

PRELIMINARY DRAINAGE STUDY
for
TENTATIVE MAP CVT 23-0001
CONCEPTUAL GRADING PLAN
OTAY RANCH VILLAGE 7, R-3, R-4, & R-8

APN: 644-241-06, 644-241-07, 644-241-08
& 644-241-10


C.V.T. 23-0001
Prepared for:

Baldwin and Sons LLC
20 Corporate Plaza Dr.
Newport Beach, CA 92660
&

Otay Project, L.P.
20 Corporate Plaza Dr.
Newport Beach, CA 92660
(949) 640-8300

W.O. 2807-0121
May 10, 2024




Alisa Vialpando, RCE # 47945
Hunsaker & Associates
San Diego, Inc.

07/26/2024
Date

TABLE OF CONTENTS

	<u>SECTION</u>
Chapter 1 - Executive Summary	I
1.1 Introduction	
1.2 Summary of Existing Conditions	
1.3 Summary of Proposed Conditions	
1.4 Summary of Results	
1.5 References	
Chapter 2 – Methodology & Model Development	II
2.1 Rational Method Model Development Summary	
2.2 Design Rainfall Determination	
- 100-Year, 6-Hour Rainfall Isopluvial Map	
- 100-Year, 24-Hour Rainfall Isopluvial Map	
- 50-Year, 6-Hour Rainfall Isopluvial Map	
- 50-Year, 24-Hour Rainfall Isopluvial Map	
2.3 Runoff Coefficient Determination	
2.4 Rainfall Intensity Determination	
- Maximum Overland Flow Length & Initial Time of Concentration Table	
- Urban Watershed Overland Time of Flow Nomograph	
- Manning’s Equation Nomograph	
- Intensity-Duration Design Chart	
Chapter 3 – Hydrologic Analysis	III
3.1 Existing Models (See appendix A)	
3.2 50-Year event for R-4 Mass Graded condition	
3.3 100-Year event for R-4 Mass Graded condition	
3.4 50-Year event for Ultimate condition	
3.5 100-Year event for Ultimate condition	
Chapter 4 – Existing Inlet Calculations	V
Chapter 5 – Detention Analysis	VI
Chapter 6 – Hydrology Maps	VII
Appendix A – References	

Preliminary Drainage Study for
OTAY RANCH VILLAGE R-3, R-4, & R-8

CHAPTER 1

EXECUTIVE SUMMARY

CHAPTER 1 - EXECUTIVE SUMMARY

1.1 - Introduction

Otay Ranch Village 7 R-8 & R-4 Conceptual Grading Plan project (herein referred to as “*the project*”) proposes: mass grading for R-8 lot (Lot 1, APN 644-241-07); rezoning R-8 and R-4 lot (lot 2- APN 644-241-08) from single-family to multi-family; and constructing the Vortac site east access road (APN 644-241-06) to replace the existing access road that runs through R-8 which will be removed in proposed conditions. Residential neighborhood R-8 was originally part of neighborhood R-3. In the March 2024 EIR Addendum, the western portion of neighborhood R-3 was adjusted, creating the distinct R-8 neighborhood. The southeast portion of residential neighborhood R-3 has been added to the Tentative Map (TM). No improvements or grading are proposed for this portion under this TM.

The project will consist of a condominium development in its ultimate conditions, with a total number of 244 residential condominium dwelling units (123 units on R-8, and 121 units on R-4), recreational area, private drives, sidewalks, parking spaces, landscaped areas, and slopes.

R-8 is located at the northeast corner of the intersection of La Media Road and Santa Luna Street, while R-4 is located at the southeast corner of the intersection. The Vortac east access road is located west of the intersection of Peabody Way and Magdalena Avenue. The project is in the City of Chula Vista, California (see the Vicinity Map below).

The project area is approximately 12.60 acres, 3.11 acres, and 0.50 acres for R-8, R-4, and the Vortac site east access road respectively. Lot R-8 currently consists of a steep slope and an existing asphalt access road, while R-4 is mass graded with a sediment basin at the southwest corner of the lot. The proposed access road is currently a vacant site. This drainage study has been prepared to assess the 50-year and 100-year peak runoff rates and the proposed drainage system of R-8 and R-4 in their mass grading conditions, and Vortac east access road in its developed conditions. An additional hydrologic analysis has been provided using the ultimate conditions runoff factor for R-8 and R-4 to determine whether the existing downstream detention basin and storm drain facilities have adequate capacity for the proposed developed flows. Once the roads and buildings are laid out, an additional drainage report will be prepared to properly model each site. It is anticipated that the peak flows will be lower than shown in this report due to the drainage improvements that are expected to improve the overall drainage conditions as they will vary the time of concentration across the lots vs the mass grading condition where the lot sheet flows as one plane.

In the ultimate conditions, R-8 runoff will be captured by the proposed inlets, catch basins and area drains. The captured flows will be routed via the proposed on-site storm drain system to proposed proprietary biofiltration best management practices (BMPs) to address water quality requirements. The treated flow will continue northerly towards the existing detention basin. The existing basin’s outlet structure is revised to accommodate for the developed conditions flows from R-8 in order to meet the hydromodification requirements. R-4 is part of the tributary area of Village 8

west Wolf Canyon basin (water quality/ hydromodification BF-1), and it was included in the drainage study using neighborhood commercial runoff factor. For more detail regarding the water quality compliance, please refer to a separate report – “Priority Development Project (PDP) Storm Water Quality Management Plan (SWQMP) for Otay Ranch Village 7 R-3,R-4 & R-8”, dated July 2024.

The proposed storm drain hydraulic calculations and grade inlets sizing will be based on 50-year peak flows, while sump inlets will be sized to capture the 100-year peak flows. These calculations will be provided during the final engineering design.

R-8’s storm drain system will have just one discharge point located immediately north on the existing detention basin per *Rough Grading Plans for Otay Ranch Village 7* (DWG 05017), prepared by Hunsaker and Associates, San Diego Inc. and dated 09-30-2005. R-4 discharges into an existing sediment basin that continues downstream through La Media Road storm drain system, turns west in Main Street West and discharges into an existing Village 8 West Wolf Canyon (BF-1 biofiltration/ hydromodification) basin per *Mass Grading Plans for Otay Ranch Village 8 West* (DWG 14011), prepared by Hale Engineering, and dated 11/13/2020. See Appendix ‘A-2’ for relevant excerpts.

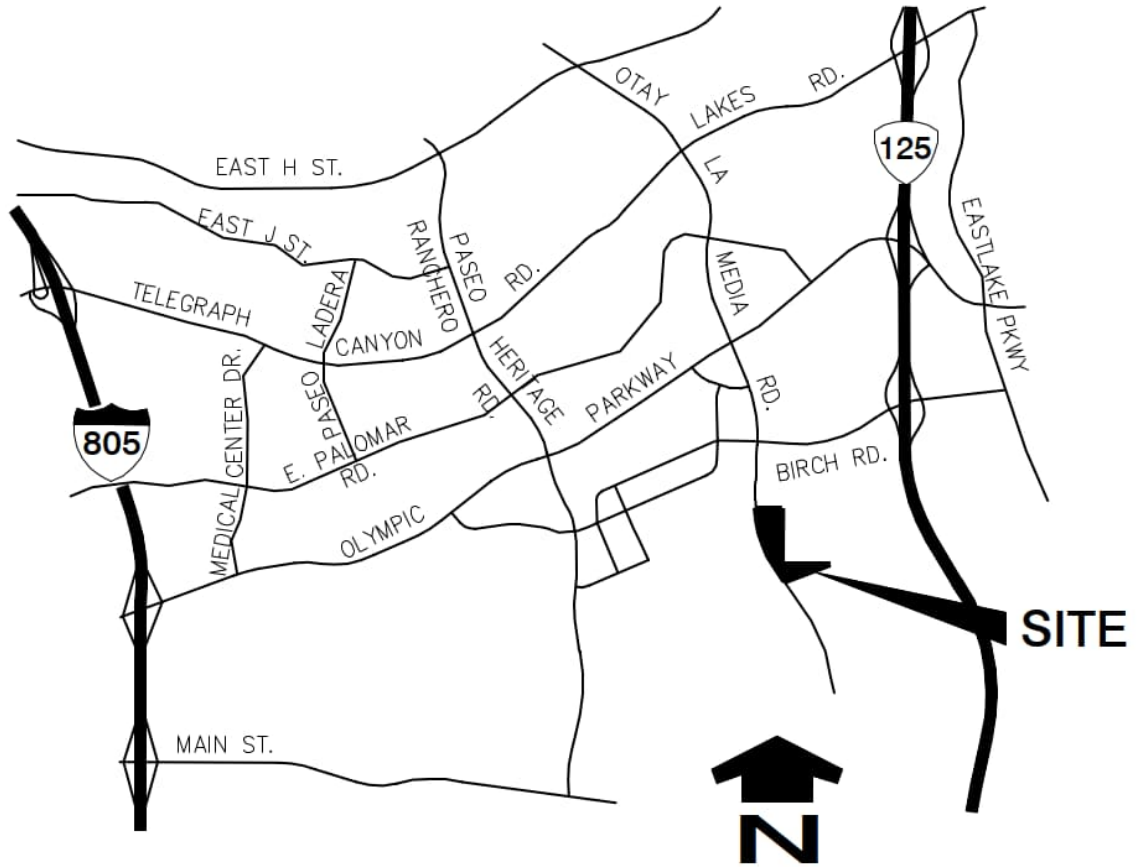
The existing detention basin and Village 8 West Wolf Canyon basin (BF-1) discharges directly into Wolf Canyon and ultimately discharges into the Otay River and then to San Diego Bay.

Please note that Vortac site proposed access road is the only proposed impervious area in the Conceptual Grading Plan for Village 7, R-8 and R-4. R-8 and R-4 lots will be in mass grading conditions with no impervious area on site. A separate drainage report and SWQMP will be submitted with the site design plan for each lot.

Per City of Chula Vista criteria, the Modified Rational Method can be used to determine peak design flowrates when the contributing drainage area is less than 1.0 square mile. Since the total watershed area discharging from the site is less than 1.0 square mile, the AES-2015 computer software was used to model the runoff response per the Modified Rational Method. Methodology used for the computation of design rainfall events, runoff coefficients, and rainfall intensity values are consistent with criteria set forth in the “County of San Diego 2003 Hydrology Manual” & “City of Chula Vista Subdivision Manual”. A more detailed explanation of the methodology used for this analysis is listed in Chapter 2 of this report.

Detailed calculations such as storm drain hydraulics will be prepared as part of the drainage study for the final engineering phase.

Preliminary Drainage Study for
Otay Ranch Village 7 R-3, R-4, & R-8



VICINITY MAP

NOT TO SCALE

1.2 – Summary of Existing Conditions

Lot R-8 is a 12.60-acre site that is currently vacant and composed of slopes, brow ditches, and an asphalt road that crosses the site and provides access to Vortac site from La Media Road.

In existing conditions, runoff from R-8 site sheet-flows westerly and northwesterly towards La Media Road where is intercepted by brow ditches that slopes northwesterly to direct the flows to catch basins and storm drain system that discharges into the existing detention basin at node 850, immediately north of the project site.

The existing graded slopes, brow ditches, road and storm drain were constructed per the Rough Grading Plans for Otay Ranch Village 7 (DWG 05017), prepared by Hunsaker and Associates, San Diego Inc. and dated 09-29-2005. The 50-year and 100-year storm events for the existing detention basin and storm drain were calculated in the Rough Grading Hydrology Study for Otay Ranch Village 7, prepared by Hunsaker and Associates, San Diego Inc. and dated 07-19-2005. The mentioned study and plans were used as the existing conditions for R-8 in this report.

Lot R-4 is approximately 3.11 acres that has been mass graded as part of the Otay Ranch Village 8 West Mass Grading Plan DWG. 14011-07 prepared by hale Engineering and dated 11/13/2023. Runoff from the site sheet flows southwesterly to be captured and routed via brow ditches and swales to the existing sediment basin at the southwest corner of the lot, where sediment control is provided. The discharge from the sediment basin is routed through a 30" CMP riser to the existing 18" storm drain pipe before tying into the exiting 60" pipe along La Media Road that ultimately discharges into the existing Village 8 West Wolf Canyon basin.

Lot R-3 Lot R-3 is approximately 3.08 acres and consists of a slope and a portion of a mass-graded pad, which was graded as part of the Rough Grading Plans for Otay Ranch Village 7, DWG 05017. The site includes a vegetated slope adjacent to Magdalena Avenue, which slopes away from the street. The slope's runoff is directed to the pad either through brow ditches or surface flow. The flows from both the slope and the pad drain westerly, where they are captured and routed by the existing brow ditches. These flows then converge with runoff from the Vortac site, eventually discharging into the existing headwall at node 893.

The proposed **Vortac access road** is part of FAA Vortac site, and currently it sheet flows in a southeastern direction towards a browditch that conveys the flows along the northern edge of Santa Luna Street westerly towards an existing headwall, where it enters the existing 18" RCP that ties into the existing 60" RCP storm drain per DWG. 14012 along La Media Road, which ultimately discharges into the existing Village 8 West Wolf Canyon basin (BF-1).

The NRCS Web Soil Survey website has been used to determine the soil characteristics for the site. The soil classified as Hydrologic Soil Group "C" and "D".

1.3 – Summary of Proposed Conditions (TM CVT 23-0001 Conceptual Grading Plan)

Lot R-8 will be mass graded with 1-1.5% slope in a southwest direction towards the proposed swale along the western boundary of the pad. The swale will convey the captured flows southerly to discharge into the proposed sediment basin southwest of the site to provide sediment control. Discharge from the sediment basin will be routed through the proposed 24" CMP riser to the proposed 24" storm drain pipe. The 24" storm drain pipe will travel northerly towards the proposed catch basin where it commingles with the runoff from the R-8 northern graded slope. The proposed catch basin will replace the existing headwall. The total discharge from the catch basin will enter the existing 42" RCP pipe that discharges into the existing detention basin. The existing basin's outlet structure is revised to accommodate for the developed conditions flows from R-8 to meet the hydromodification requirements in the ultimate conditions.

The proposed mass grading plan involves the removal of the existing Vortac Site access road from La Media Road. A new access road is being proposed to the Vortac Site from Magdalena Avenue east of R-8, as part of this project. This area is a small portion of Village 8 West Wolf Canyon biofiltration basin (BF-1) tributary area. However, a proprietary biofiltration unit will be proposed adjacent to the road to meet water quality requirements.

R-8 off-site runoff will be ultimately split into two separate discharge points; the first one located north in the existing detention basin at node 850 and the second one located immediately south at node 893. The off-site runoff draining towards La Media Road and the existing basin will be captured with a system of brow ditches and catch basins and routed into the existing detention basin via storm drain. Off-site runoff draining towards Santa Luna Street will be captured with a brow ditch that discharges into the exiting catch basin at node 893 similarly to existing conditions.

In the ultimate conditions, R-8 will consist of a condominium development with a total number of 123 residential condominium dwelling units, recreational area, private drives, sidewalks, parking spaces, landscaped areas, and slopes. The runoff from lot R-8 will be treated via proposed proprietary biofiltration BMPs prior to discharging into the existing detention basin. The ultimate proposed conditions were assumed to calculate the runoff factor in proposed conditions model.

Lot R-4 will remain in the mass grading conditions with the existing sediment basin. The drainage report for Village 8 West assumes a runoff coefficient of 0.78 which is consistent with the assumed imperviousness in this report (proposed ultimate conditions for R-4). Therefore, no increase in runoff is expected from this site.

In the ultimate conditions, R-4 will consist of a condominium development with a total number of 121 residential condominium dwelling units, recreational area, private drives, sidewalks, parking spaces, landscaped areas, and slopes. The site will be treated with a proprietary biofiltration BMPs prior to discharging into existing 60" pipe that runs on La Media Road.

A separate Drainage report and SWQMP will be submitted with the Site Design Plan for R-8 and R-4.

The hydrologic model for R-8 and R-4 has been prepared using elevations from the conceptual grading, but utilizing hydrologic features like storm drain pipe conveyance and high runoff coefficients to approximate ultimate conditions results. The runoff coefficient has been selected based on land use and preliminary building and street layouts.

Lot R-3 will remain in its current condition and no grading or improvement will occur under this permit. Otay Ranch Village 7 Neighborhood R-3 has been added to Tentative Map CVT 23-0001 in order to transfer residential units to this neighborhood for a future development. Any future development will need to process entitlements for a site plan and preliminary grading plan. The future site plan and preliminary grading plan will include a drainage report and SWQMP to comply with City requirements. Future development will not be required to process a tentative map.

For more detail regarding the water quality and hydromodification compliance, please refer to a separate report – “Priority Development Project (PDP) SWQMP Otay Ranch Village 7 R-8 and R-4”, dated July 2024.

1.4 – Results and Recommendations

Table 1 summarizes the existing peak flows from the R-4 site using the mass graded condition to estimate the runoff generated by the lot. These flows can be then compared to table 2, where the runoff of the designed conditions assumes a built-out condition so the storm drain downstream could be properly sized without needing detention onsite. This storm drain has since been constructed with a storm drain stub to the R-4 property. Table 2 also summarizes the proposed conditions, revising the area that corresponds to R-4.

Table 2 below summarizes the designed and proposed peak flows from the site. Per the City of Chula Vista rainfall isopleth maps, the design rainfall depth for the 50-year flow event at *the project* site area is 2.2 inches and for the 100-year flow event is 2.5 inches.

The discharge from Lot R-8 commingles with other flows from Village 7 at the existing detention basin (Node 850) before discharging to the Wolf Canyon. Therefore, all flows discharging into the existing detention basin coming from non-disturbed areas were analyzed based on the Rough Grading Hydrology Study for Otay Ranch Village 7 prepared by H&A and dated July 19, 2005. The outlet structure of the existing detention basin has been revised to accommodate for the hydromodification requirements for Lot R-8 in the ultimate conditions; therefore, detention analysis has been provided using the revised configuration of the outlet structure (Node 851). Please refer to the detention analysis in Chapter 5.

This report also analyzes the peak flow from the proposed graded slope east of R-8 area and the proposed access road (node 893) and compares it to the flow that was calculated in the previously mentioned hydrology study.

Node 164 has been analyzed in this report to compare the discharge from lot R-4 to what was calculated in the Hydrology Study for Otay Ranch Village 8 West.

Existing Basin Discussion:

Lot R-8 discharges into an existing basin that was approved and constructed according to the Rough Grading Plans for Otay Ranch Village 7. This basin provides detention for all the tributary areas to Wolf Canyon at the discharge location. Node 851 has been chosen as the endpoint of the analysis, as it represents an existing cleanout where all flows tributary to the basin converge with upstream bypass runoff. The results indicate that the proposed runoff discharging to the basin is reduced, primarily due to the increased time of concentration for the runoff from Lot R-8. As a result, Lot R-8 does not require onsite detention or modifications to the existing basin to mitigate the development's impact. However, according to the PDP SWQMP for this development, hydromodification is required. Based on the referenced report, an alteration to the existing outlet structure is necessary to mitigate R-8. Below is a description of the existing outlet and the proposed outlet structure.

Existing Outlet: Riser top= 400.9, Bottom= 390.0, 1-30" orifice at 390.0

Proposed Outlet: Riser top=401.6, Bottom=390.0, 1-10" orifice at 390.0, 1-12" orifice at 391.5, 2-18" orifices at 393.0, 3-18" orifices at 395.5.

Table 1 - Summary of R-4 Existing Peak Flows

Discharge Location	Existing Conditions			
	Area (acres)	Runoff Coeff. "C"	Q50 (cfs))	Q100 (cfs)
Node 164	92.5	0.71	217.12	269.46

Table 2 - Summary of Peak Flows

Discharge Location	Designed Conditions ⁽¹⁾				Proposed Conditions ⁽²⁾				Difference		
	Area (acres)	Runoff Coeff. "C"	Q50 (cfs))	Q100 (cfs)	Area (acres)	Runoff Coeff. "C"	Q50 (cfs)	Q100 (cfs)	Area (acres)	Q50 (cfs)	Q100 (cfs)
Inflow to Basin	152.7	0.678	331.03	378.37	152.7	0.682	310.50	355.27	0	-20.53	-23.10
Outflow from Basin	152.7	0.678	151.20⁽³⁾	151.20	152.7	0.682	119.00⁽⁴⁾	146.55⁽⁴⁾	0	-32.20	-4.65
Node 893	28.9	0.60	29.15	33.74	28.9	0.60	28.76⁽⁵⁾	33.30⁽⁵⁾	0	-0.39	-0.44
Node 164	93.9	0.72	221.91	274.89	92.5	0.72	221.24	274.14	-1.4⁽⁶⁾	-0.67	-0.75

- (1) For Node 850, 851, and 893 values are from Rough Grading Hydrology Study for Otay Ranch Village 7 prepared by H&A and dated July 19, 2005. For Node 164 values from the Drainage Study for Otay Ranch Village 8 West, prepared by Hale Engineering, and dated October 25, 2019. The peak flows under existing conditions are the design flow rates presented in the approved studies for Village 7 and Village 8 West, which were used to design the downstream infrastructure.
- (2) Assuming ultimate conditions for R-8 and R-4
- (3) Rough Grading Hydrology Study for Otay Ranch Village 7 does not provide detention performance for 100-yr event. It uses the same peak flow as the 50-yr result. It is expected that the flows for the 100-yr are higher.
- (4) The unmitigated flows in proposed conditions are lower than the existing unmitigated flows, so mitigation is not required. However, the riser in the existing basin is being modified per PDP SWQMP for this site to meet hydromodification requirements. Due to the proposed modification, the existing riser alters the detention capabilities of the basin. Chapter 4 analyzes this change.
- (5) No mitigation is proposed for these areas as the generated runoff decreases slightly due to the increased time of concentration.
- (6) The 1.4-acre difference in areas between the existing and proposed delineations originates from the preliminary area delineation in the master drainage study Drainage Study for Otay Ranch Village 8 West, prepared by Hale Engineering, and dated October 25, 2019. Initially, the slope south of R-4 drained towards the existing browditch and discharged into the sediment basin on R-4, making it part of the studied area for R-4. This slope has since been graded and incorporated into Parcel D. Consequently, the flows from this area were included and addressed in the Drainage Report for Parcel D, Permit No. GR23-0002, DWG No. 23021 Therefore, this minor area difference does not increase the calculated peak flow or negatively impact the downstream storm drain, as the routed flow to Parcel D and capacity of the existing storm drain were evaluated in the Drainage Report for Parcel D.

Table 3 - Existing Basin information and revised outlet structure

Basin Bottom	Basin Top	Bottom Area	WSEL		Riser Bottom	Riser Top	Riser dimensions	Orifice Configuration
			50-Yr	100-Yr				
390 ft	403.9 ft	17,535 ft ²	401.06 ft	401.96 ft	390 ft	401.6 ft	8' x 8'	1-10" orifice at 390.0, 1-12" orifice at 391.5, 2-18" orifices at 393.0, 3-18" orifices at 395.5

Preliminary Drainage Study for
Otay Ranch Village 7 R-3, R-4, & R-8

The Otay Ranch Village 7 R-8 & R-4 project will reduce the 50-year and the 100-year flowrates in the proposed conditions compared to the design flowrates presented in the approved studies for Village 7 and Village 8 West. This is due to the many acres of land being rerouted via streets and storm drain, which increases the times of concentration of such areas. Therefore, the project will not adversely affect the downstream storm drain system and no additional onsite detention is required.

Otay Ranch Village 7 Neighborhood R-3 has been added to Tentative Map CVT 23-0001 in order to transfer residential units to this neighborhood for a future development. Any future development will need to process entitlements for a site plan and preliminary grading plan. The future site plan and preliminary grading plan will include a drainage report and SWQMP to comply with City requirements. Future development will not be required to process a tentative map.

Hydraulic calculations for the onsite private storm drain will be provided in the Final engineering.

1.5 - References

City of Chula Vista Subdivision Manual. March 2012

“San Diego County Hydrology Manual”; Department of Public Works – Flood Control Division; County of San Diego, California; Revised June 2003.

“Priority Development Project (PDP) SWQMP Otay Ranch Village 7 R-3, R-4 and R-8”, dated July 2024

Hydrology/Drainage/Urban Runoff, Section 3-200, General Design Criteria; City of Chula Vista; County of San Diego, California; Revised March 2012.

Rough Grading Plans for Otay Ranch Village 7 (DWG 05017), prepared by Hunsaker and Associates, San Diego Inc. and dated July 19, 2005.

Rough Grading Hydrology Study for Otay Ranch Village 7, prepared by Hunsaker and Associates, San Diego Inc. and dated July 19, 2005.

Rough Grading Plans for Otay Ranch Village 8 West (DWG 14011), prepared by Hale Engineering. and dated December 2, 2020.

Drainage Study for Otay Ranch Ranch Village 8 West, prepared by Hale Engineering, and dated October 25, 2019.

CHAPTER 2

METHODOLOGY & MODEL DEVELOPMENT

2.1 – Rational Method Model Development Summary

Rational Method Hydrologic Analysis

Computer Software Package – AES-2015

Design Storm - 50-Year and 100-Year Return Interval

Land Use – High Dense Residential area, mixed use

Soil Type - Hydrologic soil groups C and D were found on site:

- Group C Soils have slow infiltration rate when thoroughly wetted; chiefly soils that have a layer impeding downward movement of water, or moderately fine to fine textured soils that have a slow infiltration rate. Rate of water transmission is slow.
- 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 City of Chula Vista Section 3-203.3 (2) the runoff coefficient will be based off Dense Residential with a runoff coefficient of 0.75 for soil type D. For off-site slopes, runoff coefficients vary from 0.55 to 0.6 depending on the steepness of the area. Additionally, the analysis includes runoff coefficients of 0.9 for fully paved surfaces as well as 0.85 for paved surfaces with landscape (roads with median landscape and parkways).

To confirm the appropriateness of the C value used for the proposed project, a weighted C value was computed. This calculation considered site-specific imperviousness, using a coefficient of 0.9 for impervious areas and 0.30 for pervious areas in soil type C, as per the San Diego County Hydrology Design Manual, Table 3-1.

For the R-8 site, an imperviousness of 80% has been determined in a Soil C area, the C value is calculated as $0.80 \times 0.9 + 0.20 \times 0.3 = 0.78$.

Consequently, applying a runoff factor of 0.78 for the entire lot area is validated as accurate and more conservative than 0.75.

For the R-4 site, and imperviousness of 79% with approximately 50% of the lot in a Soil C area and 50% in soil D area, the C value is calculated as $0.79 \times 0.9 + 0.105 \times 0.3 + 0.105 \times 0.35 = 0.78$

Consequently, applying a runoff factor of 0.78, like done so per the approved drainage study for Village 8 West, is validated as accurate.

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:

Preliminary Drainage Study for
Otay Ranch Village 7 R-3, R-4, & R-8

$Q = CIA$, 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-2010 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.

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

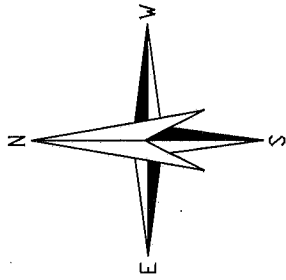
CHAPTER 2

METHODOLOGY & MODEL DEVELOPMENT

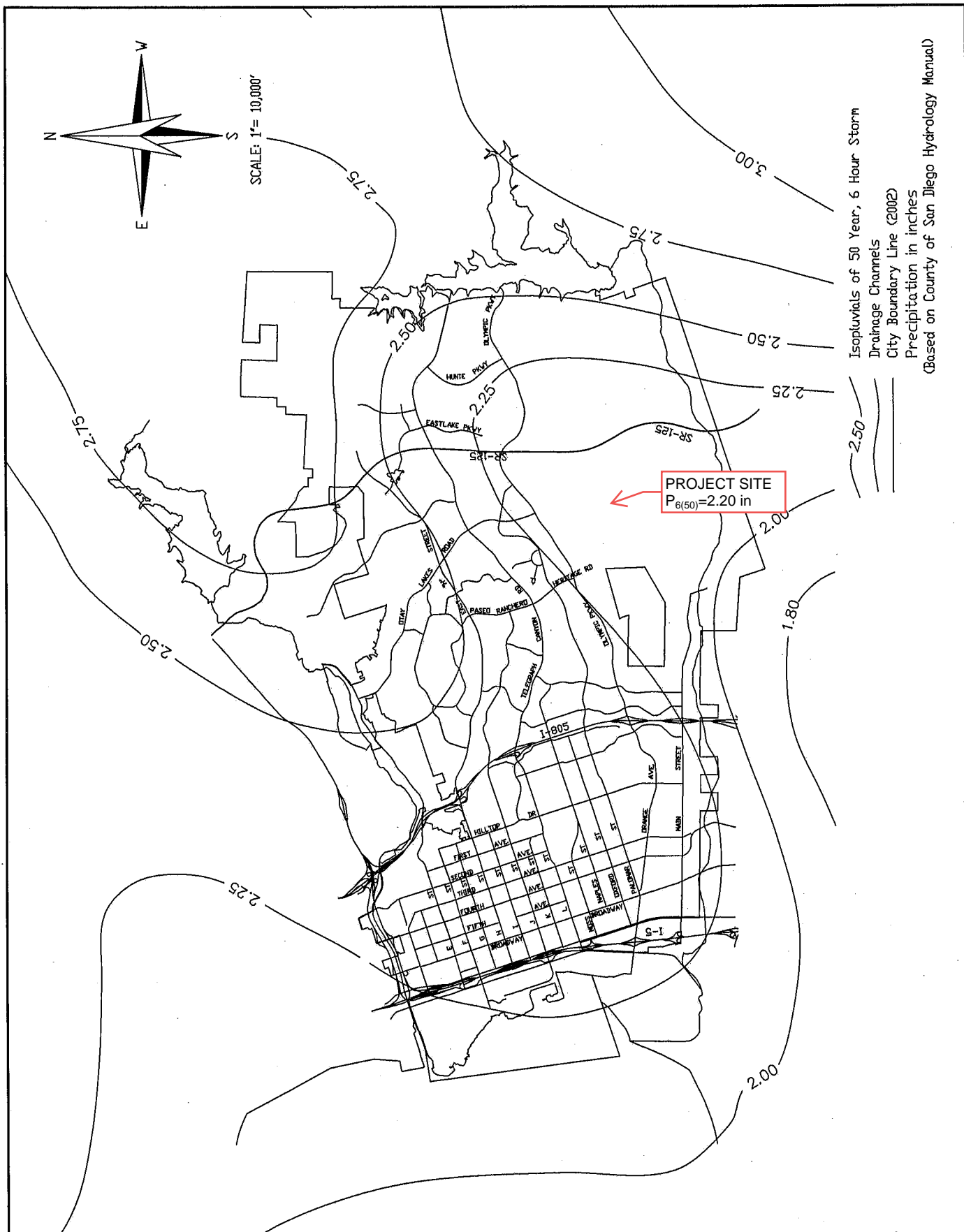
2.2 – Design Rainfall Determination

Preliminary Drainage Study for
OTAY RANCH VILLAGE R-3, R-4, & R-8

100-YEAR, 6-HOUR & 100-YEAR, 24 HOUR RAINFALL ISOPLUVIAL MAPS



SCALE: 1" = 10,000'



Isopluvials of 50 Year, 6 Hour Storm
 Drainage Channels
 City Boundary Line (2002)
 Precipitation in inches
 (Based on County of San Diego Hydrology Manual)

REVISION	BY	APPROVED	DATE
ORIGINAL			01/02
REVISION	CVM	C. SWANSON	11/02
REVISION	DPH	W. VALLE	11/17

CITY OF CHULA VISTA
 ENGINEERING & CAPITAL PROJECTS
 STANDARD DRAWING

50-YEAR, 6-HOUR PRECIPITATION

William S. Valle
 WILLIAM S. VALLE 11/21/2017
 CITY ENGINEER

DRN-03

County of San Diego Hydrology Manual

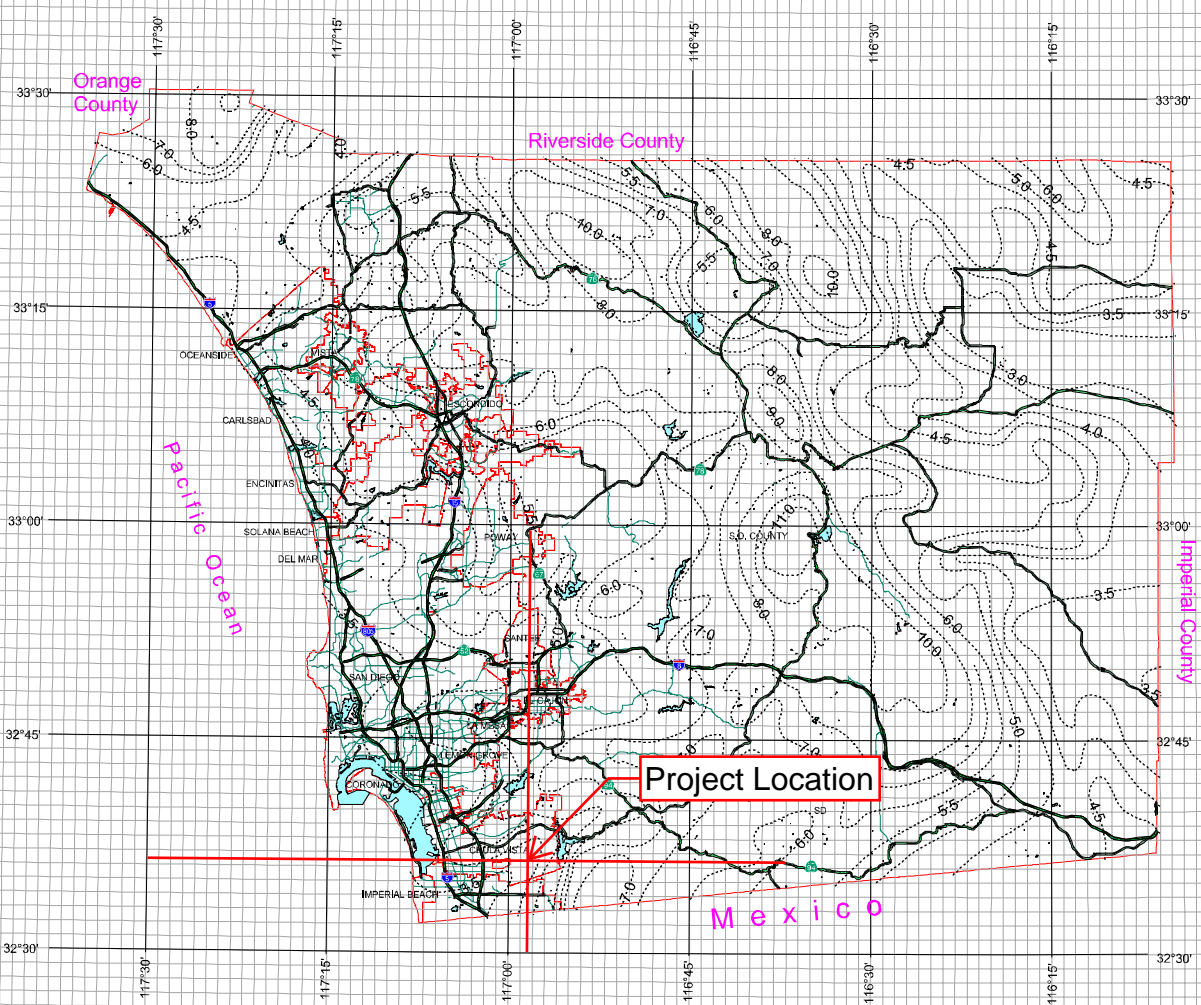


Rainfall Isopluvials

50 Year Rainfall Event - 24 Hours



$P_{24(50)} = 3.85 \text{ in}$



THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Copyright © 2015, DPW GIS. All Rights Reserved.

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

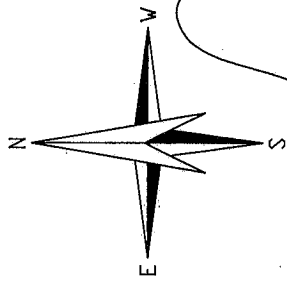
This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.



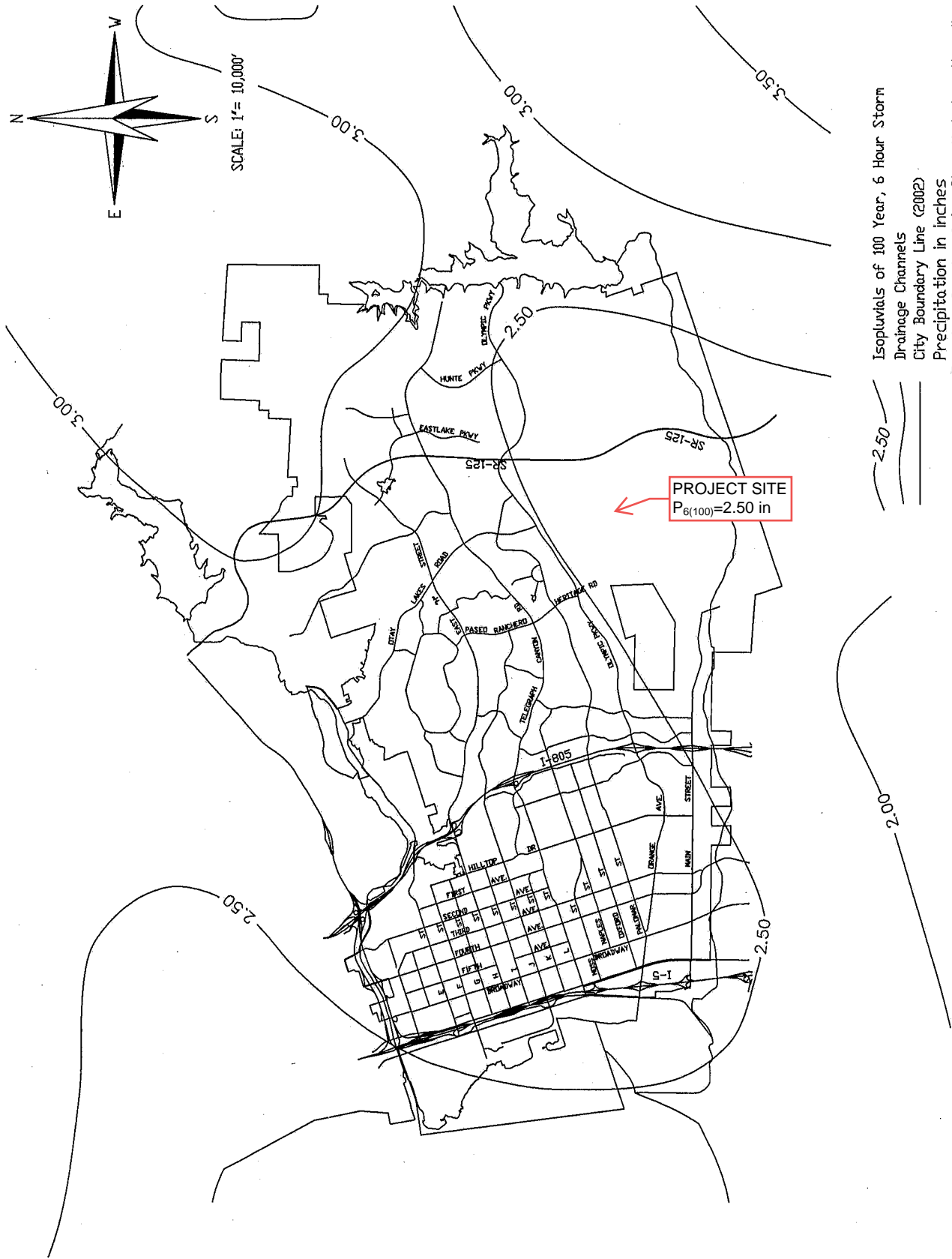
3 0 3 Miles

Preliminary Drainage Study for
OTAY RANCH VILLAGE R-3, R-4, & R-8

50-YEAR, 6-HOUR & 50-YEAR, 24 HOUR RAINFALL ISOPLUVIAL MAPS



SCALE: 1" = 10,000'



Isopluvials of 100 Year, 6 Hour Storm
 Drainage Channels
 City Boundary Line (2002)
 Precipitation in inches
 (Based on County of San Diego Hydrology Manual)

REVISION	BY	APPROVED	DATE
ORIGINAL			01/02
REVISION	CVM	C. SWANSON	11/02
REVISION	DPH	W. VALLE	11/17

CITY OF CHULA VISTA
 ENGINEERING & CAPITAL PROJECTS
 STANDARD DRAWING

100-YEAR, 6-HOUR PRECIPITATION

William S. Valle
 WILLIAM S. VALLE 11/21/2017
 CITY ENGINEER

DRN-04

County of San Diego Hydrology Manual

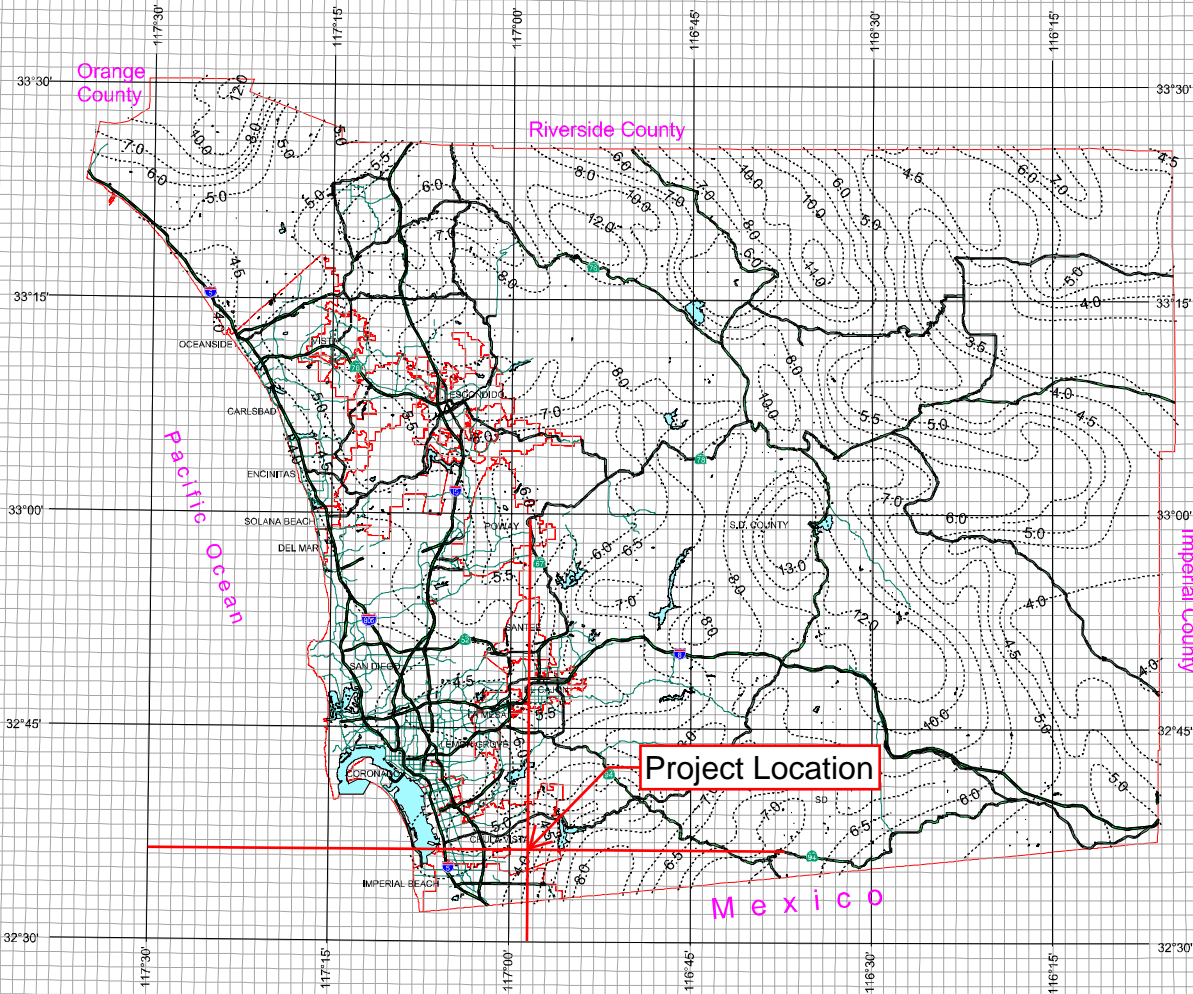


Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

----- Isopluvial (inches)

$$P_{24(100)} = 4.00 \text{ in}$$



3 0 3 Miles

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND. EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Copyright © 2010, All rights reserved.
This product may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.
This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.

