DRAINAGE STUDY
FOR
LAUREL HEIGHTS
(TM 2020-02, DR 2020-04)

PRELIMINARY ENGINEERING

Job Number 19137-A

September 18, 2020
Revised: January 13, 2021
Revised: March 17, 2021
Revised: April 15, 2021

RICK ENGINEERING COMPANY
ENGINEERING COMPANY
RICK ENGINEERING CO

RICK
ENGINEERING COMPANY

DRAINAGE STUDY
FOR
LAUREL HEIGHTS
(TM 2020-02, DR 2020-04)

PRELIMINARY ENGINEERING

Job Number 19137-A



Brendan Hastie, PE
R.C.E. #65809, Exp. 09/21

Prepared For:
Cornerstone Communities
4365 Executive Dr, Suite 600
San Diego, California 92121

Prepared By:
Rick Engineering Company
Water Resources Department
5620 Friars Road
San Diego, California 92110-2596
(619) 291-0707

September 18, 2020
Revised: January 13, 2021
Revised: March 17, 2021
Revised: April 15, 2021

TABLE OF CONTENTS

Revision Page, April 15, 2021 i
Revision Page, March 17, 2021 ii
Revision Page, January 13, 2021 iii
1.0 Introduction 1
2.0 Hydrology 4
3.0 Hydraulics 7
4.0 Detention Analysis 9
5.0 Conclusion 11

Figures:

Figure 1: Vicinity Map 3

Tables:

Table 1 Subarea Hydrologic Processes (Codes) 4
Table 2.1: Summary of Hydrologic Conditions 6
Table 4.1: Detention Analysis Summary for Basin 200 10

Appendices:

Appendix A: Modified Rational Method Output [Pre-project]
Appendix B: Modified Rational Method Output [Post-project]
Appendix C: Backup for Weighted Runoff Coefficients
Appendix D: Preliminary Inlet Sizing Calculations
Appendix E: Preliminary Storm Drain Sizing Calculations
Appendix F: Detention Analysis
Appendix G: Cobble Swale and Offsite Hydraulic Backup
Appendix H: As-builts and Existing Site Condition Photos

Map Pockets:

Map Pocket 1: Drainage Study Map for Laurel Heights [Pre-Project]
Map Pocket 2: Drainage Study Map for Laurel Heights [Post-Project]

DRAINAGE STUDY
FOR
LAUREL HEIGHTS

REVISION PAGE

April 15, 2021

Pursuant to review comments provided by the City of Santee on March 30th, 2021 and April 19th, 2021, this report presents a revision to the report titled, "Drainage Study for Laurel Heights" dated March 17th, 2021, prepared by Rick Engineering Company. The revisions below are also based on a meeting with the City of Santee held on April 8th, 2021. The outfall of DMA 2A has been revised and is now discharging to the abandoned lot to the north of the project site to best mimic existing drainage conditions. The area in the southeast of the project site previously labeled DMA 3A has been directed toward the underground vault and biofiltration basin at the northern end of the site and the MWS that had been treating this area has been removed. Associated attachments have been updated accordingly. Please refer to the DMA exhibit in Attachment 1A for revised DMA boundaries. The following text identifies the review comments received April 19th, 2021, followed by Rick Engineering Company's response in bold.

a. Include the subdivision boundaries on the pre and post project exhibits.

   Subdivision boundaries have been included on the pre and post project exhibits and can be found in Map Pocket 1 and Map Pocket 2 of this report.

b. Please show all of the tributary drainage areas that run-on to the site, specifically from the existing brow ditch located south of the site and at the south west corner of the project side.

   Offsite analysis of the tributary area to the brow ditch on the southwest corner has been performed. A small piece of area drains to the southern edge of the project site and will be collected in a proposed brow ditch and conveyed along the western edge of the site discharging at Node 150, please refer to the pre and post project exhibits in Map Pocket 1 and Map Pocket 2.

c. The drainage path of basin 100 exceeds the overland travel length of 1,000 feet and may be required to be placed underground in accordance with City standards. The drainage study shall demonstrate that the downstream facilities are adequate to handle the proposed flow rates in accordance with the City of Santee Public Works standards. It is the engineering department's recommendation that this be an underground piped system to the proposed tie in at Mission Gorge Road.

   Per the April 8th, 2021 meeting with the City of Santee, flows discharging from the underground storage unit and the biofiltration basin are no longer conveyed down

Aubrey Glen Drive and instead are discharged to the abandoned lot to the north of the project site where they flow onto Mission Gorge Road through an existing D-25. The proposed conditions will detain flows back to pre-project levels and it is anticipated that the spread width and depth at curb face will be equal to or less than what was calculated for the existing condition. Please refer to Appendix G for these calculations as well as the pre and post project exhibits in Map Pocket 1 and Map Pocket 2.

d. The detention vaults, WQ basin, and or brow ditch conveyance to the outlet on Aubrey Glen do not clearly show the overflow condition in the event of a blockage or storm event in excess of the 100-year intensity. Include the preliminary sizing of the conveyances from the proposed WQ basin to the outlet on Aubrey Glen.

In an emergency overflow condition, water will flow out the western edge of the water quality basin and discharge down the proposed driveway, ultimately to Aubrey Glen Drive at Node 250.

e. Provide WQ basin and detention vault sizing information, including the draw down time of the basin for 10-, 50- and 100-year storm events. Include specifically the duration in which the runoff will surface flow along Aubrey Glen Drive until it reaches the existing receiving inlets as the vaults and basin drain after the specified rain events.

Down calculations for the vault will be provided in Final Engineering.

f. Show the existing lane spread coverage of runoff onto Mission Gorge Road as proposed. Identify the receiving inlets on Mission Gorge Road and confirm their existing capacity.

Please refer to Appendix G for spread width calculations and inlet capacity at the existing inlets on Mission Gorge Road. It should be noted that the post-project peak flow rates are detained back to existing condition.

DRAINAGE STUDY
FOR
LAUREL HEIGHTS

REVISION PAGE

March 17, 2021

Pursuant to review comments provided by the City of Santee on February 16th, 2021, this report presents a revision to the report titled, "Drainage Study for Laurel Heights" dated January 13th, 2021, prepared by Rick Engineering Company. The revisions below are also based on meetings with the City of Santee held on February 23rd, 2021 and a follow up meeting on March 11th, 2021. The following text identifies the review comments, followed by Rick Engineering Company's response in bold.

The drainage study needs to be signed and sealed. Please provide further detail and explanation on the following concerns:

The drainage study has been signed and sealed. Additional information is provided below in response to comments.

a. Include the subdivision boundaries on the pre and post project exhibits.

   Subdivision boundaries have been included on the pre and post project exhibits and can be found in Map Pocket 1 and Map Pocket 2 of this report.

b. Please show all of the tributary drainage areas that run-on to the site, specifically from the existing brow ditch located south of the site and at the south west corner of the project side.

   Offsite analysis of the tributary area to the brow ditch on the southwest corner has been performed. A small piece of area drains to the southern edge of the project site and will be collected in a proposed brow ditch and conveyed along the western edge of the site discharging at Node 150, please refer to the pre and post project exhibits in Map Pocket 1 and Map Pocket 2.

c. Expand the limits of the tributary areas to include the upstream areas including the existing drainage paths demonstrating they are not adding to the site run-off if that is the case.

   The limit of the drainage study has been expanded to include the upstream areas and flows in the post-project condition have been detained back to the existing

condition for a 100-year storm event. Please refer to Appendix F for detention analysis and the pre and post project exhibits in Map Pocket 1 and Map Pocket 2.

d. Basin 100 proposes a cobble swale that would be interrupted by the proposed retaining walls. Identify how the proposed by-pass will occur and if energy dissipation is required.

A brow ditch is proposed along the western edge of the site in Basin 100 and terminated in a cobble swale that discharges to Aubrey Glen Drive. In the locations where the brow ditch is interrupted by a proposed wall, the brow ditch is captured by a Type-F catch basin and discharges to a brow ditch on the downstream side of the wall.

e. Please provide the reference that indicates the runoff coefficient should be 0.3 as used in the calculations. It may be more accurate to create subbasins of the rear yard and potential landscaped areas and have them drain into the proposed cobble swale with an analysis of the cobble swale sperate as channel flow with an appropriate runoff coefficient for that of a cobble lined swale. My concern is that once drainage enters the swale at the given slope it will travel at a greater velocity that that when using the averages runoff coefficient of 0.3.

The runoff coefficient for pervious area for type C soils is 0.3. Please refer Appendix C which contains a reference of the NRCS Soil Survey showing a majority of type C soils onsite as well as a reference to the County of San Diego Hydrology Manual Table 3-1 showing runoff coefficients for pervious areas.

f. The outlet condition of basin 100 onto Aubrey Glen is not defined. Please provide an enlarged plan view of this outlet condition, including tentative drainage path.

An enlarged plan view of the outlet onto Aubrey Glen is provided on the civil plans.

g. The drainage path of basin 100 exceeds the overland travel length of 1,000 feet and may be required to be placed underground in accordance with City standards. The drainage study shall demonstrate that the downstream facilities are adequate to handle the proposed flow rates in accordance with the City of Santee Public Works standards. It is the engineering department's recommendation that this be an underground piped system to the proposed tie in at Mission Gorge Road.

The drainage path length from the outfall on Aubrey Glen to the inlet on Mission Gorge Road is approximately 720-feet. Additional downstream hydrology and hydraulic analysis was performed to show the spread width and ponding at the face of curb in the existing condition for a 100-year storm event. The proposed conditions will detain flows back to pre-project levels and it is anticipated that the spread width and depth at curb face will be equal to or less than what was calculated for the existing condition. It should be noted that the 100-year existing flow is contained below the top of the curb and that a dry lane is maintained on Mission Gorge Road. 100-year existing flow would be contained below top of curb

on Aubrey Glen Drive when standard curb and gutter is presumably improved along the eastern side of the road when the northern portion of the parcel is developed by others. Please refer to Appendix G for these calculations.

h. The detention vaults, WQ basin, and or brow ditch conveyance to the outlet on Aubrey Glen do not clearly show the overflow condition in the event of a blockage or storm event in excess of the 100-year intensity. Include the preliminary sizing of the conveyances from the proposed WQ basin to the outlet on Aubrey Glen.

In an emergency overflow condition, water will flow out the western edge of the water quality basin and discharge down the proposed driveway, ultimately to Aubrey Glen Drive at Node 250.

i. The calculations for basin 100 do not appear to account for the runoff received from the WQ basin, which appears to discharge to a headwall with basin 100. The capture of this runoff from the basin and the area surrounding that of the WQ basin are included as a part of the analysis of basin 200. Please clarify this apparent discrepancy.

Basin 100 and Basin 200 confluence at Node 135, the upstream end of the cobble swale. The AES rational method analysis as been consolidated into a single run and included in Appendix B of this report.

j. Please clarify how the southernmost drainage from the three areas, which are each 0.1 acre in size, is conveyed after the runoff enters the proposed brow ditches located in these three sub basins. It is assumed this runoff enters into a proposed water quality vault. Provide additional information regarding the proposed water quality device. Confirm the drainage path the proposed brow ditches into the proposed water quality device would occur as surface flow.

The pervious areas on the southern edge of the site are collect by brow ditch and conveyed around the site. Because the areas are pervious, no water quality treatment is required for these areas are determined to be self-mitigating.

k. Provide an enlarged plan view of the discharge path of node 350 to POl3, showing how the runoff enters into the existing system.

Additional detail is provided on the civil plans. In the proposed condition runoff will sheet flow from the riprap pad onsite to the existing brow ditch to the east, mimicking existing conditions. An enlarged plan view of the outfall is included in Appendix G and photos of the existing brow ditch are included in Appendix H.

l. Please explain as to why POl3 is located downstream of node 350, given both pre and post development discharge at the same location. Should the analysis of basins 100 and 200 also occur at a common downstream POI.

POI 3 is located downstream of the eastern edge of the site to a location that collects the same tributary area in the pre and the post project condition. This strategy does not need to be applied for Basin 100 and 200. Because the outfall is at Node 340, another hydrologic comparison table has been placed here for reference. Please see the post-project exhibit in Map Pocket 2.

m. Provide As Built plans and indicate the existing capacity of the downstream systems. Indicate if the existing requires rehabilitation or improvement.

Please see Appendix H for As Built plans and photos of the existing site condition. It is anticipated that the post-project condition will discharge equal to or less flow than the pre-project condition and it is anticipated that there will be no adverse impacts to the downstream system.

n. Basin 100, in the pre-project condition, appears to include a separate sub basin located west of node 102. This sub basin will increase the length of the drainage path. Show the drainage path from this southwest corner. In addition, clarify the disconnect in the flow path from the end of node 102 and the start of node 150. Show the connection of the drainage path between these two nodes.

The flow path for Basin 100 has been revised to include the offsite area to the west. This includes the subbasin located to the west of Node 102. Please refer to the pre-project exhibit in Map Pocket 1.

o. Provide WQ basin and detention vault sizing information, including the draw down time of the basin for 10-, 50- and 100-year storm events. Include specifically the duration in which the runoff will surface flow along Aubrey Glen Drive until it reaches the existing receiving inlets as the vaults and basin drain after the specified rain events.

Down calculations for the vault will be provided in Final Engineering.

p. Show the existing lane spread coverage of runoff onto Mission Gorge Road as proposed. Identify the receiving inlets on Mission Gorge Road and confirm their existing capacity.

Please refer to Appendix G for spread with and depth of flow at curb face in the existing condition.

q. Please clarify the 8-inch curb height used in the flow process from node 202 to node 205.

This has been revised to a 6-inch curb; however, it is not the intent of AES rational method to exactly depict the hydraulic characteristics of the system. It is meant to calculate peak flow rates. Please refer to Appendix B for the post-project rational method analysis.

r. I am not understanding how the total runoff from the flow process node 220 to 220 of 16.22 cfs is held continuous to node 225 without increase.

As the Q calculations move down the flow path, Tc goes up, intensity, I, goes down, and ΣCA goes up. Usually, ΣCA goes up enough so that when you multiply ΣCA x I, Q continues to increase. However, in this case, we find ΣCA for the small subarea draining to Node 220 does not increase enough to compensate for the reduction in I from the new Tc, so ΣCA x I for this subarea is less than ΣCA x I for the upstream subarea. For design we cannot reduce Q compared to what we think was delivered from the upstream subarea, so we must "default to the upstream value" as is stated in the AES results from Node 220 to 220. Please see Section 3.3 of the San Diego County Hydrology manual.

DRAINAGE STUDY
FOR
LAUREL HEIGHTS

REVISION PAGE

January 13, 2021

Pursuant to review comments provided by the City of Santee on December 3rd, 2020, this report presents a revision to the report titled, "Drainage Study for Laurel Heights" dated September 18th, 2020, prepared by Rick Engineering Company. The following text identifies the review comments, followed by Rick Engineering Company's response in bold.

8. The Drainage Study needs to be signed and sealed.

The Drainage Study will be signed and sealed with the final submittal.

The concern with hydromodification exemption as previously mentioned above has not been satisfactorily addressed. It is necessary to demonstrate a hardened conveyance from the headwall located on the north side of Mission Gorge Road across the property within the City of San Diego to the San Diego River.

Please refer to the report titled, "Priority Development Project (PDP) Storm Water Quality Management Plan (SWQMP) for Laurel Heights" dated January 13, 2021 and prepared by Rick Engineering Company. Attachment 2A of that report presents an exhibit that shows the flow path of the site to a hardened conveyance system to the San Diego River. This project does not discharge to the headwall on the north side of Mission Gorge Road. Please refer to Map Pocket 1 and Map Pocket 2 of this Drainage Study for the flow path in the pre- and post-project condition respectively.

Note that the existing drainage will need to be improved to our Public Works Standards. Include an analysis of the flow length and velocity to confirm if this runoff needs to be in an underground conveyance to meet the standards.

Please refer to Map Pocket 1 and Map Pocket 2 for the pre- and post-project drainage maps respectively. The proposed condition mimics the flow patterns of the existing condition. Please refer to Appendix G for an analysis of the runoff velocity being discharged onto Aubrey Glen Rd.

Further include a detailed exhibit indicating the pre and post runoff conditions identifying if diversion of flow is proposed by the development. Show the drainage paths from the site down to the San Diego River. The watershed to the San Diego River are two distinct paths that do not converge as described under section 2.2 Hydrologic Results.

Detailed exhibits of the pre and post project drainage are included in Map Pocket 1 and Map Pocket 2 respectively. Arrows indicating the flow path from POI 1 have been included to show drainage patterns to the curb inlet on Mission Gorge Road. In the post-project condition, an underground vault is used to collect and detain post-project flows. A summary of these results are included in Table 4.1 of this report.

1.0 INTRODUCTION

1.1 Project Description

This drainage study presents hydrologic and hydraulic analyses for the proposed Laurel Heights Project (herein referred to as the "project"). The project is located within the City of Santee, just south of the intersection between Mission Gorge Road and West Hills Parkway. (See Figure 1, Vicinity Map). The proposed project is a redevelopment project that proposes to demolish existing residential structures and construct a residential development that includes eighty units, roadways, water quality features, and a park. The site is approximately 7.0 acres and is currently a developed area with few residential structures.

1.2 Drainage Characteristics

Pre-Project Condition

There are three discharge points in the existing condition. Two are located in the northwest corner of the site and the other is along the eastern edge. Basin 100 discharges at the edge of Aubrey Glen Dr. Flow from Basin 100 is conveyed in a v-gutter along the western edge of Aubrey Glen Rd before turning to the east on Mission Gorge Rd where it is collected by inlets. Storm drain then conveys flows to the San Diego River. Basin 200A drains to the north and flow is conveyed through the abandoned site to the north where it discharges onto Mission Gorge through and existing D-25. Basin 200B drains to the northwest and flow is conveyed in a v-gutter along the eastern edge of Aubrey Glen Rd before turning to the east on Mission Gorge Rd where it is collected by inlets. Storm drain then conveys flows to the San Diego River. Basin 300 drains to the east. Flows are collected in an existing brow ditch that lines the eastern edge of the site. The brow ditch conveys flows into the storm drain within the adjacent apartment complex, where flow continue in the storm drain to the north and eventually discharge into the San Diego River.

Post-Project Condition

Drainage patterns for the proposed condition will remain similar to drainage patterns in the pre-

project condition. In the post project condition, Basin 100 drains to a cobble lined swale. Refer to Appendix G for additional detail of the cobble swale. The flows are then discharged through a curb opening onto Aubrey Glen Drive. An existing v-gutter conveys flows to the north before turning to the east on Mission Gorge Rd where it is collected by existing inlets. Storm drain then conveys flows to the San Diego River. Basin 200 drains to the north before being collected by proposed inlets and storm drain which direct flows into a detention vault and then a water quality basin. Flows are then discharged to an abandoned site the north where flows are conveyed by an existing brow ditch and ultimately discharged onto Mission Gorge road via an existing D-25 where flows confluence with Basin 100. Flows turn to the east on Mission Gorge Rd where it is collected by existing inlets. Storm drain then conveys flows to the San Diego River. Basin 300 sheet flows to the east where flows are collected by proposed perimeter brow ditches. Flows are then conveyed to an existing brow ditch that lines the eastern edge of the site. The brow ditch conveys flows into the storm drain within the adjacent apartment complex, where flow continue in the storm drain to the north and eventually discharge into the San Diego River.

1.3 Hydrology, Hydraulics, and Detention

Hydrology, hydraulics, and detention are discussed in Section 2.0, 3.0, and 4.0 respectively of this report.

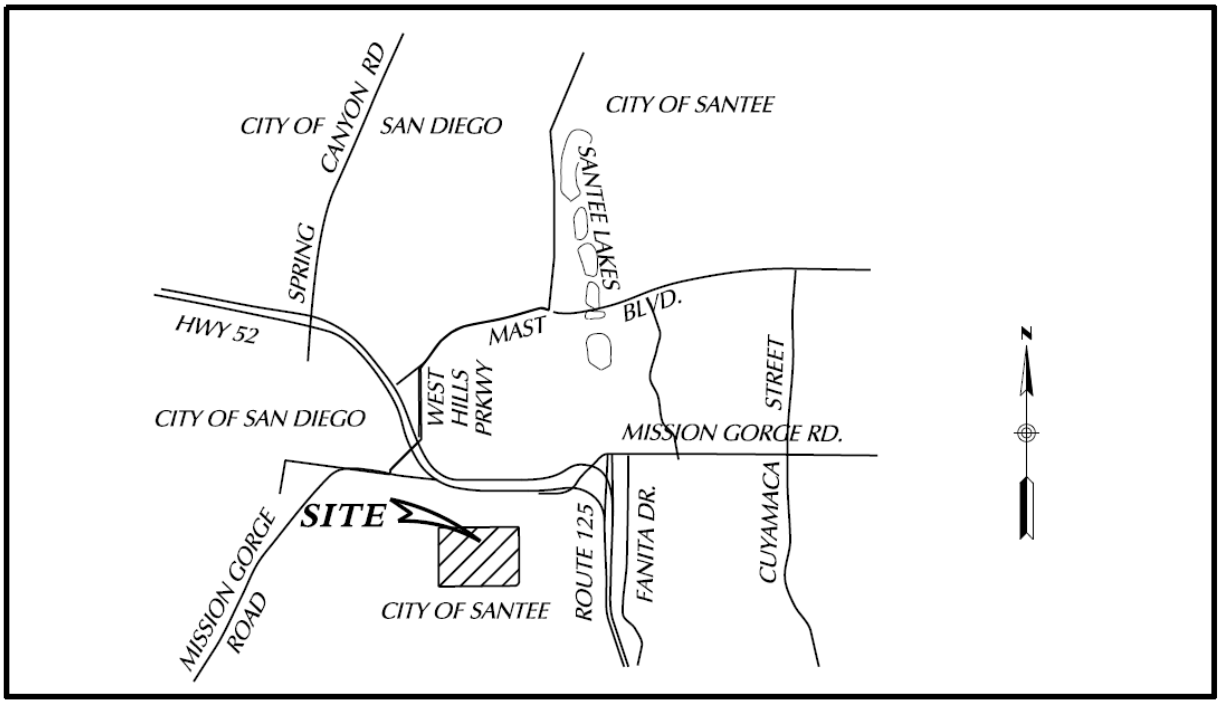
1.4 Water Quality

Post-project storm water runoff will be managed via biofiltration and proprietary compact biofiltration BMPs, designed pursuant to the guidelines from the City of Santee BMP Design Manual, dated February 2016. The PDP SWQMP specific to the Laurel Heights project is dated September 18th, 2020 (or any revision made thereafter).

1.5 Hydromodification Management Requirements

The storm drain system from the project discharges into the San Diego River, which is an HMP exempt water body per WMAA mapping. The PDP SWQMP identifies the project's exemption from hydromodification management plan (HMP) requirements, in accordance with the 2013 MS4 Permit and the City of Santee BMP Design Manual dated February 2016.

Figure 1: Vicinity Map



VICINITY MAP

NO SCALE

2.0 HYDROLOGY

The hydrologic conditions were analyzed in accordance with the June 2003 San Diego County *Hydrology Manual*.

2.1 Methodology

To determine the peak flows at points of interest identified on the provided drainage study exhibits, Advance Engineering Software (AES) 2014 Rational Method computer software version 21.0 was used. The hydrologic model was developed by first dividing each major drainage basin into several subareas. The delineation of each subarea was determined so that area within each subarea is comprised of similar hydrologic features, including topography, land use, and storm drain conveyance system (e.g., urban open channel, pipe, natural open channel, etc.). Nodes were identified at the upstream and downstream extents of each subarea, and subarea hydrologic data was determined, such as the land use(s) and drainage facility geometry, elevations, and lengths. Hydrologic backup information is included in Appendix C and AES output is provided in Appendix A and B for pre and post project conditions respectively.

Next, the hydrologic data describing each subarea were incorporated into the AES software in order to create a node-link model for each watershed. For each subarea the AES software performs calculations for the specific hydrologic process occurring in the subarea. There are 15 different hydrologic processes programmed into the software, and each process is assigned a code number that is presented on the model results. The AES Rational Method computer software hydrologic processes code numbers are described in Table 2.

Table 2. Subarea Hydrologic Processes (Codes)

Code	Subarea Type
Code 1	Confluence analysis at a node
Code 2	Initial subarea analysis
Code 3	Pipe flow travel time (computer-estimated pipe sizes)
Code 4	Pipe flow travel time (user-specified pipe size)
Code 5	Trapezoidal channel travel time
Code 6	Street flow analysis through a subarea
Code 7	User-specified information at a node
Code 8	Addition of the subarea runoff to mainline

Table 2. Subarea Hydrologic Processes (Codes)

Code	Subarea Type
Code 9	V-Gutter flow through subarea
Code 10	Copy mainstream data onto a memory bank
Code 11	Confluence a memory bank with the mainstream memory
Code 12	Clear a memory bank
Code 13	Clear the mainstream memory
Code 14	Copy a memory bank onto the mainstream memory
Code 15	Hydrologic data bank storage functions

The hydrologic conditions were analyzed in accordance with the County of San Diego's design criteria as follows:

San Diego County Hydrology Manual, June 2003:

Design Storm:	100-year. 6-hour (for storm drain systems)
Runoff Coefficients:	Weighted Runoff Coefficients [(1)]
0% Impervious Areas	C=0.30 for Type-C soils
	C=0.35 for Type-D soils
100% Impervious Areas	C=0.9
Soil Type (Conservatively Applied)	"C/D"
Design Storm Precipitation[2]	100-year, 6-hour, P=2.4 inches
Rainfall Intensity:	Based on time-intensity criteria per Section 3.0 of the County Hydrology Manual (San Diego County, 2003)

[(1)] Utilized to calculate composite 'C' values based on percent impervious.

[(2)] Isopluvial map provided in Appendix C.

2.2 Hydrologic Results

Rational Method Results

The 100-year peak flow rates for the Pre- and Post-Project conditions are summarized in Table 2.1 below.

Table 2.1: Summary of Hydrologic Conditions

Drainage Basin ID	POI	Project Condition	Tributary Area (ac)	Time of Concentration (minutes)	Q_{100} (cfs)
100 & 200B	1	Pre-Project	7.0	14.5	12.3
		Post-Project	5.1	15.0	8.7
200A	2	Pre-Project	5.6	9.6	16.1
		Post-Project	8.2	8.8	26.0
300	3	Pre-Project	0.9	6.0	3.7
		Post-Project	0.5	10.8	0.6

Based on the Rational Method result and a comparison of the pre- and post-project POIs, it can be observed that the peak discharge rate and tributary areas to POI 1 and POI 3 has decreased in the post-project condition due to a reduction in area to those POIs. It should be noted that discharge to POI 2 has increased. This is due to the increase in area to this POI and the increase in impervious area. Detention will be provided with a proposed vault under the proposed park area and is discussed in Section 4.0 of this report. Ultimately, the existing and the proposed condition flows from the site drain in northeasterly direction where they are captured by an existing storm drain system at the corner of Mission Gorge Road and West Hills Parkway. These flows are then conveyed north and discharged into the San Diego river. Refer to Appendix A and Appendix B of this report for pre- and post-project Rational Method calculations respectively and Appendix C for backup documentation.

The location of the POIs, drainage boundaries, flow patterns, and pervious/impervious areas can be found on the work maps titled, “Pre-project Drainage Study Map for Laurel Heights” located in Map Pocket 1 and “Post-project Drainage Study Map for Laurel Heights,” located in Map Pocket 2.

3.0 HYDRAULICS

3.1 Hydraulic Methodology and Criteria

The 100-year post-project peak flow rates determined using the Modified Rational Method was used to size the on-site storm drain system. In addition, hydraulic analyses regarding preliminary inlet sizing calculations are included.

3.1.1 Storm Drain Sizing

Storm drain pipe sizes were determined based on a normal depth calculation to verify storm drain capacity based on Manning's equation.

$$Q = (1.486/n)\, A\, R^{2/3}\, S^{1/2}$$

Where:

Q = Discharge (cfs)

n = Manning's roughness coefficient

A = Cross-sectional Area of flow (sq. ft.)

R = Hydraulic radius (ft.) (where hydraulic radius is defined as the cross-section area of flow divide by the wetted perimeter, R= A/P)

S = Slope of pipe (ft./ft.)

The Manning's roughness coefficient "n" of 0.013 was used for the hydraulic calculations. This value is typically used for reinforced concrete pipe (RCP), polyvinyl chloride (PVC) and high-density polyethylene pipe (HDPE). The pipe sizes were evaluated based on the Rational Method flow rates with a 30% "bump up" sizing factor to account for hydraulic losses within the system.

Please refer to Appendix E for the preliminary storm drain sizes. The AES rational method results for the post-project condition are located in Appendix B of this report may be referenced for further information concerning pipe flow.

3.1.2 Inlet Design

Inlet design calculations were completed using a computer program based on the following equations for inlets on a grade and inlets in a sump:

Type B Inlets on a Grade

$$Q = 0.7\ L\ (a + y)^{3/2}$$

Where: y = depth of flow approaching the curb inlet, in feet (ft)
a = depth of depression of curb at inlet, in feet (ft)
L = length of clear opening of inlet for total interception, in feet (ft)
Q = interception capacity of the curb inlet, in cubic feet per second (cfs)

Type B Inlets in a Sump

$$Q/L = 1.5\ cfs/ft$$

Where: Q = inlet capacity, in cubic feet per second (cfs)
L = length of clear opening of inlet for total interception, in feet (ft)

Inlet Results

Inlet locations have been identified for all of the basins within this project. Inlets will be sized for the 100-year, 6-hour storm event. Each inlet will be sized to provide 100% capture of the flow draining to the inlet. The inlet design calculations along with back up information will be presented in Appendix D during a final engineering. Refer to the drainage study map provided in Map Pocket 2 for the location of each inlet.

4.0 DETENTION ANALYSES

For the design of detention facilities, the modified rational method hydrologic analysis was performed to determine the 100-year flow rates for both the pre-project condition and the post-project condition. Detention was determined to only be required for POI 2, as the pre-project peak flow rate for both POI 1 and POI 3 is greater than the post-project peak flow rate. Pre-project and post-project rational method output for the project is provided in Appendices A and B of this report.

4.1 Hydrograph Development

The sizing of a detention facility requires an inflow hydrograph to obtain the necessary storage volume. The modified rational method only yields a peak discharge and time of concentration and does not yield a hydrograph. In order to convert the peak discharge and time of concentration into a hydrograph, Rick Engineering's program, RatHydro was used. RatHydro generates a hydrograph from the following inputs: Time of concentration, 6-Hour Precipitation depth, basin area, rational method runoff coefficient, and peak discharge rate. The generated hydrograph can then be used as the inflow hydrograph for basin sizing within HEC-1.

4.3 HEC-1 Methodology and Criteria

100-year hydrographs and preliminary elevation-storage-outflow rating curves were used in the HEC-1 hydrologic model to perform routing calculations for the detention basin, and to determine the preliminary 100-year detention volumes required for the basin to reduce the post-project peak discharge rate back to the pre-project peak discharge rate. Actual storage and rating curves will be provided during final engineering along with detailed outlet-works designs for each BMP.

4.4 Detention Results

The 100-year, 6-hour post-project peak discharge rates were routed using the HEC-1 hydrologic model to determine the detention volume required for the vaults to reduce post-project peak discharge rates back to the pre-project peak discharge rates for select storm events. The HEC-1 detention analyses computer output is located in Appendix F of this report.

The proposed detention vault is designed to include volume to comply with water quality volume. Water quality treatment will be provided by the downstream biofiltration basin. Detention volume sizing is provided within the proposed vault. This vault is designed to route the post-project peak discharge rate back to pre-project conditions at POI 2. Post-Project mitigated hydrologic analysis that reflect detention occurring upstream from the project's POI is included in Appendix B following the un-detained analysis. Refer to Map Pocket 2 of this report for an exhibit of vault location and POI locations. Table 4.1 will provide a summary of the detention analysis.

Table 4.1 Detention Analysis Summary for POI 1

POI 2	Pre-Project	Post-Project (Un-Mitigated)	Post-Project (Mitigated)
Area (ac)	5.6	8.2	8.2
Time of Concentration (min)	9.6	8.8	15.6
Q_{100} (cfs)	16.0	26.0	13.2

Refer to Appendix F for results from the HEC-1 detention analyses. It should be noted that the peak discharge rate from POI 2 with mitigation is less than the pre-project peak discharge rate; therefore, the 100-year detention requirements have been met.

5.0 CONCLUSION

This drainage study presents the hydrologic and hydraulic analyses for the Laurel Heights project. The project is a redevelopment project located in the City of Santee. The post-project condition peak discharge rates were determined using the Rational Method based on the hydrologic methodology and criteria described in the County of San Diego Hydrology Manual, dated June 2003.

Post-project flows will be treated per the City of Santee's BMP Design Manual, dated February 2016. For more information on water quality sizing, please refer to the separate report titled, "Priority Development Project Storm Water Quality Management Plan (PDP SWQMP) for Laurel Heights," dated September 18, 2020 or any revisions thereafter, and prepared by Rick Engineering Company (Job No. 19137-A).

Based on the Rational Method result and a comparison of the pre- and post-project POIs, it can be observed that the post-project peak discharge rate and tributary area to POI 1 and 3 have been reduced. Preliminary detention sizing for Basin 200 is provided for the 100-year, 6-hour storm event so that post-project peak discharge rates are routed back to pre-project conditions using the HEC-1 hydrologic model. Therefore, it is anticipated that there will be no adverse effects to downstream drainage characteristics/systems as a result of the project.

APPENDIX A

Modified Rational Method Output
[Pre-project]

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2014 Advanced Engineering Software (aes)
              Ver. 21.0 Release Date: 06/01/2014  License ID 1261

                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                             San Diego, California 92110
                           619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* LAUREL HEIGHTS                                                        *
* PRE-PROJECT CONDITION BASIN 100 & 200 100-YR, 6-HR STORM EVENT        *
* J-19137-A                                                             *
 ************************************************************************

  FILE NAME: HP200E00.RAT
  TIME/DATE OF STUDY: 18:05 04/13/2021
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.400
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
```

```
 FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    704.00
 DOWNSTREAM ELEVATION(FEET) =    694.00
 ELEVATION DIFFERENCE(FEET) =     10.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.466
 SUBAREA RUNOFF(CFS) =      0.19
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    694.00  DOWNSTREAM(FEET) =    445.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1323.00   CHANNEL SLOPE =  0.1882
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.500
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3800
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.35
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.53
 AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   6.24
 Tc(MIN.) =   12.51
 SUBAREA AREA(ACRES) =     1.70       SUBAREA RUNOFF(CFS) =    2.26
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.378
 TOTAL AREA(ACRES) =        1.8         PEAK FLOW RATE(CFS) =       2.38

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   4.24
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =    1423.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    445.00  DOWNSTREAM(FEET) =    396.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   210.00   CHANNEL SLOPE =  0.2333
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.382
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4300
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.11
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   0.68
  Tc(MIN.) =   13.20
  SUBAREA AREA(ACRES) =     1.00       SUBAREA RUNOFF(CFS) =    1.45
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.397
  TOTAL AREA(ACRES) =        2.8         PEAK FLOW RATE(CFS) =       3.76

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   5.35
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =    1633.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    150.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    396.00  DOWNSTREAM(FEET) =    354.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   504.00   CHANNEL SLOPE =  0.0833
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.205
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.32
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   1.15
  Tc(MIN.) =   14.34
  SUBAREA AREA(ACRES) =     1.80       SUBAREA RUNOFF(CFS) =    4.38
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.539
  TOTAL AREA(ACRES) =        4.6         PEAK FLOW RATE(CFS) =       7.94

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   7.95
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    150.00 =    2137.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.205
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .4300
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5164
SUBAREA AREA(ACRES) =    1.20   SUBAREA RUNOFF(CFS) =    1.65
TOTAL AREA(ACRES) =        5.8   TOTAL RUNOFF(CFS) =       9.60
TC(MIN.) =   14.34

****************************************************************************
FLOW PROCESS FROM NODE    150.00 TO NODE    250.00 IS CODE =  61
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  354.00  DOWNSTREAM ELEVATION(FEET) =  351.00
STREET LENGTH(FEET) =    77.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 24.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  19.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.020
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.74
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.35
  HALFSTREET FLOOD WIDTH(FEET) =   11.20
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.10
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.49
STREET FLOW TRAVEL TIME(MIN.) =   0.18   Tc(MIN.) =   14.52
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.179
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .8700
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT =  0.522
SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.28
TOTAL AREA(ACRES) =        5.9        PEAK FLOW RATE(CFS) =       9.80

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.27
FLOW VELOCITY(FEET/SEC.) =  7.06   DEPTH*VELOCITY(FT*FT/SEC.) =   2.48
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    250.00 =    2214.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    250.00 TO NODE    250.00 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.52
  RAINFALL INTENSITY(INCH/HR) =   3.18
  TOTAL STREAM AREA(ACRES) =     5.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.80

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    246.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    417.00
  DOWNSTREAM ELEVATION(FEET) =    406.00
  ELEVATION DIFFERENCE(FEET) =     11.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.671
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.323
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.57
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.57

****************************************************************************
  FLOW PROCESS FROM NODE    246.00 TO NODE    250.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    406.00  DOWNSTREAM(FEET) =    354.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   520.00   CHANNEL SLOPE =  0.1000
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.323
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.75
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.42
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   1.96
  Tc(MIN.) =    3.63
  SUBAREA AREA(ACRES) =     1.00       SUBAREA RUNOFF(CFS) =    4.36
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.709
```

```
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       4.93

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   5.55
  LONGEST FLOWPATH FROM NODE    245.00 TO NODE    250.00 =     620.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    250.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    3.63
  RAINFALL INTENSITY(INCH/HR) =   6.32
  TOTAL STREAM AREA(ACRES) =     1.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.93

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        9.80    14.52        3.179          5.90
      2        4.93     3.63        6.323          1.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        7.38     3.63       6.323
      2       12.28    14.52       3.179

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      12.28   Tc(MIN.) =   14.52
  TOTAL AREA(ACRES) =        7.0
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    250.00 =    2214.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    260.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  351.00  DOWNSTREAM ELEVATION(FEET) =  339.00
  STREET LENGTH(FEET) =   400.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 24.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  19.00
```

```
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.92
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   13.28
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.87
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.69
  STREET FLOW TRAVEL TIME(MIN.) =   0.97   Tc(MIN.) =   15.49
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.049
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.571
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.28
  TOTAL AREA(ACRES) =        7.5        PEAK FLOW RATE(CFS) =      13.06

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  13.35
  FLOW VELOCITY(FEET/SEC.) =  6.87   DEPTH*VELOCITY(FT*FT/SEC.) =   2.70
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    260.00 =    2614.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    260.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.049
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5909
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.54
  TOTAL AREA(ACRES) =        8.1   TOTAL RUNOFF(CFS) =      14.59
  TC(MIN.) =   15.49

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    270.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  339.00  DOWNSTREAM ELEVATION(FEET) =  337.00
  STREET LENGTH(FEET) =   230.00   CURB HEIGHT(INCHES) =  6.0
```

```
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  37.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.84
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   17.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.43
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.15
  STREET FLOW TRAVEL TIME(MIN.) =   0.86   Tc(MIN.) =   16.36
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.944
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.597
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.49
  TOTAL AREA(ACRES) =        8.3        PEAK FLOW RATE(CFS) =      14.59

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  17.83
  FLOW VELOCITY(FEET/SEC.) =  4.43   DEPTH*VELOCITY(FT*FT/SEC.) =   2.14
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    270.00 =    2844.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.36
  RAINFALL INTENSITY(INCH/HR) =   2.94
  TOTAL STREAM AREA(ACRES) =     8.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.59

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    202.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    433.00
  DOWNSTREAM ELEVATION(FEET) =    427.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.980
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    96.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.323
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.44
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.44

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    230.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    427.00  DOWNSTREAM(FEET) =    362.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   777.00   CHANNEL SLOPE =  0.0837
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  12.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.603
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5400
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.12
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.08
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   4.20
  Tc(MIN.) =    8.18
  SUBAREA AREA(ACRES) =     2.80       SUBAREA RUNOFF(CFS) =    6.96
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.545
  TOTAL AREA(ACRES) =        2.9         PEAK FLOW RATE(CFS) =       7.28

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   3.89
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =     877.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    270.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    362.00  DOWNSTREAM(FEET) =    337.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   677.00   CHANNEL SLOPE =  0.0369
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
```

```
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.160
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.98
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.11
  AVERAGE FLOW DEPTH(FEET) =   0.36   TRAVEL TIME(MIN.) =   1.39
  Tc(MIN.) =    9.57
  SUBAREA AREA(ACRES) =     2.70       SUBAREA RUNOFF(CFS) =    9.43
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.687
  TOTAL AREA(ACRES) =        5.6         PEAK FLOW RATE(CFS) =      16.01

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   8.88
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    270.00 =    1554.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.57
  RAINFALL INTENSITY(INCH/HR) =   4.16
  TOTAL STREAM AREA(ACRES) =     5.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.01

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       14.59    16.36        2.944          8.30
      2       16.01     9.57        4.160          5.60

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       26.34     9.57       4.160
      2       25.92    16.36       2.944

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      26.34   Tc(MIN.) =    9.57
  TOTAL AREA(ACRES) =       13.9
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    270.00 =    2844.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    290.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  337.00  DOWNSTREAM ELEVATION(FEET) =  336.00
  STREET LENGTH(FEET) =    94.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  37.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      26.51
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.56
    HALFSTREET FLOOD WIDTH(FEET) =   24.48
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.04
  STREET FLOW TRAVEL TIME(MIN.) =   0.29   Tc(MIN.) =    9.86
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.081
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.635
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.34
  TOTAL AREA(ACRES) =       14.0        PEAK FLOW RATE(CFS) =      36.27

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.61   HALFSTREET FLOOD WIDTH(FEET) =  29.97
  FLOW VELOCITY(FEET/SEC.) =  5.71   DEPTH*VELOCITY(FT*FT/SEC.) =   3.50
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    290.00 =    2938.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    290.00 TO NODE    290.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.081
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6352
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.28
```

