Appendix G
Drainage Report

DRAINAGE STUDY
for
Jericho Road

APN: 486-670-18-00
City of La Mesa, California

Prepared for:

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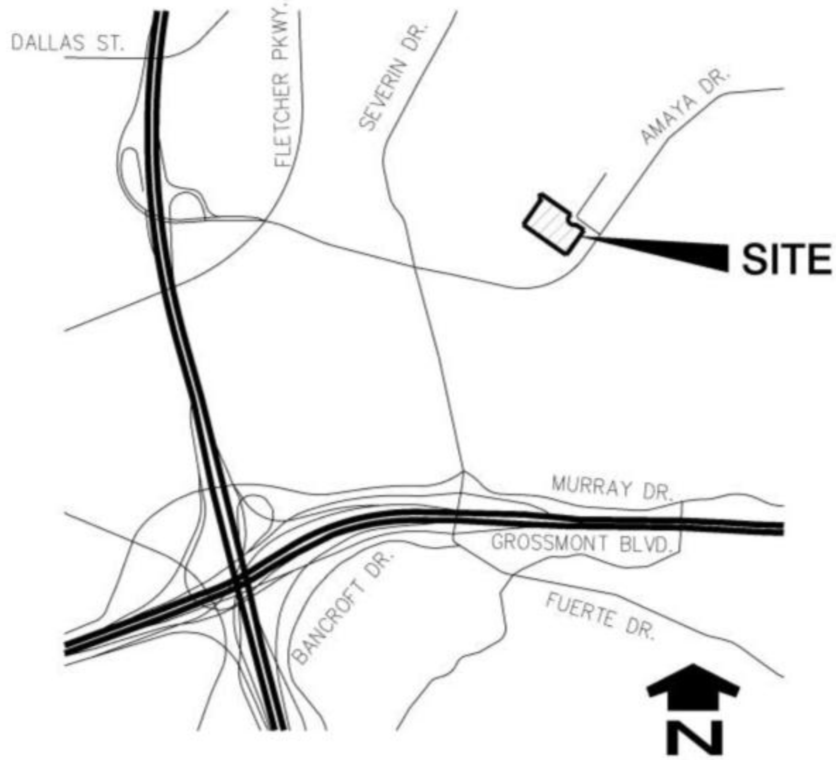
EXECUTIVE SUMMARY

1.1 Introduction

The Jericho Road project is situated at 9407 Jericho Road, on the southwest corner of the intersection of Amaya Drive and Broadmoor Drive, in the City of La Mesa, California. The 3.49-acre site, which is rectangular in shape, is bordered to the south by an existing multi-family residential community, and to the east, north, and west by existing single-family residential properties. A vicinity map is included below to better illustrate the project site's location.



VICINITY MAP

NOT TO SCALE

The redevelopment plan involves the removal of the current structures and proposes the construction of multi-family residences with 73 attached units with associated improvements. The site will also include a tot lot, open spaces, sidewalks, and private driveways. The lots are connected by private drives which are accessible via Jericho Rd on the east boundary.

This report aims to evaluate the existing and projected hydrological conditions in relation to the site's development. The proposed stormwater management infrastructure encompasses storm drain, curb inlets, catch basins, curb outlets, brow ditches, and an underground storage facility designed for water quality control, hydromodification, and detention (detention system made from corrugated metal pipe (CMP) or equivalent). The storage facility will utilize a proprietary biofiltration modular wetland system downstream of it to provide water quality treatment.

This drainage study will address:

- 100-Year Peak Flowrates for Existing and Developed Conditions
- Detention Calculations

A separate report has been prepared to address water quality and HMP flow control requirements for the project. Refer to the *Stormwater Quality Management Plan (SWQMP) for Jericho Road* prepared by Hunsaker & Associates San Diego, Inc. (July 2023).

1.2 Existing Conditions

Under existing conditions, the Jericho Road site primarily serves as a church, comprising several buildings, a concrete parking area, an asphalt basketball court, and numerous open grassy spaces. Surface water flow from the northwestern portions of the site tends to move south towards an 18" x 18" catch basin situated within a sediment basin. This flow is subsequently directed eastward via an existing 3" HDPE drain, where it converges with runoff from the northeastern section before discharging onto Jericho Road through existing curb outlets.

Surface water from the southern part of the site flows south towards a 12" x 12" catch basin and then to an existing curb outlet (D25) on Jericho Road. This runoff then merges with additional runoff from the southeastern part of the site and is funneled south through the Jericho Road and Amaya Drive curb and gutter systems.

After approximately 815 feet, this runoff is intercepted by an inlet situated across from Water Street on Amaya Drive. The captured flow enters an existing 39” R.C.P. under Amaya Drive and continues southeast under Water Street, is then discharged via an existing 3.2’ X 5’ box culvert into an existing channel north of Janfred Road. This runoff persists in its westward direction, entering a 10' X 5' R.C.B located southwest of the intersection of Amaya Drive and Severin Drive, then to dual 72” pipe which outlets into an existing open channel. This channel continues westerly to Alvarado Creek, eventually flowing into the lower San Diego River. The river subsequently empties into the Pacific Ocean at the mouth of the San Diego River.

The runoff coefficient corresponding to the site was calculated considering the respective hydrologic soil type and imperviousness, following the guidelines set forth in Table 3-1 of the San Diego County Hydrology Manual 2003. The computed runoff coefficient for the on-site drainage area associated with 48% imperviousness and Soil type D is approximately 0.618, while the slope contributes a runoff factor of 0.35.

Table 1 below summarizes the 100-year existing condition peak flow at the downstream project boundary. Supporting calculations for the data presented in

Table 1 is located in Chapter 3 of this report. The corresponding hydrology map (Exhibit 1) is located in Chapter 5.

TABLE 1
Summary of Existing Conditions

Outlet Location	Node Number	Area (Acres)	Runoff Factor C	Tc (min)	I (in\hr)	V100* Velocity (ft\sec)	100 Year Peak Flow (cfs)
East	206	3.6	0.618	10.68	4.7	8.97	9.42

1.3 Proposed Condition

The Jericho Road project proposes the construction of nine structure buildings comprising a total of 73 attached units, along with various associated improvements. In addition to the residential units, the site will feature amenities such as a tot lot, open spaces, sidewalks, and private driveways.

Runoff from the developed site will be collected by the proposed inlets and routed via the proposed storm drain system towards two underground storage facilities, such as CMP or equivalent structures. The underground storage facilities serve to meet hydromodification and peak flow attenuation requirements and to store the water quality designed captured volume and releasing it at a specified flow rate to a downstream modular wetland, which will address water quality concerns. To thoroughly address water quality and HMP flow control requirements for the Jericho Road project, a separate report titled "Stormwater Quality Management Plan (SWQMP)" has been prepared by Hunsaker & Associates San Diego, Inc. (July 2023).

The peak flow will be routed through their respective vault riser structure and discharged into the proposed 18” storm drain near the entrance of the site. The runoff will then confluence with the offsite existing 39” storm drain on Amaya Drive and flow south similarly to existing conditions to eventually discharge into the San Diego River which empties into the Pacific Ocean.

The peak flow has been calculated in accordance with the San Diego County Hydrology Manual, County of San Diego Department of Public Works Flood Control Division, June 2003.

In the Rational Method Analysis, a runoff coefficient of 0.80 has been utilized for the southern drainage area (100 Node series), considering an 81% imperviousness factor. For the northern drainage area (200 Node series), a runoff coefficient of 0.82 was used, considering an 85% imperviousness factor. These runoff coefficients were calculated assuming a fully developed site and soil type D for the entire project site, following the formula in section 3.1.2 from the San Diego County Hydrology Manual 2003.

$$C = 0.90 \times (\%\ \text{Impervious}) + C_p \times (1 - \%\ \text{Impervious})$$

Where: C_p = Pervious Coefficient Runoff Value for the soil type (shown in Table 3-1 as Undisturbed Natural Terrain/Permanent Open Space, 0% Impervious).

Cp = 0.35 from table 3-1 San Diego County Hydrology Manual 2003.

Table2 below summarizes the proposed Q100 flow at the discharge point.

TABLE 2 - Summary of Proposed Condition Peak Flows for Jericho Road

Outlet Location	Node Number	Area (Acres)	Runoff Factor	Tc (min)	I (in\hr)	V100* Velocity (ft\sec)		100 Year Peak Flow (cfs)	100 Year Peak Flow Mitigated (cfs)
						Pr.	PR. Mit.		
Jericho Road	126	3.6	0.82	7.29	4.396	17.39	14.39	15.15	8.07

1.4 Conclusion

TABLE 3 – Summary of Existing Vs Proposed Site Runoff

Outlet Location	Node Number	Area (Acres)		Runoff Factor		Tc (min)		I (in\hr)		V100* Velocity (ft\sec)			100 Year Peak Flow (cfs)		
		Ex.	Pr.	Ex.	Pr.	Ex.	Pr.	Ex.	Pr.	Ex.	Pr.	PR. Mit.	Ex.	Pr.	PR. Mit.
Jericho Road	126 – PR 206 - EX	3.6	3.6	0.618	0.82	9.65	7.29	4.7	4.4	8.97	17.39	14.39	9.66	15.15	8.07

*Ex.: Existing Conditions
Pr.: Proposed Conditions
Mit.: Mitigated Conditions

Location	Area (Acres)	100 Year Peak Flow (cfs)
Existing	3.6	9.66
Proposed (Mitigated)	3.6	8.07

DIFFERENCE	**+0.0**	**-1.59**

Per Table 3 above, there was no charge in area from existing to proposed, the 100-year peak flow is decrease by 1.59 cfs., and velocity is increased by 5.42 fps as a result of mitigation the peak flows in proposed conditions within the underground storage facility.

<u>CEQA Issues of Concern:</u>

- The project will not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion on- or off-site.

-Discharge point (outlet) from the storm drain system is designed to discharge to an existing storm drain systems at existing flow rates.

- The project will not substantially alter the existing drainage pattern of the site or area compared to existing conditions, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site, or substantial erosion or siltation on- or off-site. As discussed in the previous bulleted item, the site discharge is conveyed to the existing storm drain system through the proposed storm drain.

Underground storage with adequate outlet structure was proposed to decrease peak discharge from the site in developed conditions to be equal or less than existing values (ie.to meet downstream storm drain design flow rate. Thus, the site provides adequate drainage and protection against flooding, and downstream properties are not impacted by the project.

- The project will not create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems. The proposed peak flow has been mitigated within the underground storage facility to be equal to or less than the capacity of the existing storm drain that we connecting to. See discussion in the previous two bulleted items.

- The project will not place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate map or other flood hazard delineation map, including County Floodplain maps. The project is not located within a floodplain or floodway; resultantly no County Floodplain Map exists for the project location.

- The project will not place, within a 100-year flood hazard area, structures which would impede or redirect flood flows. See previous bulleted item for further details.

- The project will not expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam on-site or off-site. No levee or dam exists on-site or up-stream of the site.

1.5 References

"San Diego County Hydrology Manual". Department of Public Works – Flood Control Division. County of San Diego, California. Revised April 2003.

"*San Diego Regional Standard Drawings*". Section D – Drainage Systems.

"Stormwater Quality Management Plan (SWQMP) for Jericho Road" prepared by Hunsaker & Associates San Diego, Inc. (July 2023)

CHAPTER 2

METHODOLOGY & MODEL DEVELOPMENT

2.1- Rational Method Hydrologic Analysis

2.1 Rational Method Hydrologic Analysis

Computer Software Package – AES-2015

Design Storm - 100-Year Return Interval

Land Use –High Density residential in Developed Areas

Soil Type - Hydrologic soil group D was assumed for all areas. Group D soils have very slow infiltration rates when thoroughly wetted. Consisting chiefly of clay soils with a high swelling potential, soils with a high permanent water table, soils with clay pan or clay layer at or near the surface, and shallow soils over nearly impervious materials, Group D soils have a very slow rate of water transmission.

Runoff Coefficient – In accordance with the County of San Diego standards, High Density residential areas was designated a runoff coefficient of 0.80 for the southern drainage area (100 Node series), considering an 81% imperviousness factor, and 0.82 was for the northern drainage area (200 Node series), considering an 85% imperviousness factor. These runoff coefficients were calculated assuming a fully developed site and soil type D for the entire project site, following the formula in section 3.1.2 from the San Diego County Hydrology Manual 2003.

Cp = 0.35 from table 3-1 San Diego County Hydrology Manual 2003.

For existing condition, the runoff coefficient corresponding to the site was calculated considering the respective hydrologic soil type and imperviousness. The computed runoff coefficient for the on-site drainage area associated with 48% imperviousness and Soil type D is 0.618, while the slope contributes a runoff factor of 0.35 (0% impervious).

Method of Analysis – The Rational Method is the most widely used hydrologic model for estimating peak runoff rates. Applied to small urban and semi-urban areas with drainage areas less than 1.0 square mile, the Rational Method relates storm rainfall intensity, a runoff coefficient, and drainage area to peak runoff rate. This relationship is expressed by the equation:

Q = CIA, where:

Q = The peak runoff rate in cubic feet per second at the point of analysis.

C = A runoff coefficient representing the area - averaged ratio of runoff to rainfall intensity.

I = The time-averaged rainfall intensity in inches per hour corresponding to the time of concentration.

A = The drainage basin area in acres.

To perform a node-link study, the total watershed area is divided into subareas which discharge at designated nodes.

The procedure for the subarea summation model is as follows:

1. Subdivide the watershed into an initial subarea (generally 1 lot) and subsequent subareas, which are generally less than 10 acres in size. Assign upstream and downstream node numbers to each subarea.
2. Estimate an initial T_c by using the appropriate nomograph or overland flow velocity estimation.
3. Using the initial T_c, determine the corresponding values of I. Then Q = C I A.
4. Using Q, estimate the travel time between this node and the next by Manning's equation as applied to the particular channel or conduit linking the two nodes. Then, repeat the calculation for Q based on the revised intensity (which is a function of the revised time of concentration)

The nodes are joined together by links, which may be street gutter flows, drainage swales, drainage ditches, pipe flow, or various channel flows. The AES-2003 computer subarea menu is as follows:

SUBAREA HYDROLOGIC PROCESS

1. Confluence analysis at node.
2. Initial subarea analysis (including time of concentration calculation).
3. Pipeflow travel time (computer estimated).
4. Pipeflow travel time (user specified).
5. Trapezoidal channel travel time.
6. Street flow analysis through subarea.
7. User - specified information at node.
8. Addition of subarea runoff to main line.
9. V-gutter flow through area.
10. Copy main stream data to memory bank
11. Confluence main stream data with a memory bank
12. Clear a memory bank

At the confluence point of two or more basins, the following procedure is used to combine peak flow rates to account for differences in the basin's times of concentration. This adjustment is based on the assumption that each basin's hydrographs are triangular in shape.

(1). If the collection streams have the same times of concentration, then the Q values are directly summed,

$Q_p = Q_a + Q_b$; $T_p = T_a = T_b$

(2). If the collection streams have different times of concentration, the smaller of the tributary Q values may be adjusted as follows:

(i). The most frequent case is where the collection stream with the longer time of concentration has the larger Q. The smaller Q value is adjusted by the ratio of rainfall intensities.

$Q_p = Q_a + Q_b \ (I_a/I_b); \ T_p = T_a$

(ii). In some cases, the collection stream with the shorter time of concentration has the larger Q. Then the smaller Q is adjusted by a ratio of the T values.

$Q_p = Q_b + Q_a \ (T_b/T_a); \ T_p = T_b$

2.2 Detention Analysis

In order to provide adequate flood control, increases in peak flow rates at the outfall location for this site were mitigated using the design of the two proposed storage facilities (CMPs). To model the mitigation within these CMPs, we utilized the RickRatHydro software as input for SWMM 5.1.

RickRatHydro was used to produce an inflow hydrograph for the project drainage areas, based on the area, time of concentration, P6 value, runoff coefficient, and peak flow rate.

The resulting inflow hydrograph was then imported into SWMM and routed through the proposed CMPs using an iterative approach. This involved utilizing outlet structures with rating curves and storage nodes with storage curves until the final outlet structure provided a flow rate to the outfall that matched or was lower than the flow rate during existing conditions. Additionally, we ensured that the water surface elevation remained below the top of the CMPs with a minimum of 1-foot freeboard for added safety. Through these measures, we aimed to effectively manage flood control for the site.

2.3- County of San Diego Design Criteria

2.3 SELECTION OF HYDROLOGIC METHOD AND DESIGN CRITERIA

Design Frequency – The flood frequency for determining the design storm discharge is 50 years for drainage that is upstream of any major roadway and 100 years frequency for all design storms at a major roadway, crossing the major roadway and thereafter. The 50-year storm flows shall be contained within the pipe and not encroach into the travel lane. For the 100-year storm this includes allowing one lane of a four-lane road (four or more lanes) to be used for conveyance without encroaching onto private property outside the dedicated street right-of-way. Natural channels that remain natural within private property are excluded from the right-of-way guideline.

Design Method – The choice of method to determine flows (discharge) shall be based on the size of the watershed area. For an area 0 to approximately 1 square mile the Rational Method or the Modified Rational Method shall be used. For watershed areas larger than 1 square mile the NRCS hydrologic method shall be used. Please check with the governing agency for any variations to these guidelines.

SECTION 3
RATIONAL METHOD AND MODIFIED RATIONAL METHOD

3.1 THE RATIONAL METHOD

The Rational Method (RM) is a mathematical formula used to determine the maximum runoff rate from a given rainfall. It has particular application in urban storm drainage, where it is used to estimate peak runoff rates from small urban and rural watersheds for the design of storm drains and small drainage structures. The RM is recommended for analyzing the runoff response from drainage areas up to approximately 1 square mile in size. It should not be used in instances where there is a junction of independent drainage systems or for drainage areas greater than approximately 1 square mile in size. In these instances, the Modified Rational Method (MRM) should be used for junctions of independent drainage systems in watersheds up to approximately 1 square mile in size (see Section 3.4); or the NRCS Hydrologic Method should be used for watersheds greater than approximately 1 square mile in size (see Section 4).

The RM can be applied using any design storm frequency (e.g., 100-year, 50-year, 10-year, etc.). The local agency determines the design storm frequency that must be used based on the type of project and specific local requirements. A discussion of design storm frequency is provided in Section 2.3 of this manual. A procedure has been developed that converts the 6-hour and 24-hour precipitation isopluvial map data to an Intensity-Duration curve that can be used for the rainfall intensity in the RM formula as shown in Figure 3-1. The RM is applicable to a 6-hour storm duration because the procedure uses Intensity-Duration Design Charts that are based on a 6-hour storm duration.

3.1.1 Rational Method Formula

The RM formula estimates the peak rate of runoff at any location in a watershed as a function of the drainage area (A), runoff coefficient (C), and rainfall intensity (I) for a duration equal to the time of concentration (T_c), which is the time required for water to flow from the most remote point of the basin to the location being analyzed. The RM formula is expressed as follows:

$$Q = C\,I\,A$$

Where:
- Q = peak discharge, in cubic feet per second (cfs)
- C = runoff coefficient, proportion of the rainfall that runs off the surface (no units)
- I = average rainfall intensity for a duration equal to the T_c for the area, in inches per hour (Note: If the computed T_c is less than 5 minutes, use 5 minutes for computing the peak discharge, Q)
- A = drainage area contributing to the design location, in acres

Combining the units for the expression CIA yields:

$$\left(\frac{1\,\text{acre}\times\text{inch}}{\text{hour}}\right)\left(\frac{43{,}560\,\text{ft}^2}{\text{acre}}\right)\left(\frac{1\,\text{foot}}{12\,\text{inches}}\right)\left(\frac{1\,\text{hour}}{3{,}600\,\text{seconds}}\right) \Rightarrow 1.008\,\text{cfs}$$

For practical purposes the unit conversion coefficient difference of 0.8% can be ignored.

The RM formula is based on the assumption that for constant rainfall intensity, the peak discharge rate at a point will occur when the raindrop that falls at the most upstream point in the tributary drainage basin arrives at the point of interest.

Unlike the MRM (discussed in Section 3.4) or the NRCS hydrologic method (discussed in Section 4), the RM does not create hydrographs and therefore does not add separate subarea hydrographs at collection points. Instead, the RM develops peak discharges in the main line by increasing the T_c as flow travels downstream.

Characteristics of, or assumptions inherent to, the RM are listed below:

- The discharge flow rate resulting from any I is maximum when the I lasts as long as or longer than the T_c.

- The storm frequency of peak discharges is the same as that of I for the given T_c.

- The fraction of rainfall that becomes runoff (or the runoff coefficient, C) is independent of I or precipitation zone number (PZN) condition (PZN Condition is discussed in Section 4.1.2.4).

- The peak rate of runoff is the only information produced by using the RM.

3.1.2 Runoff Coefficient

Table 3-1 lists the estimated runoff coefficients for urban areas. The concepts related to the runoff coefficient were evaluated in a report entitled *Evaluation, Rational Method "C" Values* (Hill, 2002) that was reviewed by the Hydrology Manual Committee. The Report is available at San Diego County Department of Public Works, Flood Control Section and on the San Diego County Department of Public Works web page.

The runoff coefficients are based on land use and soil type. Soil type can be determined from the soil type map provided in Appendix A. An appropriate runoff coefficient (C) for each type of land use in the subarea should be selected from this table and multiplied by the percentage of the total area (A) included in that class. The sum of the products for all land uses is the weighted runoff coefficient (Σ[CA]). Good engineering judgment should be used when applying the values presented in Table 3-1, as adjustments to these values may be appropriate based on site-specific characteristics. In any event, the impervious percentage (% Impervious) as given in the table, for any area, shall govern the selected value for C. The runoff coefficient can also be calculated for an area based on soil type and impervious percentage using the following formula:

$$C = 0.90 \times (\%\ \text{Impervious}) + C_p \times (1 - \%\ \text{Impervious})$$

Where: C_p = Pervious Coefficient Runoff Value for the soil type (shown in Table 3-1 as Undisturbed Natural Terrain/Permanent Open Space, 0% Impervious). Soil type can be determined from the soil type map provided in Appendix A.

The values in Table 3-1 are typical for most urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the local agency.

3.1.3 Rainfall Intensity

The rainfall intensity (I) is the rainfall in inches per hour (in/hr) for a duration equal to the T_c for a selected storm frequency. Once a particular storm frequency has been selected for design and a T_c calculated for the drainage area, the rainfall intensity can be determined from the Intensity-Duration Design Chart (Figure 3-1). The 6-hour storm rainfall amount (P_6) and the 24-hour storm rainfall amount (P_{24}) for the selected storm frequency are also needed for calculation of I. P_6 and P_{24} can be read from the isopluvial maps provided in Appendix B. An Intensity-Duration Design Chart applicable to all areas within San Diego County is provided as Figure 3-1. Figure 3-2 provides an example of use of the Intensity-Duration Design Chart. Intensity can also be calculated using the following equation:

$$I = 7.44\, P_6\, D^{-0.645}$$

Where: P_6 = adjusted 6-hour storm rainfall amount (see discussion below)
D = duration in minutes (use T_c)

Note: This equation applies only to the 6-hour storm rainfall amount (i.e., P_6 cannot be changed to P_{24} to calculate a 24-hour intensity using this equation).

The Intensity-Duration Design Chart and the equation are for the 6-hour storm rainfall amount. In general, P_6 for the selected frequency should be between 45% and 65% of P_{24} for the selected frequency. If P_6 is not within 45% to 65% of P_{24}, P_6 should be increased or decreased as necessary to meet this criteria. The isopluvial lines are based on precipitation gauge data. At the time that the isopluvial lines were created, the majority of precipitation gauges in San Diego County were read daily, and these readings yielded 24-hour precipitation data. Some 6-hour data were available from the few recording gauges distributed throughout the County at that time; however, some 6-hour data were extrapolated. Therefore, the 24-hour precipitation data for San Diego County are considered to be more reliable.

3.1.4 Time of Concentration

The Time of Concentration (T_c) is the time required for runoff to flow from the most remote part of the drainage area to the point of interest. The T_c is composed of two components: initial time of concentration (T_i) and travel time (T_t). Methods of computation for T_i and T_t are discussed below. The T_i is the time required for runoff to travel across the surface of the most remote subarea in the study, or "initial subarea." Guidelines for designating the initial subarea are provided within the discussion of computation of T_i. The T_t is the time required for the runoff to flow in a watercourse (e.g., swale, channel, gutter, pipe) or series of watercourses from the initial subarea to the point of interest. For the RM, the T_c at any point within the drainage area is given by:

$$T_c = T_i + T_t$$

Methods of calculation differ for natural watersheds (nonurbanized) and for urban drainage systems. When analyzing storm drain systems, the designer must consider the possibility that an existing natural watershed may become urbanized during the useful life of the storm drain system. Future land uses must be used for T_c and runoff calculations, and can be determined from the local Community General Plan.

3.1.4.1 Initial Time of Concentration

The initial time of concentration is typically based on sheet flow at the upstream end of a drainage basin. The Overland Time of Flow (Figure 3-3) is approximated by an equation developed by the Federal Aviation Agency (FAA) for analyzing flow on runaways (FAA, 1970). The usual runway configuration consists of a crown, like most freeways, with sloping pavement that directs flow to either side of the runway. This type of flow is uniform in the direction perpendicular to the velocity and is very shallow. Since these depths are ¼ of an inch (more or less) in magnitude, the relative roughness is high. Some higher relative roughness values for overland flow are presented in Table 3.5 of the *HEC-1 Flood Hydrograph Package User's Manual* (USACE, 1990).

The sheet flow that is predicted by the FAA equation is limited to conditions that are similar to runway topography. Some considerations that limit the extent to which the FAA equation applies are identified below:

- Urban Areas – This "runway type" runoff includes:
  1) Flat roofs, sloping at 1% ±
  2) Parking lots at the extreme upstream drainage basin boundary (at the "ridge" of a catchment area).
     Even a parking lot is limited in the amounts of sheet flow. Parked or moving vehicles would "break-up" the sheet flow, concentrating runoff into streams that are not characteristic of sheet flow.
  3) Driveways are constructed at the upstream end of catchment areas in some developments. However, if flow from a roof is directed to a driveway through a downspout or other conveyance mechanism, flow would be concentrated.
  4) Flat slopes are prone to meandering flow that tends to be disrupted by minor irregularities and obstructions. Maximum Overland Flow lengths are shorter for the flatter slopes (see Table 3-2).

- Rural or Natural Areas - The FAA equation is applicable to these conditions since (.5% to 10%) slopes that are uniform in width of flow have slow velocities consistent with the equation. Irregularities in terrain limit the length of application.
  1) Most hills and ridge lines have a relatively flat area near the drainage divide. However, with flat slopes of .5% ±, minor irregularities would cause flow to concentrate into streams.
  2) Parks, lawns and other vegetated areas would have slow velocities that are consistent with the FAA Equation.

The concepts related to the initial time of concentration were evaluated in a report entitled *Initial Time of Concentration, Analysis of Parameters* (Hill, 2002) that was reviewed by the Hydrology Manual Committee. The Report is available at San Diego County Department of Public Works, Flood Control Section and on the San Diego County Department of Public Works web page.

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

Table 3-2

MAXIMUM OVERLAND FLOW LENGTH (L_M) & INITIAL TIME OF CONCENTRATION (T_i)

Element*	DU/ Acre	.5%		1%		2%		3%		5%		10%	
		L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

*See Table 3-1 for more detailed description

3.1.4.1A Planning Considerations

The purpose of most hydrology studies is to develop flood flow values for areas that are not at the upstream end of the basin. Another example is the Master Plan, which is usually completed before the actual detailed design of lots, streets, etc. are accomplished. In these situations it is necessary that the initial time of concentration be determined without detailed information about flow patterns.

To provide guidance for the initial time of concentration design parameters, Table 3-2 includes the Land Use Elements and other variables related to the Time of Concentration. The table development included a review of the typical "layout" of the different Land Use Elements and related flow patterns and consideration of the extent of the sheet flow regimen, the effect of ponding, the significance to the drainage basin, downstream effects, etc.

3.1.4.1B Computation Criteria

(a) Developed Drainage Areas With Overland Flow - T_i may be obtained directly from the chart, "Rational Formula – Overland Time of Flow Nomograph," shown in Figure 3-3 or from Table 3-2. This chart is based on the Federal Aviation Agency (FAA) equation (FAA, 1970). For the short rain durations (<15 minutes) involved, intensities are high but the depth of flooding is limited and much of the runoff is stored temporarily in the overland flow and in shallow ponded areas. In developed areas, overland flow is limited to lengths given in Table 3-2. Beyond these distances, flow tends to become concentrated into streets, gutters, swales, ditches, etc.

(b) Natural Or Rural Watersheds – These areas usually have an initial subarea at the upstream end with sheet flow. The sheet flow length is limited to 50 to 100 feet as specified in Table 3-2. The Overland Time of Flow Nomograph, Figure 3-3, can be used to obtain T_i. The initial time of concentration can excessively affect the magnitude of flow further downstream in the drainage basin. For instance, variations in the initial time of concentration for an initial subarea of one acre can change the flow further downstream where the area is 400 acres by 100%. Therefore, the initial time of concentration is limited (see Table 3-2).

The Rational Method procedure included in the original Hydrology Manual (1971) and Design and Procedure Manual (1968) included a 10 minute value to be added to the initial time of concentration developed through the Kirpich Formula (see Figure 3-4) for a natural watershed. That procedure is superceded by the procedure above to use Table 3-2 or Figure 3-3 to determine T_i for the appropriate sheet flow length of the initial subarea. The values for natural watersheds given in Table 3-2 vary from 13 to 7 minutes, depending on slope. If the total length of the initial subarea is greater than the maximum length allowable based on Table 3-2, add the travel time based on the Kirpich formula for the remaining length of the initial subarea.

3.1.4.2 Travel Time

The T_t is the time required for the runoff to flow in a watercourse (e.g., swale, channel, gutter, pipe) or series of watercourses from the initial subarea to the point of interest. The T_t is computed by dividing the length of the flow path by the computed flow velocity. Since the velocity normally changes as a result of each change in flow rate or slope, such as at an inlet or grade break, the total T_t must be computed as the sum of the T_t's for each section of the flow path. Use Figure 3-6 to estimate time of travel for street gutter flow. Velocity in a channel can be estimated by using the nomograph shown in Figure 3-7 (Manning's Equation Nomograph).

