APPENDIX J

GRADING AND DRAINAGE FEASIBILITY STUDY

GRADING AND DRAINAGE FEASIBILITY STUDY

Wilton Rancheria

ALTERNATE SITES
Twin Cities, Historic Rancheria and Mall

Prepared for:

Analytical Environmental Services (AES)
1801 7th Street, Suite 100
Sacramento, CA 95811

SUMMIT

CIVIL STRUCTURAL ELECTRICAL WATER|WASTEWATER

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STUDY OVERVIEW

This study describes the preliminary grading and drainage improvements associated with the Wilton Rancheria's application for a proposed casino or alternative development project to be located in Sacramento County. Potential project improvements include a casino, hotel, parking lots, roads and driveways, and shopping centers. The project location may occur at one of three sites: Twin Cities Site, Historic Rancheria Site, or Mall Site. There are six alternative project layouts: three at the Twin Cities Site, two at the Historic Rancheria Site, and one at the Mall Site.

This study examines the hydrologic impact of each alternative caused by the project improvements, as well as any impacts to the floodplain, where applicable, and the feasibility of mitigating these impacts according to the relevant regulatory requirements. Preliminary grading and drainage plans have been prepared for each alternative including the proposed mitigation measures that have been preliminarily sized to offset grading and drainage impacts (Appendix D). The following study has been separated into one section for each site.

SECTION 1 – TWIN CITIES SITE

INTRODUCTION

The Twin Cities Site is located along the west side of the Golden State Highway (SR 99) and directly east of the City of Galt's wastewater treatment plant (see Figure 1, Appendix A). It is accessed from West Stockton Boulevard. The site is approximately 282 acres and located within the City of Galt's Sphere of Influence as defined by the Sacramento Local Agency Formation Commission Resolution No. 2011-04-0119-06-09. The Twin Cities Site is not located within Sacramento County's Municipal Separate Storm Sewer System (MS4) permit boundary. Therefore, the project would be exempt from the County's hydromodification mitigation and stormwater treatment requirements. The project site, once transferred to federal trust, would be under the jurisdictional authority of the United States Environmental Protection Agency (USEPA) National Pollutant Discharge Elimination System (NPDES) stormwater program.

Three layout alternatives are proposed for the site, each encompassing approximately 76 acres of proposed development in the northern portion of the 282 acre site. Alternative A – Proposed Casino (Figure 3, Appendix C) includes a casino, hotel, paved parking lots, gravel festival grounds, gravel overflow parking, a wastewater treatment facility, stormwater detention ponds, and landscaping. Alternative B – Reduced Intensity Casino (Figure 4, Appendix C) includes the same features as Alternative A except a smaller casino and no hotel. Alternative C – Retail on Twin Cities Site (Figure 5, Appendix C) does not include a casino or a hotel, but rather a retail development including a grocery store, home improvement yard, restaurants, a gas station with car wash, retail stores, wastewater treatment facility, stormwater detention ponds, public parking, and landscaping.

The site is bounded by Laguna Creek to the north and a portion of the site is within the Federal Emergency Management Agency (FEMA) designated 100-year flood plain Zone A as shown on the Flood Insurance Rate Map (FIRM) entitled "Sacramento County, California and Incorporated Areas, map number 06067C0465H" (August 16, 2012, Appendix H). The building pads of Alternatives A, B and C are not located in the 100-year floodplain and no improvements are proposed within the floodplain. The

floodplain capacity would not be reduced if Alternative A, B or C is constructed. Therefore, floodplain encroachment will not be addressed for this site.

The preliminary grading and drainage improvement plans for all three alternatives (Figures 1, 2, and 3, Appendix D) include piping of a drainage channel flowing through the existing site, collection and conveyance of stormwater runoff from the proposed parking lots and buildings via drainage inlets and stormdrain pipes, two stormwater mitigation ponds (to be used for both water quality and hydromodification mitigation), one discharge location to a level spreader returning the runoff to sheet flow conditions and one discharge location to the existing drainage channel.

The preliminary grading plans incorporate fill in order to allow for stormwater runoff from the proposed improvements to drain via gravity towards the downstream stormwater mitigation ponds and existing drainage channel. The mitigation ponds were sized to attenuate the increase in runoff from the 85th percentile storm generated by the proposed project improvements. It is proposed that the design would include stormwater Best Management Practices (BMPs) such as bioswales and biostrips, and that the mitigation ponds will be vegetated to provide additional water quality treatment (pollutant removal) prior to being released to the downstream receiving water bodies: the drainage channel and adjacent Laguna Creek.

EXISTING SITE DESCRIPTION

The site is bounded to the east and west by SR 99 and the Union Pacific Railroad, respectively. Laguna Creek borders the site to the north. A portion of the site to the north is located within the FEMA 100-year floodplain for Laguna Creek. The site is flat with a general slope towards Laguna Creek to the north. A large drainage channel parallels the western side of the railroad outside of the site boundary. It receives effluent flow from the adjacent wastewater treatment facility. Two drainage channels flow across the site from east to west. They both flow under a railroad bridge before discharging into the large drainage channel that parallels the railroad. The southern channel turns into a pond prior to out-letting to the large channel to the west of the railroad. The site has been separated into multiple agricultural fields with elevated dirt roads separating the fields. The elevated roads act as berms for the fields to be flooded with irrigation water. The field to the north drains towards Laguna Creek. The fields in the middle of the site drain towards the adjacent drainage channels.

Stockton Boulevard is a frontage road along both the east and west sides of SR 99. A roadside ditch between Stockton Boulevard and the eastern boundary of the site conveys stormwater runoff from the frontage road towards Laguna Creek. Two 24 inch culverts allow water to pass under Highway 99 and Stockton Boulevard and into the northern drainage channel. Three 24 inch culverts convey water under Highway 99 and Stockton Boulevard and into the southern drainage channel. From Google Earth satellite imagery, it appears that the water in these drainage channels originates from irrigation and/or drainage channels along agricultural lands to the east of Highway 99. The highway spans two small bridges towards the north end of the site: one bridge allows a small drainage channel to outlet into the ditch that flows along Stockton Boulevard, and the second northernmost bridge spans Laguna Creek. Laguna Creek flows east to west at the north end of the site. Existing site conditions are shown in the Existing Hydrology Map (Figure 1, Appendix E).

FLOODPLAIN IMPACTS

The 100-year Zone A floodplain for Laguna Creek covers a portion of the site as shown on the FEMA FIRM (Appendix H). None of the alternatives, A, B, or C, propose development within the 100-year floodplain; therefore, no impact to the floodplain will occur and mitigation is not required. The preliminary grading and drainage plans for Alternatives A, B, and C show the limits of the 100-year floodplain (Appendix D).

STORMWATER HYDROLOGY

A hydrologic study was conducted for the 76 acres of proposed development in order to estimate the stormwater runoff generated from the 100-year, 24 hour storm for the Pre- and the Post-Construction condition for the three alternatives. The hydrologic study includes 76 acres of the 282 acre site as the undeveloped areas would remain in their existing condition. Hydrologic impacts for the Pre- and Post-Construction were analyzed according to the guidelines found in "Volume 2 of the Sacramento City/County Drainage Manual: Hydrology Standards" (December 1996) because this site is within Sacramento County. For master planning, the manual recommends following the Sacramento method using the SACPRE software. The Sacramento method uses the Bureau of Reclamation urban unit hydrograph as a basis for estimating runoff hydrographs and the SACPRE software was developed to process local hydrologic parameters and precipitation for input into U.S. Army Corps of Engineers, Flood Hydrograph program, HEC-1. Since the publishing of this manual, SACPRE software has been superseded by SacCalc. SacCalc is now the method prescribed by Sacramento County for estimating runoff hydrographs and was used for the purposes of this report.

The location of the site and review of the SacCalc software provides the following mathematic models and constant values used in the hydrologic analysis. All supporting information for the parameters given in this section can be found in Appendix B. Pre- and Post-Construction hydrology maps can be found in Appendix E, Figures 1, 2, 3 and 4.

<u>SacCalc</u>

Type of Storm Event	:	Design Storm
Storm Event	:	100-yr, 24-hr
Hydraulic Zone	:	2
Upstream Land Use	:	Open Space (Pre-Project Condition)

<u>NRCS Web Soil Survey</u>

Group Soil	:	Group Soil C – Low infiltration. Sandy clay loam. Infiltration rate 0.05 to 0.15 in/hr when wet Group Soil D – Very low infiltration. Clay loam, silty clay loam, sandy clay, silty clay, or clay. Infiltration rate 0 to 0.05 in/hr when wet.
Existing Land Use	:	Cultivated agriculture. Minor crop residue cover.
Proposed Land Use	:	Mix of lawn, grass, pasture and trees covering less than 50% of the open space.

Table 1 summarizes the hydrologic parameters for the existing site and the three proposed alternatives.

TABLE 1 – HYDROLOGIC PARAMETERS SUMMARY

Parameter	Existing Site	Alternative A	Alternative B	Alternative C
Impervious Area (acres)	0	63.4	62.6	59.2
Vegetated Area (acres)	76.0	12.6	13.4	16.8
Total Development Area (acres)	76.0	76.0	76.0	76.0
Percent Impervious (%)	0	83	82	78
Soil Group	C/D	C/D	C/D	C/D
Average Elevation (ft NAVD 88)	40	45	45	45
Slope (ft/ft)	0.003	0.01	0.01	0.01
Rainfall Zone	2	2	2	2

Given the above parameters, the 100-year, 24 hour storm was calculated using SacCalc software for the pre- and post-project conditions. The runoff in the post-project condition for each alternative was compared to the existing condition in order to calculate the increased runoff that would result from the proposed alternatives. Table 2 summarizes the existing, proposed, and increase in runoff for the three alternatives. SacCalc input and outputs for each alternative are included in Appendix F.

TABLE 2 – 100-YEAR STORMWATER RUNOFF

	Alternative A Peak Flow (cfs)	Alternative B Peak Flow (cfs)	Alternative C Peak Flow (cfs)
Existing Site	83	83	83
Post-Project	170	170	159
Difference	87	87	76

The scope of this feasibility study does not include a detailed offsite drainage study. In order to assess the feasibility of this site, we evaluated the stormwater limiting site constraints. Caltrans' primary concern is that development will not impede the discharge of their culverts. Due to the age of the culverts, Caltrans hydraulic studies are unavailable for the two existing 24-inch culverts that discharge onto the site. According to Caltrans District 3 Chief Hydraulic Engineer Dennis Jagoda, Caltrans standards allow culverts to be designed so that the headwater elevation of a 100-year storm is equal to the travel way or some other limit of objectionable backwater, such as the elevation of nearby properties. Based on existing conditions, this limit is assumed to be the point when water reaches Highway 99 without overtopping the road, a distance of approximately 2 feet above the top of the culverts. This leads to a 2-foot head for the water flowing through the culverts. Based on this assumption, Hydraflow Express was used to model the culverts. The approximate offsite flow that enters the site via the two existing 24 inch culverts is 51 cfs (Appendix F). It is possible that the existing culverts are undersized, and Caltrans recommends that if this site is chosen, a detailed offsite hydrology and hydraulic study be conducted.

Based on our design concept, the primary constraint that could limit discharge is where runoff leaves the site under a railroad bridge. In order to evaluate this constraint, flow under the railroad bridge was modeled as a rectangular channel using Hydraflow Express to verify it has sufficient capacity to handle the Post-Construction 100 year storm event (Appendix F). The rectangular channel measures approximately 12' X 4'. A Manning's n value of 0.024 was used to model the channel. We calculated the maximum flow capable of discharging under the railroad bridge and found it to be 420 cfs with one foot of freeboard. This is significantly more than the calculated combined offsite and onsite post construction discharge. It was determined that the channel under the railroad bridge has capacity to handle the increase in runoff from post development conditions. Additional discharge storage is available in the onsite stormwater ponds and swales.

STORMWATER DETENTION (HYDROMODIFICATION MITIGATION)

As determined in the section above, all three alternatives for the Twin Cities Site will result in an increase in runoff. This is due to the added impermeable surfaces, resulting in more runoff and a change in the hydrograph for a given watershed. The modification of the hydrograph between the pre and post-project condition is known as hydromodification. Hydromodification can be mitigated by detaining the stormwater (and reducing the peak runoff rate) to that of existing site conditions or infiltrating the stormwater so that the runoff volume is the same in the post-project condition as in the existing condition. This site falls outside of Sacramento County's MS4 permit boundary (Figure 3-7, Applicability Map, from Sacramento Stormwater Quality Partnership Hydromodification Management Plan, February 14, 2013). Therefore, hydromodification mitigation parameters were selected using the State Water Resources Control Board's (SWRCB) Post-Construction Standards to offset the impacts of the development.

The preliminary design includes mitigation of the 85th percentile storm event per the SWRCB Post-Construction Standards. This means the stormwater runoff volume in the post-project condition matches that of the existing site condition for the 85th percentile storm. The SWRCB Post-Construction Standards provide a Post-Construction Water Balance Performance Standard Spreadsheet (Appendix G) for calculating the increase in runoff caused by the proposed project improvements for the 85th percentile storm event.

Input parameters for the spreadsheet include project location, soil type, existing and proposed pervious land use type, project area and impervious areas. Spreadsheets for each alternative are included in Appendix G. More permeable soils have less runoff in a pre-project condition. In the post-project condition this translates to a larger change in volume between pre and post-project runoff on a site with more permeable soils. Alternatives A, B, and C encompass soil types C and D, therefore the Post-Construction calculator was used to evaluate both soil types and the average volume was used. The results of the spreadsheet are summarized in Table 3 below.

TABLE 3 – 85TH PERCENTILE STORMWATER RUNOFF

	Runoff Volume to Mitigate (acre-feet)
Alternative A	0.88
Alternative B	0.88
Alternative C	0.60

In order to mitigate the increase in runoff volume, two stormwater detention ponds are proposed for each alternative. The 11 acre-feet of stormwater pond volume detains the increase in runoff from the 85th percentile. Stormwater runoff that does not drain to these ponds can be controlled with underground detention such as oversized storm drain piping or detention structures with controlled outlets. The pond and underground detention devices will result in the reduction of the runoff from the 85th percentile storm in the post-project site to that of the pre-project runoff volume. The proposed stormwater detention pond and drainage improvements can be seen in the Preliminary Grading and Drainage Plans (Figures 1, 2, and 3, Appendix D). The stormwater detention ponds and underground detention systems would be designed in further detail if one of the alternatives at the Twin Cities Site is selected.

DRAINAGE AND GRADING IMPROVEMENTS

Construction of proposed development Alternatives A, B, or C will require the construction of storm drainage improvements. Preliminary grading and drainage plans for Alternatives A, B, and C are included in Appendix D, Figures 1, 2, and 3, and are described in the sections below. The preliminary grading and drainage design was based on contours extracted from Google Earth software. The level of accuracy was assumed to be sufficient for the purpose of this study. If one of the Alternatives at the Twin Cities site is selected, a detailed topographic survey should be conducted prior to detailed grading and drainage design.

BUILDING AND PARKING LOT GRADING AND DRAINAGE

The paved parking lots will have a series of drain inlets and vegetated bioswales that are connected to a stormwater conveyance system. The pipes will be sized to convey the 100 year flow. The pipes are routed to either a detention basin or the culverts that run underneath the site as shown on the preliminary grading and drainage plans (Appendix D, Figures 1, 2, and 3) and as described below.

The preliminary grading plans incorporate fill in order to allow stormwater runoff from the proposed improvements to drain via gravity towards the downstream stormwater mitigation ponds and existing channel. Preliminary calculations were conducted to determine the amount of earthwork required for each alternative based on the preliminary grading and drainage plans. It is anticipated that approximately 640,000 cubic yards of fill would be necessary to construct Alternative A, approximately 570,000 cubic yards of fill would be necessary to construct Alternative B, and approximately 270,000 cubic yards of fill soil would be necessary to construct Alternative C. Detailed calculations of earthwork quantities should be determined by the contractor based on detailed grading design. Approximately 16,000 cubic yards of fill soil may be available from excavation of the detention basins, therefore additional material would need to be imported from offsite or excavated from other locations on the

property. These fill volumes represent the worst case scenario. To reduce fill volumes other options may include installing a pump station to pump stormwater across the site or reconfiguring the design to drain to Laguna Creek. Depending on the type of soil, a Geotechnical Engineer would determine if native soils can be used or if select fill will be required.

DRAINAGE OUTLETS

The existing open northern drainage channel running through the site is proposed to be rerouted into two new stormdrain culverts for Alternatives A and B, and three new stormdrain culverts for Alternative C. The culverts will be sized to convey the 100 year storm and will outfall into a section of the existing channel along the western border of the site. This existing channel flows offsite to the west under a railroad bridge and merges with a larger channel. (Figure 1, Appendix E). Filling and rerouting the existing channel could require a Section 404 permit from the U.S. Army Corps of Engineers (USACOE). A 401 water quality certification from the USEPA could be triggered by a Section 404 permit. Offsite drainage that currently discharges to the existing open channel will be routed through the site via the new culverts as shown on the preliminary grading and drainage plans (Figures 1, 2, and 3, Appendix D). This will allow discharge from the existing culverts under Highway 99 to not be impeded by future development. Existing channels along Stockton Boulevard left in place will have their banks reseeded or replanted with native vegetation.

Alternatives A, B, and C propose one new discharge point north of the site for discharge to a vegetated bioswale and level spreader for overland flow release, which would sheet flow into Laguna Creek. Onsite stormwater runoff that is not discharged from a level spreader in Alternatives A and B will be routed to the new culverts crossing the site via a vegetated stormwater pond or via a vegetated swale as shown on the preliminary grading and drainage plans (Figures 1, 2, Appendix D). Onsite stormwater runoff that is not discharged from the level spreader in Alternative C will either be routed to the new culverts crossing the site via a vegetated stormwater pond or via a vegetated swale or it will be released to overland flow after receiving treatment via vegetated biostrips as shown on the preliminary grading and drainage plans (Figure 3, Appendix D). The best available and practicable means of minimizing adverse impacts of any discharges will be utilized.

DETENTION BASINS

Two stormwater detention basins are proposed for Alternatives A, B, and C. See Appendix D, Figures 1, 2, and 3 for preliminary location and size of the basins. Both proposed stormwater detention ponds are three feet deep with a bottom elevation of 40.0 feet. The detention basin located on the southeast corner of the site is designed to hold 8 acre-feet and the detention basin located on the northeast corner of the site is designed to hold 3 acre-feet of runoff. These detention basins are preliminarily sized to offset the development impacts and will have metered outlets to control the rate of discharge. The 11 acre-feet of proposed basins are sized to offset more than the increase in runoff from the 85th percentile storm, stated in Table 3. Each basin will have an overflow outlet capable of discharging larger storm events up to the 100 year flow. The basin in the southeast corner will discharge to the proposed culverts flowing under the site. The basin in the northeast corner will discharge to a vegetated swale and a level spreader that releases runoff to overland flow into Laguna Creek.

STORMWATER TREATMENT

Best Management Practices (BMPs) are mitigation measures set in place to reduce pollutants in stormwater discharges leaving the project site. For any of the alternatives at the Twin Cities Site, stormwater treatment BMPs should be in place both during construction (temporary BMPs and erosion control measures) and after construction (post-construction or permanent BMPs).

CONSTRUCTION BMPS

All three alternatives at this site would disturb over 1 acre of land, therefore the preparation of a Storm Water Pollution Prevention Plan (SWPPP) is required. A Notice of Intent (NOI) should be filed with USEPA and a SWPPP for the construction activity associated with the project. A stormwater pollution management plan will be developed as part of the SWPPP, detailing the site BMPs to be used during construction. Examples of temporary BMPs include fiber rolls, silt fencing, and stabilized construction entrances/exits.

POST-CONSTRUCTION BMPS

Post-Construction BMPs, or permanent BMPs, will be put in place to offset proposed development impacts. Preliminary design BMPs include bioswales and biostrips, infiltration trenches, oil/water separators, covered trash receptacles and media filters. The oil/water separators will be in place to mitigate run off from parking lots and loading docks. The stormwater detention basins for this site should also be vegetated, which will act as a post-construction BMP, reducing pollutants in stormwater from lower frequency storm events. Preliminary post-construction BMPs are shown on Figures 1, 2 and 3 (Appendix D). Runoff from the proposed development for Alternatives A, B and C is not expected to adversely impact electrical conductivity, temperature, and dissolved oxygen in Laguna Creek based on the proposed BMPs that will help reduce pollutants in the Project's runoff.

SUMMARY

The impacts associated with constructing each of the alternatives at the Twin Cities Site have been evaluated along with recommended mitigation. Construction at the site would result in an increase of impervious area, which would result in an increase in stormwater runoff. Mitigation measures will include the construction of stormwater detention basins, bioswales, biostrips and other BMPs designed to slow the runoff and allow time for infiltration, and to reduce pollutants.

The existing stormwater channel that allows offsite drainage to cross the site will need to be addressed and may be rerouted through underground pipes, which may trigger a 401 certification. These pipes could discharge into a portion of the channel that is left in place on the western boundary of the site. This would allow drainage to continue to discharge offsite to a larger channel to the west as it currently does.

The proposed improvements at the Twin Cities Site do not include building within the 100-year floodplain. Therefore, no floodplain encroachment mitigation is required. The finished grades will be higher than existing grades, in order to accommodate drainage requirements. All of the alternatives would require fill. Some material may be available from the excavation of stormwater detention ponds; however, additional material would be necessary. This additional material may be excavated from other locations on the property or imported from offsite, depending on the input and review of the soils by a Geotechnical Engineer.

SECTION 2 – HISTORIC RANCHERIA SITE

INTRODUCTION

The Historic Rancheria Site is approximately 75 acres and located east of Wilton Road on Green Road. Wilton Road is between Grant Line Road and Dillard Road, east of Highway 99 (see Figure 2, Appendix A). The Historic Rancheria Site is located in Sacramento County; however it is not located within Sacramento County's MS4 Permit boundary. Therefore, the project is exempt from the County's hydromodification mitigation and stormwater treatment requirements. The project site, once transferred to federal trust would be under the jurisdictional authority of the USEPA NPDES stormwater program.

Two layout alternatives are proposed for the site, each encompassing approximately 65 acres of proposed development in the same general region of the 75-acre site. Alternative D – Casino at Rancheria Site (Figure 6, Appendix C) includes a casino, hotel, multi-level parking structure, paved parking lots, gravel festival grounds, a wastewater treatment facility, stormwater detention ponds, and landscaping. Alternative E – Reduced Intensity Casino at Rancheria Site (Figure 7, Appendix C) includes the same features as Alternative D, except a smaller casino and no hotel.

The site is bounded by Cosumnes River to the north, Green Road to the south, and rural residential properties to the east and west. The proposed building locations for Alternatives D and E are located within the FEMA designated 100-year floodplain Zone AE of the Cosumnes River as shown on the FEMA FIRM entitled "Sacramento County, California and Incorporated Areas, map number 06067C0345H" (August 16, 2012, Appendix H). Floodplain encroachment for this site is addressed later in this section.

The preliminary grading and drainage improvement plans for both alternatives (Figures 4 and 5, Appendix D) include collection and conveyance of stormwater runoff from the proposed parking lots, multi-level parking structure, and buildings via drainage inlets and stormdrain pipes, one stormwater mitigation pond (to be used for both water quality and hydromodification mitigation) and two floodplain mitigation ponds.

The preliminary grading plans incorporate fill in order to elevate the finished floor of the buildings above the 100-year base flood elevation (BFE) for Cosumnes River. The proposed grading design allows stormwater to drain by gravity towards the downstream stormwater mitigation pond and floodplain mitigation ponds. The ponds were sized to attenuate the increase in runoff from the 85th percentile storm generated by the project improvements in accordance with NPDES General Permit requirements and to offset the increased fill volume from constructing buildings within the floodplain. In addition to local stormwater BMPs such as bioswales and biostrips, the ponds will be vegetated to provide additional water quality treatment (pollutant removal) prior to being released to the downstream receiving water body: the Cosumnes River and the drainage ditch along the southern edge of the property.

EXISTING SITE DESCRIPTION

The site encompasses four rural residential parcels. There are existing buildings on the property that would be removed if either of these alternatives are selected. As mentioned above, the site is located within the FEMA 100-year floodplain for Cosumnes River. Existing site conditions are shown in the

Existing Hydrology Map (Figure 5, Appendix E). There is a berm along the southern side of the Cosumnes River.

The site has gentle rolling topography with a cross slope of approximately one percent. There is a high point on Green Road that coincides with the location of an existing driveway for the existing property between Danlar Court and Randolph Road. There is a 24 inch culvert located west of the driveway. Immediately east of the driveway is a double culvert crossing with 24 inch and 18 inch corrugated metal pipes (CMPs). Two existing stock ponds on the east side of the parcel are hydraulically connected and drain southward into the double culvert to the east of the driveway. The 24 inch and 18 inch CMPs collect stormwater from the existing site, cross under Green Road and appear to drain into a channel running east to west along Green Road and to a channel on the property south of the site.

FLOODPLAIN IMPACTS

The proposed building locations for Alternatives D and E are located in the 100 year floodplain Zone AE of the Cosumnes River as shown on the FEMA FIRM (see Appendix H). The site is located between two BFE lines: 83 feet, northeast of the site, and 78 feet, southwest of the site. Through linear interpolation, the BFE at the site was determined to be 80.4 feet in elevation (see Appendix H). Floodwaters travel from northeast to southwest through the site.

The Sacramento County Department of Water Resources regulates construction of buildings within floodplains. The Sacramento County Department of Water Resources requires the finished floor elevations to be 18 inches above the BFE. A finished floor elevation of 82.0 feet is proposed for the potential buildings and wastewater treatment facility at the site, 18 inches above the BFE. An elevation of 82.0 feet is approximately ten feet above the existing grade. The parking lots and structures are not required to be above the BFE. In order to offset the fill required to elevate the building and wastewater treatment facility and additional site grading, ponds of equivalent total volume were designed. The ponds would additionally mitigate the decrease in flood volume storage due to building in the floodplain. AutoCAD Civil 3D was used to model the raised building and calculate a fill volume. Table 4 reflects fill and flood pond offset volumes for each alternative. The preliminary grading and drainage plans (Appendix D) for Alternatives D and E reflect ponds sized to offset the fill within the floodplain. Development within the floodplain may require a detailed floodplain study and a Letter of Map Revision from FEMA acknowledging the changes resulting from proposed improvements within the floodplain.

TABLE 4 – FLOODPLAIN ENCROACHMENT

Alternative	Fill Volume (acre-feet)	Pond Offset Volume (acre-feet)
D	130	139
E	110	114

The effects of constructing either Alternatives D or E in the floodplain were preliminarily analyzed to evaluate the impact to the 100 year hydraulic grade line (HGL) or water surface elevation of the Cosumnes River. In 1998, the United States Geological Survey (USGS) conducted a study of the Cosumnes River to determine flood flows (Flood-Inundation Map and Water-Surface Profiles for Floods of Selected Recurrence Intervals, Cosumnes River and Deer Creek, Sacramento County, California; Guay,

J., Harmon, J., and McPherson, K; USGS, 1998). The 100 year flow in the Cosumnes River at Wilton Bridge, which is approximately three-quarters of a mile downstream of the site, is 89,500 cubic feet per second (cfs). A pre- and post-construction cross section across Cosumnes River and the site was modeled in Hydraflow Express for Alternatives D and E for both flood offset ponds. Hydraflow Express is a one dimensional model that looks at a single cross section and does not incorporate upstream or downstream flow conditions. The Hydraflow Express model uses Manning's Equation to determine water surface elevation and velocity given a known flow rate and channel cross section. See Table 5 and Appendix H for location of cross sections and modeling results.

TABLE 5 – CHANGES TO HYDRAULIC GRADE LINE

Alternative	Change in water surface elevation (ft)	Change in average velocity (ft/s)	Change in flow area (ft^2)
D – cross section 1	-3.38	+4.0	-2900
D – cross section 2	0	0	0
E – cross section 1	-3.10	+3.6	-2700
E – cross section 2	0	0	0

The decrease in water surface elevation is due to modeling the flood offset ponds. Since the ponds are offsetting the development within the floodplain, it is feasible that the water surface elevation could be lowered. However, if the Historic Site is selected for the proposed project, a detailed analysis should be performed using an unsteady model such as HEC-RAS.

STORMWATER HYDROLOGY

A hydrologic study was conducted in order to estimate the stormwater runoff generated from the 100-year, 24 hour storm for the Pre- and the Post-construction condition for the two alternatives. The hydrologic study includes 65 acres of the 75 acre site, as the undeveloped areas would remain in their existing condition. Hydrologic impacts for the Pre- and Post-Construction were analyzed according to the guidelines found in "Volume 2 of the Sacramento City/County Drainage Manual: Hydrology Standards" (December 1996) because this site is within Sacramento County. For master planning, the manual recommends following the Sacramento method using the SACPRE software. The Sacramento method uses the Bureau of Reclamation urban unit hydrograph as a basis for estimating runoff hydrographs and the SACPRE software was developed to process local hydrologic parameters and precipitation for input into U.S. Army Corps of Engineers, Flood Hydrograph program, HEC-1. Since the publishing of this manual, SACPRE software has been superseded by SacCalc. SacCalc is now the method prescribed by Sacramento County for estimating runoff hydrographs and was used for the purposes of this report.

The location of the site and review of the SacCalc software provides the following mathematic models and constant values used in the hydrologic analysis. All supporting information for the parameters given in this section can be found in Appendix B. Pre- and Post-Construction hydrology maps can be found in Appendix E, Figures 5, 6, and 7.

SacCalc

Type of Storm Event	:	Design Storm
Storm Event	:	100-yr, 24-hr
Hydraulic Zone	:	2
Upstream Land Use	:	Open Space (Pre-Project Condition)

NRCS Web Soil Survey

Group Soil	:	Group Soil A – High infiltration. Sand, loamy sand or sandy loam. Infiltration rate > 0.3in/hr when wet Group Soil C – Low infiltration. Sandy clay loam. Infiltration rate 0.05 to 0.15 in/hr when wet.
Existing Land Use	:	Open space. Grass cover > 70%.
Proposed Land Use	:	Mix of lawn, grass, pasture and trees covering less than 50% of the open space.

Table 6 summarizes the hydrologic parameters for the existing site and the two proposed alternatives.

TABLE 6 – HYDROLOGIC PARAMETERS SUMMARY

Parameter	Existing Site	Alternative D	Alternative E
Impervious Area (acres)	1.2	41.8	38.8
Vegetated Area (acres)	63.6	23.0	26.0
Total Development Area (acres)	64.8	64.8	64.8
Percent Impervious (%)	2	65	60
Soil Group	A/C	A/C	A/C
Average Elevation (ft NAVD 88)	75	82	82
Slope (ft/ft)	0.02	0.01	0.01
Rainfall Zone	2	2	2

Given the above parameters, the 100-year, 24 hour storm was calculated using SacCalc software for the pre- and post-project conditions. The runoff in the post-project condition for each alternative was compared to the existing condition in order to calculate the increased runoff that would result from the proposed alternatives. Table 7 summarizes the existing, proposed, and increase in runoff for the three alternatives. SacCalc input and outputs for each alternative are included in Appendix F.

TABLE 7 – 100-YEAR STORMWATER RUNOFF

	Alternative D Peak Flows (cfs)	Alternative E Peak Flows (cfs)
Existing Site	137	137
Post-Project	150	148
Difference	13	11

STORMWATER DETENTION (HYDROMODIFICATION MITIGATION)

Both alternatives for the Historic Rancheria Site will result in an increase in stormwater runoff. This site falls outside of Sacramento County's MS4 permit boundary (Figure 3-7, Applicability Map, from Sacramento Stormwater Quality Partnership Hydromodification Management Plan, February 14, 2013). Therefore, hydromodification mitigation parameters were selected using the SWRCB's Post-Construction Standards to offset the impacts of the development.

The preliminary design includes mitigation of the 85th percentile storm event per the SWRCB Post-Construction Standards. This means the stormwater runoff volume in the post-project condition matches that of the existing site condition for the 85th percentile storm. The SWRCB Post-Construction Standards provide a Post-Construction Water Balance Performance Standard Spreadsheet (Appendix G) for calculating the increase in runoff caused by the proposed project improvements for the 85th percentile storm event.

Input parameters for the spreadsheet include project location, soil type, existing and proposed pervious land use type, project area and impervious areas. Spreadsheets for each alternative are included in Appendix G. More permeable soils have less runoff in a pre-project condition. In the post-project condition this translates to a larger change in volume between pre and post-project runoff on a site with more permeable soils. In the post-project condition this translates to a larger volume of post-project runoff on a site with more permeable soils. Alternatives D and E encompass soil types A and C, therefore the Post-Construction calculator was used to evaluate both soil types and the average volume was used.

Input parameters for the spreadsheet include project location, soil type, existing and proposed pervious land use type, project area and impervious areas. Spreadsheets for each alternative are included in Appendix G. The results of the spreadsheet are summarized in Table 8 below.

TABLE 8 – 85TH PERCENTILE STORMWATER RUNOFF

	Runoff Volume to Mitigate (acre-feet)
Alternative D	4.20
Alternative E	4.01

As shown in the above table, both alternatives for the Historic Rancheria Site will result in an increase in runoff volume for the 85th percentile storm event. In order to mitigate the increase in runoff volume, a stormwater detention pond is proposed for both alternatives. The pond was sized to detain the runoff

from the 85th percentile storm. Stormwater runoff that does not drain to these ponds will be controlled with underground detention such as oversized storm drain piping or detention structures with controlled outlets. The ponds and underground detention devices will result in the reduction of the runoff from the 85th percentile storm in the post-project site to that of the pre-project runoff volume. The proposed stormwater detention ponds and drainage improvements can be seen in the Preliminary Grading and Drainage Plans (Figures 4 and 5, Appendix D). The stormwater detention ponds and underground detention systems would be designed in further detail if one of the alternatives at the Historic Rancheria is selected.

DRAINAGE AND GRADING IMPROVEMENTS

Construction of proposed development Alternatives D or E will require the construction of storm drainage improvements. Preliminary grading and drainage plans for Alternatives D and E are included in Appendix D, Figures 4 and 5 and are described in the sections below. The preliminary grading and drainage design was based on contours extracted from Google Earth software. The level of accuracy was assumed to be sufficient for the purpose of this study. If one of the Alternatives at the Historic Rancheria site is selected, a detailed topographic survey should be conducted prior to detailed grading and drainage design.

BUILDING AND PARKING LOT GRADING AND DRAINAGE

The paved parking lots will have a series of drainage inlets that are connected to a stormdrain conveyance system. The pipes will be sized to convey the 100 year flow and are routed to either the flood offset basin or the stormwater detention basin as shown on the preliminary grading and drainage plans (Appendix D, Figures 4 and 5) and as described below.

The preliminary grading plans incorporate fill necessary to elevate the building and wastewater treatment facility above the BFE. The preliminary grading design allows stormwater runoff from the proposed improvements to drain by gravity towards a stormwater mitigation pond and an existing ditch north of Green Road. Preliminary calculations were conducted to determine the amount of earthwork required for each alternative based on the preliminary grading and drainage plans. It is anticipated that approximately 210,000 cubic yards of fill is necessary to construct Alternative D. This would be offset by approximately 233,000 cubic yards of excavated soil for the flood offset and stormwater ponds. Using a shrinkage factor of 10%, there is a net cut and fill of zero. It is anticipated that approximately 177,000 cubic yards of fill is necessary to construct Alternative E. This would be offset by approximately 197,000 cubic yards of excavated soil for the flood offset and stormwater ponds. Using a shrinkage factor of 10%, there is a net cut and fill of zero. Detailed calculations of earthwork quantities should be determined by the contractor based on detailed grading design. It is not anticipated that additional fill material would be necessary from offsite borrow locations unless the excavated flood basin material is not suitable for construction. It is outside the scope of this analysis to determine if the onsite soil material is suitable for construction. Depending on the type of soil, a Geotechnical Engineer would determine if native soils can be used or if select fill will be required.

DRAINAGE OUTLETS

The stormdrain conveyance pipes and ditches will be sized to convey the 100 year storm. The stormdrain networks will outfall to the stormwater detention basin. The stormwater detention basin will discharge to an existing drainage channel along the southern edge of the property that runs east to west

to the south of Green Road. The channel will need to be improved in order to convey the 100 year storm, however as discussed in the floodplain study section of this report, flooding is expected to occur during a 100 year storm. The scope of this feasibility study did not include a detailed offsite drainage study, however, a detailed study is recommended in order to determine the capacity of existing offsite stormdrain infrastructure.

Runoff or floodwater that is conveyed to the southern flood offset basin will discharge to the existing drainage channel along Green Road. Runoff or floodwater that is conveyed to the northern flood offset basin will be pumped to one of two metered discharge options. Option one is to pump into the Cosumnes River and option two is to pump to the southern boundary of the property for discharge into the existing drainage channel along Green Road. If option one is chosen, an NPDES permit will be required for a point source discharge into the Cosumnes River.

FLOOD POND PUMPS SECTION

The soils in the region of the proposed floodplain mitigation ponds at the site were found to be Type B with a saturated hydraulic conductivity of 0.12 inches per hour at a depth of six feet (slightly deeper than the proposed pond cut depth) according to the NRCS Web Soil Survey (Appendix B). Using the saturated hydraulic conductivity as an approximate infiltration rate, a portion of the floodwaters would infiltrate into the ground. Pumps were sized to discharge the remaining floodwaters that would not be infiltrated over the course of five days in order to reestablish flood volume capacity. Vector control concerns should be minimal during the time of year when flooding typically occurs. It is recommended that each option have an additional pump on stand-by in case one of the operating pumps requires offline maintenance. The following table summarizes the preliminary recommendations for proposed pumps for each alternative and each option.

TABLE 9 – HYDROLOGIC PARAMETERS SUMMARY

Parameter	Alternative D – Option 1	Alternative D – Option 2	Alternative E – Option 1	Alternative E – Option 2
Pond Volume (ac-ft)	115	115	90	90
Pumping Rate (gpm)	4,500	4,500	3,600	3,600
Number of Operating Pumps	2	1	2	1
Total Dynamic Head (ft)	15-30	70-90	25-35	50-70
Outlet Location	Cosumnes River	Ditch @ Green Road	Cosumnes River	Ditch @ Green Road
Pipe Length (ft)	120	1500	120	1500
Pipe Size (in)	(2) 10	12	(2) 8	12

DETENTION BASINS

A stormwater detention basin is proposed for Alternatives D and E. See Appendix D, Figures 4 and 5 for preliminary location and size of the basin. The stormwater detention basin located on the southeast

corner of the site is designed to hold 6 acre-feet. This stormwater detention pond is seven feet deep with a bottom elevation of 69.0 feet. This detention basin was preliminarily sized to offset the development impacts and will have a metered outlet to control the rate of discharge. The 6 acre-feet of proposed basin would offset the increase in runoff from the 85th percentile storm. The detention basin will have an overflow outlet capable of discharging the 100 year flow. There are two flood offset basins for Alternative D. The northern flood offset basin is 115 acre-feet and the southern flood offset basin is 24 acre-feet. There are two flood offset basins for Alternative E. The northern flood offset basin is 90 acre-feet and the southern flood offset basin is 24 acre-feet. Both northern ponds will be approximately seven feet deep. The northern flood offset pond for Alternative D will have a bottom elevation of 65.5 feet and a bottom elevation of 66.0 feet for Alternative E. The southern pond, which is the same for Alternative D and E, will be approximately six feet deep and will have a bottom elevation of 78.5 feet. The stormwater detention basin will discharge to an existing drainage channel along the southern edge of the property. Outflow from the northern flood offset basin will be pumped either into the Cosumnes River or to the drainage channel along Green Road as discussed in the Drainage Outlets section above. Outflow from the southern flood offset basin will discharge to the existing drainage channel along Green Road as discussed in the Drainage Outlets section above.

STORMWATER TREATMENT

For either of the alternatives at the Historic Rancheria Site, stormwater treatment BMPs should be in place both during construction (temporary BMPs and erosional control) and after construction (post-construction permanent BMPs).

CONSTRUCTION BMPS

Both alternatives at this site would disturb over 1 acre of land, therefore the preparation of a SWPPP is required. A NOI should be filed with USEPA and a SWPPP for the construction activity associated with the project. A stormwater pollution management plan will be developed as part of the SWPPP, detailing the construction site BMPs to be used during construction. Examples of BMPs include fiber rolls, silt fencing, and stabilized construction entrances/exits.

POST-CONSTRUCTION BMPS

Post-Construction BMPs, or permanent BMPs will be put in place to offset development impacts. Preliminary design BMPs include biostrips, infiltration trenches, oil/water separators, covered trash receptacles and media filters. The oil/water separators will be in place to mitigate runoff from parking lots and loading docks. The stormwater detention basins for this site should also be vegetated, which will act as a post-construction BMP, reducing pollutants in stormwater from lower frequency storm events.

SUMMARY

The impacts associated with constructing either alternative at the Historic Rancheria Site have been evaluated along with recommended mitigations. Construction at the site would result in an increase of impervious area, which would result in an increase in stormwater runoff. Mitigation measures will include the construction of stormwater detention basins, biostrips and other BMPs designed to slow the

runoff and allow time for infiltration. Stormwater runoff will be treated using permanent BMPs designed to reduce pollutants.

The proposed improvements at the Historic Rancheria Site include building in the 100-year floodplain. This requires elevating the building(s) and wastewater treatment facility 18 inches above the BFE, which requires adding fill in the floodplain. It is possible that the material required to elevate the building finished floors could be obtained from the excavated flood offset pond if a Geotechnical Engineer determines that the native soils are suitable for reuse on the property. Alternative D requires approximately 139 acre-feet of flood storage and Alternative E requires approximately 114 acre-feet of flood storage. Discharge from the northern flood offset pond may require pumps to discharge either to Cosumnes River or the drainage channel along Green Road. Discharge to Cosumnes River will require an NPDES permit for point source discharge. Discharge to the drainage channel along Green Road will require a detailed analysis of the capacity of the swales and downstream conveyance structures.

SECTION 3 – MALL SITE

INTRODUCTION

The Mall Site is approximately 28 acres and located off of the Grant Line Road/Kammerer Road exit on Highway 99 in the City of Elk Grove, Sacramento County (see Figure 3, Appendix A). Since the site is located within Sacramento County's MS4 permit boundary, the project would be designed to meet the MS4 permit requirements. The MS4 permit regulates hydromodification mitigation and stormwater treatment. The project site, once transferred to federal trust would be under the jurisdictional authority of the USEPA NPDES stormwater program.

Alternative F is the only alternative at the Mall Site, encompassing approximately the entire site. This alternative proposes a casino, hotel, paved parking lots, and landscaping (Figure 8, Appendix C). The site is on a partially developed mall facility (Lent Ranch Mall) which includes existing parking lots, major utilities, and partially constructed buildings. The site is bounded by Promenade Parkway to the west, Highway 99 to the east and Grant Line Road to the south.

The preliminary grading and drainage improvement plan for this alternative (Figure 6, Appendix D) includes collection and conveyance of stormwater runoff from the proposed parking lots and buildings via drainage inlets and storm drain pipes and proposes tying into an existing 48 inch storm drain in Bilby Road. The 48 inch storm drain travels across Promenade Parkway and upsizes to a 72 inch storm drain, which ultimately outfalls into the existing stormwater mitigation basin directly west of the site. Runoff from the existing mall site development, including the proposed development site, currently drains to this stormwater mitigation basin.

EXISTING SITE DESCRIPTION

The Mall site is bordered to the east and west by Promenade Parkway and Highway 99, respectively. The site is on the existing Lent Ranch Mall development and is bordered to the south by a portion of the existing development. Lent Ranch Mall was partially constructed in 2008, but never completed. The site includes paved parking lots, partially constructed buildings, grassy fields, and a large storm drain network sized for future connection. The site is flat, with existing parking lots and fields graded to drain towards existing storm drain inlets.

A storm drain trunk line (ranging from 48 to 66 inches in diameter) travels along Promenade Parkway, which has smaller laterals at each roadway intersection, including a 48 inch pipe at Bilby Road, adjacent to the project site. At the intersection of Bilby Road and Promenade Parkway, a 72 inch storm drain heads west along Bilby Road, conveying the stormwater from the Mall Site towards an existing stormwater treatment and detention basin, which is 79 acre-feet in volume. Existing site conditions are shown in the Preliminary Grading and Drainage Plan (Figure 6, Appendix D).

DRAINAGE AND GRADING IMPROVEMENTS

Construction of proposed development Alternative F will require the construction of storm drainage improvements. Preliminary grading and drainage plans for Alternative F are included in Appendix D, Figure 6 and are described in the sections below. The preliminary grading and drainage design was

based on contours extracted from Google Earth software. The level of accuracy was assumed to be sufficient for the purpose of this study. If the Alternative at the Mall site is selected, a detailed topographic survey should be conducted prior to detailed grading and drainage design.

BUILDING AND PARKING LOT GRADING AND DRAINAGE

The paved parking lots are proposed to have a series of drainage inlets that are connected to a storm drain conveyance system, with pipes sized to convey the 100 year flow. The proposed storm drain network will be connected to the existing storm drain network as shown on the preliminary grading and drainage plans (Appendix D, Figures 6). The existing storm drain network is routed to an existing offsite stormwater detention basin half a mile west of the site. Runoff from buildings will be collected via downspouts that are directly connected to storm drain conveyance pipes.

The preliminary grading design allows stormwater runoff from the proposed improvements to drain by gravity towards drain inlets that tie into the existing stormdrain network. Preliminary calculations were conducted to determine the amount of earthwork required for Alternative F based on the preliminary grading and drainage plans. It is anticipated that approximately 7,000 cubic yards of fill will be necessary to construct Alternative F. Detailed calculations of earthwork quantities should be determined by the contractor based on detailed grading design. It is likely that fill material would need to be imported from offsite or excavated from other locations on the property. It is outside the scope of this analysis to determine if the onsite soil material is suitable for construction. Depending on the type of soil, a Geotechnical Engineer would determine if native soils can be used or if select fill will be required.

DRAINAGE OUTLETS

The storm drain networks will tie into an existing 48 inch storm drain at the intersection of Bilby Road and Promenade Parkway that is routed to a 72 inch storm drain that outfalls to an offsite stormwater detention basin half a mile west of the site. The existing basin and storm drain network has previously been sized assuming a fully developed mall site and adjacent properties and is documented in a drainage study approved by the City of Elk Grove: "Master Drainage Plan for Elk Grove Promenade, Local Drainage Area Shed C," October 2005, by Wood Rodgers, for General Growth Properties, Chicago, IL. According to this study, the stormwater basin has been sized to detain runoff from the 100-year, 48 hour storm as well as treat the water quality volume per the MS4 permit. Under the direction of the City of Elk Grove Public Works Department, a drainage study is not required for the proposed project at this site, because the existing drainage study assumed a complete development (all impervious surfacing) at the Mall Site. No offsite improvements are required.

DETENTION BASINS

The offsite detention basin for Alternative F has previously been designed and built to accommodate runoff from construction of Alternative F as discussed in the Drainage Outlets section of this report. No offsite improvements are required.

SUMMARY

The proposed improvements of Alternative F at the Mall Site would result in limited grading and drainage impacts. In its current condition, the site is partially paved and has utilities available onsite for future connection. Limited grading would be required to level the existing ground and tie into existing utilities. The master plan and calculations for the City of Elk Grove includes the Mall Site and assumes the site is

fully developed. Previous hydrology and hydraulic studies have been conducted for the site in a fully built-out condition and an offsite stormwater detention basin has been sized to mitigate runoff from the site.

REFERENCES

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Wood Rodgers. "Master Drainage Plan for Elk Grove Promenade, Local Drainage Area Shed C," October 2005. Prepared for General Growth Properties, Chicago, IL.