```
  TOTAL AREA(ACRES) =       14.1   TOTAL RUNOFF(CFS) =      36.55
  TC(MIN.) =    9.86
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       14.1  TC(MIN.) =      9.86
  PEAK FLOW RATE(CFS)   =      36.55
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```



```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2014 Advanced Engineering Software (aes)
              Ver. 21.0 Release Date: 06/01/2014  License ID 1261

                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                             San Diego, California 92110
                           619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* LAUREL HEIGHTS                                                        *
* PRE-PROJECT CONDITION BASIN 300 - 100-YEAR, 6-HOUR STORM EVENT        *
* J-19137-A                                                             *
 ************************************************************************

  FILE NAME: HP300E00.RAT
  TIME/DATE OF STUDY: 14:07 04/13/2021
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.400
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
```

```
 FLOW PROCESS FROM NODE    300.00 TO NODE    302.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .6000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    424.00
 DOWNSTREAM ELEVATION(FEET) =    416.00
 ELEVATION DIFFERENCE(FEET) =      8.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.500
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.323
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    340.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    416.00  DOWNSTREAM(FEET) =    380.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   226.00   CHANNEL SLOPE =  0.1593
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  12.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.655
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .6900
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.56
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.61
 AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   1.45
 Tc(MIN.) =    5.95
 SUBAREA AREA(ACRES) =     0.60       SUBAREA RUNOFF(CFS) =    2.34
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.677
 TOTAL AREA(ACRES) =        0.7         PEAK FLOW RATE(CFS) =       2.68

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   3.35
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    340.00 =     326.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.655
 *USER SPECIFIED(SUBAREA):
```

```
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7267
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    1.02
  TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =       3.70
  TC(MIN.) =    5.95

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    350.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   379.00  DOWNSTREAM(FEET) =   362.00
  FLOW LENGTH(FEET) =   263.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.42
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.70
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =    6.37
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    350.00 =     589.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.411
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6840
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.16
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       3.70
  TC(MIN.) =    6.37

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    390.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   362.00  DOWNSTREAM(FEET) =   336.00
  FLOW LENGTH(FEET) =   537.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.70
```

```
  PIPE TRAVEL TIME(MIN.) =   0.95    Tc(MIN.) =    7.32
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    390.00 =    1126.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    390.00 TO NODE    390.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.946
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7335
  SUBAREA AREA(ACRES) =    3.00   SUBAREA RUNOFF(CFS) =   11.13
  TOTAL AREA(ACRES) =        4.0   TOTAL RUNOFF(CFS) =      14.51
  TC(MIN.) =    7.32
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        4.0  TC(MIN.) =      7.32
  PEAK FLOW RATE(CFS)   =      14.51
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```



APPENDIX B

Modified Rational Method Output
[Post-project Un-detained]

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2014 Advanced Engineering Software (aes)
              Ver. 21.0 Release Date: 06/01/2014  License ID 1261

                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                             San Diego, California 92110
                           619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* LAUREL HEIGHTS                                                        *
* POST-PROJECT CONDITION BASIN 100 & 200: 100-YR, 6-HR STORM EVENT      *
* J-19137-A                                                             *
 ************************************************************************

  FILE NAME: HP200P00.RAT
  TIME/DATE OF STUDY: 17:21 04/13/2021
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.400
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
```

```
  FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    704.00
  DOWNSTREAM ELEVATION(FEET) =    694.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.466
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    694.00  DOWNSTREAM(FEET) =    445.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1323.00   CHANNEL SLOPE =  0.1882
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.500
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.35
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.53
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   6.24
  Tc(MIN.) =   12.51
  SUBAREA AREA(ACRES) =     1.70       SUBAREA RUNOFF(CFS) =    2.26
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.378
  TOTAL AREA(ACRES) =        1.8         PEAK FLOW RATE(CFS) =       2.38

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   4.24
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =    1423.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    445.00  DOWNSTREAM(FEET) =    424.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   233.00   CHANNEL SLOPE =  0.0901
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.408
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3300
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.50
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.36
  AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   0.53
  Tc(MIN.) =   13.04
  SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.22
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.374
  TOTAL AREA(ACRES) =        2.0         PEAK FLOW RATE(CFS) =       2.55

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.15   FLOW VELOCITY(FEET/SEC.) =   7.50
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =    1656.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   420.00  DOWNSTREAM(FEET) =   400.00
  FLOW LENGTH(FEET) =   161.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.55
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   13.27
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =    1817.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    125.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    400.00  DOWNSTREAM(FEET) =    395.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   100.00   CHANNEL SLOPE =  0.0500
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.326
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.60
```

```
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.18
  AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   0.27
  Tc(MIN.) =   13.54
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.10
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.370
  TOTAL AREA(ACRES) =        2.1         PEAK FLOW RATE(CFS) =       2.58

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   6.15
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    125.00 =    1917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    130.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    387.00  DOWNSTREAM(FEET) =    381.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   150.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.261
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.90
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   0.42
  Tc(MIN.) =   13.96
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.10
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.367
  TOTAL AREA(ACRES) =        2.2         PEAK FLOW RATE(CFS) =       2.63

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   5.90
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    130.00 =    2067.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    372.00  DOWNSTREAM(FEET) =    360.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   200.00   CHANNEL SLOPE =  0.0600
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.188
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.68
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.70
  AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   0.50
  Tc(MIN.) =   14.46
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.10
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.364
  TOTAL AREA(ACRES) =        2.3         PEAK FLOW RATE(CFS) =       2.67

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   6.68
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    135.00 =    2267.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    150.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    357.00  DOWNSTREAM(FEET) =    354.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    70.00   CHANNEL SLOPE =  0.0429
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.145
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.72
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.80
  AVERAGE FLOW DEPTH(FEET) =   0.28   TRAVEL TIME(MIN.) =   0.31
  Tc(MIN.) =   14.76
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.09
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.361
  TOTAL AREA(ACRES) =        2.4         PEAK FLOW RATE(CFS) =       2.73

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   3.72
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    150.00 =    2337.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.145
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5221
  SUBAREA AREA(ACRES) =    2.30   SUBAREA RUNOFF(CFS) =    4.99
```

```
  TOTAL AREA(ACRES) =        4.7   TOTAL RUNOFF(CFS) =       7.72
  TC(MIN.) =   14.76

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    250.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  354.00  DOWNSTREAM ELEVATION(FEET) =  353.00
  STREET LENGTH(FEET) =    65.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   12.41
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.73
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.77
  STREET FLOW TRAVEL TIME(MIN.) =   0.23   Tc(MIN.) =   14.99
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.114
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.529
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.26
  TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =       7.90

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.47
  FLOW VELOCITY(FEET/SEC.) =  4.72   DEPTH*VELOCITY(FT*FT/SEC.) =   1.77
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    250.00 =    2402.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    250.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.114
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5471
  SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.78
  TOTAL AREA(ACRES) =        5.1   TOTAL RUNOFF(CFS) =       8.69
  TC(MIN.) =   14.99

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    260.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  353.00  DOWNSTREAM ELEVATION(FEET) =  339.00
  STREET LENGTH(FEET) =   400.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 24.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  19.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.19
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.20
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.70
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.35
  STREET FLOW TRAVEL TIME(MIN.) =   1.00   Tc(MIN.) =   15.99
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.988
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.568
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.00
  TOTAL AREA(ACRES) =        5.5        PEAK FLOW RATE(CFS) =       9.34

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.27
  FLOW VELOCITY(FEET/SEC.) =  6.73   DEPTH*VELOCITY(FT*FT/SEC.) =   2.37
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    260.00 =    2802.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    260.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.988
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .8400
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5951
SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.51
TOTAL AREA(ACRES) =        6.1   TOTAL RUNOFF(CFS) =     10.85
TC(MIN.) =   15.99

****************************************************************************
FLOW PROCESS FROM NODE    260.00 TO NODE    270.00 IS CODE =  61
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  339.00  DOWNSTREAM ELEVATION(FEET) =  337.00
STREET LENGTH(FEET) =   230.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 42.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  37.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.020
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.09
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.45
  HALFSTREET FLOOD WIDTH(FEET) =   16.02
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.13
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.84
STREET FLOW TRAVEL TIME(MIN.) =   0.93   Tc(MIN.) =   16.92
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.881
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .8400
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT =  0.603
SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.48
TOTAL AREA(ACRES) =        6.3        PEAK FLOW RATE(CFS) =      10.94

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  15.95
FLOW VELOCITY(FEET/SEC.) =  4.11   DEPTH*VELOCITY(FT*FT/SEC.) =   1.83
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    270.00 =    3032.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.92
  RAINFALL INTENSITY(INCH/HR) =   2.88
  TOTAL STREAM AREA(ACRES) =     6.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.94

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    202.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    425.00
  DOWNSTREAM ELEVATION(FEET) =    417.00
  ELEVATION DIFFERENCE(FEET) =      8.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.455
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    98.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.323
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.38
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    205.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  417.00  DOWNSTREAM ELEVATION(FEET) =  407.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.018
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.12
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    3.96
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.27
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
  STREET FLOW TRAVEL TIME(MIN.) =   1.17   Tc(MIN.) =    5.63
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.860
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.780
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.48
  TOTAL AREA(ACRES) =        0.4        PEAK FLOW RATE(CFS) =       1.83

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.56
  FLOW VELOCITY(FEET/SEC.) =  4.59   DEPTH*VELOCITY(FT*FT/SEC.) =   1.05
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =     400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.860
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7320
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    2.46
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       4.29
  TC(MIN.) =    5.63

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    207.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   403.00  DOWNSTREAM(FEET) =   400.00
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.93
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.29
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    5.73
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    207.00 =     460.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.793
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6955
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.19
  TOTAL AREA(ACRES) =        1.1   TOTAL RUNOFF(CFS) =       4.43
  TC(MIN.) =    5.73

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.793
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6946
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.80
  TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       5.23
  TC(MIN.) =    5.73

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.793
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6933
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    2.00
  TOTAL AREA(ACRES) =        1.8   TOTAL RUNOFF(CFS) =       7.23
  TC(MIN.) =    5.73

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    210.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   400.00  DOWNSTREAM(FEET) =   386.00
```

```
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.76
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.23
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =    5.93
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =     630.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.663
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6925
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    2.34
  TOTAL AREA(ACRES) =        2.4   TOTAL RUNOFF(CFS) =       9.41
  TC(MIN.) =    5.93

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.663
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6918
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    3.52
  TOTAL AREA(ACRES) =        3.3   TOTAL RUNOFF(CFS) =      12.93
  TC(MIN.) =    5.93

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   286.00  DOWNSTREAM(FEET) =   279.00
  FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.35
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.93
```

```
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =    6.11
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =     770.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.558
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6916
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.92
  TOTAL AREA(ACRES) =        3.8   TOTAL RUNOFF(CFS) =      14.61
  TC(MIN.) =    6.11

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.558
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6913
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    3.45
  TOTAL AREA(ACRES) =        4.7   TOTAL RUNOFF(CFS) =      18.06
  TC(MIN.) =    6.11

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    217.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   379.00  DOWNSTREAM(FEET) =   375.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.28
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.06
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    6.16
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    217.00 =     820.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.529
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6912
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    1.53
  TOTAL AREA(ACRES) =        5.1   TOTAL RUNOFF(CFS) =      19.49
  TC(MIN.) =    6.16

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    220.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   375.00  DOWNSTREAM(FEET) =   370.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.130
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.31
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.49
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =    6.41
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =     870.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.388
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6917
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.39
  TOTAL AREA(ACRES) =        5.2   TOTAL RUNOFF(CFS) =      19.49
  TC(MIN.) =    6.41
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    222.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   370.00  DOWNSTREAM(FEET) =   367.00
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.55
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.49
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    6.48
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    222.00 =     930.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    222.00 TO NODE    225.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    369.25  DOWNSTREAM(FEET) =    369.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   100.00   CHANNEL SLOPE =  0.0025
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.863
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3300
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.81
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.61
  AVERAGE FLOW DEPTH(FEET) =   0.57   TRAVEL TIME(MIN.) =   1.04
  Tc(MIN.) =    7.51
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.64
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.666
  TOTAL AREA(ACRES) =        5.6         PEAK FLOW RATE(CFS) =      19.49

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.56   FLOW VELOCITY(FEET/SEC.) =   1.60
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    225.00 =    1030.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    230.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   367.00  DOWNSTREAM(FEET) =   360.00
  FLOW LENGTH(FEET) =    39.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.89
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.49
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    7.54
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =    1069.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    270.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    360.00  DOWNSTREAM(FEET) =    337.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   704.00   CHANNEL SLOPE =  0.0327
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.403
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      24.30
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.58
  AVERAGE FLOW DEPTH(FEET) =   0.55   TRAVEL TIME(MIN.) =   1.22
  Tc(MIN.) =    8.76
  SUBAREA AREA(ACRES) =     2.60       SUBAREA RUNOFF(CFS) =    9.62
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.721
  TOTAL AREA(ACRES) =        8.2         PEAK FLOW RATE(CFS) =      26.03

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.57   FLOW VELOCITY(FEET/SEC.) =   9.76
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    270.00 =    1773.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.76
  RAINFALL INTENSITY(INCH/HR) =   4.40
  TOTAL STREAM AREA(ACRES) =     8.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     26.03

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       10.94    16.92        2.881          6.30
      2       26.03     8.76        4.403          8.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       31.70     8.76       4.403
      2       27.98    16.92       2.881
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      31.70   Tc(MIN.) =    8.76
  TOTAL AREA(ACRES) =       14.5
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    270.00 =    3032.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    290.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  337.00  DOWNSTREAM ELEVATION(FEET) =  336.00
  STREET LENGTH(FEET) =    94.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  37.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      31.88
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.59
    HALFSTREET FLOOD WIDTH(FEET) =   27.66
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.60
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.30
  STREET FLOW TRAVEL TIME(MIN.) =   0.28   Tc(MIN.) =    9.04
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.315
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.671
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.36
  TOTAL AREA(ACRES) =       14.6        PEAK FLOW RATE(CFS) =      42.26

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.64   HALFSTREET FLOOD WIDTH(FEET) =  32.72
  FLOW VELOCITY(FEET/SEC.) =  5.86   DEPTH*VELOCITY(FT*FT/SEC.) =   3.75
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    290.00 =    3126.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    290.00 TO NODE    290.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.315
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .6900
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6710
 SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.30
 TOTAL AREA(ACRES) =       14.7   TOTAL RUNOFF(CFS) =      42.56
 TC(MIN.) =    9.04
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       14.7  TC(MIN.) =      9.04
 PEAK FLOW RATE(CFS)   =      42.56
================================================================================
================================================================================
 END OF RATIONAL METHOD ANALYSIS
```



```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2014 Advanced Engineering Software (aes)
              Ver. 21.0 Release Date: 06/01/2014  License ID 1261

                              Analysis prepared by:

                             RICK ENGINEERING COMPANY
                                 5620 Friars Road
                               San Diego, California 92110
                            619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* LAUREL HEIGHTS                                                        *
* POST-PROJECT CONDITION BASIN 300 - 100-YEAR, 6-HOUR STORM EVENT       *
* J-19137-A                                                             *
 ************************************************************************

  FILE NAME: HP300P00.RAT
  TIME/DATE OF STUDY: 16:50 04/13/2021
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.400
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
```

```
 FLOW PROCESS FROM NODE    300.00 TO NODE    302.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    99.00
 UPSTREAM ELEVATION(FEET) =    432.00
 DOWNSTREAM ELEVATION(FEET) =    424.00
 ELEVATION DIFFERENCE(FEET) =      8.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.140
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.025
 SUBAREA RUNOFF(CFS) =      0.15
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    305.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    417.00  DOWNSTREAM(FEET) =    410.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   218.00   CHANNEL SLOPE =  0.0321
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   5.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.333
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3000
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.22
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.97
 AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   1.84
 Tc(MIN.) =    8.98
 SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.13
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
 TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.26

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   2.03
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =     317.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    305.00 TO NODE    320.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    398.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   123.00   CHANNEL SLOPE =  0.0976
```

```
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.140
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.32
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.11
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   0.66
  Tc(MIN.) =    9.64
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.12
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =        0.3         PEAK FLOW RATE(CFS) =       0.37

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   3.40
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    320.00 =     440.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    340.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    395.00  DOWNSTREAM(FEET) =    390.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   170.00   CHANNEL SLOPE =  0.0294
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.844
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.43
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.41
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   1.17
  Tc(MIN.) =   10.82
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.12
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       0.46

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   2.50
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    340.00 =     610.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.844
```

```
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3000
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.12
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       0.58
  TC(MIN.) =   10.82

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    350.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   378.00  DOWNSTREAM(FEET) =   362.00
  FLOW LENGTH(FEET) =   265.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.86
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.58
  PIPE TRAVEL TIME(MIN.) =   0.75    Tc(MIN.) =   11.57
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    350.00 =     875.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    390.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   362.00  DOWNSTREAM(FEET) =   336.00
  FLOW LENGTH(FEET) =   537.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.44
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.58
  PIPE TRAVEL TIME(MIN.) =   1.65    Tc(MIN.) =   13.21
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    390.00 =    1412.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    390.00 TO NODE    390.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.378
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6838
```

```
  SUBAREA AREA(ACRES) =    2.90   SUBAREA RUNOFF(CFS) =    7.35
  TOTAL AREA(ACRES) =        3.4   TOTAL RUNOFF(CFS) =       7.86
  TC(MIN.) =   13.21
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        3.4  TC(MIN.) =     13.21
  PEAK FLOW RATE(CFS)   =       7.86
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

↟

Modified Rational Method Output
[Post-project Mitigated]

```
**************************************************************************

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                       2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2014 Advanced Engineering Software (aes)
            Ver. 21.0 Release Date: 06/01/2014  License ID 1261

                           Analysis prepared by:

                          RICK ENGINEERING COMPANY
                              5620 Friars Road
                         San Diego, California 92110
                       619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY *************************
* HISER PROPERTIES                                                      *
* POST-PROJECT MITIGATED BASIN 100 & 200:100-YR, 6-HR STORM EVENT       *
* J-19137-A                                                             *
 *************************************************************************

  FILE NAME: HP200D00.RAT
  TIME/DATE OF STUDY: 11:16 04/14/2021
-------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.400
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
```

```
  FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    704.00
  DOWNSTREAM ELEVATION(FEET) =    694.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.466
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    694.00  DOWNSTREAM(FEET) =    445.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1323.00   CHANNEL SLOPE =  0.1882
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.500
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.35
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.53
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   6.24
  Tc(MIN.) =   12.51
  SUBAREA AREA(ACRES) =     1.70       SUBAREA RUNOFF(CFS) =    2.26
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.378
  TOTAL AREA(ACRES) =        1.8         PEAK FLOW RATE(CFS) =       2.38

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   4.24
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =    1423.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    445.00  DOWNSTREAM(FEET) =    424.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   233.00   CHANNEL SLOPE =  0.0901
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.408
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3300
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.50
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.36
  AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   0.53
  Tc(MIN.) =   13.04
  SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.22
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.374
  TOTAL AREA(ACRES) =        2.0         PEAK FLOW RATE(CFS) =       2.55

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.15   FLOW VELOCITY(FEET/SEC.) =   7.50
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =    1656.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   420.00  DOWNSTREAM(FEET) =   400.00
  FLOW LENGTH(FEET) =   161.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.55
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   13.27
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =    1817.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    125.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    400.00  DOWNSTREAM(FEET) =    395.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   100.00   CHANNEL SLOPE =  0.0500
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.326
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.60
```

```
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.18
  AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   0.27
  Tc(MIN.) =   13.54
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.10
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.370
  TOTAL AREA(ACRES) =        2.1         PEAK FLOW RATE(CFS) =       2.58

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   6.15
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    125.00 =    1917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    130.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    387.00  DOWNSTREAM(FEET) =    381.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   150.00   CHANNEL SLOPE =  0.0400
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.261
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.90
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   0.42
  Tc(MIN.) =   13.96
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.10
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.367
  TOTAL AREA(ACRES) =        2.2         PEAK FLOW RATE(CFS) =       2.63

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   5.90
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    130.00 =    2067.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    372.00  DOWNSTREAM(FEET) =    360.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   200.00   CHANNEL SLOPE =  0.0600
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.188
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.68
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.70
  AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   0.50
  Tc(MIN.) =   14.46
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.10
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.364
  TOTAL AREA(ACRES) =        2.3         PEAK FLOW RATE(CFS) =       2.67

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   6.68
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    135.00 =    2267.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    150.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    357.00  DOWNSTREAM(FEET) =    354.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    70.00   CHANNEL SLOPE =  0.0429
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.145
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.72
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.80
  AVERAGE FLOW DEPTH(FEET) =   0.28   TRAVEL TIME(MIN.) =   0.31
  Tc(MIN.) =   14.76
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.09
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.361
  TOTAL AREA(ACRES) =        2.4         PEAK FLOW RATE(CFS) =       2.73

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   3.72
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    150.00 =    2337.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.145
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5221
  SUBAREA AREA(ACRES) =    2.30   SUBAREA RUNOFF(CFS) =    4.99
```

```
  TOTAL AREA(ACRES) =        4.7   TOTAL RUNOFF(CFS) =       7.72
  TC(MIN.) =   14.76

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    250.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  354.00  DOWNSTREAM ELEVATION(FEET) =  353.00
  STREET LENGTH(FEET) =    65.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   12.41
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.73
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.77
  STREET FLOW TRAVEL TIME(MIN.) =   0.23   Tc(MIN.) =   14.99
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.114
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.529
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.26
  TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =       7.90

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.47
  FLOW VELOCITY(FEET/SEC.) =  4.72   DEPTH*VELOCITY(FT*FT/SEC.) =   1.77
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    250.00 =    2402.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    250.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.114
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5471
  SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.78
  TOTAL AREA(ACRES) =        5.1   TOTAL RUNOFF(CFS) =       8.69
  TC(MIN.) =   14.99

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    260.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  353.00  DOWNSTREAM ELEVATION(FEET) =  339.00
  STREET LENGTH(FEET) =   400.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 24.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  19.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.19
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.20
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.70
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.35
  STREET FLOW TRAVEL TIME(MIN.) =   1.00   Tc(MIN.) =   15.99
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.988
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.568
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.00
  TOTAL AREA(ACRES) =        5.5        PEAK FLOW RATE(CFS) =       9.34

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.27
  FLOW VELOCITY(FEET/SEC.) =  6.73   DEPTH*VELOCITY(FT*FT/SEC.) =   2.37
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    260.00 =    2802.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    260.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.988
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .8400
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5951
SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.51
TOTAL AREA(ACRES) =        6.1   TOTAL RUNOFF(CFS) =     10.85
TC(MIN.) =   15.99

****************************************************************************
FLOW PROCESS FROM NODE    260.00 TO NODE    270.00 IS CODE =  61
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  339.00  DOWNSTREAM ELEVATION(FEET) =  337.00
STREET LENGTH(FEET) =   230.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 42.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  37.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.020
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.09
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.45
  HALFSTREET FLOOD WIDTH(FEET) =   16.02
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.13
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.84
STREET FLOW TRAVEL TIME(MIN.) =   0.93   Tc(MIN.) =   16.92
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.881
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .8400
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT =  0.603
SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.48
TOTAL AREA(ACRES) =        6.3        PEAK FLOW RATE(CFS) =      10.94

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  15.95
FLOW VELOCITY(FEET/SEC.) =  4.11   DEPTH*VELOCITY(FT*FT/SEC.) =   1.83
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    270.00 =    3032.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.92
  RAINFALL INTENSITY(INCH/HR) =   2.88
  TOTAL STREAM AREA(ACRES) =     6.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.94

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    202.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    425.00
  DOWNSTREAM ELEVATION(FEET) =    417.00
  ELEVATION DIFFERENCE(FEET) =      8.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.455
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    98.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.323
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.38
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    205.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  417.00  DOWNSTREAM ELEVATION(FEET) =  407.00
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.018
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.12
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    3.96
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.27
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
  STREET FLOW TRAVEL TIME(MIN.) =   1.17   Tc(MIN.) =    5.63
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.860
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.780
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.48
  TOTAL AREA(ACRES) =        0.4        PEAK FLOW RATE(CFS) =       1.83

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.56
  FLOW VELOCITY(FEET/SEC.) =  4.59   DEPTH*VELOCITY(FT*FT/SEC.) =   1.05
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =     400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.860
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7320
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    2.46
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       4.29
  TC(MIN.) =    5.63

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    207.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   403.00  DOWNSTREAM(FEET) =   400.00
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.93
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.29
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    5.73
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    207.00 =     460.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.793
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6955
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.19
  TOTAL AREA(ACRES) =        1.1   TOTAL RUNOFF(CFS) =       4.43
  TC(MIN.) =    5.73

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.793
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6946
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.80
  TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       5.23
  TC(MIN.) =    5.73

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.793
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6933
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    2.00
  TOTAL AREA(ACRES) =        1.8   TOTAL RUNOFF(CFS) =       7.23
  TC(MIN.) =    5.73

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    210.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   400.00  DOWNSTREAM(FEET) =   386.00
```

```
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.76
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.23
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =    5.93
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =     630.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.663
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6925
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    2.34
  TOTAL AREA(ACRES) =        2.4   TOTAL RUNOFF(CFS) =       9.41
  TC(MIN.) =    5.93

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.663
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6918
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    3.52
  TOTAL AREA(ACRES) =        3.3   TOTAL RUNOFF(CFS) =      12.93
  TC(MIN.) =    5.93

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   286.00  DOWNSTREAM(FEET) =   279.00
  FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.35
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.93
```

```
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =    6.11
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =     770.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.558
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6916
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.92
  TOTAL AREA(ACRES) =        3.8   TOTAL RUNOFF(CFS) =      14.61
  TC(MIN.) =    6.11

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.558
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6913
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    3.45
  TOTAL AREA(ACRES) =        4.7   TOTAL RUNOFF(CFS) =      18.06
  TC(MIN.) =    6.11

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    217.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   379.00  DOWNSTREAM(FEET) =   375.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.28
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.06
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    6.16
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    217.00 =     820.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    217.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.529
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6912
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    1.53
  TOTAL AREA(ACRES) =        5.1   TOTAL RUNOFF(CFS) =      19.49
  TC(MIN.) =    6.16

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    220.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   375.00  DOWNSTREAM(FEET) =   370.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.130
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.31
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.49
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =    6.41
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    220.00 =     870.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.388
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6917
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.39
  TOTAL AREA(ACRES) =        5.2   TOTAL RUNOFF(CFS) =      19.49
  TC(MIN.) =    6.41
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  12.40   RAIN INTENSITY(INCH/HOUR) =  3.52
  TOTAL AREA(ACRES) =     5.20   TOTAL RUNOFF(CFS) =      7.20

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    220.00 TO NODE    222.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   370.00  DOWNSTREAM(FEET) =   367.00
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.48
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.20
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   12.49
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    222.00 =     930.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    222.00 TO NODE    225.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    369.25  DOWNSTREAM(FEET) =    369.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   100.00   CHANNEL SLOPE =  0.0025
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.257
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3300
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.42
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.11
 AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   1.50
 Tc(MIN.) =   13.98
 SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.43
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.389
 TOTAL AREA(ACRES) =        5.6         PEAK FLOW RATE(CFS) =       7.20

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.31   FLOW VELOCITY(FEET/SEC.) =   1.11
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    225.00 =    1030.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    225.00 TO NODE    230.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   367.00  DOWNSTREAM(FEET) =   360.00
 FLOW LENGTH(FEET) =    39.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
```

```
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.17
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.20
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   14.02
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =    1069.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    270.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    360.00  DOWNSTREAM(FEET) =    337.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   704.00   CHANNEL SLOPE =  0.0327
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.037
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.46
  AVERAGE FLOW DEPTH(FEET) =   0.35   TRAVEL TIME(MIN.) =   1.57
  Tc(MIN.) =   15.59
  SUBAREA AREA(ACRES) =     2.60       SUBAREA RUNOFF(CFS) =    6.63
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.532
  TOTAL AREA(ACRES) =        8.2         PEAK FLOW RATE(CFS) =      13.24

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.39   FLOW VELOCITY(FEET/SEC.) =   8.04
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    270.00 =    1773.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.59
  RAINFALL INTENSITY(INCH/HR) =   3.04
  TOTAL STREAM AREA(ACRES) =     8.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.24

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       10.94    16.92        2.881          6.30
```

```
     2       13.24    15.59        3.037          8.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       23.33    15.59       3.037
      2       23.51    16.92       2.881

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      23.51   Tc(MIN.) =   16.92
  TOTAL AREA(ACRES) =       14.5
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    270.00 =    3032.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    290.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  337.00  DOWNSTREAM ELEVATION(FEET) =  336.00
  STREET LENGTH(FEET) =    94.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 42.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  37.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0100
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      23.63
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.54
    HALFSTREET FLOOD WIDTH(FEET) =   22.75
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.31
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.87
  STREET FLOW TRAVEL TIME(MIN.) =   0.30   Tc(MIN.) =   17.21
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.849
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.565
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.24
  TOTAL AREA(ACRES) =       14.6        PEAK FLOW RATE(CFS) =      23.51
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.54   HALFSTREET FLOOD WIDTH(FEET) =  22.60
  FLOW VELOCITY(FEET/SEC.) =  5.32   DEPTH*VELOCITY(FT*FT/SEC.) =   2.87
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    290.00 =    3126.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    290.00 TO NODE    290.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.849
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5655
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.20
  TOTAL AREA(ACRES) =       14.7   TOTAL RUNOFF(CFS) =      23.68
  TC(MIN.) =   17.21
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       14.7  TC(MIN.) =     17.21
  PEAK FLOW RATE(CFS)   =      23.68
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```



APPENDIX C

Backup for Weighted Runoff Coefficients

Weighted Runoff Coefficient Calculations

Pre-Project Condition

Basin 100

U/S Node #	D/S Node #	Sub Basin Area, A (sf)	Sub Basin Area, A (acres)	% Impervious (%)	Hydrologic Soil Group	Weighted Runoff Coefficient[1], C
100	102	2011	0.1	0%	D	0.35
102	110	76882	1.7	5%	D	0.38
110	120	44574	1.0	15%	C	0.43
120	150	81358	1.8	75%	C	0.76
150	150	55582	1.2	15%	C	0.43
150	250	1507	0.1	95%	C	0.87
		261914	5.9			

Basin 200

U/S Node #	D/S Node #	Sub Basin Area, A (sf)	Sub Basin Area, A (acres)	% Impervious (%)	Hydrologic Soil Group	Weighted Runoff Coefficient[1], C
200	202	4575	0.1	65%	C	0.69
202	230	120294	2.8	40%	C	0.54
230	270	118654	2.7	90%	C	0.84
245	246	3283	0.1	100%	C	0.90
246	250	44009	1.0	65%	C	0.69
250	260	20122	0.5	90%	C	0.84
260	260	27954	0.6	90%	C	0.84
260	270	10427	0.2	90%	C	0.84
270	290	5070	0.1	90%	C	0.84
290	290	2478	0.1	65%	C	0.69
		356866	8.2			

Basin 300

U/S Node #	D/S Node #	Sub Basin Area, A (sf)	Sub Basin Area, A (acres)	% Impervious (%)	Hydrologic Soil Group	Weighted Runoff Coefficient[1], C
300	302	3485	0.1	50%	C	0.60
302	340	25295	0.6	65%	C	0.69
340	340	6986	0.2	100%	C	0.90
350	350	3894	0.1	0%	C	0.30
390	390	129688	3.0	75%	C	0.75
		169348	4.0			

Total Area (acres) = 18.1

Notes:

1. Based on County of San Diego Hydrology Manual (June 2003) Table 3-1 (Runoff Coefficients for Urban Areas), measured % impervious areas are matched up with the % impervious and soil type on the table to determine the appropriate runoff coefficient. If the measured % impervious is not provided in the table, runoff coefficients were interpolated accordingly.

2. The 100-year, 6-hour precipitation of 2.4 inches is referenced from the County of San Diego Hydrology Manual (June 2003) isopluvial map.

Weighted Runoff Coefficient Calculations

Post-Project Condition

Basin 100

U/S Node #	D/S Node #	Sub Basin Area, A (sf)	Sub Basin Area, A (acres)	% Impervious (%)	Hydrologic Soil Group	Weighted Runoff Coefficient[1], C
100	102	2011	0.1	0%	D	0.35
102	110	76866	1.7	5%	D	0.38
110	115	6968	0.2	5%	C	0.33
120	125	3867	0.1	0%	C	0.30
125	130	3160	0.1	0%	C	0.30
130	135	2672	0.1	0%	C	0.30
135	150	5988	0.1	0%	C	0.30
150	150	103892	2.3	65%	C	0.69
150	250	1054	0.1	90%	C	0.84
		206478	4.8			

Basin 200

U/S Node #	D/S Node #	Sub Basin Area, A (sf)	Sub Basin Area, A (acres)	% Impervious (%)	Hydrologic Soil Group	Weighted Runoff Coefficient[1], C
200	202	4993	0.1	50%	D	0.60
202	205	11827	0.3	90%	C	0.84
205	205	23952	0.6	65%	C/D	0.70
207	207	3717	0.1	0%	C	0.33
207	207	9586	0.2	65%	C	0.69
207	207	23520	0.5	65%	C	0.69
210	210	24401	0.6	65%	C	0.69
210	210	38814	0.9	65%	C	0.69
215	215	23110	0.5	65%	C	0.69
215	215	38741	0.9	65%	C	0.69
217	217	18648	0.4	65%	C	0.69
220	220	6172	0.1	70%	C	0.72
222	225	17864	0.4	5%	C	0.33
230	270	113761	2.6	90%	C	0.84
250	250	13750	0.3	90%	C	0.84
250	260	18924	0.4	90%	C	0.84
260	260	27954	0.6	90%	C	0.84
260	270	10427	0.2	90%	C	0.84
270	290	5070	0.1	90%	C	0.84
290	290	2478	0.1	65%	C	0.69
		437709	9.9			

Basin 300

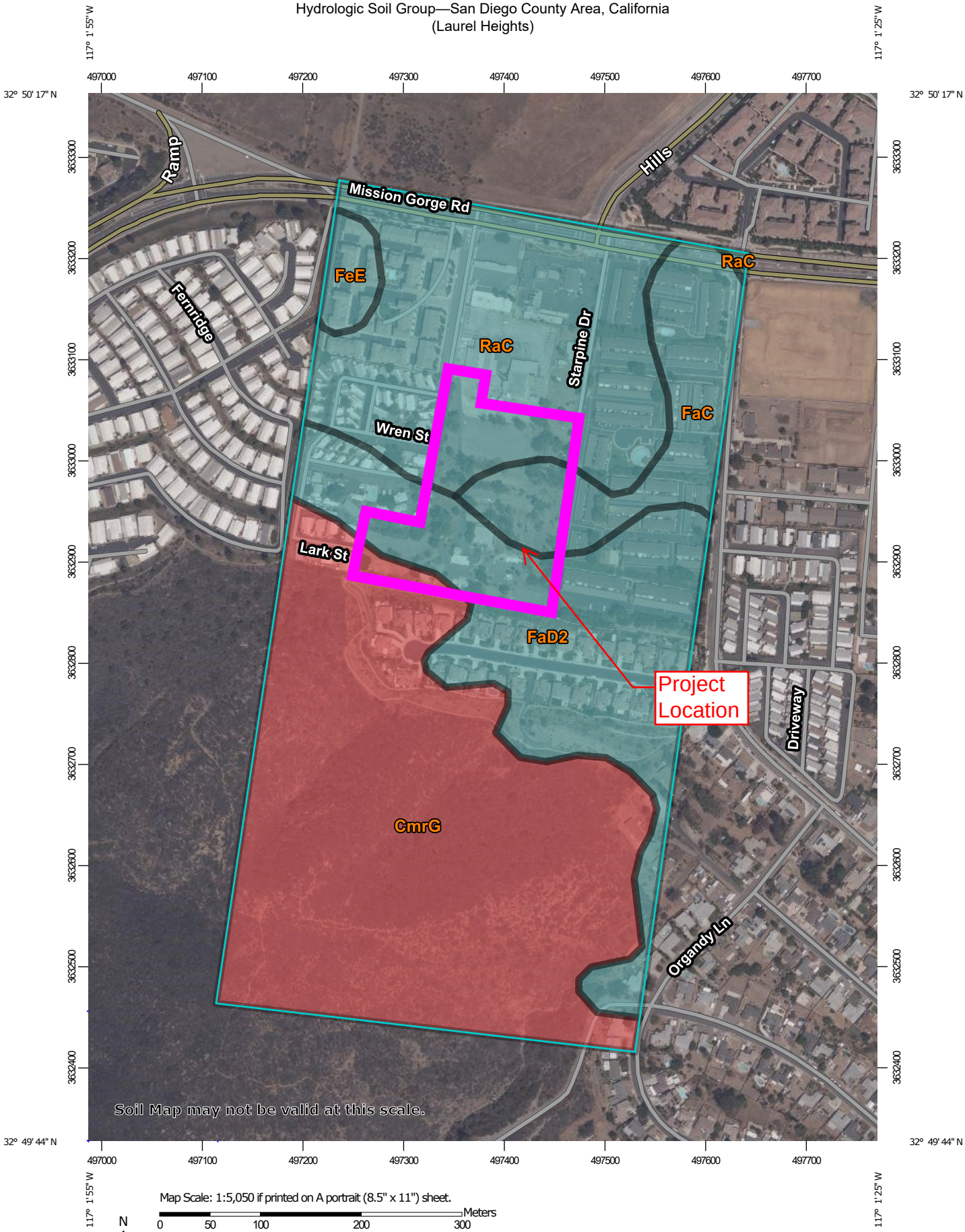
U/S Node #	D/S Node #	Sub Basin Area, A (sf)	Sub Basin Area, A (acres)	% Impervious (%)	Hydrologic Soil Group	Weighted Runoff Coefficient[1], C
300	302	2233	0.1	0%	C	0.30
302	305	4619	0.1	0%	C	0.30
305	320	5146	0.1	0%	C	0.30
320	340	4297	0.1	0%	C	0.30
340	340	2374	0.1	0%	C	0.30
390	390	126214	2.9	75%	C	0.75
		144883	3.4			

Total Area (acres) = 18.1

Notes:
1. Based on County of San Diego Hydrology Manual (June 2003) Table 3-1 (Runoff Coefficients for Urban Areas), measured % impervious areas are matched up with the % impervious and soil type on the table to determine the appropriate runoff coefficient. If the measured % impervious is not provided in the table, runoff coefficients were interpolated accordingly.

2. The 100-year, 6-hour precipitation of 2.4 inches is referenced from the County of San Diego Hydrology Manual (June 2003) isopluvial map.

Hydrologic Soil Group—San Diego County Area, California
(Laurel Heights)



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:
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: San Diego County Area, California
Survey Area Data: Version 15, May 27, 2020

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

Date(s) aerial images were photographed: Aug 22, 2018—Aug 31, 2018

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

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CmrG	Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes	D	36.5	43.8%
FaC	Fallbrook sandy loam, 5 to 9 percent slopes	C	7.5	9.0%
FaD2	Fallbrook sandy loam, 9 to 15 percent slopes, eroded	C	17.8	21.3%
FeE	Fallbrook rocky sandy loam, 9 to 30 percent slopes	C	1.4	1.6%
RaC	Ramona sandy loam, 5 to 9 percent slopes	C	20.3	24.3%
Totals for Area of Interest			**83.5**	**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.

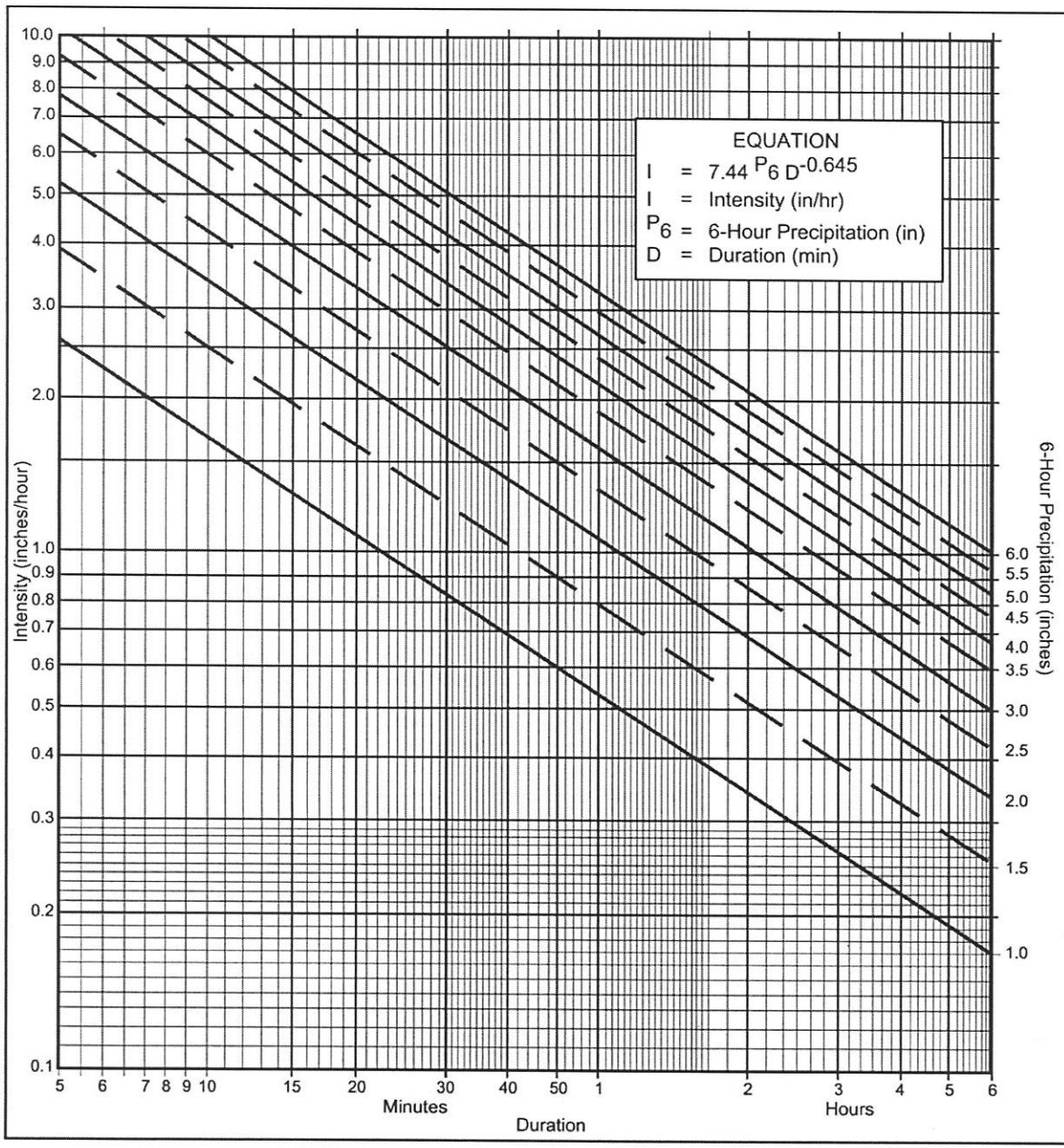
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 2.4 in., P_{24} = 4.4, $\frac{P_6}{P_{24}}$ = 55 %(2)

(c) Adjusted P_6(2) = _____ in.

(d) t_x = _____ min.

(e) I = _____ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service

Note: Runoff coefficient values used in the AES RM have been interpolated based on the percent imperviousness of the subbasin.

