0.7	Highways & Parking :
4	MH - 6	23.1		14.	Commercial Offices :
				3.4	Residential: 6-8 du/acre, LDR, School :
				3.7	Open Space, Woodland, Natural :
				2.	Highways & Parking :
5	MH - 7	6.		2.3	Residential: 6-8 du/acre, LDR, School :
				2.9	Condominiums, MDR :
				0.2	Dense Oak, Shrubs, Vines :
				0.6	Highways & Parking :
6	MH - 8	6.4		5.5	Residential: 6-8 du/acre, LDR, School :
				0.5	Dense Oak, Shrubs, Vines :
				0.4	Highways & Parking :
7	MH - 9	6.3		4.8	Residential: 6-8 du/acre, LDR, School :
				0.6	Dense Oak, Shrubs, Vines :
				0.9	Highways & Parking :
8	MH - 10	4.9		4.1	Residential: 6-8 du/acre, LDR, School :
				0.5	Dense Oak, Shrubs, Vines :
				0.3	Highways & Parking :
9	MH - 11	9.3		8.5	Commercial Offices :
				0.8	Highways & Parking :
10	MH - 12	8.8		3.3	Commercial Offices :
				2.6	Residential: 6-8 du/acre, LDR, School :
				2.	Highways & Parking :
				0.9	Dense Oak, Shrubs, Vines :
11	MH - 13	12.		7.2	Residential: 6-8 du/acre, LDR, School :
				2.4	Condominiums, MDR :
				1.1	Dense Oak, Shrubs, Vines :
				1.3	Highways & Parking :
12	MH - 14	5.		4.4	Residential: 6-8 du/acre, LDR, School :
				0.1	Dense Oak, Shrubs, Vines :
				0.5	Highways & Parking :
13	MH - 15	6.4		0.1	Highways & Parking :
				1.	Dense Oak, Shrubs, Vines :
				5.3	Residential: 6-8 du/acre, LDR, School :
14	MH - 16	28.		6.8	Commercial Offices :
				9.6	Apartments HDR :
				11.6	Residential: 6-8 du/acre, LDR, School :
16	MH - 18	23.7		9.3	Apartments HDR :
				10.1	Open Space, Woodland, Natural :
				4.3	Highways & Parking :
17	MH - 19	6.4		5.6	Apartments HDR :
				0.4	Commercial Offices :
				0.4	Highways & Parking :
18	MH - 20	19.4		16.7	Commercial Offices :
				0.1	Apartments HDR :
				2.6	Highways & Parking :
19	MH - 21	11.1		1.8	Condominiums, MDR :
				7.8	Residential: 6-8 du/acre, LDR, School :
				1.5	Highways & Parking :
20	MH - 22	5.7		4.4	Condominiums, MDR :
				1.3	Highways & Parking :
21	MH - 23	10.6		9.2	Residential: 6-8 du/acre, LDR, School :
				1.4	Highways & Parking :
22	MH - 24	7.		7.	Condominiums, MDR :
23	MH - 25	5.5		3.7	Condominiums, MDR :
				1.8	Residential: 6-8 du/acre, LDR, School :
24	MH - 26	2.6		1.6	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Woodland, Natural :
				0.8	Highways & Parking :

25	MH - 27	4.3		3.1	Residential: 6-8 du/acre, LDR, School :
				0.6	Open Space, Woodland, Natural :
				0.6	Highways & Parking :
26	MH - 28	15.9		14.2	Residential: 6-8 du/acre, LDR, School :
				0.9	Open Space, Woodland, Natural :
				0.8	Highways & Parking :
27	MH - 29	11.9		9.6	Residential: 6-8 du/acre, LDR, School :
				0.5	Open Space, Woodland, Natural :
				1.8	Highways & Parking :
28	MH - 30	3.7		2.9	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
				0.4	Highways & Parking :
29	MH - 31	14.6		13.1	Residential: 6-8 du/acre, LDR, School :
				1.	Open Space, Woodland, Natural :
				0.5	Highways & Parking :
30	MH - 32	7.		5.1	Residential: 6-8 du/acre, LDR, School :
				1.2	Open Space, Woodland, Natural :
				0.7	Highways & Parking :
31	MH - 33	5.		5.	Residential: 6-8 du/acre, LDR, School :
32	MH - 34	14.7		14.7	Residential: 6-8 du/acre, LDR, School :
33	MH - 35	13.6		9.5	Residential: 6-8 du/acre, LDR, School :
				3.2	Open Space, Woodland, Natural :
				0.9	Highways & Parking :
34	MH - 36	5.2		2.	Residential: 6-8 du/acre, LDR, School :
				2.9	Open Space, Woodland, Natural :
				0.3	Highways & Parking :
35	MH - 37	3.8		3.1	Residential: 6-8 du/acre, LDR, School :
				0.3	Open Space, Woodland, Natural :
				0.4	Highways & Parking :
36	MH - 38	8.		6.4	Residential: 6-8 du/acre, LDR, School :
				0.8	Open Space, Woodland, Natural :
				0.8	Highways & Parking :
37	MH - 39	7.2		5.4	Residential: 6-8 du/acre, LDR, School :
				1.	Open Space, Woodland, Natural :
				0.8	Highways & Parking :
38	MH - 40	4.6		4.1	Residential: 6-8 du/acre, LDR, School :
				0.5	Open Space, Woodland, Natural :
39	MH - 41	11.6		8.9	Residential: 6-8 du/acre, LDR, School :
				2.7	Open Space, Woodland, Natural :
41	EAST CH 3	1.4		1.4	Residential: 6-8 du/acre, LDR, School :
43	WEST CH 1	29.9		10.	Open Space, Woodland, Natural :
				19.9	Residential: 6-8 du/acre, LDR, School :
46	WEST CH 4	3.3		3.3	Residential: 6-8 du/acre, LDR, School :
50	NW-1	10.6		10.6	Residential: 6-8 du/acre, LDR, School :
51	NW-1B	5.9		5.4	Residential: 6-8 du/acre, LDR, School :
				0.5	Highways & Parking :
52	NW-2	7.7		7.4	Residential: 6-8 du/acre, LDR, School :
				0.3	Highways & Parking :
53	NW-3	9.6		8.7	Residential: 6-8 du/acre, LDR, School :
				0.9	Open Space, Woodland, Natural :
54	NW-4	12.4		4.2	Residential: 6-8 du/acre, LDR, School :
				4.5	Open Space, Woodland, Natural :
				3.7	Highways & Parking :
55	NW-5	4.2		3.8	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
56	NW-6	7.7		6.8	Residential: 6-8 du/acre, LDR, School :
				0.9	Open Space, Woodland, Natural :
57	NW-7	7.5		7.1	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
58	NW-8	3.3		2.9	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
59	NW-9	3.4		3.	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
60	NW-10	5.1		4.	Residential: 6-8 du/acre, LDR, School :
				1.1	Open Space, Woodland, Natural :
64	SE 1	17.9		6.3	Condominiums, MDR :
				8.5	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
				1.1	Highways & Parking :
65	SE 2	7.9		6.2	Condominiums, MDR :
				1.1	Residential: 6-8 du/acre, LDR, School :
				0.6	Highways & Parking :
66	SE 3	4.2		4.2	Residential: 6-8 du/acre, LDR, School :

67	SE 4	8.1		5.5	Residential: 6-8 du/acre, LDR, School :
				1.3	Condominiums, MDR :
				1.3	Highways & Parking :
68	SE 5	10.9		6.	Apartments HDR :
				3.	Residential: 6-8 du/acre, LDR, School :
				1.9	Highways & Parking :
69	SE 6	13.6		8.2	Condominiums, MDR :
				3.5	Residential: 6-8 du/acre, LDR, School :
				1.9	Highways & Parking :
70	SE Outlet	0.		0.9	Highways & Parking :
				5.4	Open Space, Woodland, Natural :
71	NW-1A	21.6		21.6	Residential: 6-8 du/acre, LDR, School :
72	NW-1C	8.5		8.5	Residential: 6-8 du/acre, LDR, School :

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Node Cumulative Areas Information:

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#	Node Name	Total Cumulative Area		Cumulative Area by Type	Cumulative Area by type
1	MH - 3	7.		1.1	Highways & Parking :
				5.9	Condominiums, MDR :
2	MH - 4	15.6		2.3	Highways & Parking :
				1.5	Commercial Offices :
				5.9	Apartments HDR :
				5.9	Condominiums, MDR :
3	MH - 5	19.		3.	Highways & Parking :
				1.5	Commercial Offices :
				7.5	Apartments HDR :
				5.9	Condominiums, MDR :
				0.9	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
4	MH - 6	42.1		5.	Highways & Parking :
				15.5	Commercial Offices :
				7.5	Apartments HDR :
				5.9	Condominiums, MDR :
				4.3	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
5	MH - 7	54.5		6.	Highways & Parking :
				15.5	Commercial Offices :
				7.5	Apartments HDR :
				8.8	Condominiums, MDR :
				12.1	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				0.7	Dense Oak, Shrubs, Vines :
6	MH - 8	6.4		0.4	Highways & Parking :
				5.5	Residential: 6-8 du/acre, LDR, School :
				0.5	Dense Oak, Shrubs, Vines :
7	MH - 9	60.8		6.9	Highways & Parking :
				15.5	Commercial Offices :
				7.5	Apartments HDR :
				8.8	Condominiums, MDR :
				16.9	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				1.3	Dense Oak, Shrubs, Vines :
8	MH - 10	95.8		11.3	Highways & Parking :
				27.3	Commercial Offices :
				7.5	Apartments HDR :
				11.2	Condominiums, MDR :
				30.8	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				3.8	Dense Oak, Shrubs, Vines :
9	MH - 11	9.3		0.8	Highways & Parking :
				8.5	Commercial Offices :
10	MH - 12	18.1		2.8	Highways & Parking :
				11.8	Commercial Offices :
				2.6	Residential: 6-8 du/acre, LDR, School :
				0.9	Dense Oak, Shrubs, Vines :
11	MH - 13	30.1		4.1	Highways & Parking :
				11.8	Commercial Offices :
				2.4	Condominiums, MDR :
				9.8	Residential: 6-8 du/acre, LDR, School :
				2.	Dense Oak, Shrubs, Vines :
12	MH - 14	100.8		11.8	Highways & Parking :
				27.3	Commercial Offices :
				7.5	Apartments HDR :
				11.2	Condominiums, MDR :
				35.2	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				3.9	Dense Oak, Shrubs, Vines :
13	MH - 15	107.2		11.9	Highways & Parking :

				27.3	Commercial Offices :
				7.5	Apartments HDR :
				11.2	Condominiums, MDR :
				40.5	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				4.9	Dense Oak, Shrubs, Vines :
14	MH - 16	28.		6.8	Commercial Offices :
				9.6	Apartments HDR :
				11.6	Residential: 6-8 du/acre, LDR, School :
15	MH - 17	28.		6.8	Commercial Offices :
				9.6	Apartments HDR :
				11.6	Residential: 6-8 du/acre, LDR, School :
16	MH - 18	94.3		10.1	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				6.2	Condominiums, MDR :
				19.4	Residential: 6-8 du/acre, LDR, School :
				10.1	Open Space, Woodland, Natural :
17	MH - 19	6.4		0.4	Highways & Parking :
				0.4	Commercial Offices :
				5.6	Apartments HDR :
18	MH - 20	25.8		3.	Highways & Parking :
				17.1	Commercial Offices :
				5.7	Apartments HDR :
19	MH - 21	11.1		1.5	Highways & Parking :
				1.8	Condominiums, MDR :
				7.8	Residential: 6-8 du/acre, LDR, School :
20	MH - 22	16.8		2.8	Highways & Parking :
				6.2	Condominiums, MDR :
				7.8	Residential: 6-8 du/acre, LDR, School :
21	MH - 23	117.4		11.5	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				30.4	Residential: 6-8 du/acre, LDR, School :
				10.1	Open Space, Woodland, Natural :
22	MH - 24	7.		7.	Condominiums, MDR :
23	MH - 25	12.5		10.7	Condominiums, MDR :
				1.8	Residential: 6-8 du/acre, LDR, School :
24	MH - 26	124.3		12.9	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				35.1	Residential: 6-8 du/acre, LDR, School :
				10.9	Open Space, Woodland, Natural :
25	MH - 27	4.3		0.6	Highways & Parking :
				3.1	Residential: 6-8 du/acre, LDR, School :
				0.6	Open Space, Woodland, Natural :
26	MH - 28	155.8		15.9	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				61.8	Residential: 6-8 du/acre, LDR, School :
				12.7	Open Space, Woodland, Natural :
27	MH - 29	11.9		1.8	Highways & Parking :
				9.6	Residential: 6-8 du/acre, LDR, School :
				0.5	Open Space, Woodland, Natural :
28	MH - 30	15.6		2.2	Highways & Parking :
				12.5	Residential: 6-8 du/acre, LDR, School :
				0.9	Open Space, Woodland, Natural :
29	MH - 31	197.1		17.1	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				99.7	Residential: 6-8 du/acre, LDR, School :
				14.9	Open Space, Woodland, Natural :
30	MH - 32	7.		0.7	Highways & Parking :
				5.1	Residential: 6-8 du/acre, LDR, School :
				1.2	Open Space, Woodland, Natural :
31	MH - 33	12.		0.7	Highways & Parking :
				10.1	Residential: 6-8 du/acre, LDR, School :
				1.2	Open Space, Woodland, Natural :

32	MH - 34	26.7		0.7	Highways & Parking :
				24.8	Residential: 6-8 du/acre, LDR, School :
				1.2	Open Space, Woodland, Natural :
33	MH - 35	210.7		18.	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				109.2	Residential: 6-8 du/acre, LDR, School :
				18.1	Open Space, Woodland, Natural :
34	MH - 36	5.2		0.3	Highways & Parking :
				2.	Residential: 6-8 du/acre, LDR, School :
				2.9	Open Space, Woodland, Natural :
35	MH - 37	9.		0.7	Highways & Parking :
				5.1	Residential: 6-8 du/acre, LDR, School :
				3.2	Open Space, Woodland, Natural :
36	MH - 38	17.		1.5	Highways & Parking :
				11.5	Residential: 6-8 du/acre, LDR, School :
				4.	Open Space, Woodland, Natural :
37	MH - 39	24.2		2.3	Highways & Parking :
				16.9	Residential: 6-8 du/acre, LDR, School :
				5.	Open Space, Woodland, Natural :
38	MH - 40	4.6		4.1	Residential: 6-8 du/acre, LDR, School :
				0.5	Open Space, Woodland, Natural :
39	MH - 41	16.2		13.	Residential: 6-8 du/acre, LDR, School :
				3.2	Open Space, Woodland, Natural :
40	EAST CH 2	107.2		11.9	Highways & Parking :
				27.3	Commercial Offices :
				7.5	Apartments HDR :
				11.2	Condominiums, MDR :
				40.5	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				4.9	Dense Oak, Shrubs, Vines :
41	EAST CH 3	108.6		11.9	Highways & Parking :
				27.3	Commercial Offices :
				7.5	Apartments HDR :
				11.2	Condominiums, MDR :
				41.9	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				4.9	Dense Oak, Shrubs, Vines :
42	EAST CH 4	124.8		11.9	Highways & Parking :
				27.3	Commercial Offices :
				7.5	Apartments HDR :
				11.2	Condominiums, MDR :
				54.9	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				6.9	Open Space, Woodland, Natural :
				4.9	Dense Oak, Shrubs, Vines :
43	WEST CH 1	240.6		18.	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				129.1	Residential: 6-8 du/acre, LDR, School :
				28.1	Open Space, Woodland, Natural :
44	WEST CH 2	240.6		18.	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				129.1	Residential: 6-8 du/acre, LDR, School :
				28.1	Open Space, Woodland, Natural :
45	WEST CH 3	264.8		20.3	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				146.	Residential: 6-8 du/acre, LDR, School :
				33.1	Open Space, Woodland, Natural :
46	WEST CH 4	268.1		20.3	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				149.3	Residential: 6-8 du/acre, LDR, School :
				33.1	Open Space, Woodland, Natural :

47	NW CH 4	375.6		24.8	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				243.3	Residential: 6-8 du/acre, LDR, School :
				42.1	Open Space, Woodland, Natural :
48	NW CH 5	500.4		36.7	Highways & Parking :
				51.2	Commercial Offices :
				32.1	Apartments HDR :
				28.1	Condominiums, MDR :
				298.2	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				49.	Open Space, Woodland, Natural :
				4.9	Dense Oak, Shrubs, Vines :
49	Creek	500.4		36.7	Highways & Parking :
				51.2	Commercial Offices :
				32.1	Apartments HDR :
				28.1	Condominiums, MDR :
				298.2	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				49.	Open Space, Woodland, Natural :
				4.9	Dense Oak, Shrubs, Vines :
50	NW-1	40.7		40.7	Residential: 6-8 du/acre, LDR, School :
51	NW-1B	46.6		0.5	Highways & Parking :
				46.1	Residential: 6-8 du/acre, LDR, School :
52	NW-2	54.3		0.8	Highways & Parking :
				53.5	Residential: 6-8 du/acre, LDR, School :
53	NW-3	63.9		0.8	Highways & Parking :
				62.2	Residential: 6-8 du/acre, LDR, School :
				0.9	Open Space, Woodland, Natural :
54	NW-4	12.4		3.7	Highways & Parking :
				4.2	Residential: 6-8 du/acre, LDR, School :
				4.5	Open Space, Woodland, Natural :
55	NW-5	16.6		3.7	Highways & Parking :
				8.	Residential: 6-8 du/acre, LDR, School :
				4.9	Open Space, Woodland, Natural :
56	NW-6	31.8		3.7	Highways & Parking :
				21.9	Residential: 6-8 du/acre, LDR, School :
				6.2	Open Space, Woodland, Natural :
57	NW-7	7.5		7.1	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
58	NW-8	3.3		2.9	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
59	NW-9	3.4		3.	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
60	NW-10	11.8		9.9	Residential: 6-8 du/acre, LDR, School :
				1.9	Open Space, Woodland, Natural :
61	NW CH-1	63.9		0.8	Highways & Parking :
				62.2	Residential: 6-8 du/acre, LDR, School :
				0.9	Open Space, Woodland, Natural :
62	NW CH-2	95.7		4.5	Highways & Parking :
				84.1	Residential: 6-8 du/acre, LDR, School :
				7.1	Open Space, Woodland, Natural :
63	NW CH-3	107.5		4.5	Highways & Parking :
				94.	Residential: 6-8 du/acre, LDR, School :
				9.	Open Space, Woodland, Natural :
64	SE 1	17.9		1.1	Highways & Parking :
				6.3	Condominiums, MDR :
				8.5	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
65	SE 2	25.8		1.7	Highways & Parking :
				12.5	Condominiums, MDR :
				9.6	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
66	SE 3	30.		1.7	Highways & Parking :
				12.5	Condominiums, MDR :
				13.8	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
67	SE 4	38.1		3.	Highways & Parking :
				13.8	Condominiums, MDR :
				19.3	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
68	SE 5	49.		4.9	Highways & Parking :

				6.	Apartments HDR :
				13.8	Condominiums, MDR :
				22.3	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
69	SE 6	62.6		6.8	Highways & Parking :
				6.	Apartments HDR :
				22.	Condominiums, MDR :
				25.8	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
70	SE Outlet	68.9		7.7	Highways & Parking :
				6.	Apartments HDR :
				22.	Condominiums, MDR :
				25.8	Residential: 6-8 du/acre, LDR, School :
				7.4	Open Space, Woodland, Natural :
71	NW-1A	21.6		21.6	Residential: 6-8 du/acre, LDR, School :
72	NW-1C	30.1		30.1	Residential: 6-8 du/acre, LDR, School :

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                                                  |<--MH - 3
                                              |<--MH - 4
                                          |<--MH - 5
                                      |<--MH - 6
                                      |<--MH - 8
                                  |<--MH - 7
                              |<--MH - 9
                              |       |<--MH - 11
                              |   |<--MH - 12
                              |<--MH - 13
                          |<--MH - 10
                      |<--MH - 14
                  |<--MH - 15
              |<--EAST CH 2
          |<--EAST CH 3
          |   |<--MH - 40
          |<--MH - 41
      |<--EAST CH 4
      |                                               |<--MH - 16
      |                                           |<--MH - 17
      |                                           |   |<--MH - 19
      |                                           |<--MH - 20
      |                                           |   |<--MH - 21
      |                                           |<--MH - 22
      |                                       |<--MH - 18
      |                                       |   |<--MH - 24
      |                                       |<--MH - 25
      |                                   |<--MH - 23
      |                                   |<--MH - 27
      |                               |<--MH - 26
      |                               |   |<--MH - 29
      |                               |<--MH - 30
      |                           |<--MH - 28
      |                           |       |<--MH - 32
      |                           |   |<--MH - 33
      |                           |<--MH - 34
      |                       |<--MH - 31
      |                   |<--MH - 35
      |               |<--WEST CH 1
      |           |<--WEST CH 2
      |           |           |<--MH - 36
      |           |       |<--MH - 37
      |           |   |<--MH - 38
      |           |<--MH - 39
      |       |<--WEST CH 3
      |   |<--WEST CH 4
      |   |               |<--NW-4
      |   |           |<--NW-5
      |   |           |<--NW-7
      |   |       |<--NW-6
      |   |       |                       |<--NW-1A
      |   |       |                   |<--NW-1C
      |   |       |               |<--NW-1
      |   |       |           |<--NW-1B
      |   |       |       |<--NW-2
      |   |       |   |<--NW-3
      |   |       |<--NW CH-1
      |   |   |<--NW CH-2
      |   |   |   |<--NW-8
      |   |   |   |<--NW-9
      |   |   |<--NW-10
      |   |<--NW CH-3
      |<--NW CH 4
  |<--NW CH 5
--Creek
                      |<--SE 1
                  |<--SE 2
              |<--SE 3
          |<--SE 4
      |<--SE 5
  |<--SE 6
--SE Outlet
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 Conveyance Description Information:
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 1      MH - 3 to MH - 4    MH - 3   MH - 4   PIPE       30  Inch   'n'= .015   'Z'= 2
P- 1    MH - 3 to MH - 4    MH - 3   MH - 4   Composite Open Channel
 2      MH - 4 to MH - 5    MH - 4   MH - 5   PIPE       30  Inch   'n'= .015   'Z'= 2
P- 2    MH - 4 to MH - 5    MH - 4   MH - 5   Composite Open Channel
 3      MH - 5 to MH - 6    MH - 5   MH - 6   PIPE       42  Inch   'n'= .015   'Z'= 2
P- 3    MH - 5 to MH - 6    MH - 5   MH - 6   Composite Open Channel
 4      MH - 6 to MH - 7    MH - 6   MH - 7   PIPE       48  Inch   'n'= .015   'Z'= 2
P- 4    MH - 6 to MH - 7    MH - 6   MH - 7   Composite Open Channel
 5      MH - 8 to MH - 7    MH - 8   MH - 7   PIPE       24  Inch   'n'= .015   'Z'= 2
P- 5    MH - 8 to MH - 7    MH - 8   MH - 7   Composite Open Channel
 6      MH - 7 to MH - 9    MH - 7   MH - 9   PIPE       48  Inch   'n'= .015   'Z'= 2
P- 6    MH - 7 to MH - 9    MH - 7   MH - 9   Composite Open Channel
 7      MH - 9 to MH - 10   MH - 9   MH - 10  PIPE       48  Inch   'n'= .015   'Z'= 2
P- 7    MH - 9 to MH - 10   MH - 9   MH - 10  Composite Open Channel
 8      MH - 11 to MH - 12  MH - 11  MH - 12  PIPE       36  Inch   'n'= .015   'Z'= 2
P- 8    MH - 11 to MH - 12  MH - 11  MH - 12  Composite Open Channel
 9      MH - 12 to MH - 13  MH - 12  MH - 13  PIPE       42  Inch   'n'= .015   'Z'= 2
P- 9    MH - 12 to MH - 13  MH - 12  MH - 13  Composite Open Channel
 10     MH - 13 to MH - 10  MH - 13  MH - 10  PIPE       42  Inch   'n'= .015   'Z'= 2
P- 10   MH - 13 to MH - 10  MH - 13  MH - 10  Composite Open Channel
 11     MH - 10 to MH - 14  MH - 10  MH - 14  PIPE       54  Inch   'n'= .015   'Z'= 2
P- 11   MH - 10 to MH - 14  MH - 10  MH - 14  Composite Open Channel
 12     MH - 14 to MH - 15  MH - 14  MH - 15  PIPE       54  Inch   'n'= .015   'Z'= 2
P- 12   MH - 14 to MH - 15  MH - 14  MH - 15  Composite Open Channel
 13     MH - 15 to EAST CH 2         MH - 15  EAST CH 2         PIPE       54  Inch   'n'= .015   'Z'= 2
P- 13   MH - 15 to EAST CH 2         MH - 15  EAST CH 2         RECTANGULAR     50  Ft.     'n'= .015   'Z'= 2
 14     MH - 16 to MH - 17  MH - 16  MH - 17  PIPE       48  Inch   'n'= .015   'Z'= 2
 15     MH - 17 to MH - 18  MH - 17  MH - 18  PIPE       48  Inch   'n'= .015   'Z'= 2
 16     MH - 19 to MH - 20  MH - 19  MH - 20  PIPE       30  Inch   'n'= .015   'Z'= 2
P- 16   MH - 19 to MH - 20  MH - 19  MH - 20  Composite Open Channel
 17     MH - 20 to MH - 18  MH - 20  MH - 18  PIPE       36  Inch   'n'= .015   'Z'= 2
P- 17   MH - 20 to MH - 18  MH - 20  MH - 18  Composite Open Channel
 18     MH - 21 to MH - 22  MH - 21  MH - 22  PIPE       30  Inch   'n'= .015   'Z'= 2
P- 18   MH - 21 to MH - 22  MH - 21  MH - 22  Composite Open Channel
 19     MH - 22 to MH - 18  MH - 22  MH - 18  PIPE       36  Inch   'n'= .015   'Z'= 2
P- 19   MH - 22 to MH - 18  MH - 22  MH - 18  Composite Open Channel
 20     MH - 18 to MH - 23  MH - 18  MH - 23  PIPE       72  Inch   'n'= .015   'Z'= 2
P- 20   MH - 18 to MH - 23  MH - 18  MH - 23  Composite Open Channel
 21     MH - 24 to MH - 25  MH - 24  MH - 25  PIPE       30  Inch   'n'= .015   'Z'= 2
P- 21   MH - 24 to MH - 25  MH - 24  MH - 25  Composite Open Channel
 22     MH - 25 to MH - 23  MH - 25  MH - 23  PIPE       36  Inch   'n'= .015   'Z'= 2
P- 22   MH - 25 to MH - 23  MH - 25  MH - 23  Composite Open Channel
 23     MH - 23 to MH - 26  MH - 23  MH - 26  PIPE       72  Inch   'n'= .015   'Z'= 2
P- 23   MH - 23 to MH - 26  MH - 23  MH - 26  Composite Open Channel
 24     MH - 27 to MH - 26  MH - 27  MH - 26  PIPE       24  Inch   'n'= .015   'Z'= 2
P- 24   MH - 27 to MH - 26  MH - 27  MH - 26  Composite Open Channel
 25     MH - 26 to MH - 28  MH - 26  MH - 28  PIPE       72  Inch   'n'= .015   'Z'= 2
P- 25   MH - 26 to MH - 28  MH - 26  MH - 28  Composite Open Channel
 26     MH - 29 to MH - 30  MH - 29  MH - 30  PIPE       30  Inch   'n'= .015   'Z'= 2
P- 26   MH - 29 to MH - 30  MH - 29  MH - 30  Composite Open Channel
 27     MH - 30 to MH - 28  MH - 30  MH - 28  PIPE       36  Inch   'n'= .015   'Z'= 2
P- 27   MH - 30 to MH - 28  MH - 30  MH - 28  Composite Open Channel
 28     MH - 28 to MH - 31  MH - 28  MH - 31  PIPE       72  Inch   'n'= .015   'Z'= 2
P- 28   MH - 28 to MH - 31  MH - 28  MH - 31  Composite Open Channel
 29     MH - 32 to MH - 33  MH - 32  MH - 33  PIPE       24  Inch   'n'= .015   'Z'= 2
P- 29   MH - 32 to MH - 33  MH - 32  MH - 33  Composite Open Channel
 30     MH - 33 to MH - 34  MH - 33  MH - 34  PIPE       30  Inch   'n'= .015   'Z'= 2
P- 30   MH - 33 to MH - 34  MH - 33  MH - 34  Composite Open Channel
 31     MH - 34 to MH - 31  MH - 34  MH - 31  PIPE       36  Inch   'n'= .015   'Z'= 2
P- 31   MH - 34 to MH - 31  MH - 34  MH - 31  Composite Open Channel
 32     MH - 31 to MH - 35  MH - 31  MH - 35  PIPE       72  Inch   'n'= .015   'Z'= 2
P- 32   MH - 31 to MH - 35  MH - 31  MH - 35  Composite Open Channel
 33     MH - 35 to WEST CH 1         MH - 35  WEST CH 1         PIPE       72  Inch   'n'= .015   'Z'= 2
P- 33   MH - 35 to WEST CH 1         MH - 35  WEST CH 1         Composite Open Channel
 34     MH - 36 to MH - 37  MH - 36  MH - 37  PIPE       30  Inch   'n'= .015   'Z'= 2
P- 34   MH - 36 to MH - 37  MH - 36  MH - 37  Composite Open Channel
 35     MH - 37 to MH - 38  MH - 37  MH - 38  PIPE       30  Inch   'n'= .015   'Z'= 2
P- 35   MH - 37 to MH - 38  MH - 37  MH - 38  Composite Open Channel
 36     MH - 38 to MH - 39  MH - 38  MH - 39  PIPE       36  Inch   'n'= .015   'Z'= 2
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P- 36   MH - 38 to MH - 39  MH - 38   MH - 39   Composite Open Channel
 37     MH - 39 to WEST CH 3          MH - 39   WEST CH 3          PIPE          36  Inch   'n'= .015   'Z'= 2
P- 37   MH - 39 to WEST CH 3          MH - 39   WEST CH 3          RECTANGULAR   20  Ft.    'n'= .015   'Z'= 2
 38     MH - 40 to MH - 41  MH - 40   MH - 41   PIPE      24  Inch   'n'= .015   'Z'= 2
P- 38   MH - 40 to MH - 41  MH - 40   MH - 41   Composite Open Channel
 39     MH - 41 to EAST CH 4          MH - 41   EAST CH 4          PIPE          24  Inch   'n'= .015   'Z'= 2
P- 39   MH - 41 to EAST CH 4          MH - 41   EAST CH 4          RECTANGULAR   30  Ft.    'n'= .015   'Z'= 2
 40     Convey  43          EAST CH 2           EAST CH 3          TRAPEZOIDAL    6  Ft.    'n'= .085   'Z'= 3
 41     Convey  44          EAST CH 3           EAST CH 4          TRAPEZOIDAL    6  Ft.    'n'= .085   'Z'= 3
 42     Convey  45          EAST CH 4           NW CH 5 TRAPEZOIDAL       6  Ft.    'n'= .085   'Z'= 3
 43     Convey  46          WEST CH 1           WEST CH 2          TRAPEZOIDAL    6  Ft.    'n'= .085   'Z'= 3
 44     Convey  47          WEST CH 2           WEST CH 3          TRAPEZOIDAL    6  Ft.    'n'= .085   'Z'= 3
 45     Convey  48          WEST CH 3           WEST CH 4          TRAPEZOIDAL    6  Ft.    'n'= .085   'Z'= 3
 46     Convey  49          WEST CH 4           NW CH 4 TRAPEZOIDAL       6  Ft.    'n'= .085   'Z'= 3
 47     Convey  50          NW CH 4 NW CH 5 TRAPEZOIDAL    8  Ft.     'n'= .085   'Z'= 3
 48     Convey  51          NW CH 5 Creek     TRAPEZOIDAL   10  Ft.     'n'= .085   'Z'= 3
 49     NW-1 to NW-1B       NW-1      NW-1B     PIPE      36  Inch   'n'= .015   'Z'= 2
P- 49   NW-1 to NW-1B       NW-1      NW-1C     Composite Open Channel
 50     NW-1B to NW-2       NW-1B     NW-2      PIPE      36  Inch   'n'= .015   'Z'= 2
P- 50   NW-1B to NW-2       NW-1C     NW-2      Composite Open Channel
 51     NW-2 to NW-3        NW-2      NW-3      PIPE      36  Inch   'n'= .015   'Z'= 2
P- 51   NW-2 to NW-3        NW-2      NW-3      Composite Open Channel
 52     NW-3 to NW CH-1     NW-3      NW CH-1 PIPE        36  Inch   'n'= .015   'Z'= 2
P- 52   NW-3 to NW CH-1     NW-3      NW CH-1 RECTANGULAR   30  Ft.    'n'= .015   'Z'= 2
 53     NW-4 to NW-5        NW-4      NW-5      PIPE      30  Inch   'n'= .015   'Z'= 2
P- 53   NW-4 to NW-5        NW-4      NW-5      Composite Open Channel
 54     NW-5 to NW-6        NW-5      NW-6      PIPE      30  Inch   'n'= .015   'Z'= 2
P- 54   NW-5 to NW-6        NW-5      NW-6      Composite Open Channel
 55     NW-7 to NW-6        NW-7      NW-6      PIPE      24  Inch   'n'= .015   'Z'= 2
P- 55   NW-7 to NW-6        NW-7      NW-6      Composite Open Channel
 56     NW-6 to NW CH-2     NW-6      NW CH-2 PIPE        30  Inch   'n'= .015   'Z'= 2
P- 56   NW-6 to NW CH-2     NW-6      NW CH-2 RECTANGULAR   20  Ft.    'n'= .015   'Z'= 2
 57     NW-8 to NW-10       NW-8      NW-10     PIPE      24  Inch   'n'= .015   'Z'= 2
P- 57   NW-8 to NW-10       NW-8      NW-10     Composite Open Channel
 58     NW-9 to NW-10       NW-9      NW-10     PIPE      24  Inch   'n'= .015   'Z'= 2
P- 58   NW-9 to NW-10       NW-9      NW-10     Composite Open Channel
 59     NW-10 to NW CH-3 NW-10        NW CH-3 PIPE        24  Inch   'n'= .015   'Z'= 2
P- 59   NW-10 to NW CH-3 NW-10        NW CH-3 RECTANGULAR   20  Ft.    'n'= .015   'Z'= 2
 60     NW Channel 1        NW CH-1 NW CH-2 TRAPEZOIDAL    6  Ft.    'n'= .085   'Z'= 3
 61     NW Channel 2        NW CH-2 NW CH-3 TRAPEZOIDAL    6  Ft.    'n'= .085   'Z'= 3
 62     NW Channel 3        NW CH-3 NW CH 4 TRAPEZOIDAL    6  Ft.    'n'= .085   'Z'= 3
 63     SE 1 to SE 2        SE 1      SE 2      PIPE      30  Inch   'n'= .015   'Z'= 2
P- 63   SE 1 to SE 2        SE 1      SE 2      Composite Open Channel
 64     SE 2 to SE 3        SE 2      SE 3      PIPE      36  Inch   'n'= .015   'Z'= 2
P- 64   SE 2 to SE 3                            Composite Open Channel
 65     SE 3 to SE 4        SE 3      SE 4      PIPE      42  Inch   'n'= .015   'Z'= 2
P- 65   SE 3 to SE 4                            Composite Open Channel
 66     SE 4 to SE 5        SE 4      SE 5      PIPE      54  Inch   'n'= .015   'Z'= 2
P- 66   SE 4 to SE 5                            Composite Open Channel
 67     SE 5 to SE 6        SE 5      SE 6      PIPE      54  Inch   'n'= .015   'Z'= 2
P- 67   SE 5 to SE 6                            Composite Open Channel
 68     SE 6 to SE Outlet   SE 6      SE Outlet PIPE      54  Inch   'n'= .015   'Z'= 2
P- 68   SE 6 to SE Outlet                       RECTANGULAR   20  Ft.    'n'= .015   'Z'= 2
 69     NW-1C to NW-1       NW-1C     NW-1      PIPE      30  Inch   'n'= .015   'Z'= 2
P- 69   NW-1C to NW-1       NW-1C     NW-1      Composite Open Channel
 70     NW-1A to NW-1C      NW-1A     NW-1C     PIPE      18  Inch   'n'= .015   'Z'= 2
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Conveyance Profile Information:

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#	Convey Name	Distance	Invert Elevation
1	MH - 3 to MH - 4	0.	89.5
1		490.	86.3
P - 1		0.	98.
P - 1		490.	96.
2	MH - 4 to MH - 5	0.	86.3
2		380.	84.5
P - 2		0.	96.
P - 2		380.	95.
3	MH - 5 to MH - 6	0.	83.5
3		770.	82.8
P - 3		0.	95.
P - 3		770.	90.
4	MH - 6 to MH - 7	0.	82.3
4		310.	81.9
P - 4		0.	90.
P - 4		310.	89.
5	MH - 8 to MH - 7	0.	84.4
5		420.	82.9
P - 5		0.	94.
P - 5		420.	89.
6	MH - 7 to MH - 9	0.	81.9
6		280.	81.2
P - 6		0.	89.
P - 6		280.	88.
7	MH - 9 to MH - 10	0.	81.2
7		270.	80.5
P - 7		0.	88.
P - 7		270.	87.5
8	MH - 11 to MH - 12	0.	86.
8		480.	83.5
P - 8		0.	93.
P - 8		480.	92.
9	MH - 12 to MH - 13	0.	82.9
9		700.	81.9
P - 9		0.	92.
P - 9		700.	91.
10	MH - 13 to MH - 10	0.	81.9
10		540.	81.
P - 10		0.	91.
P - 10		540.	87.5
11	MH - 10 to MH - 14	0.	80.
11		280.	79.2
P - 11		0.	87.5
P - 11		280.	87.
12	MH - 14 to MH - 15	0.	79.2
12		360.	78.16
P - 12		0.	87.
P - 12		360.	86.5
13	MH - 15 to EAST CH 2	0.	78.16
13		190.	77.5
P - 13		0.	86.5
P - 13		190.	85.
14	MH - 16 to MH - 17	0.	95.
14		950.	92.
15	MH - 17 to MH - 18	0.	92.
15		1260.	88.3
16	MH - 19 to MH - 20	0.	94.8
16		700.	92.8
P - 16		0.	105.5
P - 16		720.	102.5
17	MH - 20 to MH - 18	0.	92.3
17		800.	89.3
P - 17		0.	102.5
P - 17		800.	99.
18	MH - 21 to MH - 22	0.	94.
18		800.	90.9
P - 18		0.	104.5
P - 18		800.	100.

19	MH - 22 to MH - 18	0.	90.4
19		650.	89.3
P - 19		0.	100.
P - 19		650.	99.
20	MH - 18 to MH - 23	0.	86.4
20		620.	85.4
P - 20		0.	99.
P - 20		620.	97.
21	MH - 24 to MH - 25	0.	89.9
21		410.	89.1
P - 21		0.	97.5
P - 21		410.	96.5
22	MH - 25 to MH - 23	0.	88.6
22		470.	87.4
P - 22		0.	97.5
P - 22		470.	96.5
23	MH - 23 to MH - 26	0.	85.4
23		270.	84.68
P - 23		0.	97.
P - 23		270.	96.
24	MH - 27 to MH - 26	0.	91.2
24		450.	87.7
P - 24		0.	97.5
P - 24		450.	96.
25	MH - 26 to MH - 28	0.	84.68
25		860.	82.68
P - 25		0.	96.
P - 25		870.	92.
26	MH - 29 to MH - 30	0.	89.
26		290.	87.
P - 26		0.	97.
P - 26		290.	93.
27	MH - 30 to MH - 28	0.	86.5
27		490.	84.4
P - 27		0.	93.
P - 27		490.	92.
28	MH - 28 to MH - 31	0.	82.68
28		870.	79.72
P - 28		0.	92.
P - 28		870.	89.
29	MH - 32 to MH - 33	0.	86.5
29		260.	85.9
P - 29		0.	94.5
P - 29		260.	92.5
30	MH - 33 to MH - 34	0.	85.4
30		690.	84.5
P - 30		0.	92.5
P - 30		690.	90.
31	MH - 34 to MH - 31	0.	84.
31		560.	81.5
P - 31		0.	90.
P - 31		560.	89.
32	MH - 31 to MH - 35	0.	79.72
32		390.	77.78
P - 32		0.	89.
P - 32		390.	88.
33	MH - 35 to WEST CH 1	0.	77.78
33		90.	77.5
P - 33		0.	88.
P - 33		90.	87.8
34	MH - 36 to MH - 37	0.	81.5
34		370.	81.
P - 34		0.	88.
P - 34		370.	87.
35	MH - 37 to MH - 38	0.	81.3
35		590.	80.3
P - 35		0.	87.
P - 35		590.	86.
36	MH - 38 to MH - 39	0.	79.8
36		460.	78.9
P - 36		0.	86.
P - 36		460.	84.
37	MH - 39 to WEST CH 3	0.	78.9

37		30.	78.6
P - 37		0.	84.
P - 37		30.	83.5
38	MH - 40 to MH - 41	0.	79.
38		360.	78.2
P - 38		0.	84.
P - 38		360.	81.
39	MH - 41 to EAST CH 4	0.	78.2
39		60.	77.85
P - 39		0.	81.
P - 39		60.	80.5
40	Convey 43	0.	78.
40		1400.	76.4
41	Convey 44	0.	76.4
41		250.	76.1
42	Convey 45	0.	76.1
42		300.	75.55
43	Convey 46	0.	77.8
43		300.	77.4
44	Convey 47	0.	77.4
44		600.	76.7
45	Convey 48	0.	76.7
45		350.	76.25
46	Convey 49	0.	76.25
46		180.	76.07
47	Convey 50	0.	76.07
47		450.	75.55
48	Convey 51	0.	75.55
48		500.	75.23
49	NW-1 to NW-1B	0.	88.5
49		710.	86.8
P - 49		0.	94.5
P - 49		710.	93.5
50	NW-1B to NW-2	0.	86.8
50		590.	85.
P - 50		0.	93.5
P - 50		590.	91.
51	NW-2 to NW-3	0.	85.
51		510.	82.1
P - 51		0.	91.
P - 51		510.	87.5
52	NW-3 to NW CH-1	0.	82.1
52		220.	79.32
P - 52		0.	87.5
P - 52		220.	87.
53	NW-4 to NW-5	0.	85.5
53		490.	84.
P - 53		0.	91.
P - 53		490.	88.
54	NW-5 to NW-6	0.	84.
54		260.	83.
P - 54		0.	88.
P - 54		260.	86.5
55	NW-7 to NW-6	0.	87.
55		490.	84.
P - 55		0.	92.
P - 55		490.	86.5
56	NW-6 to NW CH-2	0.	83.
56		250.	78.76
P - 56		0.	87.1
P - 56		250.	86.6
57	NW-8 to NW-10	0.	81.
57		270.	80.
P - 57		0.	86.
P - 57		270.	85.
58	NW-9 to NW-10	0.	85.
58		470.	80.
P - 58		0.	90.
P - 58		470.	85.
59	NW-10 to NW CH-3	0.	80.
59		210.	77.92
P - 59		0.	85.
P - 59		210.	84.5

60	NW Channel 1	0.	79.3
60		560.	78.8
61	NW Channel 2	0.	78.8
61		840.	78.
62	NW Channel 3	0.	78.
62		1850.	76.07
63	SE 1 to SE 2	0.	96.4
63		450.	94.
P - 63		0.	101.
P - 63		450.	98.5
64	SE 2 to SE 3	0.	93.5
64		370.	92.1
P - 64		0.	98.5
P - 64		370.	97.5
65	SE 3 to SE 4	0.	91.6
65		580.	90.4
P - 65		0.	97.5
P - 65		580.	95.
66	SE 4 to SE 5	0.	89.4
66		320.	88.95
P - 66		0.	95.
P - 66		320.	94.
67	SE 5 to SE 6	0.	88.95
67		270.	87.1
P - 67		0.	94.
P - 67		270.	92.
68	SE 6 to SE Outlet	0.	87.1
68		70.	86.8
P - 68		0.	92.5
P - 68		70.	92.2
69	NW-1C to NW-1	0.	89.6
69		570.	89.
P - 69		0.	96.4
P - 69		570.	94.3
70	NW-1A to NW-1C	0.	90.
70		140.	89.6

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Node Results Information:

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#	Node Name	Cumul. Area	Pervious Area	Fi	Unit Peak Flow q(cfs/ac)	Cumul. Qp(cfs)	Known WS Elevation	RIM or GRATE Elev.	Node HGL	Node EGL	Cumul. Tr(min)
1	MH - 3	7.00	1.83	0.42	1.95	12.87	N/A	96.60	93.74	93.86	15.00
2	MH - 4	15.60	3.22	0.36	1.77	26.47	N/A	95.90	92.71	93.21	18.11
3	MH - 5	19.00	4.22	0.36	1.72	31.09	N/A	94.30	90.93	91.11	19.29
4	MH - 6	42.10	11.08	0.36	1.50	59.11	N/A	90.50	90.11	90.13	23.26
5	MH - 7	54.50	16.59	0.38	1.44	72.14	N/A	90.00	89.37	89.43	24.36
6	MH - 8	6.40	3.27	0.42	1.95	11.08	N/A	92.90	90.56	90.77	15.00
7	MH - 9	60.80	19.63	0.38	1.40	77.47	N/A	89.40	88.60	88.63	25.17
8	MH - 10	95.80	31.18	0.39	1.36	118.42	N/A	89.20	87.93	87.96	25.90
9	MH - 11	9.30	0.89	0.30	1.95	17.84	N/A	93.40	90.56	90.67	15.00
10	MH - 12	18.10	3.51	0.37	1.77	30.71	N/A	92.80	90.04	90.21	18.17
11	MH - 13	30.10	8.99	0.40	1.58	44.04	N/A	91.20	88.98	89.34	21.82
12	MH - 14	100.80	33.50	0.39	1.33	121.27	N/A	87.90	85.75	86.75	26.57
13	MH - 15	107.20	37.15	0.40	1.30	124.35	N/A	87.00	83.87	84.92	27.43
14	MH - 16	28.00	8.40	0.39	1.46	37.55	N/A	102.90	97.07	97.63	24.00
15	MH - 17	28.00	8.40	0.39	1.33	33.85	N/A	101.50	93.99	94.50	26.76
16	MH - 18	94.30	29.37	0.36	1.18	100.62	N/A	98.20	90.11	90.63	30.61
17	MH - 19	6.40	1.18	0.30	1.95	12.10	N/A	105.50	98.05	98.16	15.00
18	MH - 20	25.80	3.00	0.30	1.70	42.91	N/A	101.70	96.71	97.34	19.73
19	MH - 21	11.10	4.52	0.42	1.95	19.72	N/A	107.80	95.98	96.37	15.00
20	MH - 22	16.80	5.90	0.42	1.77	27.23	N/A	99.70	93.74	94.00	18.20
21	MH - 23	117.40	38.15	0.38	1.12	117.08	N/A	95.50	88.93	89.72	32.51
22	MH - 24	7.00	2.10	0.43	1.95	12.74	N/A	98.30	91.58	91.80	15.00
23	MH - 25	12.50	4.11	0.43	1.84	21.26	N/A	96.40	90.52	90.86	16.79
24	MH - 26	124.30	41.37	0.38	1.10	121.03	N/A	95.00	88.37	89.13	33.20
25	MH - 27	4.30	2.17	0.40	1.95	7.51	N/A	97.40	92.17	92.60	15.00
26	MH - 28	155.80	56.65	0.39	1.04	139.92	N/A	92.80	86.24	87.34	35.43
27	MH - 29	11.90	5.39	0.41	1.78	18.93	N/A	96.80	90.48	91.15	18.00
28	MH - 30	15.60	7.25	0.41	1.74	24.21	N/A	93.50	88.09	88.79	18.73
29	MH - 31	197.10	77.84	0.39	0.99	164.76	N/A	89.40	83.21	84.82	37.36
30	MH - 32	7.00	3.77	0.40	1.95	12.14	N/A	94.40	90.49	90.75	15.00
31	MH - 33	12.00	6.27	0.41	1.88	19.98	N/A	92.40	89.46	89.75	16.12
32	MH - 34	26.70	13.62	0.42	1.73	40.57	N/A	90.80	87.00	87.57	18.95
33	MH - 35	210.70	85.80	0.39	0.97	171.20	N/A	87.70	82.08	83.15	38.19
34	MH - 36	5.20	3.89	0.36	1.95	8.72	N/A	86.70	83.50	83.57	15.00
35	MH - 37	9.00	5.75	0.38	1.76	13.67	N/A	87.10	83.17	83.37	18.37
36	MH - 38	17.00	9.79	0.39	1.59	23.29	N/A	85.00	82.09	82.37	21.66
37	MH - 39	24.20	13.52	0.39	1.46	29.99	N/A	83.10	80.67	81.49	23.99
38	MH - 40	4.60	2.55	0.41	1.95	7.92	N/A	86.60	81.68	81.79	15.00
39	MH - 41	16.20	9.67	0.40	1.81	25.46	N/A	83.00	81.13	81.20	17.38
40	EAST CH 2	107.20	37.15	0.40	1.28	122.43	N/A	N/A	82.86	82.88	27.87
41	EAST CH 3	108.60	37.85	0.40	1.11	105.33	N/A	N/A	80.68	80.71	32.87
42	EAST CH 4	124.80	47.51	0.40	1.00	105.85	N/A	N/A	80.22	80.26	37.02
43	WEST CH 1	240.60	105.65	0.39	0.52	83.56	N/A	N/A	81.85	81.88	78.59
44	WEST CH 2	240.60	105.65	0.39	0.50	79.03	N/A	N/A	81.46	81.48	82.00
45	WEST CH 3	264.80	119.16	0.39	0.48	79.20	N/A	N/A	80.77	80.79	87.00
46	WEST CH 4	268.10	120.81	0.39	0.46	74.69	N/A	N/A	80.38	80.40	91.42
47	NW CH 4	375.60	176.95	0.40	0.44	96.62	N/A	N/A	80.21	80.23	93.93
48	NW CH 5	500.40	224.46	0.40	0.43	123.40	N/A	N/A	79.61	79.64	98.93
49	Creek	500.40	224.46	0.40	0.41	115.78	78.00	N/A	78.00	78.00	103.17
50	NW-1	40.70	20.35	0.43	0.79	23.31	N/A	94.30	90.60	90.94	48.85
51	NW-1B	46.60	23.08	0.42	0.75	25.16	N/A	93.50	88.82	89.25	51.50
52	NW-2	54.30	26.79	0.42	0.73	28.03	N/A	90.60	86.75	87.49	53.50
53	NW-3	63.90	32.03	0.42	0.71	31.85	N/A	88.00	83.93	84.79	54.84
54	NW-4	12.40	6.74	0.36	1.89	20.95	N/A	89.80	89.76	90.07	16.00
55	NW-5	16.60	9.04	0.37	1.78	26.20	N/A	87.80	88.30	88.37	17.91
56	NW-6	31.80	17.27	0.39	1.74	48.65	N/A	87.10	87.27	87.30	18.73
57	NW-7	7.50	3.95	0.42	1.95	12.96	N/A	91.90	89.15	89.45	15.00
58	NW-8	3.30	1.85	0.41	1.95	5.67	N/A	87.20	83.37	83.43	15.00
59	NW-9	3.40	1.90	0.41	1.95	5.85	N/A	91.40	85.85	86.21	15.00
60	NW-10	11.80	6.83	0.40	1.80	18.50	N/A	85.90	82.60	83.20	17.54
61	NW CH-1	63.90	32.03	0.42	0.71	31.58	N/A	N/A	82.43	82.44	55.22
62	NW CH-2	95.70	49.30	0.41	0.65	42.36	N/A	N/A	82.11	82.12	60.22
63	NW CH-3	107.50	56.14	0.41	0.61	42.63	N/A	N/A	81.32	81.33	65.22
64	SE 1	17.90	8.18	0.40	1.95	31.56	N/A	101.10	101.28	101.34	15.00
65	SE 2	25.80	10.62	0.41	1.88	44.07	N/A	98.60	97.70	98.37	16.17

66	SE 3	30.00	12.72	0.41	1.82	49.40	N/A	97.20	95.76	96.22	17.16
67	SE 4	38.10	15.92	0.41	1.73	59.29	N/A	94.10	92.72	93.10	19.04
68	SE 5	49.00	18.72	0.40	1.70	75.53	N/A	93.80	91.49	92.64	20.16
69	SE 6	62.60	23.02	0.41	1.66	94.36	N/A	92.50	90.24	91.33	20.71
70	SE Outlet	58.20	28.41	0.39	1.65	102.31	N/A	N/A	0.00	0.00	20.85
71	NW-1A	21.60	10.80	0.43	0.83	13.28	N/A	N/A	95.27	96.25	46.00
72	NW-1C	30.10	15.05	0.43	0.82	18.37	N/A	96.40	93.02	93.26	46.31

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Convey Results Information:

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#	Convey Name	Upstream Critical Elevation	Upstream HGL	Downstream HGL	Upstream EGL	Downstream EGL	Exit Velocity (fps)	Travel Time (min)	Flow (cfs)
1	MH - 3 to MH - 4	90.71	93.74	93.1	93.86	93.22	2.62	3.11	12.87
P - 1		98.12	93.74	93.1	93.86	93.22	1.31	0.	0.
2	MH - 4 to MH - 5	88.8	92.71	90.61	93.21	91.11	5.39	1.17	26.47
P - 2		96.51	92.71	90.61	93.21	91.11	2.31	0.	0.
3	MH - 5 to MH - 6	87.	90.93	89.95	91.11	90.13	3.23	3.97	31.09
P - 3		95.48	90.93	89.95	91.11	90.13	2.35	0.	0.
4	MH - 6 to MH - 7	84.61	89.75	89.05	90.13	89.43	4.69	1.1	58.96
P - 4		90.09	90.11	89.43	90.12	89.43	0.03	5.	0.15
5	MH - 8 to MH - 7	85.59	90.56	89.22	90.77	89.43	3.53	1.99	11.08
P - 5		94.46	90.56	89.22	90.77	89.43	0.83	0.	0.
6	MH - 7 to MH - 9	84.36	88.95	88.15	89.43	88.63	5.28	0.88	66.32
P - 6		89.36	89.37	88.63	89.43	88.63	0.47	3.22	5.82
7	MH - 9 to MH - 10	85.2	88.21	87.55	88.63	87.96	4.92	0.91	61.82
P - 7		88.48	88.6	87.99	88.63	88.08	2.31	3.1	15.65
8	MH - 11 to MH - 12	87.35	90.56	90.1	90.67	90.21	2.52	3.17	17.84
P - 8		0.	90.56	90.1	90.67	90.21	3.11	0.	0.
9	MH - 12 to MH - 13	84.61	90.04	89.17	90.21	89.34	3.19	3.66	30.71
P - 9		92.19	90.04	89.17	90.21	89.34	1.56	0.	0.
10	MH - 13 to MH - 10	85.4	88.98	87.6	89.34	87.97	4.58	1.97	44.04
P - 10		0.	88.98	87.6	89.34	87.97	6.07	0.	0.
11	MH - 10 to MH - 14	84.5	87.1	85.9	87.95	86.75	7.02	0.66	111.72
P - 11		87.87	87.93	87.38	87.96	87.45	1.97	3.29	6.7
12	MH - 14 to MH - 15	83.7	85.75	83.93	86.75	84.93	7.62	0.79	121.27
P - 12		87.4	85.75	83.93	86.75	84.93	2.21	0.	0.
13	MH - 15 to EAST CH 2	82.66	83.87	82.86	84.92	83.91	7.82	0.41	124.35
P - 13		86.54	83.87	82.86	84.92	83.91	1.17	0.	0.
14	MH - 16 to MH - 17	96.82	97.07	94.	97.63	94.61	5.99	2.77	37.55
15	MH - 17 to MH - 18	93.73	93.99	90.03	94.5	90.76	6.5	3.85	33.85
16	MH - 19 to MH - 20	95.97	98.05	97.24	98.16	97.34	2.47	4.73	12.1
P - 16		105.59	98.05	97.24	98.16	97.34	0.01	0.	0.
17	MH - 20 to MH - 18	95.3	96.71	92.3	97.34	92.93	6.07	2.2	42.91
P - 17		102.84	96.71	92.3	97.34	92.93	1.97	0.	0.
18	MH - 21 to MH - 22	95.51	95.98	93.72	96.37	94.	4.02	3.21	19.72
P - 18		0.	95.98	93.72	96.37	94.	0.	0.	0.
19	MH - 22 to MH - 18	93.4	93.74	92.3	94.	92.56	3.85	2.81	27.23
P - 19		100.1	93.74	92.3	94.	92.56	1.04	0.	0.
20	MH - 18 to MH - 23	89.1	90.11	89.24	90.63	89.72	5.26	1.91	100.62
P - 20		99.41	90.11	89.24	90.63	89.72	0.53	0.	0.
21	MH - 24 to MH - 25	91.1	91.58	90.53	91.8	90.86	4.38	1.8	12.74
P - 21		97.57	91.58	90.53	91.8	90.86	0.99	0.	0.
22	MH - 25 to MH - 23	90.08	90.52	89.41	90.86	89.72	4.22	1.78	21.26
P - 22		97.58	90.52	89.41	90.86	89.72	1.	0.	0.
23	MH - 23 to MH - 26	88.32	88.93	88.46	89.72	89.13	6.25	0.69	117.08
P - 23		97.16	88.93	88.46	89.72	89.13	0.04	0.	0.
24	MH - 27 to MH - 26	92.17	92.17	88.91	92.6	89.15	3.79	1.39	7.51
P - 24		0.	92.17	88.91	92.6	89.15	0.	0.	0.
25	MH - 26 to MH - 28	87.65	88.37	86.74	89.13	87.35	5.95	2.23	121.03
P - 25		96.44	88.37	86.74	89.13	87.35	0.67	0.	0.
26	MH - 29 to MH - 30	90.48	90.48	88.46	91.15	89.16	6.38	0.73	18.93
P - 26		97.53	90.48	88.46	91.15	89.16	0.87	0.	0.
27	MH - 30 to MH - 28	88.09	88.09	87.12	88.79	87.35	3.59	1.72	24.21
P - 27		93.29	88.09	87.12	88.79	87.35	1.58	0.	0.
28	MH - 28 to MH - 31	85.89	86.24	84.14	87.34	84.82	6.26	1.93	139.92
P - 28		92.47	86.24	84.14	87.34	84.82	2.31	0.	0.
29	MH - 32 to MH - 33	88.5	90.49	89.49	90.75	89.75	3.86	1.12	12.14
P - 29		94.57	90.49	89.49	90.75	89.75	0.94	0.	0.
30	MH - 33 to MH - 34	87.9	89.46	87.28	89.75	87.57	4.07	2.83	19.98
P - 30		92.75	89.46	87.28	89.75	87.57	1.56	0.	0.
31	MH - 34 to MH - 31	86.08	87.	84.5	87.57	85.07	5.74	1.57	40.57
P - 31		90.18	87.	84.5	87.57	85.07	1.56	0.	0.
32	MH - 31 to MH - 35	83.21	83.21	82.23	84.82	83.16	7.32	0.69	164.76
P - 32		89.19	83.21	82.23	84.82	83.16	1.56	0.	0.
33	MH - 35 to WEST CH 1	81.34	82.08	81.86	83.15	82.9	7.78	0.19	171.2
P - 33		88.2	82.08	81.86	83.15	82.9	1.56	0.	0.
34	MH - 36 to MH - 37	82.48	83.5	83.32	83.57	83.38	1.84	3.16	8.72
P - 34		0.	83.5	83.32	83.57	83.38	2.98	0.	0.