APPENDIX A: VICINITY MAPS

SUMMIT

WILTON RANCHERIA

TWIN CITIES SITE

PROJECT NO. 2014014
DATE 2014-09-26
SHT NO 1 OF 3
BY TAF CHK TCS

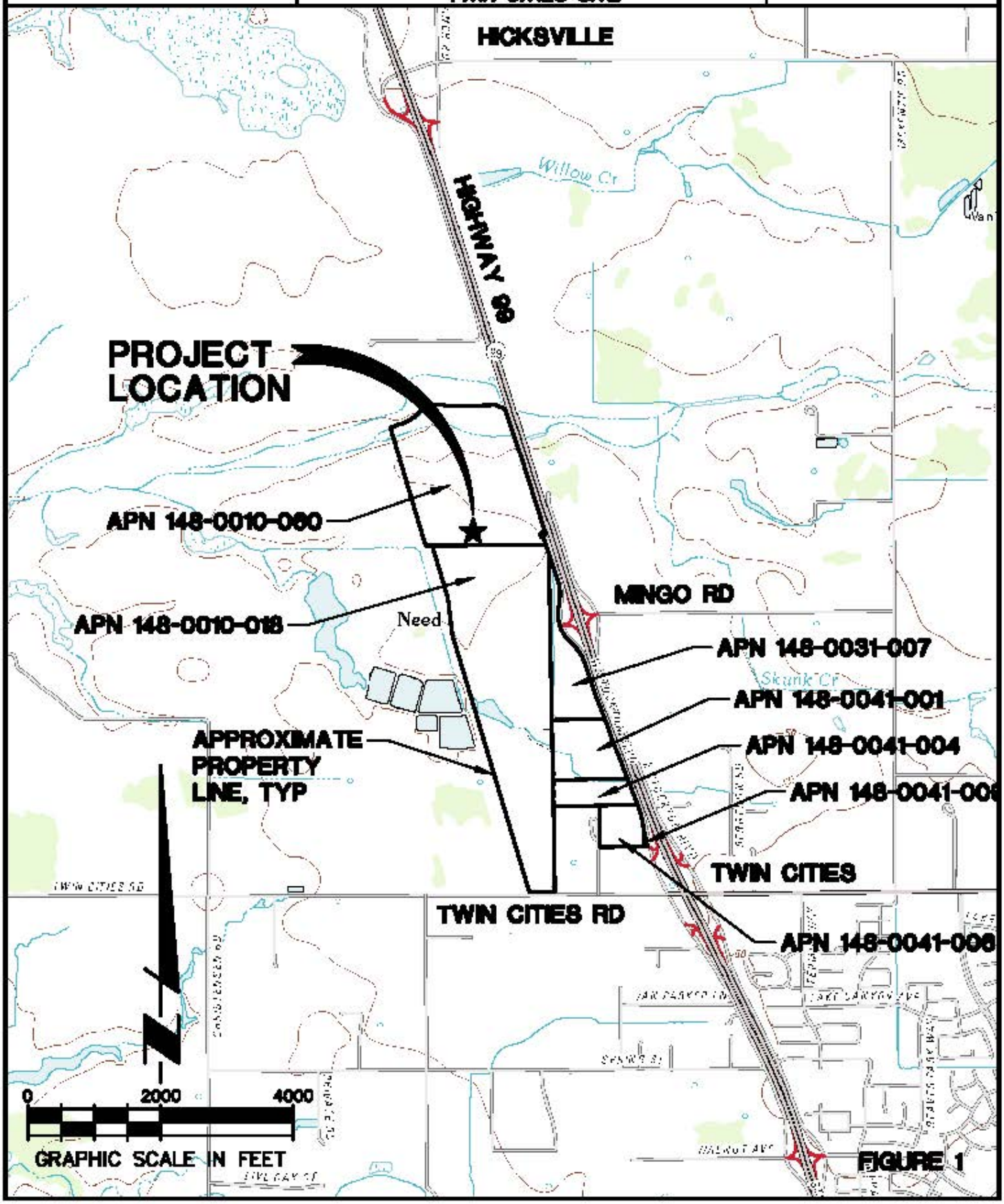

FIGURE 1

PLOTTED ON: 9/25/2014 9:08 AM
P:\2014\2014014 WILTON RANCHERIA FEASIBILITY STUDIES\CAD\CIVIL\2014014-VICINITY MAPS.DWG

Summit Engineering, Inc
463 Aviation Blvd., Suite 200 • Santa Rosa, CA 95403 • 707-527-0775 • www.summit-sr.com

SUMMIT

WILTON RANCHERIA

RANCHERIA SITE

PROJECT NO. 2014014
DATE 2014-09-26
SHT NO 2 OF 3
BY TAF CHK TCS

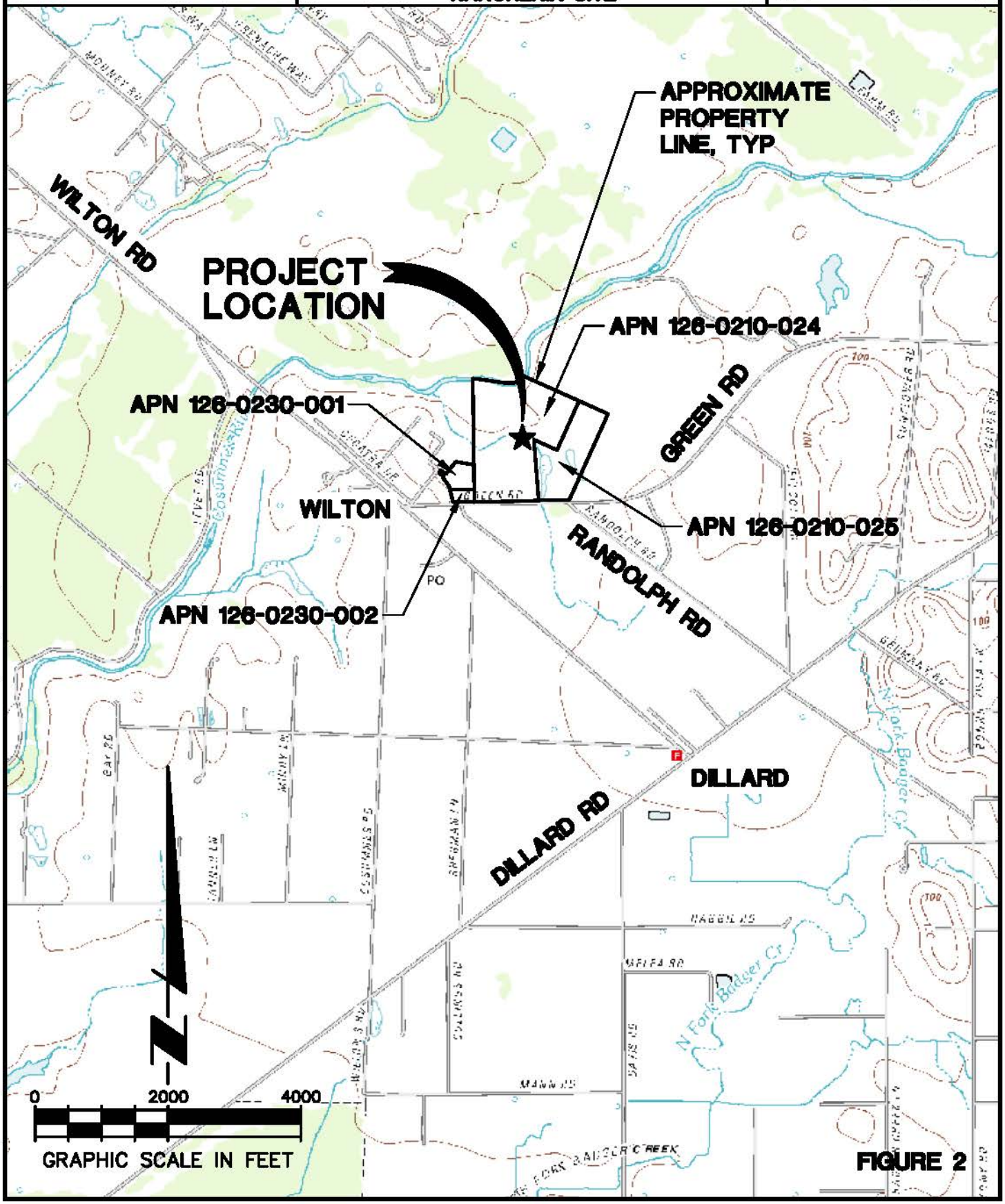

FIGURE 2

PLOTTED ON: 9/25/2014 9:06 AM
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SUMMIT

WILTON RANCHERIA

MALL SITE

PROJECT NO. 2014014
DATE 2014-09-26
SHT NO 3 OF 3
BY TAF CHK TCS

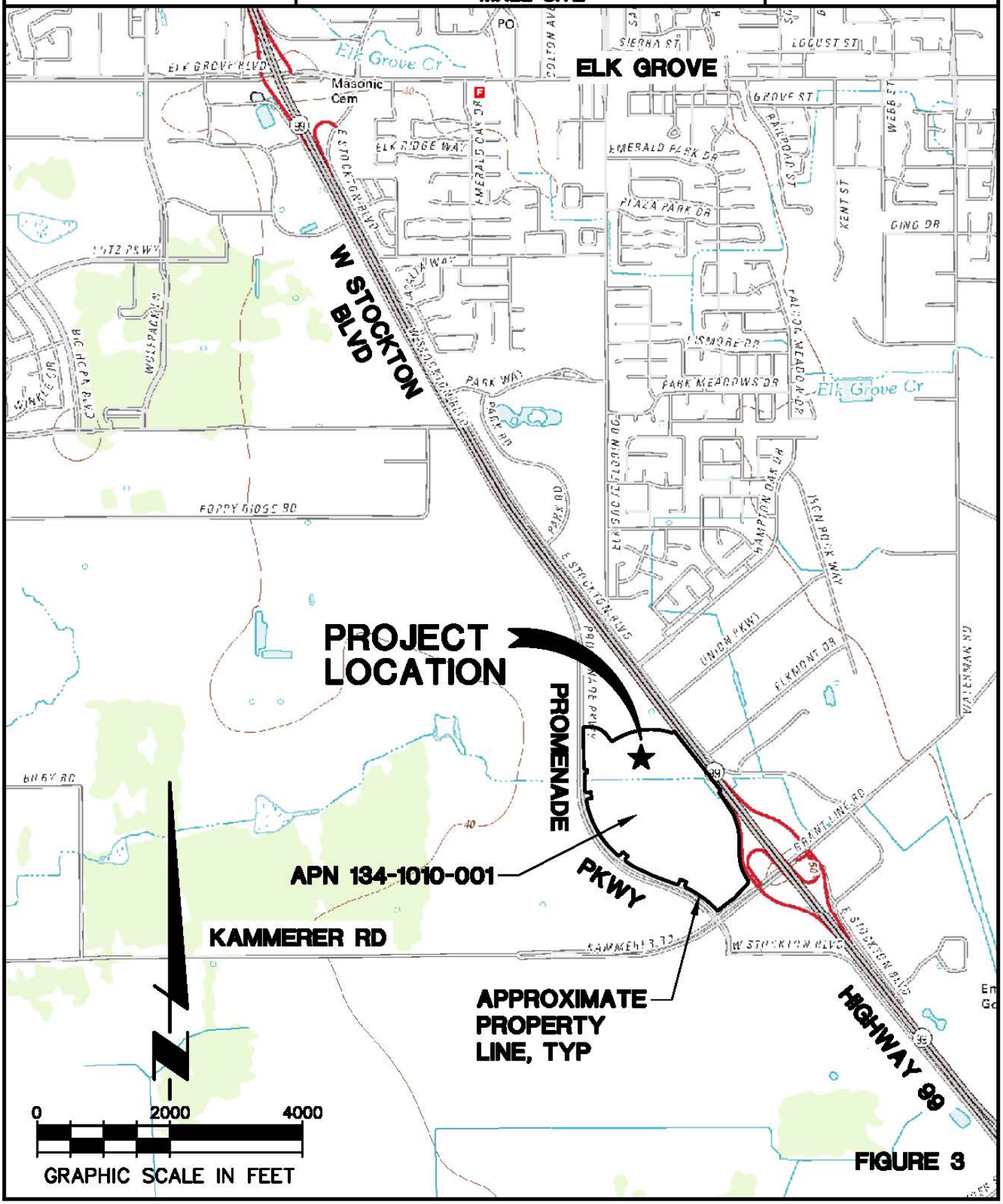

FIGURE 3

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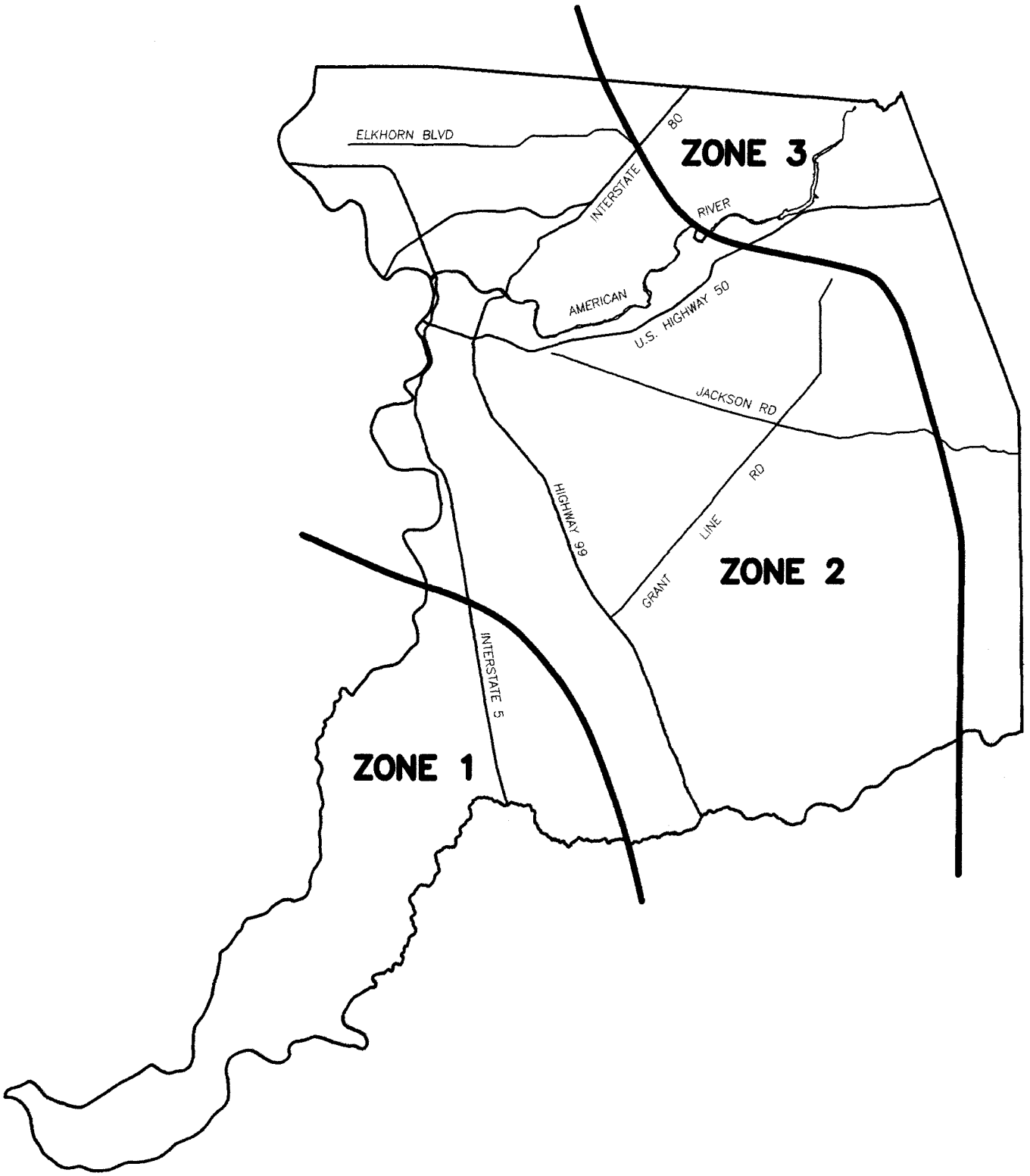
APPENDIX B: PARAMETER SUPPORT



Note : See foldout map in the back of Hydrology Standards for larger scale map of Rainfall Zones.

Sacramento City and County Rainfall Zones Sacramento Method

Date **December 1996**

Figure **2-11**

Map Scale: 1:7,750 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Sacramento County, California
Survey Area Data: Version 12, Nov 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 3, 2010—Apr 29, 2012

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.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Sacramento County, California (CA067)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
129	Cosumnes silt loam, drained, 0 to 2 percent slopes, occasionally flooded	C	15.7	8.1%
137	Durixeralfs, 0 to 1 percent slopes	D	8.2	4.3%
152	Galt clay, 0 to 2 percent slopes	D	7.8	4.0%
213	San Joaquin silt loam, leveled, 0 to 1 percent slopes	C	64.1	33.2%
214	San Joaquin silt loam, 0 to 3 percent slopes	C	25.6	13.3%
217	San Joaquin-Galt complex, leveled, 0 to 1 percent slopes	D	65.8	34.1%
238	Xerarents-San Joaquin complex, 0 to 1 percent slopes		5.7	2.9%
Totals for Area of Interest			**192.8**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

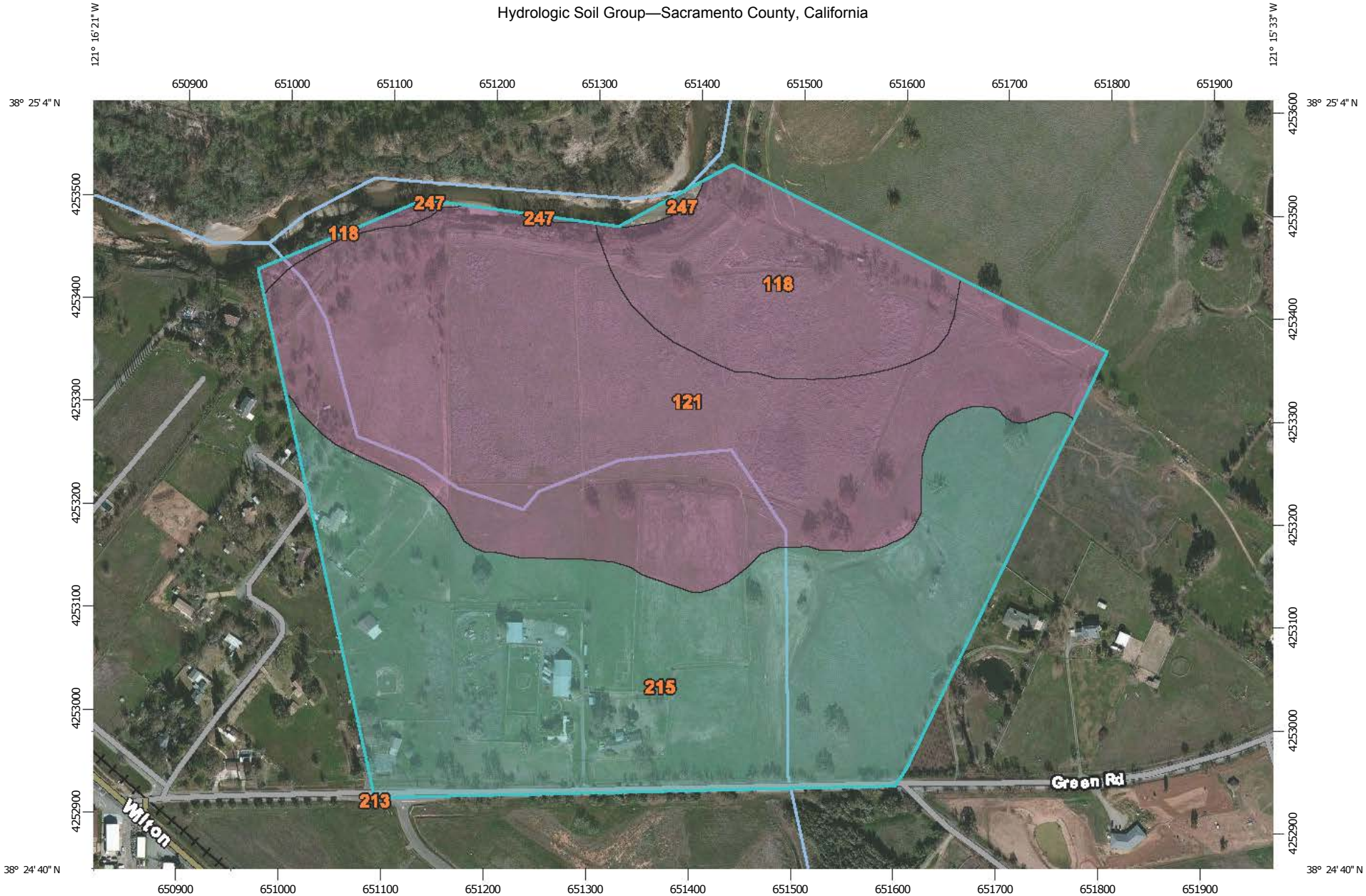
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Hydrologic Soil Group—Sacramento County, California



Map Scale: 1:5,260 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Sacramento County, California
Survey Area Data: Version 12, Nov 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 3, 2010—Apr 29, 2012

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.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Sacramento County, California (CA067)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
118	Columbia sandy loam, drained, 0 to 2 percent slopes, occasionall y flooded	A	12.0	12.9%
121	Columbia sandy loam, clayey substratum, drained, 0 to 2 percent slopes, occasionally flooded	A	40.4	43.4%
213	San Joaquin silt loam, leveled, 0 to 1 percent slopes	C	0.0	0.0%
215	San Joaquin silt loam, 3 to 8 percent slopes	C	40.3	43.3%
247	Water		0.4	0.4%
Totals for Area of Interest			**93.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

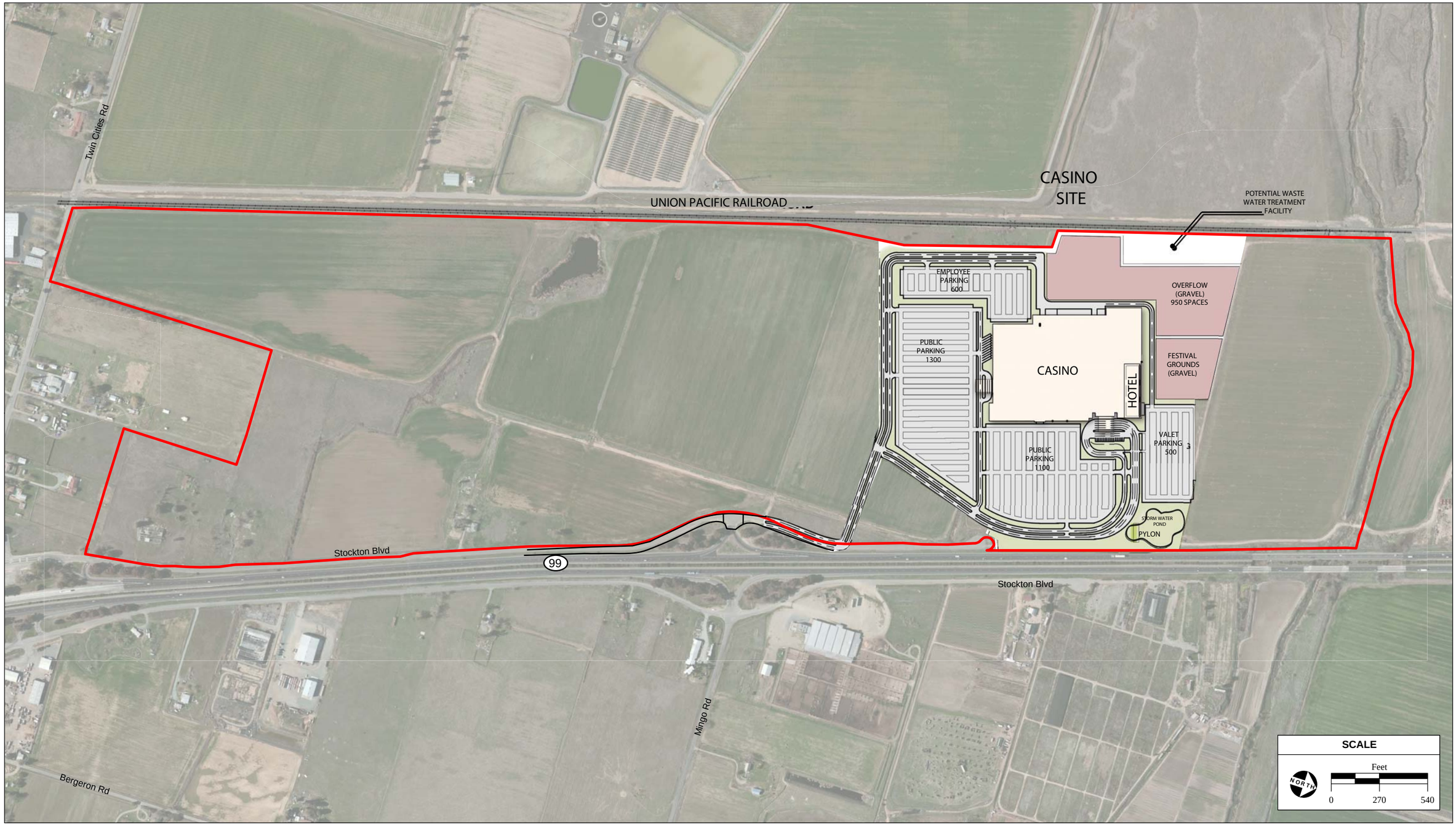
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

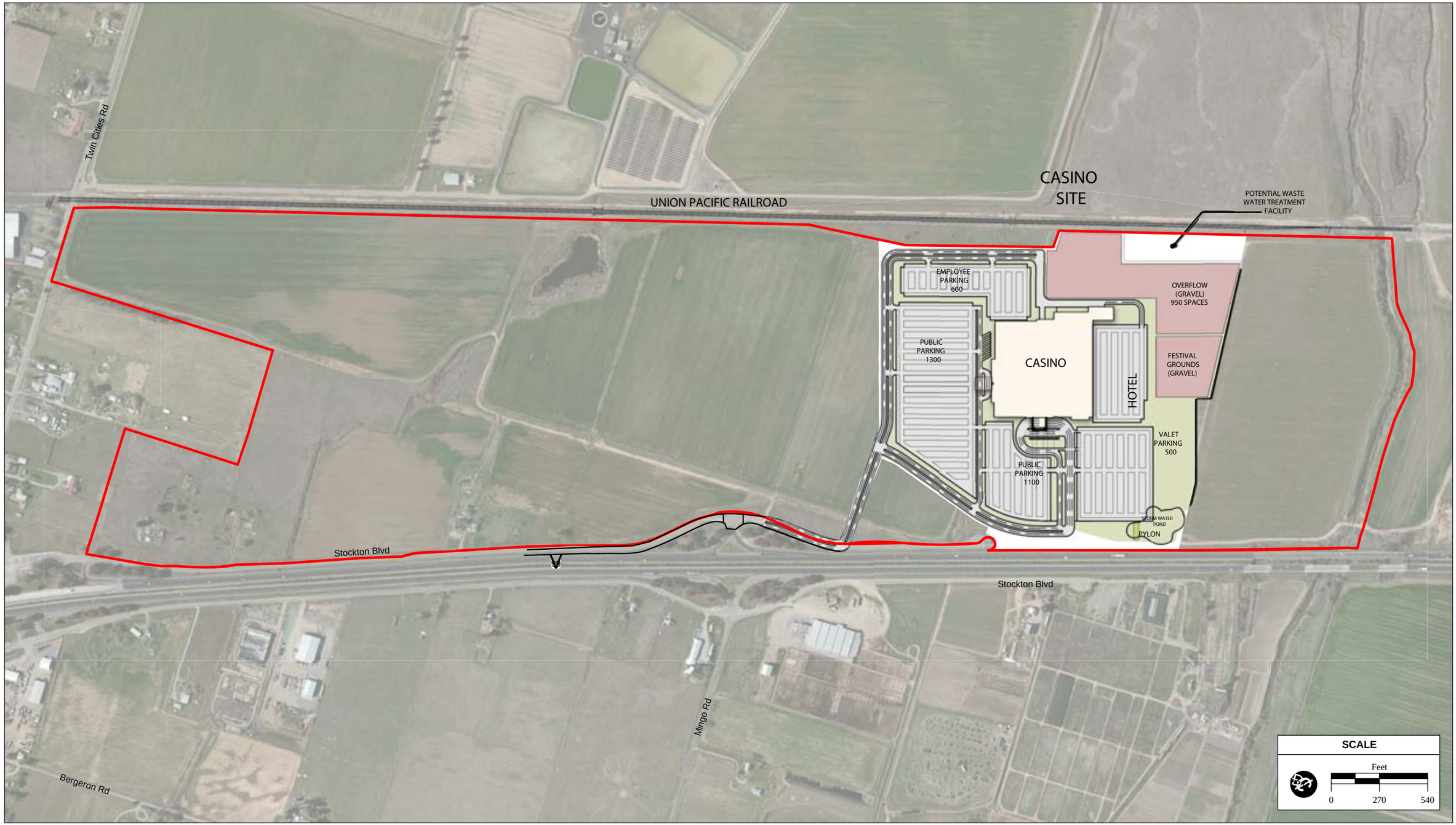
Tie-break Rule: Higher

APPENDIX C: SITE LAYOUTS



SOURCE: Klai Juba Architects, 1/10/2014; Microsoft aerial photograph, 2/2/2012; AES, 2014

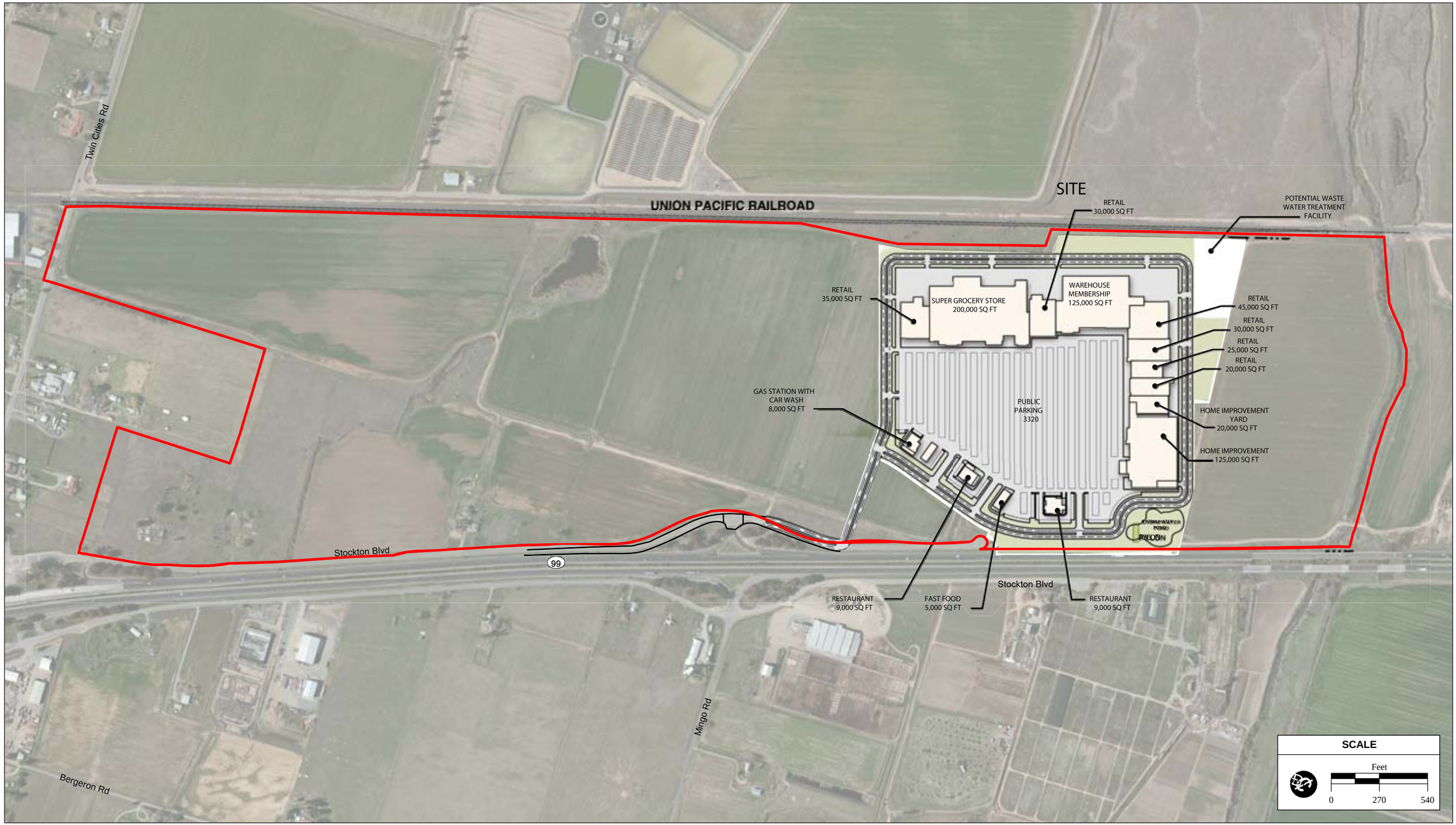
Figure 3
Alternative A – Proposed Action



SOURCE: Klai Juba Architects, 1/10/2014; Microsoft aerial photograph, 2/2/2012; AES, 2014

Figure 4

Alternative B – Reduced Intensity Casino



SOURCE: Klai Juba Architects, 1/10/2014; Microsoft aerial photograph, 2/2/2012; AES, 2014

Figure 5
Alternative C - Retail on Twin Cities Site

SOURCE: Klai Juba Architects, 1/10/2014; Microsoft aerial photograph, 2/2/2012; AES, 2014

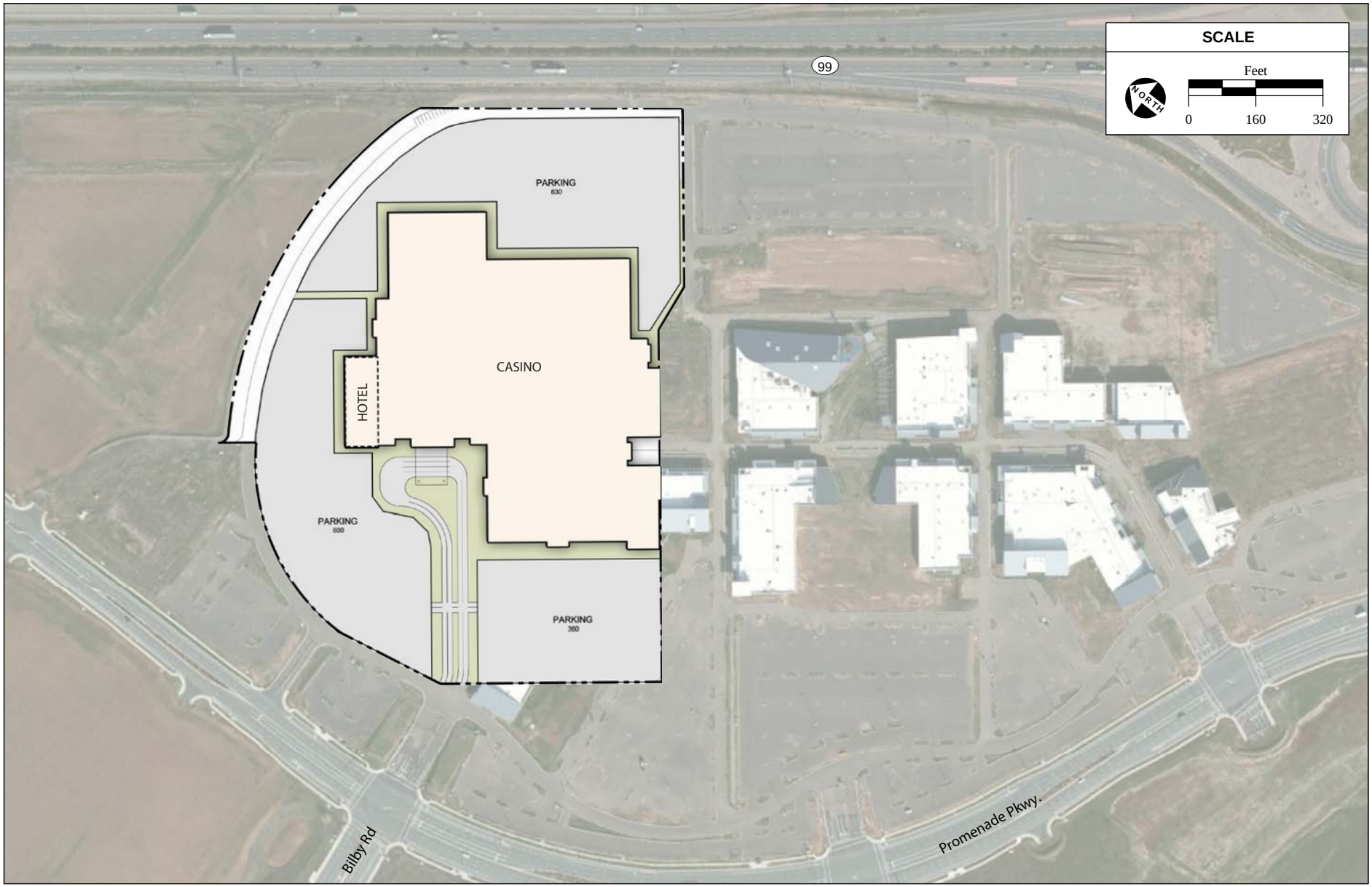
Figure 6

Alternative D – Casino at Rancheria Site

SOURCE: Klai Juba Architects, 1/10/2014; Microsoft aerial photograph, 2/2/2012; AES, 2014

Figure 7

Alternative E – Reduced Intensity Casino at Rancheria Site



SOURCE: Klai Juba Architects, 1/17/2014; AES, 2014

Figure 8

Alternative F – Casino at Mall Site

APPENDIX D: PRELIMINARY GRADING AND DRAINAGE PLANS

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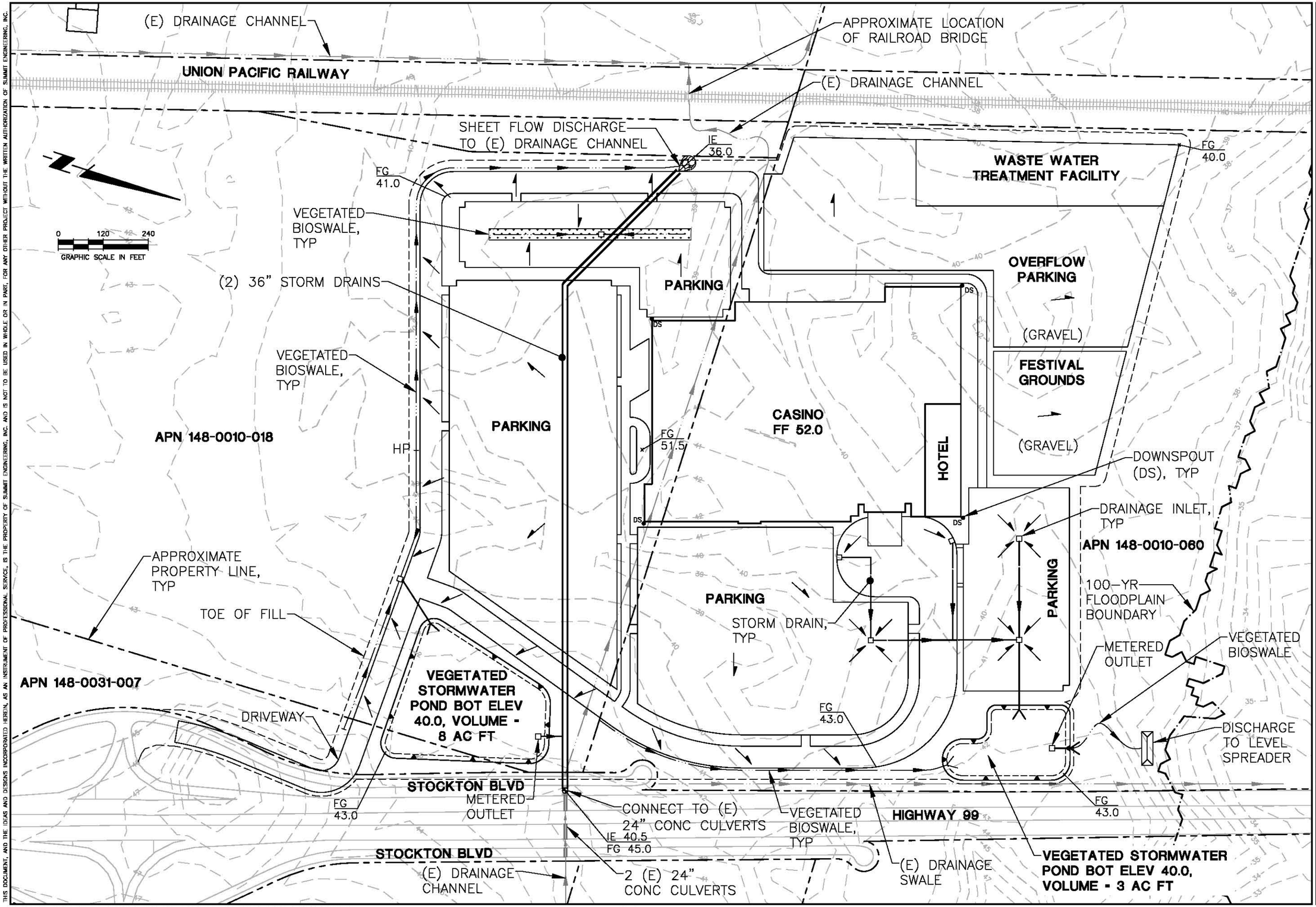

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WILTON RANCHERIA

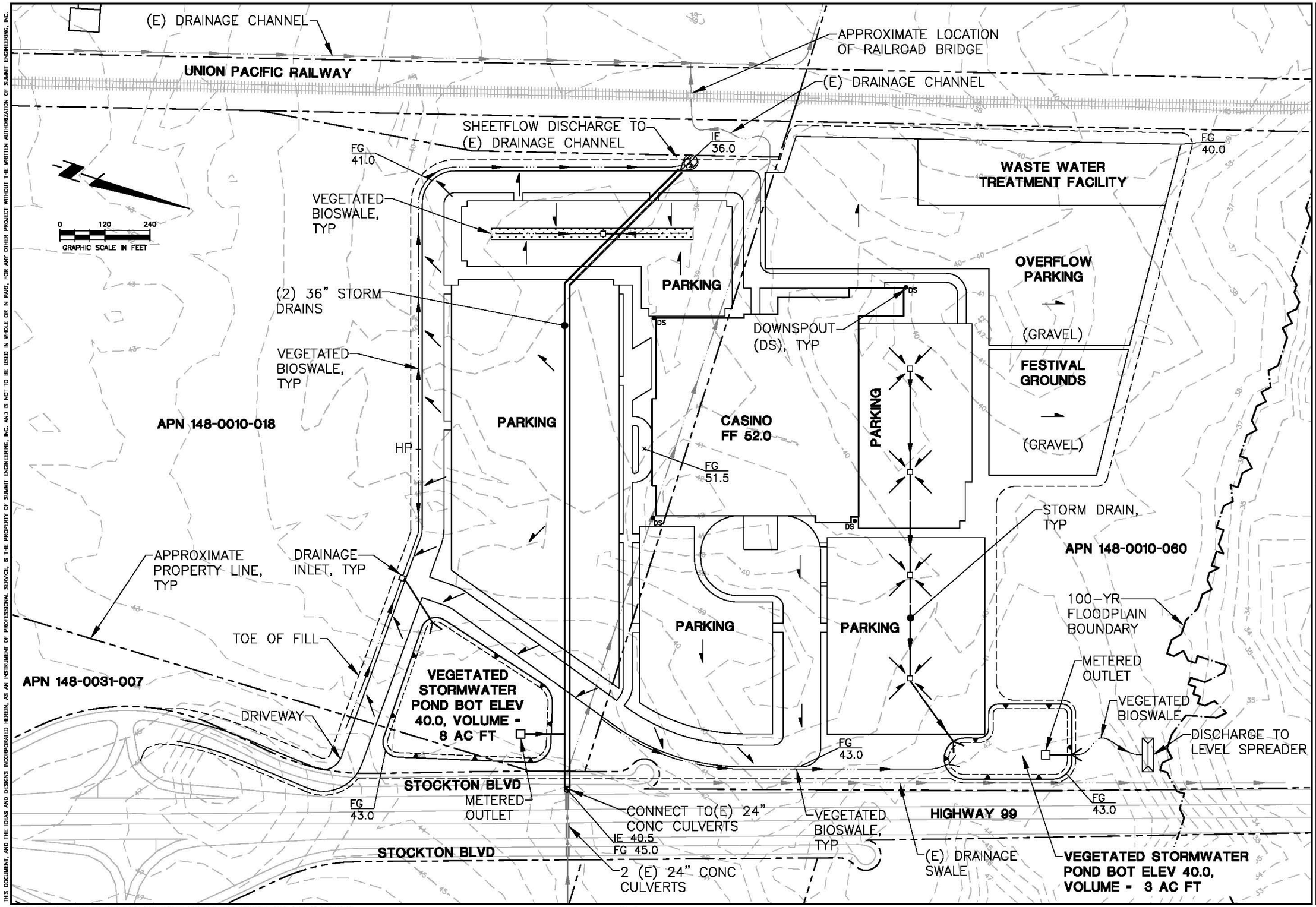
TWIN CITIES SITE

ALERNATIVE A, PRELIMINARY GRADING AND DRAINAGE

2014-09-26
DRAFT REPORT

DATE:	2014-03-03
JOB NO:	2014014
SCALE:	AS SHOWN
DRAWN:	TAF
CHECKED:	TCS

SHEET
FIGURE 1



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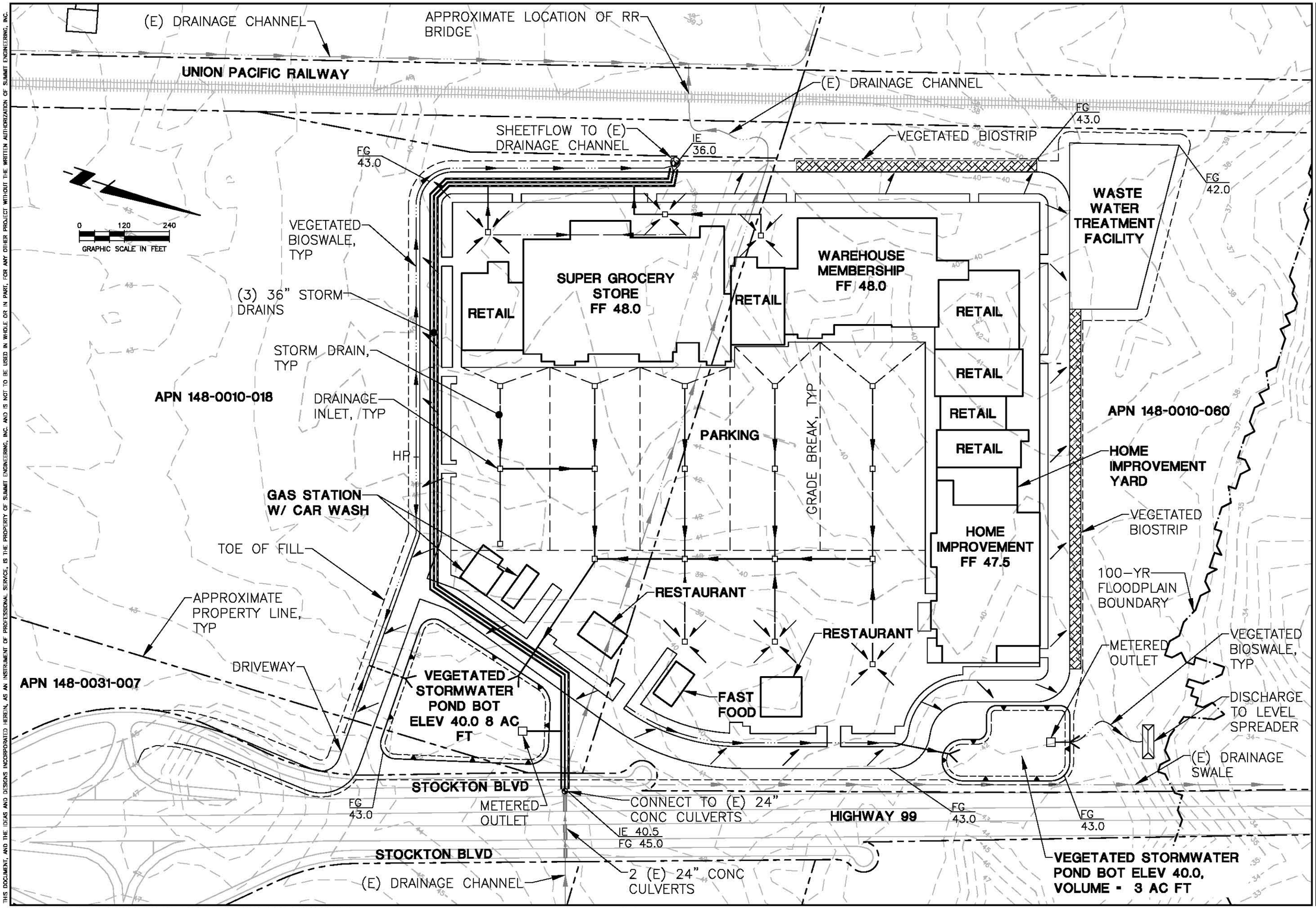
TWIN CITIES SITE

ALTERNATIVE B, PRELIMINARY GRADING AND DRAINAGE

2014-09-26
DRAFT REPORT

DATE:	2014-03-03
JOB NO:	2014014
SCALE:	AS SHOWN
DRAWN:	TAF
CHECKED:	TCS

SHEET
FIGURE 2



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TWIN CITIES SITE

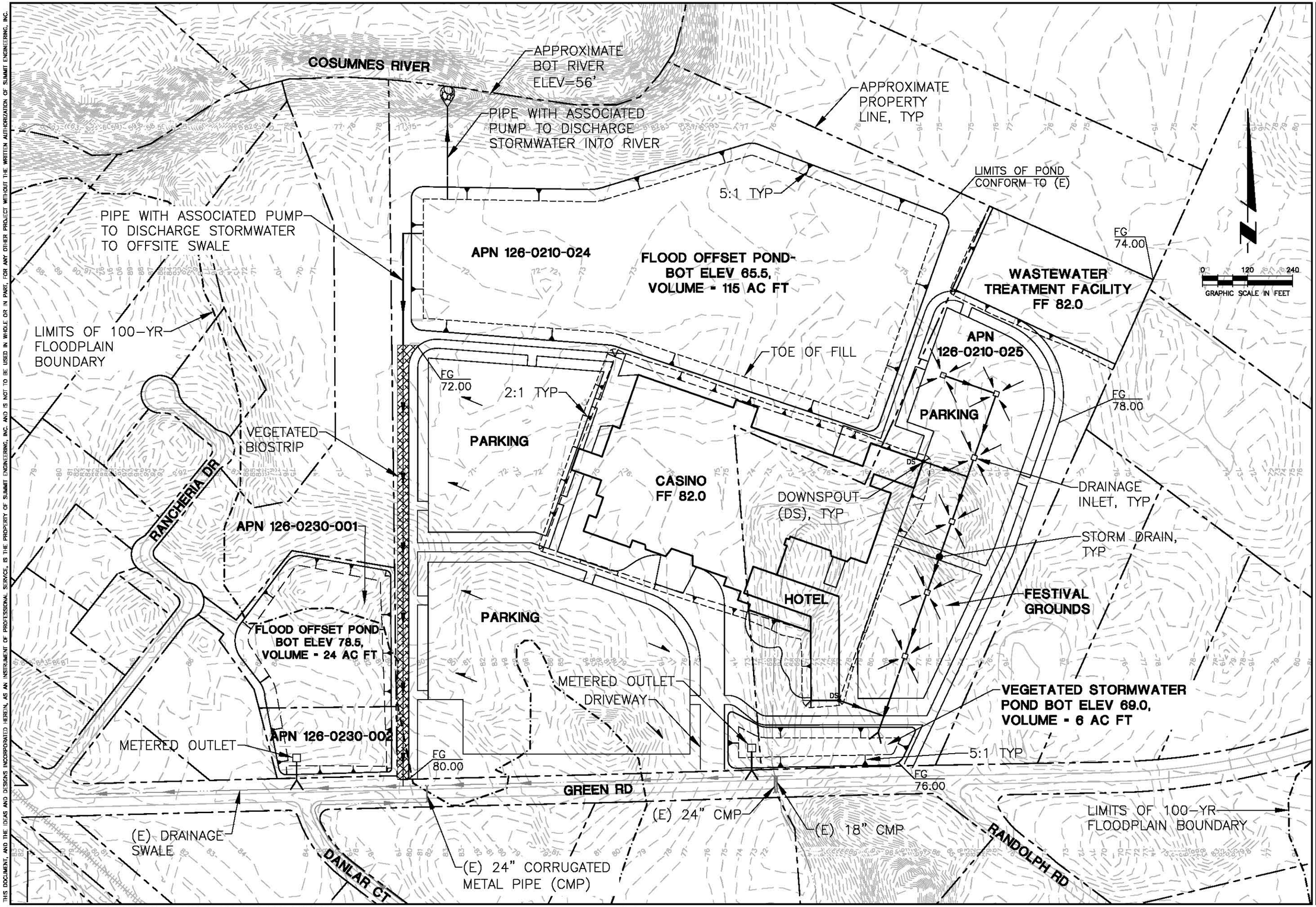
ALTERNATIVE C, PRELIMINARY GRADING AND DRAINAGE