CHAPTER 2

METHODOLOGY & MODEL DEVELOPMENT

2.3 – Rainfall Coefficient Determination

3-203 Hydrology

Developers draining to a river or stream will be required to use the latest adopted County Hydrology Manual to determine the flows expected at a given frequency (Q10, Q50, Q100, etc.) Infill developments will use the following Hydrology requirements. The City Engineer will determine which projects may be considered "infill" projects.

3-203.1 Previously Approved Reports

Runoff quantities; as set forth or derived from the report prepared by Lawrence, Fogg, Florer and Smith titled "A Special Study of Storm Drain Facilities" on file in the office of the City Engineer may be used in the design of drainage facilities in Chula Vista. A hydrologic study prepared and approved at General Development Plan (GDP) or Specific Planning Area (SPA) plan may be used as determined by the City Engineer.

3-203.2

For local drainage basins, storm discharge flow may be estimated based on the Rational Method or the Modified Rational Method. For all lateral and major drainage basins the SCS method, U.S. Army Corps of Engineers HEC-1 computer method or other tabular or computer method may be used upon City Engineer approval.

3-203.3 Rational and Modified Rational Methods

- (1) The rational method equation relates storm rainfall intensity (I), a selected runoff coefficient (C) and drainage area (A) to the peak runoff rate (Q):

$$Q = CIA \text{ (Empirical Units)}$$

where:

Q = Peak runoff in cubic feet per second
C = Runoff coefficient
I = Intensity, inches per hours
A = Drainage basin area in acres

Or

$$Q=0.278CIA \text{ (Metric Units)}$$

where:

Q = Peak runoff in cubic meters per second
C = Runoff coefficient
I = Intensity in millimeters per second
A = Drainage area in square kilometers

- (2) Coefficient of Runoff: Consider probable development. Use highest number of the following values:

a)	Paved Surface	0.90
b)	Commercial Area	0.85
c)	Dense Residential (R2, R3)	0.75

d)	Normal Residential (R1)	0.65
e)	Suburban Property (RE)	0.55
f)	Barren Slopes Steep	0.80
g)	Barren Slopes Hilly	0.75
h)	" " Rolling	0.70
i)	" " Flat	0.65
j)	Vegetated Slopes Steep	0.60
k)	" " Hilly	0.55
l)	" " Rolling	0.50
m)	" " Flat	0.45
n)	Farm Land	0.35
o)	Parks, Golf Courses	0.30

NOTES: Steep = Steep, rugged terrain with average slopes generally above 30%.
 Hilly = Hilly terrain with average slopes of 10% to 30%.
 Rolling = Rolling terrain with average slopes of 5% to 10%.
 Flat = Relatively flat land, with average slopes of 0% to 5%.
 Composite = Where drainage areas are composed of parts having different runoff characteristics, a weighted coefficient for the total drainage area may be used.

The runoff coefficient for a basin should be a composite coefficient made of the many different runoff coefficients for the sub-areas of the basin per equation:

$$CA_T = \frac{C_1A_1 + C_2A_2 + \dots + C_nA_n}{n}$$

(3) Time of Concentration (t_c = minutes) is the time required for runoff to flow from the most remote part of the watershed to the outlet point under consideration. With exceptions for limited natural watersheds, the time of concentration shall be calculated as follows:

a) $t_c = t_i + t_r$ where:

t_i = Initial time or overland flow time of concentration, the time required for runoff to flow to the first inlet or to the street gutter

t_r = Travel time of concentration, the time required for runoff to flow within street gutters to inlets, with channels or within storm drain pipes.

b) t_i may be calculated using the following natural watershed flow formula:

$$t_i = 60x [(11.9L^3)/H]^{0.385}$$

L = Length of water shed (miles)

H = Difference in elevation from furthestmost point to the design point (feet).

CHAPTER 2

METHODOLOGY & MODEL DEVELOPMENT

2.4 – Rainfall Intensity Determination

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.

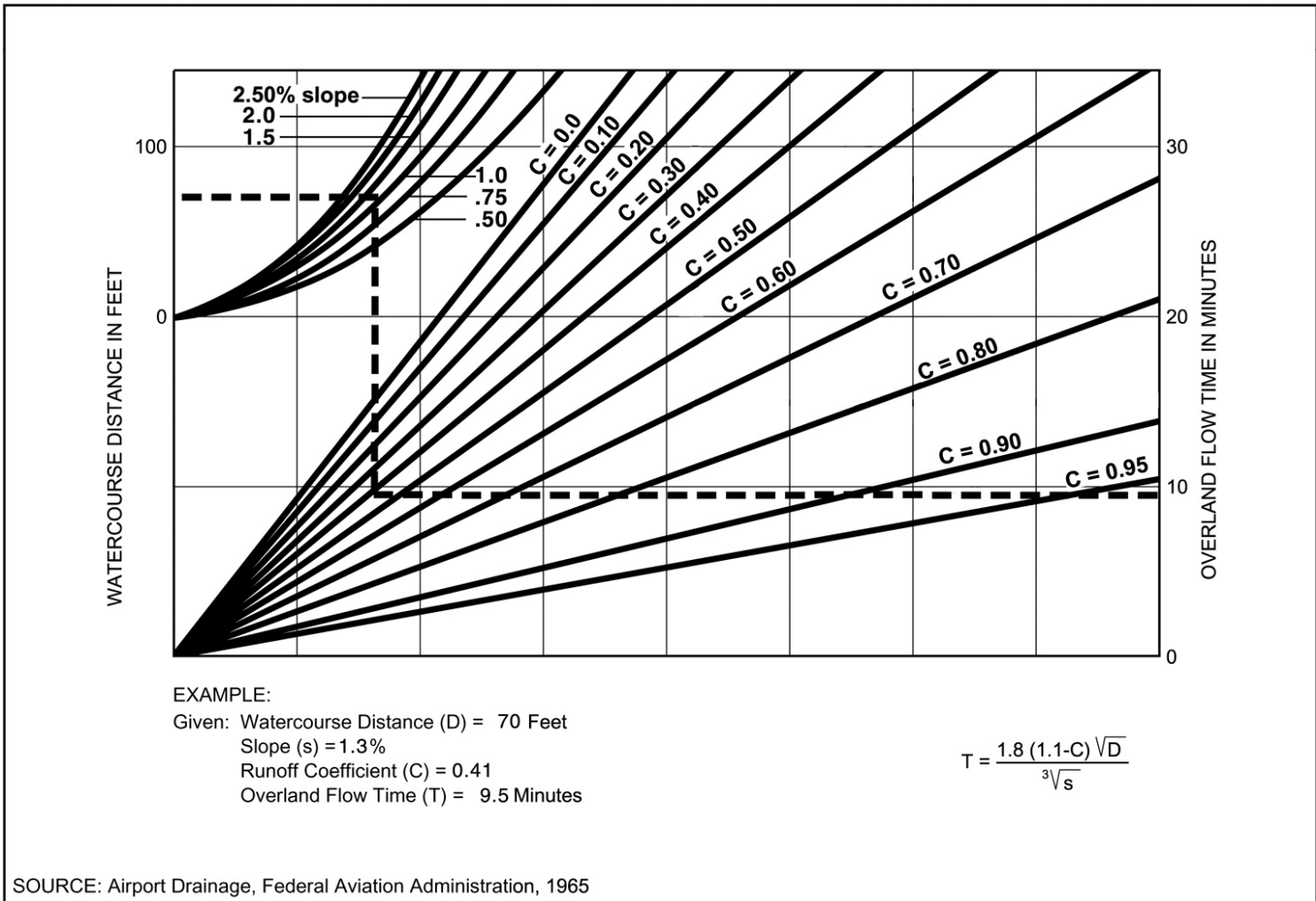
Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved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

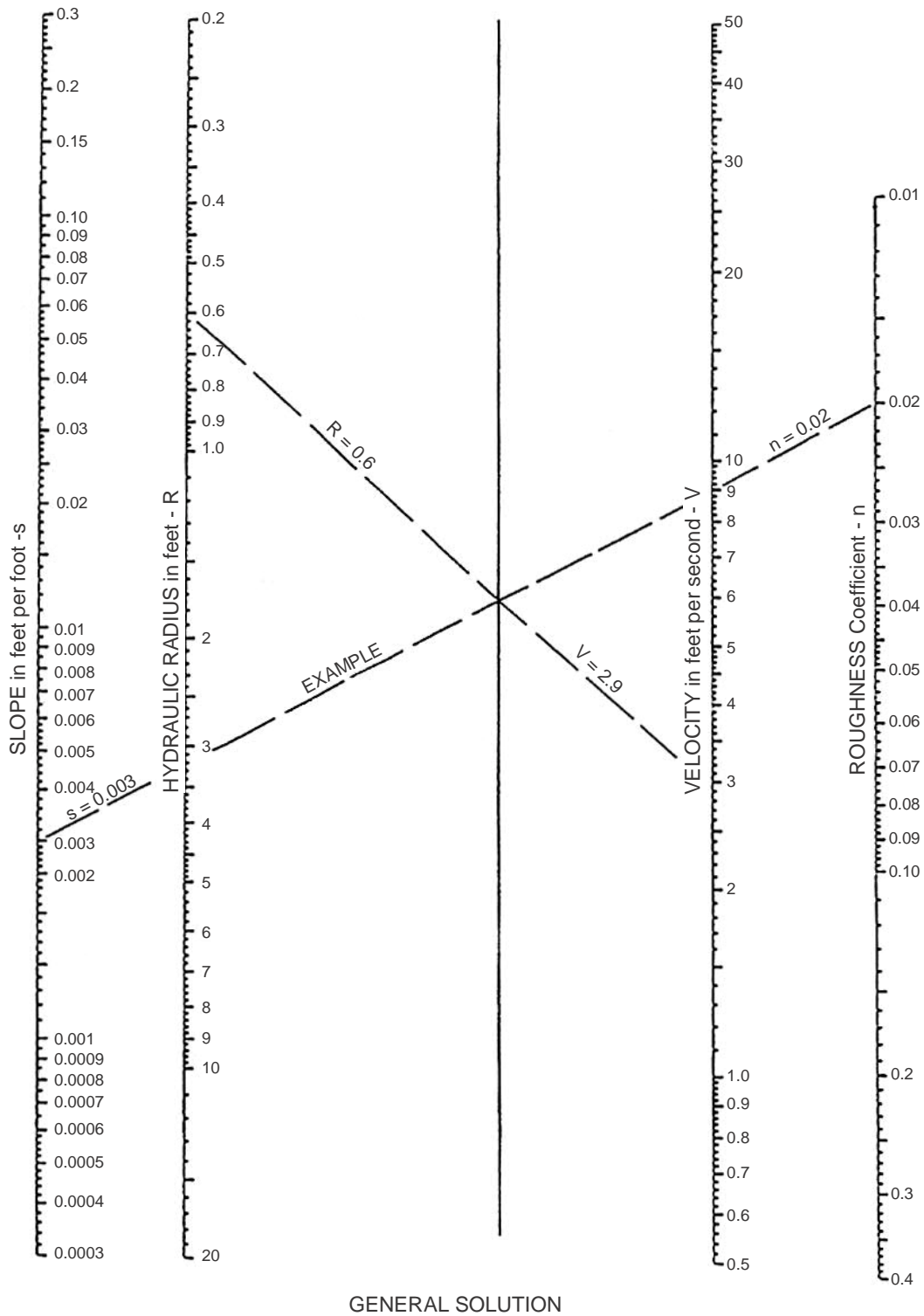


F I G U R E

Rational Formula - Overland Time of Flow Nomograph

3-3

$$\text{EQUATION: } V = \frac{1.49}{n} R^{2/3} s^{1/2}$$



SOURCE: USDOT, FHWA, HDS-3 (1961)

Manning's Equation Nomograph

FIGURE

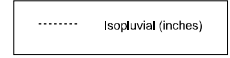
3-7

County of San Diego Hydrology Manual

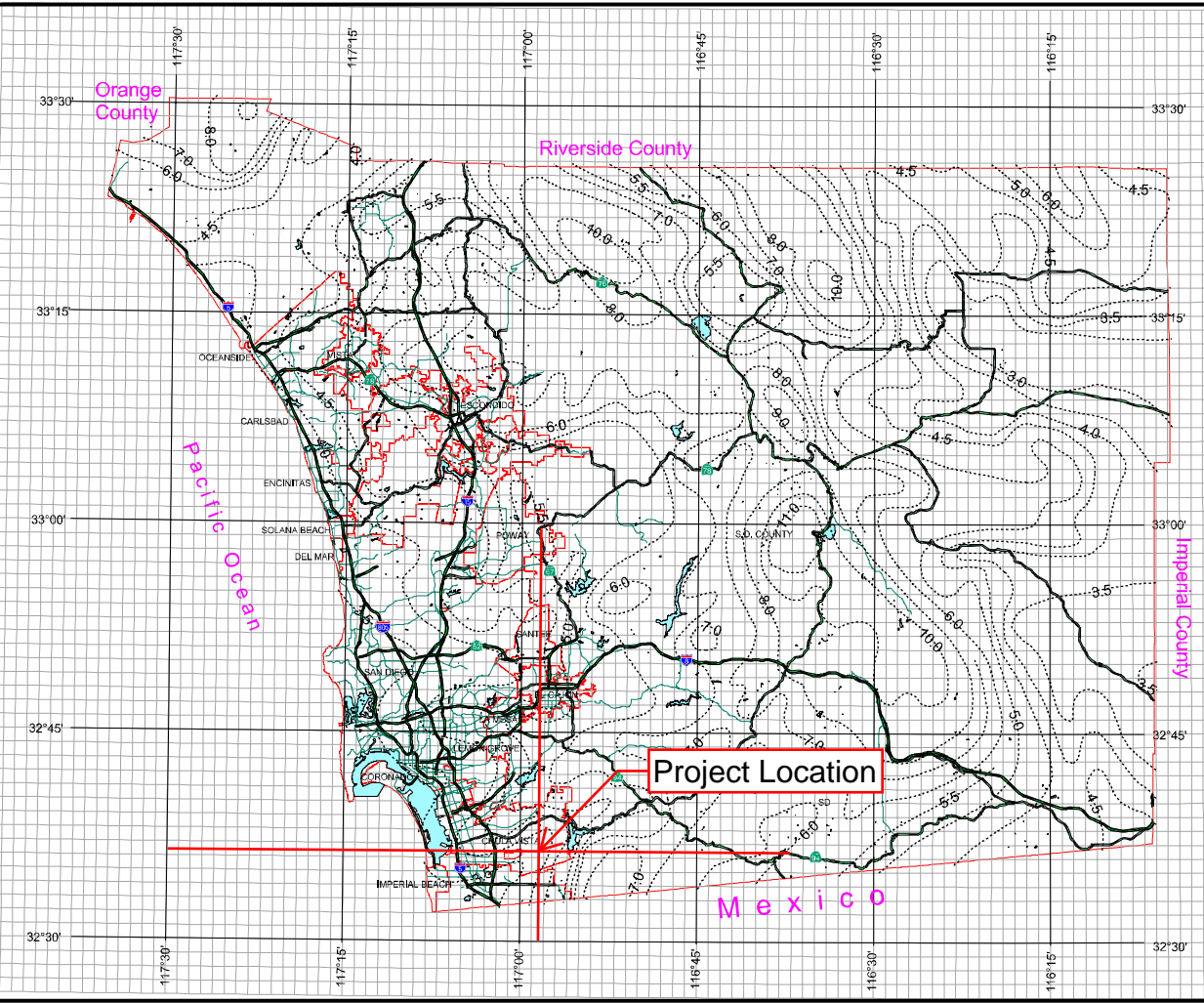


Rainfall Isopluvials

50 Year Rainfall Event - 24 Hours



$$P_{24(50)} = 3.85 \text{ in}$$



DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Copyright © 2013, DPW GIS. All Rights Reserved.

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

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

County of San Diego Hydrology Manual

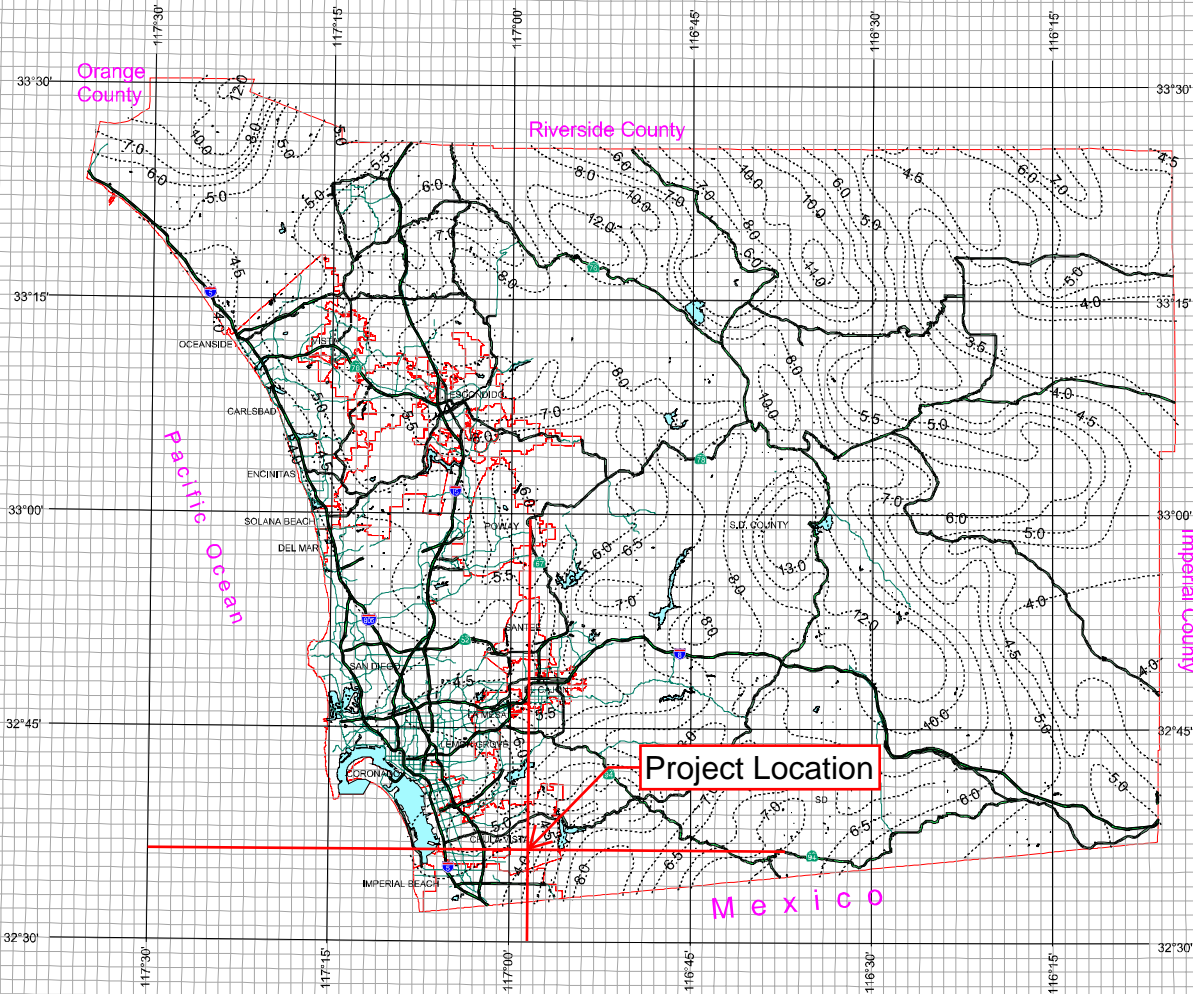


Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

----- Isopluvial (inches)

$$P_{24(100)} = 4.00 \text{ in}$$



3 0 3 Miles

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND. EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Copyright © 2012, All rights reserved.

This product may contain information which cannot be reproduced without the written permission of SANDAG.

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

Preliminary Drainage Study for
OTAY RANCH VILLAGE R-3, R-4, & R-8

CHAPTER 3

HYDROLOGIC ANALYSIS

Preliminary Drainage Study for
OTAY RANCH VILLAGE R-3, R-4, & R-8

CHAPTER 3.1

EXISTING MODELS (SEE APPENDIX A)

Preliminary Drainage Study for
OTAY RANCH VILLAGE R-3, R-4, & R-8

CHAPTER 3.2

EXISTING CONDITION (R-4 MASS GRADED PAD) 50-YEAR

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:

Hunsaker & Associates San Diego, Inc.
9707 Waples Street
San Diego, CA 92121

***** DESCRIPTION OF STUDY *****

- * OTAY RANCH VILLAGE 7, R-8 & R-4
* 50-Year Mass Graded Conditions
* DLN: 1601, W.O. 9999-3336

FILE NAME: R:\1601\HYD\DR\TM\CALCS\AES\50PRI N. DAT
TIME/DATE OF STUDY: 11:45 07/30/2024

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 50.00
6-HOUR DURATION PRECIPITATION (INCHES) = 2.200
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
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

Table with columns: NO., HALF-WIDTH (FT), CROWN TO CROSSFALL (FT), STREET-CROSSFALL: IN-/OUT-/PARK-SIDE / SIDE/ WAY, CURB HEIGHT (FT), GUTTER WIDTH (FT), GUTTER LIP (FT), GUTTER HIKE (FT), GEOMETRIES: MANNING FACTOR (n)

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.50 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 200.00 TO NODE 202.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 490.00
DOWNSTREAM ELEVATION(FEET) = 475.00
ELEVATION DIFFERENCE(FEET) = 15.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.178
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.796
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 0.14
 TOTAL AREA(ACRES) = 0.04 TOTAL RUNOFF(CFS) = 0.14

FLOW PROCESS FROM NODE 202.00 TO NODE 204.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.796
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2, R3) RUNOFF COEFFICIENT = .3500
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3535
 SUBAREA AREA(ACRES) = 2.81 SUBAREA RUNOFF(CFS) = 5.70
 TOTAL AREA(ACRES) = 2.8 TOTAL RUNOFF(CFS) = 5.84
 Tc(MIN.) = 4.18

FLOW PROCESS FROM NODE 204.00 TO NODE 164.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 453.00 DOWNSTREAM(FEET) = 441.86
 FLOW LENGTH(FEET) = 146.08 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.36
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.84
 PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 4.37
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 164.00 = 246.08 FEET.

FLOW PROCESS FROM NODE 164.00 TO NODE 164.00 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.) = 4.37
 RAINFALL INTENSITY(INCH/HR) = 5.80
 TOTAL STREAM AREA(ACRES) = 2.85
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.84

FLOW PROCESS FROM NODE 164.00 TO NODE 164.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

=====

USER-SPECIFIED VALUES ARE AS FOLLOWS:
 Tc(MIN) = 12.00 RAIN INTENSITY(INCH/HOUR) = 3.30
 TOTAL AREA(ACRES) = 89.63 TOTAL RUNOFF(CFS) = 213.80

FLOW PROCESS FROM NODE 164.00 TO NODE 164.00 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.) = 12.00
 RAINFALL INTENSITY(INCH/HR) = 3.30
 TOTAL STREAM AREA(ACRES) = 89.63
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 213.80

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	5.84	4.37	5.796	2.85

2 213.80 12.00 3.296 50PRIN.OUT
89.63

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	83.78	4.37	5.796
2	217.12	12.00	3.296

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 217.12 Tc(MIN.) = 12.00

TOTAL AREA(ACRES) = 92.5

LONGEST FLOWPATH FROM NODE 200.00 TO NODE 164.00 = 246.08 FEET.

=====
END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 92.5 TC(MIN.) = 12.00

PEAK FLOW RATE(CFS) = 217.12
=====

=====
END OF RATIONAL METHOD ANALYSIS
=====



Preliminary Drainage Study for
OTAY RANCH VILLAGE R-3, R-4, & R-8

CHAPTER 3.3

EXISTING CONDITION (R-4 MASS GRADED PAD) 100-YEAR

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:

Hunsaker & Associates San Diego, Inc.
 9707 Waples Street
 San Diego, CA 92121

***** DESCRIPTION OF STUDY *****
 * OTAY RANCH VILLAGE 7, R-8 & R-4 *
 * 100-Year Mass Graded Conditions *
 * DLN: 1601, W.O. 9999-3336 *

FILE NAME: R:\1601\HYD\DR\TM\CALCS\AES\100PRIN.DAT
 TIME/DATE OF STUDY: 12:00 07/30/2024

 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
 6-HOUR DURATION PRECIPITATION (INCHES) = 2.500
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
 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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	42.0	20.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150
2	38.0	20.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150
3	24.0	12.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150
4	25.0	12.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150
5	25.0	18.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150
6	16.0	9.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150
7	12.0	5.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150
8	20.0	10.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
 1. Relative Flow-Depth = 0.50 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 200.00 TO NODE 202.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

 VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "D"
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
 UPSTREAM ELEVATION(FEET) = 490.00
 DOWNSTREAM ELEVATION(FEET) = 475.00
 ELEVATION DIFFERENCE(FEET) = 15.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.178
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.587
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 0.16
 TOTAL AREA(ACRES) = 0.04 TOTAL RUNOFF(CFS) = 0.16

FLOW PROCESS FROM NODE 202.00 TO NODE 204.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.587
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .3500
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3535
 SUBAREA AREA(ACRES) = 2.81 SUBAREA RUNOFF(CFS) = 6.48
 TOTAL AREA(ACRES) = 2.8 TOTAL RUNOFF(CFS) = 6.64
 Tc(MIN.) = 4.18

FLOW PROCESS FROM NODE 204.00 TO NODE 164.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 453.00 DOWNSTREAM(FEET) = 441.86
 FLOW LENGTH(FEET) = 146.08 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.) = 12.81
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 6.64
 PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 4.37
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 164.00 = 246.08 FEET.

FLOW PROCESS FROM NODE 164.00 TO NODE 164.00 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.) = 4.37
 RAINFALL INTENSITY(INCH/HR) = 6.59
 TOTAL STREAM AREA(ACRES) = 2.85
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.64

FLOW PROCESS FROM NODE 164.00 TO NODE 164.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

=====

USER-SPECIFIED VALUES ARE AS FOLLOWS:
 Tc(MIN) = 12.00 RAIN INTENSITY(INCH/HOUR) = 3.74
 TOTAL AREA(ACRES) = 89.63 TOTAL RUNOFF(CFS) = 265.69

FLOW PROCESS FROM NODE 164.00 TO NODE 164.00 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.) = 12.00
 RAINFALL INTENSITY(INCH/HR) = 3.74
 TOTAL STREAM AREA(ACRES) = 89.63
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 265.69

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	6.64	4.37	6.587	2.85

2 265.69 12.00 3.745 100PRIN. OUT
89.63

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	103.34	4.37	6.587
2	269.46	12.00	3.745

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 269.46 Tc(MIN.) = 12.00
TOTAL AREA(ACRES) = 92.5
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 164.00 = 246.08 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 92.5 TC(MIN.) = 12.00
PEAK FLOW RATE(CFS) = 269.46

=====

=====

END OF RATIONAL METHOD ANALYSIS



Preliminary Drainage Study for
OTAY RANCH VILLAGE R-3, R-4, & R-8

CHAPTER 3.4

ULTIMATE CONDITION

50-YEAR

AES PR INPUT DATA

Node #		Code	Elevation		Length	Slope	Area		C value	If Channel			If memory
From	To		Up	Down			total	Land Use		Base (ft)	Z:1	maning	Bank #
100	102	2	474.6	473.8	65	1.23%	0.08	Multi Family	0.78				
102	104	3	461.5	449.65	1150	1.03%							
102	104	8					7.72	Multi Family	0.78				
104	106	3	449.65	406	1120	3.90%							
106	106	1											1-2
322	324	2	474	440	100	34.00%	0.22	Vegetated Slope	0.60				
324	106	5	440	416	455	5.27%				2	2	0.015	
324	106	8					0.93	Vegetated Slope	0.60				
106	106	1											2-2
106	816	3	406	390	130	12.31%	3.33	Basin (Hilly)	0.55				
816	850	8											
816	850	10											1
308	310	2	476	474	75	2.67%	0.08	Vegetated Slope	0.60				
310	312	5	474	461.8	1090	1.12%				2	2	0.015	
310	312	8					2.77	Vegetated Slope	0.60				
312	792	3	461.8	461.2	15	4.00%							
792	792	10											2
314	316	2	462	458	95	4.21%	0.04	Vegetated Slope	0.60				
316	803	5	458	443	440	3.41%				2	2	0.015	
316	803	8					0.42	Vegetated Slope	0.60				
803	793	3	436.81	433.7	38.96	7.98%							
793	793	10											3
791	792	2	463	462.35	60	1.08%	0.32	Commercial	0.90				
792	792	11											2
792	792	12											2
792	793	6	461	442	557	3.29%	1.15	Commercial	9.00				
793	793	11											3
793	793	12											3
793	784	3	433.2	432.4	64.25	1.25%							
784	784	11											2
784	784	12											2
784	784	10											2
			EVENT	Q (CFS)	A (AC)	TC (MIN)	EVENT	Q (CFS)	A (AC)	TC (MIN)			
788	788	7	100-YR	3.96	1.17	7.2	50-YR	3.46	1.17	7.27			
788	783	3	438.03	435.26	23.75	11.66%							
783	783	1											1-2
			EVENT	Q (CFS)	A (AC)	TC (MIN)	EVENT	Q (CFS)	A (AC)	TC (MIN)			
783	783	7	100-YR	7.96	1.78	6.25	50-YR	6.93	1.78	6.35			
783	783	1											2-2
783	784	3	434.93	432.9	36.25	5.60%							
784	784	11											2
784	784	12											2
784	804	3	432.4	398.05	723.1	4.75%							
804	804	1											1-3
			EVENT	Q (CFS)	A (AC)	TC (MIN)	EVENT	Q (CFS)	A (AC)	TC (MIN)			
932	932	7	100-YR	6.45	1.56	5.27	50-YR	5.64	1.56	5.34			
932	804	3	399.19	398.55	64	1.00%							
804	804	1											2-3
318	320	2	470	440	100	30.00%	0.13	Vegetated Slope	0.60				
320	808	5	440	409.1	590	5.24%				2	2	0.015	
320	808	8					1.28	Vegetated Slope	0.60				
808	804	3	399.67	398.55	101	1.11%							
804	804	1											3-3
804	756	3	398.05	393.15	309.38	1.58%							
756	756	1											1-2
			EVENT	Q (CFS)	A (AC)	TC (MIN)	EVENT	Q (CFS)	A (AC)	TC (MIN)			
769	769	7	100-YR	19.01	4.06	6.44	50-YR	16.54	4.06	6.56			
769	756	3	394.26	393.65	61	1.00%							
756	756	1											2-2
756	755	3	392.65	392.3	69.54	0.50%							
755	755	1											1-3
			EVENT	Q (CFS)	A (AC)	TC (MIN)	EVENT	Q (CFS)	A (AC)	TC (MIN)			
746	746	7	100-YR	192.31	73.73	12.23	50-YR	168.9	73.73	12.48			
746	755	3	393.68	391.3	183.06	1.30%							
755	755	1											2-3
			EVENT	Q (CFS)	A (AC)	TC (MIN)	EVENT	Q (CFS)	A (AC)	TC (MIN)			

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:

Hunsaker & Associates San Diego, Inc.
 9707 Waples Street
 San Diego, CA 92121

***** DESCRIPTION OF STUDY *****

* OTAY RANCH VILLAGE 7, R-8 & R-4 *
 * 50-Year Developed Condition *
 * DLN: 1601, W.O. 9999-3336 *

FILE NAME: R:\1601\HYD\DR\TM\CALCS\AES\50PR.DAT
 TIME/DATE OF STUDY: 14:57 07/25/2024

 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 50.00
 6-HOUR DURATION PRECIPITATION (INCHES) = 2.200
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
 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

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	42.0	20.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150
2	38.0	20.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150
3	24.0	12.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150
4	25.0	12.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150
5	25.0	18.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150
6	16.0	9.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150
7	12.0	5.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150
8	20.0	10.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
 1. Relative Flow-Depth = 0.50 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):
 DENSE RESIDENTIAL (R2, R3) RUNOFF COEFFICIENT = .7800
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 65.00
 UPSTREAM ELEVATION(FEET) = 474.60
 DOWNSTREAM ELEVATION(FEET) = 473.80
 ELEVATION DIFFERENCE(FEET) = 0.80
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.333
 50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.796
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 0.36

TOTAL AREA(ACRES) = 0.08 TOTAL RUNOFF(CFS) = 0.36

FLOW PROCESS FROM NODE 102.00 TO NODE 104.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 461.50 DOWNSTREAM(FEET) = 449.65
 FLOW LENGTH(FEET) = 1150.00 MANNING'S N = 0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 2.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 2.86
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 0.36
 PIPE TRAVEL TIME(MIN.) = 6.71 Tc(MIN.) = 11.04
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 104.00 = 1215.00 FEET.

FLOW PROCESS FROM NODE 102.00 TO NODE 104.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.477
 *USER SPECIFIED(SUBAREA):
 DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7800
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
 SUBAREA AREA(ACRES) = 7.72 SUBAREA RUNOFF(CFS) = 20.94
 TOTAL AREA(ACRES) = 7.8 TOTAL RUNOFF(CFS) = 21.16
 TC(MIN.) = 11.04

FLOW PROCESS FROM NODE 104.00 TO NODE 106.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 449.65 DOWNSTREAM(FEET) = 406.00
 FLOW LENGTH(FEET) = 1120.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.75
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 21.16
 PIPE TRAVEL TIME(MIN.) = 1.36 Tc(MIN.) = 12.40
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 106.00 = 2335.00 FEET.

FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 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.) = 12.40
 RAINFALL INTENSITY(INCH/HR) = 3.23
 TOTAL STREAM AREA(ACRES) = 7.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 21.16

FLOW PROCESS FROM NODE 322.00 TO NODE 324.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "D"
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
 UPSTREAM ELEVATION(FEET) = 474.00
 DOWNSTREAM ELEVATION(FEET) = 440.00
 ELEVATION DIFFERENCE(FEET) = 34.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.178
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.796
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.77
TOTAL AREA(ACRES) = 0.22 TOTAL RUNOFF(CFS) = 0.77

FLOW PROCESS FROM NODE 324.00 TO NODE 106.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 440.00 DOWNSTREAM(FEET) = 416.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 455.00 CHANNEL SLOPE = 0.0527
CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
CHANNEL FLOW THRU SUBAREA(CFS) = 0.77
FLOW VELOCITY(FEET/SEC.) = 4.06 FLOW DEPTH(FEET) = 0.09
TRAVEL TIME(MIN.) = 1.87 Tc(MIN.) = 6.05
LONGEST FLOWPATH FROM NODE 322.00 TO NODE 106.00 = 555.00 FEET.

FLOW PROCESS FROM NODE 324.00 TO NODE 106.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

=====

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.127
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
SUBAREA AREA(ACRES) = 0.93 SUBAREA RUNOFF(CFS) = 2.86
TOTAL AREA(ACRES) = 1.1 TOTAL RUNOFF(CFS) = 3.54
TC(MIN.) = 6.05

FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 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.) = 6.05
RAINFALL INTENSITY(INCH/HR) = 5.13
TOTAL STREAM AREA(ACRES) = 1.15
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.54

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	21.16	12.40	3.227	7.80
2	3.54	6.05	5.127	1.15

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	13.86	6.05	5.127
2	23.38	12.40	3.227

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 23.38 Tc(MIN.) = 12.40
TOTAL AREA(ACRES) = 8.9
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 106.00 = 2335.00 FEET.