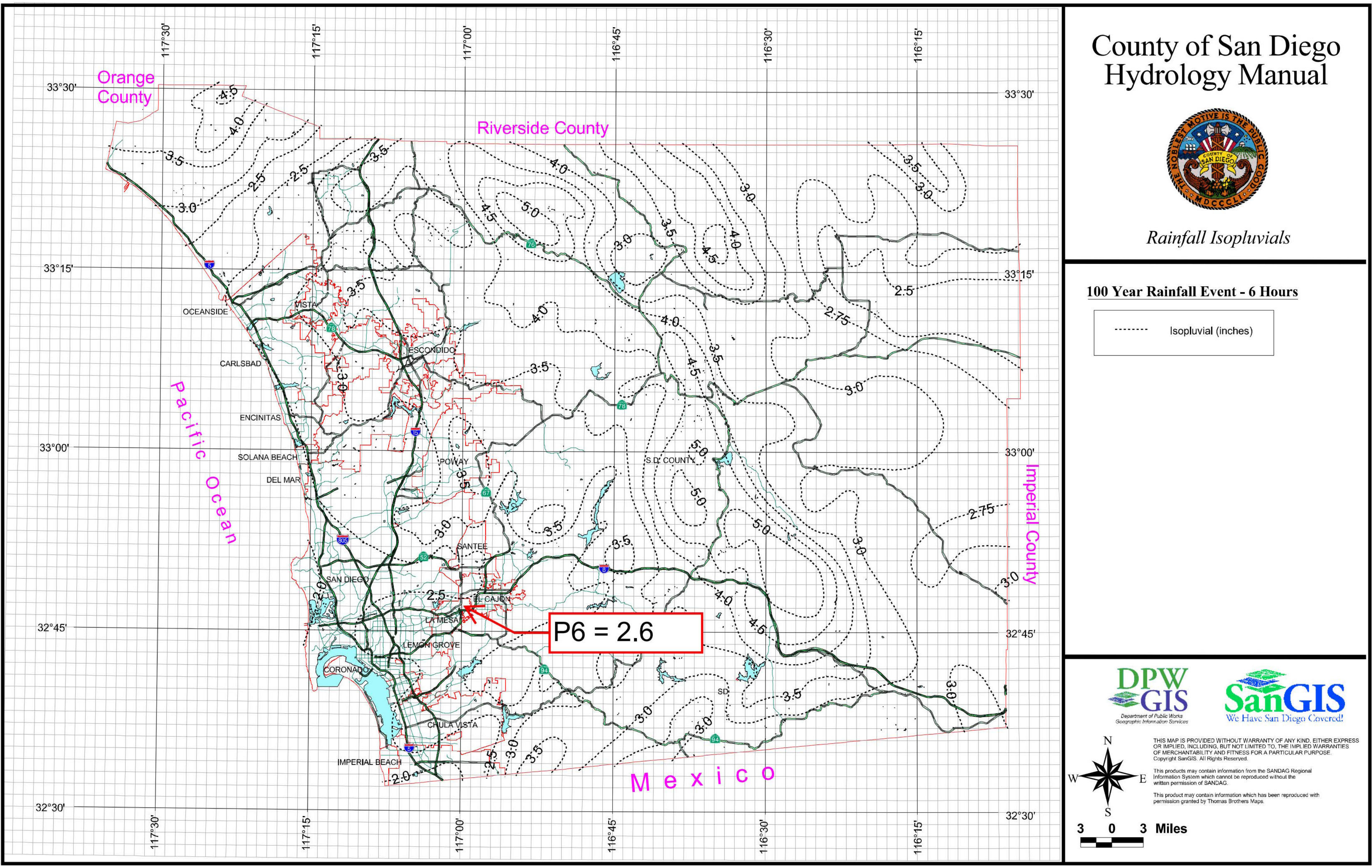
(a) Natural Watersheds – This includes rural, ranch, and agricultural areas with natural channels. Obtain T_t directly from the Kirpich nomograph in Figure 3-4 or from the equation. This nomograph requires values for length and change in elevation along the effective slope line for the subarea. See Figure 3-5 for a representation of the effective slope line.

This nomograph is based on the Kirpich formula, which was developed with data from agricultural watersheds ranging from 1.25 to 112 acres in area, 350 to 4,000 feet in length, and 2.7 to 8.8% slope (Kirpich, 1940). A maximum length of 4,000 feet should be used for the subarea length. Typically, as the flow length increases, the depth of flow will increase, and therefore it is considered a concentration of flow at points beyond lengths listed in Figure 3-2. However, because the Kirpich formula has been shown to be applicable for watersheds up to 4,000 feet in length (Kirpich, 1940), a subarea may be designated with a length up to 4,000 feet provided the topography and slope of the natural channel are generally uniform.

Justification needs to be included with this calculation showing that the watershed will remain natural forever. Examples include areas located in the Multiple Species Conservation Plan (MSCP), areas designated as open space or rural in a community's General Plan, and Cleveland National Forest.

(b) Urban Watersheds - Flow through a closed conduit where no additional flow can enter the system during the travel, length, velocity and T_t are determined using the peak flow in the conduit. In cases where the conduit is not closed and additional flow from a contributing subarea is added to the total flow during travel (e.g., street flow in a gutter), calculation of velocity and T_t is performed using an assumed average flow based on the total area (including upstream subareas) contributing to the point of interest. The Manning equation is usually used to determine velocity. Discharges for small watersheds typically range from 2 to 3 cfs per acre, depending on land use, drainage area, and slope and rainfall intensity.

Note: The MRM should be used to calculate the peak discharge when there is a junction from independent subareas into the drainage system.



County of San Diego
Hydrology Manual
Rainfall Isopluvials
100 Year Rainfall Event - 6 Hours
Isopluvial (inches)
P6 = 2.6
Orange County
Riverside County
Imperial County
Pacific Ocean
Mexico
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
33°30'
33°15'
33°00'
32°45'
32°30'
117°30'
117°15'
117°00'
116°45'
116°30'
116°15'
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.
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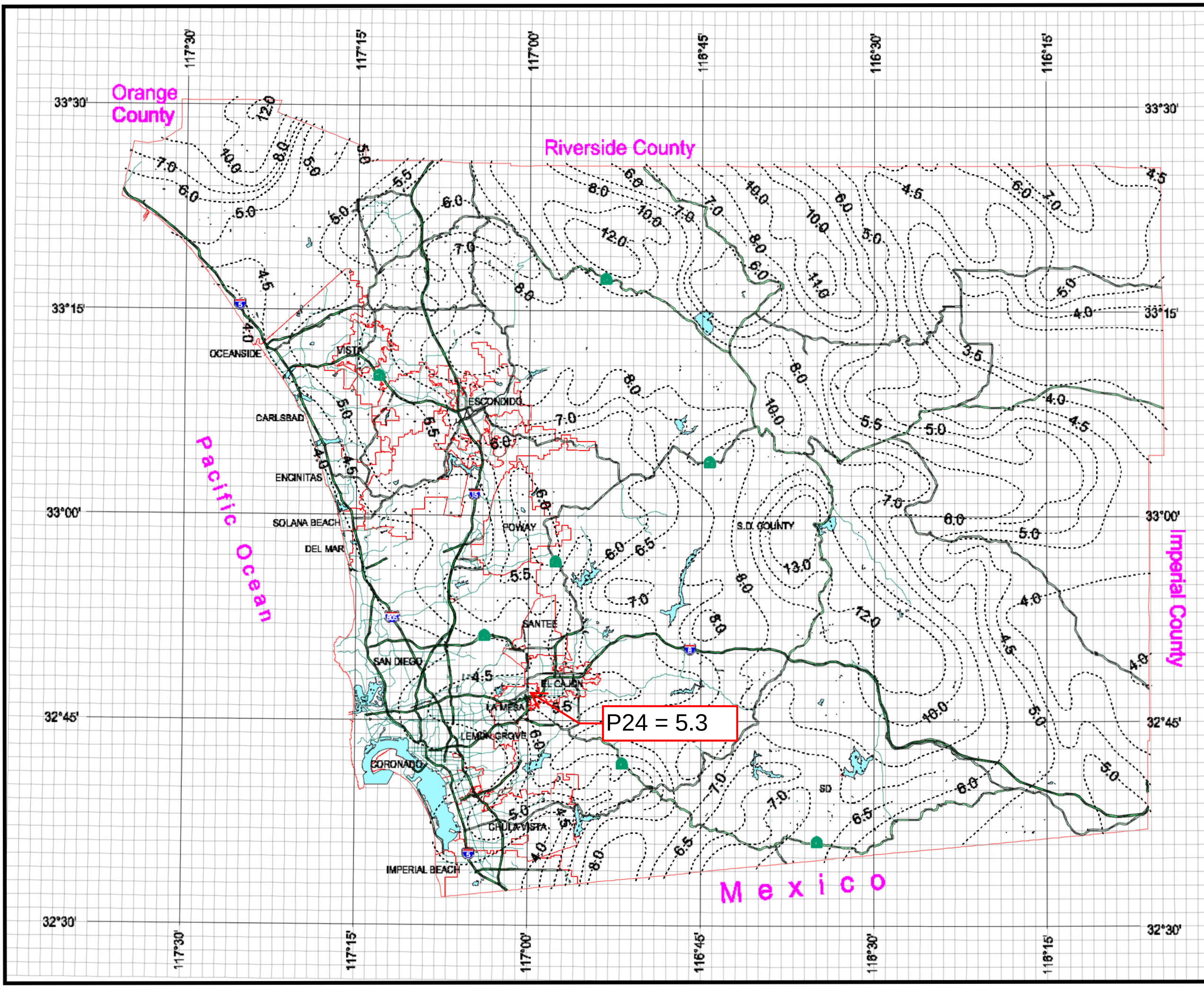
N
E
S
W
3 0 3 Miles



County of San Diego Hydrology Manual

Rainfall Isopluvials

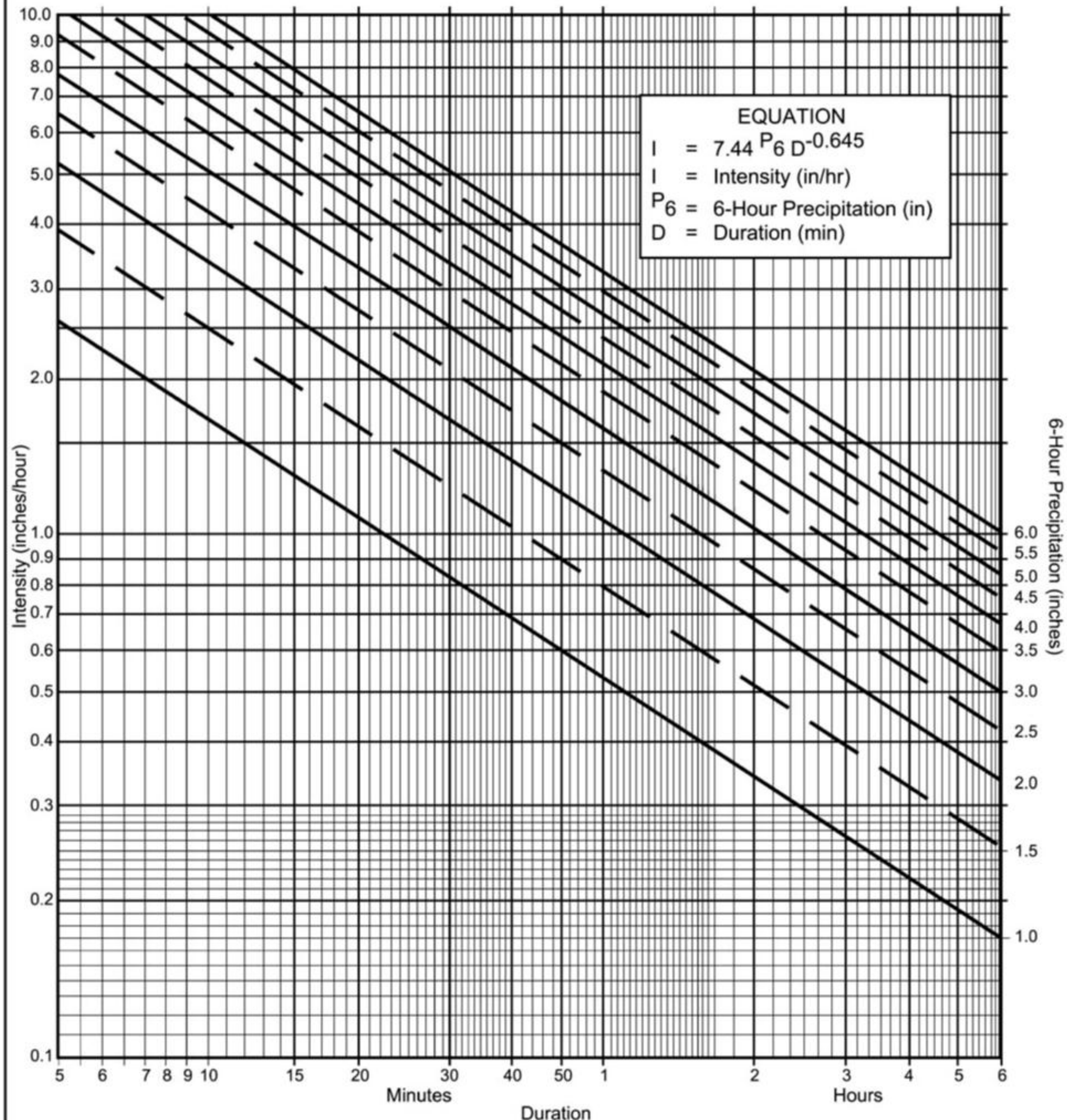
100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

DPW GIS
Department of Public Works Geographic Information Services

SanGIS
We Have San Diego Covered!

3 0 3 Miles



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 applicable 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 = 2.6 in., P_{24} = 5.3, $\frac{P_6}{P_{24}}$ = 49 %$^{(2)}$

(c) Adjusted $P_6^{(2)}$ = 2.6 in.

(d) t_x = ______ min.

(e) I = ______ in./hr.

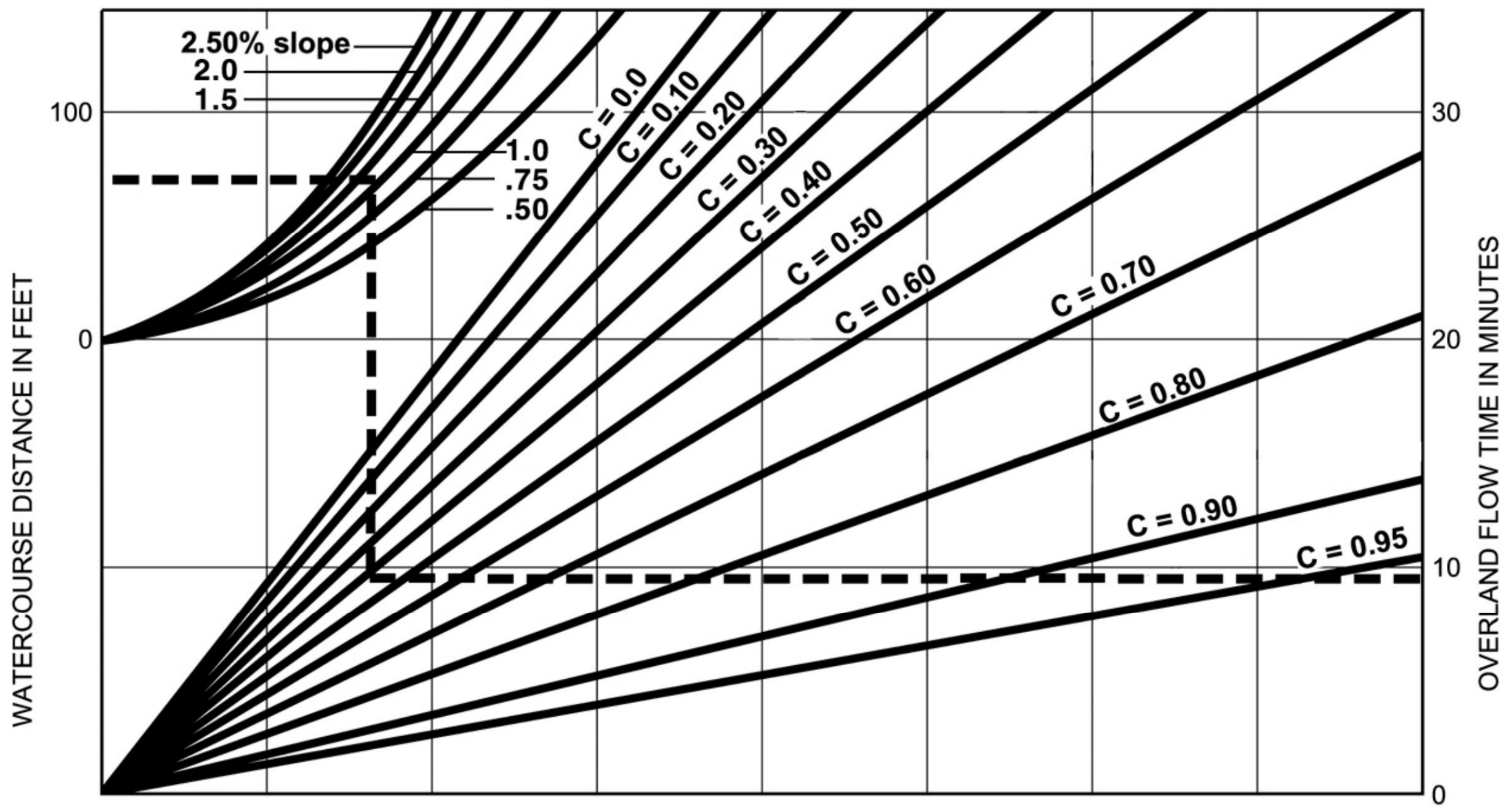
Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

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



EXAMPLE:

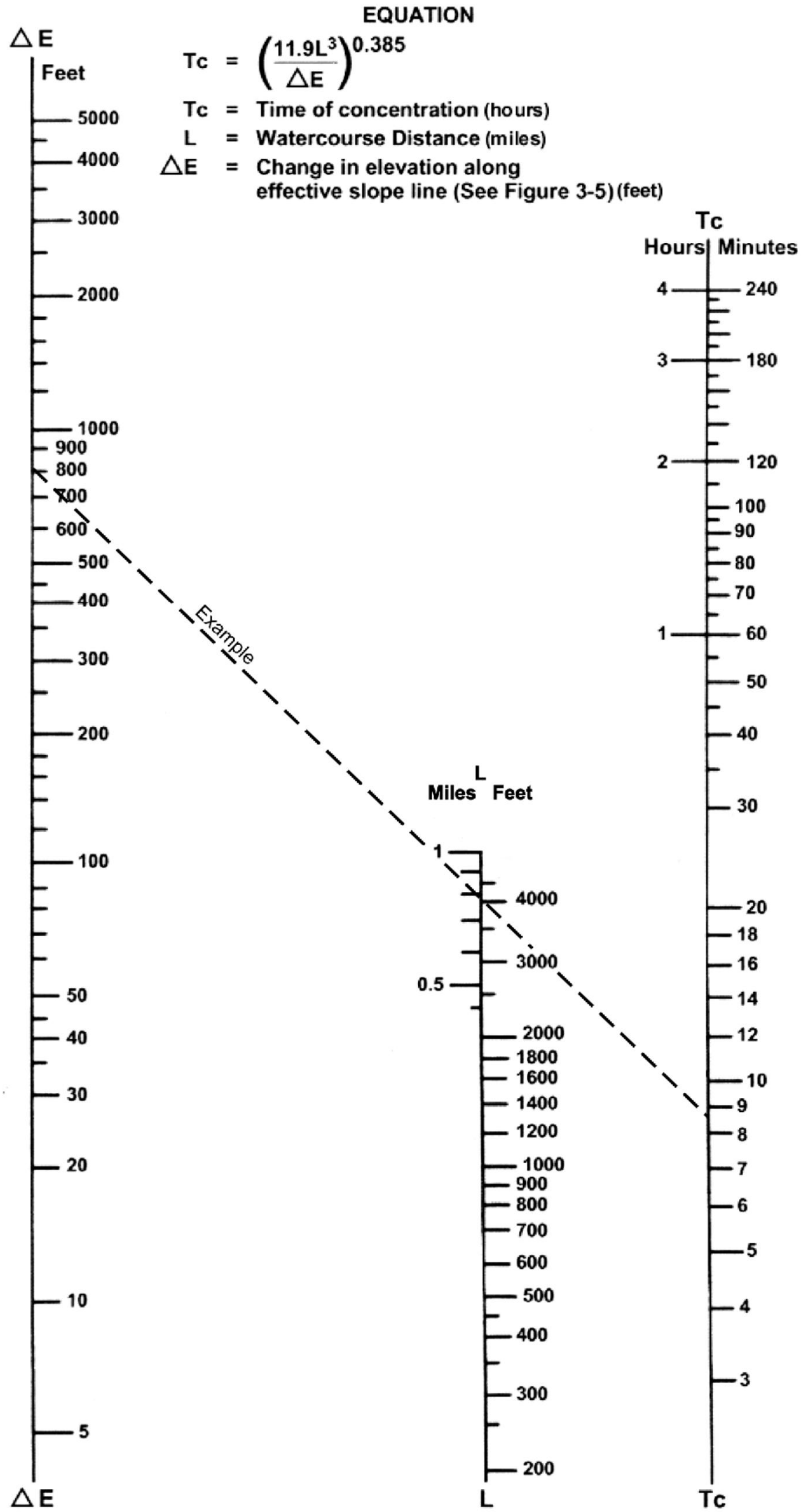
Given: Watercourse Distance (D) = 70 Feet
Slope (s) = 1.3%
Runoff Coefficient (C) = 0.41
Overland Flow Time (T) = 9.5 Minutes

$$T = \frac{1.8\,(1.1\text{-}C)\sqrt{D}}{\sqrt[3]{s}}$$

SOURCE: Airport Drainage, Federal Aviation Administration, 1965

FIGURE 3-3

Rational Formula - Overland Time of Flow Nomograph

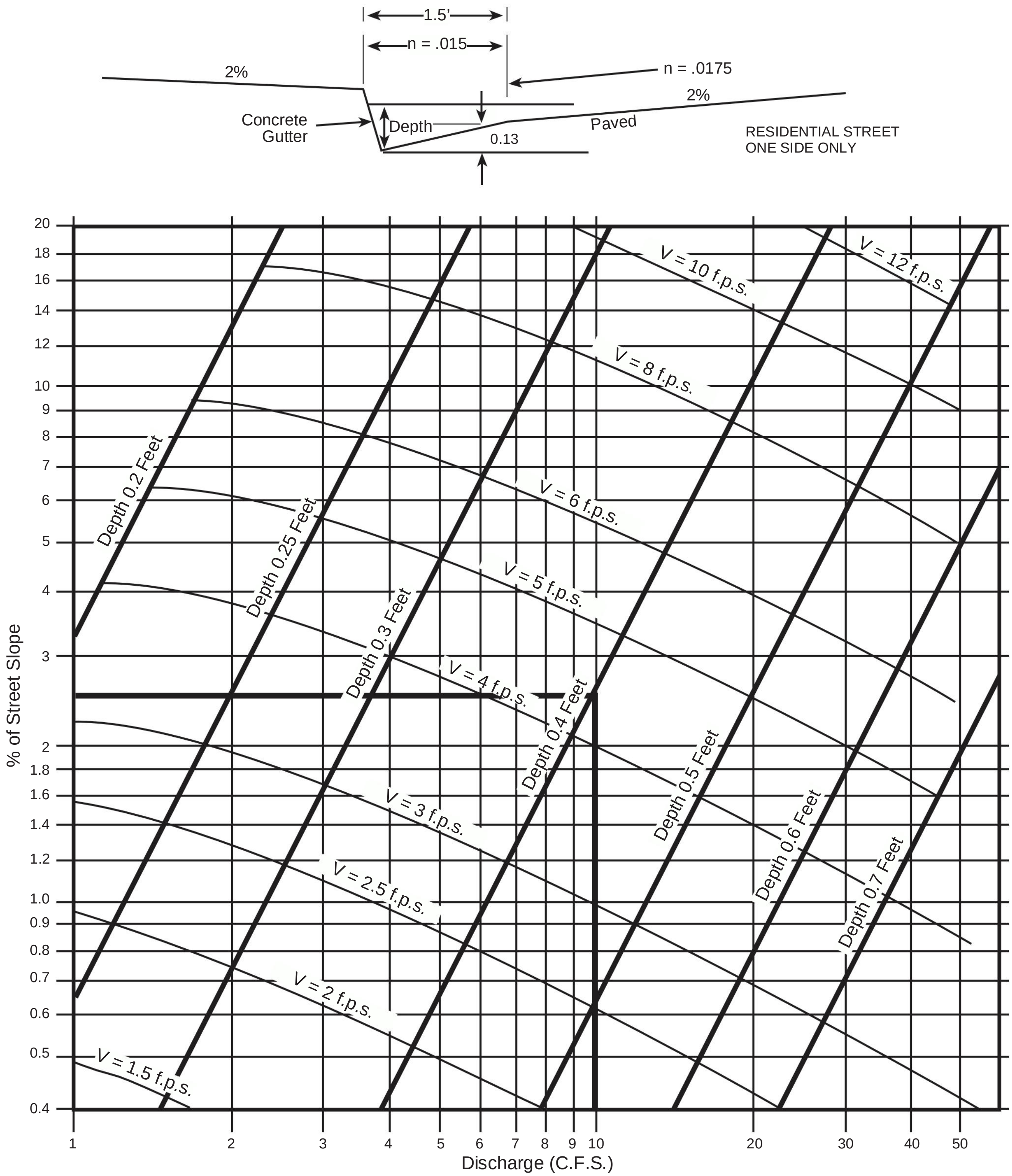


SOURCE: California Division of Highways (1941) and Kirpich (1940)

FIGURE

3-4

Nomograph for Determination of
Time of Concentration (Tc) or Travel Time (Tt) for Natural Watersheds



EXAMPLE:
Given: Q = 10   S = 2.5%
Chart gives: Depth = 0.4, Velocity = 4.4 f.p.s.

SOURCE: San Diego County Department of Special District Services Design Manual

Gutter and Roadway Discharge - Velocity Chart

FIGURE 3-6

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Slopes in existing and proposed conditions

Land Use		...fficient "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)	Re...	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Re...	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)	Neig...	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	Gene...	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.)	Li...	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	Ge...	95	0.87	0.87	0.87	0.87

Existing Condition, on site, 48% Imp

0.618

Proposed Condition, 81% Imp, 100 Node Series

0.80

Proposed Condition, 85% imp, 200 Node Series

*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

CHAPTER 3

RATIONAL METHOD HYDROLOGIC ANALYSIS (AES MODEL OUTPUT)

3.1 – Existing and Developed Condition AES Model Output

100 Year Existing Flow

– Existing Condition AES Model Output

100-YR EXISTING

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2015 Advanced Engineering Software (aes)
             Ver. 22.0 Release Date: 07/01/2015  License ID 1239

                           Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* JERICHO ROAD                                                             *
* 100-YEAR EXISTING CONDITION HYDROLOGICAL MODEL                            *
* JULY 25, 2023                                                            *
 **************************************************************************

  FILE NAME: R:\1790\HYD\TM\DR\CALCS\AES\EX\100EX.DAT
  TIME/DATE OF STUDY: 10:56 07/28/2023
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.600
  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   24.0     19.0    0.020/0.020/0.020   0.50    1.50 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.*

+--------------------------------------------------------------------------+
| START OF SITE FLOW TO NODE 53                                            |
```

```
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .6180
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    653.00
  DOWNSTREAM ELEVATION(FEET) =    652.50
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.729
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    50.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.172
  SUBAREA RUNOFF(CFS) =      0.58
  TOTAL AREA(ACRES) =      0.18   TOTAL RUNOFF(CFS) =      0.58

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    104.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    652.50  DOWNSTREAM(FEET) =    650.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   190.08   CHANNEL SLOPE =  0.0084
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =  62.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.449
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .6180
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.56
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   2.04
  Tc(MIN.) =    9.76
  SUBAREA AREA(ACRES) =     0.96       SUBAREA RUNOFF(CFS) =    2.64
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.618
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       3.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   1.73
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     290.08 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   648.00  DOWNSTREAM(FEET) =   645.50
  FLOW LENGTH(FEET) =   270.46   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.95
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.13
  PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =   10.68
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =     560.54 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.200
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .6180
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6180
  SUBAREA AREA(ACRES) =    0.91   SUBAREA RUNOFF(CFS) =    2.36
  TOTAL AREA(ACRES) =        2.0   TOTAL RUNOFF(CFS) =       5.32
  TC(MIN.) =   10.68

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    206.00 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.) =   10.68
  RAINFALL INTENSITY(INCH/HR) =   4.20
  TOTAL STREAM AREA(ACRES) =     2.05
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.32

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    202.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .6180
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
```

```
  UPSTREAM ELEVATION(FEET) =    649.39
  DOWNSTREAM ELEVATION(FEET) =    648.22
  ELEVATION DIFFERENCE(FEET) =      1.17
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.467
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    61.70
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.803
  SUBAREA RUNOFF(CFS) =      0.36
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.36

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    204.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    648.39  DOWNSTREAM(FEET) =    648.22
  CHANNEL LENGTH THRU SUBAREA(FEET) =   100.00   CHANNEL SLOPE =  0.0017
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.791
   *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .6180
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.83
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.75
  AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   2.24
  Tc(MIN.) =    8.70
  SUBAREA AREA(ACRES) =     0.99       SUBAREA RUNOFF(CFS) =    2.93
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.618
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       3.23

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   0.85
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =     200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    206.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   642.00  DOWNSTREAM(FEET) =   635.00
  FLOW LENGTH(FEET) =    48.80   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.29
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.23
```

```
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    8.76
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =     248.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 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) =   4.77
  TOTAL STREAM AREA(ACRES) =     1.09
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.23

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.32    10.68        4.200          2.05
      2        3.23     8.76        4.770          1.09

  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        7.60     8.76       4.770
      2        8.16    10.68       4.200

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       8.16   Tc(MIN.) =   10.68
  TOTAL AREA(ACRES) =        3.1
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    206.00 =     560.54 FEET.