2014-09-26 DRAFT REPORT

DATE:	2014-03-03
JOB NO:	2014014
SCALE:	AS SHOWN
DRAWN:	TAF
CHECKED:	TCS

SHEET

FIGURE 3



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WILTON RANCHERIA

RANCHERIA SITE

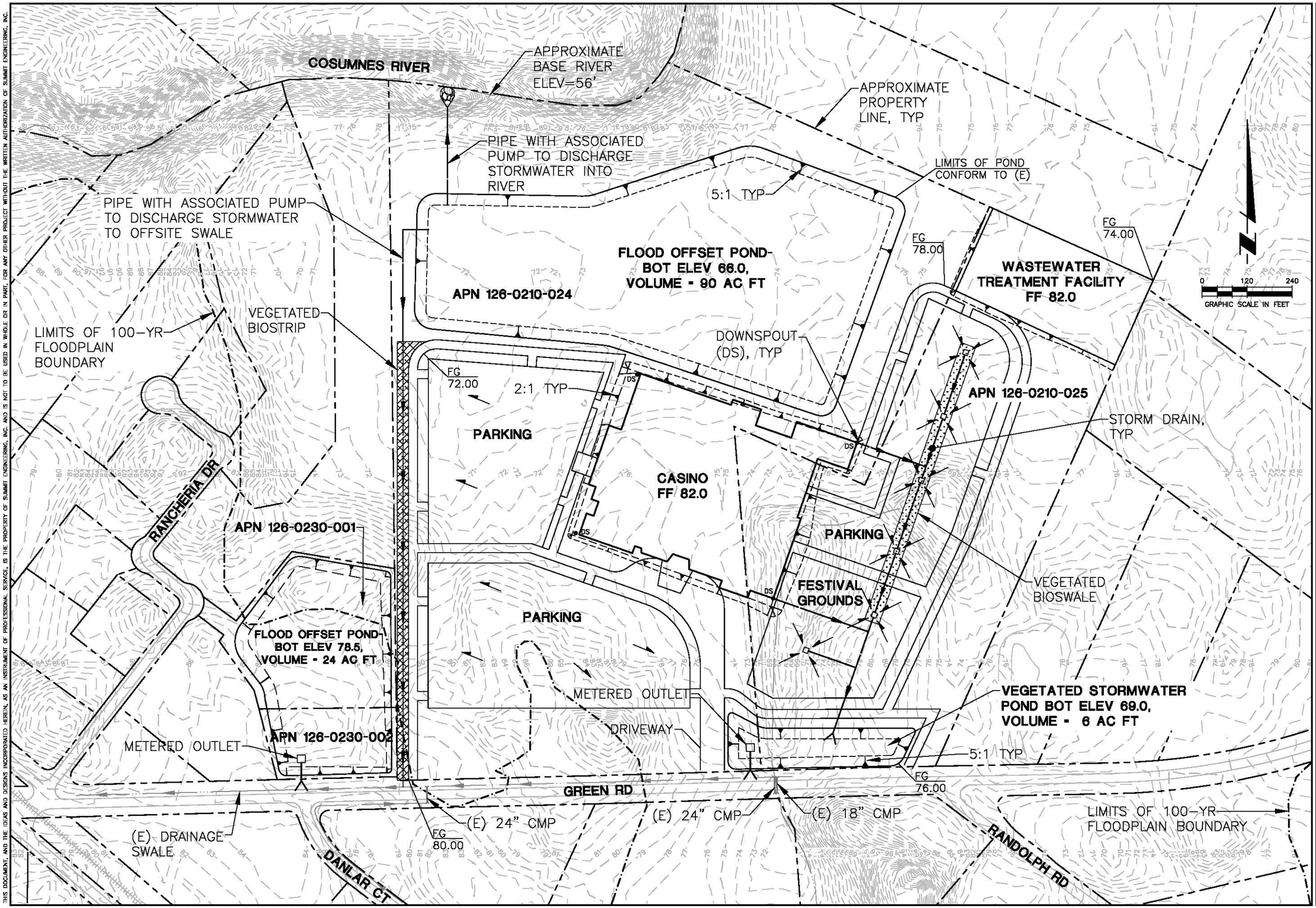
ALTERNATIVE D, PRELIMINARY GRADING AND DRAINAGE

2014-09-26	DRAFT REPORT

DATE:	2014-03-03
JOB NO:	2014014
SCALE:	AS SHOWN
DRAWN:	TAF
CHECKED:	TCS

SHEET

FIGURE 4



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WILTON RANCHERIA

RANCHERIA SITE

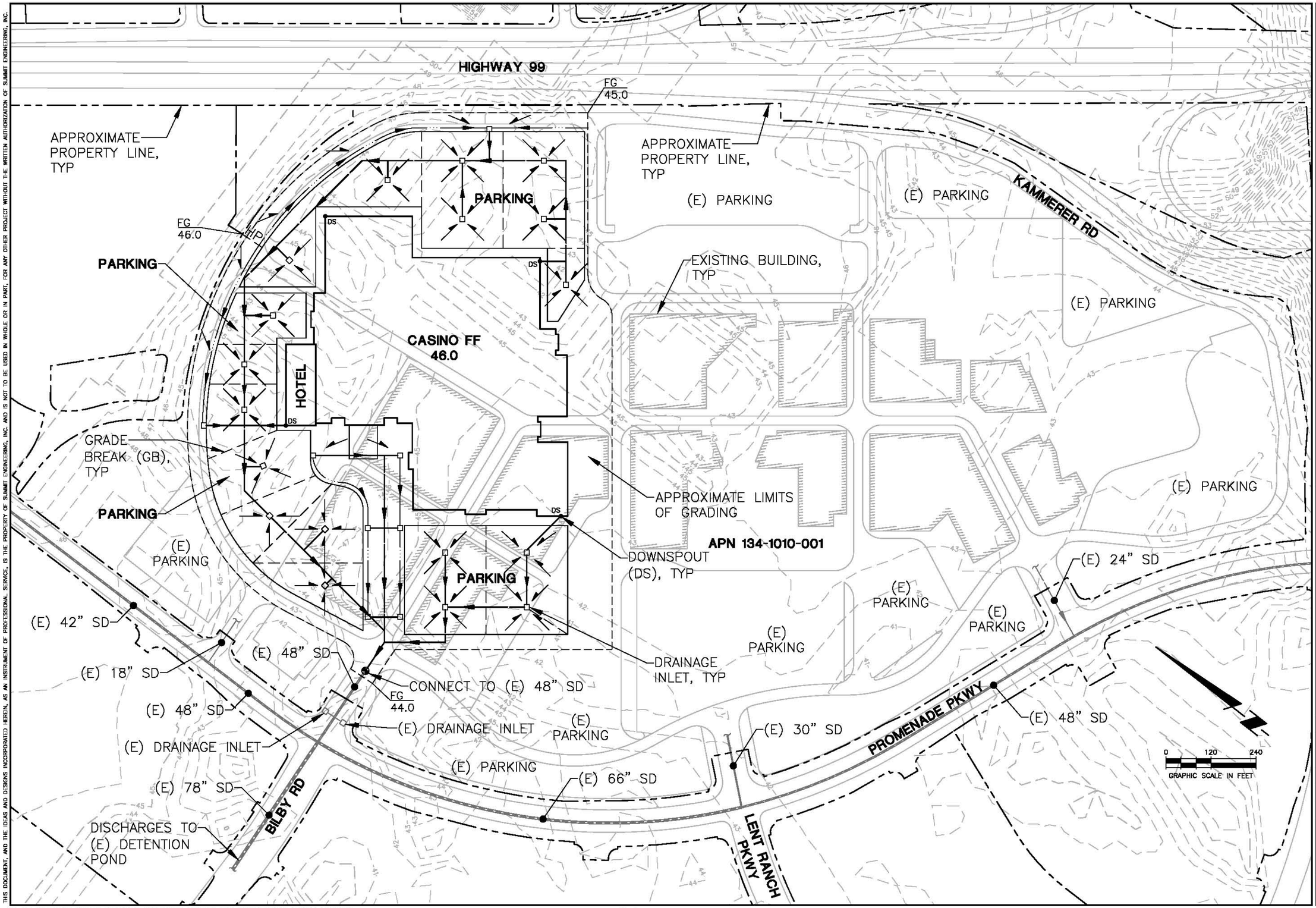
ALTERNATIVE E, PRELIMINARY GRADING AND DRAINAGE

2014-09-26	DRAFT REPORT

DATE:	2014-03-03
JOB NO:	2014014
SCALE:	AS SHOWN
DRAWN:	TAF
CHECKED:	TCS

SHEET

FIGURE 5



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WILTON RANCHERIA

MALL SITE

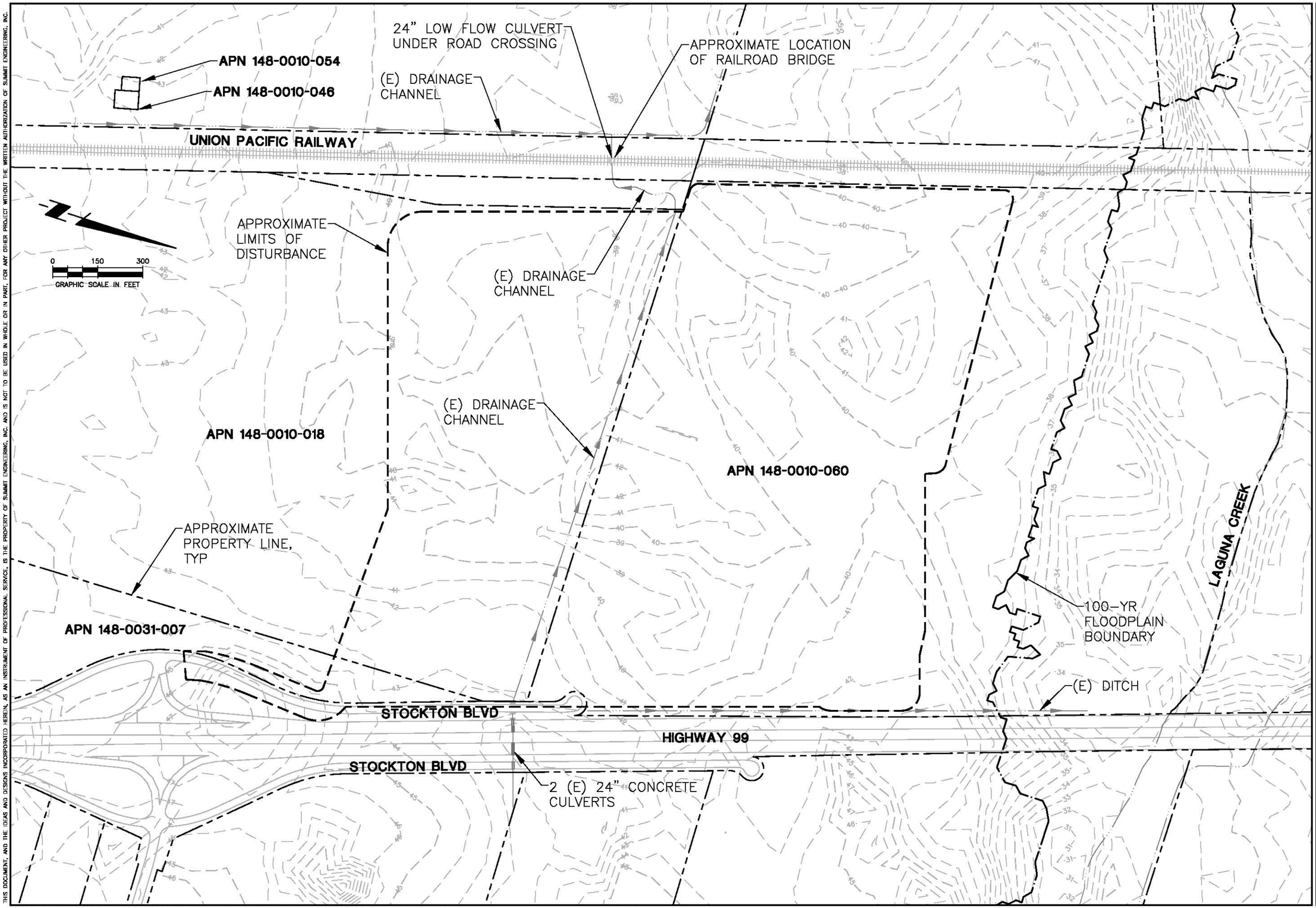
ALTERNATIVE F, PRELIMINARY GRADING AND DRAINAGE

2014-09-26
DRAFT REPORT

DATE: 2014-03-03
JOB NO: 2014014
SCALE: AS SHOWN
DRAWN: TAF
CHECKED: TCS

SHEET
FIGURE 6

APPENDIX E: HYDROLOGY MAPS



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WILTON RANCHERIA

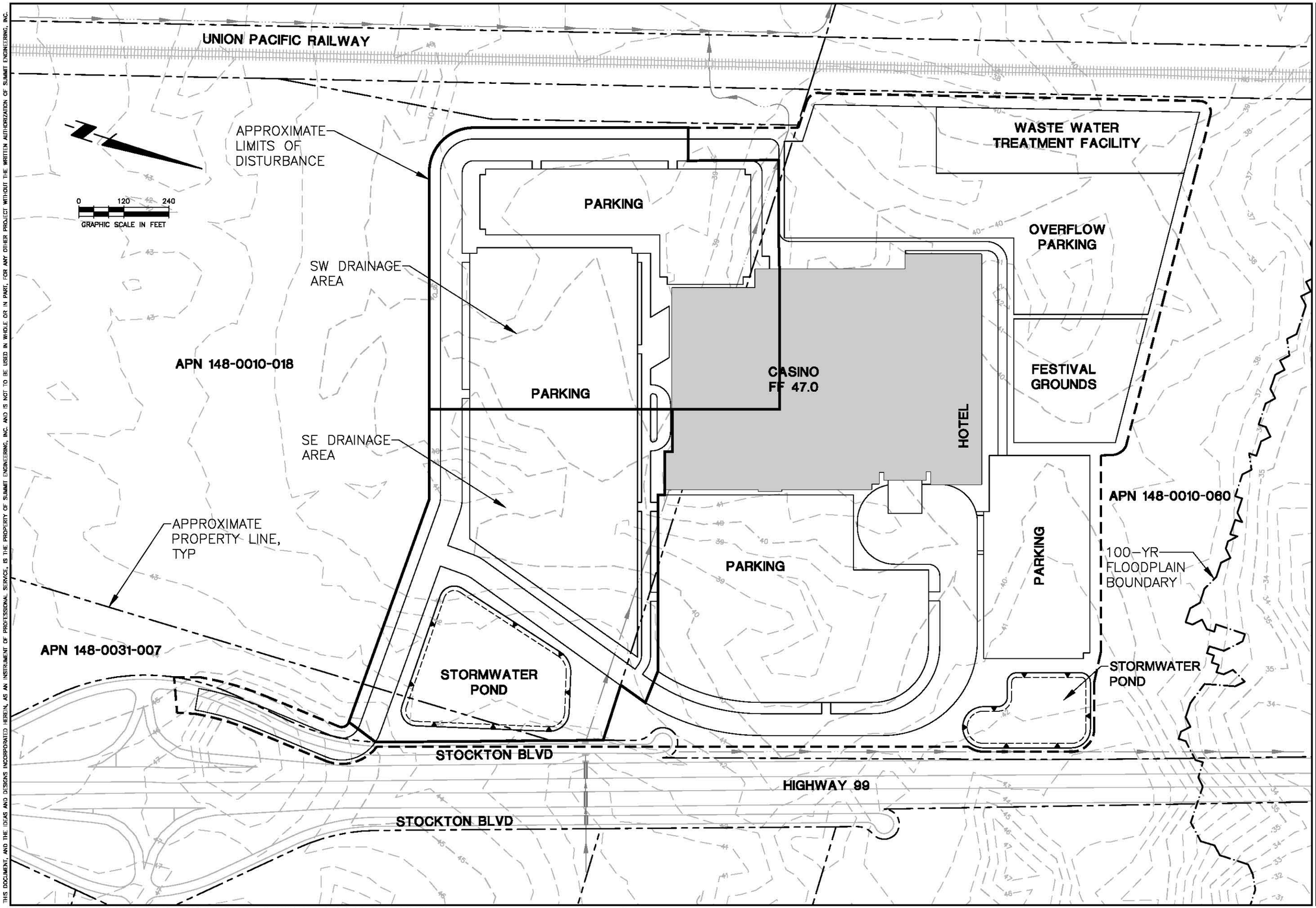
TWIN CITIES SITE

PRE-PROJET CONDITION HYDROLOGY MAP

2014-09-26
DRAFT REPORT

DATE:	2014-03-03
JOB NO:	2014014
SCALE:	AS SHOWN
DRAWN:	TAF
CHECKED:	TCS
SHEET	

FIGURE 1



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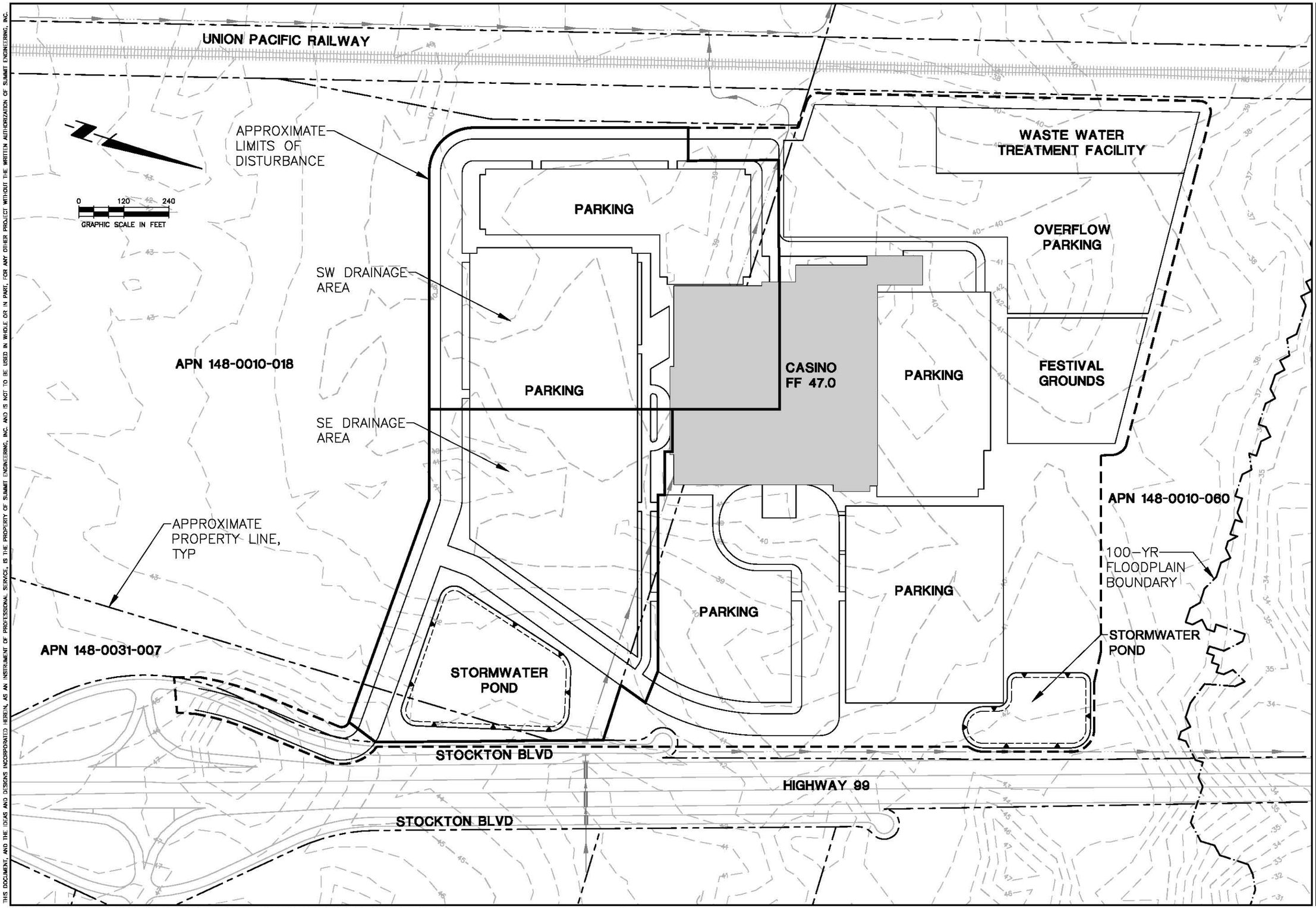
TWIN CITIES SITE

ALERNATIVE A, HYDROLOGY MAP

2014-09-26	DRAFT REPORT

DATE:	2014-03-03
JOB NO:	2014014
SCALE:	AS SHOWN
DRAWN:	TAF
CHECKED:	TCS
SHEET	

FIGURE 2



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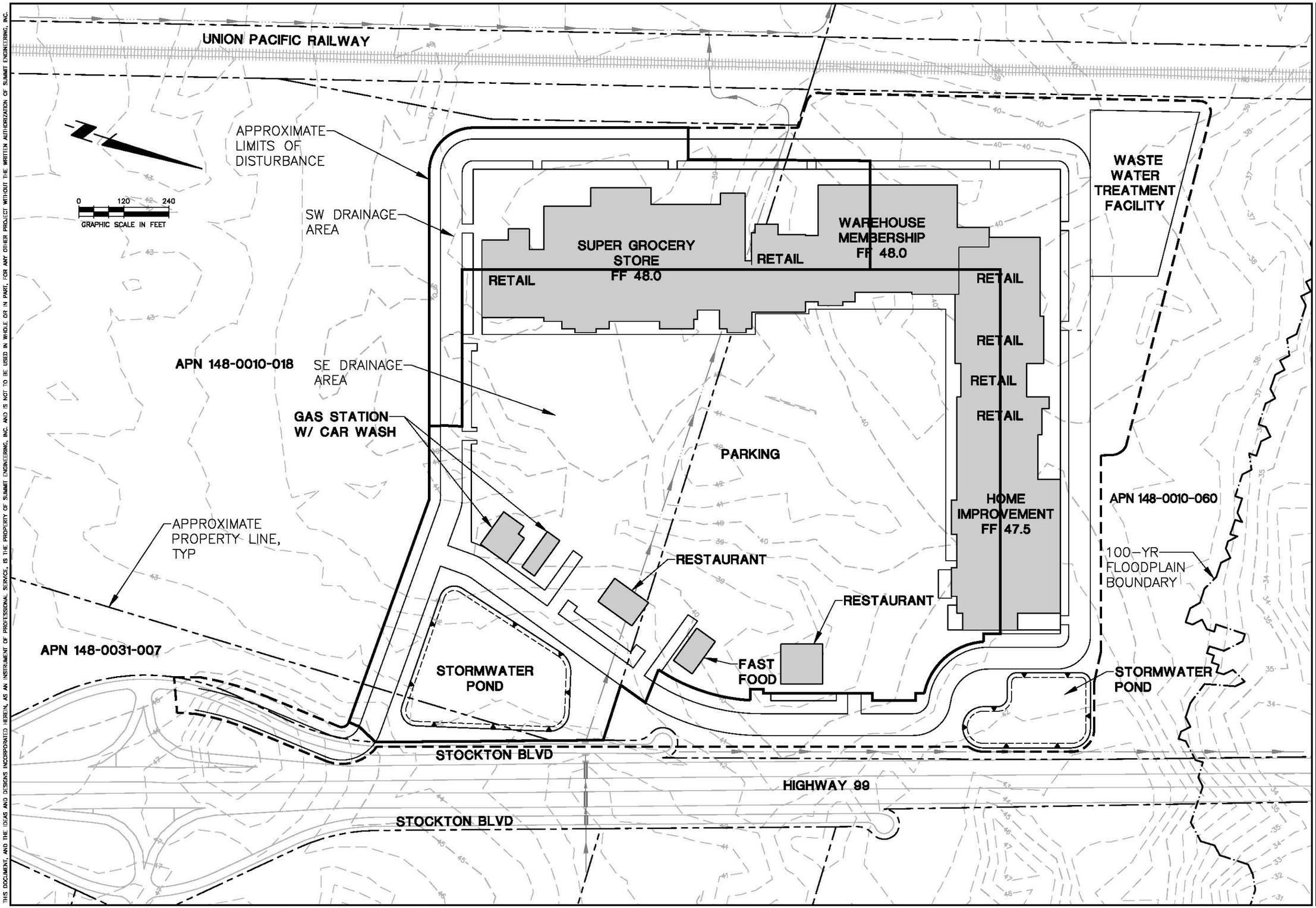
TWIN CITIES SITE

ALERNATIVE B, HYDROLOGY MAP

2014-09-26	DRAFT REPORT

DATE:	2014-03-03
JOB NO:	2014014
SCALE:	AS SHOWN
DRAWN:	TAF
CHECKED:	TCS
SHEET	FIGURE 3



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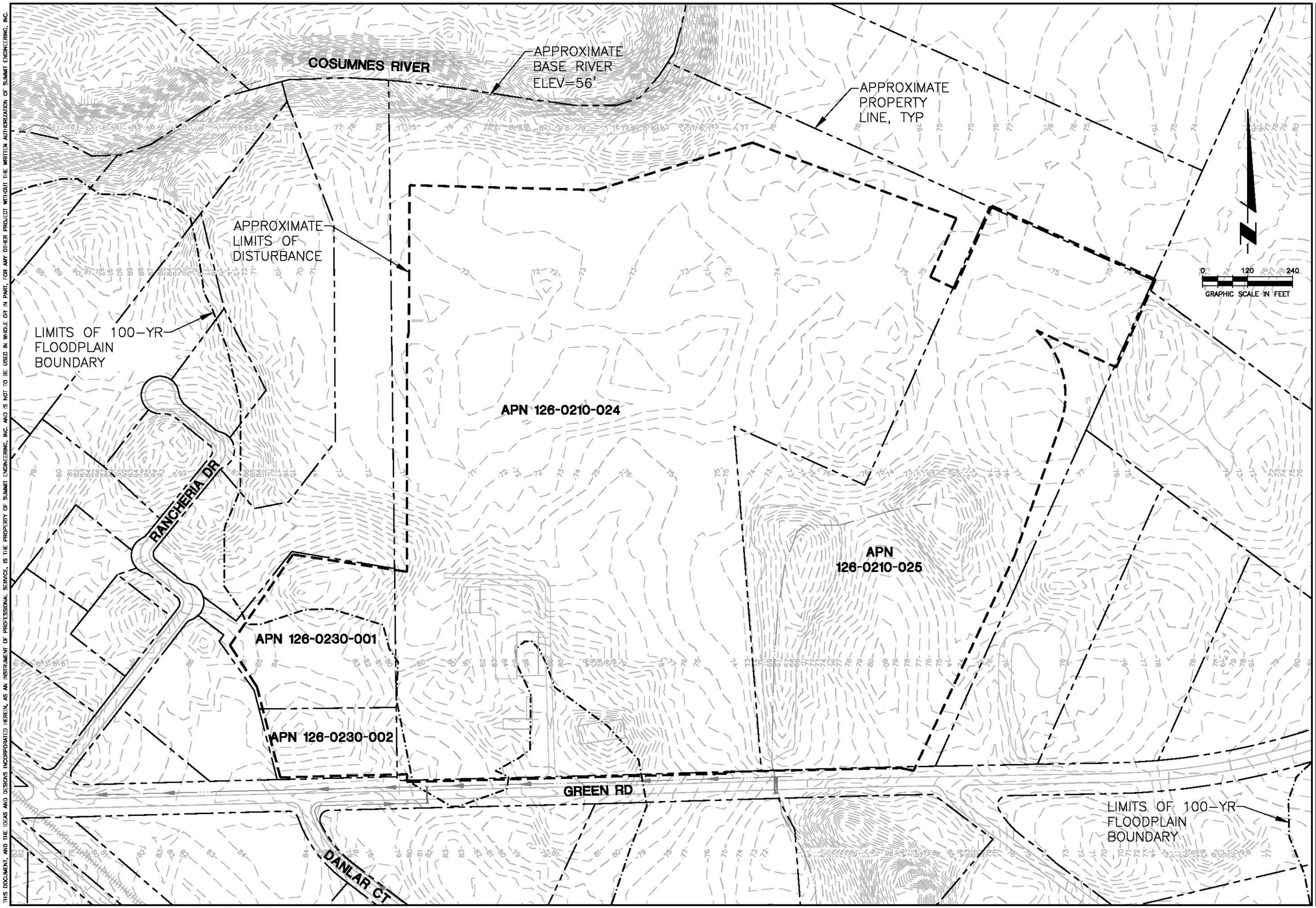
ALTERNATIVE C, HYDROLOGY MAP

2014-09-26	DRAFT REPORT

DATE:	2014-03-03
JOB NO:	2014014
SCALE:	AS SHOWN
DRAWN:	TAF
CHECKED:	TCS
SHEET	

FIGURE 4



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WILTON RANCHERIA

RANCHERIA SITE

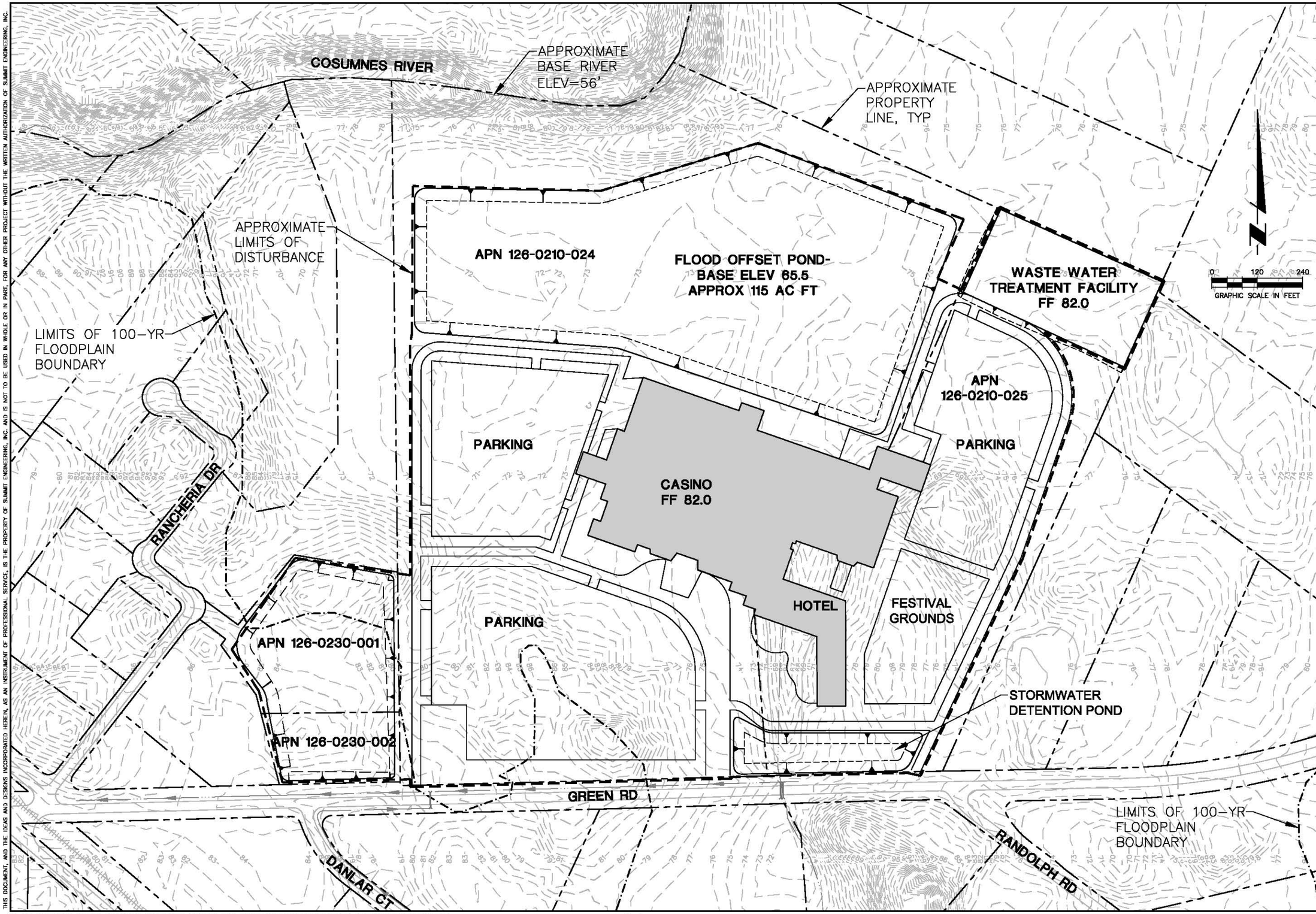
PRE-PROJECT CONDITION HYDROLOGY MAP

2014-09-26
DRAFT REPORT

DATE:	2014-03-03
JOB NO:	2014014
SCALE:	AS SHOWN
DRAWN:	TAF
CHECKED:	TCS

SHEET

FIGURE 5



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WILTON RANCHERIA

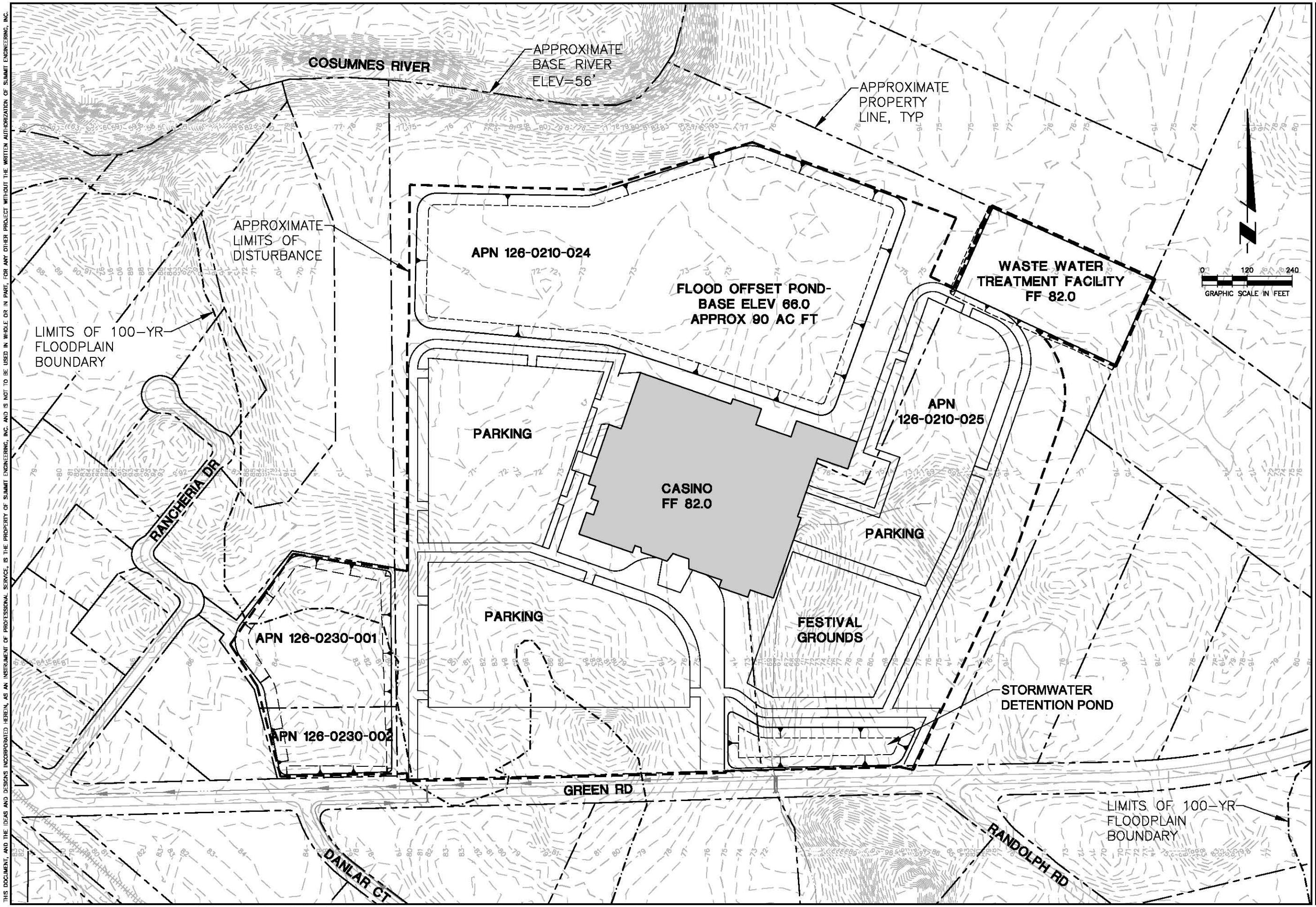
RANCHERIA SITE

ALTERNATIVE D, HYDROLOGY MAP

2014-09-26
DRAFT REPORT

DATE:	2014-03-03
JOB NO:	2014014
SCALE:	AS SHOWN
DRAWN:	TAF
CHECKED:	TCS

SHEET
FIGURE 6



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WILTON RANCHERIA

RANCHERIA SITE

ALTERNATIVE E, HYDROLOGY MAP

2014-09-26
DRAFT REPORT

DATE:	2014-03-03
JOB NO:	2014014
SCALE:	AS SHOWN
DRAWN:	TAF
CHECKED:	TCS

SHEET
FIGURE 7

APPENDIX F: HYDROLOGY SUPPORT CALCULATIONS

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Jump to: runoff summary | index

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OUTPUT FILENAME ===>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\PRE A-C\sc.hecout
DSS FILENAME ===>hcalc.dss
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****************************************                                                  ****************************************
*                                      *                                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                                  *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                                  *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                                  *          609 SECOND STREET           *
*                                      *                                                  *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   02APR14  TIME  15:17:21  *                                                  *           (916) 756-1104             *
*                                      *                                                  *                                      *
****************************************                                                  ****************************************
```

```
X     X  XXXXXXX   XXXXX           X   X
X     X  X        X     X         XX   X
X     X  X        X                X   X
XXXXXXX  XXXX     X        XXXXX   X   X
X     X  X        X                X   X
X     X  X        X     X          X   X
X     X  XXXXXXX   XXXXX          XXX  XXXX
```

```
Special version of HEC-1 with Extra-large array
Modified by David Ford Consulting Engineers (2000)
 Program dimensions:
 Number of hydrograph ordinates: 20000
 Unit hydrograph ordinates: 3000
```

```
THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
```

```
                                                HEC-1L INPUT                                                PAGE  1

 LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

                * SacCalc, developed by David Ford Consulting Engineers
                * File generated 04/02/2014 15:17:21
                *
    1           ID   Pre-Project Condition for Alternative A-C
                * Lag computation for station PRE
                *   Lag frequency factor of 1.3 (Table 7-6) for frequency 100 years will be appl
                *   Basin "n" composition (based on Table 7-1)
                *              Developed                 Undeveloped
                *          n   adj n   fract           n   adj n   fract
                *   ----------------------------------------------------
                *      0.030  0.0390  0.0000       0.067  0.0670  0.0000
                *      0.031  0.0403  0.0000       0.070  0.0700  0.0000
                *      0.032  0.0416  0.0000       0.071  0.0710  0.0000
                *      0.033  0.0429  0.0000       0.072  0.0720  0.0000
                *      0.034  0.0442  0.0000       0.073  0.0730  0.0000
                *      0.035  0.0455  0.0000       0.074  0.0740  0.0000
                *      0.037  0.0481  0.0000       0.076  0.0760  0.0000
                *      0.040  0.0520  0.0000       0.080  0.0800  0.0000
                *      0.042  0.0546  0.0000       0.084  0.0840  0.0000
                *      0.046  0.0598  0.0000       0.088  0.0880  0.0000
                *      0.050  0.0650  0.0000       0.090  0.0900  0.0000
                *      0.053  0.0689  0.0000       0.093  0.0930  0.0000
                *      0.056  0.0560  0.0000       0.096  0.0960  0.0000
                *      0.060  0.0600  0.0000       0.100  0.1000  0.0000
                *      0.065  0.0650  0.0000       0.110  0.1100  0.0000
                *      0.070  0.0700  0.0051       0.115  0.1150  0.9945
                *      0.075  0.0750  0.0000       0.120  0.1200  0.0000
                *      0.080  0.0800  0.0000       0.150  0.1500  0.0000
                *   ----------------------------------------------------
                *   Equation (7-1) with L=  0.3314, Lc=  0.1705, S=   15.840, n=0.1147
                *   Resulting lag:   44.0 minutes
                * End of lag computations
                *
                *   NMIN  JXDATE  JXTIME      NQ            CENT
    2           IT       1 23MAR14    2400    1747                    2000
                *   IPRT    IPLT
    3           IO       3       0
                *

    4           KK  PRE
```

```
                 *  JXMIN    Time interval for input data
  5              IN       5
  6              KM   Pre-Project Alternative A-C
                 *
                 * Design storm construction details
                 *
                 * Regional multiplier (zone 2) applied:  1.000
                 * Areal adjustment using area:  0.119
                 *   multiplier from table 4-4: 1.0000
                 *
                 * Adjusted depths for each duration from table 4-1: frequency: 100
                 * Duration----Regional------Elev-----Areal (adjustments)
                 * 5 min         0.4400    0.4400    0.4400
                 * 10 min        0.6200    0.6200    0.6200
                 * 15 min        0.7300    0.7300    0.7300
                 * 30 min        0.9400    0.9400    0.9400
                 * 1 hour        1.2100    1.2100    1.2100
                 * 2 hours       1.5900    1.5900    1.5900
                 * 3 hours       1.8500    1.8500    1.8500
                 * 6 hours       2.5000    2.5000    2.5000
                 * 12 hours      3.3000    3.3000    3.3000
                 * 24 hours      4.2500    4.2500    4.2500
                 * 36 hours      5.0900    5.0900    5.0840
                 * 2 days        5.7000    5.7000    5.7000
                 * 3 days        6.8000    6.8000    6.8000
                 * 5 days        8.4200    8.4200    8.4100
                 * 10 days      11.0100   11.0100   10.9969
                 * Storm duration:  24, length:  288 ordinates
```

```
                                          HEC-1L INPUT                                                PAGE  2

LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

  7              PB       0
  8              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
  9              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 10              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 11              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 12              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 13              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 14              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 15              PI  0.0066  0.0066  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 16              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 17              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 18              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0181  0.0181
 19              PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 20              PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0217  0.0217  0.0217  0.0217
 21              PI  0.0217  0.0217  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0450  0.0450
 22              PI  0.0450  0.0700  0.1100  0.4400  0.1800  0.0700  0.0700  0.0450  0.0450  0.0450
 23              PI  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0217  0.0217  0.0217  0.0217
 24              PI  0.0217  0.0217  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 25              PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 26              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 27              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 28              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 29              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0066  0.0066  0.0066  0.0066
 30              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 31              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 32              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 33              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 34              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 35              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 36              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
                 *
                 * Precipitation losses computation (Chapter 5)
                 *   Computing RTIMP (percent impervious) from land use and table 5-2
                 *   Computing CNSTL (infiltration rate) from soil type and table 5-2
                 *  TAREA   subbasin area (sq mi)
 37              BA  0.1188
                 *  STRTL   CNSTL   RTIMP
 38              LU    0.10   0.085   2.000
                 *
                 * Runoff hydrograph computation (Chapter 6)
                 *   Using basin lag:  44.0 minutes
                 *   Using unit duration (Step 2): 1. min
                 *   Lag Time + Unit Duration / 2 (Step 3): 44.45241
                 *   Volume of runoff (Step 4) V=    3.194316
 39              UI   1.242   2.483   4.147   5.931   7.759   9.621  11.542  13.578  15.560  17.093
 40              UI  18.625  21.276  24.069  26.489  28.720  31.190  33.964  36.764  39.654  42.545
 41              UI  45.744  48.945  52.176  55.415  58.997  62.857  66.813  70.965  75.077  78.860
 42              UI  82.642  83.889  84.801  85.443  85.948  86.010  85.506  84.914  84.002  83.090
 43              UI  80.098  77.092  74.010  70.906  67.781  64.639  61.622  58.868  56.218  54.492
 44              UI  52.765  51.056  49.349  47.438  45.421  43.740  42.499  41.245  39.945  38.646
 45              UI  37.307  35.969  34.883  33.875  32.855  31.827  30.836  29.925  29.011  28.080
 46              UI  27.149  26.473  25.832  25.116  24.360  23.670  23.069  22.463  21.842  21.222
 47              UI  20.658  20.096  19.607  19.142  18.708  18.300  17.868  17.383  16.907  16.520
 48              UI  16.132  15.777  15.428  15.079  14.730  14.422  14.170  13.890  13.502  13.114
 49              UI  12.898  12.684  12.368  12.018  11.773  11.618  11.427  11.155  10.898  10.781
```

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                                          HEC-1L INPUT                                                PAGE  3

LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10
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```
 50          UI  10.665  10.481  10.287  10.131   9.995   9.843   9.668   9.493   9.319   9.144
 51          UI   8.989   8.833   8.708   8.591   8.454   8.299   8.150   8.014   7.882   7.785
 52          UI   7.688   7.557   7.421   7.285   7.150   7.038   6.961   6.872   6.736   6.600
 53          UI   6.521   6.443   6.322   6.186   6.092   6.033   5.951   5.816   5.685   5.607
 54          UI   5.530   5.435   5.338   5.278   5.240   5.168   5.052   4.943   4.866   4.788
 55          UI   4.710   4.633   4.555   4.478   4.410   4.352   4.294   4.236   4.176   4.098
 56          UI   4.021   3.960   3.902   3.843   3.785   3.727   3.669   3.611   3.552   3.494
 57          UI   3.436   3.378   3.320   3.261   3.213   3.175   3.124   3.047   2.972   2.933
 58          UI   2.894   2.839   2.781   2.735   2.696   2.657   2.618   2.580   2.541   2.502
 59          UI   2.463   2.424   2.386   2.347   2.308   2.269   2.231   2.192   2.154   2.135
 60          UI   2.116   2.096   2.077   2.045   2.006   1.975   1.956   1.933   1.894   1.855
 61          UI   1.817   1.778   1.753   1.734   1.715   1.695   1.670   1.631   1.594   1.575
 62          UI   1.555   1.519   1.480   1.454   1.434   1.415   1.396   1.376   1.357   1.337
 63          UI   1.318   1.299   1.279   1.260   1.240   1.221   1.202   1.182   1.163   1.143
 64          UI   1.124   1.105   1.085   1.066   1.046   1.035   1.035   1.031   1.012   0.993
 65          UI   0.973   0.954   0.934   0.915   0.905   0.905
 66          ZW   C=FLOW F=100YR-24HR A=WILTON R
 67          ZZ
```

```
****************************************                                    ****************************************
*                                      *                                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                    *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                    *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                    *          609 SECOND STREET           *
*                                      *                                    *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   02APR14  TIME  15:17:21  *                                    *           (916) 756-1104             *
*                                      *                                    *                                      *
****************************************                                    ****************************************
```

```
                         Pre-Project Condition for Alternative A-C

  3 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           1  MINUTES IN COMPUTATION INTERVAL
                      IDATE     23MAR14  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ        1747  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     25MAR14  ENDING DATE
                     NDTIME        0506  ENDING TIME
                      ICENT          20  CENTURY MARK

                 COMPUTATION INTERVAL    0.02 HOURS
                      TOTAL TIME BASE   29.10 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
             LENGTH, ELEVATION     FEET
             FLOW                  CUBIC FEET PER SECOND
             STORAGE VOLUME        ACRE-FEET
             SURFACE AREA          ACRES
             TEMPERATURE           DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
  4 KK    *    PRE     *
          *            *
          **************
                         Pre-Project Alternative A-C

  5 IN          TIME DATA FOR INPUT TIME SERIES
                      JXMIN           5  TIME INTERVAL IN MINUTES
                     JXDATE     23MAR14  STARTING DATE
                     JXTIME        2400  STARTING TIME

             SUBBASIN RUNOFF DATA

 37 BA          SUBBASIN CHARACTERISTICS
                      TAREA,       0.12  SUBBASIN AREA

             PRECIPITATION DATA

  7 PB                STORM        4.25  BASIN TOTAL PRECIPITATION

  8 PI            INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
```

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09
0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

```
38 LU          UNIFORM LOSS RATE
                     STRTL        0.10  INITIAL LOSS
                     CNSTL        0.09  UNIFORM LOSS RATE
                     RTIMP        2.00  PERCENT IMPERVIOUS AREA
```

37 UI   INPUT UNITGRAPH, 266 ORDINATES, VOLUME = 1.00

1.2	2.5	4.1	5.9	7.8	9.6	11.5	13.6	15.6	17.1
18.6	21.3	24.1	26.5	28.7	31.2	34.0	36.8	39.7	42.5
45.7	48.9	52.2	55.4	59.0	62.9	66.8	71.0	75.1	78.9
82.6	83.9	84.8	85.4	85.9	86.0	85.5	84.9	84.0	83.1
80.1	77.1	74.0	70.9	67.8	64.6	61.6	58.9	56.2	54.5
52.8	51.1	49.3	47.4	45.4	43.7	42.5	41.2	39.9	38.6
37.3	36.0	34.9	33.9	32.9	31.8	30.8	29.9	29.0	28.1
27.1	26.5	25.8	25.1	24.4	23.7	23.1	22.5	21.8	21.2
20.7	20.1	19.6	19.1	18.7	18.3	17.9	17.4	16.9	16.5
16.1	15.8	15.4	15.1	14.7	14.4	14.2	13.9	13.5	13.1
12.9	12.7	12.4	12.0	11.8	11.6	11.4	11.2	10.9	10.8
10.7	10.5	10.3	10.1	10.0	9.8	9.7	9.5	9.3	9.1
9.0	8.8	8.7	8.6	8.5	8.3	8.1	8.0	7.9	7.8
7.7	7.6	7.4	7.3	7.2	7.0	7.0	6.9	6.7	6.6
6.5	6.4	6.3	6.2	6.1	6.0	6.0	5.8	5.7	5.6
5.5	5.4	5.3	5.3	5.2	5.2	5.1	4.9	4.9	4.8
4.7	4.6	4.6	4.5	4.4	4.4	4.3	4.2	4.2	4.1
4.0	4.0	3.9	3.8	3.8	3.7	3.7	3.6	3.6	3.5
3.4	3.4	3.3	3.3	3.2	3.2	3.1	3.0	3.0	2.9
2.9	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.5	2.5
2.5	2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.1
2.1	2.1	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9
1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.6	1.6	1.6
1.6	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.4	1.3
1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.1
1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0
1.0	1.0	0.9	0.9	0.9	0.9				