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

P24 = 4.4-inches

Orange County

Riverside County

Imperial County

Mexico

Pacific Ocean

SITE

SITE

OCEANSIDE

VISTA

CARLSBAD

ESCONDIDO

ENCINITAS

SOLANA BEACH

DEL MAR

POWAY

S.D. COUNTY

SANTEE

SAN DIEGO

EL CAJON

LA MESA

LEMON GROVE

CORONADO

CHULA VISTA

IMPERIAL BEACH

SD

117°30'

117°15'

117°00'

116°45'

116°30'

116°15'

33°30'

33°15'

33°00'

32°45'

32°30'

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

N W E S

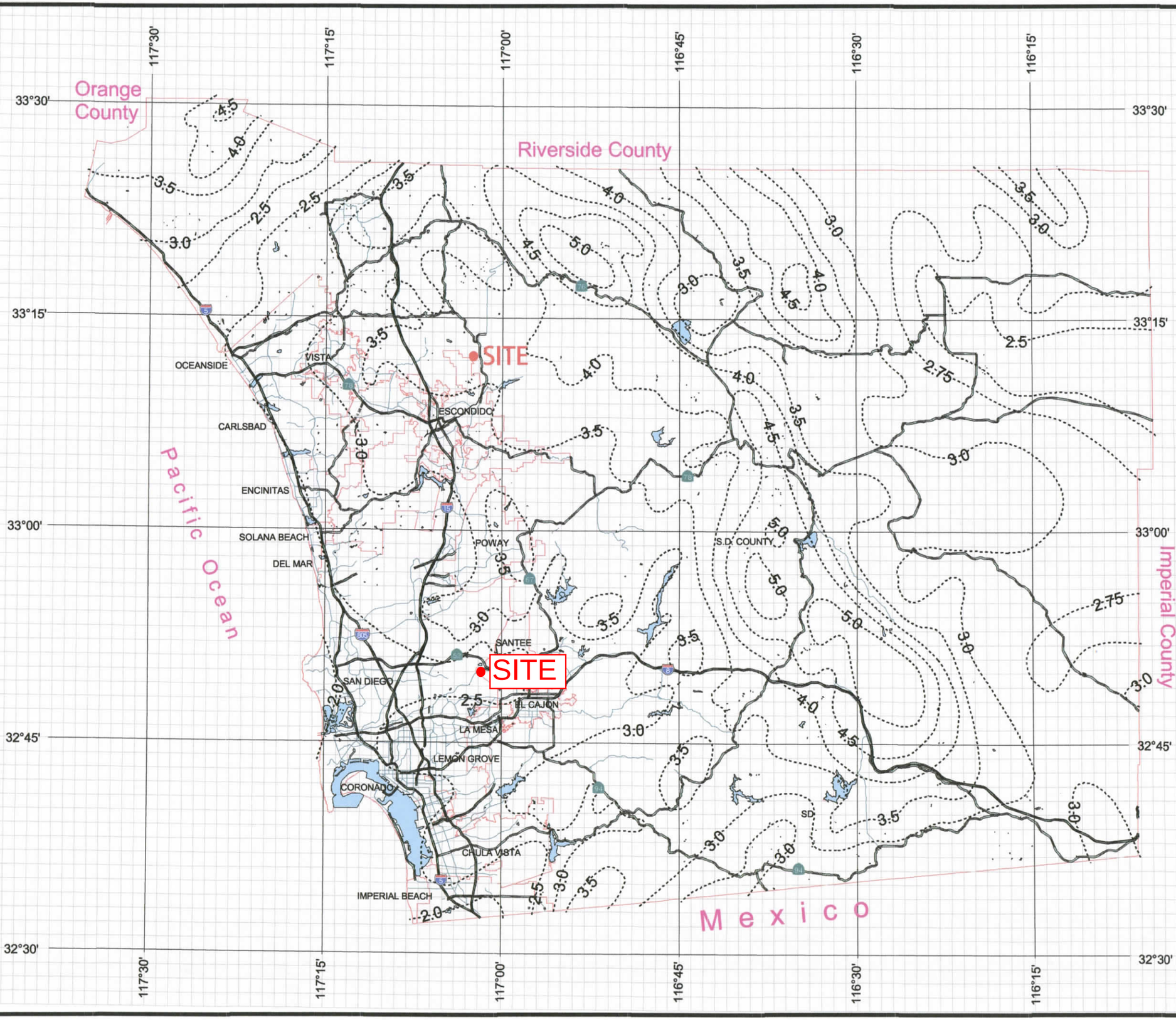
3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)



P6 = 2.4-inches

DPW GIS
Department of Public Works Geographic Information Services

SanGIS
We Have San Diego Covered!

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Copyright SanGIS. All Rights Reserved.

This products may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

N W E S

3 0 3 Miles

APPENDIX D

Preliminary Inlet Sizing Calculations

Note: Detailed inlet sizing analysis will be provided in future submittal.

APPENDIX E

Preliminary Storm Drain Sizing Calculations

Laurel Heights
J-19137-A
4/14/2021

Preliminary Storm Drain Size

The purpose of this table is to provide an estimated pipe size to convey the 100-year flow rates with a sizing factor.

Manning's n: 0.013

Sizing Factor (%): 30

			Slope at:	0.5%		1.0%		2.0%		3.0%	
Node	**Q_{100} (cfs[1])**	**Q_{100} with Sizing Factor (cfs[1])**		**Minimum Pipe Size[2] (feet)**	**Recommended Pipe Size (inches)**	**Minimum Pipe Size[2] (feet)**	**Recommended Pipe Size (inches)**	**Minimum Pipe Size[2] (feet)**	**Recommended Pipe Size (inches)**	**Minimum Pipe Size[2] (feet)**	**Recommended Pipe Size (inches)**
115-120	2.6	3.4		1.12	18"	0.98	12"	0.86	12"	0.80	10"
205-207	4.3	5.6		1.35	18"	1.18	18"	1.04	18"	0.96	12"
207-207	2.0	2.6		1.01	12"	0.89	12"	0.78	10"	0.72	10"
207-210	7.2	9.4		1.63	24"	1.44	18"	1.26	18"	1.17	18"
210-215	12.9	16.8		2.03	30"	1.79	24"	1.57	24"	1.45	18"
215-217	18.1	23.5		2.31	30"	2.03	30"	1.78	24"	1.65	24"
217-220	19.5	25.4		2.37	30"	2.09	30"	1.83	24"	1.70	24"
220-230	19.5	25.4		2.37	30"	2.09	30"	1.83	24"	1.70	24"

Note:

1. "cfs" = cubic feet per second.
2. Minimum pipe sizes are calculated using the Manning's equation and are based on the flow rates with 30% factor.

APPENDIX F

Detention Analysis

```
1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998              *                    *    HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1                *                    *          609 SECOND STREET           *
 *                                      *                    *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   14APR21  TIME  10:49:23  *                    *           (916) 756-1104             *
 *                                      *                    *                                      *
 ****************************************                    ****************************************

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

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


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

 *** FREE ***
                        *DIAGRAM
              1         ID   HISER PROPERTIES - BMP 2
              2         ID   100-YEAR DETENTION ANALYSIS
              3         ID   OCTOBER, 2018 - FILE NAME: HPDETPR2.HC1
              4         IT       1 01JAN90    1200     500
              5         IO       5       0
                        *

              6         KK  B2.hc1
              7         KM   RUN DATE   4/14/2021
              8         KM   RATIONAL METHOD HYDROGRAPH PROGRAM
              9         KM   COPYRIGHT 1992, 2014, RICK ENGINEERING COMPANY
             10         KM   6HR RAINFALL IS 2.4 INCHES
             11         KM   RATIONAL METHOD RUNOFF COEFFICIENT IS 0.69
             12         KM   RATIONAL METHOD TIME OF CONCENTRATION IS 8 MIN.
             13         KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
             14         KM   IT 2 01JAN90 1200 200
             15         BA  0.0081
             16         IN       8 01JAN90    1156
             17         QI       0     0.5     0.5     0.5     0.5     0.6     0.6     0.6     0.6     0.6
             18         QI     0.6     0.7     0.7     0.7     0.7     0.8     0.8     0.8     0.9     0.9
             19         QI       1     1.1     1.1     1.2     1.3     1.5     1.6       2     2.3     3.3
             20         QI     1.9    19.5     2.7     1.8     1.4     1.2       1     0.9     0.8     0.8
             21         QI     0.7     0.7     0.6     0.6     0.6     0.5       0       0       0       0
             22         QI       0       0       0       0       0       0       0
                        *

             23         KK    DET2
             24         KO       2       2       0       0      21
             25         KM   DETENTION VOLUME IN BMP-2
             26         RS       1    STOR      -1
             27         SV       0    0.16    0.36
             28         SQ       0    0.04     7.3
             29         SE     100     101     102
                        *
             30         ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (---->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<----) RETURN OF DIVERTED OR PUMPED FLOW

     6      B2.hc1
```

```
              V
              V
   23        DET2

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                                    ****************************************
 *                                      *                                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                    *    U.S. ARMY CORPS OF ENGINEERS      *
 *               JUN   1998             *                                    *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                                    *          609 SECOND STREET           *
 *                                      *                                    *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   14APR21  TIME  10:49:23  *                                    *           (916) 756-1104             *
 *                                      *                                    *                                      *
 ****************************************                                    ****************************************



                        HISER PROPERTIES - BMP 2
                        100-YEAR DETENTION ANALYSIS
                        OCTOBER, 2018 - FILE NAME: HPDETPR2.HC1

   5 IO          OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                        NMIN           1  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1JAN90  STARTING DATE
                       ITIME        1200  STARTING TIME
                          NQ         500  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      1JAN90  ENDING DATE
                      NDTIME        2019  ENDING TIME
                      ICENT           19  CENTURY MARK

                 COMPUTATION INTERVAL     .02 HOURS
                      TOTAL TIME BASE    8.32 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


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


           **************
           *            *
  23 KK    *      DET2  *
           *            *
           **************

  24 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           2  PRINT CONTROL
                       IPLOT           2  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         500  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .017  TIME INTERVAL IN HOURS

                           DETENTION VOLUME IN BMP-2

              HYDROGRAPH ROUTING DATA

  26 RS          STORAGE ROUTING
                       NSTPS           1  NUMBER OF SUBREACHES
                        ITYP        STOR  TYPE OF INITIAL CONDITION
                       RSVRIC       -1.00  INITIAL CONDITION
                           X          .00 WORKING R AND D COEFFICIENT

  27 SV            STORAGE          .0        .2        .4

  28 SQ          DISCHARGE          0.        0.        7.
```

29 SE ELEVATION 100.00 101.00 102.00

***

HYDROGRAPH AT STATION DET2

DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE
1 JAN 1200	1	0.	.2	101.0	1 JAN 1447	168	1.	.2	101.1	1 JAN 1734	335	1.	.2	101.1
1 JAN 1201	2	0.	.2	101.0	1 JAN 1448	169	1.	.2	101.1	1 JAN 1735	336	1.	.2	101.1
1 JAN 1202	3	0.	.2	101.0	1 JAN 1449	170	1.	.2	101.1	1 JAN 1736	337	1.	.2	101.1
1 JAN 1203	4	0.	.2	101.0	1 JAN 1450	171	1.	.2	101.1	1 JAN 1737	338	1.	.2	101.1
1 JAN 1204	5	0.	.2	101.0	1 JAN 1451	172	1.	.2	101.1	1 JAN 1738	339	1.	.2	101.1
1 JAN 1205	6	0.	.2	101.0	1 JAN 1452	173	1.	.2	101.1	1 JAN 1739	340	1.	.2	101.1
1 JAN 1206	7	0.	.2	101.0	1 JAN 1453	174	1.	.2	101.1	1 JAN 1740	341	1.	.2	101.1
1 JAN 1207	8	0.	.2	101.0	1 JAN 1454	175	1.	.2	101.1	1 JAN 1741	342	1.	.2	101.1
1 JAN 1208	9	0.	.2	101.0	1 JAN 1455	176	1.	.2	101.1	1 JAN 1742	343	1.	.2	101.1
1 JAN 1209	10	0.	.2	101.0	1 JAN 1456	177	1.	.2	101.1	1 JAN 1743	344	1.	.2	101.1
1 JAN 1210	11	0.	.2	101.0	1 JAN 1457	178	1.	.2	101.1	1 JAN 1744	345	1.	.2	101.1
1 JAN 1211	12	0.	.2	101.0	1 JAN 1458	179	1.	.2	101.1	1 JAN 1745	346	1.	.2	101.1
1 JAN 1212	13	0.	.2	101.0	1 JAN 1459	180	1.	.2	101.1	1 JAN 1746	347	1.	.2	101.1
1 JAN 1213	14	0.	.2	101.0	1 JAN 1500	181	1.	.2	101.1	1 JAN 1747	348	1.	.2	101.1
1 JAN 1214	15	0.	.2	101.0	1 JAN 1501	182	1.	.2	101.1	1 JAN 1748	349	1.	.2	101.1
1 JAN 1215	16	0.	.2	101.0	1 JAN 1502	183	1.	.2	101.1	1 JAN 1749	350	1.	.2	101.1
1 JAN 1216	17	0.	.2	101.0	1 JAN 1503	184	1.	.2	101.1	1 JAN 1750	351	1.	.2	101.1
1 JAN 1217	18	0.	.2	101.0	1 JAN 1504	185	1.	.2	101.1	1 JAN 1751	352	1.	.2	101.1
1 JAN 1218	19	0.	.2	101.0	1 JAN 1505	186	1.	.2	101.1	1 JAN 1752	353	1.	.2	101.1
1 JAN 1219	20	0.	.2	101.0	1 JAN 1506	187	1.	.2	101.1	1 JAN 1753	354	1.	.2	101.1
1 JAN 1220	21	0.	.2	101.0	1 JAN 1507	188	1.	.2	101.1	1 JAN 1754	355	1.	.2	101.1
1 JAN 1221	22	0.	.2	101.1	1 JAN 1508	189	1.	.2	101.1	1 JAN 1755	356	1.	.2	101.1
1 JAN 1222	23	0.	.2	101.1	1 JAN 1509	190	1.	.2	101.1	1 JAN 1756	357	1.	.2	101.1
1 JAN 1223	24	0.	.2	101.1	1 JAN 1510	191	1.	.2	101.2	1 JAN 1757	358	1.	.2	101.1
1 JAN 1224	25	0.	.2	101.1	1 JAN 1511	192	1.	.2	101.2	1 JAN 1758	359	1.	.2	101.1
1 JAN 1225	26	0.	.2	101.1	1 JAN 1512	193	1.	.2	101.2	1 JAN 1759	360	1.	.2	101.1
1 JAN 1226	27	0.	.2	101.1	1 JAN 1513	194	1.	.2	101.2	1 JAN 1800	361	1.	.2	101.1
1 JAN 1227	28	0.	.2	101.1	1 JAN 1514	195	1.	.2	101.2	1 JAN 1801	362	1.	.2	101.1
1 JAN 1228	29	0.	.2	101.1	1 JAN 1515	196	1.	.2	101.2	1 JAN 1802	363	1.	.2	101.1
1 JAN 1229	30	0.	.2	101.1	1 JAN 1516	197	1.	.2	101.2	1 JAN 1803	364	1.	.2	101.1
1 JAN 1230	31	0.	.2	101.1	1 JAN 1517	198	1.	.2	101.2	1 JAN 1804	365	1.	.2	101.1
1 JAN 1231	32	0.	.2	101.1	1 JAN 1518	199	1.	.2	101.2	1 JAN 1805	366	0.	.2	101.1
1 JAN 1232	33	0.	.2	101.1	1 JAN 1519	200	1.	.2	101.2	1 JAN 1806	367	0.	.2	101.1
1 JAN 1233	34	0.	.2	101.1	1 JAN 1520	201	1.	.2	101.2	1 JAN 1807	368	0.	.2	101.1
1 JAN 1234	35	0.	.2	101.1	1 JAN 1521	202	1.	.2	101.2	1 JAN 1808	369	0.	.2	101.1
1 JAN 1235	36	0.	.2	101.1	1 JAN 1522	203	1.	.2	101.2	1 JAN 1809	370	0.	.2	101.1
1 JAN 1236	37	0.	.2	101.1	1 JAN 1523	204	1.	.2	101.2	1 JAN 1810	371	0.	.2	101.0
1 JAN 1237	38	0.	.2	101.1	1 JAN 1524	205	1.	.2	101.2	1 JAN 1811	372	0.	.2	101.0
1 JAN 1238	39	0.	.2	101.1	1 JAN 1525	206	1.	.2	101.2	1 JAN 1812	373	0.	.2	101.0
1 JAN 1239	40	0.	.2	101.1	1 JAN 1526	207	1.	.2	101.2	1 JAN 1813	374	0.	.2	101.0
1 JAN 1240	41	0.	.2	101.1	1 JAN 1527	208	1.	.2	101.2	1 JAN 1814	375	0.	.2	101.0
1 JAN 1241	42	1.	.2	101.1	1 JAN 1528	209	1.	.2	101.2	1 JAN 1815	376	0.	.2	101.0
1 JAN 1242	43	1.	.2	101.1	1 JAN 1529	210	1.	.2	101.2	1 JAN 1816	377	0.	.2	101.0
1 JAN 1243	44	1.	.2	101.1	1 JAN 1530	211	1.	.2	101.2	1 JAN 1817	378	0.	.2	101.0
1 JAN 1244	45	1.	.2	101.1	1 JAN 1531	212	1.	.2	101.2	1 JAN 1818	379	0.	.2	101.0
1 JAN 1245	46	1.	.2	101.1	1 JAN 1532	213	1.	.2	101.2	1 JAN 1819	380	0.	.2	101.0
1 JAN 1246	47	1.	.2	101.1	1 JAN 1533	214	2.	.2	101.2	1 JAN 1820	381	0.	.2	101.0
1 JAN 1247	48	1.	.2	101.1	1 JAN 1534	215	2.	.2	101.2	1 JAN 1821	382	0.	.2	101.0
1 JAN 1248	49	1.	.2	101.1	1 JAN 1535	216	2.	.2	101.2	1 JAN 1822	383	0.	.2	101.0
1 JAN 1249	50	1.	.2	101.1	1 JAN 1536	217	2.	.2	101.2	1 JAN 1823	384	0.	.2	101.0
1 JAN 1250	51	1.	.2	101.1	1 JAN 1537	218	2.	.2	101.2	1 JAN 1824	385	0.	.2	101.0
1 JAN 1251	52	1.	.2	101.1	1 JAN 1538	219	2.	.2	101.2	1 JAN 1825	386	0.	.2	101.0
1 JAN 1252	53	1.	.2	101.1	1 JAN 1539	220	2.	.2	101.2	1 JAN 1826	387	0.	.2	101.0
1 JAN 1253	54	1.	.2	101.1	1 JAN 1540	221	2.	.2	101.2	1 JAN 1827	388	0.	.2	101.0
1 JAN 1254	55	1.	.2	101.1	1 JAN 1541	222	2.	.2	101.2	1 JAN 1828	389	0.	.2	101.0
1 JAN 1255	56	1.	.2	101.1	1 JAN 1542	223	2.	.2	101.2	1 JAN 1829	390	0.	.2	101.0
1 JAN 1256	57	1.	.2	101.1	1 JAN 1543	224	2.	.2	101.2	1 JAN 1830	391	0.	.2	101.0
1 JAN 1257	58	1.	.2	101.1	1 JAN 1544	225	2.	.2	101.3	1 JAN 1831	392	0.	.2	101.0
1 JAN 1258	59	1.	.2	101.1	1 JAN 1545	226	2.	.2	101.3	1 JAN 1832	393	0.	.2	101.0
1 JAN 1259	60	1.	.2	101.1	1 JAN 1546	227	2.	.2	101.3	1 JAN 1833	394	0.	.2	101.0
1 JAN 1300	61	1.	.2	101.1	1 JAN 1547	228	2.	.2	101.3	1 JAN 1834	395	0.	.2	101.0
1 JAN 1301	62	1.	.2	101.1	1 JAN 1548	229	2.	.2	101.3	1 JAN 1835	396	0.	.2	101.0
1 JAN 1302	63	1.	.2	101.1	1 JAN 1549	230	2.	.2	101.3	1 JAN 1836	397	0.	.2	101.0
1 JAN 1303	64	1.	.2	101.1	1 JAN 1550	231	2.	.2	101.3	1 JAN 1837	398	0.	.2	101.0
1 JAN 1304	65	1.	.2	101.1	1 JAN 1551	232	2.	.2	101.3	1 JAN 1838	399	0.	.2	101.0
1 JAN 1305	66	1.	.2	101.1	1 JAN 1552	233	2.	.2	101.3	1 JAN 1839	400	0.	.2	101.0
1 JAN 1306	67	1.	.2	101.1	1 JAN 1553	234	2.	.2	101.3	1 JAN 1840	401	0.	.2	101.0
1 JAN 1307	68	1.	.2	101.1	1 JAN 1554	235	2.	.2	101.3	1 JAN 1841	402	0.	.2	101.0
1 JAN 1308	69	1.	.2	101.1	1 JAN 1555	236	2.	.2	101.3	1 JAN 1842	403	0.	.2	101.0
1 JAN 1309	70	1.	.2	101.1	1 JAN 1556	237	2.	.2	101.3	1 JAN 1843	404	0.	.2	101.0

```
1 JAN 1310  71      1.      .2   101.1 *  1 JAN 1557 238      2.      .2   101.3 *  1 JAN 1844 405      0.      .2   101.0
1 JAN 1311  72      1.      .2   101.1 *  1 JAN 1558 239      2.      .2   101.3 *  1 JAN 1845 406      0.      .2   101.0
1 JAN 1312  73      1.      .2   101.1 *  1 JAN 1559 240      3.      .2   101.4 *  1 JAN 1846 407      0.      .2   101.0
1 JAN 1313  74      1.      .2   101.1 *  1 JAN 1600 241      3.      .2   101.4 *  1 JAN 1847 408      0.      .2   101.0
1 JAN 1314  75      1.      .2   101.1 *  1 JAN 1601 242      3.      .3   101.5 *  1 JAN 1848 409      0.      .2   101.0
1 JAN 1315  76      1.      .2   101.1 *  1 JAN 1602 243      4.      .3   101.5 *  1 JAN 1849 410      0.      .2   101.0
1 JAN 1316  77      1.      .2   101.1 *  1 JAN 1603 244      5.      .3   101.6 *  1 JAN 1850 411      0.      .2   101.0
1 JAN 1317  78      1.      .2   101.1 *  1 JAN 1604 245      5.      .3   101.7 *  1 JAN 1851 412      0.      .2   101.0
1 JAN 1318  79      1.      .2   101.1 *  1 JAN 1605 246      6.      .3   101.8 *  1 JAN 1852 413      0.      .2   101.0
1 JAN 1319  80      1.      .2   101.1 *  1 JAN 1606 247      6.      .3   101.9 *  1 JAN 1853 414      0.      .2   101.0
1 JAN 1320  81      1.      .2   101.1 *  1 JAN 1607 248      7.      .3   101.9 *  1 JAN 1854 415      0.      .2   101.0
1 JAN 1321  82      1.      .2   101.1 *  1 JAN 1608 249      7.      .4   102.0 *  1 JAN 1855 416      0.      .2   101.0
1 JAN 1322  83      1.      .2   101.1 *  1 JAN 1609 250      7.      .4   102.0 *  1 JAN 1856 417      0.      .2   101.0
1 JAN 1323  84      1.      .2   101.1 *  1 JAN 1610 251      7.      .4   102.0 *  1 JAN 1857 418      0.      .2   101.0
1 JAN 1324  85      1.      .2   101.1 *  1 JAN 1611 252      7.      .4   102.0 *  1 JAN 1858 419      0.      .2   101.0
1 JAN 1325  86      1.      .2   101.1 *  1 JAN 1612 253      7.      .4   102.0 *  1 JAN 1859 420      0.      .2   101.0
1 JAN 1326  87      1.      .2   101.1 *  1 JAN 1613 254      7.      .3   101.9 *  1 JAN 1900 421      0.      .2   101.0
1 JAN 1327  88      1.      .2   101.1 *  1 JAN 1614 255      7.      .3   101.9 *  1 JAN 1901 422      0.      .2   101.0
1 JAN 1328  89      1.      .2   101.1 *  1 JAN 1615 256      6.      .3   101.9 *  1 JAN 1902 423      0.      .2   101.0
1 JAN 1329  90      1.      .2   101.1 *  1 JAN 1616 257      6.      .3   101.8 *  1 JAN 1903 424      0.      .2   101.0
1 JAN 1330  91      1.      .2   101.1 *  1 JAN 1617 258      6.      .3   101.8 *  1 JAN 1904 425      0.      .2   101.0
1 JAN 1331  92      1.      .2   101.1 *  1 JAN 1618 259      6.      .3   101.8 *  1 JAN 1905 426      0.      .2   101.0
1 JAN 1332  93      1.      .2   101.1 *  1 JAN 1619 260      6.      .3   101.8 *  1 JAN 1906 427      0.      .2   101.0
1 JAN 1333  94      1.      .2   101.1 *  1 JAN 1620 261      5.      .3   101.7 *  1 JAN 1907 428      0.      .2   101.0
1 JAN 1334  95      1.      .2   101.1 *  1 JAN 1621 262      5.      .3   101.7 *  1 JAN 1908 429      0.      .2   101.0
1 JAN 1335  96      1.      .2   101.1 *  1 JAN 1622 263      5.      .3   101.7 *  1 JAN 1909 430      0.      .2   101.0
1 JAN 1336  97      1.      .2   101.1 *  1 JAN 1623 264      5.      .3   101.7 *  1 JAN 1910 431      0.      .2   101.0
1 JAN 1337  98      1.      .2   101.1 *  1 JAN 1624 265      5.      .3   101.6 *  1 JAN 1911 432      0.      .2   101.0
1 JAN 1338  99      1.      .2   101.1 *  1 JAN 1625 266      5.      .3   101.6 *  1 JAN 1912 433      0.      .2   101.0
1 JAN 1339 100      1.      .2   101.1 *  1 JAN 1626 267      4.      .3   101.6 *  1 JAN 1913 434      0.      .2   101.0
1 JAN 1340 101      1.      .2   101.1 *  1 JAN 1627 268      4.      .3   101.6 *  1 JAN 1914 435      0.      .2   101.0
1 JAN 1341 102      1.      .2   101.1 *  1 JAN 1628 269      4.      .3   101.6 *  1 JAN 1915 436      0.      .2   101.0
1 JAN 1342 103      1.      .2   101.1 *  1 JAN 1629 270      4.      .3   101.5 *  1 JAN 1916 437      0.      .2   101.0
1 JAN 1343 104      1.      .2   101.1 *  1 JAN 1630 271      4.      .3   101.5 *  1 JAN 1917 438      0.      .2   101.0
1 JAN 1344 105      1.      .2   101.1 *  1 JAN 1631 272      4.      .3   101.5 *  1 JAN 1918 439      0.      .2   101.0
1 JAN 1345 106      1.      .2   101.1 *  1 JAN 1632 273      4.      .3   101.5 *  1 JAN 1919 440      0.      .2   101.0
1 JAN 1346 107      1.      .2   101.1 *  1 JAN 1633 274      4.      .3   101.5 *  1 JAN 1920 441      0.      .2   101.0
1 JAN 1347 108      1.      .2   101.1 *  1 JAN 1634 275      3.      .3   101.5 *  1 JAN 1921 442      0.      .2   101.0
1 JAN 1348 109      1.      .2   101.1 *  1 JAN 1635 276      3.      .3   101.5 *  1 JAN 1922 443      0.      .2   101.0
1 JAN 1349 110      1.      .2   101.1 *  1 JAN 1636 277      3.      .2   101.4 *  1 JAN 1923 444      0.      .2   101.0
1 JAN 1350 111      1.      .2   101.1 *  1 JAN 1637 278      3.      .2   101.4 *  1 JAN 1924 445      0.      .2   101.0
1 JAN 1351 112      1.      .2   101.1 *  1 JAN 1638 279      3.      .2   101.4 *  1 JAN 1925 446      0.      .2   101.0
1 JAN 1352 113      1.      .2   101.1 *  1 JAN 1639 280      3.      .2   101.4 *  1 JAN 1926 447      0.      .2   101.0
1 JAN 1353 114      1.      .2   101.1 *  1 JAN 1640 281      3.      .2   101.4 *  1 JAN 1927 448      0.      .2   101.0
1 JAN 1354 115      1.      .2   101.1 *  1 JAN 1641 282      3.      .2   101.4 *  1 JAN 1928 449      0.      .2   101.0
1 JAN 1355 116      1.      .2   101.1 *  1 JAN 1642 283      3.      .2   101.4 *  1 JAN 1929 450      0.      .2   101.0
1 JAN 1356 117      1.      .2   101.1 *  1 JAN 1643 284      3.      .2   101.4 *  1 JAN 1930 451      0.      .2   101.0
1 JAN 1357 118      1.      .2   101.1 *  1 JAN 1644 285      3.      .2   101.3 *  1 JAN 1931 452      0.      .2   101.0
1 JAN 1358 119      1.      .2   101.1 *  1 JAN 1645 286      2.      .2   101.3 *  1 JAN 1932 453      0.      .2   101.0
1 JAN 1359 120      1.      .2   101.1 *  1 JAN 1646 287      2.      .2   101.3 *  1 JAN 1933 454      0.      .2   101.0
1 JAN 1400 121      1.      .2   101.1 *  1 JAN 1647 288      2.      .2   101.3 *  1 JAN 1934 455      0.      .2   101.0
1 JAN 1401 122      1.      .2   101.1 *  1 JAN 1648 289      2.      .2   101.3 *  1 JAN 1935 456      0.      .2   101.0
1 JAN 1402 123      1.      .2   101.1 *  1 JAN 1649 290      2.      .2   101.3 *  1 JAN 1936 457      0.      .2   101.0
1 JAN 1403 124      1.      .2   101.1 *  1 JAN 1650 291      2.      .2   101.3 *  1 JAN 1937 458      0.      .2   101.0
1 JAN 1404 125      1.      .2   101.1 *  1 JAN 1651 292      2.      .2   101.3 *  1 JAN 1938 459      0.      .2   101.0
1 JAN 1405 126      1.      .2   101.1 *  1 JAN 1652 293      2.      .2   101.3 *  1 JAN 1939 460      0.      .2   101.0
1 JAN 1406 127      1.      .2   101.1 *  1 JAN 1653 294      2.      .2   101.3 *  1 JAN 1940 461      0.      .2   101.0
1 JAN 1407 128      1.      .2   101.1 *  1 JAN 1654 295      2.      .2   101.3 *  1 JAN 1941 462      0.      .2   101.0
1 JAN 1408 129      1.      .2   101.1 *  1 JAN 1655 296      2.      .2   101.2 *  1 JAN 1942 463      0.      .2   101.0
1 JAN 1409 130      1.      .2   101.1 *  1 JAN 1656 297      2.      .2   101.2 *  1 JAN 1943 464      0.      .2   101.0
1 JAN 1410 131      1.      .2   101.1 *  1 JAN 1657 298      2.      .2   101.2 *  1 JAN 1944 465      0.      .2   101.0
1 JAN 1411 132      1.      .2   101.1 *  1 JAN 1658 299      2.      .2   101.2 *  1 JAN 1945 466      0.      .2   101.0
1 JAN 1412 133      1.      .2   101.1 *  1 JAN 1659 300      2.      .2   101.2 *  1 JAN 1946 467      0.      .2   101.0
1 JAN 1413 134      1.      .2   101.1 *  1 JAN 1700 301      2.      .2   101.2 *  1 JAN 1947 468      0.      .2   101.0
1 JAN 1414 135      1.      .2   101.1 *  1 JAN 1701 302      2.      .2   101.2 *  1 JAN 1948 469      0.      .2   101.0
1 JAN 1415 136      1.      .2   101.1 *  1 JAN 1702 303      2.      .2   101.2 *  1 JAN 1949 470      0.      .2   101.0
1 JAN 1416 137      1.      .2   101.1 *  1 JAN 1703 304      2.      .2   101.2 *  1 JAN 1950 471      0.      .2   101.0
1 JAN 1417 138      1.      .2   101.1 *  1 JAN 1704 305      1.      .2   101.2 *  1 JAN 1951 472      0.      .2   101.0
1 JAN 1418 139      1.      .2   101.1 *  1 JAN 1705 306      1.      .2   101.2 *  1 JAN 1952 473      0.      .2   101.0
1 JAN 1419 140      1.      .2   101.1 *  1 JAN 1706 307      1.      .2   101.2 *  1 JAN 1953 474      0.      .2   101.0
1 JAN 1420 141      1.      .2   101.1 *  1 JAN 1707 308      1.      .2   101.2 *  1 JAN 1954 475      0.      .2   101.0
1 JAN 1421 142      1.      .2   101.1 *  1 JAN 1708 309      1.      .2   101.2 *  1 JAN 1955 476      0.      .2   101.0
1 JAN 1422 143      1.      .2   101.1 *  1 JAN 1709 310      1.      .2   101.2 *  1 JAN 1956 477      0.      .2   101.0
1 JAN 1423 144      1.      .2   101.1 *  1 JAN 1710 311      1.      .2   101.2 *  1 JAN 1957 478      0.      .2   101.0
1 JAN 1424 145      1.      .2   101.1 *  1 JAN 1711 312      1.      .2   101.2 *  1 JAN 1958 479      0.      .2   101.0
1 JAN 1425 146      1.      .2   101.1 *  1 JAN 1712 313      1.      .2   101.2 *  1 JAN 1959 480      0.      .2   101.0
1 JAN 1426 147      1.      .2   101.1 *  1 JAN 1713 314      1.      .2   101.2 *  1 JAN 2000 481      0.      .2   101.0
1 JAN 1427 148      1.      .2   101.1 *  1 JAN 1714 315      1.      .2   101.2 *  1 JAN 2001 482      0.      .2   101.0
1 JAN 1428 149      1.      .2   101.1 *  1 JAN 1715 316      1.      .2   101.2 *  1 JAN 2002 483      0.      .2   101.0
1 JAN 1429 150      1.      .2   101.1 *  1 JAN 1716 317      1.      .2   101.2 *  1 JAN 2003 484      0.      .2   101.0
1 JAN 1430 151      1.      .2   101.1 *  1 JAN 1717 318      1.      .2   101.1 *  1 JAN 2004 485      0.      .2   101.0
1 JAN 1431 152      1.      .2   101.1 *  1 JAN 1718 319      1.      .2   101.1 *  1 JAN 2005 486      0.      .2   101.0
1 JAN 1432 153      1.      .2   101.1 *  1 JAN 1719 320      1.      .2   101.1 *  1 JAN 2006 487      0.      .2   101.0
```

```
   1 JAN 1433 154       1.       .2   101.1 *  1 JAN 1720 321       1.       .2   101.1 *  1 JAN 2007 488       0.       .2   101.0
   1 JAN 1434 155       1.       .2   101.1 *  1 JAN 1721 322       1.       .2   101.1 *  1 JAN 2008 489       0.       .2   101.0
   1 JAN 1435 156       1.       .2   101.1 *  1 JAN 1722 323       1.       .2   101.1 *  1 JAN 2009 490       0.       .2   101.0
   1 JAN 1436 157       1.       .2   101.1 *  1 JAN 1723 324       1.       .2   101.1 *  1 JAN 2010 491       0.       .2   101.0
   1 JAN 1437 158       1.       .2   101.1 *  1 JAN 1724 325       1.       .2   101.1 *  1 JAN 2011 492       0.       .2   101.0
   1 JAN 1438 159       1.       .2   101.1 *  1 JAN 1725 326       1.       .2   101.1 *  1 JAN 2012 493       0.       .2   101.0
   1 JAN 1439 160       1.       .2   101.1 *  1 JAN 1726 327       1.       .2   101.1 *  1 JAN 2013 494       0.       .2   101.0
   1 JAN 1440 161       1.       .2   101.1 *  1 JAN 1727 328       1.       .2   101.1 *  1 JAN 2014 495       0.       .2   101.0
   1 JAN 1441 162       1.       .2   101.1 *  1 JAN 1728 329       1.       .2   101.1 *  1 JAN 2015 496       0.       .2   101.0
   1 JAN 1442 163       1.       .2   101.1 *  1 JAN 1729 330       1.       .2   101.1 *  1 JAN 2016 497       0.       .2   101.0
   1 JAN 1443 164       1.       .2   101.1 *  1 JAN 1730 331       1.       .2   101.1 *  1 JAN 2017 498       0.       .2   101.0
   1 JAN 1444 165       1.       .2   101.1 *  1 JAN 1731 332       1.       .2   101.1 *  1 JAN 2018 499       0.       .2   101.0
   1 JAN 1445 166       1.       .2   101.1 *  1 JAN 1732 333       1.       .2   101.1 *  1 JAN 2019 500       0.       .2   101.0
   1 JAN 1446 167       1.       .2   101.1 *  1 JAN 1733 334       1.       .2   101.1 *
                                              *                                           *
*****************************************************************************************************************************************

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR       72-HR      8.32-HR
+   (CFS)       (HR)
                    (CFS)
+       7.      4.17                   1.          1.          1.          1.
                          (INCHES)    1.631       1.673       1.673       1.673
                           (AC-FT)      1.          1.          1.          1.

 PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                     6-HR        24-HR       72-HR      8.32-HR
+  (AC-FT)      (HR)
        0.      4.17                   0.          0.          0.          0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR        24-HR       72-HR      8.32-HR
+   (FEET)      (HR)
    101.99      4.17                101.19      101.14      101.14      101.14

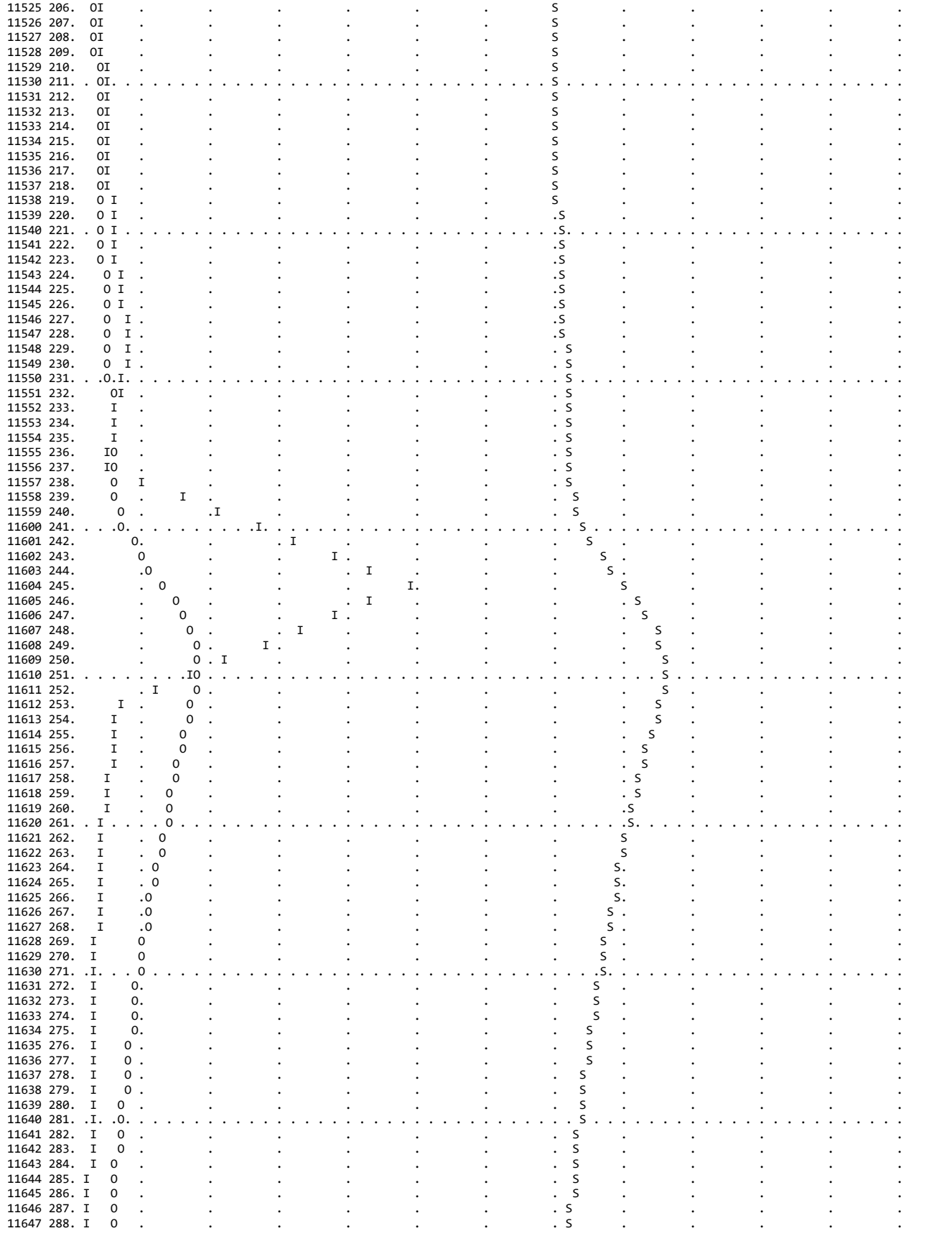
                          CUMULATIVE AREA =     .01 SQ MI

1                                                    STATION     DET2

                        (I) INFLOW,   (O) OUTFLOW
         0.        4.        8.       12.       16.       20.        0.        0.        0.        0.        0.        0.        0.
                                                                                (S) STORAGE
         .0        .0        .0        .0        .0        .0        .1        .2        .3        .4        .0        .0        .0
 DAHRMN PER
  11200   1.I--------.---------.---------.---------.---------.---------.------S--.---------.---------.---------.---------.---------.
  11201   2.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11202   3.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11203   4.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11204   5.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11205   6.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11206   7.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11207   8.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11208   9.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11209  10.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11210  11.I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . . . . . . .
  11211  12.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11212  13.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11213  14.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11214  15.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11215  16.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11216  17.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11217  18.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11218  19.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11219  20.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11220  21.I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . . . . . . .
  11221  22.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11222  23.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11223  24.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11224  25.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11225  26.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11226  27.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11227  28.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11228  29.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11229  30.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11230  31.I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . . . . . . .
  11231  32.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11232  33.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11233  34.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11234  35.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11235  36.I        .         .         .         .         .         .      S  .         .         .         .         .         .
  11236  37.OI       .         .         .         .         .         .      S  .         .         .         .         .         .
  11237  38.OI       .         .         .         .         .         .      S  .         .         .         .         .         .
  11238  39.OI       .         .         .         .         .         .      S  .         .         .         .         .         .
```

```
11239  40.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11240  41.OI . . . . . . . . . . . . . . . . . . . . . . . . . S. . . . . . . . . . . . . . . . . . . . . . . .
11241  42.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11242  43.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11243  44.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11244  45.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11245  46.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11246  47.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11247  48.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11248  49.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11249  50.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11250  51.OI . . . . . . . . . . . . . . . . . . . . . . . . . S. . . . . . . . . . . . . . . . . . . . . . . .
11251  52.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11252  53.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11253  54.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11254  55.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11255  56.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11256  57.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11257  58.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11258  59.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11259  60.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11300  61.OI . . . . . . . . . . . . . . . . . . . . . . . . . S. . . . . . . . . . . . . . . . . . . . . . . .
11301  62.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11302  63.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11303  64.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11304  65.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11305  66.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11306  67.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11307  68.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11308  69.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11309  70.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11310  71.OI . . . . . . . . . . . . . . . . . . . . . . . . . S. . . . . . . . . . . . . . . . . . . . . . . .
11311  72.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11312  73.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11313  74.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11314  75.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11315  76.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11316  77.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11317  78.OI      .       .       .       .       .       .     S .       .       .       .       .       .
11318  79.OI      .       .       .       .       .       .      S .       .       .       .       .       .
11319  80.OI      .       .       .       .       .       .      S .       .       .       .       .       .
11320  81.OI . . . . . . . . . . . . . . . . . . . . . . . . .  S . . . . . . . . . . . . . . . . . . . . . . .
11321  82.OI      .       .       .       .       .       .      S .       .       .       .       .       .
11322  83.OI      .       .       .       .       .       .      S .       .       .       .       .       .
11323  84. I      .       .       .       .       .       .      S .       .       .       .       .       .
11324  85. I      .       .       .       .       .       .      S .       .       .       .       .       .
11325  86. I      .       .       .       .       .       .      S .       .       .       .       .       .
11326  87. I      .       .       .       .       .       .      S .       .       .       .       .       .
11327  88. I      .       .       .       .       .       .      S .       .       .       .       .       .
11328  89. I      .       .       .       .       .       .      S .       .       .       .       .       .
11329  90. I      .       .       .       .       .       .      S .       .       .       .       .       .
11330  91. I . . . . . . . . . . . . . . . . . . . . . . . . .  S . . . . . . . . . . . . . . . . . . . . . . .
11331  92. I      .       .       .       .       .       .      S .       .       .       .       .       .
11332  93. I      .       .       .       .       .       .      S .       .       .       .       .       .
11333  94. I      .       .       .       .       .       .      S .       .       .       .       .       .
11334  95. I      .       .       .       .       .       .      S .       .       .       .       .       .
11335  96. I      .       .       .       .       .       .      S .       .       .       .       .       .
11336  97. I      .       .       .       .       .       .      S .       .       .       .       .       .
11337  98. I      .       .       .       .       .       .      S .       .       .       .       .       .
11338  99. I      .       .       .       .       .       .      S .       .       .       .       .       .
11339 100. I      .       .       .       .       .       .      S .       .       .       .       .       .
11340 101. I . . . . . . . . . . . . . . . . . . . . . . . . .  S . . . . . . . . . . . . . . . . . . . . . . .
11341 102. I      .       .       .       .       .       .      S .       .       .       .       .       .
11342 103. I      .       .       .       .       .       .      S .       .       .       .       .       .
11343 104. I      .       .       .       .       .       .      S .       .       .       .       .       .
11344 105. I      .       .       .       .       .       .      S .       .       .       .       .       .
11345 106. I      .       .       .       .       .       .      S .       .       .       .       .       .
11346 107. I      .       .       .       .       .       .      S .       .       .       .       .       .
11347 108. I      .       .       .       .       .       .      S .       .       .       .       .       .
11348 109. I      .       .       .       .       .       .      S .       .       .       .       .       .
11349 110. I      .       .       .       .       .       .      S .       .       .       .       .       .
11350 111. I . . . . . . . . . . . . . . . . . . . . . . . . .  S . . . . . . . . . . . . . . . . . . . . . . .
11351 112. I      .       .       .       .       .       .      S .       .       .       .       .       .
11352 113. I      .       .       .       .       .       .      S .       .       .       .       .       .
11353 114. I      .       .       .       .       .       .      S .       .       .       .       .       .
11354 115. I      .       .       .       .       .       .      S .       .       .       .       .       .
11355 116. I      .       .       .       .       .       .      S .       .       .       .       .       .
11356 117. I      .       .       .       .       .       .      S .       .       .       .       .       .
11357 118. I      .       .       .       .       .       .      S .       .       .       .       .       .
11358 119. I      .       .       .       .       .       .      S .       .       .       .       .       .
11359 120. I      .       .       .       .       .       .      S .       .       .       .       .       .
11400 121. I . . . . . . . . . . . . . . . . . . . . . . . . .  S . . . . . . . . . . . . . . . . . . . . . . .
11401 122. I      .       .       .       .       .       .      S .       .       .       .       .       .
```

```
11402 123. I      .       .       .       .       .       .      S .       .       .       .       .       .
11403 124. I      .       .       .       .       .       .      S .       .       .       .       .       .
11404 125. I      .       .       .       .       .       .      S .       .       .       .       .       .
11405 126. I      .       .       .       .       .       .      S .       .       .       .       .       .
11406 127. I      .       .       .       .       .       .      S .       .       .       .       .       .
11407 128. I      .       .       .       .       .       .      S .       .       .       .       .       .
11408 129. I      .       .       .       .       .       .      S .       .       .       .       .       .
11409 130. I      .       .       .       .       .       .      S .       .       .       .       .       .
11410 131. I . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . .
11411 132. I      .       .       .       .       .       .      S .       .       .       .       .       .
11412 133. I      .       .       .       .       .       .      S .       .       .       .       .       .
11413 134. I      .       .       .       .       .       .      S .       .       .       .       .       .
11414 135. I      .       .       .       .       .       .      S .       .       .       .       .       .
11415 136. I      .       .       .       .       .       .      S .       .       .       .       .       .
11416 137. I      .       .       .       .       .       .      S .       .       .       .       .       .
11417 138. I      .       .       .       .       .       .      S .       .       .       .       .       .
11418 139. I      .       .       .       .       .       .      S .       .       .       .       .       .
11419 140. I      .       .       .       .       .       .      S .       .       .       .       .       .
11420 141. I . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . .
11421 142. I      .       .       .       .       .       .      S .       .       .       .       .       .
11422 143. I      .       .       .       .       .       .      S .       .       .       .       .       .
11423 144. I      .       .       .       .       .       .      S .       .       .       .       .       .
11424 145. I      .       .       .       .       .       .      S .       .       .       .       .       .
11425 146. I      .       .       .       .       .       .      S .       .       .       .       .       .
11426 147. I      .       .       .       .       .       .      S .       .       .       .       .       .
11427 148. I      .       .       .       .       .       .      S .       .       .       .       .       .
11428 149. I      .       .       .       .       .       .      S .       .       .       .       .       .
11429 150. I      .       .       .       .       .       .      S .       .       .       .       .       .
11430 151. I . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . .
11431 152. I      .       .       .       .       .       .      S .       .       .       .       .       .
11432 153. I      .       .       .       .       .       .      S .       .       .       .       .       .
11433 154. I      .       .       .       .       .       .      S .       .       .       .       .       .
11434 155. I      .       .       .       .       .       .      S .       .       .       .       .       .
11435 156. I      .       .       .       .       .       .      S .       .       .       .       .       .
11436 157. I      .       .       .       .       .       .      S .       .       .       .       .       .
11437 158. OI     .       .       .       .       .       .      S .       .       .       .       .       .
11438 159. OI     .       .       .       .       .       .      S .       .       .       .       .       .
11439 160. OI     .       .       .       .       .       .      S .       .       .       .       .       .
11440 161. OI. . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . .
11441 162. OI     .       .       .       .       .       .      S .       .       .       .       .       .
11442 163. OI     .       .       .       .       .       .      S .       .       .       .       .       .
11443 164. OI     .       .       .       .       .       .      S .       .       .       .       .       .
11444 165. OI     .       .       .       .       .       .      S .       .       .       .       .       .
11445 166. OI     .       .       .       .       .       .      S .       .       .       .       .       .
11446 167. OI     .       .       .       .       .       .      S .       .       .       .       .       .
11447 168. OI     .       .       .       .       .       .       S.       .       .       .       .       .
11448 169. OI     .       .       .       .       .       .       S.       .       .       .       .       .
11449 170. OI     .       .       .       .       .       .       S.       .       .       .       .       .
11450 171. OI. . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . .
11451 172. OI     .       .       .       .       .       .       S.       .       .       .       .       .
11452 173. OI     .       .       .       .       .       .       S.       .       .       .       .       .
11453 174. OI     .       .       .       .       .       .       S.       .       .       .       .       .
11454 175. OI     .       .       .       .       .       .       S.       .       .       .       .       .
11455 176.  I     .       .       .       .       .       .       S.       .       .       .       .       .
11456 177.  I     .       .       .       .       .       .       S.       .       .       .       .       .
11457 178.  I     .       .       .       .       .       .       S.       .       .       .       .       .
11458 179.  I     .       .       .       .       .       .       S.       .       .       .       .       .
11459 180.  I     .       .       .       .       .       .       S.       .       .       .       .       .
11500 181. .I. . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . .
11501 182.  I     .       .       .       .       .       .       S.       .       .       .       .       .
11502 183.  I     .       .       .       .       .       .       S.       .       .       .       .       .
11503 184.  I     .       .       .       .       .       .       S.       .       .       .       .       .
11504 185.  I     .       .       .       .       .       .       S.       .       .       .       .       .
11505 186.  I     .       .       .       .       .       .       S.       .       .       .       .       .
11506 187.  I     .       .       .       .       .       .       S.       .       .       .       .       .
11507 188.  I     .       .       .       .       .       .       S.       .       .       .       .       .
11508 189.  I     .       .       .       .       .       .       S.       .       .       .       .       .
11509 190.  I     .       .       .       .       .       .       S.       .       .       .       .       .
11510 191. .I. . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . .
11511 192.  I     .       .       .       .       .       .       S.       .       .       .       .       .
11512 193.  I     .       .       .       .       .       .       S.       .       .       .       .       .
11513 194.  OI    .       .       .       .       .       .       S.       .       .       .       .       .
11514 195.  OI    .       .       .       .       .       .       S.       .       .       .       .       .
11515 196.  OI    .       .       .       .       .       .       S.       .       .       .       .       .
11516 197.  OI    .       .       .       .       .       .       S.       .       .       .       .       .
11517 198.  OI    .       .       .       .       .       .       S.       .       .       .       .       .
11518 199.  OI    .       .       .       .       .       .       S.       .       .       .       .       .
11519 200.  OI    .       .       .       .       .       .       S.       .       .       .       .       .
11520 201. .OI . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . .
11521 202.  OI    .       .       .       .       .       .       S.       .       .       .       .       .
11522 203.  OI    .       .       .       .       .       .       S.       .       .       .       .       .
11523 204.  OI    .       .       .       .       .       .       S.       .       .       .       .       .
11524 205.  OI    .       .       .       .       .       .        S       .       .       .       .       .
```



```
11648 289. I   O   .       .       .       .       .       .       . S     .       .       .       .       .
11649 290. I  O    .       .       .       .       .       .       . S     .       .       .       .       .
11650 291. I .O. . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . .
11651 292. I  O    .       .       .       .       .       .       . S     .       .       .       .       .
11652 293. I  O    .       .       .       .       .       .       .S      .       .       .       .       .
11653 294. I  O    .       .       .       .       .       .       .S      .       .       .       .       .
11654 295. I  O    .       .       .       .       .       .       .S      .       .       .       .       .
11655 296. I  O    .       .       .       .       .       .       .S      .       .       .       .       .
11656 297. I O     .       .       .       .       .       .       .S      .       .       .       .       .
11657 298. I O     .       .       .       .       .       .       .S      .       .       .       .       .
11658 299. I O     .       .       .       .       .       .       .S      .       .       .       .       .
11659 300. I O     .       .       .       .       .       .       S       .       .       .       .       .
11700 301. I O . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . .
11701 302. I O     .       .       .       .       .       .       S       .       .       .       .       .
11702 303. I O     .       .       .       .       .       .       S       .       .       .       .       .
11703 304. I O     .       .       .       .       .       .       S       .       .       .       .       .
11704 305. I O     .       .       .       .       .       .       S       .       .       .       .       .
11705 306. I O     .       .       .       .       .       .       S       .       .       .       .       .
11706 307. I O     .       .       .       .       .       .       S       .       .       .       .       .
11707 308. IO      .       .       .       .       .       .       S       .       .       .       .       .
11708 309. IO      .       .       .       .       .       .       S       .       .       .       .       .
11709 310. IO      .       .       .       .       .       .       S       .       .       .       .       .
11710 311. IO. . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . . . .
11711 312. IO      .       .       .       .       .       .       S.      .       .       .       .       .
11712 313. IO      .       .       .       .       .       .       S.      .       .       .       .       .
11713 314. IO      .       .       .       .       .       .       S.      .       .       .       .       .
11714 315. IO      .       .       .       .       .       .       S.      .       .       .       .       .
11715 316. IO      .       .       .       .       .       .       S.      .       .       .       .       .
11716 317. IO      .       .       .       .       .       .       S.      .       .       .       .       .
11717 318. IO      .       .       .       .       .       .       S.      .       .       .       .       .
11718 319. IO      .       .       .       .       .       .       S.      .       .       .       .       .
11719 320. IO      .       .       .       .       .       .       S.      .       .       .       .       .
11720 321. IO. . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . . . .
11721 322. IO      .       .       .       .       .       .       S.      .       .       .       .       .
11722 323. IO      .       .       .       .       .       .       S.      .       .       .       .       .
11723 324. IO      .       .       .       .       .       .       S.      .       .       .       .       .
11724 325. IO      .       .       .       .       .       .       S.      .       .       .       .       .
11725 326. I       .       .       .       .       .       .       S.      .       .       .       .       .
11726 327. I       .       .       .       .       .       .       S.      .       .       .       .       .
11727 328. I       .       .       .       .       .       .       S.      .       .       .       .       .
11728 329. I       .       .       .       .       .       .      S .      .       .       .       .       .
11729 330. I       .       .       .       .       .       .      S .      .       .       .       .       .
11730 331. I . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . .
11731 332. I       .       .       .       .       .       .      S .      .       .       .       .       .
11732 333. I       .       .       .       .       .       .      S .      .       .       .       .       .
11733 334. I       .       .       .       .       .       .      S .      .       .       .       .       .
11734 335. I       .       .       .       .       .       .      S .      .       .       .       .       .
11735 336. I       .       .       .       .       .       .      S .      .       .       .       .       .
11736 337. I       .       .       .       .       .       .      S .      .       .       .       .       .
11737 338. I       .       .       .       .       .       .      S .      .       .       .       .       .
11738 339. I       .       .       .       .       .       .      S .      .       .       .       .       .
11739 340. I       .       .       .       .       .       .      S .      .       .       .       .       .
11740 341. I . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . .
11741 342. I       .       .       .       .       .       .      S .      .       .       .       .       .
11742 343. I       .       .       .       .       .       .      S .      .       .       .       .       .
11743 344. I       .       .       .       .       .       .      S .      .       .       .       .       .
11744 345. I       .       .       .       .       .       .      S .      .       .       .       .       .
11745 346. I       .       .       .       .       .       .      S .      .       .       .       .       .
11746 347. I       .       .       .       .       .       .      S .      .       .       .       .       .
11747 348. I       .       .       .       .       .       .      S .      .       .       .       .       .
11748 349. I       .       .       .       .       .       .      S .      .       .       .       .       .
11749 350.IO       .       .       .       .       .       .      S .      .       .       .       .       .
11750 351.IO . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . .
11751 352.IO       .       .       .       .       .       .      S .      .       .       .       .       .
11752 353.IO       .       .       .       .       .       .      S .      .       .       .       .       .
11753 354.IO       .       .       .       .       .       .      S .      .       .       .       .       .
11754 355.IO       .       .       .       .       .       .      S .      .       .       .       .       .
11755 356.IO       .       .       .       .       .       .      S .      .       .       .       .       .
11756 357.IO       .       .       .       .       .       .      S .      .       .       .       .       .
11757 358.IO       .       .       .       .       .       .      S .      .       .       .       .       .
11758 359.IO       .       .       .       .       .       .      S .      .       .       .       .       .
11759 360.IO       .       .       .       .       .       .      S .      .       .       .       .       .
11800 361.IO . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . .
11801 362IO        .       .       .       .       .       .      S .      .       .       .       .       .
11802 363IO        .       .       .       .       .       .     S  .      .       .       .       .       .
11803 364IO        .       .       .       .       .       .     S  .      .       .       .       .       .
11804 365IO        .       .       .       .       .       .     S  .      .       .       .       .       .
11805 366IO        .       .       .       .       .       .     S  .      .       .       .       .       .
11806 367IO        .       .       .       .       .       .     S  .      .       .       .       .       .
11807 368IO        .       .       .       .       .       .     S  .      .       .       .       .       .
11808 369IO        .       .       .       .       .       .     S  .      .       .       .       .       .
11809 370IO        .       .       .       .       .       .     S  .      .       .       .       .       .
11810 371IO. . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . . . . . . . . . . . . . .
```

```
11811 372IO       .       .       .       .       .       .     S .       .       .       .       .       .
11812 373IO       .       .       .       .       .       .     S .       .       .       .       .       .
11813 374IO       .       .       .       .       .       .     S .       .       .       .       .       .
11814 375IO       .       .       .       .       .       .     S .       .       .       .       .       .
11815 376IO       .       .       .       .       .       .     S .       .       .       .       .       .
11816 377IO       .       .       .       .       .       .     S .       .       .       .       .       .
11817 378IO       .       .       .       .       .       .     S .       .       .       .       .       .
11818 379IO       .       .       .       .       .       .     S .       .       .       .       .       .
11819 380IO       .       .       .       .       .       .     S .       .       .       .       .       .
11820 381IO. . . . . .S. . . . . .
11821 382IO       .       .       .       .       .       .     S .       .       .       .       .       .
11822 383IO       .       .       .       .       .       .   S   .       .       .       .       .       .
11823 384IO       .       .       .       .       .       .   S   .       .       .       .       .       .
11824 385I        .       .       .       .       .       .   S   .       .       .       .       .       .
11825 386I        .       .       .       .       .       .   S   .       .       .       .       .       .
11826 387I        .       .       .       .       .       .   S   .       .       .       .       .       .
11827 388I        .       .       .       .       .       .   S   .       .       .       .       .       .
11828 389I        .       .       .       .       .       .   S   .       .       .       .       .       .
11829 390I        .       .       .       .       .       .   S   .       .       .       .       .       .
11830 391I . . . . . S . . . . . .
11831 392I        .       .       .       .       .       .   S   .       .       .       .       .       .
11832 393I        .       .       .       .       .       .   S   .       .       .       .       .       .
11833 394I        .       .       .       .       .       .   S   .       .       .       .       .       .
11834 395I        .       .       .       .       .       .   S   .       .       .       .       .       .
11835 396I        .       .       .       .       .       .   S   .       .       .       .       .       .
11836 397I        .       .       .       .       .       .   S   .       .       .       .       .       .
11837 398I        .       .       .       .       .       .   S   .       .       .       .       .       .
11838 399I        .       .       .       .       .       .   S   .       .       .       .       .       .
11839 400I        .       .       .       .       .       .   S   .       .       .       .       .       .
11840 401I . . . . . S . . . . . .
11841 402I        .       .       .       .       .       .   S   .       .       .       .       .       .
11842 403I        .       .       .       .       .       .   S   .       .       .       .       .       .
11843 404I        .       .       .       .       .       .   S   .       .       .       .       .       .
11844 405I        .       .       .       .       .       .   S   .       .       .       .       .       .
11845 406I        .       .       .       .       .       .   S   .       .       .       .       .       .
11846 407I        .       .       .       .       .       .   S   .       .       .       .       .       .
11847 408I        .       .       .       .       .       .   S   .       .       .       .       .       .
11848 409I        .       .       .       .       .       .   S   .       .       .       .       .       .
11849 410I        .       .       .       .       .       .   S   .       .       .       .       .       .
11850 411I . . . . . S . . . . . .
11851 412I        .       .       .       .       .       .   S   .       .       .       .       .       .
11852 413I        .       .       .       .       .       .   S   .       .       .       .       .       .
11853 414I        .       .       .       .       .       .   S   .       .       .       .       .       .
11854 415I        .       .       .       .       .       .   S   .       .       .       .       .       .
11855 416I        .       .       .       .       .       .   S   .       .       .       .       .       .
11856 417I        .       .       .       .       .       .   S   .       .       .       .       .       .
11857 418I        .       .       .       .       .       .   S   .       .       .       .       .       .
11858 419I        .       .       .       .       .       .   S   .       .       .       .       .       .
11859 420I        .       .       .       .       .       .   S   .       .       .       .       .       .
11900 421I . . . . . S . . . . . .
11901 422I        .       .       .       .       .       .   S   .       .       .       .       .       .
11902 423I        .       .       .       .       .       .   S   .       .       .       .       .       .
11903 424I        .       .       .       .       .       .   S   .       .       .       .       .       .
11904 425I        .       .       .       .       .       .   S   .       .       .       .       .       .
11905 426I        .       .       .       .       .       .   S   .       .       .       .       .       .
11906 427I        .       .       .       .       .       .   S   .       .       .       .       .       .
11907 428I        .       .       .       .       .       .   S   .       .       .       .       .       .
11908 429I        .       .       .       .       .       .   S   .       .       .       .       .       .
11909 430I        .       .       .       .       .       .   S   .       .       .       .       .       .
11910 431I . . . . . S . . . . . .
11911 432I        .       .       .       .       .       .   S   .       .       .       .       .       .
11912 433I        .       .       .       .       .       .   S   .       .       .       .       .       .
11913 434I        .       .       .       .       .       .   S   .       .       .       .       .       .
11914 435I        .       .       .       .       .       .   S   .       .       .       .       .       .
11915 436I        .       .       .       .       .       .   S   .       .       .       .       .       .
11916 437I        .       .       .       .       .       .   S   .       .       .       .       .       .
11917 438I        .       .       .       .       .       .   S   .       .       .       .       .       .
11918 439I        .       .       .       .       .       .   S   .       .       .       .       .       .
11919 440I        .       .       .       .       .       .   S   .       .       .       .       .       .
11920 441I . . . . . S . . . . . .
11921 442I        .       .       .       .       .       .   S   .       .       .       .       .       .
11922 443I        .       .       .       .       .       .   S   .       .       .       .       .       .
11923 444I        .       .       .       .       .       .   S   .       .       .       .       .       .
11924 445I        .       .       .       .       .       .   S   .       .       .       .       .       .
11925 446I        .       .       .       .       .       .   S   .       .       .       .       .       .
11926 447I        .       .       .       .       .       .   S   .       .       .       .       .       .
11927 448I        .       .       .       .       .       .   S   .       .       .       .       .       .
11928 449I        .       .       .       .       .       .   S   .       .       .       .       .       .
11929 450I        .       .       .       .       .       .   S   .       .       .       .       .       .
11930 451I . . . . . S . . . . . .
11931 452I        .       .       .       .       .       .   S   .       .       .       .       .       .
11932 453I        .       .       .       .       .       .   S   .       .       .       .       .       .
11933 454I        .       .       .       .       .       .   S   .       .       .       .       .       .
```

```
  11934 455I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11935 456I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11936 457I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11937 458I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11938 459I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11939 460I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11940 461I . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
  11941 462I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11942 463I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11943 464I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11944 465I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11945 466I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11946 467I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11947 468I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11948 469I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11949 470I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11950 471I . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
  11951 472I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11952 473I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11953 474I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11954 475I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11955 476I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11956 477I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11957 478I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11958 479I        .        .        .        .        .        .    S   .        .        .        .        .        .
  11959 480I        .        .        .        .        .        .    S   .        .        .        .        .        .
  12000 481I . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
  12001 482I        .        .        .        .        .        .    S   .        .        .        .        .        .
  12002 483I        .        .        .        .        .        .    S   .        .        .        .        .        .
  12003 484I        .        .        .        .        .        .    S   .        .        .        .        .        .
  12004 485I        .        .        .        .        .        .    S   .        .        .        .        .        .
  12005 486I        .        .        .        .        .        .    S   .        .        .        .        .        .
  12006 487I        .        .        .        .        .        .    S   .        .        .        .        .        .
  12007 488I        .        .        .        .        .        .    S   .        .        .        .        .        .
  12008 489I        .        .        .        .        .        .    S   .        .        .        .        .        .
  12009 490I        .        .        .        .        .        .    S   .        .        .        .        .        .
  12010 491I . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
  12011 492I        .        .        .        .        .        .    S   .        .        .        .        .        .
  12012 493I        .        .        .        .        .        .    S   .        .        .        .        .        .
  12013 494I        .        .        .        .        .        .    S   .        .        .        .        .        .
  12014 495I        .        .        .        .        .        .    S   .        .        .        .        .        .
  12015 496I        .        .        .        .        .        .    S   .        .        .        .        .        .
  12016 497I        .        .        .        .        .        .    S   .        .        .        .        .        .
  12017 498I        .        .        .        .        .        .    S   .        .        .        .        .        .
  12018 499I        .        .        .        .        .        .    S   .        .        .        .        .        .
  12019 500I---------.---------.---------.---------.---------.---------.-----S---.---------.---------.---------.---------.---------.
1
1
```