35	MH - 37 to MH - 38	82.55	83.17	82.17	83.37	82.37	3.48	2.83	13.67
P - 35		87.06	83.17	82.17	83.37	82.37	0.84	0.	0.
36	MH - 38 to MH - 39	81.35	82.09	81.22	82.37	81.49	3.97	1.91	23.29
P - 36		86.24	82.09	81.22	82.37	81.49	1.56	0.	0.
37	MH - 39 to WEST CH 3	80.68	80.67	80.77	81.49	81.29	5.47	0.04	29.99
P - 37		0.	80.67	80.77	81.49	81.29	0.	0.	0.
38	MH - 40 to MH - 41	80.	81.68	81.09	81.79	81.2	2.52	2.38	7.92
P - 38		0.	81.68	81.09	81.79	81.2	0.	0.	0.
39	MH - 41 to EAST CH 4	79.69	80.69	80.23	81.2	80.74	5.47	0.18	17.18
P - 39		81.13	81.13	80.62	81.2	80.7	2.23	0.3	8.28
40	Convey 43	79.75	82.86	80.67	82.88	80.71	1.53	17.86	122.43
41	Convey 44	78.02	80.68	80.22	80.71	80.25	1.39	3.11	105.33
42	Convey 45	77.72	80.22	79.61	80.26	79.64	1.44	3.55	105.85
43	Convey 46	79.23	81.85	81.46	81.88	81.48	1.13	4.42	83.56
44	Convey 47	78.78	81.46	80.77	81.48	80.79	1.07	9.37	79.03
45	Convey 48	78.08	80.77	80.38	80.79	80.4	1.04	5.53	79.2
46	Convey 49	77.59	80.38	80.21	80.4	80.23	0.98	3.06	74.69
47	Convey 50	77.45	80.21	79.62	80.23	79.64	1.18	6.48	96.62
48	Convey 51	77.	79.61	77.89	79.64	77.99	2.59	5.15	123.4
49	NW-1 to NW-1B	90.05	90.6	88.92	90.94	89.25	4.36	2.69	23.31
P - 49		0.	90.6	88.92	90.94	89.25	10.79	0.	0.
50	NW-1B to NW-2	88.42	88.82	87.1	89.25	87.49	4.76	1.99	25.16
P - 50		93.97	93.02	91.5	93.26	91.74	0.27	0.	0.
51	NW-2 to NW-3	86.71	86.75	84.38	87.49	84.79	4.86	1.36	28.03
P - 51		91.48	86.75	84.38	87.49	84.79	0.11	0.	0.
52	NW-3 to NW CH-1	83.93	83.93	82.06	84.79	82.44	4.71	0.37	31.85
P - 52		87.72	83.93	82.06	84.79	82.44	2.67	0.	0.
53	NW-4 to NW-5	87.06	89.76	88.05	90.07	88.37	4.27	1.91	20.95
P - 53		91.12	89.76	88.05	90.07	88.37	0.02	0.	0.
54	NW-5 to NW-6	85.62	88.	86.94	88.37	87.31	4.63	0.94	22.71
P - 54		88.31	88.3	87.3	88.37	87.3	0.16	4.52	3.5
55	NW-7 to NW-6	88.3	89.15	87.01	89.45	87.31	4.12	1.98	12.96
P - 55		0.	89.15	87.01	89.45	87.31	0.	0.	0.
56	NW-6 to NW CH-2	85.5	85.92	82.11	87.3	83.49	8.95	0.47	43.92
P - 56		87.22	87.27	86.72	87.3	86.78	1.97	3.06	4.73
57	NW-8 to NW-10	81.84	83.37	83.14	83.43	83.2	1.81	2.49	5.67
P - 57		0.	83.37	83.14	83.43	83.2	0.	0.	0.
58	NW-9 to NW-10	85.86	85.85	83.14	86.21	83.2	1.86	2.3	5.85
P - 58		0.	85.85	83.14	86.21	83.2	0.	0.	0.
59	NW-10 to NW CH-3	81.55	82.6	80.73	83.2	81.33	5.89	0.59	18.5
P - 59		85.04	82.6	80.73	83.2	81.33	1.19	0.	0.
60	NW Channel 1	80.12	82.43	82.11	82.44	82.12	0.6	14.88	31.58
61	NW Channel 2	79.78	82.11	81.32	82.12	81.33	0.8	17.45	42.36
62	NW Channel 3	78.98	81.32	80.22	81.33	80.23	0.56	44.86	42.63
63	SE 1 to SE 2	98.9	100.74	97.77	101.34	98.37	5.88	1.28	28.87
P - 63		101.28	101.28	98.78	101.34	98.84	1.79	4.11	2.69
64	SE 2 to SE 3	96.5	97.7	95.55	98.37	96.22	6.23	0.99	44.07
P - 64		98.61	95.27	92.29	96.25	93.26	1.31	0.	0.
65	SE 3 to SE 4	95.1	95.76	93.9	96.22	94.35	5.13	1.88	49.4
P - 65		0.	95.27	92.29	96.25	93.26	6.54	0.	0.
66	SE 4 to SE 5	91.64	92.72	92.25	93.1	92.64	4.74	1.13	59.29
P - 66		95.56	95.27	92.29	96.25	93.26	2.33	0.	0.
67	SE 5 to SE 6	91.49	91.49	90.84	92.64	91.33	5.34	0.57	75.53
P - 67		94.09	95.27	92.29	96.25	93.26	1.02	0.	0.
68	SE 6 to SE Outlet	89.95	90.24	89.65	91.33	91.01	8.88	0.15	94.36
P - 68		92.53	95.27	92.29	96.25	93.26	1.05	0.	0.
69	NW-1C to NW-1	92.1	93.02	91.5	93.26	91.74	3.74	2.54	18.37
P - 69		0.	93.02	91.5	93.26	91.74	0.	0.	0.
70	NW-1A to NW-1C	91.5	95.27	92.29	96.25	93.26	7.52	0.31	13.28

	Up Node Name	Down Node Name	Trib. Area at Up Node (acre)	Cumul. Area (acre)	Total Computed Time of Concentration Up Node (min.)	Total Flow at Convey (cfs)	Convey Size (in or ft)	Average Slope (ft/ft)	Total Length (feet)	Full Flow Capacity of Conduit (cfs)	Computed Flow at Convey (cfs)	Exit Velocity (fps)	Travel Time at Convey (min.)	Rim/Grate at Up Node (feet)	Up HGL (feet)	Down HGL (feet)	Up (RIM-HGL) (feet)	Energy Slope (ft/ft)	Up EGL (feet)	Down EGL (feet)	Up Invert (feet)
	MH - 3	MH - 4	7.	7.	15.	12.87	30	0.0065	490.00	28.73	12.87	2.62	3.11	96.60	93.74	93.10	2.86	0.0013	93.86	93.22	89.50
							N/A	0.0041	490.00	N/A	0.00	1.31	0.00	96.60	93.74	93.10	N/A	0.0013	93.86	93.22	98.00
	MH - 4	MH - 5	8.6	15.6	18.11	26.47	30	0.0047	380.00	24.47	26.47	5.39	1.17	95.90	92.71	90.61	3.19	0.0055	93.21	91.11	86.30
							N/A	0.0026	380.00	N/A	0.00	2.31	0.00	95.90	92.71	90.61	N/A	0.0055	93.21	91.11	96.00
	MH - 5	MH - 6	3.4	19.	19.29	31.09	42	0.0009	770.00	26.29	31.09	3.23	3.97	94.30	90.93	89.95	3.37	0.0013	91.11	90.13	83.50
							N/A	0.0065	770.00	N/A	0.00	2.35	0.00	94.30	90.93	89.95	N/A	0.0013	91.11	90.13	95.00
	MH - 6	MH - 7	23.1	42.1	23.26	59.11	48	0.0013	310.00	44.72	58.96	4.69	1.10	90.50	89.75	89.05	0.75	0.0022	90.13	89.43	82.30
							N/A	0.0032	310.00	N/A	0.15	0.03	5.00	90.50	90.11	89.43	0.39	0.0022	90.12	89.43	90.00
	MH - 8	MH - 7	6.4	6.4	15.	11.08	24	0.0036	420.00	11.72	11.08	3.53	1.99	92.90	90.56	89.22	2.34	0.0032	90.77	89.43	84.40
							N/A	0.0119	420.00	N/A	0.00	0.83	0.00	92.90	90.56	89.22	N/A	0.0032	90.77	89.43	94.00
	MH - 7	MH - 9	6.	54.5	24.36	72.14	48	0.0025	280.00	62.25	66.32	5.28	0.88	90.00	88.95	88.15	1.05	0.0028	89.43	88.63	81.90
							N/A	0.0036	280.00	N/A	5.82	0.47	3.22	90.00	89.37	88.63	0.63	0.0029	89.43	88.63	89.00
	MH - 9	MH - 10	6.3	60.8	25.17	77.47	48	0.0026	270.00	63.39	61.82	4.92	0.91	89.40	88.21	87.55	1.19	0.0025	88.63	87.96	81.20
							N/A	0.0019	270.00	N/A	15.65	2.31	3.10	89.40	88.60	87.99	0.80	0.0020	88.63	88.08	88.00
	MH - 11	MH - 12	9.3	9.3	15.	17.84	36	0.0052	480.00	41.72	17.84	2.52	3.17	93.40	90.56	90.10	2.84	0.0010	90.67	90.21	86.00
							N/A	0.0021	480.00	N/A	0.00	3.11	0.00	93.40	90.56	90.10	N/A	0.0010	90.67	90.21	93.00
	MH - 12	MH - 13	8.8	18.1	18.17	30.71	42	0.0014	700.00	32.96	30.71	3.19	3.66	92.80	90.04	89.17	2.76	0.0012	90.21	89.34	82.90
							N/A	0.0014	700.00	N/A	0.00	1.56	0.00	92.80	90.04	89.17	N/A	0.0012	90.21	89.34	92.00
	MH - 13	MH - 10	12.	30.1	21.82	44.04	42	0.0017	540.00	35.60	44.04	4.58	1.97	91.20	88.98	87.60	2.22	0.0026	89.34	87.97	81.90
							N/A	0.0065	540.00	N/A	0.00	6.07	0.00	91.20	88.98	87.60	N/A	0.0026	89.34	87.97	91.00
	MH - 10	MH - 14	4.9	95.8	25.9	118.42	54	0.0029	280.00	91.10	111.72	7.02	0.66	89.20	87.10	85.90	2.10	0.0043	87.95	86.75	80.00
							N/A	0.0018	280.00	N/A	6.70	1.97	3.29	89.20	87.93	87.38	1.27	0.0018	87.96	87.45	87.50
	MH - 14	MH - 15	5.	100.8	26.57	121.27	54	0.0029	360.00	91.60	121.27	7.62	0.79	87.90	85.75	83.93	2.15	0.0051	86.75	84.93	79.20
							N/A	0.0014	360.00	N/A	0.00	2.21	0.00	87.90	85.75	83.93	N/A	0.0051	86.75	84.93	87.00
	MH - 15	EAST CH 2	6.4	107.2	27.43	124.35	54	0.0035	190.00	100.45	124.35	7.82	0.41	87.00	83.87	82.86	3.13	0.0053	84.92	83.91	78.16
							50	0.0079	190.00	N/A	0.00	1.17	0.00	87.00	83.87	82.86	N/A	0.0053	84.92	83.91	86.50
	MH - 16	MH - 17	28.	28.	24.	37.55	48	0.0032	950.00	69.96	37.55	5.99	2.77	102.90	97.07	94.00	5.83	0.0032	97.63	94.61	95.00
	MH - 17	MH - 18	0.	28.	26.76	33.85	48	0.0029	1260.00	67.46	33.85	6.50	3.85	101.50	93.99	90.03	7.51	0.0030	94.50	90.76	92.00
	MH - 19	MH - 20	6.4	6.4	15.	12.1	30	0.0029	700.00	19.00	12.10	2.47	4.73	105.50	98.05	97.24	7.45	0.0012	98.16	97.34	94.80
							N/A	0.0042	720.00	N/A	0.00	0.01	0.00	105.50	98.05	97.24	N/A	0.0011	98.16	97.34	105.50
	MH - 20	MH - 18	19.4	25.8	19.73	42.91	36	0.0038	800.00	35.40	42.91	6.07	2.20	101.70	96.71	92.30	4.99	0.0055	97.34	92.93	92.30
							N/A	0.0044	800.00	N/A	0.00	1.97	0.00	101.70	96.71	92.30	N/A	0.0055	97.34	92.93	102.50
	MH - 21	MH - 22	11.1	11.1	15.	19.72	30	0.0039	800.00	22.13	19.72	4.02	3.21	107.80	95.98	93.72	11.82	0.0030	96.37	94.00	94.00
							N/A	0.0056	800.00	N/A	0.00	0.00	0.00	107.80	95.98	93.72	N/A	0.0030	96.37	94.00	104.50
	MH - 22	MH - 18	5.7	16.8	18.2	27.23	36	0.0017	650.00	23.78	27.23	3.85	2.81	99.70	93.74	92.30	5.96	0.0022	94.00	92.56	90.40
							N/A	0.0015	650.00	N/A	0.00	1.04	0.00	99.70	93.74	92.30	N/A	0.0022	94.00	92.56	100.00
	MH - 18	MH - 23	23.7	94.3	30.61	100.62	72	0.0016	620.00	147.41	100.62	5.26	1.91	98.20	90.11	89.24	8.09	0.0015	90.63	89.72	86.40
							N/A	0.0032	620.00	N/A	0.00	0.53	0.00	98.20	90.11	89.24	N/A	0.0015	90.63	89.72	99.00
	MH - 24	MH - 25	7.	7.	15.	12.74	30	0.0020	410.00	15.70	12.74	4.38	1.80	98.30	91.58	90.53	6.72	0.0023	91.80	90.86	89.90
							N/A	0.0024	410.00	N/A	0.00	0.99	0.00	98.30	91.58	90.53	N/A	0.0023	91.80	90.86	97.50
	MH - 25	MH - 23	5.5	12.5	16.79	21.26	36	0.0026	470.00	29.21	21.26	4.22	1.78	96.40	90.52	89.41	5.88	0.0024	90.86	89.72	88.60
							N/A	0.0021	470.00	N/A	0.00	1.00	0.00	96.40	90.52	89.41	N/A	0.0024	90.86	89.72	97.50
	MH - 23	MH - 26	10.6	117.4	32.51	117.08	72	0.0027	270.00	189.54	117.08	6.25	0.69	95.50	88.93	88.46	6.57	0.0022	89.72	89.13	85.40
							N/A	0.0037	270.00	N/A	0.00	0.04	0.00	95.50	88.93	88.46	N/A	0.0022	89.72	89.13	97.00
	MH - 27	MH - 26	4.3	4.3	15.	7.51	24	0.0078	450.00	17.29	7.51	3.79	1.39	97.40	92.17	88.91	5.23	0.0076	92.60	89.15	91.20
							N/A	0.0033	450.00	N/A	0.00	0.00	0.00	97.40	92.17	88.91	N/A	0.0076	92.60	89.15	97.50
	MH - 26	MH - 28	2.6	124.3	33.2	121.03	72	0.0023	860.00	177.00	121.03	5.95	2.23	95.00	88.37	86.74	6.63	0.0021	89.13	87.35	84.68
							N/A	0.0046	870.00	N/A	0.00	0.67	0.00	95.00	88.37	86.74	N/A	0.0020	89.13	87.35	96.00
	MH - 29	MH - 30	11.9	11.9	18.	18.93	30	0.0069	290.00	29.52	18.93	6.38	0.73	96.80	90.48	88.46	6.32	0.0069	91.15	89.16	89.00
							N/A	0.0138	290.00	N/A	0.00	0.87	0.00	96.80	90.48	88.46	N/A	0.0069	91.15	89.16	97.00
	MH - 30	MH - 28	3.7	15.6	18.73	24.21	36	0.0043	490.00	37.84	24.21	3.59	1.72	93.50	88.09	87.12	5.41	0.0029	88.79	87.35	86.50
							N/A	0.0020	490.00	N/A	0.00	1.58	0.00	93.50	88.09	87.12	N/A	0.0029	88.79	87.35	93.00
	MH - 28	MH - 31	15.9	155.8	35.43	139.92	72	0.0034	870.00	214.09	139.92	6.26	1.93	92.80	86.24	84.14	6.56	0.0029	87.34	84.82	82.68
							N/A	0.0034	870.00	N/A	0.00	2.31	0.00	92.80	86.24	84.14	N/A	0.0029	87.34	84.82	92.00
	MH - 32	MH - 33	7.	7.	15.	12.14	24	0.0023	260.00	9.42	12.14	3.86	1.12	94.40	90.49	89.49	3.91	0.0038	90.75	89.75	86.50

	Up Node Name	Down Node Name	Trib. Area at Up Node (acre)	Cumul. Area (acre)	Total Computed Time of Concentration Up Node (min.)	Total Flow at Convey (cfs)	Convey Size (in or ft)	Average Slope (ft/ft)	Total Length (feet)	Full Flow Capacity of Conduit (cfs)	Computed Flow at Convey (cfs)	Exit Velocity (fps)	Travel Time at Convey (min.)	Rim/Grate at Up Node (feet)	Up HGL (feet)	Down HGL (feet)	Up (RIM-HGL) (feet)	Energy Slope (ft/ft)	Up EGL (feet)	Down EGL (feet)	Up Invert (feet)
							N/A	0.0077	260.00	N/A	0.00	0.94	0.00	94.40	90.49	89.49	N/A	0.0038	90.75	89.75	94.50
	MH - 33	MH - 34	5.	12.	16.12	19.98	30	0.0013	690.00	12.84	19.98	4.07	2.83	92.40	89.46	87.28	2.94	0.0032	89.75	87.57	85.40
							N/A	0.0036	690.00	N/A	0.00	1.56	0.00	92.40	89.46	87.28	N/A	0.0032	89.75	87.57	92.50
	MH - 34	MH - 31	14.7	26.7	18.95	40.57	36	0.0045	560.00	38.62	40.57	5.74	1.57	90.80	87.00	84.50	3.80	0.0045	87.57	85.07	84.00
							N/A	0.0018	560.00	N/A	0.00	1.56	0.00	90.80	87.00	84.50	N/A	0.0045	87.57	85.07	90.00
	MH - 31	MH - 35	14.6	197.1	37.36	164.76	72	0.0050	390.00	258.87	164.76	7.32	0.69	89.40	83.21	82.23	6.19	0.0043	84.82	83.16	79.72
							N/A	0.0026	390.00	N/A	0.00	1.56	0.00	89.40	83.21	82.23	N/A	0.0043	84.82	83.16	89.00
	MH - 35	WEST CH 1	13.6	210.7	38.19	171.2	72	0.0031	90.00	204.72	171.20	7.78	0.19	87.70	82.08	81.86	5.62	0.0028	83.15	82.90	77.78
							N/A	0.0022	90.00	N/A	0.00	1.56	0.00	87.70	82.08	81.86	N/A	0.0028	83.15	82.90	88.00
	MH - 36	MH - 37	5.2	5.2	15.	8.72	30	0.0014	370.00	13.07	8.72	1.84	3.16	86.70	83.50	83.32	3.20	0.0005	83.57	83.38	81.50
							N/A	0.0027	370.00	N/A	0.00	2.98	0.00	86.70	83.50	83.32	N/A	0.0005	83.57	83.38	88.00
	MH - 37	MH - 38	3.8	9.	18.37	13.67	30	0.0017	590.00	14.63	13.67	3.48	2.83	87.10	83.17	82.17	3.93	0.0017	83.37	82.37	81.30
							N/A	0.0017	590.00	N/A	0.00	0.84	0.00	87.10	83.17	82.17	N/A	0.0017	83.37	82.37	87.00
	MH - 38	MH - 39	8.	17.	21.66	23.29	36	0.0020	460.00	25.57	23.29	3.97	1.91	85.00	82.09	81.22	2.91	0.0019	82.37	81.49	79.80
							N/A	0.0043	460.00	N/A	0.00	1.56	0.00	85.00	82.09	81.22	N/A	0.0019	82.37	81.49	86.00
	MH - 39	WEST CH 3	7.2	24.2	23.99	29.99	36	0.0100	30.00	57.81	29.99	5.47	0.04	83.10	80.67	80.77	2.43	0.0068	81.49	81.29	78.90
							20	0.0167	30.00	N/A	0.00	0.00	0.00	83.10	80.67	80.77	N/A	0.0068	81.49	81.29	84.00
	MH - 40	MH - 41	4.6	4.6	15.	7.92	24	0.0022	360.00	9.24	7.92	2.52	2.38	86.60	81.68	81.09	4.92	0.0016	81.79	81.20	79.00
							N/A	0.0083	360.00	N/A	0.00	0.00	0.00	86.60	81.68	81.09	N/A	0.0016	81.79	81.20	84.00
	MH - 41	EAST CH 4	11.6	16.2	17.38	25.46	24	0.0058	60.00	14.97	17.18	5.47	0.18	83.00	80.69	80.23	2.31	0.0077	81.20	80.74	78.20
							30	0.0083	60.00	N/A	8.28	2.23	0.30	83.00	81.13	80.62	1.87	0.0083	81.20	80.70	81.00
	EAST CH 2	EAST CH 3	0.	107.2	27.87	122.43	6	0.0011	1400.00	N/A	122.43	1.53	17.86	N/A	82.86	80.67	N/A	0.0016	82.88	80.71	78.00
	EAST CH 3	EAST CH 4	1.4	108.6	32.87	105.33	6	0.0012	250.00	N/A	105.33	1.39	3.11	N/A	80.68	80.22	N/A	0.0018	80.71	80.25	76.40
	EAST CH 4	NW CH 5	0.	124.8	37.02	105.85	6	0.0018	300.00	N/A	105.85	1.44	3.55	N/A	80.22	79.61	N/A	0.0021	80.26	79.64	76.10
	WEST CH 1	WEST CH 2	29.9	240.6	78.59	83.56	6	0.0013	300.00	N/A	83.56	1.13	4.42	N/A	81.85	81.46	N/A	0.0013	81.88	81.48	77.80
	WEST CH 2	WEST CH 3	0.	240.6	82.	79.03	6	0.0012	600.00	N/A	79.03	1.07	9.37	N/A	81.46	80.77	N/A	0.0012	81.48	80.79	77.40
	WEST CH 3	WEST CH 4	0.	264.8	87.	79.2	6	0.0013	350.00	N/A	79.20	1.04	5.53	N/A	80.77	80.38	N/A	0.0011	80.79	80.40	76.70
	WEST CH 4	NW CH 4	3.3	268.1	91.42	74.69	6	0.0010	180.00	N/A	74.69	0.98	3.06	N/A	80.38	80.21	N/A	0.0010	80.40	80.23	76.25
	NW CH 4	NW CH 5	0.	375.6	93.93	96.62	8	0.0012	450.00	N/A	96.62	1.18	6.48	N/A	80.21	79.62	N/A	0.0013	80.23	79.64	76.07
	NW CH 5	Creek	0.	500.4	98.93	123.4	10	0.0006	500.00	N/A	123.40	2.59	5.15	N/A	79.61	77.89	N/A	0.0033	79.64	77.99	75.55
	NW-1	NW-1B	10.6	40.7	48.85	23.31	36	0.0024	710.00	28.29	23.31	4.36	2.69	94.30	90.60	88.92	3.70	0.0024	90.94	89.25	88.50
							N/A	0.0014	710.00	N/A	0.00	10.79	0.00	94.30	90.60	88.92	N/A	0.0024	90.94	89.25	94.50
	NW-1B	NW-2	5.9	46.6	51.5	25.16	36	0.0031	590.00	31.93	25.16	4.76	1.99	93.50	88.82	87.10	4.68	0.0030	89.25	87.49	86.80
							N/A	0.0042	590.00	N/A	0.00	0.27	0.00	93.50	93.02	91.50	N/A	0.0026	93.26	91.74	93.50
	NW-2	NW-3	7.7	54.3	53.5	28.03	36	0.0057	510.00	43.59	28.03	4.86	1.36	90.60	86.75	84.38	3.85	0.0053	87.49	84.79	85.00
							N/A	0.0069	510.00	N/A	0.00	0.11	0.00	90.60	86.75	84.38	N/A	0.0053	87.49	84.79	91.00
	NW-3	NW CH-1	9.6	63.9	54.84	31.85	36	0.0126	220.00	64.98	31.85	4.71	0.37	88.00	83.93	82.06	4.07	0.0107	84.79	82.44	82.10
							30	0.0023	220.00	N/A	0.00	2.67	0.00	88.00	83.93	82.06	N/A	0.0107	84.79	82.44	87.50
	NW-4	NW-5	12.4	12.4	16.	20.95	30	0.0031	490.00	19.67	20.95	4.27	1.91	89.80	89.76	88.05	0.04	0.0035	90.07	88.37	85.50
							N/A	0.0061	490.00	N/A	0.00	0.02	0.00	89.80	89.76	88.05	N/A	0.0035	90.07	88.37	91.00
	NW-5	NW-6	4.2	16.6	17.91	26.2	30	0.0038	260.00	22.05	22.71	4.63	0.94	87.80	88.00	86.94	-0.20	0.0041	88.37	87.31	84.00
							N/A	0.0058	260.00	N/A	3.50	0.16	4.52	87.80	88.30	87.30	-0.50	0.0041	88.37	87.30	88.00
	NW-7	NW-6	7.5	7.5	15.	12.96	24	0.0061	490.00	15.34	12.96	4.12	1.98	91.90	89.15	87.01	2.75	0.0044	89.45	87.31	87.00
							N/A	0.0112	490.00	N/A	0.00	0.00	0.00	91.90	89.15	87.01	N/A	0.0044	89.45	87.31	92.00
	NW-6	NW CH-2	7.7	31.8	18.73	48.65	30	0.0170	250.00	46.29	43.92	8.95	0.47	87.10	85.92	82.11	1.18	0.0153	87.30	83.49	83.00
							20	0.0020	250.00	N/A	4.73	1.97	3.06	87.10	87.27	86.72	-0.17	0.0021	87.30	86.78	87.10
	NW-8	NW-10	3.3	3.3	15.	5.67	24	0.0037	270.00	11.93	5.67	1.81	2.49	87.20	83.37	83.14	3.83	0.0008	83.43	83.20	81.00
							N/A	0.0037	270.00	N/A	0.00	0.00	0.00	87.20	83.37	83.14	N/A	0.0008	83.43	83.20	86.00
	NW-9	NW-10	3.4	3.4	15.	5.85	24	0.0106	470.00	20.22	5.85	1.86	2.30	91.40	85.85	83.14	5.55	0.0064	86.21	83.20	85.00
							N/A	0.0106	470.00	N/A	0.00	0.00	0.00	91.40	85.85	83.14	N/A	0.0064	86.21	83.20	90.00
	NW-10	NW CH-3	5.1	11.8	17.54	18.5	24	0.0099	210.00	19.51	18.50	5.89	0.59	85.90	82.60	80.73	3.30	0.0089	83.20	81.33	80.00
							20	0.0024	210.00	N/A	0.00	1.19	0.00	85.90	82.60	80.73	N/A	0.0089	83.20	81.33	85.00
	NW CH-1	NW CH-2	0.	63.9	55.22	31.58	6	0.0009	560.00	N/A	31.58	0.60	14.88	N/A	82.43	82.11	N/A	0.0006	82.44	82.12	79.30
	NW CH-2	NW CH-3	0.	95.7	60.22	42.36	6	0.0010	840.00	N/A	42.36	0.80	17.45	N/A	82.11	81.32	N/A	0.0009	82.12	81.33	78.80

	Up Node Name	Down Node Name	Trib. Area at Up Node (acre)	Cumul. Area (acre)	Total Computed Time of Concentration Up Node (min.)	Total Flow at Convey (cfs)	Convey Size (in or ft)	Average Slope (ft/ft)	Total Length (feet)	Full Flow Capacity of Conduit (cfs)	Computed Flow at Convey (cfs)	Exit Velocity (fps)	Travel Time at Convey (min.)	Rim/Grate at Up Node (feet)	Up HGL (feet)	Down HGL (feet)	Up (RIM-HGL) (feet)	Energy Slope (ft/ft)	Up EGL (feet)	Down EGL (feet)	Up Invert (feet)
	NW CH-3	NW CH 4	0.	107.5	65.22	42.63	6	0.0010	1850.00	N/A	42.63	0.56	44.86	N/A	81.32	80.22	N/A	0.0006	81.33	80.23	78.00
	SE 1	SE 2	17.9	17.9	15.	31.56	30	0.0053	450.00	25.96	28.87	5.88	1.28	101.10	100.74	97.77	0.36	0.0066	101.34	98.37	96.40
							N/A	0.0056	450.00	N/A	2.69	1.79	4.11	101.10	101.28	98.78	-0.18	0.0056	101.34	98.84	101.00
	SE 2	SE 3	7.9	25.8	16.17	44.07	36	0.0038	370.00	35.56	44.07	6.23	0.99	98.60	97.70	95.55	0.90	0.0058	98.37	96.22	93.50
							N/A	0.0027	370.00	N/A	0.00	1.31	0.00	98.60	95.27	92.29	N/A	0.0081	96.25	93.26	98.50
	SE 3	SE 4	4.2	30.	17.16	49.4	42	0.0021	580.00	39.66	49.40	5.13	1.88	97.20	95.76	93.90	1.44	0.0032	96.22	94.35	91.60
							N/A	0.0043	580.00	N/A	0.00	6.54	0.00	97.20	95.27	92.29	N/A	0.0051	96.25	93.26	97.50
	SE 4	SE 5	8.1	38.1	19.04	59.29	54	0.0014	320.00	63.91	59.29	4.74	1.13	94.10	92.72	92.25	1.38	0.0015	93.10	92.64	89.40
							N/A	0.0031	320.00	N/A	0.00	2.33	0.00	94.10	95.27	92.29	N/A	0.0093	96.25	93.26	95.00
	SE 5	SE 6	10.9	49.	20.16	75.53	54	0.0069	270.00	141.07	75.53	5.34	0.57	93.80	91.49	90.84	2.31	0.0048	92.64	91.33	88.95
							N/A	0.0074	270.00	N/A	0.00	1.02	0.00	93.80	95.27	92.29	N/A	0.0110	96.25	93.26	94.00
	SE 6	SE Outlet	13.6	62.6	20.71	94.36	54	0.0043	70.00	111.57	94.36	8.88	0.15	92.50	90.24	89.65	2.26	0.0046	91.33	91.01	87.10
							20	0.0043	70.00	N/A	0.00	1.05	0.00	92.50	95.27	92.29	N/A	0.0426	96.25	93.26	92.50
	NW-1C	NW-1	8.5	30.1	46.31	18.37	30	0.0011	570.00	11.53	18.37	3.74	2.54	96.40	93.02	91.50	3.38	0.0027	93.26	91.74	89.60
							N/A	0.0037	570.00	N/A	0.00	0.00	0.00	96.40	93.02	91.50	N/A	0.0027	93.26	91.74	96.40
	NW-1A	NW-1C	21.6	21.6	46.	13.28	18	0.0029	140.00	4.87	13.28	7.52	0.31	N/A	95.27	92.29	N/A	0.0213	96.25	93.26	90.00

CS DRAINAGE STUDIO

Combined Hydraulics & Hydrology for Unit Peak Discharge Methods Software Package

A Civil Solutions Product

OUTPUT RESULTS FOR FILE	K:\SAC_LDEV\097679001 Amoruso Ranch\06 Reports\Drainage\CSDS\2015-10\Amoruso 100yr v10 10_27_2015_rev
PROJECT DESCRIPTION	
PRINTED ON DATE	10-28-2015
PRINTED BY USER	

This Printout Report Contains :

1) Jurisdiction File Information (hydrology basis)
2) Contributing Areas Information
3) Cumulative Areas Information
4) Node Connection Outline Information
5) Conveyance Description Information
6) Conveyance Profiles Information
7) Node Results Summary
8) Convey Results Summary

****

CONVERGENCE CONTROL VARIABLES :
This software requires the use of several control variables to force the system of calculations to be convergent. These need to be adjusted for each system, to meet jur. requirements, and to provide accurate results. The variables used in this analysis are described below.

****

DESCRIPTION:	Variable Value	Unit
Horizontal Length Increment used for Backwater Calculations	20	Feet
Computational Time Interval for Hydrograph Calculations	5	Min.
Backwater Calculations Depth Tolerance	.002	Feet
Backwater Calculations Distance Tolerance	.01	Feet
Tolerance for Flow based Calculations	.005	cfs
Tolerance for Froud based Calculations	.005	
Maximum Travel Time Allowed Between Two Connected Nodes (Tt)	5	Min.
Minimum Flow Percentage in Parallel Conveyances to Contribute to Tt	35	%
Maximum Number of Iterations Allowed at any Iterative Calculation	200	
Convergence Tr Test Tolerance	0.05	min.
Flow Diversion Calculations were DISABLED for this calculation.		

RESPONSE time Solved By : Tr at merge nodes solved by largest Contributing Area

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Jurisdiction File Information:
(used for hydrology basis)

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Description:	Variable Value
Computer Model Analysis Type	ROSEVILL
Jurisdiction Name	Roseville - Peak 100 Yr. Storm
Jurisdiction Title	ROSEV100
Jurisdiction Description	Based on Unit Peak Discharge Method - Based on Section 10 Roseville Improvement Standards.
Jurisdiction Date	July 22, 1997
Jurisdiction Location	City of Roseville
Jurisdiction State	California
Jurisdiction File Created By	Civil Solutions

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FLOW CALCULATION PARAMETERS AS FOLLOWS:

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DESCRIPTION	UNIT	Return Period	% Impervious	Perv. Infiltration (in/hr)
Highways & Parking :	Acre	100	95	.06
Commercial Offices :	Acre	100	90	.18
Intensive Industrial :	Acre	100	85	.18
Apartments HDR :	Acre	100	80	.18
Mobile Home Park :	Acre	100	75	.25
Condominiums, MDR :	Acre	100	70	.25
Residential: 8-10 du/acre, Ext Indust :	Acre	100	60	.18
Residential: 6-8 du/acre, LDR, School :	Acre	100	50	.25
Residential: 4-6 du/acre :	Acre	100	40	.25
Residential 3-4 du/acre :	Acre	100	30	.25
Residential: 2-3 du/acre :	Acre	100	25	.25
Residential: 1-2 du/acre :	Acre	100	20	.25
Residential: 0.5-1 du/acre :	Acre	100	15	.25
Residential: 0.2-0.5 du/acre, Ag. Res :	Acre	100	10	.25
Residential: <0.2 du/acre, Recreation :	Acre	100	5	.25
Open Space, Grassland, Ag. :	Acre	100	2	.2
Open Space, Woodland, Natural :	Acre	100	1	.2
Dense Oak, Shrubs, Vines :	acre	100	1	.25

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Node Contributing Areas Information:
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#	Node Name	Total Trib. Area		Trib. Area	Contrib. Area by type
1	MH - 3	7.		5.9	Condominiums, MDR :
				1.1	Highways & Parking :
2	MH - 4	8.6		5.9	Apartments HDR :
				1.5	Commercial Offices :
				1.2	Highways & Parking :
3	MH - 5	3.4		1.6	Apartments HDR :
				0.9	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				0.7	Highways & Parking :
4	MH - 6	23.1		14.	Commercial Offices :
				3.4	Residential: 6-8 du/acre, LDR, School :
				3.7	Open Space, Woodland, Natural :
				2.	Highways & Parking :
5	MH - 7	6.		2.3	Residential: 6-8 du/acre, LDR, School :
				2.9	Condominiums, MDR :
				0.2	Dense Oak, Shrubs, Vines :
				0.6	Highways & Parking :
6	MH - 8	6.4		5.5	Residential: 6-8 du/acre, LDR, School :
				0.5	Dense Oak, Shrubs, Vines :
				0.4	Highways & Parking :
7	MH - 9	6.3		4.8	Residential: 6-8 du/acre, LDR, School :
				0.6	Dense Oak, Shrubs, Vines :
				0.9	Highways & Parking :
8	MH - 10	4.9		4.1	Residential: 6-8 du/acre, LDR, School :
				0.5	Dense Oak, Shrubs, Vines :
				0.3	Highways & Parking :
9	MH - 11	9.3		8.5	Commercial Offices :
				0.8	Highways & Parking :
10	MH - 12	8.8		3.3	Commercial Offices :
				2.6	Residential: 6-8 du/acre, LDR, School :
				2.	Highways & Parking :
				0.9	Dense Oak, Shrubs, Vines :
11	MH - 13	12.		7.2	Residential: 6-8 du/acre, LDR, School :
				2.4	Condominiums, MDR :
				1.1	Dense Oak, Shrubs, Vines :
				1.3	Highways & Parking :
12	MH - 14	5.		4.4	Residential: 6-8 du/acre, LDR, School :
				0.1	Dense Oak, Shrubs, Vines :
				0.5	Highways & Parking :
13	MH - 15	6.4		0.1	Highways & Parking :
				1.	Dense Oak, Shrubs, Vines :
				5.3	Residential: 6-8 du/acre, LDR, School :
14	MH - 16	28.		6.8	Commercial Offices :
				9.6	Apartments HDR :
				11.6	Residential: 6-8 du/acre, LDR, School :
16	MH - 18	23.7		9.3	Apartments HDR :
				10.1	Open Space, Woodland, Natural :
				4.3	Highways & Parking :
17	MH - 19	6.4		5.6	Apartments HDR :
				0.4	Commercial Offices :
				0.4	Highways & Parking :
18	MH - 20	19.4		16.7	Commercial Offices :
				0.1	Apartments HDR :
				2.6	Highways & Parking :
19	MH - 21	11.1		1.8	Condominiums, MDR :
				7.8	Residential: 6-8 du/acre, LDR, School :
				1.5	Highways & Parking :
20	MH - 22	5.7		4.4	Condominiums, MDR :
				1.3	Highways & Parking :
21	MH - 23	10.6		9.2	Residential: 6-8 du/acre, LDR, School :

				1.4	Highways & Parking :
22	MH - 24	7.		7.	Condominiums, MDR :
23	MH - 25	5.5		3.7	Condominiums, MDR :
				1.8	Residential: 6-8 du/acre, LDR, School :
24	MH - 26	2.6		1.6	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Woodland, Natural :
				0.8	Highways & Parking :
25	MH - 27	4.3		3.1	Residential: 6-8 du/acre, LDR, School :
				0.6	Open Space, Woodland, Natural :
				0.6	Highways & Parking :
26	MH - 28	15.9		14.2	Residential: 6-8 du/acre, LDR, School :
				0.9	Open Space, Woodland, Natural :
				0.8	Highways & Parking :
27	MH - 29	11.9		9.6	Residential: 6-8 du/acre, LDR, School :
				0.5	Open Space, Woodland, Natural :
				1.8	Highways & Parking :
28	MH - 30	3.7		2.9	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
				0.4	Highways & Parking :
29	MH - 31	14.6		13.1	Residential: 6-8 du/acre, LDR, School :
				1.	Open Space, Woodland, Natural :
				0.5	Highways & Parking :
30	MH - 32	7.		5.1	Residential: 6-8 du/acre, LDR, School :
				1.2	Open Space, Woodland, Natural :
				0.7	Highways & Parking :
31	MH - 33	5.		5.	Residential: 6-8 du/acre, LDR, School :
32	MH - 34	14.7		14.7	Residential: 6-8 du/acre, LDR, School :
33	MH - 35	13.6		9.5	Residential: 6-8 du/acre, LDR, School :
				3.2	Open Space, Woodland, Natural :
				0.9	Highways & Parking :
34	MH - 36	5.2		2.	Residential: 6-8 du/acre, LDR, School :
				2.9	Open Space, Woodland, Natural :
				0.3	Highways & Parking :
35	MH - 37	3.8		3.1	Residential: 6-8 du/acre, LDR, School :
				0.3	Open Space, Woodland, Natural :
				0.4	Highways & Parking :
36	MH - 38	8.		6.4	Residential: 6-8 du/acre, LDR, School :
				0.8	Open Space, Woodland, Natural :
				0.8	Highways & Parking :
37	MH - 39	7.2		5.4	Residential: 6-8 du/acre, LDR, School :
				1.	Open Space, Woodland, Natural :
				0.8	Highways & Parking :
38	MH - 40	4.6		4.1	Residential: 6-8 du/acre, LDR, School :
				0.5	Open Space, Woodland, Natural :
39	MH - 41	11.6		8.9	Residential: 6-8 du/acre, LDR, School :
				2.7	Open Space, Woodland, Natural :
41	EAST CH 3	1.4		1.4	Residential: 6-8 du/acre, LDR, School :
43	WEST CH 1	29.9		10.	Open Space, Woodland, Natural :
				19.9	Residential: 6-8 du/acre, LDR, School :
46	WEST CH 4	3.3		3.3	Residential: 6-8 du/acre, LDR, School :
50	NW-1	10.6		10.6	Residential: 6-8 du/acre, LDR, School :
51	NW-1B	5.9		5.4	Residential: 6-8 du/acre, LDR, School :
				0.5	Highways & Parking :
52	NW-2	7.7		7.4	Residential: 6-8 du/acre, LDR, School :
				0.3	Highways & Parking :
53	NW-3	9.6		8.7	Residential: 6-8 du/acre, LDR, School :
				0.9	Open Space, Woodland, Natural :
54	NW-4	12.4		4.2	Residential: 6-8 du/acre, LDR, School :
				4.5	Open Space, Woodland, Natural :
				3.7	Highways & Parking :
55	NW-5	4.2		3.8	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
56	NW-6	7.7		6.8	Residential: 6-8 du/acre, LDR, School :
				0.9	Open Space, Woodland, Natural :
57	NW-7	7.5		7.1	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :

58	NW-8	3.3		2.9	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
59	NW-9	3.4		3.	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
60	NW-10	5.1		4.	Residential: 6-8 du/acre, LDR, School :
				1.1	Open Space, Woodland, Natural :
64	SE 1	17.9		6.3	Condominiums, MDR :
				8.5	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
				1.1	Highways & Parking :
65	SE 2	7.9		6.2	Condominiums, MDR :
				1.1	Residential: 6-8 du/acre, LDR, School :
				0.6	Highways & Parking :
66	SE 3	4.2		4.2	Residential: 6-8 du/acre, LDR, School :
67	SE 4	8.1		5.5	Residential: 6-8 du/acre, LDR, School :
				1.3	Condominiums, MDR :
				1.3	Highways & Parking :
68	SE 5	10.9		6.	Apartments HDR :
				3.	Residential: 6-8 du/acre, LDR, School :
				1.9	Highways & Parking :
69	SE 6	13.6		8.2	Condominiums, MDR :
				3.5	Residential: 6-8 du/acre, LDR, School :
				1.9	Highways & Parking :
70	SE Outlet	0.		0.9	Highways & Parking :
				5.4	Open Space, Woodland, Natural :
71	NW-1A	21.6		21.6	Residential: 6-8 du/acre, LDR, School :
72	NW-1C	8.5		8.5	Residential: 6-8 du/acre, LDR, School :

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Node Cumulative Areas Information:

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#	Node Name	Total Cumulative Area		Cumulative Area by Type	Cumulative Area by type
1	MH - 3	7.		1.1	Highways & Parking :
				5.9	Condominiums, MDR :
2	MH - 4	15.6		2.3	Highways & Parking :
				1.5	Commercial Offices :
				5.9	Apartments HDR :
				5.9	Condominiums, MDR :
3	MH - 5	19.		3.	Highways & Parking :
				1.5	Commercial Offices :
				7.5	Apartments HDR :
				5.9	Condominiums, MDR :
				0.9	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
4	MH - 6	42.1		5.	Highways & Parking :
				15.5	Commercial Offices :
				7.5	Apartments HDR :
				5.9	Condominiums, MDR :
				4.3	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
5	MH - 7	54.5		6.	Highways & Parking :
				15.5	Commercial Offices :
				7.5	Apartments HDR :
				8.8	Condominiums, MDR :
				12.1	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				0.7	Dense Oak, Shrubs, Vines :
6	MH - 8	6.4		0.4	Highways & Parking :
				5.5	Residential: 6-8 du/acre, LDR, School :
				0.5	Dense Oak, Shrubs, Vines :
7	MH - 9	60.8		6.9	Highways & Parking :
				15.5	Commercial Offices :
				7.5	Apartments HDR :
				8.8	Condominiums, MDR :
				16.9	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				1.3	Dense Oak, Shrubs, Vines :
8	MH - 10	95.8		11.3	Highways & Parking :
				27.3	Commercial Offices :
				7.5	Apartments HDR :
				11.2	Condominiums, MDR :
				30.8	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				3.8	Dense Oak, Shrubs, Vines :
9	MH - 11	9.3		0.8	Highways & Parking :
				8.5	Commercial Offices :
10	MH - 12	18.1		2.8	Highways & Parking :
				11.8	Commercial Offices :
				2.6	Residential: 6-8 du/acre, LDR, School :
				0.9	Dense Oak, Shrubs, Vines :
11	MH - 13	30.1		4.1	Highways & Parking :
				11.8	Commercial Offices :
				2.4	Condominiums, MDR :
				9.8	Residential: 6-8 du/acre, LDR, School :
				2.	Dense Oak, Shrubs, Vines :
12	MH - 14	100.8		11.8	Highways & Parking :
				27.3	Commercial Offices :

				7.5	Apartments HDR :
				11.2	Condominiums, MDR :
				35.2	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				3.9	Dense Oak, Shrubs, Vines :
13	MH - 15	107.2		11.9	Highways & Parking :
				27.3	Commercial Offices :
				7.5	Apartments HDR :
				11.2	Condominiums, MDR :
				40.5	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				4.9	Dense Oak, Shrubs, Vines :
14	MH - 16	28.		6.8	Commercial Offices :
				9.6	Apartments HDR :
				11.6	Residential: 6-8 du/acre, LDR, School :
15	MH - 17	28.		6.8	Commercial Offices :
				9.6	Apartments HDR :
				11.6	Residential: 6-8 du/acre, LDR, School :
16	MH - 18	94.3		10.1	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				6.2	Condominiums, MDR :
				19.4	Residential: 6-8 du/acre, LDR, School :
				10.1	Open Space, Woodland, Natural :
17	MH - 19	6.4		0.4	Highways & Parking :
				0.4	Commercial Offices :
				5.6	Apartments HDR :
18	MH - 20	25.8		3.	Highways & Parking :
				17.1	Commercial Offices :
				5.7	Apartments HDR :
19	MH - 21	11.1		1.5	Highways & Parking :
				1.8	Condominiums, MDR :
				7.8	Residential: 6-8 du/acre, LDR, School :
20	MH - 22	16.8		2.8	Highways & Parking :
				6.2	Condominiums, MDR :
				7.8	Residential: 6-8 du/acre, LDR, School :
21	MH - 23	117.4		11.5	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				30.4	Residential: 6-8 du/acre, LDR, School :
				10.1	Open Space, Woodland, Natural :
22	MH - 24	7.		7.	Condominiums, MDR :
23	MH - 25	12.5		10.7	Condominiums, MDR :
				1.8	Residential: 6-8 du/acre, LDR, School :
24	MH - 26	124.3		12.9	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				35.1	Residential: 6-8 du/acre, LDR, School :
				10.9	Open Space, Woodland, Natural :
25	MH - 27	4.3		0.6	Highways & Parking :
				3.1	Residential: 6-8 du/acre, LDR, School :
				0.6	Open Space, Woodland, Natural :
26	MH - 28	155.8		15.9	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				61.8	Residential: 6-8 du/acre, LDR, School :
				12.7	Open Space, Woodland, Natural :
27	MH - 29	11.9		1.8	Highways & Parking :
				9.6	Residential: 6-8 du/acre, LDR, School :
				0.5	Open Space, Woodland, Natural :
28	MH - 30	15.6		2.2	Highways & Parking :

				12.5	Residential: 6-8 du/acre, LDR, School :
				0.9	Open Space, Woodland, Natural :
29	MH - 31	197.1		17.1	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				99.7	Residential: 6-8 du/acre, LDR, School :
				14.9	Open Space, Woodland, Natural :
30	MH - 32	7.		0.7	Highways & Parking :
				5.1	Residential: 6-8 du/acre, LDR, School :
				1.2	Open Space, Woodland, Natural :
31	MH - 33	12.		0.7	Highways & Parking :
				10.1	Residential: 6-8 du/acre, LDR, School :
				1.2	Open Space, Woodland, Natural :
32	MH - 34	26.7		0.7	Highways & Parking :
				24.8	Residential: 6-8 du/acre, LDR, School :
				1.2	Open Space, Woodland, Natural :
33	MH - 35	210.7		18.	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				109.2	Residential: 6-8 du/acre, LDR, School :
				18.1	Open Space, Woodland, Natural :
34	MH - 36	5.2		0.3	Highways & Parking :
				2.	Residential: 6-8 du/acre, LDR, School :
				2.9	Open Space, Woodland, Natural :
35	MH - 37	9.		0.7	Highways & Parking :
				5.1	Residential: 6-8 du/acre, LDR, School :
				3.2	Open Space, Woodland, Natural :
36	MH - 38	17.		1.5	Highways & Parking :
				11.5	Residential: 6-8 du/acre, LDR, School :
				4.	Open Space, Woodland, Natural :
37	MH - 39	24.2		2.3	Highways & Parking :
				16.9	Residential: 6-8 du/acre, LDR, School :
				5.	Open Space, Woodland, Natural :
38	MH - 40	4.6		4.1	Residential: 6-8 du/acre, LDR, School :
				0.5	Open Space, Woodland, Natural :
39	MH - 41	16.2		13.	Residential: 6-8 du/acre, LDR, School :
				3.2	Open Space, Woodland, Natural :
40	EAST CH 2	107.2		11.9	Highways & Parking :
				27.3	Commercial Offices :
				7.5	Apartments HDR :
				11.2	Condominiums, MDR :
				40.5	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				4.9	Dense Oak, Shrubs, Vines :
41	EAST CH 3	108.6		11.9	Highways & Parking :
				27.3	Commercial Offices :
				7.5	Apartments HDR :
				11.2	Condominiums, MDR :
				41.9	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				3.7	Open Space, Woodland, Natural :
				4.9	Dense Oak, Shrubs, Vines :
42	EAST CH 4	124.8		11.9	Highways & Parking :
				27.3	Commercial Offices :
				7.5	Apartments HDR :
				11.2	Condominiums, MDR :
				54.9	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				6.9	Open Space, Woodland, Natural :
				4.9	Dense Oak, Shrubs, Vines :
43	WEST CH 1	240.6		18.	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :

				16.9	Condominiums, MDR :
				129.1	Residential: 6-8 du/acre, LDR, School :
				28.1	Open Space, Woodland, Natural :
44	WEST CH 2	240.6		18.	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				129.1	Residential: 6-8 du/acre, LDR, School :
				28.1	Open Space, Woodland, Natural :
45	WEST CH 3	264.8		20.3	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				146.	Residential: 6-8 du/acre, LDR, School :
				33.1	Open Space, Woodland, Natural :
46	WEST CH 4	268.1		20.3	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				149.3	Residential: 6-8 du/acre, LDR, School :
				33.1	Open Space, Woodland, Natural :
47	NW CH 4	375.6		24.8	Highways & Parking :
				23.9	Commercial Offices :
				24.6	Apartments HDR :
				16.9	Condominiums, MDR :
				243.3	Residential: 6-8 du/acre, LDR, School :
				42.1	Open Space, Woodland, Natural :
48	NW CH 5	500.4		36.7	Highways & Parking :
				51.2	Commercial Offices :
				32.1	Apartments HDR :
				28.1	Condominiums, MDR :
				298.2	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				49.	Open Space, Woodland, Natural :
				4.9	Dense Oak, Shrubs, Vines :
49	Creek	500.4		36.7	Highways & Parking :
				51.2	Commercial Offices :
				32.1	Apartments HDR :
				28.1	Condominiums, MDR :
				298.2	Residential: 6-8 du/acre, LDR, School :
				0.2	Open Space, Grassland, Ag. :
				49.	Open Space, Woodland, Natural :
				4.9	Dense Oak, Shrubs, Vines :
50	NW-1	40.7		40.7	Residential: 6-8 du/acre, LDR, School :
51	NW-1B	46.6		0.5	Highways & Parking :
				46.1	Residential: 6-8 du/acre, LDR, School :
52	NW-2	54.3		0.8	Highways & Parking :
				53.5	Residential: 6-8 du/acre, LDR, School :
53	NW-3	63.9		0.8	Highways & Parking :
				62.2	Residential: 6-8 du/acre, LDR, School :
				0.9	Open Space, Woodland, Natural :
54	NW-4	12.4		3.7	Highways & Parking :
				4.2	Residential: 6-8 du/acre, LDR, School :
				4.5	Open Space, Woodland, Natural :
55	NW-5	16.6		3.7	Highways & Parking :
				8.	Residential: 6-8 du/acre, LDR, School :
				4.9	Open Space, Woodland, Natural :
56	NW-6	31.8		3.7	Highways & Parking :
				21.9	Residential: 6-8 du/acre, LDR, School :
				6.2	Open Space, Woodland, Natural :
57	NW-7	7.5		7.1	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
58	NW-8	3.3		2.9	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :
59	NW-9	3.4		3.	Residential: 6-8 du/acre, LDR, School :
				0.4	Open Space, Woodland, Natural :

60	NW-10	11.8		9.9	Residential: 6-8 du/acre, LDR, School :
				1.9	Open Space, Woodland, Natural :
61	NW CH-1	63.9		0.8	Highways & Parking :
				62.2	Residential: 6-8 du/acre, LDR, School :
				0.9	Open Space, Woodland, Natural :
62	NW CH-2	95.7		4.5	Highways & Parking :
				84.1	Residential: 6-8 du/acre, LDR, School :
				7.1	Open Space, Woodland, Natural :
63	NW CH-3	107.5		4.5	Highways & Parking :
				94.	Residential: 6-8 du/acre, LDR, School :
				9.	Open Space, Woodland, Natural :
64	SE 1	17.9		1.1	Highways & Parking :
				6.3	Condominiums, MDR :
				8.5	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
65	SE 2	25.8		1.7	Highways & Parking :
				12.5	Condominiums, MDR :
				9.6	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
66	SE 3	30.		1.7	Highways & Parking :
				12.5	Condominiums, MDR :
				13.8	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
67	SE 4	38.1		3.	Highways & Parking :
				13.8	Condominiums, MDR :
				19.3	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
68	SE 5	49.		4.9	Highways & Parking :
				6.	Apartments HDR :
				13.8	Condominiums, MDR :
				22.3	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
69	SE 6	62.6		6.8	Highways & Parking :
				6.	Apartments HDR :
				22.	Condominiums, MDR :
				25.8	Residential: 6-8 du/acre, LDR, School :
				2.	Open Space, Woodland, Natural :
70	SE Outlet	68.9		7.7	Highways & Parking :
				6.	Apartments HDR :
				22.	Condominiums, MDR :
				25.8	Residential: 6-8 du/acre, LDR, School :
				7.4	Open Space, Woodland, Natural :
71	NW-1A	21.6		21.6	Residential: 6-8 du/acre, LDR, School :
72	NW-1C	30.1		30.1	Residential: 6-8 du/acre, LDR, School :

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                                                  |<--MH - 3
                                              |<--MH - 4
                                          |<--MH - 5
                                      |<--MH - 6
                                      |<--MH - 8
                                  |<--MH - 7
                              |<--MH - 9
                              |       |<--MH - 11
                              |   |<--MH - 12
                              |<--MH - 13
                          |<--MH - 10
                      |<--MH - 14
                  |<--MH - 15
              |<--EAST CH 2
          |<--EAST CH 3
          |   |<--MH - 40
          |<--MH - 41
      |<--EAST CH 4
      |                                               |<--MH - 16
      |                                           |<--MH - 17
      |                                           |   |<--MH - 19
      |                                           |<--MH - 20
      |                                           |   |<--MH - 21
      |                                           |<--MH - 22
      |                                       |<--MH - 18
      |                                       |   |<--MH - 24
      |                                       |<--MH - 25
      |                                   |<--MH - 23
      |                                   |<--MH - 27
      |                               |<--MH - 26
      |                               |   |<--MH - 29
      |                               |<--MH - 30
      |                           |<--MH - 28
      |                           |       |<--MH - 32
      |                           |   |<--MH - 33
      |                           |<--MH - 34
      |                       |<--MH - 31
      |                   |<--MH - 35
      |               |<--WEST CH 1
      |           |<--WEST CH 2
      |           |           |<--MH - 36
      |           |       |<--MH - 37
      |           |   |<--MH - 38
      |           |<--MH - 39
      |       |<--WEST CH 3
      |   |<--WEST CH 4
      |   |               |<--NW-4
      |   |           |<--NW-5
      |   |           |<--NW-7
      |   |       |<--NW-6
      |   |       |                       |<--NW-1A
      |   |       |                   |<--NW-1C
      |   |       |               |<--NW-1
      |   |       |           |<--NW-1B
      |   |       |       |<--NW-2
      |   |       |   |<--NW-3
      |   |       |<--NW CH-1
      |   |   |<--NW CH-2
      |   |   |   |<--NW-8
      |   |   |   |<--NW-9
      |   |   |<--NW-10
      |   |<--NW CH-3
      |<--NW CH 4
  |<--NW CH 5
--Creek
                      |<--SE 1
```

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          |<--SE 2
        |<--SE 3
      |<--SE 4
    |<--SE 5
  |<--SE 6
--SE Outlet
```

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**************************************
 Conveyance Description Information:
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 1      MH - 3 to MH - 4    MH - 3   MH - 4   PIPE      30  Inch  'n'= .015  'Z'= 2
P- 1    MH - 3 to MH - 4    MH - 3   MH - 4   Composite Open Channel
 2      MH - 4 to MH - 5    MH - 4   MH - 5   PIPE      30  Inch  'n'= .015  'Z'= 2
P- 2    MH - 4 to MH - 5    MH - 4   MH - 5   Composite Open Channel
 3      MH - 5 to MH - 6    MH - 5   MH - 6   PIPE      42  Inch  'n'= .015  'Z'= 2
P- 3    MH - 5 to MH - 6    MH - 5   MH - 6   Composite Open Channel
 4      MH - 6 to MH - 7    MH - 6   MH - 7   PIPE      48  Inch  'n'= .015  'Z'= 2
P- 4    MH - 6 to MH - 7    MH - 6   MH - 7   Composite Open Channel
 5      MH - 8 to MH - 7    MH - 8   MH - 7   PIPE      24  Inch  'n'= .015  'Z'= 2
P- 5    MH - 8 to MH - 7    MH - 8   MH - 7   Composite Open Channel
 6      MH - 7 to MH - 9    MH - 7   MH - 9   PIPE      48  Inch  'n'= .015  'Z'= 2
P- 6    MH - 7 to MH - 9    MH - 7   MH - 9   Composite Open Channel
 7      MH - 9 to MH - 10   MH - 9   MH - 10  PIPE      48  Inch  'n'= .015  'Z'= 2
P- 7    MH - 9 to MH - 10   MH - 9   MH - 10  Composite Open Channel
 8      MH - 11 to MH - 12  MH - 11  MH - 12  PIPE      36  Inch  'n'= .015  'Z'= 2
P- 8    MH - 11 to MH - 12  MH - 11  MH - 12  Composite Open Channel
 9      MH - 12 to MH - 13  MH - 12  MH - 13  PIPE      42  Inch  'n'= .015  'Z'= 2
P- 9    MH - 12 to MH - 13  MH - 12  MH - 13  Composite Open Channel
 10     MH - 13 to MH - 10  MH - 13  MH - 10  PIPE      42  Inch  'n'= .015  'Z'= 2
P- 10   MH - 13 to MH - 10  MH - 13  MH - 10  Composite Open Channel
 11     MH - 10 to MH - 14  MH - 10  MH - 14  PIPE      54  Inch  'n'= .015  'Z'= 2
P- 11   MH - 10 to MH - 14  MH - 10  MH - 14  Composite Open Channel
 12     MH - 14 to MH - 15  MH - 14  MH - 15  PIPE      54  Inch  'n'= .015  'Z'= 2
P- 12   MH - 14 to MH - 15  MH - 14  MH - 15  Composite Open Channel
 13     MH - 15 to EAST CH 2         MH - 15  EAST CH 2        PIPE         54  Inch  'n'= .015  'Z'= 2
P- 13   MH - 15 to EAST CH 2         MH - 15  EAST CH 2        RECTANGULAR  50  Ft.   'n'= .015  'Z'= 2
 14     MH - 16 to MH - 17  MH - 16  MH - 17  PIPE      48  Inch  'n'= .015  'Z'= 2
 15     MH - 17 to MH - 18  MH - 17  MH - 18  PIPE      48  Inch  'n'= .015  'Z'= 2
 16     MH - 19 to MH - 20  MH - 19  MH - 20  PIPE      30  Inch  'n'= .015  'Z'= 2
P- 16   MH - 19 to MH - 20  MH - 19  MH - 20  Composite Open Channel
 17     MH - 20 to MH - 18  MH - 20  MH - 18  PIPE      36  Inch  'n'= .015  'Z'= 2
P- 17   MH - 20 to MH - 18  MH - 20  MH - 18  Composite Open Channel
 18     MH - 21 to MH - 22  MH - 21  MH - 22  PIPE      30  Inch  'n'= .015  'Z'= 2
P- 18   MH - 21 to MH - 22  MH - 21  MH - 22  Composite Open Channel
 19     MH - 22 to MH - 18  MH - 22  MH - 18  PIPE      36  Inch  'n'= .015  'Z'= 2
P- 19   MH - 22 to MH - 18  MH - 22  MH - 18  Composite Open Channel
 20     MH - 18 to MH - 23  MH - 18  MH - 23  PIPE      72  Inch  'n'= .015  'Z'= 2
P- 20   MH - 18 to MH - 23  MH - 18  MH - 23  Composite Open Channel
 21     MH - 24 to MH - 25  MH - 24  MH - 25  PIPE      30  Inch  'n'= .015  'Z'= 2
P- 21   MH - 24 to MH - 25  MH - 24  MH - 25  Composite Open Channel
 22     MH - 25 to MH - 23  MH - 25  MH - 23  PIPE      36  Inch  'n'= .015  'Z'= 2
P- 22   MH - 25 to MH - 23  MH - 25  MH - 23  Composite Open Channel
 23     MH - 23 to MH - 26  MH - 23  MH - 26  PIPE      72  Inch  'n'= .015  'Z'= 2
P- 23   MH - 23 to MH - 26  MH - 23  MH - 26  Composite Open Channel
 24     MH - 27 to MH - 26  MH - 27  MH - 26  PIPE      24  Inch  'n'= .015  'Z'= 2
P- 24   MH - 27 to MH - 26  MH - 27  MH - 26  Composite Open Channel
 25     MH - 26 to MH - 28  MH - 26  MH - 28  PIPE      72  Inch  'n'= .015  'Z'= 2
P- 25   MH - 26 to MH - 28  MH - 26  MH - 28  Composite Open Channel
 26     MH - 29 to MH - 30  MH - 29  MH - 30  PIPE      30  Inch  'n'= .015  'Z'= 2
P- 26   MH - 29 to MH - 30  MH - 29  MH - 30  Composite Open Channel
 27     MH - 30 to MH - 28  MH - 30  MH - 28  PIPE      36  Inch  'n'= .015  'Z'= 2
P- 27   MH - 30 to MH - 28  MH - 30  MH - 28  Composite Open Channel
 28     MH - 28 to MH - 31  MH - 28  MH - 31  PIPE      72  Inch  'n'= .015  'Z'= 2
P- 28   MH - 28 to MH - 31  MH - 28  MH - 31  Composite Open Channel
 29     MH - 32 to MH - 33  MH - 32  MH - 33  PIPE      24  Inch  'n'= .015  'Z'= 2
P- 29   MH - 32 to MH - 33  MH - 32  MH - 33  Composite Open Channel
 30     MH - 33 to MH - 34  MH - 33  MH - 34  PIPE      30  Inch  'n'= .015  'Z'= 2
P- 30   MH - 33 to MH - 34  MH - 33  MH - 34  Composite Open Channel
 31     MH - 34 to MH - 31  MH - 34  MH - 31  PIPE      36  Inch  'n'= .015  'Z'= 2
P- 31   MH - 34 to MH - 31  MH - 34  MH - 31  Composite Open Channel
 32     MH - 31 to MH - 35  MH - 31  MH - 35  PIPE      72  Inch  'n'= .015  'Z'= 2
P- 32   MH - 31 to MH - 35  MH - 31  MH - 35  Composite Open Channel
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 33    MH - 35 to WEST CH 1          MH - 35   WEST CH 1          PIPE           72  Inch  'n'= .015   'Z'= 2
P- 33  MH - 35 to WEST CH 1          MH - 35   WEST CH 1          Composite Open Channel
 34    MH - 36 to MH - 37  MH - 36   MH - 37   PIPE       30  Inch  'n'= .015   'Z'= 2
P- 34  MH - 36 to MH - 37  MH - 36   MH - 37   Composite Open Channel
 35    MH - 37 to MH - 38  MH - 37   MH - 38   PIPE       30  Inch  'n'= .015   'Z'= 2
P- 35  MH - 37 to MH - 38  MH - 37   MH - 38   Composite Open Channel
 36    MH - 38 to MH - 39  MH - 38   MH - 39   PIPE       36  Inch  'n'= .015   'Z'= 2
P- 36  MH - 38 to MH - 39  MH - 38   MH - 39   Composite Open Channel
 37    MH - 39 to WEST CH 3          MH - 39   WEST CH 3          PIPE           36  Inch  'n'= .015   'Z'= 2
P- 37  MH - 39 to WEST CH 3          MH - 39   WEST CH 3          RECTANGULAR    20  Ft.   'n'= .015   'Z'= 2
 38    MH - 40 to MH - 41  MH - 40   MH - 41   PIPE       24  Inch  'n'= .015   'Z'= 2
P- 38  MH - 40 to MH - 41  MH - 40   MH - 41   Composite Open Channel
 39    MH - 41 to EAST CH 4          MH - 41   EAST CH 4          PIPE           24  Inch  'n'= .015   'Z'= 2
P- 39  MH - 41 to EAST CH 4          MH - 41   EAST CH 4          RECTANGULAR    30  Ft.   'n'= .015   'Z'= 2
 40    Convey  43          EAST CH 2           EAST CH 3          TRAPEZOIDAL     6  Ft.   'n'= .085   'Z'= 3
 41    Convey  44          EAST CH 3           EAST CH 4          TRAPEZOIDAL     6  Ft.   'n'= .085   'Z'= 3
 42    Convey  45          EAST CH 4           NW CH 5 TRAPEZOIDAL      6  Ft.   'n'= .085   'Z'= 3
 43    Convey  46          WEST CH 1           WEST CH 2          TRAPEZOIDAL     6  Ft.   'n'= .085   'Z'= 3
 44    Convey  47          WEST CH 2           WEST CH 3          TRAPEZOIDAL     6  Ft.   'n'= .085   'Z'= 3
 45    Convey  48          WEST CH 3           WEST CH 4          TRAPEZOIDAL     6  Ft.   'n'= .085   'Z'= 3
 46    Convey  49          WEST CH 4           NW CH 4 TRAPEZOIDAL      6  Ft.   'n'= .085   'Z'= 3
 47    Convey  50          NW CH 4 NW CH 5 TRAPEZOIDAL      8  Ft.   'n'= .085   'Z'= 3
 48    Convey  51          NW CH 5 Creek     TRAPEZOIDAL     10  Ft.   'n'= .085   'Z'= 3
 49    NW-1 to NW-1B       NW-1      NW-1B     PIPE       36  Inch  'n'= .015   'Z'= 2
P- 49  NW-1 to NW-1B       NW-1      NW-1C     Composite Open Channel
 50    NW-1B to NW-2       NW-1B     NW-2      PIPE       36  Inch  'n'= .015   'Z'= 2
P- 50  NW-1B to NW-2       NW-1C     NW-2      Composite Open Channel
 51    NW-2 to NW-3        NW-2      NW-3      PIPE       36  Inch  'n'= .015   'Z'= 2
P- 51  NW-2 to NW-3        NW-2      NW-3      Composite Open Channel
 52    NW-3 to NW CH-1     NW-3      NW CH-1 PIPE       36  Inch  'n'= .015   'Z'= 2
P- 52  NW-3 to NW CH-1     NW-3      NW CH-1 RECTANGULAR    30  Ft.   'n'= .015   'Z'= 2
 53    NW-4 to NW-5        NW-4      NW-5      PIPE       30  Inch  'n'= .015   'Z'= 2
P- 53  NW-4 to NW-5        NW-4      NW-5      Composite Open Channel
 54    NW-5 to NW-6        NW-5      NW-6      PIPE       30  Inch  'n'= .015   'Z'= 2
P- 54  NW-5 to NW-6        NW-5      NW-6      Composite Open Channel
 55    NW-7 to NW-6        NW-7      NW-6      PIPE       24  Inch  'n'= .015   'Z'= 2
P- 55  NW-7 to NW-6        NW-7      NW-6      Composite Open Channel
 56    NW-6 to NW CH-2     NW-6      NW CH-2 PIPE       30  Inch  'n'= .015   'Z'= 2
P- 56  NW-6 to NW CH-2     NW-6      NW CH-2 RECTANGULAR    20  Ft.   'n'= .015   'Z'= 2
 57    NW-8 to NW-10       NW-8      NW-10     PIPE       24  Inch  'n'= .015   'Z'= 2
P- 57  NW-8 to NW-10       NW-8      NW-10     Composite Open Channel
 58    NW-9 to NW-10       NW-9      NW-10     PIPE       24  Inch  'n'= .015   'Z'= 2
P- 58  NW-9 to NW-10       NW-9      NW-10     Composite Open Channel
 59    NW-10 to NW CH-3 NW-10     NW CH-3 PIPE       24  Inch  'n'= .015   'Z'= 2
P- 59  NW-10 to NW CH-3 NW-10     NW CH-3 RECTANGULAR    20  Ft.   'n'= .015   'Z'= 2
 60    NW Channel 1        NW CH-1 NW CH-2 TRAPEZOIDAL     6  Ft.   'n'= .085   'Z'= 3
 61    NW Channel 2        NW CH-2 NW CH-3 TRAPEZOIDAL     6  Ft.   'n'= .085   'Z'= 3
 62    NW Channel 3        NW CH-3 NW CH 4 TRAPEZOIDAL     6  Ft.   'n'= .085   'Z'= 3
 63    SE 1 to SE 2        SE 1      SE 2      PIPE       30  Inch  'n'= .015   'Z'= 2
P- 63  SE 1 to SE 2        SE 1      SE 2      Composite Open Channel
 64    SE 2 to SE 3        SE 2      SE 3      PIPE       36  Inch  'n'= .015   'Z'= 2
P- 64  SE 2 to SE 3                            Composite Open Channel
 65    SE 3 to SE 4        SE 3      SE 4      PIPE       42  Inch  'n'= .015   'Z'= 2
P- 65  SE 3 to SE 4                            Composite Open Channel
 66    SE 4 to SE 5        SE 4      SE 5      PIPE       54  Inch  'n'= .015   'Z'= 2
P- 66  SE 4 to SE 5                            Composite Open Channel
 67    SE 5 to SE 6        SE 5      SE 6      PIPE       54  Inch  'n'= .015   'Z'= 2
P- 67  SE 5 to SE 6                            Composite Open Channel
 68    SE 6 to SE Outlet   SE 6      SE Outlet PIPE       54  Inch  'n'= .015   'Z'= 2
P- 68  SE 6 to SE Outlet                       RECTANGULAR    20  Ft.   'n'= .015   'Z'= 2
 69    NW-1C to NW-1       NW-1C     NW-1      PIPE       30  Inch  'n'= .015   'Z'= 2
P- 69  NW-1C to NW-1       NW-1C     NW-1      Composite Open Channel
 70    NW-1A to NW-1C      NW-1A     NW-1C     PIPE       18  Inch  'n'= .015   'Z'= 2
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Conveyance Profile Information:

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#	Convey Name	Distance	Invert Elevation
1	MH - 3 to MH - 4	0.	89.5
1		490.	86.3
P - 1		0.	98.
P - 1		490.	96.
2	MH - 4 to MH - 5	0.	86.3
2		380.	84.5
P - 2		0.	96.
P - 2		380.	95.
3	MH - 5 to MH - 6	0.	83.5
3		770.	82.8
P - 3		0.	95.
P - 3		770.	90.
4	MH - 6 to MH - 7	0.	82.3
4		310.	81.9
P - 4		0.	90.
P - 4		310.	89.
5	MH - 8 to MH - 7	0.	84.4
5		420.	82.9
P - 5		0.	94.
P - 5		420.	89.
6	MH - 7 to MH - 9	0.	81.9
6		280.	81.2
P - 6		0.	89.
P - 6		280.	88.
7	MH - 9 to MH - 10	0.	81.2
7		270.	80.5
P - 7		0.	88.
P - 7		270.	87.5
8	MH - 11 to MH - 12	0.	86.
8		480.	83.5
P - 8		0.	93.
P - 8		480.	92.
9	MH - 12 to MH - 13	0.	82.9
9		700.	81.9
P - 9		0.	92.
P - 9		700.	91.
10	MH - 13 to MH - 10	0.	81.9
10		540.	81.
P - 10		0.	91.
P - 10		540.	87.5
11	MH - 10 to MH - 14	0.	80.
11		280.	79.2
P - 11		0.	87.5
P - 11		280.	87.
12	MH - 14 to MH - 15	0.	79.2
12		360.	78.16
P - 12		0.	87.
P - 12		360.	86.5
13	MH - 15 to EAST CH 2	0.	78.16
13		190.	77.5
P - 13		0.	86.5
P - 13		190.	85.
14	MH - 16 to MH - 17	0.	95.
14		950.	92.
15	MH - 17 to MH - 18	0.	92.
15		1260.	88.3
16	MH - 19 to MH - 20	0.	94.8
16		700.	92.8
P - 16		0.	105.5
P - 16		720.	102.5
17	MH - 20 to MH - 18	0.	92.3

17		800.	89.3
P - 17		0.	102.5
P - 17		800.	99.
18	MH - 21 to MH - 22	0.	94.
18		800.	90.9
P - 18		0.	104.5
P - 18		800.	100.
19	MH - 22 to MH - 18	0.	90.4
19		650.	89.3
P - 19		0.	100.
P - 19		650.	99.
20	MH - 18 to MH - 23	0.	86.4
20		620.	85.4
P - 20		0.	99.
P - 20		620.	97.
21	MH - 24 to MH - 25	0.	89.9
21		410.	89.1
P - 21		0.	97.5
P - 21		410.	96.5
22	MH - 25 to MH - 23	0.	88.6
22		470.	87.4
P - 22		0.	97.5
P - 22		470.	96.5
23	MH - 23 to MH - 26	0.	85.4
23		270.	84.68
P - 23		0.	97.
P - 23		270.	96.
24	MH - 27 to MH - 26	0.	91.2
24		450.	87.7
P - 24		0.	97.5
P - 24		450.	96.
25	MH - 26 to MH - 28	0.	84.68
25		860.	82.68
P - 25		0.	96.
P - 25		870.	92.
26	MH - 29 to MH - 30	0.	89.
26		290.	87.
P - 26		0.	97.
P - 26		290.	93.
27	MH - 30 to MH - 28	0.	86.5
27		490.	84.4
P - 27		0.	93.
P - 27		490.	92.
28	MH - 28 to MH - 31	0.	82.68
28		870.	79.72
P - 28		0.	92.
P - 28		870.	89.
29	MH - 32 to MH - 33	0.	86.5
29		260.	85.9
P - 29		0.	94.5
P - 29		260.	92.5
30	MH - 33 to MH - 34	0.	85.4
30		690.	84.5
P - 30		0.	92.5
P - 30		690.	90.
31	MH - 34 to MH - 31	0.	84.
31		560.	81.5
P - 31		0.	90.
P - 31		560.	89.
32	MH - 31 to MH - 35	0.	79.72
32		390.	77.78
P - 32		0.	89.
P - 32		390.	88.
33	MH - 35 to WEST CH 1	0.	77.78
33		90.	77.5
P - 33		0.	88.

P - 33		90.	87.8
34	MH - 36 to MH - 37	0.	81.5
34		370.	81.
P - 34		0.	88.
P - 34		370.	87.
35	MH - 37 to MH - 38	0.	81.3
35		590.	80.3
P - 35		0.	87.
P - 35		590.	86.
36	MH - 38 to MH - 39	0.	79.8
36		460.	78.9
P - 36		0.	86.
P - 36		460.	84.
37	MH - 39 to WEST CH 3	0.	78.9
37		30.	78.6
P - 37		0.	84.
P - 37		30.	83.5
38	MH - 40 to MH - 41	0.	79.
38		360.	78.2
P - 38		0.	84.
P - 38		360.	81.
39	MH - 41 to EAST CH 4	0.	78.2
39		60.	77.85
P - 39		0.	81.
P - 39		60.	80.5
40	Convey 43	0.	78.
40		1400.	76.4
41	Convey 44	0.	76.4
41		250.	76.1
42	Convey 45	0.	76.1
42		300.	75.55
43	Convey 46	0.	77.8
43		300.	77.4
44	Convey 47	0.	77.4
44		600.	76.7
45	Convey 48	0.	76.7
45		350.	76.25
46	Convey 49	0.	76.25
46		180.	76.07
47	Convey 50	0.	76.07
47		450.	75.55
48	Convey 51	0.	75.55
48		500.	75.23
49	NW-1 to NW-1B	0.	88.5
49		710.	86.8
P - 49		0.	94.5
P - 49		710.	93.5
50	NW-1B to NW-2	0.	86.8
50		590.	85.
P - 50		0.	93.5
P - 50		590.	91.
51	NW-2 to NW-3	0.	85.
51		510.	82.1
P - 51		0.	91.
P - 51		510.	87.5
52	NW-3 to NW CH-1	0.	82.1
52		220.	79.32
P - 52		0.	87.5
P - 52		220.	87.
53	NW-4 to NW-5	0.	85.5
53		490.	84.
P - 53		0.	91.
P - 53		490.	88.
54	NW-5 to NW-6	0.	84.
54		260.	83.
P - 54		0.	88.

P - 54		260.	86.5
55	NW-7 to NW-6	0.	87.
55		490.	84.
P - 55		0.	92.
P - 55		490.	86.5
56	NW-6 to NW CH-2	0.	83.
56		250.	78.76
P - 56		0.	87.1
P - 56		250.	86.6
57	NW-8 to NW-10	0.	81.
57		270.	80.
P - 57		0.	86.
P - 57		270.	85.
58	NW-9 to NW-10	0.	85.
58		470.	80.
P - 58		0.	90.
P - 58		470.	85.
59	NW-10 to NW CH-3	0.	80.
59		210.	77.92
P - 59		0.	85.
P - 59		210.	84.5
60	NW Channel 1	0.	79.3
60		560.	78.8
61	NW Channel 2	0.	78.8
61		840.	78.
62	NW Channel 3	0.	78.
62		1850.	76.07
63	SE 1 to SE 2	0.	96.4
63		450.	94.
P - 63		0.	101.
P - 63		450.	98.5
64	SE 2 to SE 3	0.	93.5
64		370.	92.1
P - 64		0.	98.5
P - 64		370.	97.5
65	SE 3 to SE 4	0.	91.6
65		580.	90.4
P - 65		0.	97.5
P - 65		580.	95.
66	SE 4 to SE 5	0.	89.4
66		320.	88.95
P - 66		0.	95.
P - 66		320.	94.
67	SE 5 to SE 6	0.	88.95
67		270.	87.1
P - 67		0.	94.
P - 67		270.	92.
68	SE 6 to SE Outlet	0.	87.1
68		70.	86.8
P - 68		0.	92.5
P - 68		70.	92.2
69	NW-1C to NW-1	0.	89.6
69		570.	89.
P - 69		0.	96.4
P - 69		570.	94.3
70	NW-1A to NW-1C	0.	90.
70		140.	89.6

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Node Results Information:

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#	Node Name	Cumul. Area	Pervious Area	Fi	Unit Peak Flow q(cfs/ac)	Cumul. Qp(cfs)	Known WS Elevation	RIM or GRATE Elev.	Node HGL	Node EGL	Cumul. Tr(min)
1	MH - 3	7.00	1.83	0.42	2.40	16.01	N/A	96.60	96.34	96.53	15.00
2	MH - 4	15.60	3.22	0.36	2.22	33.43	N/A	95.90	94.73	95.53	17.50
3	MH - 5	19.00	4.22	0.36	2.16	39.54	N/A	94.30	91.88	92.17	18.43
4	MH - 6	42.10	11.08	0.36	1.97	78.98	N/A	90.50	90.40	90.58	21.56
5	MH - 7	54.50	16.59	0.38	1.91	97.63	N/A	90.00	89.55	89.77	22.38
6	MH - 8	6.40	3.27	0.42	2.40	13.95	N/A	92.90	91.56	91.90	15.00
7	MH - 9	60.80	19.63	0.38	1.86	105.72	N/A	89.40	88.92	89.00	22.98
8	MH - 10	95.80	31.18	0.39	1.74	154.92	N/A	89.20	88.51	88.60	24.77
9	MH - 11	9.30	0.89	0.30	2.40	22.02	N/A	93.40	92.84	93.01	15.00
10	MH - 12	18.10	3.51	0.37	2.21	38.77	N/A	92.80	92.29	92.31	17.57
11	MH - 13	30.10	8.99	0.40	2.06	58.41	N/A	91.20	91.03	91.03	20.46
12	MH - 14	100.80	33.50	0.39	1.66	154.27	N/A	87.90	87.91	87.97	26.21
13	MH - 15	107.20	37.15	0.40	1.63	159.74	N/A	87.00	86.57	86.60	26.83
14	MH - 16	28.00	8.40	0.39	1.79	46.96	N/A	102.90	97.37	98.00	24.00
15	MH - 17	28.00	8.40	0.39	1.64	42.63	N/A	101.50	94.32	94.87	26.62
16	MH - 18	94.30	29.37	0.36	1.46	126.74	N/A	98.20	90.79	91.35	30.49
17	MH - 19	6.40	1.18	0.30	2.40	14.98	N/A	105.50	101.46	101.62	15.00
18	MH - 20	25.80	3.00	0.30	2.14	54.30	N/A	101.70	99.36	100.37	18.82
19	MH - 21	11.10	4.52	0.42	2.40	24.70	N/A	107.80	98.48	98.91	15.00
20	MH - 22	16.80	5.90	0.42	2.21	34.65	N/A	99.70	94.64	95.05	17.65
21	MH - 23	117.40	38.15	0.38	1.38	147.83	N/A	95.50	89.63	90.46	32.41
22	MH - 24	7.00	2.10	0.43	2.40	15.88	N/A	98.30	92.40	92.58	15.00
23	MH - 25	12.50	4.11	0.43	2.25	26.34	N/A	96.40	91.04	91.35	17.06
24	MH - 26	124.30	41.37	0.38	1.36	152.85	N/A	95.00	89.06	89.88	33.13
25	MH - 27	4.30	2.17	0.40	2.40	9.44	N/A	97.40	92.30	92.79	15.00
26	MH - 28	155.80	56.65	0.39	1.28	176.80	N/A	92.80	86.96	88.12	35.52
27	MH - 29	11.90	5.39	0.41	2.19	23.81	N/A	96.80	90.66	91.47	18.00
28	MH - 30	15.60	7.25	0.41	2.13	30.32	N/A	93.50	89.01	89.41	18.91
29	MH - 31	197.10	77.84	0.39	1.21	207.57	N/A	89.40	84.76	85.91	37.78
30	MH - 32	7.00	3.77	0.40	2.40	15.28	N/A	94.40	94.05	94.45	15.00
31	MH - 33	12.00	6.27	0.41	2.33	25.38	N/A	92.40	92.83	92.87	15.89
32	MH - 34	26.70	13.62	0.42	2.18	52.54	N/A	90.80	90.28	90.29	18.11
33	MH - 35	210.70	85.80	0.39	1.19	215.93	N/A	87.70	83.78	84.78	38.65
34	MH - 36	5.20	3.89	0.36	2.40	11.06	N/A	86.70	85.31	85.40	15.00
35	MH - 37	9.00	5.75	0.38	2.20	17.67	N/A	87.10	84.81	85.04	17.74
36	MH - 38	17.00	9.79	0.39	2.06	31.22	N/A	85.00	83.24	83.58	20.47
37	MH - 39	24.20	13.52	0.39	1.92	41.16	N/A	83.10	81.47	82.17	22.21
38	MH - 40	4.60	2.55	0.41	2.40	9.98	N/A	86.60	82.06	82.24	15.00
39	MH - 41	16.20	9.67	0.40	2.26	32.74	N/A	83.00	81.20	81.30	16.89
40	EAST CH 2	107.20	37.15	0.40	1.61	157.90	N/A	N/A	83.41	83.44	27.16
41	EAST CH 3	108.60	37.85	0.40	1.39	135.94	N/A	N/A	81.21	81.24	32.16
42	EAST CH 4	124.80	47.51	0.40	1.25	137.67	N/A	N/A	80.77	80.81	36.20
43	WEST CH 1	240.60	105.65	0.39	0.64	112.39	N/A	N/A	82.51	82.53	78.59
44	WEST CH 2	240.60	105.65	0.39	0.62	107.18	N/A	N/A	82.12	82.14	81.77
45	WEST CH 3	264.80	119.16	0.39	0.59	108.61	N/A	N/A	81.43	81.45	86.77
46	WEST CH 4	268.10	120.81	0.39	0.56	103.73	N/A	N/A	81.04	81.06	90.82
47	NW CH 4	375.60	176.95	0.40	0.55	136.73	N/A	N/A	80.86	80.89	93.12
48	NW CH 5	500.40	224.46	0.40	0.53	175.20	N/A	N/A	80.21	80.25	97.76
49	Creek	500.40	224.46	0.40	0.51	166.86	78.00	N/A	78.00	78.00	101.43
50	NW-1	40.70	20.35	0.43	0.98	31.17	N/A	94.30	91.92	92.26	48.17
51	NW-1B	46.60	23.08	0.42	0.93	33.70	N/A	93.50	89.80	90.19	50.85
52	NW-2	54.30	26.79	0.42	0.90	37.62	N/A	90.60	87.00	87.97	52.88
53	NW-3	63.90	32.03	0.42	0.88	42.94	N/A	88.00	84.24	85.33	54.15
54	NW-4	12.40	6.74	0.36	2.32	26.34	N/A	89.80	91.15	91.19	16.00
55	NW-5	16.60	9.04	0.37	2.22	33.43	N/A	87.80	88.49	88.60	17.52
56	NW-6	31.80	17.27	0.39	2.18	62.49	N/A	87.10	87.49	88.03	18.16
57	NW-7	7.50	3.95	0.42	2.40	16.33	N/A	91.90	90.97	91.43	15.00
58	NW-8	3.30	1.85	0.41	2.40	7.16	N/A	87.20	85.11	85.20	15.00

59	NW-9	3.40	1.90	0.41	2.40	7.37	N/A	91.40	85.96	86.38	15.00
60	NW-10	11.80	6.83	0.40	2.19	23.15	N/A	85.90	83.90	84.84	17.89
61	NW CH-1	63.90	32.03	0.42	0.88	42.59	N/A	N/A	82.92	82.93	54.54
62	NW CH-2	95.70	49.30	0.41	0.81	57.58	N/A	N/A	82.60	82.61	59.54
63	NW CH-3	107.50	56.14	0.41	0.76	58.52	N/A	N/A	81.90	81.91	64.54
64	SE 1	17.90	8.18	0.40	2.40	39.60	N/A	101.10	101.45	101.56	15.00
65	SE 2	25.80	10.62	0.41	2.33	55.67	N/A	98.60	99.12	99.17	15.93
66	SE 3	30.00	12.72	0.41	2.27	62.89	N/A	97.20	97.11	97.84	16.71
67	SE 4	38.10	15.92	0.41	2.17	76.21	N/A	94.10	94.09	94.49	18.25
68	SE 5	49.00	18.72	0.40	2.11	95.66	N/A	93.80	92.53	93.39	19.41
69	SE 6	62.60	23.02	0.41	2.09	121.44	N/A	92.50	92.57	92.59	20.14
70	SE Outlet	58.20	28.41	0.39	2.08	131.92	N/A	N/A	0.00	0.00	20.28
71	NW-1A	21.60	10.80	0.43	1.02	17.41	N/A	N/A	98.33	100.00	46.00
72	NW-1C	30.10	15.05	0.43	1.01	24.12	N/A	96.40	94.47	94.88	46.24

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Convey Results Information:

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#	Convey Name	Upstream Critical Elevation	Upstream HGL	Downstream HGL	Upstream EGL	Downstream EGL	Exit Velocity (fps)	Travel Time (min)	Flow (cfs)
1	MH - 3 to MH - 4	90.85	96.34	95.35	96.53	95.53	3.26	2.5	16.01
P - 1		98.12	96.34	95.35	96.53	95.53	1.31	0.	0.
2	MH - 4 to MH - 5	88.8	94.73	91.37	95.53	92.17	6.81	0.93	33.43
P - 2		96.51	94.73	91.37	95.53	92.17	2.31	0.	0.
3	MH - 5 to MH - 6	87.	91.88	90.29	92.17	90.58	4.11	3.12	39.54
P - 3		95.48	91.88	90.29	92.17	90.58	2.35	0.	0.
4	MH - 6 to MH - 7	84.71	90.14	89.33	90.58	89.77	5.07	1.02	63.66
P - 4		90.45	90.4	89.76	90.58	89.77	0.67	3.05	12.83
5	MH - 8 to MH - 7	86.4	91.56	89.43	91.9	89.77	4.44	1.58	13.95
P - 5		94.46	91.56	89.43	91.9	89.77	0.83	0.	0.
6	MH - 7 to MH - 9	84.34	89.3	88.53	89.77	89.	5.19	0.9	65.24
P - 6		89.61	89.55	88.98	89.77	89.	1.04	2.27	32.39
7	MH - 9 to MH - 10	83.27	88.75	88.35	89.	88.6	3.81	1.18	47.86
P - 7		88.73	88.92	88.55	89.	88.6	1.65	2.31	57.86
8	MH - 11 to MH - 12	87.51	92.84	92.15	93.01	92.31	3.11	2.57	22.02
P - 8		0.	93.03	92.29	93.04	92.31	3.11	2.57	0.
9	MH - 12 to MH - 13	86.4	92.05	90.78	92.31	91.04	3.87	3.02	37.21
P - 9		92.24	92.29	91.25	92.31	91.29	1.56	5.	1.56
10	MH - 13 to MH - 10	84.3	90.39	87.96	91.02	88.6	6.07	1.48	58.41
P - 10		91.02	91.03	88.6	91.03	88.6	0.	5.	0.01
11	MH - 10 to MH - 14	84.5	88.15	87.53	88.59	87.97	5.06	0.92	80.52
P - 11		88.29	88.51	87.82	88.6	88.01	3.34	2.	74.41
12	MH - 14 to MH - 15	83.7	87.22	85.86	87.97	86.61	6.59	0.91	104.81
P - 12		87.69	87.91	87.22	87.97	87.36	2.88	3.15	49.46
13	MH - 15 to EAST CH 2	81.81	84.98	83.41	86.6	85.04	9.73	0.33	154.7
P - 13		86.57	86.57	85.07	86.6	85.1	1.48	2.03	5.04
14	MH - 16 to MH - 17	97.06	97.37	94.33	98.	94.99	6.18	2.62	46.96
15	MH - 17 to MH - 18	93.95	94.32	90.95	94.87	91.35	4.82	3.8	42.63
16	MH - 19 to MH - 20	96.1	101.46	100.22	101.62	100.38	3.05	3.82	14.98
P - 16		105.59	101.46	100.22	101.62	100.38	0.01	0.	0.
17	MH - 20 to MH - 18	95.3	99.36	92.3	100.37	93.32	7.68	1.74	54.3
P - 17		102.84	99.36	92.3	100.37	93.32	1.97	0.	0.
18	MH - 21 to MH - 22	96.5	98.48	94.61	98.91	95.05	5.03	2.65	24.7
P - 18		0.	98.48	94.61	98.91	95.05	0.	0.	0.
19	MH - 22 to MH - 18	93.4	94.64	92.3	95.05	92.71	4.9	2.21	34.65
P - 19		100.1	94.64	92.3	95.05	92.71	1.04	0.	0.
20	MH - 18 to MH - 23	89.44	90.79	89.94	91.35	90.46	5.53	1.83	126.74
P - 20		99.41	90.79	89.94	91.35	90.46	0.53	0.	0.
21	MH - 24 to MH - 25	91.24	92.4	91.6	92.58	91.78	3.24	2.06	15.88
P - 21		97.57	92.4	91.6	92.58	91.78	0.99	0.	0.
22	MH - 25 to MH - 23	90.26	91.04	90.21	91.35	90.46	3.83	1.93	26.34
P - 22		97.58	91.04	90.21	91.35	90.46	1.	0.	0.
23	MH - 23 to MH - 26	88.7	89.63	89.14	90.46	89.88	6.56	0.67	147.83
P - 23		97.16	89.63	89.14	90.46	89.88	0.04	0.	0.
24	MH - 27 to MH - 26	92.3	92.3	89.73	92.79	89.88	3.	1.47	9.44
P - 24		0.	92.3	89.73	92.79	89.88	0.	0.	0.
25	MH - 26 to MH - 28	88.04	89.06	87.42	89.88	88.12	6.39	2.14	152.85
P - 25		96.44	89.06	87.42	89.88	88.12	0.67	0.	0.
26	MH - 29 to MH - 30	90.66	90.66	89.01	91.47	89.56	5.62	0.72	23.81
P - 26		97.53	90.66	89.01	91.47	89.56	0.87	0.	0.
27	MH - 30 to MH - 28	88.29	89.01	87.8	89.41	88.12	4.29	1.86	30.32
P - 27		93.29	89.01	87.8	89.41	88.12	1.58	0.	0.
28	MH - 28 to MH - 31	86.31	86.96	85.17	88.12	85.91	6.55	1.97	176.8
P - 28		92.47	86.96	85.17	88.12	85.91	2.31	0.	0.
29	MH - 32 to MH - 33	88.5	94.05	92.47	94.45	92.87	4.86	0.89	15.28
P - 29		94.57	94.05	92.47	94.45	92.87	0.94	0.	0.
30	MH - 33 to MH - 34	86.99	92.53	89.96	92.87	90.3	4.42	2.6	21.71
P - 30		92.81	92.83	90.33	92.87	90.37	1.59	5.	3.67
31	MH - 34 to MH - 31	87.	89.39	85.01	90.29	85.91	7.23	1.29	51.12

P - 31		90.23	90.28	89.24	90.29	89.28	1.56	5.	1.42
32	MH - 31 to MH - 35	83.65	84.76	83.86	85.91	84.78	7.34	0.85	207.57
P - 32		89.19	84.76	83.86	85.91	84.78	1.56	0.	0.
33	MH - 35 to WEST CH 1	81.8	83.78	83.5	84.78	84.5	7.64	0.17	215.93
P - 33		88.2	83.78	83.5	84.78	84.5	1.56	0.	0.
34	MH - 36 to MH - 37	82.61	85.31	84.95	85.4	85.04	2.25	2.74	11.06
P - 34		0.	85.31	84.95	85.4	85.04	2.98	0.	0.
35	MH - 37 to MH - 38	83.8	84.81	83.36	85.04	83.58	3.6	2.73	17.67
P - 35		87.06	84.81	83.36	85.04	83.58	0.84	0.	0.
36	MH - 38 to MH - 39	82.8	83.24	81.9	83.58	82.24	4.42	1.74	31.22
P - 36		86.24	83.24	81.9	83.58	82.24	1.56	0.	0.
37	MH - 39 to WEST CH 3	80.99	81.47	81.43	82.17	82.04	5.96	0.08	41.16
P - 37		0.	81.47	81.43	82.17	82.04	0.	0.	0.
38	MH - 40 to MH - 41	81.	82.06	81.13	82.24	81.3	3.18	1.89	9.98
P - 38		0.	82.06	81.13	82.24	81.3	0.	0.	0.
39	MH - 41 to EAST CH 4	79.72	80.75	80.26	81.3	80.81	5.66	0.18	17.77
P - 39		81.2	81.2	80.7	81.3	80.8	2.52	0.26	14.97
40	Convey 43	80.	83.41	81.2	83.44	81.24	1.61	16.67	157.9
41	Convey 44	78.25	81.21	80.77	81.24	80.8	1.45	2.95	135.94
42	Convey 45	77.96	80.77	80.21	80.81	80.24	1.48	3.4	137.67
43	Convey 46	79.48	82.51	82.12	82.53	82.14	1.18	4.23	112.39
44	Convey 47	79.03	82.12	81.43	82.14	81.45	1.12	8.9	107.18
45	Convey 48	78.34	81.43	81.04	81.45	81.06	1.11	5.18	108.61
46	Convey 49	77.86	81.04	80.87	81.06	80.88	1.06	2.83	103.73
47	Convey 50	77.75	80.86	80.22	80.89	80.24	1.33	5.77	136.73
48	Convey 51	77.32	80.21	77.72	80.25	77.98	4.02	4.39	175.2
49	NW-1 to NW-1B	91.5	91.92	89.86	92.26	90.19	4.41	2.68	31.17
P - 49		0.	91.92	89.86	92.26	90.19	10.79	0.	0.
50	NW-1B to NW-2	88.68	89.8	88.	90.19	88.39	4.77	2.02	33.7
P - 50		93.97	94.47	91.84	94.88	92.26	0.27	0.	0.
51	NW-2 to NW-3	87.	87.	84.79	87.97	85.33	5.63	1.27	37.62
P - 51		91.48	87.	84.79	87.97	85.33	0.11	0.	0.
52	NW-3 to NW CH-1	84.24	84.24	81.1	85.33	82.76	9.82	0.35	42.94
P - 52		87.72	84.24	81.1	85.33	82.76	2.67	0.	0.
53	NW-4 to NW-5	87.23	90.72	88.13	91.19	88.6	5.27	1.55	25.85
P - 53		91.15	91.15	88.6	91.19	88.6	0.04	5.	0.49
54	NW-5 to NW-6	85.38	88.4	87.83	88.6	88.03	3.39	1.28	16.63
P - 54		88.49	88.49	88.03	88.6	88.03	0.26	5.	16.81
55	NW-7 to NW-6	88.45	90.97	87.57	91.43	88.03	5.2	1.57	16.33
P - 55		0.	90.97	87.57	91.43	88.03	0.	0.	0.
56	NW-6 to NW CH-2	85.5	86.59	82.6	88.03	84.04	9.14	0.46	44.89
P - 56		87.39	87.49	86.89	87.57	87.04	3.05	1.82	17.6
57	NW-8 to NW-10	81.95	85.11	84.75	85.2	84.84	2.28	1.98	7.16
P - 57		0.	85.11	84.75	85.2	84.84	0.	0.	0.
58	NW-9 to NW-10	85.96	85.96	84.75	86.38	84.84	2.35	2.78	7.37
P - 58		0.	85.96	84.75	86.38	84.84	0.	0.	0.
59	NW-10 to NW CH-3	82.	83.9	80.98	84.84	81.91	7.37	0.47	23.15
P - 59		85.04	83.9	80.98	84.84	81.91	1.19	0.	0.
60	NW Channel 1	80.28	82.92	82.61	82.93	82.62	0.64	13.92	42.59
61	NW Channel 2	79.96	82.6	81.9	82.61	81.91	0.83	16.35	57.58
62	NW Channel 3	79.17	81.9	80.88	81.91	80.89	0.6	42.57	58.52
63	SE 1 to SE 2	98.13	101.08	98.7	101.56	99.17	5.27	1.42	25.89
P - 63		101.46	101.45	99.16	101.56	99.17	0.98	2.83	13.71
64	SE 2 to SE 3	96.5	98.76	97.43	99.17	97.85	4.9	1.26	34.6
P - 64		99.03	99.12	98.05	99.17	98.15	2.32	3.53	21.07
65	SE 3 to SE 4	95.1	97.11	94.09	97.84	94.83	6.54	1.48	62.89
P - 65		0.	98.33	93.21	100.	94.89	6.28	0.	0.
66	SE 4 to SE 5	93.9	94.09	93.45	94.49	93.85	4.79	1.11	76.21
P - 66		95.56	98.33	93.21	100.	94.89	2.33	0.	0.
67	SE 5 to SE 6	91.83	92.53	91.96	93.39	92.59	6.01	0.72	95.66
P - 67		94.09	98.33	93.21	100.	94.89	1.02	0.	0.
68	SE 6 to SE Outlet	90.33	91.6	91.3	92.58	92.28	7.55	0.13	120.01
P - 68		92.55	92.57	92.25	92.59	92.28	1.32	1.1	1.42
69	NW-1C to NW-1	92.1	94.47	91.84	94.88	92.26	4.91	1.93	24.12
P - 69		0.	94.47	91.84	94.88	92.26	0.	0.	0.
70	NW-1A to NW-1C	91.5	98.33	93.21	100.	94.89	9.85	0.24	17.41

	Up Node Name	Down Node Name	Trib. Area at Up Node (acre)	Cumul. Area (acre)	Total Computed Time of Concentration Up Node (min.)	Total Flow at Convey (cfs)	Convey Size (in or ft)	Average Slope (ft/ft)	Total Length (feet)	Full Flow Capacity of Conduit (cfs)	Computed Flow at Convey (cfs)	Exit Velocity (fps)	Travel Time at Convey (min.)	Rim/Grate at Up Node (feet)	Up HGL (feet)	Down HGL (feet)	Up (RIM-HGL) (feet)	Energy Slope (ft/ft)	Up EGL (feet)	Down EGL (feet)	Up Invert (feet)
	MH - 3	MH - 4	7.	7.	15.	16.01	30	0.0065	490.00	28.73	16.01	3.26	2.50	96.60	96.34	95.35	0.26	0.0020	96.53	95.53	89.50
							N/A	0.0041	490.00	N/A	0.00	1.31	0.00	96.60	96.34	95.35	N/A	0.0020	96.53	95.53	98.00
	MH - 4	MH - 5	8.6	15.6	17.5	33.43	30	0.0047	380.00	24.47	33.43	6.81	0.93	95.90	94.73	91.37	1.17	0.0088	95.53	92.17	86.30
							N/A	0.0026	380.00	N/A	0.00	2.31	0.00	95.90	94.73	91.37	N/A	0.0088	95.53	92.17	96.00
	MH - 5	MH - 6	3.4	19.	18.43	39.54	42	0.0009	770.00	26.29	39.54	4.11	3.12	94.30	91.88	90.29	2.42	0.0021	92.17	90.58	83.50
							N/A	0.0065	770.00	N/A	0.00	2.35	0.00	94.30	91.88	90.29	N/A	0.0021	92.17	90.58	95.00
	MH - 6	MH - 7	23.1	42.1	21.56	78.98	48	0.0013	310.00	44.72	63.66	5.07	1.02	90.50	90.14	89.33	0.36	0.0026	90.58	89.77	82.30
							N/A	0.0032	310.00	N/A	12.83	0.67	3.05	90.50	90.40	89.76	0.10	0.0026	90.58	89.77	90.00
	MH - 8	MH - 7	6.4	6.4	15.	13.95	24	0.0036	420.00	11.72	13.95	4.44	1.58	92.90	91.56	89.43	1.34	0.0051	91.90	89.77	84.40
							N/A	0.0119	420.00	N/A	0.00	0.83	0.00	92.90	91.56	89.43	N/A	0.0051	91.90	89.77	94.00
	MH - 7	MH - 9	6.	54.5	22.38	97.63	48	0.0025	280.00	62.25	65.24	5.19	0.90	90.00	89.30	88.53	0.70	0.0027	89.77	89.00	81.90
							N/A	0.0036	280.00	N/A	32.39	1.04	2.27	90.00	89.55	88.98	0.45	0.0028	89.77	89.00	89.00
	MH - 9	MH - 10	6.3	60.8	22.98	105.72	48	0.0026	270.00	63.39	47.86	3.81	1.18	89.40	88.75	88.35	0.65	0.0015	89.00	88.60	81.20
							N/A	0.0019	270.00	N/A	57.86	1.65	2.31	89.40	88.92	88.55	0.48	0.0015	89.00	88.60	88.00
	MH - 11	MH - 12	9.3	9.3	15.	22.02	36	0.0052	480.00	41.72	22.02	3.11	2.57	93.40	92.84	92.15	0.56	0.0015	93.01	92.31	86.00
							N/A	0.0021	480.00	N/A	0.00	3.11	2.57	93.40	93.03	92.29	0.37	0.0015	93.04	92.31	93.00
	MH - 12	MH - 13	8.8	18.1	17.57	38.77	42	0.0014	700.00	32.96	37.21	3.87	3.02	92.80	92.05	90.78	0.75	0.0018	92.31	91.04	82.90
							N/A	0.0014	700.00	N/A	1.56	1.56	5.00	92.80	92.29	91.25	0.51	0.0015	92.31	91.29	92.00
	MH - 13	MH - 10	12.	30.1	20.46	58.41	42	0.0017	540.00	35.60	58.41	6.07	1.48	91.20	90.39	87.96	0.81	0.0045	91.02	88.60	81.90
							N/A	0.0065	540.00	N/A	0.01	0.00	5.00	91.20	91.03	88.60	0.17	0.0045	91.03	88.60	91.00
	MH - 10	MH - 14	4.9	95.8	24.77	154.92	54	0.0029	280.00	91.10	80.52	5.06	0.92	89.20	88.15	87.53	1.05	0.0022	88.59	87.97	80.00
							N/A	0.0018	280.00	N/A	74.41	3.34	2.00	89.20	88.51	87.82	0.69	0.0021	88.60	88.01	87.50
	MH - 14	MH - 15	5.	100.8	26.21	154.27	54	0.0029	360.00	91.60	104.81	6.59	0.91	87.90	87.22	85.86	0.68	0.0038	87.97	86.61	79.20
							N/A	0.0014	360.00	N/A	49.46	2.88	3.15	87.90	87.91	87.22	-0.01	0.0017	87.97	87.36	87.00
	MH - 15	EAST CH 2	6.4	107.2	26.83	159.74	54	0.0035	190.00	100.45	154.70	9.73	0.33	87.00	84.98	83.41	2.02	0.0082	86.60	85.04	78.16
							50	0.0079	190.00	N/A	5.04	1.48	2.03	87.00	86.57	85.07	0.43	0.0079	86.60	85.10	86.50
	MH - 16	MH - 17	28.	28.	24.	46.96	48	0.0032	950.00	69.96	46.96	6.18	2.62	102.90	97.37	94.33	5.53	0.0032	98.00	94.99	95.00
	MH - 17	MH - 18	0.	28.	26.62	42.63	48	0.0029	1260.00	67.46	42.63	4.82	3.80	101.50	94.32	90.95	7.18	0.0028	94.87	91.35	92.00
	MH - 19	MH - 20	6.4	6.4	15.	14.98	30	0.0029	700.00	19.00	14.98	3.05	3.82	105.50	101.46	100.22	4.04	0.0018	101.62	100.38	94.80
							N/A	0.0042	720.00	N/A	0.00	0.01	0.00	105.50	101.46	100.22	N/A	0.0017	101.62	100.38	105.50
	MH - 20	MH - 18	19.4	25.8	18.82	54.3	36	0.0038	800.00	35.40	54.30	7.68	1.74	101.70	99.36	92.30	2.34	0.0088	100.37	93.32	92.30
							N/A	0.0044	800.00	N/A	0.00	1.97	0.00	101.70	99.36	92.30	N/A	0.0088	100.37	93.32	102.50
	MH - 21	MH - 22	11.1	11.1	15.	24.7	30	0.0039	800.00	22.13	24.70	5.03	2.65	107.80	98.48	94.61	9.32	0.0048	98.91	95.05	94.00
							N/A	0.0056	800.00	N/A	0.00	0.00	0.00	107.80	98.48	94.61	N/A	0.0048	98.91	95.05	104.50
	MH - 22	MH - 18	5.7	16.8	17.65	34.65	36	0.0017	650.00	23.78	34.65	4.90	2.21	99.70	94.64	92.30	5.06	0.0036	95.05	92.71	90.40
							N/A	0.0015	650.00	N/A	0.00	1.04	0.00	99.70	94.64	92.30	N/A	0.0036	95.05	92.71	100.00
	MH - 18	MH - 23	23.7	94.3	30.49	126.74	72	0.0016	620.00	147.41	126.74	5.53	1.83	98.20	90.79	89.94	7.41	0.0014	91.35	90.46	86.40
							N/A	0.0032	620.00	N/A	0.00	0.53	0.00	98.20	90.79	89.94	N/A	0.0014	91.35	90.46	99.00
	MH - 24	MH - 25	7.	7.	15.	15.88	30	0.0020	410.00	15.70	15.88	3.24	2.06	98.30	92.40	91.60	5.90	0.0019	92.58	91.78	89.90
							N/A	0.0024	410.00	N/A	0.00	0.99	0.00	98.30	92.40	91.60	N/A	0.0019	92.58	91.78	97.50
	MH - 25	MH - 23	5.5	12.5	17.06	26.34	36	0.0026	470.00	29.21	26.34	3.83	1.93	96.40	91.04	90.21	5.36	0.0019	91.35	90.46	88.60
							N/A	0.0021	470.00	N/A	0.00	1.00	0.00	96.40	91.04	90.21	N/A	0.0019	91.35	90.46	97.50
	MH - 23	MH - 26	10.6	117.4	32.41	147.83	72	0.0027	270.00	189.54	147.83	6.56	0.67	95.50	89.63	89.14	5.87	0.0021	90.46	89.88	85.40
							N/A	0.0037	270.00	N/A	0.00	0.04	0.00	95.50	89.63	89.14	N/A	0.0021	90.46	89.88	97.00
	MH - 27	MH - 26	4.3	4.3	15.	9.44	24	0.0078	450.00	17.29	9.44	3.00	1.47	97.40	92.30	89.73	5.10	0.0065	92.79	89.88	91.20
							N/A	0.0033	450.00	N/A	0.00	0.00	0.00	97.40	92.30	89.73	N/A	0.0065	92.79	89.88	97.50
	MH - 26	MH - 28	2.6	124.3	33.13	152.85	72	0.0023	860.00	177.00	152.85	6.39	2.14	95.00	89.06	87.42	5.94	0.0020	89.88	88.12	84.68
							N/A	0.0046	870.00	N/A	0.00	0.67	0.00	95.00	89.06	87.42	N/A	0.0020	89.88	88.12	96.00
	MH - 29	MH - 30	11.9	11.9	18.	23.81	30	0.0069	290.00	29.52	23.81	5.62	0.72	96.80	90.66	89.01	6.14	0.0066	91.47	89.56	89.00
							N/A	0.0138	290.00	N/A	0.00	0.87	0.00	96.80	90.66	89.01	N/A	0.0066	91.47	89.56	97.00
	MH - 30	MH - 28	3.7	15.6	18.91	30.32	36	0.0043	490.00	37.84	30.32	4.29	1.86	93.50	89.01	87.80	4.49	0.0026	89.41	88.12	86.50
							N/A	0.0020	490.00	N/A	0.00	1.58	0.00	93.50	89.01	87.80	N/A	0.0026	89.41	88.12	93.00
	MH - 28	MH - 31	15.9	155.8	35.52	176.8	72	0.0034	870.00	214.09	176.80	6.55	1.97	92.80	86.96	85.17	5.84	0.0025	88.12	85.91	82.68
							N/A	0.0034	870.00	N/A	0.00	2.31	0.00	92.80	86.96	85.17	N/A	0.0025	88.12	85.91	92.00
	MH - 32	MH - 33	7.	7.	15.	15.28	24	0.0023	260.00	9.42	15.28	4.86	0.89	94.40	94.05	92.47	0.35	0.0061	94.45	92.87	86.50