***

*** *** *** *** ***

HYDROGRAPH AT STATION PRE

```
  TOTAL RAINFALL =     4.25, TOTAL LOSS =     1.93, TOTAL EXCESS =     2.32

PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
  (CFS)        (HR)                  6-HR        24-HR        72-HR      29.10-HR
    83.       12.57        (CFS)      25.           7.           6.           6.
                         (INCHES)    1.945        2.318        2.319        2.319
                          (AC-FT)      12.          15.          15.          15.

                          CUMULATIVE AREA =     0.12 SQ MI
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	PRE	83.	12.57	25.	7.	6.	0.12		

*** NORMAL END OF HEC-1L ***

Index to station computation sections
PRE

(C) 2001 David Ford Consulting Engineers, Inc.

P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\ALT A\sc.hecout
Jump to: runoff summary | index

```
INPUT  FILENAME ====>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\ALT A\sc.dat
OUTPUT FILENAME ===>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\ALT A\sc.hecout
DSS FILENAME ===>hcalc.dss
```

```
****************************************                                                  ****************************************
*                                      *                                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                                  *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                                  *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                                  *          609 SECOND STREET           *
*                                      *                                                  *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   02APR14  TIME  12:58:36  *                                                  *           (916) 756-1104             *
*                                      *                                                  *                                      *
****************************************                                                  ****************************************
```

```
                                                X     X  XXXXXXX   XXXXX           X   X
                                                X     X  X        X     X         XX   X
                                                X     X  X        X                X   X
                                                XXXXXXX  XXXX     X        XXXXX   X   X
                                                X     X  X        X                X   X
                                                X     X  X        X     X          X   X
                                                X     X  XXXXXXX   XXXXX          XXX  XXXX

       Special version of HEC-1 with Extra-large array
       Modified by David Ford Consulting Engineers (2000)
        Program dimensions:
        Number of hydrograph ordinates: 20000
        Unit hydrograph ordinates: 3000


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
```

```
                                                  HEC-1L INPUT                                                  PAGE  1

        LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

                       * SacCalc, developed by David Ford Consulting Engineers
                       * File generated 04/02/2014 12:58:36
                       *
           1           ID   Post Project Condition for Alternative A
                       * Lag computation for station A-POST
                       *   Lag frequency factor of 1.3 (Table 7-6) for frequency 100 years will be appl
                       *   Basin "n" composition (based on Table 7-1)
                       *              Developed                 Undeveloped
                       *          n   adj n   fract           n   adj n   fract
                       *   ---------------------------------------------------
                       *      0.030  0.0390  0.6906       0.067  0.0670  0.0000
                       *      0.031  0.0403  0.1434       0.070  0.0700  0.0000
                       *      0.032  0.0416  0.0000       0.071  0.0710  0.0000
                       *      0.033  0.0429  0.0000       0.072  0.0720  0.0000
                       *      0.034  0.0442  0.0000       0.073  0.0730  0.0000
                       *      0.035  0.0455  0.0000       0.074  0.0740  0.0000
                       *      0.037  0.0481  0.0000       0.076  0.0760  0.0000
                       *      0.040  0.0520  0.0000       0.080  0.0800  0.0000
                       *      0.042  0.0546  0.0000       0.084  0.0840  0.0000
                       *      0.046  0.0598  0.0000       0.088  0.0880  0.0000
                       *      0.050  0.0650  0.0000       0.090  0.0900  0.0000
                       *      0.053  0.0689  0.0000       0.093  0.0930  0.0000
                       *      0.056  0.0560  0.0000       0.096  0.0960  0.0000
                       *      0.060  0.0600  0.0000       0.100  0.1000  0.0000
                       *      0.065  0.0650  0.1660       0.110  0.1100  0.0000
                       *      0.070  0.0700  0.0000       0.115  0.1150  0.0000
                       *      0.075  0.0750  0.0000       0.120  0.1200  0.0000
                       *      0.080  0.0800  0.0000       0.150  0.1500  0.0000
                       *   ---------------------------------------------------
                       *   Equation (7-1) with L=  0.3172, Lc=  0.1989, S=   52.800, n=0.0435
                       *   Resulting lag:   14.2 minutes
                       * End of lag computations
                       *
                       *   NMIN  JXDATE  JXTIME      NQ            CENT
           2           IT       1 23MAR14    2400    1539                    2000
                       *   IPRT    IPLT
           3           IO       3       0
                       *

           4           KK  A-POST
```

```
                 *  JXMIN    Time interval for input data
 5               IN       5
 6               KM   Alternative A Post Project
                 *
                 * Design storm construction details
                 *
                 * Regional multiplier (zone 2) applied:  1.000
                 * Areal adjustment using area:  0.119
                 *   multiplier from table 4-4: 1.0000
                 *
                 * Adjusted depths for each duration from table 4-1: frequency: 100
                 * Duration----Regional------Elev-----Areal (adjustments)
                 * 5 min         0.4400    0.4400    0.4400
                 * 10 min        0.6200    0.6200    0.6200
                 * 15 min        0.7300    0.7300    0.7300
                 * 30 min        0.9400    0.9400    0.9400
                 * 1 hour        1.2100    1.2100    1.2100
                 * 2 hours       1.5900    1.5900    1.5900
                 * 3 hours       1.8500    1.8500    1.8500
                 * 6 hours       2.5000    2.5000    2.5000
                 * 12 hours      3.3000    3.3000    3.3000
                 * 24 hours      4.2500    4.2500    4.2500
                 * 36 hours      5.0900    5.0900    5.0840
                 * 2 days        5.7000    5.7000    5.7000
                 * 3 days        6.8000    6.8000    6.8000
                 * 5 days        8.4200    8.4200    8.4100
                 * 10 days      11.0100   11.0100   10.9969
                 * Storm duration:  24, length:  288 ordinates
```

```
                                          HEC-1L INPUT                                                PAGE  2

LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

 7               PB       0
 8               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 9               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
10               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
11               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
12               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
13               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
14               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
15               PI  0.0066  0.0066  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
16               PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
17               PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
18               PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0181  0.0181
19               PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
20               PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0217  0.0217  0.0217  0.0217
21               PI  0.0217  0.0217  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0450  0.0450
22               PI  0.0450  0.0700  0.1100  0.4400  0.1800  0.0700  0.0700  0.0450  0.0450  0.0450
23               PI  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0217  0.0217  0.0217  0.0217
24               PI  0.0217  0.0217  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
25               PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
26               PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
27               PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
28               PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
29               PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0066  0.0066  0.0066  0.0066
30               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
31               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
32               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
33               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
34               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
35               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
36               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
                 *
                 * Precipitation losses computation (Chapter 5)
                 *   Computing RTIMP (percent impervious) from land use and table 5-2
                 *   Computing CNSTL (infiltration rate) from soil type and table 5-2
                 *  TAREA   subbasin area (sq mi)
37               BA  0.1188
                 *  STRTL   CNSTL   RTIMP
38               LU    0.10   0.061  78.846
                 *
                 * Runoff hydrograph computation (Chapter 6)
                 *   Using basin lag:  14.2 minutes
                 *   Using unit duration (Step 2): 1. min
                 *   Lag Time + Unit Duration / 2 (Step 3): 14.67028
                 *   Volume of runoff (Step 4) V=    3.194316
39               UI   12.73   29.49   47.57   65.49   88.04  112.98  140.65  170.28  205.86  242.40
40               UI  257.87  260.07  253.45  229.70  201.09  174.36  157.23  140.43  126.62  114.66
41               UI  103.77   94.38   85.95   78.81   72.17   66.59   61.21   56.88   52.86   48.99
42               UI   45.76   42.96   39.74   37.45   35.18   32.99   31.69   30.23   28.67   27.14
43               UI   25.95   24.59   23.50   22.35   21.24   20.25   19.40   18.38   17.43   16.61
44               UI   15.93   15.11   14.37   13.66   13.07   12.49   11.87   11.34   10.80   10.27
45               UI    9.76    9.26    8.78    8.30    7.94    7.58    7.23    6.87    6.52    6.35
46               UI    6.06    5.84    5.48    5.24    5.03    4.75    4.45    4.27    4.09    3.91
47               UI    3.73    3.55    3.38    3.20    3.14    2.97    2.79    2.74
48               ZW   C=FLOW F=100YR-24HR A=WILTON R
49               ZZ
```

```
****************************************                                    ****************************************
*                                      *                                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                    *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                    *    HYDROLOGIC ENGINEERING CENTER     *
```

```
*            VERSION 4.1(L)              *                                                    *          609 SECOND STREET          *
*                                        *                                                    *        DAVIS, CALIFORNIA 95616      *
*  RUN DATE   02APR14  TIME  12:58:36    *                                                    *            (916) 756-1104           *
*                                        *                                                    *                                     *
*****************************************                                                    *****************************************
```

Post Project Condition for Alternative A

```
  3 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           1  MINUTES IN COMPUTATION INTERVAL
                      IDATE     23MAR14  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ        1539  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     25MAR14  ENDING DATE
                     NDTIME        0138  ENDING TIME
                      ICENT          20  CENTURY MARK

                 COMPUTATION INTERVAL    0.02 HOURS
                      TOTAL TIME BASE   25.63 HOURS

         ENGLISH UNITS
              DRAINAGE AREA          SQUARE MILES
              PRECIPITATION DEPTH    INCHES
              LENGTH, ELEVATION      FEET
              FLOW                   CUBIC FEET PER SECOND
              STORAGE VOLUME         ACRE-FEET
              SURFACE AREA           ACRES
              TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
  4 KK     *   A-POST   *
           *            *
           **************
```

Alternative A Post Project

```
  5 IN          TIME DATA FOR INPUT TIME SERIES
                       JXMIN           5  TIME INTERVAL IN MINUTES
                     JXDATE     23MAR14  STARTING DATE
                     JXTIME        2400  STARTING TIME

              SUBBASIN RUNOFF DATA

 37 BA          SUBBASIN CHARACTERISTICS
                      TAREA,       0.12  SUBBASIN AREA

                PRECIPITATION DATA

  7 PB                STORM        4.25  BASIN TOTAL PRECIPITATION

  8 PI            INCREMENTAL PRECIPITATION PATTERN
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
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                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
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                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09
0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

38 LU          UNIFORM LOSS RATE
                    STRTL        0.10  INITIAL LOSS
                    CNSTL        0.06  UNIFORM LOSS RATE
                    RTIMP       78.85  PERCENT IMPERVIOUS AREA

37 UI          INPUT UNITGRAPH,  88 ORDINATES,  VOLUME = 1.00
                    12.7      29.5      47.6      65.5      88.0     113.0     140.6     170.3     205.9     242.4
                   257.9     260.1     253.4     229.7     201.1     174.4     157.2     140.4     126.6     114.7
                   103.8      94.4      85.9      78.8      72.2      66.6      61.2      56.9      52.9      49.0
                    45.8      43.0      39.7      37.5      35.2      33.0      31.7      30.2      28.7      27.1
                    26.0      24.6      23.5      22.4      21.2      20.3      19.4      18.4      17.4      16.6
                    15.9      15.1      14.4      13.7      13.1      12.5      11.9      11.3      10.8      10.3
                     9.8       9.3       8.8       8.3       7.9       7.6       7.2       6.9       6.5       6.3
                     6.1       5.8       5.5       5.2       5.0       4.8       4.4       4.3       4.1       3.9
                     3.7       3.5       3.4       3.2       3.1       3.0       2.8       2.7

                                                                  ***

     ***             ***             ***             ***             ***

                      HYDROGRAPH AT STATION   A-POST

   TOTAL RAINFALL =    4.25, TOTAL LOSS =    0.31, TOTAL EXCESS =    3.94

PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
  (CFS)        (HR)                   6-HR       24-HR       72-HR     25.63-HR
   170.      12.17        (CFS)       31.         13.         12.          12.
                       (INCHES)     2.409       3.924       3.934        3.934
                        (AC-FT)       15.         25.         25.          25.

                       CUMULATIVE AREA =    0.12 SQ MI
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	A-POST	170.	12.17	31.	13.	12.	0.12		

*** NORMAL END OF HEC-1L ***

Index to station computation sections
A-POST

(C) 2001 David Ford Consulting Engineers, Inc.

P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\ALT B\sc.hecout
Jump to: runoff summary | index

```
INPUT  FILENAME ====>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\ALT B\sc.dat
OUTPUT FILENAME ===>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\ALT B\sc.hecout
DSS FILENAME ===>hcalc.dss
```

```
****************************************                                                  ****************************************
*                                      *                                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                                  *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                                  *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                                  *          609 SECOND STREET           *
*                                      *                                                  *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   02APR14  TIME  13:03:58  *                                                  *           (916) 756-1104             *
*                                      *                                                  *                                      *
****************************************                                                  ****************************************
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X     X  XXXXXXX   XXXXX           X   X
X     X  X        X     X         XX   X
X     X  X        X                X   X
XXXXXXX  XXXX     X        XXXXX   X   X
X     X  X        X                X   X
X     X  X        X     X          X   X
X     X  XXXXXXX   XXXXX          XXX  XXXX
```

```
Special version of HEC-1 with Extra-large array
Modified by David Ford Consulting Engineers (2000)
 Program dimensions:
 Number of hydrograph ordinates: 20000
 Unit hydrograph ordinates: 3000
```

```
THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
```

```
                                                HEC-1L INPUT                                                  PAGE  1

 LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

                * SacCalc, developed by David Ford Consulting Engineers
                * File generated 04/02/2014 13:03:58
                *
    1           ID   Post Project Condition for Alternative B
                * Lag computation for station B-POST
                *   Lag frequency factor of 1.3 (Table 7-6) for frequency 100 years will be appl
                *   Basin "n" composition (based on Table 7-1)
                *              Developed                 Undeveloped
                *          n   adj n   fract           n   adj n   fract
                *   ---------------------------------------------------
                *      0.030  0.0390  0.7297       0.067  0.0670  0.0000
                *      0.031  0.0403  0.0939       0.070  0.0700  0.0000
                *      0.032  0.0416  0.0000       0.071  0.0710  0.0000
                *      0.033  0.0429  0.0000       0.072  0.0720  0.0000
                *      0.034  0.0442  0.0000       0.073  0.0730  0.0000
                *      0.035  0.0455  0.0000       0.074  0.0740  0.0000
                *      0.037  0.0481  0.0000       0.076  0.0760  0.0000
                *      0.040  0.0520  0.0000       0.080  0.0800  0.0000
                *      0.042  0.0546  0.0000       0.084  0.0840  0.0000
                *      0.046  0.0598  0.0000       0.088  0.0880  0.0000
                *      0.050  0.0650  0.0000       0.090  0.0900  0.0000
                *      0.053  0.0689  0.0000       0.093  0.0930  0.0000
                *      0.056  0.0560  0.0000       0.096  0.0960  0.0000
                *      0.060  0.0600  0.0000       0.100  0.1000  0.0000
                *      0.065  0.0650  0.1764       0.110  0.1100  0.0000
                *      0.070  0.0700  0.0000       0.115  0.1150  0.0000
                *      0.075  0.0750  0.0000       0.120  0.1200  0.0000
                *      0.080  0.0800  0.0000       0.150  0.1500  0.0000
                *   ---------------------------------------------------
                *   Equation (7-1) with L=  0.3172, Lc=  0.1989, S=   52.800, n=0.0437
                *   Resulting lag:   14.2 minutes
                * End of lag computations
                *
                *   NMIN  JXDATE  JXTIME      NQ            CENT
    2           IT       1 24MAR14    1200    1539                    2000
                *   IPRT    IPLT
    3           IO       3       0
                *

    4           KK  B-POST
```

```
                 *  JXMIN    Time interval for input data
 5               IN       5
 6               KM   Alternative B Post Project
                 *
                 * Design storm construction details
                 *
                 * Regional multiplier (zone 2) applied:  1.000
                 * Areal adjustment using area:  0.119
                 *   multiplier from table 4-4: 1.0000
                 *
                 * Adjusted depths for each duration from table 4-1: frequency: 100
                 * Duration----Regional------Elev-----Areal (adjustments)
                 * 5 min         0.4400    0.4400    0.4400
                 * 10 min        0.6200    0.6200    0.6200
                 * 15 min        0.7300    0.7300    0.7300
                 * 30 min        0.9400    0.9400    0.9400
                 * 1 hour        1.2100    1.2100    1.2100
                 * 2 hours       1.5900    1.5900    1.5900
                 * 3 hours       1.8500    1.8500    1.8500
                 * 6 hours       2.5000    2.5000    2.5000
                 * 12 hours      3.3000    3.3000    3.3000
                 * 24 hours      4.2500    4.2500    4.2500
                 * 36 hours      5.0900    5.0900    5.0840
                 * 2 days        5.7000    5.7000    5.7000
                 * 3 days        6.8000    6.8000    6.8000
                 * 5 days        8.4200    8.4200    8.4100
                 * 10 days      11.0100   11.0100   10.9969
                 * Storm duration:  24, length:  288 ordinates
```

```
                                          HEC-1L INPUT                                                PAGE  2

LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

 7               PB       0
 8               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 9               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
10               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
11               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
12               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
13               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
14               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
15               PI  0.0066  0.0066  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
16               PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
17               PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
18               PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0181  0.0181
19               PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
20               PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0217  0.0217  0.0217  0.0217
21               PI  0.0217  0.0217  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0450  0.0450
22               PI  0.0450  0.0700  0.1100  0.4400  0.1800  0.0700  0.0700  0.0450  0.0450  0.0450
23               PI  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0217  0.0217  0.0217  0.0217
24               PI  0.0217  0.0217  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
25               PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
26               PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
27               PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
28               PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
29               PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0066  0.0066  0.0066  0.0066
30               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
31               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
32               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
33               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
34               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
35               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
36               PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
                 *
                 * Precipitation losses computation (Chapter 5)
                 *   Computing RTIMP (percent impervious) from land use and table 5-2
                 *   Computing CNSTL (infiltration rate) from soil type and table 5-2
                 *  TAREA   subbasin area (sq mi)
37               BA  0.1188
                 *  STRTL   CNSTL   RTIMP
38               LU    0.10   0.061  78.127
                 *
                 * Runoff hydrograph computation (Chapter 6)
                 *   Using basin lag:  14.2 minutes
                 *   Using unit duration (Step 2): 1. min
                 *   Lag Time + Unit Duration / 2 (Step 3): 14.73734
                 *   Volume of runoff (Step 4) V=    3.194316
39               UI   12.60   29.20   47.16   64.72   87.18  111.74  139.08  168.43  203.37  239.73
40               UI  256.28  259.14  252.79  230.46  202.13  175.40  157.72  141.30  127.03  115.25
41               UI  104.18   94.89   86.45   79.09   72.55   66.96   61.56   57.10   53.20   49.26
42               UI   46.00   43.10   40.10   37.77   35.25   33.17   31.85   30.30   28.83   27.28
43               UI   26.03   24.71   23.57   22.50   21.29   20.42   19.49   18.41   17.62   16.72
44               UI   15.94   15.29   14.47   13.77   13.15   12.62   11.96   11.43   10.90   10.37
45               UI    9.84    9.42    8.84    8.38    8.01    7.66    7.30    6.95    6.60    6.37
46               UI    6.15    5.89    5.57    5.28    5.10    4.79    4.55    4.31    4.13    3.96
47               UI    3.78    3.60    3.43    3.25    3.12    3.03    2.85    2.73
48               ZW   C=FLOW F=100YR-24HR A=WILTON R
49               ZZ
```

```
****************************************                                    ****************************************
*                                      *                                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                    *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                    *    HYDROLOGIC ENGINEERING CENTER     *
```

```
*            VERSION 4.1(L)              *                                                    *          609 SECOND STREET          *
*                                        *                                                    *        DAVIS, CALIFORNIA 95616      *
*  RUN DATE   02APR14  TIME  13:03:58    *                                                    *            (916) 756-1104           *
*                                        *                                                    *                                     *
*****************************************                                                    *****************************************
```

Post Project Condition for Alternative B

```
  3 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           1  MINUTES IN COMPUTATION INTERVAL
                      IDATE     24MAR14  STARTING DATE
                      ITIME        1200  STARTING TIME
                         NQ        1539  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     25MAR14  ENDING DATE
                     NDTIME        1338  ENDING TIME
                      ICENT          20  CENTURY MARK

                 COMPUTATION INTERVAL    0.02 HOURS
                      TOTAL TIME BASE   25.63 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
  4 KK      *    B-POST  *
            *            *
            **************
```

Alternative B Post Project

```
  5 IN          TIME DATA FOR INPUT TIME SERIES
                       JXMIN           5  TIME INTERVAL IN MINUTES
                     JXDATE     24MAR14  STARTING DATE
                     JXTIME        1200  STARTING TIME

               SUBBASIN RUNOFF DATA

 37 BA          SUBBASIN CHARACTERISTICS
                      TAREA,        0.12  SUBBASIN AREA

                PRECIPITATION DATA

  7 PB                STORM        4.25  BASIN TOTAL PRECIPITATION

  8 PI            INCREMENTAL PRECIPITATION PATTERN
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
```

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09
0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

```
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 38 LU          UNIFORM LOSS RATE
                     STRTL        0.10  INITIAL LOSS
                     CNSTL        0.06  UNIFORM LOSS RATE
                     RTIMP       78.13  PERCENT IMPERVIOUS AREA

 37 UI          INPUT UNITGRAPH,  88 ORDINATES,  VOLUME = 1.00
                    12.6      29.2      47.2      64.7      87.2     111.7     139.1     168.4     203.4     239.7
                   256.3     259.1     252.8     230.5     202.1     175.4     157.7     141.3     127.0     115.3
                   104.2      94.9      86.4      79.1      72.6      67.0      61.6      57.1      53.2      49.3
                    46.0      43.1      40.1      37.8      35.3      33.2      31.9      30.3      28.8      27.3
                    26.0      24.7      23.6      22.5      21.3      20.4      19.5      18.4      17.6      16.7
                    15.9      15.3      14.5      13.8      13.1      12.6      12.0      11.4      10.9      10.4
                     9.8       9.4       8.8       8.4       8.0       7.7       7.3       6.9       6.6       6.4
                     6.2       5.9       5.6       5.3       5.1       4.8       4.6       4.3       4.1       4.0
                     3.8       3.6       3.4       3.3       3.1       3.0       2.8       2.7

                                                                  ***

     ***             ***             ***             ***             ***

                       HYDROGRAPH AT STATION   B-POST

   TOTAL RAINFALL =    4.25, TOTAL LOSS =    0.33, TOTAL EXCESS =    3.93

PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
  (CFS)        (HR)                   6-HR       24-HR       72-HR     25.63-HR
   170.      12.17        (CFS)       31.         12.         12.          12.
                        (INCHES)     2.405       3.912       3.923        3.923
                         (AC-FT)      15.         25.         25.          25.

                        CUMULATIVE AREA =    0.12 SQ MI
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	B-POST	170.	12.17	31.	12.	12.	0.12		

*** NORMAL END OF HEC-1L ***

Index to station computation sections
B-POST

(C) 2001 David Ford Consulting Engineers, Inc.

P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\ALT C\sc.hecout
Jump to: runoff summary | index

```
INPUT  FILENAME ====>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\ALT C\sc.dat
OUTPUT FILENAME ===>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\ALT C\sc.hecout
DSS FILENAME ===>hcalc.dss
```

```
****************************************                                                  ****************************************
*                                      *                                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                                  *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                                  *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                                  *          609 SECOND STREET           *
*                                      *                                                  *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   02APR14  TIME  13:10:04  *                                                  *           (916) 756-1104             *
*                                      *                                                  *                                      *
****************************************                                                  ****************************************
```

```
X     X  XXXXXXX   XXXXX           X   X
X     X  X        X     X         XX   X
X     X  X        X                X   X
XXXXXXX  XXXX     X        XXXXX   X   X
X     X  X        X                X   X
X     X  X        X     X          X   X
X     X  XXXXXXX   XXXXX          XXX  XXXX
```

```
Special version of HEC-1 with Extra-large array
Modified by David Ford Consulting Engineers (2000)
 Program dimensions:
 Number of hydrograph ordinates: 20000
 Unit hydrograph ordinates: 3000
```

```
THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
```

```
                                                HEC-1L INPUT                                                  PAGE  1

  LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

                 * SacCalc, developed by David Ford Consulting Engineers
                 * File generated 04/02/2014 13:10:04
                 *
     1           ID   Post Condition for Alternative C
                 * Lag computation for station C-POST
                 *   Lag frequency factor of 1.3 (Table 7-6) for frequency 100 years will be appl
                 *   Basin "n" composition (based on Table 7-1)
                 *              Developed                 Undeveloped
                 *          n   adj n   fract           n   adj n   fract
                 *   ---------------------------------------------------
                 *      0.030  0.0390  0.5821       0.067  0.0670  0.0000
                 *      0.031  0.0403  0.1968       0.070  0.0700  0.0000
                 *      0.032  0.0416  0.0000       0.071  0.0710  0.0000
                 *      0.033  0.0429  0.0000       0.072  0.0720  0.0000
                 *      0.034  0.0442  0.0000       0.073  0.0730  0.0000
                 *      0.035  0.0455  0.0000       0.074  0.0740  0.0000
                 *      0.037  0.0481  0.0000       0.076  0.0760  0.0000
                 *      0.040  0.0520  0.0000       0.080  0.0800  0.0000
                 *      0.042  0.0546  0.0000       0.084  0.0840  0.0000
                 *      0.046  0.0598  0.0000       0.088  0.0880  0.0000
                 *      0.050  0.0650  0.0000       0.090  0.0900  0.0000
                 *      0.053  0.0689  0.0000       0.093  0.0930  0.0000
                 *      0.056  0.0560  0.0000       0.096  0.0960  0.0000
                 *      0.060  0.0600  0.0000       0.100  0.1000  0.0000
                 *      0.065  0.0650  0.2211       0.110  0.1100  0.0000
                 *      0.070  0.0700  0.0000       0.115  0.1150  0.0000
                 *      0.075  0.0750  0.0000       0.120  0.1200  0.0000
                 *      0.080  0.0800  0.0000       0.150  0.1500  0.0000
                 *   ---------------------------------------------------
                 *   Equation (7-1) with L=  0.4612, Lc=  0.1847, S=   52.800, n=0.0450
                 *   Resulting lag:   16.2 minutes
                 * End of lag computations
                 *
                 *   NMIN  JXDATE  JXTIME      NQ            CENT
     2           IT       1 24MAR14    1200    1553                    2000
                 *   IPRT    IPLT
     3           IO       3       0
                 *

     4           KK  C-POST
```

```
                 *  JXMIN    Time interval for input data
  5              IN       5
  6              KM   Alternative C Post Project
                 *
                 * Design storm construction details
                 *
                 * Regional multiplier (zone 2) applied:  1.000
                 * Areal adjustment using area:  0.119
                 *   multiplier from table 4-4: 1.0000
                 *
                 * Adjusted depths for each duration from table 4-1: frequency: 100
                 * Duration----Regional------Elev-----Areal (adjustments)
                 * 5 min         0.4400    0.4400    0.4400
                 * 10 min        0.6200    0.6200    0.6200
                 * 15 min        0.7300    0.7300    0.7300
                 * 30 min        0.9400    0.9400    0.9400
                 * 1 hour        1.2100    1.2100    1.2100
                 * 2 hours       1.5900    1.5900    1.5900
                 * 3 hours       1.8500    1.8500    1.8500
                 * 6 hours       2.5000    2.5000    2.5000
                 * 12 hours      3.3000    3.3000    3.3000
                 * 24 hours      4.2500    4.2500    4.2500
                 * 36 hours      5.0900    5.0900    5.0840
                 * 2 days        5.7000    5.7000    5.7000
                 * 3 days        6.8000    6.8000    6.8000
                 * 5 days        8.4200    8.4200    8.4100
                 * 10 days      11.0100   11.0100   10.9969
                 * Storm duration:  24, length:  288 ordinates
```

```
                                          HEC-1L INPUT                                                PAGE  2

LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

  7              PB       0
  8              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
  9              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 10              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 11              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 12              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 13              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 14              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 15              PI  0.0066  0.0066  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 16              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 17              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 18              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0181  0.0181
 19              PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 20              PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0217  0.0217  0.0217  0.0217
 21              PI  0.0217  0.0217  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0450  0.0450
 22              PI  0.0450  0.0700  0.1100  0.4400  0.1800  0.0700  0.0700  0.0450  0.0450  0.0450
 23              PI  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0217  0.0217  0.0217  0.0217
 24              PI  0.0217  0.0217  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 25              PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 26              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 27              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 28              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 29              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0066  0.0066  0.0066  0.0066
 30              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 31              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 32              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 33              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 34              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 35              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 36              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
                 *
                 * Precipitation losses computation (Chapter 5)
                 *   Computing RTIMP (percent impervious) from land use and table 5-2
                 *   Computing CNSTL (infiltration rate) from soil type and table 5-2
                 *  TAREA   subbasin area (sq mi)
 37              BA  0.1188
                 *  STRTL   CNSTL   RTIMP
 38              LU    0.10   0.064  73.454
                 *
                 * Runoff hydrograph computation (Chapter 6)
                 *   Using basin lag:  16.2 minutes
                 *   Using unit duration (Step 2): 1. min
                 *   Lag Time + Unit Duration / 2 (Step 3): 16.68534
                 *   Volume of runoff (Step 4) V=    3.194316
 39              UI    9.45   22.30   36.13   48.22   66.51   82.99  102.94  124.54  147.44  174.06
 40              UI  203.10  223.42  228.49  227.40  221.46  200.26  178.15  157.16  142.33  130.19
 41              UI  116.71  107.77   98.41   90.41   83.14   76.62   70.64   65.71   61.04   56.66
 42              UI   52.75   49.57   46.42   43.41   40.87   38.48   36.41   34.23   32.11   30.72
 43              UI   28.96   27.98   26.79   25.65   24.41   23.34   22.43   21.39   20.60   19.70
 44              UI   18.78   18.11   17.33   16.53   15.99   15.11   14.52   14.01   13.40   12.79
 45              UI   12.24   11.72   11.31   10.81   10.37    9.96    9.54    9.13    8.72    8.41
 46              UI    7.90    7.59    7.24    6.96    6.69    6.41    6.13    5.86    5.66    5.53
 47              UI    5.27    5.10    4.83    4.63    4.49    4.24    4.07    3.85    3.71    3.57
 48              UI    3.44    3.30    3.16    3.02    2.89    2.76    2.73    2.59    2.45    2.41
 49              ZW   C=FLOW F=100YR-24HR A=WILTON R
```

```
                                          HEC-1L INPUT                                                PAGE  3

LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10
```

```
          50          ZZ
```

```
****************************************                                    ****************************************
*                                      *                                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                    *    U.S. ARMY CORPS OF ENGINEERS      *
*             JULY   1998              *                                    *    HYDROLOGIC ENGINEERING CENTER     *
*           VERSION 4.1(L)             *                                    *          609 SECOND STREET           *
*                                      *                                    *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   02APR14  TIME  13:10:04  *                                    *           (916) 756-1104             *
*                                      *                                    *                                      *
****************************************                                    ****************************************
```

```
                         Post Condition for Alternative C

  3 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           1  MINUTES IN COMPUTATION INTERVAL
                      IDATE     24MAR14  STARTING DATE
                      ITIME        1200  STARTING TIME
                         NQ        1553  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     25MAR14  ENDING DATE
                     NDTIME        1352  ENDING TIME
                      ICENT          20  CENTURY MARK

                 COMPUTATION INTERVAL    0.02 HOURS
                      TOTAL TIME BASE   25.87 HOURS

         ENGLISH UNITS
              DRAINAGE AREA         SQUARE MILES
              PRECIPITATION DEPTH   INCHES
              LENGTH, ELEVATION     FEET
              FLOW                  CUBIC FEET PER SECOND
              STORAGE VOLUME        ACRE-FEET
              SURFACE AREA          ACRES
              TEMPERATURE           DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
  4 KK    *   C-POST   *
          *            *
          **************
                         Alternative C Post Project

  5 IN          TIME DATA FOR INPUT TIME SERIES
                      JXMIN           5  TIME INTERVAL IN MINUTES
                     JXDATE     24MAR14  STARTING DATE
                     JXTIME        1200  STARTING TIME

             SUBBASIN RUNOFF DATA

 37 BA          SUBBASIN CHARACTERISTICS
                      TAREA,       0.12  SUBBASIN AREA

                PRECIPITATION DATA

  7 PB                STORM        4.25  BASIN TOTAL PRECIPITATION

  8 PI            INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09
0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
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                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 38 LU          UNIFORM LOSS RATE
                      STRTL        0.10  INITIAL LOSS
                      CNSTL        0.06  UNIFORM LOSS RATE
                      RTIMP       73.45  PERCENT IMPERVIOUS AREA

 37 UI          INPUT UNITGRAPH, 100 ORDINATES,  VOLUME = 1.00
                      9.4      22.3      36.1      48.2      66.5      83.0     102.9     124.5     147.4     174.1
                    203.1     223.4     228.5     227.4     221.5     200.3     178.1     157.2     142.3     130.2
                    116.7     107.8      98.4      90.4      83.1      76.6      70.6      65.7      61.0      56.7
                     52.8      49.6      46.4      43.4      40.9      38.5      36.4      34.2      32.1      30.7
                     29.0      28.0      26.8      25.6      24.4      23.3      22.4      21.4      20.6      19.7
                     18.8      18.1      17.3      16.5      16.0      15.1      14.5      14.0      13.4      12.8
                     12.2      11.7      11.3      10.8      10.4      10.0       9.5       9.1       8.7       8.4
                      7.9       7.6       7.2       7.0       6.7       6.4       6.1       5.9       5.7       5.5
                      5.3       5.1       4.8       4.6       4.5       4.2       4.1       3.8       3.7       3.6
                      3.4       3.3       3.2       3.0       2.9       2.8       2.7       2.6       2.5       2.4

                                                                  ***

    ***             ***             ***             ***             ***

                      HYDROGRAPH AT STATION   C-POST

   TOTAL RAINFALL =    4.25, TOTAL LOSS =    0.41, TOTAL EXCESS =    3.84

PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
  (CFS)       (HR)                   6-HR       24-HR       72-HR     25.87-HR
   159.     12.18        (CFS)       30.         12.         11.          11.
                       (INCHES)     2.383       3.825       3.837        3.837
                        (AC-FT)      15.         24.         24.          24.

                       CUMULATIVE AREA =    0.12 SQ MI
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	C-POST	159.	12.18	30.	12.	11.	0.12		

*** NORMAL END OF HEC-1L ***

Index to station computation sections
C-POST

(C) 2001 David Ford Consulting Engineers, Inc.

P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Pre D-E\SacCalc\sc.hecout Jump to: runoff summary | index

```
INPUT  FILENAME ====>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A\SacCalc\sc.dat
OUTPUT FILENAME ===>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A\SacCalc\sc.hecout
DSS FILENAME ===>hcalc.dss
```

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****************************************                                                  ****************************************
*                                      *                                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                                  *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                                  *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                                  *          609 SECOND STREET           *
*                                      *                                                  *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   23SEP14  TIME  09:56:13  *                                                  *           (916) 756-1104             *
*                                      *                                                  *                                      *
****************************************                                                  ****************************************
```

```
X     X  XXXXXXX   XXXXX           X   X
X     X  X        X     X         XX   X
X     X  X        X                X   X
XXXXXXX  XXXX     X        XXXXX   X   X
X     X  X        X                X   X
X     X  X        X     X          X   X
X     X  XXXXXXX   XXXXX          XXX  XXXX
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```
Special version of HEC-1 with Extra-large array
Modified by David Ford Consulting Engineers (2000)
 Program dimensions:
 Number of hydrograph ordinates: 20000
 Unit hydrograph ordinates: 3000
```

```
  THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

  THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
  THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
  NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
  DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
  KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
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```
                                                HEC-1L INPUT                                                  PAGE  1

 LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

                * SacCalc, developed by David Ford Consulting Engineers
                * File generated 09/23/2014 09:56:13
                *
   1            ID   Pre-Project Condition for Alternative D-E
                * Lag computation for station D-PRE
                *   Lag frequency factor of 1.3 (Table 7-6) for frequency 100 years will be appl
                *   Basin "n" composition (based on Table 7-1)
                *              Developed                 Undeveloped
                *          n   adj n   fract           n   adj n   fract
                *   ----------------------------------------------------
                *      0.030  0.0390  0.0046       0.067  0.0670  0.0000
                *      0.031  0.0403  0.0000       0.070  0.0700  0.0000
                *      0.032  0.0416  0.0000       0.071  0.0710  0.0000
                *      0.033  0.0429  0.0000       0.072  0.0720  0.0000
                *      0.034  0.0442  0.0000       0.073  0.0730  0.0000
                *      0.035  0.0455  0.0000       0.074  0.0740  0.0000
                *      0.037  0.0481  0.0000       0.076  0.0760  0.0000
                *      0.040  0.0520  0.0000       0.080  0.0800  0.0000
                *      0.042  0.0546  0.0000       0.084  0.0840  0.0000
                *      0.046  0.0598  0.0000       0.088  0.0880  0.0000
                *      0.050  0.0650  0.0000       0.090  0.0900  0.0000
                *      0.053  0.0689  0.0157       0.093  0.0930  0.0000
                *      0.056  0.0560  0.0000       0.096  0.0960  0.0000
                *      0.060  0.0600  0.0000       0.100  0.1000  0.0000
                *      0.065  0.0650  0.0000       0.110  0.1100  0.0000
                *      0.070  0.0700  0.9796       0.115  0.1150  0.0000
                *      0.075  0.0750  0.0000       0.120  0.1200  0.0000
                *      0.080  0.0800  0.0000       0.150  0.1500  0.0000
                *   ----------------------------------------------------
                *   Equation (7-1) with L=  0.1894, Lc=  0.1136, S=  105.600, n=0.0698
                *   Resulting lag:   14.2 minutes
                * End of lag computations
                *
                *   NMIN  JXDATE  JXTIME      NQ            CENT
   2            IT       1 24MAR14    1200    1539                    2000
                *   IPRT    IPLT
   3            IO       3       0
                *

   4            KK  D-PRE
                *  JXMIN    Time interval for input data
   5            IN       5
   6            KM   Alternative B Post Project
```

```
*
* Design storm construction details
*
* Regional multiplier (zone 2) applied:  1.000
* Areal adjustment using area:  0.101
*   multiplier from table 4-4: 1.0000
*
* Adjusted depths for each duration from table 4-1: frequency: 100
* Duration----Regional------Elev-----Areal (adjustments)
* 5 min         0.4400    0.4400    0.4400
* 10 min        0.6200    0.6200    0.6200
* 15 min        0.7300    0.7300    0.7300
* 30 min        0.9400    0.9400    0.9400
* 1 hour        1.2100    1.2100    1.2100
* 2 hours       1.5900    1.5900    1.5900
* 3 hours       1.8500    1.8500    1.8500
* 6 hours       2.5000    2.5000    2.5000
* 12 hours      3.3000    3.3000    3.3000
* 24 hours      4.2500    4.2500    4.2500
* 36 hours      5.0900    5.0900    5.0848
* 2 days        5.7000    5.7000    5.7000
* 3 days        6.8000    6.8000    6.8000
* 5 days        8.4200    8.4200    8.4115
* 10 days      11.0100   11.0100   10.9989
* Storm duration:  24, length:  288 ordinates
```

```
                                        HEC-1L INPUT                                                PAGE  2

LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

  7            PB       0
  8            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
  9            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 10            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 11            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 12            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 13            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 14            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 15            PI  0.0066  0.0066  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 16            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 17            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 18            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0181  0.0181
 19            PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 20            PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0217  0.0217  0.0217  0.0217
 21            PI  0.0217  0.0217  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0450  0.0450
 22            PI  0.0450  0.0700  0.1100  0.4400  0.1800  0.0700  0.0700  0.0450  0.0450  0.0450
 23            PI  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0217  0.0217  0.0217  0.0217
 24            PI  0.0217  0.0217  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 25            PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 26            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 27            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 28            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 29            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0066  0.0066  0.0066  0.0066
 30            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 31            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 32            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 33            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 34            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 35            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 36            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
               *
               * Precipitation losses computation (Chapter 5)
               *   Computing RTIMP (percent impervious) from land use and table 5-2
               *   Computing CNSTL (infiltration rate) from soil type and table 5-2
               *  TAREA   subbasin area (sq mi)
 37            BA  0.1013
               *  STRTL   CNSTL   RTIMP
 38            LU    0.10   0.137   4.760
               *
               * Runoff hydrograph computation (Chapter 6)
               *   Using basin lag:  14.2 minutes
               *   Using unit duration (Step 2): 1. min
               *   Lag Time + Unit Duration / 2 (Step 3): 14.72888
               *   Volume of runoff (Step 4) V=    2.722500
 39            UI   10.75   24.92   40.24   55.25   74.39   95.37  118.71  143.75  173.60  204.60
 40            UI  218.60  220.96  215.53  196.34  172.16  149.38  134.37  120.34  108.22   98.16
 41            UI   88.75   80.82   73.63   67.38   61.78   57.03   52.43   48.64   45.31   41.95
 42            UI   39.18   36.72   34.14   32.16   30.03   28.24   27.13   25.82   24.55   23.23
 43            UI   22.18   21.05   20.08   19.16   18.14   17.39   16.60   15.69   15.00   14.24
 44            UI   13.59   13.01   12.32   11.72   11.20   10.74   10.18    9.73    9.28    8.83
 45            UI    8.37    8.01    7.53    7.13    6.82    6.52    6.22    5.91    5.61    5.43
 46            UI    5.23    5.02    4.74    4.49    4.34    4.08    3.87    3.67    3.52    3.37
 47            UI    3.22    3.07    2.92    2.77    2.66    2.58    2.42    2.33
 48            ZW   C=FLOW F=100YR-24HR A=PRE COND
 49            ZZ
```

```
****************************************                                    ****************************************
*                                      *                                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                    *    U.S. ARMY CORPS OF ENGINEERS      *
*             JULY   1998              *                                    *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                    *          609 SECOND STREET           *
*                                      *                                    *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   23SEP14  TIME  09:56:13  *                                    *           (916) 756-1104             *
*                                      *                                    *                                      *
****************************************                                    ****************************************
```

```
                        Pre-Project Condition for Alternative D-E

  3 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           1  MINUTES IN COMPUTATION INTERVAL
                      IDATE     24MAR14  STARTING DATE
                      ITIME        1200  STARTING TIME
                         NQ        1539  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     25MAR14  ENDING DATE
                     NDTIME        1338  ENDING TIME
                      ICENT          20  CENTURY MARK

                 COMPUTATION INTERVAL    0.02 HOURS
                      TOTAL TIME BASE   25.63 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
             LENGTH, ELEVATION     FEET
             FLOW                  CUBIC FEET PER SECOND
             STORAGE VOLUME        ACRE-FEET
             SURFACE AREA          ACRES
             TEMPERATURE           DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
  4 KK    *    D-PRE   *
          *            *
          **************
                        Alternative B Post Project

  5 IN          TIME DATA FOR INPUT TIME SERIES
                      JXMIN           5  TIME INTERVAL IN MINUTES
                     JXDATE     24MAR14  STARTING DATE
                     JXTIME        1200  STARTING TIME

             SUBBASIN RUNOFF DATA

 37 BA          SUBBASIN CHARACTERISTICS
                      TAREA,       0.10  SUBBASIN AREA

                PRECIPITATION DATA

  7 PB                STORM        4.25  BASIN TOTAL PRECIPITATION

  8 PI            INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
```

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09
0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

```
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 38 LU          UNIFORM LOSS RATE
                     STRTL        0.10  INITIAL LOSS
                     CNSTL        0.14  UNIFORM LOSS RATE
                     RTIMP        4.76  PERCENT IMPERVIOUS AREA

 37 UI          INPUT UNITGRAPH,  88 ORDINATES,  VOLUME = 1.00
                    10.8      24.9      40.2      55.3      74.4      95.4     118.7     143.8     173.6     204.6
                   218.6     221.0     215.5     196.3     172.2     149.4     134.4     120.3     108.2      98.2
                    88.8      80.8      73.6      67.4      61.8      57.0      52.4      48.6      45.3      42.0
                    39.2      36.7      34.1      32.2      30.0      28.2      27.1      25.8      24.5      23.2
                    22.2      21.0      20.1      19.2      18.1      17.4      16.6      15.7      15.0      14.2
                    13.6      13.0      12.3      11.7      11.2      10.7      10.2       9.7       9.3       8.8
                     8.4       8.0       7.5       7.1       6.8       6.5       6.2       5.9       5.6       5.4
                     5.2       5.0       4.7       4.5       4.3       4.1       3.9       3.7       3.5       3.4
                     3.2       3.1       2.9       2.8       2.7       2.6       2.4       2.3

                                                                  ***

     ***            ***            ***            ***            ***

                       HYDROGRAPH AT STATION   D-PRE

   TOTAL RAINFALL =    4.25, TOTAL LOSS =    2.45, TOTAL EXCESS =    1.80

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
   (CFS)       (HR)                   6-HR       24-HR       72-HR     25.63-HR
     137.     12.17       (CFS)       19.          5.          5.           5.
                       (INCHES)     1.703       1.800       1.800        1.800
                        (AC-FT)        9.         10.         10.          10.

                        CUMULATIVE AREA =    0.10 SQ MI
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	D-PRE	137.	12.17	19.	5.	5.	0.10		

*** NORMAL END OF HEC-1L ***

Index to station computation sections
D-PRE

(C) 2001 David Ford Consulting Engineers, Inc.