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									
+		B2.hc1	20.	4.07	1.	1.	1.	.01		
	ROUTED TO									
+		DET2	7.	4.17	1.	1.	1.	.01		
+									101.99	4.17

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

```
DET2    11200  1JAN90 0 1 1 500      .008
     .250        .252        .256        .263        .273        .284        .295        .305        .314        .324
     .332        .340        .348        .356        .363        .369        .376        .382        .387        .393
     .398        .403        .408        .412        .417        .421        .425        .428        .432        .435
     .439        .444        .449        .454        .460        .466        .472        .478        .484        .490
     .495        .500        .505        .510        .514        .518        .522        .526        .530        .533
     .536        .539        .542        .545        .548        .550        .553        .555        .557        .559
     .561        .563        .565        .567        .568        .570        .571        .573        .574        .575
     .577        .578        .579        .580        .581        .582        .583        .584        .586        .588
     .590        .594        .597        .601        .606        .611        .615        .619        .623        .627
     .630        .634        .637        .640        .643        .646        .648        .651        .653        .656
     .658        .660        .662        .664        .665        .667        .669        .670        .672        .673
     .676        .678        .681        .685        .689        .694        .699        .704        .708        .713
     .717        .721        .725        .729        .732        .735        .738        .741        .744        .747
     .750        .752        .754        .757        .760        .763        .767        .772        .776        .782
     .787        .793        .798        .803        .808        .812        .816        .820        .824        .828
     .833        .837        .843        .848        .854        .860        .867        .874        .881        .888
     .896        .903        .912        .920        .928        .937        .945        .952        .959        .966
     .973        .979        .985        .991        .997       1.004       1.010       1.018       1.025       1.033
    1.040       1.049       1.057       1.065       1.074       1.083       1.092       1.101       1.111       1.120
    1.131       1.142       1.154       1.167       1.180       1.194       1.208       1.223       1.237       1.252
    1.266       1.280       1.294       1.308       1.322       1.337       1.353       1.371       1.391       1.412
    1.435       1.459       1.484       1.510       1.537       1.564       1.592       1.620       1.648       1.677
    1.707       1.739       1.775       1.816       1.861       1.910       1.962       2.019       2.078       2.133
    2.177       2.211       2.234       2.248       2.252       2.248       2.235       2.272       2.415       2.658
    2.997       3.426       3.942       4.540       5.216       5.862       6.373       6.758       7.021       7.168
    7.207       7.140       6.975       6.764       6.557       6.355       6.158       5.964       5.775       5.589
    5.407       5.230       5.059       4.894       4.735       4.580       4.431       4.287       4.148       4.013
    3.884       3.759       3.640       3.525       3.415       3.309       3.206       3.108       3.013       2.922
    2.833       2.748       2.666       2.587       2.510       2.436       2.365       2.297       2.231       2.169
    2.108       2.050       1.994       1.941       1.889       1.839       1.791       1.745       1.700       1.657
    1.616       1.576       1.538       1.502       1.468       1.435       1.404       1.375       1.347       1.320
    1.294       1.268       1.243       1.219       1.195       1.172       1.149       1.127       1.106       1.086
    1.068       1.050       1.033       1.016       1.001        .986        .971        .956        .942        .927
     .913        .898        .884        .870        .857        .845        .833        .821        .810        .800
     .790        .781        .772        .764        .756        .748        .741        .734        .728        .721
     .714        .707        .700        .692        .684        .676        .668        .658        .646        .631
     .614        .595        .573        .550        .525        .499        .475        .452        .430        .409
     .389        .370        .352        .335        .318        .303        .288        .274        .261        .248
     .236        .224        .213        .203        .193        .184        .175        .166        .158        .150
     .143        .136        .129        .123        .117        .111        .106        .101        .096        .091
     .087        .082        .078        .075        .071        .068        .064        .061        .058        .055
     .053        .050        .048        .045        .043        .041        .040        .040        .040        .040
     .040        .040        .040        .040        .040        .040        .040        .040        .040        .040
     .040        .040        .040        .040        .040        .040        .040        .040        .040        .040
     .040        .040        .040        .040        .040        .040        .040        .040        .040        .040
     .040        .040        .039        .039        .039        .039        .039        .039        .039        .039
     .039        .039        .039        .039        .039        .039        .039        .039        .039        .039
     .039        .039        .039        .039        .039        .039        .039        .039        .039        .039
     .039        .039        .039        .039        .039        .039        .039        .039        .039        .039
     .039        .039        .039        .039        .039        .039        .039        .039        .039        .039
```

APPENDIX G

Cobble Swale and Offsite Hydraulic Backup

Hydraulic Analysis Report

Project Data

Project Title: 19137A Laurel Heights

Designer: EGH

Project Date: Monday, January 11, 2021

Project Units: U.S. Customary Units

Notes:

Channel Analysis: CobbleSwale

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 3.0000 ft/ft

Side Slope 2 (Z2): 3.0000 ft/ft

Channel Width: 1.0000 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0340

Flow: 2.7000 cfs

Result Parameters

Depth: 0.5230 ft

Area of Flow: 1.3436 ft^2

Wetted Perimeter: 4.3078 ft

Hydraulic Radius: 0.3119 ft

Average Velocity: 2.0095 ft/s

Top Width: 4.1380 ft

Froude Number: 0.6215

Critical Depth: 0.4126 ft

Critical Velocity: 2.9245 ft/s

Critical Slope: 0.0276 ft/ft

Critical Top Width: 3.48 ft

Calculated Max Shear Stress: 0.3264 lb/ft^2

Calculated Avg Shear Stress: 0.1946 lb/ft^2

Channel Analysis: Node 150 D-25

Notes:

Input Parameters

Channel Type: Rectangular

Channel Width: 3.0000 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Flow: 2.7000 cfs

Result Parameters

Depth: 0.2303 ft

Area of Flow: 0.6908 ft^2

Wetted Perimeter: 3.4605 ft

Hydraulic Radius: 0.1996 ft

Average Velocity: 3.9085 ft/s

Top Width: 3.0000 ft

Froude Number: 1.4354

Critical Depth: 0.2930 ft

Critical Velocity: 3.0716 ft/s

Critical Slope: 0.0047 ft/ft

Critical Top Width: 3.00 ft

Calculated Max Shear Stress: 0.1437 lb/ft^2

Calculated Avg Shear Stress: 0.1246 lb/ft^2

September 2014

County of San Diego
Department of Public Works
Flood Control Section

San Diego County

HYDRAULIC DESIGN MANUAL

where ...

n = Manning roughness coefficient (dimensionless); and

d_{50} = median stone diameter (feet).

Table 5-4 Standard Rock Riprap Gradations

##Rock Gradation [a]	Median Stone Weight (W_{50}) [c]	Median Stone Diameter (d_{50}) [d]	Manning n (Ungrouted) [e]
No. 3 Backing	5 lb	0.4 ft	0.034
No. 2 Backing	25 lb	0.7 ft	0.037
No. 1 Backing [b]	75 lb	1.0 ft	0.039
Light	200 lb	1.3 ft	0.041
¼ Ton	500 lb	1.8 ft	0.044
½ Ton	1000 lb	2.3 ft	0.045
1 Ton	2000 lb	2.9 ft	0.047
2 Ton	4000 lb	3.6 ft	0.049

(a) Except for 2 ton rock, classification is based upon Caltrans Method B Placement, which allows dumping of the rock and spreading by mechanical equipment. Local surface irregularities shall not vary from the planned grade by more than 1 foot, measured perpendicular to the slope. Two-ton rock requires special placement, see Caltrans (2002) or Greenbook for more information. (b) No. 1 Backing has same gradation as Facing Riprap. (c) per Caltrans (2002). (d) Assumes specific weight of 165 lb/ft3. The designer shall take care to apply a unit weight that is applicable to the type of riprap specified for the project, and adjust their calculations when necessary. (e) Based on Manning-Strickler relationship (Chang, 1988).

Where hydraulic radius is less than or equal to two times the maximum rock size, the roughness coefficient will be greater than indicated by Equation 5-5. In these cases, the design engineer shall use the method outlined in Section 5.7.17 to calculate the roughness of the channel. Appendix A (Table A-3) provides recommended Manning roughness coefficient (n) for grouted riprap applications. A 20% roughness coefficient reduction (N grouted = 0.80 N ungrouted) for grouted rip-rap shall be required for velocity-based design for energy dissipation/scour minimization measures applications. For channel capacity design, the roughness coefficients in Table 5-4 and Appendix A shall be used.

5.7.3 Low Flow and Trickle Channels

Riprap-lined channels conveying a 100-year peak runoff of 20 cfs or less do not require trickle channels. The design engineer shall evaluate the factors such as drainage slope, flow velocity, soil type, and upstream impervious area, and specify a trickle channel when needed based on their engineering judgment. Low-flow channels shall be designed in accordance with Section 5.5.3.2.

5.7.4 Bottom Width

The selection of the over-all channel bottom width shall consider factors such as ultimate conveyance requirements, constructability, channel stability, and maintenance.

5.7.5 Freeboard and Flow Depth

Riprap-lined channels shall meet the minimum freeboard requirements outlined in Section 5.3.7. Excessive depths and high velocities shall be avoided whenever practicable to maintain public safety. Section 5.3.9 discusses access and safety for open channels, including thresholds for flow depth and velocity.

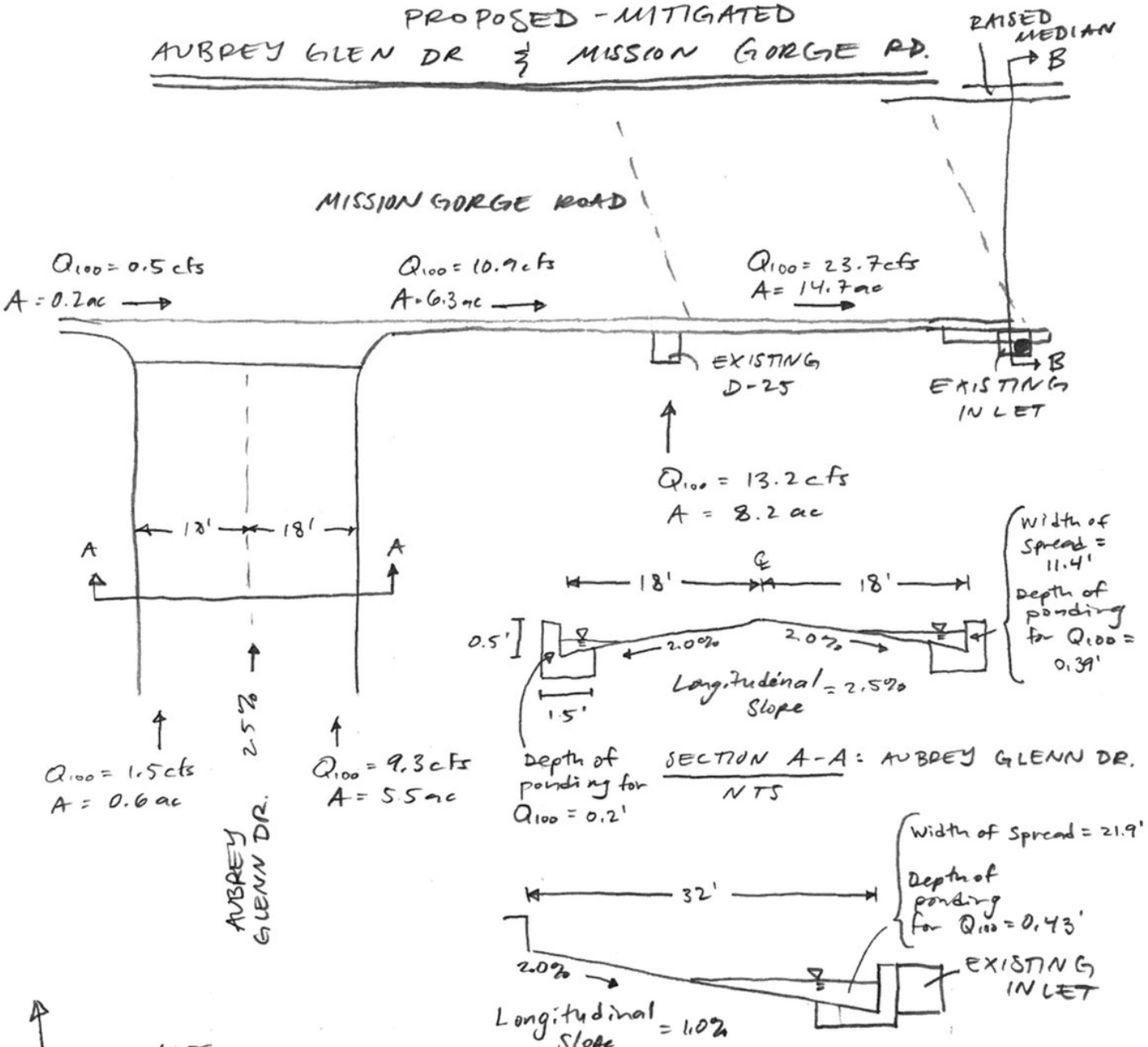
5.7.6 Side Slopes

The side slopes of riprap-lined channel shall not ordinarily be steeper than 2H:1V, except in cases where an embankment stability analysis can justify a steeper side slope. The stability analysis should be completed in consultation with a soils engineer, and consider such factors such as: soil

RICK ENGINEERING COMPANY™
5620 Friars Road
San Diego, CA 92110-2596
Tel: (619) 291-0707
Fax: (619) 291-4165

Date 4/14/21
Job No. 19137A
Page
Done By EGH
Checked By

PROPOSED - MITIGATED
AUBREY GLEN DR & MISSION GORGE RD.



NOTE:
Q_{100} = Peak flow rates for the post-project mitigated condition

Hydraulic Analysis Report

Project Data

Project Title: 19137A Laurel Heights

Designer: EGH

Project Date: Monday, March 8, 2021

Project Units: U.S. Customary Units

Notes: Flows represent peak flow rates in the post-project mitigated condition

Curb and Gutter Analysis: MissionGorgeInlet_Q100PR

Notes:

Gutter Input Parameters

Longitudinal Slope of Road: 0.0100 ft/ft

Cross-Slope of Pavement: 0.0200 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0130

Gutter Width: 1.5000 ft

Design Flow: 23.7000 cfs

Gutter Result Parameters

Width of Spread: 21.8547 ft

Gutter Depression: 0.0000 in

Area of Flow: 4.7763 ft^2

Eo (Gutter Flow to Total Flow): 0.1729

Gutter Depth at Curb: 5.2451 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Curb Opening

Length of Inlet: 20.0000 ft

Local Depression: 4.0000 in

Inlet Result Parameters

Intercepted Flow: 16.1890 cfs

Bypass Flow: 7.5110 cfs

Efficiency: 0.6831

Channel Analysis: AubreyGlenWestXSection_Q100PR

Notes:

Input Parameters

Channel Type: Custom Cross Section

Cross Section Data

Elevation (ft)	Elevation (ft)	Manning's n
0.00	0.50	0.0130
0.01	0.00	0.0130
1.50	0.12	0.0130
18.00	0.56	-----

Longitudinal Slope: 0.0250 ft/ft

Flow: 1.5000 cfs

Result Parameters

Depth: 0.2241 ft

Area of Flow: 0.4482 ft^2

Wetted Perimeter: 5.6239 ft

Hydraulic Radius: 0.0797 ft

Average Velocity: 3.3470 ft/s

Top Width: 5.3980 ft

Froude Number: 2.0470

Critical Depth: 0.2796 ft

Critical Velocity: 1.8621 ft/s

Critical Slope: 0.0054 ft/ft

Critical Top Width: 7.48 ft

Calculated Max Shear Stress: 0.3496 lb/ft^2

Calculated Avg Shear Stress: 0.1243 lb/ft^2

Composite Manning's n Equation: Lotter method

Manning's n: 0.0130

Channel Analysis: AubreyGlenEastXSection_Q100PR

Notes:

Input Parameters

Channel Type: Custom Cross Section

Cross Section Data

Elevation (ft)	Elevation (ft)	Manning's n
0.00	0.50	0.0130
0.01	0.00	0.0130
1.50	0.12	0.0130
18.00	0.56	-----

Longitudinal Slope: 0.0250 ft/ft

Flow: 9.3000 cfs

Result Parameters

Depth: 0.3850 ft

Area of Flow: 1.8028 ft^2

Wetted Perimeter: 11.8220 ft

Hydraulic Radius: 0.1525 ft

Average Velocity: 5.1587 ft/s

Top Width: 11.4362 ft

Froude Number: 2.2898

Critical Depth: 0.5090 ft

Critical Velocity: 2.6502 ft/s

Critical Slope: 0.0043 ft/ft

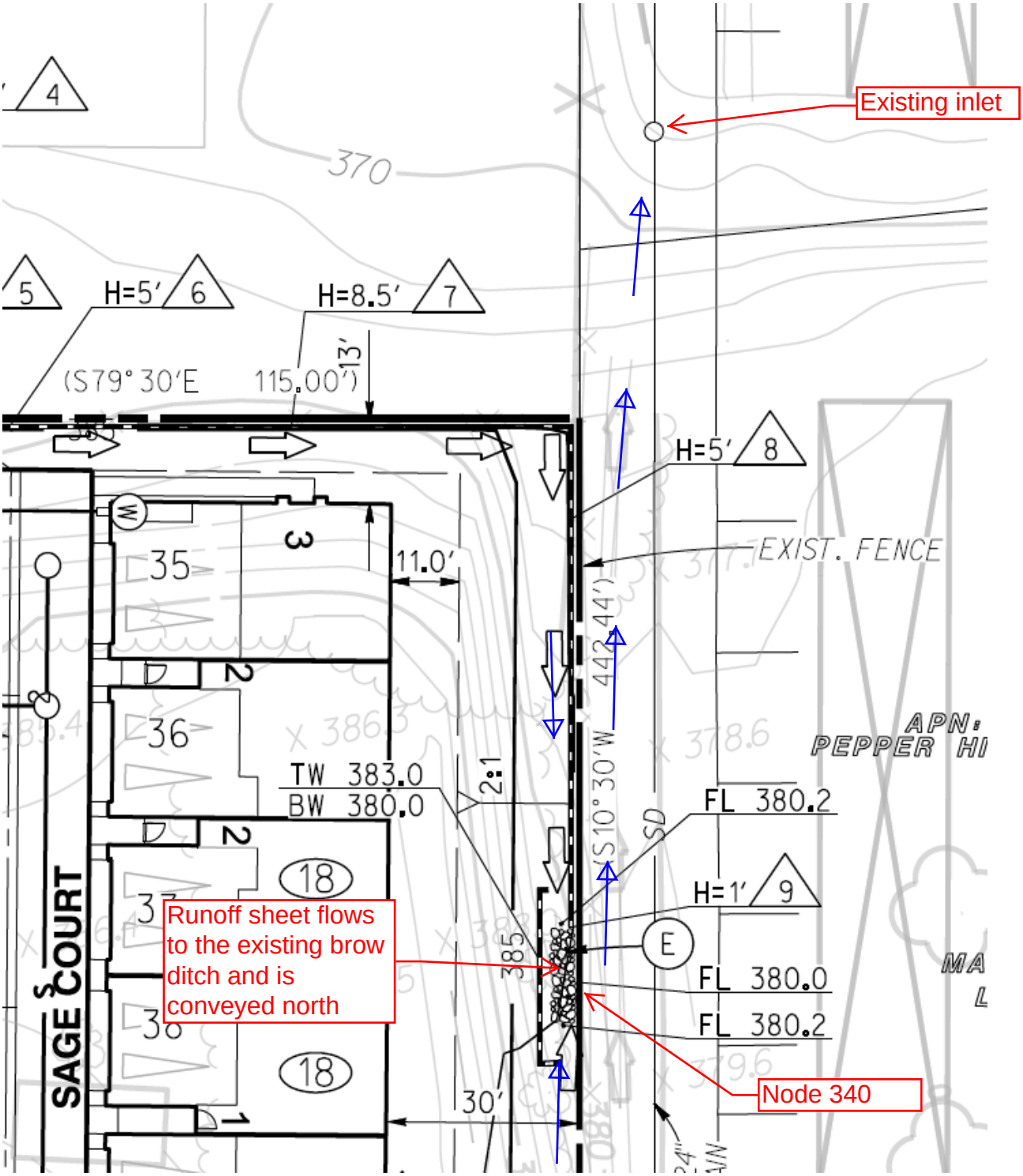
Critical Top Width: 16.09 ft

Calculated Max Shear Stress: 0.6006 lb/ft^2

Calculated Avg Shear Stress: 0.2379 lb/ft^2

Composite Manning's n Equation: Lotter method

Manning's n: 0.0130



Legend

Flow Path

Basin 300 Outfall
Laurel Heights
3/17/2021

N

NTS

APPENDIX H

As-builts and Existing Site Condition Photos


48" CMP
OUTFALL
PHOTO TAKEN
FACING SOUTH


48" CMP
OUTFALL
WEST HILLS
PKWY BRIDGE
PHOTO TAKEN FACING
SOUTH ON THE WEST SIDE
OF THE WEST HILL PKWY
BRIDGE WITHIN THE SAN
DIEGO RIVER CHANNEL

GENERAL NOTES:

1. A CONSTRUCTION PERMIT SHALL BE OBTAINED FROM THE DEPARTMENT OF PUBLIC WORKS PRIOR TO THE START OF ANY CONSTRUCTION WITHIN THE LIMITS OF THE PUBLIC RIGHT-OF-WAY INCLUDING BUT NOT LIMITED TO UTILITY CONNECTIONS OR GRADING.
2. ACCEPTANCE OF THESE IMPROVEMENTS AS SHOWN DOES NOT CONSTITUTE APPROVAL OF ANY CONSTRUCTION OUTSIDE THE PROJECT BOUNDARY.
3. ALL UNDERGROUND UTILITIES WITHIN THE STREET RIGHT-OF-WAY SHALL BE CONSTRUCTED, TESTED AND CONNECTED PRIOR TO CONSTRUCTION OF BERMS, CURBS, CROSS GUTTERS, SIDEWALKS OR FINAL PAVING.
4. THE EXISTENCE AND LOCATION OF EXISTING UNDERGROUND FACILITIES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORD DATA AND FIELD SURVEYS. TO THE BEST OF OUR KNOWLEDGE, EXISTING FACILITIES ARE SHOWN ON THESE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT ANY EXISTING FACILITIES SHOWN HEREON AND TO MAKE A REASONABLE AND DILIGENT SEARCH TO DETERMINE ANY OTHER WHICH IS NOT OF RECORD OR NOT SHOWN ON THESE PLANS AND TO PROTECT THE SAME. ANY FACILITIES SO LOCATED SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER AND INCLUDED ON THE AS-BUILT DRAWINGS FOR THIS PROJECT
5. LOCATION AND ELEVATION OF IMPROVEMENTS TO BE MET BY WORK TO BE DONE SHALL BE CONFIRMED BY FIELD MEASUREMENTS PRIOR TO CONSTRUCTION OF NEW WORK. CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING EXPLORATORY EXCAVATIONS AND LOCATING EXISTING UNDERGROUND FACILITIES SUFFICIENTLY AHEAD OF CONSTRUCTION TO ALLOW FOR REVISIONS TO PLANS IF REVISIONS ARE NECESSARY BECAUSE OF CHANGES IN LINE OR GRADE DUE TO THE ACTUAL LOCATION OF EXISTING FACILITIES.
6. THE CONTRACTOR SHALL NOTIFY THE SAN DIEGO GAS & ELECTRIC COMPANY PRIOR TO STARTING WORK NEAR S.D.G & E. FACILITIES AND SHALL COORDINATE HIS WORK WITH COMPANY REPRESENTATIVES.