+--------------------------------------------------------------------------+
| THE FOLLOWING NODES 208, 300, 302, AND 304 WILL COMINGLE WITH FLOWS AT   |
| THE EXISTING INLET                                                       |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    206.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.200
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .6180
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6180
  SUBAREA AREA(ACRES) =    0.13   SUBAREA RUNOFF(CFS) =    0.34
  TOTAL AREA(ACRES) =        3.3   TOTAL RUNOFF(CFS) =       8.49
  TC(MIN.) =   10.68

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    206.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.200
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .6180
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6180
  SUBAREA AREA(ACRES) =    0.14   SUBAREA RUNOFF(CFS) =    0.36
  TOTAL AREA(ACRES) =        3.4   TOTAL RUNOFF(CFS) =       8.85
  TC(MIN.) =   10.68

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    206.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.200
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .6180
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6180
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.26
  TOTAL AREA(ACRES) =        3.5   TOTAL RUNOFF(CFS) =       9.11
  TC(MIN.) =   10.68

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    206.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.200
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .6180
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6180
  SUBAREA AREA(ACRES) =    0.12   SUBAREA RUNOFF(CFS) =    0.31
  TOTAL AREA(ACRES) =        3.6   TOTAL RUNOFF(CFS) =       9.42
  TC(MIN.) =   10.68
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        3.6  TC(MIN.) =     10.68
  PEAK FLOW RATE(CFS)   =       9.42
============================================================================
```

===
END OF RATIONAL METHOD ANALYSIS

100 Year Unmitigated Flow

– Developed Condition AES Model Output

100-YR PROPOSED

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

             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                          2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2015 Advanced Engineering Software (aes)
              Ver. 22.0 Release Date: 07/01/2015  License ID 1239

                              Analysis prepared by:






 ************************** DESCRIPTION OF STUDY **************************
* JERICHO ROAD                                                             *
* 100-YEAR DEVELOPED CONDITION HYDROLOGICAL MODEL                          *
* JULY 25, 2023                                                            *
 **************************************************************************

  FILE NAME: R:\1790\HYD\TM\DR\CALCS\AES\PR\100PR.DAT
  TIME/DATE OF STUDY: 12:19 07/27/2023
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.600
  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   24.0     19.0    0.020/0.020/0.020   0.50    1.50 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):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    91.38
  UPSTREAM ELEVATION(FEET) =    653.00
  DOWNSTREAM ELEVATION(FEET) =    651.51
  ELEVATION DIFFERENCE(FEET) =      1.49
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.874
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    71.31
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.55
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.55

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    104.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  651.51  DOWNSTREAM ELEVATION(FEET) =  649.31
  STREET LENGTH(FEET) =   115.02   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 =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.07
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    2.62
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.54
  STREET FLOW TRAVEL TIME(MIN.) =   0.78   Tc(MIN.) =    4.66
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =  88
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.800
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    1.04
  TOTAL AREA(ACRES) =        0.3        PEAK FLOW RATE(CFS) =      1.59

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   4.26
  FLOW VELOCITY(FEET/SEC.) =  2.40   DEPTH*VELOCITY(FT*FT/SEC.) =   0.61
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     206.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    108.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   644.37  DOWNSTREAM(FEET) =   641.40
  FLOW LENGTH(FEET) =   198.10   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.86
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.59
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =    5.34
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =     404.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 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.) =    5.34
  RAINFALL INTENSITY(INCH/HR) =   6.57
  TOTAL STREAM AREA(ACRES) =     0.29
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.59

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    83.90
  UPSTREAM ELEVATION(FEET) =    653.00
  DOWNSTREAM ELEVATION(FEET) =    652.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.166
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH =    66.92
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.55
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.55

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    114.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  652.00  DOWNSTREAM ELEVATION(FEET) =  646.31
  STREET LENGTH(FEET) =   349.10   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 =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.57
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    7.41
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.55
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.81
  STREET FLOW TRAVEL TIME(MIN.) =   2.28   Tc(MIN.) =    6.45
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.815
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.800
  SUBAREA AREA(ACRES) =    1.29      SUBAREA RUNOFF(CFS) =    6.00
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       6.47

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =   9.86
  FLOW VELOCITY(FEET/SEC.) =  2.88   DEPTH*VELOCITY(FT*FT/SEC.) =   1.05
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    114.00 =     433.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    108.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   641.60  DOWNSTREAM(FEET) =   641.40
  FLOW LENGTH(FEET) =    15.50   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.75
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.47
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.49
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    108.00 =     448.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 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.) =    6.49
  RAINFALL INTENSITY(INCH/HR) =   5.79
  TOTAL STREAM AREA(ACRES) =     1.39
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.47

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1         1.59     5.34        6.568          0.29
     2         6.47     6.49        5.792          1.39

  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         6.91     5.34       6.568
     2         7.87     6.49       5.792

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.87   Tc(MIN.) =    6.49
  TOTAL AREA(ACRES) =        1.7
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    108.00 =     448.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    116.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   641.40  DOWNSTREAM(FEET) =   638.40
  FLOW LENGTH(FEET) =   192.60   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.60
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.87
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =    6.91
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    116.00 =     641.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 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.) =    6.91
  RAINFALL INTENSITY(INCH/HR) =   5.56
  TOTAL STREAM AREA(ACRES) =     1.68
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.87

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    120.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.49
  UPSTREAM ELEVATION(FEET) =    652.00
  DOWNSTREAM ELEVATION(FEET) =    645.18
  ELEVATION DIFFERENCE(FEET) =      6.82
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.499
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.55
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.55

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    122.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  645.18  DOWNSTREAM ELEVATION(FEET) =  643.21
  STREET LENGTH(FEET) =    82.76   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 =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.70
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    4.15
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.64
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.66
  STREET FLOW TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =    3.02
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.800
  SUBAREA AREA(ACRES) =    0.42      SUBAREA RUNOFF(CFS) =    2.30
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       2.85

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   5.93
  FLOW VELOCITY(FEET/SEC.) =  2.84   DEPTH*VELOCITY(FT*FT/SEC.) =   0.82
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    122.00 =     168.25 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    116.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   638.50  DOWNSTREAM(FEET) =   638.40
  FLOW LENGTH(FEET) =     7.80   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.) =   5.43
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.85
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    3.05
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    116.00 =     176.05 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 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.) =    3.05
  RAINFALL INTENSITY(INCH/HR) =   6.85
  TOTAL STREAM AREA(ACRES) =    0.52
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.85

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        7.87     6.91        5.561          1.68
      2        2.85     3.05        6.850          0.52

  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        9.24     3.05       6.850
      2       10.18     6.91       5.561

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      10.18   Tc(MIN.) =    6.91
  TOTAL AREA(ACRES) =        2.2
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    116.00 =     641.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    124.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   638.40  DOWNSTREAM(FEET) =   638.00
  FLOW LENGTH(FEET) =    18.14   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.22
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.18
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.94
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    124.00 =     659.24 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    124.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    202.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8200
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    78.66
  UPSTREAM ELEVATION(FEET) =    659.00
  DOWNSTREAM ELEVATION(FEET) =    653.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.271
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.56
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.56

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    204.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  653.00  DOWNSTREAM ELEVATION(FEET) =  645.06
  STREET LENGTH(FEET) =   314.49   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 =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    4.32
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.76
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.70
  STREET FLOW TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =    4.17
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8200
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.820
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    2.58
  TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       3.15

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   6.15
```

```
  FLOW VELOCITY(FEET/SEC.) =  2.98   DEPTH*VELOCITY(FT*FT/SEC.) =   0.87
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =     393.15 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    206.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   640.40  DOWNSTREAM(FEET) =   640.00
  FLOW LENGTH(FEET) =    36.20   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.28
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.15
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    4.29
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =     429.35 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 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.) =    4.29
  RAINFALL INTENSITY(INCH/HR) =   6.85
  TOTAL STREAM AREA(ACRES) =     0.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.15

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    210.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8200
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    77.70
  UPSTREAM ELEVATION(FEET) =    653.00
  DOWNSTREAM ELEVATION(FEET) =    652.10
  ELEVATION DIFFERENCE(FEET) =      0.90
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.916
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    66.58
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.56
```

```
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.56

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    206.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  652.10  DOWNSTREAM ELEVATION(FEET) =  645.20
  STREET LENGTH(FEET) =   254.25   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 =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    2.79
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.88
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
  STREET FLOW TRAVEL TIME(MIN.) =   1.47   Tc(MIN.) =    5.39
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.529
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8200
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.820
  SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    1.50
  TOTAL AREA(ACRES) =        0.4        PEAK FLOW RATE(CFS) =       2.03

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   4.54
  FLOW VELOCITY(FEET/SEC.) =  2.86   DEPTH*VELOCITY(FT*FT/SEC.) =   0.74
  LONGEST FLOWPATH FROM NODE    208.00 TO NODE    206.00 =     331.95 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 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.) =    5.39
  RAINFALL INTENSITY(INCH/HR) =   6.53
```

```
  TOTAL STREAM AREA(ACRES) =     0.38
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.03

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        3.15     4.29        6.850          0.56
      2        2.03     5.39        6.529          0.38

  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        4.76     4.29       6.850
      2        5.03     5.39       6.529

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.03   Tc(MIN.) =    5.39
  TOTAL AREA(ACRES) =        0.9
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =     429.35 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    124.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   640.00  DOWNSTREAM(FEET) =   638.00
  FLOW LENGTH(FEET) =    50.80   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.) =   9.53
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.03
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    5.47
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    124.00 =     480.15 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    124.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        5.03     5.47       6.461        0.94
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    124.00 =     480.15 FEET.
```

```
  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       10.18     6.94       5.544        2.20
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    124.00 =     659.24 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      13.06       5.47        6.461
      2      14.50       6.94        5.544

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      14.50   Tc(MIN.) =    6.94
  TOTAL AREA(ACRES) =        3.1

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    124.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    126.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   638.00  DOWNSTREAM(FEET) =   605.27
  FLOW LENGTH(FEET) =   358.47   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.23
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.50
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =    7.29
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    126.00 =    1017.71 FEET.

+--------------------------------------------------------------------------+
| OFFSITE DRAINAGE                                                         |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    302.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   180.00
  UPSTREAM ELEVATION(FEET) =    641.00
  DOWNSTREAM ELEVATION(FEET) =    638.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.184
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    80.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.329
  SUBAREA RUNOFF(CFS) =      0.11
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.11

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    304.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    638.00  DOWNSTREAM(FEET) =    634.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   212.00   CHANNEL SLOPE =  0.0189
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.798
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.19
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.54
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   2.29
  Tc(MIN.) =   12.48
  SUBAREA AREA(ACRES) =     0.12       SUBAREA RUNOFF(CFS) =    0.16
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.25

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   1.75
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =     392.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 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.) =   12.48
  RAINFALL INTENSITY(INCH/HR) =   3.80
  TOTAL STREAM AREA(ACRES) =     0.19
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.25
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    308.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =     75.00
  UPSTREAM ELEVATION(FEET) =    660.00
  DOWNSTREAM ELEVATION(FEET) =    656.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.692
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.676
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    310.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    656.00  DOWNSTREAM(FEET) =    651.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   231.00   CHANNEL SLOPE =  0.0216
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.752
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.81
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   2.12
  Tc(MIN.) =    8.81
  SUBAREA AREA(ACRES) =     0.11       SUBAREA RUNOFF(CFS) =    0.18
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       0.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   1.99
  LONGEST FLOWPATH FROM NODE    306.00 TO NODE    310.00 =     306.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    304.00 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.) =    8.81
  RAINFALL INTENSITY(INCH/HR) =   4.75
  TOTAL STREAM AREA(ACRES) =     0.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.30

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.25    12.48        3.798         0.19
      2        0.30     8.81        4.752         0.18

  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        0.48     8.81       4.752
      2        0.49    12.48       3.798

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       0.49   Tc(MIN.) =   12.48
  TOTAL AREA(ACRES) =        0.4
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =     392.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    304.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.798
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.09   SUBAREA RUNOFF(CFS) =    0.12
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =      0.61
  TC(MIN.) =   12.48

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    304.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.798
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.04
```

```
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       0.65
  TC(MIN.) =   12.48
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.5  TC(MIN.) =     12.48
  PEAK FLOW RATE(CFS)   =       0.65
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

100 Year mitigated Flow

– Developed Condition AES Model Output

100-YR MITIGATED

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

             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                          2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2015 Advanced Engineering Software (aes)
              Ver. 22.0 Release Date: 07/01/2015  License ID 1239

                              Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* JERICHO ROAD                                                             *
* 100-YEAR DEVELOPED CONDITION MITIGATED HYDROLOGICAL MODEL                 *
* JULY 25, 2023                                                            *
 **************************************************************************

  FILE NAME: R:\1790\HYD\TM\DR\CALCS\AES\PR\MIT.DAT
  TIME/DATE OF STUDY: 13:37 07/27/2023
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.600
  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   24.0     19.0    0.020/0.020/0.020   0.50    1.50 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):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    91.38
  UPSTREAM ELEVATION(FEET) =    653.00
  DOWNSTREAM ELEVATION(FEET) =    651.51
  ELEVATION DIFFERENCE(FEET) =      1.49
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.874
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    71.31
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.55
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.55

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    104.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  651.51  DOWNSTREAM ELEVATION(FEET) =  649.31
  STREET LENGTH(FEET) =   115.02   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 =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.07
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    2.62
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.54
  STREET FLOW TRAVEL TIME(MIN.) =   0.78   Tc(MIN.) =    4.66
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.800
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    1.04
  TOTAL AREA(ACRES) =        0.3        PEAK FLOW RATE(CFS) =      1.59

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   4.26
  FLOW VELOCITY(FEET/SEC.) =  2.40   DEPTH*VELOCITY(FT*FT/SEC.) =   0.61
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     206.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    108.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   644.37  DOWNSTREAM(FEET) =   641.40
  FLOW LENGTH(FEET) =   198.10   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.86
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.59
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =    5.34
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =     404.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 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.) =    5.34
  RAINFALL INTENSITY(INCH/HR) =   6.57
  TOTAL STREAM AREA(ACRES) =     0.29
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.59

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    83.90
  UPSTREAM ELEVATION(FEET) =    653.00
  DOWNSTREAM ELEVATION(FEET) =    652.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.166
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH =    66.92
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.55
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.55

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    114.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  652.00  DOWNSTREAM ELEVATION(FEET) =  646.31
  STREET LENGTH(FEET) =   349.10   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 =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.57
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    7.41
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.55
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.81
  STREET FLOW TRAVEL TIME(MIN.) =   2.28   Tc(MIN.) =    6.45
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.815
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.800
  SUBAREA AREA(ACRES) =    1.29      SUBAREA RUNOFF(CFS) =    6.00
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =      6.47

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =   9.86
  FLOW VELOCITY(FEET/SEC.) =  2.88   DEPTH*VELOCITY(FT*FT/SEC.) =   1.05
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    114.00 =     433.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    108.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   641.60  DOWNSTREAM(FEET) =   641.40
  FLOW LENGTH(FEET) =    15.50   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.75
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.47
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.49
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    108.00 =     448.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 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.) =    6.49
  RAINFALL INTENSITY(INCH/HR) =   5.79
  TOTAL STREAM AREA(ACRES) =     1.39
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.47

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.59     5.34        6.568         0.29
      2        6.47     6.49        5.792         1.39

  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        6.91     5.34       6.568
      2        7.87     6.49       5.792

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.87   Tc(MIN.) =    6.49
  TOTAL AREA(ACRES) =        1.7
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    108.00 =     448.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    116.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   641.40  DOWNSTREAM(FEET) =   638.40
  FLOW LENGTH(FEET) =   192.60   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.60
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.87
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =    6.91
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    116.00 =     641.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 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.) =    6.91
  RAINFALL INTENSITY(INCH/HR) =   5.56
  TOTAL STREAM AREA(ACRES) =     1.68
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.87

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    120.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.49
  UPSTREAM ELEVATION(FEET) =    652.00
  DOWNSTREAM ELEVATION(FEET) =    645.18
  ELEVATION DIFFERENCE(FEET) =      6.82
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.499
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.55
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.55

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    122.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  645.18  DOWNSTREAM ELEVATION(FEET) =  643.21
  STREET LENGTH(FEET) =    82.76   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 =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.70
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    4.15
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.64
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.66
  STREET FLOW TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =    3.02
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.800
  SUBAREA AREA(ACRES) =    0.42      SUBAREA RUNOFF(CFS) =    2.30
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       2.85

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   5.93
  FLOW VELOCITY(FEET/SEC.) =  2.84   DEPTH*VELOCITY(FT*FT/SEC.) =   0.82
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    122.00 =     168.25 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    116.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   638.50  DOWNSTREAM(FEET) =   638.40
  FLOW LENGTH(FEET) =     7.80   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.) =   5.43
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.85
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    3.05
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    116.00 =     176.05 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 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.) =    3.05
  RAINFALL INTENSITY(INCH/HR) =   6.85
  TOTAL STREAM AREA(ACRES) =    0.52
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.85

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        7.87     6.91        5.561          1.68
      2        2.85     3.05        6.850          0.52

  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        9.24     3.05       6.850
      2       10.18     6.91       5.561

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      10.18   Tc(MIN.) =    6.91
  TOTAL AREA(ACRES) =        2.2
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    116.00 =     641.10 FEET.

+--------------------------------------------------------------------------+
| Results from detention analysis. See Chapter 4                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   9.91   RAIN INTENSITY(INCH/HOUR) =  4.41
  TOTAL AREA(ACRES) =     2.20   TOTAL RUNOFF(CFS) =      7.31

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    124.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   638.40  DOWNSTREAM(FEET) =   638.00
  FLOW LENGTH(FEET) =    18.14   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.8 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.51
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.31
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    9.95
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    124.00 =     659.24 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    124.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    202.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    78.66
  UPSTREAM ELEVATION(FEET) =    659.00
  DOWNSTREAM ELEVATION(FEET) =    653.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.271
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.56
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.56

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    204.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  653.00  DOWNSTREAM ELEVATION(FEET) =  645.06
  STREET LENGTH(FEET) =   314.49   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 =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    4.32
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.76
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.70
  STREET FLOW TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =    4.17
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.820
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    2.58
  TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       3.15

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   6.15
  FLOW VELOCITY(FEET/SEC.) =  2.98   DEPTH*VELOCITY(FT*FT/SEC.) =   0.87
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =     393.15 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    206.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   640.40  DOWNSTREAM(FEET) =   640.00
  FLOW LENGTH(FEET) =    36.20   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.28
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.15
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    4.29
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =     429.35 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 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.) =    4.29
  RAINFALL INTENSITY(INCH/HR) =   6.85
  TOTAL STREAM AREA(ACRES) =     0.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.15

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    210.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    77.70
  UPSTREAM ELEVATION(FEET) =    653.00
  DOWNSTREAM ELEVATION(FEET) =    652.10
  ELEVATION DIFFERENCE(FEET) =      0.90
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.916
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    66.58
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.56
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.56

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    206.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  652.10  DOWNSTREAM ELEVATION(FEET) =  645.20
  STREET LENGTH(FEET) =   254.25   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 =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    2.79
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.88
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
  STREET FLOW TRAVEL TIME(MIN.) =   1.47   Tc(MIN.) =    5.39
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.529
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .8200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.820
  SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    1.50
  TOTAL AREA(ACRES) =       0.4        PEAK FLOW RATE(CFS) =      2.03
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   4.54
  FLOW VELOCITY(FEET/SEC.) =  2.86   DEPTH*VELOCITY(FT*FT/SEC.) =   0.74
  LONGEST FLOWPATH FROM NODE    208.00 TO NODE    206.00 =     331.95 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 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.) =    5.39
  RAINFALL INTENSITY(INCH/HR) =   6.53
  TOTAL STREAM AREA(ACRES) =     0.38
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.03

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        3.15     4.29        6.850          0.56
      2        2.03     5.39        6.529          0.38

  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        4.76     4.29       6.850
      2        5.03     5.39       6.529