P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative D\SacCalc\sc.hecout
Jump to: runoff summary | index

```
INPUT  FILENAME ====>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A\SacCalc\sc.dat
OUTPUT FILENAME ===>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A\SacCalc\sc.hecout
DSS FILENAME ===>hcalc.dss
```

```
****************************************                                                  ****************************************
*                                      *                                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                                  *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                                  *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                                  *          609 SECOND STREET           *
*                                      *                                                  *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   23SEP14  TIME  09:58:22  *                                                  *           (916) 756-1104             *
*                                      *                                                  *                                      *
****************************************                                                  ****************************************
```

```
X     X  XXXXXXX   XXXXX           X   X
X     X  X        X     X         XX   X
X     X  X        X                X   X
XXXXXXX  XXXX     X        XXXXX   X   X
X     X  X        X                X   X
X     X  X        X     X          X   X
X     X  XXXXXXX   XXXXX          XXX  XXXX
```

```
Special version of HEC-1 with Extra-large array
Modified by David Ford Consulting Engineers (2000)
 Program dimensions:
 Number of hydrograph ordinates: 20000
 Unit hydrograph ordinates: 3000
```

```
THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
```

```
                                                HEC-1L INPUT                                                  PAGE  1

 LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

                * SacCalc, developed by David Ford Consulting Engineers
                * File generated 09/23/2014 09:58:22
                *
   1            ID   Post Project Condition for Alternative D
                * Lag computation for station D-POST
                *   Lag frequency factor of 1.3 (Table 7-6) for frequency 100 years will be appl
                *   Basin "n" composition (based on Table 7-1)
                *              Developed                 Undeveloped
                *          n   adj n   fract           n   adj n   fract
                *   ----------------------------------------------------
                *      0.030  0.0390  0.5262       0.067  0.0670  0.0000
                *      0.031  0.0403  0.1188       0.070  0.0700  0.0000
                *      0.032  0.0416  0.0000       0.071  0.0710  0.0000
                *      0.033  0.0429  0.0000       0.072  0.0720  0.0000
                *      0.034  0.0442  0.0000       0.073  0.0730  0.0000
                *      0.035  0.0455  0.0000       0.074  0.0740  0.0000
                *      0.037  0.0481  0.0000       0.076  0.0760  0.0000
                *      0.040  0.0520  0.0000       0.080  0.0800  0.0000
                *      0.042  0.0546  0.0000       0.084  0.0840  0.0000
                *      0.046  0.0598  0.0000       0.088  0.0880  0.0000
                *      0.050  0.0650  0.0000       0.090  0.0900  0.0000
                *      0.053  0.0689  0.0000       0.093  0.0930  0.0000
                *      0.056  0.0560  0.0000       0.096  0.0960  0.0000
                *      0.060  0.0600  0.0000       0.100  0.1000  0.0000
                *      0.065  0.0650  0.0000       0.110  0.1100  0.0000
                *      0.070  0.0700  0.3549       0.115  0.1150  0.0000
                *      0.075  0.0750  0.0000       0.120  0.1200  0.0000
                *      0.080  0.0800  0.0000       0.150  0.1500  0.0000
                *   ----------------------------------------------------
                *   Equation (7-1) with L=  0.2557, Lc=  0.1231, S=   52.800, n=0.0502
                *   Resulting lag:   13.0 minutes
                * End of lag computations
                *
                *   NMIN  JXDATE  JXTIME      NQ            CENT
   2            IT       1 24MAR14    1200    1530                    2000
                *   IPRT    IPLT
   3            IO       3       0
                *

   4            KK  D-POST
                *  JXMIN    Time interval for input data
   5            IN       5
   6            KM   Post Project Alternative D
```

```
*
* Design storm construction details
*
* Regional multiplier (zone 2) applied:  1.000
* Areal adjustment using area:  0.101
*   multiplier from table 4-4: 1.0000
*
* Adjusted depths for each duration from table 4-1: frequency: 100
* Duration----Regional------Elev-----Areal (adjustments)
* 5 min         0.4400    0.4400    0.4400
* 10 min        0.6200    0.6200    0.6200
* 15 min        0.7300    0.7300    0.7300
* 30 min        0.9400    0.9400    0.9400
* 1 hour        1.2100    1.2100    1.2100
* 2 hours       1.5900    1.5900    1.5900
* 3 hours       1.8500    1.8500    1.8500
* 6 hours       2.5000    2.5000    2.5000
* 12 hours      3.3000    3.3000    3.3000
* 24 hours      4.2500    4.2500    4.2500
* 36 hours      5.0900    5.0900    5.0848
* 2 days        5.7000    5.7000    5.7000
* 3 days        6.8000    6.8000    6.8000
* 5 days        8.4200    8.4200    8.4115
* 10 days      11.0100   11.0100   10.9989
* Storm duration:  24, length:  288 ordinates
```

```
                                    HEC-1L INPUT                                          PAGE  2

LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

  7           PB       0
  8           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
  9           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 10           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 11           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 12           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 13           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 14           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 15           PI  0.0066  0.0066  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 16           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 17           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 18           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0181  0.0181
 19           PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 20           PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0217  0.0217  0.0217  0.0217
 21           PI  0.0217  0.0217  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0450  0.0450
 22           PI  0.0450  0.0700  0.1100  0.4400  0.1800  0.0700  0.0700  0.0450  0.0450  0.0450
 23           PI  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0217  0.0217  0.0217  0.0217
 24           PI  0.0217  0.0217  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 25           PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 26           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 27           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 28           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 29           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0066  0.0066  0.0066  0.0066
 30           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 31           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 32           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 33           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 34           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 35           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 36           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
              *
              * Precipitation losses computation (Chapter 5)
              *   Computing RTIMP (percent impervious) from land use and table 5-2
              *   Computing CNSTL (infiltration rate) from soil type and table 5-2
              *  TAREA   subbasin area (sq mi)
 37           BA  0.1013
              *  STRTL   CNSTL   RTIMP
 38           LU    0.10   0.116  62.432
              *
              * Runoff hydrograph computation (Chapter 6)
              *   Using basin lag:  13.0 minutes
              *   Using unit duration (Step 2): 1. min
              *   Lag Time + Unit Duration / 2 (Step 3): 13.48852
              *   Volume of runoff (Step 4) V=    2.722500
 39           UI   13.13   30.12   47.52   69.04   91.33  117.66  147.18  180.51  217.89  238.08
 40           UI  241.23  234.54  209.25  180.34  155.80  139.91  122.77  111.03   99.07   89.65
 41           UI   80.94   73.45   66.83   61.19   55.87   51.76   47.51   44.04   40.81   38.07
 42           UI   35.53   32.87   30.76   29.41   27.94   26.35   24.84   23.64   22.31   21.29
 43           UI   20.04   19.14   18.16   17.11   16.22   15.38   14.73   13.84   13.13   12.42
 44           UI   11.89   11.23   10.69   10.15    9.61    9.07    8.59    8.11    7.63    7.27
 45           UI    6.92    6.56    6.20    5.95    5.72    5.47    5.12    4.87    4.65    4.38
 46           UI    4.08    3.90    3.73    3.55    3.37    3.19    3.01    2.91    2.77    2.59
 47           ZW   C=FLOW F=100YR-24HR A=WILTON R
 48           ZZ
```

```
****************************************                    ****************************************
*                                      *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                    *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                    *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                    *          609 SECOND STREET           *
*                                      *                    *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   23SEP14  TIME  09:58:22  *                    *           (916) 756-1104             *
*                                      *                    *                                      *
****************************************                    ****************************************
```

```
                        Post Project Condition for Alternative D

  3 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           1  MINUTES IN COMPUTATION INTERVAL
                      IDATE     24MAR14  STARTING DATE
                      ITIME        1200  STARTING TIME
                         NQ        1530  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     25MAR14  ENDING DATE
                     NDTIME        1329  ENDING TIME
                      ICENT          20  CENTURY MARK

                 COMPUTATION INTERVAL    0.02 HOURS
                      TOTAL TIME BASE   25.48 HOURS

          ENGLISH UNITS
               DRAINAGE AREA         SQUARE MILES
               PRECIPITATION DEPTH   INCHES
               LENGTH, ELEVATION     FEET
               FLOW                  CUBIC FEET PER SECOND
               STORAGE VOLUME        ACRE-FEET
               SURFACE AREA          ACRES
               TEMPERATURE           DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
  4 KK      *    D-POST  *
            *            *
            **************
                        Post Project Alternative D

  5 IN          TIME DATA FOR INPUT TIME SERIES
                      JXMIN           5  TIME INTERVAL IN MINUTES
                     JXDATE     24MAR14  STARTING DATE
                     JXTIME        1200  STARTING TIME

               SUBBASIN RUNOFF DATA

 37 BA          SUBBASIN CHARACTERISTICS
                      TAREA,       0.10  SUBBASIN AREA

                PRECIPITATION DATA

  7 PB                STORM        4.25  BASIN TOTAL PRECIPITATION

  8 PI            INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09
0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 38 LU          UNIFORM LOSS RATE
                     STRTL        0.10  INITIAL LOSS
                     CNSTL        0.12  UNIFORM LOSS RATE
                     RTIMP       62.43  PERCENT IMPERVIOUS AREA

 37 UI          INPUT UNITGRAPH,  80 ORDINATES,  VOLUME = 1.00
                    13.1      30.1      47.5      69.0      91.3     117.7     147.2     180.5     217.9     238.1
                   241.2     234.5     209.3     180.3     155.8     139.9     122.8     111.0      99.1      89.7
                    80.9      73.4      66.8      61.2      55.9      51.8      47.5      44.0      40.8      38.1
                    35.5      32.9      30.8      29.4      27.9      26.4      24.8      23.6      22.3      21.3
                    20.0      19.1      18.2      17.1      16.2      15.4      14.7      13.8      13.1      12.4
                    11.9      11.2      10.7      10.1       9.6       9.1       8.6       8.1       7.6       7.3
                     6.9       6.6       6.2       5.9       5.7       5.5       5.1       4.9       4.7       4.4
                     4.1       3.9       3.7       3.5       3.4       3.2       3.0       2.9       2.8       2.6

                                                                   ***

     ***            ***            ***            ***            ***

                       HYDROGRAPH AT STATION   D-POST

   TOTAL RAINFALL =    4.25, TOTAL LOSS =    0.88, TOTAL EXCESS =    3.37

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
   (CFS)       (HR)                  6-HR       24-HR       72-HR     25.48-HR
     150.     12.15       (CFS)       24.          9.          9.           9.
                       (INCHES)     2.223       3.358       3.366        3.366
                        (AC-FT)       12.         18.         18.          18.

                        CUMULATIVE AREA =    0.10 SQ MI
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	D-POST	150.	12.15	24.	9.	9.	0.10		

*** NORMAL END OF HEC-1L ***

Index to station computation sections
D-POST

(C) 2001 David Ford Consulting Engineers, Inc.

P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative E\SacCalc\sc.hecout
Jump to: runoff summary | inde

```
INPUT  FILENAME ====>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A\SacCalc\sc.dat
OUTPUT FILENAME ===>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A\SacCalc\sc.hecout
DSS FILENAME ===>hcalc.dss
```

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****************************************                                                  ****************************************
*                                      *                                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                                  *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                                  *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                                  *          609 SECOND STREET           *
*                                      *                                                  *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   23SEP14  TIME  09:59:34  *                                                  *           (916) 756-1104             *
*                                      *                                                  *                                      *
****************************************                                                  ****************************************
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                                                X     X  XXXXXXX   XXXXX           X   X
                                                X     X  X        X     X         XX   X
                                                X     X  X        X                X   X
                                                XXXXXXX  XXXX     X        XXXXX   X   X
                                                X     X  X        X                X   X
                                                X     X  X        X     X          X   X
                                                X     X  XXXXXXX   XXXXX          XXX  XXXX

        Special version of HEC-1 with Extra-large array
        Modified by David Ford Consulting Engineers (2000)
         Program dimensions:
         Number of hydrograph ordinates: 20000
         Unit hydrograph ordinates: 3000


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
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                                                  HEC-1L INPUT                                                  PAGE  1

        LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

                       * SacCalc, developed by David Ford Consulting Engineers
                       * File generated 09/23/2014 09:59:34
                       *
           1           ID   Post Project Condition for Alternative E
                       * Lag computation for station E-POST
                       *   Lag frequency factor of 1.3 (Table 7-6) for frequency 100 years will be appl
                       *   Basin "n" composition (based on Table 7-1)
                       *              Developed                 Undeveloped
                       *          n   adj n   fract           n   adj n   fract
                       *   ---------------------------------------------------
                       *      0.030  0.0390  0.5108       0.067  0.0670  0.0000
                       *      0.031  0.0403  0.0880       0.070  0.0700  0.0000
                       *      0.032  0.0416  0.0000       0.071  0.0710  0.0000
                       *      0.033  0.0429  0.0000       0.072  0.0720  0.0000
                       *      0.034  0.0442  0.0000       0.073  0.0730  0.0000
                       *      0.035  0.0455  0.0000       0.074  0.0740  0.0000
                       *      0.037  0.0481  0.0000       0.076  0.0760  0.0000
                       *      0.040  0.0520  0.0000       0.080  0.0800  0.0000
                       *      0.042  0.0546  0.0000       0.084  0.0840  0.0000
                       *      0.046  0.0598  0.0000       0.088  0.0880  0.0000
                       *      0.050  0.0650  0.0000       0.090  0.0900  0.0000
                       *      0.053  0.0689  0.0000       0.093  0.0930  0.0000
                       *      0.056  0.0560  0.0000       0.096  0.0960  0.0000
                       *      0.060  0.0600  0.0000       0.100  0.1000  0.0000
                       *      0.065  0.0650  0.0000       0.110  0.1100  0.0000
                       *      0.070  0.0700  0.4012       0.115  0.1150  0.0000
                       *      0.075  0.0750  0.0000       0.120  0.1200  0.0000
                       *      0.080  0.0800  0.0000       0.150  0.1500  0.0000
                       *   ---------------------------------------------------
                       *   Equation (7-1) with L=  0.2557, Lc=  0.1231, S=   52.800, n=0.0516
                       *   Resulting lag:   13.3 minutes
                       * End of lag computations
                       *
                       *   NMIN  JXDATE  JXTIME      NQ            CENT
           2           IT       1 24MAR14    1200    1533                    2000
                       *   IPRT    IPLT
           3           IO       3       0
                       *

           4           KK  E-POST
                       *  JXMIN    Time interval for input data
           5           IN       5
           6           KM   Post Project Alternative E
```

```
*
* Design storm construction details
*
* Regional multiplier (zone 2) applied:  1.000
* Areal adjustment using area:  0.101
*   multiplier from table 4-4: 1.0000
*
* Adjusted depths for each duration from table 4-1: frequency: 100
* Duration----Regional------Elev-----Areal (adjustments)
* 5 min         0.4400    0.4400    0.4400
* 10 min        0.6200    0.6200    0.6200
* 15 min        0.7300    0.7300    0.7300
* 30 min        0.9400    0.9400    0.9400
* 1 hour        1.2100    1.2100    1.2100
* 2 hours       1.5900    1.5900    1.5900
* 3 hours       1.8500    1.8500    1.8500
* 6 hours       2.5000    2.5000    2.5000
* 12 hours      3.3000    3.3000    3.3000
* 24 hours      4.2500    4.2500    4.2500
* 36 hours      5.0900    5.0900    5.0848
* 2 days        5.7000    5.7000    5.7000
* 3 days        6.8000    6.8000    6.8000
* 5 days        8.4200    8.4200    8.4115
* 10 days      11.0100   11.0100   10.9989
* Storm duration:  24, length:  288 ordinates
```

```
                                        HEC-1L INPUT                                                PAGE  2

LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

  7           PB       0
  8           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
  9           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 10           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 11           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 12           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 13           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 14           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 15           PI  0.0066  0.0066  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 16           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 17           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 18           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0181  0.0181
 19           PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 20           PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0217  0.0217  0.0217  0.0217
 21           PI  0.0217  0.0217  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0450  0.0450
 22           PI  0.0450  0.0700  0.1100  0.4400  0.1800  0.0700  0.0700  0.0450  0.0450  0.0450
 23           PI  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0217  0.0217  0.0217  0.0217
 24           PI  0.0217  0.0217  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 25           PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 26           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 27           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 28           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 29           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0066  0.0066  0.0066  0.0066
 30           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 31           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 32           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 33           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 34           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 35           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 36           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
              *
              * Precipitation losses computation (Chapter 5)
              *   Computing RTIMP (percent impervious) from land use and table 5-2
              *   Computing CNSTL (infiltration rate) from soil type and table 5-2
              *  TAREA   subbasin area (sq mi)
 37           BA  0.1013
              *  STRTL   CNSTL   RTIMP
 38           LU    0.10   0.117  58.502
              *
              * Runoff hydrograph computation (Chapter 6)
              *   Using basin lag:  13.3 minutes
              *   Using unit duration (Step 2): 1. min
              *   Lag Time + Unit Duration / 2 (Step 3): 13.84977
              *   Volume of runoff (Step 4) V=    2.722500
 39           UI   12.37   28.46   45.20   64.61   85.69  110.51  138.01  168.54  204.19  229.72
 40           UI  235.53  231.00  213.15  185.98  159.95  142.68  126.66  113.63  102.12   92.13
 41           UI   83.35   75.26   69.08   63.05   57.68   53.06   49.33   45.33   42.13   39.25
 42           UI   36.41   34.11   31.82   29.77   28.49   27.14   25.61   24.18   23.05   21.78
 43           UI   20.82   19.63   18.79   17.79   16.76   16.04   15.16   14.43   13.73   13.00
 44           UI   12.31   11.76   11.19   10.62   10.11    9.60    9.09    8.67    8.09    7.67
 45           UI    7.29    6.95    6.61    6.27    5.93    5.74    5.48    5.26    4.92    4.71
 46           UI    4.48    4.25    3.96    3.79    3.62    3.45    3.28    3.11    2.94    2.83
 47           UI    2.72    2.55    2.48
 48           ZW   C=FLOW F=100YR-24HR A=WILTON R
 49           ZZ
```

```
****************************************                    ****************************************
*                                      *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                    *    U.S. ARMY CORPS OF ENGINEERS      *
*             JULY   1998              *                    *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                    *          609 SECOND STREET           *
*                                      *                    *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   23SEP14  TIME  09:59:34  *                    *           (916) 756-1104             *
*                                      *                    *                                      *
****************************************                    ****************************************
```

```
                        Post Project Condition for Alternative E

  3 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           1  MINUTES IN COMPUTATION INTERVAL
                      IDATE     24MAR14  STARTING DATE
                      ITIME        1200  STARTING TIME
                         NQ        1533  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     25MAR14  ENDING DATE
                     NDTIME        1332  ENDING TIME
                      ICENT          20  CENTURY MARK

                 COMPUTATION INTERVAL    0.02 HOURS
                      TOTAL TIME BASE   25.53 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
             LENGTH, ELEVATION     FEET
             FLOW                  CUBIC FEET PER SECOND
             STORAGE VOLUME        ACRE-FEET
             SURFACE AREA          ACRES
             TEMPERATURE           DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
  4 KK    *    E-POST  *
          *            *
          **************
                        Post Project Alternative E

  5 IN          TIME DATA FOR INPUT TIME SERIES
                      JXMIN           5  TIME INTERVAL IN MINUTES
                     JXDATE     24MAR14  STARTING DATE
                     JXTIME        1200  STARTING TIME

             SUBBASIN RUNOFF DATA

 37 BA          SUBBASIN CHARACTERISTICS
                      TAREA,       0.10  SUBBASIN AREA

                PRECIPITATION DATA

  7 PB                STORM        4.25  BASIN TOTAL PRECIPITATION

  8 PI            INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
```

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09
0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

```
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 38 LU          UNIFORM LOSS RATE
                     STRTL        0.10  INITIAL LOSS
                     CNSTL        0.12  UNIFORM LOSS RATE
                     RTIMP       58.50  PERCENT IMPERVIOUS AREA

 37 UI          INPUT UNITGRAPH,  83 ORDINATES,  VOLUME = 1.00
                    12.4      28.5      45.2      64.6      85.7     110.5     138.0     168.5     204.2     229.7
                   235.5     231.0     213.1     186.0     159.9     142.7     126.7     113.6     102.1      92.1
                    83.3      75.3      69.1      63.0      57.7      53.1      49.3      45.3      42.1      39.3
                    36.4      34.1      31.8      29.8      28.5      27.1      25.6      24.2      23.0      21.8
                    20.8      19.6      18.8      17.8      16.8      16.0      15.2      14.4      13.7      13.0
                    12.3      11.8      11.2      10.6      10.1       9.6       9.1       8.7       8.1       7.7
                     7.3       6.9       6.6       6.3       5.9       5.7       5.5       5.3       4.9       4.7
                     4.5       4.3       4.0       3.8       3.6       3.5       3.3       3.1       2.9       2.8
                     2.7       2.5       2.5

                                                                  ***

     ***            ***            ***            ***            ***

                       HYDROGRAPH AT STATION   E-POST

   TOTAL RAINFALL =    4.25, TOTAL LOSS =    0.98, TOTAL EXCESS =    3.27

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
   (CFS)       (HR)                   6-HR       24-HR       72-HR     25.53-HR
     148.     12.15       (CFS)       24.          9.          8.           8.
                       (INCHES)     2.195       3.264       3.271        3.271
                        (AC-FT)       12.         18.         18.          18.

                        CUMULATIVE AREA =    0.10 SQ MI
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	E-POST	148.	12.15	24.	9.	8.	0.10		

*** NORMAL END OF HEC-1L ***

Index to station computation sections
E-POST

(C) 2001 David Ford Consulting Engineers, Inc.

NORTHERN RAILROAD BRIDGE CULVERT

RR CULVERT CAPACITY

SUMMIT

PROJECT NO. 2014014 DATE 5-5-2015
BY EM CHK JLG SHT NO. ____ OF ____

OFFSITE DRAINAGE

2, 24" CONC. CULVERTS S = 0.50% n = 0.013

LIMIT OF OBJECTIONABLE BACKWATER = HWY 99 ROAD WITHOUT OVERTOPPING
= 2 FT ABOVE TOP OF CULVERTS

HYDRAFLOW RESULT: Q = 51 cfs

	SE PORTION	SW PORTION	24" CULVERTS	TOTAL
ALT A	33 cfs	36 cfs	51 cfs	120 cfs
ALT B	33 cfs	36 cfs	51 cfs	120 cfs
ALT C	92 cfs	33 cfs	51 cfs	176 cfs

Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Monday, Sep 22 2014

Circular Culvert

Invert Elev Dn (ft)	=	1.00
Pipe Length (ft)	=	41.00
Slope (%)	=	0.51
Invert Elev Up (ft)	=	1.21
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	2
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

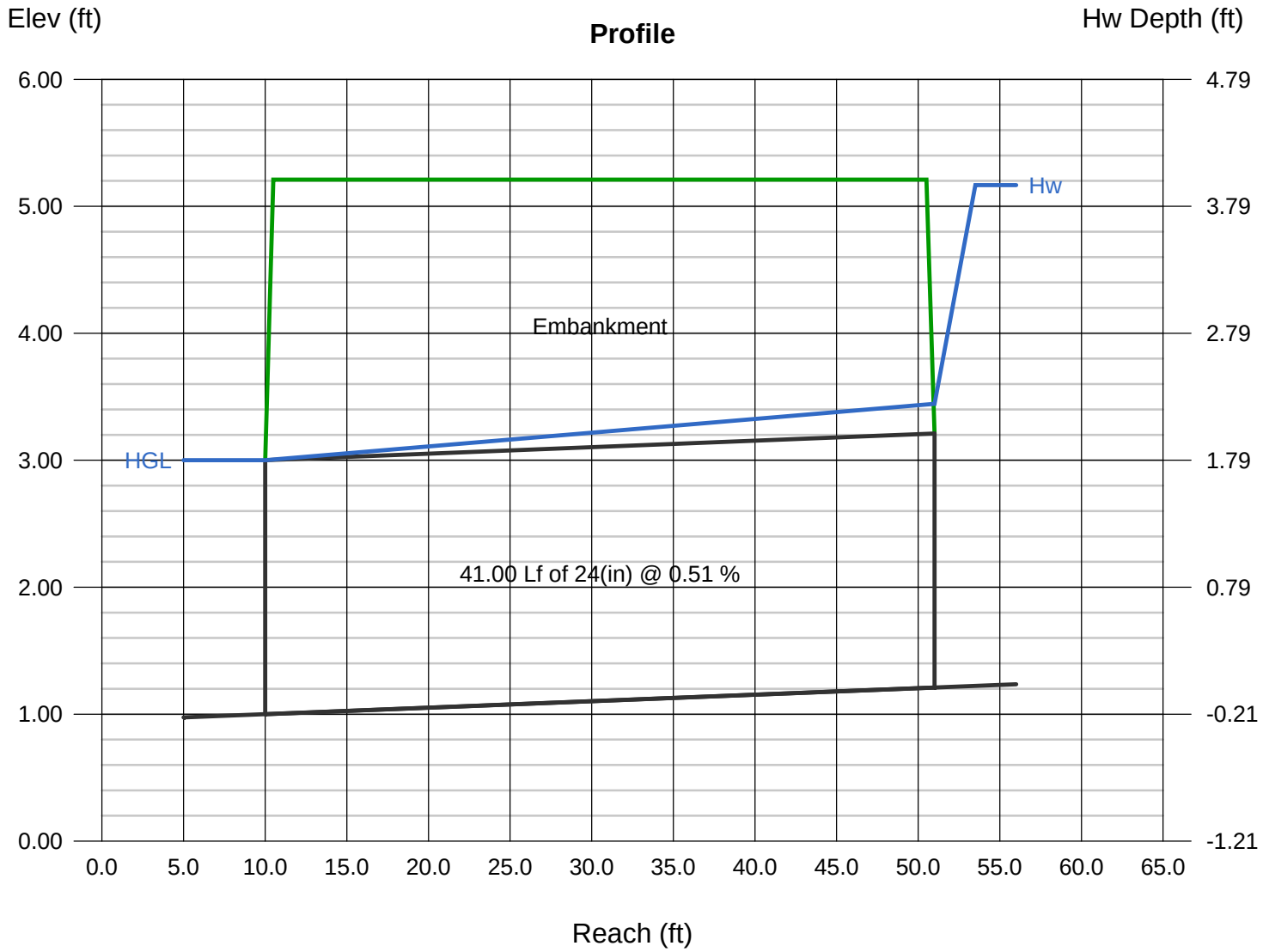
Top Elevation (ft)	=	5.21
Top Width (ft)	=	40.00
Crest Width (ft)	=	40.00

Calculations

Qmin (cfs)	=	0.00
Qmax (cfs)	=	55.00
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	51.00
Qpipe (cfs)	=	51.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	8.12
Veloc Up (ft/s)	=	8.12
HGL Dn (ft)	=	3.00
HGL Up (ft)	=	3.44
Hw Elev (ft)	=	5.17
Hw/D (ft)	=	1.98
Flow Regime	=	Inlet Control



P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\PRE A-C\sc.hecout
Jump to: runoff summary | index

```
INPUT  FILENAME ====>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\PRE A-C\sc.dat
OUTPUT FILENAME ===>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\PRE A-C\sc.hecout
DSS FILENAME ===>hcalc.dss
```

```
****************************************                                                  ****************************************
*                                      *                                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                                  *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                                  *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                                  *          609 SECOND STREET           *
*                                      *                                                  *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   02APR14  TIME  15:17:21  *                                                  *           (916) 756-1104             *
*                                      *                                                  *                                      *
****************************************                                                  ****************************************
```

```
X     X  XXXXXXX   XXXXX           X   X
X     X  X        X     X         XX   X
X     X  X        X                X   X
XXXXXXX  XXXX     X        XXXXX   X   X
X     X  X        X                X   X
X     X  X        X     X          X   X
X     X  XXXXXXX   XXXXX          XXX  XXXX
```

```
Special version of HEC-1 with Extra-large array
Modified by David Ford Consulting Engineers (2000)
 Program dimensions:
 Number of hydrograph ordinates: 20000
 Unit hydrograph ordinates: 3000
```

```
THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
```

```
                                                HEC-1L INPUT                                                PAGE  1

 LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

                * SacCalc, developed by David Ford Consulting Engineers
                * File generated 04/02/2014 15:17:21
                *
    1           ID   Pre-Project Condition for Alternative A-C
                * Lag computation for station PRE
                *   Lag frequency factor of 1.3 (Table 7-6) for frequency 100 years will be appl
                *   Basin "n" composition (based on Table 7-1)
                *              Developed                 Undeveloped
                *          n   adj n   fract           n   adj n   fract
                *   ----------------------------------------------------
                *      0.030  0.0390  0.0000       0.067  0.0670  0.0000
                *      0.031  0.0403  0.0000       0.070  0.0700  0.0000
                *      0.032  0.0416  0.0000       0.071  0.0710  0.0000
                *      0.033  0.0429  0.0000       0.072  0.0720  0.0000
                *      0.034  0.0442  0.0000       0.073  0.0730  0.0000
                *      0.035  0.0455  0.0000       0.074  0.0740  0.0000
                *      0.037  0.0481  0.0000       0.076  0.0760  0.0000
                *      0.040  0.0520  0.0000       0.080  0.0800  0.0000
                *      0.042  0.0546  0.0000       0.084  0.0840  0.0000
                *      0.046  0.0598  0.0000       0.088  0.0880  0.0000
                *      0.050  0.0650  0.0000       0.090  0.0900  0.0000
                *      0.053  0.0689  0.0000       0.093  0.0930  0.0000
                *      0.056  0.0560  0.0000       0.096  0.0960  0.0000
                *      0.060  0.0600  0.0000       0.100  0.1000  0.0000
                *      0.065  0.0650  0.0000       0.110  0.1100  0.0000
                *      0.070  0.0700  0.0051       0.115  0.1150  0.9945
                *      0.075  0.0750  0.0000       0.120  0.1200  0.0000
                *      0.080  0.0800  0.0000       0.150  0.1500  0.0000
                *   ----------------------------------------------------
                *   Equation (7-1) with L=  0.3314, Lc=  0.1705, S=   15.840, n=0.1147
                *   Resulting lag:   44.0 minutes
                * End of lag computations
                *
                *   NMIN  JXDATE  JXTIME      NQ            CENT
    2           IT       1 23MAR14    2400    1747                    2000
                *   IPRT    IPLT
    3           IO       3       0
                *

    4           KK  PRE
```

```
                 *  JXMIN    Time interval for input data
  5              IN       5
  6              KM   Pre-Project Alternative A-C
                 *
                 * Design storm construction details
                 *
                 * Regional multiplier (zone 2) applied:  1.000
                 * Areal adjustment using area:  0.119
                 *   multiplier from table 4-4: 1.0000
                 *
                 * Adjusted depths for each duration from table 4-1: frequency: 100
                 * Duration----Regional------Elev-----Areal (adjustments)
                 * 5 min         0.4400    0.4400    0.4400
                 * 10 min        0.6200    0.6200    0.6200
                 * 15 min        0.7300    0.7300    0.7300
                 * 30 min        0.9400    0.9400    0.9400
                 * 1 hour        1.2100    1.2100    1.2100
                 * 2 hours       1.5900    1.5900    1.5900
                 * 3 hours       1.8500    1.8500    1.8500
                 * 6 hours       2.5000    2.5000    2.5000
                 * 12 hours      3.3000    3.3000    3.3000
                 * 24 hours      4.2500    4.2500    4.2500
                 * 36 hours      5.0900    5.0900    5.0840
                 * 2 days        5.7000    5.7000    5.7000
                 * 3 days        6.8000    6.8000    6.8000
                 * 5 days        8.4200    8.4200    8.4100
                 * 10 days      11.0100   11.0100   10.9969
                 * Storm duration:  24, length:  288 ordinates
```

```
                                          HEC-1L INPUT                                                PAGE  2

LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

  7              PB       0
  8              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
  9              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 10              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 11              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 12              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 13              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 14              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 15              PI  0.0066  0.0066  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 16              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 17              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 18              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0181  0.0181
 19              PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 20              PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0217  0.0217  0.0217  0.0217
 21              PI  0.0217  0.0217  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0450  0.0450
 22              PI  0.0450  0.0700  0.1100  0.4400  0.1800  0.0700  0.0700  0.0450  0.0450  0.0450
 23              PI  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0217  0.0217  0.0217  0.0217
 24              PI  0.0217  0.0217  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 25              PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 26              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 27              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 28              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 29              PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0066  0.0066  0.0066  0.0066
 30              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 31              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 32              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 33              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 34              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 35              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 36              PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
                 *
                 * Precipitation losses computation (Chapter 5)
                 *   Computing RTIMP (percent impervious) from land use and table 5-2
                 *   Computing CNSTL (infiltration rate) from soil type and table 5-2
                 *  TAREA   subbasin area (sq mi)
 37              BA  0.1188
                 *  STRTL   CNSTL   RTIMP
 38              LU    0.10   0.085   2.000
                 *
                 * Runoff hydrograph computation (Chapter 6)
                 *   Using basin lag:  44.0 minutes
                 *   Using unit duration (Step 2): 1. min
                 *   Lag Time + Unit Duration / 2 (Step 3): 44.45241
                 *   Volume of runoff (Step 4) V=    3.194316
 39              UI   1.242   2.483   4.147   5.931   7.759   9.621  11.542  13.578  15.560  17.093
 40              UI  18.625  21.276  24.069  26.489  28.720  31.190  33.964  36.764  39.654  42.545
 41              UI  45.744  48.945  52.176  55.415  58.997  62.857  66.813  70.965  75.077  78.860
 42              UI  82.642  83.889  84.801  85.443  85.948  86.010  85.506  84.914  84.002  83.090
 43              UI  80.098  77.092  74.010  70.906  67.781  64.639  61.622  58.868  56.218  54.492
 44              UI  52.765  51.056  49.349  47.438  45.421  43.740  42.499  41.245  39.945  38.646
 45              UI  37.307  35.969  34.883  33.875  32.855  31.827  30.836  29.925  29.011  28.080
 46              UI  27.149  26.473  25.832  25.116  24.360  23.670  23.069  22.463  21.842  21.222
 47              UI  20.658  20.096  19.607  19.142  18.708  18.300  17.868  17.383  16.907  16.520
 48              UI  16.132  15.777  15.428  15.079  14.730  14.422  14.170  13.890  13.502  13.114
 49              UI  12.898  12.684  12.368  12.018  11.773  11.618  11.427  11.155  10.898  10.781
```

```
                                          HEC-1L INPUT                                                PAGE  3

LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10
```

```
 50          UI  10.665  10.481  10.287  10.131   9.995   9.843   9.668   9.493   9.319   9.144
 51          UI   8.989   8.833   8.708   8.591   8.454   8.299   8.150   8.014   7.882   7.785
 52          UI   7.688   7.557   7.421   7.285   7.150   7.038   6.961   6.872   6.736   6.600
 53          UI   6.521   6.443   6.322   6.186   6.092   6.033   5.951   5.816   5.685   5.607
 54          UI   5.530   5.435   5.338   5.278   5.240   5.168   5.052   4.943   4.866   4.788
 55          UI   4.710   4.633   4.555   4.478   4.410   4.352   4.294   4.236   4.176   4.098
 56          UI   4.021   3.960   3.902   3.843   3.785   3.727   3.669   3.611   3.552   3.494
 57          UI   3.436   3.378   3.320   3.261   3.213   3.175   3.124   3.047   2.972   2.933
 58          UI   2.894   2.839   2.781   2.735   2.696   2.657   2.618   2.580   2.541   2.502
 59          UI   2.463   2.424   2.386   2.347   2.308   2.269   2.231   2.192   2.154   2.135
 60          UI   2.116   2.096   2.077   2.045   2.006   1.975   1.956   1.933   1.894   1.855
 61          UI   1.817   1.778   1.753   1.734   1.715   1.695   1.670   1.631   1.594   1.575
 62          UI   1.555   1.519   1.480   1.454   1.434   1.415   1.396   1.376   1.357   1.337
 63          UI   1.318   1.299   1.279   1.260   1.240   1.221   1.202   1.182   1.163   1.143
 64          UI   1.124   1.105   1.085   1.066   1.046   1.035   1.035   1.031   1.012   0.993
 65          UI   0.973   0.954   0.934   0.915   0.905   0.905
 66          ZW   C=FLOW F=100YR-24HR A=WILTON R
 67          ZZ
```

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****************************************                                    ****************************************
*                                      *                                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                    *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                    *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                    *          609 SECOND STREET           *
*                                      *                                    *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   02APR14  TIME  15:17:21  *                                    *           (916) 756-1104             *
*                                      *                                    *                                      *
****************************************                                    ****************************************
```

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                         Pre-Project Condition for Alternative A-C

  3 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           1  MINUTES IN COMPUTATION INTERVAL
                      IDATE     23MAR14  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ        1747  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     25MAR14  ENDING DATE
                     NDTIME        0506  ENDING TIME
                      ICENT          20  CENTURY MARK

                 COMPUTATION INTERVAL    0.02 HOURS
                      TOTAL TIME BASE   29.10 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
             LENGTH, ELEVATION     FEET
             FLOW                  CUBIC FEET PER SECOND
             STORAGE VOLUME        ACRE-FEET
             SURFACE AREA          ACRES
             TEMPERATURE           DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
  4 KK    *    PRE     *
          *            *
          **************
                         Pre-Project Alternative A-C

  5 IN          TIME DATA FOR INPUT TIME SERIES
                      JXMIN           5  TIME INTERVAL IN MINUTES
                     JXDATE     23MAR14  STARTING DATE
                     JXTIME        2400  STARTING TIME

             SUBBASIN RUNOFF DATA

 37 BA          SUBBASIN CHARACTERISTICS
                      TAREA,       0.12  SUBBASIN AREA

             PRECIPITATION DATA

  7 PB                STORM        4.25  BASIN TOTAL PRECIPITATION

  8 PI            INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09
0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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38 LU          UNIFORM LOSS RATE
                    STRTL        0.10  INITIAL LOSS
                    CNSTL        0.09  UNIFORM LOSS RATE
                    RTIMP        2.00  PERCENT IMPERVIOUS AREA

37 UI          INPUT UNITGRAPH, 266 ORDINATES,  VOLUME = 1.00
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1.2	2.5	4.1	5.9	7.8	9.6	11.5	13.6	15.6	17.1
18.6	21.3	24.1	26.5	28.7	31.2	34.0	36.8	39.7	42.5
45.7	48.9	52.2	55.4	59.0	62.9	66.8	71.0	75.1	78.9
82.6	83.9	84.8	85.4	85.9	86.0	85.5	84.9	84.0	83.1
80.1	77.1	74.0	70.9	67.8	64.6	61.6	58.9	56.2	54.5
52.8	51.1	49.3	47.4	45.4	43.7	42.5	41.2	39.9	38.6
37.3	36.0	34.9	33.9	32.9	31.8	30.8	29.9	29.0	28.1
27.1	26.5	25.8	25.1	24.4	23.7	23.1	22.5	21.8	21.2
20.7	20.1	19.6	19.1	18.7	18.3	17.9	17.4	16.9	16.5
16.1	15.8	15.4	15.1	14.7	14.4	14.2	13.9	13.5	13.1
12.9	12.7	12.4	12.0	11.8	11.6	11.4	11.2	10.9	10.8
10.7	10.5	10.3	10.1	10.0	9.8	9.7	9.5	9.3	9.1
9.0	8.8	8.7	8.6	8.5	8.3	8.1	8.0	7.9	7.8
7.7	7.6	7.4	7.3	7.2	7.0	7.0	6.9	6.7	6.6
6.5	6.4	6.3	6.2	6.1	6.0	6.0	5.8	5.7	5.6
5.5	5.4	5.3	5.3	5.2	5.2	5.1	4.9	4.9	4.8
4.7	4.6	4.6	4.5	4.4	4.4	4.3	4.2	4.2	4.1
4.0	4.0	3.9	3.8	3.8	3.7	3.7	3.6	3.6	3.5
3.4	3.4	3.3	3.3	3.2	3.2	3.1	3.0	3.0	2.9
2.9	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.5	2.5
2.5	2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.1
2.1	2.1	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9
1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.6	1.6	1.6
1.6	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.4	1.3
1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.1
1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0
1.0	1.0	0.9	0.9	0.9	0.9				

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*** *** *** *** ***

HYDROGRAPH AT STATION PRE

```
  TOTAL RAINFALL =     4.25, TOTAL LOSS =     1.93, TOTAL EXCESS =     2.32

PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
  (CFS)        (HR)                  6-HR        24-HR        72-HR      29.10-HR
     83.      12.57       (CFS)       25.           7.           6.           6.
                        (INCHES)     1.945        2.318        2.319        2.319
                         (AC-FT)       12.          15.          15.          15.

                         CUMULATIVE AREA =     0.12 SQ MI
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	PRE	83.	12.57	25.	7.	6.	0.12		

*** NORMAL END OF HEC-1L ***

Index to station computation sections
PRE

(C) 2001 David Ford Consulting Engineers, Inc.

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, May 5 2015

RR Culvert Estimate Pre-Conditions

Invert Elev Dn (ft)	=	99.93
Pipe Length (ft)	=	15.00
Slope (%)	=	0.47
Invert Elev Up (ft)	=	100.00
Rise (in)	=	48.0
Shape	=	Box
Span (in)	=	144.0
No. Barrels	=	1
n-Value	=	0.024
Culvert Type	=	Rectagular Concrete
Culvert Entrance	=	Slope tapered, less favorable edges
Coeff. K,M,c,Y,k	=	0.5, 0.667, 0.0446, 0.65, 0.5

Embankment

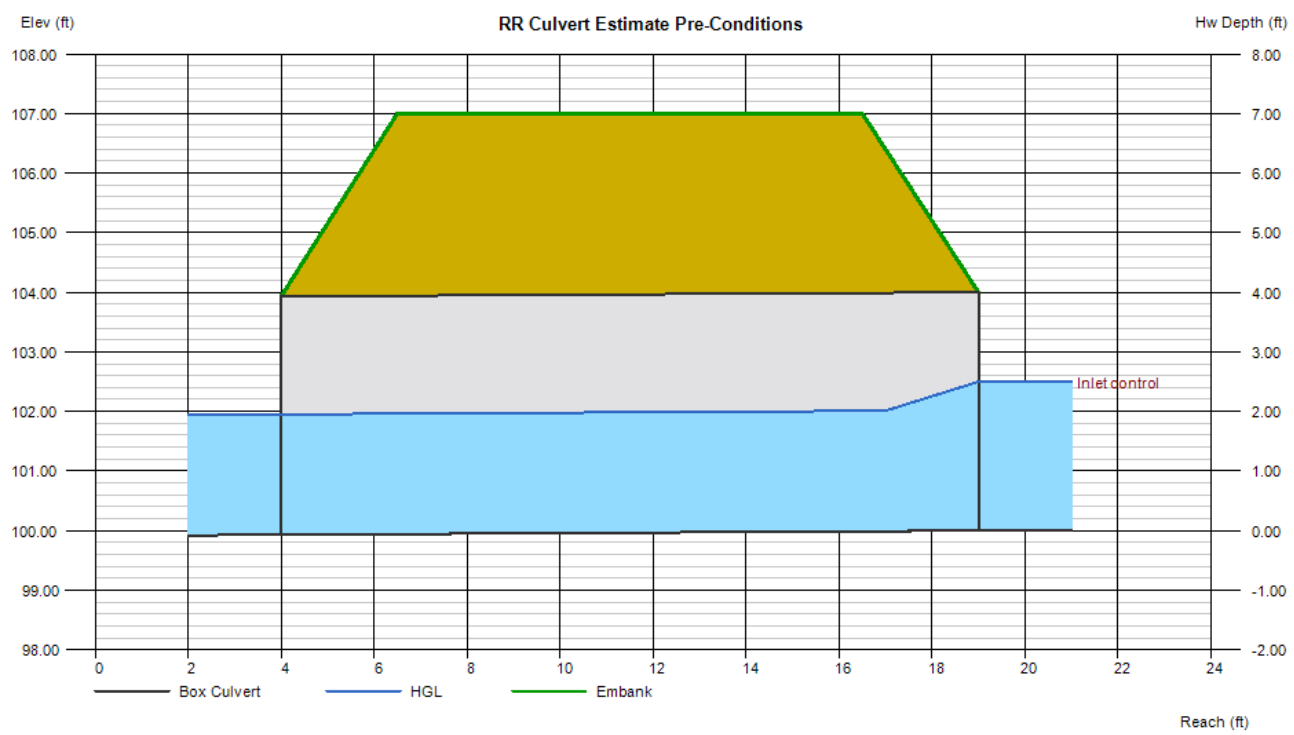
Top Elevation (ft)	=	107.00
Top Width (ft)	=	10.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	134.00
Qmax (cfs)	=	134.00
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	134.00
Qpipe (cfs)	=	134.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	5.53
Veloc Up (ft/s)	=	5.53
HGL Dn (ft)	=	101.95
HGL Up (ft)	=	102.02
Hw Elev (ft)	=	102.50
Hw/D (ft)	=	0.62
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, May 5 2015

RR Bridge Culvert - Full Flow - 1 foot of freeboard

Invert Elev Dn (ft)	=	99.93
Pipe Length (ft)	=	15.00
Slope (%)	=	0.47
Invert Elev Up (ft)	=	100.00
Rise (in)	=	48.0
Shape	=	Box
Span (in)	=	144.0
No. Barrels	=	1
n-Value	=	0.024
Culvert Type	=	Rectagular Concrete
Culvert Entrance	=	Slope tapered, less favorable edges
Coeff. K,M,c,Y,k	=	0.5, 0.667, 0.0446, 0.65, 0.5

Embankment

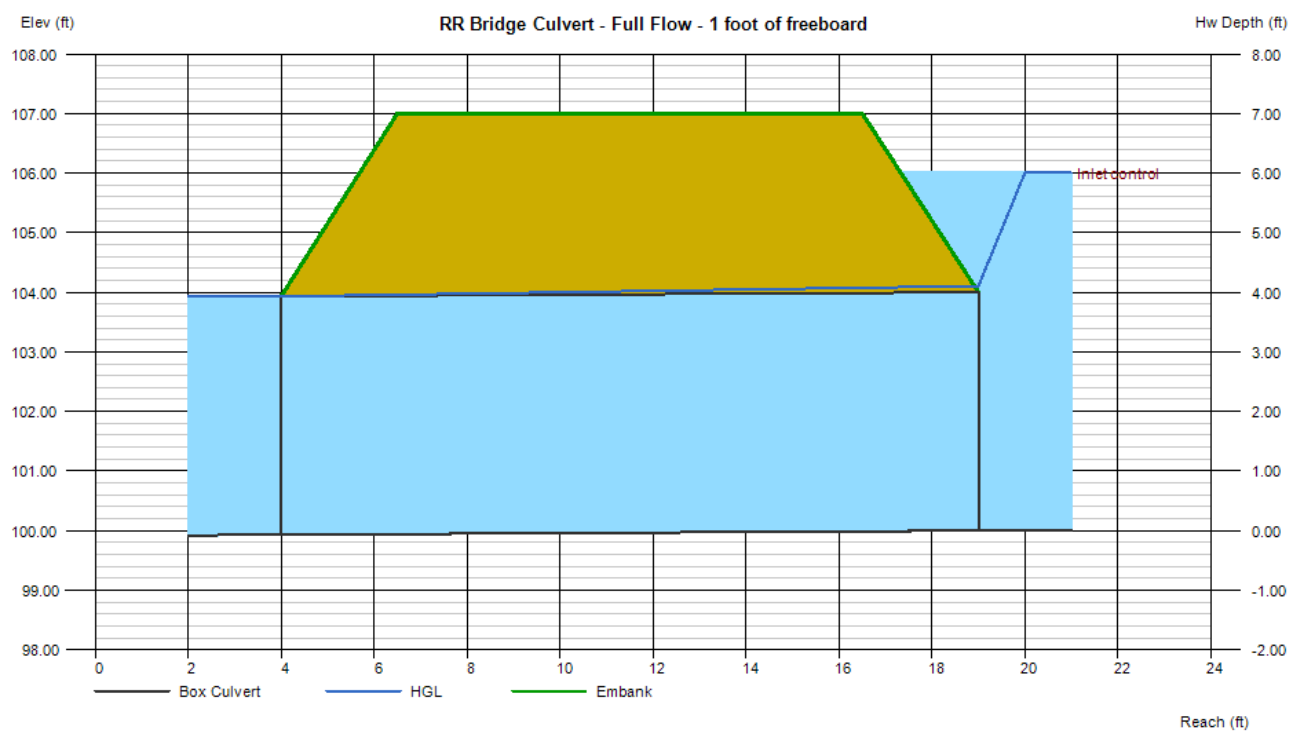
Top Elevation (ft)	=	107.00
Top Width (ft)	=	10.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	420.00
Qmax (cfs)	=	420.00
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	420.00
Qpipe (cfs)	=	420.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	8.75
Veloc Up (ft/s)	=	8.75
HGL Dn (ft)	=	103.93
HGL Up (ft)	=	104.10
Hw Elev (ft)	=	106.01
Hw/D (ft)	=	1.50
Flow Regime	=	Inlet Control



P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A SW \SacCalc \sc.hecout Jump to: runoff summary | index

```
INPUT  FILENAME ====>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A\SacCalc\sc.dat
OUTPUT FILENAME ===>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A\SacCalc\sc.hecout
DSS FILENAME ===>hcalc.dss
```

```
****************************************                                                  ****************************************
*                                      *                                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                                  *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                                  *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                                  *          609 SECOND STREET           *
*                                      *                                                  *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   22SEP14  TIME  15:59:09  *                                                  *           (916) 756-1104             *
*                                      *                                                  *                                      *
****************************************                                                  ****************************************
```

```
                                                X     X  XXXXXXX   XXXXX           X   X
                                                X     X  X        X     X         XX   X
                                                X     X  X        X                X   X
                                                XXXXXXX  XXXX     X        XXXXX   X   X
                                                X     X  X        X                X   X
                                                X     X  X        X     X          X   X
                                                X     X  XXXXXXX   XXXXX          XXX  XXXX

        Special version of HEC-1 with Extra-large array
        Modified by David Ford Consulting Engineers (2000)
         Program dimensions:
         Number of hydrograph ordinates: 20000
         Unit hydrograph ordinates: 3000


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
```

```
                                                  HEC-1L INPUT                                                  PAGE  1

     LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

                    * SacCalc, developed by David Ford Consulting Engineers
                    * File generated 09/22/2014 15:59:09
                    *
       1            ID   Post Project Condition for Alternative A - SW Portion
                    * Lag computation for station SW
                    *   Lag frequency factor of 1.3 (Table 7-6) for frequency 100 years will be appl
                    *   Basin "n" composition (based on Table 7-1)
                    *              Developed                 Undeveloped
                    *          n   adj n   fract           n   adj n   fract
                    *   ---------------------------------------------------
                    *      0.030  0.0390  0.9387       0.067  0.0670  0.0000
                    *      0.031  0.0403  0.0000       0.070  0.0700  0.0000
                    *      0.032  0.0416  0.0000       0.071  0.0710  0.0000
                    *      0.033  0.0429  0.0000       0.072  0.0720  0.0000
                    *      0.034  0.0442  0.0000       0.073  0.0730  0.0000
                    *      0.035  0.0455  0.0000       0.074  0.0740  0.0000
                    *      0.037  0.0481  0.0000       0.076  0.0760  0.0000
                    *      0.040  0.0520  0.0000       0.080  0.0800  0.0000
                    *      0.042  0.0546  0.0000       0.084  0.0840  0.0000
                    *      0.046  0.0598  0.0000       0.088  0.0880  0.0000
                    *      0.050  0.0650  0.0000       0.090  0.0900  0.0000
                    *      0.053  0.0689  0.0000       0.093  0.0930  0.0000
                    *      0.056  0.0560  0.0000       0.096  0.0960  0.0000
                    *      0.060  0.0600  0.0000       0.100  0.1000  0.0000
                    *      0.065  0.0650  0.0000       0.110  0.1100  0.0000
                    *      0.070  0.0700  0.0613       0.115  0.1150  0.0000
                    *      0.075  0.0750  0.0000       0.120  0.1200  0.0000
                    *      0.080  0.0800  0.0000       0.150  0.1500  0.0000
                    *   ---------------------------------------------------
                    *   Equation (7-1) with L=  0.3428, Lc=  0.1894, S=   52.800, n=0.0409
                    *   Resulting lag:   13.4 minutes
                    * End of lag computations
                    *
                    *   NMIN  JXDATE  JXTIME      NQ            CENT
       2            IT       1 23MAR14    2400    1534                    2000
                    *   IPRT    IPLT
       3            IO       3       0
                    *

       4            KK  SW
                    *  JXMIN    Time interval for input data
       5            IN       5
       6            KM   Alternative A Post Project SW Portion
```

```
*
* Design storm construction details
*
* Regional multiplier (zone 2) applied:  1.000
* Areal adjustment using area:  0.024
*   multiplier from table 4-4: 1.0000
*
* Adjusted depths for each duration from table 4-1: frequency: 100
* Duration----Regional------Elev-----Areal (adjustments)
* 5 min         0.4400    0.4400    0.4400
* 10 min        0.6200    0.6200    0.6200
* 15 min        0.7300    0.7300    0.7300
* 30 min        0.9400    0.9400    0.9400
* 1 hour        1.2100    1.2100    1.2100
* 2 hours       1.5900    1.5900    1.5900
* 3 hours       1.8500    1.8500    1.8500
* 6 hours       2.5000    2.5000    2.5000
* 12 hours      3.3000    3.3000    3.3000
* 24 hours      4.2500    4.2500    4.2500
* 36 hours      5.0900    5.0900    5.0888
* 2 days        5.7000    5.7000    5.7000
* 3 days        6.8000    6.8000    6.8000
* 5 days        8.4200    8.4200    8.4180
* 10 days      11.0100   11.0100   11.0073
* Storm duration:  24, length:  288 ordinates
```

```
                                        HEC-1L INPUT                                                PAGE  2

LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

  7            PB       0
  8            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
  9            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 10            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 11            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 12            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 13            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 14            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 15            PI  0.0066  0.0066  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 16            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 17            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 18            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0181  0.0181
 19            PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 20            PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0217  0.0217  0.0217  0.0217
 21            PI  0.0217  0.0217  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0450  0.0450
 22            PI  0.0450  0.0700  0.1100  0.4400  0.1800  0.0700  0.0700  0.0450  0.0450  0.0450
 23            PI  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0217  0.0217  0.0217  0.0217
 24            PI  0.0217  0.0217  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 25            PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 26            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 27            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 28            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 29            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0066  0.0066  0.0066  0.0066
 30            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 31            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 32            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 33            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 34            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 35            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 36            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
               *
               * Precipitation losses computation (Chapter 5)
               *   Computing RTIMP (percent impervious) from land use and table 5-2
               *   Computing CNSTL (infiltration rate) from soil type and table 5-2
               *  TAREA   subbasin area (sq mi)
 37            BA  0.0242
               *  STRTL   CNSTL   RTIMP
 38            LU    0.10   0.068  89.298
               *
               * Runoff hydrograph computation (Chapter 6)
               *   Using basin lag:  13.4 minutes
               *   Using unit duration (Step 2): 1. min
               *   Lag Time + Unit Duration / 2 (Step 3): 13.94999
               *   Volume of runoff (Step 4) V=    0.650795
 39            UI   2.908   6.697  10.659  15.166  20.128  25.968  32.413  39.536  47.901  54.382
 40            UI  55.815  54.986  51.171  44.797  38.578  34.273  30.573  27.302  24.616  22.168
 41            UI  20.068  18.167  16.650  15.181  13.913  12.775  11.871  10.920  10.150   9.429
 42            UI   8.820   8.239   7.628   7.181   6.864   6.514   6.174   5.827   5.557   5.250
 43            UI   5.013   4.744   4.518   4.273   4.070   3.895   3.652   3.468   3.345   3.142
 44            UI   2.982   2.837   2.716   2.568   2.448   2.327   2.207   2.091   1.978   1.874
 45            UI   1.766   1.686   1.605   1.525   1.445   1.382   1.340   1.274   1.208   1.138
 46            UI   1.097   1.029   0.971   0.921   0.881   0.841   0.801   0.761   0.720   0.680
 47            UI   0.668   0.628   0.588
 48            ZW   C=FLOW F=100YR-24HR A=WILTON R
 49            ZZ
```

```
****************************************                    ****************************************
*                                      *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                    *    U.S. ARMY CORPS OF ENGINEERS      *
*             JULY   1998              *                    *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                    *          609 SECOND STREET           *
*                                      *                    *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   22SEP14  TIME  15:59:09  *                    *           (916) 756-1104             *
*                                      *                    *                                      *
****************************************                    ****************************************
```

```
                        Post Project Condition for Alternative A - SW Portion

  3 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           1  MINUTES IN COMPUTATION INTERVAL
                      IDATE     23MAR14  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ        1534  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     25MAR14  ENDING DATE
                     NDTIME        0133  ENDING TIME
                      ICENT          20  CENTURY MARK

                 COMPUTATION INTERVAL    0.02 HOURS
                      TOTAL TIME BASE   25.55 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
             LENGTH, ELEVATION     FEET
             FLOW                  CUBIC FEET PER SECOND
             STORAGE VOLUME        ACRE-FEET
             SURFACE AREA          ACRES
             TEMPERATURE           DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
  4 KK    *    SW      *
          *            *
          **************
                        Alternative A Post Project SW Portion

  5 IN          TIME DATA FOR INPUT TIME SERIES
                      JXMIN           5  TIME INTERVAL IN MINUTES
                     JXDATE     23MAR14  STARTING DATE
                     JXTIME        2400  STARTING TIME

             SUBBASIN RUNOFF DATA

 37 BA          SUBBASIN CHARACTERISTICS
                      TAREA,       0.02  SUBBASIN AREA

                PRECIPITATION DATA

  7 PB                STORM        4.25  BASIN TOTAL PRECIPITATION

  8 PI            INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
```

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09
0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

```
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 38 LU          UNIFORM LOSS RATE
                     STRTL        0.10  INITIAL LOSS
                     CNSTL        0.07  UNIFORM LOSS RATE
                     RTIMP       89.30  PERCENT IMPERVIOUS AREA

 37 UI          INPUT UNITGRAPH,  83 ORDINATES,  VOLUME = 1.00
                     2.9       6.7      10.7      15.2      20.1      26.0      32.4      39.5      47.9      54.4
                    55.8      55.0      51.2      44.8      38.6      34.3      30.6      27.3      24.6      22.2
                    20.1      18.2      16.6      15.2      13.9      12.8      11.9      10.9      10.1       9.4
                     8.8       8.2       7.6       7.2       6.9       6.5       6.2       5.8       5.6       5.3
                     5.0       4.7       4.5       4.3       4.1       3.9       3.7       3.5       3.3       3.1
                     3.0       2.8       2.7       2.6       2.4       2.3       2.2       2.1       2.0       1.9
                     1.8       1.7       1.6       1.5       1.4       1.4       1.3       1.3       1.2       1.1
                     1.1       1.0       1.0       0.9       0.9       0.8       0.8       0.8       0.7       0.7
                     0.7       0.6       0.6

                                                                  ***

     ***            ***            ***            ***            ***

                       HYDROGRAPH AT STATION   SW

   TOTAL RAINFALL =    4.25, TOTAL LOSS =    0.18, TOTAL EXCESS =    4.08

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
   (CFS)       (HR)                   6-HR       24-HR       72-HR     25.55-HR
      36.     12.15       (CFS)        6.          3.          2.           2.
                       (INCHES)     2.443       4.062       4.073        4.073
                        (AC-FT)        3.          5.          5.           5.