   NOTICE: ALL ELECTRIC AND GAS SERVICES WITHIN THE PROJECT ARE "UNDERGROUND INSTALLATIONS". FOR LOCATION OF ELECTRICAL CABLES AND GAS PIPING AND APPURTENANCES CONTRACT THE SAN DIEGO GAS & ELECTRIC COMPANY. TELEPHONE: 1-800-422-4133
7. THE CONTRACTOR SHALL NOTIFY THE PACIFIC BELL TELEPHONE COMPANY PRIOR TO STARTING WORK NEAR PACIFIC BELL FACILITIES AND SHALL COORDINATE HIS WORK WITH COMPANY REPRESENTATIVES.

   NOTICE: ALL TELEPHONE SERVICES WITHIN THIS PROJECT BOUNDARY ARE "UNDERGROUND INSTALLATIONS". FOR LOCATION OF CABLES AND APPURTENANCES CONTACT PACIFIC BELL. TELEPHONE 1-800-422-4133
8. THE CONTRACTOR SHALL NOTIFY PADRE DAM MUNICIPAL WATER DISTRICT PRIOR TO STARTING WORK NEAR PADRE DAM FACILITIES AND SHALL COORDINATE HIS WORK WITH DISTRICT REPRESENTATIVES.

   NOTICE: FOR LOCATION OF WATER AND SEWER FACILITIES AND APPURTENANCES CONTACT PADRE DAM. TELEPHONE: 448-3111
9. THE CONTRACTOR SHALL NOTIFY COX CABLE TV PRIOR TO STARTING WORK NEAR COX CABLE FACILITIES AND SHALL COORDINATE HIS WORK WITH COMPANY REPRESENTATIVES.

   NOTICE: ALL TELEVISION SERVICES WITHIN THIS PROJECT ARE "UNDERGROUND INSTALLATIONS". FOR LOCATION OF CABLES AND APPURTENANCES CONTACT COX CABLE. TELEPHONE: 263-5793
10. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER TO CONTACT THE UTILITY AGENCIES, ADVISE THEM OF THE PROPOSED IMPROVEMENTS, AND BEAR THE COST OF RELOCATIONS, IF NEEDED.
11. POWER SOURCES AND RUNS SERVING STREET LIGHTS SHALL BE SHOWN ON THE "AS-BUILT" IMPROVEMENT DRAWINGS. ALL SOURCES SHALL BE LOCATED WITHIN THE DEDICATED RIGHT-OF-WAY, OR WITHIN EASEMENTS DEDICATED TO THE CITY OF SANTEE.
12. FINAL PAVING SHALL BE DONE UNTIL EXISTING POWER POLES ARE RELOCATED OUTSIDE THE AREAS TO BE PAVED.
13. CITY OF SANTEE INSPECTION REQUIREMENTS:
    A. CONTRACTOR SHALL INFORM THE CITY PROJECT ENGINEER 48 HRS. IN ADVANCE OF COMMENCING WORK. PHONE: (619) 258-4130.
    B. THE CONTRACTOR SHALL GIVE A MINIMUM OF 24 HOURS NOTICE ON REQUESTS FOR INSPECTION. PHONE: (619) 258-4130.
    C. ANY WORK PERFORMED WITHOUT THE BENEFIT OF INSPECTION IS SUBJECT TO REMOVAL AND REPLACEMENT AT THE CONTRACTOR'S EXPENSE.
14. STORM DRAINS AS SHOWN ON THESE PLANS SHALL BE CONSTRUCTED AS PART OF THE GRADING OPERATION. PRIOR TO RELEASE OF ANY GRADING SECURITIES ALL PUBLIC STORM DRAIN SYSTEMS SHOWN ON THESE PLANS SHALL BE CONSTRUCTED AND ACCEPTED BY THE CITY OF SANTEE.
15. THE DEPARTMENT OF PUBLIC WORKS WILL REMOVE STREET NAME SIGNS WHEN CONDITIONS SO DICTATE. CONTRACTOR SHALL PROTECT AND ASSUME RESPONSIBILITY FOR ALL OTHER TRAFFIC CONTROL DEVICES. CONTRACTOR SHALL REPLACE TRAFFIC STRIPING, STREET MARKINGS, AND CURB MARKINGS REMOVED OR DAMAGED BY HIS WORK.
16. SIDEWALK JOINT LOCATIONS SHALL BE INSTALLED IN ACCORDANCE WITH REGIONAL STANDARD DRAWING NO. G-9. CURB OR CURB AND GUTTER JOINT LOCATIONS SHALL INCLUDE EXPANSION JOINTS AT CURB RETURNS, ADJACENT TO STRUCTURES AND AT 45 FOOT INTERVALS. WEAKENED PLANE JOINTS SHALL BE INSTALLED AT DRIVEWAY LOCATIONS AND AT 15 FOOT INTERVALS BETWEEN EXPANSION JOINTS. ALL CONCRETE JOINTS SHALL CONFORM TO REGIONAL STANDARD DRAWING NO. G-10.
17. SIDEWALKS AND BIKEPATHS ARE DESIGNED TO HAVE CLEAR UNOBSTRUCTED ACCESS. THESE FACILITIES SHALL BE KEPT CLEAR OF STREET LIGHTS, FIRE HYDRANTS, METER BOXES, ELECTRICAL PULL BOXES, BLOWOFFS, AIR VENTS, OR OTHER SIMILAR OBSTRUCTIONS AT ALL TIMES.
18. ACCEPTANCE OF THESE PLANS BY THE CITY OF SANTEE IS VALID FOR ONE YEAR FROM THE DATE OF ACCEPTANCE. FAILURE TO COMMENCE CONSTRUCTION WITHIN ONE YEAR VOIDS ACCEPTANCE OF THESE PLANS.

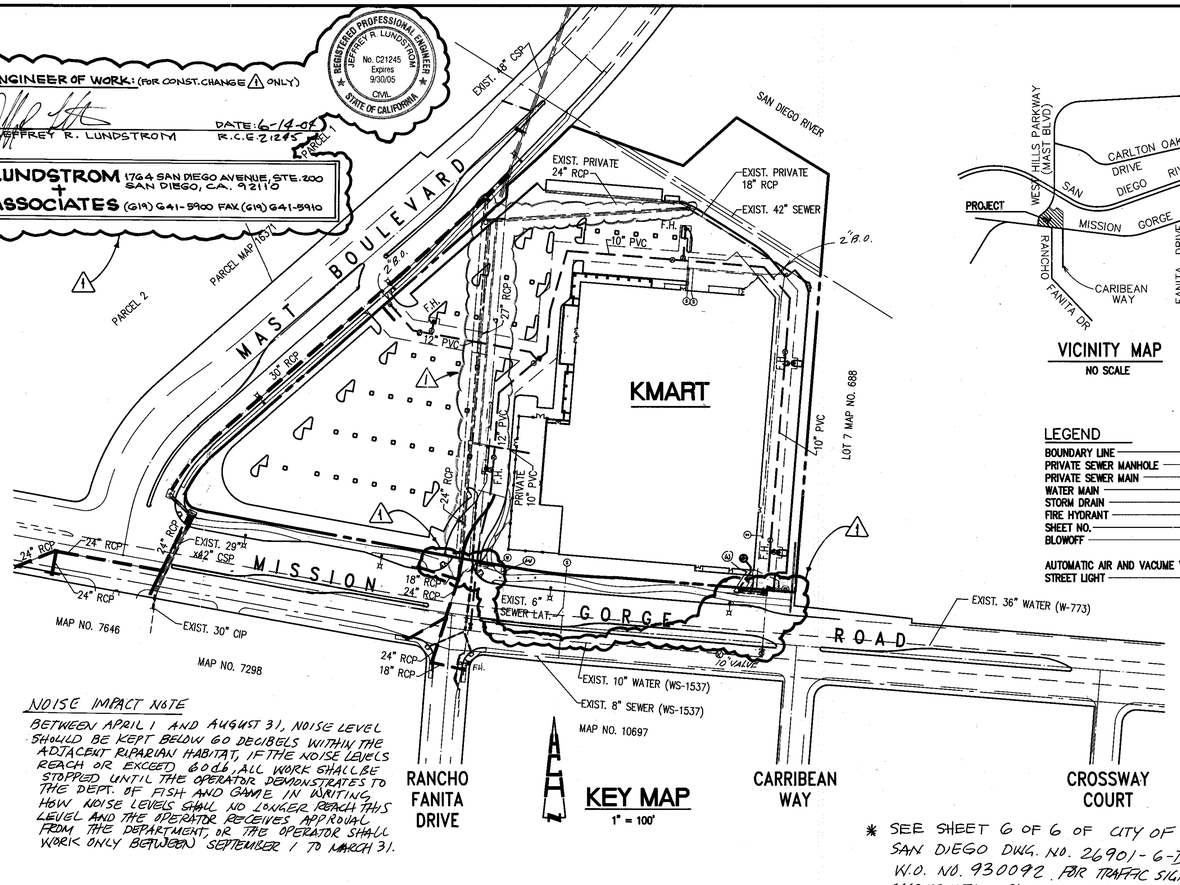
G-315 = 93-016-021
G-315A = 93-022-027

REFERENCES	
CITY OF S.D.: DWG # 25483-35, 36-D; W 772, 773	
COUNTY OF S.D.: TM 2946-1, WS 1536, 1537	
R.S. 627-5; RS 1275-3	
SDGE DWG # IL-1000	
CITY OF SANTEE: 87-100,101,102; 87-122, 88-084	

ENGINEER OF WORK: (FOR CONST. CHANGE ⚠ ONLY)
JEFFREY R. LUNDSTROM DATE: 6-14-93 R.C.E. 21245 EXPIRES 3/31/95

REGISTERED PROFESSIONAL ENGINEER JEFFREY R. LUNDSTROM No. 021245 Expires 9/30/95 CIVIL STATE OF CALIFORNIA

LUNDSTROM + ASSOCIATES 1764 SAN DIEGO AVENUE, STE. 200 SAN DIEGO, CA. 92110 (619) 641-5900 FAX (619) 641-5910



KEY MAP
1" = 100'

VICINITY MAP
NO SCALE

LEGEND

BOUNDARY LINE	
PRIVATE SEWER MANHOLE	
PRIVATE SEWER MAIN	S
WATER MAIN	W
STORM DRAIN	
FIRE HYDRANT	
SHEET NO.	2
BLOWOFF	W
AUTOMATIC AIR AND VACUME VALVE	W
STREET LIGHT	

NOISE IMPACT NOTE

BETWEEN APRIL 1 AND AUGUST 31, NOISE LEVEL SHOULD BE KEPT BELOW 60 DECIBELS WITHIN THE ADJACENT RIPARIAN HABITAT, IF THE NOISE LEVELS REACH OR EXCEED 60dB, ALL WORK SHALL BE STOPPED UNTIL THE OPERATOR DEMONSTRATES TO THE DEPT. OF FISH AND GAME IN WRITING HOW NOISE LEVELS SHALL NO LONGER REACH THIS LEVEL AND THE OPERATOR RECEIVES APPROVAL FROM THE DEPARTMENT, OR THE OPERATOR SHALL WORK ONLY BETWEEN SEPTEMBER 1 TO MARCH 31.

✱ SEE SHEET 6 OF 6 OF CITY OF SAN DIEGO DWG. NO. 26901-6-D W.O. NO. 930092 FOR TRAFFIC SIGNAL MODIFICATION PLAN AT MISSION GORGE ROAD AND MAST BLVD.

PAVING NOTES:

1. SEVEN DAYS PRIOR TO THE PLACEMENT OF ROADWAY BASE MATERIAL THE CONTRACTOR SHALL SUBMIT A CERTIFIED SOILS REPORT FROM A REGISTERED CIVIL ENGINEER CERTIFYING ALL ROADWAY AND UTILITY TRENCHING HAS BEEN COMPACTED TO THE MINIMUN REQUIREMENTS SPECIFIED IN THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION AND THE RECOMMENDATIONS OF THE SOILS ENGINEER CONTAINED IN THE PROJECT'S SOILS REPORT.
2. PAVEMENT STRUCTURAL SECTION DESIGNS SHALL BE SUBMITTED TO THE CITY ENGINEER FOR APPROVAL. THE DESIGN SHALL BE BASED ON THE 'R' VALUE METHOD. THE 'R' VALUE TESTS SHALL BE PERFORMED BY A REGISTERED CIVIL ENGINEER WHOSE PRIMARY PROFESSIONAL ACTIVITY IS PERFORMING SUCH TESTS. THE NUMBER AND LOCATIONS OF THESE TESTS SHALL BE SUBJECT TO APPROVAL BY THE CITY ENGINEER. BASE MATERIAL SHALL CONFORM TO THE CURRENT STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION SECTION 200-2.2 WITH THE FOLLOWING EXCEPTIONS.
   A. NATURAL MATERIAL CONFORMING TO SECTION 200-1.5 MAY BE SUBSTITUTED FOR ROCK DUST.
   B. THE MINIMUM SAND EQUIVALENT PER CALIFORNIA TEST NO. 217 SHALL BE 30.
3. THE FOLLOWING MINIMUM STRUCTURAL THICKNESS AND TRAFFIC INDEXES SHALL BE USED FOR PAVEMENT DESIGN PURPOSES:

STREET NAME	TRAFFIC INDEX	ACTUAL STRUCTURAL SECTION
A. MISSION GORGE ROAD	9	5" A.C. OVER 6" A.B.

4. ASPHALT CONCRETE SHALL CONFORM TO ALL PROVISIONS OF SECTION 203-6 OF THE CURRENT STANDARD SPECIFICATIONS OF PUBLIC WORKS CONSTRUCTION. MINIMUM STRUCTURAL SECTIONS SHALL CONFORM TO THE CITY OF SANTEE PUBLIC WORKS STANDARDS. ASPHALT SURFACE COURSE SHALL BE C2-AR-4000, MINIMUM THICKNESS 2 INCHES, MAXIMUM THICKNESS 3 INCHES. ASPHALT CONCRETE SECTIONS GREATER THAN 3 INCHES SHALL CONTAIN A BASE COURSE OF B-AR-4000, MINIMUM THICKNESS OF 2 INCHES.
5. A MINIMUM 2-FOOT CLEAR ZONE SHALL BE MAINTAINED FROM THE EDGE OF THE BIKE/PEDESTRIAN PATH AND ANY OBSTACLES OR HARDWARE, INCLUDING BUT NOT LIMITED TO FIRE HYDRANTS, LIGHTS, TREES, ETC.

FINAL ACCEPTANCE:

FINAL ACCEPTANCE OF PUBLIC IMPROVEMENTS WILL NOT BE DONE UNTIL SUCH TIME AS ALL ITEMS OF WORK AS SHOWN ON THE APPROVED IMPROVEMENT PLAN, AND ANY CORRECTIONS, ARE COMPLETED. WHEN ALL ITEMS ARE COMPLETED, THE DEVELOPER SHALL REQUEST FINAL ACCEPTANCE AND, AFTER ACCEPTANCE, THE IMPROVEMENT SECURITY SHALL BE RELEASED AND ANY CASH SECURITY DEPOSITS SHALL BE RETURNED.

PAVING NOTES CONTINUED:

6. ALL TRENCHING IN AREAS OF EXISTING PAVEMENT SHALL BE CONTRUCTED AND RESURFACED PER REGIONAL STANDARD DRAWINGS G-24 TYPE A OR AS DIRECTED BY CITY ENGINEER.

UTILITIES COORDINATION NOTES:

1. THESE PLANS CONTAIN MEANDERING BIKE AND PEDESTRIAN PATHS. THE LOCATION OF ALL ABOVE GROUND AND AT GRADE UTILITIES SHALL BE COORDINATED WITH THE MEANDERING PATH. NO ABOVE GROUND FACILITY SHALL BE LOCATED WITHIN TWO FEET OF THE PATH (PREFERRED MINIMUM IS THREE FEET). ACTUAL LOCATION OF FACILITIES IS SUBJECT TO APPROVAL BY THE CITY ENGINEER PRIOR TO ISSUANCE OF A CONSTRUCTION/ENCROACHMENT PERMIT. CONTRACTOR TO OBTAIN APPROVAL FROM CITY OF SANTEE DEPT. OF PUBLIC WORKS, LOCATIONS AND TYPES OF ANY UTILITY STRUCTURES BEFORE INSTALLATION WITHIN THE PUBLIC RIGHT-OF-WAYS.

INDEX

CONTENTS	SHEET NUMBER
TITLE SHEET & NOTES, KEY MAP, ETC.	1
WATER NOTES, DETAILS AND STRUCTURAL SECTIONS	2
MISSION GORGE ROAD IMPROVEMENT PLANS	3, 4
PUBLIC STORM DRAIN	5
PUBLIC WATER IMPROVEMENT PLANS	6,7
STRIPING AND SIGNAGE PLANS	8
✱ (TRAFFIC SIGNAL MODIFICATION PLAN AT MISSION GORGE ROAD AND MAST BOULEVARD)	
TRAFFIC SIGNAL PLAN AT MISSION GORGE ROAD AND RANCHO FANITA DRIVE	9
PEDESTRIAN AND BIKE PATH IMPROVEMENT PLAN	10

ENGINEER OF WORK'S CERTIFICATION

I, TAT L. WAI, HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTANT WITH CURRENT STANDARDS. I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS IN THE CITY OF SANTEE IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME AS ENGINEER OF WORK OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

SIGNED: _____ DATE: 3/15/93
REGISTRATION NO, 26433, MY REGISTRATION EXPIRES ON 3-31-96

REGISTERED PROFESSIONAL ENGINEER TAT L. WAI NO. 26433 EXP. 3-31-96 CIVIL STATE OF CALIFORNIA

HCH PARTNERS
LAND PLANNING
ARCHITECTURE
ENGINEERING
SURVEYING
4877 Viewridge Avenue
San Diego, California
92123-1667
(619) 278-5750
FAX (619) 278-9258

LEGAL DESCRIPTION:

PARCEL 1 OF PARCEL MAP NO. 17020, IN THE CITY OF SANTEE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, FIELD IN THE OFFICE OF THE COUNTY RECORDER ON DECEMBER 17, 1992.

ASSESSORS PARCEL NO.

383-050-13, 383-060-09,10,11.

OWNER/DEVELOPER:

I HEREBY AGREE TO COMMENCE WORK ON ANY IMPROVEMENTS SHOWN ON THESE PLANS WITHIN EXISTING CITY RIGHT-OF-WAY WITHIN 60 DAYS AFTER ISSUANCE OF THE CONSTRUCTION PERMIT AND TO PURSUE SUCH WORK ACTIVELY ON EVERY NORMAL WORKING DAY UNTIL COMPLETED. IRRESPECTIVE AND INDEPENDENT OF ANY OTHER WORK ASSOCIATED WITH THIS PROJECT OR UNDER MY CONTROL.

SIGNATURE, _____
OWNER AND DEVELOPER: KMART CORPORATION-WRO
ADDRESS: 700 S. ORANGE, COVINA, CA. 91790, TEL. 818-856-8363

ENGINEER'S AS-BUILT CERTIFICATION

I, TAT L. WAI, A REGISTERED CIVIL ENGINEER IN THE STATE OF CALIFORNIA, HEREBY DECLARE THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE PREPARATION OF THESE AS-BUILT DRAWINGS. THE INFORMATION SHOWN IS BASED ON ACTUAL FIELD SURVEY OF THE IMPROVEMENTS BETWEEN THE DATES OF SEPTEMBER 1993 AND AUGUST 1995, TO THE BEST OF MY KNOWLEDGE AND EXPERIENCE THE SURVEY AND THESE PLANS PROVIDE AN ACCURATE AND CORRECT REPRESENTATION OF THE AS-BUILT CONDITIONS.

SIGNED: _____ DATE: 9/14/95
REGISTRATION NO. 26433, MY REGISTRATION EXPIRES ON 3-31-96

BURKETT & WONG ENGINEERS
3434 FOURTH AVENUE
SAN DIEGO, CALIFORNIA, 92103
TEL. (619) 299-5550

GENERAL STANDARDS OF CONSTRUCTION:

UNLESS OTHERWISE NOTED ON THESE PLANS, ALL WORK SHALL CONFORM W/ THE FOLLOWING STD. SPECIFICATIONS AND DRAWINGS.

STANDARD SPECIFICATIONS:
1. STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1991 EDITION.
2. STANDARD SPECIAL PROVISIONS.
3. CITY OF SANTEE PUBLIC WORKS STANDARDS, SEPTEMBER 1982.
4. CALIFORNIA DEPARTMENT OF TRANSPORTATION, "MANUAL OF TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTAINANCE WORK ZONES." (1990 EDITION).
5. STANDARD SPECIFICATIONS OF THE PADRE DAM MUNICIPAL WATER DISTRICT, ADOPTED NOVEMVER, 21 1966 BY RESOLUTION NO. 1047.

STANDARD DRAWINGS:
1. CITY OF SANTEE STANDARD DRAWINGS.
2. SAN DIEGO REGIONAL STANDARD DRAWINGS (S.D.R.S.) AS RECOMMENDED BY THE REGIONAL STANDARDS COMMITTEE, MAINTAINED AND PUBLISHED BY THE BY THE SAN DIEGO COUNTY DEPARTMENT OF PUBLIC WORKS, 1992 EDITION.
3. STANDARD DRAWINGS OF THE PADRE DAM MUNICIPAL WATER DISTRICT, ADOPTED NOVEMBER ,21, 1966 BY RESOLUTION NO. 1047.

LEGEND

IMPROVEMENTS	STD.DWG. (RSD)	SYMBOL
THE CONSTRUCTION OF A.C. OVERLAY (TO SATISFACTION OF CITY ENGINEER)		
THE CONSTRUCTION OF WALKWAY LIGHTING (DELTA LIGHTING)		
THE CONSTRUCTION OF A.C. SURFACING OVER AGGREGATE BASE (SEE PAVING NOTES, SHEET 1)	-	
THE CONSTRUCTION OF 6" CONCRETE CURB	G-1	
THE CONSTRUCTION OF 6" MEDIAN CONCRETE CURB (B-1)	G-6	
THE CONSTRUCTION OF 6" TYPE 'G' CURB AND GUTTER	G-1	
THE CONSTRUCTION OF STREET LIGHT (250 WATT H.P.S.) SUPPLEMENT TO E-1		1
THE CONSTRUCTION OF PEDESTRIAN RAMP	G-2, G-32	
THE CONSTRUCTION OF BIKE PATH AND PEDESTRIAN WALK (SEE STREET SECTION, SHEET 2)	G-7	2/2
THE CONSTRUCTION OF ALLEY APRON		
THE CONSTRUCTION OF TYPE 'B', 'B-1', 'B-2' CURB INLETS	D-2	
THE CONSTRUCTION OF TYPE 'A' CLEANOUT	D-9	
THE CONSTRUCTION OF STORM DRAIN (RCP)	D-60	
THE CONSTRUCTION OF CONCRETE PIPE COLLAR	D-62	
THE CONSTRUCTION OF CONCRETE LUG	D-63	
THE CONSTRUCTION OF TYPE 'B-1' CURB INLET WITH GREASE TRAP		2
THE CONSTRUCTION OF CONCRETE PAVERS		2
THE CONSTRUCTION OF TYPE 'A-2' CURB INLET	D-1	

WATER IMPROVEMENTS	SYMBOL
THE CONSTRUCTION OF WATER MAIN SHOWN THUS:	
THE CONSTRUCTION OF 1-1/2" OR GREATER WATER LATERAL WITH VALVE AND STANDARD GATE WELL SHOWN THUS:	W
THE CONSTRUCTION OF WATER LATERAL WITH REDUCED PRESSURE BACKFLOW PREVENTION DEVICE SHOWN THUS: (INDICATE SIZE ON DRAWINGS)	W RP
THE CONSTRUCTION OF 6" FIRE HYDRANT WITH 2 - 4" AND 1 - 2-1/2" OUTLETS AND APPURTENANCES WITH 4'X4'X4" CONCRETE SPLASH PAD COMPLETE SHOWN THUS:	
THE CONSTRUCTION OF VALVE AND STANDARD GATE WELL WITH CAST IRON COVER SHOWN THUS:	
THE CONSTRUCTION OF BLOWOFF SHOWN THUS:	
THE CONSTRUCTION OF AUTOMATIC AIR AND VACUUM VALVE SHOWN THUS:	
THE CONSTRUCTION OF REDUCER SHOWN THUS:	
THE CONSTRUCTION OF FIRE SERVICE SHOWN THUS:	FS

SEWER (PRIVATE) IMPROVEMENTS	SYMBOL
THE CONSTRUCTION OF PRIVATE PVC (SDR-35) PIPE SEWER MAIN SHOWN THUS:	
THE CONSTRUCTION OF 6" PVC PIPE SEWER LATERALS SHOWN THUS:	S
THE CONSTRUCTION OF PRIVATE CONCRETE MANHOLES WITH 36" FRAME AND DOUBLE LID SHOWN THUS:	
THE CONSTRUCTION OF PRIVATE SEWER PUMP STATION (NOT A PART)	PS
THE CONSTRUCTION OF PRIVATE FORCE MAIN (NOT A PART)	F F
THE CONSTRUCTION OF PRIVATE SEWER CLEANOUTS	

SEWER & WATER AGENCY
PADRE DAM MUNICIPAL WATER DISTRICT
Approved By: _____ Director of Engineering and Planning — Date 4/16/93
R.C.E. No. 23190 — Exp. 12-31-93
Improvement District A — Job No. 89022
VALID FOR ONE YEAR FROM DATE OF SIGNATURE.
SIGNATURE OF THESE PLANS IS NOT A COMMITMENT TO SERVE

"AS-BUILT" - WATER & SEWER
4/19/94
TAT L. WAI RCE 26433 DATE

CONSTRUCTION RECORD	
Contractor:	HBD CONST.
Inspector:	HECTOR EZQUERRO
Date Completed:	3-12-95

Date	By	REVISIONS	App'd
7-14-93	HCH	MOVE 27" S.D. W'LY 15'	
9-1-95	B.C.W.	AS BUILT	
9-3-96	L.T.A.	⚠ ADD G.O.W. LOGO & SIGNATURE BLOCK	
		REV. KEY MAP & LEGEND	

BENCH MARK: CITY OF SANTEE G.P.S. STA. 1002 PER R.O.S. 11252 STANDARD STREET SURVEY MONUMENT CENTER-PUNCHED. NO STAMPING PER MAP 7198. CENTER-LINE INTERSECTION OF MISSION GORGE ROAD AND RANCHO FANITA DRIVE. ELEV. 331.37

SCALE: Horizontal AS SHOWN; Vertical AS SHOWN

Office CDC; Field See; Traffic C.D.C.

Designed By	Drawn By	Checked By
TLW	MPH	TLW

Plans Prepared Under Supervision Of
R.C.E. No. 26433 Date 3/15/93 Expires 3/31/92

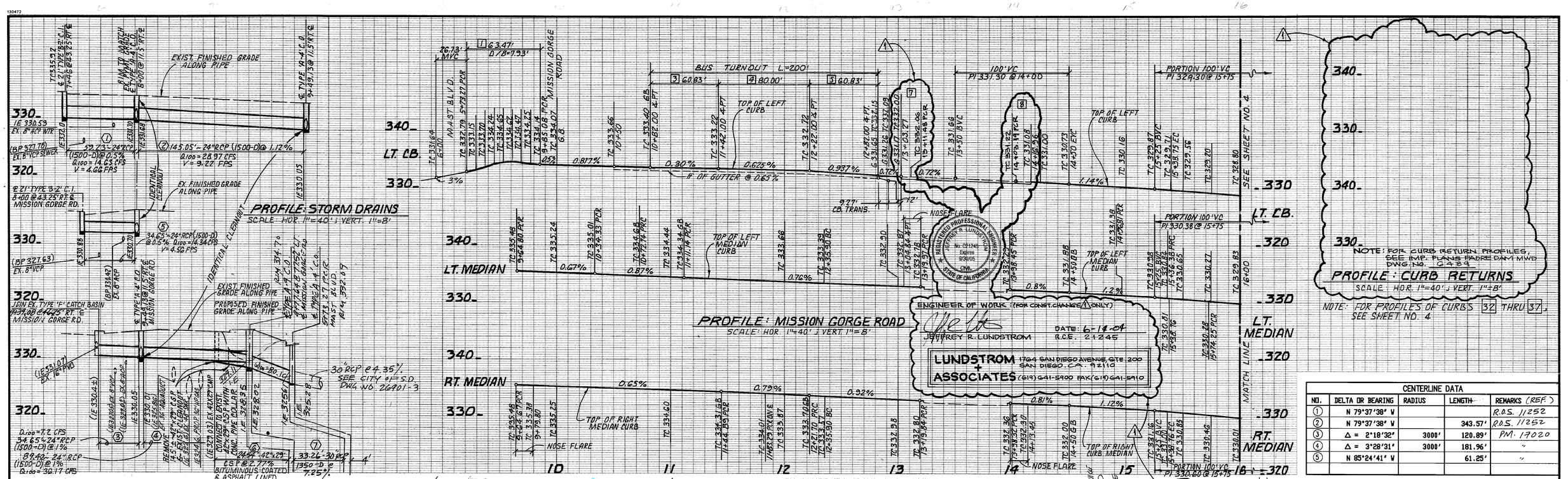
REVIEWED 5/24/93 By _____ LAND DEVELOPMENT ENGINEER
ACCEPTED 5/25/93 By _____ DIR. OF PUBLIC WORKS R.C.E. No. 18765 Expires 3/31/97

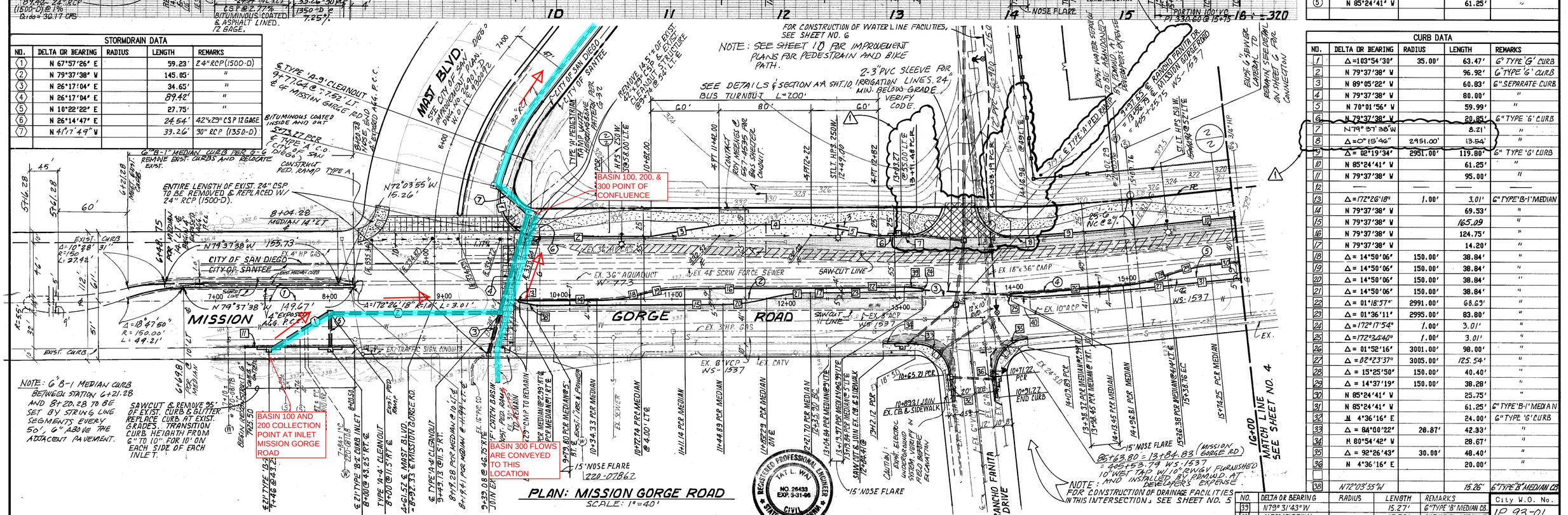
FIRE DEPARTMENT	DEPARTMENT OF PLANNING	CITY W.O. NO.
REVIEWED 5-24-93 By Phil Navis for R. Nutto	REVIEWED 5/21/93 By _____	IP93-01

CITY OF SANTEE — DEPARTMENT OF PUBLIC WORKS — Drawing No. 93-129
IMPROVEMENT PLANS FOR: KMART STORE NO. 7638 — CUP P92-08 — G-315, G-315A — Sheet 1 of 10

\12442\IP-1

130472





CENTERLINE DATA				
NO.	DELTA OR BEARING	RADIUS	LENGTH	REMARKS (REF.)
1	N 79°37'38" W			R.O.S. 11252
2	N 79°37'38" W		343.57'	R.O.S. 11252
3	Δ = 2°18'32"	3000'	120.89'	PM. 17020
4	Δ = 3°28'31"	3000'	181.96'	"
5	N 85°24'41" W		61.25'	"

CURB DATA				
NO.	DELTA OR BEARING	RADIUS	LENGTH	REMARKS
1	Δ=103°54'30"	35.00'	63.47'	G" TYPE 'G' CURB
2	N 79°37'38" W		96.92'	G" TYPE 'G' CURB
3	N 89°05'22" W		60.83'	G" SEPARATE CURB
4	N 79°37'38" W		80.00'	"
5	N 70°01'56" W		59.99'	"
6	N 79°37'38" W		20.85'	G" TYPE 'G' CURB
7	N79° 37' 38"W		8.21'	"
8	Δ=0° 15'46"	2951.00'	13.54'	"
9	Δ= 02°19'34"	2951.00'	119.80'	G" TYPE 'G' CURB
10	N 85°24'41" W		61.25'	"
11	N 79°37'38" W		95.00'	"
12	—	—	—	—
13	Δ=172°26'18"	1.00'	3.01'	G" TYPE'B-1' MEDIAN
14	N 79°37'38" W		69.53'	"
15	N 79°37'38" W		165.09	"
16	N 79°37'38" W		124.75'	"
17	N 79°37'38" W		14.20'	"
18	Δ = 14°50'06"	150.00'	38.84'	"
19	Δ = 14°50'06"	150.00'	38.84'	"
20	Δ = 14°50'06"	150.00'	38.84'	"
21	Δ = 14°50'06"	150.00'	38.84'	"
22	Δ = 01°18'57"	2991.00'	68.69'	"
23	Δ = 01°36'11"	2995.00'	83.80'	"
24	Δ=172°17'54"	1.00'	3.01'	"
25	Δ=172°32'40"	1.00'	3.01'	"
26	Δ = 01°52'16"	3001.00'	98.00'	"
27	Δ = 02°23'37"	3005.00'	125.54'	"
28	Δ = 15°25'50"	150.00'	40.40'	"
29	Δ = 14°37'19"	150.00'	38.28'	"
30	N 85°24'41" W		25.75'	"
31	N 85°24'41" W		61.25'	G" TYPE'B-1' MEDIAN
32	N 4°36'16" E		24.00'	G" TYPE 'G' CURB
33	Δ = 84°00'22"	20.87'	42.33'	"
34	N 80°54'42" W		28.67'	"
35	Δ = 92°26'43"	30.00'	48.40'	"
36	N 4°36'16" E		20.00'	"
38	N72°03'55"W		15.26'	G"TYPE'B' MEDIAN CB

NO.	DELTA OR BEARING	RADIUS	LENGTH	REMARKS
39	N79° 51'43"W		15.27'	G"TYPE'B' MEDIAN CB
40	N 75°18'33"W		15.26'	G"TYPE'B' MEDIAN CB

STORMDRAIN DATA				
NO.	DELTA OR BEARING	RADIUS	LENGTH	REMARKS
1	N 67°57'26" E		59.23'	24" RCP (1500-D)
2	N 79°37'38" W		145.05'	"
3	N 26°17'04" E		34.65'	"
4	N 26°17'04" E		89.42'	"
5	N 10°22'22" E		27.75'	"
6	N 26°14'47" E		24.54'	42"x29" CSP 12 GAGE
7	N 41°17'49" W		33.26'	30" RCP (1350-D)

CONSTRUCTION RECORD	
Contractor	HBD CONST
Inspector	HECTOR EZQUERRO
Date Completed	5-12-95

REFERENCES
SEE SHEET NO. 1

Date	By	REVISIONS	Appv
9-1-95	S&W	AS BUILT	
8-3-99	L+A	1\ ADD S.G.W.L. LOGO & SIGNATURE BLOCK & REV. CURB RETURNS	

BENCH MARK: CITY OF SANTEE G.P.S. STA. 1002 PER R.O.S. 11252 STANDARD ST. SURVEY MON. "CENTER-PUNCHED". NO STAMPING PER MAP 7198. ℄ INT. OF MISSION GORGE ROAD AND RANCHO FANITA DRIVE. ELEV: 331.37

SCALE: Horizontal 1"=40' ; Vertical 1"=8'

Office RO
Field RO
Traffic RO

Designed By	Drawn By	Checked By
DJG, MPH	MPH	TLW

Plans Prepared Under Supervision of: [signature] Date 3/24/93
R.C.E. No. 26433 Expires 3-31-96

Submitted By [signature] Date 5/24/93 LAND DEVELOPMENT ENGINEER
ACCEPTED By [signature] Date 5-26-93 DIR. OF PUBLIC WORKS
R.C.E. No. 18786 Expires 3/31/97

CITY OF SANTEE DEPARTMENT OF PUBLIC WORKS
PLANS FOR THE IMPROVEMENT OF: CUP P92-08
MISSION GORGE ROAD

City W.O. No. IP 93-01
Drawing No. 93-131
Sheet 3 of 10

GENERAL NOTES

1. APPROVAL OF THESE PLANS BY THE CITY ENGINEER DOES NOT AUTHORIZE ANY WORK TO BE PERFORMED UNTIL A PERMIT HAS BEEN ISSUED.
2. CONTRACTOR SHALL KEEP THE EQUIPMENT AND CONSTRUCTION ACTIVITIES OUTSIDE OF THE OPEN SPACE AREA AND SHALL NOT DISTURB THE NATIVE VEGITATION UNLESS WRITTEN PERMISSION IS GRANTED BY THE CITY.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY MONUMENTATION AND/OR BENCHMARKS WHICH WILL BE DISTURBED BY CONSTRUCTION. SUCH POINTS SHALL BE REFERENCED AND REPLACED WITH APPROPRIATE MONUMENTATION BY A LICENCED LAND SURVEYOR OR A REGISTERED CIVIL ENGINEER AUTHORIZED TO PRACTICE LAND SURVEYING. A CORNER RECORD OR RECORD OF SURVEY, AS APPROPRIATE, SHALL BE FILED BY THE LICENSED LAND SURVEYOR OR REGISTERED CIVIL ENGINEER AS REQUIRED BY THE LAND SURVEYOR'S ACT.
4. IMPORTANT NOTICE
   SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIGALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A "PERMIT TO EXCAVATE" WILL BE VALID. FOR YOUR DIGALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1-800-422-4133 TWO WORKING DAYS BEFORE YOU DIG.
5. CALL 627-3200 FOR INSPECTION. TWENTY-FOUR (24) HOUR PRIOR NOTICE IS REQUIRED WHEN REQUESTING INSPECTION OF WORK.
6. AS BUILT DRAWINGS MUST BE SUBMITTED TO THE RESIDENT ENGINEER PRIOR TO THE ACCEPTANCE OF THIS PROJECT.

SPECIAL NOTES

THE FOLLOWING NOTES ARE PROVIDED TO GIVE DIRECTIONS TO THE CONTRACTOR BY THE ENGINEER OF WORK. THE CITY ENGINEER'S SIGNATURE ON THESE PLANS DOES NOT CONSTITUTE APPROVAL OF ANY OF THESE NOTES AND THE CITY WILL NOT BE RESPONSIBLE FOR THEIR ENFORCEMENT.