	Up Node Name	Down Node Name	Trib. Area at Up Node (acre)	Cumul. Area (acre)	Total Computed Time of Concentration Up Node (min.)	Total Flow at Convey (cfs)	Convey Size (in or ft)	Average Slope (ft/ft)	Total Length (feet)	Full Flow Capacity of Conduit (cfs)	Computed Flow at Convey (cfs)	Exit Velocity (fps)	Travel Time at Convey (min.)	Rim/Grate at Up Node (feet)	Up HGL (feet)	Down HGL (feet)	Up (RIM-HGL) (feet)	Energy Slope (ft/ft)	Up EGL (feet)	Down EGL (feet)	Up Invert (feet)
							N/A	0.0077	260.00	N/A	0.00	0.94	0.00	94.40	94.05	92.47	N/A	0.0061	94.45	92.87	94.50
	MH - 33	MH - 34	5.	12.	15.89	25.38	30	0.0013	690.00	12.84	21.71	4.42	2.60	92.40	92.53	89.96	-0.13	0.0037	92.87	90.30	85.40
							N/A	0.0036	690.00	N/A	3.67	1.59	5.00	92.40	92.83	90.33	-0.43	0.0036	92.87	90.37	92.50
	MH - 34	MH - 31	14.7	26.7	18.11	52.54	36	0.0045	560.00	38.62	51.12	7.23	1.29	90.80	89.39	85.01	1.41	0.0078	90.29	85.91	84.00
							N/A	0.0018	560.00	N/A	1.42	1.56	5.00	90.80	90.28	89.24	0.52	0.0018	90.29	89.28	90.00
	MH - 31	MH - 35	14.6	197.1	37.78	207.57	72	0.0050	390.00	258.87	207.57	7.34	0.85	89.40	84.76	83.86	4.64	0.0029	85.91	84.78	79.72
							N/A	0.0026	390.00	N/A	0.00	1.56	0.00	89.40	84.76	83.86	N/A	0.0029	85.91	84.78	89.00
	MH - 35	WEST CH 1	13.6	210.7	38.65	215.93	72	0.0031	90.00	204.72	215.93	7.64	0.17	87.70	83.78	83.50	3.92	0.0031	84.78	84.50	77.78
							N/A	0.0022	90.00	N/A	0.00	1.56	0.00	87.70	83.78	83.50	N/A	0.0031	84.78	84.50	88.00
	MH - 36	MH - 37	5.2	5.2	15.	11.06	30	0.0014	370.00	13.07	11.06	2.25	2.74	86.70	85.31	84.95	1.39	0.0010	85.40	85.04	81.50
							N/A	0.0027	370.00	N/A	0.00	2.98	0.00	86.70	85.31	84.95	N/A	0.0010	85.40	85.04	88.00
	MH - 37	MH - 38	3.8	9.	17.74	17.67	30	0.0017	590.00	14.63	17.67	3.60	2.73	87.10	84.81	83.36	2.29	0.0025	85.04	83.58	81.30
							N/A	0.0017	590.00	N/A	0.00	0.84	0.00	87.10	84.81	83.36	N/A	0.0025	85.04	83.58	87.00
	MH - 38	MH - 39	8.	17.	20.47	31.22	36	0.0020	460.00	25.57	31.22	4.42	1.74	85.00	83.24	81.90	1.76	0.0029	83.58	82.24	79.80
							N/A	0.0043	460.00	N/A	0.00	1.56	0.00	85.00	83.24	81.90	N/A	0.0029	83.58	82.24	86.00
	MH - 39	WEST CH 3	7.2	24.2	22.21	41.16	36	0.0100	30.00	57.81	41.16	5.96	0.08	83.10	81.47	81.43	1.63	0.0045	82.17	82.04	78.90
							20	0.0167	30.00	N/A	0.00	0.00	0.00	83.10	81.47	81.43	N/A	0.0045	82.17	82.04	84.00
	MH - 40	MH - 41	4.6	4.6	15.	9.98	24	0.0022	360.00	9.24	9.98	3.18	1.89	86.60	82.06	81.13	4.54	0.0026	82.24	81.30	79.00
							N/A	0.0083	360.00	N/A	0.00	0.00	0.00	86.60	82.06	81.13	N/A	0.0026	82.24	81.30	84.00
	MH - 41	EAST CH 4	11.6	16.2	16.89	32.74	24	0.0058	60.00	14.97	17.77	5.66	0.18	83.00	80.75	80.26	2.25	0.0082	81.30	80.81	78.20
							30	0.0083	60.00	N/A	14.97	2.52	0.26	83.00	81.20	80.70	1.80	0.0083	81.30	80.80	81.00
	EAST CH 2	EAST CH 3	0.	107.2	27.16	157.9	6	0.0011	1400.00	N/A	157.90	1.61	16.67	N/A	83.41	81.20	N/A	0.0016	83.44	81.24	78.00
	EAST CH 3	EAST CH 4	1.4	108.6	32.16	135.94	6	0.0012	250.00	N/A	135.94	1.45	2.95	N/A	81.21	80.77	N/A	0.0017	81.24	80.80	76.40
	EAST CH 4	NW CH 5	0.	124.8	36.2	137.67	6	0.0018	300.00	N/A	137.67	1.48	3.40	N/A	80.77	80.21	N/A	0.0019	80.81	80.24	76.10
	WEST CH 1	WEST CH 2	29.9	240.6	78.59	112.39	6	0.0013	300.00	N/A	112.39	1.18	4.23	N/A	82.51	82.12	N/A	0.0013	82.53	82.14	77.80
	WEST CH 2	WEST CH 3	0.	240.6	81.77	107.18	6	0.0012	600.00	N/A	107.18	1.12	8.90	N/A	82.12	81.43	N/A	0.0012	82.14	81.45	77.40
	WEST CH 3	WEST CH 4	0.	264.8	86.77	108.61	6	0.0013	350.00	N/A	108.61	1.11	5.18	N/A	81.43	81.04	N/A	0.0011	81.45	81.06	76.70
	WEST CH 4	NW CH 4	3.3	268.1	90.82	103.73	6	0.0010	180.00	N/A	103.73	1.06	2.83	N/A	81.04	80.87	N/A	0.0010	81.06	80.88	76.25
	NW CH 4	NW CH 5	0.	375.6	93.12	136.73	8	0.0012	450.00	N/A	136.73	1.33	5.77	N/A	80.86	80.22	N/A	0.0014	80.89	80.24	76.07
	NW CH 5	Creek	0.	500.4	97.76	175.2	10	0.0006	500.00	N/A	175.20	4.02	4.39	N/A	80.21	77.72	N/A	0.0045	80.25	77.98	75.55
	NW-1	NW-1B	10.6	40.7	48.17	31.17	36	0.0024	710.00	28.29	31.17	4.41	2.68	94.30	91.92	89.86	2.38	0.0029	92.26	90.19	88.50
							N/A	0.0014	710.00	N/A	0.00	10.79	0.00	94.30	91.92	89.86	N/A	0.0029	92.26	90.19	94.50
	NW-1B	NW-2	5.9	46.6	50.85	33.7	36	0.0031	590.00	31.93	33.70	4.77	2.02	93.50	89.80	88.00	3.70	0.0030	90.19	88.39	86.80
							N/A	0.0042	590.00	N/A	0.00	0.27	0.00	93.50	94.47	91.84	N/A	0.0044	94.88	92.26	93.50
	NW-2	NW-3	7.7	54.3	52.88	37.62	36	0.0057	510.00	43.59	37.62	5.63	1.27	90.60	87.00	84.79	3.60	0.0052	87.97	85.33	85.00
							N/A	0.0069	510.00	N/A	0.00	0.11	0.00	90.60	87.00	84.79	N/A	0.0052	87.97	85.33	91.00
	NW-3	NW CH-1	9.6	63.9	54.15	42.94	36	0.0126	220.00	64.98	42.94	9.82	0.35	88.00	84.24	81.10	3.76	0.0117	85.33	82.76	82.10
							30	0.0023	220.00	N/A	0.00	2.67	0.00	88.00	84.24	81.10	N/A	0.0117	85.33	82.76	87.50
	NW-4	NW-5	12.4	12.4	16.	26.34	30	0.0031	490.00	19.67	25.85	5.27	1.55	89.80	90.72	88.13	-0.92	0.0053	91.19	88.60	85.50
							N/A	0.0061	490.00	N/A	0.49	0.04	5.00	89.80	91.15	88.60	-1.35	0.0053	91.19	88.60	91.00
	NW-5	NW-6	4.2	16.6	17.52	33.43	30	0.0038	260.00	22.05	16.63	3.39	1.28	87.80	88.40	87.83	-0.60	0.0022	88.60	88.03	84.00
							N/A	0.0058	260.00	N/A	16.81	0.26	5.00	87.80	88.49	88.03	-0.69	0.0022	88.60	88.03	88.00
	NW-7	NW-6	7.5	7.5	15.	16.33	24	0.0061	490.00	15.34	16.33	5.20	1.57	91.90	90.97	87.57	0.93	0.0069	91.43	88.03	87.00
							N/A	0.0112	490.00	N/A	0.00	0.00	0.00	91.90	90.97	87.57	N/A	0.0069	91.43	88.03	92.00
	NW-6	NW CH-2	7.7	31.8	18.16	62.49	30	0.0170	250.00	46.29	44.89	9.14	0.46	87.10	86.59	82.60	0.51	0.0159	88.03	84.04	83.00
							20	0.0020	250.00	N/A	17.60	3.05	1.82	87.10	87.49	86.89	-0.39	0.0021	87.57	87.04	87.10
	NW-8	NW-10	3.3	3.3	15.	7.16	24	0.0037	270.00	11.93	7.16	2.28	1.98	87.20	85.11	84.75	2.09	0.0013	85.20	84.84	81.00
							N/A	0.0037	270.00	N/A	0.00	0.00	0.00	87.20	85.11	84.75	N/A	0.0013	85.20	84.84	86.00
	NW-9	NW-10	3.4	3.4	15.	7.37	24	0.0106	470.00	20.22	7.37	2.35	2.78	91.40	85.96	84.75	5.44	0.0033	86.38	84.84	85.00
							N/A	0.0106	470.00	N/A	0.00	0.00	0.00	91.40	85.96	84.75	N/A	0.0033	86.38	84.84	90.00
	NW-10	NW CH-3	5.1	11.8	17.89	23.15	24	0.0099	210.00	19.51	23.15	7.37	0.47	85.90	83.90	80.98	2.00	0.0139	84.84	81.91	80.00
							20	0.0024	210.00	N/A	0.00	1.19	0.00	85.90	83.90	80.98	N/A	0.0139	84.84	81.91	85.00
	NW CH-1	NW CH-2	0.	63.9	54.54	42.59	6	0.0009	560.00	N/A	42.59	0.64	13.92	N/A	82.92	82.61	N/A	0.0006	82.93	82.62	79.30
	NW CH-2	NW CH-3	0.	95.7	59.54	57.58	6	0.0010	840.00	N/A	57.58	0.83	16.35	N/A	82.60	81.90	N/A	0.0008	82.61	81.91	78.80

	Up Node Name	Down Node Name	Trib. Area at Up Node (acre)	Cumul. Area (acre)	Total Computed Time of Concentration Up Node (min.)	Total Flow at Convey (cfs)	Convey Size (in or ft)	Average Slope (ft/ft)	Total Length (feet)	Full Flow Capacity of Conduit (cfs)	Computed Flow at Convey (cfs)	Exit Velocity (fps)	Travel Time at Convey (min.)	Rim/Grate at Up Node (feet)	Up HGL (feet)	Down HGL (feet)	Up (RIM-HGL) (feet)	Energy Slope (ft/ft)	Up EGL (feet)	Down EGL (feet)	Up Invert (feet)
	NW CH-3	NW CH 4	0.	107.5	64.54	58.52	6	0.0010	1850.00	N/A	58.52	0.60	42.57	N/A	81.90	80.88	N/A	0.0006	81.91	80.89	78.00
	SE 1	SE 2	17.9	17.9	15.	39.6	30	0.0053	450.00	25.96	25.89	5.27	1.42	101.10	101.08	98.70	0.02	0.0053	101.56	99.17	96.40
							N/A	0.0056	450.00	N/A	13.71	0.98	2.83	101.10	101.45	99.16	-0.35	0.0053	101.56	99.17	101.00
	SE 2	SE 3	7.9	25.8	15.93	55.67	36	0.0038	370.00	35.56	34.60	4.90	1.26	98.60	98.76	97.43	-0.16	0.0036	99.17	97.85	93.50
							N/A	0.0027	370.00	N/A	21.07	2.32	3.53	98.60	99.12	98.05	-0.52	0.0028	99.17	98.15	98.50
	SE 3	SE 4	4.2	30.	16.71	62.89	42	0.0021	580.00	39.66	62.89	6.54	1.48	97.20	97.11	94.09	0.09	0.0052	97.84	94.83	91.60
							N/A	0.0043	580.00	N/A	0.00	6.28	0.00	97.20	98.33	93.21	N/A	0.0088	100.00	94.89	97.50
	SE 4	SE 5	8.1	38.1	18.25	76.21	54	0.0014	320.00	63.91	76.21	4.79	1.11	94.10	94.09	93.45	0.01	0.0020	94.49	93.85	89.40
							N/A	0.0031	320.00	N/A	0.00	2.33	0.00	94.10	98.33	93.21	N/A	0.0160	100.00	94.89	95.00
	SE 5	SE 6	10.9	49.	19.41	95.66	54	0.0069	270.00	141.07	95.66	6.01	0.72	93.80	92.53	91.96	1.27	0.0030	93.39	92.59	88.95
							N/A	0.0074	270.00	N/A	0.00	1.02	0.00	93.80	98.33	93.21	N/A	0.0190	100.00	94.89	94.00
	SE 6	SE Outlet	13.6	62.6	20.14	121.44	54	0.0043	70.00	111.57	120.01	7.55	0.13	92.50	91.60	91.30	0.90	0.0043	92.58	92.28	87.10
							20	0.0043	70.00	N/A	1.42	1.32	1.10	92.50	92.57	92.25	-0.07	0.0043	92.59	92.28	92.50
	NW-1C	NW-1	8.5	30.1	46.24	24.12	30	0.0011	570.00	11.53	24.12	4.91	1.93	96.40	94.47	91.84	1.93	0.0046	94.88	92.26	89.60
							N/A	0.0037	570.00	N/A	0.00	0.00	0.00	96.40	94.47	91.84	N/A	0.0046	94.88	92.26	96.40
	NW-1A	NW-1C	21.6	21.6	46.	17.41	18	0.0029	140.00	4.87	17.41	9.85	0.24	N/A	98.33	93.21	N/A	0.0366	100.00	94.89	90.00

Amoruso Ranch Specific Plan Area

Drainage Master Plan

Appendix E

Preliminary Geotechnical Exploration

PRELIMINARY EXPLORATION

AMORUSO RANCH SPECIFIC PLAN
ROSEVILLE, CALIFORNIA

Submitted to:
Ms. Deanne Green
Brookfield Residential
2271 Lava Ridge Court, Suite 220
Roseville, CA 95661

Prepared by:
ENGEO Incorporated

April 26, 20112

Project No:
8186.000.001

- Expect Excellence -

ENGEO
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
WATER RESOURCES
CONSTRUCTION SERVICES

Project No.
8186.000.001

April 26, 2012

Ms. Deanne Green
Brookfield Residential
2271 Lava Ridge Court, Suite 220
Roseville, CA 95661

Subject: Amoruso Ranch Specific Plan
Roseville, California

PRELIMINARY EXPLORATION REPORT

Dear Mr. Green:

ENGEO prepared this preliminary exploration report for the Amoruso Ranch Specific Plan as outlined in our agreement dated March 13, 2012. We characterized the subsurface conditions at the site to explore potential stormwater infiltration opportunities for low impact design.

If you have any questions or comments regarding this report, please call and we will be glad to discuss them with you.

Sincerely,

ENGEO Incorporated

Jonathan C. Boland, GE
Senior Engineer

Mark M. Gilbert, GE
Principal

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Letter of Transmittal

FIGURES

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

ENGEO prepared this preliminary exploration report for the Amoruso Ranch Specific Plan in Roseville, California. The purpose of our services was to characterize the subsurface conditions at the site to explore potential infiltration opportunities for low impact design. Our scope of services, as outlined in our agreement with Brookfield Residential dated March 13, 2012, included the following:

- Service Plan Development
- Subsurface Field Exploration
- Soil Laboratory Testing
- Data Analysis and Conclusions
- Report Preparation.

For our use we received the following documents:

1. A draft land use plan prepared by the Dahlin Group, dated April 5, 2012.

2. A preliminary Grading and Stormwater Analysis memorandum by RBF dated April 28, 2011.

3. A preliminary cut/fill map by RBF dated February 28, 2011.

4. A map showing designated wetlands and vernal pools (sent from Brookfield in CAD format, not dated).

We performed previous subsurface exploration in the vicinity of the site as referenced in our report titled "Geotechnical Report for Roseville Energy Park", dated January 12, 2005.

This report was prepared for the exclusive use of our client and their consultants for planning of this project. This document may not be reproduced in whole or in part by any means whatsoever, nor may it be quoted or excerpted without our express written consent.

1.2 PROJECT LOCATION

Figure 1 displays a Site Vicinity Map. The approximately 680-acre site is located south of the intersection of West Sunset Boulevard and Amoruso Road in western Placer County, California. We understand the area is proposed to be annexed into the City of Roseville.

Figure 2 shows site boundaries, proposed land use areas, and our exploratory locations. West Sunset Boulevard defines the northern boundary of the site and undeveloped land borders the site to the west, south and east.

1.3 PROJECT DESCRIPTION

Based on our discussion with you, and review of the information provided, we understand that future site improvements will include mixed-use development (residential, commercial, retail), roadways, parks and open space. Because this project is still in the planning phase, no specific development details are yet available.

2.0 FINDINGS

2.1 FIELD EXPLORATION

We observed drilling of 10 borings at the locations shown on the Site Plan, Figure 2. An ENGEO representative supervised the drilling and logged the subsurface conditions at each location. We retained a truck-mounted Soil Test Ranger drill rig and crew to advance the borings using 5-inch diameter solid flight auger methods. The borings were advanced to depths ranging from 10 to 21 feet below existing grade. The borings were backfilled with drill cuttings. During our field exploration, we were accompanied by a senior botanist from ECORP Consulting.

The location of our explorations are approximate and were field-located using hand-held GPS equipment; they should be considered accurate only to the degree implied by the method used. We obtained bulk soil samples from drill cuttings and retrieved both disturbed and relatively undisturbed soil samples at various intervals in the borings using standard penetration tests and 3-inch O.D. split spoon sampler.

The blow counts were obtained by dropping a 140-pound hammer through a 30-inch free fall. The 2-inch O.D. split spoon sampler was driven 18 inches and the number of blows was recorded for each 6 inches of penetration. In addition, 2.5-inch I.D. samples were obtained using a Modified California Sampler driven into the soil with the 140-pound hammer previously described. Unless otherwise indicated, the blows per foot recorded on the boring log represent the accumulated number of blows required to drive the last 1 foot of penetration; the blow counts have not been converted using any correction factors. When sampler driving was difficult, penetration was recorded only as inches penetrated for 50 hammer blows.

We used the field logs to develop the report logs in Appendix A. The logs depict subsurface conditions at the exploration locations for the date of exploration; however, subsurface conditions may vary with time.

2.2 SURFACE CONDITIONS

Site topography generally consists of a planar surface formed by an ancient alluvial fan dissected by gentle swales, closed depressions, and seasonal drainages. Along the eastern boundary, three fields have been graded for alfalfa irrigation purposes. These fields have berms between them and terrace down to the north. The site generally slopes to the south, west, and north from a central high point with elevations generally ranging from approximately Elevation +78 feet (Datum: 0 feet = Mean Sea Level), in the southwest to Elevation +107 feet along the middle of the western boundary.

We observed the following site features during our reconnaissance:

- The majority of the property is being used as grazing land and is covered with short grasses and weeds.
- Multiple seasonal drainage swales and small closed depressions exist across the site. These features contained wet surface soil or standing water during our visit.
- Three small stock ponds are located along the eastern edge and northeastern portion of the property.
- A residence is located in the northeastern portion of the site. This portion of the property includes multiple outbuildings, a collapsed barn, and a variety of discarded equipment, vehicles, and miscellaneous junk.

2.3 SUBSURFACE CONDITIONS

Our borings indicate the near surface soils generally consist of stiff to hard, low to medium plasticity silts and clays. The near surface silt and clay is typically underlain by a somewhat poorly defined 3- to 7-foot thick, moderately cemented, silt/clay “hardpan” layer. Generally, beneath the hardpan layer, the borings encountered interspersed layers of silty clay, silt, and silty sand across the site. The clay and silt observed below the hardpan layer is generally very stiff to hard, low plasticity material with occasional zones of cementation.

Below the surface silt and clay layer, Borings B-3, B-6 and B-7 encountered layers of medium dense to very dense silty sands and relatively clean sands extending to a depth of 11 to 16½ feet (the maximum depth explored for these specific borings). The fines content (that amount passing the No. 200 sieve) of these sandy layers range from approximately 10 to 40 percent. The borings drilled for this study did not encounter any noticeably weak, liquefiable or compressible soils.

Consult the Site Plan and exploration logs for specific subsurface conditions at each location. We include our exploration logs in Appendix A. The logs contain the soil type, color, consistency, and visual classification in general accordance with the Unified Soil Classification System. The logs graphically depict the subsurface conditions encountered at the time of the exploration.

2.4 GROUNDWATER CONDITIONS

We did not observe static or perched groundwater in any of our subsurface explorations. Fluctuations in the level of groundwater may occur due to variations in rainfall, irrigation practice, and other factors not evident at the time measurements were made.

We reviewed the Department of Water Resources California Water Data Library (http://www.water.ca.gov/waterdatalibrary/) to review the general groundwater conditions in the vicinity of the site. We summarize data from several nearby wells in Table 2.4-1 below:

TABLE 2.4-1
Groundwater Levels in Nearby Wells

Well Identification	Approximate Depth to Groundwater (feet)	Approximate Groundwater Elevation (feet)	Date of Last Reading
11N05E23B001M	99.6	-13.6	8/2011
11N05E15G001M	90.2	-15.5	4/2003
11N05E16H001M	116.2	-28.2	8/2011
11N05E03M003M	95.8	-6.5	4/1980

2.5 LABORATORY TESTING

We performed laboratory tests on selected soil samples to determine some of their engineering properties. For this preliminary exploration report, we performed moisture content, sieve analysis, and plasticity index testing. Moisture contents are recorded on the boring logs in Appendix A. All other laboratory data is included in Appendix B.

2.6 HYDROLOGIC SOIL GROUPS

We reviewed published soil data compiled by the United States Department of Agriculture (USDA), National Resource Conservation Service for background information on mapped soil conditions (http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm). Each survey maps soil units and includes a summary of general characteristics and recommended guidance. We generated a site specific, custom USDA Soil Resource report, attached as Appendix C, with the approximate project boundaries. We tabulate the mapped soil units on the Amoruso property in Table 2.6-1.

TABLE 2.6-1
USDA Soil Types

Map Unit Number:Name	Slope (Percent)	*Natural Drainage Class	Depth to Restrictive Layer (inches)
104: Alamo-Fiddyment Complex	0-5	Poorly to well drained	35 to 41
141: Cometa-Fiddyment Complex	1-5	Well drained	35 to <60
146: Fiddyment Loam	1-8	Well drained	35 to 39
147: Fiddyment-Kaseberg Complex	2-9	Well drained	17 to 39
195: Xerofluvents	0-5	Somewhat poorly drained	20 to 36

* Natural Drainage Class refers to the ability to drain water off the surface, not to infiltrate water into the soil

Much of the Amoruso Property, more than approximately 70 percent, is mapped as the Cometa-Fiddyment Complex and the Fiddyment-Kaseberg Complex. A map unit delineation represents an area dominated by one or more major kinds of soils and named according to the taxonomic classification of the dominant soils. The high fines content of this group translates to a high rate of surface water runoff, thus the ‘well drained’ drainage class shown in Table 2.6-1.

The USDA assignment of soils to hydrologic soil groups is generally based on the premise that soils that are similar in depth to a restrictive layer or water table, percolation rate, texture, and structure, will have similar runoff responses. The slope of the soil surface is not considered when assigning hydrologic soil groups.

Table 2.6-2 below shows USDA generalized criteria for assigning hydrologic soil groups.

TABLE 2.6-2

USDA Hydrologic Soil Groups*

Criteria for assignment of hydrologic soil groups when a water impermeable layer exists at a depth between 20 and 40 inches

Soil Property	Unit A	Unit B	Unit C	Unit D
Hydraulic conductivity of the least transmissive layer	>5.67 in/hr	5.67 to 1.42 in/hr	1.42 to 0.14 in/hr	< 0.14 in/hr
Depth to water impermeable layer	20 to 40 in	20 to 40 in	20 to 40 in	<20 in
Depth to high water table	24 to 40 in	24 to 40 in	24 to 40 in	<24 in

*From Table 7-1, USDA National Engineering Handbook, Part 630 (210-VI-NEH), Chapter 7, May 2007

The two dominant soil units mapped onsite are part of Hydrologic Soil Group D, which includes soils that have a very slow water infiltration rate when thoroughly wet and a slow rate of water transmission. Soils within this group generally have the following characteristics.

- Fine grained silts and clays with high shrink/swell potential
- Relatively high permanent water table
- Cemented clay or silt layer near the ground surface
- Shallow soils located over an impermeable stratum

3.0 CONCLUSIONS

The soil conditions at the site are generally consistent with other sites in the area. The surficial deposits are generally fine-grained and exhibit poor infiltration qualities that are associated with Hydrologic Soil Group D. As a result, potential infiltration opportunities are somewhat limited, though further exploration and testing could be helpful. We summarize below our preliminary opinions regarding infiltration opportunities and recommendations for future studies.

3.1 INFILTRATION OPPORTUNITIES

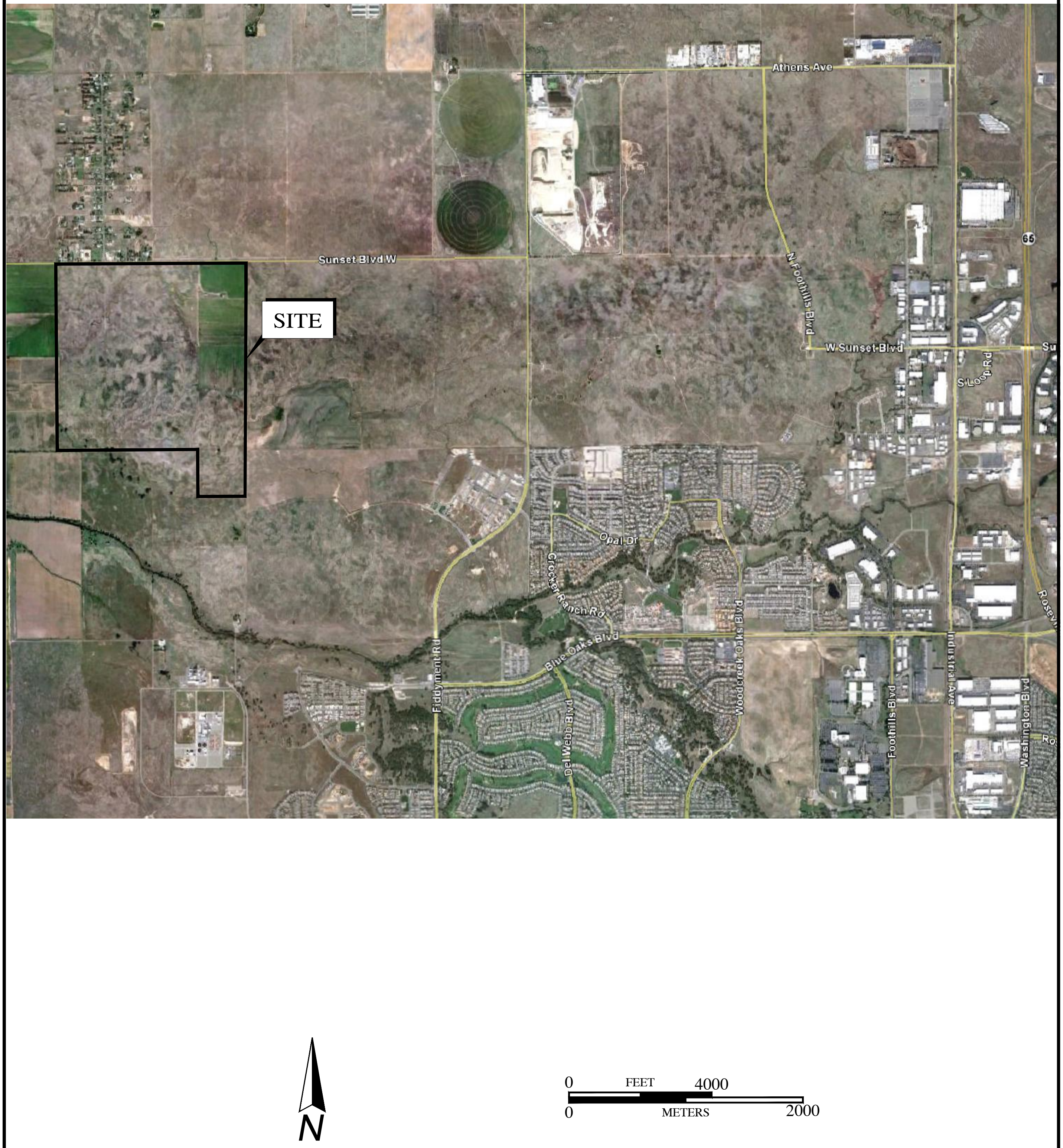
As described in Section 2.3, the site is dominated by surficial fine grained silts and clays. The majority of the near surface soils have or will have (as a result of proper compaction) a low to moderately low permeability value for stormwater infiltration in grassy swales or permeable pavers, unless subdrains are installed. Therefore, best management practices should assume that very limited stormwater infiltration will occur across the majority of the site unless an engineered system is designed. Infiltration testing was not included in our study; however, for preliminary consideration we estimate the near-surface soils may exhibit an in-situ infiltration rate of less than approximately 0.02 in/hour.

In some isolated areas of the site we did encounter relatively shallow, medium dense to dense sands. These sands could provide limited infiltration opportunity for pre-treatment of stormwater and urban runoff, possibly using some type of infiltration gallery. These zones are shown on Figure 3 in the vicinity of Borings B3, B6 and B7. The sands in these areas consist of 60 to 80 percent fine to medium grained sands with 9 to 37 percent silts and clays. Based on our experience, we estimate the relatively clean, medium dense, fine sands will exhibit an in-situ infiltration rate greater than the near surface fine grained soils onsite. Specific soil infiltration rates for sandy materials should be confirmed in the field with double ring infiltrometer testing.

3.2 FUTURE WORK

To further evaluate the extent of sandy soils and to quantify the potential for stormwater infiltration onsite, we suggest additional exploration via test pits in the vicinity of Borings B3, B6 and B7 with a rubber-tired backhoe. This data may help to refine the lateral limits of soils that may have the potential to infiltrate water. In conjunction with the test pits, we suggest performing several double ring infiltration tests per ASTM 3385 to quantify the in-situ infiltration rate of the sandy soils.

FIGURES



BASE MAP SOURCE: GOOGLE EARTH

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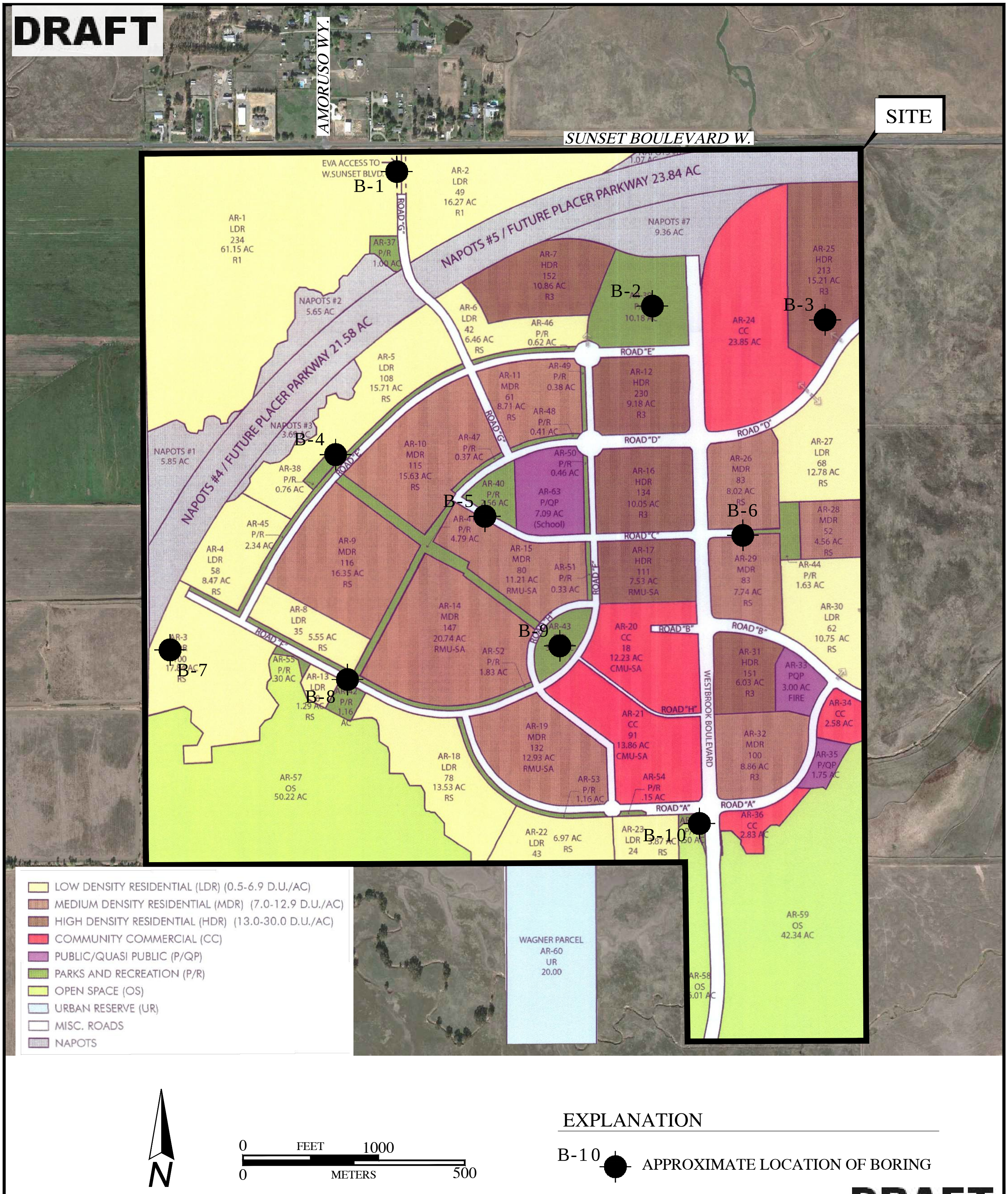
VICINITY MAP
AMORUSO RANCH
ROSEVILLE, CALIFORNIA

PROJECT NO.: 8186.000.001
SCALE: AS SHOWN
DRAWN BY: SRP
CHECKED BY: MG
FIGURE NO.
1

C:\Documents and Settings\dborde\local settings\temp\AcPublish_3380\8186000001-1-VicinityMap-0412.dwg Plot Date: 4-26-12 dborde

ORIGINAL FIGURE PRINTED IN COLOR



BASE MAP SOURCE: DAHLIN GROUP, GOOGLE EARTH, 2011

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SITE PLAN
AMORUSO RANCH
ROSEVILLE, CALIFORNIA

PROJECT NO.: 8186.000.001
SCALE: AS SHOWN
DRAWN BY: SRP
CHECKED BY:

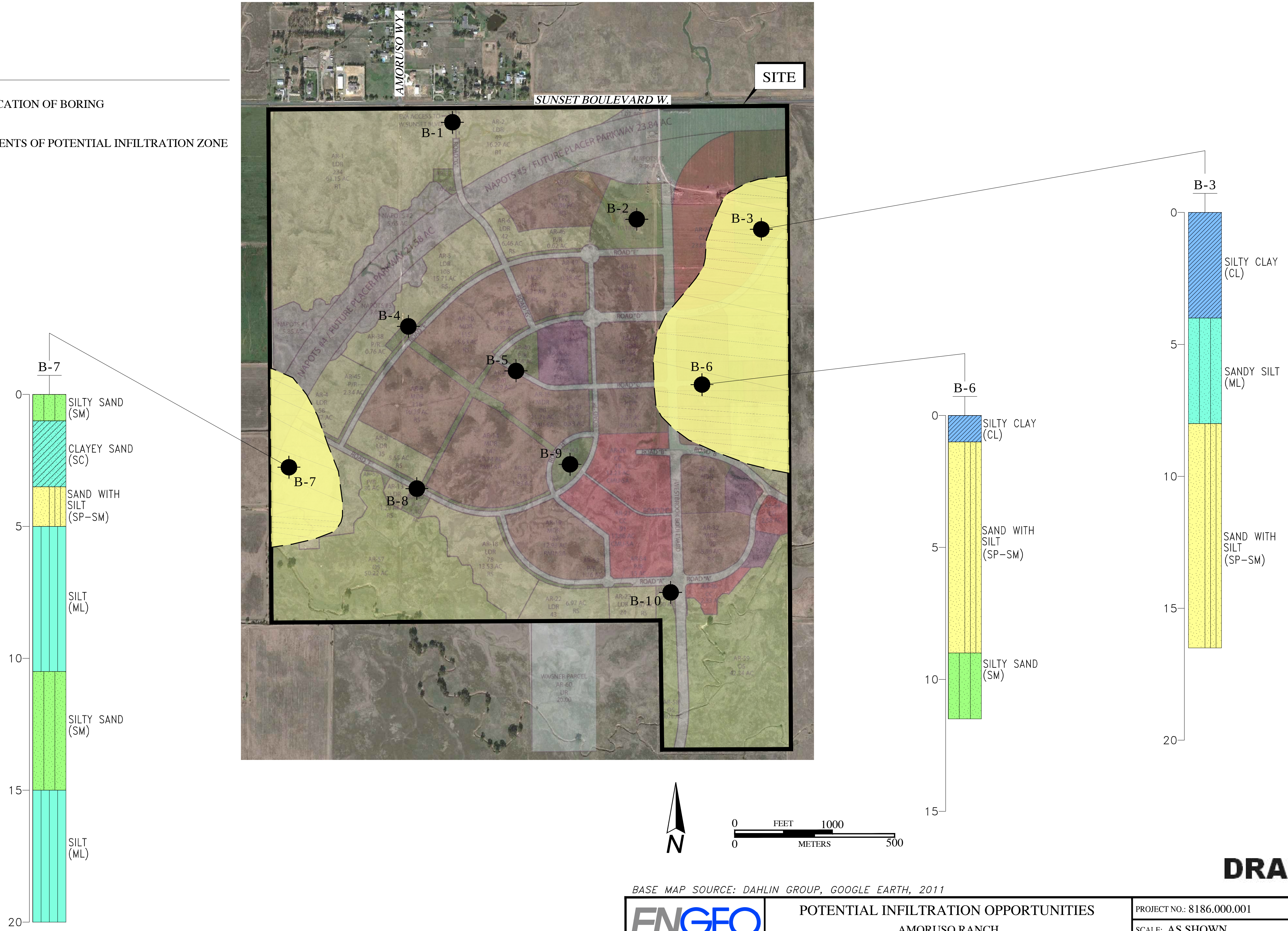
FIGURE NO.
2

DRAFT

EXPLANATION

B-10 ● APPROXIMATE LOCATION OF BORING

🟨 INTERPRETED EXTENTS OF POTENTIAL INFILTRATION ZONE



DRAFT

BASE MAP SOURCE: DAHLIN GROUP, GOOGLE EARTH, 2011

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POTENTIAL INFILTRATION OPPORTUNITIES
AMORUSO RANCH
ROSEVILLE, CALIFORNIA

PROJECT NO.: 8186.000.001	FIGURE NO. 3
SCALE: AS SHOWN	
DRAWN BY: DLB	CHECKED BY: MG

G:\Drafting\DRAFTING2_Dwg\8186\000\8186000001-3-InfiltrationOpps-0412.dwg Plot Date: 4-26-12 dborde

ORIGINAL FIGURE PRINTED IN COLOR

APPENDIX A

Key to Boring Logs
Exploration Logs

APPENDIX A

KEY TO BORING LOGS

MAJOR TYPES				DESCRIPTION
COARSE-GRAINED SOILS MORE THAN HALF OF MAT'L LARGER THAN #200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELS WITH LESS THAN 5% FINES	▨	GW - Well graded gravels or gravel-sand mixtures
			▨	GP - Poorly graded gravels or gravel-sand mixtures
		GRAVELS WITH OVER 12 % FINES	▨	GM - Silty gravels, gravel-sand and silt mixtures
			▨	GC - Clayey gravels, gravel-sand and clay mixtures
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LESS THAN 5% FINES	▨	SW - Well graded sands, or gravelly sand mixtures
			▨	SP - Poorly graded sands or gravelly sand mixtures
		SANDS WITH OVER 12 % FINES	▨	SM - Silty sand, sand-silt mixtures
			▨	SC - Clayey sand, sand-clay mixtures
FINE-GRAINED SOILS MORE THAN HALF OF MAT'L SMALLER THAN #200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50 % OR LESS		▨	ML - Inorganic silt with low to medium plasticity
			▨	CL - Inorganic clay with low to medium plasticity
			▨	OL - Low plasticity organic silts and clays
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50 %		▨	MH - Elastic silt with high plasticity
			▨	CH - Fat clay with high plasticity
			▨	OH - Highly plastic organic silts and clays
	HIGHLY ORGANIC SOILS		▨	PT - Peat and other highly organic soils

For fine-grained soils with 15 to 29% retained on the #200 sieve, the words "with sand" or "with gravel" (whichever is predominant) are added to the group name.

For fine-grained soil with >30% retained on the #200 sieve, the words "sandy" or "gravelly" (whichever is predominant) are added to the group name.

GRAIN SIZES

U.S. STANDARD SERIES SIEVE SIZE

CLEAR SQUARE SIEVE OPENINGS

200 40 10 4 3/4 " 3" 12"

SILTS AND CLAYS	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

RELATIVE DENSITY

SANDS AND GRAVELS	BLOWS/FOOT (S.P.T.)
VERY LOOSE	0-4
LOOSE	4-10
MEDIUM DENSE	10-30
DENSE	30-50
VERY DENSE	OVER 50

CONSISTENCY

SILTS AND CLAYS	STRENGTH*
VERY SOFT	0-1/4
SOFT	1/4-1/2
MEDIUM STIFF	1/2-1
STIFF	1-2
VERY STIFF	2-4
HARD	OVER 4

MOISTURE CONDITION

DRY	Dusty, dry to touch
MOIST	Damp but no visible water
WET	Visible freewater

SAMPLER SYMBOLS

■	Modified California (3" O.D.) sampler
☰	California (2.5" O.D.) sampler
◩	S.P.T. - Split spoon sampler
☐	Shelby Tube
▯	Continuous Core
☒	Bag Samples
✋	Grab Samples
NR	No Recovery

LINE TYPES

________	Solid - Layer Break
― ― ― ― ― ―	Dashed - Gradational or approximate layer break

GROUND-WATER SYMBOLS

▽	Groundwater level during drilling
▼	Stabilized groundwater level

(S.P.T.) Number of blows of 140 lb. hammer falling 30" to drive a 2-inch O.D. (1-3/8 inch I.D.) sampler

* Unconfined compressive strength in tons/sq. ft., asterisk on log means determined by pocket penetrometer

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LOG OF BORING B-1

Geotechnical Exploration
Amoruso Ranch Specific Plan
Roseville, CA
8186.000.001

DATE DRILLED: 4/2/2012
HOLE DEPTH: Approx. 21 ft.
HOLE DIAMETER: 4.0 in.

LOGGED / REVIEWED BY: P. Cottingham / M. Gilbert
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

							Atterberg Limits						
Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Liquid Limit	Plastic Limit	Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
			SANDY SILT (ML), dark reddish brown, moist	▥									
		■	SILTY CLAY (CL), dark reddish brown, hard, moist, medium plasticity	▨		50/4	46	14	32	90	19.2		4.5+*
	1		Grades to light reddish brown, low plasticity, weak cementation, 10% fine sand	▨									
			SILT (ML), light yellowish brown, hard, moist, moderate cementation	▥									
5		■		▥		52/6							4.5+*
	2			▥									
			Grades to brown, very dense, moist, wth fine-grained sand	▥									
10	3	■		▥		62/6				62	23.3		
	4		SILTY CLAY (CL), red, hard, moist, medium plasticity, weak cementation	▨									
15	5	◣		▨		52				95	29.2		4.5+*
20	6	■	Grades to yellowish red, low plasticity	▨		50/4					26.8		
			Bottom of boring at 21 feet. No groundwater encountered.										

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LOG OF BORING B-2

Geotechnical Exploration
Amoruso Ranch Specific Plan
Roseville, CA
8186.000.001

DATE DRILLED: 4/2/2012
HOLE DEPTH: Approx. 10 ft.
HOLE DIAMETER: 4.0 in.

LOGGED / REVIEWED BY: P. Cottingham / M. Gilbert
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
			SANDY SILT (ML), black, very stiff, moist, with rust staining, 20% fine-grained sand	🟩									
		■	Grades to olive brown, moderate cementation, trace sand	🟩		58				93	34.6		
	1			🟩									
5		■	Grades to weak cementation, hard	🟩		50/4					29.5		
	2			🟩									
10	3	■	Grades to yellowish brown, trace fine-grained sand	🟩		50/2.5							
			Bottom of boring at 10 feet. No groundwater encountered.										

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LOG OF BORING B-3

Geotechnical Exploration
Amoruso Ranch Specific Plan
Roseville, CA
8186.000.001

DATE DRILLED: 4/2/2012
HOLE DEPTH: Approx. 16½ ft.
HOLE DIAMETER: 4.0 in.

LOGGED / REVIEWED BY: P. Cottingham / M. Gilbert
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
							Liquid Limit	Plastic Limit	Plasticity Index				
			SANDY CLAY (CL), olive brown, very stiff, moist, low plasticity, 38% fine-grained sand	▨									
		■		▨		17				54			2.0* 4.5+*
			Grades to dark brown, fine- to medium-grained sand.	▨									
			Grades to light olive brown, weak cementation	▨									
	1			▨									
			SANDY SILT (ML), brown, hard, moist	🟩									
5		■		🟩		50/1				78	33.6		
	2			🟩									
			SAND WITH SILT (SP-SM), olive brown, dense, moist, fine- to medium-grained sand, less than 11% fines	🟨									
10	3	■		🟨		34				11	11.3		
	4			🟨									
15		◣	Abundant mica	🟨		24					16		
	5		Bottom of boring at 16.5 feet. No groundwater encountered.										

ENGEO
INCORPORATED

LOG OF BORING B-4

Geotechnical Exploration
Amoruso Ranch Specific Plan
Roseville, CA
8186.000.001

DATE DRILLED: 4/2/2012
HOLE DEPTH: Approx. 10½ ft.
HOLE DIAMETER: 4.0 in.

LOGGED / REVIEWED BY: P. Cottingham / M. Gilbert
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
							Liquid Limit	Plastic Limit	Plasticity Index				
			SANDY CLAY (CL), dark brown, stiff, moist, low plasticity, 30% fine-grained sand	▨									
		■	Grades to 45% fine- to medium-grained sand	▨		33				32	24.6		1.5*
			SILTY SAND (SM), yellowish red, dense, moist, medium-grained sand, 32% silt	🟩									
	1			🟩									
			SILT (ML), light olive brown, hard, moist, moderate cementation	▥									
5		■		▥		62					43.3		4.5+*
	2			▥									
10	3	■		▥		50/3					30.9		4.5+*
			Bottom of boring at 10.5 feet. No groundwater encountered.										

ENGEO INCORPORATED

LOG OF BORING B-5

Geotechnical Exploration
Amoruso Ranch Specific Plan
Roseville, CA
8186.000.001

DATE DRILLED: 4/2/2012
HOLE DEPTH: Approx. 21 ft.
HOLE DIAMETER: 4.0 in.

LOGGED / REVIEWED BY: P. Cottingham / M. Gilbert
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
			SANDY SILT (ML), dark yellowish brown, hard, weak cementation, 45% fine-grained sand										
		■	SILT (ML), light olive brown, hard, moist, moderate cementation			50/3					24.6		4.5*
	1												
			SANDY SILT (ML), light olive brown, hard, moist, fine-grained sand										
5		◣				35				62	12.8		
	2												
			Grades to pale yellow, moderate cementation										
10	3	■				50/2					40.5		4.5+*
	4												
15		■				50/3							4.5+*
	5												
			SILTY CLAY (CL), olive brown, hard, moist, low plasticity, moderate cementation	▨									
20	6	◣		▨		73				91	24.1		
			Bottom of boring at 21 feet. No groundwater encountered.										

ENGEO
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LOG OF BORING B-6

Geotechnical Exploration
Amoruso Ranch Specific Plan
Roseville, CA
8186.000.001

DATE DRILLED: 4/2/2012
HOLE DEPTH: Approx. 11½ ft.
HOLE DIAMETER: 4.0 in.

LOGGED / REVIEWED BY: P. Cottingham / M. Gilbert
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
							Liquid Limit	Plastic Limit	Plasticity Index				
			SILTY CLAY (CL), dark brown, moist, low plasticity										
			SAND WITH SILT (SP-SM), dark grayish brown, medium dense, fine- to medium-grained sand, 10% fines			25					18.2		
	1					15							
5			Grades to with rust staining, 9% fines			15				9	18.5		
	2												
			SILTY SAND (SM), grayish brown, medium dense, 82% fine-grained sand										
10	3		Grades to grayish brown, fine-grained sand			23				17	15.8		
			Bottom of boring at 11.5 feet. No groundwater encountered.										

ENGEO
INCORPORATED

LOG OF BORING B-7

Geotechnical Exploration
Amoruso Ranch Specific Plan
Roseville, CA
8186.000.001

DATE DRILLED: 4/2/2012
HOLE DEPTH: Approx. 20 ft.
HOLE DIAMETER: 4.0 in.

LOGGED / REVIEWED BY: P. Cottingham / M. Gilbert
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
			SILTY SAND (SM), brown, moist, 35% fines	🟩									
		■	CLAYEY SAND (SC), brown, loose to medium dense, moist, fine- to medium-grained sand, trace gravel	▨		16				37	15		2.0*
	1												
			SAND WITH SILT (SP-SM), light yellowish brown, medium dense, moist, fine- to medium-grained sand, 10% fines	🟨									
5		◣	SILT (ML), light olive brown, hard, moist, moderate cementation	🟦		57					39.9		4.5+*
	2												
10	3	■	Grades to no cementation										
			SILTY SAND (SM), pale olive, very dense, fine-grained sand, 17% fines	🟩		73				17	8.2		
	4												
			Increasing fines										
15		◣	SILT (ML), dark brown, hard, moist, weak cementation	🟦		50/4				76			4.5+*
	5												
20	6	■				53					18.7		
			Bottom of boring at 20 feet. No groundwater encountered.										