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.03   Tc(MIN.) =    5.39
  TOTAL AREA(ACRES) =        0.9
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =     429.35 FEET.

+--------------------------------------------------------------------------+
| Results from Detention Analysis. See Chapter 4                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
```

```
  TC(MIN) =  27.39   RAIN INTENSITY(INCH/HOUR) =  2.29
  TOTAL AREA(ACRES) =     0.94   TOTAL RUNOFF(CFS) =      0.37

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    124.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   640.00  DOWNSTREAM(FEET) =   638.00
  FLOW LENGTH(FEET) =    50.80   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.40
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.37
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   27.58
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    124.00 =     480.15 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    124.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1        0.37    27.58       2.277        0.94
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    124.00 =     480.15 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1        7.31     9.95       4.396       2.20
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    124.00 =     659.24 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1       7.42       9.95        4.396
     2       4.15      27.58        2.277

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.42   Tc(MIN.) =    9.95
  TOTAL AREA(ACRES) =        3.1

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    124.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
```

```
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    126.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   638.00  DOWNSTREAM(FEET) =   605.27
  FLOW LENGTH(FEET) =   358.47   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.39
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.42
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   10.36
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    126.00 =    1017.71 FEET.

+--------------------------------------------------------------------------+
| OFFSITE DRAINAGE                                                         |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    302.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   180.00
  UPSTREAM ELEVATION(FEET) =    641.00
  DOWNSTREAM ELEVATION(FEET) =    638.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.184
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    80.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.329
  SUBAREA RUNOFF(CFS) =      0.11
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.11

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    304.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    638.00  DOWNSTREAM(FEET) =    634.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   212.00   CHANNEL SLOPE =  0.0189
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.798
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.19
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.54
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   2.29
  Tc(MIN.) =   12.48
  SUBAREA AREA(ACRES) =     0.12       SUBAREA RUNOFF(CFS) =    0.16
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.25

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   1.75
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =     392.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 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.) =   12.48
  RAINFALL INTENSITY(INCH/HR) =   3.80
  TOTAL STREAM AREA(ACRES) =     0.19
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.25

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    308.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    660.00
  DOWNSTREAM ELEVATION(FEET) =    656.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.692
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.676
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    310.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    656.00  DOWNSTREAM(FEET) =    651.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   231.00   CHANNEL SLOPE =  0.0216
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.752
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.81
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   2.12
  Tc(MIN.) =    8.81
  SUBAREA AREA(ACRES) =     0.11       SUBAREA RUNOFF(CFS) =    0.18
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   1.99
  LONGEST FLOWPATH FROM NODE    306.00 TO NODE    310.00 =     306.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    304.00 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.) =    8.81
  RAINFALL INTENSITY(INCH/HR) =   4.75
  TOTAL STREAM AREA(ACRES) =     0.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.30

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.25    12.48        3.798         0.19
      2        0.30     8.81        4.752         0.18

  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        0.48     8.81       4.752
      2        0.49    12.48       3.798
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       0.49   Tc(MIN.) =   12.48
  TOTAL AREA(ACRES) =        0.4
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =     392.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    304.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.798
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.09   SUBAREA RUNOFF(CFS) =    0.12
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       0.61
  TC(MIN.) =   12.48

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    304.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.798
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.04
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       0.65
  TC(MIN.) =   12.48
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.5  TC(MIN.) =     12.48
  PEAK FLOW RATE(CFS)   =       0.65
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

CHAPTER 4

DETENTION ANALYSIS

200 Node Series

BASIN AREA 0.94 ACRES
RUNOFF COEFFICIENT 0.82
PEAK DISCHARGE 5.03 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 5	DISCHARGE (CFS) = 0.1
TIME (MIN) = 10	DISCHARGE (CFS) = 0.1
TIME (MIN) = 15	DISCHARGE (CFS) = 0.1
TIME (MIN) = 20	DISCHARGE (CFS) = 0.1
TIME (MIN) = 25	DISCHARGE (CFS) = 0.1
TIME (MIN) = 30	DISCHARGE (CFS) = 0.1
TIME (MIN) = 35	DISCHARGE (CFS) = 0.1
TIME (MIN) = 40	DISCHARGE (CFS) = 0.1
TIME (MIN) = 45	DISCHARGE (CFS) = 0.1
TIME (MIN) = 50	DISCHARGE (CFS) = 0.1
TIME (MIN) = 55	DISCHARGE (CFS) = 0.1
TIME (MIN) = 60	DISCHARGE (CFS) = 0.1
TIME (MIN) = 65	DISCHARGE (CFS) = 0.1
TIME (MIN) = 70	DISCHARGE (CFS) = 0.1
TIME (MIN) = 75	DISCHARGE (CFS) = 0.1
TIME (MIN) = 80	DISCHARGE (CFS) = 0.2
TIME (MIN) = 85	DISCHARGE (CFS) = 0.2
TIME (MIN) = 90	DISCHARGE (CFS) = 0.2
TIME (MIN) = 95	DISCHARGE (CFS) = 0.2
TIME (MIN) = 100	DISCHARGE (CFS) = 0.2
TIME (MIN) = 105	DISCHARGE (CFS) = 0.2
TIME (MIN) = 110	DISCHARGE (CFS) = 0.2
TIME (MIN) = 115	DISCHARGE (CFS) = 0.2
TIME (MIN) = 120	DISCHARGE (CFS) = 0.2
TIME (MIN) = 125	DISCHARGE (CFS) = 0.2
TIME (MIN) = 130	DISCHARGE (CFS) = 0.2
TIME (MIN) = 135	DISCHARGE (CFS) = 0.2
TIME (MIN) = 140	DISCHARGE (CFS) = 0.2
TIME (MIN) = 145	DISCHARGE (CFS) = 0.2
TIME (MIN) = 150	DISCHARGE (CFS) = 0.2
TIME (MIN) = 155	DISCHARGE (CFS) = 0.2
TIME (MIN) = 160	DISCHARGE (CFS) = 0.2
TIME (MIN) = 165	DISCHARGE (CFS) = 0.2
TIME (MIN) = 170	DISCHARGE (CFS) = 0.3
TIME (MIN) = 175	DISCHARGE (CFS) = 0.3
TIME (MIN) = 180	DISCHARGE (CFS) = 0.3
TIME (MIN) = 185	DISCHARGE (CFS) = 0.3
TIME (MIN) = 190	DISCHARGE (CFS) = 0.3
TIME (MIN) = 195	DISCHARGE (CFS) = 0.3
TIME (MIN) = 200	DISCHARGE (CFS) = 0.3
TIME (MIN) = 205	DISCHARGE (CFS) = 0.4
TIME (MIN) = 210	DISCHARGE (CFS) = 0.4
TIME (MIN) = 215	DISCHARGE (CFS) = 0.5
TIME (MIN) = 220	DISCHARGE (CFS) = 0.5
TIME (MIN) = 225	DISCHARGE (CFS) = 0.6
TIME (MIN) = 230	DISCHARGE (CFS) = 0.7
TIME (MIN) = 235	DISCHARGE (CFS) = 1
TIME (MIN) = 240	DISCHARGE (CFS) = 1.7
TIME (MIN) = 245	DISCHARGE (CFS) = 5.03
TIME (MIN) = 250	DISCHARGE (CFS) = 0.8
TIME (MIN) = 255	DISCHARGE (CFS) = 0.6
TIME (MIN) = 260	DISCHARGE (CFS) = 0.4
TIME (MIN) = 265	DISCHARGE (CFS) = 0.4
TIME (MIN) = 270	DISCHARGE (CFS) = 0.3
TIME (MIN) = 275	DISCHARGE (CFS) = 0.3
TIME (MIN) = 280	DISCHARGE (CFS) = 0.3
TIME (MIN) = 285	DISCHARGE (CFS) = 0.2
TIME (MIN) = 290	DISCHARGE (CFS) = 0.2
TIME (MIN) = 295	DISCHARGE (CFS) = 0.2
TIME (MIN) = 300	DISCHARGE (CFS) = 0.2
TIME (MIN) = 305	DISCHARGE (CFS) = 0.2
TIME (MIN) = 310	DISCHARGE (CFS) = 0.2
TIME (MIN) = 315	DISCHARGE (CFS) = 0.2
TIME (MIN) = 320	DISCHARGE (CFS) = 0.2
TIME (MIN) = 325	DISCHARGE (CFS) = 0.2
TIME (MIN) = 330	DISCHARGE (CFS) = 0.1
TIME (MIN) = 335	DISCHARGE (CFS) = 0.1
TIME (MIN) = 340	DISCHARGE (CFS) = 0.1
TIME (MIN) = 345	DISCHARGE (CFS) = 0.1
TIME (MIN) = 350	DISCHARGE (CFS) = 0.1

TIME (MIN) = 355	DISCHARGE (CFS) = 0.1
TIME (MIN) = 360	DISCHARGE (CFS) = 0.1
TIME (MIN) = 365	DISCHARGE (CFS) = 0

HMP #1 Discharge

Discharge vs Elevation Table

Low orifice:	1	"	Top orifice:	4	"
Number:	1		Number:	0	
Cg-low:	0.61		Cg-low:	0.61	
invert elev:	0.00	ft	invert elev:	4.00	ft
Middle orifice:	3	"	Emergency inlet: 18" standup pipe		
number of orif:	1		Rim height:	5.00	ft
Cg-middle:	0.61		Area	1.7671	sq ft
invert elev:	3.17	ft	Circumference	4.7124	ft

h (ft)	H/D-low -	H/D-mid -	H/D-top -	Qlow-orif (cfs)	Qlow-weir (cfs)	Qtot-low (cfs)	Qmid-orif (cfs)	Qmid-weir (cfs)	Qtot-med (cfs)	Qtop-orif (cfs)	Qtop-weir (cfs)	Qtot-top (cfs)	Qemerg (cfs)	Qtot (cfs)	
0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.17	2.00	0.00	0.00	0.009	0.013	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	
0.33	4.00	1.88	0.00	0.014	0.024	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	
0.50	6.00	0.00	0.00	0.018	0.344	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.018	
0.67	8.00	0.00	0.00	0.021	2.243	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	
0.83	10.00	0.00	0.00	0.024	8.567	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.024	
1.00	12.00	0.00	0.00	0.026	24.355	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.026	
1.17	14.00	0.00	0.00	0.028	57.454	0.028	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.028	
1.33	16.00	0.00	0.00	0.030	119.136	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.030	
1.50	18.00	0.00	0.00	0.032	224.716	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032	
1.67	20.00	0.00	0.00	0.034	394.165	0.034	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.034	
1.83	22.00	0.00	0.00	0.036	652.729	0.036	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.036	
2.00	24.00	0.00	0.00	0.037	1031.545	0.037	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.037	
2.17	26.00	0.00	0.00	0.039	1568.256	0.039	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.039	
2.33	28.00	0.00	0.00	0.040	2307.630	0.040	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.040	
2.50	30.00	0.00	0.00	0.042	3302.171	0.042	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.042	
2.67	32.00	0.00	0.00	0.043	4612.744	0.043	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.043	
2.83	34.00	0.00	0.00	0.045	6309.182	0.045	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.045	
3.00	36.00	0.00	0.00	0.046	8470.909	0.046	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.046	
3.17	38.00	0.00	0.00	0.047	11187.553	0.047	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.047	< 0.054 cfs
3.33	40.00	0.65	0.00	0.048	14559.566	0.048	0.047	0.039	0.039	0.000	0.000	0.000	0.000	0.088	
3.50	42.00	1.32	0.00	0.050	18698.833	0.050	0.109	0.123	0.109	0.000	0.000	0.000	0.000	0.158	
3.67	44.00	1.99	0.00	0.051	23729.298	0.051	0.146	0.194	0.146	0.000	0.000	0.000	0.000	0.197	
3.83	46.00	2.65	0.00	0.052	29787.573	0.052	0.176	0.219	0.176	0.000	0.000	0.000	0.000	0.228	
4.00	48.00	3.32	0.00	0.053	37023.556	0.053	0.202	0.230	0.202	0.000	0.000	0.000	0.000	0.255	
4.17	50.00	3.99	0.50	0.054	45601.051	0.054	0.224	0.363	0.224	0.000	0.000	0.000	0.000	0.279	
4.33	52.00	4.65	1.00	0.055	55698.380	0.055	0.245	0.902	0.245	0.000	0.000	0.000	0.000	0.300	
4.50	54.00	5.32	1.50	0.056	67509.000	0.056	0.264	2.310	0.264	0.000	0.000	0.000	0.000	0.320	
4.67	56.00	5.99	2.00	0.057	81242.122	0.057	0.281	5.277	0.281	0.000	0.000	0.000	0.000	0.339	
4.83	58.00	6.65	2.50	0.058	97123.324	0.058	0.298	10.755	0.298	0.000	0.000	0.000	0.000	0.356	
5.00	60.00	7.32	3.00	0.059	115395.172	0.059	0.314	19.999	0.314	0.000	0.000	0.000	0.000	0.373	
5.17	62.00	7.99	3.50	0.060	136317.830	0.060	0.329	34.603	0.329	0.000	0.000	0.000	0.994	1.383	
5.33	64.00	8.65	4.00	0.061	160169.680	0.061	0.343	56.547	0.343	0.000	0.000	0.000	2.811	3.216	
5.50	66.00	9.32	4.50	0.062	187247.942	0.062	0.357	88.230	0.357	0.000	0.000	0.000	5.165	5.584	
5.67	68.00	9.99	5.00	0.063	217869.281	0.063	0.370	132.512	0.370	0.000	0.000	0.000	7.063	7.497	
5.83	70.00	10.65	5.50	0.064	252370.432	0.064	0.383	192.752	0.383	0.000	0.000	0.000	7.897	8.344	
6.00	72.00	11.32	6.00	0.065	291108.813	0.065	0.395	272.851	0.395	0.000	0.000	0.000	8.651	9.111	

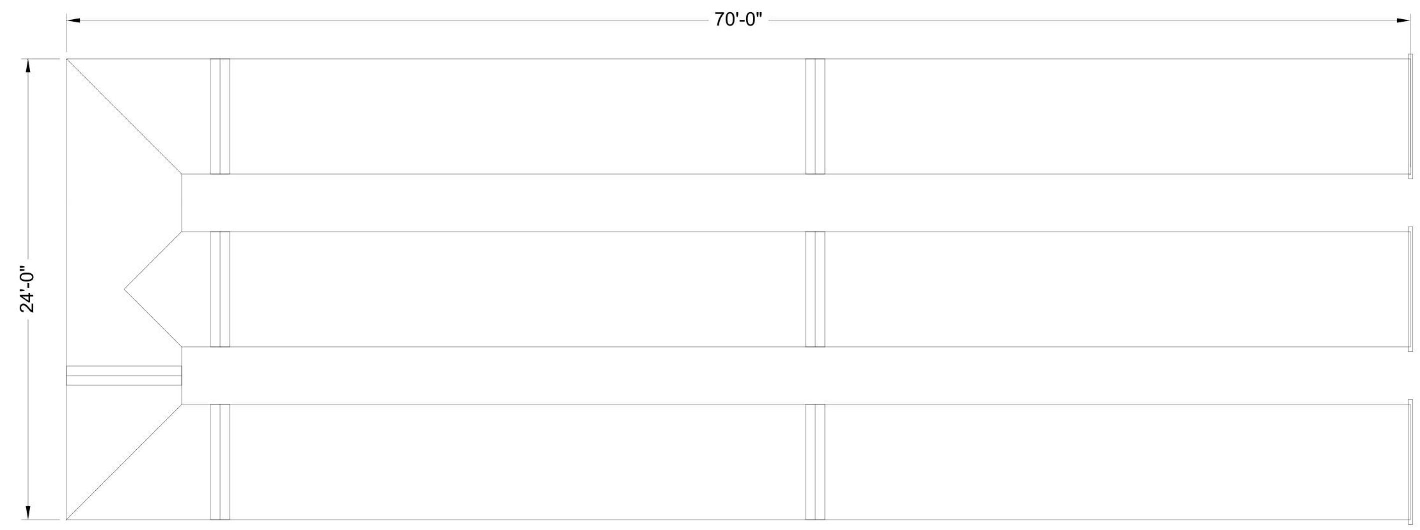
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 216 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = N/A
- PIPE STORAGE VOLUME = 6,107 CF
- BACKFILL STORAGE VOLUME = 2,611 CF
- TOTAL STORAGE PROVIDED = 8,719 CF

PIPE DETAILS
- DIAMETER = 72"
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = PERFORATED
- BARREL SPACING = 36"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 6"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 0"



ASSEMBLY
SCALE: 1" = 10'

NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}$" x $\frac{1}{2}$" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

C:\EXPORTS\TEMPLATES\CMP_V8.DWG 10/18/2019 10:02 AM

DATE	REVISION DESCRIPTION	BY

CONTECH®
ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH®
CMP DETENTION SYSTEMS

CONTECH
DYODS
DRAWING

DYO33763 calvary Church
DMA1- SOUTH - COPY
La Mesa, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
22716	33763	7/26/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

Date: 7/26/2023
Project Name: DMA1- SOUTH - COPY - 33763 (7-26-2023 22-10-38)

City / County:
State:

Designed By:
Company:
Telephone:

CMP: Underground Detention System Storage Volume Estimation

=Adjustable Input Cells

Contech Engineered Solutions, LLC is pleased to offer the following estimate of storage volume for the above named project. The results are submitted as an estimate only, without liability on the part of Contech Engineered Solutions, LLC for accuracy or suitability to any particular applicaton and are subject to verification of the Engineer of Record. This tool is only applicable for rectangular shaped systems.

Summary of Inputs

System Information		Backfill Information		Pipe & Analysis Information	
Out-to-out length (ft):	**70.0**	**Backfill Porosity (%):**	**40%**	**System Diameter (in):**	**72**
Out-to-out width (ft):	**24.0**	**Depth Above Pipe (in):**	**6.0**	**Pipe Spacing (in):**	**36**
Number of Manifolds (ea):	**1.0**	**Depth Below Pipe (in):**	**0.0**	**Incremental Analysis (in):**	**2**
Number of Barrels (ea):	**3.0**	**Width At Ends (ft):**	**1.0**	**System Invert (Elevation):**	**0**
		Width At Sides (ft):	**1.0**		

Storage Volume Estimation

System		Pipe		Stone		Total System		Miscellaneous	
Depth (ft)	**Elevation (ft)**	**Incremental Storage (cf)**	**Cumulative Storage (cf)**	**Incremental Storage (cf)**	**Cumulative Storage (cf)**	**Incremental Storage (cf)**	**Cumulative Storage (cf)**	**Percent Open Storage (%)**	**Ave. Surface Area (sf)**
0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0%	748.8
0.17	0.16	47.6	47.6	105.8	105.8	153.4	153.4	31.0%	1,004.4
0.33	0.33	85.9	133.5	90.4	196.2	176.3	329.7	40.5%	1,105.0
0.50	0.50	109.6	243.1	81.0	277.2	190.6	520.3	46.7%	1,178.6
0.67	0.66	127.9	370.9	73.7	350.8	201.5	721.8	51.4%	1,237.6
0.83	0.83	142.8	513.7	67.7	418.5	210.5	932.2	55.1%	1,286.6
1.00	1.00	155.3	669.1	62.7	481.2	218.0	1,150.2	58.2%	1,328.4
1.17	1.16	166.1	835.2	58.4	539.5	224.5	1,374.7	60.8%	1,364.3
1.33	1.33	175.4	1,010.6	54.6	594.2	230.0	1,604.7	63.0%	1,395.4
1.50	1.50	183.4	1,194.0	51.4	645.6	234.9	1,839.6	64.9%	1,422.2
1.67	1.66	190.4	1,384.3	48.7	694.3	239.0	2,078.6	66.6%	1,445.4
1.83	1.83	196.3	1,580.7	46.3	740.5	242.6	2,321.2	68.1%	1,465.2
2.00	2.00	201.4	1,782.0	44.2	784.8	245.6	2,566.8	69.4%	1,481.9
2.17	2.16	205.6	1,987.7	42.5	827.3	248.2	2,815.0	70.6%	1,495.8
2.33	2.33	209.1	2,196.8	41.2	868.5	250.3	3,065.3	71.7%	1,507.0
2.50	2.50	211.8	2,408.6	40.1	908.5	251.9	3,317.2	72.6%	1,515.5
2.67	2.66	213.9	2,622.5	39.2	947.8	253.1	3,570.3	73.5%	1,521.6
2.83	2.83	215.2	2,837.7	38.7	986.5	253.9	3,824.2	74.2%	1,525.2
3.00	3.00	215.9	3,053.6	38.4	1,024.9	254.3	4,078.6	74.9%	1,526.4
3.17	3.16	215.9	3,269.5	38.4	1,063.4	254.3	4,332.9	75.5%	1,525.2
3.33	3.33	215.2	3,484.7	38.7	1,102.1	253.9	4,586.8	76.0%	1,521.6
3.50	3.50	213.9	3,698.6	39.2	1,141.4	253.1	4,840.0	76.4%	1,515.5
3.67	3.66	211.8	3,910.5	40.1	1,181.4	251.9	5,091.9	76.8%	1,507.0
3.83	3.83	209.1	4,119.6	41.2	1,222.6	250.3	5,342.1	77.1%	1,495.8
4.00	4.00	205.6	4,325.2	42.5	1,265.1	248.2	5,590.3	77.4%	1,481.9
4.17	4.16	201.4	4,526.6	44.2	1,309.4	245.6	5,836.0	77.6%	1,465.2
4.33	4.33	196.3	4,722.9	46.3	1,355.6	242.6	6,078.6	77.7%	1,445.4
4.50	4.50	190.4	4,913.3	48.7	1,404.3	239.0	6,317.6	77.8%	1,422.2
4.67	4.66	183.4	5,096.7	51.4	1,455.7	234.9	6,552.4	77.8%	1,395.4
4.83	4.83	175.4	5,272.1	54.6	1,510.4	230.0	6,782.5	77.7%	1,364.3
5.00	5.00	166.1	5,438.2	58.4	1,568.7	224.5	7,006.9	77.6%	1,328.4
5.17	5.16	155.3	5,593.5	62.7	1,631.4	218.0	7,224.9	77.4%	1,286.6
5.33	5.33	142.8	5,736.3	67.7	1,699.1	210.5	7,435.4	77.1%	1,237.6
5.50	5.50	127.9	5,864.2	73.7	1,772.7	201.5	7,636.9	76.8%	1,178.6
5.67	5.66	109.6	5,973.8	81.0	1,853.7	190.6	7,827.5	76.3%	1,105.0
5.83	5.83	85.9	6,059.7	90.4	1,944.1	176.3	8,003.8	75.7%	1,004.4
6.00	6.00	47.6	6,107.3	105.8	2,049.9	153.4	8,157.2	74.9%	748.8
6.17	6.16	0.0	6,107.3	124.8	2,174.7	124.8	8,282.0	73.7%	748.8
6.33	6.33	0.0	6,107.3	124.8	2,299.5	124.8	8,406.8	72.6%	748.8

$\boxed{6.50}$	6.50	0.0	6,107.3	124.8	2,424.3	124.8	$\boxed{8,531.6}$	71.6%	748.8

HMP #1 Stage Storage-CMP

depth	area	area (ac)	elevation	volume (cf)	volume (acft)	
0.00	749	0.0172	0.0	0.0	0.000	
0.17	1004	0.0231	0.2	153.4	0.004	
0.33	1105	0.0254	0.3	329.7	0.008	
0.50	1179	0.0271	0.5	520.3	0.012	
0.67	1238	0.0284	0.7	721.8	0.017	
0.83	1287	0.0295	0.8	932.2	0.021	
1.00	1328	0.0305	1.0	1,150.2	0.026	
1.17	1364	0.0313	1.2	1,374.7	0.032	
1.33	1395	0.0320	1.3	1,604.7	0.037	
1.50	1422	0.0326	1.5	1,839.6	0.042	
1.67	1445	0.0332	1.7	2,078.6	0.048	1.53 DCV
1.83	1465	0.0336	1.8	2,321.2	0.053	
2.00	1482	0.0340	2.0	2,566.8	0.059	
2.17	1496	0.0343	2.2	2,815.0	0.065	
2.33	1507	0.0346	2.3	3,065.3	0.070	
2.50	1516	0.0348	2.5	3,317.2	0.076	
2.67	1522	0.0349	2.7	3,570.3	0.082	
2.83	1525	0.0350	2.8	3,824.2	0.088	
3.00	1526	0.0350	3.0	4,078.6	0.094	
3.17	1525	0.0350	3.2	4,332.9	0.099	>4240 cft
3.33	1522	0.0349	3.3	4,586.8	0.105	
3.50	1516	0.0348	3.5	4,840.0	0.111	
3.67	1507	0.0346	3.7	5,091.9	0.117	
3.83	1496	0.0343	3.8	5,342.1	0.123	
4.00	1482	0.0340	4.0	5,590.3	0.128	
4.17	1465	0.0336	4.2	5,836.0	0.134	
4.33	1445	0.0332	4.3	6,078.6	0.140	
4.50	1422	0.0326	4.5	6,317.6	0.145	
4.67	1395	0.0320	4.7	6,552.4	0.150	
4.83	1364	0.0313	4.8	6,782.5	0.156	
5.00	1328	0.0305	5.0	7,006.9	0.161	
5.17	1287	0.0295	5.2	7,224.9	0.166	
5.33	1238	0.0284	5.3	7,435.4	0.171	
5.50	1179	0.0271	5.5	7,636.9	0.175	
5.67	1105	0.0254	5.7	7,827.5	0.180	
5.83	1004	0.0231	5.8	8,003.8	0.184	
6.00	749	0.0172	6.0	8,157.2	0.187	
6.17	749	0.0172	6.2	8,282.0	0.190	
6.33	749	0.0172	6.3	8,406.8	0.193	
6.50	749	0.0172	6.5	8,531.6	0.196	

HMP #1 DRAWDOWN CALCULATION				
Elevation	Q_{AVG} (CFS)	DV (CF)	DT (HR)	Total T
0.17	0.01	153	4.51	47.72
0.33	0.01	176	4.11	43.21
0.50	0.02	191	3.26	39.11
0.67	0.02	202	2.86	35.85
0.83	0.02	210	2.61	32.99
1.00	0.02	218	2.43	30.38
1.17	0.03	224	2.29	27.96
1.33	0.03	230	2.18	25.67
1.50	0.03	235	2.08	23.49
1.67	0.03	239	2.00	21.40
1.83	0.03	243	1.93	19.40
2.00	0.04	246	1.87	17.47
2.17	0.04	248	1.81	15.60
2.33	0.04	250	1.75	13.79
2.50	0.04	252	1.70	12.04
2.67	0.04	253	1.65	10.34
2.83	0.04	254	1.61	8.69
3.00	0.05	254	1.56	7.08
3.17	0.05	254	1.52	5.52
3.33	0.07	254	1.05	4.01
3.50	0.12	253	0.57	2.96
3.67	0.18	252	0.39	2.39
3.83	0.21	250	0.33	1.99
4.00	0.24	248	0.29	1.67
4.17	0.27	246	0.26	1.38
4.33	0.29	243	0.23	1.13
4.50	0.31	239	0.21	0.89
4.67	0.33	235	0.20	0.68
4.83	0.35	230	0.18	0.48
5.00	0.36	224	0.17	0.30
5.17	0.88	218	0.07	0.13
5.33	2.30	210	0.03	0.06
5.50	4.40	202	0.01	0.03
5.67	6.54	191	0.01	0.02
5.83	7.92	176	0.01	0.01
6.00	8.73	153	0.00	0.00

TOTAL DRAW DOWN < 96 HRS

100 Node Series

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 7/26/2023
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 7 MIN.
6 HOUR RAINFALL 2.6 INCHES
BASIN AREA 2.2 ACRES
RUNOFF COEFFICIENT 0.8
PEAK DISCHARGE 10.18 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 7	DISCHARGE (CFS) = 0.3
TIME (MIN) = 14	DISCHARGE (CFS) = 0.3
TIME (MIN) = 21	DISCHARGE (CFS) = 0.3
TIME (MIN) = 28	DISCHARGE (CFS) = 0.3
TIME (MIN) = 35	DISCHARGE (CFS) = 0.3
TIME (MIN) = 42	DISCHARGE (CFS) = 0.3
TIME (MIN) = 49	DISCHARGE (CFS) = 0.3
TIME (MIN) = 56	DISCHARGE (CFS) = 0.3
TIME (MIN) = 63	DISCHARGE (CFS) = 0.3
TIME (MIN) = 70	DISCHARGE (CFS) = 0.3
TIME (MIN) = 77	DISCHARGE (CFS) = 0.3
TIME (MIN) = 84	DISCHARGE (CFS) = 0.4
TIME (MIN) = 91	DISCHARGE (CFS) = 0.4
TIME (MIN) = 98	DISCHARGE (CFS) = 0.4
TIME (MIN) = 105	DISCHARGE (CFS) = 0.4
TIME (MIN) = 112	DISCHARGE (CFS) = 0.4
TIME (MIN) = 119	DISCHARGE (CFS) = 0.4
TIME (MIN) = 126	DISCHARGE (CFS) = 0.4
TIME (MIN) = 133	DISCHARGE (CFS) = 0.4
TIME (MIN) = 140	DISCHARGE (CFS) = 0.5
TIME (MIN) = 147	DISCHARGE (CFS) = 0.5
TIME (MIN) = 154	DISCHARGE (CFS) = 0.5
TIME (MIN) = 161	DISCHARGE (CFS) = 0.5
TIME (MIN) = 168	DISCHARGE (CFS) = 0.6
TIME (MIN) = 175	DISCHARGE (CFS) = 0.6
TIME (MIN) = 182	DISCHARGE (CFS) = 0.6
TIME (MIN) = 189	DISCHARGE (CFS) = 0.7
TIME (MIN) = 196	DISCHARGE (CFS) = 0.8
TIME (MIN) = 203	DISCHARGE (CFS) = 0.9
TIME (MIN) = 210	DISCHARGE (CFS) = 0.9
TIME (MIN) = 217	DISCHARGE (CFS) = 1.1
TIME (MIN) = 224	DISCHARGE (CFS) = 1.3
TIME (MIN) = 231	DISCHARGE (CFS) = 1.9
TIME (MIN) = 238	DISCHARGE (CFS) = 2.2
TIME (MIN) = 245	DISCHARGE (CFS) = 10.18
TIME (MIN) = 252	DISCHARGE (CFS) = 1.5
TIME (MIN) = 259	DISCHARGE (CFS) = 1
TIME (MIN) = 266	DISCHARGE (CFS) = 0.8
TIME (MIN) = 273	DISCHARGE (CFS) = 0.7
TIME (MIN) = 280	DISCHARGE (CFS) = 0.6
TIME (MIN) = 287	DISCHARGE (CFS) = 0.5
TIME (MIN) = 294	DISCHARGE (CFS) = 0.5
TIME (MIN) = 301	DISCHARGE (CFS) = 0.4
TIME (MIN) = 308	DISCHARGE (CFS) = 0.4
TIME (MIN) = 315	DISCHARGE (CFS) = 0.4
TIME (MIN) = 322	DISCHARGE (CFS) = 0.4
TIME (MIN) = 329	DISCHARGE (CFS) = 0.3
TIME (MIN) = 336	DISCHARGE (CFS) = 0.3
TIME (MIN) = 343	DISCHARGE (CFS) = 0.3
TIME (MIN) = 350	DISCHARGE (CFS) = 0.3
TIME (MIN) = 357	DISCHARGE (CFS) = 0.3
TIME (MIN) = 364	DISCHARGE (CFS) = 0

HMP #2 Discharge

Discharge vs Elevation Table

Low orifice:	1.45 "	Top orifice:	6 "		
Number:	1	Number:	0		
Cg-low:	0.61	Cg-low:	0.61		
invert elev:	0.00 ft	invert elev:	5.00 ft		
Middle orifice:	6 "	Emergency inlet:			
number of orif:	10	Rim height:		5.00 ft	
Cg-middle:	0.61	Area		1.7671 sq ft	<-2' X 2' Weir
invert elev:	4.17 ft	Circumference		4.7124 ft	

h (ft)	H/D-low -	H/D-mid -	H/D-top -	Qlow-orif (cfs)	Qlow-weir (cfs)	Qtot-low (cfs)	Qmid-orif (cfs)	Qmid-weir (cfs)	Qtot-med (cfs)	Qtop-orif (cfs)	Qtop-weir (cfs)	Qtot-top (cfs)	Qemerg (cfs)	Qtot (cfs)	
0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.17	1.38	0.00	0.00	0.018	0.021	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.018	
0.33	2.76	1.88	0.00	0.029	0.036	0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.029	
0.50	4.14	0.00	0.00	0.037	0.071	0.037	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.037	
0.67	5.52	0.00	0.00	0.044	0.485	0.044	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.044	
0.83	6.90	0.00	0.00	0.049	2.211	0.049	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.049	
1.00	8.28	0.00	0.00	0.054	6.998	0.054	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.054	
1.17	9.66	0.00	0.00	0.059	17.657	0.059	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.059	
1.33	11.03	0.00	0.00	0.063	38.303	0.063	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.063	
1.50	12.41	0.00	0.00	0.067	74.599	0.067	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.067	
1.67	13.79	0.00	0.00	0.071	133.999	0.071	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.071	
1.83	15.17	0.00	0.00	0.075	225.991	0.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.075	
2.00	16.55	0.00	0.00	0.078	362.342	0.078	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.078	
2.17	17.93	0.00	0.00	0.081	557.341	0.081	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.081	
2.33	19.31	0.00	0.00	0.085	828.042	0.085	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.085	
2.50	20.69	0.00	0.00	0.088	1194.507	0.088	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.088	
2.67	22.07	0.00	0.00	0.091	1680.049	0.091	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.091	
2.83	23.45	0.00	0.00	0.093	2311.478	0.093	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.093	
3.00	24.83	0.00	0.00	0.096	3119.343	0.096	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.096	
3.17	26.21	0.00	0.00	0.099	4138.174	0.099	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.099	
3.33	27.59	0.00	0.00	0.102	5406.727	0.102	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.102	
3.50	28.97	0.00	0.00	0.104	6968.229	0.104	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.104	
3.67	30.34	0.00	0.00	0.107	8870.617	0.107	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.107	
3.83	31.72	0.00	0.00	0.109	11166.786	0.109	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.109	
4.00	33.10	0.00	0.00	0.111	13914.830	0.111	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.111	
4.17	34.48	0.00	0.00	0.114	17178.286	0.114	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.114	< 0.127 cfs
4.33	35.86	0.33	0.00	0.116	21026.378	0.116	0.000	0.606	0.606	0.000	0.000	0.000	0.000	0.722	
4.50	37.24	0.66	0.00	0.118	25534.259	0.118	2.719	2.252	2.252	0.000	0.000	0.000	0.000	2.370	
4.67	38.62	0.99	0.00	0.120	30783.255	0.120	4.774	4.542	4.542	0.000	0.000	0.000	0.000	4.663	
4.83	40.00	1.33	0.00	0.123	36861.111	0.123	6.179	7.034	6.179	0.000	0.000	0.000	0.000	6.302	
5.00	41.38	1.66	0.00	0.125	43862.231	0.125	7.320	9.305	7.320	0.000	0.000	0.000	0.000	7.445	
5.17	42.76	1.99	0.33	0.127	51887.922	0.127	8.306	11.028	8.306	0.000	0.000	0.000	0.994	9.426	
5.33	44.14	2.33	0.67	0.129	61046.639	0.129	9.186	12.036	9.186	0.000	0.000	0.000	2.811	12.126	
5.50	45.52	2.66	1.00	0.131	71454.227	0.131	9.989	12.396	9.989	0.000	0.000	0.000	5.165	15.285	
5.67	46.90	2.99	1.33	0.133	83234.167	0.133	10.732	12.475	10.732	0.000	0.000	0.000	7.063	17.928	
5.83	48.28	3.33	1.67	0.135	96517.815	0.135	11.427	13.014	11.427	0.000	0.000	0.000	7.897	19.459	
6.00	49.66	3.66	2.00	0.137	111444.651	0.137	12.082	15.195	12.082	0.000	0.000	0.000	8.651	20.869	
6.17	51.06	4.00	2.34	0.139	128516.201	0.139	12.715	20.871	12.715	0.000	0.000	0.000	9.357	22.211	
6.33	52.39	4.32	2.66	0.141	146434.413	0.141	13.284	31.545	13.284	0.000	0.000	0.000	9.976	23.401	
6.50	53.79	4.66	3.00	0.142	167605.986	0.142	13.862	51.508	13.862	0.000	0.000	0.000	10.595	24.599	

PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 357 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = N/A
- PIPE STORAGE VOLUME = 10,094 CF
- BACKFILL STORAGE VOLUME = 4,269 CF
- TOTAL STORAGE PROVIDED = 14,363 CF

PIPE DETAILS
- DIAMETER = 72"
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = PERFORATED
- BARREL SPACING = 36"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 6"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 0"

ASSEMBLY
SCALE: 1" = 10'

NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}$" x $\frac{1}{2}$" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

C:\EXPORTS\TEMPLATES\CMP_V8.DWG 10/18/2019 10:02 AM

DATE	REVISION DESCRIPTION	BY

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH® CMP DETENTION SYSTEMS

CONTECH
DYODS
DRAWING

DYO35383 Jericho Road
Underground Perforated CMP
La Mesa, CA
DETENTION SYSTEM

PROJECT No.: 24012	SEQ. No.: 35383	DATE: 8/1/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

CONTECH ENGINEERED SOLUTIONS

CMP: Underground Detention System
Storage Volume Estimation

=Adjustable Input Cells

Date: 8/1/2023
Project Name: Underground Perforated CMP - 35383 (8-1-2023 17-29-9)

City / County:
State:

Designed By:
Company:
Telephone:

Contech Engineered Solutions, LLC is pleased to offer the following estimate of storage volume for the above named project. The results are submitted as an estimate only, without liability on the part of Contech Engineered Solutions, LLC for accuracy or suitability to any particular applicaton and are subject to verification of the Engineer of Record. This tool is only applicable for rectangular shaped systems.

Summary of Inputs

System Information		Backfill Information		Pipe & Analysis Information	
Out-to-out length (ft):	**69.0**	**Backfill Porosity (%):**	**40%**	**System Diameter (in):**	**72**
Out-to-out width (ft):	**42.0**	**Depth Above Pipe (in):**	**6.0**	**Pipe Spacing (in):**	**36**
Number of Manifolds (ea):	**1.0**	**Depth Below Pipe (in):**	**0.0**	**Incremental Analysis (in):**	**2**
Number of Barrels (ea):	**5.0**	**Width At Ends (ft):**	**1.0**	**System Invert (Elevation):**	**0**
		Width At Sides (ft):	**1.0**		

Storage Volume Estimation

System		Pipe		Stone		Total System		Miscellaneous	
Depth (ft)	**Elevation (ft)**	**Incremental Storage (cf)**	**Cumulative Storage (cf)**	**Incremental Storage (cf)**	**Cumulative Storage (cf)**	**Incremental Storage (cf)**	**Cumulative Storage (cf)**	**Percent Open Storage (%)**	**Ave. Surface Area (sf)**
0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0%	1,249.6
0.17	0.16	78.7	78.7	176.8	176.8	255.5	255.5	30.8%	1,672.0
0.33	0.33	141.9	220.6	151.5	328.3	293.4	548.9	40.2%	1,838.4
0.50	0.50	181.2	401.8	135.8	464.1	317.0	865.9	46.4%	1,960.0
0.67	0.66	211.3	613.1	123.7	587.8	335.1	1,200.9	51.1%	2,057.4
0.83	0.83	236.0	849.0	113.9	701.7	349.9	1,550.8	54.8%	2,138.5
1.00	1.00	256.8	1,105.8	105.6	807.3	362.3	1,913.1	57.8%	2,207.5
1.17	1.16	274.5	1,380.3	98.5	905.7	373.0	2,286.1	60.4%	2,266.9
1.33	1.33	289.9	1,670.2	92.3	998.0	382.2	2,668.3	62.6%	2,318.2
1.50	1.50	303.2	1,973.4	87.0	1,085.0	390.2	3,058.4	64.5%	2,362.6
1.67	1.66	314.6	2,288.0	82.4	1,167.5	397.0	3,455.5	66.2%	2,400.9
1.83	1.83	324.5	2,612.5	78.5	1,245.9	403.0	3,858.4	67.7%	2,433.6
2.00	2.00	332.9	2,945.3	75.1	1,321.1	408.0	4,266.4	69.0%	2,461.3
2.17	2.16	339.9	3,285.2	72.3	1,393.4	412.2	4,678.6	70.2%	2,484.2
2.33	2.33	345.6	3,630.8	70.0	1,463.4	415.6	5,094.2	71.3%	2,502.7
2.50	2.50	350.1	3,980.9	68.2	1,531.6	418.3	5,512.6	72.2%	2,516.8
2.67	2.66	353.5	4,334.4	66.9	1,598.5	420.4	5,932.9	73.1%	2,526.8
2.83	2.83	355.7	4,690.2	66.0	1,664.5	421.7	6,354.6	73.8%	2,532.8
3.00	3.00	356.8	5,047.0	65.5	1,730.0	422.4	6,777.0	74.5%	2,534.8
3.17	3.16	356.8	5,403.8	65.5	1,795.6	422.4	7,199.3	75.1%	2,532.8
3.33	3.33	355.7	5,759.5	66.0	1,861.5	421.7	7,621.0	75.6%	2,526.8
3.50	3.50	353.5	6,113.0	66.9	1,928.4	420.4	8,041.4	76.0%	2,516.8
3.67	3.66	350.1	6,463.1	68.2	1,996.6	418.3	8,459.7	76.4%	2,502.7
3.83	3.83	345.6	6,808.7	70.0	2,066.6	415.6	8,875.4	76.7%	2,484.2
4.00	4.00	339.9	7,148.6	72.3	2,139.0	412.2	9,287.6	77.0%	2,461.3
4.17	4.16	332.9	7,481.5	75.1	2,214.1	408.0	9,695.5	77.2%	2,433.6
4.33	4.33	324.5	7,805.9	78.5	2,292.6	403.0	10,098.5	77.3%	2,400.9
4.50	4.50	314.6	8,120.6	82.4	2,375.0	397.0	10,495.5	77.4%	2,362.6
4.67	4.66	303.2	8,423.7	87.0	2,462.0	390.2	10,885.7	77.4%	2,318.2
4.83	4.83	289.9	8,713.6	92.3	2,554.3	382.2	11,267.9	77.3%	2,266.9
5.00	5.00	274.5	8,988.1	98.5	2,652.7	373.0	11,640.9	77.2%	2,207.5
5.17	5.16	256.8	9,244.9	105.6	2,758.3	362.3	12,003.2	77.0%	2,138.5
5.33	5.33	236.0	9,480.9	113.9	2,872.2	349.9	12,353.1	76.7%	2,057.4
5.50	5.50	211.3	9,692.2	123.7	2,995.9	335.1	12,688.1	76.4%	1,960.0
5.67	5.66	181.2	9,873.3	135.8	3,131.7	317.0	13,005.1	75.9%	1,838.4
5.83	5.83	141.9	10,015.3	151.5	3,283.2	293.4	13,298.5	75.3%	1,672.0
6.00	6.00	78.7	10,093.9	176.8	3,460.0	255.5	13,554.0	74.5%	1,249.6
6.17	6.16	0.0	10,093.9	208.3	3,668.3	208.3	13,762.2	73.3%	1,249.6

6.33	6.33	0.0	10,093.9	208.3	3,876.6	208.3	13,970.5	72.3%	1,249.6
6.50	6.50	0.0	10,093.9	208.3	4,084.8	208.3	14,178.8	71.2%	1,249.6

HMP #2 Stage Storage-CMP

depth	area	area (ac)	elevation	volume (cf)	volume (acft)	
0.00	1249.6	0.0000	0.0	0.0	0.000	
0.17	1672.0	0.0384	0.2	255.5	0.006	
0.33	1838.4	0.0422	0.3	548.9	0.013	
0.50	1960.0	0.0450	0.5	865.9	0.020	
0.67	2057.4	0.0472	0.7	1,200.9	0.028	
0.83	2138.5	0.0491	0.8	1,550.8	0.036	
1.00	2207.5	0.0507	1.0	1,913.1	0.044	
1.17	2266.9	0.0520	1.2	2,286.1	0.052	
1.33	2318.2	0.0532	1.3	2,668.3	0.061	
1.50	2362.6	0.0542	1.5	3,058.4	0.070	
1.67	2400.9	0.0551	1.7	3,455.5	0.079	
1.83	2433.6	0.0559	1.8	3,858.4	0.089	
2.00	2461.3	0.0565	2.0	4,266.4	0.098	
2.17	2484.2	0.0570	2.2	4,678.6	0.107	1.57 DCV
2.33	2502.7	0.0575	2.3	5,094.2	0.117	
2.50	2516.8	0.0578	2.5	5,512.6	0.127	
2.67	2526.8	0.0580	2.7	5,932.9	0.136	
2.83	2532.8	0.0581	2.8	6,354.6	0.146	
3.00	2534.8	0.0582	3.0	6,777.0	0.156	
3.17	2532.8	0.0581	3.2	7,199.3	0.165	
3.33	2526.8	0.0580	3.3	7,621.0	0.175	
3.50	2516.8	0.0578	3.5	8,041.4	0.185	
3.67	2502.7	0.0575	3.7	8,459.7	0.194	
3.83	2484.2	0.0570	3.8	8,875.4	0.204	
4.00	2461.3	0.0565	4.0	9,287.6	0.213	
4.17	2433.6	0.0559	4.2	9,695.5	0.223	>9566 cft
4.33	2400.9	0.0551	4.3	10,098.5	0.232	
4.50	2362.6	0.0542	4.5	10,495.5	0.241	
4.67	2318.2	0.0532	4.7	10,885.7	0.250	
4.83	2266.9	0.0520	4.8	11,267.9	0.259	
5.00	2207.5	0.0507	5.0	11,640.9	0.267	
5.17	2138.5	0.0491	5.2	12,003.2	0.276	
5.33	2057.4	0.0472	5.3	12,353.1	0.284	
5.50	1960.0	0.0450	5.5	12,688.1	0.291	
5.67	1838.4	0.0422	5.7	13,005.1	0.299	
5.83	1672.0	0.0384	5.8	13,298.5	0.305	
6.00	1249.6	0.0287	6.0	13,554.0	0.311	
6.17	1249.6	0.0287	6.2	13,762.2	0.316	
6.33	1249.6	0.0287	6.3	13,970.5	0.321	
6.50	1249.6	0.0287	6.5	14,178.8	0.325	

9,696 CFT STORAGE PROVIDED AT 4.17 FT > 9,566 CFT MIN BMP SIZE

HMP #2 DRAWDOWN CALCULATION				
Elevation	Q_{AVG} (CFS)	DV (CF)	DT (HR)	Total T
0.17	0.02	255	3.88	42.28
0.33	0.02	293	3.42	38.40
0.50	0.03	317	2.65	34.97
0.67	0.04	335	2.30	32.33
0.83	0.05	350	2.09	30.03
1.00	0.05	362	1.94	27.94
1.17	0.06	373	1.83	26.00
1.33	0.06	382	1.74	24.17
1.50	0.07	390	1.66	22.44
1.67	0.07	397	1.59	20.78
1.83	0.07	403	1.53	19.19
2.00	0.08	408	1.48	17.65
2.17	0.08	412	1.43	16.17
2.33	0.08	416	1.39	14.74
2.50	0.09	418	1.35	13.35
2.67	0.09	420	1.31	12.00
2.83	0.09	422	1.27	10.69
3.00	0.09	422	1.24	9.42
3.17	0.10	422	1.20	8.18
3.33	0.10	422	1.17	6.98
3.50	0.10	420	1.14	5.81
3.67	0.11	418	1.10	4.67
3.83	0.11	416	1.07	3.57
4.00	0.11	412	1.04	2.50
4.17	0.11	408	1.01	1.46
4.33	0.42	403	0.27	0.45
4.50	1.55	397	0.07	0.19
4.67	3.52	390	0.03	0.11
4.83	5.48	382	0.02	0.08
5.00	6.87	373	0.02	0.06
5.17	8.44	362	0.01	0.05
5.33	10.78	350	0.01	0.04
5.50	13.71	335	0.01	0.03
5.67	16.61	317	0.01	0.02
5.83	18.69	293	0.00	0.02
6.00	20.16	255	0.00	0.01
6.17	21.54	208	0.00	0.01
6.33	22.81	208	0.00	0.00
6.50	24.00	208	0.00	0.00

TOTAL DRAW DOWN < 96 HRS

Input