1. NEITHER THE OWNER, NOR THE ENGINEER OF WORK WILL ENFORCE SAFETY MEASURES OR REGULATIONS, THE CONTRACTOR SHALL DESIGN, CONSTRUCT AND MAINTAIN ALL SAFETY DEVICES, INCLUDING SHORING, AND SHALL BE SOLELY RESPONSIBLE FOR CONFORMING TO ALL LOCAL, STATE AND FEDERAL SAFETY AND HEALTH STANDARDS, LAWS AND REGULATIONS.
2. CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOBSITE CONDITIONS DURING THE SOURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, AND THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER.
3. THE CONTRACTOR SHALL BE RESPONSIBLE TO INSURE THAT ALL SLOPES, STREETS, UTILITIES, AND STORM DRAINS ARE BUILT IN ACCORDANCE WITH THESE PLANS. IF THERE IS ANY QUESTION REGARDING THESE PLANS OR FIELD STAKES, THE CONTRACTOR SHALL REQUEST AN INTERPRETATION BEFORE DOING ANY WORK BY CALLING THE ENGINEER OF WORK AT 278-5750. THE CONTRACTOR SHALL ALSO TAKE THE NECESSARY STEPS TO PROTECT THE PROJECT AND ADJACENT PROPERTY FROM ANY EROSION AND SILTATION THAT RESULT FROM HIS OPERATIONS BY APPROPRIATE MEANS (SAND BAGS, HAY BALES, TEMPORARY DESILTING BASINS, DIKES, SHORING ETC.) UNTIL SUCH TIME THAT THE PROJECT IS COMPLETED AND ACCEPTED FOR MAINTENANCE BY WHATEVER OWNER, AGENCY OR ASSOCIATION IS TO BE ULTIMATELY RESPONSIBLE FOR MAINTENANCE.
4. CONTRACTOR SHALL MAKE EXPLORATORY EXCAVATIONS AND LOCATE EXISTING UNDERGROUND FACILITIES SUFFICIENTLY AHEAD OF CONSTRUCTION TO PERMIT REVISIONS TO PLANS IF REVISIONS ARE NECESSARY BECAUSE OF ACTUAL LOCATION OF EXISTING FACILTIES.
5. LOCATION AND ELEVATION OF EXISTING IMPROVEMENTS TO BE MET BY WORK TO BE DONE SHALL BE CONFIRMED BY FIELD MEASUREMENTS PRIOR TO CONSTRUCTION OF NEW WORK.
6. BEFORE EXCAVATING FOR THIS CONTRACT, THE CONTRACTOR SHALL VERIFY LOCATION OF UNDERGROUND UTILITIES, THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO OTHER EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS.
7. CONTRACTOR SHALL NOTIFY THE SAN DIEGO GAS & ELECTRIC COMPANY PRIOR TO STARTING WORK NEAR COMPANY FACILITIES AND SHALL COORDINATE HIS WORK WITH COMPANY REPRESENTATIVES.
   NOTICE: ALL ELECTRICAL AND GAS SERVICES WITHIN THIS SUBDIVISION ARE "UNDERGROUND INSTALLATIONS." FOR LOCATION OF ELECTRICAL CABLES AND GAS PIPING AND APPURTENANCES, CONTACT THE SAN DIEGO GAS & ELECTRIC COMPANY. TELEPHONE: 800-422-4133.
8. CONTRACTOR SHALL NOTIFY THE PACIFIC BELL TELEPHONE COMPANY PRIOR TO STARTING WORK NEAR COMPANY FACILITIES AND SHALL COORDINATE HIS WORK WITH COMAPNY REPRESENTATIVES.
   NOTICE: ALL TELEPHONE SERVICES WITHIN THIS SUBDIVISION ARE "UNDERGROUND INSTALLATIONS." FOR LOCATION OF CABLES AND APPURTENANCES, CONTACT PACIFIC BELL. TELEPHONE: 800-422-4133.
9. CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN HEREON AND ANY OTHER EXISTING LINES NOT OF RECORD OR NOT SHOWN ON THESE PLANS.

STREET LIGHT NOTES

1. 3 - 250 WATT HIGH PRESSURE SODIUM VAPOR WITH TYPE 15 STEEL STANDARD (30' NOMIMAL MOUNTING HEIGHT, 12' ARM) AND CUTOFF FIXTURES.
2. CONTRACTOR INSTALLING THE STREET LIGHTING DISTRIBUTION SYSTEM SHALL NOTIFY FIELD ENGINEER, TELEPHONE 627-3200, A MINIMUM OF THREE (3) DAYS BEFORE BEGINNING OF WORK FOR APPROVAL OF CONDUIT LOCATION AND REQUIREMENTS.
3. THE NEW, UPGRADED, AND RELOCATED STREET LIGHTS WILL BE IN A STREET LIGHTING ASSESSMENT DISTRICT.
4. WHEN STREET LIGHTS ARE INSTALLED, CONTRACTOR SHALL BE ASSESSED THE ENERGY COSTS OF THE STREET LIGHTS FOR THE PERIOD FROM THE DATE THE LIGHTS ARE ENERGIZED UNTIL THE ASSESSMENT DISTRICT IS FORMED. CONTRACTOR SHALL CONTACT TRAFFIC ENGINEERING DIVISION AT 236-7185 TO DETERMINE THE COST. THIS FEE MUST BE PAID PRIOR TO STREET LIGHTS BEING ENERGIZED. (SEE TRAFFIC ENGINEERING FOR PAYMENT PROCEDURE.)
5. CONTRACTOR SHALL VERIFY THAT ALL STREET LIGHTS ARE ACTIVATED AND NOTIFY FIELD ENGINEER, TELEPHONE 627-3200, A MAXIMUM OF FOUR (4) WEEKS AFTER FINAL ELECTRICAL INSPECTION.
6. STREET LIGHT SCHEDULE:

ST. LT. NO.	STREET NAME	LOCATION REF.	STREET SIDE	WATTAGE
1	MAST BOULEVARD	7+72 56' RT.	S-EAST	250
2	MAST BOULEVARD	10+12 56' RT.	S-EAST	250
3	MAST BOULEVARD	12+62 38.41' RT.	S-EAST	250

7. THE STREET LIGHTS SHALL BE MAINTAINED IN A SAFE CONDITION AT THE SOLE COST, RISK AND RESPONSIBILITY OF THE CITY OF SANTEE.

MONUMENTATION NOTE

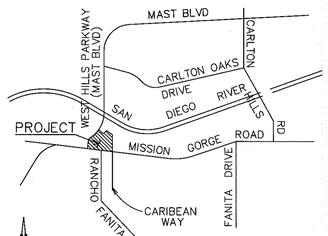
THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY MONUMENTATION AND/OR BENCHMARK WHICH IS DISTURBED OR DESTROYED BY CONSTRUCTION. SUCH POINTS SHALL BE REFERENCED AND REPLACED WITH APPROPRIATE MONUMENTATION BY A LICENSED LAND SURVEYOR OR A REGISTERED ENGINEER AUTHORIZED TO PRACTICE LAND SURVEYING. A CORNER RECORD OR RECORD OF SURVEY, IF APPROPRIATE, SHALL THEN BE FILED BY THE LAND SURVEYOR OR REGISTERED CIVIL ENGINEER AS REQUIRED BY THE LAND SURVEYOR'S ACT.

CONCRETE PAVER ENCROACHMENT RESPONSIBILITY:

1. THE ENCROACHMENT SHALL BE INSTALLED AND MAINTAINED IN A SAFE AND SANITARY CONDITION AT THE SOLE COST, RISK AND RESPONSIBILITY OF THE CITY OF SANTEE.

2. THE CITY OF SANTEE SHALL AGREE TO AT ALL TIMES INDEMNIFY AND SAVE THE CITY OF SAN DIEGO FREE AND HARMLESS FROM AND PAY IN FULL, ANY AND ALL CLAIMS, DEMANDS, LOSSES, DAMAGES OR EXPENSES THAT THE CITY OF SAN DIEGO MAY SUSTAIN OR INCUR IN ANY MANNER RESULTING FROM THE CONSTRUCTION, MAINTENANCE, STATE OF USE, REPAIR OR PRESENCE OF THE STRUCTURE INSTALLED HEREINUNDER, INCLUDING ANY LOSS, DAMAGE OR EXPENSE ARISING OUT OF (1) LOSS OF OR DAMAGE TO PROPERTY, AND (2) INJURY TO OR DEATH OF PERSONS; EXCEPTING ANY LOSS, DAMAGE, OR EXPENSE AND CLAIMS FOR LOSS, DAMAGE OR EXPENSE RESULTING IN ANY MANNER FROM THE NEGLIGENT ACT OR ACTS OF THE CITY OF SANTEE, ITS CONTRACTORS, OFFICERS, AGENTS OR EMPLOYEES.

3. WHATEVER RIGHTS AND OBLIGATIONS WERE ACQUIRED BY THE CITY WITH RESPECT TO THE RIGHTS-OF-WAY SHALL REMAIN AND CONTINUE IN FULL FORCE AND EFFECT AND SHALL IN NO WAY BE AFFECTED BY THE CITY OF SAN DIEGO'S GRANT OF PERMISSION TO CONSTRUCT AND MAINTAIN THE ENCROACHMENT STRUCTURE.



VICINITY MAP
N.T.S.

KMART
STORE NO. 7638

SCALE: 1"=100'

KEY MAP

KEY MAP LEGEND

SHEET NO.	(4)
STREET LIGHTS - EXISTING	☼ 250 W
SURVEY MONUMENT	■
PROPERTY LINE	
STORM DRAINS (EXIST.)	
STORM DRAINS (PROPOSED)	

ADT TABLE

STREET	CLASS	FUTURE ADT	DESIGN SPEED	R/W
MAST BOULEVARD	4L COL.	20,000	45 MPH	84' / 64'

WORK TO BE DONE

THE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE ACCORDING TO THESE PLANS AND THE STANDARD DRAWINGS OF THE CITY OF SAN DIEGO.

STANDARD SPECIFICATIONS

(1) STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (1991 ED.) INCLUDING THE 1991 REGIONAL AND 1991 CITY OF SAN DIEGO SUPPLEMENTAL AMENDMENT, DOC. NO. 769796, FILED APRIL 23, 1992.
(2) 1990 STANDARD SPECIAL PROVISIONS STREET LIGHTING & TRAFFIC SIGNAL SYSTEMS OF THE CITY OF SAN DIEGO, DOCUMENT NO. 769759, FILED FEBRUARY 5, 1991.
(3) CALIFORNIA DEPARTMENT OF TRANSPORTATION "MANUAL OF TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE WORK ZONES," (1991 ED.), DOCUMENT NO. 769744, FILED NOVEMBER 7, 1990.
(4) CALIFORNIA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS (JANUARY 1988), DOCUMENT NO. 769692, FILED APRIL 12, 1988."

STANDARD DRAWINGS

(1) CITY OF SAN DIEGO STANDARD DRAWINGS, DOCUMENT NO. 769798, FILED APRIL 23, 1992.

(2) CALIFORNIA DEPARTMENT OF TRANSPORTATION STANDARD PLANS (JANUARY 1988), DOCUMENT NO. 769691, FILED APRIL 11, 1988.

LEGEND

IMPROVEMENTS	STD. DWGS.	SYMBOL
PROPERTY LINE		
EXISTING CONTOUR		315
FINISH CONTOUR		315
SCHEDULE 'J' PAVEMENT	SDG-113	
TRENCH RESTORATION	SDG-107, SDG-108	
MEDIAN STAMPED COLORED CONCRETE — PAVEMENT GRINDING & OVERLAY — SEE PMT. NOTE 6, SHT. 2	SDG-112	
6" TYPE "G" CURB AND GUTTER	G-2, G-10, SDG-100	
6" STD CURB	G-1	
6" TYPE 'B-1' MEDIAN CURB	G-6	
4" PCC SIDEWALK	SDG-100, G-7, G-9, G-10	
PCC DRIVEWAY COMMERCIAL ALTERNATE	G-26	
PEDESTRIAN RAMP	G-27, G-32	
STEET LIGHT, 250W HPS	SDE-101, E-1-	
STORM DRAIN	D-60	
TYPE "A" CLEANOUT	D-9, D-11	
TYPE 'B-1' CURB INLET	SDD-100, SDG-110, D-2, D-11, D-12	
CONCRETE PAVER	DETAIL SHEET 2	
TYPE "J" MEDIAN CURB INLET	D-45	

REFERENCE DRAWINGS

CITY OF SAN DIEGO: DWG. # 25483-35, 36-D; W772,773
COUNTY OF SAN DIEGO: TM2946-1; WS-1536, 1537
RS 627-5; RS 1275-3
SDGE: DWG. # IL-1000
CITY OF SANTEE: DWG. # 87-100, 101, 102; 87-122, 88-084

LEGAL DESCRIPTION:

PARCEL 1 OF PARCEL MAP NO. 17020, IN THE CITY OF SANTEE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, FILED IN THE OFFICE OF THE COUNTY RECORDER ON DEC. 17, 1992.

ASSESSORS PARCEL NO.

383-050-13, 383-050-09,10,11.

REGISTERED PROFESSIONAL ENGINEER — M. GAMMAK No. 37140 6-30-95 CIVIL — STATE OF CALIFORNIA

CONSTRUCTION CHANGE TABLE

CHANGE	SHEET NUMBERS REVISED THIS CHANGE

CITY OF SANTEE — IP 93-01

REVIEWED 5/10/93 — LAND DEVELOPMENT ENGINEER
ACCEPTED 5/11/93 — DIR. OF PUBLIC WORKS
R.C.E. NO. 12726 EXPIRES 6/30/97

BENCH MARK

DESCRIPTION: GPS STA 1002 PER ROS 11252 STD. STREET SURVEY MONUMENT, CENTER PUNCHED.
LOCATION: CENTERLINE INTERSECTION OF MISSION GORGE ROAD AND RANCH FANITA ROAD
RECORD FROM: CITY OF SANTEE VERTICAL CONTROL
ELEVATION: 331.37 DATUM: MSL

ENGINEER OF WORK

I, TAT L. WAI, HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OF THE DESIGN AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE AND, THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS. I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS IN THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME AS ENGINEER OF WORK OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

SIGNED: _____ DATE: 3/23/93
REGISTRATION NO, 26433, MY REGISTRATION EXPIRES ON 3-31-96

ENGINEER OF WORK:
HCH PARTNERS — LAND PLANNING, ARCHITECTURE, ENGINEERING, SURVEYING
4877 Viewridge Avenue
San Diego, California 92123
(619) 278-5750
FAX (619) 278-9258

REGISTERED PROFESSIONAL ENGINEER — TAT L. WAI NO. 26433 EXP. 3-31-96 CIVIL — STATE OF CALIFORNIA

TAT L. WAI R.C.E. 26433 — 3/23/93 DATE — 12444 JOB NO.

ENGINEERING PERMIT NO.
PRIVATE CONTRACT

PLANS FOR THE IMPROVEMENT OF:

MAST BOULEVARD
(FUTURE WEST HILLS PARKWAY)

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING DEPARTMENT
SHEET 1 OF 6 SHEETS

W.O. NO. 930092

M. Gammak — FOR CITY ENGINEER — 5/17/93 DATE

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	HCHP			

1884-6324 NAD 83 COORDINATES
242-1761 LAMBERT COORDINATES

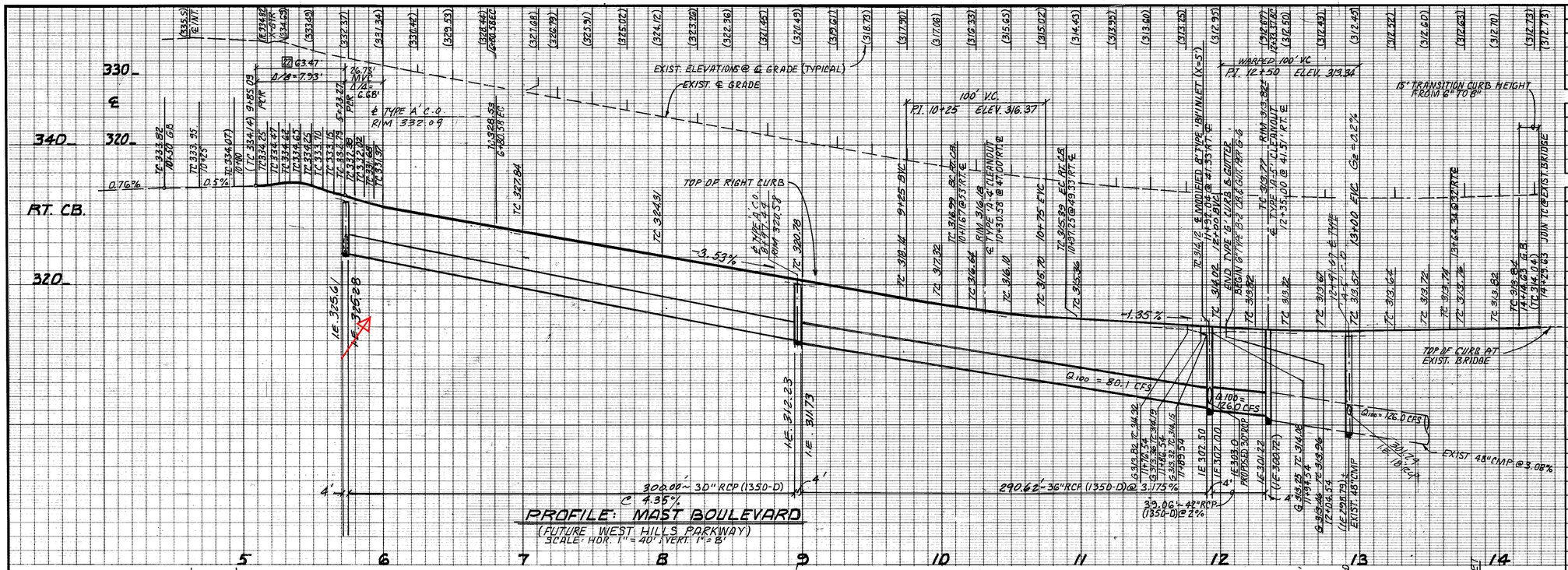
CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

26901-1-D

H:\12442\SD-1

93-139

150972



CENTERLINE DATA				
NO.	DELTA OR BEARING	RADIUS	LENGTH	REMARKS
1	N 10°22'22" E		51.06'	
2	Δ = 38°30'11"	250.00'	168.00'	
3	N 48°52'33" E		552.79'	
4	Δ = 48°30'33"	1500.00'	1269.97'	

STORM DRAIN DATA				
NO.	DELTA OR BEARING	RADIUS	LENGTH	REMARKS
1	N 48°52'33" E		214.86'	30" RCP 1350-D
2	N 48°18'30" E		290.62'	36" RCP 1350-D
3	N 45°04'01" E		39.06'	42" RCP 1350-D

CURB DATA				
NO.	DELTA OR BEARING	RADIUS	LENGTH	REMARKS
1	Δ =180°00'00"	2.00'	6.28'	TYPE 'B-3' MEDIAN CB
2	Δ = 32°15'02"	231.00'	130.02'	TYPE 'B-3' MEDIAN CB
3	Δ = 32°15'02"	227.00'	127.77'	TYPE 'B-3' MEDIAN CB
4	N 48°52'33" E		109.15'	TYPE 'B-3' MEDIAN CB
5	N 48°52'33" E		292.17'	TYPE 'B-3' MEDIAN CB
6	Δ = 21°33'55"	150.00'	56.46'	TYPE 'B-3' MEDIAN CB
7	Δ = 21°33'55"	150.00'	56.46'	TYPE 'B-3' MEDIAN CB
8	N 48°52'33" E		50.38'	TYPE 'B-3' MEDIAN CB
9	N 50°20'41" E		57.73'	TYPE 'B-3' MEDIAN CB
10	Δ = 47°31'14"	10.00'	8.29'	TYPE 'B-3' MEDIAN CB
11	Δ = 29°06'46"	67.00'	34.04'	TYPE 'B-3' MEDIAN CB
12	Δ =160°07'24"	1.00'	2.79'	TYPE 'B-3' MEDIAN CB
13	Δ = 52°36'17"	24.00'	21.99'	TYPE 'B-3' MEDIAN CB
14	N 48°52'33" E		102.20'	TYPE 'B-3' MEDIAN CB
15	Δ=04°54'33"	970'	83.11'	TYPE 'B-3' MEDIAN CB
16	Δ = 17°22'08"	150.00'	45.47'	TYPE 'B-3' MEDIAN CB
17	Δ = 16°16'33"	150.00'	42.61'	TYPE 'B-3' MEDIAN CB
18	N 43°58'00" E		246.01'	TYPE 'B-3' MEDIAN CB
19	N 47°46'58" E		18.25'	TYPE 'B-3' MEDIAN CB
20	Δ = 04°03'31"	1498.00'	106.11'	TYPE 'B-3' MEDIAN CB
21	Δ =180°27'29"	2.08'	6.56'	TYPE 'B-3' MEDIAN CB
22	Δ =103°54'30"	35.00'	63.47'	PART OF X-GUTTER
23	Δ = 24°35'40"	197.00'	84.56'	TYPE 'G' CB & GUT
24	N 48°52'33" E		331.09'	TYPE 'G' CB & GUT
25	Δ = 04°54'33"	1000.00'	85.68'	TYPE 'G' CB & GUT
26	N 43°58'00" E		107.41'	TYPE 'G' CB & GUT
27	N 43°58'00" E		160.80'	6" TYPE 'G' CB&GUT
28	Δ = 02°32'36"	1532.00'	68.00'	6" TYPE 'G' CB&GUT
29	Δ =127°29'43"	1.00'	2.23'	TYPE B-3 MED. CB.
30	N 48°52'33"E		3.58'	TYPE B-3 MED. CB.

BENCH MARK

DESCRIPTION: GPS STA 1002 PER ROS 11252 STD. STREET SURVEY MONUMENT, CENTER PUNCHED.

LOCATION: CENTERLINE INTERSECTION OF MISSION GORGE ROAD AND RANCHO FANITA ROAD

RECORD FROM: CITY OF SANTEE VERTICAL CONTROL

ELEVATION: 331.37 DATUM: MSL

ENGINEER OF WORK:

HCH PARTNERS
LAND PLANNING
ARCHITECTURE
ENGINEERING
SURVEYING

4877 Viewridge Avenue
San Diego, California 92123-1
(619) 278-5750
FAX (619) 278-9258

REGISTERED PROFESSIONAL ENGINEER TAT L. WAI NO. 26433 EXP. 5-31-96 CIVIL STATE OF CALIFORNIA

TAT L. WAI R.C.E. 26433 — 3/11/93 DATE — 12444 JOB NO.

PRIVATE CONTRACT

PLANS FOR THE IMPROVEMENT OF:

MAST BOULEVARD
(FUTURE WEST HILLS PARKWAY)

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING DEPARTMENT
SHEET 3 OF 6 SHEETS

W.O. NO. 930092

FOR CITY ENGINEER — 5/17/93 DATE

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	HCHP			

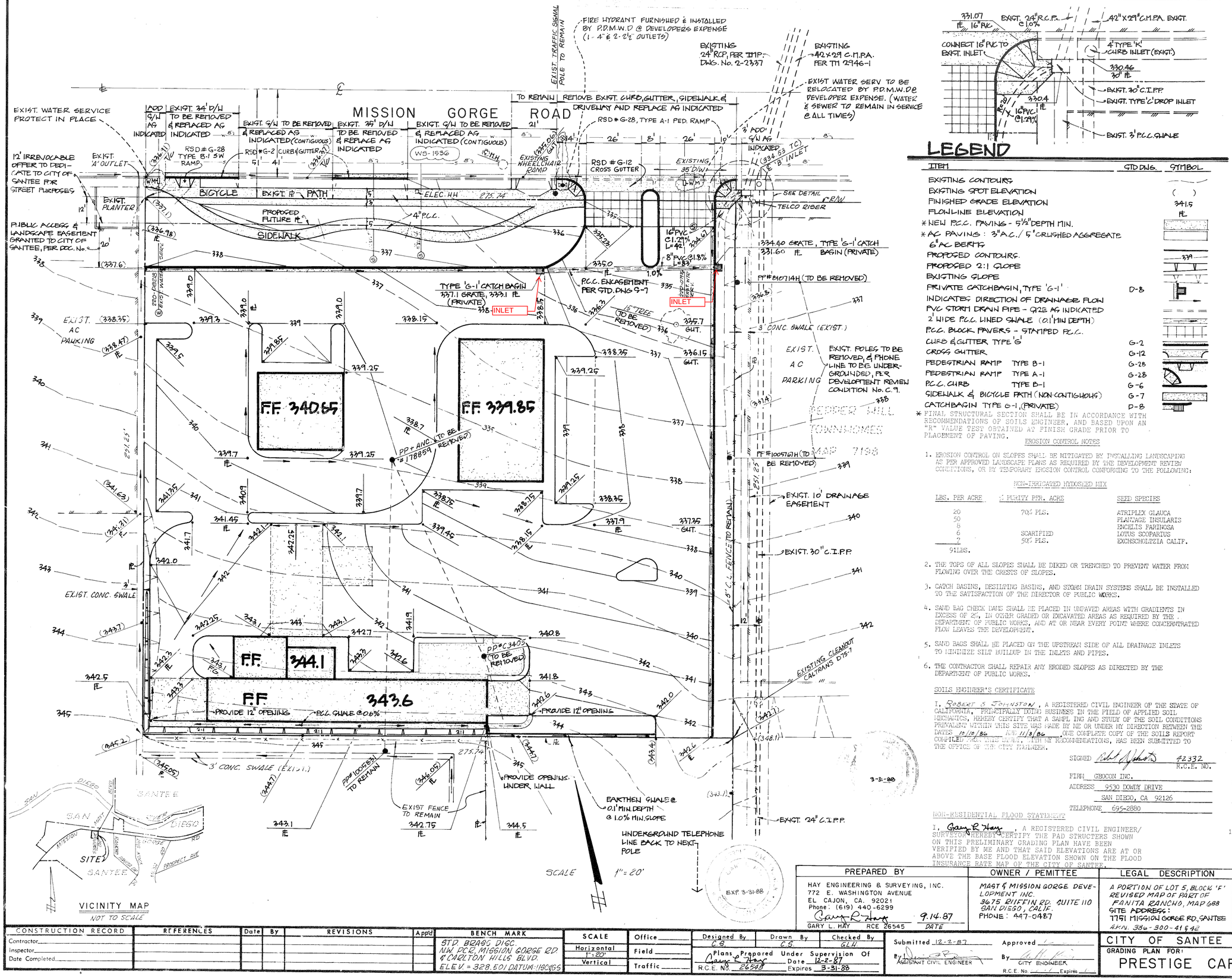
·1884-6324
NAD 83 COORDINATES
242-1761
LAMBERT COORDINATES

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

26901-3-D

93-141

RS 242



LEGEND

ITEM	STD DWG.	SYMBOL
EXISTING CONTOURS		( )
EXISTING SPOT ELEVATION		341.5 FL
FINISHED GRADE ELEVATION		
FLOWLINE ELEVATION		
* NEW P.C.C. PAVING - 5½" DEPTH MIN.		
* AC PAVING : 3" A.C./ 5" CRUSHED AGGREGATE		
6" AC BERMS		
PROPOSED CONTOURS.		
PROPOSED 2:1 SLOPE		
EXISTING SLOPE		
PRIVATE CATCHBASIN, TYPE 'G-1'	D-8	
INDICATES DIRECTION OF DRAINAGE FLOW		
PVC STORM DRAIN PIPE - SIZE AS INDICATED		
2' WIDE P.C.C. LINED SWALE (0.1' MIN DEPTH)		
P.C.C. BLOCK PAVERS - STAMPED P.C.C.		
CURB & GUTTER TYPE 'G'	G-2	
CROSS GUTTER	G-12	
PEDESTRIAN RAMP TYPE B-1	G-28	
PEDESTRIAN RAMP TYPE A-1	G-28	
P.C.C. CURB TYPE B-1	G-6	
SIDEWALK & BICYCLE PATH (NON CONTIGUOUS)	G-7	
CATCHBASIN TYPE G-1, (PRIVATE)	D-8	

* FINAL STRUCTURAL SECTION SHALL BE IN ACCORDANCE WITH RECOMMENDATIONS OF SOILS ENGINEER, AND BASED UPON AN "R" VALUE TEST OBTAINED AT FINISH GRADE PRIOR TO PLACEMENT OF PAVING.

EROSION CONTROL NOTES

1. EROSION CONTROL ON SLOPES SHALL BE MITIGATED BY INSTALLING LANDSCAPING AS PER APPROVED LANDSCAPE PLANS AS REQUIRED BY THE DEVELOPMENT REVIEW CONDITIONS, OR BY TEMPORARY EROSION CONTROL CONFORMING TO THE FOLLOWING:

NON-IRRIGATED HYDOSEED MIX

LBS. PER ACRE	% PURITY PER. ACRE	SEED SPECIES
20	70% PLS.	ATRIPLEX GLAUCA
50		PLANTAGE INSULARIS
8		ENCELIS FARINOSA
6	SCARIFIED	LOTUS SCOPARIUS
7	50% PLS.	EXCHSCHOLYZIA CALIF.
91 LBS.		

2. THE TOPS OF ALL SLOPES SHALL BE DIKED OR TRENCHED TO PREVENT WATER FROM FLOWING OVER THE CRESTS OF SLOPES.
3. CATCH BASINS, DESILTING BASINS, AND STORM DRAIN SYSTEMS SHALL BE INSTALLED TO THE SATISFACTION OF THE DIRECTOR OF PUBLIC WORKS.
4. SAND BAG CHECK DAMS SHALL BE PLACED IN UNPAVED AREAS WITH GRADIENTS IN EXCESS OF 2%, IN OTHER GRADED OR EXCAVATED AREAS AS REQUIRED BY THE DEPARTMENT OF PUBLIC WORKS, AND AT OR NEAR EVERY POINT WHERE CONCENTRATED FLOW LEAVES THE DEVELOPMENT.
5. SAND BAGS SHALL BE PLACED ON THE UPSTREAM SIDE OF ALL DRAINAGE INLETS TO MINIMIZE SILT BUILDUP IN THE INLETS AND PIPES.
6. THE CONTRACTOR SHALL REPAIR ANY ERODED SLOPES AS DIRECTED BY THE DEPARTMENT OF PUBLIC WORKS.

SOILS ENGINEER'S CERTIFICATE

I, ROBERT S JOHNSTON, A REGISTERED CIVIL ENGINEER OF THE STATE OF CALIFORNIA, PRINCIPALLY DOING BUSINESS IN THE FIELD OF APPLIED SOIL MECHANICS, HEREBY CERTIFY THAT A SAMPLING AND STUDY OF THE SOIL CONDITIONS PREVALENT WITHIN THIS SITE WAS MADE BY ME OR UNDER MY DIRECTION BETWEEN THE DATES 10/10/86 AND 11/3/86, ONE COMPLETE COPY OF THE SOILS REPORT COMPILED FROM THIS DATA, WITH MY RECOMMENDATIONS, HAS BEEN SUBMITTED TO THE OFFICE OF THE CITY ENGINEER.

SIGNED Robert S Johnston 42332 R.C.E. NO.

FIRM GEOCON INC.

ADDRESS 9530 DOWDY DRIVE

SAN DIEGO, CA 92126

TELEPHONE 695-2880

NON-RESIDENTIAL FLOOD STATEMENT

I, Gary L Hay, A REGISTERED CIVIL ENGINEER/ SURVEYOR HEREBY CERTIFY THE PAD STRUCTERS SHOWN ON THIS PRELIMINARY GRADING PLAN HAVE BEEN VERIFIED BY ME AND THAT SAID ELEVATIONS ARE AT OR ABOVE THE BASE FLOOD ELEVATION SHOWN ON THE FLOOD INSURANCE RATE MAP OF THE CITY OF SANTEE.

GRADING NOTES:

1. APPROVAL OF THIS GRADING PLAN DOES NOT CONSTITUTE APPROVAL OF VERTICAL OR HORIZONTAL ALIGNMENT OF ANY PRIVATE ROAD SHOWN HEREON FOR PUBLIC ROAD PURPOSES.
2. FINAL APPROVAL OF THESE GRADING PLANS IS SUBJECT TO FINAL APPROVAL OF THE ASSOCIATED IMPROVEMENT PLANS WHERE APPLICABLE. FINAL CURB GRADE ELEVATIONS MAY REQUIRE CHANGES IN THESE PLANS.
3. IMPORT MATERIAL SHALL BE OBTAINED FROM A LEGAL SITE.
4. A CONSTRUCTION, EXCAVATION OR ENCROACHMENT PERMIT FROM THE DIRECTOR OF PUBLIC WORKS WILL BE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY.
5. ALL SLOPES OVER 3 FEET IN HEIGHT WILL BE PLANTED IN ACCORDANCE WITH CITY OF SANTEE SPECIFICATIONS.
6. THE CONTRACTOR SHALL VERIFY THE EXISTENCE AND LOCATION OF ALL UTILITIES BEFORE COMMENCING WORK. NOTICE OF THE PROPOSED WORK SHALL BE GIVEN TO THE FOLLOWING AGENCIES:
   SAN DIEGO GAS & ELECTRIC
   PACIFIC TELEPHONE
   CATV:
   SEWER:
   WATER:
   1-800-422-4133
7. The soils report titled MISSION GORGE CARWASH prepared by GEOCON INC. dated 11-3-86 shall be considered as a part of this grading plan. All grading shall be done in accordance with the recommendations and specifications contained in said report.
8. APPROVAL OF THESE PLANS BY THE DIRECTOR OF PUBLIC WORKS DOES NOT AUTHORIZE ANY WORK OR GRADING TO BE PERFORMED UNTIL THE PROPERTY OWNER'S PERMISSION HAS BEEN OBTAINED AND A VALID GRADING PERMIT HAS BEEN ISSUED.
9. THE DIRECTOR OF PUBLIC WORKS' APPROVAL OF THESE PLANS DOES NOT CONSTITUTE THE BUILDING OFFICIAL'S APPROVAL OF ANY FOUNDATIONS FOR STRUCTURES TO BE PLACED ON THE AREA COVERED BY THESE PLANS. NO WAIVER OF THE GRADING ORDINANCE REQUIREMENTS CONCERNING MINIMUM COVER OVER EXPANSIVE SOILS IS MADE OR IMPLIED (SECTIONS 87.403 & 87.410).
10. ALL OPERATIONS CONDUCTED ON THE PREMISES, INCLUDING THE WARMING UP, REPAIR, ARRIVAL, RUNNING OR DEPARTURE OF TRUCKS, EARTHMOVING EQUIPMENT, CONSTRUCTION EQUIPMENT AND ANY OTHER ASSOCIATED GRADING EQUIPMENT SHALL BE LIMITED TO THE PERIOD BETWEEN 7:00 a.m. AND 6:00 p.m. EACH DAY, MONDAY THROUGH FRIDAY AND NO EARTHMOVING OR GRADING OPERATIONS SHALL BE CONDUCTED ON THE PREMISES ON SUNDAYS, SATURDAYS OR HOLIDAYS WITHOUT THE WRITTEN PERMISSION OF THE DIRECTOR OF PUBLIC WORKS.
11. ALL MAJOR SLOPES SHALL BE ROUNDED INTO EXISTING TERRAIN TO PRODUCE A CONTOURED TRANSITION FROM CUT OR FILL FACES TO NATURAL GROUND AND ABUTTING CUT OR FILL SURFACES.
12. NOTWITHSTANDING THE MINIMUM STANDARDS SET FORTH IN THE GRADING ORDINANCE AND NOTWITHSTANDING THE APPROVAL OF THESE GRADING PLANS, THE PERMITTEE IS RESPONSIBLE FOR THE PREVENTION OF DAMAGE TO THE ADJACENT PROPERTY. NO PERSON SHALL EXCAVATE ON LAND SO CLOSE TO THE PROPERTY LINE AS TO ENDANGER ANY ADJOINING PUBLIC STREET, SIDEWALK, ALLEY, FUNCTION OF ANY SEWAGE DISPOSAL SYSTEM OR ANY OTHER PUBLIC OR PRIVATE PROPERTY WITHOUT SUPPORTING AND PROTECTING SUCH PROPERTY FROM SETTLING, CRACKING, EROSION, SILTING, SCOUR OR OTHER DAMAGE WHICH MIGHT RESULT FROM THE GRADING DESCRIBED ON THIS PLAN. THE CITY WILL HOLD THE PERMITTEE RESPONSIBLE FOR CORRECTION OF NON-DEDICATED IMPROVEMENTS WHICH DAMAGE ADJACENT PROPERTY.
13. SLOPE RATIOS
    CUT - 2:1
    FILL - 2:1 Slopes Deviating From The Above Will Require Approval Of The Director Of Public Works After Review Of A Report From A Soils Engineer.
    EXCAVATION 1100 C.Y. FILL 1100 C.Y.
    WASTE 0 C.Y. A Separate Permit Must Be Obtained For Waste Or Import Area
14. SPECIAL CONDITION IF ANY ARCHAEOLOGICAL RESOURCES ARE DISCOVERED ON THE SITE OF THIS GRADING DURING GRADING OPERATIONS, SUCH OPERATIONS WILL CEASE IMMEDIATELY, AND THE PERMITTEE WILL NOTIFY THE DIRECTOR OF PUBLIC WORKS OF THE DISCOVERY. GRADING OPERATIONS WILL NOT RECOMMENCE UNTIL THE PERMITTEE HAS RECEIVED WRITTEN AUTHORITY FROM THE DIRECTOR OF PUBLIC WORKS TO DO SO
15. ALL GRADING ON THIS PLAN SHALL BE COMPLETED AS A SINGULAR UNIT WITH NO PROVISION FOR PARTIAL RELEASES. SHOULD IT BE ANTICIPATED THAT A PORTION OF THIS PROJECT BE COMPLETED SEPARATELY, A SEPARATE PLAN AND PERMIT APPLICATION SHALL BE SUBMITTED FOR APPROVAL.
16. THE CONTRACTOR SHALL NOTIFY THE CITY OF SANTEE (258-0206) 24 HOURS BEFORE GRADING OPERATIONS BEGIN. THE OWNER/DEVELOPER, THE CONTRACTOR, AND THE SOILS ENGINEER SHALL ATTEND A PRE-CONSTRUCTION MEETING WITH THE CITY PRIOR TO ISSUANCE OF A GRADING PERMIT.
17. FINISH GRADING AND PLANTING SHALL BE ACCOMPLISHED ON ALL SLOPES PRIOR TO OCTOBER 1 OR IMMEDIATELY UPON COMPLETION OF ANY SLOPES GRADED BETWEEN OCTOBER 1 AND APRIL 1. PRIOR TO ANY PLANTING, ALL LANDSCAPING SHALL BE APPROVED BY THE CITY'S LANDSCAPE ARCHITECT AT THE DEVELOPMENT REVIEW STAGE OR BY SEPARATE LANDSCAPE PLAN.
18. ALL OFFSITE HAUL ROUTES SHALL BE SUBMITTED BY THE CONTRACTOR TO THE DIRECTOR OF PUBLIC WORKS FOR APPROVAL 72 HOURS PRIOR TO BEGINNING WORK. A HAUL PERMIT SHALL BE OBTAINED FROM THE DEPARTMENT OF PUBLIC WORKS PRIOR TO ISSUANCE OF A GRADING PERMIT.
19. PADRE DAM M.W.D MUST REVIEW & SIGN STREET IMPROVEMENT PLANS.

PREPARED BY	OWNER / PERMITTEE	LEGAL DESCRIPTION	PADRE DAM M.W.D
HAY ENGINEERING & SURVEYING, INC. 772 E. WASHINGTON AVENUE EL CAJON, CA. 92021 Phone: (619) 440-6299 Gary L Hay 9.14.87 GARY L. HAY RCE 26545 DATE	MAGT & MISSION GORGE DEVELOPMENT INC. 3675 RIFFIN RD. SUITE 110 SAN DIEGO, CALIF. PHONE: 447-0487	A PORTION OF LOT 5, BLOCK 'F' REVISED MAP OF PART OF FANITA RANCHO, MAP 688 SITE ADDRESS: 7751 MISSION GORGE RD, SANTEE A.P.N. 386-300-41 & 42	APPROVED BY DATE W.O. NO. G-134

CONSTRUCTION RECORD	REFERENCES	Date	By	REVISIONS	Appd
Contractor					
Inspector					
Date Completed					

BENCH MARK: STD. BRASS DISC. NW. COR. MISSION GORGE RD & CARLTON HILLS BLVD. ELEV. = 328.501 DATUM: NGVD 29

SCALE: Horizontal 1"=20', Vertical

Office ____ Field ____ Traffic ____

Designed By C.S. Drawn By C.S. Checked By G.L.H.

Plans Prepared Under Supervision Of Gary L Hay Date 12-2-87
R.C.E. NO. 26545 Expires 3-31-88

Submitted 12-2-87 By ____ ASSISTANT CIVIL ENGINEER

Approved ____ By ____ CITY ENGINEER
R.C.E. No. ____ Expires ____

CITY OF SANTEE ENGINEERING DEPARTMENT

GRADING PLAN FOR:
PRESTIGE CAR WASH

Drawing No. 87-122
Sheet 1 of 1

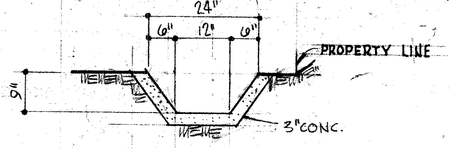
8757

CUT	= 8200	C.Y.
FILL	= 100	C.Y.
WASTE	= 8100	C.Y.

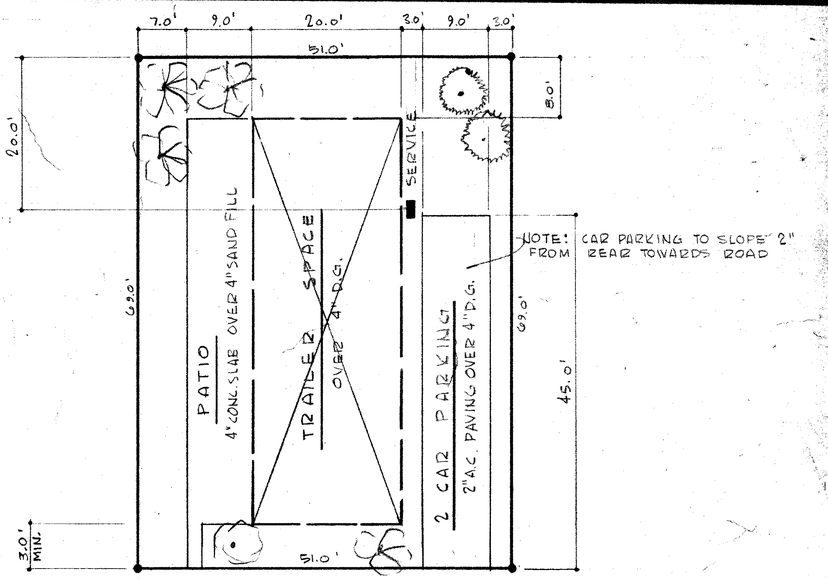
WASTE SOIL SHALL BE DEPOSITED TO SAFEWAY SITE AT WOODSIDE & CHANNEL ROAD LAKESIDE CALIF. L-5103

GENERAL NOTES:

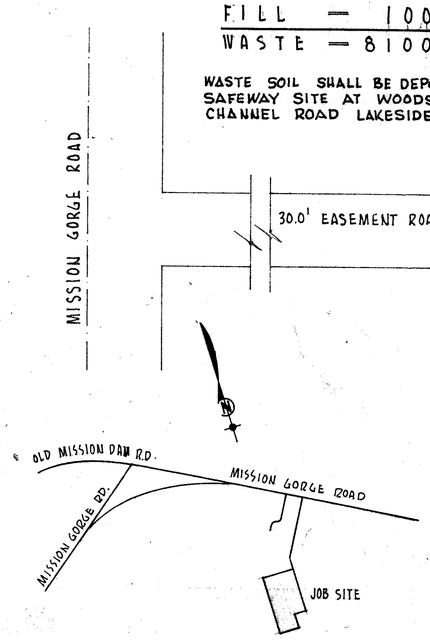
1. BANKS SHALL BE PLANTED W/APPROVED PLANTS.
2. LOTS SHALL HAVE A MIN. SLOPE OF 1% REAR TO FRONT.
3. ALL WORK IS ON OWNERS PROPERTY (EXCEPT FOR WASTE DISPOSAL).
4. DITCHS TO BE SETBACK 3'.0" FROM PROPERTY LINES.