                        CUMULATIVE AREA =    0.02 SQ MI
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	SW	36.	12.15	6.	3.	2.	0.02		

*** NORMAL END OF HEC-1L ***

Index to station computation sections
SW

(C) 2001 David Ford Consulting Engineers, Inc.

P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A SE\ SacCalc \sc.hecout Jump to: runoff summary | index

```
INPUT  FILENAME ====>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A\SacCalc\sc.dat
OUTPUT FILENAME ===>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A\SacCalc\sc.hecout
DSS FILENAME ===>hcalc.dss
```

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****************************************                                                  ****************************************
*                                      *                                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                                  *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                                  *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                                  *          609 SECOND STREET           *
*                                      *                                                  *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   22SEP14  TIME  15:43:29  *                                                  *           (916) 756-1104             *
*                                      *                                                  *                                      *
****************************************                                                  ****************************************
```

```
                                                X     X  XXXXXXX   XXXXX           X   X
                                                X     X  X        X     X         XX   X
                                                X     X  X        X                X   X
                                                XXXXXXX  XXXX     X        XXXXX   X   X
                                                X     X  X        X                X   X
                                                X     X  X        X     X          X   X
                                                X     X  XXXXXXX   XXXXX          XXX  XXXX

        Special version of HEC-1 with Extra-large array
        Modified by David Ford Consulting Engineers (2000)
         Program dimensions:
         Number of hydrograph ordinates: 20000
         Unit hydrograph ordinates: 3000


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
```

```
                                                  HEC-1L INPUT                                                  PAGE  1

        LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

                       * SacCalc, developed by David Ford Consulting Engineers
                       * File generated 09/22/2014 15:43:28
                       *
           1           ID   Post Project Condition for Alternative A - SE Portion
                       * Lag computation for station NEW
                       *   Lag frequency factor of 1.3 (Table 7-6) for frequency 100 years will be appl
                       *   Basin "n" composition (based on Table 7-1)
                       *              Developed                 Undeveloped
                       *          n   adj n   fract           n   adj n   fract
                       *   ---------------------------------------------------
                       *      0.030  0.0390  0.6442       0.067  0.0670  0.0000
                       *      0.031  0.0403  0.0000       0.070  0.0700  0.0000
                       *      0.032  0.0416  0.0000       0.071  0.0710  0.0000
                       *      0.033  0.0429  0.0000       0.072  0.0720  0.0000
                       *      0.034  0.0442  0.0000       0.073  0.0730  0.0000
                       *      0.035  0.0455  0.0000       0.074  0.0740  0.0000
                       *      0.037  0.0481  0.0000       0.076  0.0760  0.0000
                       *      0.040  0.0520  0.0000       0.080  0.0800  0.0000
                       *      0.042  0.0546  0.0000       0.084  0.0840  0.0000
                       *      0.046  0.0598  0.0000       0.088  0.0880  0.0000
                       *      0.050  0.0650  0.0000       0.090  0.0900  0.0000
                       *      0.053  0.0689  0.0000       0.093  0.0930  0.0000
                       *      0.056  0.0560  0.0000       0.096  0.0960  0.0000
                       *      0.060  0.0600  0.0000       0.100  0.1000  0.0000
                       *      0.065  0.0650  0.0000       0.110  0.1100  0.0000
                       *      0.070  0.0700  0.3558       0.115  0.1150  0.0000
                       *      0.075  0.0750  0.0000       0.120  0.1200  0.0000
                       *      0.080  0.0800  0.0000       0.150  0.1500  0.0000
                       *   ---------------------------------------------------
                       *   Equation (7-1) with L=  0.2237, Lc=  0.1223, S=   52.800, n=0.0500
                       *   Resulting lag:   12.4 minutes
                       * End of lag computations
                       *
                       *   NMIN  JXDATE  JXTIME      NQ            CENT
           2           IT       1 23MAR14    2400    1526                    2000
                       *   IPRT    IPLT
           3           IO       3       0
                       *

           4           KK  NEW
                       *  JXMIN    Time interval for input data
           5           IN       5
           6           KM   Alternative A Post Project SE Portion
```

```
*
* Design storm construction details
*
* Regional multiplier (zone 2) applied:  1.000
* Areal adjustment using area:  0.022
*   multiplier from table 4-4: 1.0000
*
* Adjusted depths for each duration from table 4-1: frequency: 100
* Duration----Regional------Elev-----Areal (adjustments)
* 5 min         0.4400    0.4400    0.4400
* 10 min        0.6200    0.6200    0.6200
* 15 min        0.7300    0.7300    0.7300
* 30 min        0.9400    0.9400    0.9400
* 1 hour        1.2100    1.2100    1.2100
* 2 hours       1.5900    1.5900    1.5900
* 3 hours       1.8500    1.8500    1.8500
* 6 hours       2.5000    2.5000    2.5000
* 12 hours      3.3000    3.3000    3.3000
* 24 hours      4.2500    4.2500    4.2500
* 36 hours      5.0900    5.0900    5.0889
* 2 days        5.7000    5.7000    5.7000
* 3 days        6.8000    6.8000    6.8000
* 5 days        8.4200    8.4200    8.4182
* 10 days      11.0100   11.0100   11.0076
* Storm duration:  24, length:  288 ordinates
```

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                                        HEC-1L INPUT                                                PAGE  2

     LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

       7            PB       0
       8            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
       9            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      10            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      11            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      12            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      13            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      14            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      15            PI  0.0066  0.0066  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
      16            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
      17            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
      18            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0181  0.0181
      19            PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
      20            PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0217  0.0217  0.0217  0.0217
      21            PI  0.0217  0.0217  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0450  0.0450
      22            PI  0.0450  0.0700  0.1100  0.4400  0.1800  0.0700  0.0700  0.0450  0.0450  0.0450
      23            PI  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0217  0.0217  0.0217  0.0217
      24            PI  0.0217  0.0217  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
      25            PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
      26            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
      27            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
      28            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
      29            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0066  0.0066  0.0066  0.0066
      30            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      31            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      32            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      33            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      34            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      35            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      36            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
                    *
                    * Precipitation losses computation (Chapter 5)
                    *   Computing RTIMP (percent impervious) from land use and table 5-2
                    *   Computing CNSTL (infiltration rate) from soil type and table 5-2
                    *  TAREA   subbasin area (sq mi)
      37            BA  0.0215
                    *  STRTL   CNSTL   RTIMP
      38            LU    0.10   0.071  61.908
                    *
                    * Runoff hydrograph computation (Chapter 6)
                    *   Using basin lag:  12.4 minutes
                    *   Using unit duration (Step 2): 1. min
                    *   Lag Time + Unit Duration / 2 (Step 3): 12.87120
                    *   Volume of runoff (Step 4) V=    0.578531
      39            UI   3.100   7.101  11.037  16.310  21.710  28.056  35.018  43.425  51.888  53.614
      40            UI  53.119  49.267  42.599  36.217  32.144  28.085  25.220  22.360  20.153  18.104
      41            UI  16.348  14.813  13.494  12.297  11.360  10.383   9.596   8.910   8.180   7.603
      42            UI   7.137   6.706   6.339   6.001   5.634   5.350   5.031   4.792   4.498   4.286
      43            UI   4.050   3.808   3.595   3.402   3.267   3.050   2.882   2.730   2.601   2.452
      44            UI   2.326   2.201   2.075   1.974   1.836   1.725   1.641   1.558   1.474   1.390
      45            UI   1.327   1.276   1.216   1.136   1.079   1.022   0.965   0.899   0.857   0.815
      46            UI   0.773   0.731   0.690   0.648   0.633   0.591   0.566
      47            ZW   C=FLOW F=100YR-24HR A=WILTON R
      48            ZZ
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****************************************                                    ****************************************
*                                      *                                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                    *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                    *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                    *          609 SECOND STREET           *
*                                      *                                    *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   22SEP14  TIME  15:43:29  *                                    *           (916) 756-1104             *
*                                      *                                    *                                      *
****************************************                                    ****************************************
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                        Post Project Condition for Alternative A - SE Portion

  3 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           1  MINUTES IN COMPUTATION INTERVAL
                      IDATE     23MAR14  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ        1526  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     25MAR14  ENDING DATE
                     NDTIME        0125  ENDING TIME
                      ICENT          20  CENTURY MARK

                 COMPUTATION INTERVAL    0.02 HOURS
                      TOTAL TIME BASE   25.42 HOURS

          ENGLISH UNITS
               DRAINAGE AREA         SQUARE MILES
               PRECIPITATION DEPTH   INCHES
               LENGTH, ELEVATION     FEET
               FLOW                  CUBIC FEET PER SECOND
               STORAGE VOLUME        ACRE-FEET
               SURFACE AREA          ACRES
               TEMPERATURE           DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
  4 KK      *    NEW     *
            *            *
            **************
                        Alternative A Post Project SE Portion

  5 IN          TIME DATA FOR INPUT TIME SERIES
                      JXMIN           5  TIME INTERVAL IN MINUTES
                     JXDATE     23MAR14  STARTING DATE
                     JXTIME        2400  STARTING TIME

               SUBBASIN RUNOFF DATA

 37 BA          SUBBASIN CHARACTERISTICS
                      TAREA,       0.02  SUBBASIN AREA

                PRECIPITATION DATA

  7 PB                STORM        4.25  BASIN TOTAL PRECIPITATION

  8 PI            INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09
0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

```
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 38 LU          UNIFORM LOSS RATE
                     STRTL        0.10  INITIAL LOSS
                     CNSTL        0.07  UNIFORM LOSS RATE
                     RTIMP       61.91  PERCENT IMPERVIOUS AREA

 37 UI          INPUT UNITGRAPH,  77 ORDINATES,  VOLUME = 1.00
                     3.1       7.1      11.0      16.3      21.7      28.1      35.0      43.4      51.9      53.6
                    53.1      49.3      42.6      36.2      32.1      28.1      25.2      22.4      20.2      18.1
                    16.3      14.8      13.5      12.3      11.4      10.4       9.6       8.9       8.2       7.6
                     7.1       6.7       6.3       6.0       5.6       5.3       5.0       4.8       4.5       4.3
                     4.1       3.8       3.6       3.4       3.3       3.0       2.9       2.7       2.6       2.5
                     2.3       2.2       2.1       2.0       1.8       1.7       1.6       1.6       1.5       1.4
                     1.3       1.3       1.2       1.1       1.1       1.0       1.0       0.9       0.9       0.8
                     0.8       0.7       0.7       0.6       0.6       0.6       0.6

                                                                   ***

     ***            ***             ***             ***             ***

                       HYDROGRAPH AT STATION   NEW

   TOTAL RAINFALL =    4.25, TOTAL LOSS =    0.65, TOTAL EXCESS =    3.60

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
   (CFS)       (HR)                   6-HR       24-HR       72-HR     25.42-HR
      33.     12.13       (CFS)         5.          2.          2.           2.
                       (INCHES)      2.328       3.592       3.599        3.599
                        (AC-FT)         3.          4.          4.           4.

                        CUMULATIVE AREA =    0.02 SQ MI
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	NEW	33.	12.13	5.	2.	2.	0.02		

*** NORMAL END OF HEC-1L ***

Index to station computation sections
NEW

(C) 2001 David Ford Consulting Engineers, Inc.

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, May 5 2015

RR Culvert Estimate Alt. A

Invert Elev Dn (ft)	=	99.93
Pipe Length (ft)	=	15.00
Slope (%)	=	0.47
Invert Elev Up (ft)	=	100.00
Rise (in)	=	48.0
Shape	=	Box
Span (in)	=	144.0
No. Barrels	=	1
n-Value	=	0.024
Culvert Type	=	Rectagular Concrete
Culvert Entrance	=	Slope tapered, less favorable edges
Coeff. K,M,c,Y,k	=	0.5, 0.667, 0.0446, 0.65, 0.5

Embankment

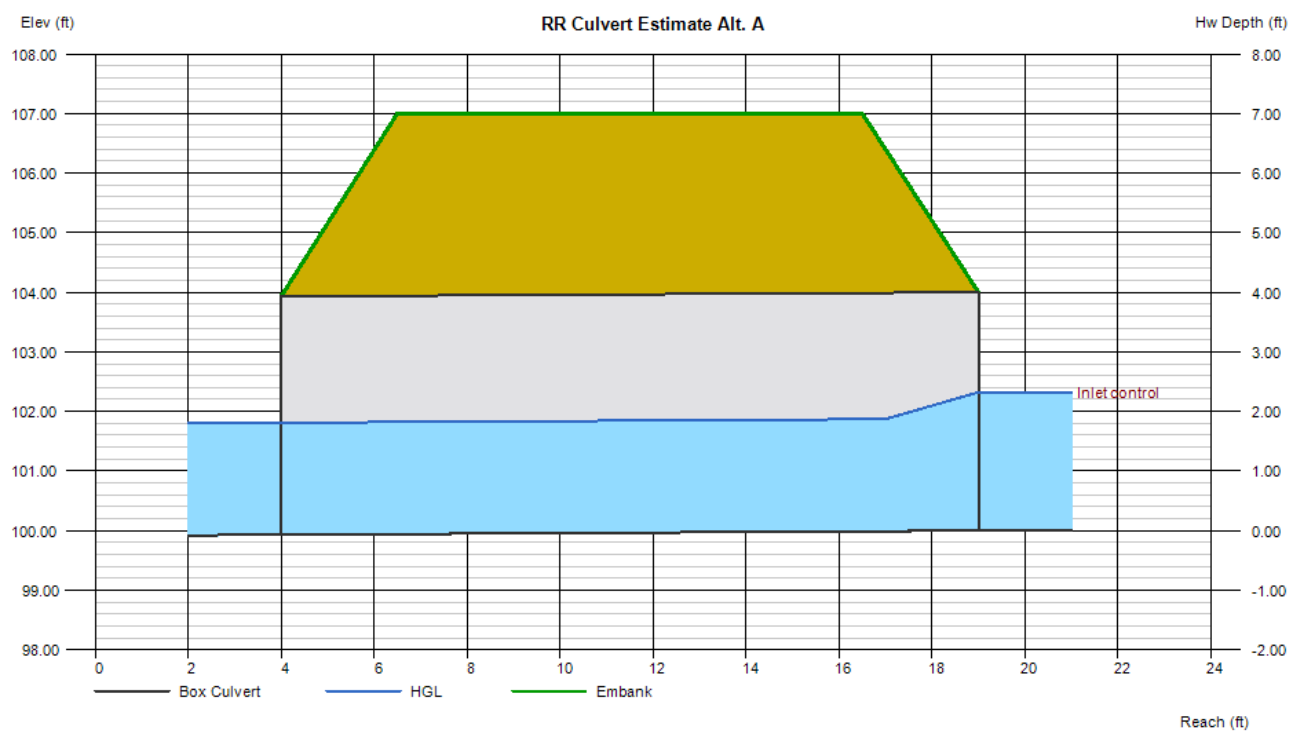
Top Elevation (ft)	=	107.00
Top Width (ft)	=	10.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	120.00
Qmax (cfs)	=	120.00
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	120.00
Qpipe (cfs)	=	120.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	5.32
Veloc Up (ft/s)	=	5.32
HGL Dn (ft)	=	101.81
HGL Up (ft)	=	101.88
Hw Elev (ft)	=	102.32
Hw/D (ft)	=	0.58
Flow Regime	=	Inlet Control



P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative B SW\SacCalc \sc.hecout Jump to: runoff summary | index

```
INPUT  FILENAME ====>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A\SacCalc\sc.dat
OUTPUT FILENAME ===>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A\SacCalc\sc.hecout
DSS FILENAME ===>hcalc.dss
```

```
****************************************                                                  ****************************************
*                                      *                                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                                  *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                                  *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                                  *          609 SECOND STREET           *
*                                      *                                                  *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   22SEP14  TIME  16:01:30  *                                                  *           (916) 756-1104             *
*                                      *                                                  *                                      *
****************************************                                                  ****************************************
```

```
                                                X     X  XXXXXXX   XXXXX           X   X
                                                X     X  X        X     X         XX   X
                                                X     X  X        X                X   X
                                                XXXXXXX  XXXX     X        XXXXX   X   X
                                                X     X  X        X                X   X
                                                X     X  X        X     X          X   X
                                                X     X  XXXXXXX   XXXXX          XXX  XXXX

        Special version of HEC-1 with Extra-large array
        Modified by David Ford Consulting Engineers (2000)
         Program dimensions:
         Number of hydrograph ordinates: 20000
         Unit hydrograph ordinates: 3000


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
```

```
                                                  HEC-1L INPUT                                                  PAGE  1

      LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

                     * SacCalc, developed by David Ford Consulting Engineers
                     * File generated 09/22/2014 16:01:30
                     *
        1            ID   Post Project Condition for Alternative B - SW Portion
                     * Lag computation for station SW
                     *   Lag frequency factor of 1.3 (Table 7-6) for frequency 100 years will be appl
                     *   Basin "n" composition (based on Table 7-1)
                     *              Developed                 Undeveloped
                     *          n   adj n   fract           n   adj n   fract
                     *   ---------------------------------------------------
                     *      0.030  0.0390  0.9387       0.067  0.0670  0.0000
                     *      0.031  0.0403  0.0000       0.070  0.0700  0.0000
                     *      0.032  0.0416  0.0000       0.071  0.0710  0.0000
                     *      0.033  0.0429  0.0000       0.072  0.0720  0.0000
                     *      0.034  0.0442  0.0000       0.073  0.0730  0.0000
                     *      0.035  0.0455  0.0000       0.074  0.0740  0.0000
                     *      0.037  0.0481  0.0000       0.076  0.0760  0.0000
                     *      0.040  0.0520  0.0000       0.080  0.0800  0.0000
                     *      0.042  0.0546  0.0000       0.084  0.0840  0.0000
                     *      0.046  0.0598  0.0000       0.088  0.0880  0.0000
                     *      0.050  0.0650  0.0000       0.090  0.0900  0.0000
                     *      0.053  0.0689  0.0000       0.093  0.0930  0.0000
                     *      0.056  0.0560  0.0000       0.096  0.0960  0.0000
                     *      0.060  0.0600  0.0000       0.100  0.1000  0.0000
                     *      0.065  0.0650  0.0000       0.110  0.1100  0.0000
                     *      0.070  0.0700  0.0613       0.115  0.1150  0.0000
                     *      0.075  0.0750  0.0000       0.120  0.1200  0.0000
                     *      0.080  0.0800  0.0000       0.150  0.1500  0.0000
                     *   ---------------------------------------------------
                     *   Equation (7-1) with L=  0.3428, Lc=  0.1894, S=   52.800, n=0.0409
                     *   Resulting lag:   13.4 minutes
                     * End of lag computations
                     *
                     *   NMIN  JXDATE  JXTIME      NQ            CENT
        2            IT       1 23MAR14    2400    1534                    2000
                     *   IPRT    IPLT
        3            IO       3       0
                     *

        4            KK  SW
                     *  JXMIN    Time interval for input data
        5            IN       5
        6            KM   Alternative B Post Project SW Portion
```

```
*
* Design storm construction details
*
* Regional multiplier (zone 2) applied:  1.000
* Areal adjustment using area:  0.024
*   multiplier from table 4-4: 1.0000
*
* Adjusted depths for each duration from table 4-1: frequency: 100
* Duration----Regional------Elev-----Areal (adjustments)
* 5 min         0.4400    0.4400    0.4400
* 10 min        0.6200    0.6200    0.6200
* 15 min        0.7300    0.7300    0.7300
* 30 min        0.9400    0.9400    0.9400
* 1 hour        1.2100    1.2100    1.2100
* 2 hours       1.5900    1.5900    1.5900
* 3 hours       1.8500    1.8500    1.8500
* 6 hours       2.5000    2.5000    2.5000
* 12 hours      3.3000    3.3000    3.3000
* 24 hours      4.2500    4.2500    4.2500
* 36 hours      5.0900    5.0900    5.0888
* 2 days        5.7000    5.7000    5.7000
* 3 days        6.8000    6.8000    6.8000
* 5 days        8.4200    8.4200    8.4180
* 10 days      11.0100   11.0100   11.0073
* Storm duration:  24, length:  288 ordinates
```

```
                                        HEC-1L INPUT                                                PAGE  2

LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

  7            PB       0
  8            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
  9            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 10            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 11            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 12            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 13            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 14            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 15            PI  0.0066  0.0066  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 16            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 17            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 18            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0181  0.0181
 19            PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 20            PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0217  0.0217  0.0217  0.0217
 21            PI  0.0217  0.0217  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0450  0.0450
 22            PI  0.0450  0.0700  0.1100  0.4400  0.1800  0.0700  0.0700  0.0450  0.0450  0.0450
 23            PI  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0217  0.0217  0.0217  0.0217
 24            PI  0.0217  0.0217  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 25            PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 26            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 27            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 28            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 29            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0066  0.0066  0.0066  0.0066
 30            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 31            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 32            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 33            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 34            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 35            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 36            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
               *
               * Precipitation losses computation (Chapter 5)
               *   Computing RTIMP (percent impervious) from land use and table 5-2
               *   Computing CNSTL (infiltration rate) from soil type and table 5-2
               *  TAREA   subbasin area (sq mi)
 37            BA  0.0242
               *  STRTL   CNSTL   RTIMP
 38            LU    0.10   0.068  89.298
               *
               * Runoff hydrograph computation (Chapter 6)
               *   Using basin lag:  13.4 minutes
               *   Using unit duration (Step 2): 1. min
               *   Lag Time + Unit Duration / 2 (Step 3): 13.94999
               *   Volume of runoff (Step 4) V=    0.650795
 39            UI   2.908   6.697  10.659  15.166  20.128  25.968  32.413  39.536  47.901  54.382
 40            UI  55.815  54.986  51.171  44.797  38.578  34.273  30.573  27.302  24.616  22.168
 41            UI  20.068  18.167  16.650  15.181  13.913  12.775  11.871  10.920  10.150   9.429
 42            UI   8.820   8.239   7.628   7.181   6.864   6.514   6.174   5.827   5.557   5.250
 43            UI   5.013   4.744   4.518   4.273   4.070   3.895   3.652   3.468   3.345   3.142
 44            UI   2.982   2.837   2.716   2.568   2.448   2.327   2.207   2.091   1.978   1.874
 45            UI   1.766   1.686   1.605   1.525   1.445   1.382   1.340   1.274   1.208   1.138
 46            UI   1.097   1.029   0.971   0.921   0.881   0.841   0.801   0.761   0.720   0.680
 47            UI   0.668   0.628   0.588
 48            ZW   C=FLOW F=100YR-24HR A=WILTON R
 49            ZZ
```

```
****************************************                    ****************************************
*                                      *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                    *    U.S. ARMY CORPS OF ENGINEERS      *
*             JULY   1998              *                    *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                    *          609 SECOND STREET           *
*                                      *                    *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   22SEP14  TIME  16:01:30  *                    *           (916) 756-1104             *
*                                      *                    *                                      *
****************************************                    ****************************************
```

```
                        Post Project Condition for Alternative B - SW Portion

  3 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           1  MINUTES IN COMPUTATION INTERVAL
                      IDATE     23MAR14  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ        1534  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     25MAR14  ENDING DATE
                     NDTIME        0133  ENDING TIME
                      ICENT          20  CENTURY MARK

                 COMPUTATION INTERVAL    0.02 HOURS
                      TOTAL TIME BASE   25.55 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
             LENGTH, ELEVATION     FEET
             FLOW                  CUBIC FEET PER SECOND
             STORAGE VOLUME        ACRE-FEET
             SURFACE AREA          ACRES
             TEMPERATURE           DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
  4 KK    *    SW      *
          *            *
          **************
                        Alternative B Post Project SW Portion

  5 IN          TIME DATA FOR INPUT TIME SERIES
                       JXMIN           5  TIME INTERVAL IN MINUTES
                     JXDATE     23MAR14  STARTING DATE
                     JXTIME        2400  STARTING TIME

             SUBBASIN RUNOFF DATA

 37 BA          SUBBASIN CHARACTERISTICS
                      TAREA,       0.02  SUBBASIN AREA

                PRECIPITATION DATA

  7 PB                STORM        4.25  BASIN TOTAL PRECIPITATION

  8 PI            INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
```

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09
0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

```
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 38 LU          UNIFORM LOSS RATE
                     STRTL        0.10  INITIAL LOSS
                     CNSTL        0.07  UNIFORM LOSS RATE
                     RTIMP       89.30  PERCENT IMPERVIOUS AREA

 37 UI          INPUT UNITGRAPH,  83 ORDINATES,  VOLUME = 1.00
                     2.9       6.7      10.7      15.2      20.1      26.0      32.4      39.5      47.9      54.4
                    55.8      55.0      51.2      44.8      38.6      34.3      30.6      27.3      24.6      22.2
                    20.1      18.2      16.6      15.2      13.9      12.8      11.9      10.9      10.1       9.4
                     8.8       8.2       7.6       7.2       6.9       6.5       6.2       5.8       5.6       5.3
                     5.0       4.7       4.5       4.3       4.1       3.9       3.7       3.5       3.3       3.1
                     3.0       2.8       2.7       2.6       2.4       2.3       2.2       2.1       2.0       1.9
                     1.8       1.7       1.6       1.5       1.4       1.4       1.3       1.3       1.2       1.1
                     1.1       1.0       1.0       0.9       0.9       0.8       0.8       0.8       0.7       0.7
                     0.7       0.6       0.6

                                                                  ***

     ***            ***            ***            ***            ***

                       HYDROGRAPH AT STATION   SW

   TOTAL RAINFALL =    4.25, TOTAL LOSS =    0.18, TOTAL EXCESS =    4.08

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
   (CFS)       (HR)                   6-HR       24-HR       72-HR     25.55-HR
      36.     12.15       (CFS)        6.          3.          2.           2.
                       (INCHES)     2.443       4.062       4.073        4.073
                        (AC-FT)        3.          5.          5.           5.

                        CUMULATIVE AREA =    0.02 SQ MI
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	SW	36.	12.15	6.	3.	2.	0.02		

*** NORMAL END OF HEC-1L ***

Index to station computation sections
SW

(C) 2001 David Ford Consulting Engineers, Inc.

P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative B SE\SacCalc \sc.hecout Jump to: runoff summary | index

```
INPUT  FILENAME ====>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A\SacCalc\sc.dat
OUTPUT FILENAME ===>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A\SacCalc\sc.hecout
DSS FILENAME ===>hcalc.dss
```

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****************************************                                                  ****************************************
*                                      *                                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                                  *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                                  *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                                  *          609 SECOND STREET           *
*                                      *                                                  *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   22SEP14  TIME  16:03:39  *                                                  *           (916) 756-1104             *
*                                      *                                                  *                                      *
****************************************                                                  ****************************************
```

```
                                                X     X  XXXXXXX   XXXXX           X   X
                                                X     X  X        X     X         XX   X
                                                X     X  X        X                X   X
                                                XXXXXXX  XXXX     X        XXXXX   X   X
                                                X     X  X        X                X   X
                                                X     X  X        X     X          X   X
                                                X     X  XXXXXXX   XXXXX          XXX  XXXX

        Special version of HEC-1 with Extra-large array
        Modified by David Ford Consulting Engineers (2000)
         Program dimensions:
         Number of hydrograph ordinates: 20000
         Unit hydrograph ordinates: 3000


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
```

```
                                                  HEC-1L INPUT                                                  PAGE  1

        LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

                       * SacCalc, developed by David Ford Consulting Engineers
                       * File generated 09/22/2014 16:03:39
                       *
           1           ID   Post Project Condition for Alternative B - SE Portion
                       * Lag computation for station NEW
                       *   Lag frequency factor of 1.3 (Table 7-6) for frequency 100 years will be appl
                       *   Basin "n" composition (based on Table 7-1)
                       *              Developed                 Undeveloped
                       *          n   adj n   fract           n   adj n   fract
                       *   ---------------------------------------------------
                       *      0.030  0.0390  0.6442       0.067  0.0670  0.0000
                       *      0.031  0.0403  0.0000       0.070  0.0700  0.0000
                       *      0.032  0.0416  0.0000       0.071  0.0710  0.0000
                       *      0.033  0.0429  0.0000       0.072  0.0720  0.0000
                       *      0.034  0.0442  0.0000       0.073  0.0730  0.0000
                       *      0.035  0.0455  0.0000       0.074  0.0740  0.0000
                       *      0.037  0.0481  0.0000       0.076  0.0760  0.0000
                       *      0.040  0.0520  0.0000       0.080  0.0800  0.0000
                       *      0.042  0.0546  0.0000       0.084  0.0840  0.0000
                       *      0.046  0.0598  0.0000       0.088  0.0880  0.0000
                       *      0.050  0.0650  0.0000       0.090  0.0900  0.0000
                       *      0.053  0.0689  0.0000       0.093  0.0930  0.0000
                       *      0.056  0.0560  0.0000       0.096  0.0960  0.0000
                       *      0.060  0.0600  0.0000       0.100  0.1000  0.0000
                       *      0.065  0.0650  0.0000       0.110  0.1100  0.0000
                       *      0.070  0.0700  0.3558       0.115  0.1150  0.0000
                       *      0.075  0.0750  0.0000       0.120  0.1200  0.0000
                       *      0.080  0.0800  0.0000       0.150  0.1500  0.0000
                       *   ---------------------------------------------------
                       *   Equation (7-1) with L=  0.2237, Lc=  0.1223, S=   52.800, n=0.0500
                       *   Resulting lag:   12.4 minutes
                       * End of lag computations
                       *
                       *   NMIN  JXDATE  JXTIME      NQ            CENT
           2           IT       1 23MAR14    2400    1526                    2000
                       *   IPRT    IPLT
           3           IO       3       0
                       *

           4           KK  NEW
                       *  JXMIN    Time interval for input data
           5           IN       5
           6           KM   Alternative B Post Project SE Portion
```

```
*
* Design storm construction details
*
* Regional multiplier (zone 2) applied:  1.000
* Areal adjustment using area:  0.022
*   multiplier from table 4-4: 1.0000
*
* Adjusted depths for each duration from table 4-1: frequency: 100
* Duration----Regional------Elev-----Areal (adjustments)
* 5 min         0.4400    0.4400    0.4400
* 10 min        0.6200    0.6200    0.6200
* 15 min        0.7300    0.7300    0.7300
* 30 min        0.9400    0.9400    0.9400
* 1 hour        1.2100    1.2100    1.2100
* 2 hours       1.5900    1.5900    1.5900
* 3 hours       1.8500    1.8500    1.8500
* 6 hours       2.5000    2.5000    2.5000
* 12 hours      3.3000    3.3000    3.3000
* 24 hours      4.2500    4.2500    4.2500
* 36 hours      5.0900    5.0900    5.0889
* 2 days        5.7000    5.7000    5.7000
* 3 days        6.8000    6.8000    6.8000
* 5 days        8.4200    8.4200    8.4182
* 10 days      11.0100   11.0100   11.0076
* Storm duration:  24, length:  288 ordinates
```

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                                        HEC-1L INPUT                                                PAGE  2

     LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

       7            PB       0
       8            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
       9            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      10            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      11            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      12            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      13            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      14            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      15            PI  0.0066  0.0066  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
      16            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
      17            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
      18            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0181  0.0181
      19            PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
      20            PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0217  0.0217  0.0217  0.0217
      21            PI  0.0217  0.0217  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0450  0.0450
      22            PI  0.0450  0.0700  0.1100  0.4400  0.1800  0.0700  0.0700  0.0450  0.0450  0.0450
      23            PI  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0217  0.0217  0.0217  0.0217
      24            PI  0.0217  0.0217  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
      25            PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
      26            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
      27            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
      28            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
      29            PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0066  0.0066  0.0066  0.0066
      30            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      31            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      32            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      33            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      34            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      35            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
      36            PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
                    *
                    * Precipitation losses computation (Chapter 5)
                    *   Computing RTIMP (percent impervious) from land use and table 5-2
                    *   Computing CNSTL (infiltration rate) from soil type and table 5-2
                    *  TAREA   subbasin area (sq mi)
      37            BA  0.0215
                    *  STRTL   CNSTL   RTIMP
      38            LU    0.10   0.071  61.908
                    *
                    * Runoff hydrograph computation (Chapter 6)
                    *   Using basin lag:  12.4 minutes
                    *   Using unit duration (Step 2): 1. min
                    *   Lag Time + Unit Duration / 2 (Step 3): 12.87120
                    *   Volume of runoff (Step 4) V=    0.578531
      39            UI   3.100   7.101  11.037  16.310  21.710  28.056  35.018  43.425  51.888  53.614
      40            UI  53.119  49.267  42.599  36.217  32.144  28.085  25.220  22.360  20.153  18.104
      41            UI  16.348  14.813  13.494  12.297  11.360  10.383   9.596   8.910   8.180   7.603
      42            UI   7.137   6.706   6.339   6.001   5.634   5.350   5.031   4.792   4.498   4.286
      43            UI   4.050   3.808   3.595   3.402   3.267   3.050   2.882   2.730   2.601   2.452
      44            UI   2.326   2.201   2.075   1.974   1.836   1.725   1.641   1.558   1.474   1.390
      45            UI   1.327   1.276   1.216   1.136   1.079   1.022   0.965   0.899   0.857   0.815
      46            UI   0.773   0.731   0.690   0.648   0.633   0.591   0.566
      47            ZW   C=FLOW F=100YR-24HR A=WILTON R
      48            ZZ
```

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****************************************                                    ****************************************
*                                      *                                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                    *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                    *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                    *          609 SECOND STREET           *
*                                      *                                    *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   22SEP14  TIME  16:03:39  *                                    *           (916) 756-1104             *
*                                      *                                    *                                      *
****************************************                                    ****************************************
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                        Post Project Condition for Alternative B - SE Portion

  3 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           1  MINUTES IN COMPUTATION INTERVAL
                      IDATE     23MAR14  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ        1526  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     25MAR14  ENDING DATE
                     NDTIME        0125  ENDING TIME
                      ICENT          20  CENTURY MARK

                  COMPUTATION INTERVAL    0.02 HOURS
                       TOTAL TIME BASE   25.42 HOURS

          ENGLISH UNITS
               DRAINAGE AREA         SQUARE MILES
               PRECIPITATION DEPTH   INCHES
               LENGTH, ELEVATION     FEET
               FLOW                  CUBIC FEET PER SECOND
               STORAGE VOLUME        ACRE-FEET
               SURFACE AREA          ACRES
               TEMPERATURE           DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
  4 KK      *    NEW     *
            *            *
            **************
                        Alternative B Post Project SE Portion

  5 IN          TIME DATA FOR INPUT TIME SERIES
                      JXMIN           5  TIME INTERVAL IN MINUTES
                     JXDATE     23MAR14  STARTING DATE
                     JXTIME        2400  STARTING TIME

               SUBBASIN RUNOFF DATA

 37 BA          SUBBASIN CHARACTERISTICS
                      TAREA,       0.02  SUBBASIN AREA

                PRECIPITATION DATA

  7 PB                STORM        4.25  BASIN TOTAL PRECIPITATION

  8 PI            INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
```

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09
0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

```
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 38 LU          UNIFORM LOSS RATE
                     STRTL        0.10  INITIAL LOSS
                     CNSTL        0.07  UNIFORM LOSS RATE
                     RTIMP       61.91  PERCENT IMPERVIOUS AREA

 37 UI          INPUT UNITGRAPH,  77 ORDINATES,  VOLUME = 1.00
                     3.1       7.1      11.0      16.3      21.7      28.1      35.0      43.4      51.9      53.6
                    53.1      49.3      42.6      36.2      32.1      28.1      25.2      22.4      20.2      18.1
                    16.3      14.8      13.5      12.3      11.4      10.4       9.6       8.9       8.2       7.6
                     7.1       6.7       6.3       6.0       5.6       5.3       5.0       4.8       4.5       4.3
                     4.1       3.8       3.6       3.4       3.3       3.0       2.9       2.7       2.6       2.5
                     2.3       2.2       2.1       2.0       1.8       1.7       1.6       1.6       1.5       1.4
                     1.3       1.3       1.2       1.1       1.1       1.0       1.0       0.9       0.9       0.8
                     0.8       0.7       0.7       0.6       0.6       0.6       0.6

                                                                   ***

     ***            ***             ***             ***             ***

                       HYDROGRAPH AT STATION   NEW

   TOTAL RAINFALL =    4.25, TOTAL LOSS =    0.65, TOTAL EXCESS =    3.60

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
   (CFS)       (HR)                   6-HR       24-HR       72-HR     25.42-HR
      33.     12.13       (CFS)         5.          2.          2.           2.
                       (INCHES)      2.328       3.592       3.599        3.599
                        (AC-FT)         3.          4.          4.           4.

                        CUMULATIVE AREA =    0.02 SQ MI
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	NEW	33.	12.13	5.	2.	2.	0.02		

*** NORMAL END OF HEC-1L ***

Index to station computation sections
NEW

(C) 2001 David Ford Consulting Engineers, Inc.

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, May 5 2015

RR Culvert Estimate Alt. B

Invert Elev Dn (ft)	=	99.93
Pipe Length (ft)	=	15.00
Slope (%)	=	0.47
Invert Elev Up (ft)	=	100.00
Rise (in)	=	48.0
Shape	=	Box
Span (in)	=	144.0
No. Barrels	=	1
n-Value	=	0.024
Culvert Type	=	Rectagular Concrete
Culvert Entrance	=	Slope tapered, less favorable edges
Coeff. K,M,c,Y,k	=	0.5, 0.667, 0.0446, 0.65, 0.5

Embankment

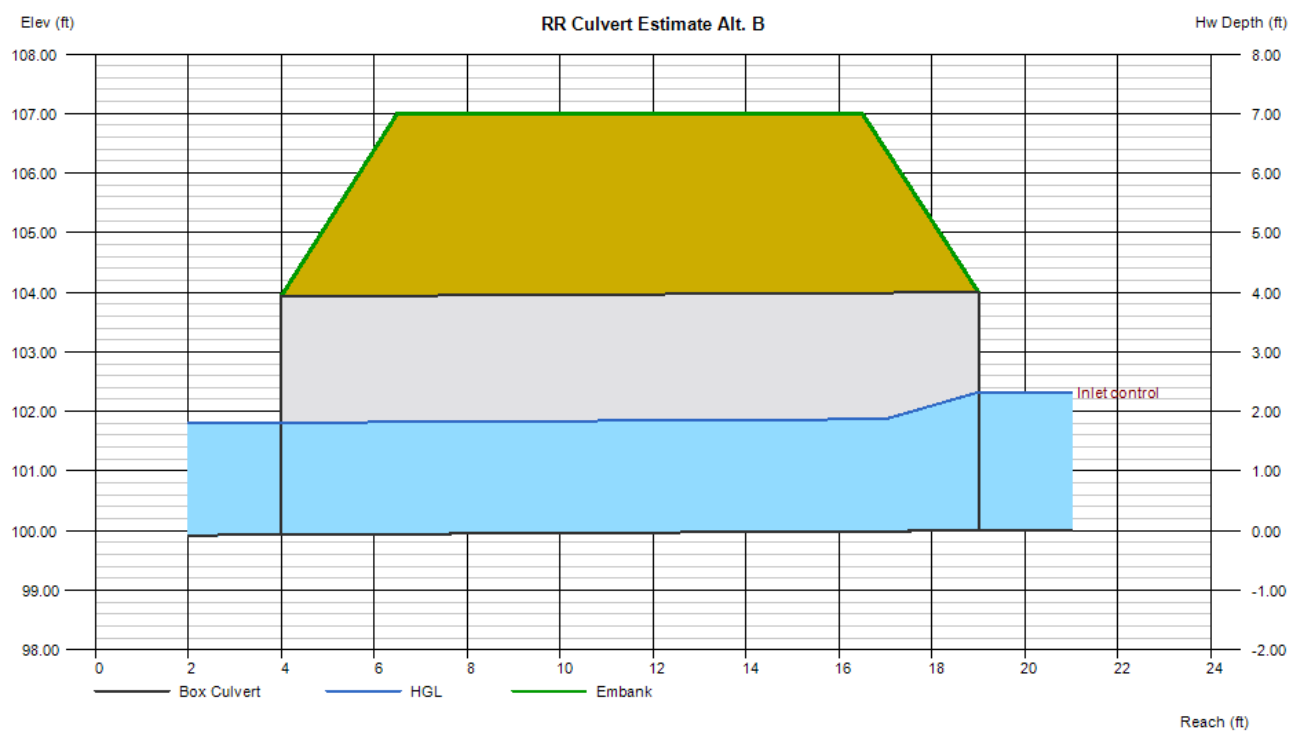
Top Elevation (ft)	=	107.00
Top Width (ft)	=	10.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	120.00
Qmax (cfs)	=	120.00
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	120.00
Qpipe (cfs)	=	120.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	5.32
Veloc Up (ft/s)	=	5.32
HGL Dn (ft)	=	101.81
HGL Up (ft)	=	101.88
Hw Elev (ft)	=	102.32
Hw/D (ft)	=	0.58
Flow Regime	=	Inlet Control



P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative C SW\SacCalc \sc.hecout Jump to: runoff summary | index

```
INPUT  FILENAME ====>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A\SacCalc\sc.dat
OUTPUT FILENAME ===>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A\SacCalc\sc.hecout
DSS FILENAME ===>hcalc.dss
```

```
****************************************                                                  ****************************************
*                                      *                                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                                  *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                                  *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                                  *          609 SECOND STREET           *
*                                      *                                                  *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   22SEP14  TIME  16:39:57  *                                                  *           (916) 756-1104             *
*                                      *                                                  *                                      *
****************************************                                                  ****************************************
```

```
                                                X     X  XXXXXXX   XXXXX           X   X
                                                X     X  X        X     X         XX   X
                                                X     X  X        X                X   X
                                                XXXXXXX  XXXX     X        XXXXX   X   X
                                                X     X  X        X                X   X
                                                X     X  X        X     X          X   X
                                                X     X  XXXXXXX   XXXXX          XXX  XXXX

        Special version of HEC-1 with Extra-large array
        Modified by David Ford Consulting Engineers (2000)
         Program dimensions:
         Number of hydrograph ordinates: 20000
         Unit hydrograph ordinates: 3000


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
```

```
                                                  HEC-1L INPUT                                                  PAGE  1

     LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

                    * SacCalc, developed by David Ford Consulting Engineers
                    * File generated 09/22/2014 16:39:56
                    *
       1            ID   Post Project Condition for Alternative C Mall - SW Portion
                    * Lag computation for station SWMALL
                    *   Lag frequency factor of 1.3 (Table 7-6) for frequency 100 years will be appl
                    *   Basin "n" composition (based on Table 7-1)
                    *              Developed                 Undeveloped
                    *          n   adj n   fract           n   adj n   fract
                    *   ----------------------------------------------------
                    *      0.030  0.0390  0.9010       0.067  0.0670  0.0000
                    *      0.031  0.0403  0.0000       0.070  0.0700  0.0000
                    *      0.032  0.0416  0.0000       0.071  0.0710  0.0000
                    *      0.033  0.0429  0.0000       0.072  0.0720  0.0000
                    *      0.034  0.0442  0.0000       0.073  0.0730  0.0000
                    *      0.035  0.0455  0.0000       0.074  0.0740  0.0000
                    *      0.037  0.0481  0.0000       0.076  0.0760  0.0000
                    *      0.040  0.0520  0.0000       0.080  0.0800  0.0000
                    *      0.042  0.0546  0.0000       0.084  0.0840  0.0000
                    *      0.046  0.0598  0.0000       0.088  0.0880  0.0000
                    *      0.050  0.0650  0.0000       0.090  0.0900  0.0000
                    *      0.053  0.0689  0.0000       0.093  0.0930  0.0000
                    *      0.056  0.0560  0.0000       0.096  0.0960  0.0000
                    *      0.060  0.0600  0.0000       0.100  0.1000  0.0000
                    *      0.065  0.0650  0.0000       0.110  0.1100  0.0000
                    *      0.070  0.0700  0.0990       0.115  0.1150  0.0000
                    *      0.075  0.0750  0.0000       0.120  0.1200  0.0000
                    *      0.080  0.0800  0.0000       0.150  0.1500  0.0000
                    *   ----------------------------------------------------
                    *   Equation (7-1) with L=  0.1612, Lc=  0.0305, S=   52.800, n=0.0421
                    *   Resulting lag:    5.9 minutes
                    * End of lag computations
                    *
                    *   NMIN  JXDATE  JXTIME      NQ            CENT
       2            IT       1 23MAR14    2400    1481                    2000
                    *   IPRT    IPLT
       3            IO       3       0
                    *

       4            KK  SWMALL
                    *  JXMIN    Time interval for input data
       5            IN       5
       6            KM   Alternative C Post Project SW Portion
```

```
*
* Design storm construction details
*
* Regional multiplier (zone 2) applied:  1.000
* Areal adjustment using area:  0.016
*   multiplier from table 4-4: 1.0000
*
* Adjusted depths for each duration from table 4-1: frequency: 100
* Duration----Regional------Elev-----Areal (adjustments)
* 5 min         0.4400    0.4400    0.4400
* 10 min        0.6200    0.6200    0.6200
* 15 min        0.7300    0.7300    0.7300
* 30 min        0.9400    0.9400    0.9400
* 1 hour        1.2100    1.2100    1.2100
* 2 hours       1.5900    1.5900    1.5900
* 3 hours       1.8500    1.8500    1.8500
* 6 hours       2.5000    2.5000    2.5000
* 12 hours      3.3000    3.3000    3.3000
* 24 hours      4.2500    4.2500    4.2500
* 36 hours      5.0900    5.0900    5.0892
* 2 days        5.7000    5.7000    5.7000
* 3 days        6.8000    6.8000    6.8000
* 5 days        8.4200    8.4200    8.4187
* 10 days      11.0100   11.0100   11.0083
* Storm duration:  24, length:  288 ordinates
```

```
                                        HEC-1L INPUT                                                PAGE  2

LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

  7           PB       0
  8           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
  9           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 10           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 11           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 12           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 13           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 14           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 15           PI  0.0066  0.0066  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 16           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 17           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 18           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0181  0.0181
 19           PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 20           PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0217  0.0217  0.0217  0.0217
 21           PI  0.0217  0.0217  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0450  0.0450
 22           PI  0.0450  0.0700  0.1100  0.4400  0.1800  0.0700  0.0700  0.0450  0.0450  0.0450
 23           PI  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0217  0.0217  0.0217  0.0217
 24           PI  0.0217  0.0217  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 25           PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 26           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 27           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 28           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 29           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0066  0.0066  0.0066  0.0066
 30           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 31           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 32           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 33           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 34           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 35           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 36           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
              *
              * Precipitation losses computation (Chapter 5)
              *   Computing RTIMP (percent impervious) from land use and table 5-2
              *   Computing CNSTL (infiltration rate) from soil type and table 5-2
              *  TAREA   subbasin area (sq mi)
 37           BA  0.0156
              *  STRTL   CNSTL   RTIMP
 38           LU    0.10   0.069  85.791
              *
              * Runoff hydrograph computation (Chapter 6)
              *   Using basin lag:   5.9 minutes
              *   Using unit duration (Step 2): 1. min
              *   Lag Time + Unit Duration / 2 (Step 3):  6.40260
              *   Volume of runoff (Step 4) V=    0.420139
 39           UI  10.433  23.956  41.272  63.937  78.354  71.339  52.247  40.477  32.328  26.128
 40           UI  21.411  17.771  14.994  12.894  10.929   9.730   8.665   7.724   6.912   6.169
 41           UI   5.520   4.897   4.395   3.941   3.532   3.163   2.820   2.483   2.237   1.991
 42           UI   1.824   1.617   1.453   1.291   1.168   1.045   0.945   0.839
 43           ZW   C=FLOW F=100YR-24HR A=WILTON R
 44           ZZ
```

```
*****************************************                    ****************************************
*                                       *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L)  *                    *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998              *                    *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)             *                    *          609 SECOND STREET           *
*                                       *                    *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   22SEP14  TIME  16:39:57   *                    *           (916) 756-1104             *
*                                       *                    *                                      *
*****************************************                    ****************************************
```

Post Project Condition for Alternative C Mall - SW Portion

```
  3 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           1  MINUTES IN COMPUTATION INTERVAL
                      IDATE     23MAR14  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ        1481  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     25MAR14  ENDING DATE
                     NDTIME        0040  ENDING TIME
                      ICENT          20  CENTURY MARK

                 COMPUTATION INTERVAL    0.02 HOURS
                      TOTAL TIME BASE   24.67 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
  4 KK      *    SWMALL  *
            *            *
            **************
                      Alternative C Post Project SW Portion

  5 IN          TIME DATA FOR INPUT TIME SERIES
                       JXMIN           5  TIME INTERVAL IN MINUTES
                     JXDATE     23MAR14  STARTING DATE
                     JXTIME        2400  STARTING TIME

               SUBBASIN RUNOFF DATA

 37 BA          SUBBASIN CHARACTERISTICS
                      TAREA,       0.02  SUBBASIN AREA

                PRECIPITATION DATA

  7 PB                STORM        4.25  BASIN TOTAL PRECIPITATION

  8 PI            INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
```

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09
0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

```
 38 LU          UNIFORM LOSS RATE
                     STRTL        0.10  INITIAL LOSS
                     CNSTL        0.07  UNIFORM LOSS RATE
                     RTIMP       85.79  PERCENT IMPERVIOUS AREA

 37 UI          INPUT UNITGRAPH,  38 ORDINATES,  VOLUME = 1.00
                    10.4      24.0      41.3      63.9      78.4      71.3      52.2      40.5      32.3      26.1
                    21.4      17.8      15.0      12.9      10.9       9.7       8.7       7.7       6.9       6.2
                     5.5       4.9       4.4       3.9       3.5       3.2       2.8       2.5       2.2       2.0
                     1.8       1.6       1.5       1.3       1.2       1.0       0.9       0.8

                                                                   ***

     ***            ***             ***             ***             ***

                       HYDROGRAPH AT STATION   SWMALL

   TOTAL RAINFALL =    4.25, TOTAL LOSS =    0.24, TOTAL EXCESS =    4.01

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
   (CFS)       (HR)                  6-HR       24-HR       72-HR     24.67-HR
      33.     12.05       (CFS)        4.          2.          2.           2.
                      (INCHES)     2.432       4.002       4.007        4.007
                       (AC-FT)        2.          3.          3.           3.