FLOW PROCESS FROM NODE 106.00 TO NODE 816.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<<

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 406.00 DOWNSTREAM(FEET) = 390.00
FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.20
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 23.38
PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 12.50
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 816.00 = 2465.00 FEET.

```

```

FLOW PROCESS FROM NODE 816.00 TO NODE 850.00 IS CODE = 81
-----

```

```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

```

```

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.210
VEGETATED SLOPES (HILLY) RUNOFF COEFFICIENT = .5500
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7008
SUBAREA AREA(ACRES) = 3.33 SUBAREA RUNOFF(CFS) = 5.88
TOTAL AREA(ACRES) = 12.3 TOTAL RUNOFF(CFS) = 27.62
TC(MIN.) = 12.50

```

```

FLOW PROCESS FROM NODE 816.00 TO NODE 850.00 IS CODE = 10
-----

```

```

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
-----

```

```

FLOW PROCESS FROM NODE 308.00 TO NODE 310.00 IS CODE = 21
-----

```

```

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
-----

```

```

VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
INITIAL SUBAREA FLOW-LENGTH(FEET) = 75.00
UPSTREAM ELEVATION(FEET) = 476.00
DOWNSTREAM ELEVATION(FEET) = 474.00
ELEVATION DIFFERENCE(FEET) = 2.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.621
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.375
SUBAREA RUNOFF(CFS) = 0.26
TOTAL AREA(ACRES) = 0.08 TOTAL RUNOFF(CFS) = 0.26

```

```

FLOW PROCESS FROM NODE 310.00 TO NODE 312.00 IS CODE = 51
-----

```

```

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
-----

```

```

ELEVATION DATA: UPSTREAM(FEET) = 474.00 DOWNSTREAM(FEET) = 461.80
CHANNEL LENGTH THRU SUBAREA(FEET) = 1090.00 CHANNEL SLOPE = 0.0112
CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
CHANNEL FLOW THRU SUBAREA(CFS) = 0.26
FLOW VELOCITY(FEET/SEC.) = 1.68 FLOW DEPTH(FEET) = 0.07
TRAVEL TIME(MIN.) = 10.79 Tc(MIN.) = 16.41
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 312.00 = 1165.00 FEET.

```

```

FLOW PROCESS FROM NODE 310.00 TO NODE 312.00 IS CODE = 81
-----

```

```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

```

```

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.693
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
SUBAREA AREA(ACRES) = 2.77 SUBAREA RUNOFF(CFS) = 4.48
TOTAL AREA(ACRES) = 2.8 TOTAL RUNOFF(CFS) = 4.60

```

TC(MIN.) = 16.41

```
*****
FLOW PROCESS FROM NODE 312.00 TO NODE 792.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 461.80 DOWNSTREAM(FEET) = 461.20
FLOW LENGTH(FEET) = 15.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.17
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.60
PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 16.44
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 792.00 = 1180.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 792.00 TO NODE 792.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
=====
```

```
*****
FLOW PROCESS FROM NODE 314.00 TO NODE 316.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
INITIAL SUBAREA FLOW-LENGTH(FEET) = 95.00
UPSTREAM ELEVATION(FEET) = 462.00
DOWNSTREAM ELEVATION(FEET) = 458.00
ELEVATION DIFFERENCE(FEET) = 4.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.433
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.494
SUBAREA RUNOFF(CFS) = 0.13
TOTAL AREA(ACRES) = 0.04 TOTAL RUNOFF(CFS) = 0.13
```

```
*****
FLOW PROCESS FROM NODE 316.00 TO NODE 803.00 IS CODE = 51
-----
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 458.00 DOWNSTREAM(FEET) = 443.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 440.00 CHANNEL SLOPE = 0.0341
CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
CHANNEL FLOW THRU SUBAREA(CFS) = 0.13
FLOW VELOCITY(FEET/SEC.) = 1.91 FLOW DEPTH(FEET) = 0.03
TRAVEL TIME(MIN.) = 3.84 Tc(MIN.) = 9.27
LONGEST FLOWPATH FROM NODE 314.00 TO NODE 803.00 = 535.00 FEET.
```

```
*****
FLOW PROCESS FROM NODE 316.00 TO NODE 803.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.893
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
SUBAREA AREA(ACRES) = 0.42 SUBAREA RUNOFF(CFS) = 0.98
TOTAL AREA(ACRES) = 0.5 TOTAL RUNOFF(CFS) = 1.07
TC(MIN.) = 9.27
```

```
*****
FLOW PROCESS FROM NODE 803.00 TO NODE 793.00 IS CODE = 31
-----
```


>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 436.81 DOWNSTREAM(FEET) = 433.70
FLOW LENGTH(FEET) = 38.96 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 2.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.68
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.07
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 9.35
LONGEST FLOWPATH FROM NODE 314.00 TO NODE 793.00 = 573.96 FEET.

FLOW PROCESS FROM NODE 793.00 TO NODE 793.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<<

FLOW PROCESS FROM NODE 791.00 TO NODE 792.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<

COMMERCIAL AREA RUNOFF COEFFICIENT = .8500
SOIL CLASSIFICATION IS "D"
INITIAL SUBAREA FLOW-LENGTH(FEET) = 60.00
UPSTREAM ELEVATION(FEET) = 463.00
DOWNSTREAM ELEVATION(FEET) = 462.35
ELEVATION DIFFERENCE(FEET) = 0.65
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.394
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.796
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 1.58
TOTAL AREA(ACRES) = 0.32 TOTAL RUNOFF(CFS) = 1.58

FLOW PROCESS FROM NODE 792.00 TO NODE 792.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 1.58 3.39 5.796 0.32
LONGEST FLOWPATH FROM NODE 791.00 TO NODE 792.00 = 60.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 4.60 16.44 2.690 2.85
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 792.00 = 1180.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 2.53 3.39 5.796
2 5.34 16.44 2.690

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 5.34 Tc(MIN.) = 16.44
TOTAL AREA(ACRES) = 3.2

FLOW PROCESS FROM NODE 792.00 TO NODE 792.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<<<

FLOW PROCESS FROM NODE 792.00 TO NODE 793.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 461.00 DOWNSTREAM ELEVATION(FEET) = 442.00
STREET LENGTH(FEET) = 557.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 42.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 6.55
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.36
HALFSTREET FLOOD WIDTH(FEET) = 11.55
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.51
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.61
STREET FLOW TRAVEL TIME(MIN.) = 2.06 Tc(MIN.) = 18.50
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.493
COMMERCIAL AREA RUNOFF COEFFICIENT = .8500
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.685
SUBAREA AREA(ACRES) = 1.15 SUBAREA RUNOFF(CFS) = 2.44
TOTAL AREA(ACRES) = 4.3 PEAK FLOW RATE(CFS) = 7.38

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 12.19
FLOW VELOCITY(FEET/SEC.) = 4.60 DEPTH*VELOCITY(FT*FT/SEC.) = 1.70
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 793.00 = 1737.00 FEET.

FLOW PROCESS FROM NODE 793.00 TO NODE 793.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	7.38	18.50	2.493	4.32

LONGEST FLOWPATH FROM NODE 308.00 TO NODE 793.00 = 1737.00 FEET.

** MEMORY BANK # 3 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	1.07	9.35	3.870	0.46

LONGEST FLOWPATH FROM NODE 314.00 TO NODE 793.00 = 573.96 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	4.80	9.35	3.870
2	8.07	18.50	2.493

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 8.07 Tc(MIN.) = 18.50
TOTAL AREA(ACRES) = 4.8

FLOW PROCESS FROM NODE 793.00 TO NODE 793.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 3 <<<<<

FLOW PROCESS FROM NODE 793.00 TO NODE 784.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 433.20 DOWNSTREAM(FEET) = 432.40
FLOW LENGTH(FEET) = 64.25 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.86
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.07
PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 18.65
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 784.00 = 1801.25 FEET.

FLOW PROCESS FROM NODE 784.00 TO NODE 784.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<

FLOW PROCESS FROM NODE 788.00 TO NODE 788.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

USER-SPECIFIED VALUES ARE AS FOLLOWS:
TC(MIN) = 7.27 RAIN INTENSITY(INCH/HOUR) = 4.55
TOTAL AREA(ACRES) = 1.17 TOTAL RUNOFF(CFS) = 3.46

FLOW PROCESS FROM NODE 788.00 TO NODE 783.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 438.03 DOWNSTREAM(FEET) = 435.26
FLOW LENGTH(FEET) = 23.75 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.37
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.46
PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 7.30
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 783.00 = 1825.00 FEET.

FLOW PROCESS FROM NODE 783.00 TO NODE 783.00 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.) = 7.30
RAINFALL INTENSITY(INCH/HR) = 4.54
TOTAL STREAM AREA(ACRES) = 1.17
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.46

FLOW PROCESS FROM NODE 783.00 TO NODE 783.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

USER-SPECIFIED VALUES ARE AS FOLLOWS:
TC(MIN) = 6.35 RAIN INTENSITY(INCH/HOUR) = 4.97
TOTAL AREA(ACRES) = 1.78 TOTAL RUNOFF(CFS) = 6.93

FLOW PROCESS FROM NODE 783.00 TO NODE 783.00 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.) = 6.35
RAINFALL INTENSITY(INCH/HR) = 4.97
TOTAL STREAM AREA(ACRES) = 1.78
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.93
    
```

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	3.46	7.30	4.540	1.17
2	6.93	6.35	4.968	1.78

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	9.94	6.35	4.968
2	9.79	7.30	4.540

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```

PEAK FLOW RATE(CFS) = 9.94 Tc(MIN.) = 6.35
TOTAL AREA(ACRES) = 2.9
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 783.00 = 1825.00 FEET.
    
```

```

FLOW PROCESS FROM NODE 783.00 TO NODE 784.00 IS CODE = 31
    
```

```

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<
    
```

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 434.93 DOWNSTREAM(FEET) = 432.90
FLOW LENGTH(FEET) = 36.25 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.78
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.94
PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 6.40
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 784.00 = 1861.25 FEET.
    
```

```

FLOW PROCESS FROM NODE 784.00 TO NODE 784.00 IS CODE = 11
    
```

```

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
=====
    
```

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	9.94	6.40	4.945	2.95

LONGEST FLOWPATH FROM NODE 308.00 TO NODE 784.00 = 1861.25 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	8.07	18.65	2.479	4.78

LONGEST FLOWPATH FROM NODE 308.00 TO NODE 784.00 = 1801.25 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	12.71	6.40	4.945
2	13.05	18.65	2.479

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```

PEAK FLOW RATE(CFS) = 13.05 Tc(MIN.) = 18.65
    
```

TOTAL AREA(ACRES) = 7.7

FLOW PROCESS FROM NODE 784.00 TO NODE 784.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<<

FLOW PROCESS FROM NODE 784.00 TO NODE 804.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 432.40 DOWNSTREAM(FEET) = 398.05
FLOW LENGTH(FEET) = 723.10 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.85
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 13.05
PIPE TRAVEL TIME(MIN.) = 0.94 Tc(MIN.) = 19.59
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 804.00 = 2584.35 FEET.

FLOW PROCESS FROM NODE 804.00 TO NODE 804.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 19.59
RAINFALL INTENSITY(INCH/HR) = 2.40
TOTAL STREAM AREA(ACRES) = 7.73
PEAK FLOW RATE(CFS) AT CONFLUENCE = 13.05

FLOW PROCESS FROM NODE 932.00 TO NODE 932.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

USER-SPECIFIED VALUES ARE AS FOLLOWS:
TC(MIN) = 5.34 RAIN INTENSITY(INCH/HOUR) = 5.56
TOTAL AREA(ACRES) = 1.56 TOTAL RUNOFF(CFS) = 5.64

FLOW PROCESS FROM NODE 932.00 TO NODE 804.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 399.19 DOWNSTREAM(FEET) = 398.55
FLOW LENGTH(FEET) = 64.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.82
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.64
PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 5.52
LONGEST FLOWPATH FROM NODE 322.00 TO NODE 804.00 = 619.00 FEET.

FLOW PROCESS FROM NODE 804.00 TO NODE 804.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.52
RAINFALL INTENSITY(INCH/HR) = 5.44
TOTAL STREAM AREA(ACRES) = 1.56

PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.64

FLOW PROCESS FROM NODE 318.00 TO NODE 320.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 470.00
DOWNSTREAM ELEVATION(FEET) = 440.00
ELEVATION DIFFERENCE(FEET) = 30.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.178
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.796
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.45
TOTAL AREA(ACRES) = 0.13 TOTAL RUNOFF(CFS) = 0.45

FLOW PROCESS FROM NODE 320.00 TO NODE 808.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 440.00 DOWNSTREAM(FEET) = 409.10
CHANNEL LENGTH THRU SUBAREA(FEET) = 590.00 CHANNEL SLOPE = 0.0524
CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
CHANNEL FLOW THRU SUBAREA(CFS) = 0.45
FLOW VELOCITY(FEET/SEC.) = 3.33 FLOW DEPTH(FEET) = 0.06
TRAVEL TIME(MIN.) = 2.96 Tc(MIN.) = 7.13
LONGEST FLOWPATH FROM NODE 318.00 TO NODE 808.00 = 690.00 FEET.

FLOW PROCESS FROM NODE 320.00 TO NODE 808.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.609
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
SUBAREA AREA(ACRES) = 1.28 SUBAREA RUNOFF(CFS) = 3.54
TOTAL AREA(ACRES) = 1.4 TOTAL RUNOFF(CFS) = 3.90
Tc(MIN.) = 7.13

FLOW PROCESS FROM NODE 808.00 TO NODE 804.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 399.67 DOWNSTREAM(FEET) = 398.55
FLOW LENGTH(FEET) = 101.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.50
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.90
PIPE TRAVEL TIME(MIN.) = 0.31 Tc(MIN.) = 7.44
LONGEST FLOWPATH FROM NODE 318.00 TO NODE 804.00 = 791.00 FEET.

FLOW PROCESS FROM NODE 804.00 TO NODE 804.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 3

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
 TIME OF CONCENTRATION(MIN.) = 7.44
 RAINFALL INTENSITY(INCH/HR) = 4.49
 TOTAL STREAM AREA(ACRES) = 1.41
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.90

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	13.05	19.59	2.402	7.73
2	5.64	5.52	5.436	1.56
3	3.90	7.44	4.485	1.41

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	12.21	5.52	5.436
2	13.51	7.44	4.485
3	17.63	19.59	2.402

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 17.63 Tc(MIN.) = 19.59
 TOTAL AREA(ACRES) = 10.7
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 804.00 = 2584.35 FEET.

FLOW PROCESS FROM NODE 804.00 TO NODE 756.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 398.05 DOWNSTREAM(FEET) = 393.15
 FLOW LENGTH(FEET) = 309.38 MANNING'S N = 0.013
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 16.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.94
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 17.63
 PIPE TRAVEL TIME(MIN.) = 0.58 Tc(MIN.) = 20.17
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 756.00 = 2893.73 FEET.

FLOW PROCESS FROM NODE 756.00 TO NODE 756.00 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.) = 20.17
 RAINFALL INTENSITY(INCH/HR) = 2.36
 TOTAL STREAM AREA(ACRES) = 10.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 17.63

FLOW PROCESS FROM NODE 769.00 TO NODE 769.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

=====

USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) = 6.56 RAIN INTENSITY(INCH/HOUR) = 4.87
 TOTAL AREA(ACRES) = 4.06 TOTAL RUNOFF(CFS) = 16.54

FLOW PROCESS FROM NODE 769.00 TO NODE 756.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 394.26 DOWNSTREAM(FEET) = 393.65

FLOW LENGTH(FEET) = 61.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.54
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 16.54
PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 6.69
LONGEST FLOWPATH FROM NODE 322.00 TO NODE 756.00 = 680.00 FEET.

FLOW PROCESS FROM NODE 756.00 TO NODE 756.00 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.) = 6.69
RAINFALL INTENSITY(INCH/HR) = 4.80
TOTAL STREAM AREA(ACRES) = 4.06
PEAK FLOW RATE(CFS) AT CONFLUENCE = 16.54

** CONFLUENCE DATA **

Table with 5 columns: STREAM NUMBER, RUNOFF (CFS), Tc (MIN.), INTENSITY (INCH/HOUR), AREA (ACRE). Rows for stream 1 and 2.

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

** PEAK FLOW RATE TABLE **

Table with 4 columns: STREAM NUMBER, RUNOFF (CFS), Tc (MIN.), INTENSITY (INCH/HOUR). Rows for stream 1 and 2.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 25.75 Tc(MIN.) = 20.17
TOTAL AREA(ACRES) = 14.8
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 756.00 = 2893.73 FEET.

FLOW PROCESS FROM NODE 756.00 TO NODE 755.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 392.62 DOWNSTREAM(FEET) = 392.30
FLOW LENGTH(FEET) = 69.54 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.13
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 25.75
PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 20.36
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 755.00 = 2963.27 FEET.

FLOW PROCESS FROM NODE 755.00 TO NODE 755.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 20.36
RAINFALL INTENSITY(INCH/HR) = 2.34
TOTAL STREAM AREA(ACRES) = 14.76
PEAK FLOW RATE(CFS) AT CONFLUENCE = 25.75

FLOW PROCESS FROM NODE 746.00 TO NODE 746.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

=====
USER-SPECIFIED VALUES ARE AS FOLLOWS:

TC(MIN) = 12.48 RAIN INTENSITY(INCH/HOUR) = 3.21
TOTAL AREA(ACRES) = 73.73 TOTAL RUNOFF(CFS) = 168.90

FLOW PROCESS FROM NODE 746.00 TO NODE 755.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 393.68 DOWNSTREAM(FEET) = 391.30
FLOW LENGTH(FEET) = 183.06 MANNING'S N = 0.013
DEPTH OF FLOW IN 51.0 INCH PIPE IS 38.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.62
ESTIMATED PIPE DIAMETER(INCH) = 51.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 168.90
PIPE TRAVEL TIME(MIN.) = 0.21 Tc(MIN.) = 12.69
LONGEST FLOWPATH FROM NODE 322.00 TO NODE 755.00 = 863.06 FEET.

FLOW PROCESS FROM NODE 755.00 TO NODE 755.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 12.69
RAINFALL INTENSITY(INCH/HR) = 3.18
TOTAL STREAM AREA(ACRES) = 73.73
PEAK FLOW RATE(CFS) AT CONFLUENCE = 168.90

FLOW PROCESS FROM NODE 763.00 TO NODE 763.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

=====
USER-SPECIFIED VALUES ARE AS FOLLOWS:

TC(MIN) = 6.41 RAIN INTENSITY(INCH/HOUR) = 4.94
TOTAL AREA(ACRES) = 4.12 TOTAL RUNOFF(CFS) = 17.26

FLOW PROCESS FROM NODE 763.00 TO NODE 755.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 393.25 DOWNSTREAM(FEET) = 391.98
FLOW LENGTH(FEET) = 25.50 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.90
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 17.26
PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 6.44
LONGEST FLOWPATH FROM NODE 318.00 TO NODE 755.00 = 816.50 FEET.

FLOW PROCESS FROM NODE 755.00 TO NODE 755.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 6.44
RAINFALL INTENSITY(INCH/HR) = 4.92
TOTAL STREAM AREA(ACRES) = 4.12
PEAK FLOW RATE(CFS) AT CONFLUENCE = 17.26

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	25.75	20.36	2.343	14.76
2	168.90	12.69	3.179	73.73
3	17.26	6.44	4.923	4.12

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	115.25	6.44	4.923
2	199.03	12.69	3.179
3	158.48	20.36	2.343

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 199.03 Tc(MIN.) = 12.69
 TOTAL AREA(ACRES) = 92.6
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 755.00 = 2963.27 FEET.

 FLOW PROCESS FROM NODE 755.00 TO NODE 850.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 390.80 DOWNSTREAM(FEET) = 390.00
 FLOW LENGTH(FEET) = 96.43 MANNING'S N = 0.013
 DEPTH OF FLOW IN 60.0 INCH PIPE IS 43.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.94
 ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 199.03
 PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 12.81
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 850.00 = 3059.70 FEET.

 FLOW PROCESS FROM NODE 850.00 TO NODE 850.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<

 FLOW PROCESS FROM NODE 824.00 TO NODE 835.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

=====

USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) = 8.63 RAIN INTENSITY(INCH/HOUR) = 4.08
 TOTAL AREA(ACRES) = 29.23 TOTAL RUNOFF(CFS) = 65.09

 FLOW PROCESS FROM NODE 835.00 TO NODE 835.00 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.) = 8.63
 RAINFALL INTENSITY(INCH/HR) = 4.08
 TOTAL STREAM AREA(ACRES) = 29.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 65.09

 FLOW PROCESS FROM NODE 300.00 TO NODE 302.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "D"
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 75.00

UPSTREAM ELEVATION(FEET) = 578.00
DOWNSTREAM ELEVATION(FEET) = 576.00
ELEVATION DIFFERENCE(FEET) = 2.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.621
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.375
SUBAREA RUNOFF(CFS) = 0.32
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.32

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) = 576.00 DOWNSTREAM(FEET) = 425.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1400.00 CHANNEL SLOPE = 0.1079
CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
MANNING' S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
CHANNEL FLOW THRU SUBAREA(CFS) = 0.32
FLOW VELOCITY(FEET/SEC.) = 3.78 FLOW DEPTH(FEET) = 0.04
TRAVEL TIME(MIN.) = 6.18 Tc(MIN.) = 11.80
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 304.00 = 1475.00 FEET.

FLOW PROCESS FROM NODE 302.00 TO NODE 304.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.332
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
SUBAREA AREA(ACRES) = 4.65 SUBAREA RUNOFF(CFS) = 9.30
TOTAL AREA(ACRES) = 4.8 TOTAL RUNOFF(CFS) = 9.50
TC(MIN.) = 11.80

FLOW PROCESS FROM NODE 306.00 TO NODE 304.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.332
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
SUBAREA AREA(ACRES) = 0.32 SUBAREA RUNOFF(CFS) = 0.64
TOTAL AREA(ACRES) = 5.1 TOTAL RUNOFF(CFS) = 10.14
TC(MIN.) = 11.80

FLOW PROCESS FROM NODE 304.00 TO NODE 835.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 425.00 DOWNSTREAM(FEET) = 420.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 80.00 CHANNEL SLOPE = 0.0625
CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
MANNING' S FACTOR = 0.150 MAXIMUM DEPTH(FEET) = 2.00
CHANNEL FLOW THRU SUBAREA(CFS) = 10.14
FLOW VELOCITY(FEET/SEC.) = 1.97 FLOW DEPTH(FEET) = 1.18
TRAVEL TIME(MIN.) = 0.68 Tc(MIN.) = 12.47
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 835.00 = 1555.00 FEET.

FLOW PROCESS FROM NODE 835.00 TO NODE 835.00 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.) = 12.47
 RAINFALL INTENSITY(INCH/HR) = 3.21
 TOTAL STREAM AREA(ACRES) = 5.07
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.14

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	65.09	8.63	4.076	29.23
2	10.14	12.47	3.214	5.07

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	72.10	8.63	4.076
2	61.46	12.47	3.214

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 72.10 Tc(MIN.) = 8.63
 TOTAL AREA(ACRES) = 34.3
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 835.00 = 3059.70 FEET.

FLOW PROCESS FROM NODE 835.00 TO NODE 836.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 419.00 DOWNSTREAM(FEET) = 414.99
 FLOW LENGTH(FEET) = 71.76 MANNING'S N = 0.013
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 20.74
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 72.10
 PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 8.69
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 836.00 = 3131.46 FEET.

FLOW PROCESS FROM NODE 836.00 TO NODE 743.50 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 414.99 DOWNSTREAM(FEET) = 390.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 300.00 CHANNEL SLOPE = 0.0833
 CHANNEL BASE(FEET) = 15.00 "Z" FACTOR = 2.000
 MANNING'S FACTOR = 0.019 MAXIMUM DEPTH(FEET) = 2.00
 CHANNEL FLOW THRU SUBAREA(CFS) = 72.10
 FLOW VELOCITY(FEET/SEC.) = 11.65 FLOW DEPTH(FEET) = 0.39
 TRAVEL TIME(MIN.) = 0.43 Tc(MIN.) = 9.12
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 743.50 = 3431.46 FEET.

FLOW PROCESS FROM NODE 743.50 TO NODE 743.50 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.) = 9.12
 RAINFALL INTENSITY(INCH/HR) = 3.93
 TOTAL STREAM AREA(ACRES) = 34.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 72.10

FLOW PROCESS FROM NODE 743.50 TO NODE 743.50 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

=====

USER-SPECIFIED VALUES ARE AS FOLLOWS:

TC(MIN) = 10.62 RAIN INTENSITY(INCH/HOUR) = 3.57
 TOTAL AREA(ACRES) = 13.55 TOTAL RUNOFF(CFS) = 38.29

FLOW PROCESS FROM NODE 743.50 TO NODE 743.50 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.) = 10.62
 RAINFALL INTENSITY(INCH/HR) = 3.57
 TOTAL STREAM AREA(ACRES) = 13.55
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 38.29

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	72.10	9.12	3.935	34.30
2	38.29	10.62	3.566	13.55

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	104.97	9.12	3.935
2	103.63	10.62	3.566

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 104.97 Tc(MIN.) = 9.12
 TOTAL AREA(ACRES) = 47.8
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 743.50 = 3431.46 FEET.

FLOW PROCESS FROM NODE 743.50 TO NODE 850.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	104.97	9.12	3.935	47.85

LONGEST FLOWPATH FROM NODE 308.00 TO NODE 850.00 = 3431.46 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	199.03	12.81	3.159	92.61

LONGEST FLOWPATH FROM NODE 308.00 TO NODE 850.00 = 3059.70 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	246.59	9.12	3.935
2	283.31	12.81	3.159

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 283.31 Tc(MIN.) = 12.81
 TOTAL AREA(ACRES) = 140.5

FLOW PROCESS FROM NODE 743.50 TO NODE 850.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<<

 FLOW PROCESS FROM NODE 850.00 TO NODE 850.00 IS CODE = 11

 >>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
 =====

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	283.31	12.81	3.159	140.46

LONGEST FLOWPATH FROM NODE 308.00 TO NODE 850.00 = 3431.46 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	27.62	12.50	3.210	12.28

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 850.00 = 2465.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	304.04	12.50	3.210
2	310.50	12.81	3.159

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 310.50 Tc(MIN.) = 12.81
 TOTAL AREA(ACRES) = 152.7

 FLOW PROCESS FROM NODE 850.00 TO NODE 850.00 IS CODE = 12

 >>>>CLEAR MEMORY BANK # 1 <<<<<
 =====

```

+-----+
| AREA TRIBUTARY TO NODE 893                |
| EXISTING HEADWALL WEST @ INTERSECTION OF  |
| LA MEDIA ROAD AND SANTA LUNA STREET        |
+-----+
    
```

 FLOW PROCESS FROM NODE 881.00 TO NODE 882.00 IS CODE = 21

 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 =====

VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "D"
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
 UPSTREAM ELEVATION(FEET) = 576.00
 DOWNSTREAM ELEVATION(FEET) = 571.00
 ELEVATION DIFFERENCE(FEET) = 5.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.264
 50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.608
 SUBAREA RUNOFF(CFS) = 3.43
 TOTAL AREA(ACRES) = 1.02 TOTAL RUNOFF(CFS) = 3.43

 FLOW PROCESS FROM NODE 882.00 TO NODE 883.00 IS CODE = 31

 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<
 =====

ELEVATION DATA: UPSTREAM(FEET) = 571.00 DOWNSTREAM(FEET) = 495.00
 FLOW LENGTH(FEET) = 8449.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.92
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.43

50PR. OUT
PIPE TRAVEL TIME(MIN.) = 28.63 Tc(MIN.) = 33.90
LONGEST FLOWPATH FROM NODE 881.00 TO NODE 883.00 = 8549.00 FEET.

FLOW PROCESS FROM NODE 882.00 TO NODE 883.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.687
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
SUBAREA AREA(ACRES) = 15.11 SUBAREA RUNOFF(CFS) = 15.29
TOTAL AREA(ACRES) = 16.1 TOTAL RUNOFF(CFS) = 16.32
TC(MIN.) = 33.90

FLOW PROCESS FROM NODE 883.00 TO NODE 883.00 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.) = 33.90
RAINFALL INTENSITY(INCH/HR) = 1.69
TOTAL STREAM AREA(ACRES) = 16.13
PEAK FLOW RATE(CFS) AT CONFLUENCE = 16.32

FLOW PROCESS FROM NODE 250.00 TO NODE 252.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

PAVED SURFACE RUNOFF COEFFICIENT = .9000
SOIL CLASSIFICATION IS "D"
INITIAL SUBAREA FLOW-LENGTH(FEET) = 60.00
UPSTREAM ELEVATION(FEET) = 561.00
DOWNSTREAM ELEVATION(FEET) = 560.35
ELEVATION DIFFERENCE(FEET) = 0.65
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.715
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.796
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.31
TOTAL AREA(ACRES) = 0.06 TOTAL RUNOFF(CFS) = 0.31

FLOW PROCESS FROM NODE 252.00 TO NODE 254.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 7 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 560.35 DOWNSTREAM ELEVATION(FEET) = 540.00
STREET LENGTH(FEET) = 520.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 12.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 5.00
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(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.04
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.16
HALFSTREET FLOOD WIDTH(FEET) = 1.50
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.73
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.58
STREET FLOW TRAVEL TIME(MIN.) = 2.32 Tc(MIN.) = 5.04

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.768
 PAVED SURFACE RUNOFF COEFFICIENT = .9000
 SOIL CLASSIFICATION IS "D"
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.900
 SUBAREA AREA(ACRES) = 0.28 SUBAREA RUNOFF(CFS) = 1.45
 TOTAL AREA(ACRES) = 0.3 PEAK FLOW RATE(CFS) = 1.77

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.21 HALFSTREET FLOOD WIDTH(FEET) = 3.95
 FLOW VELOCITY(FEET/SEC.) = 3.22 DEPTH*VELOCITY(FT*FT/SEC.) = 0.66
 LONGEST FLOWPATH FROM NODE 250.00 TO NODE 254.00 = 580.00 FEET.

 FLOW PROCESS FROM NODE 254.00 TO NODE 256.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 535.00 DOWNSTREAM(FEET) = 525.00
 FLOW LENGTH(FEET) = 50.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 2.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.25
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.77
 PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 5.11
 LONGEST FLOWPATH FROM NODE 250.00 TO NODE 256.00 = 630.00 FEET.

 FLOW PROCESS FROM NODE 256.00 TO NODE 883.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 525.00 DOWNSTREAM(FEET) = 495.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 948.00 CHANNEL SLOPE = 0.0316
 CHANNEL BASE(FEET) = 3.00 "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 3.00
 CHANNEL FLOW THRU SUBAREA(CFS) = 1.77
 FLOW VELOCITY(FEET/SEC.) = 4.12 FLOW DEPTH(FEET) = 0.13
 TRAVEL TIME(MIN.) = 3.84 Tc(MIN.) = 8.94
 LONGEST FLOWPATH FROM NODE 250.00 TO NODE 883.00 = 1578.00 FEET.

 FLOW PROCESS FROM NODE 883.00 TO NODE 883.00 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.) = 8.94
 RAINFALL INTENSITY(INCH/HR) = 3.98
 TOTAL STREAM AREA(ACRES) = 0.34
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.77

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	16.32	33.90	1.687	16.13
2	1.77	8.94	3.983	0.34

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	6.07	8.94	3.983
2	17.07	33.90	1.687

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 17.07 Tc(MIN.) = 33.90
TOTAL AREA(ACRES) = 16.5
LONGEST FLOWPATH FROM NODE 881.00 TO NODE 883.00 = 8549.00 FEET.

FLOW PROCESS FROM NODE 884.00 TO NODE 883.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.687
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6054
SUBAREA AREA(ACRES) = 2.55 SUBAREA RUNOFF(CFS) = 2.58
TOTAL AREA(ACRES) = 19.0 TOTAL RUNOFF(CFS) = 19.42
TC(MIN.) = 33.90

FLOW PROCESS FROM NODE 883.00 TO NODE 885.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 495.00 DOWNSTREAM(FEET) = 462.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 668.00 CHANNEL SLOPE = 0.0494
CHANNEL BASE(FEET) = 3.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 3.00
CHANNEL FLOW THRU SUBAREA(CFS) = 19.42
FLOW VELOCITY(FEET/SEC.) = 10.46 FLOW DEPTH(FEET) = 0.43
TRAVEL TIME(MIN.) = 1.06 Tc(MIN.) = 34.96
LONGEST FLOWPATH FROM NODE 881.00 TO NODE 885.00 = 9217.00 FEET.

FLOW PROCESS FROM NODE 892.00 TO NODE 885.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.653
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6047
SUBAREA AREA(ACRES) = 2.87 SUBAREA RUNOFF(CFS) = 2.85
TOTAL AREA(ACRES) = 21.9 TOTAL RUNOFF(CFS) = 21.88
TC(MIN.) = 34.96

FLOW PROCESS FROM NODE 885.00 TO NODE 885.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.653
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6045
SUBAREA AREA(ACRES) = 0.60 SUBAREA RUNOFF(CFS) = 0.60
TOTAL AREA(ACRES) = 22.5 TOTAL RUNOFF(CFS) = 22.48
TC(MIN.) = 34.96

FLOW PROCESS FROM NODE 885.00 TO NODE 893.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 462.00 DOWNSTREAM(FEET) = 456.32
CHANNEL LENGTH THRU SUBAREA(FEET) = 270.00 CHANNEL SLOPE = 0.0210
CHANNEL BASE(FEET) = 3.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 3.00
CHANNEL FLOW THRU SUBAREA(CFS) = 22.48
FLOW VELOCITY(FEET/SEC.) = 8.50 FLOW DEPTH(FEET) = 0.62

TRAVEL TIME(MIN.) = 0.53 Tc(MIN.) = 35.49
LONGEST FLOWPATH FROM NODE 881.00 TO NODE 893.00 = 9487.00 FEET.

FLOW PROCESS FROM NODE 893.00 TO NODE 893.00 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.) = 35.49
RAINFALL INTENSITY(INCH/HR) = 1.64
TOTAL STREAM AREA(ACRES) = 22.49
PEAK FLOW RATE(CFS) AT CONFLUENCE = 22.48

FLOW PROCESS FROM NODE 400.00 TO NODE 402.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
INITIAL SUBAREA FLOW-LENGTH(FEET) = 75.00
UPSTREAM ELEVATION(FEET) = 577.00
DOWNSTREAM ELEVATION(FEET) = 575.00
ELEVATION DIFFERENCE(FEET) = 2.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.621
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.375
SUBAREA RUNOFF(CFS) = 0.64
TOTAL AREA(ACRES) = 0.20 TOTAL RUNOFF(CFS) = 0.64

FLOW PROCESS FROM NODE 402.00 TO NODE 893.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 575.00 DOWNSTREAM(FEET) = 456.32
CHANNEL LENGTH THRU SUBAREA(FEET) = 1320.00 CHANNEL SLOPE = 0.0899
CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
MANNING' S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
CHANNEL FLOW THRU SUBAREA(CFS) = 0.64
FLOW VELOCITY(FEET/SEC.) = 4.60 FLOW DEPTH(FEET) = 0.07
TRAVEL TIME(MIN.) = 4.78 Tc(MIN.) = 10.41
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 893.00 = 1395.00 FEET.

FLOW PROCESS FROM NODE 402.00 TO NODE 893.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.613
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
SUBAREA AREA(ACRES) = 6.19 SUBAREA RUNOFF(CFS) = 13.42
TOTAL AREA(ACRES) = 6.4 TOTAL RUNOFF(CFS) = 13.85
TC(MIN.) = 10.41

FLOW PROCESS FROM NODE 893.00 TO NODE 893.00 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.) = 10.41
RAINFALL INTENSITY(INCH/HR) = 3.61
TOTAL STREAM AREA(ACRES) = 6.39
PEAK FLOW RATE(CFS) AT CONFLUENCE = 13.85

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	22.48	35.49	1.637	22.49
2	13.85	10.41	3.613	6.39

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	24.04	10.41	3.613
2	28.76	35.49	1.637

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 28.76 Tc(MIN.) = 35.49
TOTAL AREA(ACRES) = 28.9
LONGEST FLOWPATH FROM NODE 881.00 TO NODE 893.00 = 9487.00 FEET.

FLOW PROCESS FROM NODE 200.00 TO NODE 202.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

*USER SPECIFIED(SUBAREA):
DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7800
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 490.00
DOWNSTREAM ELEVATION(FEET) = 475.00
ELEVATION DIFFERENCE(FEET) = 15.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.674
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.796
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.18
TOTAL AREA(ACRES) = 0.04 TOTAL RUNOFF(CFS) = 0.18

FLOW PROCESS FROM NODE 202.00 TO NODE 204.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 465.00 DOWNSTREAM(FEET) = 453.00
FLOW LENGTH(FEET) = 720.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 1.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.60
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.18
PIPE TRAVEL TIME(MIN.) = 4.62 Tc(MIN.) = 7.30
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 204.00 = 820.00 FEET.

FLOW PROCESS FROM NODE 202.00 TO NODE 204.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.542
*USER SPECIFIED(SUBAREA):
DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7800
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
SUBAREA AREA(ACRES) = 2.81 SUBAREA RUNOFF(CFS) = 9.96
TOTAL AREA(ACRES) = 2.8 TOTAL RUNOFF(CFS) = 10.10
Tc(MIN.) = 7.30

FLOW PROCESS FROM NODE 204.00 TO NODE 164.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 453.00 DOWNSTREAM(FEET) = 441.86
 FLOW LENGTH(FEET) = 146.08 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.37
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 10.10
 PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 7.47
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 164.00 = 966.08 FEET.

FLOW PROCESS FROM NODE 164.00 TO NODE 164.00 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.) = 7.47
 RAINFALL INTENSITY(INCH/HR) = 4.48
 TOTAL STREAM AREA(ACRES) = 2.85
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.10

FLOW PROCESS FROM NODE 164.00 TO NODE 164.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<<

USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) = 12.00 RAIN INTENSITY(INCH/HOUR) = 3.30
 TOTAL AREA(ACRES) = 89.63 TOTAL RUNOFF(CFS) = 213.80

FLOW PROCESS FROM NODE 164.00 TO NODE 164.00 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.) = 12.00
 RAINFALL INTENSITY(INCH/HR) = 3.30
 TOTAL STREAM AREA(ACRES) = 89.63
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 213.80

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	10.10	7.47	4.475	2.85
2	213.80	12.00	3.296	89.63

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	143.14	7.47	4.475
2	221.24	12.00	3.296

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 221.24 Tc(MIN.) = 12.00
 TOTAL AREA(ACRES) = 92.5
 LONGEST FLOWPATH FROM NODE 400.00 TO NODE 164.00 = 1395.00 FEET.

=====

END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 92.5 TC(MIN.) = 12.00
 PEAK FLOW RATE(CFS) = 221.24

=====

Preliminary Drainage Study for
OTAY RANCH VILLAGE R-3, R-4, & R-8

CHAPTER 3.5

ULTIMATE CONDITION

100-YEAR

AES PR INPUT DATA

Node #		Code	Elevation		Length	Slope	Area		C value	If Channel			If memory Bank #
From	To		Up	Down			total	Land Use		Base (ft)	Z:1	maning	
100	102	2	474.6	473.8	65	1.23%	0.08	Multi Family	0.78				
102	104	3	461.5	449.65	1150	1.03%							
102	104	8					7.72	Multi Family	0.78				
104	106	3	449.65	406	1120	3.90%							
106	106	1											1-2
322	324	2	474	440	100	34.00%	0.22	Vegetated Slope	0.60				
324	106	5	440	416	455	5.27%				2	2	0.015	
324	106	8					0.93	Vegetated Slope	0.60				
106	106	1											2-2
106	816	3	406	390	130	12.31%	3.33	Basin (Hilly)	0.55				
816	850	8											
816	850	10											1
308	310	2	476	474	75	2.67%	0.08	Vegetated Slope	0.60				
310	312	5	474	461.8	1090	1.12%				2	2	0.015	
310	312	8					2.77	Vegetated Slope	0.60				
312	792	3	461.8	461.2	15	4.00%							
792	792	10											2
314	316	2	462	458	95	4.21%	0.04	Vegetated Slope	0.60				
316	803	5	458	443	440	3.41%				2	2	0.015	
316	803	8					0.42	Vegetated Slope	0.60				
803	793	3	436.81	433.7	38.96	7.98%							
793	793	10											3
791	792	2	463	462.35	60	1.08%	0.32	Commercial	0.90				
792	792	11											2
792	792	12											2
792	793	6	461	442	557	3.29%	1.15	Commercial	9.00				
793	793	11											3
793	793	12											3
793	784	3	433.2	432.4	64.25	1.25%							
784	784	11											2
784	784	12											2
784	784	10											2
			EVENT	Q (CFS)	A (AC)	TC (MIN)	EVENT	Q (CFS)	A (AC)	TC (MIN)			
788	788	7	100-YR	3.96	1.17	7.2	50-YR	3.46	1.17	7.27			
788	783	3	438.03	435.26	23.75	11.66%							
783	783	1											1-2
			EVENT	Q (CFS)	A (AC)	TC (MIN)	EVENT	Q (CFS)	A (AC)	TC (MIN)			
783	783	7	100-YR	7.96	1.78	6.25	50-YR	6.93	1.78	6.35			
783	783	1											2-2
783	784	3	434.93	432.9	36.25	5.60%							
784	784	11											2
784	784	12											2
784	804	3	432.4	398.05	723.1	4.75%							
804	804	1											1-3
			EVENT	Q (CFS)	A (AC)	TC (MIN)	EVENT	Q (CFS)	A (AC)	TC (MIN)			
932	932	7	100-YR	6.45	1.56	5.27	50-YR	5.64	1.56	5.34			
932	804	3	399.19	398.55	64	1.00%							
804	804	1											2-3
318	320	2	470	440	100	30.00%	0.13	Vegetated Slope	0.60				
320	808	5	440	409.1	590	5.24%				2	2	0.015	
320	808	8					1.28	Vegetated Slope	0.60				
808	804	3	399.67	398.55	101	1.11%							
804	804	1											3-3
804	756	3	398.05	393.15	309.38	1.58%							
756	756	1											1-2
			EVENT	Q (CFS)	A (AC)	TC (MIN)	EVENT	Q (CFS)	A (AC)	TC (MIN)			
769	769	7	100-YR	19.01	4.06	6.44	50-YR	16.54	4.06	6.56			
769	756	3	394.26	393.65	61	1.00%							
756	756	1											2-2
756	755	3	392.65	392.3	69.54	0.50%							
755	755	1											1-3
			EVENT	Q (CFS)	A (AC)	TC (MIN)	EVENT	Q (CFS)	A (AC)	TC (MIN)			
746	746	7	100-YR	192.31	73.73	12.23	50-YR	168.9	73.73	12.48			
746	755	3	393.68	391.3	183.06	1.30%							
755	755	1											2-3
			EVENT	Q (CFS)	A (AC)	TC (MIN)	EVENT	Q (CFS)	A (AC)	TC (MIN)			

763	763	7	100-YR	19.91	4.12	6.26	50-YR	17.26	4.12	6.41					
763	755	3	393.25	391.98	25.5	4.98%									
755	755	1													3-3
755	850	3	390.8	390	96.43	0.83%									
850	850	10													2
			EVENT	Q (CFS)	A (AC)	TC (MIN)	EVENT	Q (CFS)	A (AC)	TC (MIN)					
824	835	7	100-YR	73.47	29.23	8.59	50-YR	65.09	29.23	8.63					
835	835	1													1-2
300	302	2	578	576	75	2.67%	0.10	Vegetated Slope	0.60						
302	304	5	576	425	1400	10.79%					2	2	0.015		
302	304	8					4.65	Vegetated Slope	0.60						
306	304	8					0.32	Vegetated Slope	0.60						
304	835	5	425	420	80	6.25%					2	2	0.015		
835	835	1													2-2
835	836	3	419	414.99	71.76	5.59%									
836	743.5	5	414.99	390	300	8.33%					15	2	0.019		
743.5	743.5	1													1-2
			EVENT	Q (CFS)	A (AC)	TC (MIN)	EVENT	Q (CFS)	A (AC)	TC (MIN)					
743.5	743.5	7	100-YR	43.88	13.55	10.48	50-YR	38.29	13.55	10.62					
743.5	743.5	1													2-2
743.5	850	11													2
743.5	850	12													2
850	850	11													1
850	850	12													1
Summary of areas to existing Basin															
								Total Area	152.74						
881	882	2	576	571	100	5.00%	1.02	Vegetated Slope	0.60						
882	883	3	571	495	8449	0.90%									
882	883	8					15.11	Vegetated Slope	0.60						
883	883	1													1-2
250	252	2	561	560.35	60	1.08%	0.06	Road	0.90						
252	254	6	560.35	540	520	3.91%	0.28	Road	0.90						
254	256	3	535	525	50	20.00%									
256	883	5	525	495	948	3.16%					3	2	0.015		
883	883	1													2-2
884	883	8					2.55	Vegetated Slope	0.60						
883	885	5	495	462	668	4.94%					3	2	0.015		
892	885	8					2.87	Vegetated Slope	0.60						
885	885	8					0.60	Vegetated Slope	0.60						
885	893	5	462	456.32	270	2.10%					3	2	0.015		
893	893	1													1-2
400	402	2	577	575	75	2.67%	0.20	Vegetated Slope	0.60						
402	893	5	575	456.32	1320	8.99%					2	2	0.015		
402	893	8					6.19	Vegetated Slope	0.60						
893	893	1													2-2
Summary of areas to existing 893 Node (Existing Headwall)															
								Total Area	28.88						
200	202	2	490	475	100	15.00%	0.04	Multi Family	0.78						
202	204	3	465	453	720	1.67%									
202	204	8					2.81	Multi Family	0.78						
204	164	3	453	441.86	146.08	7.63%									
164	164	1													1-2
			EVENT	Q (CFS)	A (AC)	TC (MIN)	EVENT	Q (CFS)	A (AC)	TC (MIN)					
164	164	7	100-YR	265.69	89.63	12	50-YR	213.8	89.63	12					
164	164	1													2-2
Summary of areas to existing 164 Node (Existing Cleanout)															
								Total Area	92.48						
For Mass graded condition analysis, Nodes 100 to 104 and 200 to 204 were modeled with a 0.35 runoff coefficient															

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:

Hunsaker & Associates San Diego, Inc.
9707 Waples Street
San Diego, CA 92121

***** DESCRIPTION OF STUDY *****

- * OTAY RANCH VILLAGE 7, R-8 & R-4
* 100-Year Developed Condition
* DLN: 1601, W.O. 9999-3336

FILE NAME: R:\1601\HYD\DR\TM\CALCS\AES\100PR.DAT
TIME/DATE OF STUDY: 15:02 07/25/2024

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 2.500
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
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

Table with columns: NO., HALF-WIDTH (FT), CROWN TO CROSSFALL (FT), STREET-CROSSFALL: IN-/OUT-/PARK-SIDE / SIDE/ WAY, CURB HEIGHT (FT), GUTTER GEOMETRIES: WIDTH (FT), LIP (FT), HIKE (FT), MANNING FACTOR (n). Rows 1-8.

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.50 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):
DENSE RESIDENTIAL (R2, R3) RUNOFF COEFFICIENT = .7800
INITIAL SUBAREA FLOW-LENGTH(FEET) = 65.00
UPSTREAM ELEVATION(FEET) = 474.60
DOWNSTREAM ELEVATION(FEET) = 473.80
ELEVATION DIFFERENCE(FEET) = 0.80
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.333
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.587
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.41

TOTAL AREA(ACRES) = 0.08 TOTAL RUNOFF(CFS) = 0.41

FLOW PROCESS FROM NODE 102.00 TO NODE 104.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 461.50 DOWNSTREAM(FEET) = 449.65
FLOW LENGTH(FEET) = 1150.00 MANNING'S N = 0.012
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 2.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.98
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.41
PIPE TRAVEL TIME(MIN.) = 6.42 Tc(MIN.) = 10.75
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 104.00 = 1215.00 FEET.

FLOW PROCESS FROM NODE 102.00 TO NODE 104.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.019
*USER SPECIFIED(SUBAREA):
DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7800
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
SUBAREA AREA(ACRES) = 7.72 SUBAREA RUNOFF(CFS) = 24.20
TOTAL AREA(ACRES) = 7.8 TOTAL RUNOFF(CFS) = 24.45
TC(MIN.) = 10.75

FLOW PROCESS FROM NODE 104.00 TO NODE 106.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 449.65 DOWNSTREAM(FEET) = 406.00
FLOW LENGTH(FEET) = 1120.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.71
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 24.45
PIPE TRAVEL TIME(MIN.) = 1.27 Tc(MIN.) = 12.02
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 106.00 = 2335.00 FEET.

FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 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.) = 12.02
RAINFALL INTENSITY(INCH/HR) = 3.74
TOTAL STREAM AREA(ACRES) = 7.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 24.45

FLOW PROCESS FROM NODE 322.00 TO NODE 324.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 474.00
DOWNSTREAM ELEVATION(FEET) = 440.00
ELEVATION DIFFERENCE(FEET) = 34.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.178
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.587
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.87
TOTAL AREA(ACRES) = 0.22 TOTAL RUNOFF(CFS) = 0.87

FLOW PROCESS FROM NODE 324.00 TO NODE 106.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 440.00 DOWNSTREAM(FEET) = 416.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 455.00 CHANNEL SLOPE = 0.0527
CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
CHANNEL FLOW THRU SUBAREA(CFS) = 0.87
FLOW VELOCITY(FEET/SEC.) = 4.21 FLOW DEPTH(FEET) = 0.09
TRAVEL TIME(MIN.) = 1.80 Tc(MIN.) = 5.98
LONGEST FLOWPATH FROM NODE 322.00 TO NODE 106.00 = 555.00 FEET.

FLOW PROCESS FROM NODE 324.00 TO NODE 106.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.869
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
SUBAREA AREA(ACRES) = 0.93 SUBAREA RUNOFF(CFS) = 3.27
TOTAL AREA(ACRES) = 1.1 TOTAL RUNOFF(CFS) = 4.05
TC(MIN.) = 5.98

FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 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.) = 5.98
RAINFALL INTENSITY(INCH/HR) = 5.87
TOTAL STREAM AREA(ACRES) = 1.15
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.05

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	24.45	12.02	3.740	7.80
2	4.05	5.98	5.869	1.15

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	16.21	5.98	5.869
2	27.03	12.02	3.740

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 27.03 Tc(MIN.) = 12.02
TOTAL AREA(ACRES) = 8.9
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 106.00 = 2335.00 FEET.

FLOW PROCESS FROM NODE 106.00 TO NODE 816.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 406.00 DOWNSTREAM(FEET) = 390.00
FLOW LENGTH(FEET) = 130.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.84
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 27.03
PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 12.12
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 816.00 = 2465.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 816.00 TO NODE 850.00 IS CODE = 81
-----