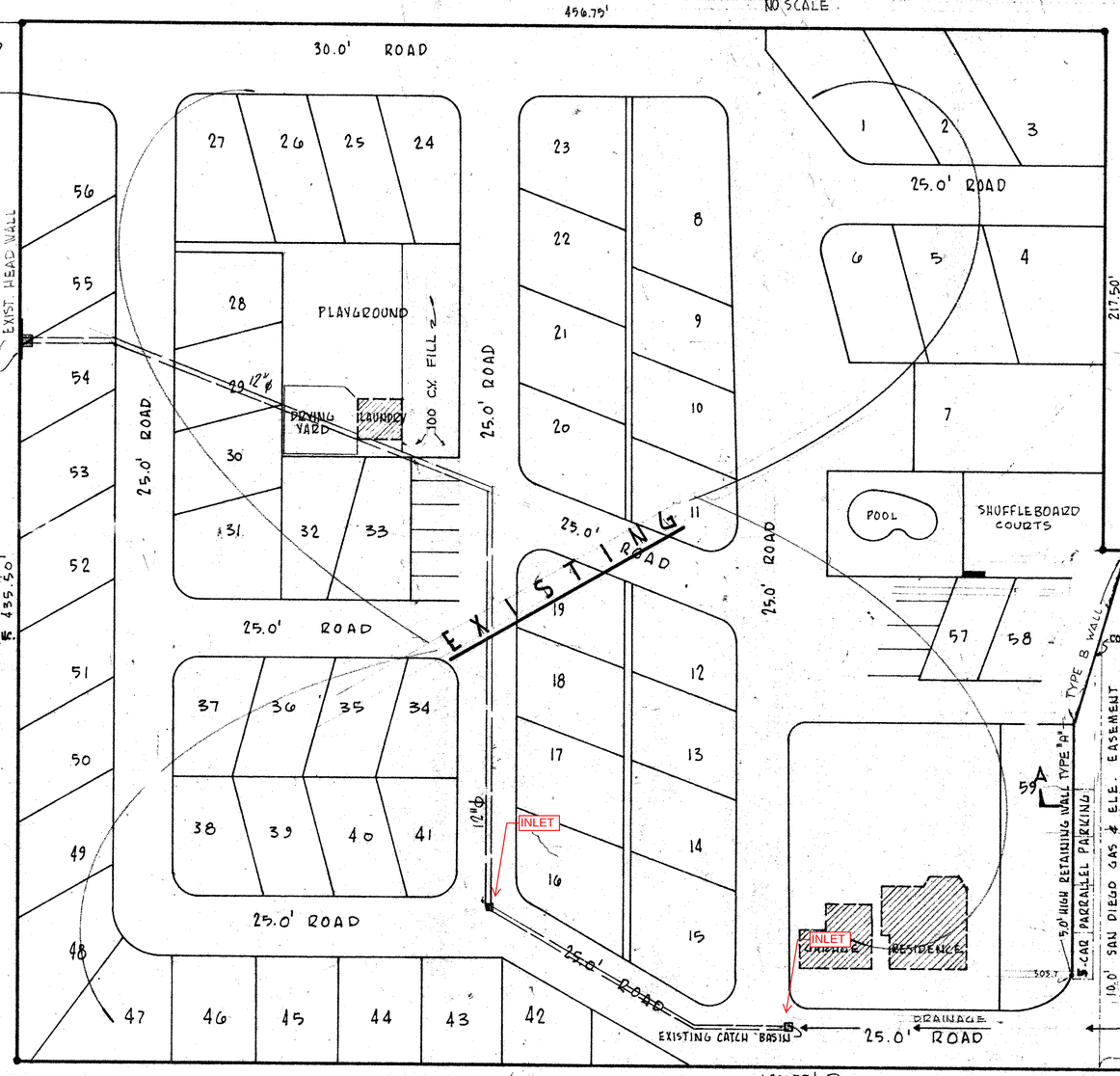
BROW DITCH DETAIL
NO SCALE

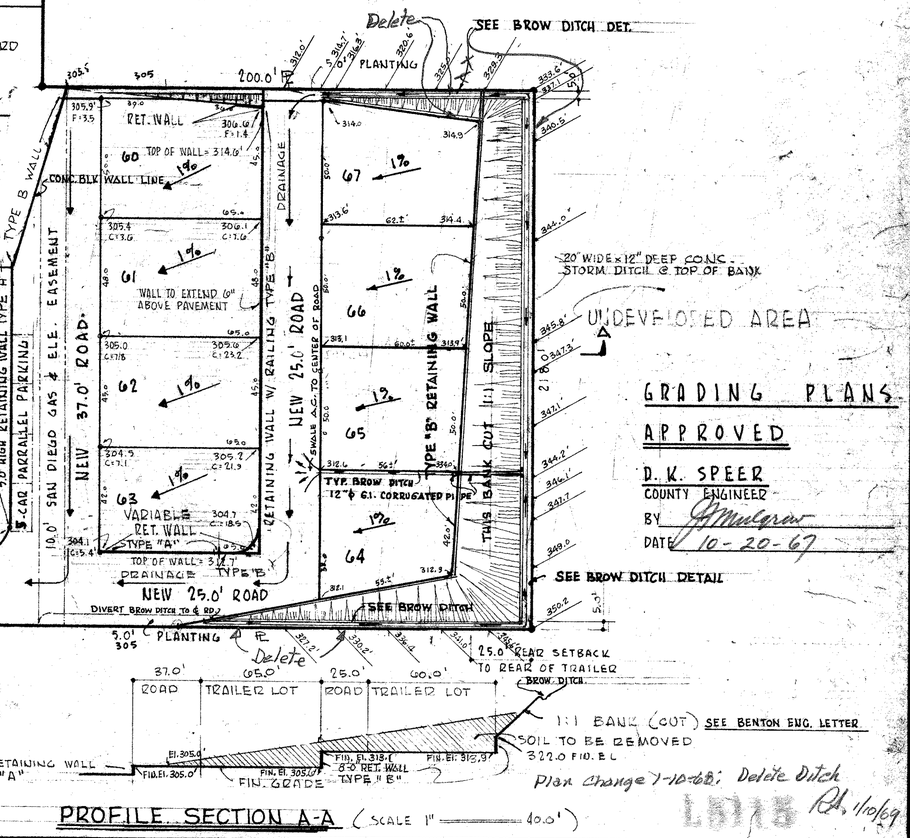


TYP. TRAILER LOT No. 65



VICINITY MAP
NO SCALE





PROFILE SECTION A-A (SCALE 1" = 40.0')

LEGEND

CUT SLOPES — 1:1 PER BENTON ENGINEERING INC. SOILS REPORT.

FILL SLOPES — 1½:1

EXISTING GRADES — 320

FINISH GRADES — 304.5 C=7.1'

THE UNDERSIGNED CIVIL ENGINEER CERTIFIES THIS GRADING WORK WILL BE SUPERVISED IN ACCORDANCE W/SAN DIEGO COUNTY GRADING ORDINANCE No. 2925 (NEW SERIES)

NAME Arthur Delafield Johnson
R.C.E No. 5713
DATE Oct. 13, 1967

SCALE 1" = 30.0'

LEGAL

LOT No. 4 & N. 200' OF W 218' OF LOT No. 8
RANCHO FONITA REVISED SUB.
SAN DIEGO, COUNTY CALIFORNIA
SITE ADDRESS = 7735 MISSION GORGE ROAD, SANTEE
OWNER: MR. B. JOHNSON, 7735 MISSION GORGE RD., PH = 448-1325

GRADING PLAN

58	EXIST. SPACES
9	NEW SPACES
67	TOTAL SPACES

ARTHUR DELAFIELD JOHNSON
REGISTERED CIVIL ENGINEER
18854 Adrian Way Poway, Calif.
RI 8-3237 HI 4-7871

GRADING PLANS APPROVED
D. K. SPEER
COUNTY ENGINEER
BY J. Mulgrew
DATE 10-20-67

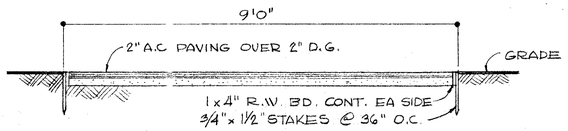
REMARKS	ENGINEER	REVISIONS	SHEET TITLE	SCALE	DATE	SHEET NO.
Contractor to verify all dimensions and grades.	Arthur Delafield Johnson 10-19-67	No. 1. Description: REVISE GRADING; Date: 10/3/67	GRADING	1" = 30.0'	7/67	1 OF 13

JOHN F. DIETERT
Building Designer No. 365
439 EL CAJON BLVD. — EL CAJON, CALIFORNIA — PH. 444 5255

FOR PLEASANT VALLEY TRAILER PARK
SAN DIEGO COUNTY, CALIFORNIA

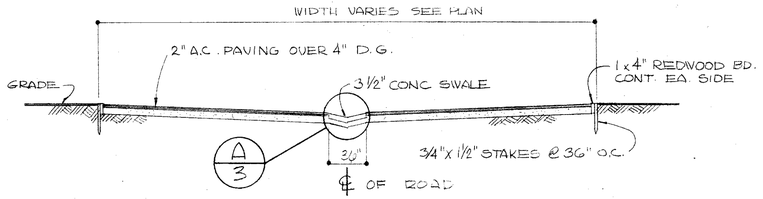
JOB NO. L5115

2/67 DIETERICH-POST CLEARPRINT 3000H



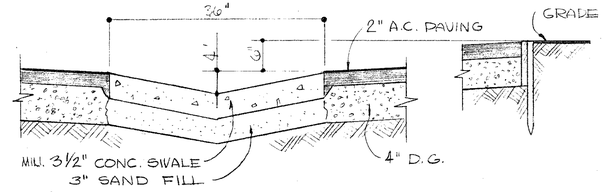
TYPICAL PARKING SPACE SECTION

NO SCALE



TYPICAL ROAD SECTION

NO SCALE



SWALE DETAIL A/3

NO SCALE

See Letter of Permission ON FILE Co. Engineers office

DISPOSAL AREA (See left side this sheet)

LEGAL

LOT No. 4 & N. 200' OF W 218' OF LOT No. 8
RANCHO FONITA REVISED SUB.
SAN DIEGO, COUNTY CALIFORNIA

ROAD PLAN

58 EXIST. SPACES
9 NEW SPACES
67 TOTAL SPACES

Plan Change Add Disposal Area 5/6/68 Rqmnt

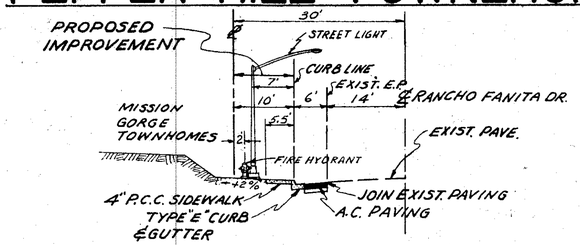
L5115

REMARKS	ENGINEER	REVISIONS	SHEET TITLE	SCALE	DATE	SHEET NO.
Contractor to verify all dimensions and grades.	JOHN F. DIETERT Building Designer No. 365	No. Description Date / No. Description Date	ROAD PLAN FOR PLEASANT VALLEY TRAILER PARK	1" = 30.0'	7/67	3 OF 3
	439 EL CAJON BLVD. — EL CAJON, CALIFORNIA — PH. 444 5255		SAN DIEGO COUNTY CALIFORNIA		JOB NO.	

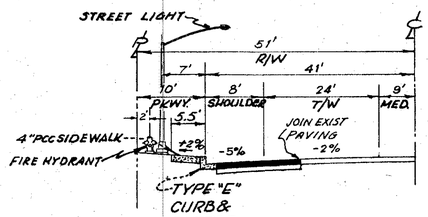
PRECISION MAY 23 1968 MICROFILMED

2/67 DIETERICH-POST CLEARPRINT 1000H

PEPPER HILL TOWNEHOMES



TYPICAL SECT. RANCHO FANITA DRIVE



TYPICAL SECTION

MISSION GORGE ROAD

WORK TO BE DONE (CONT'D)

V.C.P. SEWER ——— 6" V.C.

6" V.C.P. CLEAN-OUT ——— 6" V.C. ——● C.O.

NOTES: (CONT'D)

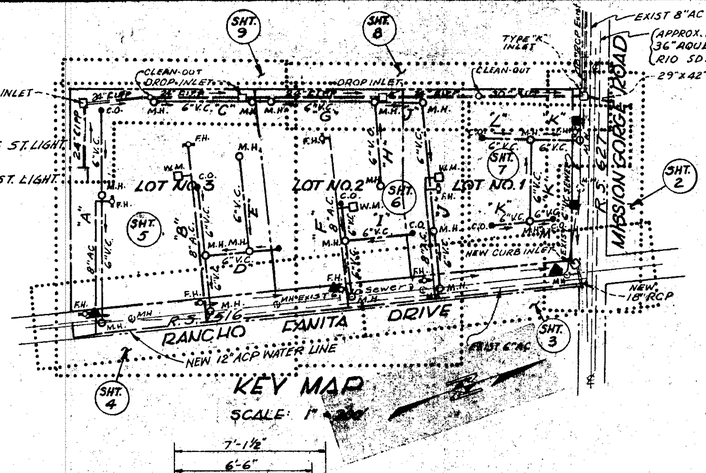
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RELOCATION OF ANY EXISTING WATER SERVICE APPURTENANCES OR ADJUSTING OF ANY EXISTING METER BOXES TO NEW FINISH GRADE.
13. EACH LOT SHALL BE SERVED BY A 4" DIAMETER SEWER LATERAL. LOCATION OF SEWER LATERAL WILL BE DETERMINED IN THE FIELD BY ENGINEER OF WORK. "AS CONSTRUCTED" SEWER LATERAL LOCATION SHALL BE SHOWN ON THESE PLANS. ORIGINAL PLANS OF SEWER LATERALS DATA TABLE TO BE COMPLETED PRIOR TO ACCEPTANCE BY THE SANTEE COUNTY WATER DISTRICT.
14. ALL TELEPHONE, GAS & ELECTRIC SERVICES ARE UNDERGROUND INSTALLATIONS. FOR LOCATION OF CABLES, PIPING & APPURTENANCES CONTACT PACIFIC TELEPHONE CO. AND SAN DIEGO GAS & ELECTRIC CO.

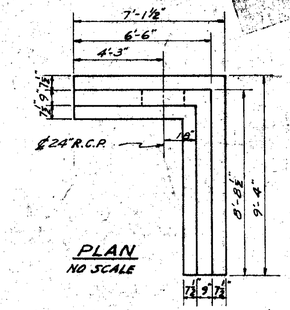
SEWER LATERALS TABLE

(SEE SHEET 7)

■ 20,000 LUMENS ST. LIGHT

▲ 7000 LUMENS ST. LIGHT

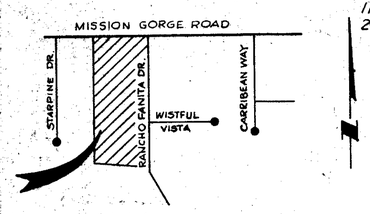




PLAN
NO SCALE

DETAIL "C"

TYPE "L" HEADWALL PER CO. STD. DWG. 127-1



VICINITY MAP

NO SCALE

WORK TO BE DONE

THE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE ACCORDING TO THESE PLANS, THE CURRENT COUNTY OF SAN DIEGO ENGINEER DEPARTMENT STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS FOR IMPROVEMENT OF SUBDIVISION STREETS AND STANDARD REFERENCE DRAWINGS AND TO THE STANDARD SPECIFICATIONS AND DRAWINGS FOR SEWER AND WATER CONSTRUCTION OF THE SANTEE COUNTY WATER DISTRICT ADOPTED NOV. 21, 1966 BY RESOLUTION Nº 1047.

COUNTY STD. DWG. (UNLESS OTHERWISE NOTED)	
	STORM DRAIN
CAL. STATE HWY. D75-3	CLEAN-OUT (STACK-TYPE)
CAL. STATE HWY. D75-3	GCP INLET
108-1	CURB INLET, TYPE "H"
106-1	TYPE J INLET
127-1	HEADWALL "L" TYPE
	GRADING
200-3	6" TYPE "E" CURB & GUTTER
205-1	X-GUTTER & RETURN SEGMENT
211-1 & 305-2	CONCRETE DRIVEWAYS
201-1	6" A.C. DIKE - TYPE "A"
212-2	CONCRETE SIDEWALK
301-2	STREET NAME SIGN
	PAVING
	CL 150 A.C. WATER MAIN — 12" A.C.P.
	6" FIRE HYDRANT & APPURTENANCES — F.H.
	C-I. GATE VALVES & STD. VALVE BOXES
	2" BLOW-OFF
	4" V.C. PIPE LATERAL
	CONCRETE SEWER MANHOLES — S
112-1	CONCRETE CURTAIN WALL
203-1	CUT OFF WALL

NOTES:

1. A PERMIT SHALL BE ACQUIRED FROM THE COUNTY ROAD DEPARTMENT FOR ANY EXCAVATION WITHIN THE EXISTING RIGHT-OF-WAY.
2. ALL UNDERGROUND UTILITIES & LATERALS TO BE INSTALLED BEFORE CONSTRUCTION OF CURBS, CONCRETE CROSS-GUTTERS OR SURFACING OF STREETS.
3. THE STRUCTURAL SECTION WILL BE IN ACCORDANCE WITH SAN DIEGO COUNTY STANDARDS AND AS DETERMINED BY THE MATERIALS LABORATORY.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING & MAINTAINING ALL EXISTING UNDERGROUND UTILITIES DURING CONSTRUCTION.
5. ALL WATER MAINS SHALL BE CLASS 150 & HAVE A MIN. COVER OF 36".
6. ALL CONNECTIONS TO EXIST. WATERMAINS SHALL BE DONE BY THE DISTRICT AND AS SHOWN ON THESE PLANS.
7. THE LETTER "S" SHALL BE STAMPED IN THE CURB AT ALL SEWER LOCATIONS.
8. ALL M.H. COVERS & GATE WELL COVERS SHALL BE ADJUSTED TO FINISH GRADE.
9. WATERMAIN TRENCH GRADES ARE TO BE 4" BELOW BOTTOM OF PIPE GRADE.
10. CONTRACTOR SHALL UNCOVER LOCATION OF CONNECTIONS PRIOR TO BEGINNING INSTALLATION TO INSURE CONFORMANCE W/LINES & GRADES SHOWN ON THE PLANS. ANY DISCREPENCIES SHALL BE BROUGHT TO THE ATTENTION OF THE DISTRICT ENGINEER PRIOR TO PROCEEDING.
11. THE CONSTRUCTION OF COMMERCIAL DRIVEWAYS AS SHOWN ON PLANS. P.C.C. SURFACING TO EXTEND FROM CURB TO PROPERTY LINE. USE STD. DWG. 211-1 & 305-2.

BENCH MARK LJ 104 SAN DIEGO

Description: CONC. MON. SO. SIDE OF MISSION GORGE ROAD, WEST OF RANCHO FANITA DR.

Location:

Record From:

Elev.: 332.717 Datum: U.S.C. & G.S.

PRIVATE CONTRACT

NASLAND ENGINEERING
CIVIL ENGINEERING · SURVEYING · LAND PLANNING
2100 UNIVERSITY AVENUE SAN DIEGO, CALIFORNIA 92104
291-7760

SCALE: AS SHOWN | DATE: 4-9-71
DESIGNED BY: CRUZEN | DRAWN BY: COTE
CLIENT: MC KEON CONSTR. | JOB NO.: 1059-71

APPROVED
SANTEE COUNTY SEWER AND WATER DISTRICT
M. Hale Keeffe 9-22-71
ASSISTANT MANAGER-ENGINEER DATE

COUNTY APPROVED CHANGES

No.	Description	Approved By	Date

SHEET 1 | COUNTY OF SAN DIEGO ENGINEERING DEPARTMENT | 9 SHEETS

PLANS FOR THE IMPROVEMENT OF
MISSION GORGE ROAD & RANCHO FANITA DRIVE
PEPPER HILL TOWNEHOMES

Recommended for Approval: J.C. Goldhammer, Subdivision Engineer

Approved: R.J. Masoman, Asst. County Engineer

Engineer of Work: D.L. Chamberlain, C.E. 18892

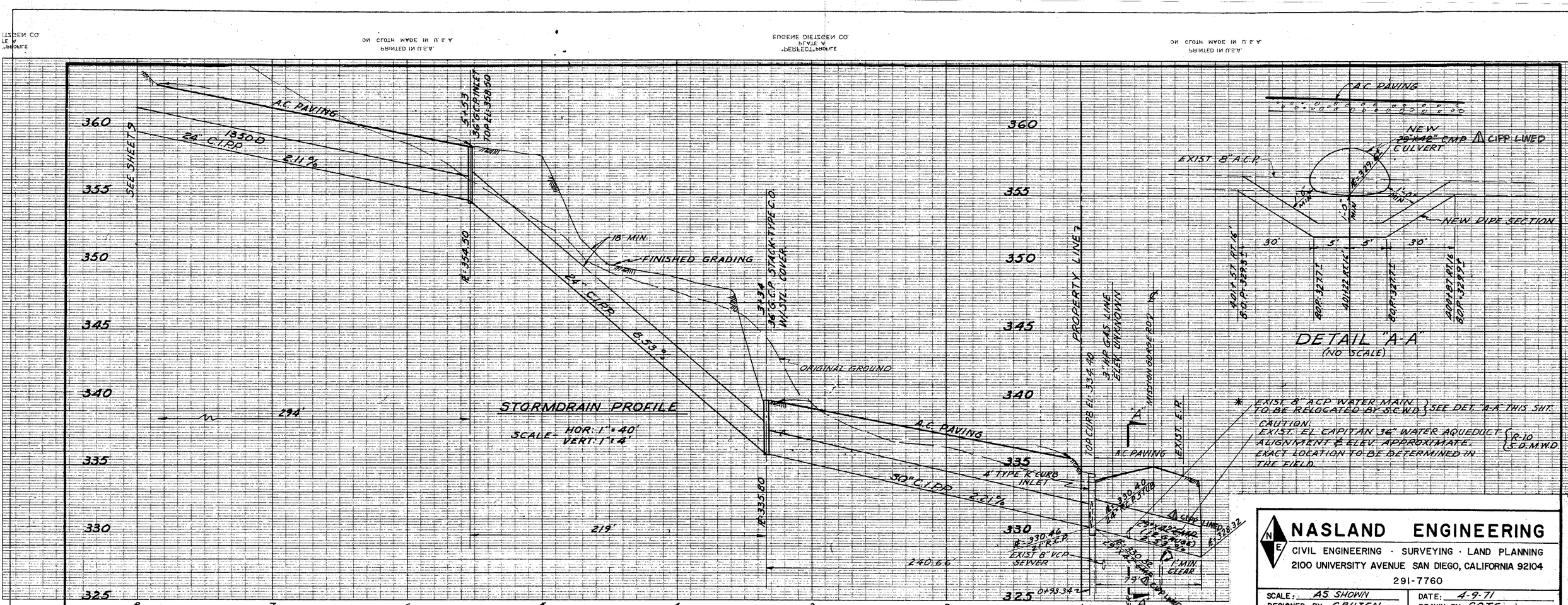
Checked by: RDB

Approval Date: 9-30-71

2946-1 T.M.

FILE NO. WS-1214

PRINTED IN U.S.A. ENGENE DIETZGEN CO. "PERFECT" BRAND



NASLAND ENGINEERING

CIVIL ENGINEERING · SURVEYING · LAND PLANNING
2100 UNIVERSITY AVENUE SAN DIEGO, CALIFORNIA 92104
291-7760

SCALE: AS SHOWN	DATE: 4-9-71
DESIGNED BY: CRUZEN	DRAWN BY: COTE
CLIENT: MC KEON CONSTR.	JOB NO.: 1059-71

BENCH MARK LJ 104 SAN DIEGO
Description: CONC. MON. So. SIDE OF MISSION GORGE RD. WEST OF RANCHO FANITA DR
Elev.: 332.717 Datum: U.S.C.&G.S.

BASIN 100, 200, & 300 POINT OF CONFLUENCE

PRIVATE CONTRACT

SHEET 8	COUNTY OF SAN DIEGO ENGINEERING DEPARTMENT	9 SHEETS

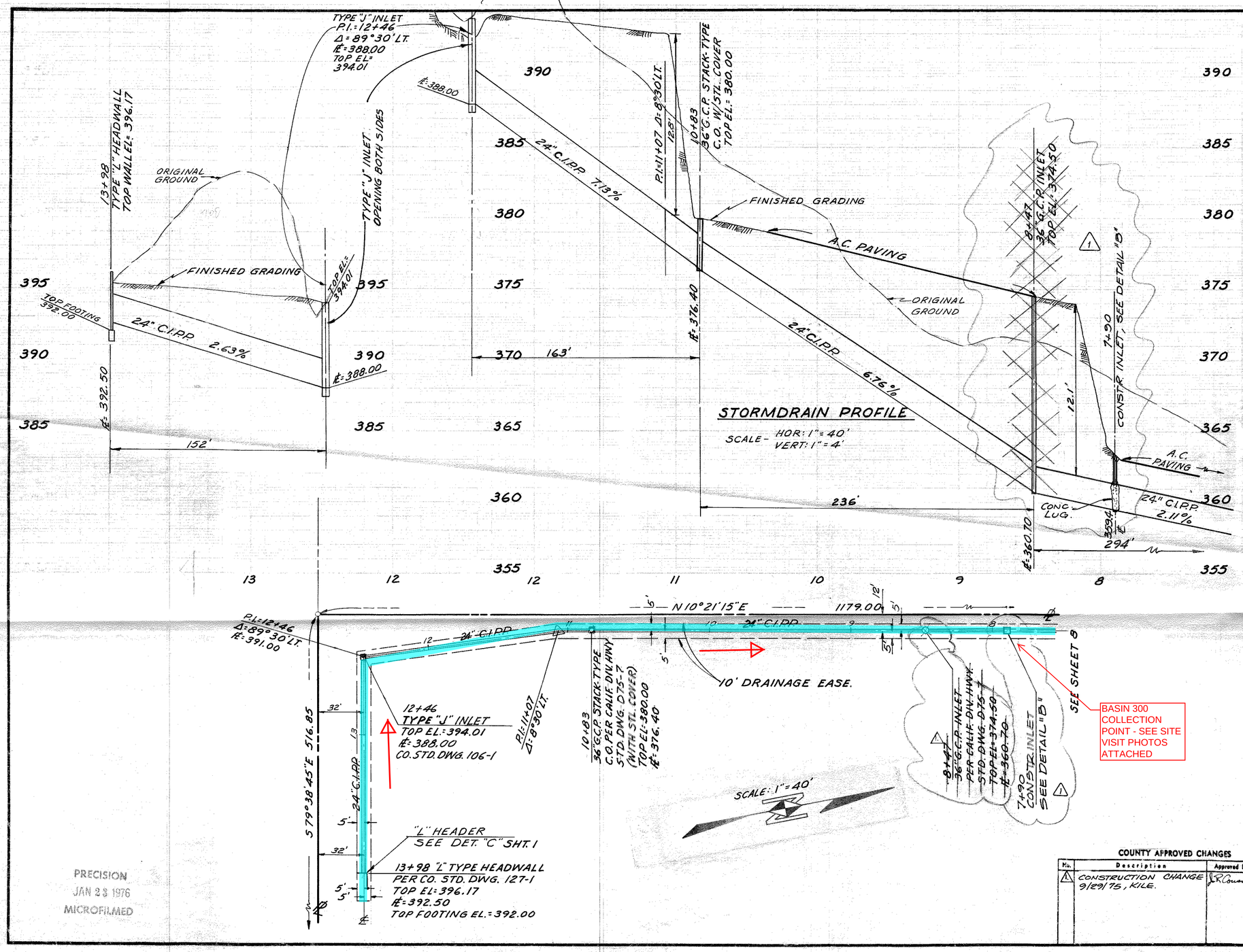
PLANS FOR THE IMPROVEMENT OF STORM DRAIN SYSTEM IN PEPPER HILL TOWNEHOMES

COUNTY APPROVED CHANGES

No.	Description	Approved By	Date
⚠	Per CIP 2013-24	[illegible]	12/22/15

Recommended for Approval: J.C. Hold — Subdivision Engineer
R.J. Masonman — Asst. County Eng.
Engineer of Work: O.J. CHAMBERLAIN, C.E. 18,892
Checked: [illegible]
Approval Date: 9-30-71
2946-1
T.M.

FILE NO WS 1221



PRECISION
JAN 23 1976
MICROFILMED

DIETZGEN
OCT. 7 1971
MICROFILMED

NASLAND ENGINEERING
CIVIL ENGINEERING · SURVEYING · LAND PLANNING
~~2302 UNIVERSITY AVENUE~~ SAN DIEGO, CALIFORNIA 92104
4855 RUFFNER ST. 291-1760

SCALE: AS SHOWN	DATE: 4-9-71
DESIGNED BY: CRUZEN	DRAWN BY: COTE
McKEON CONSTR.	JOB NO.: 1059-71

BENCH MARK LJ 104 SAN DIEGO
Description: CONC. MON. SO. SIDE OF MISSION GORGE RD. WEST OF RANCHO FANITA DR.
Location :
Record From : Elev. : 332.717 Datum: U.S.C.&G.S.
PRIVATE CONTRACT

COUNTY APPROVED CHANGES

No.	Description	Approved By	Date
1	CONSTRUCTION CHANGE 9/29/75, KILE.	J.R. Cousins	12/17/75

SHEET 9	COUNTY OF SAN DIEGO ENGINEERING DEPARTMENT	9 SHEETS

PLANS FOR THE IMPROVEMENT OF STORM DRAIN SYSTEM IN PEPPER HILL TOWNEHOMES

Recommended for Approval: J.C. Goldhammer, Subdivision Engineer	R.J. Massman, Asst. County Eng.
Engineer of Work: D.L. Chamberlain, D.L. CHAMBERLAIN R. C. E. 18,892	Checked by: 2946-1
	Approval Date: 9-30-71 T. M.

FILE NO. WS 1222


PHOTO TAKEN FACING NORTH AT APPROX LOCATION OF BASIN 300 OUTFALL


PHOTO TAKEN FACING SOUTH FROM EXISTING INLET LOCATION


PHOTO TAKEN FACING NORTH: INLET LOCATION. REFER TO ASBUILT DRWING NO. 2946-1 SHT 9 DETAIL "B"

MISSION VIEW ESTATES

GRADING PLAN

ENGINEER OF WORK'S DESIGN CERTIFICATION

I, RAYMOND L. MARTIN, HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE, AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, OVER THE ENGINEERING DESIGN OF THIS PROJECT AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I, UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SANTEE IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME AS THE ENGINEER OF WORK OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

I FURTHER UNDERSTAND THAT UPON APPROVAL OF THESE PLANS BY THE CITY ENGINEER, THE PLANS BECOME THE PROPERTY OF THE CITY OF SANTEE IN ACCORDANCE WITH THE CITY PUBLIC WORKS STANDARDS. AS SUCH, I HEREBY RELINQUISH RIGHT OF OWNERSHIP TO THE CITY TO USE THESE PLANS AS THEY MAY DEEM NECESSARY.

SIGNED: Raymond L Martin DATE: 12/5/07
REGISTRATION NO. 48670, MY REGISTRATION EXPIRES ON 06/30/08
FIRM: HUNSAKER & ASSOCIATES
ADDRESS: 9707 WAPLES STREET
SAN DIEGO, CA 92121
TELEPHONE: (858) 558-4500

REGISTERED PROFESSIONAL ENGINEER RAYMOND L. MARTIN NO. 48670 EXP. 6/30/08 CIVIL STATE OF CALIFORNIA

ENGINEER OF WORK'S RECORD DRAWING CERTIFICATION

I, RAYMOND L. MARTIN, A REGISTERED CIVIL ENGINEER IN THE STATE OF CALIFORNIA, HEREBY DECLARE THAT I HAVE EXERCISED RESPONSIBLE CHARGE, AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, OVER THE PREPARATION OF THE ENGINEERING PORTION OF THE AS-BUILT DRAWINGS AND THAT THE INFORMATION SHOWN IS BASED ON AN INVESTIGATION AND SURVEY OF THE IMPROVEMENTS BETWEEN THE DATES OF AND. TO THE BEST OF MY KNOWLEDGE AND EXPERIENCE THE INFORMATION SHOWN ON THESE PLANS PROVIDE AN ACCURATE AND CORRECT REPRESENTATION OF THE AS-BUILT CONDITIONS.

SIGNED: Raymond L Martin DATE: 2/28/11
REGISTRATION NO. 48670, MY REGISTRATION EXPIRES ON 06/30/08
FIRM: HUNSAKER & ASSOCIATES
ADDRESS: 9707 WAPLES STREET
SAN DIEGO, CA 92121
TELEPHONE: (858) 558-4500

SOIL ENGINEER'S DESIGN CERTIFICATION

I, CHARLES H. CHRISTIAN, A REGISTERED CIVIL ENGINEER IN THE STATE OF CALIFORNIA, PRINCIPALLY DOING BUSINESS IN THE FIELD OF APPLIED SOIL MECHANICS, HEREBY CERTIFY THAT A SAMPLING AND STUDY OF THE SOIL CONDITIONS PREVALENT WITHIN THIS SITE WAS MADE BY ME OR UNDER MY DIRECTION BETWEEN THE DATES MARCH 2005 AND OCTOBER 2007. THREE COMPLETE COPIES OF THE SOILS REPORT COMPLIED FROM WITH MY RECOMMENDATIONS, HAS BEEN SUBMITTED TO THE OFFICE OF THE DIRECTOR OF DEVELOPMENT SERVICES.

I HAVE REVIEWED THE PROJECT DESIGN AND THE GRADING SHOWN HEREON IS CONSISTENT WITH THE RECOMMENDATIONS CONTAINED IN THE APPROVED SOILS AND GEOTECHNICAL REPORTS FOR THE PROJECT.

I FURTHER UNDERSTAND THAT UPON APPROVAL OF THESE PLANS BY THE CITY ENGINEER, THE PLANS BECOME THE PROPERTY OF THE CITY OF SANTEE IN ACCORDANCE WITH THE CITY PUBLIC WORKS STANDARDS. AS SUCH, I HEREBY RELINQUISH RIGHT OF OWNERSHIP TO THE CITY TO USE THESE PLANS AS THEY MAY DEEM NECESSARY.

SIGNED: Charles H Chte DATE: 12/10/07
REGISTRATION NO. , MY REGISTRATION EXPIRES ON 9/30/09
FIRM: CHRISTIAN WHEELER ENGINEERING
ADDRESS: 4925 MERCURY STREET
SAN DIEGO, CA 92111
TELEPHONE: (858) 496-9760

REGISTERED PROFESSIONAL ENGINEER CHARLES H. CHRISTIAN No. GE215 Exp. 9-30-11 GEOTECHNICAL STATE OF CALIFORNIA

SOIL ENGINEER'S AS-BUILT CERTIFICATION

I, CHARLES H CHRISTIAN, A REGISTERED CIVIL ENGINEER IN THE STATE OF CALIFORNIA, HEREBY DECLARE THAT I HAVE EXERCISED RESPONSIBLE CHARGE, AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, OVER THE GEOTECHNICAL ASPECTS OF THE GRADING OF THIS PROJECT. TO THE BEST OF MY KNOWLEDGE AND EXPERIENCE THE GRADING CONFORMS WITH THE RECOMMENDATIONS CONTAINED IN THE SOILS REPORTS AND PLANS WITH THE EXCEPTION THAT ANY CHANGES OR DEVIATIONS FROM THE PLANS DUE TO UNFORESEEN FIELD CONDITIONS HAVE BEEN IDENTIFIED IN THE FINAL SOILS REPORT FOR THE PROJECT.

SIGNED: Charles H Chte DATE: 03/09/2011
REGISTRATION NO. , MY REGISTRATION EXPIRES ON 9/31/2011
FIRM: CHRISTIAN WHEELER ENGINEERING
ADDRESS: 4925 MERCURY STREET
SAN DIEGO, CA 92111
TELEPHONE: (858) 496-9760

REGISTERED PROFESSIONAL ENGINEER CHARLES H. CHRISTIAN No. GE215 Exp. 9-30-11 GEOTECHNICAL STATE OF CALIFORNIA

H&A HUNSAKER & ASSOCIATES SAN DIEGO, INC

PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 FX(858)558-1414

CIVIL ENGINEER'S CERTIFICATION (FOR RETAINING WALLS AS SHOWN ON SHEETS 53 TO 62)

I, CHARLES CHEN HEREBY DECLARE THAT I AM THE CIVIL ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE, AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, OVER THE DESIGN OF THIS PROJECT AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS IN THE CITY OF SANTEE IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME AS ENGINEER OF WORK OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

I FURTHER UNDERSTAND THAT UPON APPROVAL OF THESE PLANS BY THE CITY ENGINEER, THE PLANS BECOME THE PROPERTY OF THE CITY OF SANTEE IN ACCORDANCE WITH THE CITY PUBLIC WORKS STANDARDS. AS SUCH, I HEREBY RELINQUISH RIGHT OF OWNERSHIP TO THE CITY TO USE THESE PLANS AS THEY MAY DEEM NECESSARY.

SIGNED: DATE: 4/1/08
REGISTRATION NO. 64291 MY REGISTRATION EXPIRES ON 6/30/2009
FIRM: CHARLES CHEN, P.E.
ADDRESS: 8 PATINA LANE
LADERA RANCH, CA 92694
TELEPHONE: (949) 916-6269

REGISTERED PROFESSIONAL ENGINEER CHARLES W. CHEN C 64291 EXP 6-30-2009 CIVIL STATE OF CALIFORNIA

CIVIL ENGINEER'S AS-BUILT CERTIFICATION

I, CHARLES CHEN, A REGISTERED CIVIL ENGINEER IN THE STATE OF CALIFORNIA, HEREBY DECLARE THAT I HAVE EXERCISED RESPONSIBLE CHARGE, AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, OVER THE PREPARATION OF THE STRUCTURAL PORTION OF THE AS-BUILT DRAWINGS AS THEY PERTAIN TO THE STRUCTURAL IMPROVEMENTS AND RETAINING WALLS. THE INFORMATION SHOWN IS BASED ON ACTUAL SITE INVESTIGATION AND SURVEY OF THE IMPROVEMENTS BETWEEN THE DATES OF AND . TO THE BEST OF MY KNOWLEDGE AND EXPERIENCE THE INFORMATION SHOWN ON THESE PLANS PROVIDES AN ACCURATE AND CORRECT REPRESENTATION OF THE AS-BUILT CONDITIONS.

SIGNED: DATE: 4/7/11
REGISTRATION NO. 64291 , MY REGISTRATION EXPIRES ON
FIRM: CHARLES CHEN, P.E.
ADDRESS: 8 PATINA LANE
LADERA RANCH, CA 92694
TELEPHONE: (949) 916-6269

REGISTERED PROFESSIONAL ENGINEER CHARLES W. CHEN C 64291 EXP 6-30-2011 CIVIL STATE OF CALIFORNIA

STRUCTURAL ENGINEER'S CERTIFICATION

I, TROY L. LYVER, HEREBY DECLARE THAT I AM THE STRUCTURAL ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE, AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, OVER THE DESIGN OF THIS PROJECT AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS IN THE CITY OF SANTEE IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME AS ENGINEER OF WORK OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

I FURTHER UNDERSTAND THAT UPON APPROVAL OF THESE PLANS BY THE CITY ENGINEER, THE PLANS BECOME THE PROPERTY OF THE CITY OF SANTEE IN ACCORDANCE WITH THE CITY PUBLIC WORKS STANDARDS. AS SUCH, I HEREBY RELINQUISH RIGHT OF OWNERSHIP TO THE CITY TO USE THESE PLANS AS THEY MAY DEEM NECESSARY.

SIGNED: DATE: 3/27/08
REGISTRATION NO. 34656 , MY REGISTRATION EXPIRES ON DEC. 31 2008
FIRM: ZCS ENGINEERING, INC.
ADDRESS: 10121 SE SUNNYSIDE RD. NO.205
CLACKMAS, OR. 97015
TELEPHONE: 503-659-2205

REGISTERED PROFESSIONAL ENGINEER TROY L. LYVER No. 34656 STRUCTURAL STATE OF CALIFORNIA Expires: Dec. 31, 2008

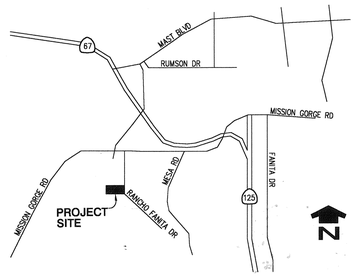
STRUCTURAL ENGINEER'S AS-BUILT CERTIFICATION

I, TROY L. LYVER, A REGISTERED CIVIL ENGINEER IN THE STATE OF CALIFORNIA, HEREBY DECLARE THAT I HAVE EXERCISED RESPONSIBLE CHARGE, AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, OVER THE PREPARATION OF THE STRUCTURAL PORTION OF THE AS-BUILT DRAWINGS AS THEY PERTAIN TO THE STRUCTURAL IMPROVEMENTS AND RETAINING WALLS. THE INFORMATION SHOWN IS BASED ON ACTUAL SITE INVESTIGATION AND SURVEY OF THE IMPROVEMENTS BETWEEN THE DATES OF AND 3/10/11 . TO THE BEST OF MY KNOWLEDGE AND EXPERIENCE THE INFORMATION SHOWN ON THESE PLANS PROVIDES AN ACCURATE AND CORRECT REPRESENTATION OF THE AS-BUILT CONDITIONS.

SIGNED: DATE: 3/10/2011
REGISTRATION NO. 34656, MY REGISTRATION EXPIRES ON DEC 31, 2012
FIRM: ZCS ENGINEERING, INC
ADDRESS: 10121 S.E. SUNNYSIDE RD. STE. 205
CLACKMAS, OR. 97015
TELEPHONE: (503) 659-2205

SHEET INDEX

NOTES & DETAILS	SHEET 1-2
GRADING INDEX MAP	SHEET 3
SECTIONS & DETAILS	SHEET 4
ROUGH GRADE PLANS	SHEET 5-9
STORM DRAIN PROFILES	SHEET 10-15
EROSION CONTROL DETAILS	SHEET 16
EROSION CONTROL	SHEET 17
L&I NOTES & DETAILS	SHEET 17A
IRRIGATION PLANS	SHEET 18-27
LANDSCAPE PLANS	SHEET 28-46
WALL AND FENCE PLANS	SHEET 47-52
RETAINING WALL PLANS	SHEET 53-63 ⚠1



VICINITY MAP
NTS

OWNER'S ACCEPTANCE

I, SI SANTEE, L.P. , AS OWNER OF THE PROPERTY DESCRIBED HEREON ACKNOWLEDGE THESE PLANS HAVE BEEN PREPARED AT MY DIRECTION AND WITH MY FULL CONSENT. I UNDERSTAND ALL CONSTRUCTION MUST CONFORM TO CURRENT CITY STANDARDS AND BE COMPLETED IN ACCORDANCE WITH THESE PLANS. ANY CHANGES TO THE WORK MUST BE APPROVED IN WRITING, IN ADVANCE, IN ACCORDANCE WITH THE CITY'S CONSTRUCTION CHANGE POLICY. I AGREE TO REMOVE AND RECONSTRUCT AT MY COST ANY WORK NOT COMPLETED IN STRICT ACCORDANCE WITH THESE PLANS OR ANY CONSTRUCTION CHANGES APPROVED INCIDENTAL THERETO.

SIGNED: ~~JACK ROBSON~~ URE KRETOWICZ DATE: 12/5/07
ADDRESS: CORNERSTONE COMMUNITIES
4365 EXECUTIVE DRIVE, SUITE 600
SAN DIEGO, CA 92121
TELEPHONE: (858) 458-9700

ASSESSOR PARCEL NUMBER

386-300-34-00

LEGAL DESCRIPTION

A PORTION OF LOTS 6 & 8 IN BLOCK F OF FANITA RANCHO, IN THE CITY OF SANTEE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 688, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAID SAN DIEGO COUNTY ON OCTOBER 22, 1891.

RESIDENTIAL FLOOD STATEMENT

I, RAYMOND L. MARTIN , A REGISTERED CIVIL ENGINEER/~~LAND SURVEYOR~~ HEREBY CERTIFY THAT THE PAD ELEVATIONS SHOWN ON THIS AS-BUILT GRADING PLAN HAVE BEEN VERIFIED BY ME AND THAT SAID ELEVATIONS ARE AT OR ABOVE THE BASE FLOOD ELEVATION AS ESTABLISHED BY THE BASE FLOOD DISCHARGE RATES SET FORTH IN THE FLOOD DAMAGE PREVENTION ORDINANCE – CHAPTER 15.52 OF THE SANTEE MUNICIPAL CODE.