ENGEO
INCORPORATED

LOG OF BORING B-8

Geotechnical Exploration
Amoruso Ranch Specific Plan
Roseville, CA
8186.000.001

DATE DRILLED: 4/2/2012
HOLE DEPTH: Approx. 11 ft.
HOLE DIAMETER: 4.0 in.

LOGGED / REVIEWED BY: P. Cottingham / M. Gilbert
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
							Liquid Limit	Plastic Limit	Plasticity Index				
			SILTY CLAY (CL), dark brown, stiff, moist, low plasticity	▨									
		■	SILT (ML), light olive brown, hard, moist, moderate cementation	▥		60					45		1.5* 4.5+*
	1			▥									
5		■		▥		55/5					40.8		4.5+*
	2			▥									
10	3			▥									
		◣	Grades to brown, trace clay	▥		80				94	41.4		4.5+*
			Bottom of boring at 11 feet. No groundwater encountered.										

ENGEO
INCORPORATED

LOG OF BORING B-9

Geotechnical Exploration
Amoruso Ranch Specific Plan
Roseville, CA
8186.000.001

DATE DRILLED: 4/2/2012
HOLE DEPTH: Approx. 10½ ft.
HOLE DIAMETER: 4.0 in.

LOGGED / REVIEWED BY: P. Cottingham / M. Gilbert
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
							Liquid Limit	Plastic Limit	Plasticity Index				
			SILTY CLAY (CL), dark brown, very stiff, moist, low plasticity	▨									
		■	Grades to yellowish brown, low plasticity, trace fine sand	▨		19	38	19	19		23.8		3.5*
	1			▨									
			SILT (ML), pale yellow, hard, dry to moist	▥									
5		■		▥		50/4				93	26.8		4.5+*
			Grades to olive brown, moist, moderate cementation	▥									
	2			▥									
10	3	■		▥		55/5							4.5+*
			Bottom of boring at 10.5 feet. No groundwater encountered.										

ENGEO
INCORPORATED

LOG OF BORING B-10

Geotechnical Exploration
Amoruso Ranch Specific Plan
Roseville, CA
8186.000.001

DATE DRILLED: 4/2/2012
HOLE DEPTH: Approx. 16½ ft.
HOLE DIAMETER: 4.0 in.

LOGGED / REVIEWED BY: P. Cottingham / M. Gilbert
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
HAMMER TYPE: 140 lb. Rope and Cathead

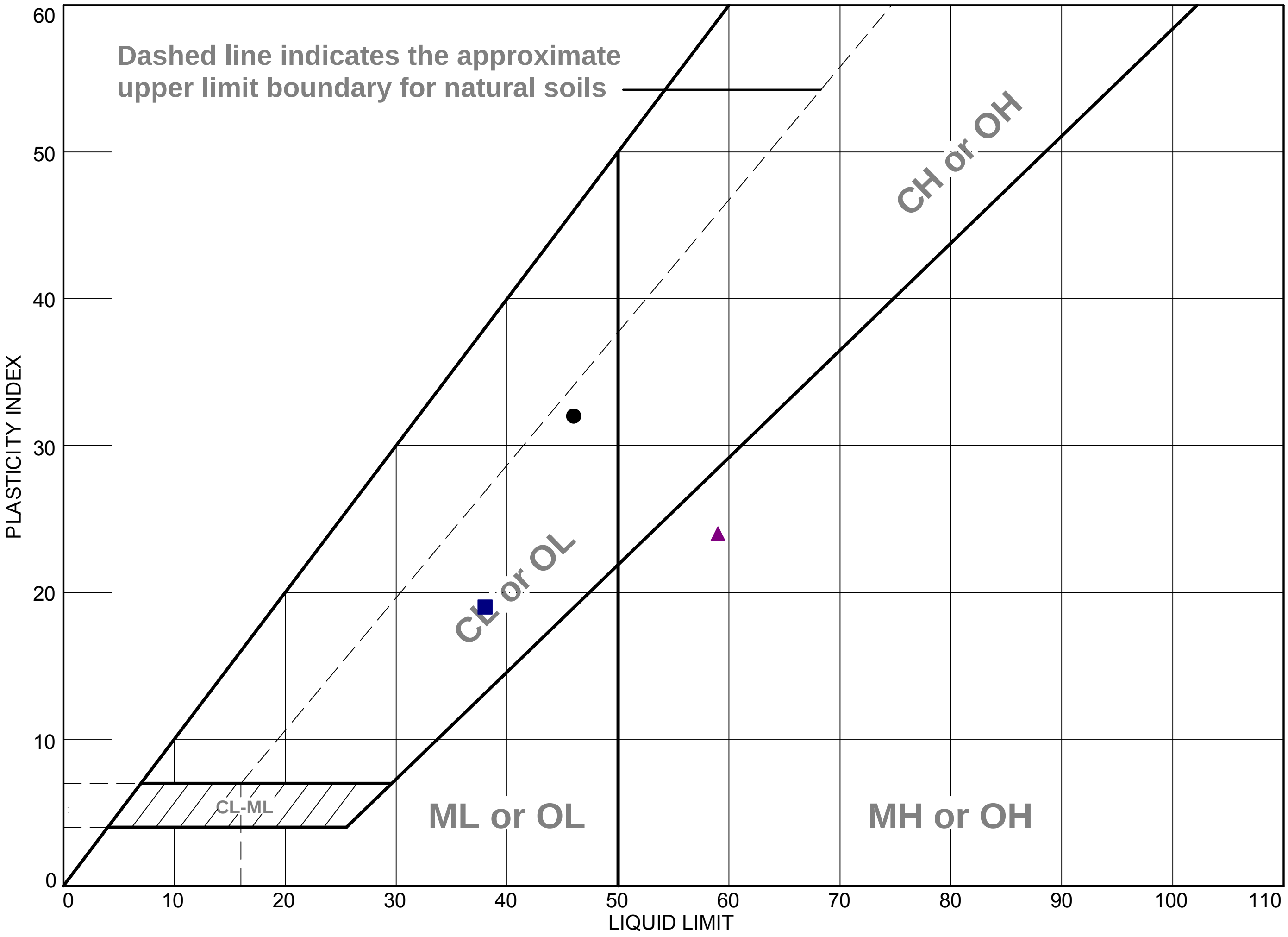
Depth in Feet	Depth in Meters	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Unconfined Strength (tsf) *field approx
			SANDY SILT (ML), dark reddish brown, hard, moist, 10% fine-grained sand										
		■	Grades to olive brown with rust staining, weak cementation, trace sand			50/2.5				90	26.3		4.5+*
	1												
5		■	Grades to moderate cementation			50/4					25.2		4.5+*
	2												
			SILTY CLAY (CL), olive brown, hard, moist, medium plasticity										
10	3	◣				50/3	59	35	24		39.7		4.5+*
	4												
			SILT (MH), olive brown, moist, high plasticity										
15		◣				29							4.5+*
	5		Bottom of boring at 16.5 feet. No groundwater encountered.										

APPENDIX B
LABORATORY TEST DATA

Liquid and Plastic Limits Test Report
Particle Size Distribution Report

APPENDIX B

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark Reddish Brown Silty Clay	46	14	32		90.2	
■	Dark Brown Silty Clay	38	19	19			
▲	Olive Brown Silt	59	35	24			

Project No. 8186.000.001 **Client:** Brookfield Residential Properties

Project: Amoruso Ranch Specific Plan

●**Source of Sample:** Native **Sample Number:** B1-1.5

■**Source of Sample:** Native **Sample Number:** B9-1.5

▲**Source of Sample:** Native **Sample Number:** B10-10

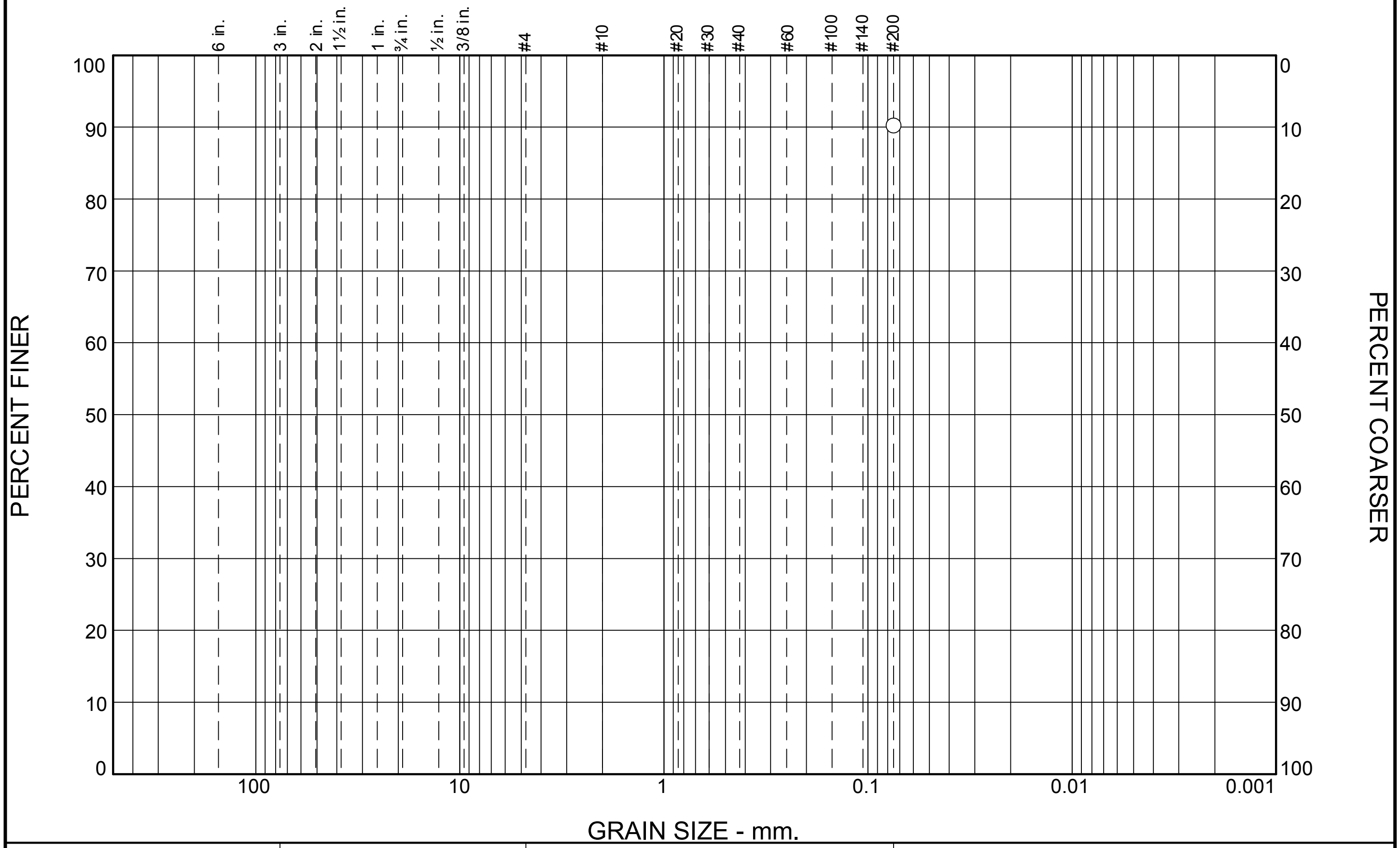
ENGEO INCORPORATED

Remarks:

Figure

Tested By: RAM **Checked By:** PC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						90.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	90.2		

* (no specification provided)

Soil Description

Dark Reddish Brown Silty Clay

Atterberg Limits

PL= 14 LL= 46 PI= 32

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: Native
Sample Number: B1-1.5

Date: 04-02-2012

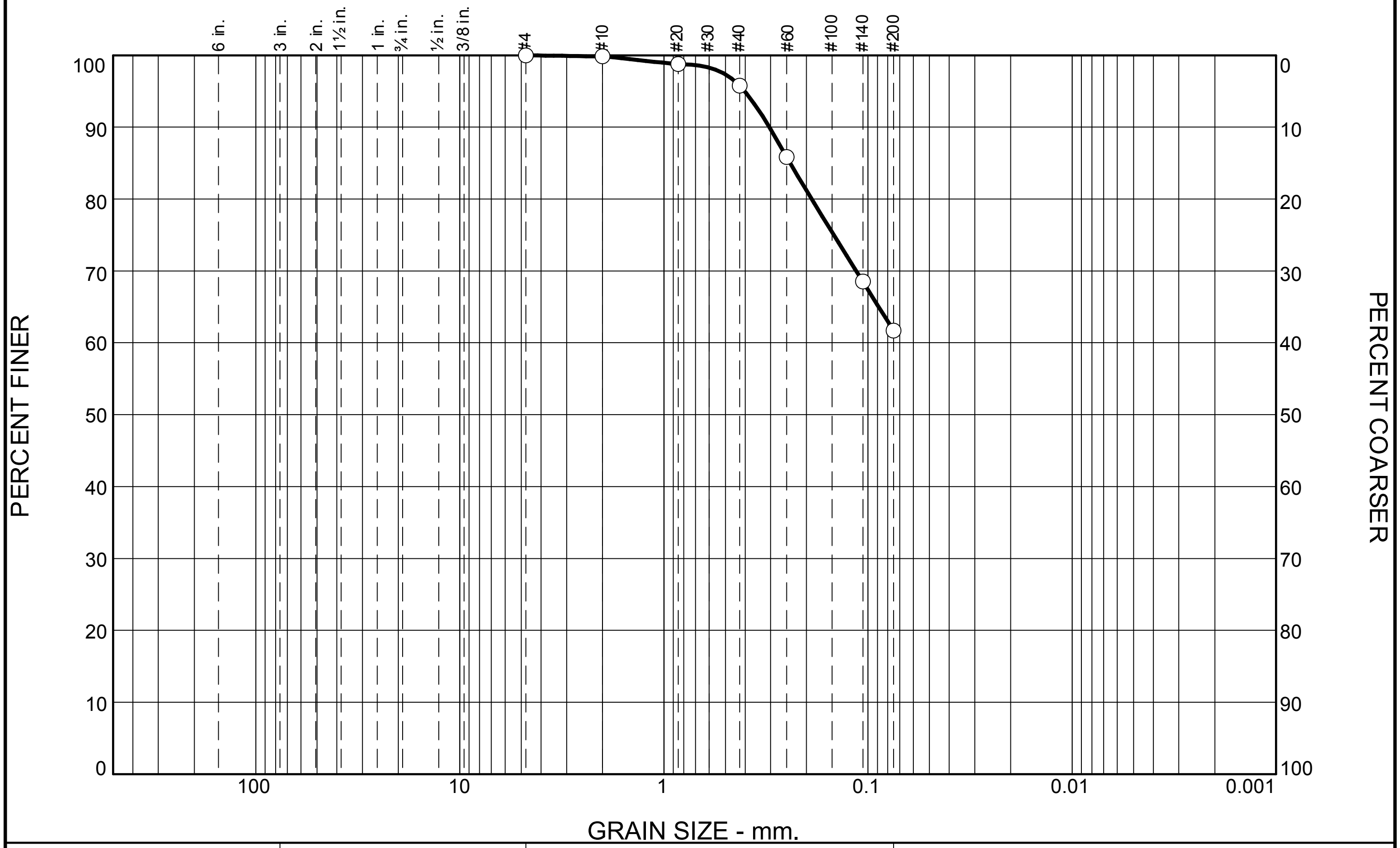
ENGEO INCORPORATED

Client: Brookfield Residential Properties
Project: Amoruso Ranch Specific Plan

Project No: 8186.000.001 **Figure**

Tested By: RAM **Checked By:** PC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	4.0	34.1	61.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.8		
#20	98.8		
#40	95.8		
#60	85.8		
#140	68.5		
#200	61.7		

* (no specification provided)

Soil Description

Brown Sandy Silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3044 D_{85}= 0.2403 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: Native
Sample Number: B1-10

Date: 04-02-2012

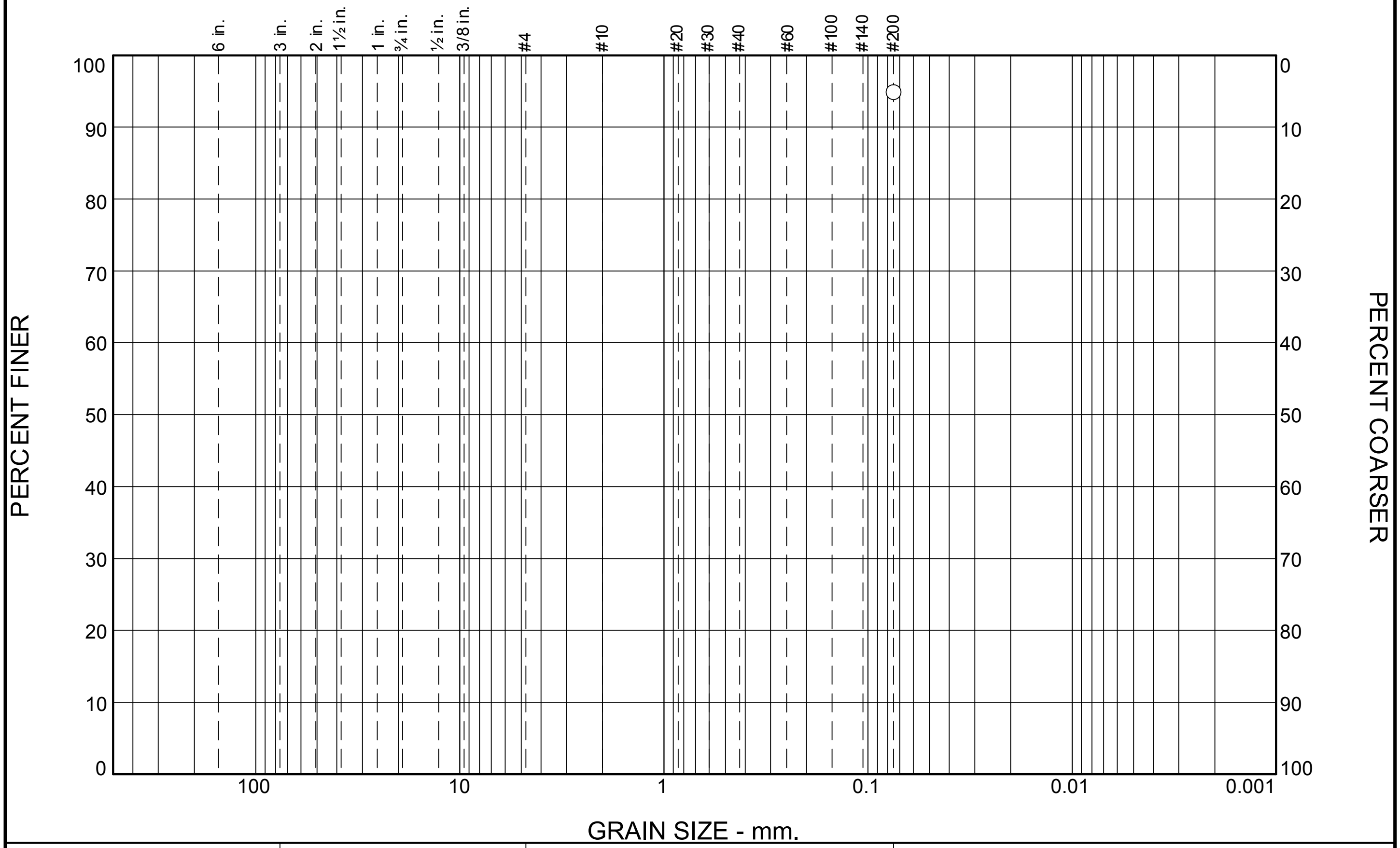
ENGEO INCORPORATED

Client: Brookfield Residential Properties
Project: Amoruso Ranch Specific Plan

Project No: 8186.000.001 **Figure**

Tested By: RAM **Checked By:** PC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						94.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	94.9		

* (no specification provided)

Soil Description

Red Silty Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: Native
Sample Number: B1-15

Date: 04-02-2012

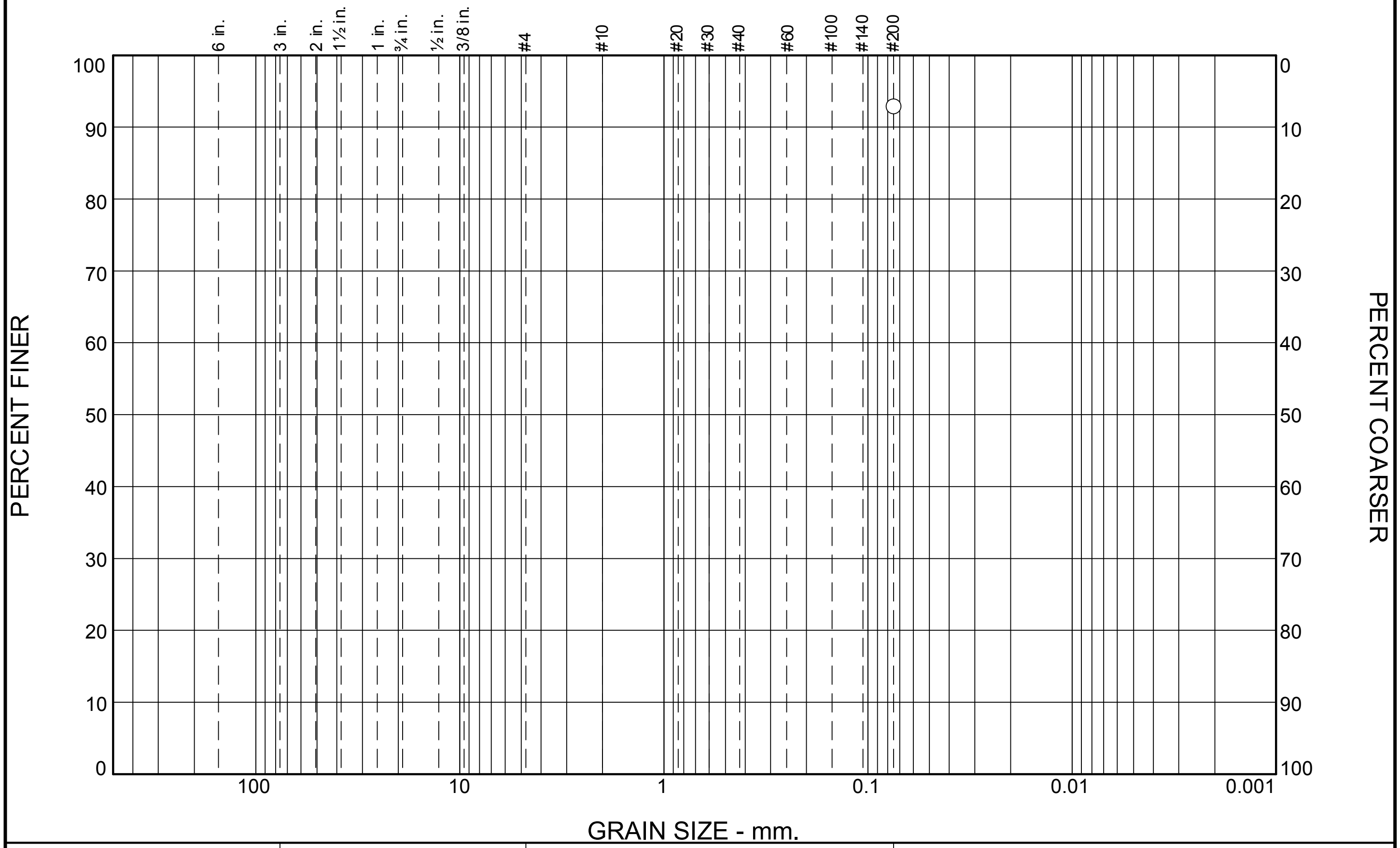
ENGEO INCORPORATED

Client: Brookfield Residential Properties
Project: Amoruso Ranch Specific Plan

Project No: 8186.000.001 **Figure**

Tested By: RAM **Checked By:** PC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						92.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	92.9		

* (no specification provided)

Soil Description

Olive Brown Silt with Sand

Atterberg Limits

PL=
LL=
PI=

Coefficients

D_{90}=
D_{85}=
D_{60}=
D_{50}=
D_{30}=
D_{15}=
D_{10}=
C_u=
C_c=

Classification

USCS=
AASHTO=

Remarks

Source of Sample: Native
Sample Number: B2-5

Date: 04-02-2012

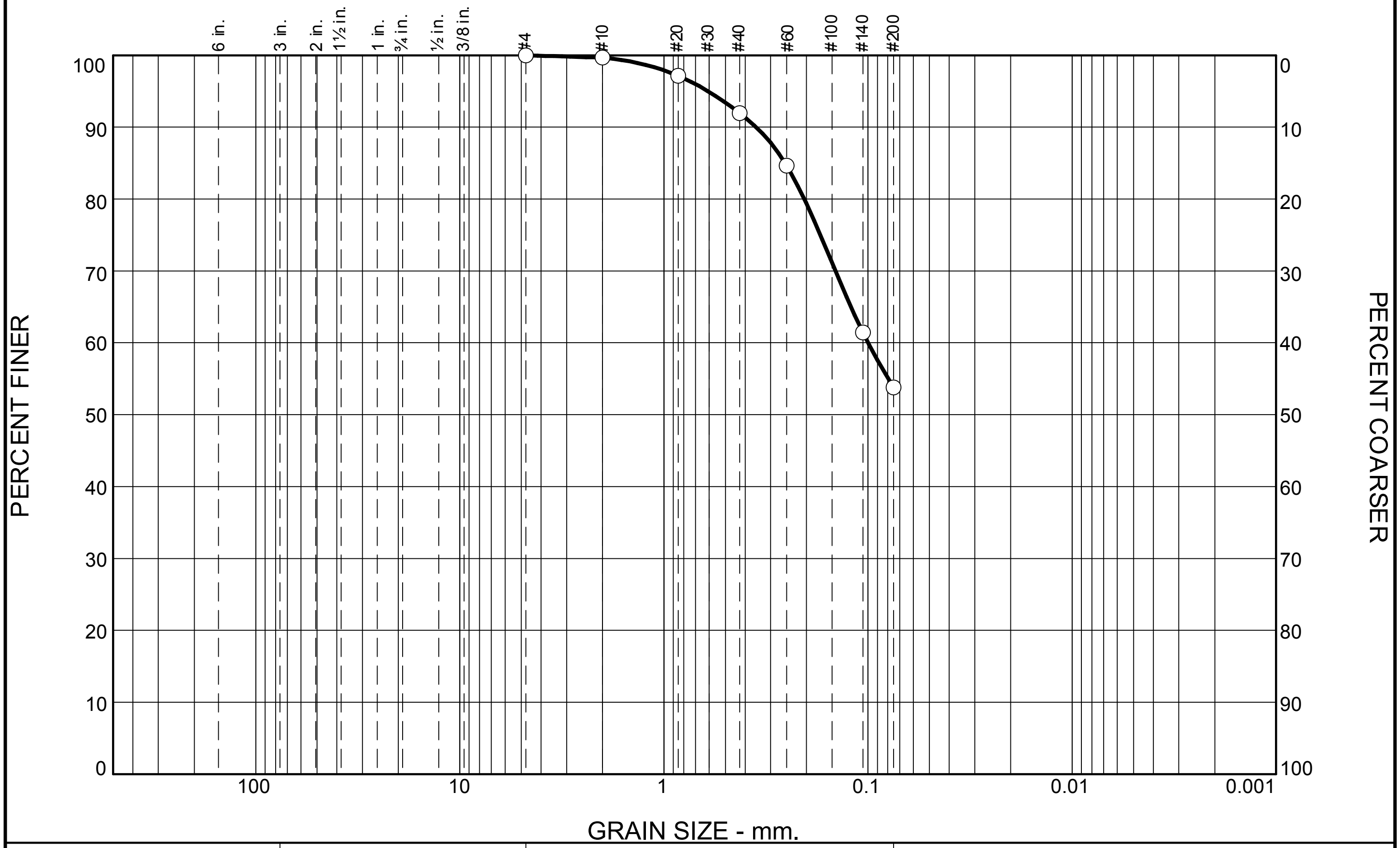
ENGEO INCORPORATED

Client: Brookfield Residential Properties
Project: Amoruso Ranch Specific Plan

Project No: 8186.000.001
Figure

Tested By: RAM
Checked By: PC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	7.8	38.1	53.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.7		
#20	97.1		
#40	91.9		
#60	84.6		
#140	61.4		
#200	53.8		

* (no specification provided)

Soil Description

Olive Brown Sandy Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3532 D_{85}= 0.2545 D_{60}= 0.0999

D_{50}= D_{30}= D_{15}=

D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: Native
Sample Number: B3-1.5

Date: 04-02-2012

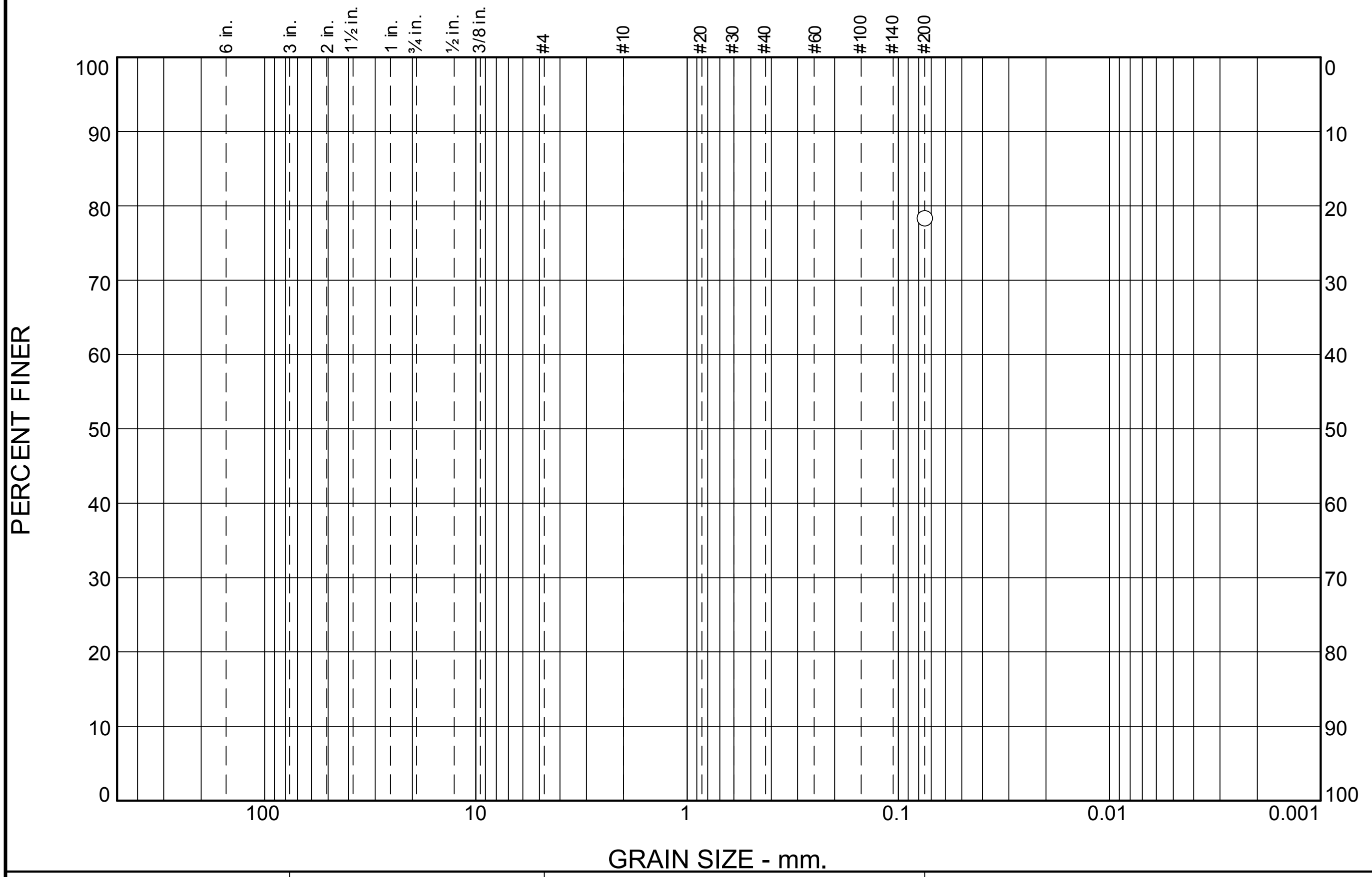
ENGEO INCORPORATED

Client: Brookfield Residential Properties
Project: Amoruso Ranch Specific Plan

Project No: 8186.000.001 **Figure**

Tested By: RAM **Checked By:** PC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						78.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	78.3		

* (no specification provided)

Soil Description

Brown Sandy Silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: Native
Sample Number: B3-5

Date: 04-02-2012

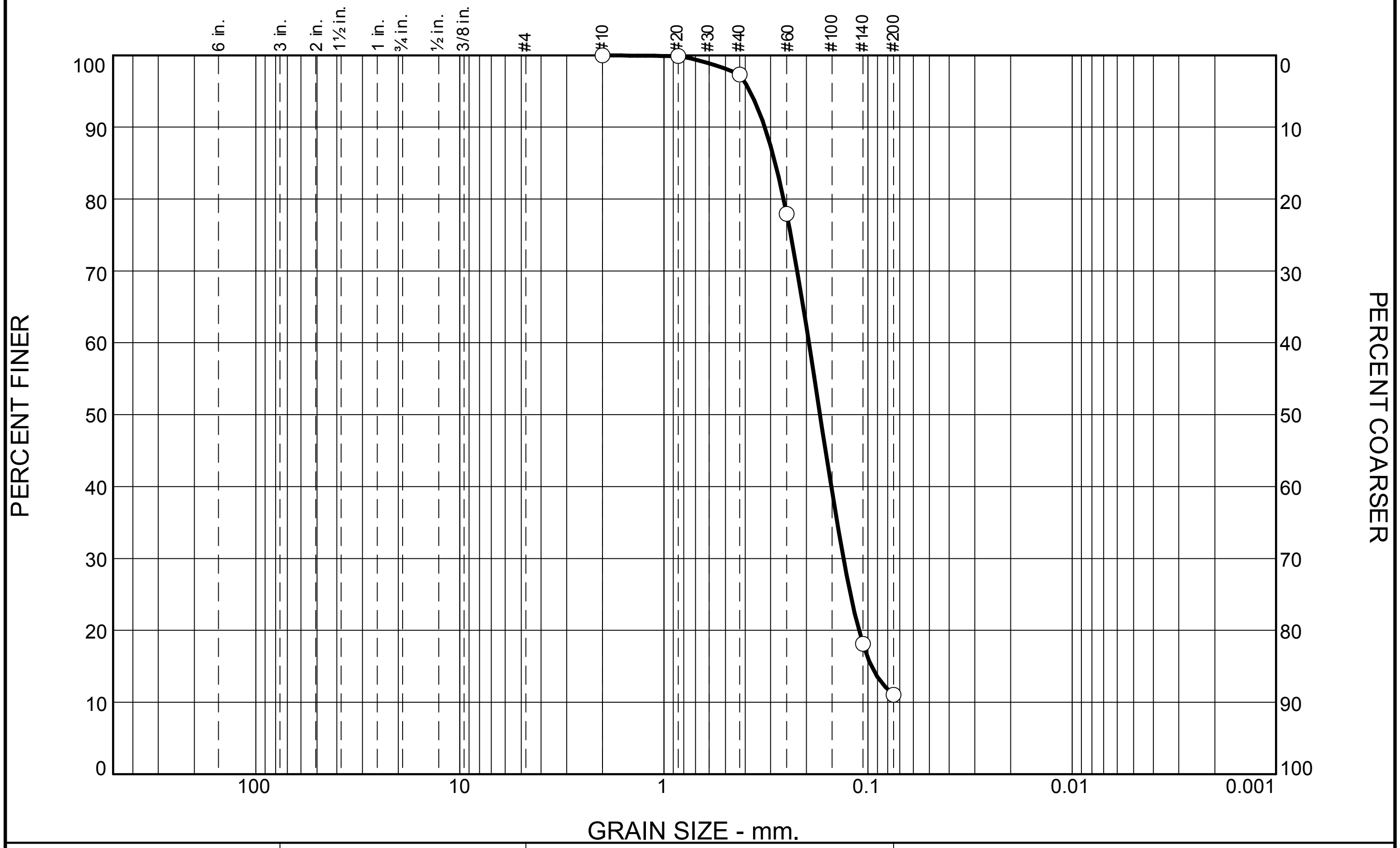
ENGEO INCORPORATED

Client: Brookfield Residential Properties
Project: Amoruso Ranch Specific Plan

Project No: 8186.000.001 **Figure**

Tested By: RAM **Checked By:** PC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	2.7	86.3	11.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	97.3		
#60	77.9		
#140	18.1		
#200	11.0		

* (no specification provided)

Soil Description

Olive Brown Sand with Silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3206 D_{85}= 0.2847 D_{60}= 0.1947

D_{50}= 0.1718 D_{30}= 0.1319 D_{15}= 0.0961

D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: Native
Sample Number: B3-10.5

Date: 04-02-2012

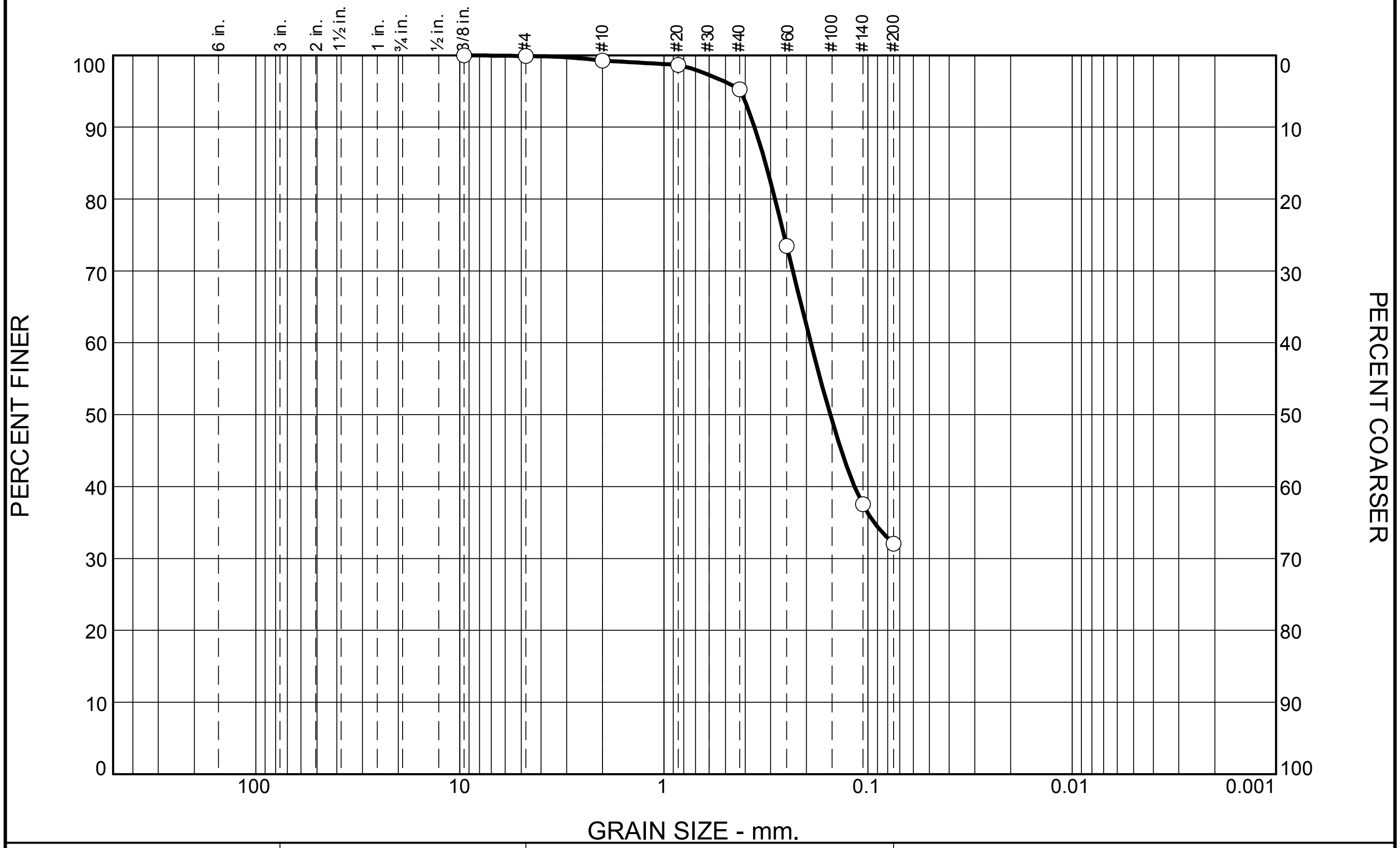
ENGEO INCORPORATED

Client: Brookfield Residential Properties
Project: Amoruso Ranch Specific Plan

Project No: 8186.000.001 **Figure**

Tested By: RAM **Checked By:** PC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.6	4.1	63.2	32.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.9		
#10	99.3		
#20	98.7		
#40	95.2		
#60	73.5		
#140	37.5		
#200	32.0		

* (no specification provided)

Soil Description

Yellowish Red Silty Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3595	D_{85}= 0.3181	D_{60}= 0.1905
D_{50}= 0.1530	D_{30}=	D_{15}=
D_{10}=	C_u=	C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: Native
Sample Number: B4-2

Date: 04-02-2012

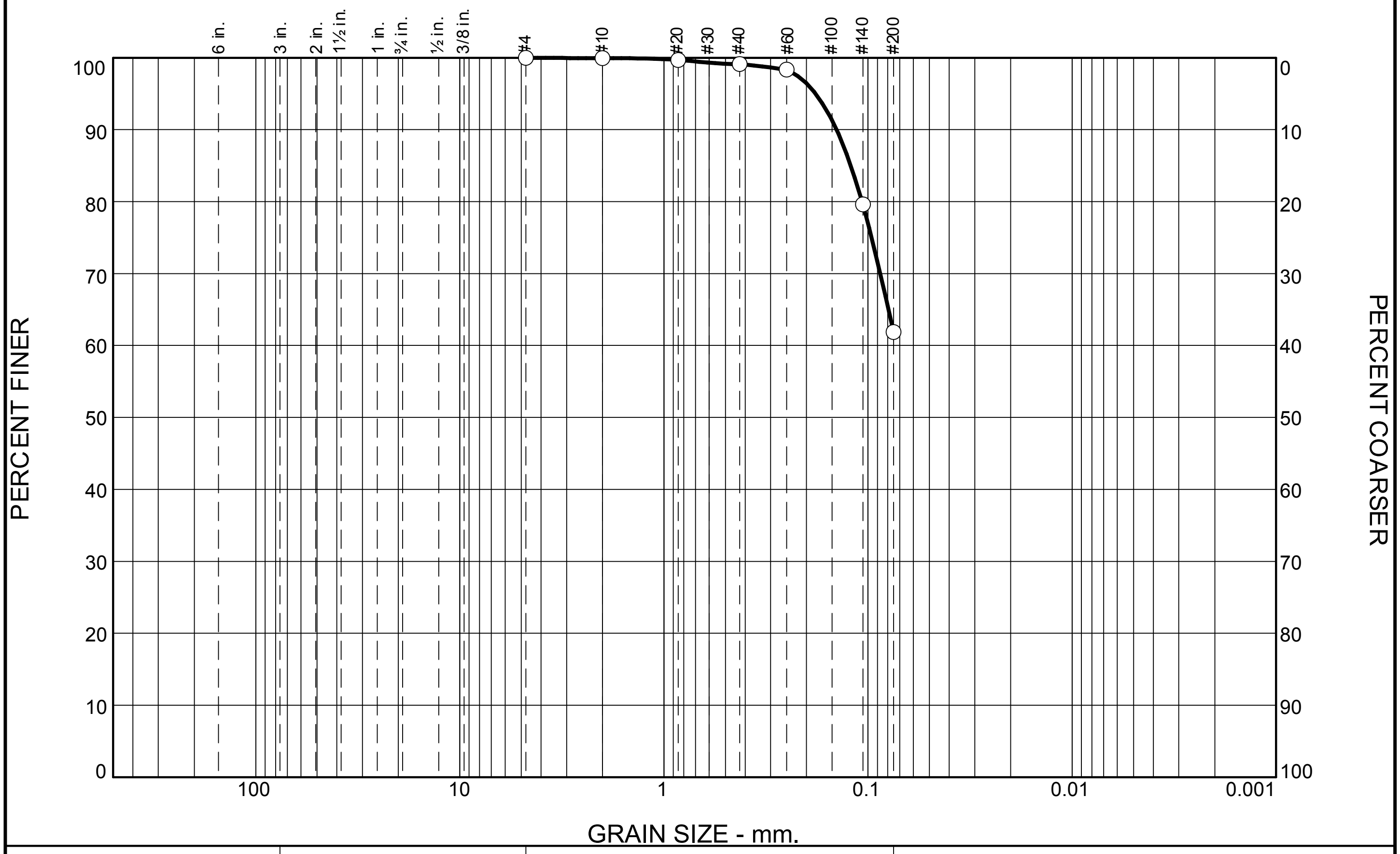
ENGEO INCORPORATED

Client: Brookfield Residential Properties
Project: Amoruso Ranch Specific Plan

Project No: 8186.000.001 **Figure**

Tested By: RAM **Checked By:** PC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.8	37.3	61.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#20	99.7		
#40	99.1		
#60	98.3		
#140	79.6		
#200	61.8		

* (no specification provided)

Soil Description

Light Olive Brown Sandy Silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1426 D_{85}= 0.1214 D_{60}=

D_{50}= D_{30}= D_{15}=

D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: Native
Sample Number: B5-5

Date: 04-02-2012

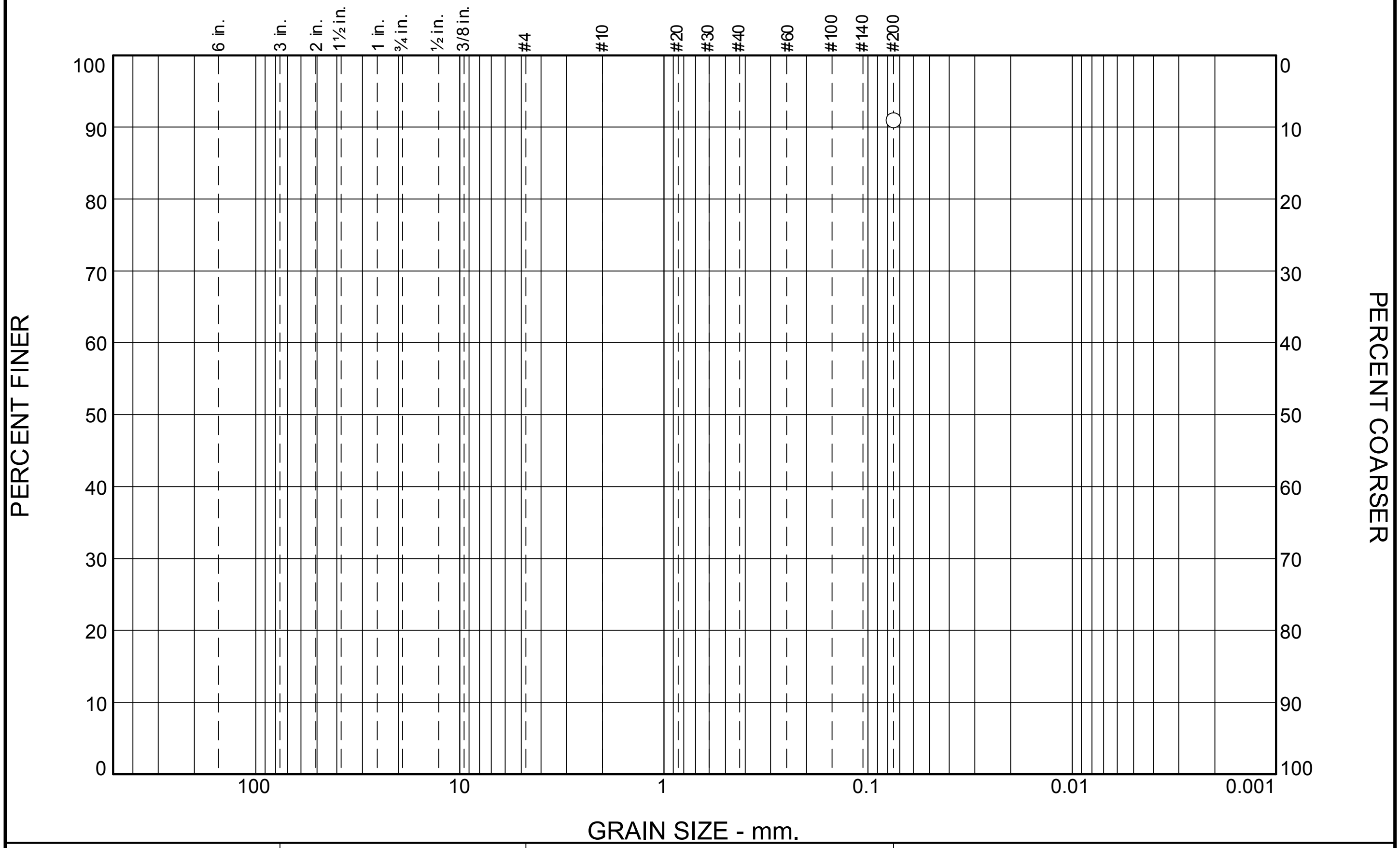
ENGEO
INCORPORATED

Client: Brookfield Residential Properties
Project: Amoruso Ranch Specific Plan

Project No: 8186.000.001 **Figure**

Tested By: RAM **Checked By:** PC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						91.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	91.0		

* (no specification provided)

Soil Description

Olive Brown Silty Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: Native
Sample Number: B5-20

Date: 04-02-2012

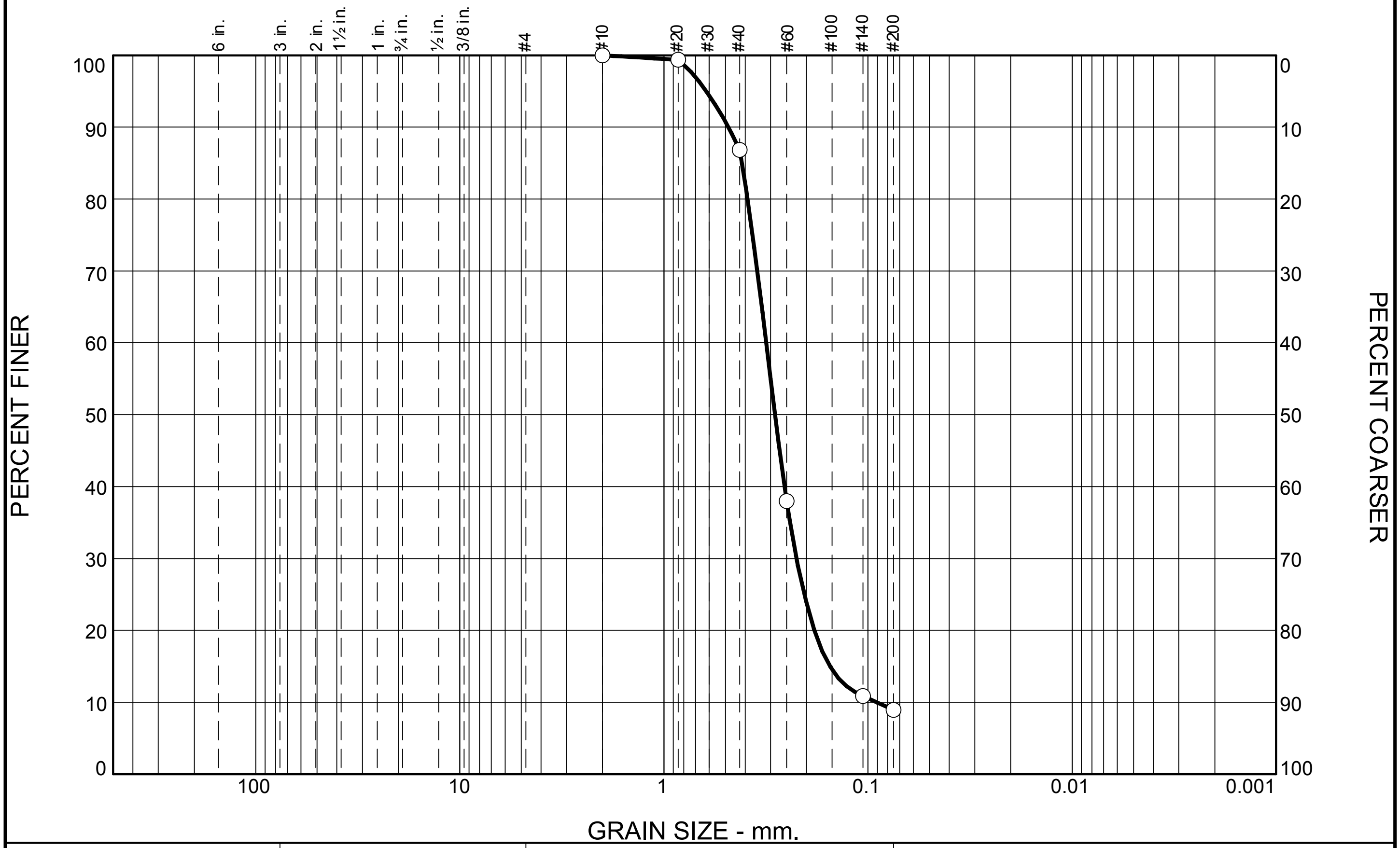
ENGEO
INCORPORATED

Client: Brookfield Residential Properties
Project: Amoruso Ranch Specific Plan

Project No: 8186.000.001 **Figure**

Tested By: RAM **Checked By:** PC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	13.2	77.9	8.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.4		
#40	86.8		
#60	38.0		
#140	10.9		
#200	8.9		

* (no specification provided)

Soil Description

Brown Sand with Silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4838 D_{85}= 0.4141 D_{60}= 0.3155
D_{50}= 0.2855 D_{30}= 0.2238 D_{15}= 0.1536
D_{10}= 0.0911 C_u= 3.46 C_c= 1.74