```
[TITLE]
;;Project Title/Notes
Jericho Road- Detention Analysis

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           07/26/2023
START_TIME           00:00:00
REPORT_START_DATE    07/26/2023
REPORT_START_TIME    00:00:00
END_DATE             07/26/2023
END_TIME             10:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:15:00
WET_STEP             00:05:00
DRY_STEP             01:00:00
ROUTING_STEP         0:00:30
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.566
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
CONSTANT         0.0
DRY_ONLY         NO

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
Node216          0          FREE                        NO
```

```
Node116          0          FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params            N/A      Fevap    Psi      Ksat     IMD
;;-------------- -------- ---------- ----------- ---------- ---------------------------- -------- --------          -------- --------
Basin1           0         6.5        1.67      TABULAR    CMP1                         0        0
Basin2           0        6.5         2.17      TABULAR    CMP2                         0        0

[OUTLETS]
;;Name           From Node        To Node          Offset     Type            QTable/Qcoeff    Qexpon     Gated
;;-------------- ---------------- ---------------- ---------- --------------- ---------------- ---------- --------
Detention/HMPOrifices1 Basin1           Node216          0          TABULAR/HEAD    Basin1Discharge             NO
Detention/HMPOrifices2 Basin2           Node116          0          TABULAR/HEAD    Basin2Discharge             NO

[INFLOWS]
;;Node           Constituent      Time Series      Type     Mfactor  Sfactor  Baseline Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
Basin1           FLOW             Basin1InflowHyd  FLOW     1.0      1.0
Basin2           FLOW             Basin2InflowHyd  FLOW     1.0      1.0

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
Basin1Discharge  Rating     0.00       0.000
Basin1Discharge             0.17       0.009
Basin1Discharge             0.33       0.014
Basin1Discharge             0.50       0.018
Basin1Discharge             0.67       0.021
Basin1Discharge             0.83       0.024
Basin1Discharge             1.00       0.026
Basin1Discharge             1.17       0.028
Basin1Discharge             1.33       0.030
Basin1Discharge             1.50       0.032
Basin1Discharge             1.67       0.034
Basin1Discharge             1.83       0.036
Basin1Discharge             2.00       0.037
Basin1Discharge             2.17       0.039
Basin1Discharge             2.33       0.040
Basin1Discharge             2.50       0.042
Basin1Discharge             2.67       0.043
Basin1Discharge             2.83       0.045
Basin1Discharge             3.00       0.046
Basin1Discharge             3.17       0.047
Basin1Discharge             3.33       0.088
Basin1Discharge             3.50       0.158
Basin1Discharge             3.67       0.197
Basin1Discharge             3.83       0.228
Basin1Discharge             4.00       0.255
Basin1Discharge             4.17       0.279
Basin1Discharge             4.33       0.300
Basin1Discharge             4.50       0.320
Basin1Discharge             4.67       0.339
```

```
Basin1Discharge             4.83       0.356
Basin1Discharge             5.00       0.373
Basin1Discharge             5.17       1.383
Basin1Discharge             5.33       3.216
Basin1Discharge             5.50       5.584
Basin1Discharge             5.67       7.497
Basin1Discharge             5.83       8.344
Basin1Discharge             6.00       9.111
;
Basin2Discharge  Rating     0.00       0.000
Basin2Discharge             0.17       0.018
Basin2Discharge             0.33       0.029
Basin2Discharge             0.50       0.037
Basin2Discharge             0.67       0.044
Basin2Discharge             0.83       0.049
Basin2Discharge             1.00       0.054
Basin2Discharge             1.17       0.059
Basin2Discharge             1.33       0.063
Basin2Discharge             1.50       0.067
Basin2Discharge             1.67       0.071
Basin2Discharge             1.83       0.075
Basin2Discharge             2.00       0.078
Basin2Discharge             2.17       0.081
Basin2Discharge             2.33       0.085
Basin2Discharge             2.50       0.088
Basin2Discharge             2.67       0.091
Basin2Discharge             2.83       0.093
Basin2Discharge             3.00       0.096
Basin2Discharge             3.17       0.099
Basin2Discharge             3.33       0.102
Basin2Discharge             3.50       0.104
Basin2Discharge             3.67       0.107
Basin2Discharge             3.83       0.109
Basin2Discharge             4.00       0.111
Basin2Discharge             4.17       0.114
Basin2Discharge             4.33       0.722
Basin2Discharge             4.50       2.370
Basin2Discharge             4.67       4.663
Basin2Discharge             4.83       6.302
Basin2Discharge             5.00       7.445
Basin2Discharge             5.17       9.426
Basin2Discharge             5.33       12.126
Basin2Discharge             5.50       15.285
Basin2Discharge             5.67       17.928
Basin2Discharge             5.83       19.459
Basin2Discharge             6.00       20.869
Basin2Discharge             6.17       22.211
Basin2Discharge             6.33       23.401
Basin2Discharge             6.50       24.599
;
CMP1             Storage    0.00       749
CMP1                        0.17       1004
```

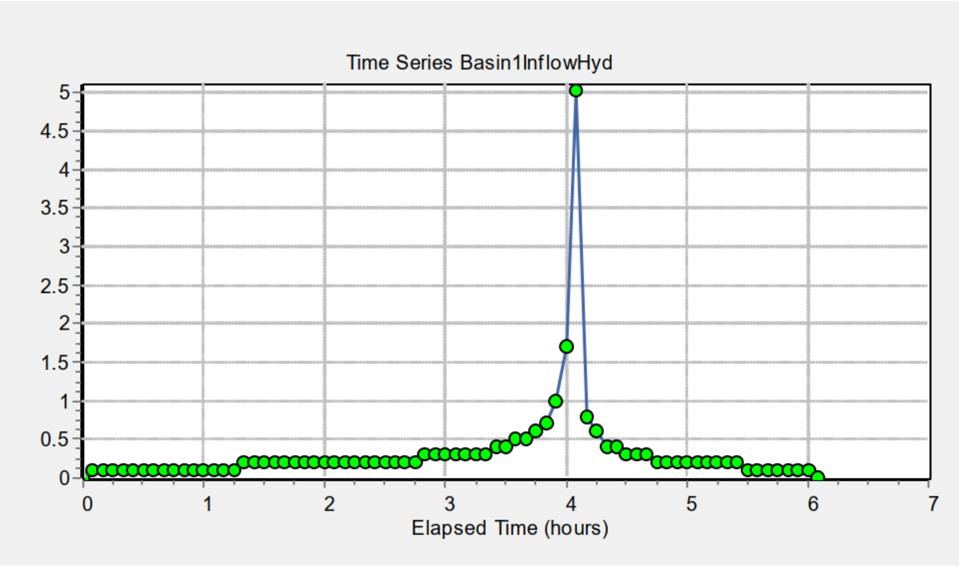
```
CMP1                            0.33       1105
CMP1                            0.50       1179
CMP1                            0.67       1238
CMP1                            0.83       1287
CMP1                            1.00       1328
CMP1                            1.17       1364
CMP1                            1.33       1395
CMP1                            1.50       1422
CMP1                            1.67       1445
CMP1                            1.83       1465
CMP1                            2.00       1482
CMP1                            2.17       1496
CMP1                            2.33       1507
CMP1                            2.50       1516
CMP1                            2.67       1522
CMP1                            2.83       1525
CMP1                            3.00       1526
CMP1                            3.17       1525
CMP1                            3.33       1522
CMP1                            3.50       1516
CMP1                            3.67       1507
CMP1                            3.83       1496
CMP1                            4.00       1482
CMP1                            4.17       1465
CMP1                            4.33       1445
CMP1                            4.50       1422
CMP1                            4.67       1395
CMP1                            4.83       1364
CMP1                            5.00       1328
CMP1                            5.17       1287
CMP1                            5.33       1238
CMP1                            5.50       1179
CMP1                            5.67       1105
CMP1                            5.83       1004
CMP1                            6.00       749
CMP1                            6.17       749
CMP1                            6.33       749
CMP1                            6.50       749
;
CMP2             Storage        0.00       1249.6
CMP2                            0.17       1672.0
CMP2                            0.33       1838.4
CMP2                            0.50       1960.0
CMP2                            0.67       2057.4
CMP2                            0.83       2138.5
CMP2                            1.00       2207.5
CMP2                            1.17       2266.9
CMP2                            1.33       2318.2
CMP2                            1.50       2362.6
CMP2                            1.67       2400.9
CMP2                            1.83       2433.6
CMP2                            2.00       2461.3
```

```
CMP2                        2.17      2484.2
CMP2                        2.33      2502.7
CMP2                        2.50      2516.8
CMP2                        2.67      2526.8
CMP2                        2.83      2532.8
CMP2                        3.00      2534.8
CMP2                        3.17      2532.8
CMP2                        3.33      2526.8
CMP2                        3.50      2516.8
CMP2                        3.67      2502.7
CMP2                        3.83      2484.2
CMP2                        4.00      2461.3
CMP2                        4.17      2433.6
CMP2                        4.33      2400.9
CMP2                        4.50      2362.6
CMP2                        4.67      2318.2
CMP2                        4.83      2266.9
CMP2                        5.00      2207.5
CMP2                        5.17      2138.5
CMP2                        5.33      2057.4
CMP2                        5.50      1960.0
CMP2                        5.67      1838.4
CMP2                        5.83      1672.0
CMP2                        6.00      1249.6
CMP2                        6.17      1249.6
CMP2                        6.33      1249.6
CMP2                        6.50      1249.6

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
Basin1InflowHyd  7/26/2023  0:00       0
Basin1InflowHyd  7/26/2023  0:05       0.1
Basin1InflowHyd  7/26/2023  0:10       0.1
Basin1InflowHyd  7/26/2023  0:15       0.1
Basin1InflowHyd  7/26/2023  0:20       0.1
Basin1InflowHyd  7/26/2023  0:25       0.1
Basin1InflowHyd  7/26/2023  0:30       0.1
Basin1InflowHyd  7/26/2023  0:35       0.1
Basin1InflowHyd  7/26/2023  0:40       0.1
Basin1InflowHyd  7/26/2023  0:45       0.1
Basin1InflowHyd  7/26/2023  0:50       0.1
Basin1InflowHyd  7/26/2023  0:55       0.1
Basin1InflowHyd  7/26/2023  1:00       0.1
Basin1InflowHyd  7/26/2023  1:05       0.1
Basin1InflowHyd  7/26/2023  1:10       0.1
Basin1InflowHyd  7/26/2023  1:15       0.1
Basin1InflowHyd  7/26/2023  1:20       0.2
Basin1InflowHyd  7/26/2023  1:25       0.2
Basin1InflowHyd  7/26/2023  1:30       0.2
Basin1InflowHyd  7/26/2023  1:35       0.2
Basin1InflowHyd  7/26/2023  1:40       0.2
```

Inflow hydrograph CMP1 (Node 200)

Jericho Road- Detention Analysis

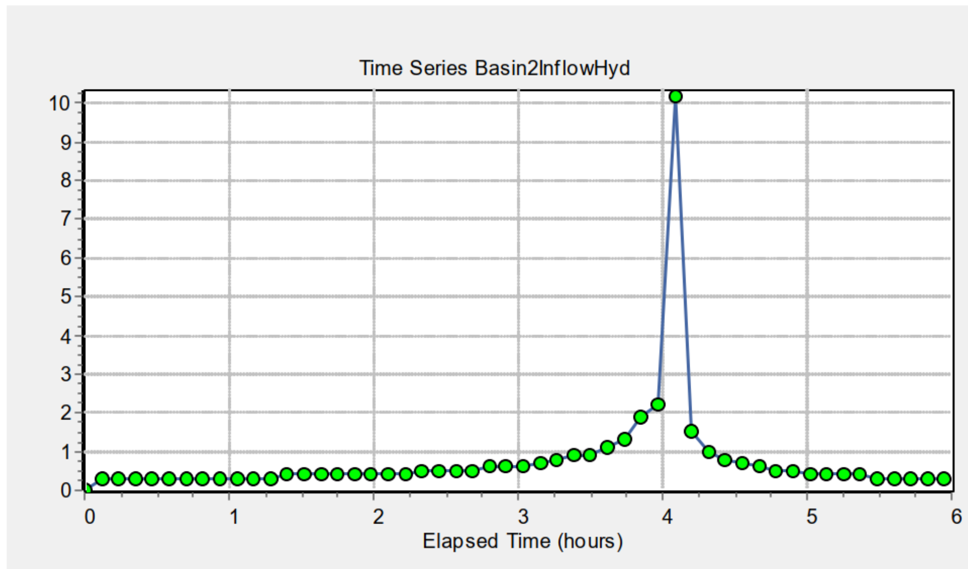


```
Basin1InflowHyd  7/26/2023  1:45       0.2
Basin1InflowHyd  7/26/2023  1:50       0.2
Basin1InflowHyd  7/26/2023  1:55       0.2
Basin1InflowHyd  7/26/2023  2:00       0.2
Basin1InflowHyd  7/26/2023  2:05       0.2
Basin1InflowHyd  7/26/2023  2:10       0.2
Basin1InflowHyd  7/26/2023  2:15       0.2
Basin1InflowHyd  7/26/2023  2:20       0.2
Basin1InflowHyd  7/26/2023  2:25       0.2
Basin1InflowHyd  7/26/2023  2:30       0.2
Basin1InflowHyd  7/26/2023  2:35       0.2
Basin1InflowHyd  7/26/2023  2:40       0.2
Basin1InflowHyd  7/26/2023  2:45       0.2
Basin1InflowHyd  7/26/2023  2:50       0.3
Basin1InflowHyd  7/26/2023  2:55       0.3
Basin1InflowHyd  7/26/2023  3:00       0.3
Basin1InflowHyd  7/26/2023  3:05       0.3
Basin1InflowHyd  7/26/2023  3:10       0.3
Basin1InflowHyd  7/26/2023  3:15       0.3
Basin1InflowHyd  7/26/2023  3:20       0.3
Basin1InflowHyd  7/26/2023  3:25       0.4
Basin1InflowHyd  7/26/2023  3:30       0.4
Basin1InflowHyd  7/26/2023  3:35       0.5
Basin1InflowHyd  7/26/2023  3:40       0.5
Basin1InflowHyd  7/26/2023  3:45       0.6
Basin1InflowHyd  7/26/2023  3:50       0.7
Basin1InflowHyd  7/26/2023  3:55       1
Basin1InflowHyd  7/26/2023  4:00       1.7
Basin1InflowHyd  7/26/2023  4:05       5.03
Basin1InflowHyd  7/26/2023  4:10       0.8
Basin1InflowHyd  7/26/2023  4:15       0.6
Basin1InflowHyd  7/26/2023  4:20       0.4
Basin1InflowHyd  7/26/2023  4:25       0.4
Basin1InflowHyd  7/26/2023  4:30       0.3
Basin1InflowHyd  7/26/2023  4:35       0.3
Basin1InflowHyd  7/26/2023  4:40       0.3
Basin1InflowHyd  7/26/2023  4:45       0.2
Basin1InflowHyd  7/26/2023  4:50       0.2
Basin1InflowHyd  7/26/2023  4:55       0.2
Basin1InflowHyd  7/26/2023  5:00       0.2
Basin1InflowHyd  7/26/2023  5:05       0.2
Basin1InflowHyd  7/26/2023  5:10       0.2
Basin1InflowHyd  7/26/2023  5:15       0.2
Basin1InflowHyd  7/26/2023  5:20       0.2
Basin1InflowHyd  7/26/2023  5:25       0.2
Basin1InflowHyd  7/26/2023  5:30       0.1
Basin1InflowHyd  7/26/2023  5:35       0.1
Basin1InflowHyd  7/26/2023  5:40       0.1
Basin1InflowHyd  7/26/2023  5:45       0.1
Basin1InflowHyd  7/26/2023  5:50       0.1
Basin1InflowHyd  7/26/2023  5:55       0.1
Basin1InflowHyd  7/26/2023  6:00       0.1
```

```
Basin1InflowHyd  7/26/2023  6:05       0
;
Basin2InflowHyd  7/26/2023  0:00       0
Basin2InflowHyd  7/26/2023  0:07       0.3
Basin2InflowHyd  7/26/2023  0:14       0.3
Basin2InflowHyd  7/26/2023  0:21       0.3
Basin2InflowHyd  7/26/2023  0:28       0.3
Basin2InflowHyd  7/26/2023  0:35       0.3
Basin2InflowHyd  7/26/2023  0:42       0.3
Basin2InflowHyd  7/26/2023  0:49       0.3
Basin2InflowHyd  7/26/2023  0:56       0.3
Basin2InflowHyd  7/26/2023  1:03       0.3
Basin2InflowHyd  7/26/2023  1:10       0.3
Basin2InflowHyd  7/26/2023  1:17       0.3
Basin2InflowHyd  7/26/2023  1:24       0.4
Basin2InflowHyd  7/26/2023  1:31       0.4
Basin2InflowHyd  7/26/2023  1:38       0.4
Basin2InflowHyd  7/26/2023  1:45       0.4
Basin2InflowHyd  7/26/2023  1:52       0.4
Basin2InflowHyd  7/26/2023  1:59       0.4
Basin2InflowHyd  7/26/2023  2:06       0.4
Basin2InflowHyd  7/26/2023  2:13       0.4
Basin2InflowHyd  7/26/2023  2:20       0.5
Basin2InflowHyd  7/26/2023  2:27       0.5
Basin2InflowHyd  7/26/2023  2:34       0.5
Basin2InflowHyd  7/26/2023  2:41       0.5
Basin2InflowHyd  7/26/2023  2:48       0.6
Basin2InflowHyd  7/26/2023  2:55       0.6
Basin2InflowHyd  7/26/2023  3:02       0.6
Basin2InflowHyd  7/26/2023  3:09       0.7
Basin2InflowHyd  7/26/2023  3:16       0.8
Basin2InflowHyd  7/26/2023  3:23       0.9
Basin2InflowHyd  7/26/2023  3:30       0.9
Basin2InflowHyd  7/26/2023  3:37       1.1
Basin2InflowHyd  7/26/2023  3:44       1.3
Basin2InflowHyd  7/26/2023  3:51       1.9
Basin2InflowHyd  7/26/2023  3:58       2.2
Basin2InflowHyd  7/26/2023  4:05       10.18
Basin2InflowHyd  7/26/2023  4:12       1.5
Basin2InflowHyd  7/26/2023  4:19       1
Basin2InflowHyd  7/26/2023  4:26       0.8
Basin2InflowHyd  7/26/2023  4:33       0.7
Basin2InflowHyd  7/26/2023  4:40       0.6
Basin2InflowHyd  7/26/2023  4:47       0.5
Basin2InflowHyd  7/26/2023  4:54       0.5
Basin2InflowHyd  7/26/2023  5:01       0.4
Basin2InflowHyd  7/26/2023  5:08       0.4
Basin2InflowHyd  7/26/2023  5:15       0.4
Basin2InflowHyd  7/26/2023  5:22       0.4
Basin2InflowHyd  7/26/2023  5:29       0.3
Basin2InflowHyd  7/26/2023  5:36       0.3
Basin2InflowHyd  7/26/2023  5:43       0.3
```

Inflow hydrograph CMP2 (Node 100)

Jericho Road- Detention Analysis



```
Basin2InflowHyd  7/26/2023  5:50       0.3
Basin2InflowHyd  7/26/2023  5:57       0.3

[REPORT]
;;Reporting Options
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -822.614 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Node216          -702.726           5698.467
Node116          1337.308           5689.949
Basin1           -719.761           7580.920
Basin2           1337.308           7649.063

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.014)
--------------------------------------------------------------

Jericho Road- Detention Analysis


*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ NO
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Flow Routing Method ...... KINWAVE
Starting Date ............ 07/26/2023 00:00:00
Ending Date .............. 07/26/2023 10:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:15:00
Routing Time Step ........ 30.00 sec


**************************        Volume         Volume
Flow Routing Continuity        acre-feet       10^6 gal
**************************     ---------      ---------
Dry Weather Inflow .......         0.000          0.000
Wet Weather Inflow .......         0.000          0.000
Groundwater Inflow .......         0.000          0.000
RDII Inflow ..............         0.000          0.000
External Inflow ..........         0.537          0.175
External Outflow .........         0.408          0.133
Flooding Loss ............         0.000          0.000
Evaporation Loss .........         0.000          0.000
Exfiltration Loss ........         0.000          0.000
Initial Stored Volume ....         0.155          0.050
Final Stored Volume ......         0.283          0.092
Continuity Error (%) .....         0.048


********************************
Highest Flow Instability Indexes
********************************
All links are stable.


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :    29.00 sec
Average Time Step           :    30.00 sec
Maximum Time Step           :    30.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     1.00
Percent Not Converging      :     0.00


******************
Node Depth Summary
```

****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
Node216	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
Node116	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
Basin1	STORAGE	3.23	4.97	4.97	0 04:27	4.97
Basin2	STORAGE	3.61	4.98	4.98	0 04:08	4.54

100 yr WSE

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
Node216	OUTFALL	0.00	0.37	0 04:27	0	0.0372	0.000
Node116	OUTFALL	0.00	7.31	0 04:08	0	0.0958	0.000
Basin1	STORAGE	5.03	5.03	0 04:05	0.053	0.0685	0.040
Basin2	STORAGE	10.18	10.18	0 04:05	0.122	0.157	0.051

Outflow

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
Basin1	4.411	52	0	0	6.958	82	0 04:27	0.37
Basin2	8.290	59	0	0	11.584	82	0 04:08	7.31

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
Node216	100.00	0.14	0.37	0.037
Node116	100.00	0.36	7.31	0.096
System	100.00	0.49	7.31	0.133

****
Link Flow Summary
****