                       CUMULATIVE AREA =    0.02 SQ MI
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	SWMALL	33.	12.05	4.	2.	2.	0.02		

*** NORMAL END OF HEC-1L ***

Index to station computation sections
SWMALL

(C) 2001 David Ford Consulting Engineers, Inc.

P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative C SE\SacCalc \sc.hecout Jump to: runoff summary | index

```
INPUT  FILENAME ====>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A\SacCalc\sc.dat
OUTPUT FILENAME ===>P:\2014\2014014 Wilton Rancheria Feasibility Studies\Technical Docs\Civil\Hydrology\Alternative A\SacCalc\sc.hecout
DSS FILENAME ===>hcalc.dss
```

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****************************************                                                  ****************************************
*                                      *                                                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                                                  *    U.S. ARMY CORPS OF ENGINEERS      *
*              JULY   1998             *                                                  *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                                                  *          609 SECOND STREET           *
*                                      *                                                  *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   22SEP14  TIME  16:12:16  *                                                  *           (916) 756-1104             *
*                                      *                                                  *                                      *
****************************************                                                  ****************************************
```

```
                                                X     X  XXXXXXX   XXXXX           X   X
                                                X     X  X        X     X         XX   X
                                                X     X  X        X                X   X
                                                XXXXXXX  XXXX     X        XXXXX   X   X
                                                X     X  X        X                X   X
                                                X     X  X        X     X          X   X
                                                X     X  XXXXXXX   XXXXX          XXX  XXXX

        Special version of HEC-1 with Extra-large array
        Modified by David Ford Consulting Engineers (2000)
         Program dimensions:
         Number of hydrograph ordinates: 20000
         Unit hydrograph ordinates: 3000


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
```

```
                                                  HEC-1L INPUT                                                  PAGE  1

     LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

                    * SacCalc, developed by David Ford Consulting Engineers
                    * File generated 09/22/2014 16:12:16
                    *
       1            ID   Post Project Condition for Alternative C Mall - SE Portion
                    * Lag computation for station SEMALL
                    *   Lag frequency factor of 1.3 (Table 7-6) for frequency 100 years will be appl
                    *   Basin "n" composition (based on Table 7-1)
                    *              Developed                 Undeveloped
                    *          n   adj n   fract           n   adj n   fract
                    *   ---------------------------------------------------
                    *      0.030  0.0390  0.8814       0.067  0.0670  0.0000
                    *      0.031  0.0403  0.0000       0.070  0.0700  0.0000
                    *      0.032  0.0416  0.0000       0.071  0.0710  0.0000
                    *      0.033  0.0429  0.0000       0.072  0.0720  0.0000
                    *      0.034  0.0442  0.0000       0.073  0.0730  0.0000
                    *      0.035  0.0455  0.0000       0.074  0.0740  0.0000
                    *      0.037  0.0481  0.0000       0.076  0.0760  0.0000
                    *      0.040  0.0520  0.0000       0.080  0.0800  0.0000
                    *      0.042  0.0546  0.0000       0.084  0.0840  0.0000
                    *      0.046  0.0598  0.0000       0.088  0.0880  0.0000
                    *      0.050  0.0650  0.0000       0.090  0.0900  0.0000
                    *      0.053  0.0689  0.0000       0.093  0.0930  0.0000
                    *      0.056  0.0560  0.0000       0.096  0.0960  0.0000
                    *      0.060  0.0600  0.0000       0.100  0.1000  0.0000
                    *      0.065  0.0650  0.0000       0.110  0.1100  0.0000
                    *      0.070  0.0700  0.1186       0.115  0.1150  0.0000
                    *      0.075  0.0750  0.0000       0.120  0.1200  0.0000
                    *      0.080  0.0800  0.0000       0.150  0.1500  0.0000
                    *   ---------------------------------------------------
                    *   Equation (7-1) with L=  0.4078, Lc=  0.1648, S=   52.800, n=0.0427
                    *   Resulting lag:   14.2 minutes
                    * End of lag computations
                    *
                    *   NMIN  JXDATE  JXTIME      NQ            CENT
       2            IT       1 23MAR14    2400    1539                    2000
                    *   IPRT    IPLT
       3            IO       3       0
                    *

       4            KK  SEMALL
                    *  JXMIN    Time interval for input data
       5            IN       5
       6            KM   Alternative C Post Project SE Portion
```