Classification

USCS= AASHTO=

Remarks

Source of Sample: Native
Sample Number: B6-5

Date: 04-02-2012

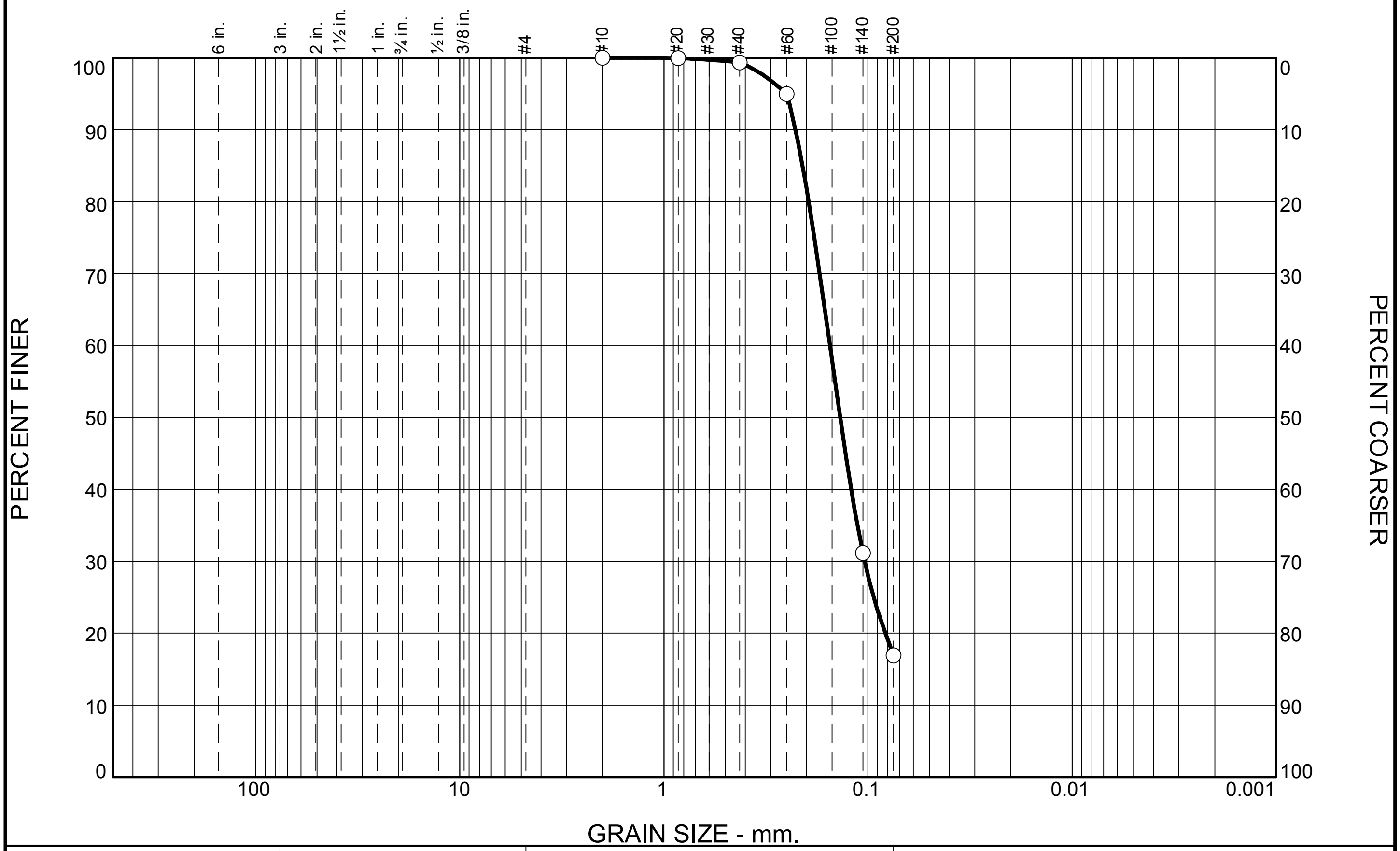
ENGEO INCORPORATED

Client: Brookfield Residential Properties
Project: Amoruso Ranch Specific Plan

Project No: 8186.000.001 **Figure**

Tested By: RAM **Checked By:** PC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.6	82.5	16.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	99.4		
#60	94.9		
#140	31.2		
#200	16.9		

* (no specification provided)

Soil Description

Grayish Brown Silty Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2263 D_{85}= 0.2091 D_{60}= 0.1537
D_{50}= 0.1369 D_{30}= 0.1039 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: Native
Sample Number: B6-10

Date: 04-02-2012

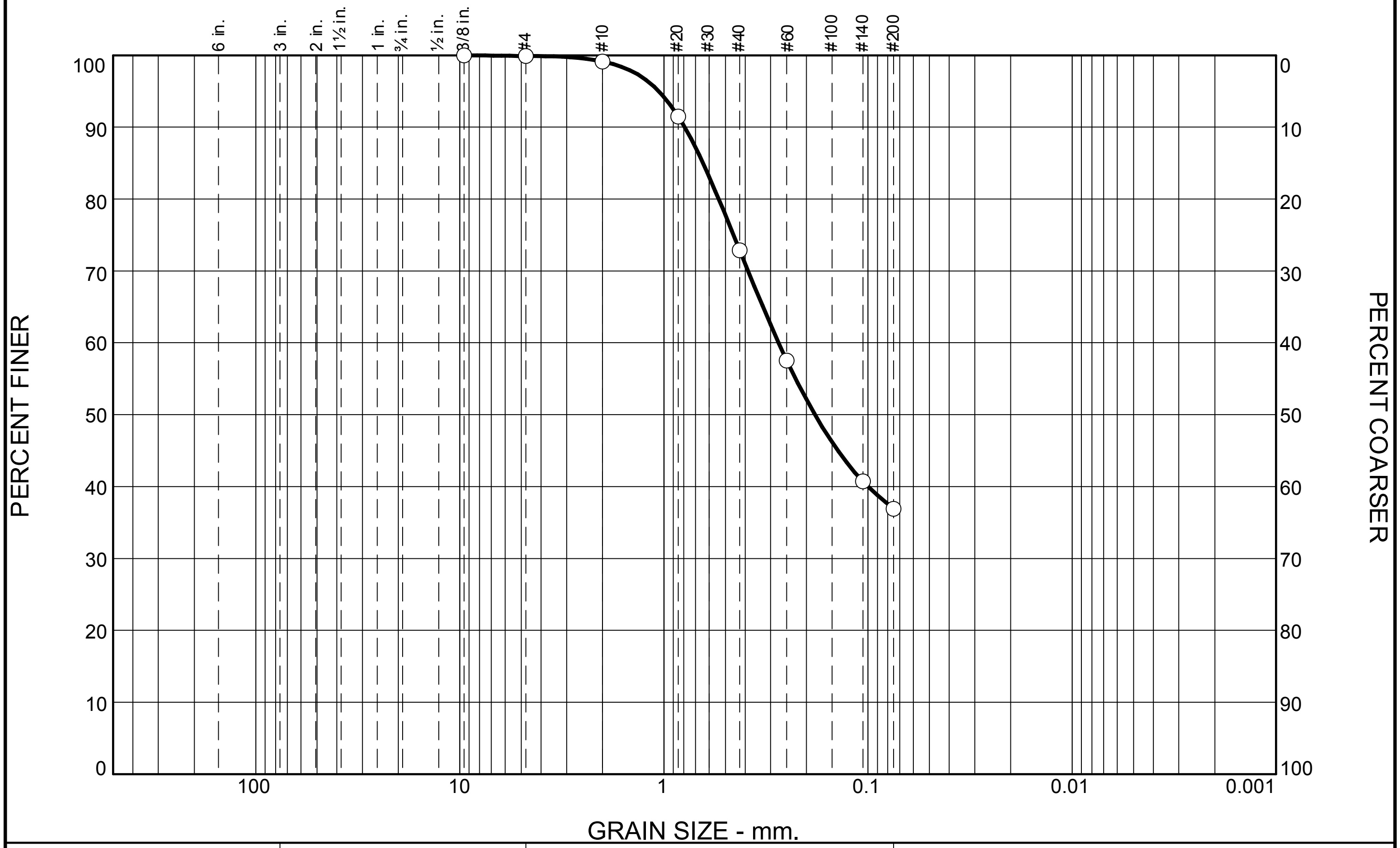
ENGEO
INCORPORATED

Client: Brookfield Residential Properties
Project: Amoruso Ranch Specific Plan

Project No: 8186.000.001 **Figure**

Tested By: RAM **Checked By:** PC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.8	26.3	35.9	36.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.9		
#10	99.1		
#20	91.5		
#40	72.8		
#60	57.5		
#140	40.7		
#200	36.9		

* (no specification provided)

Soil Description

Brown Clayey Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.7902 D_{85}= 0.6435 D_{60}= 0.2740
D_{50}= 0.1819 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: Native
Sample Number: B7-1.5

Date: 04-02-2012

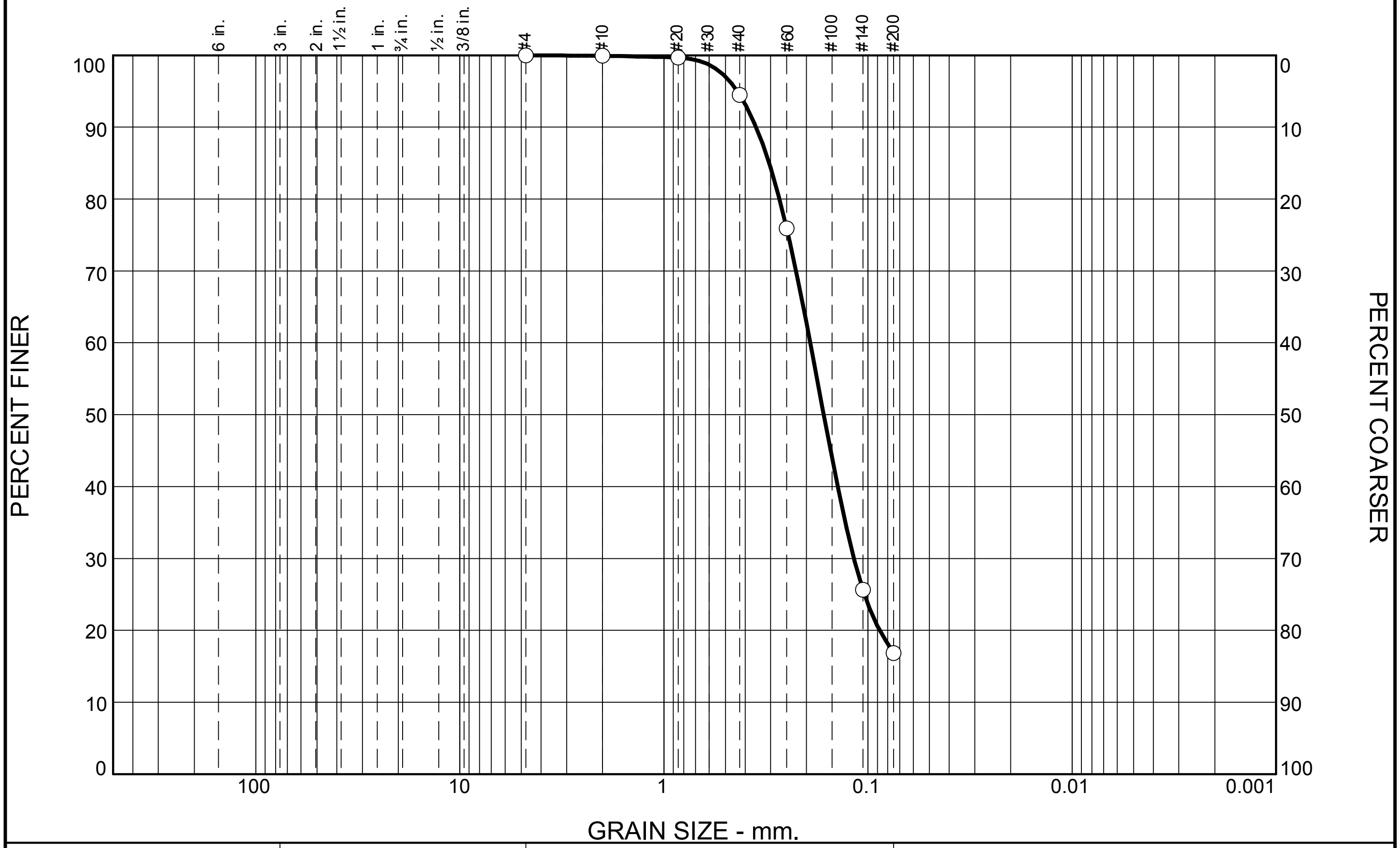
ENGEO INCORPORATED

Client: Brookfield Residential Properties
Project: Amoruso Ranch Specific Plan

Project No: 8186.000.001 **Figure**

Tested By: RAM **Checked By:** PC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	5.4	77.7	16.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#20	99.7		
#40	94.5		
#60	75.9		
#140	25.7		
#200	16.8		

* (no specification provided)

Soil Description

Pale Olive Silty Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3534 D_{85}= 0.3051 D_{60}= 0.1919
D_{50}= 0.1647 D_{30}= 0.1172 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: Native
Sample Number: B7-11

Date: 04-02-2012

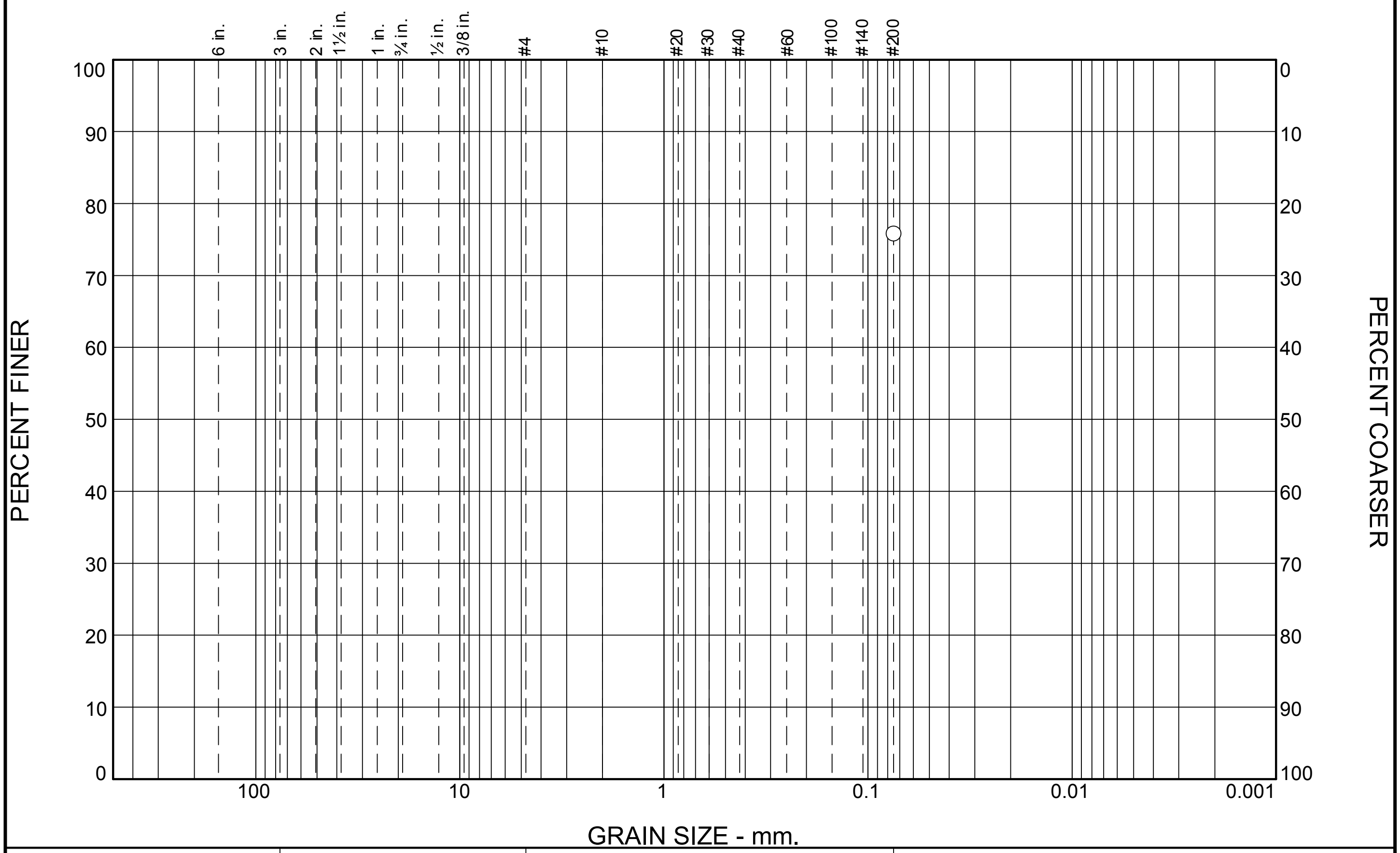
ENGEO INCORPORATED

Client: Brookfield Residential Properties
Project: Amoruso Ranch Specific Plan

Project No: 8186.000.001 **Figure**

Tested By: RAM **Checked By:** PC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						75.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	75.8		

* (no specification provided)

Soil Description

Dark Brown Silt

Atterberg Limits

PL= LL= PI=

Coefficients

D90= D85= D60=
D50= D30= D15=
D10= Cu= Cc=

Classification

USCS= AASHTO=

Remarks

Source of Sample: Native
Sample Number: B7-15.5

Date: 04-02-2012

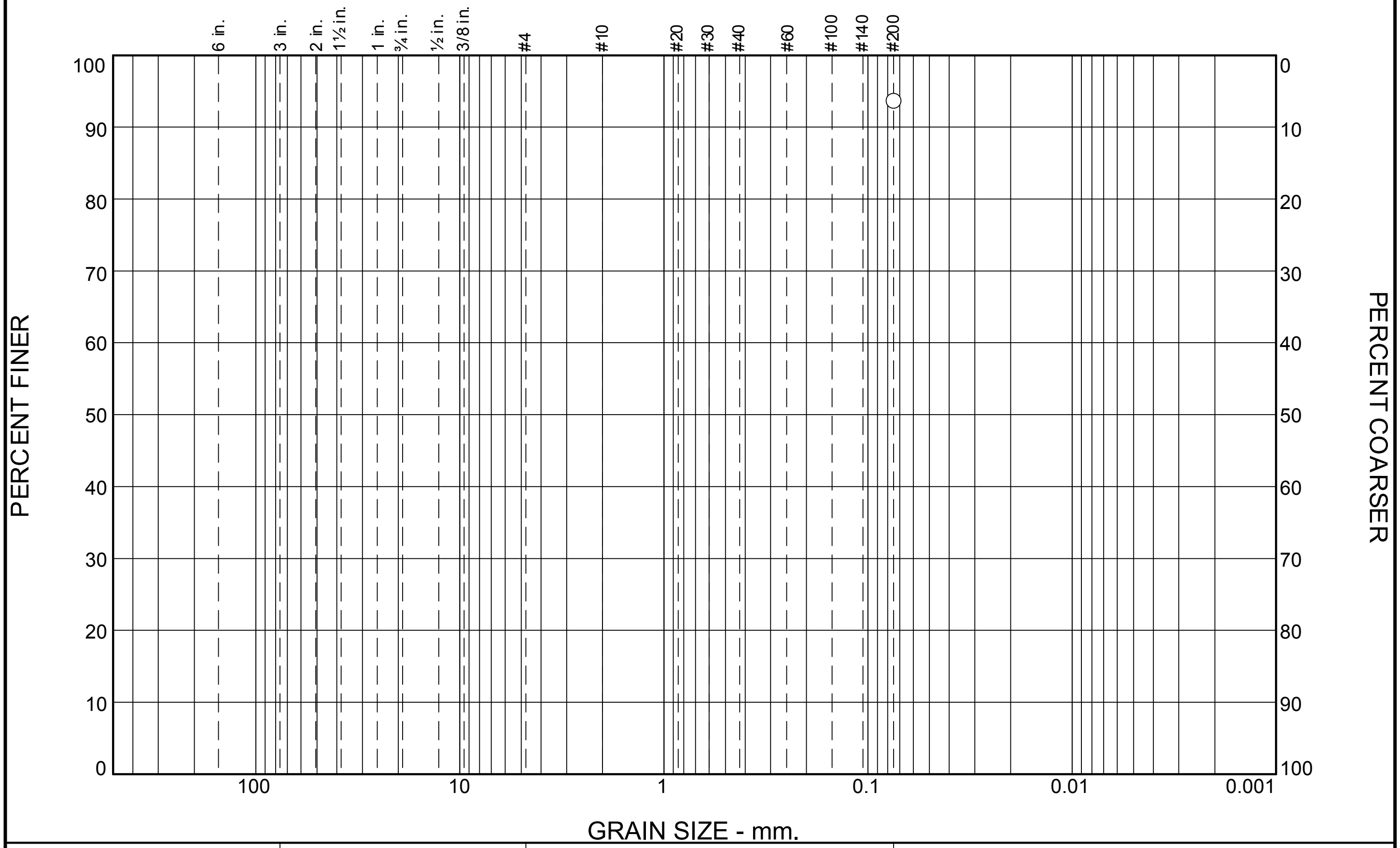
ENGEO INCORPORATED

Client: Brookfield Residential Properties
Project: Amoruso Ranch Specific Plan

Project No: 8186.000.001 **Figure**

Tested By: RAM **Checked By:** PC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						93.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	93.7		

* (no specification provided)

Soil Description

Brown Silt

Atterberg Limits

PL= LL= PI=

Coefficients

D90= D85= D60=
D50= D30= D15=
D10= Cu= Cc=

Classification

USCS= AASHTO=

Remarks

Source of Sample: Native
Sample Number: B8-10

Date: 04-02-2012

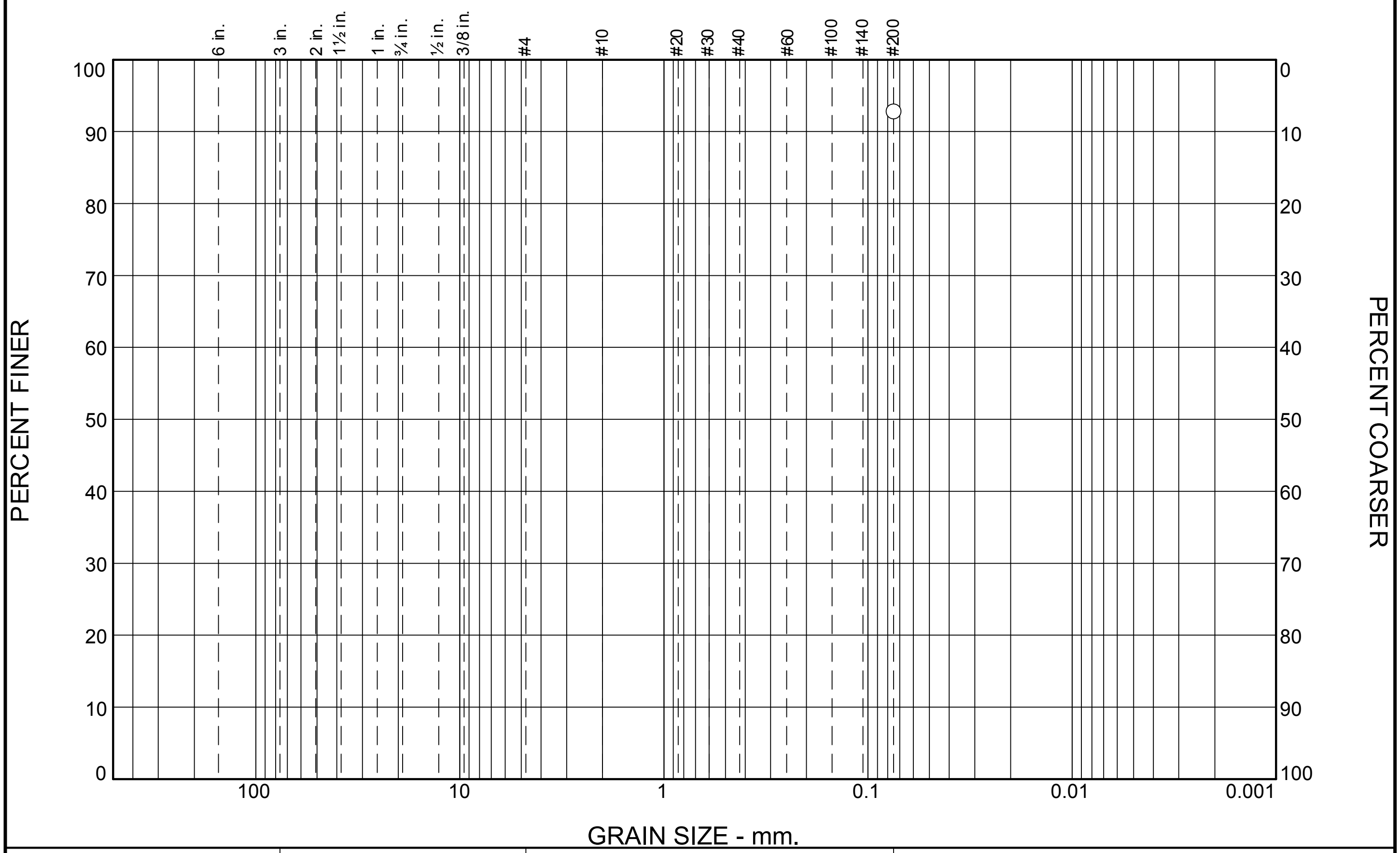
ENGEO INCORPORATED

Client: Brookfield Residential Properties
Project: Amoruso Ranch Specific Plan

Project No: 8186.000.001 **Figure**

Tested By: RAM **Checked By:** PC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						92.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	92.8		

* (no specification provided)

Soil Description

Olive Brown Silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: Native
Sample Number: B9-5.5

Date: 04-02-2012

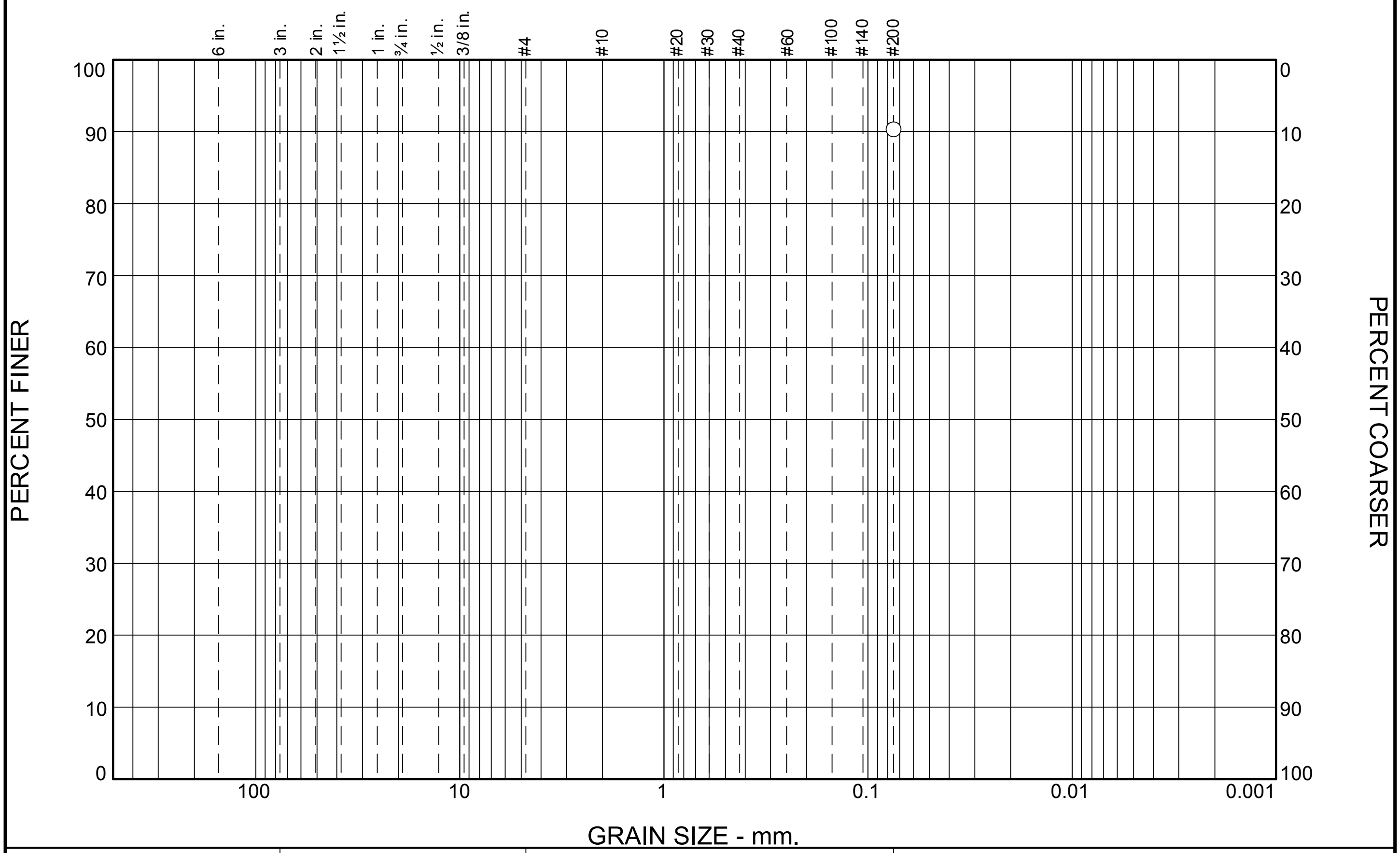
ENGEO INCORPORATED

Client: Brookfield Residential Properties
Project: Amoruso Ranch Specific Plan

Project No: 8186.000.001 **Figure**

Tested By: RAM **Checked By:** PC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						90.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	90.3		

* (no specification provided)

Soil Description

Dark Reddish Brown Silt with Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: Native
Sample Number: B10-1

Date: 04-02-2012

ENGEO INCORPORATED

Client: Brookfield Residential Properties
Project: Amoruso Ranch Specific Plan

Project No: 8186.000.001 **Figure**

Tested By: RAM **Checked By:** PC

APPENDIX C

USDA NRCS Custom Soil Resource Report
Amoruso Ranch

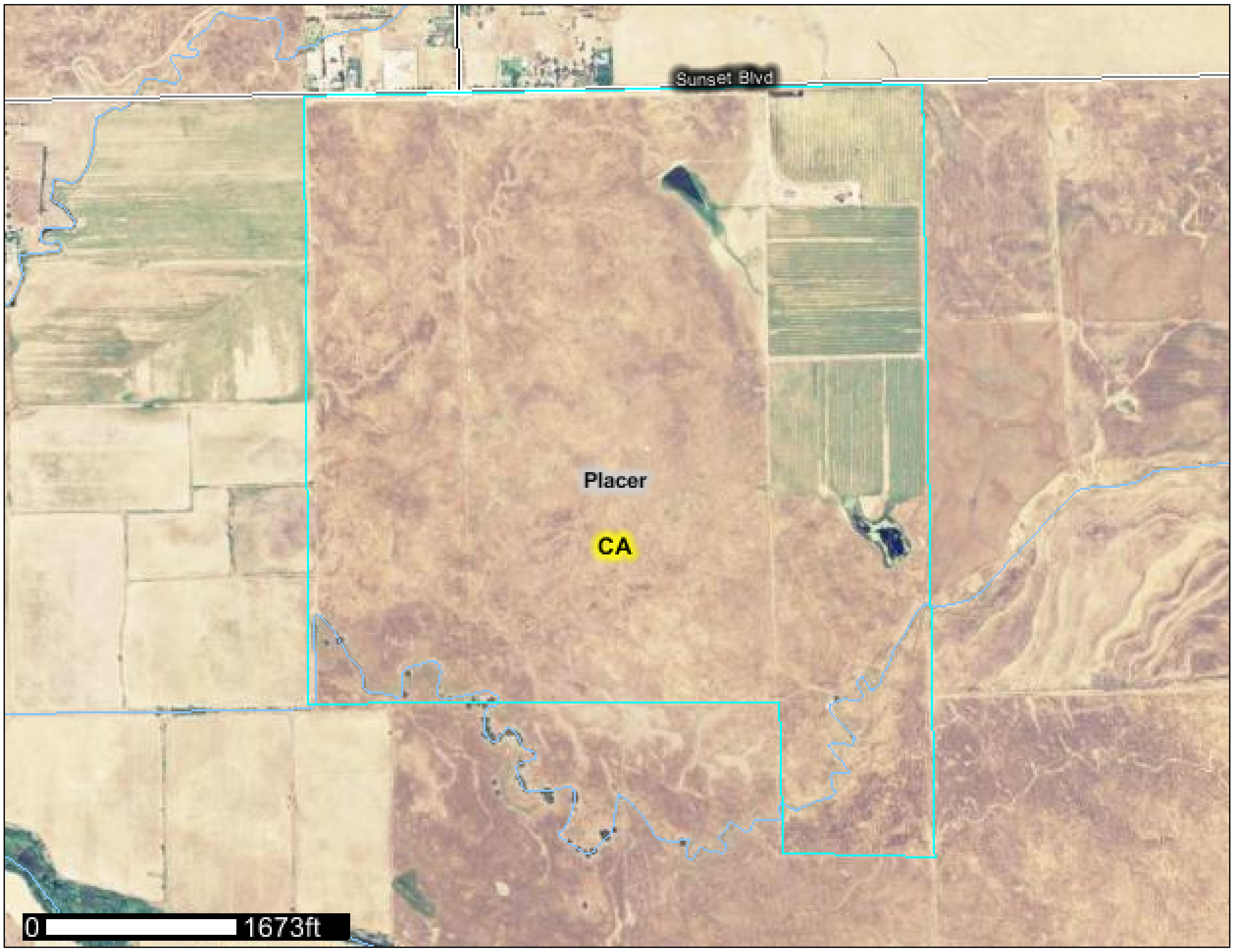
United States
Department of
Agriculture

Natural
Resources
Conservation
Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for
Placer County, California, Western Part

Amoruso Ranch



April 25, 2012

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

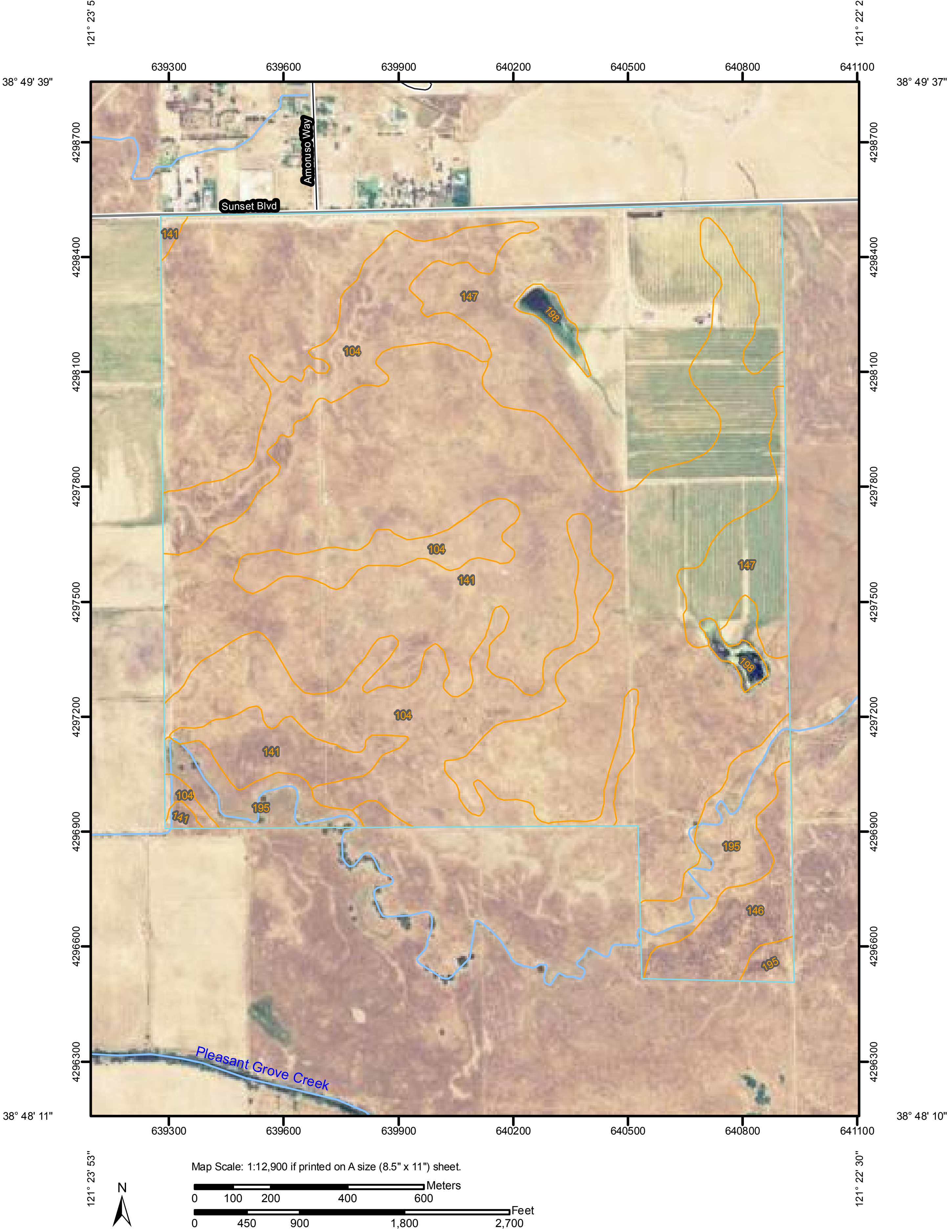
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Map Scale: 1:12,900 if printed on A size (8.5" x 11") sheet.

MAP LEGEND

Area of Interest (AOI)
- ▭ Area of Interest (AOI)

Soils
- ▭ Soil Map Units

Special Point Features
- ⊙ Blowout
- ⊠ Borrow Pit
- ✳ Clay Spot
- ◆ Closed Depression
- ✕ Gravel Pit
- ∴ Gravelly Spot
- ⊚ Landfill
- Λ Lava Flow
- ψ Marsh or swamp
- ⚒ Mine or Quarry
- ◎ Miscellaneous Water
- ◉ Perennial Water
- ∨ Rock Outcrop
- \+ Saline Spot
- ⁙ Sandy Spot
- ≡ Severely Eroded Spot
- ◇ Sinkhole
- ʒ Slide or Slip
- ø Sodic Spot
- ≣ Spoil Area
- ◊ Stony Spot
- ∞ Very Stony Spot
- ψ Wet Spot
- ▲ Other

Special Line Features
- ∿ Gully
- ⋯ Short Steep Slope
- ^ Other

Political Features
- ● Cities

Water Features
- ∼ Streams and Canals

Transportation
- ┼┼┼ Rails
- ∼ Interstate Highways
- ∼ US Routes
- ≈ Major Roads
- ∼ Local Roads

MAP INFORMATION

Map Scale: 1:12,900 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 10N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 5, Dec 14, 2007

Date(s) aerial images were photographed: 6/29/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Placer County, California, Western Part (CA620)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
104	Alamo-Fiddyment complex, 0 to 5 percent slopes	126.9	18.4%
141	Cometa-Fiddyment complex, 1 to 5 percent slopes	302.6	43.9%
146	Fiddyment loam, 1 to 8 percent slopes	19.4	2.8%
147	Fiddyment-Kaseberg loams, 2 to 9 percent slopes	195.1	28.3%
195	Xerofluvents, hardpan substratum	38.3	5.6%
198	Water	6.9	1.0%
Totals for Area of Interest		**689.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Placer County, California, Western Part

104—Alamo-Fiddyment complex, 0 to 5 percent slopes

Map Unit Setting

Elevation: 50 to 500 feet
Mean annual precipitation: 10 to 22 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 230 to 300 days

Map Unit Composition

Alamo and similar soils: 50 percent
Fiddyment and similar soils: 30 percent
Minor components: 20 percent

Description of Alamo

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 37 to 41 inches to duripan
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability (nonirrigated): 4w

Typical profile

0 to 9 inches: Clay
9 to 37 inches: Clay
37 to 41 inches: Indurated

Description of Fiddyment

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches; 20 to 35 inches to duripan; 28 to 35 inches to duripan; 35 to 39 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability (nonirrigated): 4e

Typical profile

0 to 12 inches: Loam
12 to 28 inches: Clay loam
28 to 35 inches: Indurated
35 to 39 inches: Weathered bedrock

Minor Components

San joaquin sandy loam

Percent of map unit: 10 percent

Cometa sandy loam

Percent of map unit: 5 percent

Kaselburg loam

Percent of map unit: 5 percent

141—Cometa-Fiddyment complex, 1 to 5 percent slopes

Map Unit Setting

Elevation: 20 to 400 feet
Mean annual precipitation: 10 to 23 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 230 to 300 days

Map Unit Composition

Fiddyment and similar soils: 35 percent
Cometa and similar soils: 35 percent
Minor components: 30 percent

Description of Cometa

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability (nonirrigated): 4e
Ecological site: CLAYPAN (R017XD093CA)

Typical profile

0 to 18 inches: Sandy loam
18 to 29 inches: Clay
29 to 60 inches: Sandy loam

Description of Fiddyment

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from siltstone

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: 20 to 35 inches to duripan; 28 to 35 inches to duripan; 35 to 39 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability (nonirrigated): 4e
Ecological site: CLAYPAN (R017XD093CA)

Typical profile

0 to 12 inches: Loam
12 to 28 inches: Clay loam
28 to 35 inches: Indurated
35 to 39 inches: Weathered bedrock

Minor Components

San joaquin

Percent of map unit: 10 percent

Kaseburg

Percent of map unit: 10 percent

Ramona

Percent of map unit: 5 percent

Alamo

Percent of map unit: 5 percent
Landform: Depressions

146—Fiddyment loam, 1 to 8 percent slopes

Map Unit Setting

Elevation: 50 to 280 feet
Mean annual precipitation: 19 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 230 to 300 days

Map Unit Composition

Fiddyment and similar soils: 85 percent
Minor components: 15 percent

Description of Fiddyment

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from siltstone

Properties and qualities

Slope: 1 to 8 percent
Depth to restrictive feature: 20 to 35 inches to duripan; 28 to 35 inches to duripan; 35 to 39 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability (nonirrigated): 4e

Typical profile

0 to 12 inches: Loam
12 to 28 inches: Clay loam
28 to 35 inches: Indurated
35 to 39 inches: Weathered bedrock

Minor Components

Cometa

Percent of map unit: 5 percent

Kaseburg

Percent of map unit: 5 percent

San joaquin

Percent of map unit: 3 percent

Alamo

Percent of map unit: 2 percent
Landform: Depressions

147—Fiddyment-Kaseberg loams, 2 to 9 percent slopes

Map Unit Setting

Elevation: 50 to 280 feet
Mean annual precipitation: 16 to 22 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 230 to 300 days

Map Unit Composition

Fiddyment and similar soils: 50 percent
Kaseberg and similar soils: 30 percent
Minor components: 20 percent

Description of Fiddyment

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from siltstone

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: 20 to 35 inches to duripan; 28 to 35 inches to duripan; 35 to 39 inches to lithic bedrock

Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability (nonirrigated): 4e
Ecological site: CLAYPAN (R018XD082CA)

Typical profile

0 to 12 inches: Loam
12 to 28 inches: Clay loam
28 to 35 inches: Indurated
35 to 39 inches: Weathered bedrock

Description of Kaseberg

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from siltstone

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: 16 to 17 inches to duripan; 17 to 21 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.6 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability (nonirrigated): 4e
Ecological site: CLAYPAN (R018XD082CA)

Typical profile

0 to 16 inches: Loam
16 to 17 inches: Indurated
17 to 21 inches: Weathered bedrock

Minor Components

Unnamed, gravelly

Percent of map unit: 10 percent

Alamo

Percent of map unit: 10 percent

Landform: Depressions

195—Xerofluvents, hardpan substratum

Map Unit Setting

Elevation: 300 to 3,500 feet
Mean annual precipitation: 30 to 40 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 200 to 300 days

Map Unit Composition

Xerofluvents and similar soils: 85 percent
Minor components: 15 percent

Description of Xerofluvents

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: 20 to 36 inches to duripan
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water capacity: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability (nonirrigated): 3w

Typical profile

0 to 40 inches: Stratified loam to clay loam
40 to 44 inches: Indurated

Minor Components

Alamo

Percent of map unit: 10 percent
Landform: Depressions

Unnamed

Percent of map unit: 3 percent

Landform: Drainageways

Unnamed

Percent of map unit: 2 percent
Landform: Drainageways

198—Water

Map Unit Composition

Water: 100 percent

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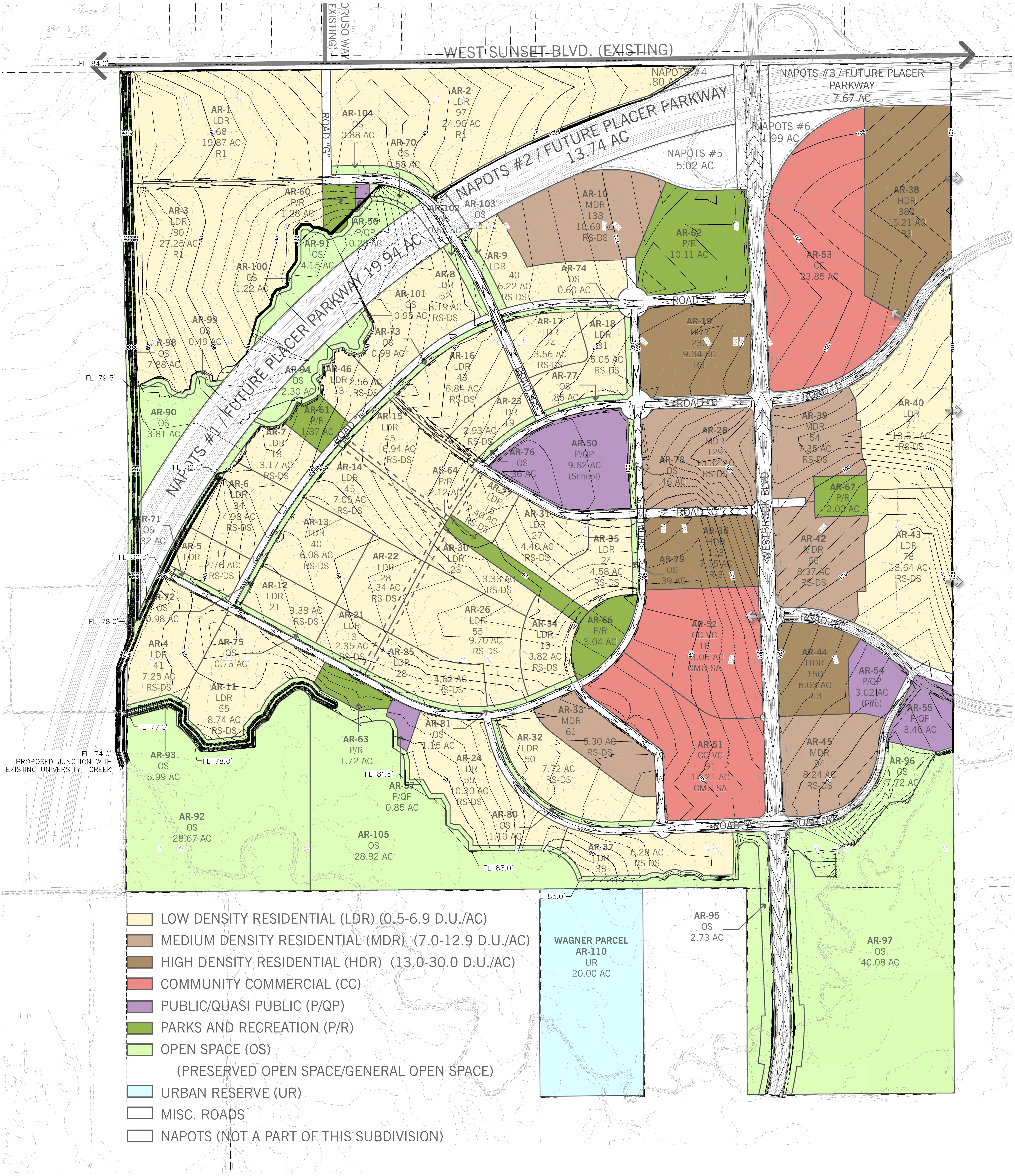
Amoruso Ranch Specific Plan Area

Drainage Master Plan

Appendix F

Preliminary Grading Plan
Preliminary Channel Grading Sheets



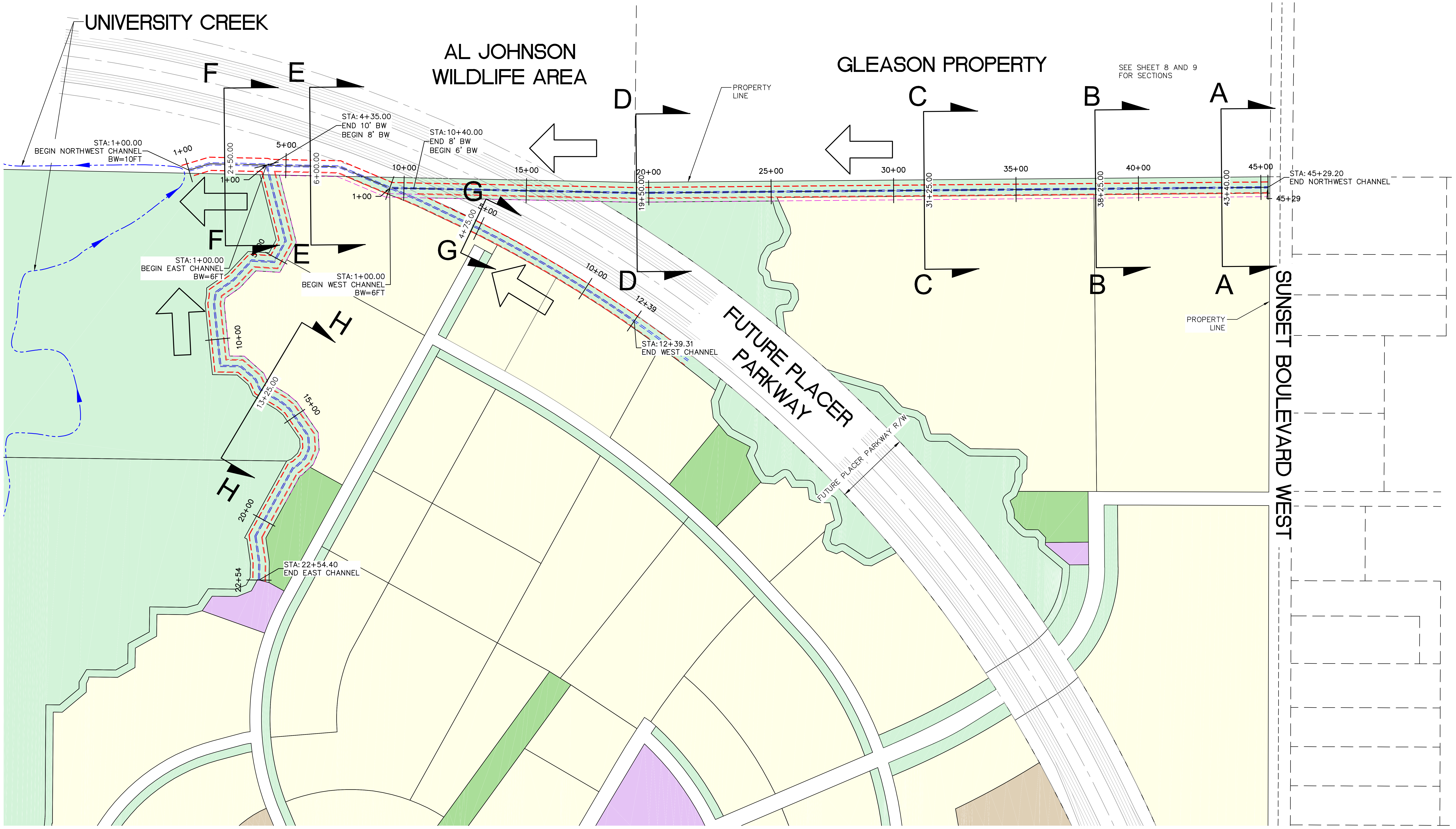
- 🟨 LOW DENSITY RESIDENTIAL (LDR) (0.5-6.9 D.U./AC)
- 🟫 MEDIUM DENSITY RESIDENTIAL (MDR) (7.0-12.9 D.U./AC)
- 🟫 HIGH DENSITY RESIDENTIAL (HDR) (13.0-30.0 D.U./AC)
- 🟥 COMMUNITY COMMERCIAL (CC)
- 🟪 PUBLIC/QUASI PUBLIC (P/QP)
- 🟩 PARKS AND RECREATION (P/R)
- 🟩 OPEN SPACE (OS)
  (PRESERVED OPEN SPACE/GENERAL OPEN SPACE)
- 🟦 URBAN RESERVE (UR)
- ☐ MISC. ROADS
- ☐ NAPOTS (NOT A PART OF THIS SUBDIVISION)

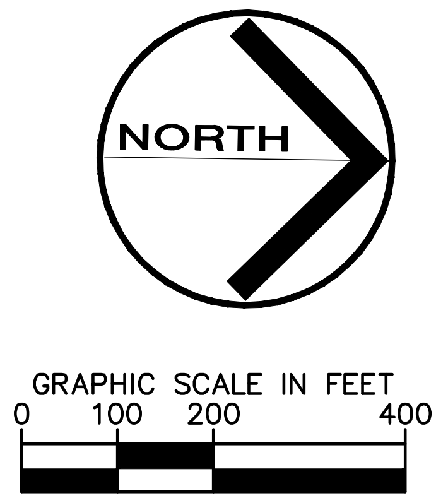
AMORUSO RANCH
PRELIMINARY MASS GRADING EXHIBIT

JANUARY 2016

Kimley»Horn

Jan 04, 2016 – 1:48pm – USER:jmatos.kh\tober
K:\SAC_LDEV\097679001 Amoruso Ranch\06 CADD\From San Diego\Design\Exhibits\X-PLAN.dwg





JANUARY 2016

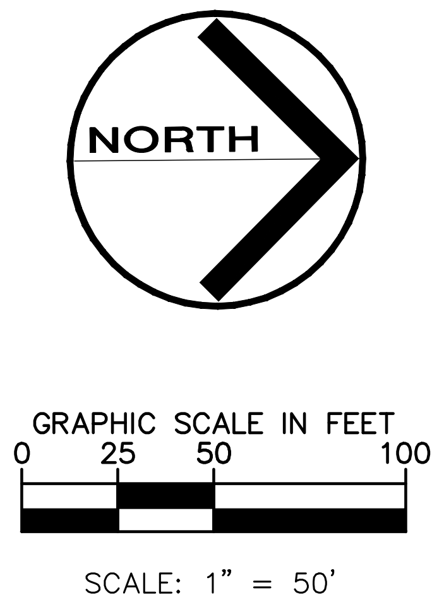
NOTE:
UNIVERSITY CREEK ENERGY DISSIPATION AND/ OR EROSION CONTROL PROTECTION MAY BE NECESSARY IN THE FUTURE. MEASURES SUCH AS THE INSTALLATION OF RIP RAP, VELOCITY CHECK DAMS, AND EROSION CONTROL BLANKETS AND MATS MAY BE USED.

DATUM – NAVD88

AMORUSO RANCH - APPENDIX F
DRAINAGE CHANNEL - OVERALL SITE PLAN
SHEET 1 OF 9

Kimley»Horn

NORTHWEST CHANNEL - 10 / 8 / 6 FT. BOTTOM



PROFILE SCALE

1" = 50' HORIZONTAL
1" = 5' VERTICAL

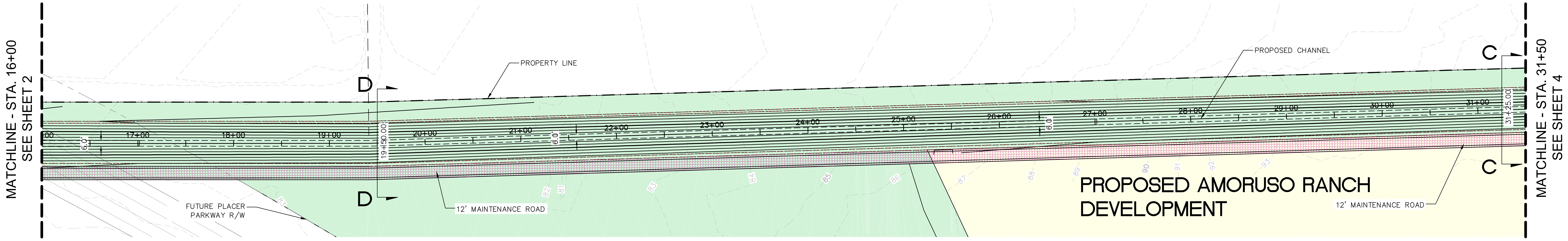
DATUM – NAVD88

NOTE:
UNIVERSITY CREEK ENERGY DISSIPATION AND/ OR EROSION CONTROL PROTECTION MAY BE NECESSARY IN THE FUTURE. MEASURES SUCH AS THE INSTALLATION OF RIP RAP, VELOCITY CHECK DAMS, AND EROSION CONTROL BLANKETS AND MATS MAY BE USED.