```
                          Maximum  Time of Max   Maximum    Max/    Max/
                           |Flow|   Occurrence   |Veloc|    Full    Full
Link                 Type      CFS  days hr:min    ft/sec    Flow   Depth
-----------------------------------------------------------------------------
Detention/HMPOrifices1 DUMMY        0.37     0  04:27
Detention/HMPOrifices2 DUMMY        7.31     0  04:08
```

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Tue Aug 1 10:55:24 2023
Analysis ended on: Tue Aug 1 10:55:24 2023
Total elapsed time: < 1 sec

Channel Report

For Existing condition Velocity calculation

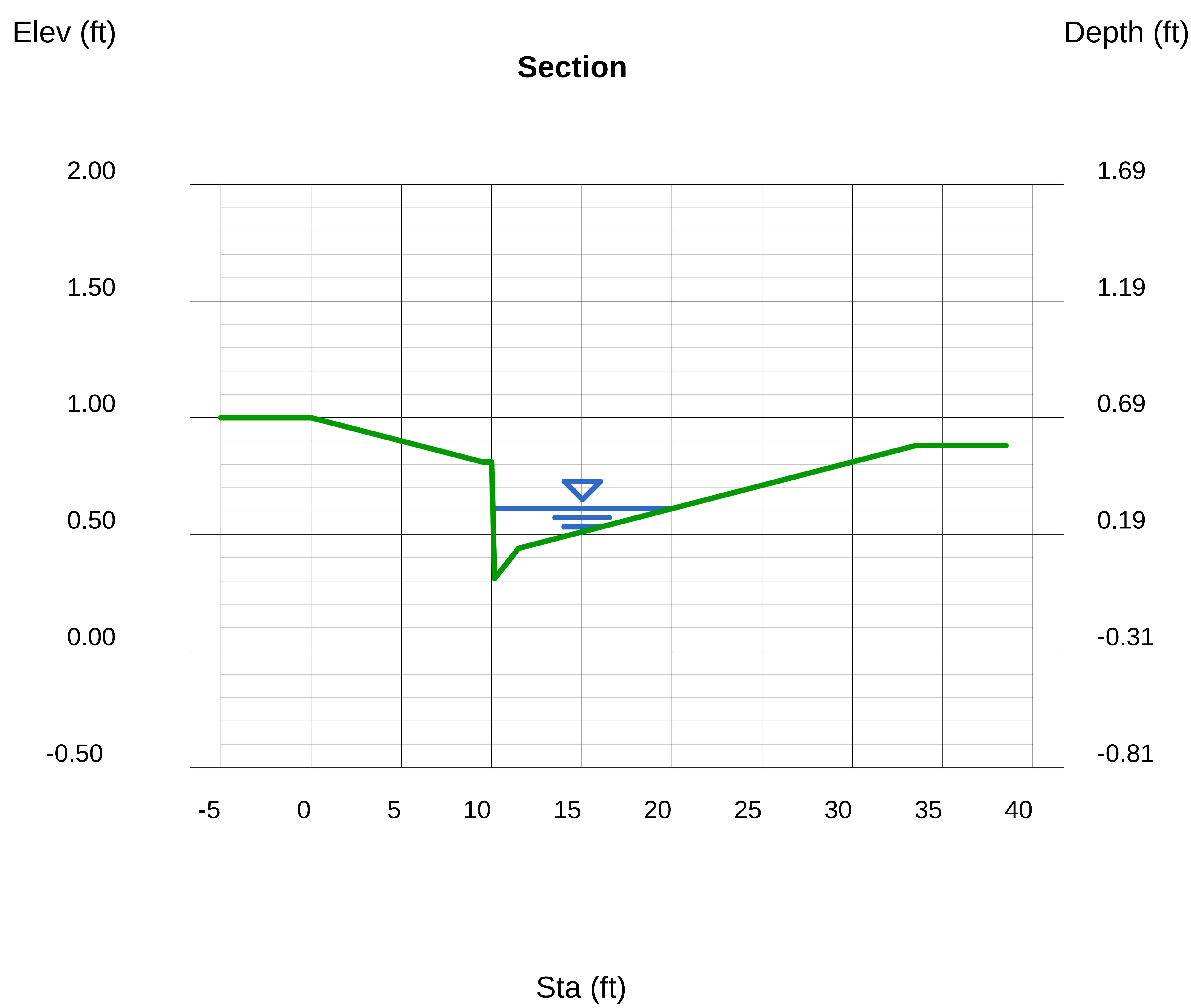
Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Jul 28 2023

Existing Jericho Road at Node 206

User-defined		**Highlighted**	
Invert Elev (ft)	= 0.31	Depth (ft)	= 0.30
Slope (%)	= 12.80	Q (cfs)	= 9.420
N-Value	= 0.013	Area (sqft)	= 1.05
		Velocity (ft/s)	= 8.97
Calculations		Wetted Perim (ft)	= 10.15
Compute by:	Known Q	Crit Depth, Yc (ft)	= 0.49
Known Q (cfs)	= 9.42	Top Width (ft)	= 9.93
		EGL (ft)	= 1.55

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

(0.00, 1.00)-(9.50, 0.81, 0.013)-(10.00, 0.81, 0.013)-(10.17, 0.31, 0.013)-(11.50, 0.44, 0.013)-(33.50, 0.88, 0.013)



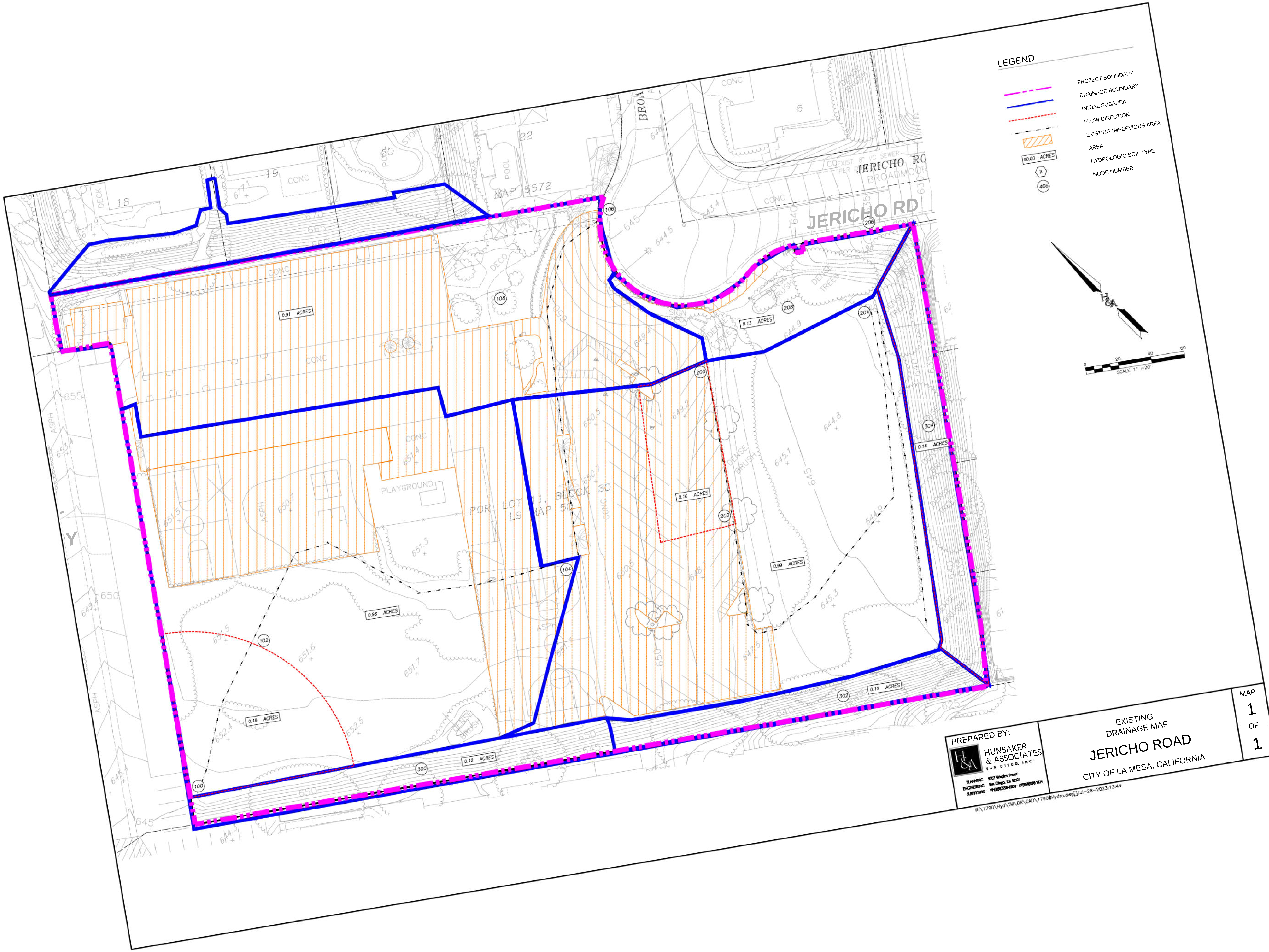
CHAPTER 5

HYDROLOGY EXHIBITS

CHAPTER 5

HYDROLOGY EXHIBITS

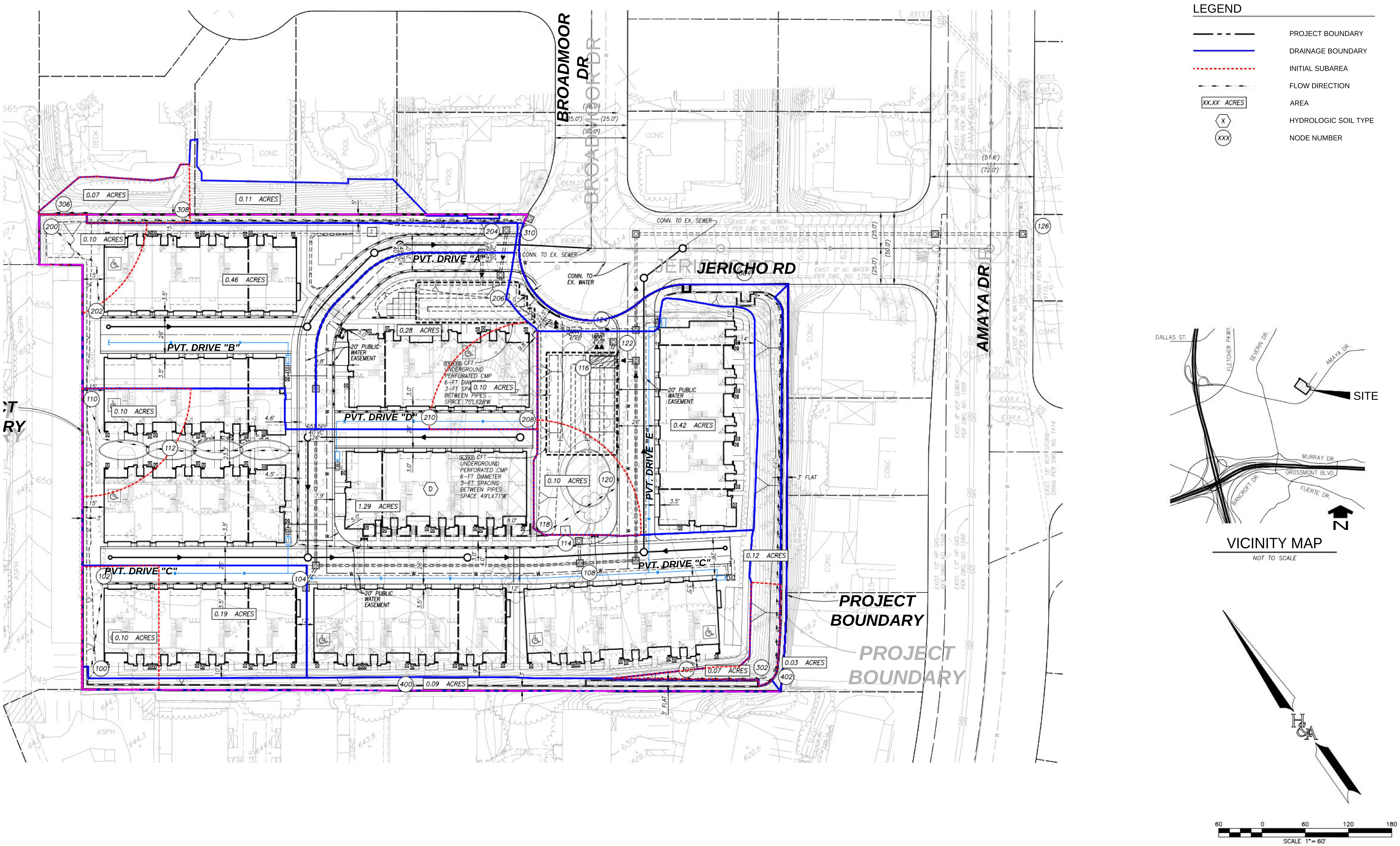
5.1 – Existing Condition Hydrology Exhibit


LEGEND
PROJECT BOUNDARY
DRAINAGE BOUNDARY
INITIAL SUBAREA
FLOW DIRECTION
EXISTING IMPERVIOUS AREA
AREA
HYDROLOGIC SOIL TYPE
NODE NUMBER
00.00 ACRES
406
SCALE 1" = 20'
0
20
40
60
JERICHO RD
JERICHO RD
BROADMOOR
MAP 5572
POR. LOT 11, BLOCK 30
LS MAP 50
PLAYGROUND
0.91 ACRES
0.96 ACRES
0.18 ACRES
0.12 ACRES
0.10 ACRES
0.99 ACRES
0.13 ACRES
0.14 ACRES
0.10 ACRES
100
102
104
106
108
200
202
204
206
208
300
302
304
PREPARED BY:
HUNSAKER & ASSOCIATES
SAN DIEGO, INC
EXISTING
DRAINAGE MAP
JERICHO ROAD
CITY OF LA MESA, CALIFORNIA
MAP
1
OF
1
R:\1790\Hyd\TM\DR\CAD\1790$Hydro.dwg[]Jul-28-2023:13:44

CHAPTER 5

HYDROLOGY EXHIBITS

5.2 – Developed Condition Hydrology Exhibit



PREPARED BY:

HUNSAKER & ASSOCIATES SAN DIEGO, INC.

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

PROPOSED HYDROLOGY MAP

JERICHO ROAD

CITY OF LA MESA, CALIFORNIA

MAP 1 OF 1

W.O.# 3087-0012

R:\1790\Hyd\TM\DR\CAD\1790$Hydro-PR.dwg[]Jul-28-2023:13:47

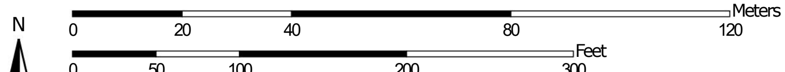
CHAPTER 6

References

CHAPTER 6

6.1 Soil Map

Map Scale: 1:1,380 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
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 18, Sep 14, 2022

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

Date(s) aerial images were photographed: Mar 24, 2022—Apr 29, 2022

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
RhE	Redding-Urban land complex, 9 to 30 percent slopes	D	3.3	100.0%
Totals for Area of Interest			**3.3**	**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

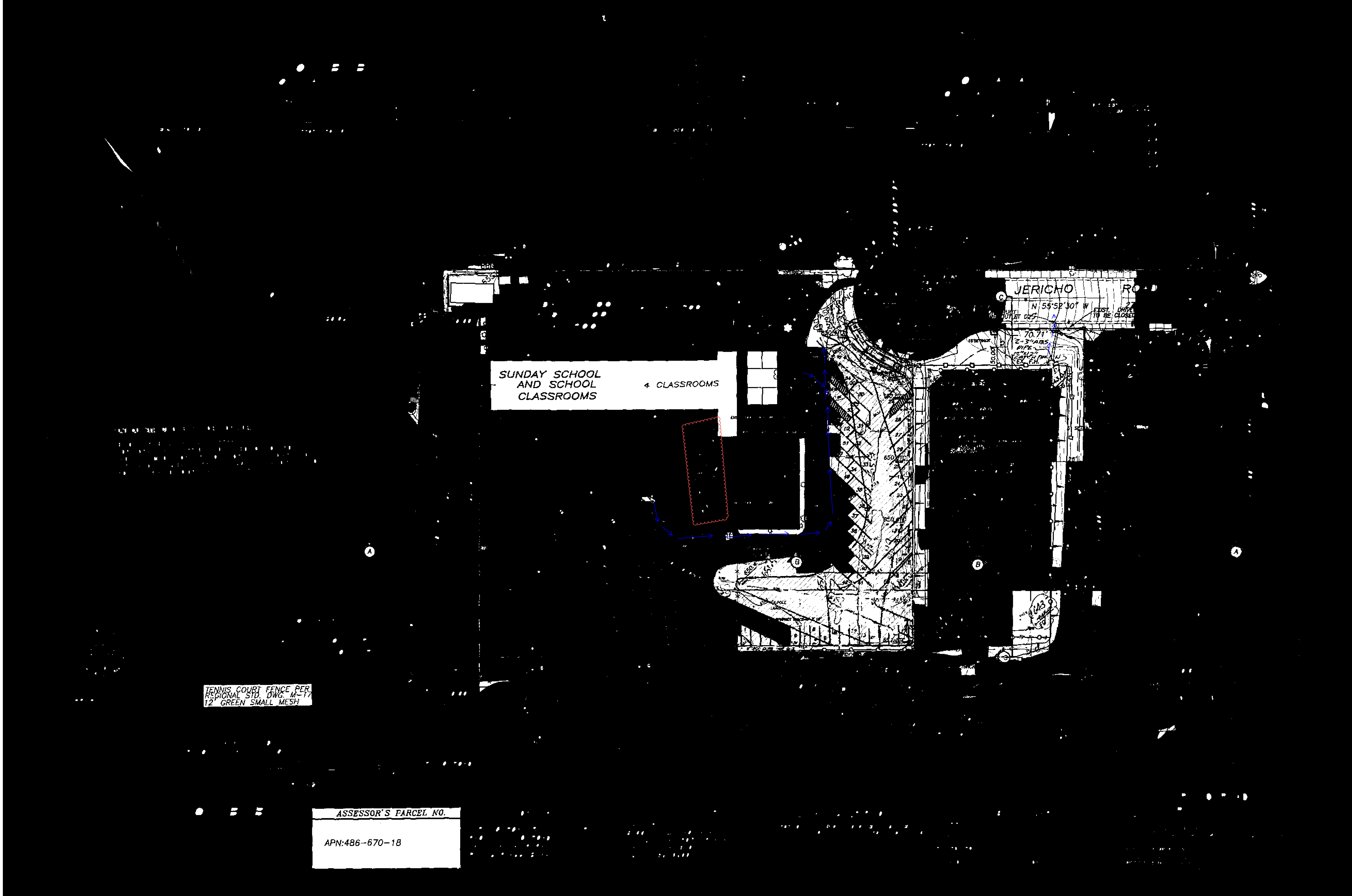
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

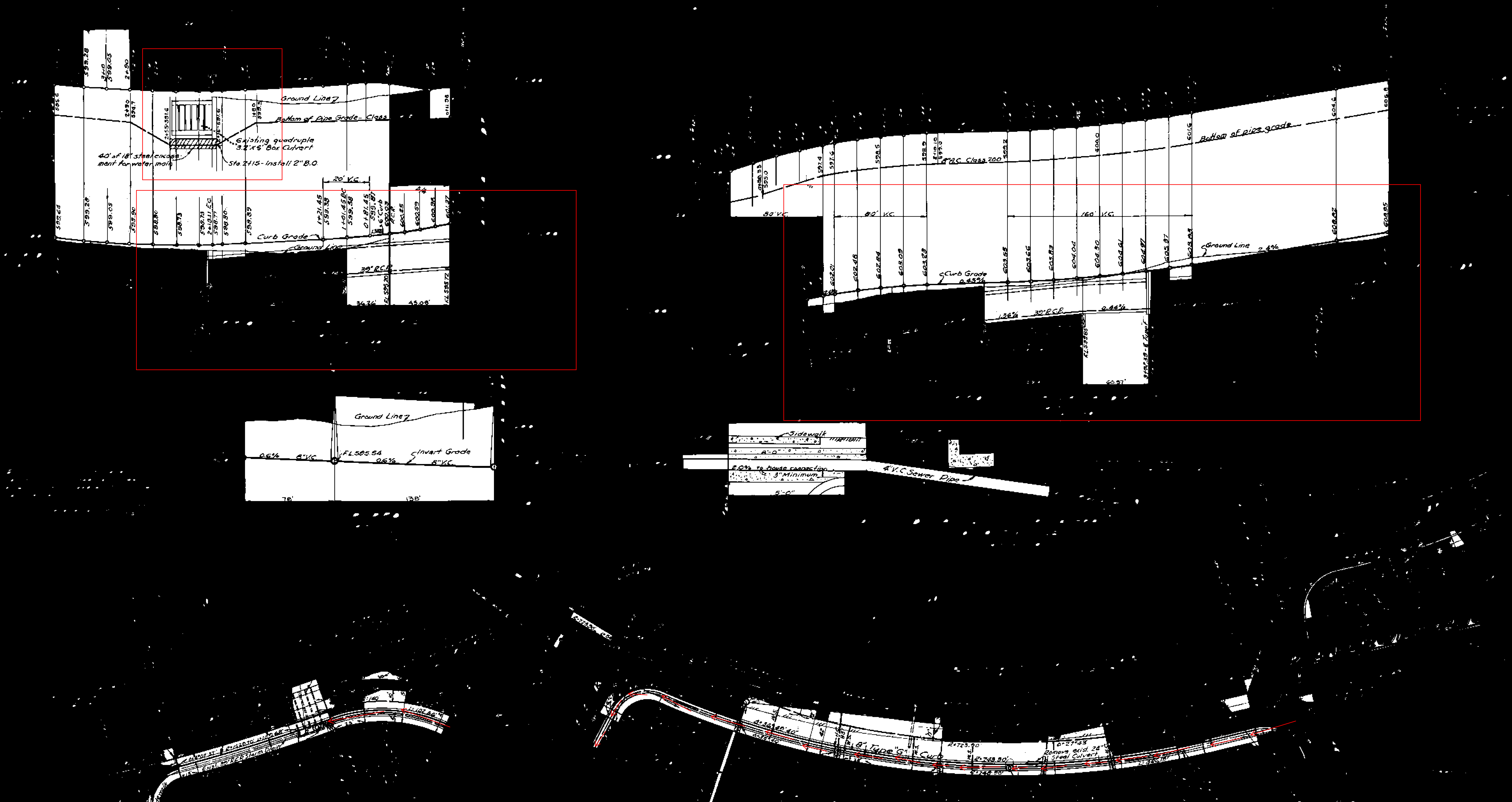
Tie-break Rule: Higher

CHAPTER 6

6.2 As-Built Plans

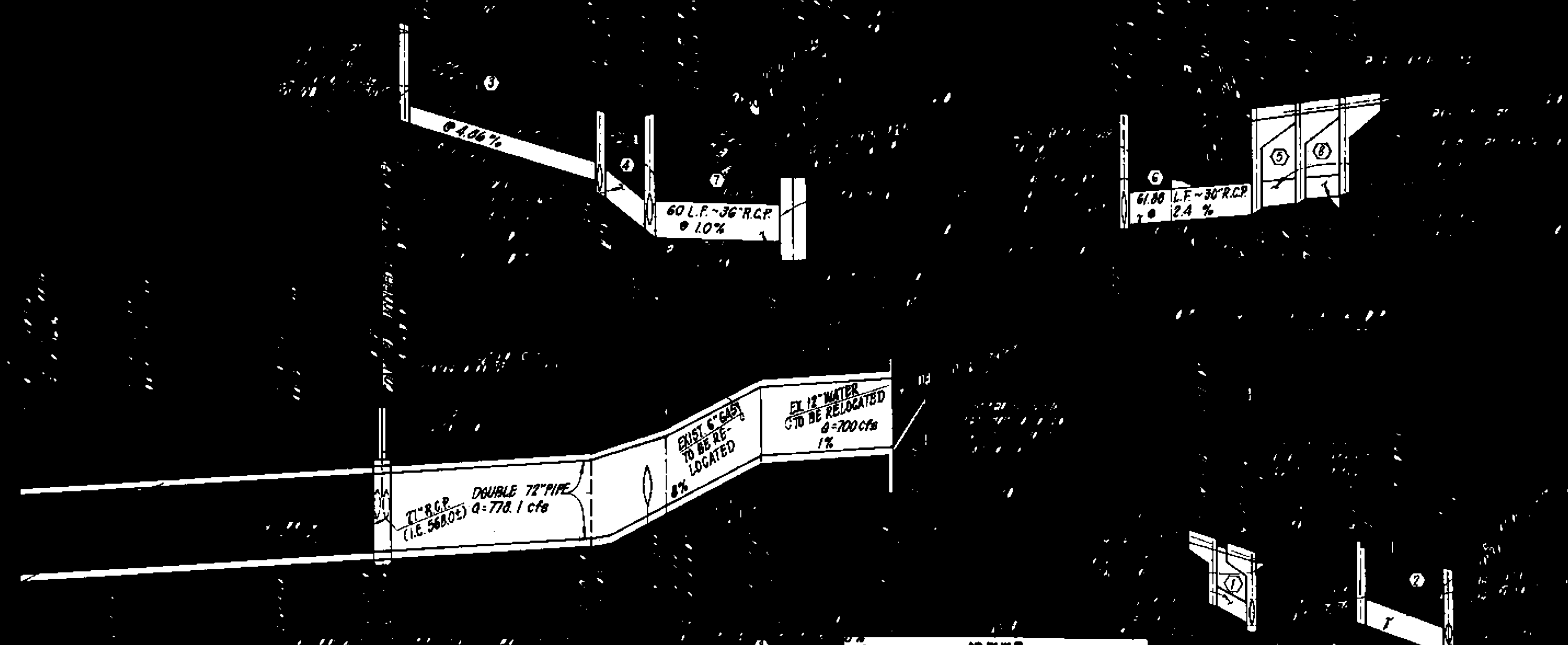


SUNDAY SCHOOL
AND SCHOOL
CLASSROOMS
4 CLASSROOMS
JERICHO
TENNIS COURT FENCE PER
REGIONAL STD. DWG. M-17
12' GREEN SMALL MESH
ASSESSOR'S PARCEL NO.
APN:486-670-18



JANFRED MANOR UNIT Nº 2

CITY OF LA MESA ENGINEERING DEPARTMENT				SHEET 2 OF 3 SHEETS		W.O. NO.
PLAN REVISION				*[signature]* CITY ENGINEER	11-7-57 DATE	ASS'T CITY ENGINEER AND OFFICE ENGINEER
CHANGE	BY	DATE	APPROVAL	APPROVALS FOR		
				WATER DEPT. *[signature]*	SEWERAGE	SUPERVISOR
				PLANNING DEPT.	DRAINAGE	
CONSTRUCTION RECORD				ELECTRICAL	HIGHWAY	CHECKED
DATE STARTED		DATE COMPLETED		STRUCTURAL	GRADES	DESIGNED
CONTR.		INSP.		TRAFFIC	CONTROL	1105
FIELD BOOK						



AS-BUILT

BY ____ RCE# 226 DATE 5/14/90

APPROVED ____ 6-7-90
CITY ENGINEER DATE

NO.	DELTA OR BRG.	RADIUS	LENGTH	REMARKS
1	2° 34' 03"	700'	31.37	DBL. 72" C.I.P.P.
2	4° 31' 18"	700'	55.24	" "
3				" "
4	N 77°50'39" W		208.91	" "
5			10.00'	JUNCTION STRUCTURE
6			28.00'	TRANSITION STRUCTURE
7			115.00'	10' x 5' R.C.B.
8		700'	95.00'	INTERIM DBL. 72" C.I.P.P.

NO.	RADIUS	LENGTH	REMARKS
1		17.00'	18" R.C.P.
		35.14'	DUAL 18" R.C.P.
		69.66'	18" R.C.P.
		23.50'	24" R.C.P.
5		16.00'	"
6		61.88'	30" R.C.P.
7		68.00'	36" R.C.P.
8		16.00'	18" R.C.P.
9		27.35'	18" R.C.P.

PROJECT DESIGN CONSULTANTS

Civil Engineering, Urban and Regional Planning
1010 Second Avenue, Suite 500, San Diego, CA 92101
(619) 235-6471

DOUGLAS C. PAUL, RCE 22606 — DATE 9/30/87

DESIGNED BY	DRAWN BY	CHECKED BY
R.E.	V.L.A.	D.W.S.

PUBLIC STREET IMPROVEMENT FOR :

PUBLIC OFFSITE DRAINAGE FACILITIES AT THE INTERSECTION OF AMAYA DRIVE AND SEVERIN DRIVE

VILLAGES OF LA MESA TR #87-2, NORTH

CITY OF LA MESA, CALIFORNIA
ENGINEERING DEPARTMENT
SHEET 8 OF 16 SHEETS

W.O. NO. ____

CITY ENGINEER RCE #27272 — DATE 12-10-87

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL				
A CHANGE	P.D.C.	DW		
B CHANGE	P.D.C.	DW		
C CHANGE	P.D.C.	DW	4/6/88	
AS-BUILT	P.D.C.			

CONTROL CERTIFICATION

226-1769
LAMBERT COORDINATES

UTILITIES BY: DW
TRAFFIC BY: HHL
DEVELOPMENT BY: ARC
SPECIAL PROJECTS BY: FD

5205

APPROVED BY HELIX WATER DISTRICT

DESCRIPTION	BY	APPROVED	DATE
A CHANGE	P.D.C.	DLK	[illegible]

NO.	DATE	REVISIONS	BY	CHK	APRV

CITY OF LA MESA, CA

NOLTE and ASSOCIATES
Engineers / Planners / Surveyors
9755 Clairemont Mesa Boulevard, San Diego, CA 92124 Tel: (619) 278-9392

REGISTERED PROFESSIONAL ENGINEER
JOHN A. KNUTSON
No. 038223
CIVIL
STATE OF CALIFORNIA
EXP DATE: 12/31/89

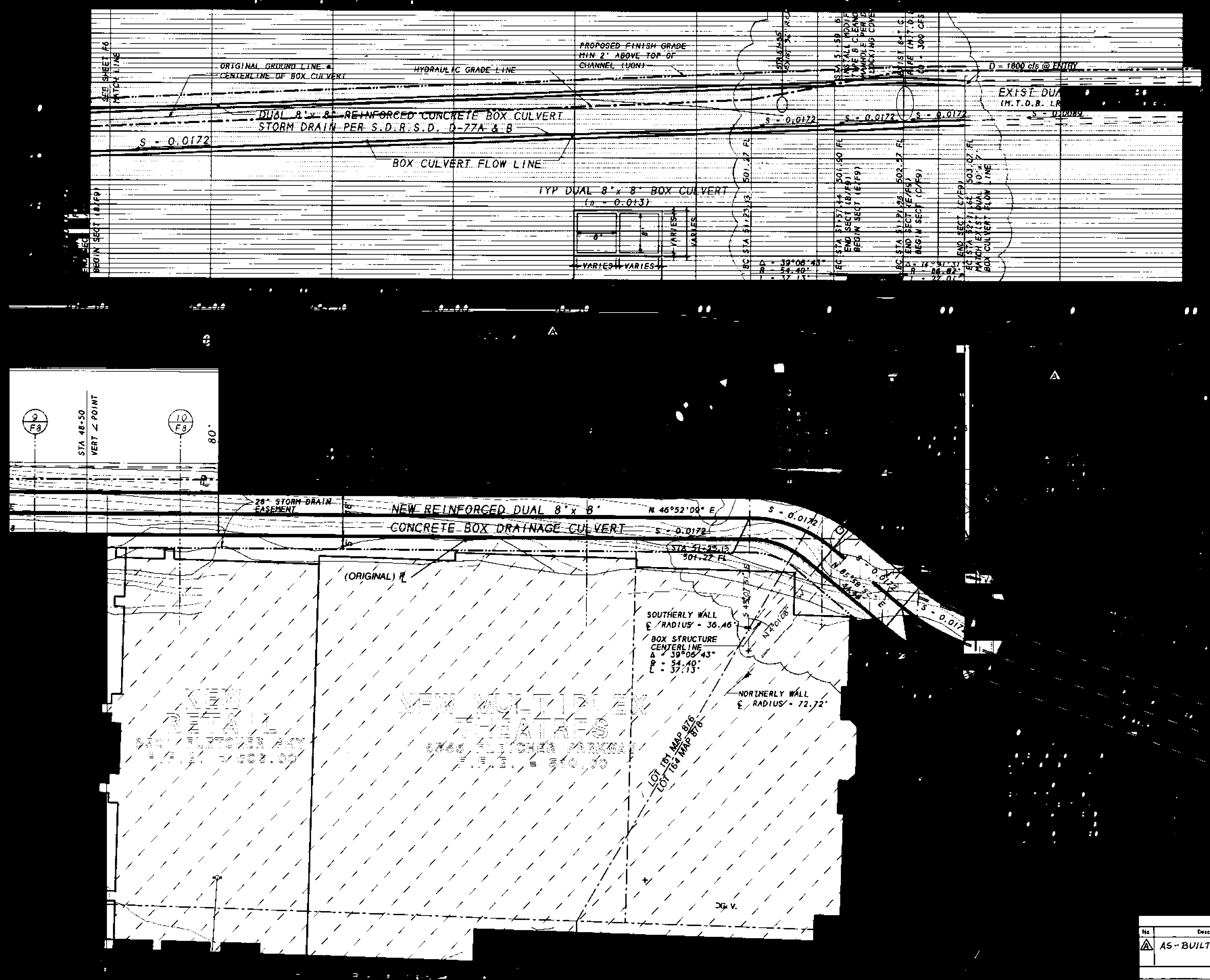
DESIGNED BY	LB/DP
DRAWN BY	AP
CHECKED BY	KY
DATE 8/24/87	

mtdb Metropolitan Transit Development Board
620 C Street, Suite 400 San Diego, California 92101 231-1466

LIGHT RAIL GUIDEWAY PROJECT
San Diego

EAST URBAN LRT LINE
AMAYA DR STATION
UTILITY PLAN

SCALE	1" = 40'
JOB NO.	8921-87-00
DRAWING NO.	C-61
REV.	
SHEET NO.	43/87



STORM DRAIN PLAN & PROFILE

IMPROVEMENT PLANS FOR:

GROSSMONT TROLLEY CENTER DUAL BOX CULVERT & R.C.P. STORM DRAINS

ALVARADO CHANNEL BASIN, FROM JACKSON DRIVE EASTERLY TO THE M.T.D.B. TROLLEY STATION PARKING LOT

DAB #89-35

REVISIONS			
No.	Description	Approved by	Date
A	AS-BUILT	JPS	11-9-90

BENCH MARK

DESCRIPTION: BENCHMARK #3067 X02 STANDARD BENCHMARK 3-1/2" BRASS DISC IN TOP OF 'K' INLET

LOCATION: IN FRONT OF 5341 JACKSON DRIVE N. OF CENTER DRIVE

RECORD FROM: CITY OF LA MESA