SIGNED: Raymond L Martin DATE: 2/28/11
REGISTRATION NO. 48670 , MY REGISTRATION EXPIRES ON 6/30/12

LEGEND OF ABBREVIATIONS

TC	TOP OF CURB	N.T.S.	NOT TO SCALE
GB	GRADE BREAK	TW	TOP OF WALL
BC	BEGIN CURVE	TF	TOP OF FOOTING
EC	END CURVE	C.I.	CURB INLET
HP	HIGH POINT	C.O.	CLEANOUT
LP	LOW POINT	RCP	REINFORCED CONCRETE PIPE
FL	FLOW LINE	C.B.	CATCH BASIN
ST	STREET	EVC	END VERTICAL CURVE
RT	RIGHT	BVC	BEGIN VERTICAL CURVE
LT	LEFT	FG	FINISHED GRADE
FS	FINISHED SURFACE	PP	POWER POLE

GENERAL STANDARDS OF CONSTRUCTION

UNLESS OTHERWISE NOTED ON THE PLANS, ALL WORK SHALL CONFORM WITH THE FOLLOWING STANDARD SPECIFICATIONS AND DRAWINGS:

STANDARD SPECIFICATIONS:

1. STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, LATEST EDITION.
2. STANDARD SPECIAL PROVISIONS.
3. CITY OF SANTEE PUBLIC WORKS STANDARDS, SEPTEMBER 1982.
4. CALIFORNIA DEPARTMENT OF TRANSPORTATION, "MANUAL OF TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE WORK ZONES," LATEST EDITION.
5. STANDARD SPECIFICATIONS OF THE WATER AGENCIES STANDARDS COMMITTEE (WAS).
6. CALIFORNIA STORMWATER QUALITY ASSOCIATION (CASQA), STORMWATER BEST MANAGEMENT HAND BOOK CONTRUCTION, LATEST EDITION.

STANDARD DRAWINGS:

1. CITY OF SANTEE STANDARD DRAWINGS.
2. SAN DIEGO REGIONAL STANDARD DRAWINGS (S.D.R.S.D.) AS RECOMMENDED BY THE REGIONAL STANDARDS COMMITTEE, MAINTAINED AND PUBLISHED BY THE SAN DIEGO COUNTY DEPARTMENT OF PUBLIC WORKS, LATEST EDITION.
3. STANDARD DRAWINGS OF THE WATER AGENCIES STANDARDS COMMITTEE (WAS).

LEGEND

DESCRIPTION	STD. DWG.	SYMBOL	QUANTITY
SUBDIVISION BOUNDARY			
RIGHT OF WAY			
LOT LINE			
BRUSH MANAGEMENT ZONE LIMIT			
LOT NO		34	
EASEMENT			
TYPE "B-1", "B", "B-2" CURB INLET	R.S.D. D-2		4 E.A.
TYPE "A-1", "A", "A-2" CURB INLET	R.S.D. D-1		
TYPE "F" CATCH BASIN	R.S.D. D-7		4 E.A.
TYPE "A" CLEANOUT	R.S.D. D-9		9 E.A.
WING HEADWALLS	R.S.D. D-34		4 E.A.
6" PVC	R.S.D. D-60		75 L.F.
12" PVC	R.S.D. D-60		8 L.F.
18" RCP	R.S.D. D-60		900 L.F.
24" RCP	R.S.D. D-60		310 L.F.
30" RCP	R.S.D. D-60		163 L.F.
CURB OUTLET	R.S.D. D-25		3 E.A.
CURB INLET	PER DETAIL SHEET 2		1 E.A.
CUTOFF WALL	R.S.D. S-10		2 E.A.
PROPOSED SPOT ELEVATIONS		125.3 FS	
EARTHEN SWALE			
CUT/FILL LINE		CUT FILL	
DAYLIGHT LINE			
SLOPE EMBANKMENT (1.5:1/2:1 FILL MAX)	CUT/FILL	CUT FILL	
EXISTING CONTOUR		180	
FINISH CONTOUR		180	
BROW DITCH	MODIFIED R.S.D. D-75		4,374 L.F.
FUEL MODIFICATION LINE			
PAD ELEVATION		250	
RETAINING WALL	SEE SHEETS 42-46		24,826 S.F.
RIP RAP ENEGERY DISSIPATOR	R.S.D. D-40		
EXISTING STORM DRAIN			
PROPOSED SEWER		S 6" PVC	
PROPOSED WATER LINE		W 10" PVC	
EXISTING SEWER		S 6" VCP	
EXISTING WATER LINE		W	
EXISTING BROW DITCH			

OWNER

CORNERSTONE COMMUNITIES
4365 EXECUTIVE DRIVE
SUITE 600
SAN DIEGO, CA 92121
(858) 458-9700

CITY OF SANTEE

FIRE DEPARTMENT — DATE 2/6/08
~~DEPUTY~~ FIRE CHIEF

COMMUNITY SERVICES DEPARTMENT — DATE 2/6/08
PUBLIC WORKS SUPERINTENDENT

ENGINEERING DIVISION — DATE 2/6/08
CITY ENGINEER RCE NO: 47180, EXPIRES: 12/31/07

PLANNING DIVISION — DATE 2/5/08
PROJECT PLANNER

TRAFFIC SECTION — DATE 1/30/08
PRINCIPAL TRAFFIC ENGINEER

SEWER & WATER AGENCY

PADRE DAM MUNICIPAL WATER DISTRICT

APPROVED BY: Director of Engineering and Planning — Date 1-28-08
47094 R.C.E. No. — 12/31/09 Date
MISSION VIEW ESTATES Project / File Name — 207016 Job No. — WSA SA

VALID FOR ONE YEAR FROM DATE OF SIGNATURE.
SIGNATURE OF THESE PLANS IS NOT A COMMITMENT TO SERVE.

COUNTY OF SAN DIEGO

DEPARTMENT OF ENVIRONMENTAL HEALTH SERVICES
REVIEWED 1-28-08 PROJECT NO. RW2697
BY Glenn Leeks TITLE REHS

REVIEWED 1-30-08
BY PROJECT ENGINEER

CONSTRUCTION RECORD	REFERENCES	DATE	BY	REVISIONS	ACPTD
CONTRACTOR		7/30/08	H&A	⚠1 "AS-BUILT"	dt
INSPECTOR					
DATE COMPLETED					

BENCH MARK
STATION ROS 11252 POINT 1002
STANDARD STREET WELL MONUMENT WITH CENTER PUNCH AT THE CENTERLINE OF MISSION GORGE ROAD & RANCHO FANITA DRIVE. ELEV=331.37 M.S.L.D.

SCALE
HORIZ: 1"=20'
VERT: NONE

DESIGNED BY | DRAWN BY | CHECKED BY

PLANS PREPARED UNDER THE SUPERVISION OF
Raymond L Martin DATE 12/5/07
RAYMOND L. MARTIN RCE NO. 48670 EXPIRES 06/30/08

CITY OF SANTEE — DEPARTMENT OF DEVELOPMENT SERVICES

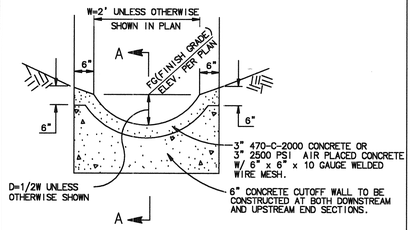
ROUGH GRADING PLAN FOR:
MISSION VIEW ESTATES — TM 2006-04

CITY W.O. NO. G-1043

DRAWING NO. 2008-025 ⚠1
SHEET 1 OF 63

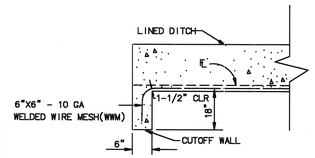
AS-BUILT
MISSION VIEW ESTATES - GRADING PLAN
W.O. No. 2020-13

R:\0722\Eng\ROUGH GRADING\0722RG01.dwg[ ]Nov-15-2007: 10: 27



MODIFIED TYPE D TERRACE DITCH PER D-75 (PVT)

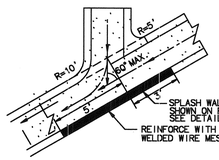
NOT TO SCALE



SECTION A-A (PVT)

NOT TO SCALE

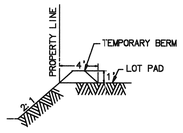
A



LINED DITCH CONFLUENCE (PVT)

NOT TO SCALE

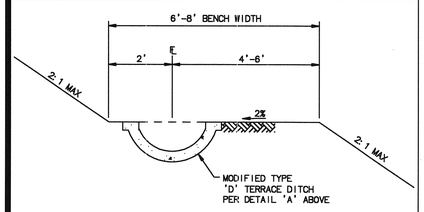
B



TEMPORARY BERM AT SIDE YARD

NOT TO SCALE

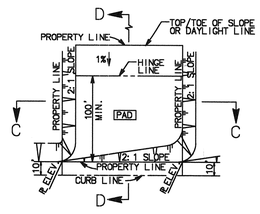
C



TYPICAL BENCH DETAIL (PVT)

NOT TO SCALE

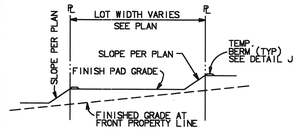
D



TYPICAL LOT ROUGH GRADING

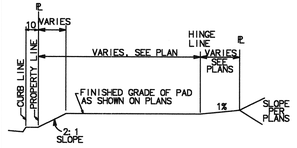
NOT TO SCALE

NOTE:
WHERE BOTH CUT AND FILL OR BEDROCK MATERIALS OF DISSIMILAR EXPANSION CHARACTERISTICS ARE EXPOSED IN THE BUILDING AREA, THE CUT PORTION OF THE BUILDING AREA SHOULD BE UNDERCUT 3.0 FEET BELOW PAD GRADE OR AS APPROVED BY THE SOILS ENGINEER, AND REPLACED WITH COMPACTED SOILS SIMILAR TO THE FILL MATERIAL.



SECTION C-C

NOT TO SCALE

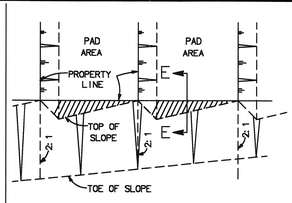


SECTION D-D

NOT TO SCALE

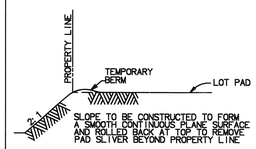
NOTE: FINISH LOT GRADING SHALL BE PER GS-15

E



TYPICAL LOT GRADING REAR OF LOTS

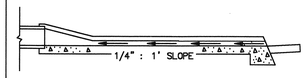
NOT TO SCALE



SECTION E-E

NOT TO SCALE

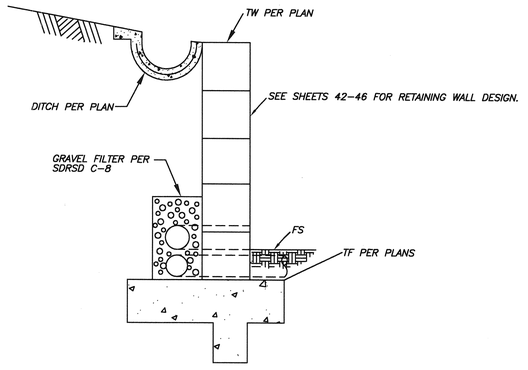
F



MODIFIED D-25 CURB INLET DETAIL

NOT TO SCALE

G



RETAINING WALL WITH DITCH (PVT)

NOT TO SCALE

OUTLET ALTERNATIVES

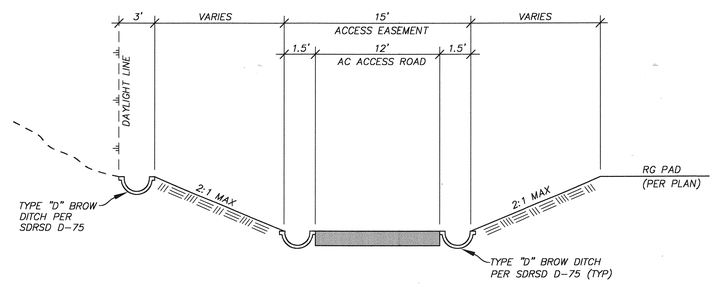
CASE 1) SIDE YARD- EXTEND PERF PIPE AROUND WALL IN FRONT YARD AND DISCHARGE ONTO F.S.

CASE 2) REAR YARD- INDIVIDUAL WALL- EXTEND PERF PIPE AROUND WALL @ SIDE PROPERTY LINE AND DISCHARGE ONTO F.S.

CASE 3) REAR YARD- CONTINUOUS WALL- CONSTRUCT 3" TEE AND DISCHARGE PIPE THROUGH WALL @ F.S. NEAR SIDE PROPERTY LINE.

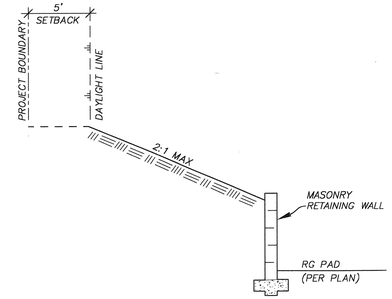
CASE 4) PUBLIC R/W- CONSTRUCT 3" TEE AND CONNECT 3" PVC @ 2% TO D-27 PER IMP. PLANS.

H



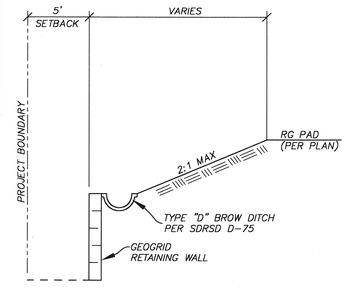
SECTION A-A

NOT TO SCALE



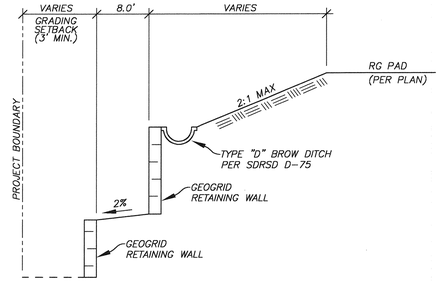
SECTION D-D

NOT TO SCALE



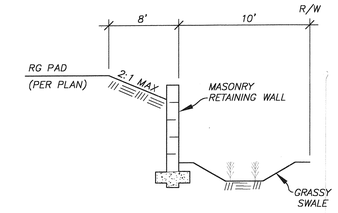
SECTION B-B

NOT TO SCALE



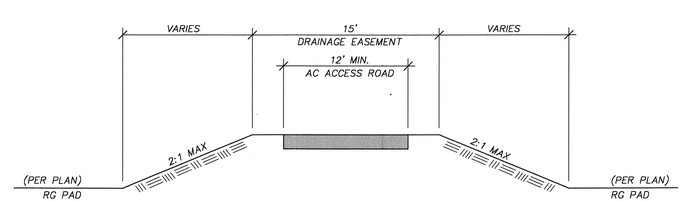
SECTION C-C

NOT TO SCALE



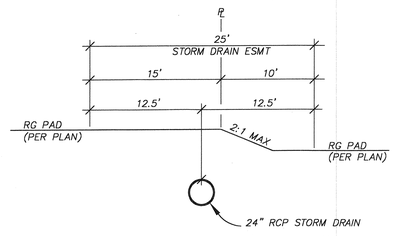
SECTION E-E

NOT TO SCALE



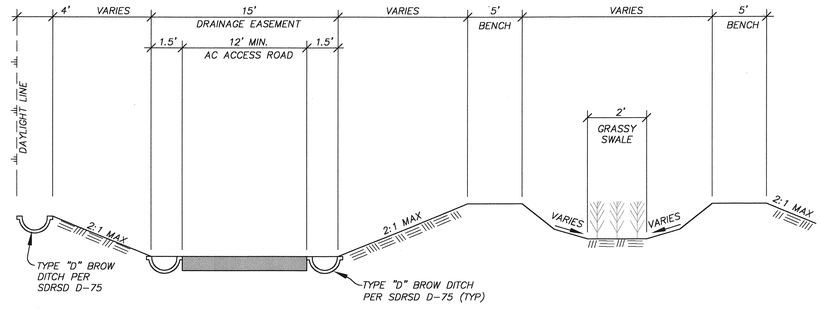
SECTION F-F

NOT TO SCALE



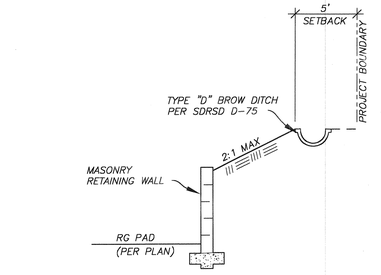
SECTION H-H

NOT TO SCALE



SECTION G-G

NOT TO SCALE



SECTION I-I

NOT TO SCALE

HUNSAKER & ASSOCIATES
SAN DIEGO, INC.

PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 · FX(858)558-1414

REGISTERED PROFESSIONAL ENGINEER · RAYMOND L. MARTIN · NO. 48670 EXP. 6/30/08 · CIVIL · STATE OF CALIFORNIA

CONSTRUCTION RECORD	REFERENCES	DATE	BY	REVISIONS	ACPTD
CONTRACTOR		2/28/2008	H&A	"AS-BUILT"	
INSPECTOR					
DATE COMPLETED					

BENCH MARK:
STATION ROS 11252 POINT 1002
STANDARD STREET WELL MONUMENT WITH CENTER PUNCH AT THE CENTERLINE OF MISSION GORGE ROAD & RANCHO FANITA DRIVE. ELEV=331.37 M.S.L.D.

SCALE	DESIGNED BY	DRAWN BY	CHECKED BY
HORIZ: 1"=20'			
VERT: NONE	PLANS PREPARED UNDER THE SUPERVISION OF RAYMOND L. MARTIN	DATE 12/5/07	
	RCE NO. 48670	EXPIRES 06/30/08	

REVIEWED 1-30-08
BY CITY PROJECT ENGINEER

CITY OF SANTEE — DEPARTMENT OF DEVELOPMENT SERVICES

ROUGH GRADING PLAN FOR:

MISSION VIEW ESTATES

TM 2006-04

CITY W.O. NO. G-1043

DRAWING NO. 2008-028 (1)

SHEET 4 OF 63

MISSION VIEW ESTATES - GRADING PLAN
W.O. No. 2020-1.3

AS-BUILT

R: \0722\dEng\ROUGH GRADING\0722RG04.dwg[ ]Jan-23-2008: 13: 51

20' WIDE EXISTING WATER AND SEWER EASEMENT GRANTED TO SANTEE COUNTY WATER DISTRICT PER DOC. REC. JAN. 04, 1973 AS DOC. NO. 73-003470 O.R.

EXISTING 10" A.C. WATERLINE PER DWG W-1244 BEGIN REMOVAL AND VACATION OF EXISTING EASEMENT

EXISTING 10" A.C. WATER LINE DWG 1325 TO BE REMOVED

APN 386-300-44
MAP 688

50' D-75 TYPE B W=3', D=12" Q_{MAX}=2.70 CFS DETAIL 'A'

25' TRANSITION

SUBDIVISION BOUNDARY

25' D-75 TYPE B W=2', D=3" Q_{MAX}=2.25 CFS DETAIL 'B'

25' D-75 TYPE B W=2', D=2" Q_{MAX}=1.16 CFS DETAIL 'C'

25' D-75 TYPE B W=2', D=1" Q =0.37 CFS DETAIL 'D'

10'

D-40 RIP RAP ENERGY DISSIPATOR 10'x4'x0.6' NO. 3 BACKING Q =0.37 CFS, V=3.32 FPS

EXISTING 10" WATER EASEMENT DOC.# 1973-003470 TO BE PARTIALLY QUIT CLAIMED

KEYSTONE RETAINING WALL PER SHEETS 42-47

EXISTI WATER PER D TO BE

BROW DITCH CONFLUENCE PER DETAIL ON SHEET 4

EXISTING BROW DITCH

CONCRETE CROSS CHANNEL PER SDRSD G-13

EXISTING 10" A.C. WATER LINE PER DWG 1325-W TO REMAIN

LOT B

LOT C

BRUSH MANAGEMENT ZONE 1

BRUSH MANAGEMENT ZONE 2

BROW DITCH CONFLUENCE SEE DETAIL SHEET 4

20' PADRE DAM MUNICIPAL WATER DISTRICT EASEMENT PER FINAL MAP 15702

PROPOSED PRIVATE 10' STORM DRAIN EASEMENT

BRUSH MANAGEMENT ZONE 1

VISTA RETAINING WALL PER SHEET 59

VISTA RETAINING WALL PER SHEET 59

VISTA RETAINING WALL PER SHEET 59

VISTA RETAINING WALL PER SHEET 59

SD LINE "A-1" PER SHEET 11

SD LINE "A" PER SHEET 12

BRITT PLACE

10" PVC WATER

6" PVC SEWER TYPE A-4 C.O.

TYPE F INLET

FILL

CUT

SUBDIVISION BOUNDARY

SEE SHEET NO. 6

SEE SHEET NO. 8

AS-BUILT

MISSION VIEW ESTATES - GRADING PLAN

W.O. No. 2020-13

BROW DITCH DETAIL 'A'
*CONCRETE SPECS PER SDRSD D-75 NTS

BROW DITCH DETAIL 'B'
*CONCRETE SPECS PER SDRSD D-75 NTS

BROW DITCH DETAIL 'C'
*CONCRETE SPECS PER SDRSD D-75 NTS

BROW DITCH DETAIL 'D'
*CONCRETE SPECS PER SDRSD D-75 NTS

SCALE 1"=20'

HUNSAKER & ASSOCIATES
SAN DIEGO, INC
PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 FX(858)558-1414

REGISTERED PROFESSIONAL ENGINEER RAYMOND L. MARTIN NO. 48670 EXP. 6/30/12 CIVIL STATE OF CALIFORNIA

CONSTRUCTION RECORD	REFERENCES	DATE	BY	REVISIONS	ACPTD
CONTRACTOR		7/28/11	H&A	⚠ AS-BUILT REPLACEMENT SHEET	
INSPECTOR					
DATE COMPLETED					

BENCH MARK
STATION ROS 11252 POINT 1002
STANDARD STREET WELL MONUMENT WITH CENTER PUNCH AT THE CENTERLINE OF MISSION GORGE ROAD & RANCHO FANITA DRIVE. ELEV=331.37 M.S.L.D.

SCALE
HORIZ: 1"=20'
VERT: NONE

DESIGNED BY
DRAWN BY
CHECKED BY
PLANS PREPARED UNDER THE SUPERVISION OF RAYMOND L. MARTIN DATE 2/28/11
RCE NO. 48670 EXPIRES 06/30/12

REVIEWED BY 7/28/2011 PROJECT ENGINEER

CITY OF SANTEE DEPARTMENT OF DEVELOPMENT SERVICES
ROUGH GRADING PLAN FOR:
MISSION VIEW ESTATES TM 2006-04

CITY W.O. NO. G-1043

DRAWING NO. 2008-029
SHEET 5 OF 60

R: \0722\kEng\ROUGH GRADING\0722RG05.dwg[ ]Feb-21-2011: 09:23

SCALE 1"=20'

EXISTING PROPERTY LINE

EXISTING 10' STORM DRAIN EASEMENT PER FINAL MAP NO. 7198

EXISTING 10" A.C. WATERLINE PER DWG 1325-W BEGIN REMOVAL AND VACATION OF EXISTING EASEMENT

EXISTING 24" CIPP STORM DRAIN PER DWG. NO. 2946-1 AND MAP NO. 7198

APN 386-300-44 MAP 688

APN 386-300-38 MAP 7198

EXISTING POWER POLE TO REMAIN

20' WIDE EXISTING WATER AND SEWER EASEMENT GRANTED TO SANTEE COUNTY WATER DISTRICT PER DOC. REC. JAN. 04, 1973 AS DOC. NO. 73-003470 O.R. TO BE PARTIALLY QUIT CLAIMED

EXISTING 10" A.C. WATER LINE PER DWG 1325-W TO BE REMOVED

FOR OFFSITE LETTER OF PERMISSION TO GRADE SEE LETTER DATED DECEMBER 20, 2007 FROM MARIAN L. GRANT

20' DRAINAGE EASEMENT PER DOC. FINAL MAP 15702 REC. 7-23-08

FOR OFFSITE PERMISSION TO GRADE SEE AGREEMENT BETWEEN REPAIR TOWNHOMES ASSOC. AND CITY OF SANTEE DATED FEB. 5, 2008.

BROW... PER DI... FOR OF... PERMIS... SEE LETTER ... FROM ...

SUBDIVISION BOUNDARY

KEYSTONE RETAINING WALL PER SHEETS 42-47

TYPE F INLET

TYPE A-4 C.O.

SD LINE "A-3" PER SHEET 14

VISTA RETAINING WALL PER SHEET 59

25' STORM DRAIN EASEMENT PER FINAL MAP 15702

7X14 PRECAST STORMFILTER

TYPE B INLET

SD LINE "B-1" PER SHEET 13

SD LINE "B-2" PER SHEET 13

SD LINE "A" PER SHEET 12

SD LINE "A-2" PER SHEET 10

SD LINE "A-4" PER SHEET 10

SD LINE "B" PER SHEET 13

MOD. TYPE A-4 C.O.

10" PVC WATER

6" PVC SEWER

15" PUBLIC DRAINAGE EASEMENT

BRUSH MANAGEMENT ZONE 1

PRIVATE BROW DITCH

BRITT PLACE

175' VC

56' ROW

LOT A

SEE SHEET NO. 5

SEE SHEET NO. 7

SEE SHEET NO. 8

SEE SHEET NO. 9

AS-BUILT

MISSION VIEW ESTATES - GRADING PLAN

W.O. No. 2020-13

HUNSAKER & ASSOCIATES SAN DIEGO, INC

PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 FX(858)558-1414

REGISTERED PROFESSIONAL ENGINEER RAYMOND L. MARTIN NO. 48670 EXP. 6/30/08 CIVIL STATE OF CALIFORNIA

CONSTRUCTION RECORD	REFERENCES	DATE	BY	REVISIONS	ACPTD
CONTRACTOR		7/08/08	H&A	1 "AS-BUILT"	
INSPECTOR					
DATE COMPLETED					

BENCH MARK

STATION ROS 11252 POINT 1002 STANDARD STREET WELL MONUMENT WITH CENTER PUNCH AT THE CENTERLINE OF MISSION GORGE ROAD & RANCHO FANITA DRIVE. ELEV=331.37 M.S.L.D.

SCALE		DESIGNED BY	DRAWN BY	CHECKED BY
HORIZ:	1"=20'			
VERT:	NONE			

PLANS PREPARED UNDER THE SUPERVISION OF RAYMOND L. MARTIN DATE 12/5/07
RCE NO. 48670 EXPIRES 06/30/08

REVIEWED 1-30-08
BY PROJECT ENGINEER

CITY OF SANTEE — DEPARTMENT OF DEVELOPMENT SERVICES

ROUGH GRADING PLAN FOR:

MISSION VIEW ESTATES TM 2006-04

CITY W.O. NO. G-1043

DRAWING NO. 2008-030 1

SHEET 6 OF 63

R: \0722\&Eng\ROUGH GRADING\0722RG06.dwg[ ]Jan-23-2008: 13: 51

SEE SHEET NO. 6

SEE SHEET NO. 9

SEE SHEET NO. 10

APN 386-300-38
MAP 7198

BROW DITCH CONFLUENCE PER DETAIL ON SHEET 4 FOR OFFSITE PERMISSION TO GRADE SEE AGREEMENT BETWEEN PEPPER TOWNHOMES ASSOC. AND CITY OF SANTEE DATED FEB. 5, 2006.

KEYSTONE RETAINING WALL PER SHEETS 42-47

EXISTING POWER POLE TO REMAIN

EXISTING OFFSITE BROW DITCH TO REMAIN

SUBDIVISION BOUNDARY

EXISTING OFFSITE BROW DITCH TO REMAIN

CORNER SIGHT DISTANCE PER CITY OF SANTEE PUBLIC WORKS STDS

PROPOSED 20' PRIVATE MAINTENANCE AND ACCESS EASEMENT

EXISTING 12" ACP WTR PER DWG. 1891-W

EXISTING 20" PVC RW WTR PER DWG 3109 R

EXISTING 6" ACP WATER PER DWG 844

EXISTING 6" VCP PER DWG 345

VISIBILITY EASEMENT PER FINAL MAP

BRITT PLACE

10" PVC WATER
6" PVC SEWER

SD LINE "C" PER SHEET 15

PROPOSED PRIVATE MAINTENANCE AND ACCESS EASEMENT

D-40 ENERGY DISSIPATOR
Q100=1.8 CFS
V100=13.8 FPS

CORNER SIGHT DISTANCE PER CITY OF SANTEE PUBLIC WORKS STDS

RANCHO FANITA DRIVE

EXISTING POWER POLE TO REMAIN

BRUSH MANAGEMENT ZONE 1

BRUSH MANAGEMENT ZONE 2

EXISTING RESIDENTIAL

APN 386-133-01

HOUSE

LOT A

VISTA RETAINING WALL PER SHEET 59

FILL
CUT

CUT
FILL

P=404.0 (1)
P=411.2 (2)
P=418.3 (3)
P=425.4 (4)
P=432.3 (5)
P=437.7 (6)
P=404.7 (31)
P=416.9 (29)
P=423.7 (28)
P=430.5 (27)
P=436.6 (26)
P=410.4 (30)

0 20 40 60
SCALE 1"=20'

HUNSAKER & ASSOCIATES
SAN DIEGO, INC

PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 FX(858)558-1414

REGISTERED PROFESSIONAL ENGINEER
RAYMOND L. MARTIN
NO. 48670
EXP. 6/30/08
CIVIL
STATE OF CALIFORNIA

CONSTRUCTION RECORD	REFERENCES	DATE	BY	REVISIONS	ACPTD
CONTRACTOR		2/15/08	H&A	1 "AS-BUILT"	
INSPECTOR					
DATE COMPLETED					

BENCH MARK
STATION ROS 11252 POINT 1002
STANDARD STREET WELL MONUMENT WITH CENTER PUNCH AT THE CENTERLINE OF MISSION GORGE ROAD & RANCHO FANITA DRIVE. ELEV=331.37 M.S.L.D.

SCALE	DESIGNED BY	DRAWN BY	CHECKED BY
HORIZ: 1"=20'			
VERT: NONE	PLANS PREPARED UNDER THE SUPERVISION OF RAYMOND L. MARTIN DATE 12/5/07		
	RCE NO. 48670 EXPIRES 06/30/08		

REVIEWED 1-30-08
BY PROJECT ENGINEER

CITY OF SANTEE — DEPARTMENT OF DEVELOPMENT SERVICES

ROUGH GRADING PLAN FOR:

MISSION VIEW ESTATES

TM 2006-04

CITY W.O. NO. G-1043

DRAWING NO. 2008-031 (1)

SHEET 7 OF 25

MISSION VIEW ESTATES - GRADING PLAN

W.O. No. 2020-13

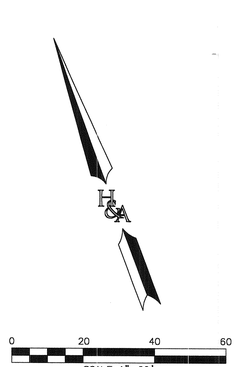
AS-BUILT

R: \0722\Eng\ROUGH GRADING\0722RG07.dwg[ ]Jan-23-2008: 13: 50

SEE SHEET NO. 5

SEE SHEET NO. 6

SEE SHEET NO. 9



BROW DITCH CONFLUENCE SEE DETAIL SHEET 4

BRUSH MANAGEMENT ZONE 2

LOT B

20' PADRE DAM MUNICIPAL WATER DISTRICT EASEMENT PER FINAL MAP 15207

BRITT PLACE

10" PVC WATER

6" PVC SEWER

TYPE A-4 C.O.

SD LINE "A" PER SHEET 12

PROPOSED PRIVATE 10' STORM DRAIN EASEMENT

BRUSH MANAGEMENT ZONE 1

SD LINE "A-1" PER SHEET 11

VISTA RETAINING WALL PER SHEET 59

TYPE F INLET

BRUSH MANAGEMENT ZONE 2

LOT A

LOT C

185.75'

HUNSAKER & ASSOCIATES
SAN DIEGO, INC.
PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 FX(858)558-1414

REGISTERED PROFESSIONAL ENGINEER RAYMOND L. MARTIN NO. 48670 EXP. 6/30/08 CIVIL STATE OF CALIFORNIA

CONSTRUCTION RECORD	REFERENCES	DATE	BY	REVISIONS	ACPTD
CONTRACTOR		3/13/08	H&A	1\ "AS-BUILT"	JT
INSPECTOR					
DATE COMPLETED					

BENCH MARK

STATION ROS 11252 POINT 1002 STANDARD STREET WELL MONUMENT WITH CENTER PUNCH AT THE CENTERLINE OF MISSION GORGE ROAD & RANCHO FANITA DRIVE. ELEV=331.37 M.S.L.D.

SCALE	DESIGNED BY	DRAWN BY	CHECKED BY
HORIZ: 1"=20'	PLANS PREPARED UNDER THE SUPERVISION OF		
VERT: NONE	RAYMOND L. MARTIN	DATE 12/5/07	
	RCE NO. 48670	EXPIRES 08/30/08	

REVIEWED 1-30-08
BY CITY PROJECT ENGINEER

CITY OF SANTEE — DEPARTMENT OF DEVELOPMENT SERVICES

ROUGH GRADING PLAN FOR:

MISSION VIEW ESTATES

TM 2006-04

CITY W.O. NO. G-1043

DRAWING NO. 2008-032 1

SHEET 8 OF 63

MISSION VIEW ESTATES - GRADING PLAN

W.O. No. 2020-13

AS-BUILT

R:\0722\bEng\ROUGH GRADING\0722RGD8.dwg[ ]Jan-23-2008: 13: 50

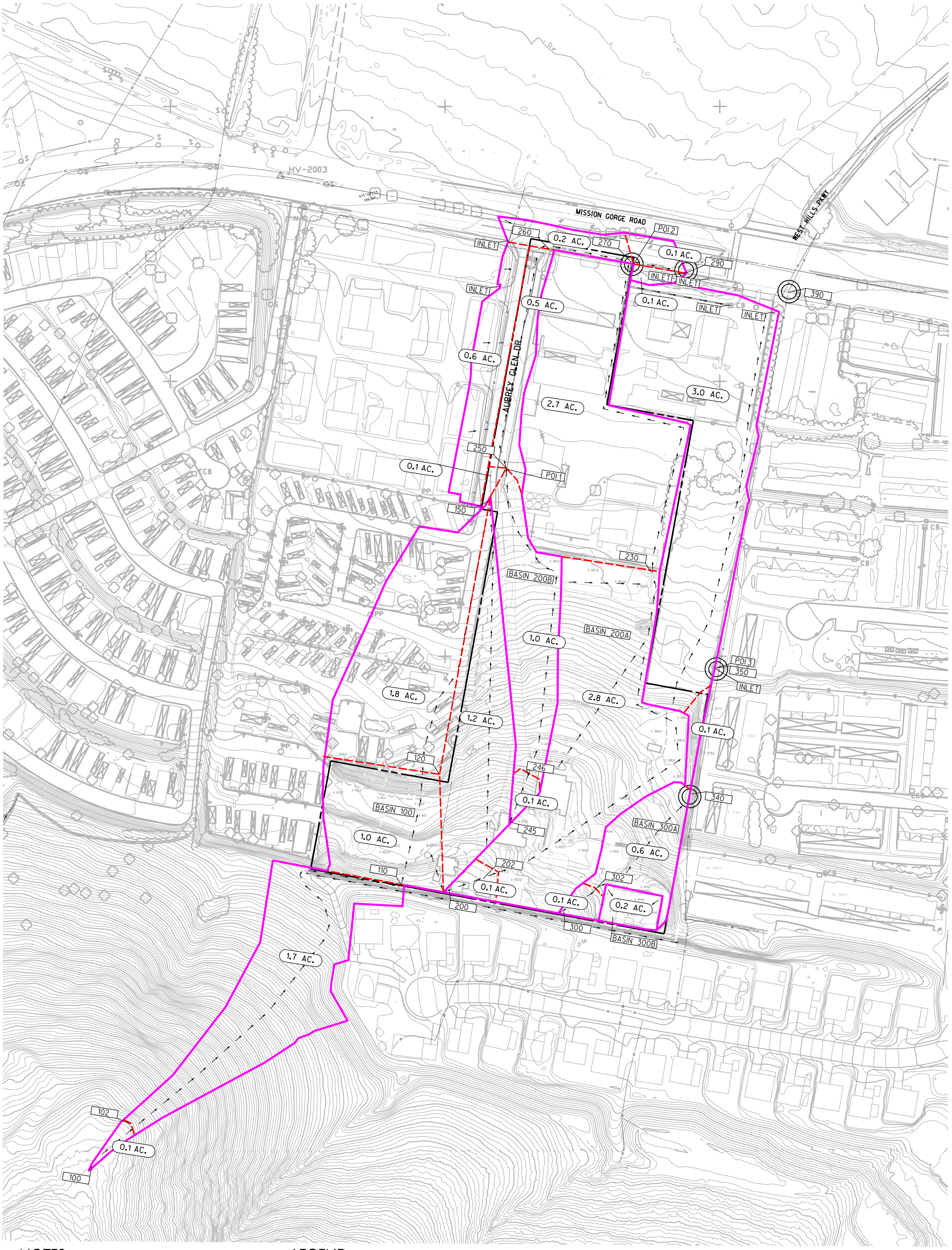
MAP POCKET 1

Drainage Study Map

for

Laurel Heights

[Pre-Project]



NOTES

1. FLOW FROM BASIN 100 AND BASIN 200B DISCHARGE TO AUBREY GLEN ROAD AND FLOW ALONG THE EASTERN EDGE. RUN OFF THEN TURNS EAST ON MISSION GORGE ROAD AND IS COLLECTED BY INLETS AND CONVEYED TO THE SAN DIEGO RIVER.

LEGEND

- MAJOR DRAINAGE BASIN BOUNDARY
- SUB BASIN DRAINAGE BOUNDARY
- XX.X AC. — DRAINAGE AREA
- XXXXX — DRAINAGE NODE ID
- POINT OF INTEREST (POI)
- FLOW PATH

80 40 0 80 160 240

GRAPHIC SCALE 1" = 80'

DRAINAGE STUDY MAP FOR LAUREL HEIGHTS (PRE-PROJECT)

September 18, 2020
Revised: January 13, 2021
Revised: March 17, 2021
Revised: April 15, 2021

J-19137-A

RICK ENGINEERING COMPANY
San Diego
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619-291-0707
(FAX) 619-291-4165
rickengineering.com
Riverside - Orange - Sacramento - San Luis Obispo - Phoenix - Tucson - Denver

J-19137-A

© 2021 Rick Engineering Company

C:\RICK\Projects\19000\19137A_Hisen\WaterResources\19137Adrnge01.cgn
C:\RICK\Projects\19000\19137A_Hisen\WaterResources\SD CorpStds 2005_discript
20-APR-2021 10:00

NOT FOR CONSTRUCTION - EXHIBIT FOR DRAINAGE STUDY ONLY

MAP POCKET 2

Drainage Study Map

for

Laurel Heights

[Post-Project]

POI 2 - BASIN 200 - NODE 270		
PRE-PROJECT	POST-PROJECT	POST MITIGATED
A = 5.6 ac Q_100 = 16.0 cfs Tc = 9.6 min	A = 8.2 ac Q_100 = 26.0 cfs Tc = 8.8 min	A = 8.2 ac Q_100 = 13.2 cfs Tc = 15.6 min

BASIN 100 & BASIN 200 - NODE 290		
PRE-PROJECT	POST-PROJECT	POST MITIGATED
A = 14.1 ac Q_100 = 36.6 cfs Tc = 9.9 min	A = 14.7 ac Q_100 = 42.6 cfs Tc = 9.0 min	A = 14.7 ac Q_100 = 23.7 cfs Tc = 17.2 min

BASIN 300	
PRE-PROJECT	POST-PROJECT
A = 4.0 ac Q_100 = 14.5 cfs Tc = 7.3 min	A = 3.4 ac Q_100 = 7.9 cfs Tc = 13.2 min

POI 1 - NODE 250	
PRE-PROJECT	POST-PROJECT
A = 7.0 ac Q_100 = 12.3 cfs Tc = 14.5 min	A = 5.1 ac Q_100 = 8.7 cfs Tc = 15.0 min

NODE 135 TO 150
POST-PROJECT
A = 2.4 ac Q_100 = 2.7 cfs Tc = 14.8 min

EMERGENCY OVERFLOW WILL BE DIRECTED DOWN THE DRIVEWAY TO AUBREY GLEN DR

BASIN 200 - NODE 230		
PRE-PROJECT	POST-PROJECT	POST MITIGATED
A = 2.9 ac Q_100 = 7.3 cfs Tc = 8.2 min	A = 5.6 ac Q_100 = 19.5 cfs Tc = 7.5 min	A = 5.6 ac Q_100 = 7.2 cfs Tc = 14.0 min

BASIN 300	
PRE-PROJECT	POST-PROJECT
A = 1.0 ac Q_100 = 3.7 cfs Tc = 6.4 min	A = 0.5 ac Q_100 = 0.6 cfs Tc = 11.6 min

POI 3 - NODE 340	
PRE-PROJECT	POST-PROJECT
A = 0.9 ac Q_100 = 3.7 cfs Tc = 6.0 min	A = 0.5 ac Q_100 = 0.6 cfs Tc = 10.8 min

NOTES

1. FLOWS FROM BASIN 100 DISCHARGE TO A COBBLE SWALE LOCATED ON THE NORTHWEST CORNER OF THE SITE. FLOWS THEN DISCHARGE ALONG THE EASTERN EDGE OF AUBREY GLEN DRIVE WHERE THEY ARE CONVEYED NORTH, TURNING EAST ON MISSION GORGE ROAD, THE FLOWS ARE COLLECTED BY INLETS, MIMICKING THE EXISTING CONDITION DRAINAGE PATTERNS OF THE SITE.

2. THE UNDERGROUND VAULT DETAINS FLOWS FROM BASIN 200 SO THAT THE DISCHARGE ONTO MISSION GORGE ROAD AT POI 2 IS MITIGATED BACK TO EXISTING CONDITION FLOWRATES.

LEGEND

- MAJOR DRAINAGE BASIN BOUNDARY
- SUB BASIN DRAINAGE BOUNDARY
- XX.X AC. — DRAINAGE AREA
- XXXXX — DRAINAGE NODE ID
- POINT OF INTEREST (POI)
- FLOW PATH

80 40 0 80 160 240

GRAPHIC SCALE 1" = 80'

DRAINAGE STUDY MAP FOR LAUREL HEIGHTS (POST-PROJECT)

September 18, 2020
Revised: January 13, 2021
Revised: March 17, 2021
Revised: April 15, 2021

J-19137-A

RICK ENGINEERING COMPANY
San Diego
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619-291-0707
(FAX) 619-291-4165
rickengineering.com
Riverside - Orange - Sacramento - San Luis Obispo - Phoenix - Tucson - Denver

J-19137-A

© 2021 Rick Engineering Company

C:\RICK\Projects\19000\19137A_Hisen\WaterResources\19137Apropos01.dgn
C:\RICK\Projects\19000\19137A_Hisen\WaterResources\SD CorpStds 2005.dscrlpt
20-APR-2021 10:03

NOT FOR CONSTRUCTION - EXHIBIT FOR DRAINAGE STUDY ONLY