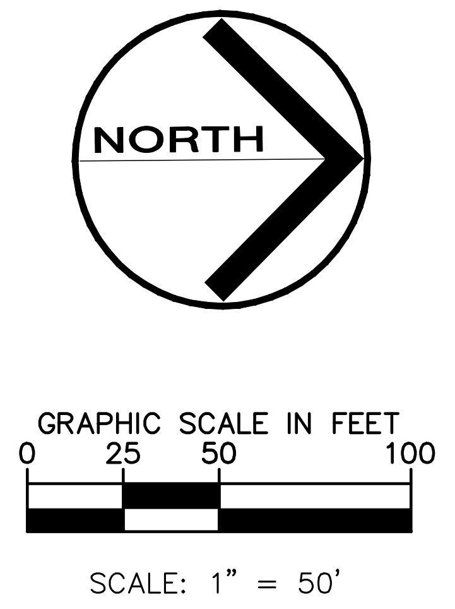
JANUARY 2016

AMORUSO RANCH - APPENDIX F
DRAINAGE CHANNEL - PLAN AND PROFILE
NORTHWEST CHANNEL - SHEET 2 OF 9

Kimley»Horn



NORTHWEST CHANNEL - 6 FT. BOTTOM



PROFILE SCALE

1" = 50' HORIZONTAL
1" = 5' VERTICAL

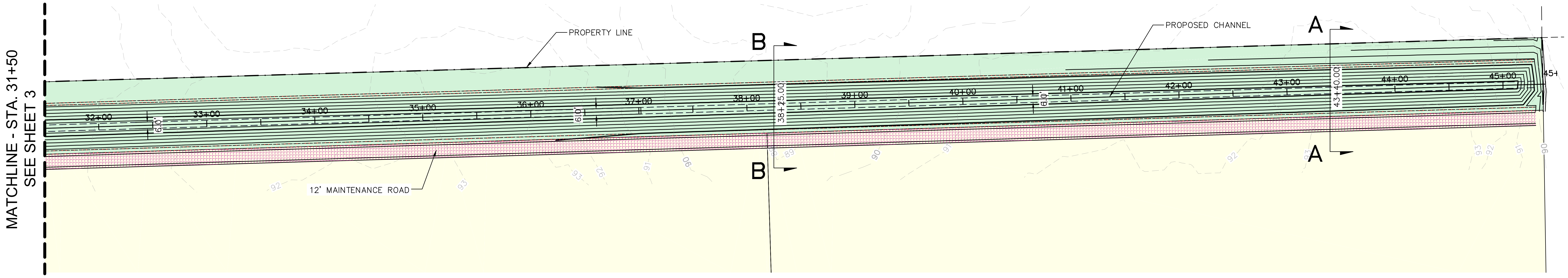
DATUM – NAVD88

JANUARY 2016

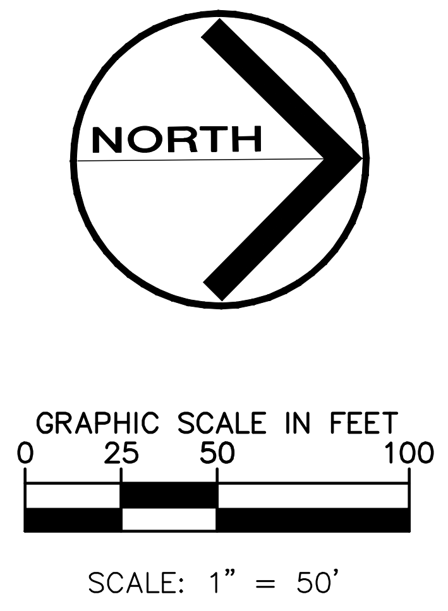
AMORUSO RANCH - APPENDIX F
DRAINAGE CHANNEL - PLAN AND PROFILE
NORTHWEST CHANNEL - SHEET 3 OF 9

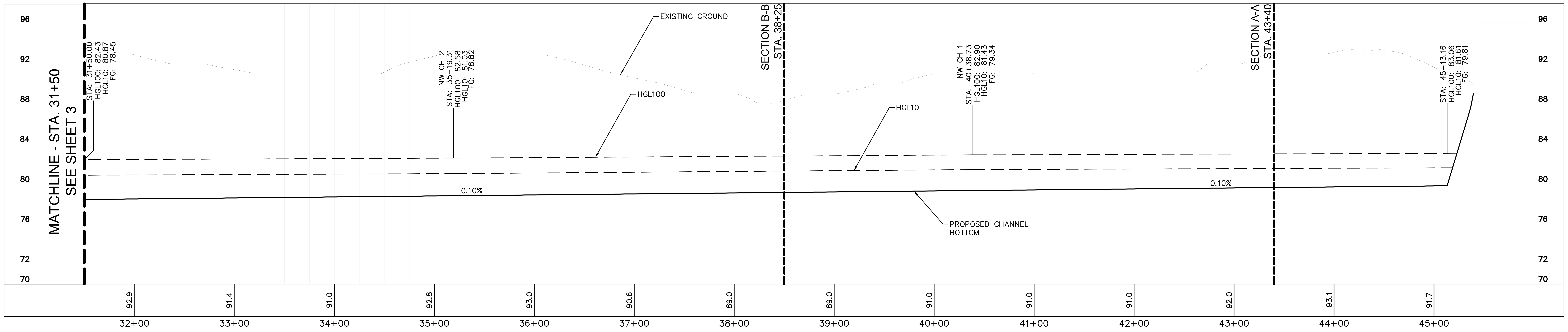
Kimley»Horn

Feb 02, 2016 – 11:12am K:\SAC_LDEV\097679001 Amoruso Ranch\08 CADD\From San Diego\Design\Exhibits\Drainage Channel\2016.01.04\Exh_3_Northwest Channel.dwg



NORTHWEST CHANNEL - 6 FT. BOTTOM





PROFILE SCALE
1" = 50' HORIZONTAL
1" = 5' VERTICAL

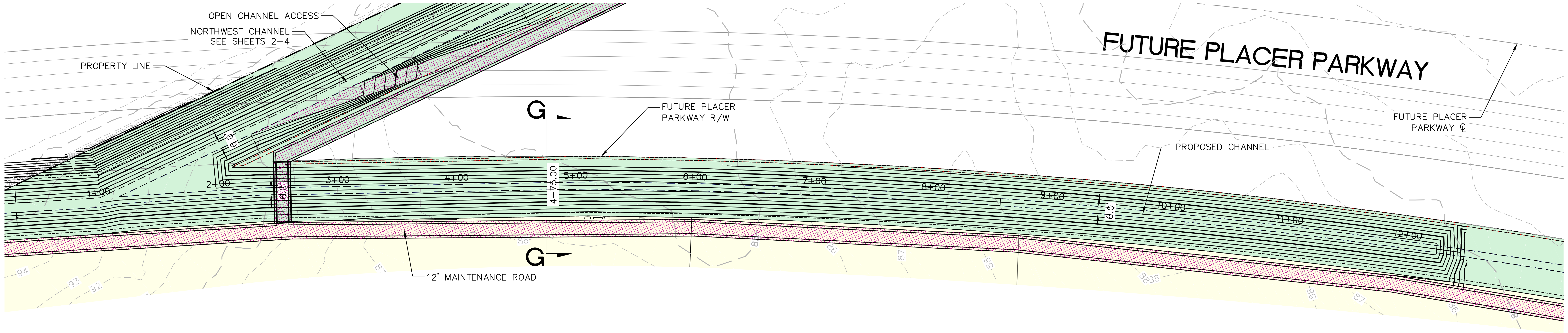
DATUM – NAVD88

JANUARY 2016

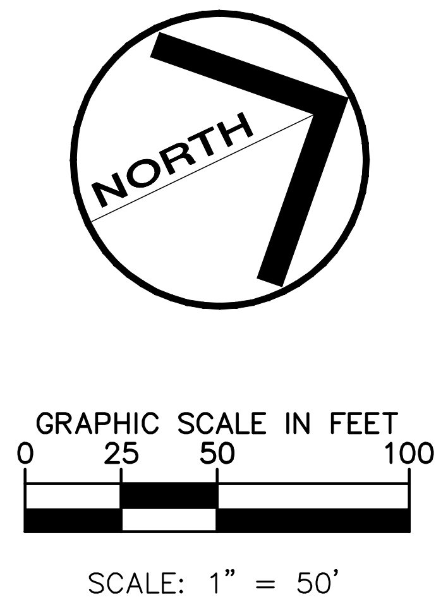
AMORUSO RANCH - APPENDIX F
DRAINAGE CHANNEL - PLAN AND PROFILE
NORTHWEST CHANNEL - SHEET 4 OF 9

Kimley»Horn

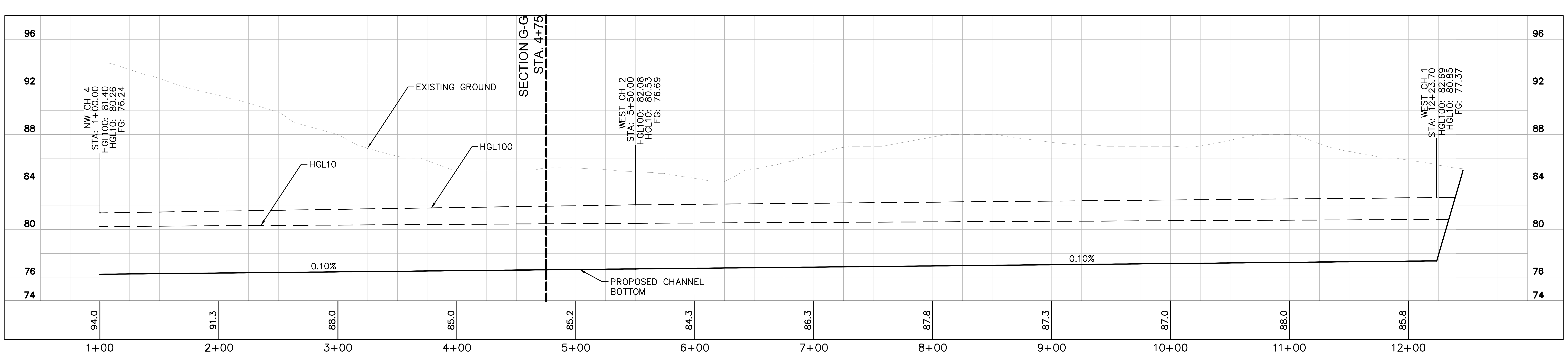
Feb 02, 2016 – 11:14am K:\SAC_LDEV\097679001 Amoruso Ranch\08 CADD\From San Diego\Design\Exhibits\Drainage Channel\2016.01.04\Exh_4_Northwest Channel.dwg



WEST CHANNEL - 6 FT. BOTTOM



SCALE: 1" = 50'



PROFILE SCALE

1" = 50' HORIZONTAL
1" = 5' VERTICAL

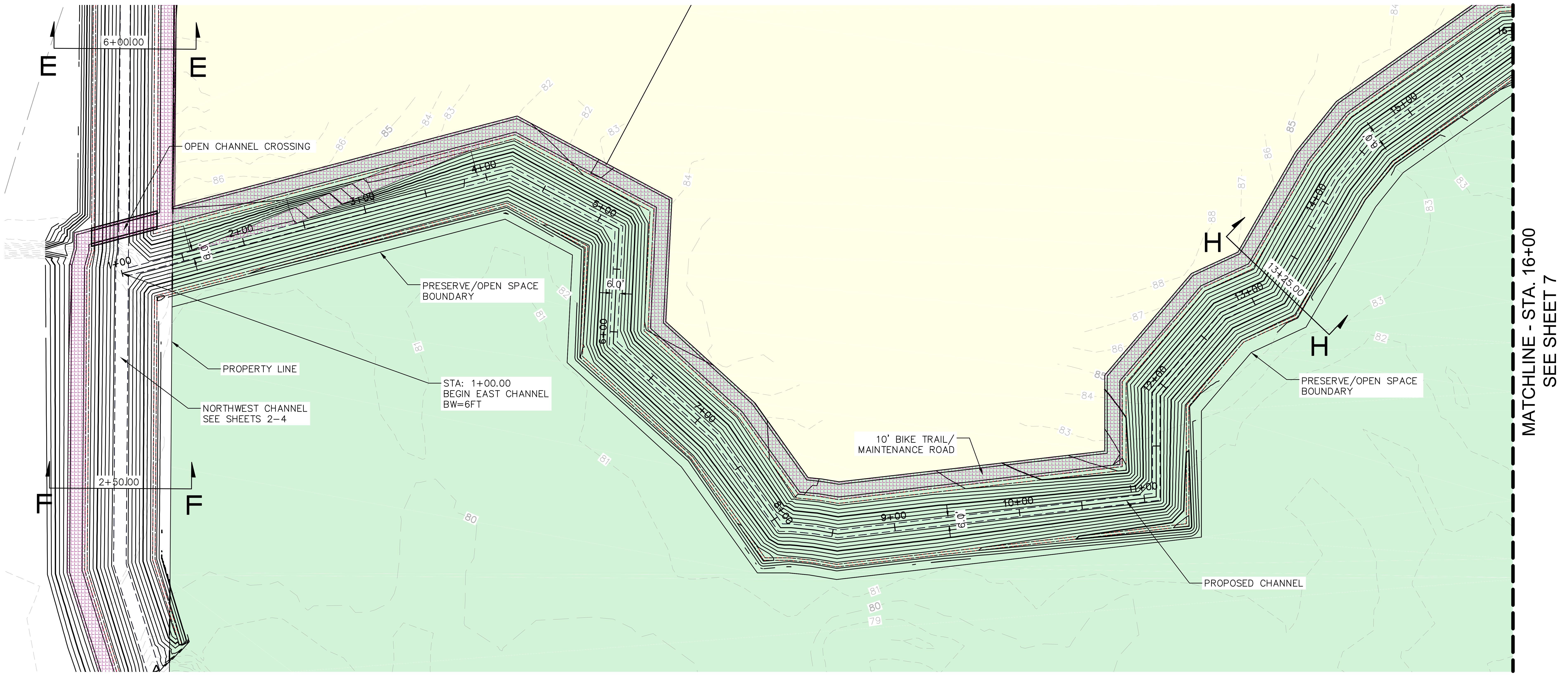
DATUM – NAVD88

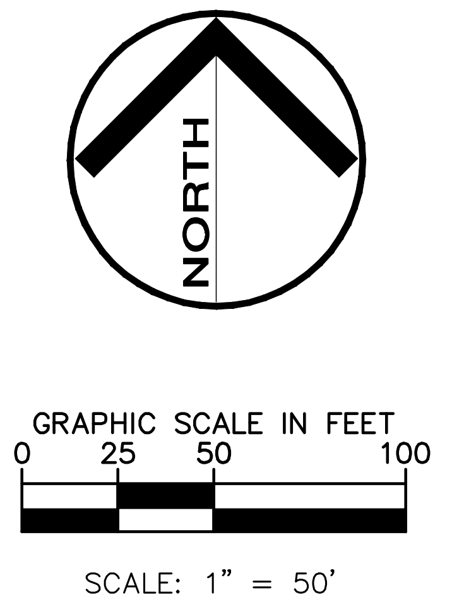
AMORUSO RANCH - APPENDIX F
DRAINAGE CHANNEL - PLAN AND PROFILE
WEST CHANNEL - SHEET 5 OF 9

Kimley»Horn

JANUARY 2016

Feb 02, 2016 – 11:17am K:\SAC_LDEV\097679001 Amoruso Ranch\08 CADD\From San Diego\Design\Exhibits\Drainage Channel\2016.01.04\Exh_5_West Channel.dwg





EAST CHANNEL - 6 FT. BOTTOM

PROFILE SCALE

1" – 50' HORIZONTAL
1" – 5' VERTICAL

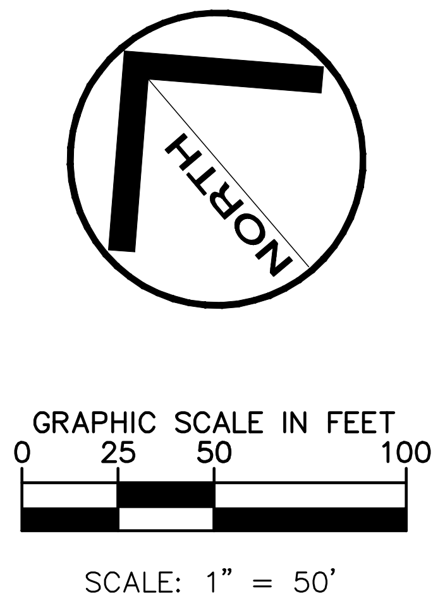
NOTE: ACCESS TO OPEN SPACE WILL BE PROVIDED AT APPROPRIATE LOCATIONS PER FIGURE 6 IN DRAINAGE MASTER PLAN.

JANUARY 2016

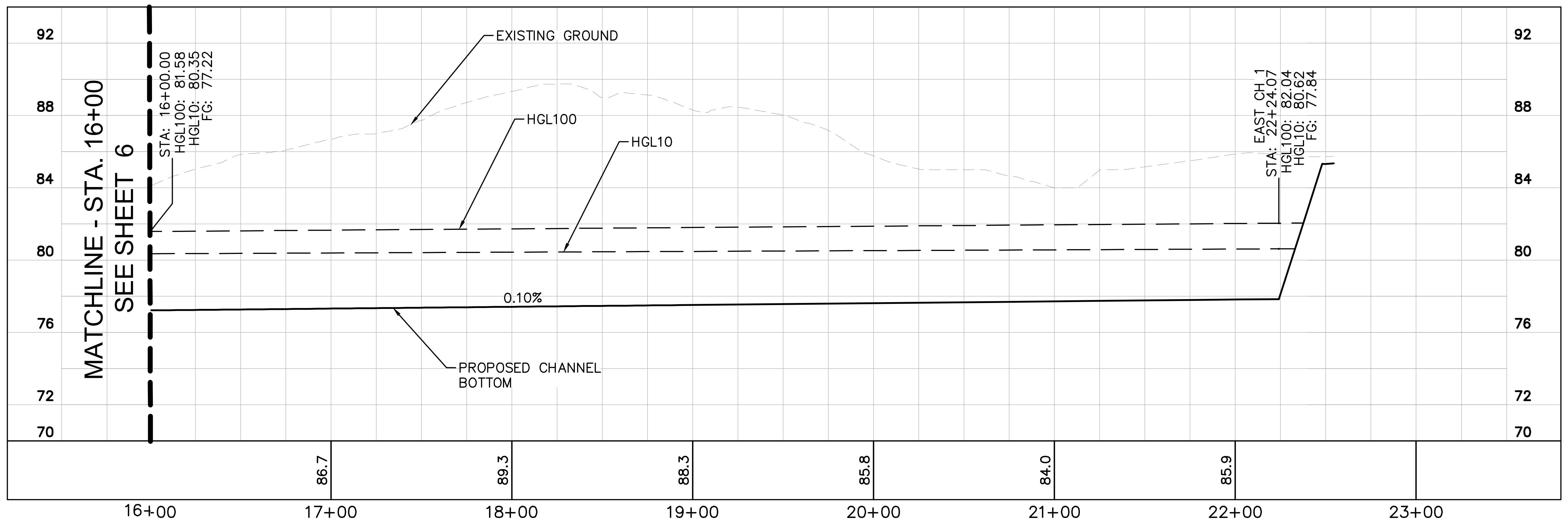
AMORUSO RANCH - APPENDIX F
DRAINAGE CHANNEL - PLAN AND PROFILE
EAST CHANNEL - SHEET 6 OF 9

Kimley»Horn

Feb 02, 2016 – 11:20am K:\SAC_LDEV\097679001 Amoruso Ranch\08 CADD\From San Diego\Design\Exhibits\Drainage Channel\2016.01.04\Exh_6_East Channel.dwg



EAST CHANNEL - 6 FT. BOTTOM



PROFILE SCALE

1" – 50' HORIZONTAL
1" – 5' VERTICAL

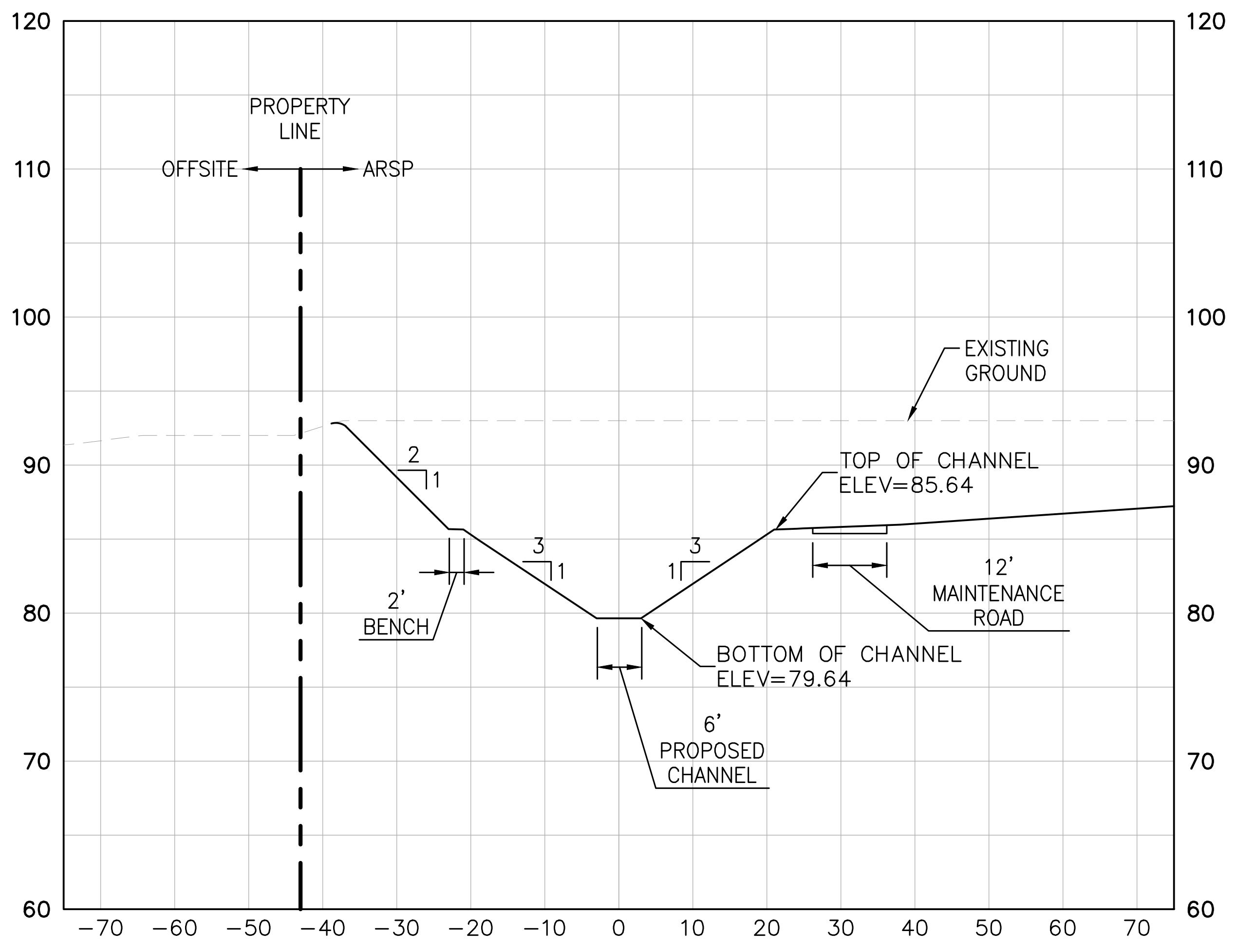
DATUM – NAVD88

NOTE: ACCESS TO OPEN SPACE WILL BE PROVIDED AT APPROPRIATE LOCATIONS PER FIGURE 6 IN DRAINAGE MASTER PLAN.

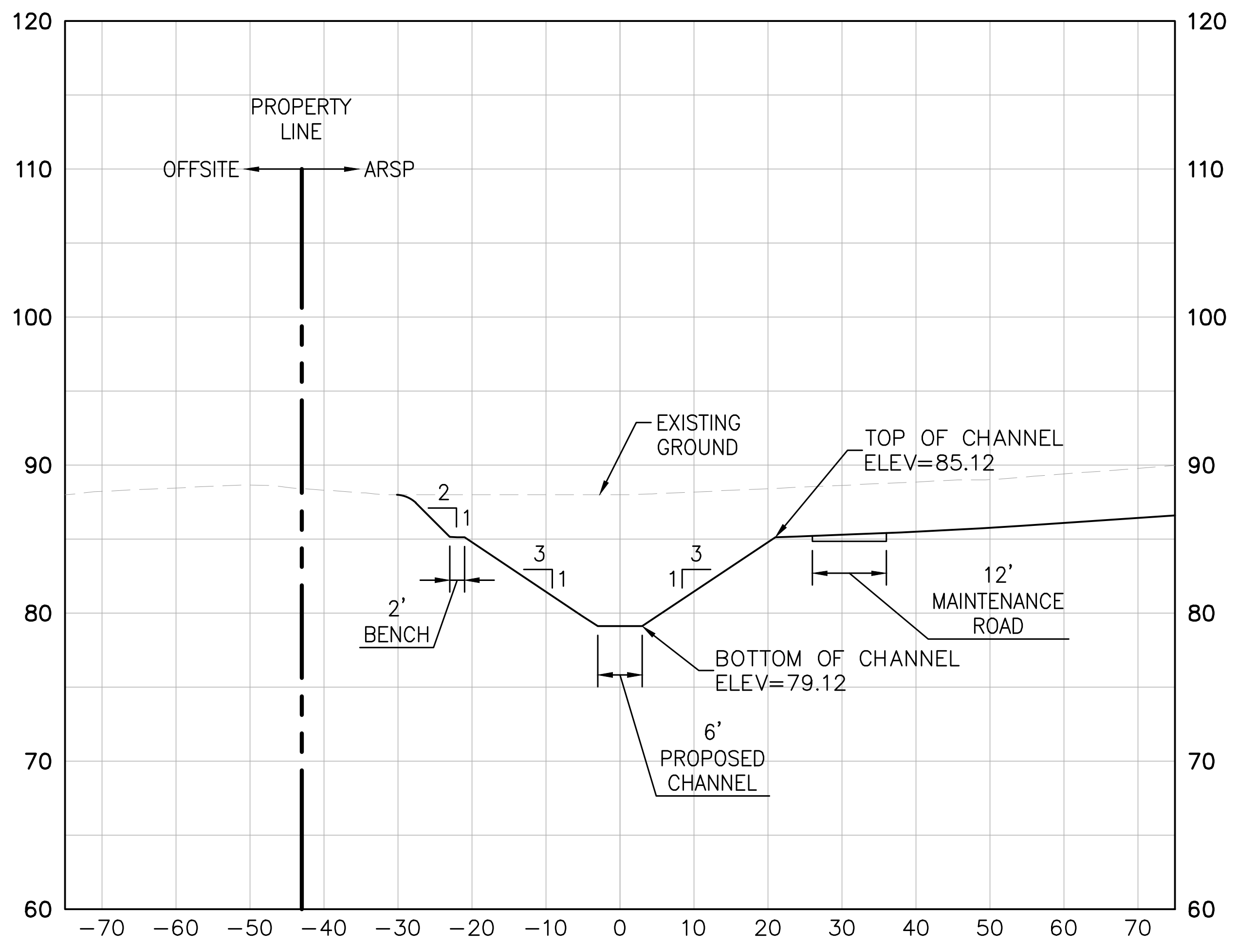
JANUARY 2016

AMORUSO RANCH - APPENDIX F
DRAINAGE CHANNEL - PLAN AND PROFILE
EAST CHANNEL - SHEET 7 OF 9

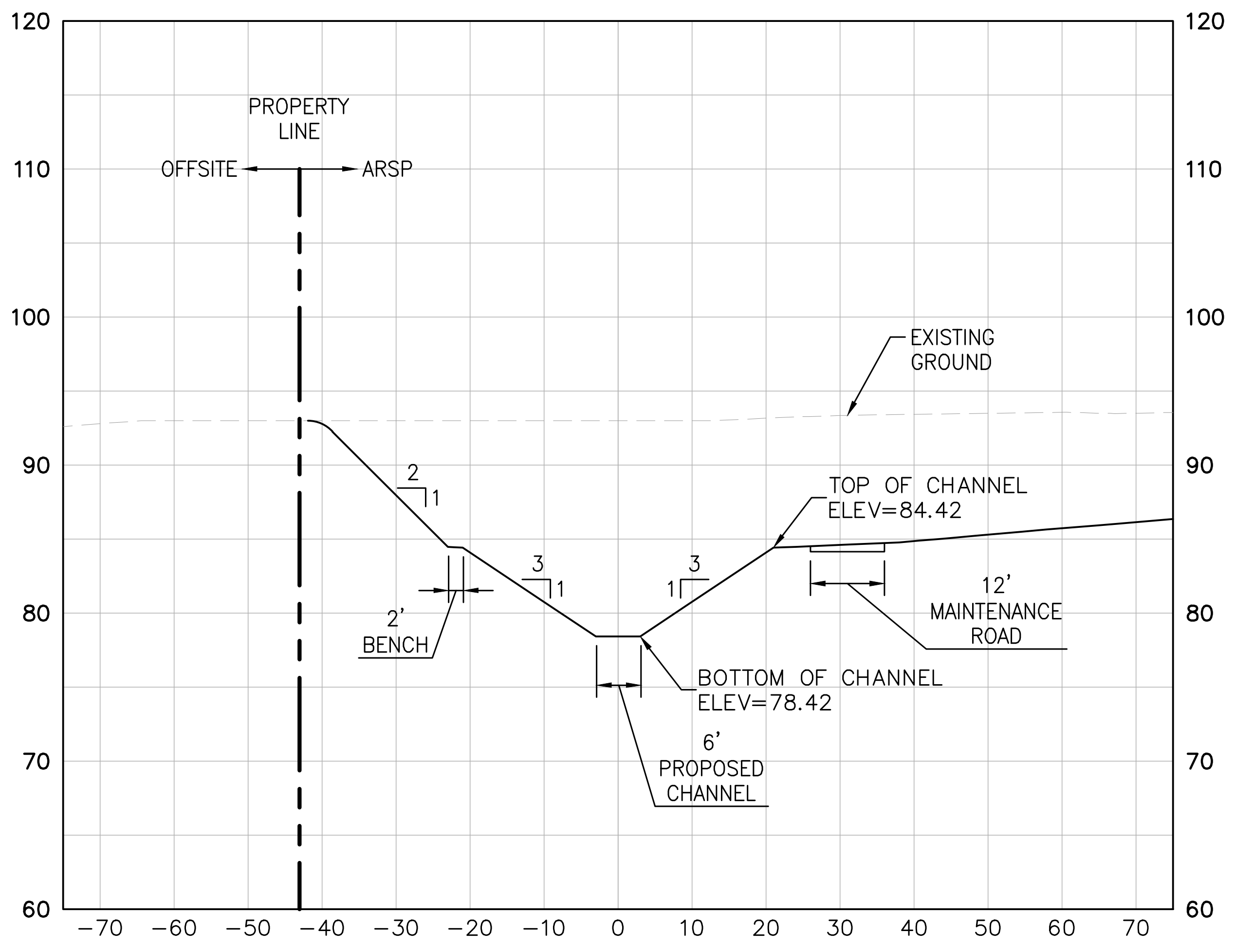
Kimley»Horn



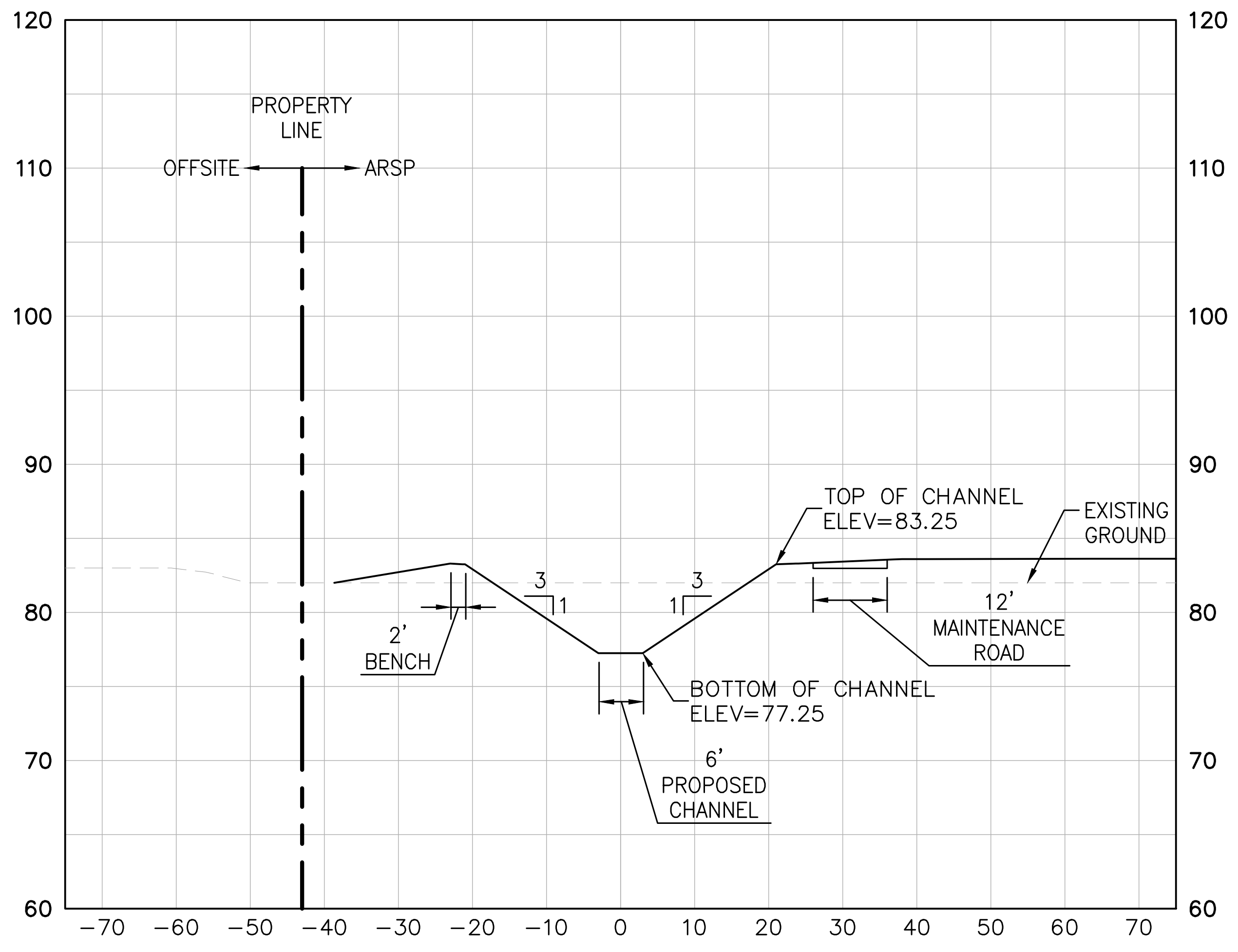
SECTION A-A
NORTHWEST CHANNEL - HIGH POINT STA 43+40
SCALE: 1"=20' (HORIZ.)
1"=10' (VERT)
DATUM - NAVD88



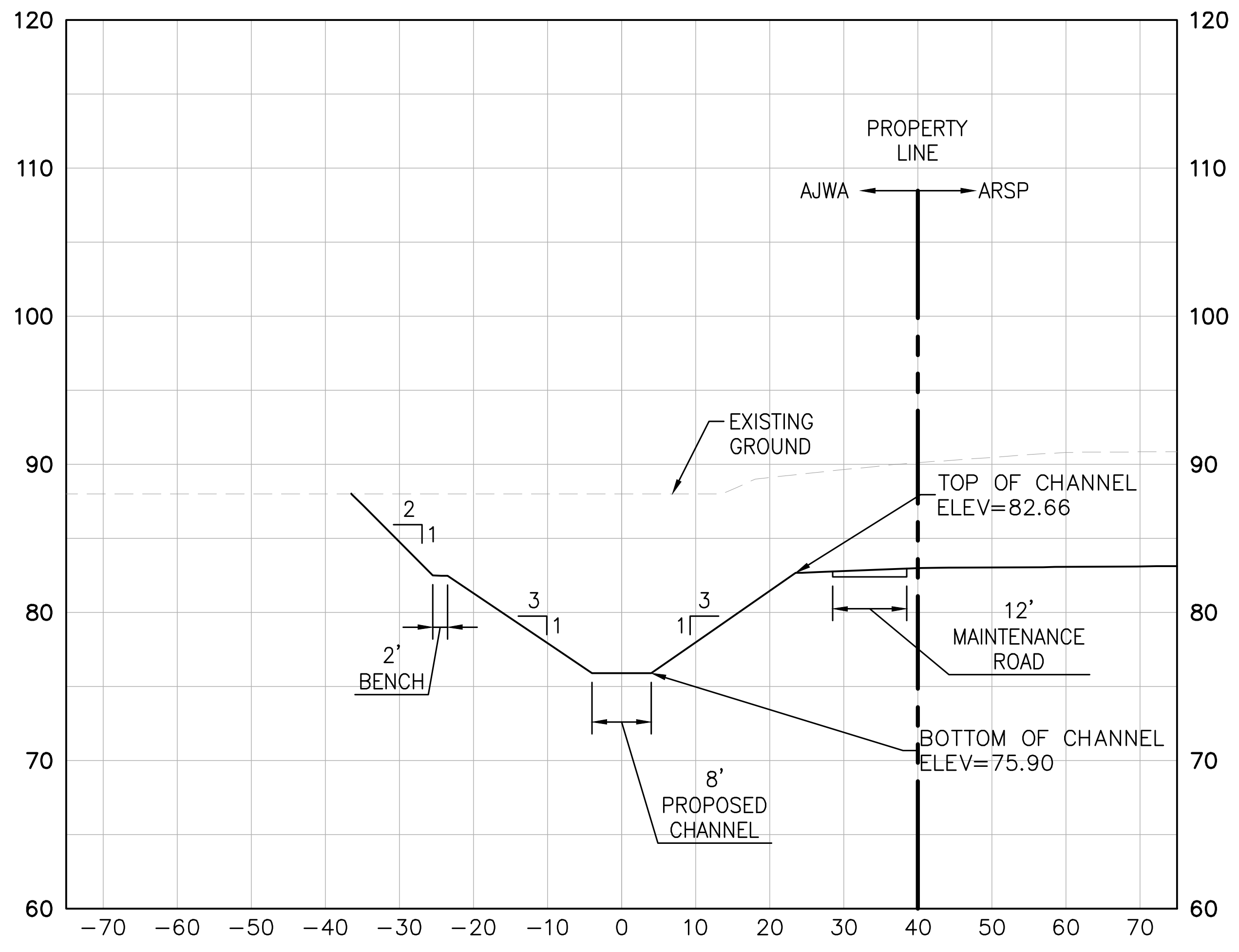
SECTION B-B
NORTHWEST CHANNEL - TYPICAL SECTION STA 38+25
SCALE: 1"=20' (HORIZ.)
1"=10' (VERT)
DATUM - NAVD88



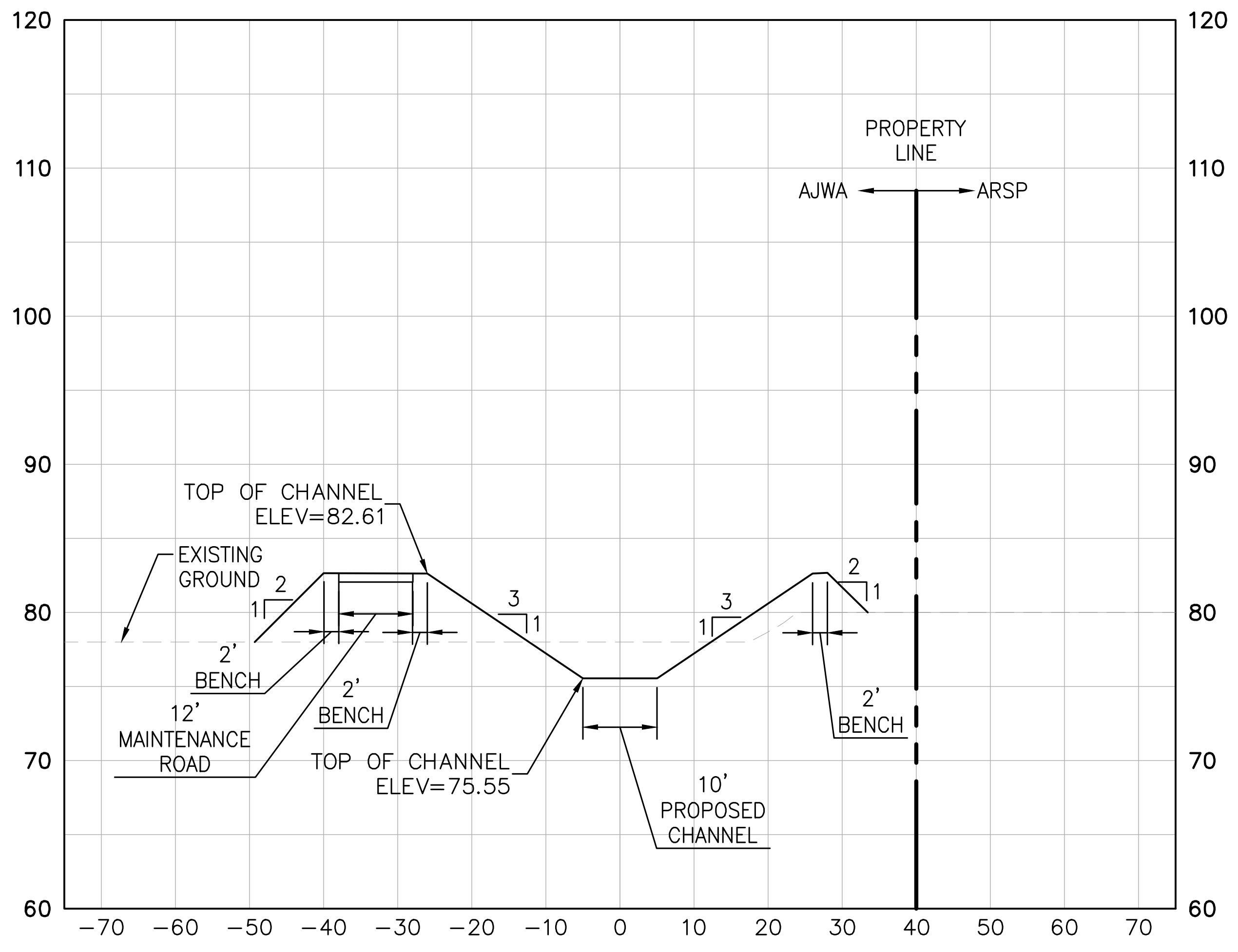
SECTION C-C
NORTHWEST CHANNEL - HIGH POINT STA 31+25
SCALE: 1"=20' (HORIZ.)
1"=10' (VERT)
DATUM - NAVD88



SECTION D-D
NORTHWEST CHANNEL - LOW POINT STA 19+50
SCALE: 1"=20' (HORIZ.)
1"=10' (VERT)
DATUM - NAVD88



SECTION E-E
NORTHWEST CHANNEL - TYPICAL SECTION STA 6+00
SCALE: 1"=20' (HORIZ.)
1"=10' (VERT)
DATUM - NAVD88



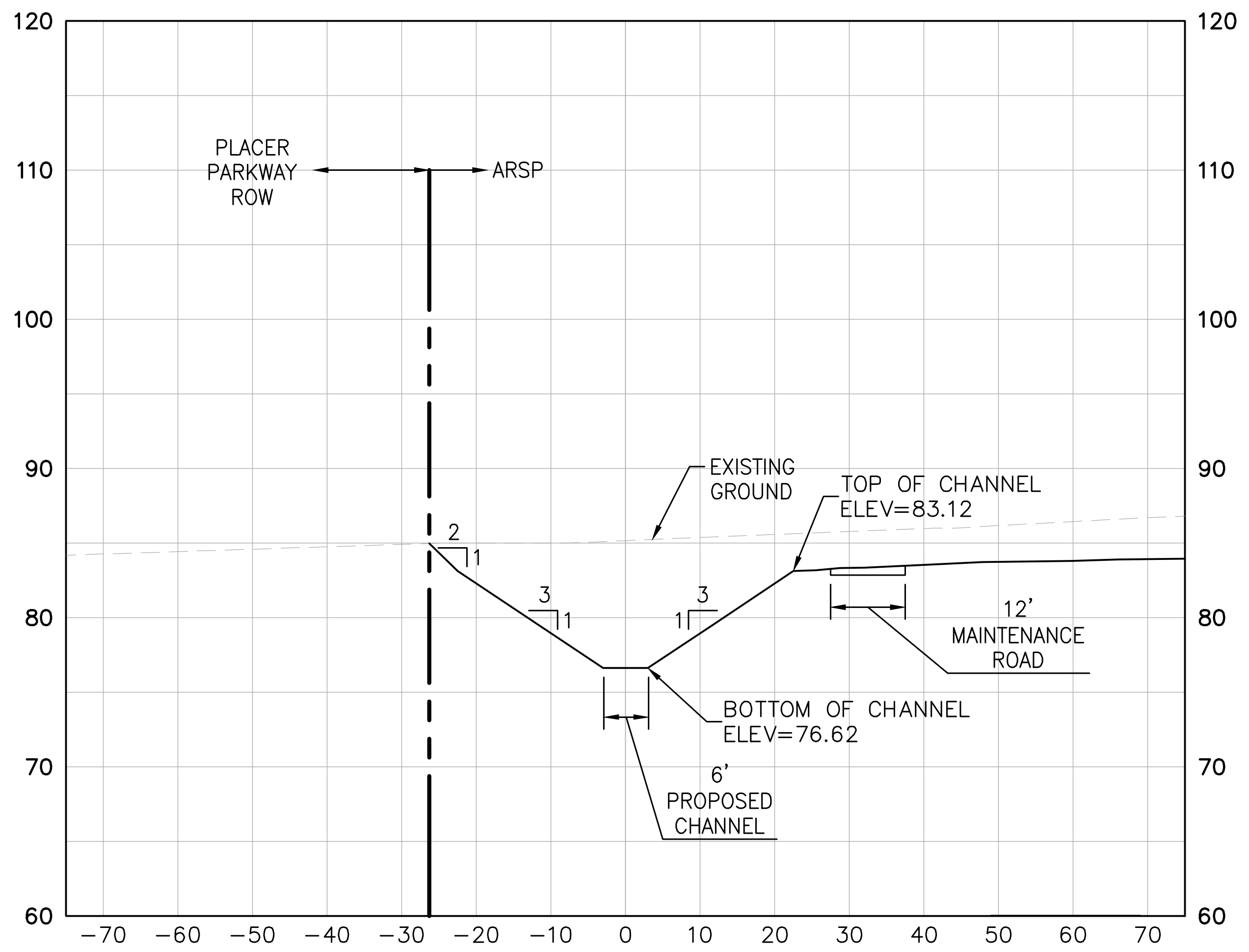
SECTION F-F
NORTHWEST CHANNEL - TYPICAL SECTION STA 2+50
SCALE: 1"=20' (HORIZ.)
1"=10' (VERT)
DATUM - NAVD88

JANUARY 2016

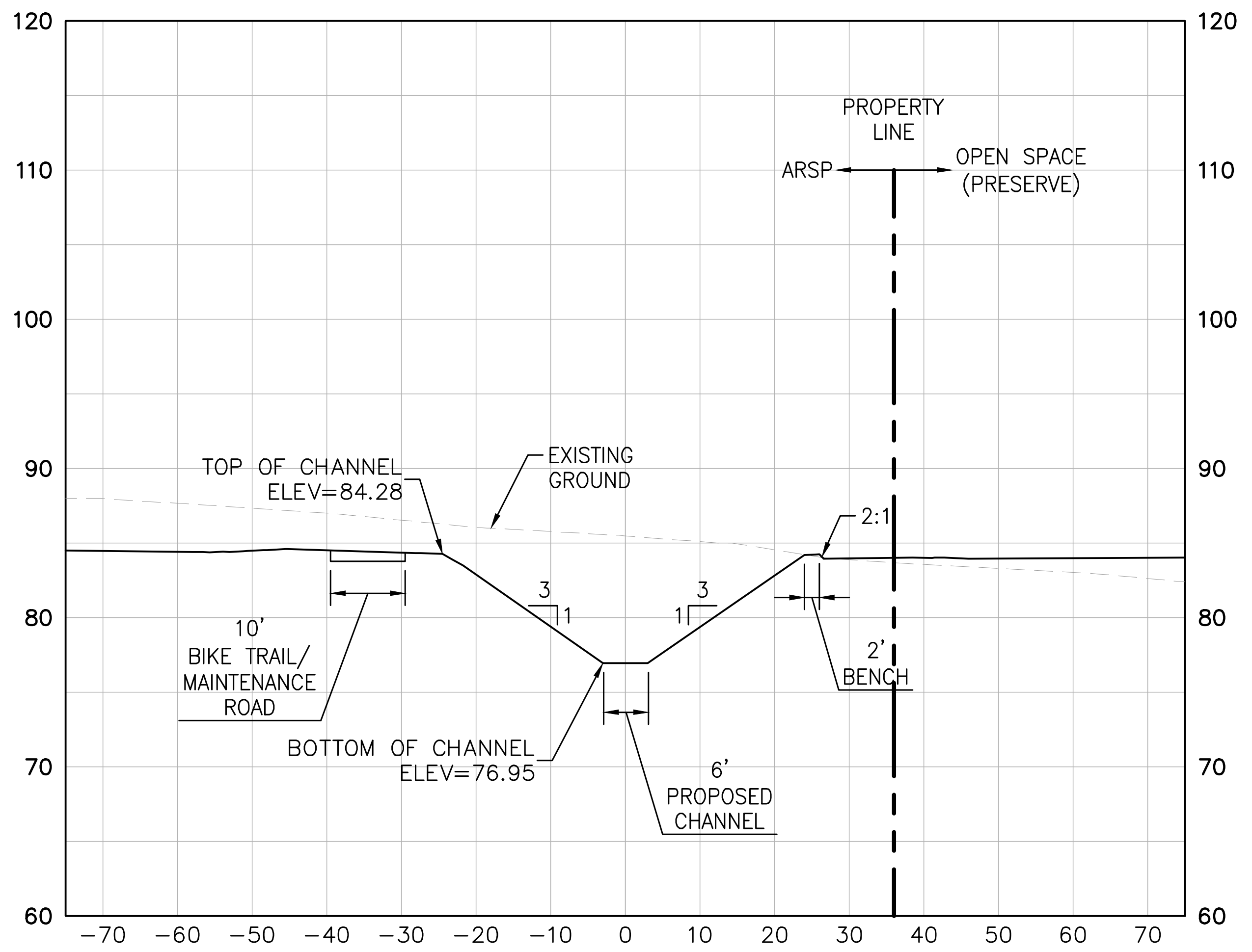
AMORUSO RANCH - APPENDIX F
NORTHWEST DRAINAGE CHANNEL SECTIONS
SHEET 8 OF 9

Kimley»Horn

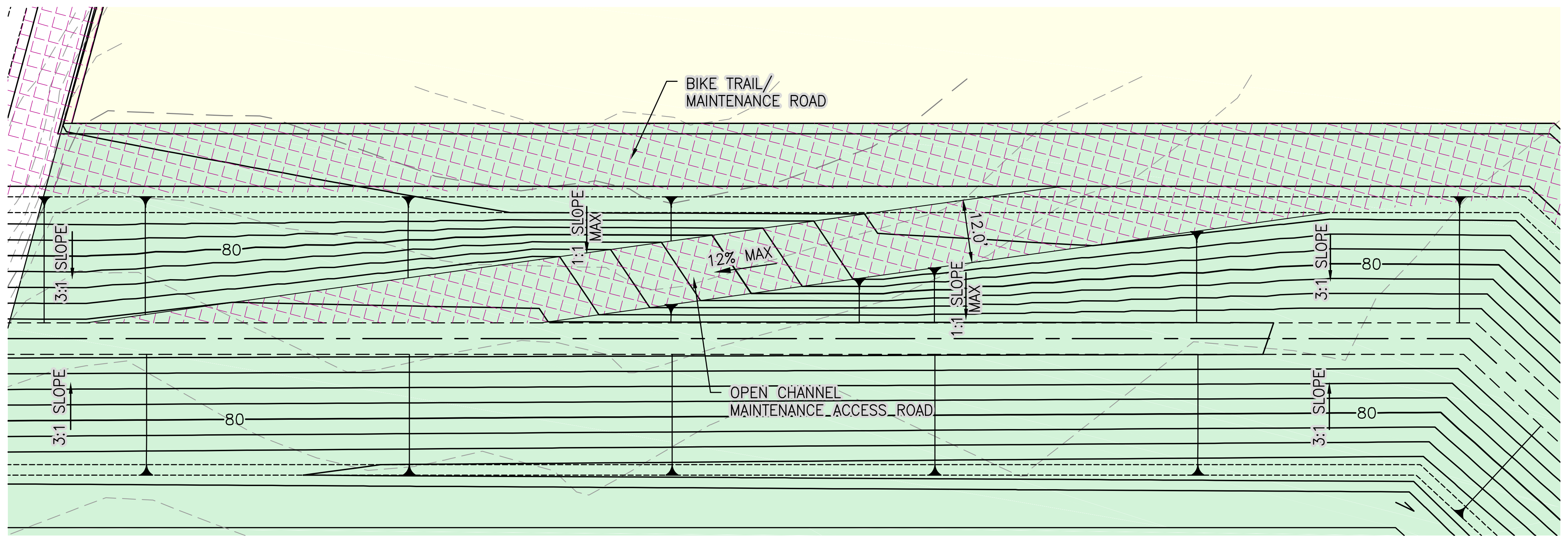
Feb 02, 2016 – 11:06am C:\Users\breanne.busby\appdata\local\temp\AcPublish_5908\Exh_8_West_Channel_Sections.dwg



SECTION G-G
WEST CHANNEL - TYPICAL SECTION STA 4+75
SCALE: 1"=20' (HORIZ.)
1"=10' (VERT)
DATUM - NAVD88



SECTION H-H
EAST CHANNEL - TYPICAL SECTION STA 13+25
SCALE: 1"=20' (HORIZ.)
1"=10' (VERT)
DATUM - NAVD88



TYPICAL CHANNEL ACCESS DETAIL

N.T.S.