```

```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

```

```

=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.720
VEGETATED SLOPES (HILLY) RUNOFF COEFFICIENT = .5500
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7008
SUBAREA AREA(ACRES) = 3.33 SUBAREA RUNOFF(CFS) = 6.81
TOTAL AREA(ACRES) = 12.3 TOTAL RUNOFF(CFS) = 32.02
TC(MIN.) = 12.12

```

```

*****
FLOW PROCESS FROM NODE 816.00 TO NODE 850.00 IS CODE = 10
-----

```

```

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
-----

```

```

*****
FLOW PROCESS FROM NODE 308.00 TO NODE 310.00 IS CODE = 21
-----

```

```

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
-----

```

```

VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
INITIAL SUBAREA FLOW-LENGTH(FEET) = 75.00
UPSTREAM ELEVATION(FEET) = 476.00
DOWNSTREAM ELEVATION(FEET) = 474.00
ELEVATION DIFFERENCE(FEET) = 2.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.621
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.108
SUBAREA RUNOFF(CFS) = 0.29
TOTAL AREA(ACRES) = 0.08 TOTAL RUNOFF(CFS) = 0.29

```

```

*****
FLOW PROCESS FROM NODE 310.00 TO NODE 312.00 IS CODE = 51
-----

```

```

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
-----

```

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 474.00 DOWNSTREAM(FEET) = 461.80
CHANNEL LENGTH THRU SUBAREA(FEET) = 1090.00 CHANNEL SLOPE = 0.0112
CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
CHANNEL FLOW THRU SUBAREA(CFS) = 0.29
FLOW VELOCITY(FEET/SEC.) = 1.72 FLOW DEPTH(FEET) = 0.08
TRAVEL TIME(MIN.) = 10.59 Tc(MIN.) = 16.21
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 312.00 = 1165.00 FEET.

```

```

*****
FLOW PROCESS FROM NODE 310.00 TO NODE 312.00 IS CODE = 81
-----

```

```

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
-----

```

```

=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.085
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
SUBAREA AREA(ACRES) = 2.77 SUBAREA RUNOFF(CFS) = 5.13
TOTAL AREA(ACRES) = 2.8 TOTAL RUNOFF(CFS) = 5.28

```

TC(MIN.) = 16.21

FLOW PROCESS FROM NODE 312.00 TO NODE 792.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 461.80 DOWNSTREAM(FEET) = 461.20
 FLOW LENGTH(FEET) = 15.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.52
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 5.28
 PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 16.23
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 792.00 = 1180.00 FEET.

FLOW PROCESS FROM NODE 792.00 TO NODE 792.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<

FLOW PROCESS FROM NODE 314.00 TO NODE 316.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "D"
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 95.00
 UPSTREAM ELEVATION(FEET) = 462.00
 DOWNSTREAM ELEVATION(FEET) = 458.00
 ELEVATION DIFFERENCE(FEET) = 4.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.433
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.244
 SUBAREA RUNOFF(CFS) = 0.15
 TOTAL AREA(ACRES) = 0.04 TOTAL RUNOFF(CFS) = 0.15

FLOW PROCESS FROM NODE 316.00 TO NODE 803.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 458.00 DOWNSTREAM(FEET) = 443.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 440.00 CHANNEL SLOPE = 0.0341
 CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
 CHANNEL FLOW THRU SUBAREA(CFS) = 0.15
 FLOW VELOCITY(FEET/SEC.) = 2.05 FLOW DEPTH(FEET) = 0.04
 TRAVEL TIME(MIN.) = 3.58 Tc(MIN.) = 9.01
 LONGEST FLOWPATH FROM NODE 314.00 TO NODE 803.00 = 535.00 FEET.

FLOW PROCESS FROM NODE 316.00 TO NODE 803.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.506
 VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "D"
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
 SUBAREA AREA(ACRES) = 0.42 SUBAREA RUNOFF(CFS) = 1.14
 TOTAL AREA(ACRES) = 0.5 TOTAL RUNOFF(CFS) = 1.24
 TC(MIN.) = 9.01

FLOW PROCESS FROM NODE 803.00 TO NODE 793.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 436.81 DOWNSTREAM(FEET) = 433.70
FLOW LENGTH(FEET) = 38.96 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 2.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.00
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.24
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 9.09
LONGEST FLOWPATH FROM NODE 314.00 TO NODE 793.00 = 573.96 FEET.

FLOW PROCESS FROM NODE 793.00 TO NODE 793.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<<

FLOW PROCESS FROM NODE 791.00 TO NODE 792.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<

COMMERCIAL AREA RUNOFF COEFFICIENT = .8500
SOIL CLASSIFICATION IS "D"
INITIAL SUBAREA FLOW-LENGTH(FEET) = 60.00
UPSTREAM ELEVATION(FEET) = 463.00
DOWNSTREAM ELEVATION(FEET) = 462.35
ELEVATION DIFFERENCE(FEET) = 0.65
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.394
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.587
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 1.79
TOTAL AREA(ACRES) = 0.32 TOTAL RUNOFF(CFS) = 1.79

FLOW PROCESS FROM NODE 792.00 TO NODE 792.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 1.79 3.39 6.587 0.32
LONGEST FLOWPATH FROM NODE 791.00 TO NODE 792.00 = 60.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 5.28 16.23 3.082 2.85
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 792.00 = 1180.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 2.89 3.39 6.587
2 6.11 16.23 3.082

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 6.11 Tc(MIN.) = 16.23
TOTAL AREA(ACRES) = 3.2

FLOW PROCESS FROM NODE 792.00 TO NODE 792.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<<<

FLOW PROCESS FROM NODE 792.00 TO NODE 793.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 461.00 DOWNSTREAM ELEVATION(FEET) = 442.00
STREET LENGTH(FEET) = 557.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 42.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 7.51
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.37
HALFSTREET FLOOD WIDTH(FEET) = 12.27
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.63
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.72
STREET FLOW TRAVEL TIME(MIN.) = 2.01 Tc(MIN.) = 18.24
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.859
COMMERCIAL AREA RUNOFF COEFFICIENT = .8500
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.685
SUBAREA AREA(ACRES) = 1.15 SUBAREA RUNOFF(CFS) = 2.79
TOTAL AREA(ACRES) = 4.3 PEAK FLOW RATE(CFS) = 8.46

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.38 HALFSTREET FLOOD WIDTH(FEET) = 12.83
FLOW VELOCITY(FEET/SEC.) = 4.79 DEPTH*VELOCITY(FT*FT/SEC.) = 1.84
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 793.00 = 1737.00 FEET.

FLOW PROCESS FROM NODE 793.00 TO NODE 793.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 8.46 18.24 2.859 4.32
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 793.00 = 1737.00 FEET.

** MEMORY BANK # 3 CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 1.24 9.09 4.480 0.46
LONGEST FLOWPATH FROM NODE 314.00 TO NODE 793.00 = 573.96 FEET.

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 5.46 9.09 4.480
2 9.25 18.24 2.859

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 9.25 Tc(MIN.) = 18.24
TOTAL AREA(ACRES) = 4.8

FLOW PROCESS FROM NODE 793.00 TO NODE 793.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 3 <<<<<

FLOW PROCESS FROM NODE 793.00 TO NODE 784.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 433.20 DOWNSTREAM(FEET) = 432.40
FLOW LENGTH(FEET) = 64.25 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.04
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.25
PIPE TRAVEL TIME(MIN.) = 0.15 Tc(MIN.) = 18.39
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 784.00 = 1801.25 FEET.

FLOW PROCESS FROM NODE 784.00 TO NODE 784.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<

FLOW PROCESS FROM NODE 788.00 TO NODE 788.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

USER-SPECIFIED VALUES ARE AS FOLLOWS:
TC(MIN) = 7.20 RAIN INTENSITY(INCH/HOUR) = 5.21
TOTAL AREA(ACRES) = 1.17 TOTAL RUNOFF(CFS) = 3.96

FLOW PROCESS FROM NODE 788.00 TO NODE 783.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 438.03 DOWNSTREAM(FEET) = 435.26
FLOW LENGTH(FEET) = 23.75 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.87
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.96
PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 7.23
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 783.00 = 1825.00 FEET.

FLOW PROCESS FROM NODE 783.00 TO NODE 783.00 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.) = 7.23
RAINFALL INTENSITY(INCH/HR) = 5.19
TOTAL STREAM AREA(ACRES) = 1.17
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.96

FLOW PROCESS FROM NODE 783.00 TO NODE 783.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

USER-SPECIFIED VALUES ARE AS FOLLOWS:
TC(MIN) = 6.25 RAIN INTENSITY(INCH/HOUR) = 5.70
TOTAL AREA(ACRES) = 1.78 TOTAL RUNOFF(CFS) = 7.96

FLOW PROCESS FROM NODE 783.00 TO NODE 783.00 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.) = 6.25
RAINFALL INTENSITY(INCH/HR) = 5.70
TOTAL STREAM AREA(ACRES) = 1.78
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.96
```

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	3.96	7.23	5.192	1.17
2	7.96	6.25	5.704	1.78

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	11.38	6.25	5.704
2	11.21	7.23	5.192

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```
PEAK FLOW RATE(CFS) = 11.38 Tc(MIN.) = 6.25
TOTAL AREA(ACRES) = 2.9
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 783.00 = 1825.00 FEET.
```

```
FLOW PROCESS FROM NODE 783.00 TO NODE 784.00 IS CODE = 31
```

```
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<
```

```
=====
ELEVATION DATA: UPSTREAM(FEET) = 434.93 DOWNSTREAM(FEET) = 432.90
FLOW LENGTH(FEET) = 36.25 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.) = 13.23
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.38
PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 6.30
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 784.00 = 1861.25 FEET.
```

```
FLOW PROCESS FROM NODE 784.00 TO NODE 784.00 IS CODE = 11
```

```
-----
>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
```

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	11.38	6.30	5.677	2.95

LONGEST FLOWPATH FROM NODE 308.00 TO NODE 784.00 = 1861.25 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	9.25	18.39	2.843	4.78

LONGEST FLOWPATH FROM NODE 308.00 TO NODE 784.00 = 1801.25 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	14.55	6.30	5.677
2	14.95	18.39	2.843

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```
PEAK FLOW RATE(CFS) = 14.95 Tc(MIN.) = 18.39
```


TOTAL AREA(ACRES) = 7.7

FLOW PROCESS FROM NODE 784.00 TO NODE 784.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<<

FLOW PROCESS FROM NODE 784.00 TO NODE 804.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 432.40 DOWNSTREAM(FEET) = 398.05
 FLOW LENGTH(FEET) = 723.10 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.25
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 14.95
 PIPE TRAVEL TIME(MIN.) = 0.91 Tc(MIN.) = 19.30
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 804.00 = 2584.35 FEET.

FLOW PROCESS FROM NODE 804.00 TO NODE 804.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 19.30
 RAINFALL INTENSITY(INCH/HR) = 2.76
 TOTAL STREAM AREA(ACRES) = 7.73
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 14.95

FLOW PROCESS FROM NODE 932.00 TO NODE 932.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) = 5.27 RAIN INTENSITY(INCH/HOUR) = 6.37
 TOTAL AREA(ACRES) = 1.56 TOTAL RUNOFF(CFS) = 6.45

FLOW PROCESS FROM NODE 932.00 TO NODE 804.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 399.19 DOWNSTREAM(FEET) = 398.55
 FLOW LENGTH(FEET) = 64.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.00
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 6.45
 PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 5.45
 LONGEST FLOWPATH FROM NODE 322.00 TO NODE 804.00 = 619.00 FEET.

FLOW PROCESS FROM NODE 804.00 TO NODE 804.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.45
 RAINFALL INTENSITY(INCH/HR) = 6.23
 TOTAL STREAM AREA(ACRES) = 1.56
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.45

FLOW PROCESS FROM NODE 318.00 TO NODE 320.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

```

=====
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 470.00
DOWNSTREAM ELEVATION(FEET) = 440.00
ELEVATION DIFFERENCE(FEET) = 30.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.178
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.587
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.51
TOTAL AREA(ACRES) = 0.13 TOTAL RUNOFF(CFS) = 0.51

```

FLOW PROCESS FROM NODE 320.00 TO NODE 808.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 440.00 DOWNSTREAM(FEET) = 409.10
CHANNEL LENGTH THRU SUBAREA(FEET) = 590.00 CHANNEL SLOPE = 0.0524
CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
CHANNEL FLOW THRU SUBAREA(CFS) = 0.51
FLOW VELOCITY(FEET/SEC.) = 3.66 FLOW DEPTH(FEET) = 0.07
TRAVEL TIME(MIN.) = 2.68 Tc(MIN.) = 6.86
LONGEST FLOWPATH FROM NODE 318.00 TO NODE 808.00 = 690.00 FEET.

```

FLOW PROCESS FROM NODE 320.00 TO NODE 808.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

```

=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.370
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
SUBAREA AREA(ACRES) = 1.28 SUBAREA RUNOFF(CFS) = 4.12
TOTAL AREA(ACRES) = 1.4 TOTAL RUNOFF(CFS) = 4.54
Tc(MIN.) = 6.86

```

FLOW PROCESS FROM NODE 808.00 TO NODE 804.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 399.67 DOWNSTREAM(FEET) = 398.55
FLOW LENGTH(FEET) = 101.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.73
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.54
PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 7.16
LONGEST FLOWPATH FROM NODE 318.00 TO NODE 804.00 = 791.00 FEET.

```

FLOW PROCESS FROM NODE 804.00 TO NODE 804.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

```

=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 7.16

```

RAINFALL INTENSITY(INCH/HR) = 5.23
 TOTAL STREAM AREA(ACRES) = 1.41
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.54

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	14.95	19.30	2.756	7.73
2	6.45	5.45	6.232	1.56
3	4.54	7.16	5.227	1.41

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	14.13	5.45	6.232
2	15.50	7.16	5.227
3	20.20	19.30	2.756

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 20.20 Tc(MIN.) = 19.30
 TOTAL AREA(ACRES) = 10.7
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 804.00 = 2584.35 FEET.

FLOW PROCESS FROM NODE 804.00 TO NODE 756.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 398.05 DOWNSTREAM(FEET) = 393.15
 FLOW LENGTH(FEET) = 309.38 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.43
 ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 20.20
 PIPE TRAVEL TIME(MIN.) = 0.55 Tc(MIN.) = 19.85
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 756.00 = 2893.73 FEET.

FLOW PROCESS FROM NODE 756.00 TO NODE 756.00 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.) = 19.85
 RAINFALL INTENSITY(INCH/HR) = 2.71
 TOTAL STREAM AREA(ACRES) = 10.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 20.20

FLOW PROCESS FROM NODE 769.00 TO NODE 769.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<<

=====

USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) = 6.44 RAIN INTENSITY(INCH/HOUR) = 5.59
 TOTAL AREA(ACRES) = 4.06 TOTAL RUNOFF(CFS) = 19.01

FLOW PROCESS FROM NODE 769.00 TO NODE 756.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 394.26 DOWNSTREAM(FEET) = 393.65
 FLOW LENGTH(FEET) = 61.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.6 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 7.71
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.01
PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 6.57
LONGEST FLOWPATH FROM NODE 322.00 TO NODE 756.00 = 680.00 FEET.

FLOW PROCESS FROM NODE 756.00 TO NODE 756.00 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.) = 6.57
RAINFALL INTENSITY(INCH/HR) = 5.52
TOTAL STREAM AREA(ACRES) = 4.06
PEAK FLOW RATE(CFS) AT CONFLUENCE = 19.01

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	20.20	19.85	2.707	10.70
2	19.01	6.57	5.522	4.06

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	28.91	6.57	5.522
2	29.52	19.85	2.707

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 29.52 Tc(MIN.) = 19.85
TOTAL AREA(ACRES) = 14.8
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 756.00 = 2893.73 FEET.

FLOW PROCESS FROM NODE 756.00 TO NODE 755.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 392.62 DOWNSTREAM(FEET) = 392.30
FLOW LENGTH(FEET) = 69.54 MANNING'S N = 0.013
DEPTH OF FLOW IN 33.0 INCH PIPE IS 23.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.45
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 29.52
PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 20.03
LONGEST FLOWPATH FROM NODE 308.00 TO NODE 755.00 = 2963.27 FEET.

FLOW PROCESS FROM NODE 755.00 TO NODE 755.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 20.03
RAINFALL INTENSITY(INCH/HR) = 2.69
TOTAL STREAM AREA(ACRES) = 14.76
PEAK FLOW RATE(CFS) AT CONFLUENCE = 29.52

FLOW PROCESS FROM NODE 746.00 TO NODE 746.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

=====

USER-SPECIFIED VALUES ARE AS FOLLOWS:

TC(MIN) = 12.23 RAIN INTENSITY(INCH/HOUR) = 3.70
TOTAL AREA(ACRES) = 73.73 TOTAL RUNOFF(CFS) = 192.31

FLOW PROCESS FROM NODE 746.00 TO NODE 755.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 393.68 DOWNSTREAM(FEET) = 391.30
FLOW LENGTH(FEET) = 183.06 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 40.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.14
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 192.31
PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 12.43
LONGEST FLOWPATH FROM NODE 322.00 TO NODE 755.00 = 863.06 FEET.

FLOW PROCESS FROM NODE 755.00 TO NODE 755.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 12.43
RAINFALL INTENSITY(INCH/HR) = 3.66
TOTAL STREAM AREA(ACRES) = 73.73
PEAK FLOW RATE(CFS) AT CONFLUENCE = 192.31

FLOW PROCESS FROM NODE 763.00 TO NODE 763.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

USER-SPECIFIED VALUES ARE AS FOLLOWS:
TC(MIN) = 6.26 RAIN INTENSITY(INCH/HOUR) = 5.70
TOTAL AREA(ACRES) = 4.12 TOTAL RUNOFF(CFS) = 19.91

FLOW PROCESS FROM NODE 763.00 TO NODE 755.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 393.25 DOWNSTREAM(FEET) = 391.98
FLOW LENGTH(FEET) = 25.50 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.23
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.91
PIPE TRAVEL TIME(MIN.) = 0.03 Tc(MIN.) = 6.29
LONGEST FLOWPATH FROM NODE 318.00 TO NODE 755.00 = 816.50 FEET.

FLOW PROCESS FROM NODE 755.00 TO NODE 755.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 6.29
RAINFALL INTENSITY(INCH/HR) = 5.68
TOTAL STREAM AREA(ACRES) = 4.12
PEAK FLOW RATE(CFS) AT CONFLUENCE = 19.91

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
---------------	--------------	-----------	-----------------------	-------------

				100PR. OUT
1	29.52	20.03	2.691	14.76
2	192.31	12.43	3.661	73.73
3	19.91	6.29	5.681	4.12

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	131.20	6.29	5.681
2	226.84	12.43	3.661
3	180.34	20.03	2.691

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 226.84 Tc(MIN.) = 12.43
 TOTAL AREA(ACRES) = 92.6
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 755.00 = 2963.27 FEET.

 FLOW PROCESS FROM NODE 755.00 TO NODE 850.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 390.80 DOWNSTREAM(FEET) = 390.00
 FLOW LENGTH(FEET) = 96.43 MANNING'S N = 0.013
 DEPTH OF FLOW IN 63.0 INCH PIPE IS 46.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.37
 ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 226.84
 PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 12.55
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 850.00 = 3059.70 FEET.

 FLOW PROCESS FROM NODE 850.00 TO NODE 850.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<<

 FLOW PROCESS FROM NODE 824.00 TO NODE 835.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<<

=====

USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) = 8.59 RAIN INTENSITY(INCH/HOUR) = 4.65
 TOTAL AREA(ACRES) = 29.23 TOTAL RUNOFF(CFS) = 73.47

 FLOW PROCESS FROM NODE 835.00 TO NODE 835.00 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.) = 8.59
 RAINFALL INTENSITY(INCH/HR) = 4.65
 TOTAL STREAM AREA(ACRES) = 29.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 73.47

 FLOW PROCESS FROM NODE 300.00 TO NODE 302.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<

=====

VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "D"
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 75.00
 UPSTREAM ELEVATION(FEET) = 578.00
 DOWNSTREAM ELEVATION(FEET) = 576.00

ELEVATION DIFFERENCE(FEET) = 2.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.621
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.108
SUBAREA RUNOFF(CFS) = 0.37
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.37

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) = 576.00 DOWNSTREAM(FEET) = 425.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1400.00 CHANNEL SLOPE = 0.1079
CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
CHANNEL FLOW THRU SUBAREA(CFS) = 0.37
FLOW VELOCITY(FEET/SEC.) = 4.09 FLOW DEPTH(FEET) = 0.04
TRAVEL TIME(MIN.) = 5.70 Tc(MIN.) = 11.32
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 304.00 = 1475.00 FEET.

FLOW PROCESS FROM NODE 302.00 TO NODE 304.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.888
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
SUBAREA AREA(ACRES) = 4.65 SUBAREA RUNOFF(CFS) = 10.85
TOTAL AREA(ACRES) = 4.8 TOTAL RUNOFF(CFS) = 11.08
TC(MIN.) = 11.32

FLOW PROCESS FROM NODE 306.00 TO NODE 304.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.888
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
SUBAREA AREA(ACRES) = 0.32 SUBAREA RUNOFF(CFS) = 0.75
TOTAL AREA(ACRES) = 5.1 TOTAL RUNOFF(CFS) = 11.83
TC(MIN.) = 11.32

FLOW PROCESS FROM NODE 304.00 TO NODE 835.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 425.00 DOWNSTREAM(FEET) = 420.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 80.00 CHANNEL SLOPE = 0.0625
CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.150 MAXIMUM DEPTH(FEET) = 2.00
CHANNEL FLOW THRU SUBAREA(CFS) = 11.83
FLOW VELOCITY(FEET/SEC.) = 2.05 FLOW DEPTH(FEET) = 1.27
TRAVEL TIME(MIN.) = 0.65 Tc(MIN.) = 11.97
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 835.00 = 1555.00 FEET.

FLOW PROCESS FROM NODE 835.00 TO NODE 835.00 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.) = 11.97

RAINFALL INTENSITY(INCH/HR) = 3.75
 TOTAL STREAM AREA(ACRES) = 5.07
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 11.83

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	73.47	8.59	4.646	29.23
2	11.83	11.97	3.751	5.07

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	81.96	8.59	4.646
2	71.14	11.97	3.751

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 81.96 Tc(MIN.) = 8.59
 TOTAL AREA(ACRES) = 34.3
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 835.00 = 3059.70 FEET.

 FLOW PROCESS FROM NODE 835.00 TO NODE 836.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 419.00 DOWNSTREAM(FEET) = 414.99
 FLOW LENGTH(FEET) = 71.76 MANNING'S N = 0.013
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 21.18
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 81.96
 PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 8.65
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 836.00 = 3131.46 FEET.

 FLOW PROCESS FROM NODE 836.00 TO NODE 743.50 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 414.99 DOWNSTREAM(FEET) = 390.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 300.00 CHANNEL SLOPE = 0.0833
 CHANNEL BASE(FEET) = 15.00 "Z" FACTOR = 2.000
 MANNING'S FACTOR = 0.019 MAXIMUM DEPTH(FEET) = 2.00
 CHANNEL FLOW THRU SUBAREA(CFS) = 81.96
 FLOW VELOCITY(FEET/SEC.) = 12.19 FLOW DEPTH(FEET) = 0.42
 TRAVEL TIME(MIN.) = 0.41 Tc(MIN.) = 9.06
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 743.50 = 3431.46 FEET.

 FLOW PROCESS FROM NODE 743.50 TO NODE 743.50 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.) = 9.06
 RAINFALL INTENSITY(INCH/HR) = 4.49
 TOTAL STREAM AREA(ACRES) = 34.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 81.96

 FLOW PROCESS FROM NODE 743.50 TO NODE 743.50 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

USER-SPECIFIED VALUES ARE AS FOLLOWS:

TC(MIN) = 10.48 RAIN INTENSITY(INCH/HOUR) = 4.09
 TOTAL AREA(ACRES) = 13.55 TOTAL RUNOFF(CFS) = 43.88

FLOW PROCESS FROM NODE 743.50 TO NODE 743.50 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.) = 10.48
 RAINFALL INTENSITY(INCH/HR) = 4.09
 TOTAL STREAM AREA(ACRES) = 13.55
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 43.88

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	81.96	9.06	4.490	34.30
2	43.88	10.48	4.087	13.55

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	119.88	9.06	4.490
2	118.47	10.48	4.087

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 119.88 Tc(MIN.) = 9.06
 TOTAL AREA(ACRES) = 47.8
 LONGEST FLOWPATH FROM NODE 308.00 TO NODE 743.50 = 3431.46 FEET.

FLOW PROCESS FROM NODE 743.50 TO NODE 850.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	119.88	9.06	4.490	47.85

LONGEST FLOWPATH FROM NODE 308.00 TO NODE 850.00 = 3431.46 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	226.84	12.55	3.638	92.61

LONGEST FLOWPATH FROM NODE 308.00 TO NODE 850.00 = 3059.70 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	283.56	9.06	4.490
2	323.97	12.55	3.638

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 323.97 Tc(MIN.) = 12.55
 TOTAL AREA(ACRES) = 140.5

FLOW PROCESS FROM NODE 743.50 TO NODE 850.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<<

FLOW PROCESS FROM NODE 850.00 TO NODE 850.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	323.97	12.55	3.638	140.46

LONGEST FLOWPATH FROM NODE 308.00 TO NODE 850.00 = 3431.46 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	32.02	12.12	3.720	12.28

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 850.00 = 2465.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	344.91	12.12	3.720
2	355.27	12.55	3.638

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 355.27 Tc(MIN.) = 12.55
 TOTAL AREA(ACRES) = 152.7

FLOW PROCESS FROM NODE 850.00 TO NODE 850.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<<

```

+-----+
| AREA TRIBUTARY TO NODE 893                |
| EXISTING HEADWALL WEST @ INTERSECTION OF  |
| LA MEDIA ROAD AND SANTA LUNA STREET       |
+-----+
    
```

FLOW PROCESS FROM NODE 881.00 TO NODE 882.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "D"
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
 UPSTREAM ELEVATION(FEET) = 576.00
 DOWNSTREAM ELEVATION(FEET) = 571.00
 ELEVATION DIFFERENCE(FEET) = 5.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.264
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.372
 SUBAREA RUNOFF(CFS) = 3.90
 TOTAL AREA(ACRES) = 1.02 TOTAL RUNOFF(CFS) = 3.90

FLOW PROCESS FROM NODE 882.00 TO NODE 883.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 571.00 DOWNSTREAM(FEET) = 495.00
 FLOW LENGTH(FEET) = 8449.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.09
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.90
 PIPE TRAVEL TIME(MIN.) = 27.67 Tc(MIN.) = 32.93
 LONGEST FLOWPATH FROM NODE 881.00 TO NODE 883.00 = 8549.00 FEET.

```
*****
FLOW PROCESS FROM NODE      882.00 TO NODE      883.00 IS CODE =  81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.953
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
SUBAREA AREA(ACRES) =  15.11  SUBAREA RUNOFF(CFS) =  17.70
TOTAL AREA(ACRES) =  16.1  TOTAL RUNOFF(CFS) =  18.90
TC(MIN.) =  32.93
```

```
*****
FLOW PROCESS FROM NODE      883.00 TO NODE      883.00 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.) =  32.93
RAINFALL INTENSITY(INCH/HR) =  1.95
TOTAL STREAM AREA(ACRES) =  16.13
PEAK FLOW RATE(CFS) AT CONFLUENCE =  18.90
```

```
*****
FLOW PROCESS FROM NODE      250.00 TO NODE      252.00 IS CODE =  21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====
PAVED SURFACE RUNOFF COEFFICIENT = .9000
SOIL CLASSIFICATION IS "D"
INITIAL SUBAREA FLOW-LENGTH(FEET) =  60.00
UPSTREAM ELEVATION(FEET) =  561.00
DOWNSTREAM ELEVATION(FEET) =  560.35
ELEVATION DIFFERENCE(FEET) =  0.65
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =  2.715
100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.587
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =  0.36
TOTAL AREA(ACRES) =  0.06  TOTAL RUNOFF(CFS) =  0.36
```

```
*****
FLOW PROCESS FROM NODE      252.00 TO NODE      254.00 IS CODE =  62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STREET TABLE SECTION # 7 USED)<<<<<
=====
UPSTREAM ELEVATION(FEET) = 560.35  DOWNSTREAM ELEVATION(FEET) = 540.00
STREET LENGTH(FEET) = 520.00  CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 12.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  5.00
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(curbs-to-curbs) =  0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =  0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =  1.14
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) =  0.17
HALFSTREET FLOOD WIDTH(FEET) =  2.40
AVERAGE FLOW VELOCITY(FEET/SEC.) =  3.25
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =  0.57
STREET FLOW TRAVEL TIME(MIN.) =  2.66  Tc(MIN.) =  5.38
100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.284
PAVED SURFACE RUNOFF COEFFICIENT = .9000
```

SOIL CLASSIFICATION IS "D"

AREA-AVERAGE RUNOFF COEFFICIENT = 0.900
 SUBAREA AREA(ACRES) = 0.28 SUBAREA RUNOFF(CFS) = 1.58
 TOTAL AREA(ACRES) = 0.3 PEAK FLOW RATE(CFS) = 1.92

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.21 HALFSTREET FLOOD WIDTH(FEET) = 4.29
 FLOW VELOCITY(FEET/SEC.) = 3.18 DEPTH*VELOCITY(FT*FT/SEC.) = 0.67
 LONGEST FLOWPATH FROM NODE 250.00 TO NODE 254.00 = 580.00 FEET.

FLOW PROCESS FROM NODE 254.00 TO NODE 256.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 535.00 DOWNSTREAM(FEET) = 525.00
 FLOW LENGTH(FEET) = 50.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 2.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.57
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.92
 PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 5.44
 LONGEST FLOWPATH FROM NODE 250.00 TO NODE 256.00 = 630.00 FEET.

FLOW PROCESS FROM NODE 256.00 TO NODE 883.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 525.00 DOWNSTREAM(FEET) = 495.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 948.00 CHANNEL SLOPE = 0.0316
 CHANNEL BASE(FEET) = 3.00 "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 3.00
 CHANNEL FLOW THRU SUBAREA(CFS) = 1.92
 FLOW VELOCITY(FEET/SEC.) = 4.27 FLOW DEPTH(FEET) = 0.13
 TRAVEL TIME(MIN.) = 3.70 Tc(MIN.) = 9.15
 LONGEST FLOWPATH FROM NODE 250.00 TO NODE 883.00 = 1578.00 FEET.

FLOW PROCESS FROM NODE 883.00 TO NODE 883.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.15
 RAINFALL INTENSITY(INCH/HR) = 4.46
 TOTAL STREAM AREA(ACRES) = 0.34
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.92

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	18.90	32.93	1.953	16.13
2	1.92	9.15	4.462	0.34

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	7.17	9.15	4.462
2	19.74	32.93	1.953

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 19.74 Tc(MIN.) = 32.93

TOTAL AREA(ACRES) = 16.5
LONGEST FLOWPATH FROM NODE 881.00 TO NODE 883.00 = 8549.00 FEET.

FLOW PROCESS FROM NODE 884.00 TO NODE 883.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.953
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6054
SUBAREA AREA(ACRES) = 2.55 SUBAREA RUNOFF(CFS) = 2.99
TOTAL AREA(ACRES) = 19.0 TOTAL RUNOFF(CFS) = 22.48
TC(MIN.) = 32.93

FLOW PROCESS FROM NODE 883.00 TO NODE 885.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 495.00 DOWNSTREAM(FEET) = 462.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 668.00 CHANNEL SLOPE = 0.0494
CHANNEL BASE(FEET) = 3.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 3.00
CHANNEL FLOW THRU SUBAREA(CFS) = 22.48
FLOW VELOCITY(FEET/SEC.) = 10.84 FLOW DEPTH(FEET) = 0.47
TRAVEL TIME(MIN.) = 1.03 Tc(MIN.) = 33.96
LONGEST FLOWPATH FROM NODE 881.00 TO NODE 885.00 = 9217.00 FEET.

FLOW PROCESS FROM NODE 892.00 TO NODE 885.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.915
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6047
SUBAREA AREA(ACRES) = 2.87 SUBAREA RUNOFF(CFS) = 3.30
TOTAL AREA(ACRES) = 21.9 TOTAL RUNOFF(CFS) = 25.34
TC(MIN.) = 33.96

FLOW PROCESS FROM NODE 885.00 TO NODE 885.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.915
VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "D"
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6045
SUBAREA AREA(ACRES) = 0.60 SUBAREA RUNOFF(CFS) = 0.69
TOTAL AREA(ACRES) = 22.5 TOTAL RUNOFF(CFS) = 26.03
TC(MIN.) = 33.96

FLOW PROCESS FROM NODE 885.00 TO NODE 893.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 462.00 DOWNSTREAM(FEET) = 456.32
CHANNEL LENGTH THRU SUBAREA(FEET) = 270.00 CHANNEL SLOPE = 0.0210
CHANNEL BASE(FEET) = 3.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 3.00
CHANNEL FLOW THRU SUBAREA(CFS) = 26.03
FLOW VELOCITY(FEET/SEC.) = 8.88 FLOW DEPTH(FEET) = 0.67
TRAVEL TIME(MIN.) = 0.51 Tc(MIN.) = 34.46
LONGEST FLOWPATH FROM NODE 881.00 TO NODE 893.00 = 9487.00 FEET.

FLOW PROCESS FROM NODE 893.00 TO NODE 893.00 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.) = 34.46
 RAINFALL INTENSITY(INCH/HR) = 1.90
 TOTAL STREAM AREA(ACRES) = 22.49
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 26.03

FLOW PROCESS FROM NODE 400.00 TO NODE 402.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "D"
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 75.00
 UPSTREAM ELEVATION(FEET) = 577.00
 DOWNSTREAM ELEVATION(FEET) = 575.00
 ELEVATION DIFFERENCE(FEET) = 2.00
 URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.621
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.108
 SUBAREA RUNOFF(CFS) = 0.73
 TOTAL AREA(ACRES) = 0.20 TOTAL RUNOFF(CFS) = 0.73

FLOW PROCESS FROM NODE 402.00 TO NODE 893.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 575.00 DOWNSTREAM(FEET) = 456.32
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1320.00 CHANNEL SLOPE = 0.0899
 CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 2.00
 CHANNEL FLOW THRU SUBAREA(CFS) = 0.73
 FLOW VELOCITY(FEET/SEC.) = 4.78 FLOW DEPTH(FEET) = 0.07
 TRAVEL TIME(MIN.) = 4.60 Tc(MIN.) = 10.22
 LONGEST FLOWPATH FROM NODE 400.00 TO NODE 893.00 = 1395.00 FEET.

FLOW PROCESS FROM NODE 402.00 TO NODE 893.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.153
 VEGETATED SLOPES (STEEP) RUNOFF COEFFICIENT = .6000
 SOIL CLASSIFICATION IS "D"
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
 SUBAREA AREA(ACRES) = 6.19 SUBAREA RUNOFF(CFS) = 15.42
 TOTAL AREA(ACRES) = 6.4 TOTAL RUNOFF(CFS) = 15.92
 TC(MIN.) = 10.22

FLOW PROCESS FROM NODE 893.00 TO NODE 893.00 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.) = 10.22
 RAINFALL INTENSITY(INCH/HR) = 4.15
 TOTAL STREAM AREA(ACRES) = 6.39
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 15.92

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	26.03	34.46	1.896	22.49
2	15.92	10.22	4.153	6.39

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	27.81	10.22	4.153
2	33.30	34.46	1.896

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 33.30 Tc(MIN.) = 34.46
TOTAL AREA(ACRES) = 28.9
LONGEST FLOWPATH FROM NODE 881.00 TO NODE 893.00 = 9487.00 FEET.