```
*
* Design storm construction details
*
* Regional multiplier (zone 2) applied:  1.000
* Areal adjustment using area:  0.064
*   multiplier from table 4-4: 1.0000
*
* Adjusted depths for each duration from table 4-1: frequency: 100
* Duration----Regional------Elev-----Areal (adjustments)
* 5 min         0.4400    0.4400    0.4400
* 10 min        0.6200    0.6200    0.6200
* 15 min        0.7300    0.7300    0.7300
* 30 min        0.9400    0.9400    0.9400
* 1 hour        1.2100    1.2100    1.2100
* 2 hours       1.5900    1.5900    1.5900
* 3 hours       1.8500    1.8500    1.8500
* 6 hours       2.5000    2.5000    2.5000
* 12 hours      3.3000    3.3000    3.3000
* 24 hours      4.2500    4.2500    4.2500
* 36 hours      5.0900    5.0900    5.0867
* 2 days        5.7000    5.7000    5.7000
* 3 days        6.8000    6.8000    6.8000
* 5 days        8.4200    8.4200    8.4146
* 10 days      11.0100   11.0100   11.0029
* Storm duration:  24, length:  288 ordinates
```

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                                        HEC-1L INPUT                                                PAGE  2

LINE          ID.......1.......2.......3.......4.......5,.......6.......7.......8.......9......10

  7           PB       0
  8           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
  9           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 10           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 11           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 12           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 13           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 14           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 15           PI  0.0066  0.0066  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 16           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 17           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 18           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0181  0.0181
 19           PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 20           PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0217  0.0217  0.0217  0.0217
 21           PI  0.0217  0.0217  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0450  0.0450
 22           PI  0.0450  0.0700  0.1100  0.4400  0.1800  0.0700  0.0700  0.0450  0.0450  0.0450
 23           PI  0.0317  0.0317  0.0317  0.0317  0.0317  0.0317  0.0217  0.0217  0.0217  0.0217
 24           PI  0.0217  0.0217  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 25           PI  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181  0.0181
 26           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 27           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 28           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111
 29           PI  0.0111  0.0111  0.0111  0.0111  0.0111  0.0111  0.0066  0.0066  0.0066  0.0066
 30           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 31           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 32           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 33           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 34           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 35           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
 36           PI  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066  0.0066
              *
              * Precipitation losses computation (Chapter 5)
              *   Computing RTIMP (percent impervious) from land use and table 5-2
              *   Computing CNSTL (infiltration rate) from soil type and table 5-2
              *  TAREA   subbasin area (sq mi)
 37           BA  0.0642
              *  STRTL   CNSTL   RTIMP
 38           LU    0.10   0.061  83.995
              *
              * Runoff hydrograph computation (Chapter 6)
              *   Using basin lag:  14.2 minutes
              *   Using unit duration (Step 2): 1. min
              *   Lag Time + Unit Duration / 2 (Step 3): 14.69320
              *   Volume of runoff (Step 4) V=    1.725510
 39           UI    6.85   15.88   25.62   35.23   47.40   60.80   75.69   91.64  110.74  130.44
 40           UI  139.00  140.31  136.79  124.22  108.82   94.38   85.02   76.02   68.48   62.05
 41           UI   56.13   51.08   46.52   42.63   39.04   36.04   33.13   30.77   28.62   26.51
 42           UI   24.76   23.23   21.53   20.29   19.02   17.83   17.15   16.34   15.52   14.69
 43           UI   14.03   13.30   12.71   12.10   11.48   10.97   10.51    9.93    9.45    9.00
 44           UI    8.61    8.20    7.78    7.40    7.07    6.77    6.43    6.14    5.85    5.57
 45           UI    5.28    5.03    4.76    4.49    4.30    4.11    3.92    3.73    3.53    3.43
 46           UI    3.29    3.17    2.98    2.84    2.74    2.58    2.42    2.31    2.22    2.12
 47           UI    2.03    1.93    1.83    1.74    1.69    1.62    1.52    1.48
 48           ZW   C=FLOW F=100YR-24HR A=WILTON R
 49           ZZ
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****************************************                    ****************************************
*                                      *                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1L) *                    *    U.S. ARMY CORPS OF ENGINEERS      *
*             JULY   1998              *                    *    HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1(L)            *                    *          609 SECOND STREET           *
*                                      *                    *       DAVIS, CALIFORNIA 95616        *
*  RUN DATE   22SEP14  TIME  16:12:16  *                    *           (916) 756-1104             *
*                                      *                    *                                      *
****************************************                    ****************************************
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                        Post Project Condition for Alternative C Mall - SE Portion

  3 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           1  MINUTES IN COMPUTATION INTERVAL
                      IDATE     23MAR14  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ        1539  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     25MAR14  ENDING DATE
                     NDTIME        0138  ENDING TIME
                      ICENT          20  CENTURY MARK

                 COMPUTATION INTERVAL    0.02 HOURS
                      TOTAL TIME BASE   25.63 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
             LENGTH, ELEVATION     FEET
             FLOW                  CUBIC FEET PER SECOND
             STORAGE VOLUME        ACRE-FEET
             SURFACE AREA          ACRES
             TEMPERATURE           DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
  4 KK    *    SEMALL  *
          *            *
          **************
                        Alternative C Post Project SE Portion

  5 IN          TIME DATA FOR INPUT TIME SERIES
                      JXMIN           5  TIME INTERVAL IN MINUTES
                     JXDATE     23MAR14  STARTING DATE
                     JXTIME        2400  STARTING TIME

             SUBBASIN RUNOFF DATA

 37 BA          SUBBASIN CHARACTERISTICS
                      TAREA,       0.06  SUBBASIN AREA

                PRECIPITATION DATA

  7 PB                STORM        4.25  BASIN TOTAL PRECIPITATION

  8 PI            INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09
0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 38 LU          UNIFORM LOSS RATE
                     STRTL        0.10  INITIAL LOSS
                     CNSTL        0.06  UNIFORM LOSS RATE
                     RTIMP       84.00  PERCENT IMPERVIOUS AREA

 37 UI          INPUT UNITGRAPH,  88 ORDINATES,  VOLUME = 1.00
                     6.8      15.9      25.6      35.2      47.4      60.8      75.7      91.6     110.7     130.4
                   139.0     140.3     136.8     124.2     108.8      94.4      85.0      76.0      68.5      62.0
                    56.1      51.1      46.5      42.6      39.0      36.0      33.1      30.8      28.6      26.5
                    24.8      23.2      21.5      20.3      19.0      17.8      17.1      16.3      15.5      14.7
                    14.0      13.3      12.7      12.1      11.5      11.0      10.5       9.9       9.4       9.0
                     8.6       8.2       7.8       7.4       7.1       6.8       6.4       6.1       5.8       5.6
                     5.3       5.0       4.8       4.5       4.3       4.1       3.9       3.7       3.5       3.4
                     3.3       3.2       3.0       2.8       2.7       2.6       2.4       2.3       2.2       2.1
                     2.0       1.9       1.8       1.7       1.7       1.6       1.5       1.5

                                                                  ***

     ***            ***            ***            ***            ***

                       HYDROGRAPH AT STATION   SEMALL

   TOTAL RAINFALL =    4.25, TOTAL LOSS =    0.24, TOTAL EXCESS =    4.01

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
   (CFS)       (HR)                   6-HR       24-HR       72-HR     25.63-HR
      92.     12.17       (CFS)       17.          7.          6.           6.
                       (INCHES)     2.426       3.998       4.009        4.009
                        (AC-FT)        8.         14.         14.          14.

                        CUMULATIVE AREA =    0.06 SQ MI
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	SEMALL	92.	12.17	17.	7.	6.	0.06		

*** NORMAL END OF HEC-1L ***

Index to station computation sections
SEMALL

(C) 2001 David Ford Consulting Engineers, Inc.

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, May 5 2015

RR Culvert Estimate Alt. C

Invert Elev Dn (ft)	=	99.93
Pipe Length (ft)	=	15.00
Slope (%)	=	0.47
Invert Elev Up (ft)	=	100.00
Rise (in)	=	48.0
Shape	=	Box
Span (in)	=	144.0
No. Barrels	=	1
n-Value	=	0.024
Culvert Type	=	Rectagular Concrete
Culvert Entrance	=	Slope tapered, less favorable edges
Coeff. K,M,c,Y,k	=	0.5, 0.667, 0.0446, 0.65, 0.5

Embankment

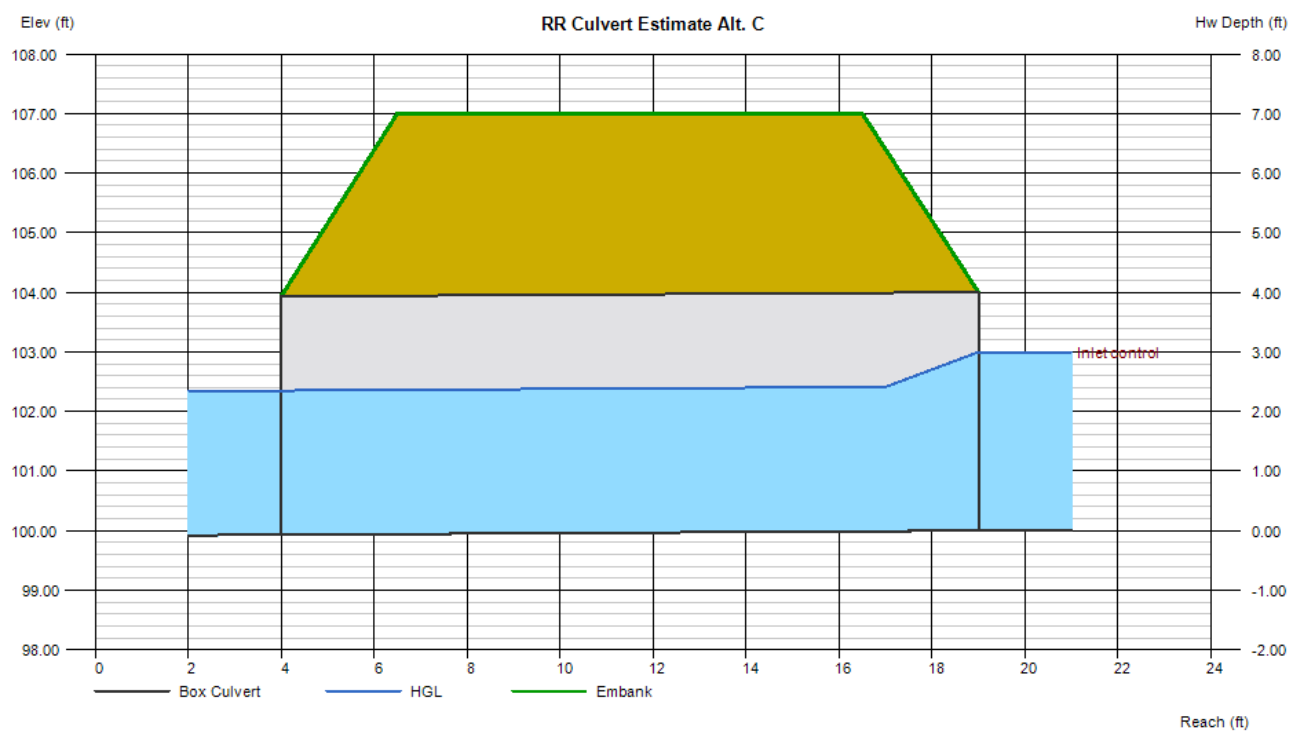
Top Elevation (ft)	=	107.00
Top Width (ft)	=	10.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	176.00
Qmax (cfs)	=	176.00
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	176.00
Qpipe (cfs)	=	176.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	6.06
Veloc Up (ft/s)	=	6.06
HGL Dn (ft)	=	102.35
HGL Up (ft)	=	102.42
Hw Elev (ft)	=	103.00
Hw/D (ft)	=	0.75
Flow Regime	=	Inlet Control



APPENDIX G: STORMWATER MITIGATION SUPPORT CALCULATIONS

Post-Construction Water Balance Calculator

User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.		(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below	(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.	***SACRAMENTO***
			(Step 1c) If you would like a more percise value select the location closest to your site. If you do not recgonize any of these locations, leave this drop-down menu at location. The average value for the County will be used.	**SACRAMENTO DOWNTOWN**

Project Information		***Runoff Calculations***		
Project Name:	***Wilton Rancheria Feasibility Study - Alternative A***	(Step 2) Indicate the Soil Type (dropdown menu to right):	***Group C Soils***	**Low infiltration. Sandy clay loam. Infiltration rate 0.05 to 0.15 inch/hr when wet.**
Waste Discharge Identification (WDID):	***N/A***	(Step 3) Indicate the existing **dominant** non-built land Use Type (dropdown menu to right):	***Cultivated Agricultural: major crop residue cover***	
Date:	***9/25/2014***	(Step 4) Indicate the proposed **dominant** non-built land Use Type (dropdown menu to right):	***A mix of lawn, grass, pasture and tress covering less than 50% of the open space***	
Sub Drainage Area Name (from map):	***N/A***			

Runoff Curve Numbers			**Complete Either**		
			Sq Ft	**Acres**	**Acres**
Existing Runoff Curve Number	**90**	*(Step 5) Total Project Site Area:*		**76.03**	**76.03**
Proposed Development Runoff Curve Number	**95**	*(Step 6) Sub-watershed Area:*		**76.03**	**76.03**
Design Storm		*Percent of total project :*	**100%**		
Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.	**0.64** **in**				
The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)	**0.22** **In**	***(Step 7) Sub-watershed Conditions***	**Complete Either**		**Calculated Acres**
P used for calculations (in) (the greater of the above two criteria)	**0.64** **In**	Sub-watershed Area (acres)	**Sq Ft**	**Acres**	**76.03**
^Available at www.cabmphandbooks.com		Existing Rooftop Impervious Coverage		**0**	**0.00**
		Existing Non-Rooftop Impervious Coverage		**0**	**0.00**
		Proposed Rooftop Impervious Coverage		**10.9**	**10.90**
		Proposed Non-Rooftop Impervious Coverage		**52.51**	**52.51**

			Credits	**Acres**	**Square Feet**
			Porous Pavement	**0.00**	**0**
			Tree Planting	**0.00**	**0**
Pre-Project Runoff Volume (cu ft)	**31,559**	**Cu.Ft.**	Downspout Disconnection	**0.00**	**0**
Project-Related Runoff Volume Increase w/o credits (cu ft)	**42,406**	**Cu.Ft.**	Impervious Area Disconnection	**0.00**	**0**
			Green Roof	**0.00**	**0**
			Stream Buffer	**0.00**	**0**
			Vegetated Swales	**0.00**	**0**
Project-Related Volume Increase with Credits (cu ft)	**42,406**	**Cu.Ft.**	**Subtotal**	**0.00**	**0**
			Subtotal Runoff Volume Reduction Credit	**0 Cu. Ft.**	

You need to do more impervious area reduction to meet minimum requirements	***(Step 9) Impervious Volume Reduction Credits***	**Volume (cubic feet)**
	Rain Barrels/Cisterns	**0 Cu. Ft.**
	Soil Quality	**0 Cu. Ft.**
	Subtotal Runoff Volume Reduction	**0 Cu. Ft.**
	Total Runoff Volume Reduction Credit	**0 Cu. Ft.**

Post-Construction Water Balance Calculator

User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.

(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below

(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.

SACRAMENTO

(Step 1c) If you would like a more percise value select the location closest to your site. If you do not recgonize any of these locations, leave this drop-down menu at location. The average value for the County will be used.

SACRAMENTO DOWNTOWN

Project Information		***Runoff Calculations***		
Project Name:	***Wilton Rancheria Feasibility Study - Alternative A***	(Step 2) Indicate the Soil Type (dropdown menu to right):	***Group D Soils***	**Very low infiltration. Clay loam, silty clay loam, sandy clay, silty clay, or clay. Infiltration rate 0 to 0.05 inch/hr when wet.**
Waste Discharge Identification (WDID):	***N/A***	(Step 3) Indicate the existing **dominant** non-built land Use Type (dropdown menu to right):	***Cultivated Agricultural: major crop residue cover***	
Date:	***9/25/2014***	(Step 4) Indicate the proposed **dominant** non-built land Use Type (dropdown menu to right):	***A mix of lawn, grass, pasture and tress covering less than 50% of the open space***	
Sub Drainage Area Name (from map):	***N/A***			

Runoff Curve Numbers			**Complete Either**		
			Sq Ft	**Acres**	**Acres**
Existing Runoff Curve Number	**93**	*(Step 5) Total Project Site Area:*		**76.03**	**76.03**
Proposed Development Runoff Curve Number	**96**	*(Step 6) Sub-watershed Area:*		**76.03**	**76.03**
Design Storm		*Percent of total project :*	**100%**		
Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.	**0.64** **in**				
The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)	**0.15** **In**	***(Step 7) Sub-watershed Conditions***	**Complete Either**		**Calculated Acres**
P used for calculations (in) (the greater of the above two criteria)	**0.64** **In**	Sub-watershed Area (acres)	**Sq Ft**	**Acres**	**76.03**
^Available at www.cabmphandbooks.com		Existing Rooftop Impervious Coverage		**0**	**0.00**
		Existing Non-Rooftop Impervious Coverage		**0**	**0.00**
		Proposed Rooftop Impervious Coverage		**10.9**	**10.90**
		Proposed Non-Rooftop Impervious Coverage		**52.51**	**52.51**
		Credits	**Acres**		**Square Feet**
		Porous Pavement	**0.00**		**0**
		Tree Planting	**0.00**		**0**
Pre-Project Runoff Volume (cu ft)	**53,439** **Cu.Ft.**	Downspout Disconnection	**0.00**		**0**
Project-Related Runoff Volume Increase w/o credits (cu ft)	**34,049** **Cu.Ft.**	Impervious Area Disconnection	**0.00**		**0**
		Green Roof	**0.00**		**0**
		Stream Buffer	**0.00**		**0**
		Vegetated Swales	**0.00**		**0**
Project-Related Volume Increase with Credits (cu ft)	**34,049** **Cu.Ft.**	**Subtotal**	**0.00**		**0**
		Subtotal Runoff Volume Reduction Credit	**0 Cu. Ft.**		
You need to do more impervious area reduction to meet minimum requirements		***(Step 9) Impervious Volume Reduction Credits***	**Volume (cubic feet)**		
		Rain Barrels/Cisterns	**0 Cu. Ft.**		
		Soil Quality	**0 Cu. Ft.**		
		Subtotal Runoff Volume Reduction	**0 Cu. Ft.**		
		Total Runoff Volume Reduction Credit	**0 Cu. Ft.**		

Post-Construction Water Balance Calculator

User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.		(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below	(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.	***SACRAMENTO***
			(Step 1c) If you would like a more percise value select the location closest to your site. If you do not recgonize any of these locations, leave this drop-down menu at location. The average value for the County will be used.	**SACRAMENTO DOWNTOWN**

Project Information		***Runoff Calculations***		
Project Name:	***Wilton Rancheria Feasibility Study - Alternative B***	(Step 2) Indicate the Soil Type (dropdown menu to right):	***Group D Soils***	**Very low infiltration. Clay loam, silty clay loam, sandy clay, silty clay, or clay. Infiltration rate 0 to 0.05 inch/hr when wet.**
Waste Discharge Identification (WDID):	***N/A***	(Step 3) Indicate the existing **dominant** non-built land Use Type (dropdown menu to right):	***Cultivated Agricultural: major crop residue cover***	
Date:	***9/25/2014***	(Step 4) Indicate the proposed **dominant** non-built land Use Type (dropdown menu to right):	***A mix of lawn, grass, pasture and tress covering less than 50% of the open space***	
Sub Drainage Area Name (from map):	***N/A***		**Complete Either**	

Runoff Curve Numbers			**Sq Ft**	**Acres**	**Acres**
Existing Runoff Curve Number	**93**	*(Step 5) Total Project Site Area:*		**76.03**	**76.03**
Proposed Development Runoff Curve Number	**96**	*(Step 6) Sub-watershed Area:*		**76.03**	**76.03**
Design Storm		*Percent of total project :*	**100%**		
Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.	**0.64** **in**				
The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)	**0.15** **In**	***(Step 7) Sub-watershed Conditions***	**Complete Either**		**Calculated Acres**
P used for calculations (in) (the greater of the above two criteria)	**0.64** **In**	Sub-watershed Area (acres)	**Sq Ft**	**Acres**	**76.03**
^Available at www.cabmphandbooks.com		Existing Rooftop Impervious Coverage		**0**	**0.00**
		Existing Non-Rooftop Impervious Coverage		**0**	**0.00**
		Proposed Rooftop Impervious Coverage		**7.14**	**7.14**
		Proposed Non-Rooftop Impervious Coverage		**55.48**	**55.48**
		Credits	**Acres**		**Square Feet**
		Porous Pavement	**0.00**		**0**
		Tree Planting	**0.00**		**0**
Pre-Project Runoff Volume (cu ft)	**53,439** **Cu.Ft.**	Downspout Disconnection	**0.00**		**0**
Project-Related Runoff Volume Increase w/o credits (cu ft)	**34,049** **Cu.Ft.**	Impervious Area Disconnection	**0.00**		**0**
		Green Roof	**0.00**		**0**
		Stream Buffer	**0.00**		**0**
		Vegetated Swales	**0.00**		**0**
Project-Related Volume Increase with Credits (cu ft)	**34,049** **Cu.Ft.**	**Subtotal**	**0.00**		**0**
		Subtotal Runoff Volume Reduction Credit	**0 Cu. Ft.**		
You need to do more impervious area reduction to meet minimum requirements		***(Step 9) Impervious Volume Reduction Credits***	**Volume (cubic feet)**		
		Rain Barrels/Cisterns	**0 Cu. Ft.**		
		Soil Quality	**0 Cu. Ft.**		
		Subtotal Runoff Volume Reduction	**0 Cu. Ft.**		
		Total Runoff Volume Reduction Credit	**0 Cu. Ft.**		

Post-Construction Water Balance Calculator

User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.		(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below	(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.	***SACRAMENTO***
			(Step 1c) If you would like a more percise value select the location closest to your site. If you do not recgonize any of these locations, leave this drop-down menu at location. The average value for the County will be used.	**SACRAMENTO DOWNTOWN**

Project Information		***Runoff Calculations***		
Project Name:	***Wilton Rancheria Feasibility Study - Alternative B***	(Step 2) Indicate the Soil Type (dropdown menu to right):	***Group C Soils***	**Low infiltration. Sandy clay loam. Infiltration rate 0.05 to 0.15 inch/hr when wet.**
Waste Discharge Identification (WDID):	***N/A***	(Step 3) Indicate the existing **dominant** non-built land Use Type (dropdown menu to right):	***Cultivated Agricultural: major crop residue cover***	
Date:	***9/25/2014***	(Step 4) Indicate the proposed **dominant** non-built land Use Type (dropdown menu to right):	***A mix of lawn, grass, pasture and tress covering less than 50% of the open space***	
Sub Drainage Area Name (from map):	***N/A***		**Complete Either**	

Runoff Curve Numbers			**Sq Ft**	**Acres**	**Acres**
Existing Runoff Curve Number	**90**	*(Step 5) Total Project Site Area:*		**76.03**	**76.03**
Proposed Development Runoff Curve Number	**95**	*(Step 6) Sub-watershed Area:*		**76.03**	**76.03**
Design Storm		*Percent of total project :*	**100%**		
Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.	**0.64** **in**				
The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)	**0.22** **In**	***(Step 7) Sub-watershed Conditions***	**Complete Either**		**Calculated Acres**
P used for calculations (in) (the greater of the above two criteria)	**0.64** **In**	Sub-watershed Area (acres)	**Sq Ft**	**Acres**	**76.03**
^Available at www.cabmphandbooks.com		Existing Rooftop Impervious Coverage		**0**	**0.00**
		Existing Non-Rooftop Impervious Coverage		**0**	**0.00**
		Proposed Rooftop Impervious Coverage		**7.14**	**7.14**
		Proposed Non-Rooftop Impervious Coverage		**55.48**	**55.48**

			Credits	**Acres**	**Square Feet**
			Porous Pavement	**0.00**	**0**
			Tree Planting	**0.00**	**0**
Pre-Project Runoff Volume (cu ft)	**31,559**	**Cu.Ft.**	Downspout Disconnection	**0.00**	**0**
Project-Related Runoff Volume Increase w/o credits (cu ft)	**42,406**	**Cu.Ft.**	Impervious Area Disconnection	**0.00**	**0**
			Green Roof	**0.00**	**0**
			Stream Buffer	**0.00**	**0**
			Vegetated Swales	**0.00**	**0**
Project-Related Volume Increase with Credits (cu ft)	**42,406**	**Cu.Ft.**	**Subtotal**	**0.00**	**0**
			Subtotal Runoff Volume Reduction Credit	**0 Cu. Ft.**	

You need to do more impervious area reduction to meet minimum requirements	***(Step 9) Impervious Volume Reduction Credits***	**Volume (cubic feet)**
	Rain Barrels/Cisterns	**0 Cu. Ft.**
	Soil Quality	**0 Cu. Ft.**
	Subtotal Runoff Volume Reduction	**0 Cu. Ft.**
	Total Runoff Volume Reduction Credit	**0 Cu. Ft.**

Post-Construction Water Balance Calculator

User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.		(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below	(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.	***SACRAMENTO***
			(Step 1c) If you would like a more percise value select the location closest to your site. If you do not recgonize any of these locations, leave this drop-down menu at location. The average value for the County will be used.	**SACRAMENTO DOWNTOWN**

Project Information		***Runoff Calculations***		
Project Name:	***Wilton Rancheria Feasibility Study - Alternative C***	(Step 2) Indicate the Soil Type (dropdown menu to right):	***Group D Soils***	**Very low infiltration. Clay loam, silty clay loam, sandy clay, silty clay, or clay. Infiltration rate 0 to 0.05 inch/hr when wet.**
Waste Discharge Identification (WDID):	***N/A***	(Step 3) Indicate the existing **dominant** non-built land Use Type (dropdown menu to right):	***Cultivated Agricultural: major crop residue cover***	
Date:	***9/25/2014***	(Step 4) Indicate the proposed **dominant** non-built land Use Type (dropdown menu to right):	***A mix of lawn, grass, pasture and tress covering less than 50% of the open space***	
Sub Drainage Area Name (from map):	***N/A***		**Complete Either**	

Runoff Curve Numbers			**Sq Ft**	**Acres**	**Acres**
Existing Runoff Curve Number	**93**	*(Step 5) Total Project Site Area:*		**76.03**	**76.03**
Proposed Development Runoff Curve Number	**95**	*(Step 6) Sub-watershed Area:*		**76.03**	**76.03**
Design Storm		*Percent of total project :*	**100%**		
Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.	**0.64** **in**				
The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)	**0.15** **In**	***(Step 7) Sub-watershed Conditions***	**Complete Either**		**Calculated Acres**
P used for calculations (in) (the greater of the above two criteria)	**0.64** **In**	Sub-watershed Area (acres)	**Sq Ft**	**Acres**	**76.03**
^Available at www.cabmphandbooks.com		Existing Rooftop Impervious Coverage		**0**	**0.00**
		Existing Non-Rooftop Impervious Coverage		**0**	**0.00**
		Proposed Rooftop Impervious Coverage		**14.96**	**14.96**
		Proposed Non-Rooftop Impervious Coverage		**44.26**	**44.26**
		Credits	**Acres**		**Square Feet**
		Porous Pavement	**0.00**		**0**
		Tree Planting	**0.00**		**0**
Pre-Project Runoff Volume (cu ft)	**53,439** **Cu.Ft.**	Downspout Disconnection	**0.00**		**0**
Project-Related Runoff Volume Increase w/o credits (cu ft)	**20,526** **Cu.Ft.**	Impervious Area Disconnection	**0.00**		**0**
		Green Roof	**0.00**		**0**
		Stream Buffer	**0.00**		**0**
		Vegetated Swales	**0.00**		**0**
Project-Related Volume Increase with Credits (cu ft)	**20,526** **Cu.Ft.**	**Subtotal**	**0.00**		**0**
		Subtotal Runoff Volume Reduction Credit	**0 Cu. Ft.**		
You need to do more impervious area reduction to meet minimum requirements		***(Step 9) Impervious Volume Reduction Credits***	**Volume (cubic feet)**		
		Rain Barrels/Cisterns	**0 Cu. Ft.**		
		Soil Quality	**0 Cu. Ft.**		
		Subtotal Runoff Volume Reduction	**0 Cu. Ft.**		
		Total Runoff Volume Reduction Credit	**0 Cu. Ft.**		

Post-Construction Water Balance Calculator

User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.

(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below

(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.

SACRAMENTO

(Step 1c) If you would like a more percise value select the location closest to your site. If you do not recgonize any of these locations, leave this drop-down menu at location. The average value for the County will be used.

SACRAMENTO DOWNTOWN

Project Information		***Runoff Calculations***		
Project Name:	***Wilton Rancheria Feasibility Study - Alternative C***	(Step 2) Indicate the Soil Type (dropdown menu to right):	***Group C Soils***	**Low infiltration. Sandy clay loam. Infiltration rate 0.05 to 0.15 inch/hr when wet.**
Waste Discharge Identification (WDID):	***N/A***	(Step 3) Indicate the existing **dominant** non-built land Use Type (dropdown menu to right):	***Cultivated Agricultural: major crop residue cover***	
Date:	***9/25/2014***	(Step 4) Indicate the proposed **dominant** non-built land Use Type (dropdown menu to right):	***A mix of lawn, grass, pasture and tress covering less than 50% of the open space***	
Sub Drainage Area Name (from map):	***N/A***		**Complete Either**	

Runoff Curve Numbers			**Sq Ft**	**Acres**	**Acres**
Existing Runoff Curve Number	**90**	*(Step 5) Total Project Site Area:*		**76.03**	**76.03**
Proposed Development Runoff Curve Number	**94**	*(Step 6) Sub-watershed Area:*		**76.03**	**76.03**
Design Storm		*Percent of total project :*	**100%**		
Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.	**0.64** **in**				
The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)	**0.22** **In**	***(Step 7) Sub-watershed Conditions***	**Complete Either**		**Calculated Acres**
P used for calculations (in) (the greater of the above two criteria)	**0.64** **In**	Sub-watershed Area (acres)	**Sq Ft**	**Acres**	**76.03**
^Available at www.cabmphandbooks.com		Existing Rooftop Impervious Coverage		**0**	**0.00**
		Existing Non-Rooftop Impervious Coverage		**0**	**0.00**
		Proposed Rooftop Impervious Coverage		**14.96**	**14.96**
		Proposed Non-Rooftop Impervious Coverage		**44.26**	**44.26**
		Credits	**Acres**		**Square Feet**
		Porous Pavement	**0.00**		**0**
		Tree Planting	**0.00**		**0**
Pre-Project Runoff Volume (cu ft)	**31,559** **Cu.Ft.**	Downspout Disconnection	**0.00**		**0**
Project-Related Runoff Volume Increase w/o credits (cu ft)	**31,366** **Cu.Ft.**	Impervious Area Disconnection	**0.00**		**0**
		Green Roof	**0.00**		**0**
		Stream Buffer	**0.00**		**0**
		Vegetated Swales	**0.00**		**0**
Project-Related Volume Increase with Credits (cu ft)	**31,366** **Cu.Ft.**	**Subtotal**	**0.00**		**0**
		Subtotal Runoff Volume Reduction Credit	**0 Cu. Ft.**		
You need to do more impervious area reduction to meet minimum requirements		***(Step 9) Impervious Volume Reduction Credits***	**Volume (cubic feet)**		
		Rain Barrels/Cisterns	**0 Cu. Ft.**		
		Soil Quality	**0 Cu. Ft.**		
		Subtotal Runoff Volume Reduction	**0 Cu. Ft.**		
		Total Runoff Volume Reduction Credit	**0 Cu. Ft.**		

Post-Construction Water Balance Calculator

User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.		(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below	(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.	***SACRAMENTO***
			(Step 1c) If you would like a more percise value select the location closest to your site. If you do not recgonize any of these locations, leave this drop-down menu at location. The average value for the County will be used.	**SACRAMENTO DOWNTOWN**

Project Information		***Runoff Calculations***		
Project Name:	***Wilton Rancheria Feasibility Study - Alternative D***	(Step 2) Indicate the Soil Type (dropdown menu to right):	***Group C Soils***	**Low infiltration. Sandy clay loam. Infiltration rate 0.05 to 0.15 inch/hr when wet.**
Waste Discharge Identification (WDID):	***N/A***	(Step 3) Indicate the existing **dominant** non-built land Use Type (dropdown menu to right):	***Open Space: grass cover >75%***	
Date:	***9/25/2014***	(Step 4) Indicate the proposed **dominant** non-built land Use Type (dropdown menu to right):	***A mix of lawn, grass, pasture and tress covering less than 50% of the open space***	
Sub Drainage Area Name (from map):	***N/A***		**Complete Either**	

Runoff Curve Numbers			**Sq Ft**	**Acres**	**Acres**
Existing Runoff Curve Number	**75**	*(Step 5) Total Project Site Area:*		**64.80**	**64.80**
Proposed Development Runoff Curve Number	**92**	*(Step 6) Sub-watershed Area:*		**64.80**	**64.80**
Design Storm		*Percent of total project :*	**100%**		
Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.	**0.64** **in**				
The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)	**0.67** **In**	***(Step 7) Sub-watershed Conditions***	**Complete Either**		**Calculated Acres**
P used for calculations (in) (the greater of the above two criteria)	**0.67** **In**	Sub-watershed Area (acres)	**Sq Ft**	**Acres**	**64.80**
^Available at www.cabmphandbooks.com		Existing Rooftop Impervious Coverage		**1.41**	**1.41**
		Existing Non-Rooftop Impervious Coverage		**0.79**	**0.79**
		Proposed Rooftop Impervious Coverage		**7.71**	**7.71**
		Proposed Non-Rooftop Impervious Coverage		**34.08**	**34.08**
		Credits	**Acres**		**Square Feet**
		Porous Pavement	**0.00**		**0**
		Tree Planting	**0.00**		**0**
Pre-Project Runoff Volume (cu ft)	**1** **Cu.Ft.**	Downspout Disconnection	**0.00**		**0**
Project-Related Runoff Volume Increase w/o credits (cu ft)	**42,339** **Cu.Ft.**	Impervious Area Disconnection	**0.00**		**0**
		Green Roof	**0.00**		**0**
		Stream Buffer	**0.00**		**0**
		Vegetated Swales	**0.00**		**0**
Project-Related Volume Increase with Credits (cu ft)	**42,339** **Cu.Ft.**	**Subtotal**	**0.00**		**0**
		Subtotal Runoff Volume Reduction Credit	**0 Cu. Ft.**		
You need to do more impervious area reduction to meet minimum requirements		***(Step 9) Impervious Volume Reduction Credits***	**Volume (cubic feet)**		
		Rain Barrels/Cisterns	**0 Cu. Ft.**		
		Soil Quality	**0 Cu. Ft.**		
		Subtotal Runoff Volume Reduction	**0 Cu. Ft.**		
		Total Runoff Volume Reduction Credit	**0 Cu. Ft.**		

Post-Construction Water Balance Calculator

User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.		(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below	(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.	***SACRAMENTO***
			(Step 1c) If you would like a more percise value select the location closest to your site. If you do not recgonize any of these locations, leave this drop-down menu at location. The average value for the County will be used.	**SACRAMENTO DOWNTOWN**

Project Information		***Runoff Calculations***		
Project Name:	***Wilton Rancheria Feasibility Study - Alternative D***	(Step 2) Indicate the Soil Type (dropdown menu to right):	***Group A Soils***	**High infiltration. Sand, loamy sand, or sandy loam. Infiltration rate > 0.3 inch/hr when wet.**
Waste Discharge Identification (WDID):	***N/A***	(Step 3) Indicate the existing **dominant** non-built land Use Type (dropdown menu to right):	***Open Space: grass cover >75%***	
Date:	***9/25/2014***	(Step 4) Indicate the proposed **dominant** non-built land Use Type (dropdown menu to right):	***A mix of lawn, grass, pasture and tress covering less than 50% of the open space***	
Sub Drainage Area Name (from map):	***N/A***		**Complete Either**	

Runoff Curve Numbers			**Sq Ft**	**Acres**	**Acres**
Existing Runoff Curve Number	**41**	*(Step 5) Total Project Site Area:*		**64.80**	**64.80**
Proposed Development Runoff Curve Number	**83**	*(Step 6) Sub-watershed Area:*		**64.80**	**64.80**

Design Storm			*Percent of total project :*	**100%**
Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.	**0.64**	**in**		
The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)	**2.91**	**In**	***(Step 7) Sub-watershed Conditions***	**Complete Either** / **Calculated Acres**
P used for calculations (in) (the greater of the above two criteria)	**2.91**	**In**	Sub-watershed Area (acres)	**Sq Ft** / **Acres** / **64.80**
^Available at www.cabmphandbooks.com			Existing Rooftop Impervious Coverage	**1.41** / **1.41**
			Existing Non-Rooftop Impervious Coverage	**0.79** / **0.79**
			Proposed Rooftop Impervious Coverage	**7.71** / **7.71**
			Proposed Non-Rooftop Impervious Coverage	**34.08** / **34.08**

			Credits	**Acres**	**Square Feet**
			Porous Pavement	**0.00**	**0**
			Tree Planting	**0.00**	**0**
Pre-Project Runoff Volume (cu ft)	**17**	**Cu.Ft.**	Downspout Disconnection	**0.00**	**0**
Project-Related Runoff Volume Increase w/o credits (cu ft)	**323,181**	**Cu.Ft.**	Impervious Area Disconnection	**0.00**	**0**
			Green Roof	**0.00**	**0**
			Stream Buffer	**0.00**	**0**
			Vegetated Swales	**0.00**	**0**
Project-Related Volume Increase with Credits (cu ft)	**323,181**	**Cu.Ft.**	**Subtotal**	**0.00**	**0**
			Subtotal Runoff Volume Reduction Credit	**0 Cu. Ft.**	

You need to do more impervious area reduction to meet minimum requirements			***(Step 9) Impervious Volume Reduction Credits***	**Volume (cubic feet)**
			Rain Barrels/Cisterns	**0 Cu. Ft.**
			Soil Quality	**0 Cu. Ft.**
			Subtotal Runoff Volume Reduction	**0 Cu. Ft.**
			Total Runoff Volume Reduction Credit	**0 Cu. Ft.**

Post-Construction Water Balance Calculator

User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.		(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below	(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.	***SACRAMENTO***
			(Step 1c) If you would like a more percise value select the location closest to your site. If you do not recgonize any of these locations, leave this drop-down menu at location. The average value for the County will be used.	**SACRAMENTO DOWNTOWN**

Project Information		***Runoff Calculations***		
Project Name:	***Wilton Rancheria Feasibility Study - Alternative E***	(Step 2) Indicate the Soil Type (dropdown menu to right):	***Group A Soils***	**High infiltration. Sand, loamy sand, or sandy loam. Infiltration rate > 0.3 inch/hr when wet.**
Waste Discharge Identification (WDID):	***N/A***	(Step 3) Indicate the existing **dominant** non-built land Use Type (dropdown menu to right):	***Open Space: grass cover >75%***	
Date:	***9/25/2014***	(Step 4) Indicate the proposed **dominant** non-built land Use Type (dropdown menu to right):	***A mix of lawn, grass, pasture and tress covering less than 50% of the open space***	
Sub Drainage Area Name (from map):	***N/A***		**Complete Either**	

Runoff Curve Numbers			**Sq Ft**	**Acres**	**Acres**
Existing Runoff Curve Number	**41**	*(Step 5) Total Project Site Area:*		**64.80**	**64.80**
Proposed Development Runoff Curve Number	**82**	*(Step 6) Sub-watershed Area:*		**64.80**	**64.80**
Design Storm		*Percent of total project :*	**100%**		
Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.	**0.64** **in**				
The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)	**2.91** **In**	***(Step 7) Sub-watershed Conditions***	**Complete Either**		**Calculated Acres**
P used for calculations (in) (the greater of the above two criteria)	**2.91** **In**	Sub-watershed Area (acres)	**Sq Ft**	**Acres**	**64.80**
^Available at www.cabmphandbooks.com		Existing Rooftop Impervious Coverage		**1.41**	**1.41**
		Existing Non-Rooftop Impervious Coverage		**0.79**	**0.79**
		Proposed Rooftop Impervious Coverage		**6.71**	**6.71**
		Proposed Non-Rooftop Impervious Coverage		**33.1**	**33.10**
		Credits	**Acres**		**Square Feet**
		Porous Pavement	**0.00**		**0**
		Tree Planting	**0.00**		**0**
Pre-Project Runoff Volume (cu ft)	**17** **Cu.Ft.**	Downspout Disconnection	**0.00**		**0**
Project-Related Runoff Volume Increase w/o credits (cu ft)	**307,186** **Cu.Ft.**	Impervious Area Disconnection	**0.00**		**0**
		Green Roof	**0.00**		**0**
		Stream Buffer	**0.00**		**0**
		Vegetated Swales	**0.00**		**0**
Project-Related Volume Increase with Credits (cu ft)	**307,186** **Cu.Ft.**	**Subtotal**	**0.00**		**0**
		Subtotal Runoff Volume Reduction Credit	**0 Cu. Ft.**		
You need to do more impervious area reduction to meet minimum requirements		***(Step 9) Impervious Volume Reduction Credits***	**Volume (cubic feet)**		
		Rain Barrels/Cisterns	**0 Cu. Ft.**		
		Soil Quality	**0 Cu. Ft.**		
		Subtotal Runoff Volume Reduction	**0 Cu. Ft.**		
		Total Runoff Volume Reduction Credit	**0 Cu. Ft.**		

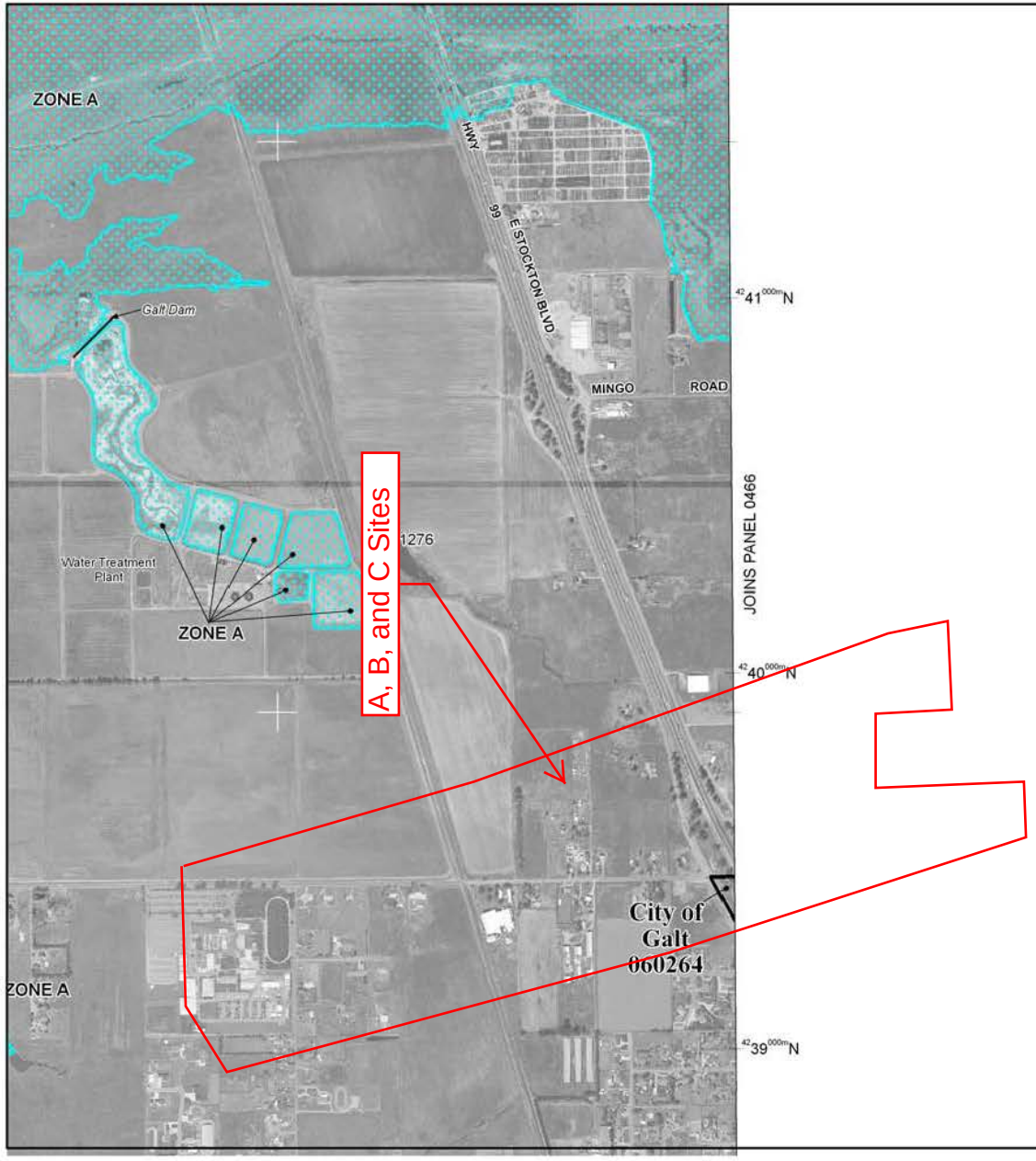
Post-Construction Water Balance Calculator

User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.		(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below	(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.	***SACRAMENTO***
			(Step 1c) If you would like a more percise value select the location closest to your site. If you do not recgonize any of these locations, leave this drop-down menu at location. The average value for the County will be used.	**SACRAMENTO DOWNTOWN**

Project Information		***Runoff Calculations***		
Project Name:	***Wilton Rancheria Feasibility Study - Alternative E***	(Step 2) Indicate the Soil Type (dropdown menu to right):	***Group C Soils***	**Low infiltration. Sandy clay loam. Infiltration rate 0.05 to 0.15 inch/hr when wet.**
Waste Discharge Identification (WDID):	***N/A***	(Step 3) Indicate the existing **dominant** non-built land Use Type (dropdown menu to right):	***Open Space: grass cover >75%***	
Date:	***9/25/2014***	(Step 4) Indicate the proposed **dominant** non-built land Use Type (dropdown menu to right):	***A mix of lawn, grass, pasture and tress covering less than 50% of the open space***	
Sub Drainage Area Name (from map):	***N/A***		**Complete Either**	

Runoff Curve Numbers			**Sq Ft**	**Acres**	**Acres**
Existing Runoff Curve Number	**75**	*(Step 5) Total Project Site Area:*		**64.80**	**64.80**
Proposed Development Runoff Curve Number	**92**	*(Step 6) Sub-watershed Area:*		**64.80**	**64.80**
Design Storm		*Percent of total project :*	**100%**		
Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.	**0.64** **in**				
The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)	**0.67** **In**	***(Step 7) Sub-watershed Conditions***	**Complete Either**		**Calculated Acres**
P used for calculations (in) (the greater of the above two criteria)	**0.67** **In**	Sub-watershed Area (acres)	**Sq Ft**	**Acres**	**64.80**
^Available at www.cabmphandbooks.com		Existing Rooftop Impervious Coverage		**1.41**	**1.41**
		Existing Non-Rooftop Impervious Coverage		**0.79**	**0.79**
		Proposed Rooftop Impervious Coverage		**6.71**	**6.71**
		Proposed Non-Rooftop Impervious Coverage		**33.1**	**33.10**
		Credits	**Acres**		**Square Feet**
		Porous Pavement	**0.00**		**0**
		Tree Planting	**0.00**		**0**
Pre-Project Runoff Volume (cu ft)	**1** **Cu.Ft.**	Downspout Disconnection	**0.00**		**0**
Project-Related Runoff Volume Increase w/o credits (cu ft)	**42,339** **Cu.Ft.**	Impervious Area Disconnection	**0.00**		**0**
		Green Roof	**0.00**		**0**
		Stream Buffer	**0.00**		**0**
		Vegetated Swales	**0.00**		**0**
Project-Related Volume Increase with Credits (cu ft)	**42,339** **Cu.Ft.**	**Subtotal**	**0.00**		**0**
		Subtotal Runoff Volume Reduction Credit	**0 Cu. Ft.**		
You need to do more impervious area reduction to meet minimum requirements		***(Step 9) Impervious Volume Reduction Credits***	**Volume (cubic feet)**		
		Rain Barrels/Cisterns	**0 Cu. Ft.**		
		Soil Quality	**0 Cu. Ft.**		
		Subtotal Runoff Volume Reduction	**0 Cu. Ft.**		
		Total Runoff Volume Reduction Credit	**0 Cu. Ft.**		

APPENDIX H: FLOODPLAIN SUPPORT CALCULATIONS



area subject to flooding by the 1% annual chance flood. Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determine
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (us Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually depths determined. For areas of determined.
ZONE AR	Special Flood Hazard Area formerly flood by a flood control system tha AR indicates that the former flooc provide protection from the 1% ann
ZONE A99	Area to be protected from 1% an protection system under constr determined.
ZONE V	Coastal flood zone with velocity h Elevations determined.
ZONE VE	Coastal flood zone with velocity Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent of encroachment so that the 1% annual chance flood can b in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; average depths of less than 1 foot or mile; and areas protected by levees fr

OTHER AREAS

ZONE X — Areas determined to be outside the 0.

ZONE D — Areas in which flood hazards are unde

COASTAL BARRIER RESOURCES

OTHERWISE PROTECTED AREA

CBRS areas and OPAs are normally located within or adjacen

1% annual chance floodpla

0.2% annual chance floodp

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Speci boundary dividing Special Flood Elevations, flood dep

Limit of Moderate Wave Ac

513 — Base Flood Elevation line a

(EL 987) — Base Flood Elevation value in feet*

* Referenced to the North American Vertical Datum of 1988

Cross section line

Transect line

Culvert, Flume, Penstock o

Road or Railroad Bridge

Footbridge

87°07'45", 32°22'30" — Geographic coordinates r Datum of 1983 (NAD 83),

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0465H

FIRM

FLOOD INSURANCE RATE MAP

SACRAMENTO COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 465 OF 705

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GALT, CITY OF	060264	0465	H
SACRAMENTO COUNTY	060262	0465	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06067C0465H

EFFECTIVE DATE
AUGUST 16, 2012

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was California State Plane Zone II (FIPSZONE 0402). The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by the County of Sacramento Water Resources Department. This information was derived from digital orthophotos produced with 6-inch pixel resolution and 3.3-foot horizontal accuracy from aerial photography dated March 2001.

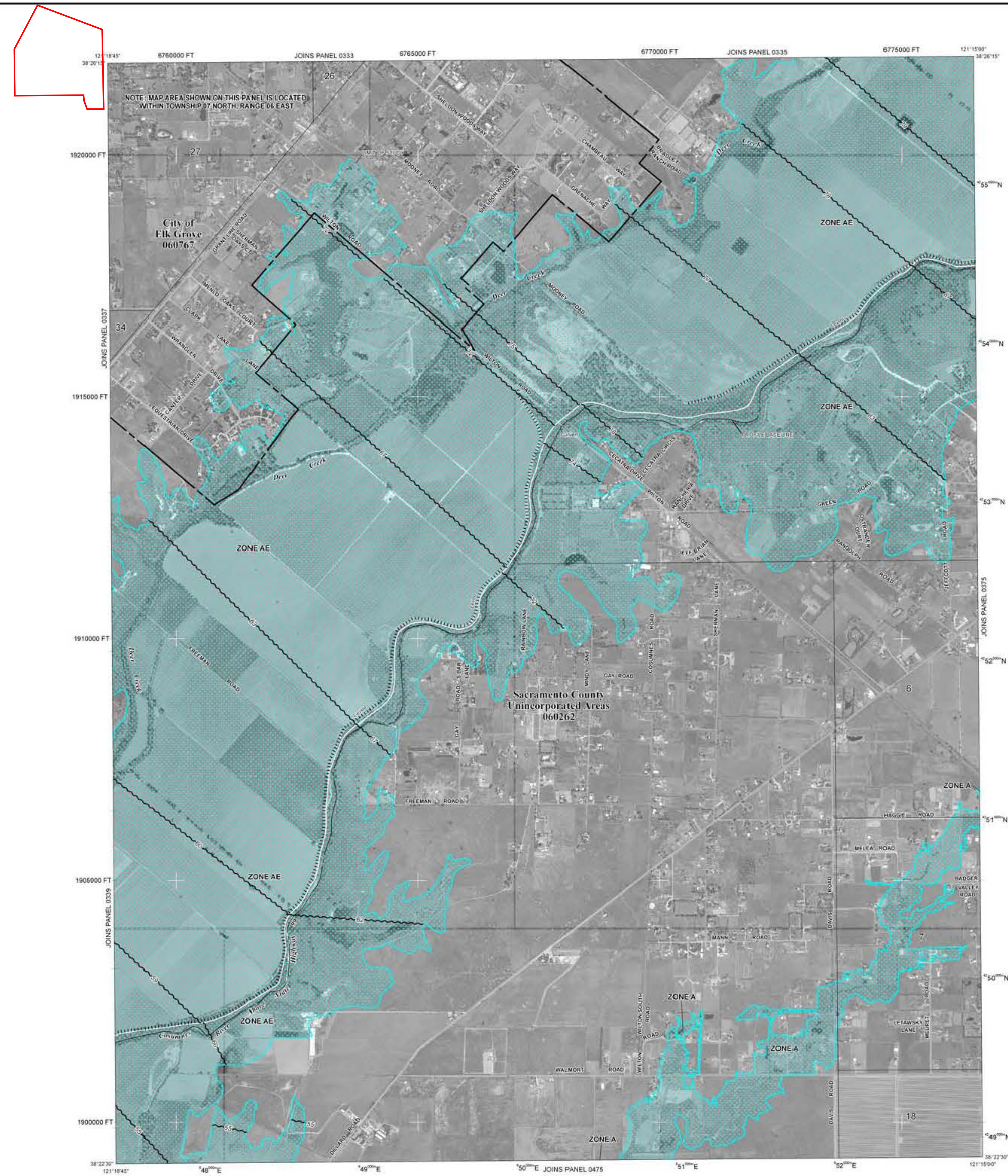
This map may reflect more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange (FMIX) at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- Limit of Moderate Wave Action

~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

(A)———(A)	Cross section line
(23)- - - -(23)	Transect line
	Culvert, Flume, Penstock or Aqueduct
	Road or Railroad Bridge
	Footbridge
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
⁷⁶⁰⁰⁰⁰N	1000-meter Universal Transverse Mercator grid values, zone 10
600000 FT	5000-foot grid values: California State Plane coordinate system, zone II (FIPSZONE 0402), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
AUGUST 16, 2012

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0345H

FIRM
FLOOD INSURANCE RATE MAP

SACRAMENTO COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 345 OF 705
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

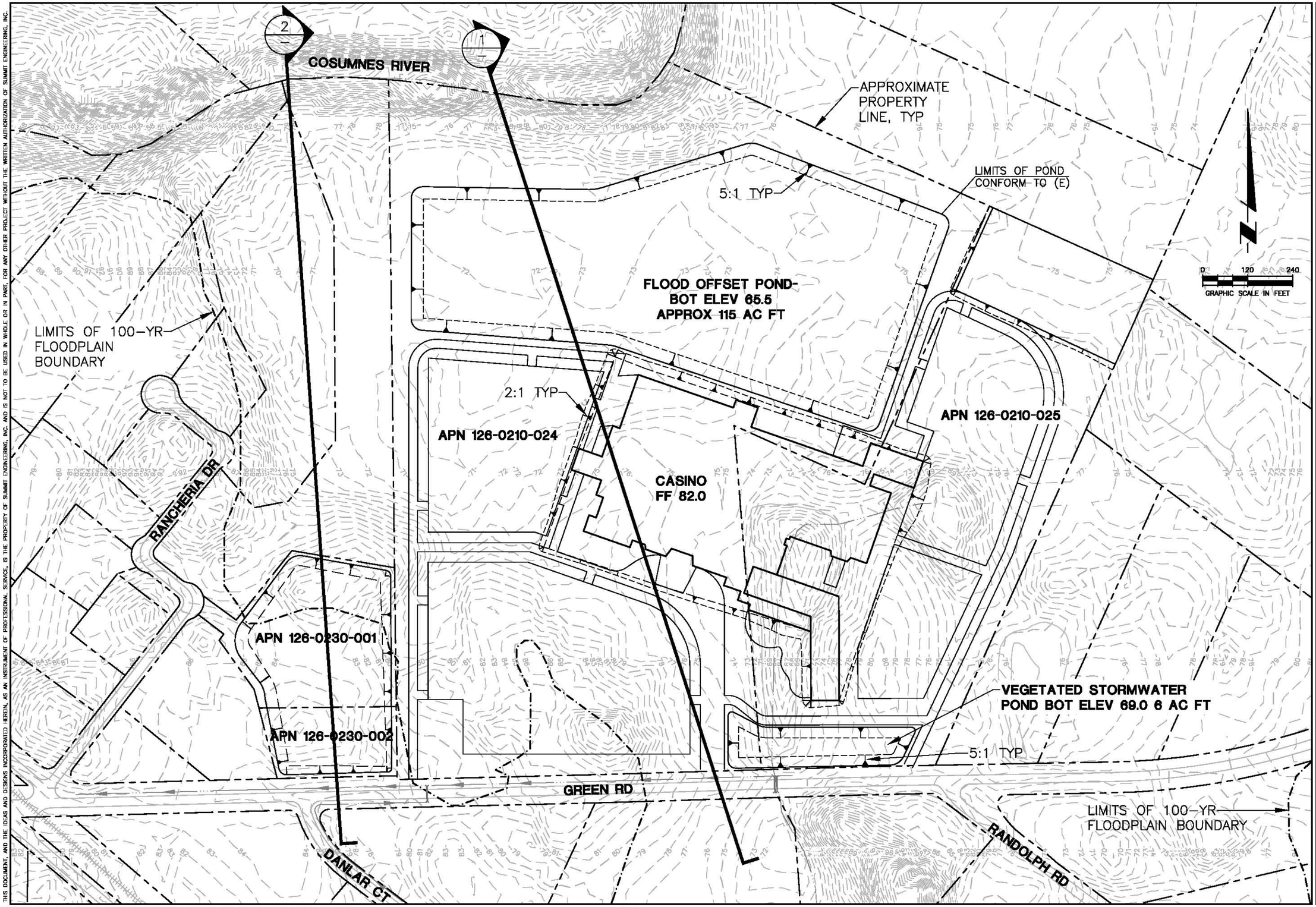
COMMUNITY	NUMBER	PANEL	SUFFIX
ELK GROVE, CITY OF	060767	0345	H
SACRAMENTO COUNTY	060262	0345	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06067C0345H

EFFECTIVE DATE
AUGUST 16, 2012

Federal Emergency Management Agency



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WILTON RANCHERIA

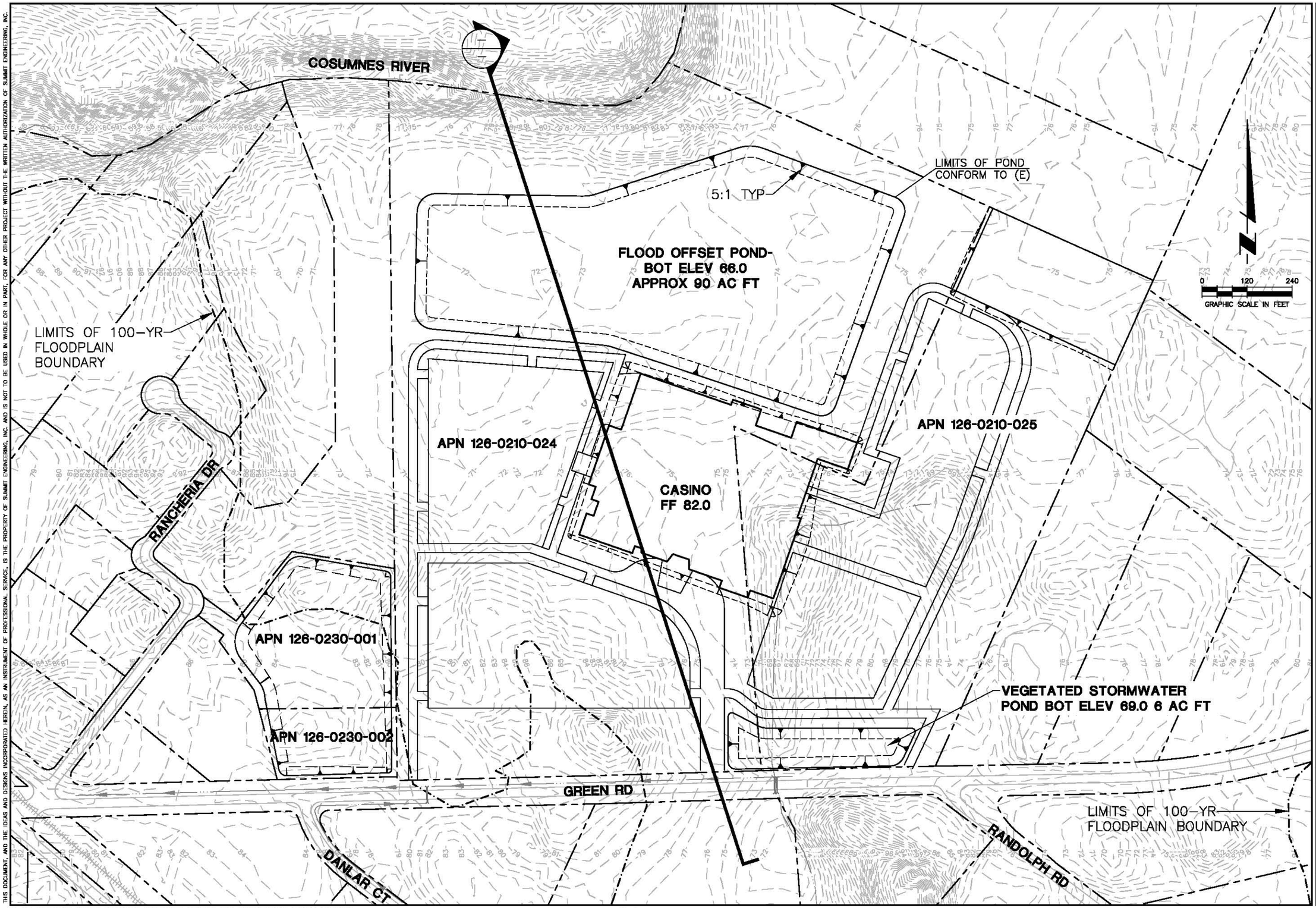
RANCHERIA SITE

ALTERNATIVE D,
CROSS SECTION LOCATION

2014-09-26
DRAFT REPORT

DATE: 2014-03-03
JOB NO: 2014014
SCALE: AS SHOWN
DRAWN: TAF
CHECKED: TCS
SHEET

FIGURE 1



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WILTON RANCHERIA

RANCHERIA SITE

ALTERNATIVE E,
CROSS SECTION LOCATION

2014-09-26
DRAFT REPORT

DATE:	2014-03-03
JOB NO:	2014014
SCALE:	AS SHOWN
DRAWN:	TAF
CHECKED:	TCS

SHEET
FIGURE 2

WILTON RANCHERIA
BASE FLOOD EL.
+ FLOOD OFFSET POND

SUMMIT

PROJECT NO. 2014014 DATE 9/25/2014
BY EM CHK _____ SHT NO. 1 OF 1

BASE ELEVATIONS SHOWN AT 83' & 78' OVER 3700' ON FEMA FIRM

$$\frac{83-78}{3700} = 0.00135$$

$$83' - (1900)(0.00135) = 80.4' \text{ BFE}$$

$$FF = 1.5' + BFE = 81.9' \Rightarrow \boxed{82' \text{ FF}}$$

ALT. D - FLOOD OFFSET POND

→ CIVIL 3D VOLUME CALCULATOR
FF @ 82', PARKING LOT @ 78'

FILL = 210,400 CY

NORTHERN OFFSET POND: 72' AVG. → 65.5' 5:1 SIDE SLOPES 185,000 CY CUT
SOUTHERN OFFSET POND: 39,000 CY CUT TOTAL CUT = 224,000 CY CUT

ALT. E - FLOOD OFFSET POND

→ CIVIL 3D VOLUME CALCULATOR
FF @ 82', PARKING LOT @ 78'

FILL = 177,000 CY

NORTHERN OFFSET POND: 72' AVG → 66' 5:1 SIDE SLOPES
CUT = 149,000 CY TOTAL CUT: 182,000 CY

SOUTHERN OFFSET POND: 39,000 CY CUT

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Wednesday, Mar 19 2014

Pre Construction (Cross Section 1) - 100 yr HGL

User-defined

Invert Elev (ft)	=	60.00
Slope (%)	=	1.00
N-Value	=	0.040

Calculations

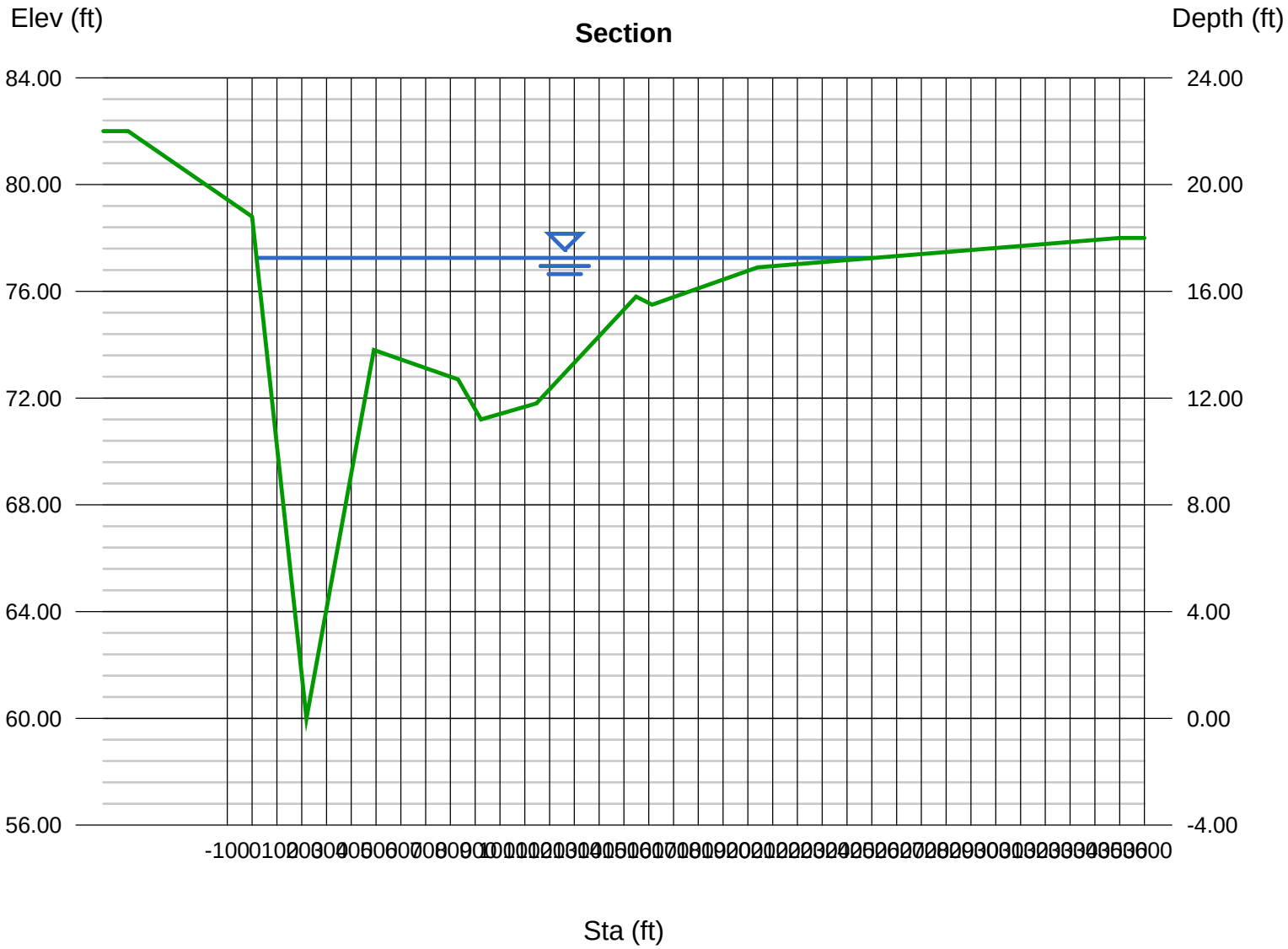
Compute by:		Known Q
Known Q (cfs)	=	89500.00

Highlighted

Depth (ft)	=	17.25
Q (cfs)	=	89,500
Area (sqft)	=	9704.18
Velocity (ft/s)	=	9.22
Wetted Perim (ft)	=	2488.01
Crit Depth, Yc (ft)	=	16.26
Top Width (ft)	=	2486.89
EGL (ft)	=	18.57

(Sta, El, n)-(Sta, El, n)...

(-500.00, 82.00)-(219.00, 60.00, 0.040)-(491.00, 73.80, 0.040)-(831.00, 72.70, 0.040)-(923.00, 71.20, 0.040)-(1147.00, 71.80, 0.040)-(1549.00, 75.80, 0.040)-(1614.00, 75.50, 0.040)-(2040.00, 76.90, 0.040)-(3500.00, 78.00, 0.040)



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Thursday, Apr 3 2014

Alternative D (Cross Section 1) - Post Construction - 100 yr HGL

User-defined

Invert Elev (ft)	=	60.00
Slope (%)	=	1.00
N-Value	=	0.040

Calculations

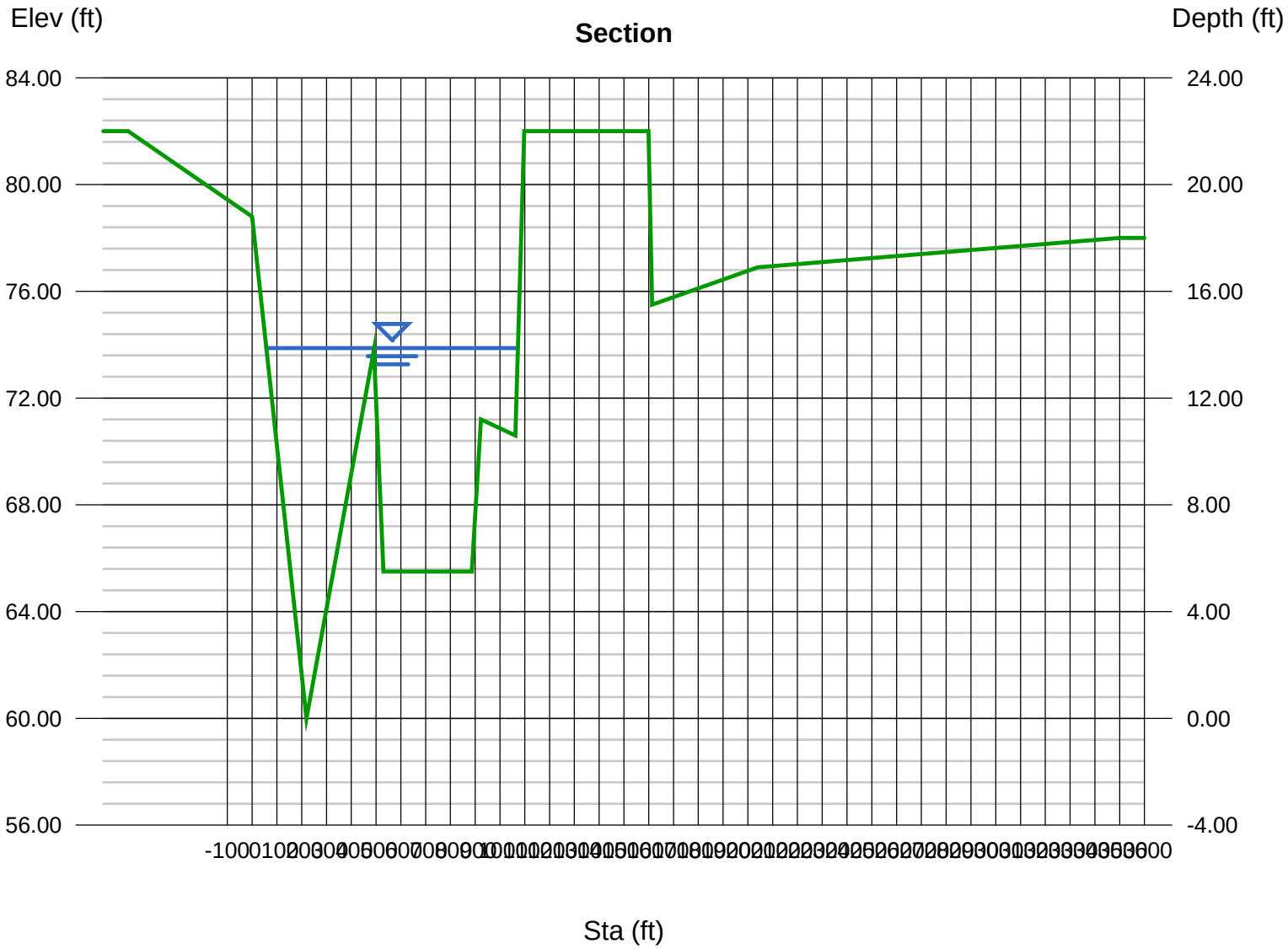
Compute by:		Known Q
Known Q (cfs)	=	89500.00

Highlighted

Depth (ft)	=	13.87
Q (cfs)	=	89,500
Area (sqft)	=	6794.81
Velocity (ft/s)	=	13.17
Wetted Perim (ft)	=	1017.66
Crit Depth, Yc (ft)	=	13.37
Top Width (ft)	=	1014.90
EGL (ft)	=	16.57

(Sta, El, n)-(Sta, El, n)...

(-500.00, 82.00)-(219.00, 60.00, 0.040)-(491.00, 73.80, 0.040)-(530.00, 65.50, 0.040)-(886.00, 65.50, 0.040)-(923.00, 71.20, 0.040)-(1062.00, 70.60, 0.040)-(1098.00, 82.00, 0.040)-(1599.00, 82.00, 0.040)-(1614.00, 75.50, 0.040)-(2040.00, 76.90, 0.040)-(3500.00, 78.00, 0.040)



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Thursday, Apr 3 2014

Alternative E (Cross Section 1) - Post Construction - 100 yr HGL

User-defined

Invert Elev (ft)	=	60.00
Slope (%)	=	1.00
N-Value	=	0.040

Calculations

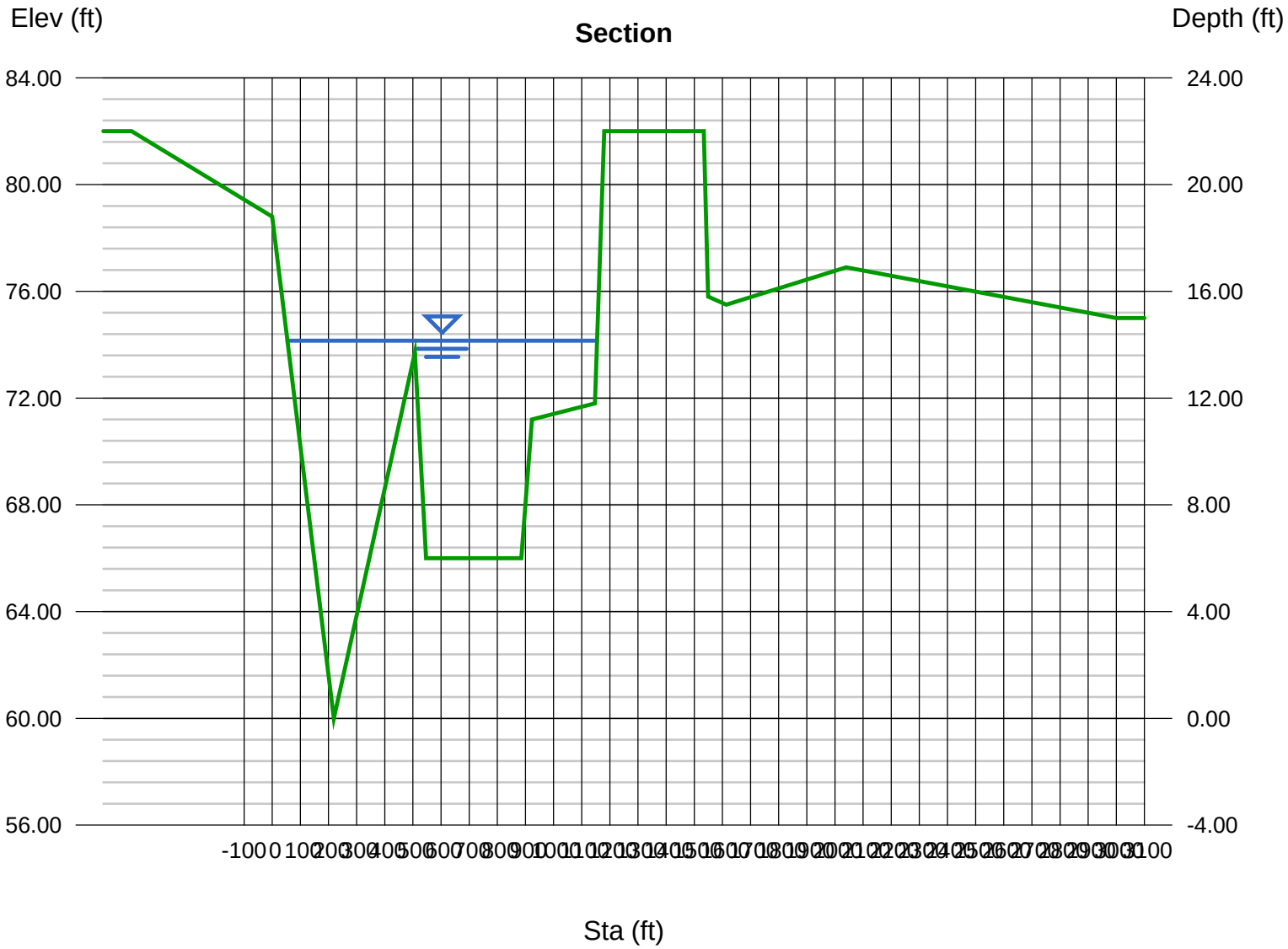
Compute by:		Known Q
Known Q (cfs)	=	89500.00

Highlighted

Depth (ft)	=	14.15
Q (cfs)	=	89,500
Area (sqft)	=	7008.98
Velocity (ft/s)	=	12.77
Wetted Perim (ft)	=	1102.82
Crit Depth, Yc (ft)	=	13.67
Top Width (ft)	=	1100.44
EGL (ft)	=	16.69

(Sta, El, n)-(Sta, El, n)...

(-500.00, 82.00)-(219.00, 60.00, 0.040)-(507.00, 73.70, 0.040)-(547.00, 66.00, 0.040)-(885.00, 66.00, 0.040)-(923.00, 71.20, 0.040)-(1147.00, 71.80, 0.040)-(1180.00, 82.00, 0.040)-(1534.00, 82.00, 0.040)-(1549.00, 75.80, 0.040)-(1614.00, 75.50, 0.040)-(2040.00, 76.90, 0.040)-(3000.00, 75.00, 0.040)



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Monday, Sep 22 2014

Pre Construction (Cross Section 2) - 100 yr HGL

User-defined

Invert Elev (ft)	=	58.00
Slope (%)	=	1.00
N-Value	=	0.040

Calculations

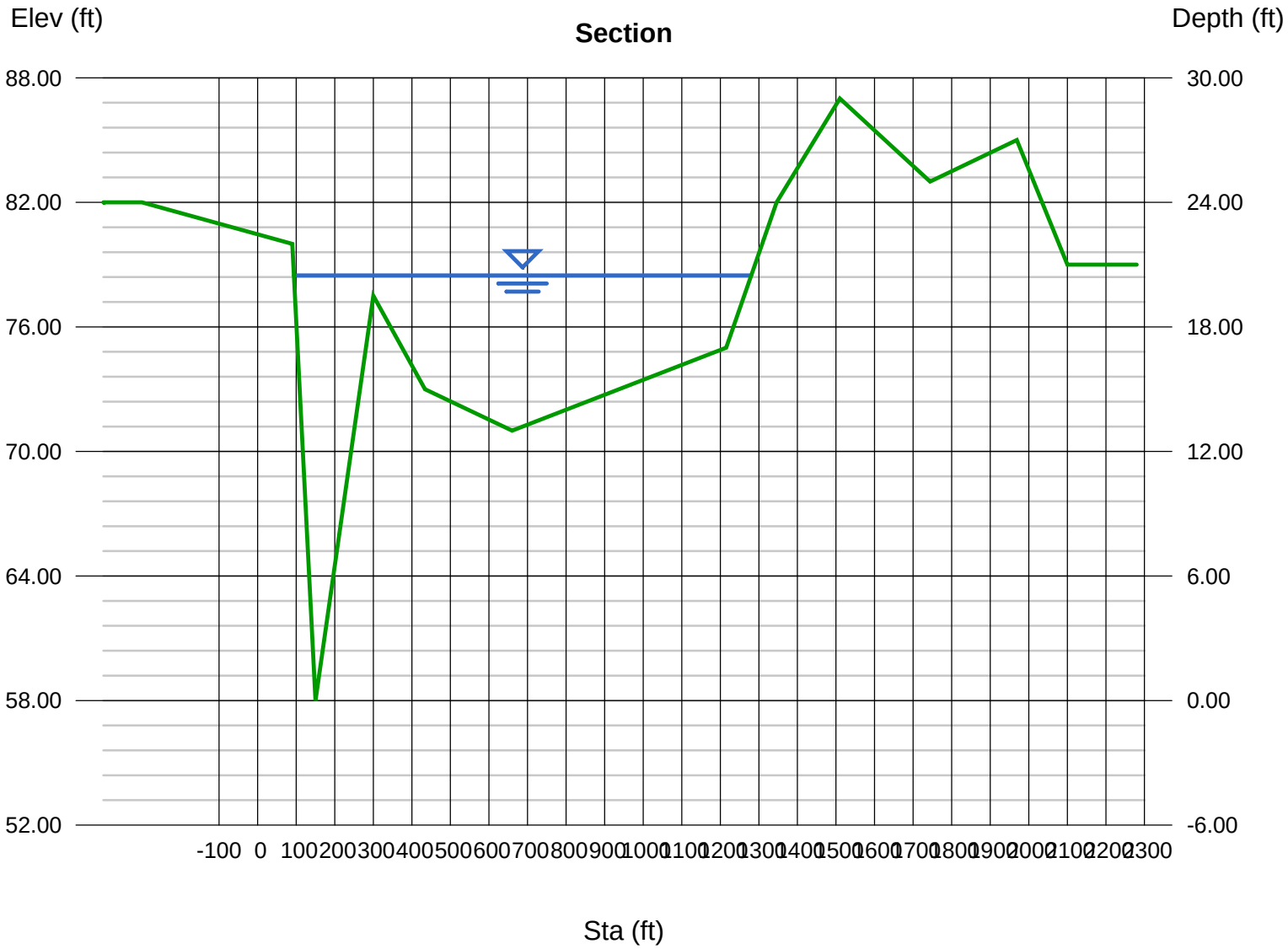
Compute by:		Known Q
Known Q (cfs)	=	89500.00

Highlighted

Depth (ft)	=	20.48
Q (cfs)	=	89,500
Area (sqft)	=	7233.92
Velocity (ft/s)	=	12.37
Wetted Perim (ft)	=	1191.08
Crit Depth, Yc (ft)	=	19.98
Top Width (ft)	=	1185.99
EGL (ft)	=	22.86

(Sta, El, n)-(Sta, El, n)...

(-300.00, 82.00)-(90.00, 80.00, 0.040)-(150.00, 58.00, 0.040)-(300.00, 77.50, 0.040)-(434.00, 73.00, 0.040)-(660.00, 71.00, 0.040)-(1215.00, 75.00, 0.040)-(1346.00, 82.00, 0.040)-(1510.00, 87.00, 0.040)-(1744.00, 83.00, 0.040)-(1969.00, 85.00, 0.040)-(2100.00, 79.00, 0.040)-(2180.00, 79.00, 0.040)



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Monday, Sep 22 2014

Alternative D (Cross Section 2) - Post Construction - 100 yr HGL

User-defined

Invert Elev (ft)	=	58.00
Slope (%)	=	1.00
N-Value	=	0.040

Calculations

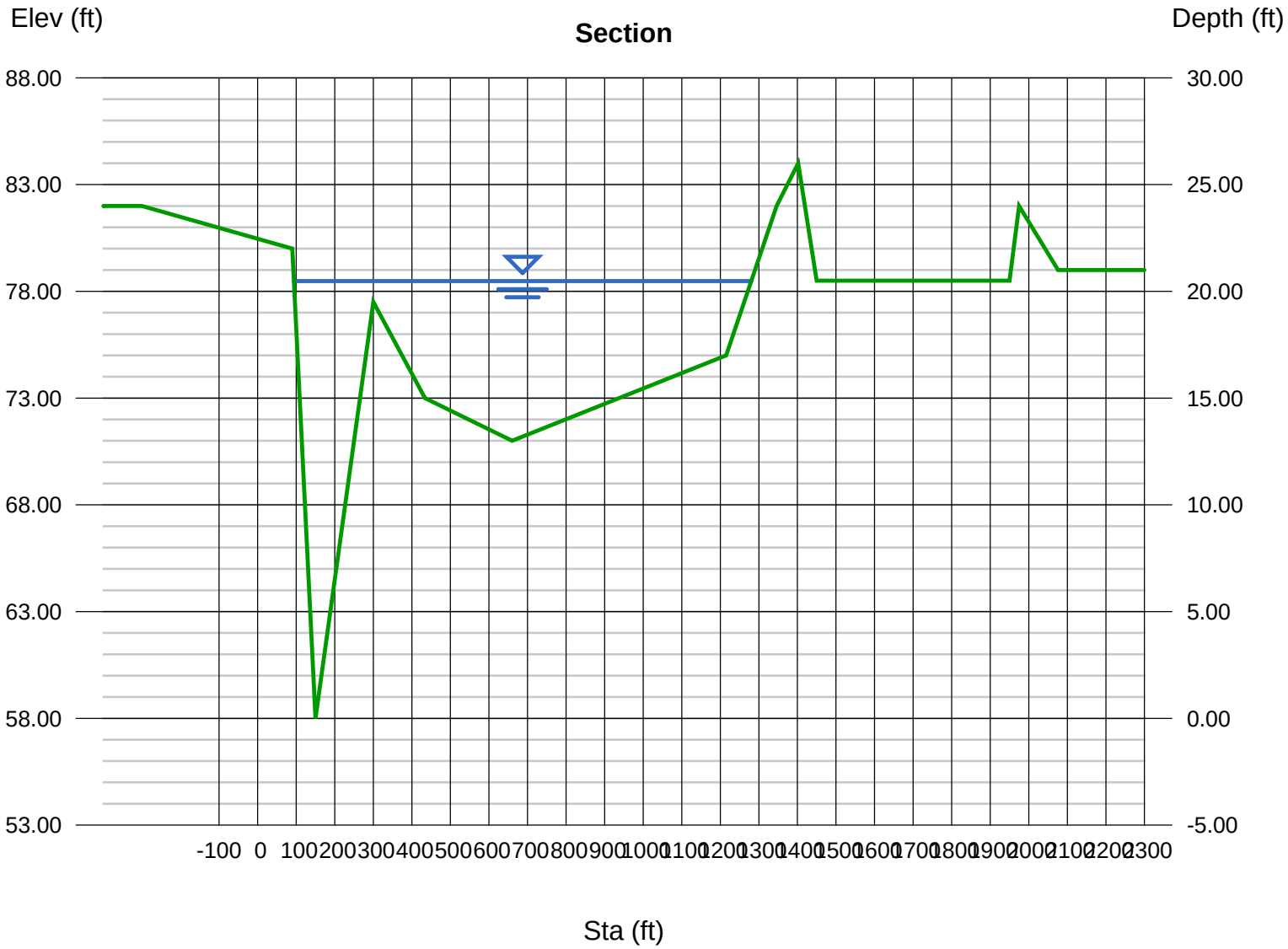
Compute by:		Known Q
Known Q (cfs)	=	89500.00

Highlighted

Depth (ft)	=	20.48
Q (cfs)	=	89,500
Area (sqft)	=	7233.92
Velocity (ft/s)	=	12.37
Wetted Perim (ft)	=	1191.08
Crit Depth, Yc (ft)	=	19.98
Top Width (ft)	=	1185.99
EGL (ft)	=	22.86

(Sta, El, n)-(Sta, El, n)...

(-300.00, 82.00)-(90.00, 80.00, 0.040)-(150.00, 58.00, 0.040)-(300.00, 77.50, 0.040)-(434.00, 73.00, 0.040)-(660.00, 71.00, 0.040)-(1215.00, 75.00, 0.040)
-(1346.00, 82.00, 0.040)-(1402.00, 84.00, 0.040)-(1450.00, 78.50, 0.040)-(1950.00, 78.50, 0.040)-(1975.00, 82.00, 0.040)-(2076.00, 79.00, 0.040)-(2200.00, 79.00, 0



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Monday, Sep 22 2014

Alternative E (Cross Section 2) - Post Construction - 100 yr HGL

User-defined

Invert Elev (ft)	=	58.00
Slope (%)	=	1.00
N-Value	=	0.040

Calculations

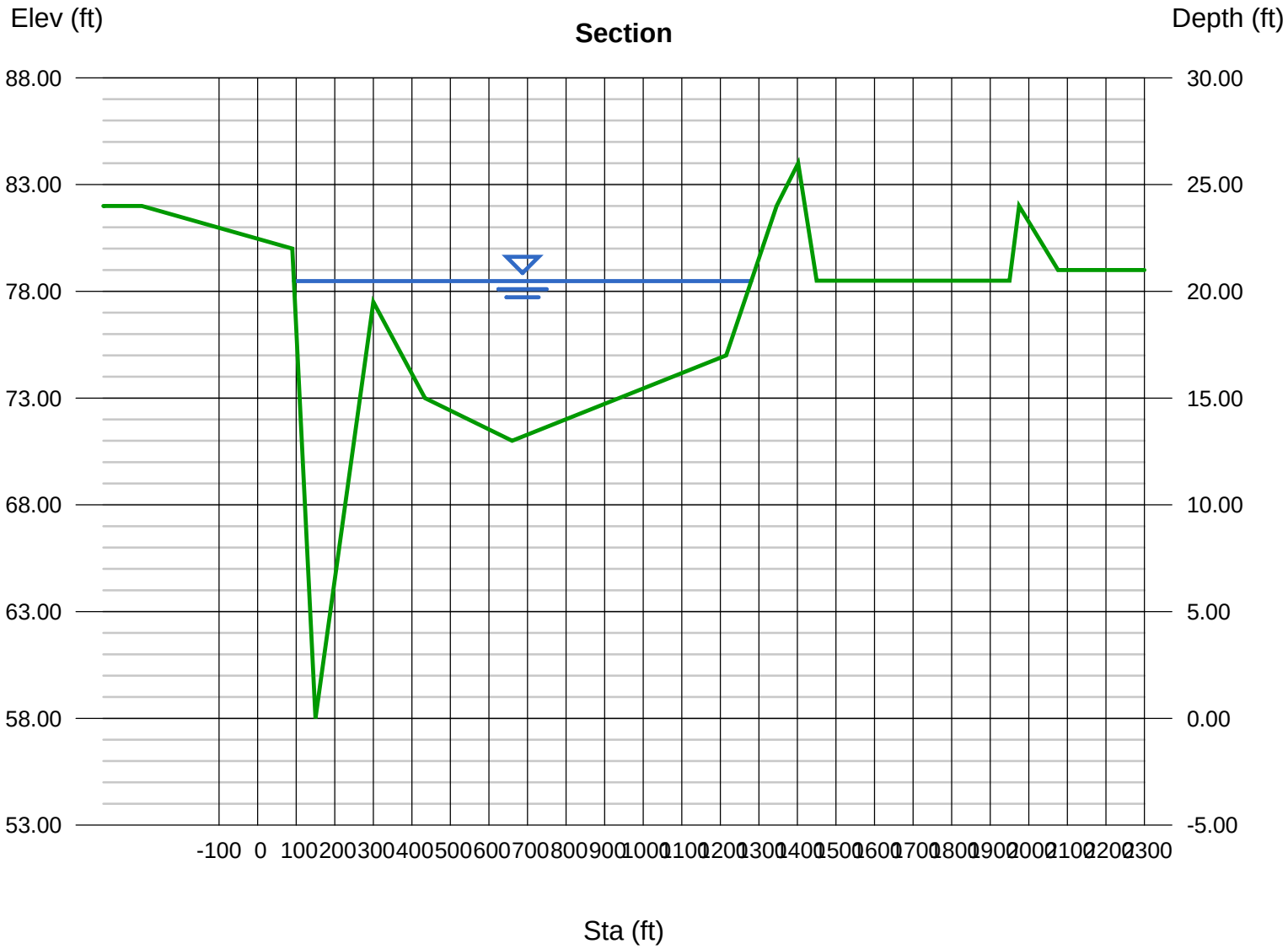
Compute by:		Known Q
Known Q (cfs)	=	89500.00

Highlighted

Depth (ft)	=	20.48
Q (cfs)	=	89,500
Area (sqft)	=	7233.92
Velocity (ft/s)	=	12.37
Wetted Perim (ft)	=	1191.08
Crit Depth, Yc (ft)	=	19.98
Top Width (ft)	=	1185.99
EGL (ft)	=	22.86

(Sta, El, n)-(Sta, El, n)...

(-300.00, 82.00)-(90.00, 80.00, 0.040)-(150.00, 58.00, 0.040)-(300.00, 77.50, 0.040)-(434.00, 73.00, 0.040)-(660.00, 71.00, 0.040)-(1215.00, 75.00, 0.040)
-(1346.00, 82.00, 0.040)-(1402.00, 84.00, 0.040)-(1450.00, 78.50, 0.040)-(1950.00, 78.50, 0.040)-(1975.00, 82.00, 0.040)-(2076.00, 79.00, 0.040)-(2200.00, 79.00, 0



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