JANUARY 2016

AMORUSO RANCH - APPENDIX F
EAST & WEST DRAINAGE CHANNEL SECTIONS
SHEET 9 OF 9

Kimley»Horn

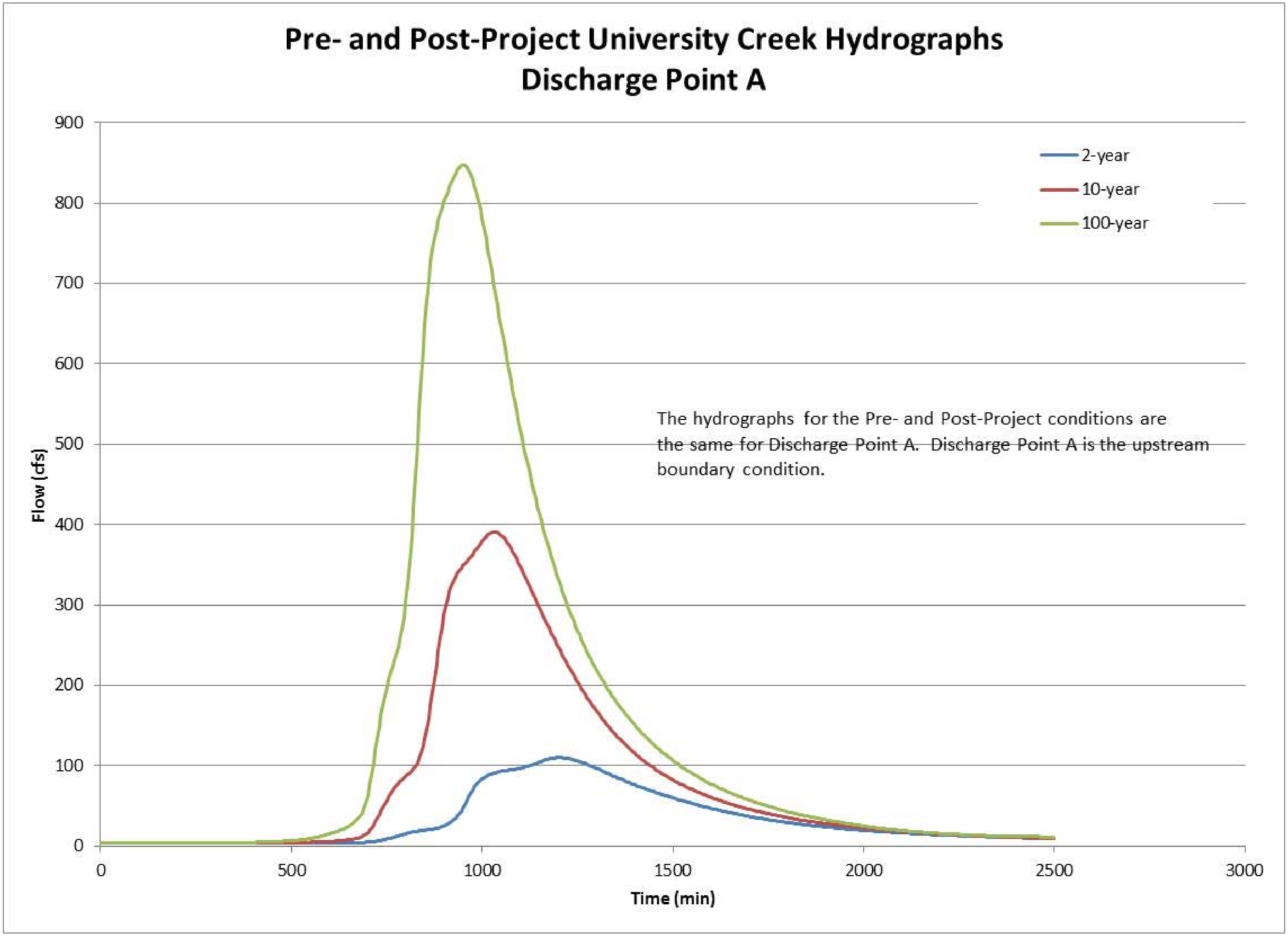
Feb 02, 2016 – 3:46pm K:\SAC_LDEV\097679001 Amoruso Ranch\08 CADD\From San Diego\Design\Exhibits\Drainage Channel\2016.01.04\Exh_8_West_Channel_Sections.dwg

Amoruso Ranch Specific Plan Area

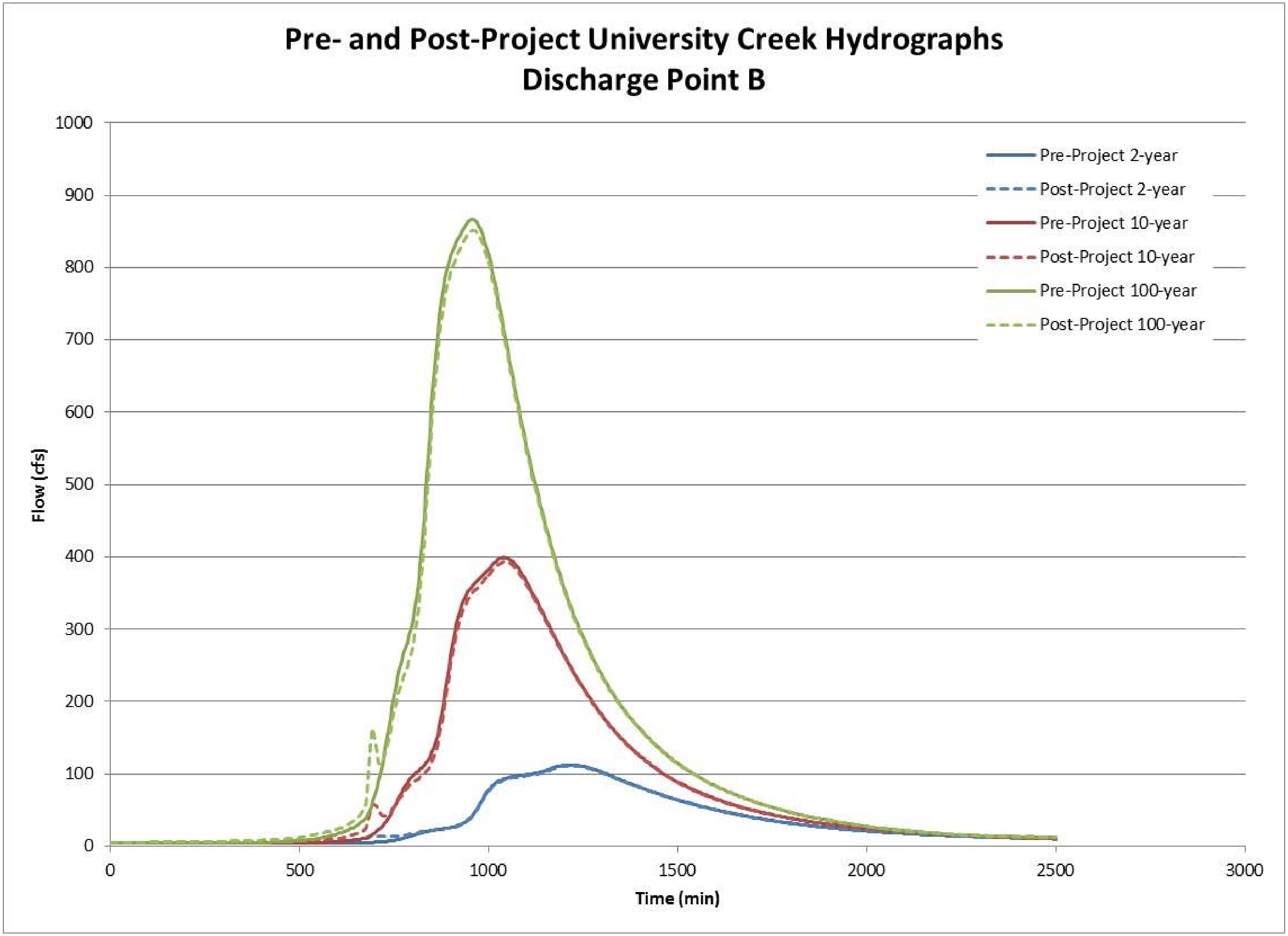
Drainage Master Plan

Appendix G

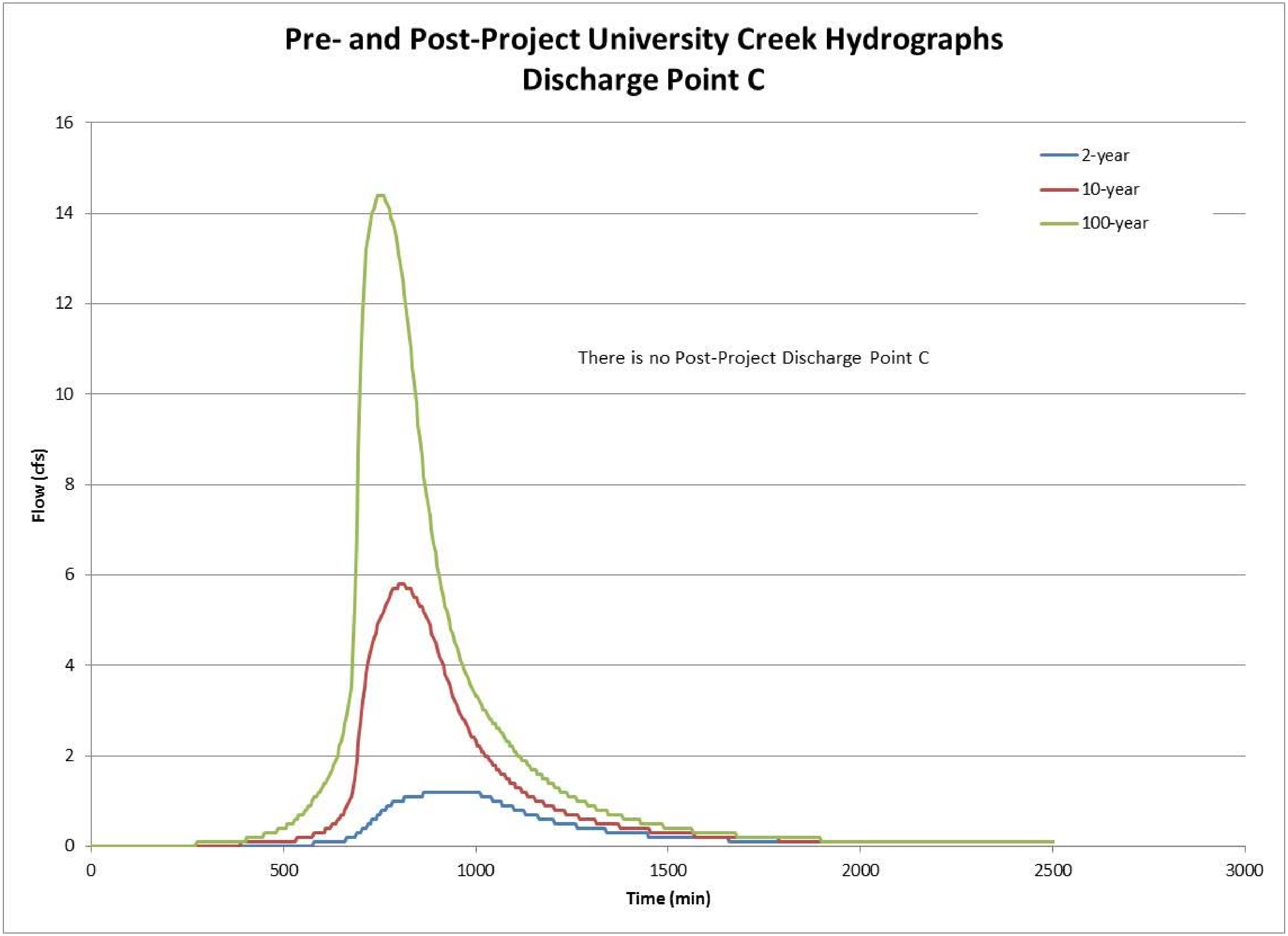
HEC-HMS Hydrographs for Each Discharge Point

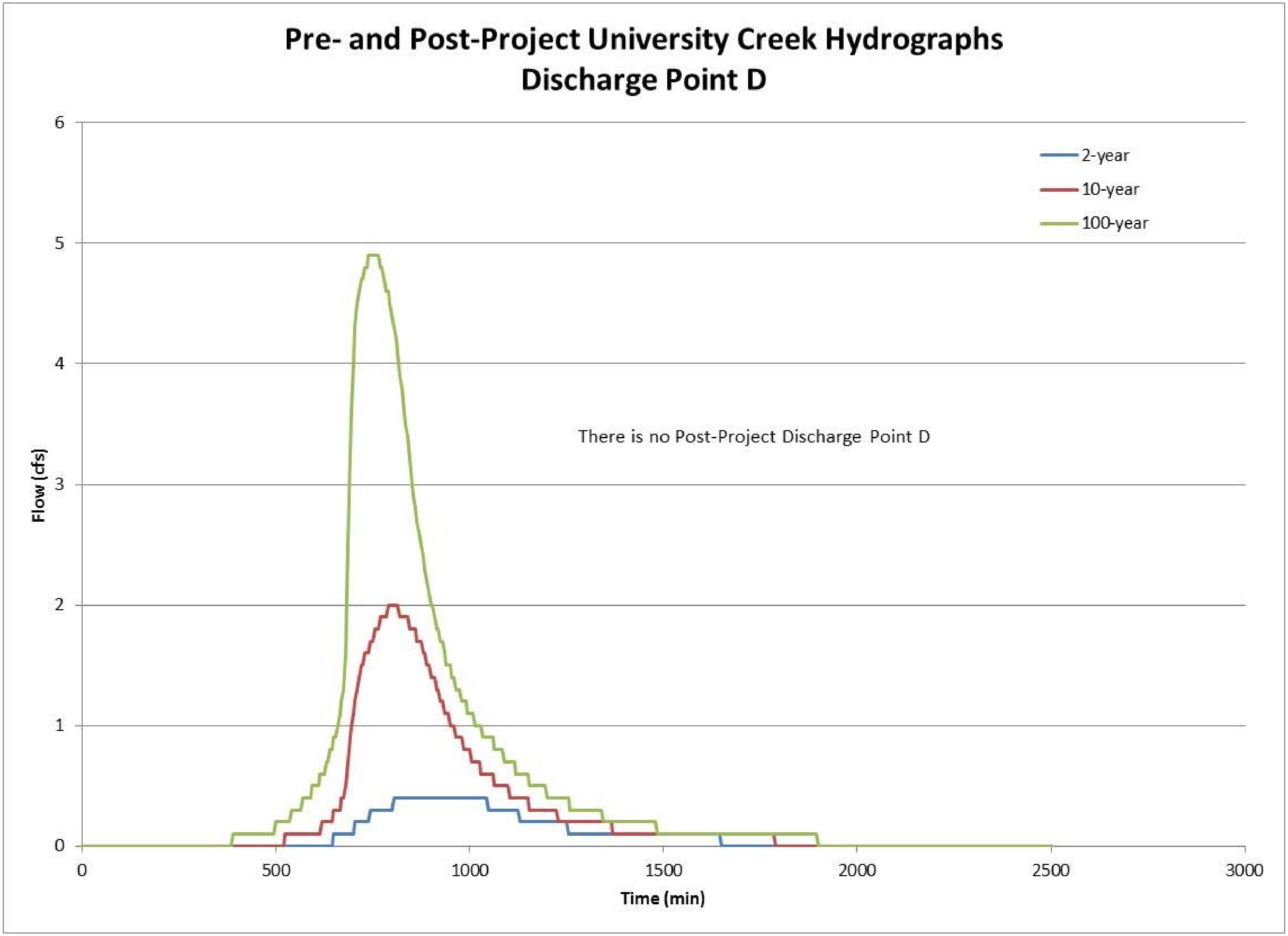


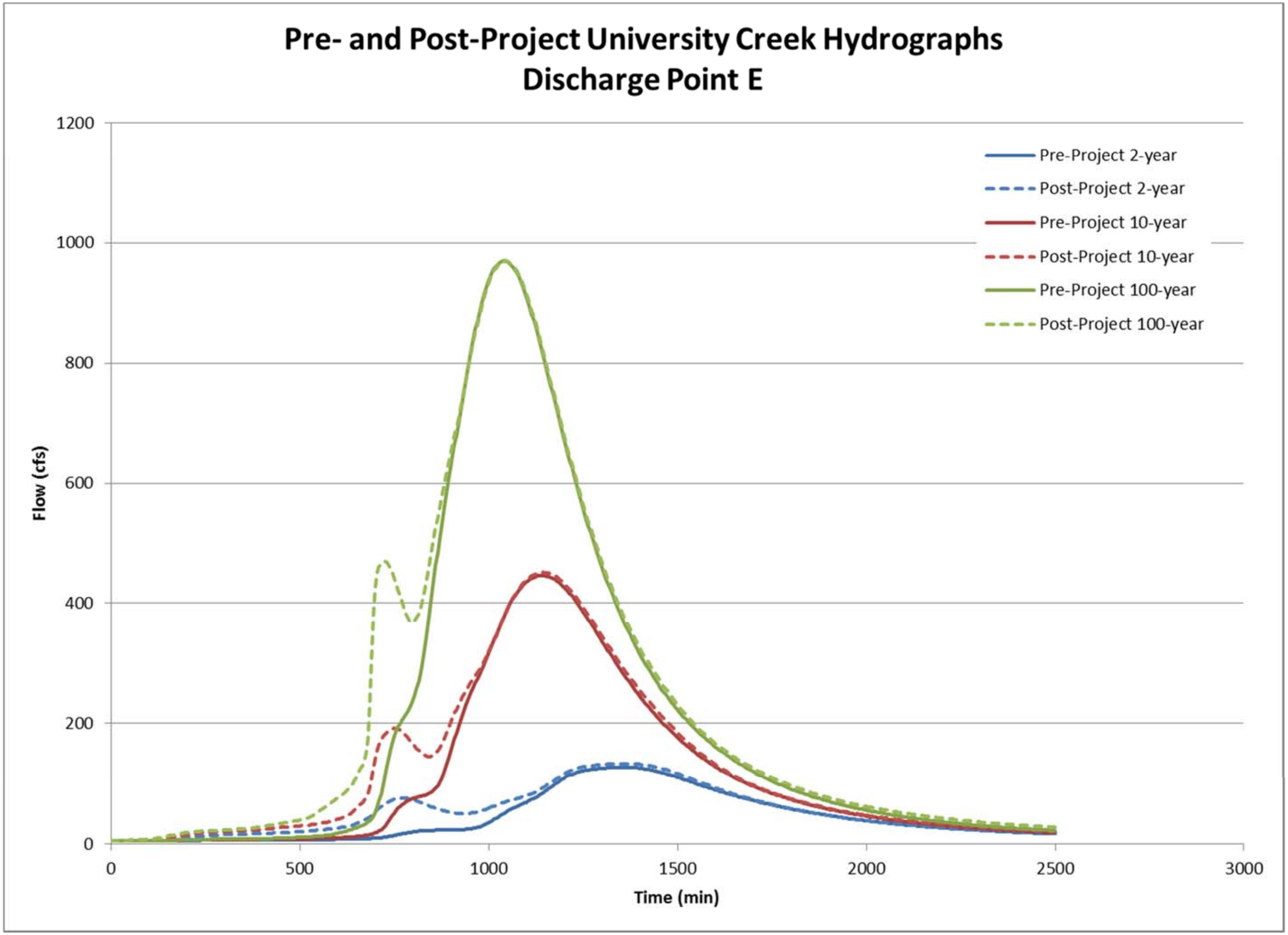
The hydrographs for the Pre- and Post-Project conditions are the same for Discharge Point A. Discharge Point A is the upstream boundary condition.



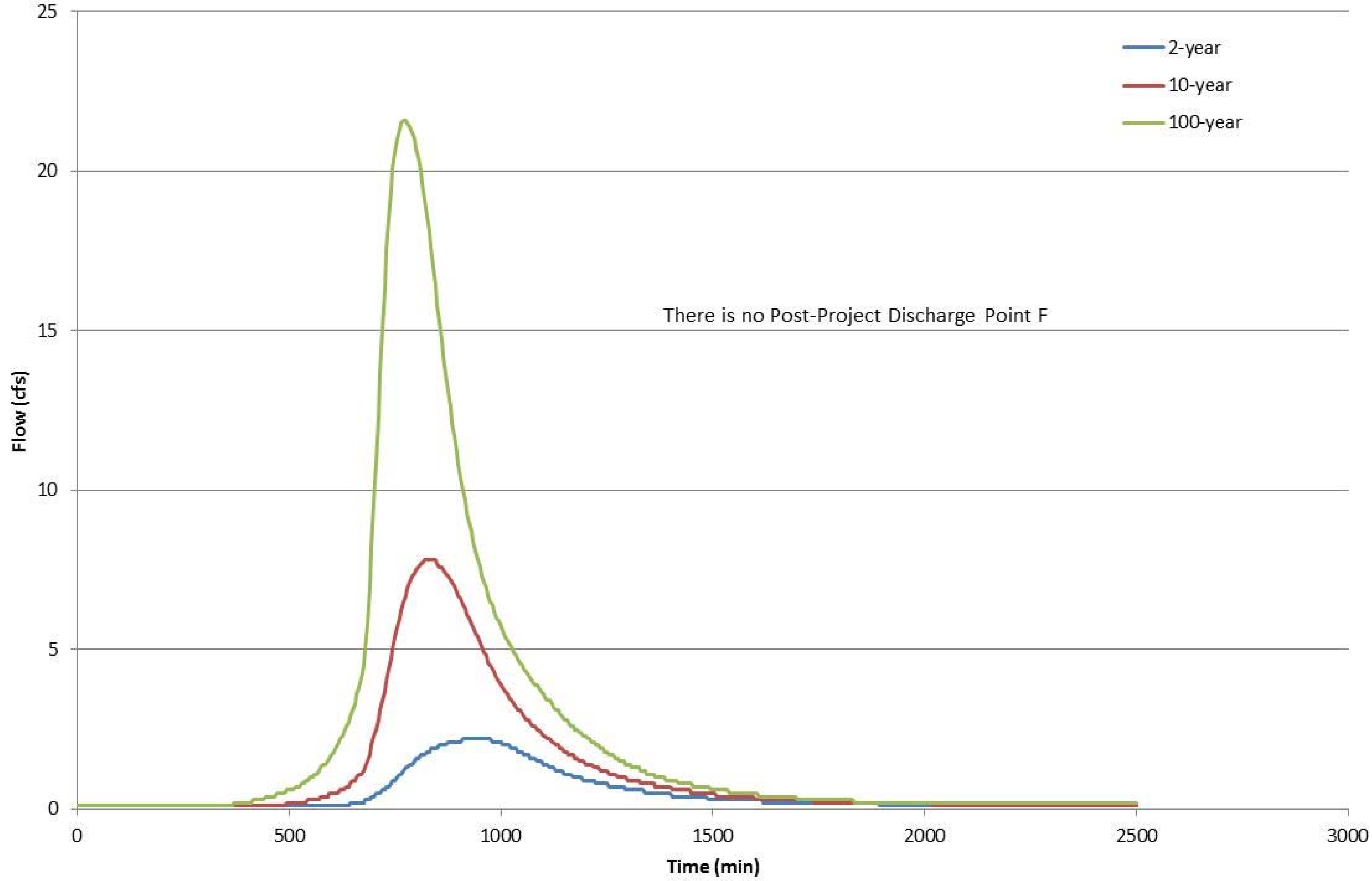
Pre- and Post-Project University Creek Hydrographs
Discharge Point B

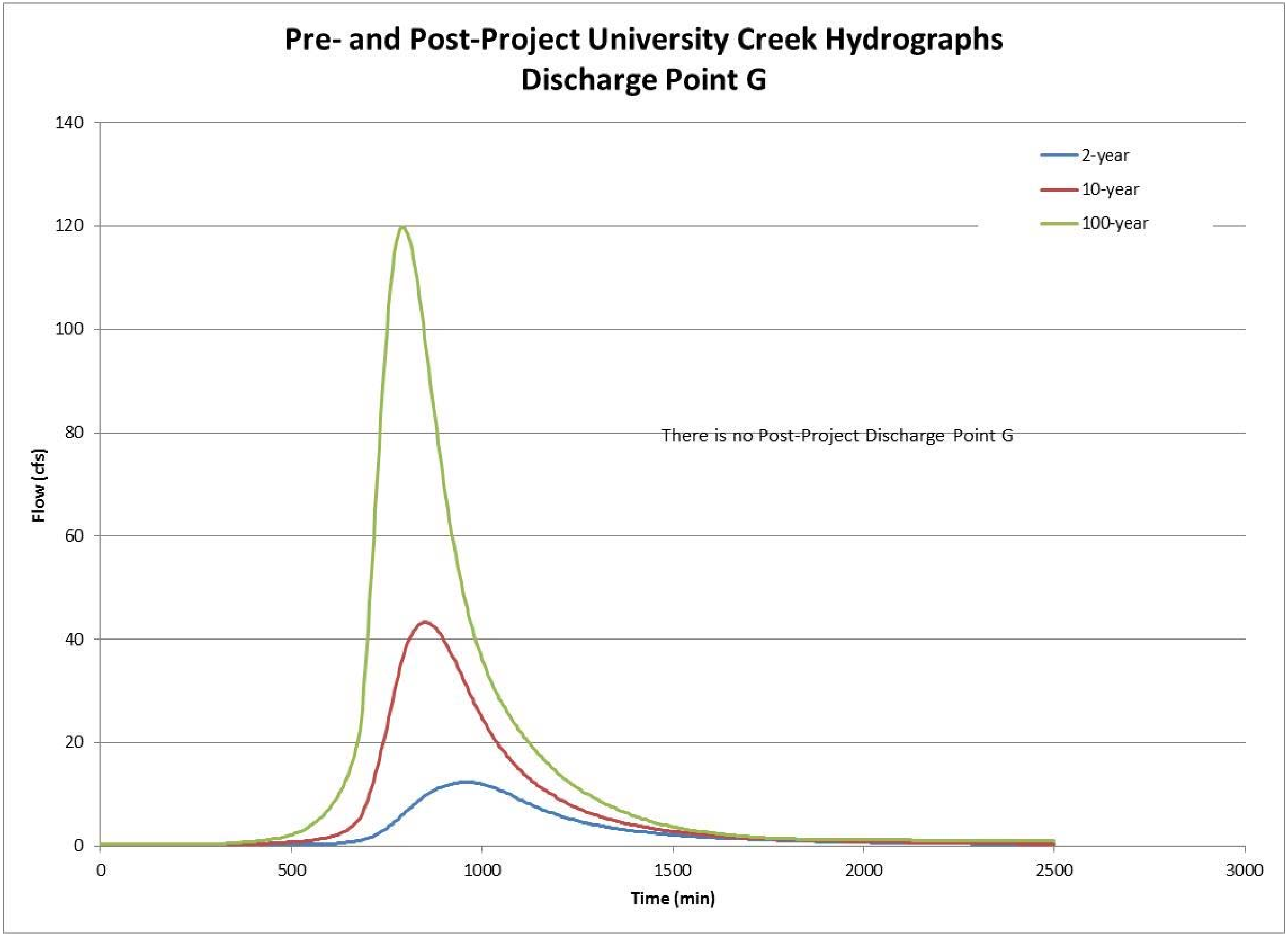
Pre- and Post-Project University Creek Hydrographs
Discharge Point C
16
14
12
10
8
6
4
2
0
Flow (cfs)
0
500
1000
1500
2000
2500
3000
Time (min)
2-year
10-year
100-year
There is no Post-Project Discharge Point C

Pre- and Post-Project University Creek Hydrographs
Discharge Point D
6
5
4
3
2
1
0
Flow (cfs)
0
500
1000
1500
2000
2500
3000
Time (min)
2-year
10-year
100-year
There is no Post-Project Discharge Point D


Pre- and Post-Project University Creek Hydrographs
Discharge Point E
1200
1000
800
600
400
200
0
Flow (cfs)
0
500
1000
1500
2000
2500
3000
Time (min)
Pre-Project 2-year
Post-Project 2-year
Pre-Project 10-year
Post-Project 10-year
Pre-Project 100-year
Post-Project 100-year

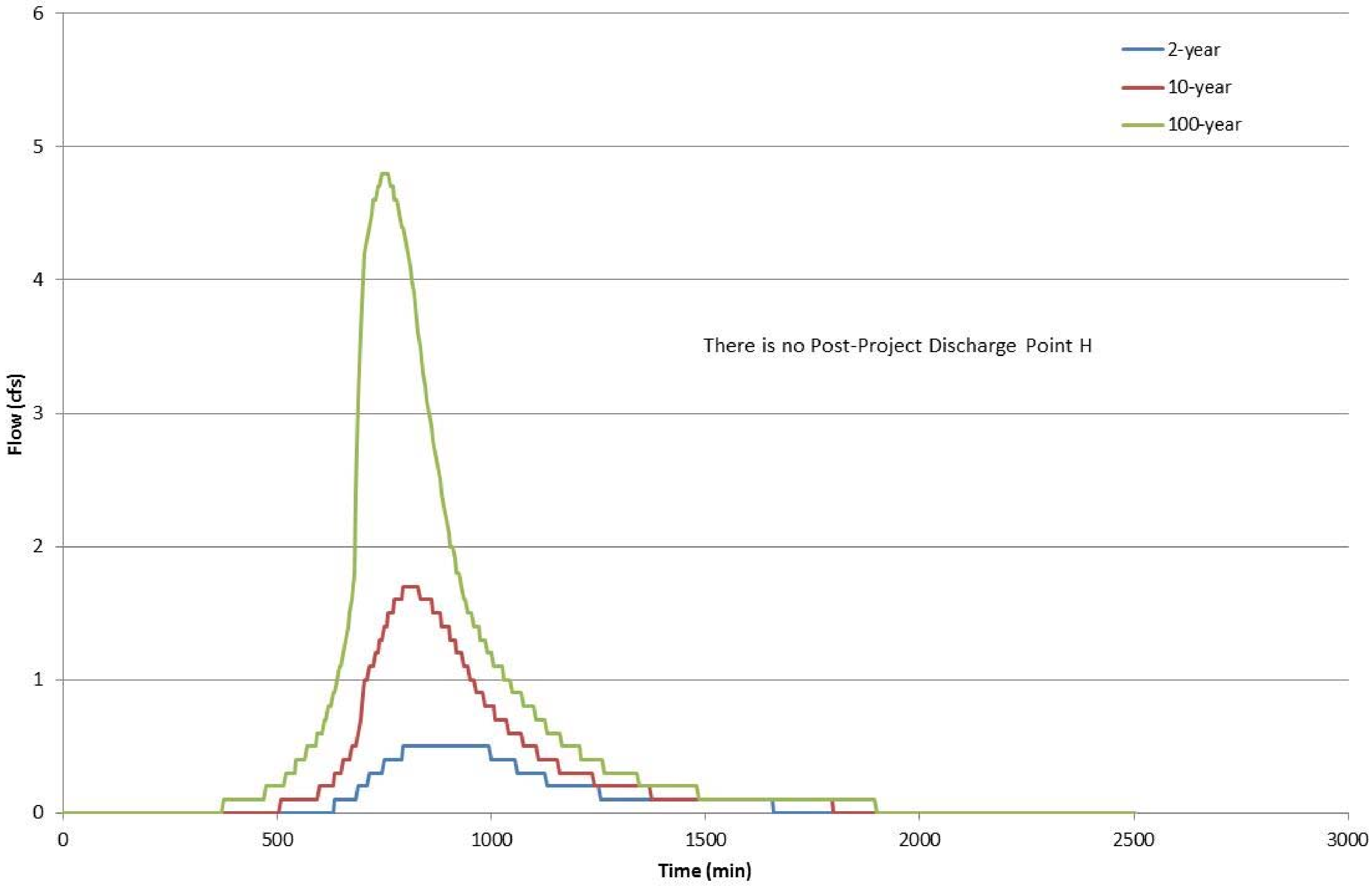
Pre- and Post-Project University Creek Hydrographs
Discharge Point F



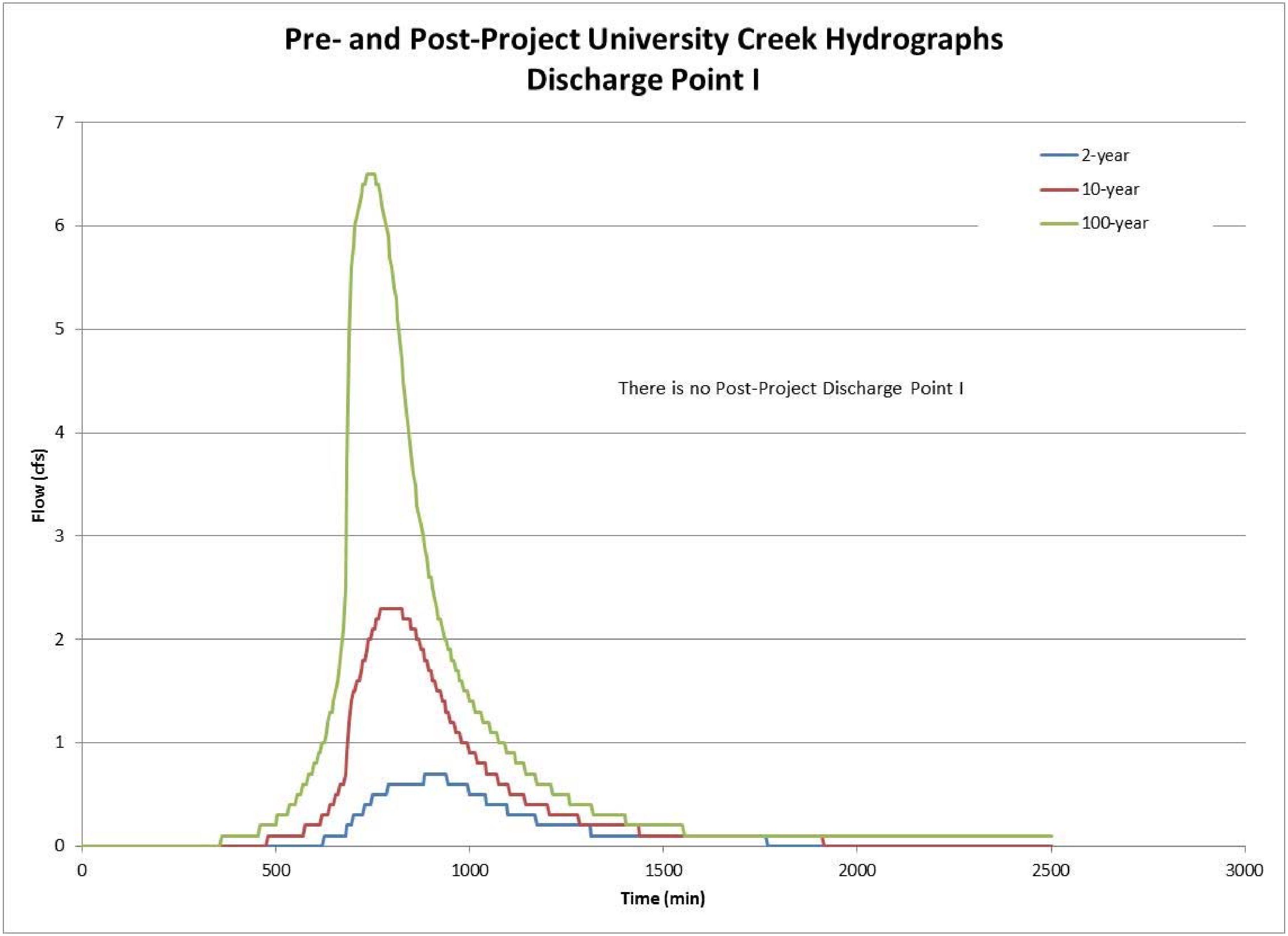


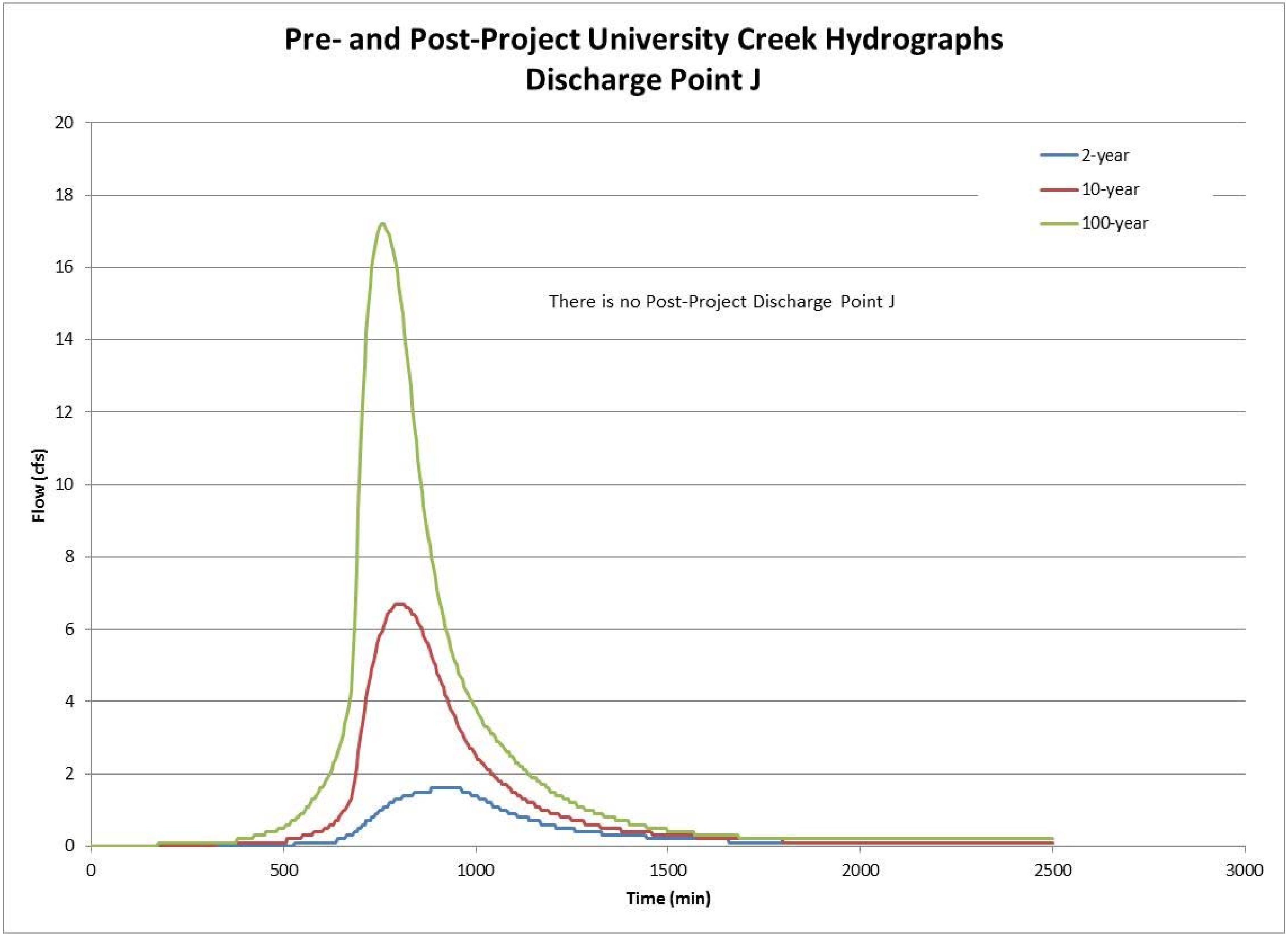
Pre- and Post-Project University Creek Hydrographs
Discharge Point G

Pre- and Post-Project University Creek Hydrographs
Discharge Point H



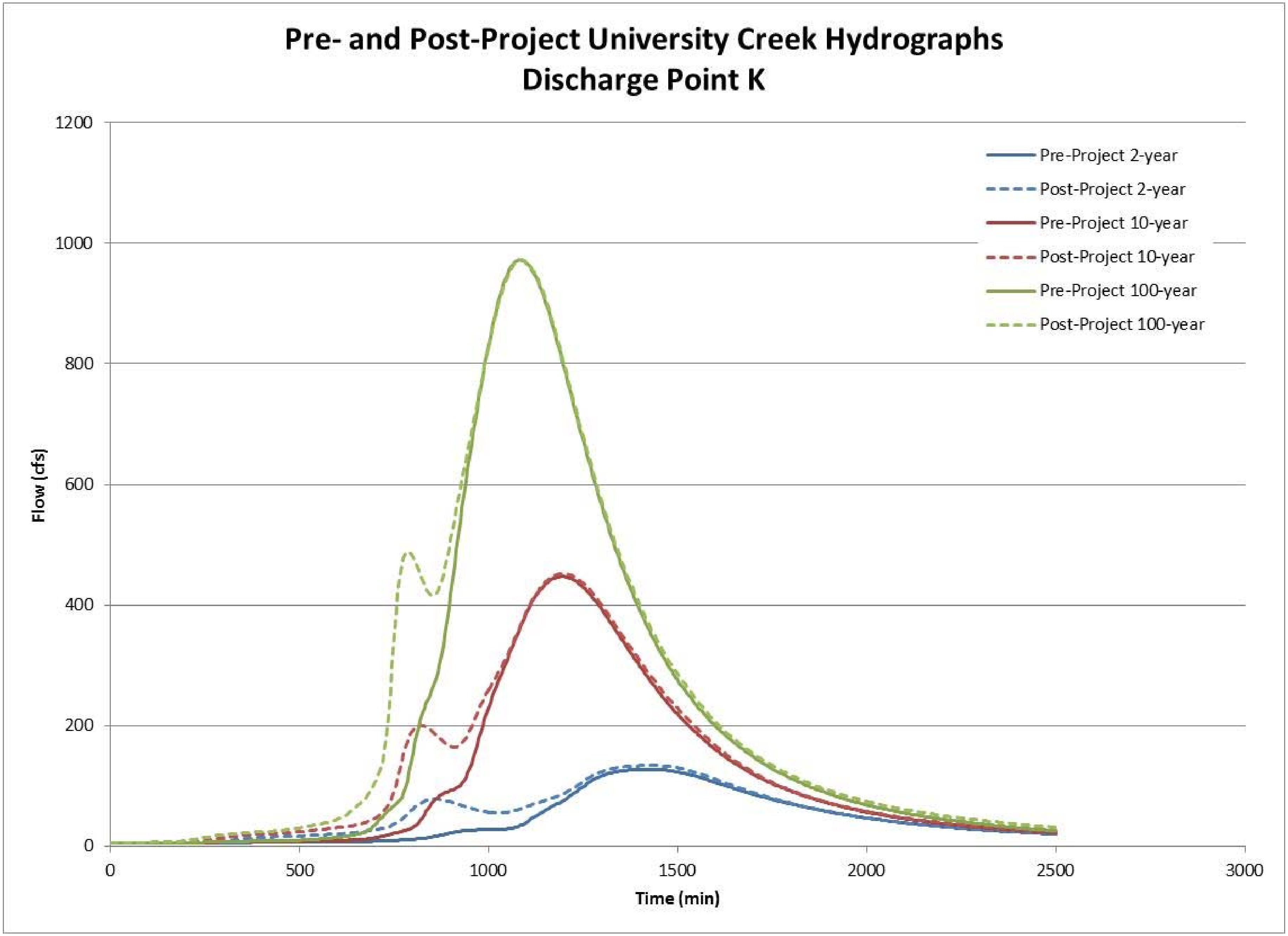
There is no Post-Project Discharge Point H

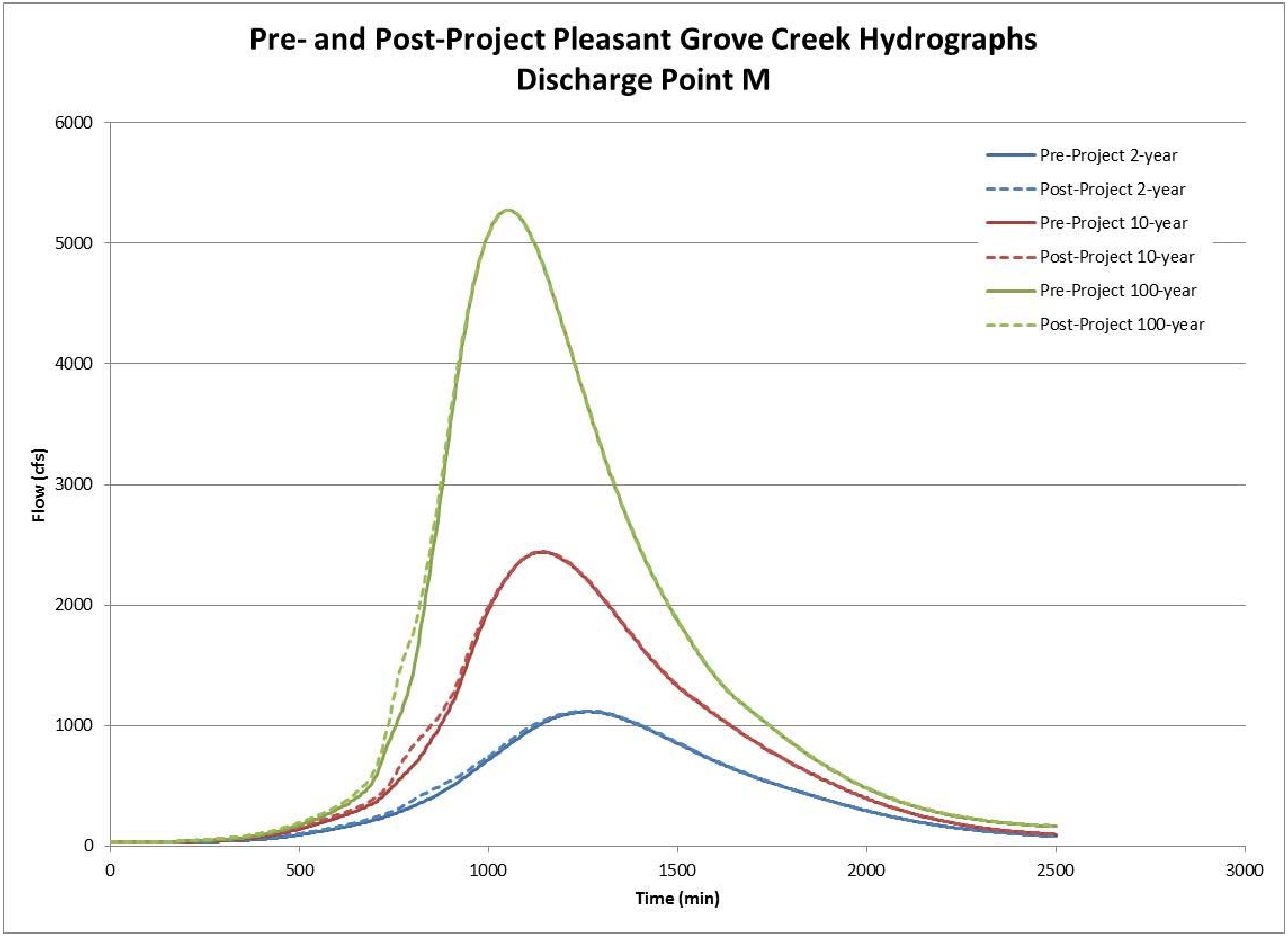
Pre- and Post-Project University Creek Hydrographs
Discharge Point I
Flow (cfs)
Time (min)
0
1
2
3
4
5
6
7
0
500
1000
1500
2000
2500
3000
2-year
10-year
100-year
There is no Post-Project Discharge Point I

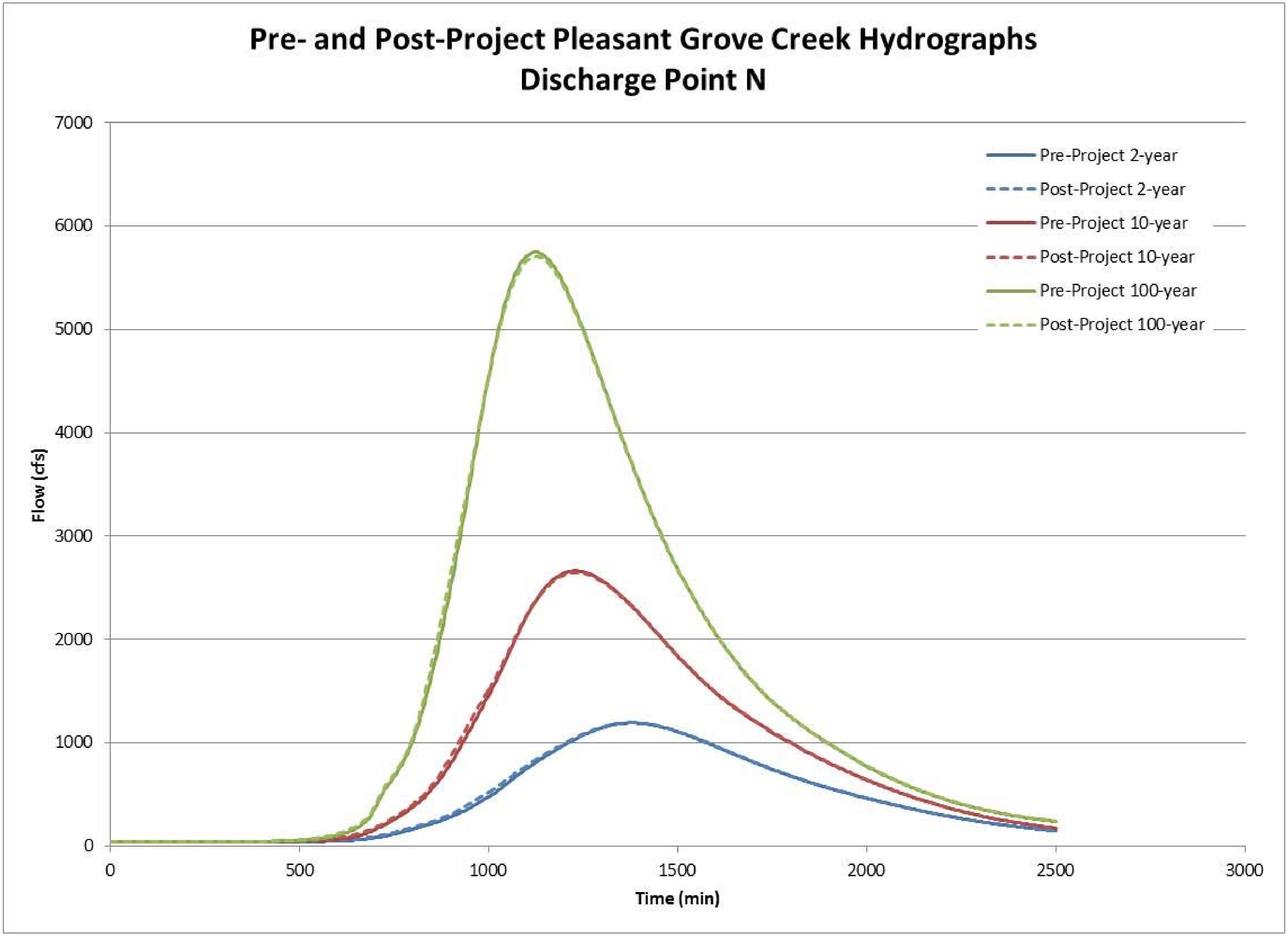


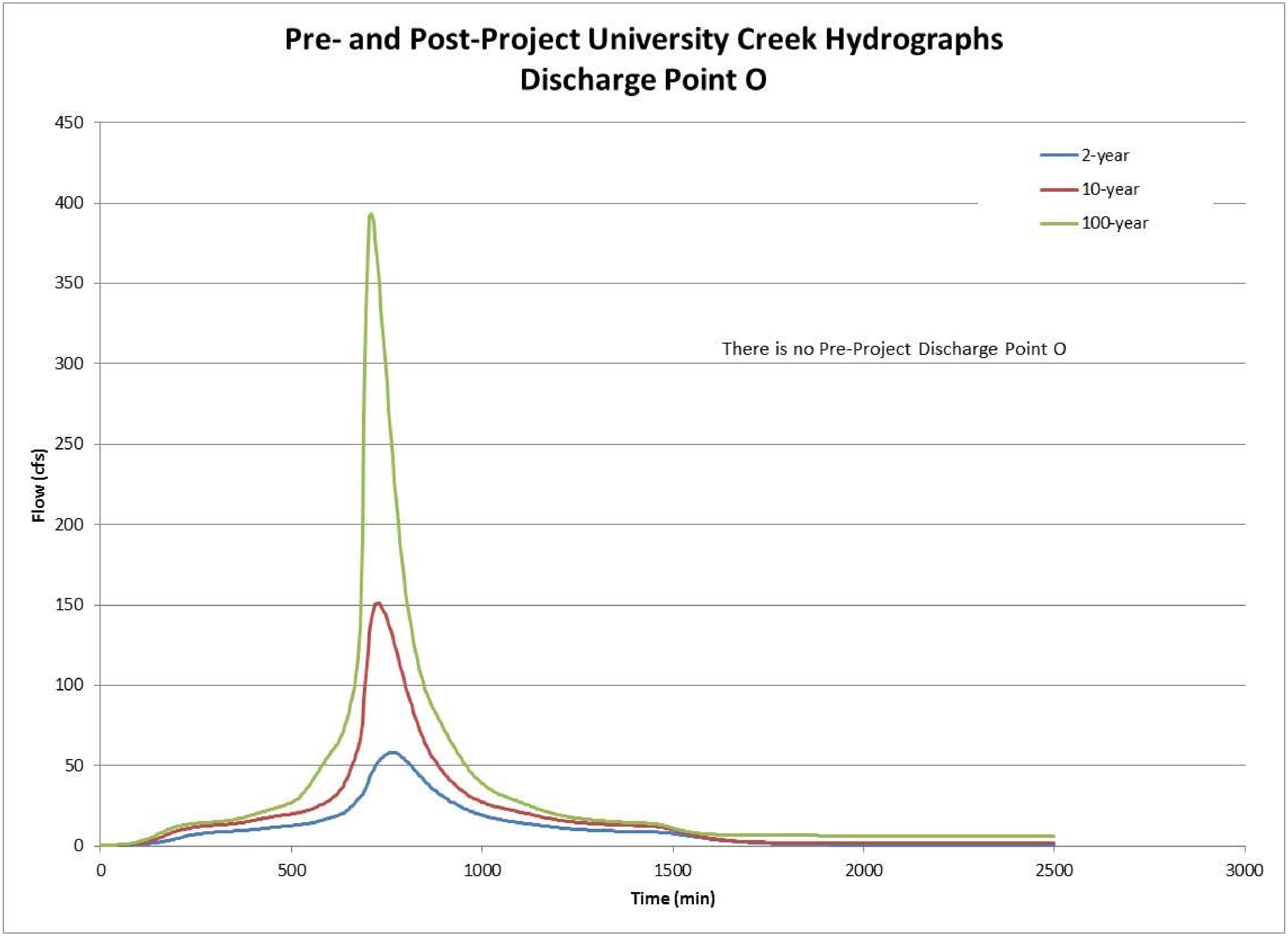
Pre- and Post-Project University Creek Hydrographs
Discharge Point J

There is no Post-Project Discharge Point J


Pre- and Post-Project University Creek Hydrographs
Discharge Point K
Flow (cfs)
1200
1000
800
600
400
200
0
0
500
1000
1500
2000
2500
3000
Time (min)
Pre-Project 2-year
Post-Project 2-year
Pre-Project 10-year
Post-Project 10-year
Pre-Project 100-year
Post-Project 100-year


Pre- and Post-Project Pleasant Grove Creek Hydrographs
Discharge Point M
6000
5000
4000
3000
2000
1000
0
Flow (cfs)
0
500
1000
1500
2000
2500
3000
Time (min)
Pre-Project 2-year
Post-Project 2-year
Pre-Project 10-year
Post-Project 10-year
Pre-Project 100-year
Post-Project 100-year


Pre- and Post-Project Pleasant Grove Creek Hydrographs
Discharge Point N
Flow (cfs)
Time (min)
0
1000
2000
3000
4000
5000
6000
7000
0
500
1000
1500
2000
2500
3000
Pre-Project 2-year
Post-Project 2-year
Pre-Project 10-year
Post-Project 10-year
Pre-Project 100-year
Post-Project 100-year


Pre- and Post-Project University Creek Hydrographs
Discharge Point O
450
400
350
300
250
200
150
100
50
0
Flow (cfs)
0
500
1000
1500
2000
2500
3000
Time (min)
2-year
10-year
100-year
There is no Pre-Project Discharge Point O

Kimley»Horn

2720 Gateway Oaks Drive, Suite 310
Sacramento, CA 95833
Phone: 916.858.5800

www.kimley-horn.com