FLOW PROCESS FROM NODE 200.00 TO NODE 202.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

*USER SPECIFIED(SUBAREA):
DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7800
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 490.00
DOWNSTREAM ELEVATION(FEET) = 475.00
ELEVATION DIFFERENCE(FEET) = 15.00
URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.674
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.587
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.21
TOTAL AREA(ACRES) = 0.04 TOTAL RUNOFF(CFS) = 0.21

FLOW PROCESS FROM NODE 202.00 TO NODE 204.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 465.00 DOWNSTREAM(FEET) = 453.00
FLOW LENGTH(FEET) = 720.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 1.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.71
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.21
PIPE TRAVEL TIME(MIN.) = 4.43 Tc(MIN.) = 7.11
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 204.00 = 820.00 FEET.

FLOW PROCESS FROM NODE 202.00 TO NODE 204.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.251
*USER SPECIFIED(SUBAREA):
DENSE RESIDENTIAL (R2,R3) RUNOFF COEFFICIENT = .7800
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7800
SUBAREA AREA(ACRES) = 2.81 SUBAREA RUNOFF(CFS) = 11.51
TOTAL AREA(ACRES) = 2.8 TOTAL RUNOFF(CFS) = 11.67
TC(MIN.) = 7.11

FLOW PROCESS FROM NODE 204.00 TO NODE 164.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPE SIZE (NON-PRESSURE FLOW)<<<<<

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 453.00 DOWNSTREAM(FEET) = 441.86
FLOW LENGTH(FEET) = 146.08 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.93
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 11.67
PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) = 7.27
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 164.00 = 966.08 FEET.
    
```

```

FLOW PROCESS FROM NODE 164.00 TO NODE 164.00 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.) = 7.27
RAINFALL INTENSITY(INCH/HR) = 5.17
TOTAL STREAM AREA(ACRES) = 2.85
PEAK FLOW RATE(CFS) AT CONFLUENCE = 11.67
    
```

```

FLOW PROCESS FROM NODE 164.00 TO NODE 164.00 IS CODE = 7
    
```

```

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
    
```

```

=====
USER-SPECIFIED VALUES ARE AS FOLLOWS:
TC(MIN) = 12.00 RAIN INTENSITY(INCH/HOUR) = 3.74
TOTAL AREA(ACRES) = 89.63 TOTAL RUNOFF(CFS) = 265.69
    
```

```

FLOW PROCESS FROM NODE 164.00 TO NODE 164.00 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.) = 12.00
RAINFALL INTENSITY(INCH/HR) = 3.74
TOTAL STREAM AREA(ACRES) = 89.63
PEAK FLOW RATE(CFS) AT CONFLUENCE = 265.69
    
```

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	11.67	7.27	5.175	2.85
2	265.69	12.00	3.745	89.63

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	172.60	7.27	5.175
2	274.14	12.00	3.745

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 274.14 Tc(MIN.) = 12.00
TOTAL AREA(ACRES) = 92.5
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 164.00 = 1395.00 FEET.
    
```

```

=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 92.5 TC(MIN.) = 12.00
PEAK FLOW RATE(CFS) = 274.14
    
```

=====

END OF RATIONAL METHOD ANALYSIS

Preliminary Drainage Study for
OTAY RANCH VILLAGE R-3, R-4, & R-8

CHAPTER 4

EXISTING INLET CALCULATIONS

Village 7, R-8 Curb Inlet Sizing

-Curb Inlet Design-

Type of Inlet	Inlet Node Number	Street Grade S (%)	Peak 50-yr Flow Q (cfs)	Gutter Depression a (ft)	Flow Depth y (ft)	Curb Inlet Length Required* (FT)	Curb Inlet Length Specified ** (min.) (FT)
On-grade	793	4.60%	7.38	0.33	0.33	19.7	22.00
Per C.V. DWG. NO. 05017, this inlet has a length of 22'. The peak flow increase is negligible.							

* From Equation: $Q = 0.7L(a+y)^{3/2}$

** Length shown on plans (Required Length of Opening + 1 foot)

*** The bypass Q should be equal or less than 15% of the peak 50-yr flow

**** The bypass Q should be added to the peak flow of downstream node.

If the downstream node is a sump inlet, we should use the 100-yr Q to calculate the bypass Q from the on-grade inlet and redesign the downstream sump inlet to capture the additional 100-yr bypass

Q/S ^{0.5}	Q Captured	Bypass Q	85% of Q50	85% of the 50-yr Peak Flow Captured by the inlet
34.409			6.27	YES

CHAPTER 5 DETENTION ANALYSIS

To provide adequate flood control, increases in peak flow rates at the outfall location for this site were mitigated using the existing detention basin.

The hydrology calculations discussed above provide peak flowrates for the existing detention basin, which are entered into a separate program called RickRatHydro. The RickratHydro was used to produce an inflow hydrograph for the project drainage area to the unit, based on the area, time of concentration, P6 value, runoff coefficient, and peak flow rate.

Mitigation within the basin was modeled using Civil 3D Hydrographs Extension. The Hydrograph that was generated from RickRatHydro was used as an input data for the inflows to the storage unit in the Hydrographs model. The riser was modeled using the stage discharge table, and the volume was modeled using the storage stage table, which represents the storage provided within the basin.

This basin is designed solely for peak flow detention and hydromodification purposes. It is not intended to address water quality pollutant removal requirements. The storage volume for flood control may overlap with the volume provided for hydromodification control, provided that the hydromodification storage volume drains within 96 hours, as specified in the County of San Diego's "Conjunctive Use Facilities for Storm Water Management and Flood Control" handout, dated January 21, 2020.

Preliminary Drainage Study for
OTAY RANCH VILLAGE R-3, R-4, & R-8

STAGE STORAGE TABLE

Otay Ranch Village 7 R-8
/ Stage Storage

Ex Detention Basin	
Depth (ft)	Area (sqft)
0.00	17535
0.05	17647
0.10	17758
0.15	17870
0.20	17982
0.25	18093
0.30	18205
0.35	18317
0.40	18428
0.45	18540
0.50	18651
0.55	18763
0.60	18875
0.65	18986
0.70	19098
0.75	19210
0.80	19321
0.85	19433
0.90	19545
0.95	19656
1.00	19768
1.05	19873
1.10	19979
1.15	20085
1.20	20190
1.25	20296
1.30	20401
1.35	20507
1.40	20613
1.45	20718
1.50	20824
1.55	20929
1.60	21035
1.65	21140
1.70	21246
1.75	21352
1.80	21457
1.85	21563
1.90	21668
1.95	21774
2.00	21880
2.05	21991

Depth (ft)	Area (sqft)
2.10	22102
2.15	22213
2.20	22325
2.25	22436
2.30	22547
2.35	22659
2.40	22770
2.45	22881
2.50	22993
2.55	23104
2.60	23215
2.65	23326
2.70	23438
2.75	23549
2.80	23660
2.85	23772
2.90	23883
2.95	23994
3.00	24106
3.05	24215
3.10	24325
3.15	24435
3.20	24545
3.25	24655
3.30	24765
3.35	24875
3.40	24985
3.45	25095
3.50	25205
3.55	25315
3.60	25425
3.65	25535
3.70	25645
3.75	25755
3.80	25865
3.85	25975
3.90	26085
3.95	26195
4.00	26305
4.05	26420
4.10	26536
4.15	26652
4.20	26768
4.25	26883
4.30	26999

Depth (ft)	Area (sqft)
4.35	27115
4.40	27230
4.45	27346
4.50	27462
4.55	27578
4.60	27693
4.65	27809
4.70	27925
4.75	28040
4.80	28156
4.85	28272
4.90	28388
4.95	28503
5.00	28619
5.05	28739
5.10	28860
5.15	28980
5.20	29101
5.25	29221
5.30	29342
5.35	29462
5.40	29582
5.45	29703
5.50	29823
5.55	29944
5.60	30064
5.65	30184
5.70	30305
5.75	30425
5.80	30546
5.85	30666
5.90	30787
5.95	30907
6.00	31027
6.05	31160
6.10	31292
6.15	31424
6.20	31557
6.25	31689
6.30	31821
6.35	31954
6.40	32086
6.45	32219
6.50	32351
6.55	32483

Depth (ft)	Area (sqft)
6.60	32616
6.65	32748
6.70	32880
6.75	33013
6.80	33145
6.85	33277
6.90	33410
6.95	33542
7.00	33674
7.05	33810
7.10	33945
7.15	34081
7.20	34216
7.25	34352
7.30	34487
7.35	34623
7.40	34758
7.45	34894
7.50	35029
7.55	35165
7.60	35300
7.65	35436
7.70	35571
7.75	35707
7.80	35842
7.85	35977
7.90	36113
7.95	36248
8.00	36384
8.05	36523
8.10	36662
8.15	36801
8.20	36941
8.25	37080
8.30	37219
8.35	37358
8.40	37497
8.45	37636
8.50	37776
8.55	37915
8.60	38054
8.65	38193
8.70	38332
8.75	38471
8.80	38611

Depth (ft)	Area (sqft)
8.85	38750
8.90	38889
8.95	39028
9.00	39167
9.05	39311
9.10	39455
9.15	39599
9.20	39743
9.25	39887
9.30	40031
9.35	40175
9.40	40319
9.45	40463
9.50	40607
9.55	40751
9.60	40895
9.65	41039
9.70	41183
9.75	41327
9.80	41471
9.85	41615
9.90	41759
9.95	41903
10.00	42047
10.05	42200
10.10	42353
10.15	42506
10.20	42659
10.25	42812
10.30	42965
10.35	43118
10.40	43271
10.45	43424
10.50	43577
10.55	43730
10.60	43883
10.65	44036
10.70	44189
10.75	44342
10.80	44495
10.85	44648
10.90	44801
10.95	44954
11.00	45107
11.05	45270

Depth (ft)	Area (sqft)
11.10	45432
11.15	45595
11.20	45758
11.25	45920
11.30	46083
11.35	46246
11.40	46408
11.45	46571
11.50	46734
11.55	46896
11.60	47059
11.65	47222
11.70	47384
11.75	47547
11.80	47710
11.85	47872
11.90	48035
11.95	48198
12.00	48360
12.05	48537
12.10	48713
12.15	48889
12.20	49066
12.25	49242
12.30	49419
12.35	49595
12.40	49772
12.45	49948
12.50	50124
12.55	50301
12.60	50477
12.65	50654
12.70	50830
12.75	51007
12.80	51183
12.85	51359
12.90	51536
12.95	51712
13.00	51889
13.05	52065
13.10	52242
13.15	52418
13.20	52594
13.25	52771
13.30	52947

Depth (ft)	Area (sqft)
13.35	53124
13.40	53300
13.45	53477
13.50	53653
13.55	53829
13.60	54006
13.65	54182
13.70	54359
13.75	54535
13.80	54712
13.85	54888
13.90	55064

Preliminary Drainage Study for
OTAY RANCH VILLAGE R-3, R-4, & R-8

PROPOSED CONDITIONS DISCHARGE TABLE

Otay Village 7 R-8, Ex Basin
Discharge vs Elevation Table

1 Orifice Stag diameter: 10"	2 Orifice Stag diameter: 12"	3 Orifice Stag diameter: 18"	4 Orifice Stag diameter: 18"	Emergency v 8X8
Number: 1	number of orif: 1	Number: 2	Number: 3	Invert: 11.60 ft
Cg-low: 0.61	Cg-middle: 0.61	Cg-low: 0.61	Cg-low: 0.61	Area: 64.00 sq ft
Invert elev: 0.00 ft	Invert elev: 1.50 ft	Invert elev: 3.00 ft	Invert elev: 5.50 ft	Circumferen: 32 ft
				8' x 8'

Elev

	h (ft)	H/D-1	H/D-2	H/D-3	H/D-4	H/D-peak	Olow-orif (cfs)	Olow-weir (cfs)	Otot-1 (cfs)	Omid-orif (cfs)	Omid-weir (cfs)	Otot-2 (cfs)	Otop-orif (cfs)	Otop-weir (cfs)	Otot-3 (cfs)	Otop-orif (cfs)	Otop-weir (cfs)	Otot-4 (cfs)	Emergency (cfs)	Otot (cfs)
390.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
390.05	0.05	0.06	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
390.10	0.10	0.12	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
390.15	0.15	0.18	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
390.20	0.20	0.24	0.00	0.00	0.00	0.00	0.00	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
390.25	0.25	0.30	0.00	0.00	0.00	0.00	0.00	0.18	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18
390.30	0.30	0.36	0.00	0.00	0.00	0.00	0.00	0.26	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26
390.35	0.35	0.42	0.00	0.00	0.00	0.00	0.00	0.35	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35
390.40	0.40	0.48	0.00	0.00	0.00	0.00	0.00	0.45	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45
390.45	0.45	0.54	0.00	0.00	0.00	0.00	0.00	0.49	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56
390.50	0.50	0.60	0.00	0.00	0.00	0.00	0.00	0.77	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68
390.55	0.55	0.66	0.00	0.00	0.00	0.00	0.00	0.97	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.97
390.60	0.60	0.72	0.00	0.00	0.00	0.00	1.14	0.94	0.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.94
390.65	0.65	0.78	0.00	0.00	0.00	0.00	1.29	1.08	1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.08
390.70	0.70	0.84	0.00	0.00	0.00	0.00	1.42	1.23	1.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.23
390.75	0.75	0.90	0.00	0.00	0.00	0.00	1.54	1.38	1.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.38
390.80	0.80	0.96	0.00	0.00	0.00	0.00	1.86	1.54	1.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.54
390.85	0.85	1.02	0.00	0.00	0.00	0.00	1.76	1.70	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.70
390.90	0.90	1.08	0.00	0.00	0.00	0.00	1.86	1.86	1.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.86
390.95	0.95	1.14	0.00	0.00	0.00	0.00	1.95	2.02	1.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.95
391.00	1.00	1.20	0.00	0.00	0.00	0.00	2.04	2.18	2.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.09
391.05	1.05	1.26	0.00	0.00	0.00	0.00	2.12	2.35	2.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.12
391.10	1.10	1.32	0.00	0.00	0.00	0.00	2.21	2.50	2.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.20
391.15	1.15	1.38	0.00	0.00	0.00	0.00	2.29	2.66	2.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.28
391.20	1.20	1.44	0.00	0.00	0.00	0.00	2.36	2.81	2.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.36
391.25	1.25	1.50	0.00	0.00	0.00	0.00	2.44	2.96	2.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.43
391.30	1.30	1.56	0.00	0.00	0.00	0.00	2.51	3.11	2.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.50
391.35	1.35	1.62	0.00	0.00	0.00	0.00	2.58	3.25	2.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.57
391.40	1.40	1.68	0.00	0.00	0.00	0.00	2.65	3.38	2.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.64
391.45	1.45	1.74	0.00	0.00	0.00	0.00	2.71	3.51	2.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.71
391.50	1.50	1.80	0.00	0.00	0.00	0.00	2.78	3.63	2.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.77
391.55	1.55	1.86	0.05	0.00	0.00	0.00	2.84	3.74	2.84	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.85
391.60	1.60	1.92	0.10	0.00	0.00	0.00	2.90	3.84	2.90	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.93
391.65	1.65	1.98	0.15	0.00	0.00	0.00	2.97	3.93	2.97	0.00	0.08	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.04
391.70	1.70	2.04	0.20	0.00	0.00	0.00	3.02	4.02	3.02	0.00	0.13	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.15
391.75	1.75	2.10	0.25	0.00	0.00	0.00	3.08	4.10	3.08	0.00	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.28
391.80	1.80	2.16	0.30	0.00	0.00	0.00	3.14	4.17	3.14	0.00	0.29	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.41
391.85	1.85	2.22	0.35	0.00	0.00	0.00	3.20	4.23	3.20	0.00	0.39	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.58
391.90	1.90	2.28	0.40	0.00	0.00	0.00	3.25	4.28	3.25	0.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.75
391.95	1.95	2.34	0.45	0.00	0.00	0.00	3.31	4.33	3.31	0.00	0.63	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.96
392.00	2.00	2.40	0.50	0.00	0.00	0.00	3.36	4.36	3.36	0.00	0.77	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.12
392.05	2.05	2.46	0.55	0.00	0.00	0.00	3.41	4.39	3.41	0.86	0.91	0.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.32
392.10	2.10	2.52	0.60	0.00	0.00	0.00	3.46	4.41	3.46	1.22	1.07	1.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.53
392.15	2.15	2.58	0.65	0.00	0.00	0.00	3.52	4.43	3.52	1.49	1.24	1.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.75
392.20	2.20	2.64	0.70	0.00	0.00	0.00	3.57	4.44	3.57	1.72	1.41	1.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.98
392.25	2.25	2.70	0.75	0.00	0.00	0.00	3.62	4.45	3.62	1.92	1.60	1.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.21
392.30	2.30	2.76	0.80	0.00	0.00	0.00	3.66	4.46	3.66	2.11	1.79	1.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.45
392.35	2.35	2.82	0.85	0.00	0.00	0.00	3.71	4.46	3.71	2.27	1.98	1.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.69
392.40	2.40	2.88	0.90	0.00	0.00	0.00	3.76	4.46	3.76	2.43	2.18	2.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.94
392.45	2.45	2.94	0.95	0.00	0.00	0.00	3.81	4.47	3.81	2.58	2.39	2.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.19
392.50	2.50	3.00	1.00	0.00	0.00	0.00	3.85	4.47	3.85	2.72	2.60	2.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.45
392.55	2.55	3.06	1.05	0.00	0.00	0.00	3.90	4.49	3.90	2.85	2.81	2.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.70
392.60	2.60	3.12	1.10	0.00	0.00	0.00	3.95	4.51	3.95	2.98	3.02	2.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.92
392.65	2.65	3.18	1.15	0.00	0.00	0.00	3.99	4.54	3.99	3.10	3.23	3.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.09
392.70	2.70	3.24	1.20	0.00	0.00	0.00	4.03	4.58	4.03	3.22	3.45	3.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.25
392.75	2.75	3.30	1.25	0.00	0.00	0.00	4.08	4.64	4.08	3.33	3.66	3.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.40
392.80	2.80	3.36	1.30	0.00	0.00	0.00	4.12	4.71	4.12	3.44	3.87	3.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.56
392.85	2.85	3.42	1.35	0.00	0.00	0.00	4.16	4.80	4.16	3.54	4.08	3.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.71
392.90	2.90	3.48	1.40	0.00	0.00	0.00	4.21	4.92	4.21	3.65	4.28	3.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.85
392.95	2.95	3.54	1.45	0.00	0.00	0.00	4.25	5.07												

390.20	0.20	0.24	0.00	0.00	0.00	0.00	0.00	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.120
390.25	0.25	0.30	0.00	0.00	0.00	0.00	0.00	0.18	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.180
395.90	5.90	7.08	4.40	1.93	0.27	0.00	6.25	3275.51	8.25	7.59	19.98	7.59	25.37	33.57	25.37	0.00	1.92	1.92	0.00	0.00	0.00	41.130
395.95	5.95	7.14	4.45	1.97	0.30	0.00	6.28	345.83	6.28	7.64	21.46	7.64	25.66	34.03	25.66	0.00	2.41	2.41	0.00	0.00	0.00	41.989
396.00	6.00	7.20	4.50	2.00	0.33	0.00	6.31	364.95	6.31	7.69	23.07	7.69	27.49	36.49	27.49	0.00	2.94	2.94	0.00	0.00	0.00	42.895
396.05	6.05	7.26	4.55	2.03	0.37	0.00	6.34	384.90	6.34	7.74	24.81	7.74	26.24	34.88	26.24	0.00	3.53	3.53	0.00	0.00	0.00	43.845
396.10	6.10	7.32	4.60	2.07	0.40	0.00	6.37	405.69	6.37	7.78	26.69	7.78	26.52	35.27	26.52	0.00	4.17	4.17	0.00	0.00	0.00	44.840
396.15	6.15	7.38	4.65	2.10	0.43	0.00	6.39	427.36	6.39	7.83	28.71	7.83	26.80	35.64	26.80	0.00	4.85	4.85	0.00	0.00	0.00	45.876
396.20	6.20	7.44	4.70	2.13	0.47	0.00	6.42	449.93	6.42	7.88	30.89	7.88	27.08	35.98	27.08	0.00	5.57	5.57	0.00	0.00	0.00	46.952
396.25	6.25	7.50	4.75	2.17	0.50	0.00	6.45	473.44	6.45	7.93	33.23	7.93	27.36	36.30	27.36	0.00	6.34	6.34	0.00	0.00	0.00	48.067
396.30	6.30	7.56	4.80	2.20	0.53	0.00	6.48	497.90	6.48	7.97	35.73	7.97	27.63	36.60	27.63	0.00	7.14	7.14	0.00	0.00	0.00	49.218
396.35	6.35	7.62	4.85	2.23	0.57	0.00	6.50	523.34	6.50	8.02	38.41	8.02	27.90	36.87	27.90	0.00	7.99	7.99	0.00	0.00	0.00	50.405
396.40	6.40	7.68	4.90	2.27	0.60	0.00	6.53	549.80	6.53	8.06	41.28	8.06	28.16	37.13	28.16	0.00	8.86	8.86	0.00	0.00	0.00	51.624
396.45	6.45	7.74	4.95	2.30	0.63	0.00	6.56	577.30	6.56	8.11	44.34	8.11	28.43	37.36	28.43	0.00	9.78	9.78	0.00	0.00	0.00	52.874
396.50	6.50	7.80	5.00	2.33	0.67	0.00	6.59	605.87	6.59	8.16	47.60	8.16	28.69	37.56	28.69	0.00	10.72	10.72	0.00	0.00	0.00	54.154
396.55	6.55	7.86	5.05	2.37	0.70	0.00	6.61	635.55	6.61	8.20	51.08	8.20	28.95	37.75	28.95	0.00	11.70	11.70	0.00	0.00	0.00	55.461
396.60	6.60	7.92	5.10	2.40	0.73	0.00	6.64	666.36	6.64	8.25	54.78	8.25	29.21	37.92	29.21	0.00	12.70	12.70	0.00	0.00	0.00	56.793
396.65	6.65	7.98	5.15	2.43	0.77	0.00	6.67	698.34	6.67	8.29	58.70	8.29	29.46	38.07	29.46	0.00	13.73	13.73	0.00	0.00	0.00	58.148
396.70	6.70	8.04	5.20	2.47	0.80	0.00	6.69	731.51	6.69	8.34	62.87	8.34	29.72	38.20	29.72	0.00	14.78	14.78	0.00	0.00	0.00	59.524
396.75	6.75	8.10	5.25	2.50	0.83	0.00	6.72	765.91	6.72	8.38	67.29	8.38	29.97	38.31	29.97	0.00	15.85	15.85	0.00	0.00	0.00	60.919
396.80	6.80	8.16	5.30	2.53	0.87	0.00	6.75	801.57	6.75	8.42	71.97	8.42	30.22	38.41	30.22	0.00	16.95	16.95	0.00	0.00	0.00	62.332
396.85	6.85	8.22	5.35	2.57	0.90	0.00	6.77	838.53	6.77	8.47	76.93	8.47	30.46	38.49	30.46	0.00	18.06	18.06	0.00	0.00	0.00	63.759
396.90	6.90	8.28	5.40	2.60	0.93	0.00	6.80	876.82	6.80	8.51	82.17	8.51	30.71	38.56	30.71	0.00	19.18	19.18	0.00	0.00	0.00	65.199
396.95	6.95	8.34	5.45	2.63	0.97	0.00	6.82	916.47	6.82	8.55	87.70	8.55	30.95	38.61	30.95	0.00	20.32	20.32	0.00	0.00	0.00	66.650
397.00	7.00	8.40	5.50	2.67	1.00	0.00	6.85	957.52	6.85	8.60	93.54	8.60	31.19	38.65	31.19	0.00	21.47	21.47	0.00	0.00	0.00	68.110
397.05	7.05	8.46	5.55	2.70	1.03	0.00	6.88	1000.01	6.88	8.64	99.69	8.64	31.43	38.69	31.43	0.00	22.63	22.63	0.00	0.00	0.00	69.577
397.10	7.10	8.52	5.60	2.73	1.07	0.00	6.90	1043.97	6.90	8.68	106.18	8.68	31.67	38.71	31.67	0.00	23.80	23.80	0.00	0.00	0.00	71.048
397.15	7.15	8.58	5.65	2.77	1.10	0.00	6.93	1089.44	6.93	8.73	113.00	8.73	31.90	38.74	31.90	0.00	24.97	24.97	0.00	0.00	0.00	72.522
397.20	7.20	8.64	5.70	2.80	1.13	0.00	6.95	1136.46	6.95	8.77	120.19	8.77	32.14	38.75	32.14	0.00	26.14	26.14	0.00	0.00	0.00	73.151
397.25	7.25	8.70	5.75	2.83	1.17	0.00	6.98	1185.06	6.98	8.81	127.74	8.81	32.37	38.77	32.37	0.00	27.31	27.31	0.00	0.00	0.00	74.108
397.30	7.30	8.76	5.80	2.87	1.20	0.00	7.00	1235.29	7.00	8.85	135.67	8.85	32.60	38.78	32.60	0.00	28.49	28.49	0.00	0.00	0.00	75.047
397.35	7.35	8.82	5.85	2.90	1.23	0.00	7.03	1287.18	7.03	8.89	143.99	8.89	32.83	38.80	32.83	0.00	29.65	29.65	0.00	0.00	0.00	75.968
397.40	7.40	8.88	5.90	2.93	1.27	0.00	7.06	1340.78	7.06	8.93	152.73	8.93	33.05	38.83	33.05	0.00	30.82	30.82	0.00	0.00	0.00	76.874
397.45	7.45	8.94	5.95	2.97	1.30	0.00	7.08	1396.12	7.08	8.98	161.88	8.98	33.28	38.86	33.28	0.00	31.97	31.97	0.00	0.00	0.00	77.764
397.50	7.50	9.00	6.00	3.00	1.33	0.00	7.11	1453.24	7.11	9.02	171.48	9.02	33.50	38.90	33.50	0.00	33.12	33.12	0.00	0.00	0.00	78.641
397.55	7.55	9.06	6.05	3.03	1.37	0.00	7.13	1512.20	7.13	9.06	181.52	9.06	33.73	38.96	33.73	0.00	34.26	34.26	0.00	0.00	0.00	79.504
397.60	7.60	9.12	6.10	3.07	1.40	0.00	7.16	1573.02	7.16	9.10	192.03	9.10	33.95	39.03	33.95	0.00	35.38	35.38	0.00	0.00	0.00	80.355
397.65	7.65	9.18	6.15	3.10	1.43	0.00	7.18	1635.76	7.18	9.14	203.02	9.14	34.17	39.13	34.17	0.00	36.49	36.49	0.00	0.00	0.00	81.193
397.70	7.70	9.24	6.20	3.13	1.47	0.00	7.21	1700.46	7.21	9.18	214.51	9.18	34.39	39.25	34.39	0.00	37.58	37.58	0.00	0.00	0.00	82.020
397.75	7.75	9.30	6.25	3.17	1.50	0.00	7.23	1767.16	7.23	9.22	226.52	9.22	34.60	39.39	34.60	0.00	38.66	38.66	0.00	0.00	0.00	82.836
397.80	7.80	9.36	6.30	3.20	1.53	0.00	7.25	1835.91	7.25	9.26	239.05	9.26	34.82	39.57	34.82	0.00	39.71	39.71	0.00	0.00	0.00	83.642
397.85	7.85	9.42	6.35	3.23	1.57	0.00	7.28	1906.75	7.28	9.30	252.13	9.30	35.03	39.77	35.03	0.00	40.74	40.74	0.00	0.00	0.00	84.437
397.90	7.90	9.48	6.40	3.27	1.60	0.00	7.30	1979.73	7.30	9.34	265.77	9.34	35.25	40.02	35.25	0.00	41.76	41.76	0.00	0.00	0.00	85.223
397.95	7.95	9.54	6.45	3.30	1.63	0.00	7.33	2054.90	7.33	9.38	279.99	9.38	35.46	40.31	35.46	0.00	42.74	42.74	0.00	0.00	0.00	86.000
398.00	8.00	9.60	6.50	3.33	1.67	0.00	7.35	2132.31	7.35	9.42	294.81	9.42	35.67	40.65	35.67	0.00	43.71	43.71	0.00	0.00	0.00	86.768
398.05	8.05	9.66	6.55	3.37	1.70	0.00	7.38	2212.00	7.38	9.46	310.24	9.46	35.88	41.03	35.88	0.00	44.64	44.64	0.00	0.00	0.00	87.528
398.10	8.10	9.72	6.60	3.40	1.73	0.00	7.40	2294.03	7.40	9.50	326.31	9.50	36.08	41.47	36.08	0.00	45.55	45.55	0.00	0.00	0.00	88.279
398.15	8.15	9.78	6.65	3.43	1.77	0.00	7.42	2378.44	7.42	9.53	343.03	9.53	36.29	41.98	36.29	0.00	46.43	46.43	0.00	0.00	0.00	89.023
398.20	8.20	9.84	6.70	3.47	1.80	0.00	7.45	2465.28	7.45	9.57	360.43	9.57	36.50	42.54	36.50	0.00	47.28	47.28	0.00	0.00	0.00	89.758
398.25	8.25	9.90	6.75	3.50	1.83	0.00	7.47	2554.61	7.47	9.61	378.51	9.61	36.70	43.18	36.70	0.00	48.10	48.10	0.00	0.00	0.00	90.487
398.30	8.30	9.96	6.80	3.53	1.87	0.00	7.50	2646.48	7.50	9.65	397.30	9.65	36.90	43.89	36.90	0.00	48.88	48.88	0.00	0.00	0.00	91.208
398.35	8.35	10.02	6.85	3.57	1.90	0.00	7.52	2740.94	7.52	9.69	416.83	9.69	37.11	44.68	37.11	0.00	49.64	49.64	0.00	0.00	0.00	91.923
398.40	8.40	10.08	6.90	3.60	1.93	0.00	7.54	2838.05	7.54	9.73	437.10	9.73	37.31	45.56	37.31	0.00	50.36	50.36	0.00	0.00	0.00	92.631
398.45	8.45	10.14	6.95	3.63	1.97	0.00	7.57	2937.85	7.57	9.76	458.15	9.76	37.51	46.53	37.51	0.00	51.05	51.05	0.00	0.00	0.00	93.332
398.50	8.50	10.20	7.00	3.67	2.00	0.00	7.59	3040.41	7.59	9.80	479.98	9.80	37.71	47.60	37.71	0.00	51.70	51.70	0.00	0.00	0.00	94.028

390.20	0.20	0.24	0.00	0.00	0.00	0.00	0.00	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.120	
390.25	0.25	0.30	0.00	0.00	0.00	0.00	0.00	0.18	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.184	
402.15	12.15	14.58	10.65	6.10	4.43	0.10	9.15	22706.15	9.15	12.25	6156.96	12.25	50.14	1058.36	50.14	63.04	173.25	63.04	86.93	221.504
402.20	12.20	14.64	10.70	6.13	4.47	0.11	9.17	23222.63	9.17	12.28	6325.25	12.28	50.29	1098.44	50.29	63.30	181.77	63.30	99.05	234.089
402.25	12.25	14.70	10.75	6.17	4.50	0.12	9.18	23748.41	9.18	12.31	6497.16	12.31	50.44	1139.74	50.44	63.57	190.75	63.57	111.68	247.188
402.30	12.30	14.76	10.80	6.20	4.53	0.13	9.20	24283.61	9.20	12.34	6672.74	12.34	50.59	1182.26	50.59	63.83	200.22	63.83	124.82	260.781
402.35	12.35	14.82	10.85	6.23	4.57	0.14	9.22	24828.35	9.22	12.37	6852.05	12.37	50.74	1226.04	50.74	64.10	210.18	64.10	138.43	274.851
402.40	12.40	14.88	10.90	6.27	4.60	0.15	9.24	25382.76	9.24	12.40	7035.16	12.40	50.88	1271.11	50.88	64.36	220.66	64.36	152.50	289.380
402.45	12.45	14.94	10.95	6.30	4.63	0.16	9.26	25946.97	9.26	12.43	7222.12	12.43	51.03	1317.48	51.03	64.62	231.67	64.62	167.01	304.355
402.50	12.50	15.00	11.00	6.33	4.67	0.17	9.28	26521.11	9.28	12.46	7412.99	12.46	51.18	1365.20	51.18	64.88	243.24	64.88	181.97	319.761
402.55	12.55	15.06	11.05	6.37	4.70	0.18	9.30	27105.31	9.30	12.49	7607.83	12.49	51.32	1414.27	51.32	65.14	255.37	65.14	197.34	335.587
402.60	12.60	15.12	11.10	6.40	4.73	0.19	9.32	27699.69	9.32	12.52	7806.71	12.52	51.47	1464.74	51.47	65.40	268.10	65.40	213.12	351.822
402.65	12.65	15.18	11.15	6.43	4.77	0.20	9.34	28304.39	9.34	12.55	8009.68	12.55	51.61	1516.64	51.61	65.65	281.43	65.65	229.30	368.455
402.70	12.70	15.24	11.20	6.47	4.80	0.21	9.36	28919.54	9.36	12.58	8216.80	12.58	51.76	1569.98	51.76	65.91	295.39	65.91	245.87	385.477
402.75	12.75	15.30	11.25	6.50	4.83	0.22	9.38	29545.28	9.38	12.61	8428.14	12.61	51.90	1624.80	51.90	66.16	310.00	66.16	262.83	402.877
402.80	12.80	15.36	11.30	6.53	4.87	0.23	9.40	30181.74	9.40	12.63	8643.77	12.63	52.05	1681.13	52.05	66.42	325.29	66.42	280.15	420.650
402.85	12.85	15.42	11.35	6.57	4.90	0.23	9.41	30829.05	9.41	12.66	8863.74	12.66	52.19	1738.99	52.19	66.67	341.26	66.67	297.84	438.785
402.90	12.90	15.48	11.40	6.60	4.93	0.24	9.43	31487.86	9.43	12.69	9088.12	12.69	52.33	1798.43	52.33	66.92	357.95	66.92	315.89	457.277
402.95	12.95	15.54	11.45	6.63	4.97	0.25	9.45	32156.81	9.45	12.72	9316.97	12.72	52.48	1859.46	52.48	67.17	375.37	67.17	334.29	476.117
403.00	13.00	15.60	11.50	6.67	5.00	0.26	9.47	32837.53	9.47	12.75	9550.37	12.75	52.62	1922.12	52.62	67.42	393.54	67.42	353.03	495.300
403.05	13.05	15.66	11.55	6.70	5.03	0.27	9.49	33529.66	9.49	12.78	9788.37	12.78	52.76	1986.44	52.76	67.67	412.50	67.67	372.11	514.820
403.10	13.10	15.72	11.60	6.73	5.07	0.28	9.51	34233.34	9.51	12.81	10031.05	12.81	52.90	2052.45	52.90	67.92	432.25	67.92	383.71	526.849
403.15	13.15	15.78	11.65	6.77	5.10	0.29	9.53	34948.73	9.53	12.84	10278.48	12.84	53.04	2120.18	53.04	68.17	452.83	68.17	390.05	533.628
403.20	13.20	15.84	11.70	6.80	5.13	0.30	9.55	35675.96	9.55	12.87	10530.71	12.87	53.19	2189.68	53.19	68.42	474.26	68.42	396.29	540.304
403.25	13.25	15.90	11.75	6.83	5.17	0.31	9.56	36415.18	9.56	12.90	10787.82	12.90	53.33	2260.96	53.33	68.66	496.57	68.66	402.43	546.882
403.30	13.30	15.96	11.80	6.87	5.20	0.32	9.58	37166.53	9.58	12.92	11049.89	12.92	53.47	2334.06	53.47	68.91	519.77	68.91	408.49	553.366
403.35	13.35	16.02	11.85	6.90	5.23	0.33	9.60	37930.17	9.60	12.95	11316.97	12.95	53.61	2409.01	53.61	69.15	543.89	69.15	414.45	559.760
403.40	13.40	16.08	11.90	6.93	5.27	0.34	9.62	38706.24	9.62	12.98	11589.15	12.98	53.75	2485.86	53.75	69.39	568.97	69.39	420.33	566.069
403.45	13.45	16.14	11.95	6.97	5.30	0.35	9.64	39494.89	9.64	13.01	11866.48	13.01	53.88	2564.63	53.88	69.64	592.01	69.64	426.13	572.295
403.50	13.50	16.20	12.00	7.00	5.33	0.36	9.66	40296.28	9.66	13.04	12149.06	13.04	54.02	2645.35	54.02	69.88	622.06	69.88	431.85	578.442
403.55	13.55	16.26	12.05	7.03	5.37	0.37	9.68	41110.56	9.68	13.07	12436.94	13.07	54.16	2728.07	54.16	70.12	650.14	70.12	437.49	584.513
403.60	13.60	16.32	12.10	7.07	5.40	0.38	9.69	41937.87	9.69	13.09	12730.20	13.09	54.30	2812.82	54.30	70.36	679.26	70.36	443.07	590.513
403.65	13.65	16.38	12.15	7.10	5.43	0.38	9.71	42778.39	9.71	13.12	13028.92	13.12	54.44	2899.63	54.44	70.60	709.48	70.60	448.57	596.438
403.70	13.70	16.44	12.20	7.13	5.47	0.39	9.73	43632.26	9.73	13.15	13333.17	13.15	54.57	2988.54	54.57	70.83	740.80	70.83	454.01	602.297
403.75	13.75	16.50	12.25	7.17	5.50	0.40	9.75	44499.63	9.75	13.18	13643.03	13.18	54.71	3079.59	54.71	71.07	773.26	71.07	459.38	608.091
403.80	13.80	16.56	12.30	7.20	5.53	0.41	9.77	45380.68	9.77	13.21	13958.57	13.21	54.85	3172.82	54.85	71.31	806.89	71.31	464.69	613.821
403.85	13.85	16.62	12.35	7.23	5.57	0.42	9.79	46275.56	9.79	13.23	14279.87	13.23	54.98	3268.25	54.98	71.54	841.71	71.54	469.94	619.490
403.90	13.90	16.68	12.40	7.27	5.60	0.43	9.80	47184.42	9.80	13.26	14607.00	13.26	55.12	3365.94	55.12	71.78	877.76	71.78	475.13	625.100

Preliminary Drainage Study for
OTAY RANCH VILLAGE R-3, R-4, & R-8

PROPOSED CONDITIONS DRAW DOWN CALCULATIONS

Ex Basin		$Q_{Sub\ Drain} =$	0.000	cfs
Elevation	Q_{AVG} (CFS)	DV (CF)	DT (HR)	Total T
0.00	0.000	879.5	60.807	93.33
0.05	0.008	885.1	12.577	32.52
0.10	0.031	890.7	4.968	19.94
0.15	0.069	896.3	2.642	14.98
0.20	0.120	901.9	1.646	12.33
0.25	0.184	907.5	1.130	10.69
0.30	0.262	913.0	0.829	9.56
0.35	0.350	918.6	0.637	8.73
0.40	0.450	924.2	0.508	8.09
0.45	0.560	929.8	0.417	7.58
0.50	0.680	935.4	0.349	7.17
0.55	0.808	940.9	0.299	6.82
0.60	0.943	946.5	0.259	6.52
0.65	1.085	952.1	0.228	6.26
0.70	1.232	957.7	0.203	6.03
0.75	1.385	963.3	0.183	5.83
0.80	1.541	968.9	0.166	5.64
0.85	1.700	974.4	0.152	5.48
0.90	1.861	980.0	0.143	5.33
0.95	1.950	985.6	0.137	5.18
1.00	2.039	991.0	0.132	5.05
1.05	2.125	996.3	0.128	4.91
1.10	2.207	1001.6	0.124	4.79
1.15	2.286	1006.9	0.120	4.66
1.20	2.363	1012.1	0.117	4.54
1.25	2.437	1017.4	0.114	4.43
1.30	2.509	1022.7	0.112	4.31
1.35	2.579	1028.0	0.109	4.20
1.40	2.648	1033.3	0.107	4.09
1.45	2.714	1038.5	0.105	3.98
1.50	2.779	1043.8	0.103	3.88
1.55	2.851	1049.1	0.101	3.78
1.60	2.939	1054.4	0.098	3.67
1.65	3.041	1059.7	0.095	3.58
1.70	3.157	1064.9	0.092	3.48
1.75	3.288	1070.2	0.088	3.39
1.80	3.431	1075.5	0.085	3.30
1.85	3.588	1080.8	0.082	3.22
1.90	3.756	1086.1	0.078	3.13
1.95	3.936	1091.3	0.075	3.06
2.00	4.126	1096.8	0.072	2.98
2.05	4.327	1102.3	0.069	2.91
2.10	4.536	1107.9	0.066	2.84
2.15	4.754	1113.5	0.064	2.77
2.20	4.980	1119.0	0.061	2.71
2.25	5.213	1124.6	0.059	2.65
2.30	5.452	1130.1	0.056	2.59
2.35	5.696	1135.7	0.054	2.53
2.40	5.944	1141.3	0.052	2.48
2.45	6.196	1146.8	0.050	2.43
2.50	6.451	1152.4	0.049	2.38