ELEVATION: 495.317 DATUM: CITY OF LA MESA

CITY OF LA MESA, CALIFORNIA
ENGINEERING DEPARTMENT
SHEET 7 OF 10 SHEETS

CITY ENGINEER RCE #24079 — 7-16-90 DATE

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL				

TRANSPORTATION UTILITIES — SPECIAL PROJECTS DEVELOPMENT

W.O. NO.

DIVISION HEAD

DESIGN ENGINEER

CONTROL CERTIFICATION

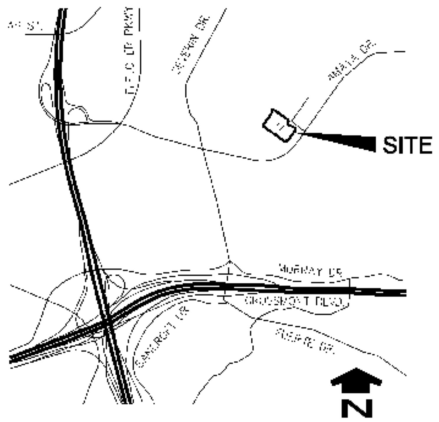
LAMBERT COORDINATES

5884 -D

CHAPTER 6

6.3 Site Development Plan

SITE DEVELOPMENT PLAN
JERICHO ROAD
CITY OF LA MESA, CALIFORNIA



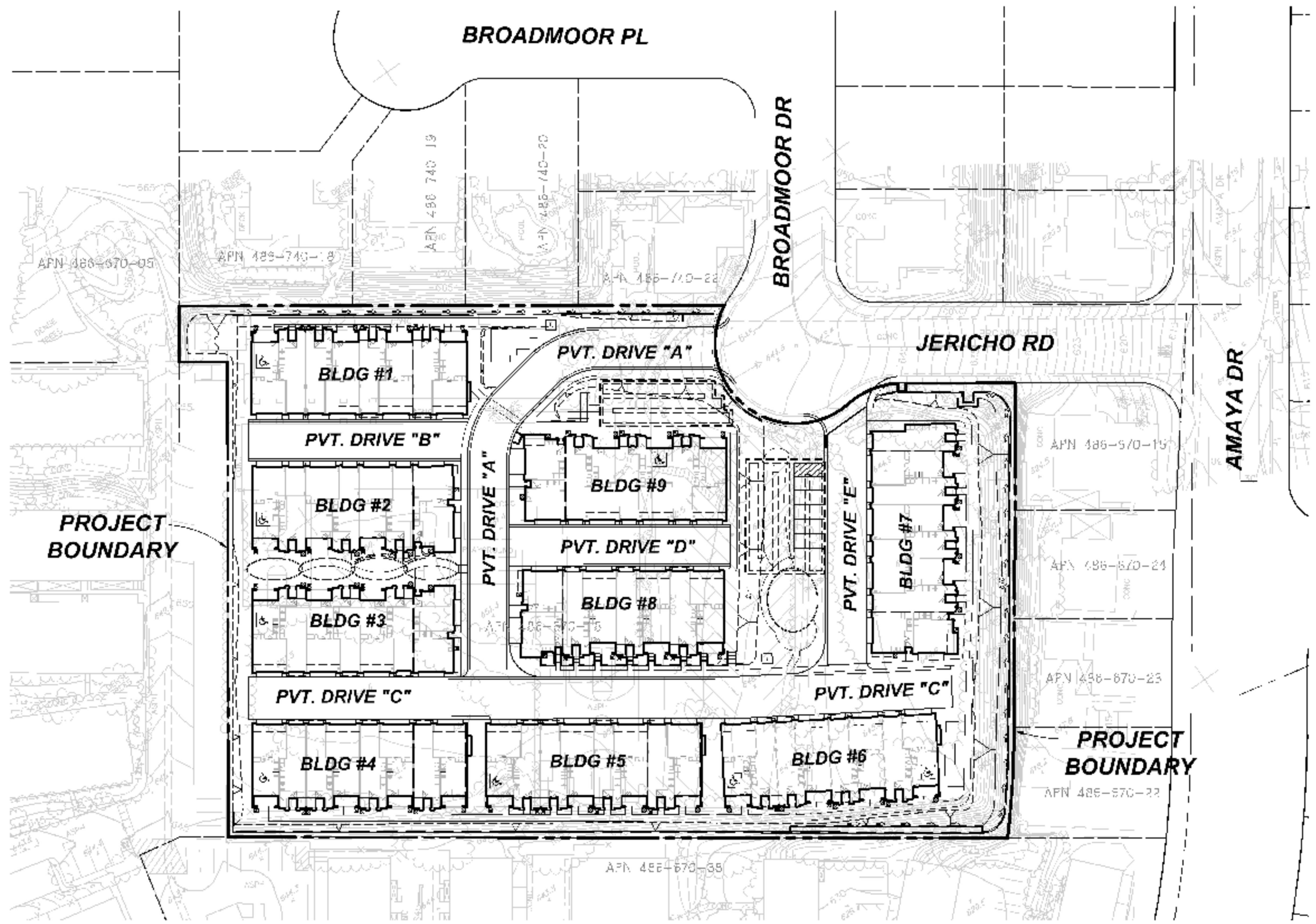
VICINITY MAP
NOT TO SCALE

LEGEND

PROJECT BOUNDARY	
EXISTING TOPO CONTOUR	350
BUILDING NUMBER	BLDG #2
FINISH FLOOR ELEVATION	FF=100.75
PAD ELEVATION	P=100.00
SLOPE (2:1 MAX)	2:1
DAYLIGHT LINE	
PERCENT OF GRADE	2%
ST. ELEVATION	350.4
8"* PVC PRIVATE SEWER MAIN W/ MANHOLE *UNLESS SHOWN OTHERWISE ON PLAN	
SEWER INVERT ELEVATION	347.4 IF
4"* PRIVATE PVC WATER MAIN *UNLESS SHOWN OTHERWISE ON PLAN	W
8" PUBLIC PVC WATER MAIN (HELIX WATER DISTRICT)	W
WATER METER	M
BACKFLOW PREVENTER	
FIRE HYDRANT	
18" PRIVATE HDPE STORM DRAIN* *UNLESS SHOWN OTHERWISE ON PLAN	
18" PUBLIC HDPE STORM DRAIN* *UNLESS SHOWN OTHERWISE ON PLAN	
RETAINING WALL* *PER CITY OF LA MESA STANDARD DRAWINGS	
TOP OF WALL ELEVATION/ FINISH GRADE	TW/FG
ST. LIGHT	
EASEMENT LINE	
TRANSFORMER	T
DRAINAGE SWALE PATH	
BROW DITCH	
ACCESSIBLE UNIT	

PARKING SUMMARY

USE	PARKING STANDARD	# OF UNITS	REQUIRED	PROVIDED
ATTACHED RESIDENTIAL	2 spaces per unit	73	146	146
GUEST PARKING	No minimum per AB 2097	73	0	5
	SUBTOTAL	73	146	151



KEY MAP
NOT TO SCALE

GENERAL NOTES

1. GROSS SITE AREA: 3.49 AC
2. TOTAL NUMBER OF EXISTING LOTS: 1
3. TOTAL NUMBER OF PROPOSED LOTS: 1
4. TOTAL NUMBER OF UNITS: 73 (ATTACHED UNITS)
5. ASSESSOR PARCEL NUMBER: 486 670 18
6. EXISTING GENERAL PLAN: URBAN RESIDENTIAL (7-10 DU/AC)
7. PROPOSED GENERAL PLAN: MULTIPLE UNIT RESIDENTIAL (18-23 DU/AC)
8. EXISTING ZONING CLASSIFICATION: R1
9. PROPOSED ZONING CLASSIFICATION: R3
10. PROPOSED DENSITY: 20.9 DU/AC (73 DU's/3.49 AC)
11. TOPOGRAPHIC CONTOUR INTERVAL: 1 FOOT
12. MAXIMUM SLOPE GRADIENT: 2:1
13. AREA/PERCENT OF TOTAL BUILDING COVERAGE: 1.30 AC (37.2%)
14. AREA/PERCENT OF PROJECT IN STREETS, DRIVEWAYS & DRIVE AISLES: 0.82 AC (23.5%)
15. AREA/PERCENT OF SIDEWALKS: 0.17 AC (4.9%)
16. AREA/PERCENT OF LANDSCAPING: 1.20 AC (34.4%)

DESIGN NOTES

1. ALL STREET DESIGN SHALL CONFORM TO THE CITY OF LA MESA DESIGN STANDARDS AS REQUIRED BY THE CITY ENGINEER.
2. EASEMENTS SHALL BE PROVIDED, REMOVED OR RELOCATED AS REQUIRED BY THE CITY ENGINEER.
3. ALL PROPOSED UTILITIES SHALL BE UNDERGROUNDED AND EASEMENTS PROVIDED.
4. GEOTECHNICAL INVESTIGATION PREPARED BY: LGC GEOTECHNICAL, INC. DATED JUNE 5, 2023.
5. THE DEVELOPER SHALL INSTALL STREET LIGHTS PER THE CITY OF LA MESA ENGINEERING DEPARTMENT.
6. THE PROPOSED SEWER SHALL BE INSTALLED PER CITY OF LA MESA STANDARDS.
7. THE PROPOSED WATER SHALL BE INSTALLED PER HELIX WATER DISTRICT.
8. FINISH GRADES ARE APPROXIMATE AND SUBJECT TO CHANGE IN FINAL DESIGN.
9. MODEL UNITS MAY BE BUILT PRIOR TO FINAL MAP WITH APPROVAL FROM THE CITY ENGINEER AND PLANNING DIRECTOR.
10. ALL FUTURE DRIVEWAYS AND GEOMETRIC DESIGN SHALL BE DESIGNED IN COMPLIANCE WITH THE CITY OF LA MESA ENGINEERS DESIGN STANDARDS.
11. THE PRESENT OR FUTURE OWNER/DEVELOPER SHALL INDEMNIFY AND SAVE CITY OF LA MESA, ITS OFFICERS, AGENTS, AND EMPLOYEES HARMLESS FROM ANY AND ALL LIABILITIES, CLAIMS ARISING FROM ANY FLOODING THAT OCCURS ON THIS SITE AND FLOODING THAT MAYBE DISCHARGED FROM THIS SITE INTO ADJACENT PROPERTIES.
12. ADA COMPLIANT SIDEWALKS AND PATHWAYS ARE PROVIDED THROUGHOUT THE SITE WHERE APPROPRIATE.

OWNER

CALVARY CHAPEL OF EL CAJON
9407 JERICHO ROAD
LA MESA, CA 91942
ATTN: PONZIO OLIVERIO
TEL: (619) 533 9956

OWNER DATE

APPLICANT

MLC HOLDINGS, INC./ MERITAGE HOMES
JOHANNA CROOKER
5 PETERS CANYON ROAD
SUITE 310
IRVINE, CA 92606

JOHANNA CROOKER DATE
APPLICANT

EARTHWORK/GRADING QUANTITIES

CUT: APPROX. 4,522 C.Y.
FILL: APPROX. 4,522 C.Y.

GRADING QUANTITIES SHOWN ARE RAW QUANTITIES ONLY AND DO NOT INCLUDE THE EFFECT OF REMEDIAL GRADING SHOWN IN THE PRELIMINARY SOILS REPORT.

SHEET INDEX

OPEN SPACE

SEE SHEET 6

BASIS OF BEARING

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CCS '83 CALIFORNIA COORDINATE SYSTEM ZONE 6, 1991.35 EPOCH, GRID BEARING BETWEEN STATION 51 AND STATION 47 AS SAID COORDINATES ARE PUBLISHED IN RECORD OF SURVEY MAP NO. 15575. I.E. N80°11'21"E

BENCHMARK

VERTICAL BASED ON CITY OF LA MESA BENCHMARK NO. 1(4611) ELEV. 579.160' (NGVD 29)

TOPOGRAPHY SOURCE

VERTICAL RELIEF SHOWN HEREON WAS PRODUCED BY FIELD METHODS COMBINED WITH AERIAL PHOTOGRAPHY BY PHOTO GEODETIC CORPORATION FLOWN ON MARCH 17, 2023.

REGISTERED PROFESSIONAL ENGINEER
ALISA S. VIALPANDO
C 47945
CIVIL
STATE OF CALIFORNIA

CIVIL ENGINEER

HUNSAKER & ASSOCIATES, SAN DIEGO, INC
9707 WAPLES STREET
SAN DIEGO, CA 92121
(858) 558 4500

ALISA S. VIALPANDO R.C.E. 47945 DATE

LEGAL DESCRIPTION

SEE SHEET 8

EASEMENTS

SEE SHEET 8

PREPARED BY:

HUNSAKER & ASSOCIATES
SAN DIEGO, INC

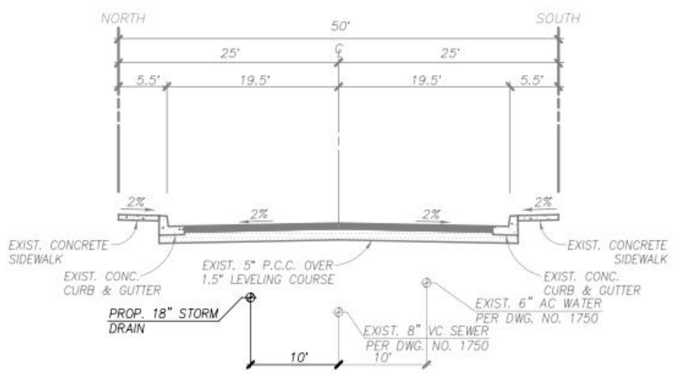
PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 · FX(858)558-1414

NO.	REVISIONS	DATE	BY
1	1st SUBMITTAL	08/11/2023	H&A
2			
3			
4			
5			
6			
7			
8			
9			
10			

SITE DEVELOPMENT PLAN
JERICHO ROAD
CITY OF LA MESA, CALIFORNIA

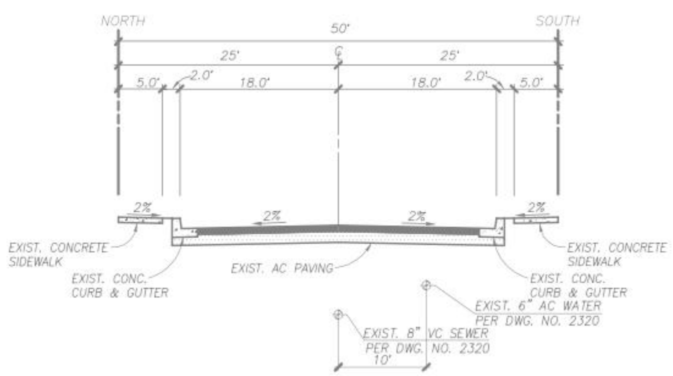
SHEET 1 OF 8

WO # 3937-0012



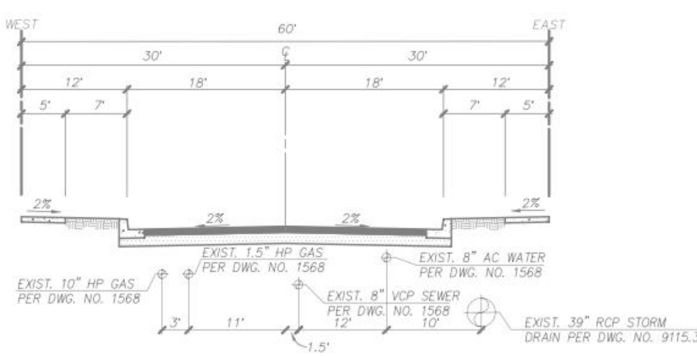
EXISTING JERICHO ROAD

NOT TO SCALE



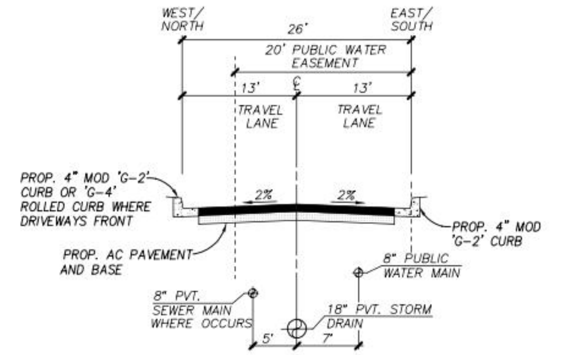
EXISTING BROADMOR DRIVE

NOT TO SCALE



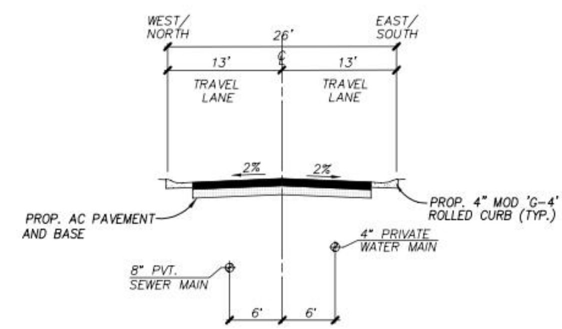
EXISTING AMAYA DRIVE
(AT CURB RETURN NORTH OF PROP. STORM DRAIN CONN.)

NOT TO SCALE



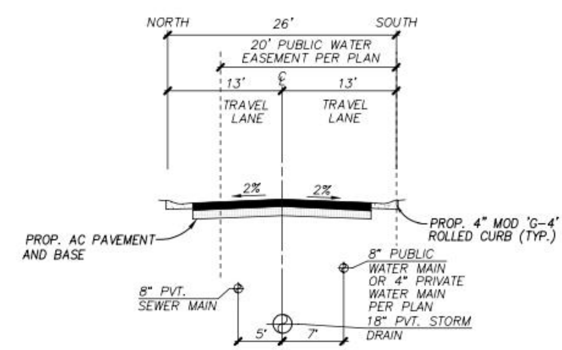
PROPOSED PVT. DRIVE 'A'

NOT TO SCALE



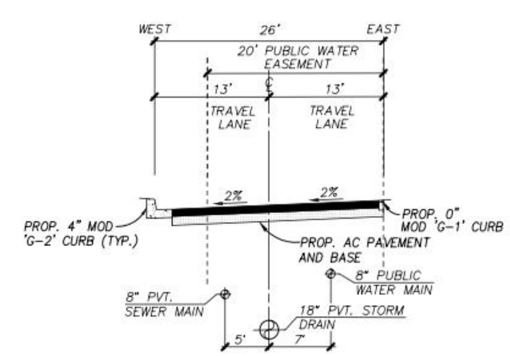
PROPOSED PVT. DRIVES 'B' & 'D'

NOT TO SCALE



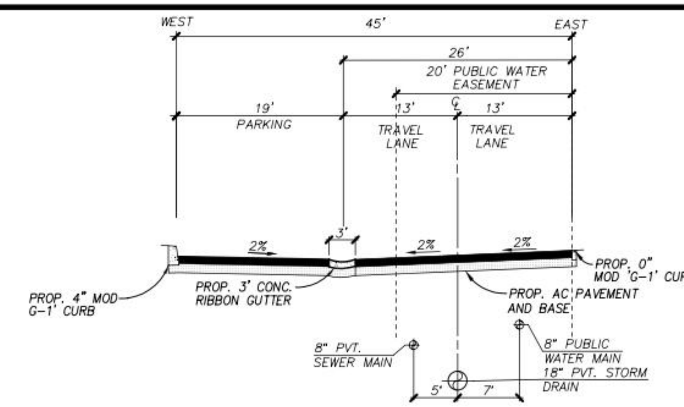
PROPOSED PORTION OF PVT. DRIVE 'C'

NOT TO SCALE



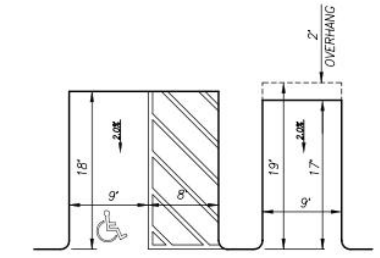
PROPOSED PORTION OF PVT. DRIVE 'E'

NOT TO SCALE



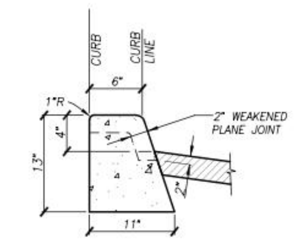
PROPOSED PORTION OF PVT. DRIVE 'E'
(WHERE ON STREET PARKING IS SHOWN)

NOT TO SCALE



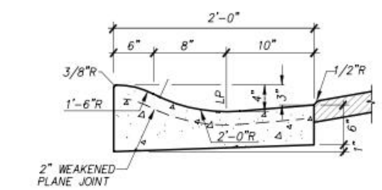
TYPICAL PARKING DETAIL

NOT TO SCALE



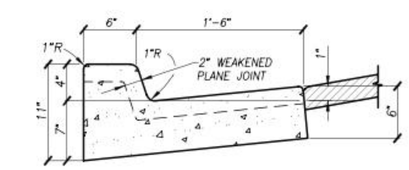
4" MOD. 'G-1' CURB

NOT TO SCALE



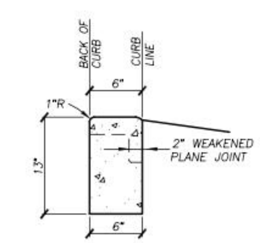
4" MOD. 'G-4' ROLLED CURB

NOT TO SCALE



4" MOD. 'G-2' CURB & GUTTER

NOT TO SCALE



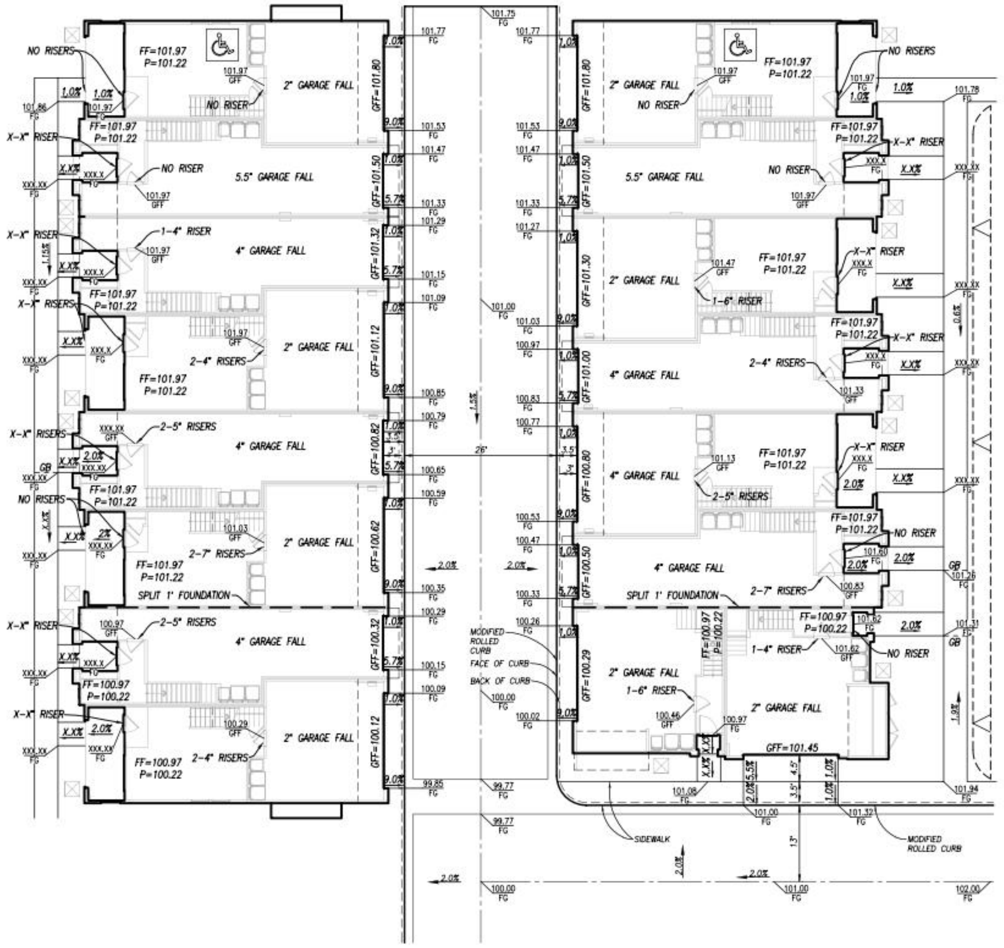