Ex Basin		$Q_{Sub\ Drain} =$	0.000	cfs
Elevation	Q_{AVG} (CFS)	DV (CF)	DT (HR)	Total T
2.55	6.708	1158.0	0.047	2.33
2.60	6.923	1163.5	0.046	2.28
2.65	7.090	1169.1	0.045	2.24
2.70	7.251	1174.7	0.045	2.19
2.75	7.408	1180.2	0.044	2.15
2.80	7.561	1185.8	0.043	2.10
2.85	7.710	1191.4	0.043	2.06
2.90	7.855	1196.9	0.042	2.02
2.95	7.997	1202.5	0.041	1.97
3.00	8.136	1208.0	0.041	1.93
3.05	8.295	1213.5	0.040	1.89
3.10	8.492	1219.0	0.039	1.85
3.15	8.726	1224.5	0.038	1.81
3.20	8.998	1230.0	0.037	1.77
3.25	9.306	1235.5	0.036	1.74
3.30	9.649	1241.0	0.035	1.70
3.35	10.027	1246.5	0.034	1.67
3.40	10.439	1252.0	0.033	1.63
3.45	10.884	1257.5	0.031	1.60
3.50	11.360	1263.0	0.030	1.57
3.55	11.868	1268.5	0.029	1.54
3.60	12.405	1274.0	0.028	1.51
3.65	12.971	1279.5	0.027	1.48
3.70	13.565	1285.0	0.026	1.45
3.75	14.185	1290.5	0.025	1.43
3.80	14.831	1296.0	0.024	1.40
3.85	15.500	1301.5	0.023	1.38
3.90	16.192	1307.0	0.022	1.36
3.95	16.906	1312.5	0.021	1.33
4.00	17.639	1318.1	0.020	1.31
4.05	18.392	1323.9	0.020	1.29
4.10	19.162	1329.7	0.019	1.27
4.15	19.948	1335.5	0.018	1.25
4.20	20.750	1341.3	0.018	1.24
4.25	21.564	1347.1	0.017	1.22
4.30	22.391	1352.8	0.016	1.20
4.35	23.228	1358.6	0.016	1.19
4.40	24.074	1364.4	0.015	1.17
4.45	24.929	1370.2	0.015	1.15
4.50	25.789	1376.0	0.015	1.14
4.55	26.655	1381.8	0.014	1.12
4.60	27.525	1387.6	0.014	1.11
4.65	28.397	1393.3	0.014	1.10
4.70	28.706	1399.1	0.013	1.08
4.75	29.235	1404.9	0.013	1.07
4.80	29.752	1410.7	0.013	1.06
4.85	30.258	1416.5	0.013	1.04
4.90	30.754	1422.3	0.013	1.03
4.95	31.241	1428.1	0.013	1.02
5.00	31.718	1434.0	0.012	1.00
5.05	32.188	1440.0	0.012	0.99

Ex Basin		Q _{Sub Drain} =	0.000	cfs
Elevation	Q _{AVG} (CFS)	DV (CF)	DT (HR)	Total T
5.10	32.649	1446.0	0.012	0.98
5.15	33.103	1452.0	0.012	0.97
5.20	33.550	1458.0	0.012	0.96
5.25	33.990	1464.1	0.012	0.94
5.30	34.424	1470.1	0.012	0.93
5.35	34.852	1476.1	0.012	0.92
5.40	35.273	1482.1	0.012	0.91
5.45	35.689	1488.2	0.012	0.90
5.50	36.100	1494.2	0.011	0.89
5.55	36.539	1500.2	0.011	0.87
5.60	37.034	1506.2	0.011	0.86
5.65	37.585	1512.2	0.011	0.85
5.70	38.190	1518.3	0.011	0.84
5.75	38.848	1524.3	0.011	0.83
5.80	39.558	1530.3	0.011	0.82
5.85	40.320	1536.3	0.010	0.81
5.90	41.130	1542.3	0.010	0.80
5.95	41.989	1548.4	0.010	0.79
6.00	42.895	1554.7	0.010	0.78
6.05	43.845	1561.3	0.010	0.77
6.10	44.840	1567.9	0.010	0.76
6.15	45.876	1574.5	0.009	0.75
6.20	46.952	1581.1	0.009	0.74
6.25	48.067	1587.8	0.009	0.73
6.30	49.218	1594.4	0.009	0.72
6.35	50.405	1601.0	0.009	0.71
6.40	51.624	1607.6	0.009	0.70
6.45	52.874	1614.2	0.008	0.69
6.50	54.154	1620.9	0.008	0.69
6.55	55.461	1627.5	0.008	0.68
6.60	56.793	1634.1	0.008	0.67
6.65	58.148	1640.7	0.008	0.66
6.70	59.524	1647.3	0.008	0.65
6.75	60.919	1653.9	0.007	0.65
6.80	62.332	1660.6	0.007	0.64
6.85	63.759	1667.2	0.007	0.63
6.90	65.199	1673.8	0.007	0.62
6.95	66.650	1680.4	0.007	0.62
7.00	68.110	1687.1	0.007	0.61
7.05	69.577	1693.9	0.007	0.60
7.10	71.048	1700.7	0.007	0.60
7.15	72.522	1707.4	0.007	0.59
7.20	73.151	1714.2	0.006	0.58
7.25	74.108	1721.0	0.006	0.58
7.30	75.047	1727.7	0.006	0.57
7.35	75.968	1734.5	0.006	0.56
7.40	76.874	1741.3	0.006	0.56
7.45	77.764	1748.1	0.006	0.55
7.50	78.641	1754.8	0.006	0.55
7.55	79.504	1761.6	0.006	0.54
7.60	80.355	1768.4	0.006	0.53

<u>Ex Basin</u>		$Q_{Sub\ Drain} =$	0.000	cfs
Elevation	Q_{AVG} (CFS)	DV (CF)	DT (HR)	Total T
7.65	81.193	1775.2	0.006	0.53
7.70	82.020	1781.9	0.006	0.52
7.75	82.836	1788.7	0.006	0.51
7.80	83.642	1795.5	0.006	0.51
7.85	84.437	1802.3	0.006	0.50
7.90	85.223	1809.0	0.006	0.50
7.95	86.000	1815.8	0.006	0.49
8.00	86.768	1822.7	0.006	0.49
8.05	87.528	1829.6	0.006	0.48
8.10	88.279	1836.6	0.006	0.47
8.15	89.023	1843.6	0.006	0.47
8.20	89.758	1850.5	0.006	0.46
8.25	90.487	1857.5	0.006	0.46
8.30	91.208	1864.4	0.006	0.45
8.35	91.923	1871.4	0.006	0.45
8.40	92.631	1878.3	0.006	0.44
8.45	93.332	1885.3	0.006	0.43
8.50	94.028	1892.3	0.006	0.43
8.55	94.717	1899.2	0.006	0.42
8.60	95.400	1906.2	0.006	0.42
8.65	96.078	1913.1	0.006	0.41
8.70	96.750	1920.1	0.005	0.41
8.75	97.416	1927.1	0.005	0.40
8.80	98.077	1934.0	0.005	0.40
8.85	98.734	1941.0	0.005	0.39
8.90	99.385	1947.9	0.005	0.38
8.95	100.031	1954.9	0.005	0.38
9.00	100.672	1962.0	0.005	0.37
9.05	101.309	1969.2	0.005	0.37
9.10	101.941	1976.4	0.005	0.36
9.15	102.569	1983.6	0.005	0.36
9.20	103.193	1990.8	0.005	0.35
9.25	103.812	1998.0	0.005	0.35
9.30	104.427	2005.2	0.005	0.34
9.35	105.038	2012.4	0.005	0.34
9.40	105.645	2019.6	0.005	0.33
9.45	106.248	2026.8	0.005	0.33
9.50	106.848	2034.0	0.005	0.32
9.55	107.443	2041.2	0.005	0.31
9.60	108.035	2048.4	0.005	0.31
9.65	108.624	2055.6	0.005	0.30
9.70	109.209	2062.8	0.005	0.30
9.75	109.790	2070.0	0.005	0.29
9.80	110.368	2077.2	0.005	0.29
9.85	110.943	2084.4	0.005	0.28
9.90	111.515	2091.6	0.005	0.28
9.95	112.083	2098.8	0.005	0.27
10.00	112.648	2106.2	0.005	0.27
10.05	113.210	2113.8	0.005	0.26
10.10	113.769	2121.5	0.005	0.26
10.15	114.325	2129.1	0.005	0.25

Ex Basin		$Q_{Sub\ Drain} =$	0.000	cfs
Elevation	Q_{AVG} (CFS)	DV (CF)	DT (HR)	Total T
10.20	114.878	2136.8	0.005	0.25
10.25	115.428	2144.4	0.005	0.24
10.30	115.976	2152.1	0.005	0.24
10.35	116.520	2159.7	0.005	0.23
10.40	117.062	2167.4	0.005	0.23
10.45	117.601	2175.0	0.005	0.22
10.50	118.138	2182.7	0.005	0.22
10.55	118.672	2190.3	0.005	0.21
10.60	119.203	2198.0	0.005	0.21
10.65	119.732	2205.6	0.005	0.20
10.70	120.258	2213.3	0.005	0.20
10.75	120.782	2220.9	0.005	0.19
10.80	121.303	2228.6	0.005	0.19
10.85	121.822	2236.2	0.005	0.18
10.90	122.339	2243.9	0.005	0.18
10.95	122.853	2251.5	0.005	0.17
11.00	123.365	2259.4	0.005	0.17
11.05	123.875	2267.6	0.005	0.16
11.10	124.383	2275.7	0.005	0.15
11.15	124.888	2283.8	0.005	0.15
11.20	125.391	2292.0	0.005	0.14
11.25	125.892	2300.1	0.005	0.14
11.30	126.391	2308.2	0.005	0.13
11.35	126.888	2316.4	0.005	0.13
11.40	127.383	2324.5	0.005	0.12
11.45	127.875	2332.6	0.005	0.12
11.50	128.366	2340.7	0.005	0.11
11.55	128.855	2348.9	0.005	0.11
11.60	129.342	2357.0	0.005	0.10
11.65	132.209	2365.1	0.005	0.10
11.70	137.049	2373.3	0.005	0.09
11.75	143.172	2381.4	0.005	0.09
11.80	150.332	2389.5	0.004	0.09
11.85	158.387	2397.7	0.004	0.08
11.90	167.242	2405.8	0.004	0.08
11.95	178.825	2413.9	0.004	0.07
12.00	187.084	2422.4	0.003	0.07
12.05	197.973	2431.2	0.003	0.07
12.10	209.457	2440.1	0.003	0.06
12.15	221.504	2448.9	0.003	0.06
12.20	234.089	2457.7	0.003	0.06
12.25	247.188	2466.5	0.003	0.05
12.30	260.781	2475.3	0.003	0.05
12.35	274.851	2484.2	0.002	0.05
12.40	289.380	2493.0	0.002	0.05
12.45	304.355	2501.8	0.002	0.04
12.50	319.761	2510.6	0.002	0.04
12.55	335.587	2519.5	0.002	0.04
12.60	351.822	2528.3	0.002	0.04
12.65	368.455	2537.1	0.002	0.04
12.70	385.477	2545.9	0.002	0.03

Ex Basin		$Q_{Sub\ Drain=}$	0.000	cfs
Elevation	Q_{AVG} (CFS)	DV (CF)	DT (HR)	Total T
12.75	402.877	2554.7	0.002	0.03
12.80	420.650	2563.6	0.002	0.03
12.85	438.785	2572.4	0.002	0.03
12.90	457.277	2581.2	0.002	0.03
12.95	476.117	2590.0	0.001	0.02
13.00	495.300	2598.8	0.001	0.02
13.05	514.820	2607.7	0.001	0.02
13.10	526.849	2616.5	0.001	0.02
13.15	533.628	2625.3	0.001	0.02
13.20	540.304	2634.1	0.001	0.02
13.25	546.882	2643.0	0.001	0.02
13.30	553.366	2651.8	0.001	0.02
13.35	559.760	2660.6	0.001	0.01
13.40	566.069	2669.4	0.001	0.01
13.45	572.295	2678.2	0.001	0.01
13.50	578.442	2687.1	0.001	0.01
13.55	584.513	2695.9	0.001	0.01
13.60	590.511	2704.7	0.001	0.01
13.65	596.438	2713.5	0.001	0.01
13.70	602.297	2722.3	0.001	0.00
13.75	608.091	2731.2	0.001	0.00
13.80	613.821	2740.0	0.001	0.00
13.85	619.490	2748.8	0.001	0.00
13.90	625.100	0.0	0.000	0.00

Preliminary Drainage Study for
OTAY RANCH VILLAGE R-3, R-4, & R-8

PROPOSED CONDITIONS 50-YR

RATIONAL METHOD HYDROGRAPH PROGRAM
COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE 7/25/2024
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 13 MIN.
6 HOUR RAINFALL 2.2 INCHES
BASIN AREA 152.74 ACRES
RUNOFF COEFFICIENT 0.682
PEAK DISCHARGE 310 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 13	DISCHARGE (CFS) = 0
TIME (MIN) = 26	DISCHARGE (CFS) = 14
TIME (MIN) = 39	DISCHARGE (CFS) = 14.3
TIME (MIN) = 52	DISCHARGE (CFS) = 15.1
TIME (MIN) = 65	DISCHARGE (CFS) = 15.5
TIME (MIN) = 78	DISCHARGE (CFS) = 16.5
TIME (MIN) = 91	DISCHARGE (CFS) = 17
TIME (MIN) = 104	DISCHARGE (CFS) = 18.3
TIME (MIN) = 117	DISCHARGE (CFS) = 19
TIME (MIN) = 130	DISCHARGE (CFS) = 20.6
TIME (MIN) = 143	DISCHARGE (CFS) = 21.6
TIME (MIN) = 156	DISCHARGE (CFS) = 24
TIME (MIN) = 169	DISCHARGE (CFS) = 25.4
TIME (MIN) = 182	DISCHARGE (CFS) = 29.1
TIME (MIN) = 195	DISCHARGE (CFS) = 31.6
TIME (MIN) = 208	DISCHARGE (CFS) = 38.6
TIME (MIN) = 221	DISCHARGE (CFS) = 44
TIME (MIN) = 234	DISCHARGE (CFS) = 64.6
TIME (MIN) = 247	DISCHARGE (CFS) = 107
TIME (MIN) = 260	DISCHARGE (CFS) = 310
TIME (MIN) = 273	DISCHARGE (CFS) = 51.8
TIME (MIN) = 286	DISCHARGE (CFS) = 34.6
TIME (MIN) = 299	DISCHARGE (CFS) = 27.1
TIME (MIN) = 312	DISCHARGE (CFS) = 22.7
TIME (MIN) = 325	DISCHARGE (CFS) = 19.8
TIME (MIN) = 338	DISCHARGE (CFS) = 17.6
TIME (MIN) = 351	DISCHARGE (CFS) = 16
TIME (MIN) = 364	DISCHARGE (CFS) = 14.7
TIME (MIN) = 377	DISCHARGE (CFS) = 0

Hydraflow Table of Contents

Watershed Model Schematic.....	1
Hydrograph Return Period Recap.....	2
100 - Year	
Summary Report.....	3
Hydrograph Reports.....	4
Hydrograph No. 1, Manual, Storm 50yr.....	4
Hydrograph No. 2, Reservoir, Ex Basin.....	5
Pond Report - Ex Basin.....	6

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020



Legend

<u>Hyd.</u>	<u>Origin</u>	<u>Description</u>
1	Manual	Storm 50yr
2	Reservoir	Ex Basin

Hydrograph Return Period Recap

Hydroflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Manual	-----	-----	-----	-----	-----	-----	-----	-----	310.50	Storm 50yr
2	Reservoir	1	-----	-----	-----	-----	-----	-----	-----	119.00	Ex Basin

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Manual	310.50	13	260	819,780	-----	-----	-----	Storm 50yr
2	Reservoir	119.00	13	273	819,771	1	401.18	316,412	Ex Basin
Detention_Q50.gpw					Return Period: 100 Year			Thursday, 07 / 25 / 2024	

Hydrograph Report

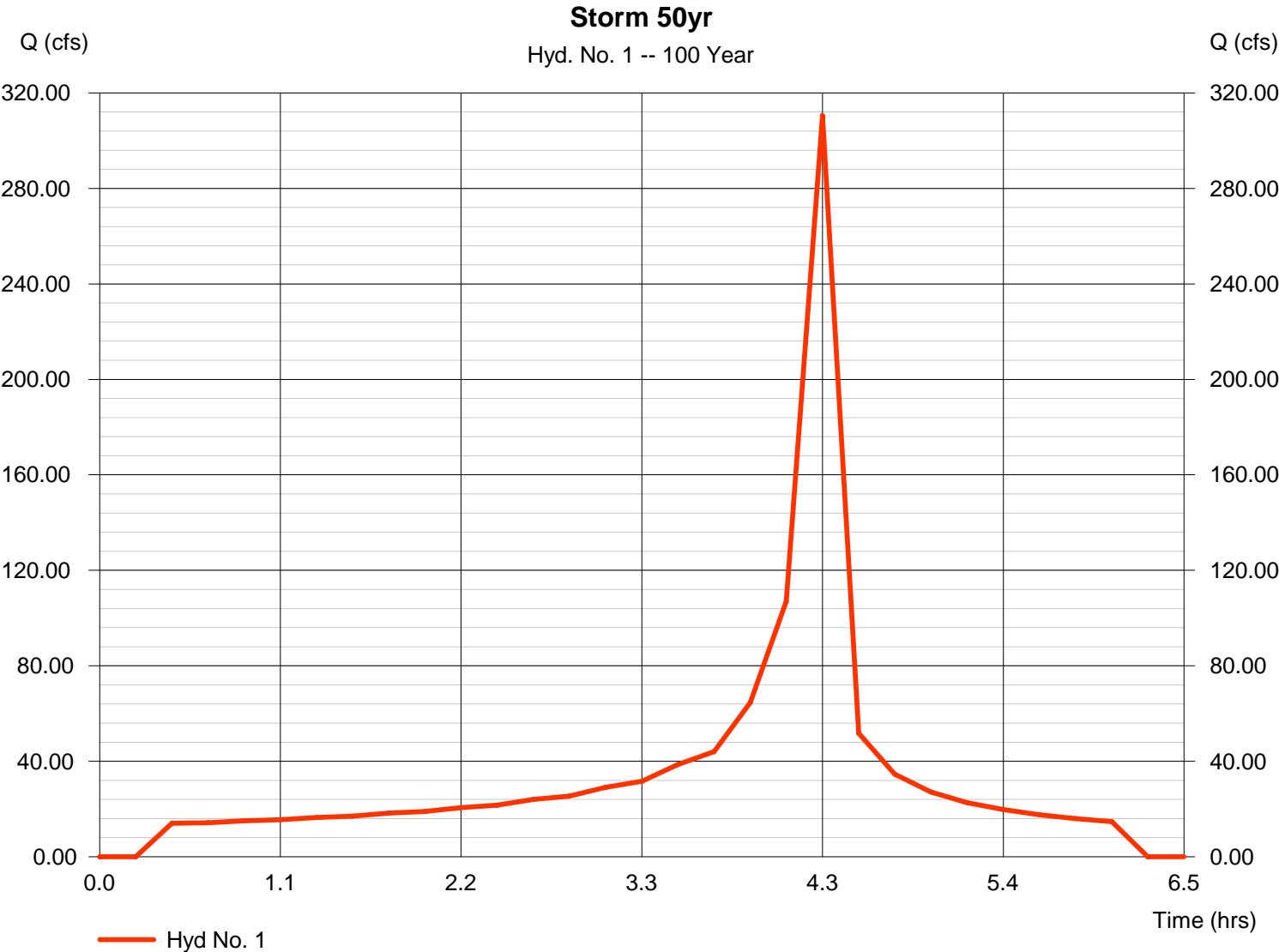
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Thursday, 07 / 25 / 2024

Hyd. No. 1

Storm 50yr

Hydrograph type	= Manual	Peak discharge	= 310.50 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.33 hrs
Time interval	= 13 min	Hyd. volume	= 819,780 cuft



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

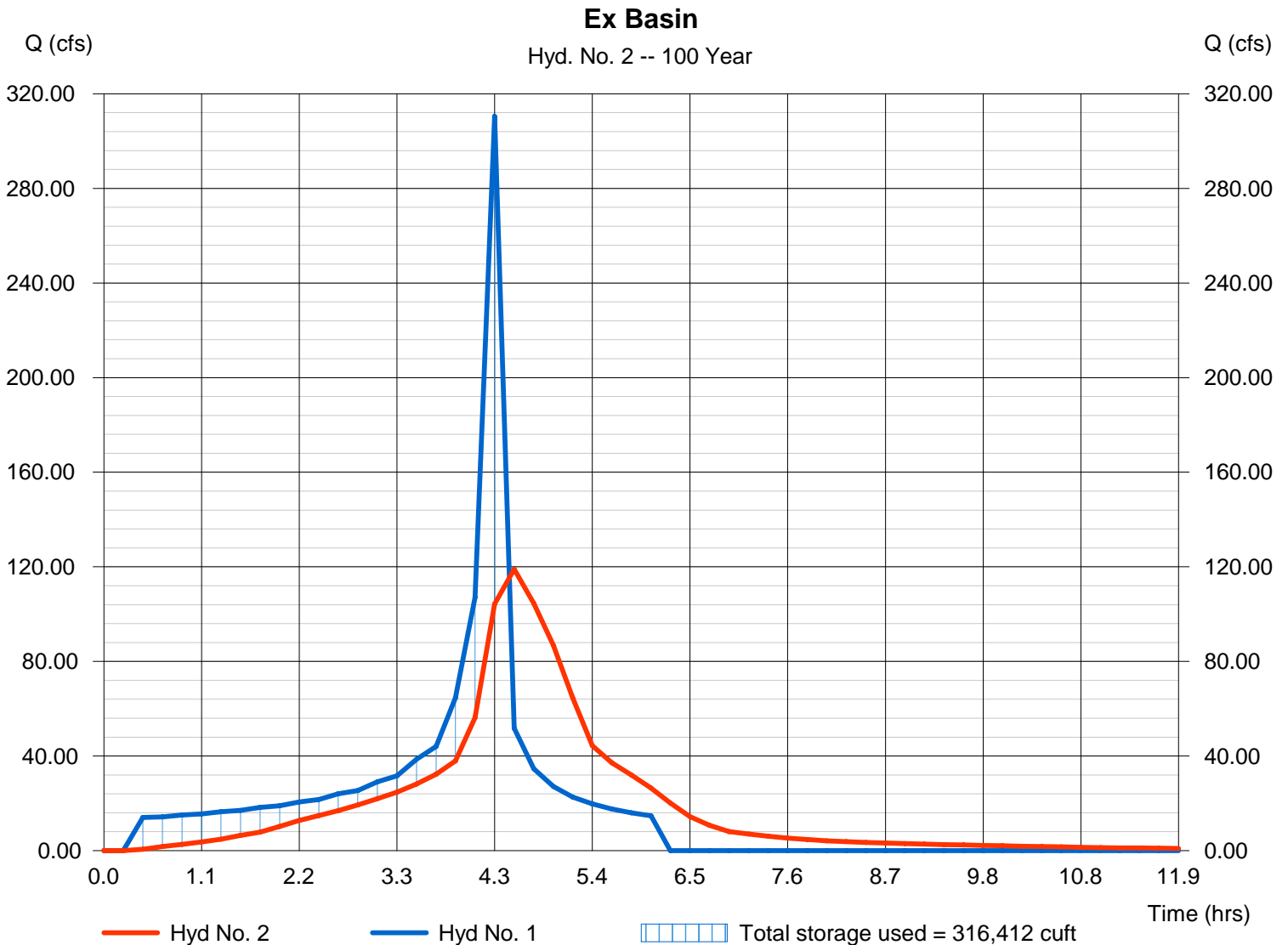
Thursday, 07 / 25 / 2024

Hyd. No. 2

Ex Basin

Hydrograph type	= Reservoir	Peak discharge	= 119.00 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.55 hrs
Time interval	= 13 min	Hyd. volume	= 819,771 cuft
Inflow hyd. No.	= 1 - Storm 50yr	Max. Elevation	= 401.18 ft
Reservoir name	= Ex Basin	Max. Storage	= 316,412 cuft

Storage Indication method used.



Pond No. 1 - Ex Basin

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 390.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	390.00	17,535	0	0
1.00	391.00	19,768	18,638	18,638
2.00	392.00	21,880	20,813	39,451
3.00	393.00	24,106	22,982	62,433
4.00	394.00	26,305	25,195	87,628
5.00	395.00	28,619	27,451	115,079
6.00	396.00	31,027	29,812	144,891
7.00	397.00	33,674	32,338	177,230
8.00	398.00	36,384	35,017	212,246
9.00	399.00	39,167	37,763	250,009
10.00	400.00	42,047	40,594	290,604
11.00	401.00	45,107	43,564	334,168
12.00	402.00	48,360	46,719	380,887
13.00	403.00	51,889	50,109	430,996

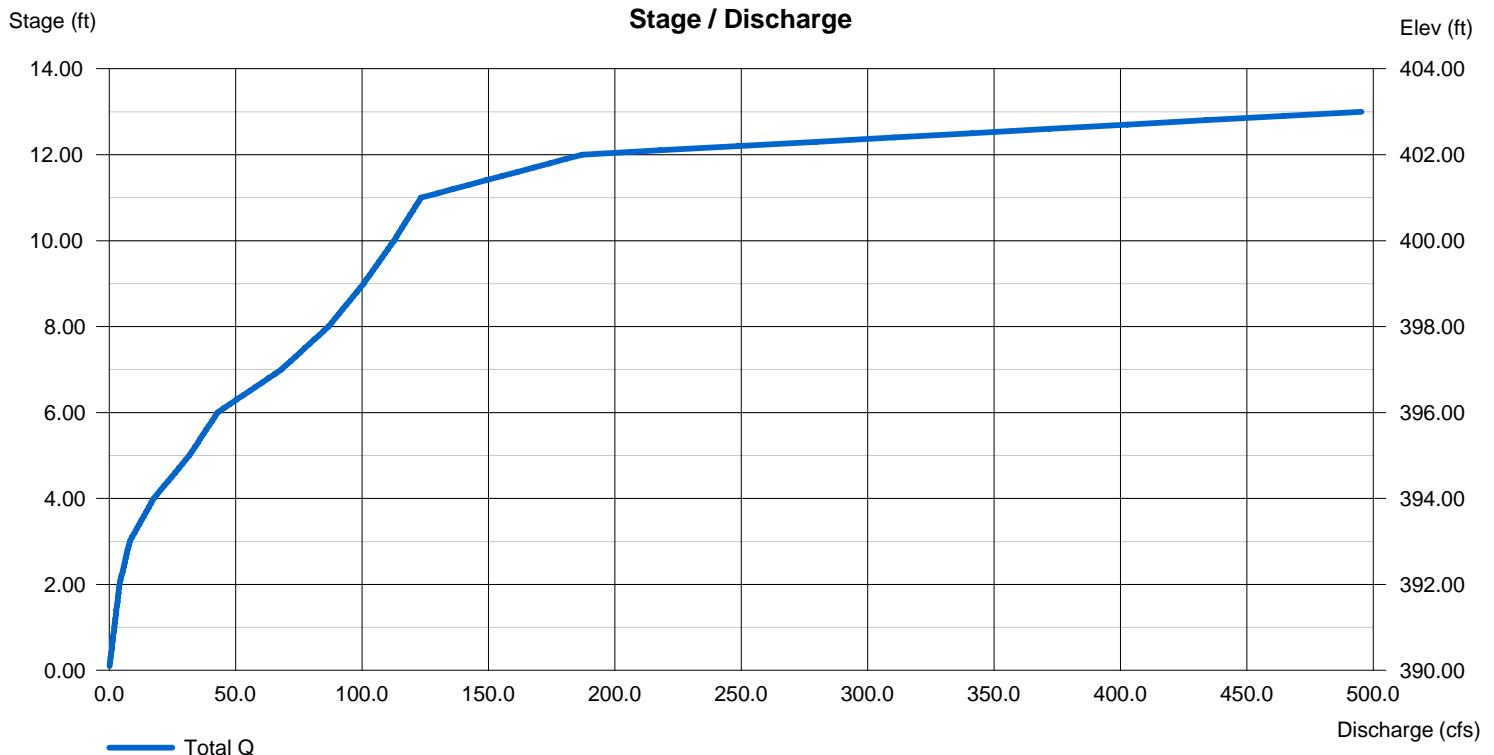
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	Inactive	Inactive	Inactive	Inactive
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	Inactive	Inactive	Inactive
Crest El. (ft)	= 401.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	Yes	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Preliminary Drainage Study for
OTAY RANCH VILLAGE R-3, R-4, & R-8

PROPOSED CONDITIONS 100-YR

RATIONAL METHOD HYDROGRAPH PROGRAM
COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

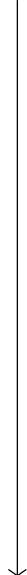
RUN DATE 7/25/2024
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 13 MIN.
6 HOUR RAINFALL 2.5 INCHES
BASIN AREA 152.74 ACRES
RUNOFF COEFFICIENT 0.682
PEAK DISCHARGE 354.38 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 13	DISCHARGE (CFS) = 0
TIME (MIN) = 26	DISCHARGE (CFS) = 15.9
TIME (MIN) = 39	DISCHARGE (CFS) = 16.3
TIME (MIN) = 52	DISCHARGE (CFS) = 17.2
TIME (MIN) = 65	DISCHARGE (CFS) = 17.7
TIME (MIN) = 78	DISCHARGE (CFS) = 18.7
TIME (MIN) = 91	DISCHARGE (CFS) = 19.4
TIME (MIN) = 104	DISCHARGE (CFS) = 20.8
TIME (MIN) = 117	DISCHARGE (CFS) = 21.6
TIME (MIN) = 130	DISCHARGE (CFS) = 23.4
TIME (MIN) = 143	DISCHARGE (CFS) = 24.5
TIME (MIN) = 156	DISCHARGE (CFS) = 27.2
TIME (MIN) = 169	DISCHARGE (CFS) = 28.9
TIME (MIN) = 182	DISCHARGE (CFS) = 33.1
TIME (MIN) = 195	DISCHARGE (CFS) = 35.9
TIME (MIN) = 208	DISCHARGE (CFS) = 43.9
TIME (MIN) = 221	DISCHARGE (CFS) = 50
TIME (MIN) = 234	DISCHARGE (CFS) = 73.4
TIME (MIN) = 247	DISCHARGE (CFS) = 119.4
TIME (MIN) = 260	DISCHARGE (CFS) = 354.38
TIME (MIN) = 273	DISCHARGE (CFS) = 58.8
TIME (MIN) = 286	DISCHARGE (CFS) = 39.4
TIME (MIN) = 299	DISCHARGE (CFS) = 30.8
TIME (MIN) = 312	DISCHARGE (CFS) = 25.8
TIME (MIN) = 325	DISCHARGE (CFS) = 22.5
TIME (MIN) = 338	DISCHARGE (CFS) = 20
TIME (MIN) = 351	DISCHARGE (CFS) = 18.2
TIME (MIN) = 364	DISCHARGE (CFS) = 16.7
TIME (MIN) = 377	DISCHARGE (CFS) = 0

Watershed Model Schematic.....	1
Hydrograph Return Period Recap.....	2
100 - Year	
Summary Report.....	3
Hydrograph Reports.....	4
Hydrograph No. 1, Manual, Storm 100yr.....	4
Hydrograph No. 2, Reservoir, Ex Basin.....	5
Pond Report - Ex Basin.....	6

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020



Legend

<u>Hyd.</u>	<u>Origin</u>	<u>Description</u>
1	Manual	Storm 100yr
2	Reservoir	Ex Basin

Hydrograph Return Period Recap

Hydroflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Manual	-----	-----	-----	-----	-----	-----	-----	-----	355.27	Storm 100yr
2	Reservoir	1	-----	-----	-----	-----	-----	-----	-----	146.55	Ex Basin
Proj. file: Detention_Q100.gpw										Thursday, 07 / 25 / 2024	

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	Manual	355.27	13	260	931,297	-----	-----	-----	Storm 100yr	
2	Reservoir	146.55	13	273	931,288	1	402.10	351,169	Ex Basin	
Detention_Q100.gpw					Return Period: 100 Year			Thursday, 07 / 25 / 2024		

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

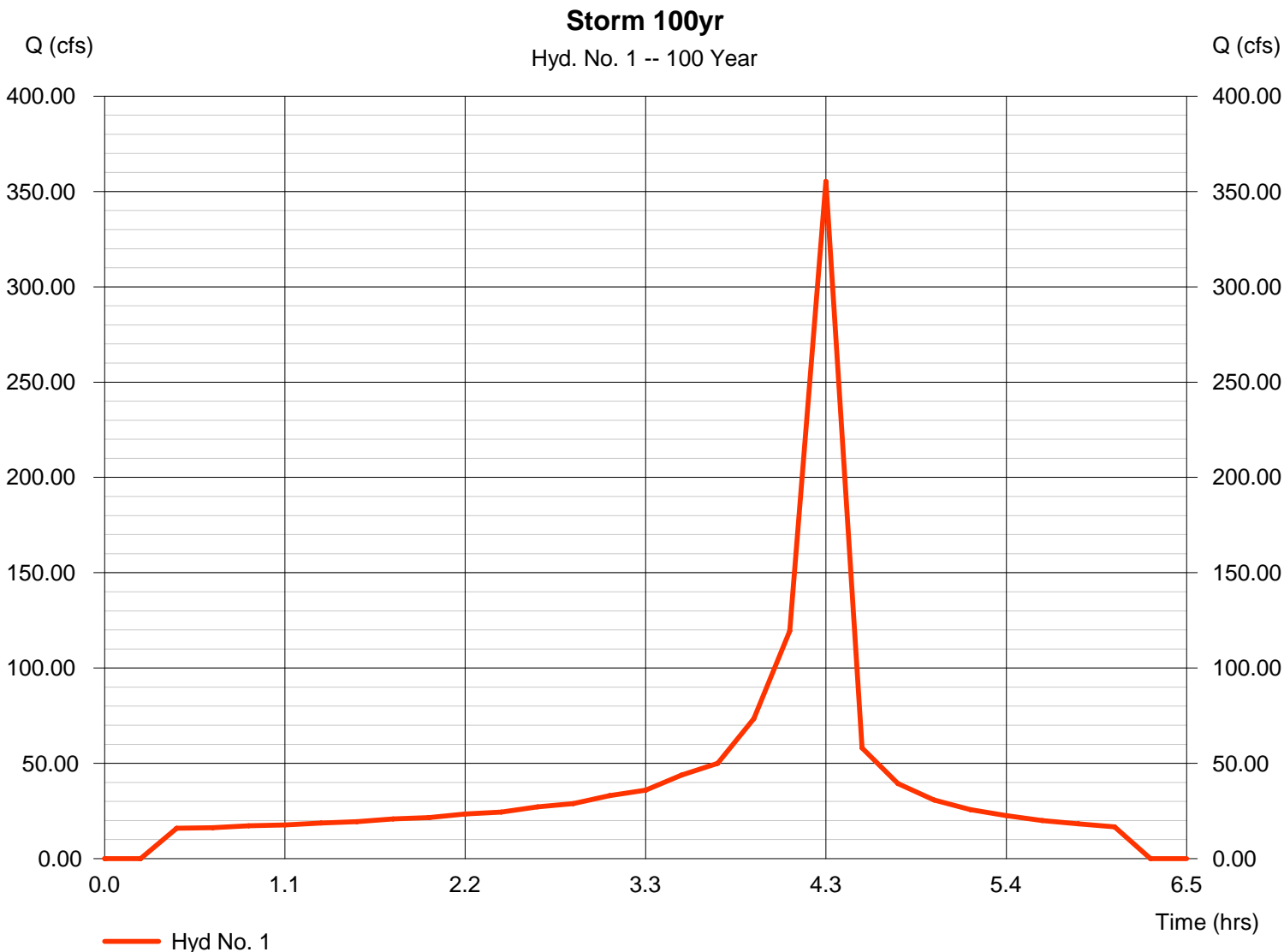
Thursday, 07 / 25 / 2024

Hyd. No. 1

Storm 100yr

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 13 min

Peak discharge = 355.27 cfs
Time to peak = 4.33 hrs
Hyd. volume = 931,297 cuft



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

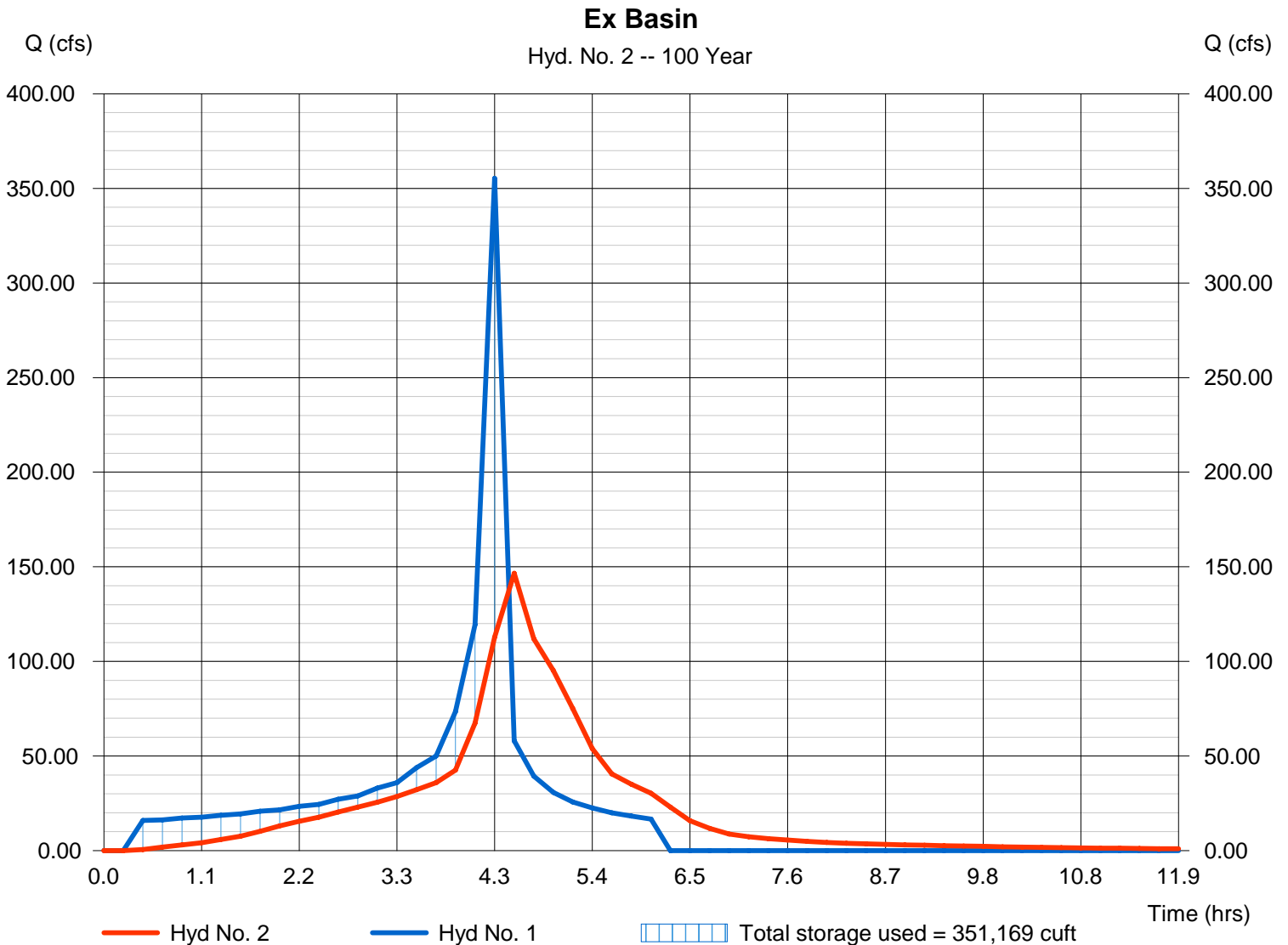
Thursday, 07 / 25 / 2024

Hyd. No. 2

Ex Basin

Hydrograph type	= Reservoir	Peak discharge	= 146.55 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.55 hrs
Time interval	= 13 min	Hyd. volume	= 931,288 cuft
Inflow hyd. No.	= 1 - Storm 100yr	Max. Elevation	= 402.10 ft
Reservoir name	= Ex Basin	Max. Storage	= 351,169 cuft

Storage Indication method used.