0" MOD. CURB

NOT TO SCALE

STREET SECTIONS / SITE DETAILS

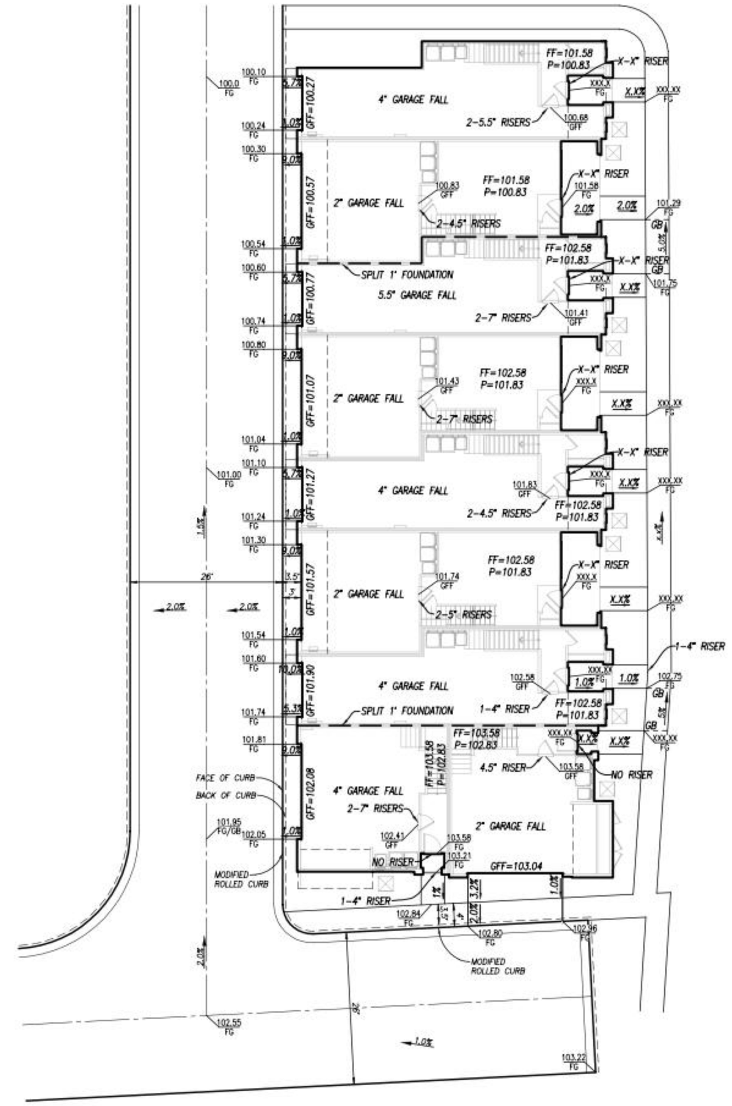
PREPARED BY:	SITE DEVELOPMENT PLAN	SHEET
HUNSAKER & ASSOCIATES SAN DIEGO, INC. PLANNING 9707 Waples Street ENGINEERING San Diego, Ca 92121 SURVEYING PH(858)558-4500 · FX(858)558-1414	**JERICHO ROAD** CITY OF LA MESA, CALIFORNIA	2 OF 8

WO # 3087-0012



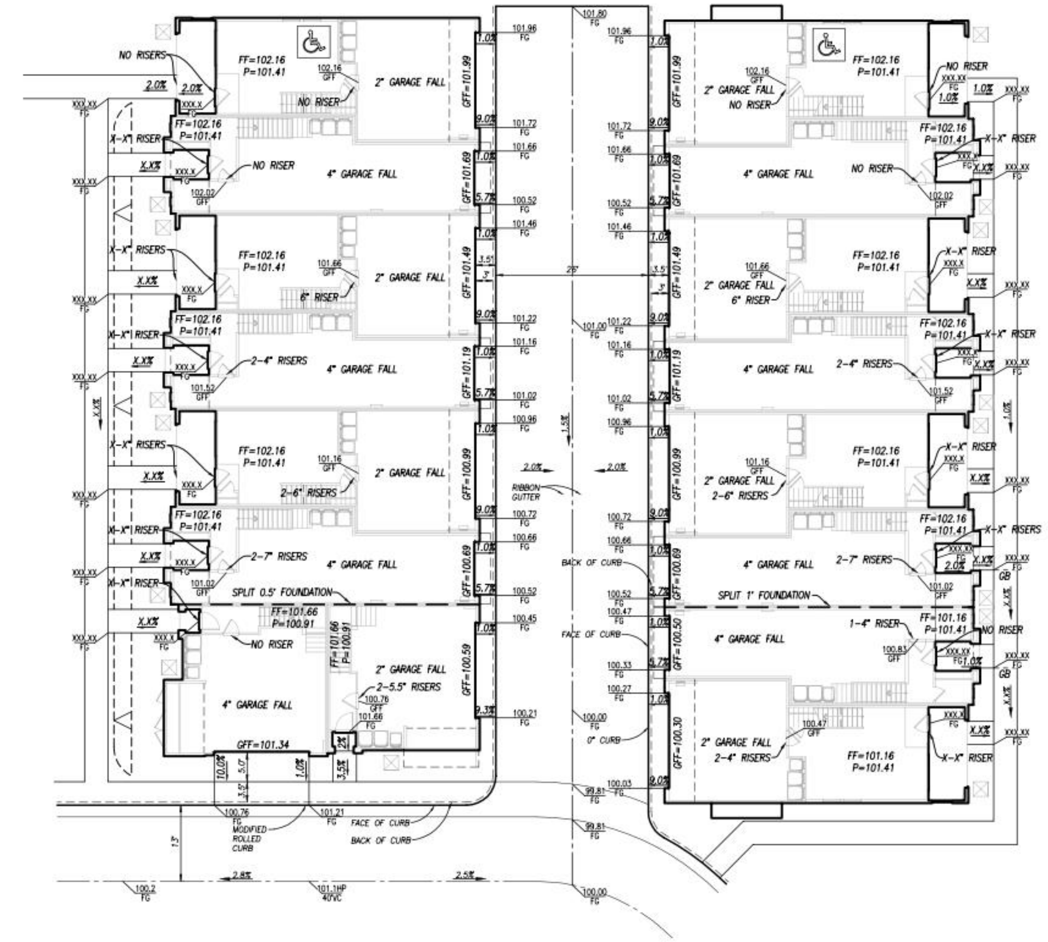
TYPICAL 8-PLEX & 8-PLEX WITH TURN-IN DRIVEWAY/GARAGE DETAIL ON CROWNED DRIVE

NOT TO SCALE



TYPICAL 9-PLEX WITH TURN-IN DRIVEWAY/GARAGE DETAIL ON CROWNED DRIVE

NOT TO SCALE



TYPICAL 8-PLEX & 8-PLEX WITH TURN-IN DRIVEWAY/GARAGE DETAIL ON INVERTED DRIVE

NOT TO SCALE

SITE DETAILS / DRIVEWAY DETAILS

PREPARED BY:

HUNSAKER & ASSOCIATES
SAN DIEGO, INC.

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

SITE DEVELOPMENT PLAN

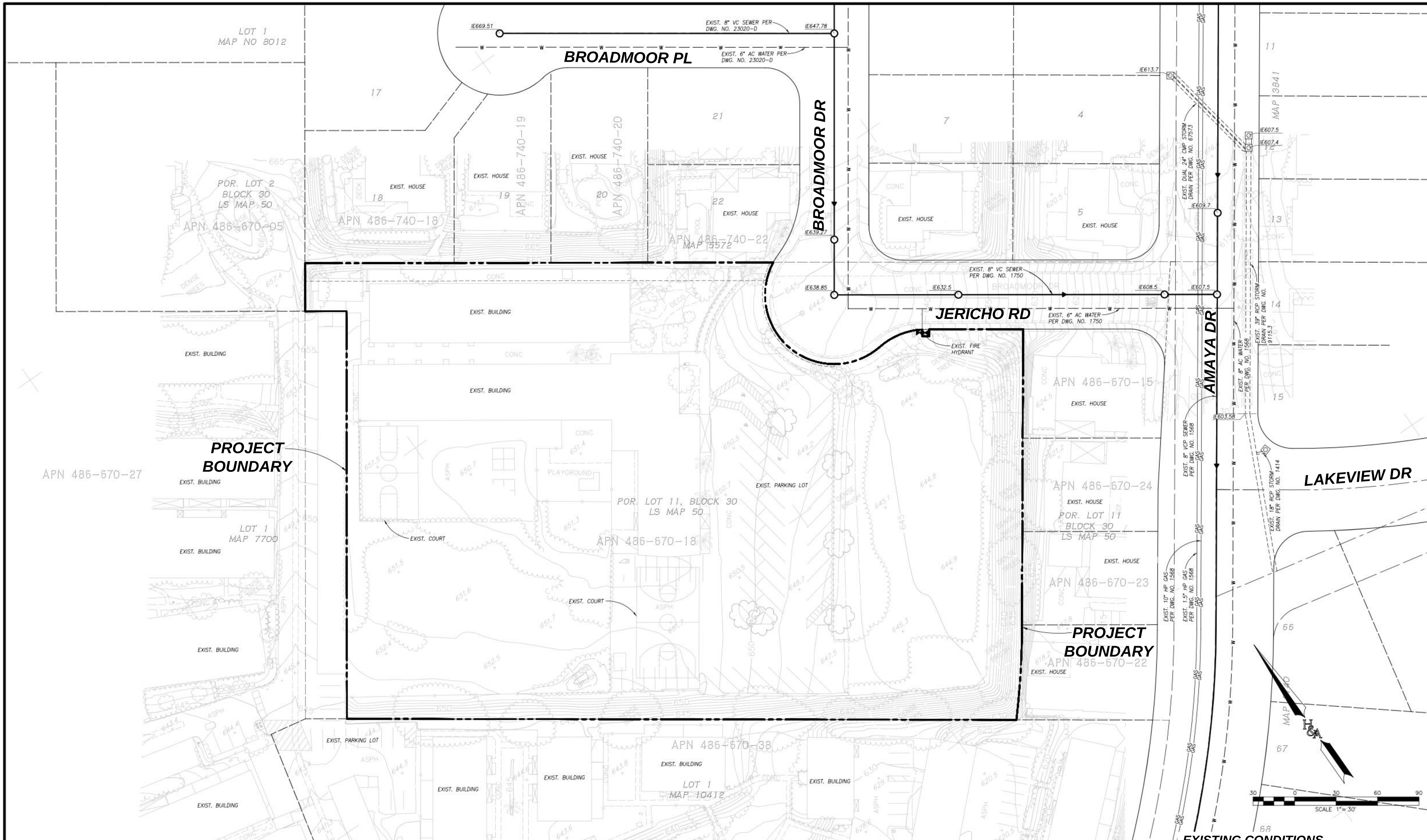
JERICHO ROAD

CITY OF LA MESA, CALIFORNIA

SHEET 3 OF 8

WO # 3087-0012

R:\1790\&Pln\SDP\Jericho Road SDP Sht 03.dwg[]Aug-10-2023:16:28



PREPARED BY:

HUNSAKER & ASSOCIATES SAN DIEGO, INC.

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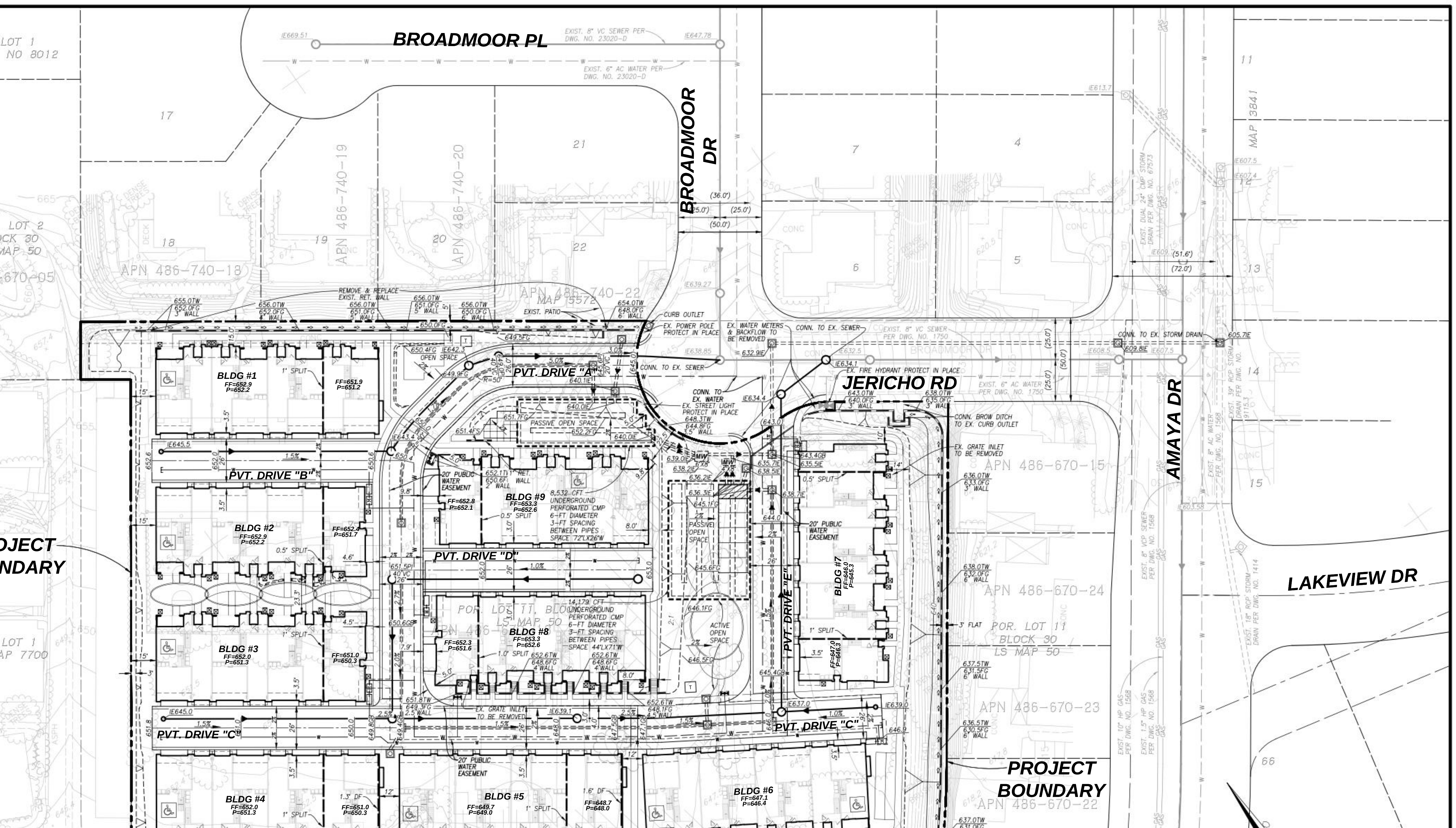
SITE DEVELOPMENT PLAN

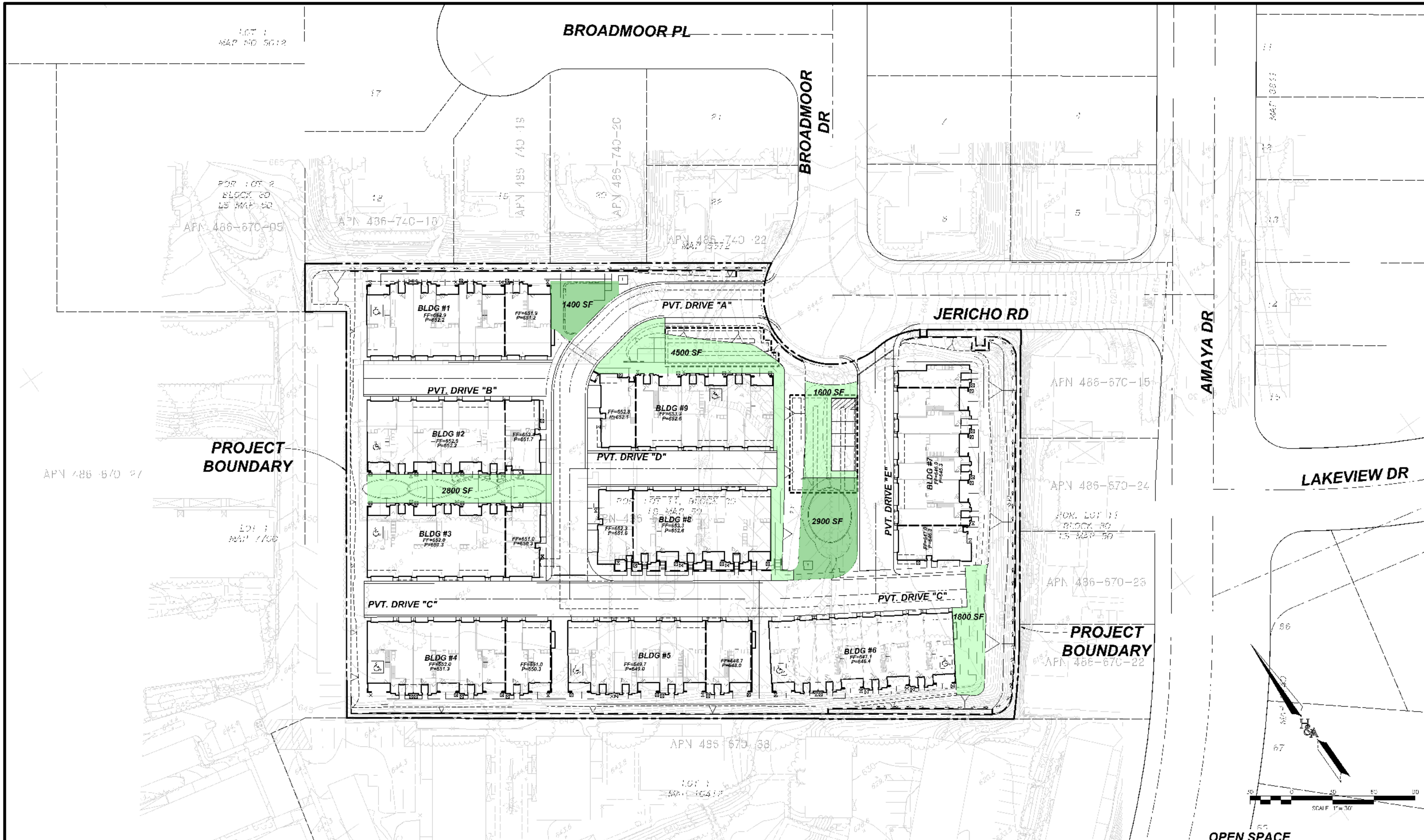
JERICHO ROAD

CITY OF LA MESA, CALIFORNIA

SHEET 4 OF 8

WO # 3087-0012


BROADMOOR PL
BROADMOOR DR
JERICHO RD
AMAYA DR
LAKEVIEW DR
PVT. DRIVE "A"
PVT. DRIVE "B"
PVT. DRIVE "C"
PVT. DRIVE "D"
PVT. DRIVE "E"
BLDG #1
BLDG #2
BLDG #3
BLDG #4
BLDG #5
BLDG #6
BLDG #7
BLDG #8
BLDG #9
PROJECT BOUNDARY
APN 486-740-18
APN 486-740-19
APN 486-740-20
APN 486-740-22
APN 486-670-15
APN 486-670-24
APN 486-670-23
APN 486-670-22
PASSIVE OPEN SPACE
ACTIVE OPEN SPACE
20' PUBLIC WATER EASEMENT
CONN. TO EX. SEWER
CONN. TO EX. STORM DRAIN
EX. FIRE HYDRANT PROTECT IN PLACE
POR. LOT 11 BLOCK 30 LS MAP 50



LEGEND

ACTIVE COMMON OPEN SPACE
PASSIVE COMMON OPEN SPACE

PREPARED BY:

HUNSAKER & ASSOCIATES SAN DIEGO, INC

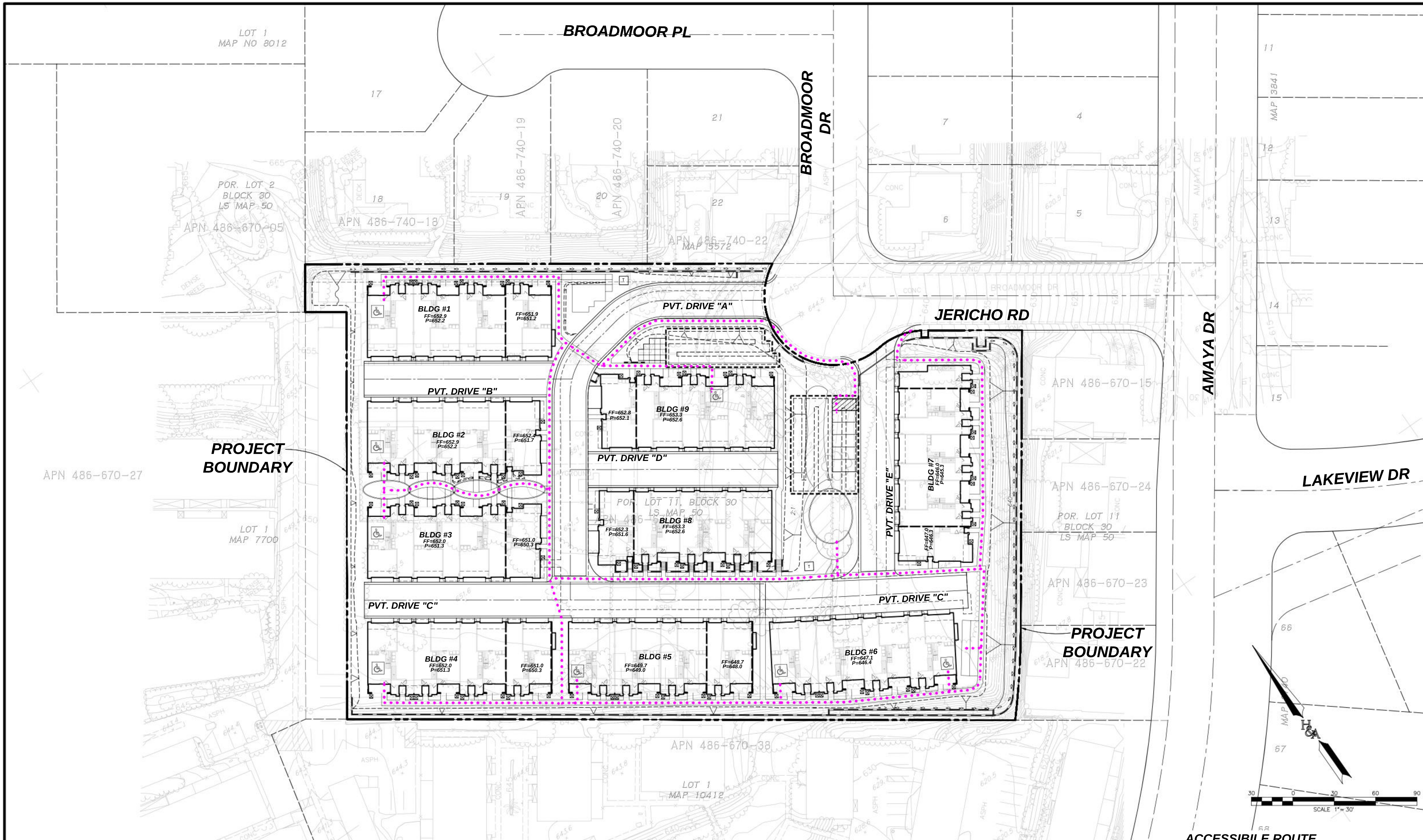
PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING P:(858)558-4500 · FX(858)558-1414

SITE DEVELOPMENT PLAN

JERICHO ROAD

CITY OF LA MESA, CALIFORNIA

SHEET 6 OF 8



ACCESSIBILE ROUTE

LEGEND

PROPOSED ACCESSIBLE ROUTE

PREPARED BY:

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SITE DEVELOPMENT PLAN

JERICHO ROAD

CITY OF LA MESA, CALIFORNIA

SHEET 7 OF 8

WO # 3087-0012

THE NORTHWEST 30.00 FEET OF LOT 11 IN BLOCK 30 OF EL CAJON HEIGHTS, IN THE CITY OF LA MESA, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO LICENSE SURVEY MAP NO. 50, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAID SAN DIEGO COUNTY, FEBRUARY 20, 1894, LYING SOUTHWESTERLY OF THE SOUTHEASTERLY PROLONGATION OF THE SOUTHWESTERLY LINE OF THE NORTHEASTERLY 180.00 FEET OF LOT 2 IN BLOCK 30 OF SAID EL CAJON HEIGHTS.

TITLE REFERENCE

THE INFORMATION SHOWN HEREON IS BASED ON THE PRELIMINARY TITLE REPORT ISSUED BY FIRST AMERICAN TITLE COMPANY AS ORDER NO. NHSC-1172039-SA1 DATED MARCH 20, 2023.

ASSESSOR'S PARCEL NUMBER

486-670-18-00

TITLE EXCEPTIONS

1. ANY DEFECT, LIEN, ENCUMBRANCE, ADVERSE CLAIM, OR OTHER MATTER THAT APPEARS FOR THE FIRST TIME IN THE PUBLIC RECORDS OR IS CREATED, ATTACHES, OR IS DISCLOSED BETWEEN THE COMMITMENT DATE AND THE DATE ON WHICH ALL OF THE SCHEDULE B, PART I—REQUIREMENTS ARE MET.

2. (A) TAXES OR ASSESSMENTS THAT ARE NOT SHOWN AS EXISTING LIENS BY THE RECORDS OF ANY TAXING AUTHORITY THAT LEVIES TAXES OR ASSESSMENTS ON REAL PROPERTY OR BY THE PUBLIC RECORDS; (B) PROCEEDINGS BY A PUBLIC AGENCY THAT MAY RESULT IN TAXES OR ASSESSMENTS, OR NOTICES OF SUCH PROCEEDINGS, WHETHER OR NOT SHOWN BY THE RECORDS OF SUCH AGENCY OR BY THE PUBLIC RECORDS.

3. ANY FACTS, RIGHTS, INTERESTS, OR CLAIMS THAT ARE NOT SHOWN BY THE PUBLIC RECORDS BUT THAT COULD BE ASCERTAINED BY AN INSPECTION OF THE LAND OR THAT MAY BE ASSERTED BY PERSONS IN POSSESSION OF THE LAND.

4. EASEMENTS, LIENS OR ENCUMBRANCES, OR CLAIMS THEREOF, NOT SHOWN BY THE PUBLIC RECORDS.

5. ANY ENCROACHMENT, ENCUMBRANCE, VIOLATION, VARIATION, OR ADVERSE CIRCUMSTANCE AFFECTING THE TITLE THAT WOULD BE DISCLOSED BY AN ACCURATE AND COMPLETE LAND SURVEY OF THE LAND AND NOT SHOWN BY THE PUBLIC RECORDS.

6. (A) UNPATENTED MINING CLAIMS; (B) RESERVATIONS OR EXCEPTIONS IN PATENTS OR IN ACTS AUTHORIZING THE ISSUANCE THEREOF; (C) WATER RIGHTS, CLAIMS OR TITLE TO WATER, WHETHER OR NOT THE MATTERS EXCEPTED UNDER (A), (B), OR (C) ARE SHOWN BY THE PUBLIC RECORDS.

7. GENERAL AND SPECIAL TAXES AND ASSESSMENTS FOR THE FISCAL YEAR 2023–2024, A LIEN NOT YET DUE OR PAYABLE.

8. GENERAL AND SPECIAL TAXES AND ASSESSMENTS FOR THE FISCAL YEAR 2022–2023 ARE PARTIALLY EXEMPT. IF THE EXEMPT STATUS IS TERMINATED AN ADDITIONAL TAX MAY BE LEVIED. ACCOUNT NO. 486–670–18–00.

9. THE LIEN OF SUPPLEMENTAL TAXES, IF ANY, ASSESSED PURSUANT TO CHAPTER 3.5 COMMENCING WITH SECTION 75 OF THE CALIFORNIA REVENUE AND TAXATION CODE.

10. AN EASEMENT FOR PIPE LINES AND AQUEDUCTS AND INCIDENTAL PURPOSES, RECORDED AUGUST 17, 1887 IN BOOK 175 OF DEEDS, PAGE 342.

    IN FAVOR OF: SAN DIEGO FLUME COMPANY

    AFFECTS: AS DESCRIBED THEREIN

    THE LOCATION OF THE EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION.

11. AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES, RECORDED JULY 11, 1960 AS INSTRUMENT NO. 139520 OF OFFICIAL RECORDS.

    IN FAVOR OF: SAN DIEGO GAS AND ELECTRIC COMPANY

    AFFECTS: AS DESCRIBED THEREIN

    THE LOCATION OF THE EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION.

12. AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES, RECORDED SEPTEMBER 03, 1965 AS INSTRUMENT NO. 65–161436 OF OFFICIAL RECORDS.

    IN FAVOR OF: SAN DIEGO GAS AND ELECTRIC COMPANY

    AFFECTS: AS DESCRIBED THEREIN

13. A DEED OF TRUST TO SECURE AN ORIGINAL INDEBTEDNESS OF $980,000.00 RECORDED SEPTEMBER 06, 2017 AS INSTRUMENT NO. 2017–0408505 OF OFFICIAL RECORDS.

    DATED: AUGUST 29, 2017

    TRUSTOR: CALVARY CHAPEL OF EL CAJON, A CALIFORNIA CORPORATION

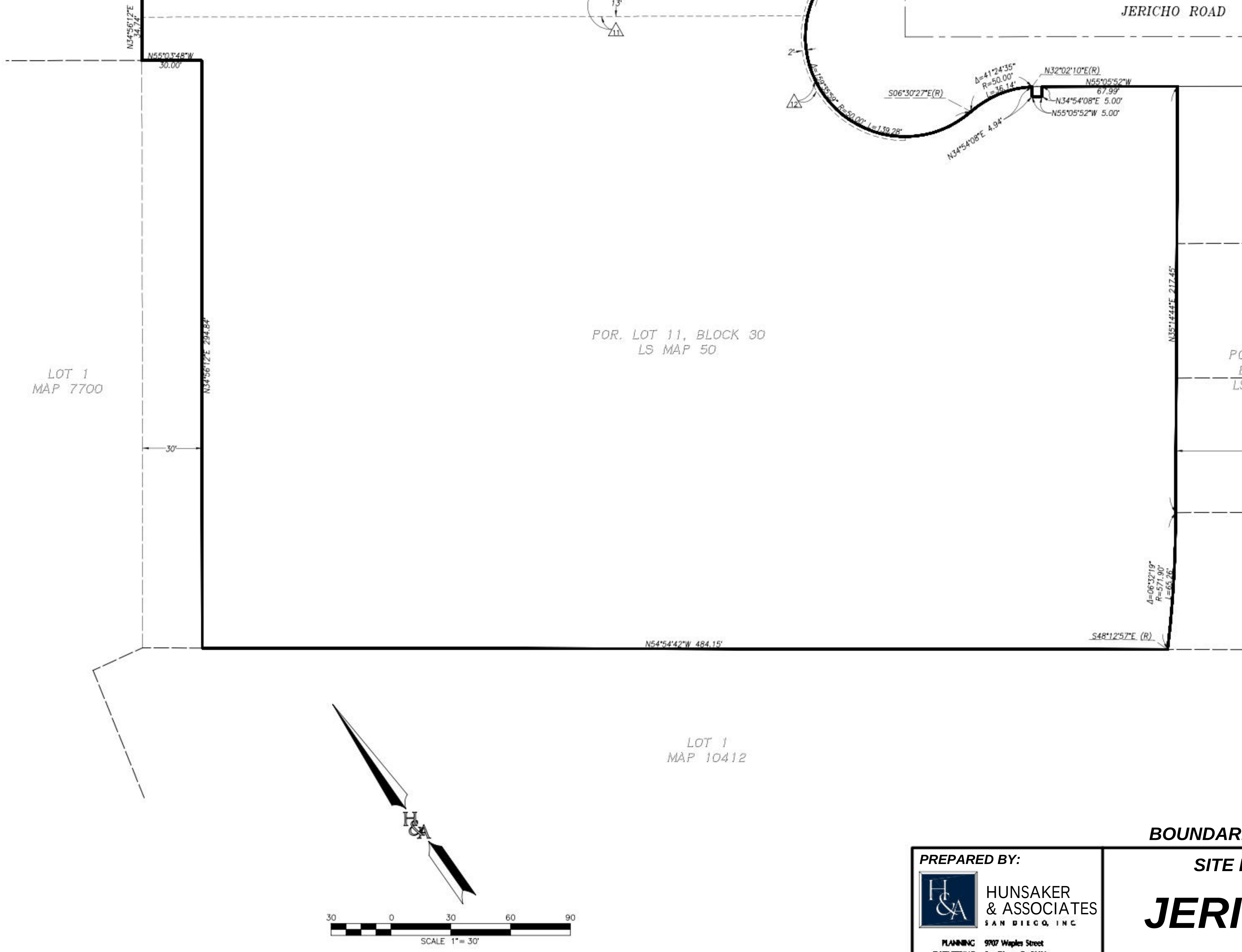
    TRUSTEE: COMMERCEWEST BANK

    BENEFICIARY: COMMERCEWEST BANK

14. WATER RIGHTS, CLAIMS OR TITLE TO WATER, WHETHER OR NOT SHOWN BY THE PUBLIC RECORDS.

15. ANY FACTS, RIGHTS, INTERESTS OR CLAIMS WHICH WOULD BE DISCLOSED BY A CORRECT ALTA/NSPS SURVEY.

16. RIGHTS OF PARTIES IN POSSESSION.



BOUNDAR

PREPARED BY:

HUNSAKER & ASSOCIATES SAN DIEGO, INC.

PLANNING ENGINEERING SURVEYING

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

SITE

JERI

CITY