Pond No. 1 - Ex Basin

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 390.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	390.00	17,535	0	0
1.00	391.00	19,768	18,638	18,638
2.00	392.00	21,880	20,813	39,451
3.00	393.00	24,106	22,982	62,433
4.00	394.00	26,305	25,195	87,628
5.00	395.00	28,619	27,451	115,079
6.00	396.00	31,027	29,812	144,891
7.00	397.00	33,674	32,338	177,230
8.00	398.00	36,384	35,017	212,246
9.00	399.00	39,167	37,763	250,009
10.00	400.00	42,047	40,594	290,604
11.00	401.00	45,107	43,564	334,168
12.00	402.00	48,360	46,719	380,887
12.50	402.50	50,124	24,617	405,504
13.00	403.00	51,889	25,499	431,004

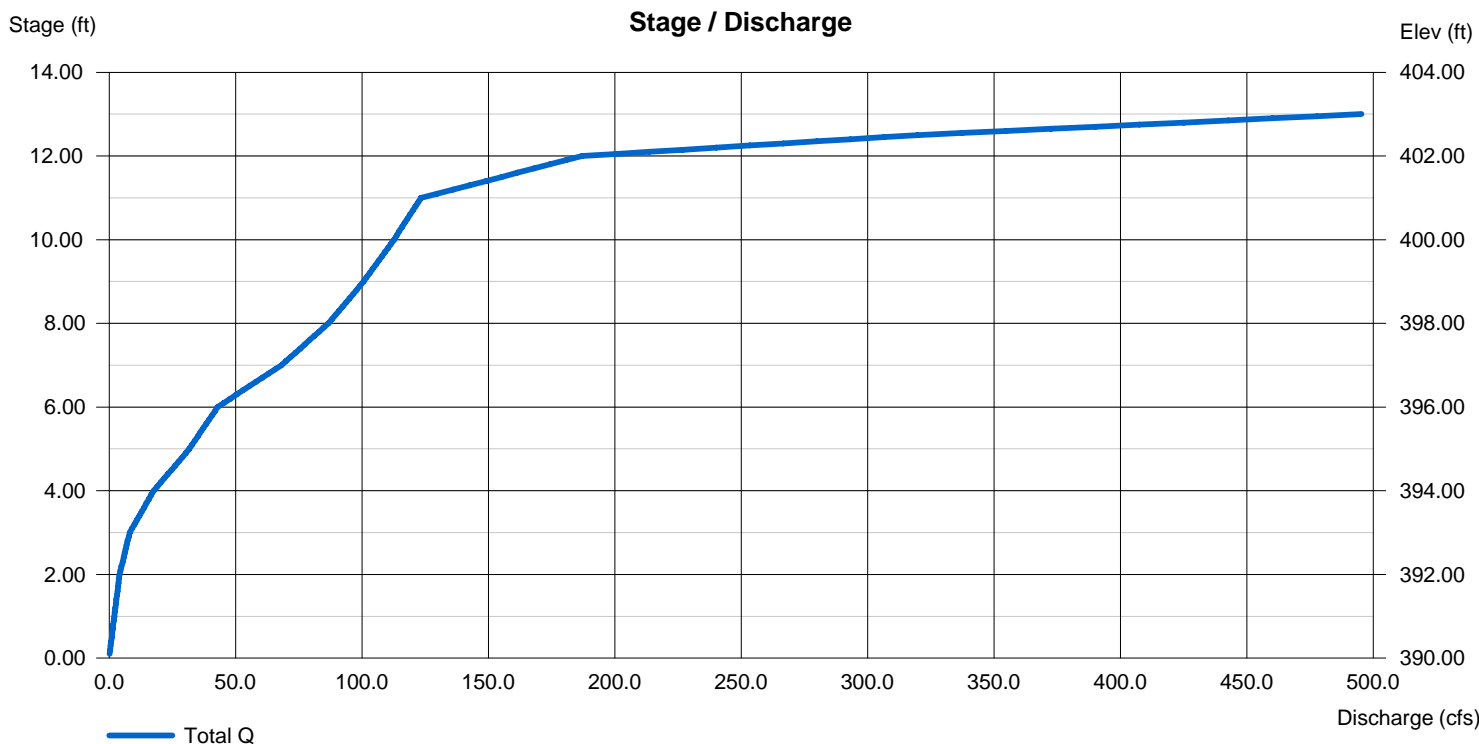
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	Inactive	Inactive	Inactive	Inactive
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	Inactive	Inactive	Inactive
Crest El. (ft)	= 401.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	Yes	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

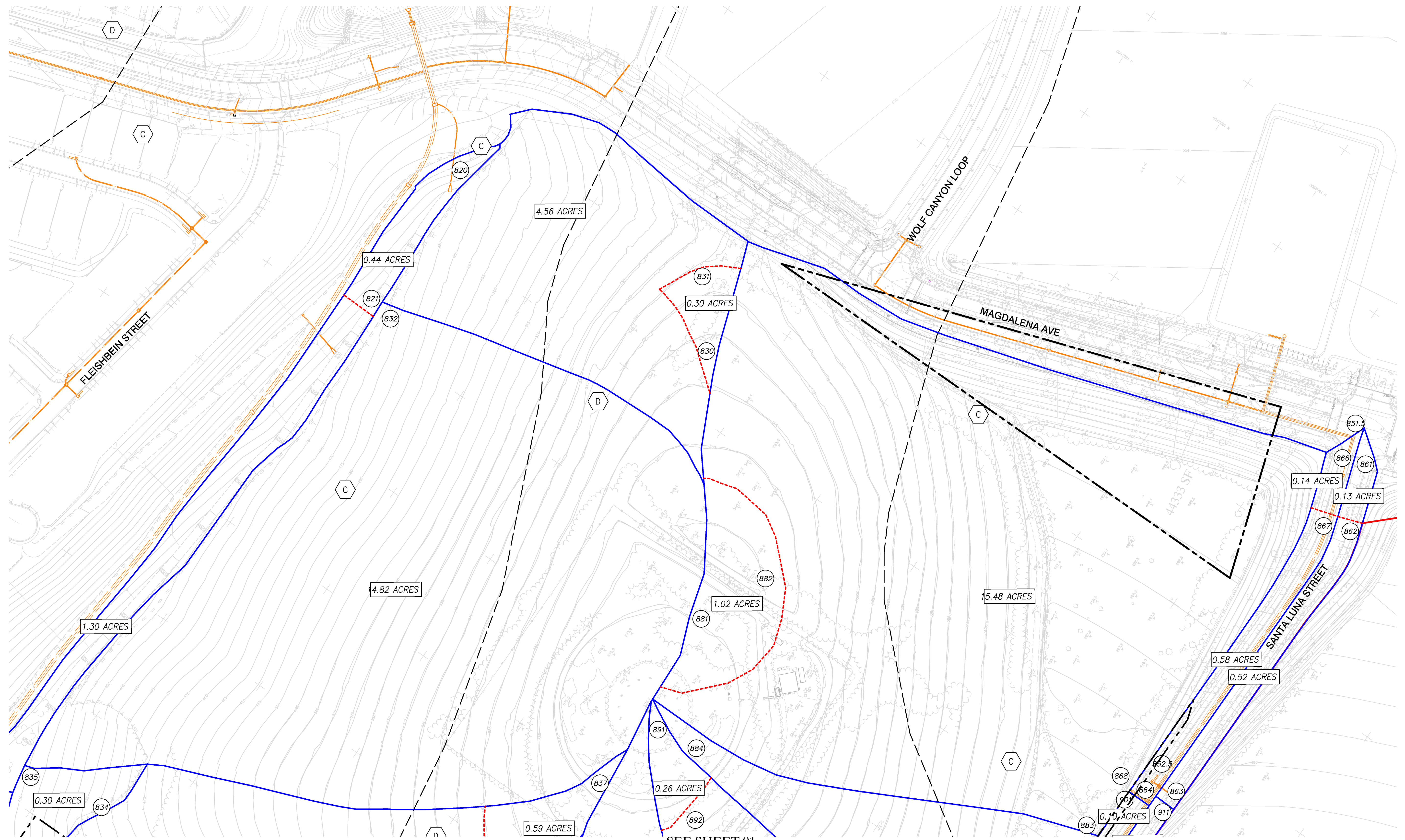
Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Preliminary Drainage Study for
OTAY RANCH VILLAGE R-3, R-4, & R-8

CHAPTER 6

HYDROLOGY MAPS

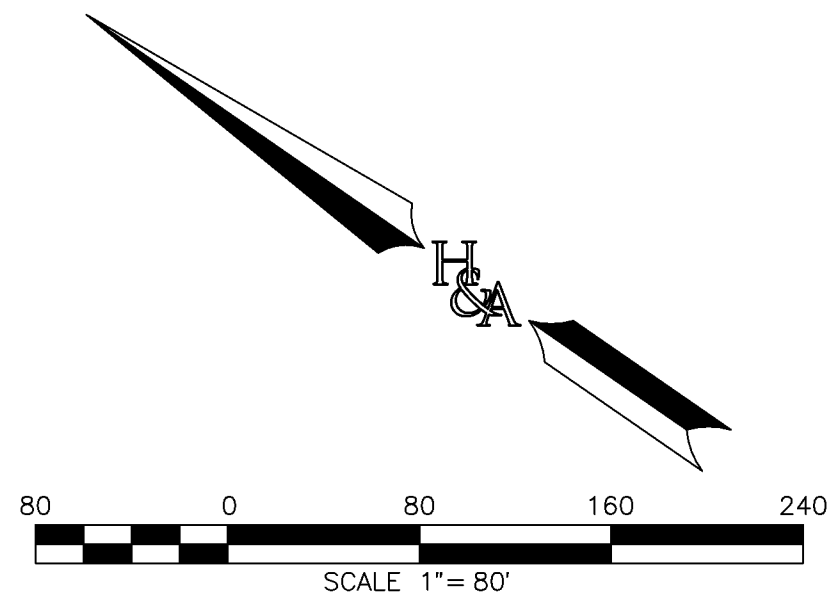


SEE SHEET 01

LEGEND

- PROJECT BOUNDARY
- DRAINAGE BOUNDARY
- - - INITIAL SUBAREA
- FLOW DIRECTION
- XX.XX ACRES AREA
- D --- HYDROLOGIC SOIL TYPE & BOUNDARY
- (XXX) NODE NUMBER
- (XXX) NODE NUMBER (ROUGH GRADING HYDROLOGY STUDY FRO OTAY RANCH VILLAGE 7 DWG. NO. 05017-15)
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN

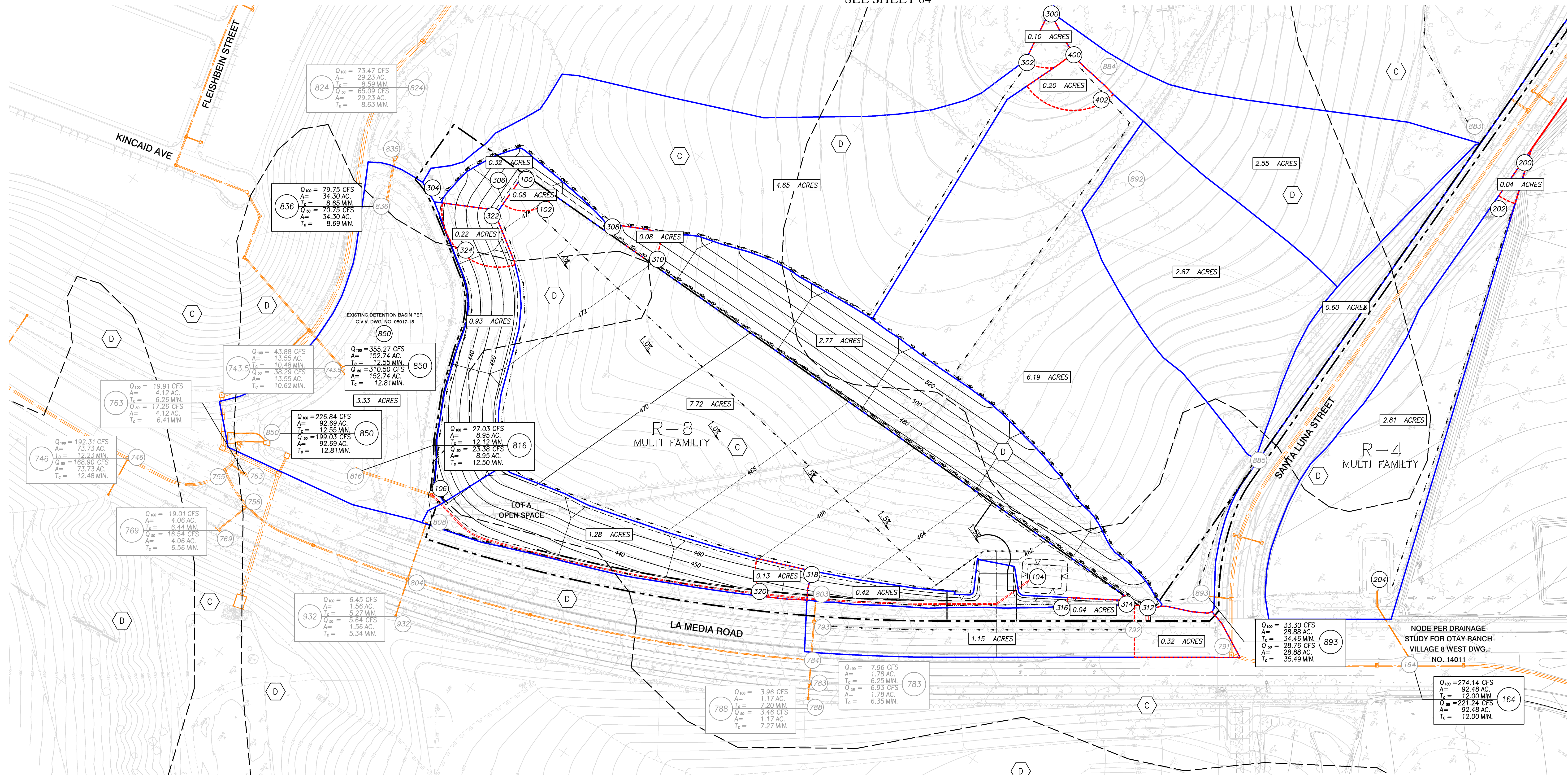
NOTE:
 PLEASE SEE HYDROLOGY REPORT FOR VILLAGE 7 ROUGH GRADING FOR FULL-SCALE MAP. RESULTS AND NODES SHOWN ON THIS EXHIBIT ARE FROM THE REPORT MENTIONED IN THIS NOTE. PEAK FLOWS AT NODE 164 ARE OBTAINED FROM THE DRAINAGE STUDY FOR VILLAGE 8 WEST. REFERENCE AES RESULTS WILL BE INCLUDED IN THIS REPORT.



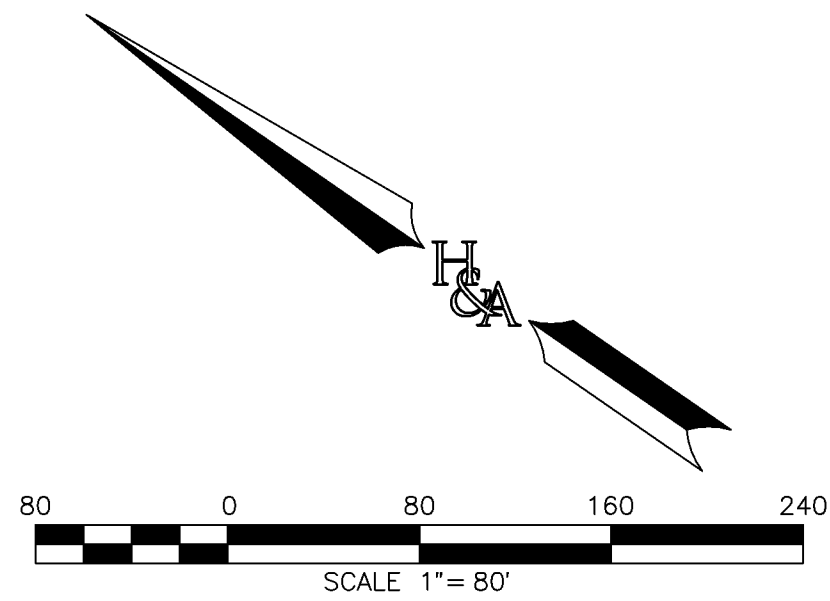
PREPARED BY:
 **HUNSAKER & ASSOCIATES**
 SAN DIEGO, INC.
 PLANNING 9707 Waples Street
 ENGINEERING San Diego, Ca 92121
 SURVEYING PH(619)558-4500 - FX(619)558-1414

HYDROLOGY MAP
EXISTING CONDITIONS
OTAY VILLAGE 7, R-3, R-4 & R-8
 CITY OF CHULA VISTA, CALIFORNIA

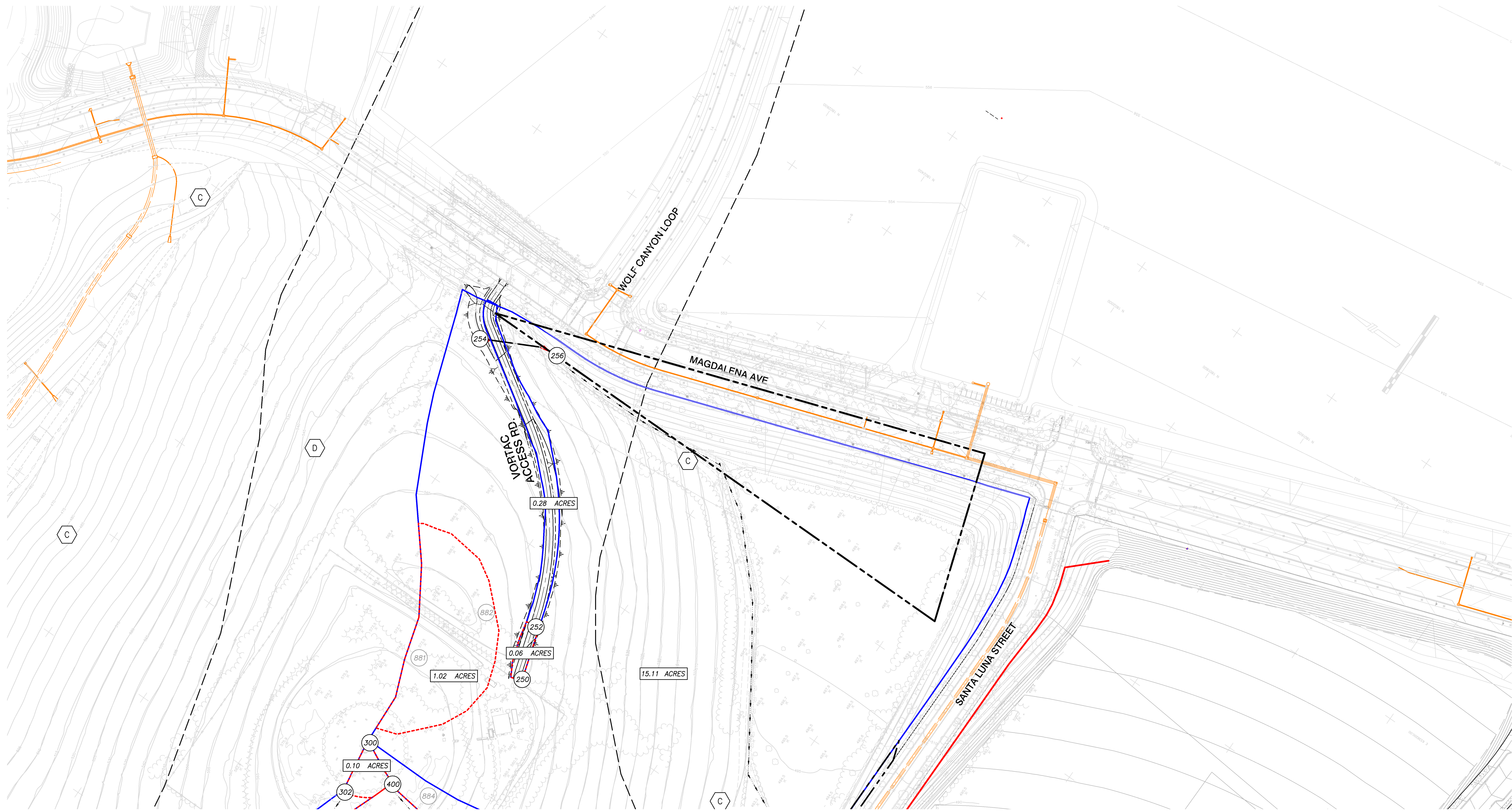
SEE SHEET 04



- LEGEND**
- PROJECT BOUNDARY
 - DRAINAGE BOUNDARY
 - INITIAL SUBAREA
 - FLOW DIRECTION
 - XX.XX ACRES AREA
 - D HYDROLOGIC SOIL TYPE
 - XXX NODE NUMBER
 - XXX NODE NUMBER (ROUGH GRADING HYDROLOGY STUDY FOR OTAY RANCH VILLAGE 7 DWG. NO. 05017-15)
 - EXISTING STORM DRAIN
 - PROPOSED STORM DRAIN

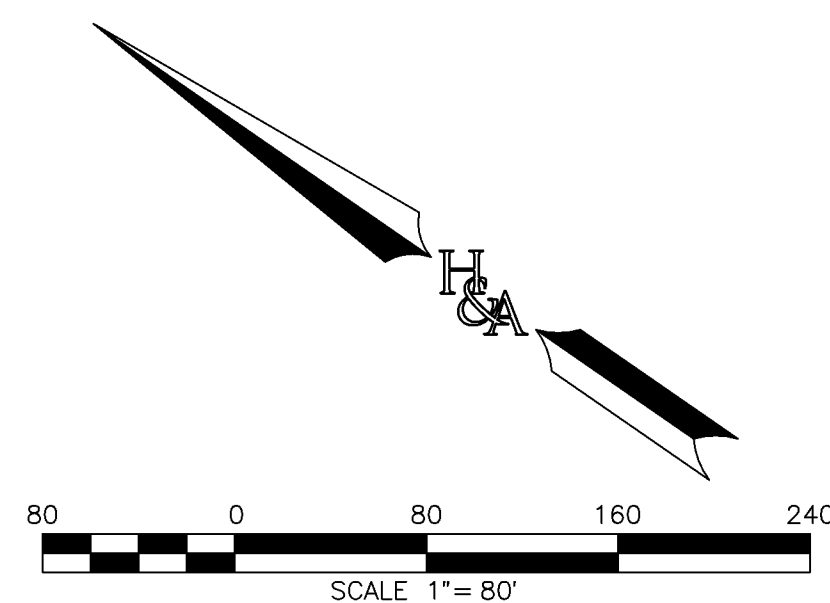


<p>PREPARED BY:</p> <p>HUNSAKER & ASSOCIATES SAN DIEGO, INC.</p> <p>PLANNING 9707 Waples Street ENGINEERING San Diego, Ca 92121 SURVEYING PH(619)558-4500 - FX(619)558-1414</p>	<p>HYDROLOGY MAP- PROPOSED CONDITIONS TM CVT 23-0001 CONCEPTUAL GRADING PLAN</p>	<p>MAP 3 OF 4</p>
	<p>OTAY VILLAGE 7, R-3, R-4 & R-8</p> <p>CITY OF CHULA VISTA, CALIFORNIA</p>	



LEGEND

- PROJECT BOUNDARY
- DRAINAGE BOUNDARY
- INITIAL SUBAREA
- FLOW DIRECTION
- XX.XX ACRES AREA
- HYDROLOGIC SOIL TYPE
- XXX NODE NUMBER
- XXX NODE NUMBER (ROUGH GRADING HYDROLOGY STUDY FRO OTAY RANCH VILLAGE 7 DWG. NO. 05017-15)
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN



SEE SHEET 03

PREPARED BY:



PLANNING 9707 Waples Street
 ENGINEERING San Diego, Ca 92121
 SURVEYING PH(619)558-4500 · FX(619)558-1414

HYDROLOGY MAP- PROPOSED CONDITIONS TM
 CVT 23-0001 CONCEPTUAL GRADING PLAN

OTAY VILLAGE 7, R-3, R-4 & R-8

CITY OF CHULA VISTA, CALIFORNIA

MAP
4
 OF
4

M.O.# 8958-3356

Preliminary Drainage Study for
Otay Ranch Village 7 R-3, R-4, & R-8

APPENDIX A

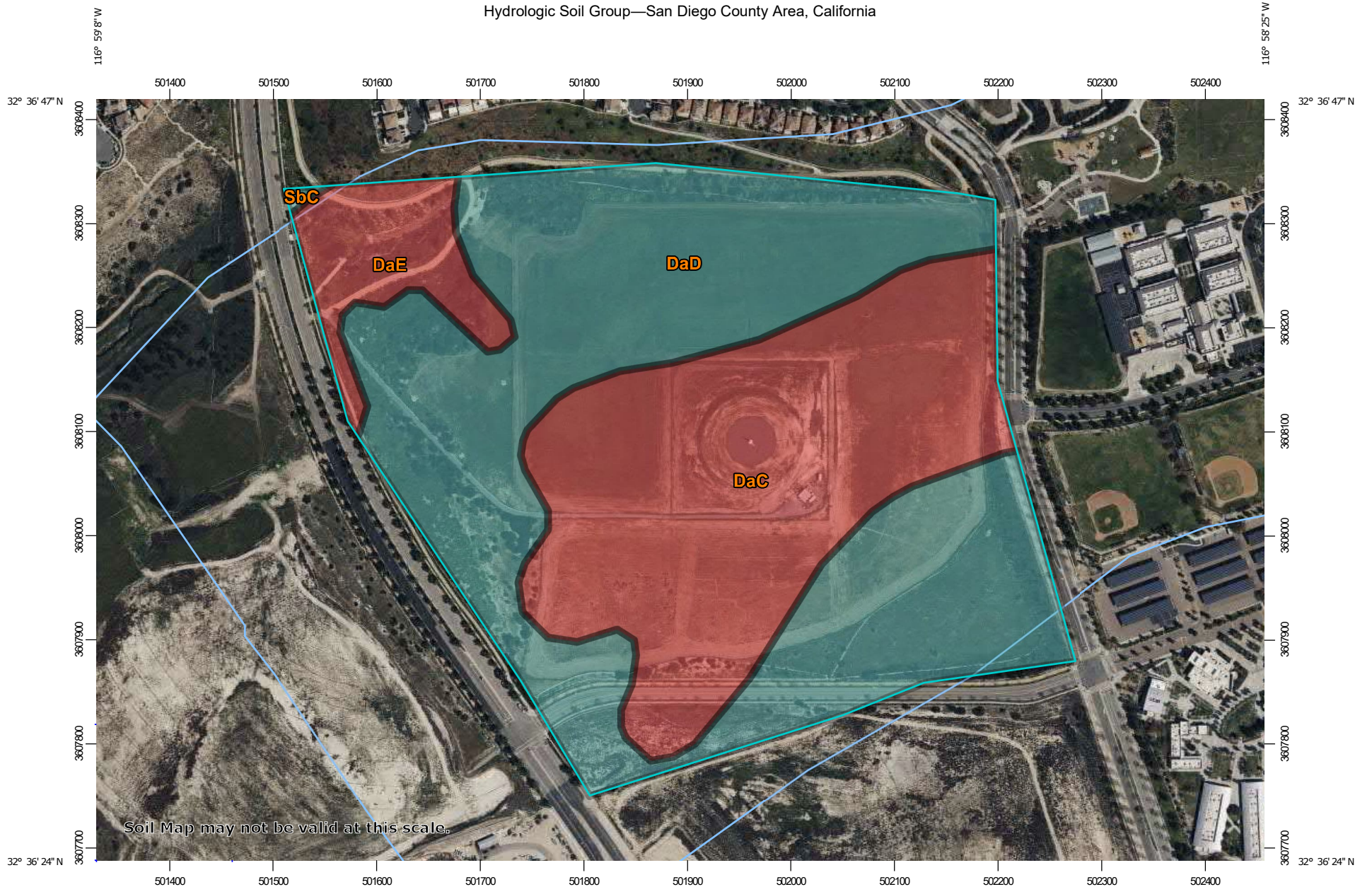
REFERENCES

Preliminary Drainage Study for
Otay Ranch Village 7 R-3, R-4, & R-8

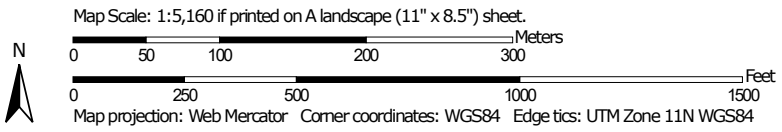
APPENDIX A-1

HYDROLOGIC SOIL GROUP MAP

Hydrologic Soil Group—San Diego County Area, California




Soil Map may not be valid at this scale.





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
DaC	Diablo clay, 2 to 9 percent slopes	D	30.0	37.5%
DaD	Diablo clay, 9 to 15 percent slopes, warm MAAT	C	44.4	55.4%
DaE	Diablo clay, 15 to 30 percent slopes	D	5.5	6.9%
SbC	Salinas clay loam, 2 to 9 percent slopes	C	0.1	0.2%
Totals for Area of Interest			80.1	100.0%

Drainage Study for
OTAY RANCH VILLAGE R-3, R-4, & R-8

APPENDIX A-2

ROUGH GRADING HYDROLOGY STUDY FOR OTAY RANCH VILLAGE 7 AND OTAY RANCH VILLAGE 8 WEST



**HUNSAKER
& ASSOCIATES**
SAN DIEGO, INC.

PLANNING
ENGINEERING
SURVEYING

IRVINE
LOS ANGELES
RIVERSIDE
SAN DIEGO

**ROUGH GRADING
HYDROLOGY STUDY
for
OTAY RANCH VILLAGE 7**

City of Chula Vista, California


Prepared for
Otay Ranch Company
610 West Ash Street
Suite 1500
San Diego, CA 92101

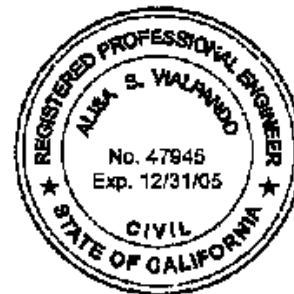
w.o. 0025-349

July 19, 2005

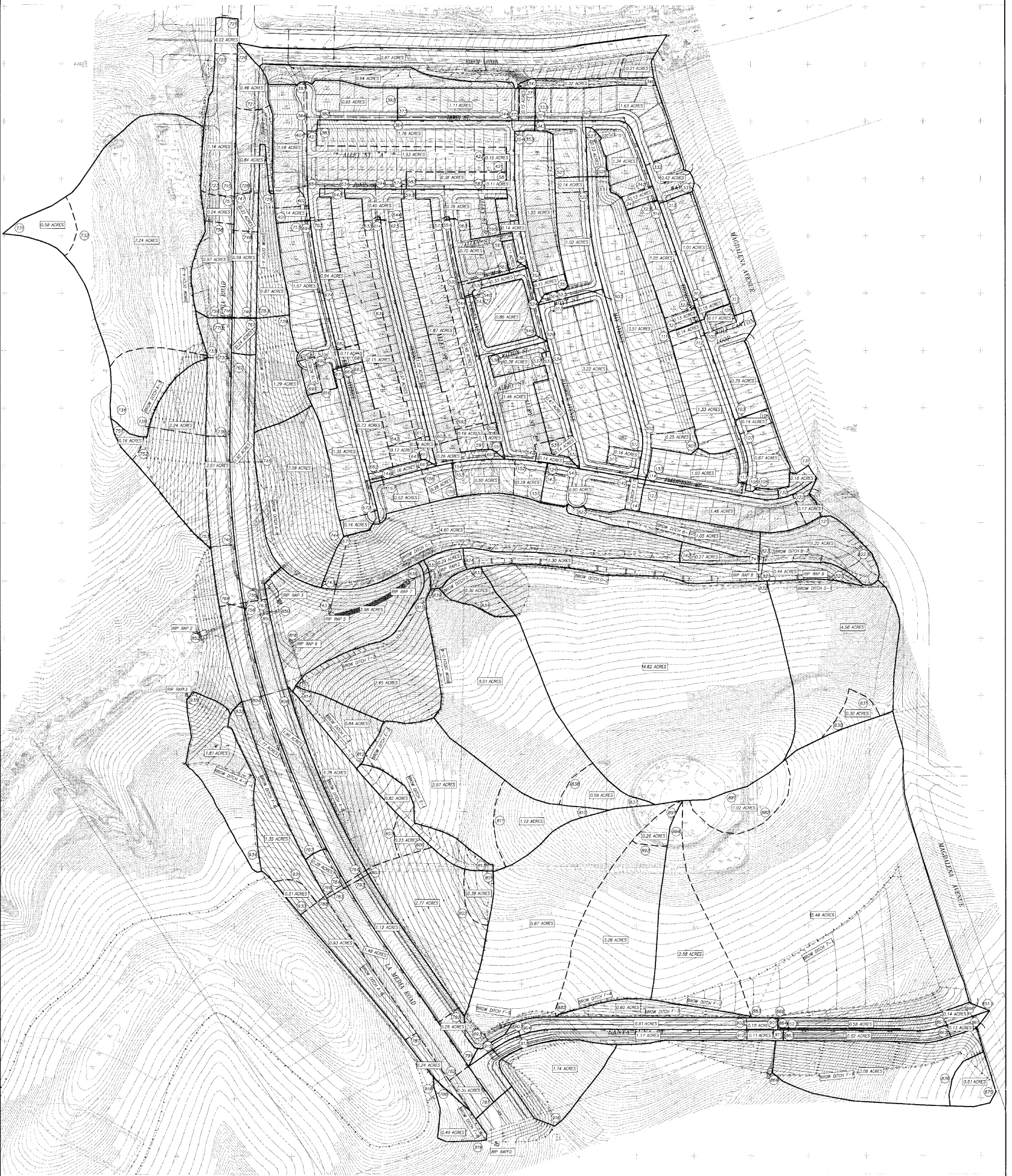
Hunsaker & Associates
San Diego, Inc.

DAVE HAMMAR
LEX WILLIMAN
ALISA VIALPANDO
DAN SMITH
RAY MARTIN


Alisa S. Vialpando/R.C.E. 47945
Vice President



10179 Huennekens St.
San Diego, CA 92121
(658) 558-4500 PH
(658) 558-1414 FX
www.HunsakerSD.com
Info@HunsakerSD.com



LEGEND
 WATERSHED BOUNDARY ———
 SUB-AREA BOUNDARY - - - - -
 NODES (1)

SCALE: 1" = 100'

PREPARED FOR:
H & A
HUNSAKER & ASSOCIATES
 ENGINEERING, SURVEYING
 11770 H. Avenue, Suite 100
 San Diego, CA 92121
 PH: (619) 550-4900 FAX: (619) 550-1614

ROUGH GRADING HYDROLOGY MAP FOR
OTAY RANCH, VILLAGE 7
 CITY OF CHULA VISTA, CALIFORNIA

SHEET
 1
 OF
 2

Preliminary Drainage Study for
Otay Ranch Village 7 R-3, R-4, & R-8

EXISTING CONDITIONS 50-YEAR For R-8

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL
(c) Copyright 1982-2003 Advanced Engineering Software (aes)
Ver. 1.5A Release Date: 01/01/2003 License ID 1239

Analysis prepared by:

HUNSAKER & ASSOCIATES - SAN DIEGO
10179 Huennekens Street
San Diego, Ca. 92121
(858) 558-4500

***** DESCRIPTION OF STUDY

* Otay Ranch Village 7 + Village 2 R-15

*

* 50 Year Hydrology Analysis

*

* w.o. 25-349

*

*

FILE NAME: H:\AES2003\0025\349\RG\V7RG50C.DAT

TIME/DATE OF STUDY: 18:09 07/18/2005

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 50.00

6-HOUR DURATION PRECIPITATION (INCHES) = 2.200

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

FLOW LENGTH(FEET) = 1276.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 2.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.58
 ESTIMATED PIPE DIAMETER(INCH) = 18.000 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.02
 PIPE TRAVEL TIME(MIN.) = 3.81 Tc(MIN.) = 7.57
 LONGEST FLOWPATH FROM NODE 741.00 TO NODE 743.00 = 1376.00
 FEET.

FLOW PROCESS FROM NODE 742.00 TO NODE 743.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====
===

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.436
 *USER SPECIFIED(SUBAREA):
 RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) = 0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6500
 SUBAREA AREA(ACRES) = 4.60 SUBAREA RUNOFF(CFS) = 13.26
 TOTAL AREA(ACRES) = 4.87 TOTAL RUNOFF(CFS) = 14.04
 TC(MIN.) = 7.57

FLOW PROCESS FROM NODE 743.00 TO NODE 743.00 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.) = 7.57
 RAINFALL INTENSITY(INCH/HR) = 4.44
 TOTAL STREAM AREA(ACRES) = 4.87
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 14.04

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	26.97	10.57	3.576	8.68
2	14.04	7.57	4.436	4.87

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	35.78	7.57	4.436
2	38.29	10.57	3.576

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 38.29 Tc(MIN.) = 10.57
TOTAL AREA(ACRES) = 13.55
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 743.00 = 2384.00 FEET.

FLOW PROCESS FROM NODE 743.00 TO NODE 743.50 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====
===

ELEVATION DATA: UPSTREAM(FEET) = 420.00 DOWNSTREAM(FEET) = 391.00
FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 33.70
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 38.29
PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 10.62
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 743.50 = 2484.00 FEET.

FLOW PROCESS FROM NODE 743.50 TO NODE 743.50 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

=====
===

FLOW PROCESS FROM NODE 311.00 TO NODE 312.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

FLOW PROCESS FROM NODE 753.00 TO NODE 746.00 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.) = 3.95
RAINFALL INTENSITY(INCH/HR) = 5.80
TOTAL STREAM AREA(ACRES) = 2.40
PEAK FLOW RATE(CFS) AT CONFLUENCE = 9.00

** CONFLUENCE DATA **

Table with 5 columns: STREAM NUMBER, RUNOFF (CFS), Tc (MIN.), INTENSITY (INCH/HOUR), AREA (ACRE). Rows for stream 1 and 2.

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

** PEAK FLOW RATE TABLE **

Table with 4 columns: STREAM NUMBER, RUNOFF (CFS), Tc (MIN.), INTENSITY (INCH/HOUR). Rows for stream 1 and 2.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 168.90 Tc(MIN.) = 12.48
TOTAL AREA(ACRES) = 73.73
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 746.00 = 3662.00 FEET.

FLOW PROCESS FROM NODE 746.00 TO NODE 755.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 400.00 DOWNSTREAM(FEET) = 398.00
FLOW LENGTH(FEET) = 238.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 42.5 INCHES

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====
===

*USER SPECIFIED(SUBAREA):
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 65.00
UPSTREAM ELEVATION(FEET) = 463.00
DOWNSTREAM ELEVATION(FEET) = 462.35
ELEVATION DIFFERENCE(FEET) = 0.65
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.789
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 60.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.796
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 1.36
TOTAL AREA(ACRES) = 0.26 TOTAL RUNOFF(CFS) = 1.36

FLOW PROCESS FROM NODE 792.00 TO NODE 793.00 IS CODE = 61

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STANDARD CURB SECTION USED)<<<<<

=====
===

UPSTREAM ELEVATION(FEET) = 461.00 DOWNSTREAM ELEVATION(FEET) =
442.00
STREET LENGTH(FEET) = 577.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 44.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 22.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) =
0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.01
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.32
HALFSTREET FLOOD WIDTH(FEET) = 9.71
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.78
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.21
STREET FLOW TRAVEL TIME(MIN.) = 2.54 Tc(MIN.) = 5.33

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.560
 *USER SPECIFIED(SUBAREA):
 NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) = 0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.859
 SUBAREA AREA(ACRES) = 1.12 SUBAREA RUNOFF(CFS) = 5.29
 TOTAL AREA(ACRES) = 1.38 PEAK FLOW RATE(CFS) = 6.59

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 12.03
 FLOW VELOCITY(FEET/SEC.) = 4.21 DEPTH*VELOCITY(FT*FT/SEC.) = 1.55
 LONGEST FLOWPATH FROM NODE 791.00 TO NODE 793.00 = 642.00
 FEET.

 FLOW PROCESS FROM NODE 793.00 TO NODE 793.00 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.) = 5.33
 RAINFALL INTENSITY(INCH/HR) = 5.56
 TOTAL STREAM AREA(ACRES) = 1.38
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.59

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	11.91	4.39	5.796	3.16
2	6.59	5.33	5.560	1.38

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	17.34	4.39	5.796
2	18.02	5.33	5.560

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 18.02 Tc(MIN.) = 5.33
 TOTAL AREA(ACRES) = 4.54
 LONGEST FLOWPATH FROM NODE 791.00 TO NODE 793.00 = 642.00
 FEET.

ELEVATION DIFFERENCE(FEET) = 0.65
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.789
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 60.00
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.796
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 1.57
 TOTAL AREA(ACRES) = 0.30 TOTAL RUNOFF(CFS) = 1.57

```

*****
***
FLOW PROCESS FROM NODE      782.00 TO NODE      783.00 IS CODE = 61
-----
----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STANDARD CURB SECTION USED)<<<<<
=====
===
UPSTREAM ELEVATION(FEET) = 463.00  DOWNSTREAM ELEVATION(FEET) =
442.00
STREET LENGTH(FEET) = 769.00  CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 44.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 22.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) =
0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.40
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.34
HALFSTREET FLOOD WIDTH(FEET) = 10.51
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.60
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.21
STREET FLOW TRAVEL TIME(MIN.) = 3.56  Tc(MIN.) = 6.35
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.967
*USER SPECIFIED(SUBAREA):
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7600
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.784
SUBAREA AREA(ACRES) = 1.48  SUBAREA RUNOFF(CFS) = 5.59
TOTAL AREA(ACRES) = 1.78  PEAK FLOW RATE(CFS) = 6.93

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.38  HALFSTREET FLOOD WIDTH(FEET) = 12.75
  
```

```
FLOW VELOCITY(FEET/SEC.) = 3.97 DEPTH*VELOCITY(FT*FT/SEC.) = 1.51
LONGEST FLOWPATH FROM NODE 781.00 TO NODE 783.00 = 834.00
FEET.
```

```
FLOW PROCESS FROM NODE 783.00 TO NODE 784.00 IS CODE = 1
```

```
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

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

```
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.35
RAINFALL INTENSITY(INCH/HR) = 4.97
TOTAL STREAM AREA(ACRES) = 1.78
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.93
```

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

```
FLOW PROCESS FROM NODE 786.00 TO NODE 787.00 IS CODE = 21
```

```
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

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

```
*USER SPECIFIED(SUBAREA):
PERENNIAL GRASS FAIR COVER RUNOFF COEFFICIENT = .6500
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 250.00
UPSTREAM ELEVATION(FEET) = 470.00
DOWNSTREAM ELEVATION(FEET) = 462.00
ELEVATION DIFFERENCE(FEET) = 8.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.497
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.453
SUBAREA RUNOFF(CFS) = 0.85
TOTAL AREA(ACRES) = 0.24 TOTAL RUNOFF(CFS) = 0.85
```

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

```
FLOW PROCESS FROM NODE 787.00 TO NODE 788.00 IS CODE = 31
```

```
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

```
=====
===
ELEVATION DATA: UPSTREAM(FEET) = 462.00 DOWNSTREAM(FEET) = 443.00
FLOW LENGTH(FEET) = 570.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 2.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.35
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.85
PIPE TRAVEL TIME(MIN.) = 1.78 Tc(MIN.) = 7.27
LONGEST FLOWPATH FROM NODE 786.00 TO NODE 788.00 = 820.00
FEET.
```

```
*****
***
FLOW PROCESS FROM NODE 787.00 TO NODE 788.00 IS CODE = 81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
===
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.552
*USER SPECIFIED(SUBAREA):
PERENNIAL GRASS FAIR COVER RUNOFF COEFFICIENT = .6500
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6500
SUBAREA AREA(ACRES) = 0.93 SUBAREA RUNOFF(CFS) = 2.75
TOTAL AREA(ACRES) = 1.17 TOTAL RUNOFF(CFS) = 3.46
TC(MIN.) = 7.27
```

```
*****
***
FLOW PROCESS FROM NODE 788.00 TO NODE 784.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
=====
===
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 7.27
RAINFALL INTENSITY(INCH/HR) = 4.55
TOTAL STREAM AREA(ACRES) = 1.17
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.46

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
```


FLOW PROCESS FROM NODE 931.00 TO NODE 932.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====
===

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.558
*USER SPECIFIED(SUBAREA):
PERENNIAL GRASS FAIR COVER RUNOFF COEFFICIENT = .6500
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6500
SUBAREA AREA(ACRES) = 1.35 SUBAREA RUNOFF(CFS) = 4.88
TOTAL AREA(ACRES) = 1.56 TOTAL RUNOFF(CFS) = 5.64
TC(MIN.) = 5.34

FLOW PROCESS FROM NODE 932.00 TO NODE 804.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====
===

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.34
RAINFALL INTENSITY(INCH/HR) = 5.56
TOTAL STREAM AREA(ACRES) = 1.56
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.64

FLOW PROCESS FROM NODE 806.00 TO NODE 807.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====
===

*USER SPECIFIED(SUBAREA):
PASTURE OR RANGE LAND FAIR COVER RUNOFF COEFFICIENT = .6500

S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 40.00
UPSTREAM ELEVATION(FEET) = 495.00
DOWNSTREAM ELEVATION(FEET) = 485.00
ELEVATION DIFFERENCE(FEET) = 10.00

SUBAREA AREA(ACRES) = 1.77 SUBAREA RUNOFF(CFS) = 7.10
TOTAL AREA(ACRES) = 2.05 PEAK FLOW RATE(CFS) = 8.23

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.39 HALFSTREET FLOOD WIDTH(FEET) = 13.07
FLOW VELOCITY(FEET/SEC.) = 4.50 DEPTH*VELOCITY(FT*FT/SEC.) = 1.75
LONGEST FLOWPATH FROM NODE 766.00 TO NODE 769.00 = 1058.00

FEET.

```
*****  
***  
FLOW PROCESS FROM NODE 770.00 TO NODE 769.00 IS CODE = 81  
-----  
-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
=====
```

```
===  
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.865  
*USER SPECIFIED(SUBAREA):  
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .8500  
S.C.S. CURVE NUMBER (AMC II) = 0  
AREA-AVERAGE RUNOFF COEFFICIENT = 0.8374  
SUBAREA AREA(ACRES) = 2.01 SUBAREA RUNOFF(CFS) = 8.31  
TOTAL AREA(ACRES) = 4.06 TOTAL RUNOFF(CFS) = 16.54  
TC(MIN.) = 6.56
```

```
*****  
***  
FLOW PROCESS FROM NODE 769.00 TO NODE 756.00 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.) = 6.56  
RAINFALL INTENSITY(INCH/HR) = 4.86  
TOTAL STREAM AREA(ACRES) = 4.06  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 16.54
```

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	38.30	6.94	4.690	11.06
2	16.54	6.56	4.865	4.06

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

SUBAREA AREA(ACRES) = 1.92 SUBAREA RUNOFF(CFS) = 8.06
TOTAL AREA(ACRES) = 2.16 PEAK FLOW RATE(CFS) = 9.03

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.40 HALFSTREET FLOOD WIDTH(FEET) = 13.63
FLOW VELOCITY(FEET/SEC.) = 4.57 DEPTH*VELOCITY(FT*FT/SEC.) = 1.82
LONGEST FLOWPATH FROM NODE 761.00 TO NODE 763.00 = 978.00

FEET.

```
*****
***
FLOW PROCESS FROM NODE 764.00 TO NODE 763.00 IS CODE = 81
-----
----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
===
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.936
*USER SPECIFIED(SUBAREA):
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .8500
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.8485
SUBAREA AREA(ACRES) = 1.96 SUBAREA RUNOFF(CFS) = 8.22
TOTAL AREA(ACRES) = 4.12 TOTAL RUNOFF(CFS) = 17.26
TC(MIN.) = 6.41
*****
```

```
***
FLOW PROCESS FROM NODE 763.00 TO NODE 755.00 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.) = 6.41
RAINFALL INTENSITY(INCH/HR) = 4.94
TOTAL STREAM AREA(ACRES) = 4.12
PEAK FLOW RATE(CFS) AT CONFLUENCE = 17.26

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 205.95 12.79 3.162 88.85
2 17.26 6.41 4.936 4.12

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	120.51	6.41	4.936
2	217.00	12.79	3.162

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 217.00 Tc(MIN.) = 12.79

TOTAL AREA(ACRES) = 92.97

LONGEST FLOWPATH FROM NODE 321.00 TO NODE 755.00 = 3900.00

FEET.

```
*****
***
FLOW PROCESS FROM NODE 755.00 TO NODE 850.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
===
ELEVATION DATA: UPSTREAM(FEET) = 391.49 DOWNSTREAM(FEET) = 390.00
FLOW LENGTH(FEET) = 150.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 45.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.19
ESTIMATED PIPE DIAMETER(INCH) = 57.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 217.00
PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 12.97
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 850.00 = 4050.00
FEET.
*****
```

```
***
FLOW PROCESS FROM NODE 850.00 TO NODE 850.00 IS CODE = 10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
=====
===
```

```
*****
***
FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 7
-----
>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
```


FLOW PROCESS FROM NODE 834.00 TO NODE 833.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====
===

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.136
*USER SPECIFIED(SUBAREA):
IRRIGATED PASTURE FAIR COVER RUNOFF COEFFICIENT = .6000
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
SUBAREA AREA(ACRES) = 0.30 SUBAREA RUNOFF(CFS) = 0.74
TOTAL AREA(ACRES) = 19.93 TOTAL RUNOFF(CFS) = 49.46
TC(MIN.) = 8.44

FLOW PROCESS FROM NODE 833.00 TO NODE 824.00 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.) = 8.44
RAINFALL INTENSITY(INCH/HR) = 4.14
TOTAL STREAM AREA(ACRES) = 19.93
PEAK FLOW RATE(CFS) AT CONFLUENCE = 49.46

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	15.93	8.19	4.215	9.01
2	49.46	8.44	4.136	19.93

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	63.96	8.19	4.215
2	65.09	8.44	4.136

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 65.09 Tc(MIN.) = 8.44

```
TOTAL AREA(ACRES) =      28.94
LONGEST FLOWPATH FROM NODE      321.00 TO NODE      824.00 = 5284.00
FEET.
```

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

```
FLOW PROCESS FROM NODE      824.00 TO NODE      835.00 IS CODE = 31
-----
```

```
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

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

```
ELEVATION DATA: UPSTREAM(FEET) = 422.00 DOWNSTREAM(FEET) = 421.00
FLOW LENGTH(FEET) = 116.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 28.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.15
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 65.09
PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 8.63
LONGEST FLOWPATH FROM NODE      321.00 TO NODE      835.00 = 5400.00
FEET.
```

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

```
FLOW PROCESS FROM NODE      824.00 TO NODE      835.00 IS CODE = 81
-----
```

```
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

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

```
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.077
*USER SPECIFIED(SUBAREA):
RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5448
SUBAREA AREA(ACRES) = 0.29 SUBAREA RUNOFF(CFS) = 0.77
TOTAL AREA(ACRES) = 29.23 TOTAL RUNOFF(CFS) = 65.09
TC(MIN.) = 8.63
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

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

```
FLOW PROCESS FROM NODE      835.00 TO NODE      835.00 IS CODE = 1
-----
```

```
-----
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

PIPE-FLOW(CFS) = 2.05
 PIPE TRAVEL TIME(MIN.) = 1.17 Tc(MIN.) = 5.63
 LONGEST FLOWPATH FROM NODE 837.00 TO NODE 839.00 = 951.00
 FEET.

FLOW PROCESS FROM NODE 838.00 TO NODE 839.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====
 ===

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.369
 *USER SPECIFIED(SUBAREA):
 PASTURE OR RANGE LAND FAIR COVER RUNOFF COEFFICIENT = .6000
 S.C.S. CURVE NUMBER (AMC II) = 0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
 SUBAREA AREA(ACRES) = 5.01 SUBAREA RUNOFF(CFS) = 16.14
 TOTAL AREA(ACRES) = 5.60 TOTAL RUNOFF(CFS) = 18.04
 TC(MIN.) = 5.63

FLOW PROCESS FROM NODE 839.00 TO NODE 835.00 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.) = 5.63
 RAINFALL INTENSITY(INCH/HR) = 5.37
 TOTAL STREAM AREA(ACRES) = 5.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 18.04

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	65.09	8.63	4.077	29.23
2	18.04	5.63	5.369	5.60

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	65.09	8.63	4.077
2	18.04	5.63	5.369

1	67.47	5.63	5.369
2	78.79	8.63	4.077

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 78.79 Tc(MIN.) = 8.63
TOTAL AREA(ACRES) = 34.83
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 835.00 = 5400.00
FEET.

FLOW PROCESS FROM NODE 835.00 TO NODE 836.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====
===

ELEVATION DATA: UPSTREAM(FEET) = 420.00 DOWNSTREAM(FEET) = 414.00
FLOW LENGTH(FEET) = 103.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.92
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 78.79
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 8.71
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 836.00 = 5503.00
FEET.

FLOW PROCESS FROM NODE 836.00 TO NODE 155.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====
===

ELEVATION DATA: UPSTREAM(FEET) = 415.00 DOWNSTREAM(FEET) = 405.00
FLOW LENGTH(FEET) = 97.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 27.16
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 78.79
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 8.77
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 155.00 = 5600.00
FEET.

PASTURE OR RANGE LAND FAIR COVER RUNOFF COEFFICIENT = .6500
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6144
SUBAREA AREA(ACRES) = 0.84 SUBAREA RUNOFF(CFS) = 2.98
TOTAL AREA(ACRES) = 5.75 TOTAL RUNOFF(CFS) = 19.31
TC(MIN.) = 5.48

FLOW PROCESS FROM NODE 815.00 TO NODE 814.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====
===

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.467
*USER SPECIFIED(SUBAREA):
PASTURE OR RANGE LAND FAIR COVER RUNOFF COEFFICIENT = .6500
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6257
SUBAREA AREA(ACRES) = 2.65 SUBAREA RUNOFF(CFS) = 9.42
TOTAL AREA(ACRES) = 8.40 TOTAL RUNOFF(CFS) = 28.73
TC(MIN.) = 5.48

FLOW PROCESS FROM NODE 814.00 TO NODE 816.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====
===

ELEVATION DATA: UPSTREAM(FEET) = 405.00 DOWNSTREAM(FEET) = 390.00
FLOW LENGTH(FEET) = 151.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 20.63
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 28.73
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 5.60
LONGEST FLOWPATH FROM NODE 810.00 TO NODE 816.00 = 1161.00 FEET.

FLOW PROCESS FROM NODE 816.00 TO NODE 850.00 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.) = 5.60
RAINFALL INTENSITY(INCH/HR) = 5.39
TOTAL STREAM AREA(ACRES) = 8.40
PEAK FLOW RATE(CFS) AT CONFLUENCE = 28.73

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	314.32	12.97	3.134	144.33
2	28.73	5.60	5.389	8.40

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	164.38	5.60	5.389
2	331.03	12.97	3.134

Total Q50 inflow to the existing detention basin at 850 Node

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 331.03 Tc(MIN.) = 12.97
TOTAL AREA(ACRES) = 152.73

LONGEST FLOWPATH FROM NODE 321.00 TO NODE 850.00 = 5972.00 FEET.

FLOW PROCESS FROM NODE 850.00 TO NODE 850.00 IS CODE = 7

>>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

Total Q50 outflow from the existing detention basin to node 851

=====
===

USER-SPECIFIED VALUES ARE AS FOLLOWS:

TC(MIN) = 13.28 RAIN INTENSITY(INCH/HOUR) = 3.09
TOTAL AREA(ACRES) = 143.81 TOTAL RUNOFF(CFS) = 151.20

FLOW PROCESS FROM NODE 850.00 TO NODE 851.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.41

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	19.89	34.11	1.680	19.68
2	10.41	6.42	4.931	3.52

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	14.16	6.42	4.931
2	23.44	34.11	1.680

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 23.44 Tc(MIN.) = 34.11

TOTAL AREA(ACRES) = 23.20

LONGEST FLOWPATH FROM NODE 881.00 TO NODE 885.00 = 9217.00
FEET.

```
*****
***
FLOW PROCESS FROM NODE 885.00 TO NODE 893.00 IS CODE = 81
-----
----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
===
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.680
*USER SPECIFIED(SUBAREA):
OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .6000
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6010
SUBAREA AREA(ACRES) = 5.67 SUBAREA RUNOFF(CFS) = 5.72
TOTAL AREA(ACRES) = 28.87 TOTAL RUNOFF(CFS) = 29.15
TC(MIN.) = 34.11
```

```
***
FLOW PROCESS FROM NODE 893.00 TO NODE 915.00 IS CODE = 11
-----
----
>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<
=====
===
```

** MAIN STREAM CONFLUENCE DATA **

Preliminary Drainage Study for
Otay Ranch Village 7 R-3, R-4, & R-8

EXISTING CONDITIONS 100-YEAR For R-8

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL
(c) Copyright 1982-2003 Advanced Engineering Software (aes)
Ver. 1.5A Release Date: 01/01/2003 License ID 1239

Analysis prepared by:

HUNSAKER & ASSOCIATES - SAN DIEGO
10179 Huennekens Street
San Diego, Ca. 92121
(858) 558-4500

***** DESCRIPTION OF STUDY

* Otay Ranch Village 7 + Village 2 R-15
*
* 100 Year Hydrology Analysis
*
* July 13, 2005
*

*

FILE NAME: H:\AES2003\0025\349\RG\V7RG100.DAT
TIME/DATE OF STUDY: 18:19 07/18/2005

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 2.500
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

FLOW LENGTH(FEET) = 1276.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.80
 ESTIMATED PIPE DIAMETER(INCH) = 18.000 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.16
 PIPE TRAVEL TIME(MIN.) = 3.67 Tc(MIN.) = 7.43
 LONGEST FLOWPATH FROM NODE 741.00 TO NODE 743.00 = 1376.00
 FEET.

FLOW PROCESS FROM NODE 742.00 TO NODE 743.00 IS CODE = 81

 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====
 ==

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.103
 *USER SPECIFIED(SUBAREA):
 RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) = 0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6500
 SUBAREA AREA(ACRES) = 4.60 SUBAREA RUNOFF(CFS) = 15.26
 TOTAL AREA(ACRES) = 4.87 TOTAL RUNOFF(CFS) = 16.15
 TC(MIN.) = 7.43

FLOW PROCESS FROM NODE 743.00 TO NODE 743.00 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.) = 7.43
 RAINFALL INTENSITY(INCH/HR) = 5.10
 TOTAL STREAM AREA(ACRES) = 4.87
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 16.15

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	30.90	10.43	4.100	8.68
2	16.15	7.43	5.103	4.87

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	40.98	7.43	5.103
2	43.88	10.43	4.100

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 43.88 Tc(MIN.) = 10.43
TOTAL AREA(ACRES) = 13.55
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 743.00 = 2384.00 FEET.

FLOW PROCESS FROM NODE 743.00 TO NODE 743.50 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====
===

ELEVATION DATA: UPSTREAM(FEET) = 420.00 DOWNSTREAM(FEET) = 391.00
FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 34.63
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 43.88
PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 10.48
LONGEST FLOWPATH FROM NODE 101.00 TO NODE 743.50 = 2484.00 FEET.

FLOW PROCESS FROM NODE 743.50 TO NODE 743.50 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

=====
===

FLOW PROCESS FROM NODE 311.00 TO NODE 312.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

FLOW PROCESS FROM NODE 753.00 TO NODE 746.00 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.) = 3.91
RAINFALL INTENSITY(INCH/HR) = 6.59
TOTAL STREAM AREA(ACRES) = 2.40
PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.22

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	186.57	12.23	3.698	71.33
2	10.22	3.91	6.587	2.40

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	114.98	3.91	6.587
2	192.31	12.23	3.698

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 192.31 Tc(MIN.) = 12.23
TOTAL AREA(ACRES) = 73.73
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 746.00 = 3662.00
FEET.

FLOW PROCESS FROM NODE 746.00 TO NODE 755.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====
===

ELEVATION DATA: UPSTREAM(FEET) = 400.00 DOWNSTREAM(FEET) = 398.00
FLOW LENGTH(FEET) = 238.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 57.0 INCH PIPE IS 44.2 INCHES

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====
===

*USER SPECIFIED(SUBAREA):
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .9000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 65.00
UPSTREAM ELEVATION(FEET) = 463.00
DOWNSTREAM ELEVATION(FEET) = 462.35
ELEVATION DIFFERENCE(FEET) = 0.65
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.789
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 60.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.587
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 1.54
TOTAL AREA(ACRES) = 0.26 TOTAL RUNOFF(CFS) = 1.54

FLOW PROCESS FROM NODE 792.00 TO NODE 793.00 IS CODE = 61

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>(STANDARD CURB SECTION USED)<<<<<

=====
===

UPSTREAM ELEVATION(FEET) = 461.00 DOWNSTREAM ELEVATION(FEET) = 442.00
STREET LENGTH(FEET) = 577.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 44.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 22.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.58
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.33
HALFSTREET FLOOD WIDTH(FEET) = 10.27
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.91
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.30
STREET FLOW TRAVEL TIME(MIN.) = 2.46 Tc(MIN.) = 5.25


```

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.384
*USER SPECIFIED(SUBAREA):
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .8500
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.859
SUBAREA AREA(ACRES) = 1.12 SUBAREA RUNOFF(CFS) = 6.08
TOTAL AREA(ACRES) = 1.38 PEAK FLOW RATE(CFS) = 7.57

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.38 HALFSTREET FLOOD WIDTH(FEET) = 12.67
FLOW VELOCITY(FEET/SEC.) = 4.39 DEPTH*VELOCITY(FT*FT/SEC.) = 1.67
LONGEST FLOWPATH FROM NODE 791.00 TO NODE 793.00 = 642.00
FEET.

```

```

***
FLOW PROCESS FROM NODE 793.00 TO NODE 793.00 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.) = 5.25
RAINFALL INTENSITY(INCH/HR) = 6.38
TOTAL STREAM AREA(ACRES) = 1.38
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.57

```

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	13.53	4.37	6.587	3.16
2	7.57	5.25	6.384	1.38

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	19.83	4.37	6.587
2	20.68	5.25	6.384

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 20.68 Tc(MIN.) = 5.25
TOTAL AREA(ACRES) = 4.54
LONGEST FLOWPATH FROM NODE 791.00 TO NODE 793.00 = 642.00
FEET.

```

ELEVATION DIFFERENCE(FEET) = 0.65
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.789
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 60.00
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.587
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 1.78
 TOTAL AREA(ACRES) = 0.30 TOTAL RUNOFF(CFS) = 1.78

FLOW PROCESS FROM NODE 782.00 TO NODE 783.00 IS CODE = 61

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<<
 >>>>(STANDARD CURB SECTION USED)<<<<<<

UPSTREAM ELEVATION(FEET) = 463.00 DOWNSTREAM ELEVATION(FEET) =
 442.00

STREET LENGTH(FEET) = 769.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(FEET) = 44.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 22.00
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) =
 0.0160

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.04

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.35
 HALFSTREET FLOOD WIDTH(FEET) = 11.15
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.70
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.29
 STREET FLOW TRAVEL TIME(MIN.) = 3.46 Tc(MIN.) = 6.25
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.705

*USER SPECIFIED(SUBAREA):

NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) = 0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.784
 SUBAREA AREA(ACRES) = 1.48 SUBAREA RUNOFF(CFS) = 6.42
 TOTAL AREA(ACRES) = 1.78 PEAK FLOW RATE(CFS) = 7.96

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.40 HALFSTREET FLOOD WIDTH(FEET) = 13.47

```
FLOW VELOCITY(FEET/SEC.) = 4.12 DEPTH*VELOCITY(FT*FT/SEC.) = 1.63
LONGEST FLOWPATH FROM NODE 781.00 TO NODE 783.00 = 834.00
FEET.
```

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

```
FLOW PROCESS FROM NODE 783.00 TO NODE 784.00 IS CODE = 1
```

```
-----
```

```
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

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

```
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.25
RAINFALL INTENSITY(INCH/HR) = 5.70
TOTAL STREAM AREA(ACRES) = 1.78
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.96
```

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

```
FLOW PROCESS FROM NODE 786.00 TO NODE 787.00 IS CODE = 21
```

```
-----
```

```
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

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

```
*USER SPECIFIED(SUBAREA):
PERENNIAL GRASS FAIR COVER RUNOFF COEFFICIENT = .6500
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 250.00
UPSTREAM ELEVATION(FEET) = 470.00
DOWNSTREAM ELEVATION(FEET) = 462.00
ELEVATION DIFFERENCE(FEET) = 8.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.497
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.196
SUBAREA RUNOFF(CFS) = 0.97
TOTAL AREA(ACRES) = 0.24 TOTAL RUNOFF(CFS) = 0.97
```

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

```
FLOW PROCESS FROM NODE 787.00 TO NODE 788.00 IS CODE = 31
```

```
-----
```

```
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====
===

ELEVATION DATA: UPSTREAM(FEET) = 462.00 DOWNSTREAM(FEET) = 443.00
FLOW LENGTH(FEET) = 570.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 2.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.59
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.97
PIPE TRAVEL TIME(MIN.) = 1.70 Tc(MIN.) = 7.20
LONGEST FLOWPATH FROM NODE 786.00 TO NODE 788.00 = 820.00
FEET.

```
*****
***
FLOW PROCESS FROM NODE 787.00 TO NODE 788.00 IS CODE = 81
-----
----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
===
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.208
*USER SPECIFIED(SUBAREA):
PERENNIAL GRASS FAIR COVER RUNOFF COEFFICIENT = .6500
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6500
SUBAREA AREA(ACRES) = 0.93 SUBAREA RUNOFF(CFS) = 3.15
TOTAL AREA(ACRES) = 1.17 TOTAL RUNOFF(CFS) = 3.96
TC(MIN.) = 7.20
```

```
***
FLOW PROCESS FROM NODE 788.00 TO NODE 784.00 IS CODE = 1
-----
----
```

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====
===

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 7.20
RAINFALL INTENSITY(INCH/HR) = 5.21
TOTAL STREAM AREA(ACRES) = 1.17
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.96

** CONFLUENCE DATA **

STREAM	RUNOFF	Tc	INTENSITY	AREA
--------	--------	----	-----------	------

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

```
FLOW PROCESS FROM NODE 931.00 TO NODE 932.00 IS CODE = 81
```

```
-----
----
```

```
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
```

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

```
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.365
*USER SPECIFIED(SUBAREA):
PERENNIAL GRASS FAIR COVER RUNOFF COEFFICIENT = .6500
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6500
SUBAREA AREA(ACRES) = 1.35 SUBAREA RUNOFF(CFS) = 5.59
TOTAL AREA(ACRES) = 1.56 TOTAL RUNOFF(CFS) = 6.45
TC(MIN.) = 5.27
```

```
***
```

```
FLOW PROCESS FROM NODE 932.00 TO NODE 804.00 IS CODE = 1
```

```
-----
----
```

```
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
```

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

```
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.27
RAINFALL INTENSITY(INCH/HR) = 6.37
TOTAL STREAM AREA(ACRES) = 1.56
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.45
```

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

```
FLOW PROCESS FROM NODE 806.00 TO NODE 807.00 IS CODE = 21
```

```
-----
----
```

```
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
```

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

```
*USER SPECIFIED(SUBAREA):
PASTURE OR RANGE LAND FAIR COVER RUNOFF COEFFICIENT = .6500

S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 40.00
UPSTREAM ELEVATION(FEET) = 495.00
DOWNSTREAM ELEVATION(FEET) = 485.00
ELEVATION DIFFERENCE(FEET) = 10.00
```

SUBAREA AREA(ACRES) = 1.77 SUBAREA RUNOFF(CFS) = 8.17
TOTAL AREA(ACRES) = 2.05 PEAK FLOW RATE(CFS) = 9.46

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.40 HALFSTREET FLOOD WIDTH(FEET) = 13.79
FLOW VELOCITY(FEET/SEC.) = 4.68 DEPTH*VELOCITY(FT*FT/SEC.) = 1.88
LONGEST FLOWPATH FROM NODE 766.00 TO NODE 769.00 = 1058.00

FEET.

```
***  
FLOW PROCESS FROM NODE 770.00 TO NODE 769.00 IS CODE = 81  
-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<  
=====
```

```
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.593  
*USER SPECIFIED(SUBAREA):  
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .8500  
S.C.S. CURVE NUMBER (AMC II) = 0  
AREA-AVERAGE RUNOFF COEFFICIENT = 0.8374  
SUBAREA AREA(ACRES) = 2.01 SUBAREA RUNOFF(CFS) = 9.56  
TOTAL AREA(ACRES) = 4.06 TOTAL RUNOFF(CFS) = 19.01  
TC(MIN.) = 6.44
```

```
*****
```

```
***  
FLOW PROCESS FROM NODE 769.00 TO NODE 756.00 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.) = 6.44  
RAINFALL INTENSITY(INCH/HR) = 5.59  
TOTAL STREAM AREA(ACRES) = 4.06  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 19.01
```

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	43.95	6.83	5.389	11.06
2	19.01	6.44	5.593	4.06

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

SUBAREA AREA(ACRES) = 1.92 SUBAREA RUNOFF(CFS) = 9.29
TOTAL AREA(ACRES) = 2.16 PEAK FLOW RATE(CFS) = 10.42

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.41 HALFSTREET FLOOD WIDTH(FEET) = 14.43
FLOW VELOCITY(FEET/SEC.) = 4.73 DEPTH*VELOCITY(FT*FT/SEC.) = 1.96
LONGEST FLOWPATH FROM NODE 761.00 TO NODE 763.00 = 978.00

FEET.

```
***  
FLOW PROCESS FROM NODE 764.00 TO NODE 763.00 IS CODE = 81  
-----  
-----  
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<  
=====
```

```
=====  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.695  
*USER SPECIFIED(SUBAREA):  
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .8500  
S.C.S. CURVE NUMBER (AMC II) = 0  
AREA-AVERAGE RUNOFF COEFFICIENT = 0.8485  
SUBAREA AREA(ACRES) = 1.96 SUBAREA RUNOFF(CFS) = 9.49  
TOTAL AREA(ACRES) = 4.12 TOTAL RUNOFF(CFS) = 19.91  
TC(MIN.) = 6.26
```

```
*****
```

```
***  
FLOW PROCESS FROM NODE 763.00 TO NODE 755.00 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.) = 6.26  
RAINFALL INTENSITY(INCH/HR) = 5.70  
TOTAL STREAM AREA(ACRES) = 4.12  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 19.91
```

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	234.92	12.54	3.640	88.85
2	19.91	6.26	5.695	4.12

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	137.28	6.26	5.695
2	247.65	12.54	3.640

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 247.65 Tc(MIN.) = 12.54

TOTAL AREA(ACRES) = 92.97

LONGEST FLOWPATH FROM NODE 321.00 TO NODE 755.00 = 3900.00

FEET.

```
*****
***
FLOW PROCESS FROM NODE 755.00 TO NODE 850.00 IS CODE = 31
-----
---
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
==
ELEVATION DATA: UPSTREAM(FEET) = 391.49 DOWNSTREAM(FEET) = 390.00
FLOW LENGTH(FEET) = 150.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 60.0 INCH PIPE IS 48.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.69
ESTIMATED PIPE DIAMETER(INCH) = 60.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 247.65
PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 12.71
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 850.00 = 4050.00
FEET.
```

```
***
FLOW PROCESS FROM NODE 850.00 TO NODE 850.00 IS CODE = 10
-----
---
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<
=====
==
```

```
*****
***
FLOW PROCESS FROM NODE 820.00 TO NODE 820.00 IS CODE = 7
-----
---
>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<
```


FLOW PROCESS FROM NODE 834.00 TO NODE 833.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====
===

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.714
*USER SPECIFIED(SUBAREA):
IRRIGATED PASTURE FAIR COVER RUNOFF COEFFICIENT = .6000
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
SUBAREA AREA(ACRES) = 0.30 SUBAREA RUNOFF(CFS) = 0.85
TOTAL AREA(ACRES) = 19.93 TOTAL RUNOFF(CFS) = 56.37
TC(MIN.) = 8.40

FLOW PROCESS FROM NODE 833.00 TO NODE 824.00 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.) = 8.40
RAINFALL INTENSITY(INCH/HR) = 4.71
TOTAL STREAM AREA(ACRES) = 19.93
PEAK FLOW RATE(CFS) AT CONFLUENCE = 56.37

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	17.57	8.05	4.843	9.01
2	56.37	8.40	4.714	19.93

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	71.62	8.05	4.843
2	73.47	8.40	4.714

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 73.47 Tc(MIN.) = 8.40

```
TOTAL AREA(ACRES) =      28.94
LONGEST FLOWPATH FROM NODE      321.00 TO NODE      824.00 = 5284.00
FEET.
```

```
FLOW PROCESS FROM NODE      824.00 TO NODE      835.00 IS CODE = 31
```

```
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

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

```
ELEVATION DATA: UPSTREAM(FEET) = 422.00 DOWNSTREAM(FEET) = 421.00
FLOW LENGTH(FEET) = 116.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.27
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 73.47
PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 8.59
LONGEST FLOWPATH FROM NODE      321.00 TO NODE      835.00 = 5400.00
FEET.
```

```
FLOW PROCESS FROM NODE      824.00 TO NODE      835.00 IS CODE = 81
```

```
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

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

```
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.647
*USER SPECIFIED(SUBAREA):
RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5397
SUBAREA AREA(ACRES) = 0.29 SUBAREA RUNOFF(CFS) = 0.88
TOTAL AREA(ACRES) = 29.23 TOTAL RUNOFF(CFS) = 73.47
TC(MIN.) = 8.59
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
FLOW PROCESS FROM NODE      835.00 TO NODE      835.00 IS CODE = 1
```

```
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

PIPE-FLOW(CFS) = 2.33
 PIPE TRAVEL TIME(MIN.) = 1.12 Tc(MIN.) = 5.59
 LONGEST FLOWPATH FROM NODE 837.00 TO NODE 839.00 = 951.00
 FEET.

FLOW PROCESS FROM NODE 838.00 TO NODE 839.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====
 ===

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.131
 *USER SPECIFIED(SUBAREA):
 PASTURE OR RANGE LAND FAIR COVER RUNOFF COEFFICIENT = .6000
 S.C.S. CURVE NUMBER (AMC II) = 0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
 SUBAREA AREA(ACRES) = 5.01 SUBAREA RUNOFF(CFS) = 18.43
 TOTAL AREA(ACRES) = 5.60 TOTAL RUNOFF(CFS) = 20.60
 TC(MIN.) = 5.59

FLOW PROCESS FROM NODE 839.00 TO NODE 835.00 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.) = 5.59
 RAINFALL INTENSITY(INCH/HR) = 6.13
 TOTAL STREAM AREA(ACRES) = 5.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 20.60

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	73.47	8.59	4.647	29.23
2	20.60	5.59	6.131	5.60

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	73.47	8.59	4.647
2	20.60	5.59	6.131

1	76.29	5.59	6.131
2	89.09	8.59	4.647

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 89.09 Tc(MIN.) = 8.59
TOTAL AREA(ACRES) = 34.83
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 835.00 = 5400.00
FEET.

FLOW PROCESS FROM NODE 835.00 TO NODE 836.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====
===

ELEVATION DATA: UPSTREAM(FEET) = 420.00 DOWNSTREAM(FEET) = 414.00
FLOW LENGTH(FEET) = 103.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 22.31
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 89.09
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 8.66
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 836.00 = 5503.00
FEET.

FLOW PROCESS FROM NODE 836.00 TO NODE 155.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====
===

ELEVATION DATA: UPSTREAM(FEET) = 415.00 DOWNSTREAM(FEET) = 405.00
FLOW LENGTH(FEET) = 97.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 27.65
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 89.09
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 8.72
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 155.00 = 5600.00
FEET.

PASTURE OR RANGE LAND FAIR COVER RUNOFF COEFFICIENT = .6500
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6144
SUBAREA AREA(ACRES) = 0.84 SUBAREA RUNOFF(CFS) = 3.40
TOTAL AREA(ACRES) = 5.75 TOTAL RUNOFF(CFS) = 22.03
TC(MIN.) = 5.44

FLOW PROCESS FROM NODE 815.00 TO NODE 814.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====
===

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.236
*USER SPECIFIED(SUBAREA):
PASTURE OR RANGE LAND FAIR COVER RUNOFF COEFFICIENT = .6500
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6257
SUBAREA AREA(ACRES) = 2.65 SUBAREA RUNOFF(CFS) = 10.74
TOTAL AREA(ACRES) = 8.40 TOTAL RUNOFF(CFS) = 32.77
TC(MIN.) = 5.44

FLOW PROCESS FROM NODE 814.00 TO NODE 816.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====
===

ELEVATION DATA: UPSTREAM(FEET) = 405.00 DOWNSTREAM(FEET) = 390.00
FLOW LENGTH(FEET) = 151.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 12.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.71
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 32.77
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 5.56
LONGEST FLOWPATH FROM NODE 810.00 TO NODE 816.00 = 1161.00
FEET.

FLOW PROCESS FROM NODE 816.00 TO NODE 850.00 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.) = 5.56
RAINFALL INTENSITY(INCH/HR) = 6.15
TOTAL STREAM AREA(ACRES) = 8.40
PEAK FLOW RATE(CFS) AT CONFLUENCE = 32.77

** CONFLUENCE DATA **
STREAM      RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)      (MIN.)  (INCH/HOUR)    (ACRE)
  1         359.14     12.71     3.609         144.33
  2          32.77      5.56     6.152          8.40

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         189.86     5.56     6.152
  2         378.37    12.71     3.609

```

Total Q100 inflow to the existing detention basin at 850 Node

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 378.37 Tc(MIN.) = 12.71
TOTAL AREA(ACRES) = 152.73
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 850.00 = 5972.00
FEET.

```

```

***
FLOW PROCESS FROM NODE 850.00 TO NODE 850.00 IS CODE = 7
-----
>>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
=====
**
USER-SPECIFIED VALUES ARE AS FOLLOWS:
TC(MIN) = 13.28 RAIN INTENSITY(INCH/HOUR) = 3.51
TOTAL AREA(ACRES) = 143.81 TOTAL RUNOFF(CFS) = 151.20
=====
*****

```

Total Q100 outflow from the existing detention basin to node 851 Node

```

***
FLOW PROCESS FROM NODE 850.00 TO NODE 851.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

```

1	23.02	33.16	1.944	19.68
2	11.88	6.39	5.625	3.52

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	16.31	6.39	5.625
2	27.12	33.16	1.944

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 27.12 Tc(MIN.) = 33.16

TOTAL AREA(ACRES) = 23.20

LONGEST FLOWPATH FROM NODE 881.00 TO NODE 885.00 = 9217.00

FEET.

```

*****
***
FLOW PROCESS FROM NODE 885.00 TO NODE 893.00 IS CODE = 81
-----
----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
===
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.944
*USER SPECIFIED(SUBAREA):
OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .6000
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6010
SUBAREA AREA(ACRES) = 5.67 SUBAREA RUNOFF(CFS) = 6.61
TOTAL AREA(ACRES) = 28.87 TOTAL RUNOFF(CFS) = 33.74
TC(MIN.) = 33.16
*****

```

```

***
FLOW PROCESS FROM NODE 893.00 TO NODE 915.00 IS CODE = 11
-----
----
>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<
=====
===

```

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	33.74	33.16	1.944	28.87

LONGEST FLOWPATH FROM NODE 881.00 TO NODE 915.00 = 9217.00

FEET.

Drainage Study

For

Otay Ranch
Village 8 West

Chula Vista Tract No. 19-03



Jill Gravely, P.E.
R.C.E. # 70843

Expiration Date: June 30, 2021

Prepared For

Homefed Village 8, LLC
1903 Wright Place, Suite 220
Carlsbad, CA 92008
(760) 602-3777

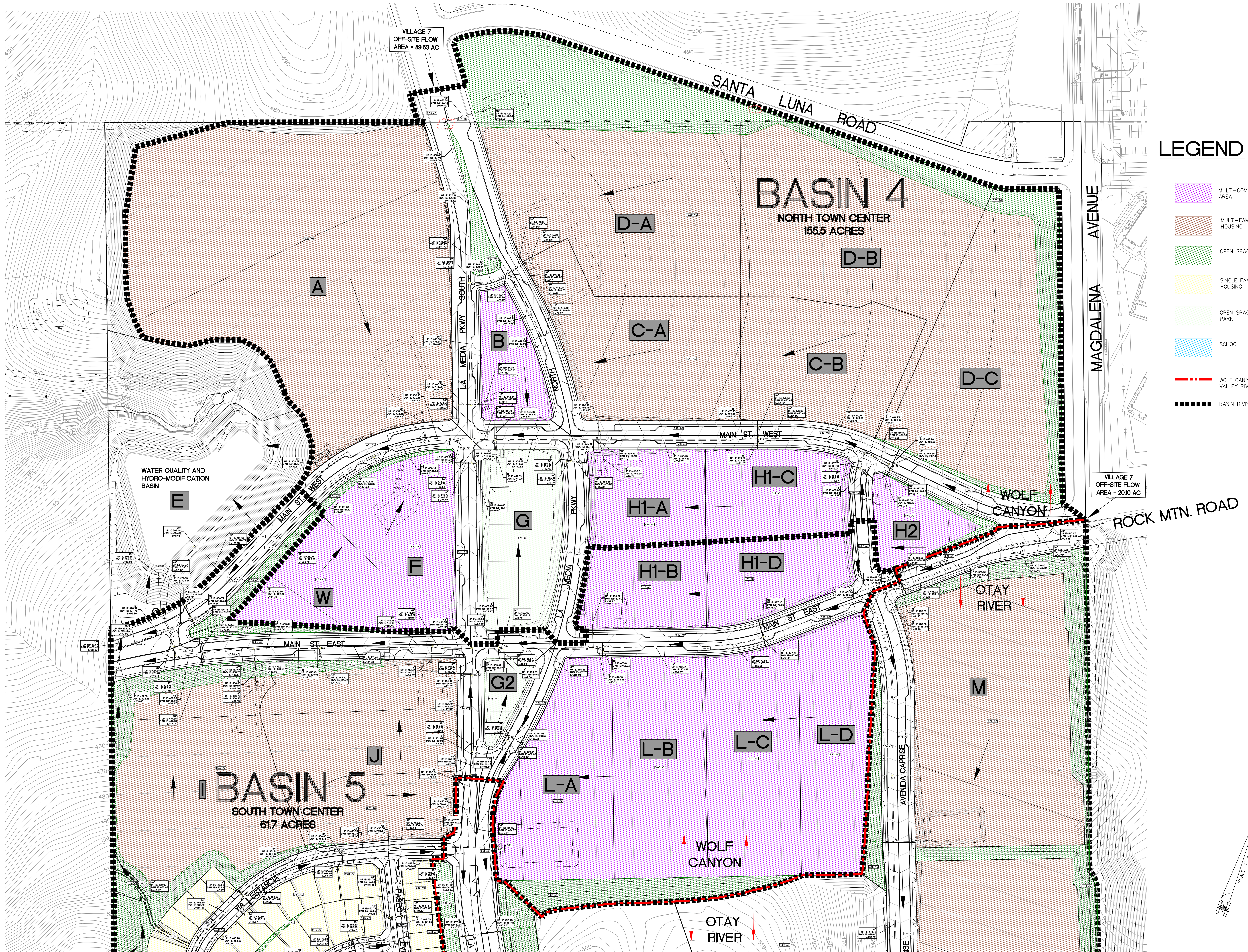
Prepared By

Hale Engineering
7910 Convoy Court
San Diego, CA 92111
(858) 715-1420

Date: October 25, 2019

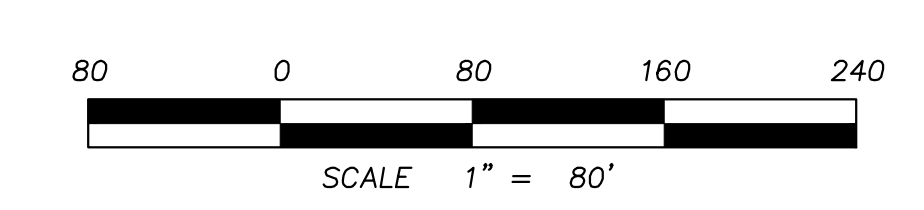


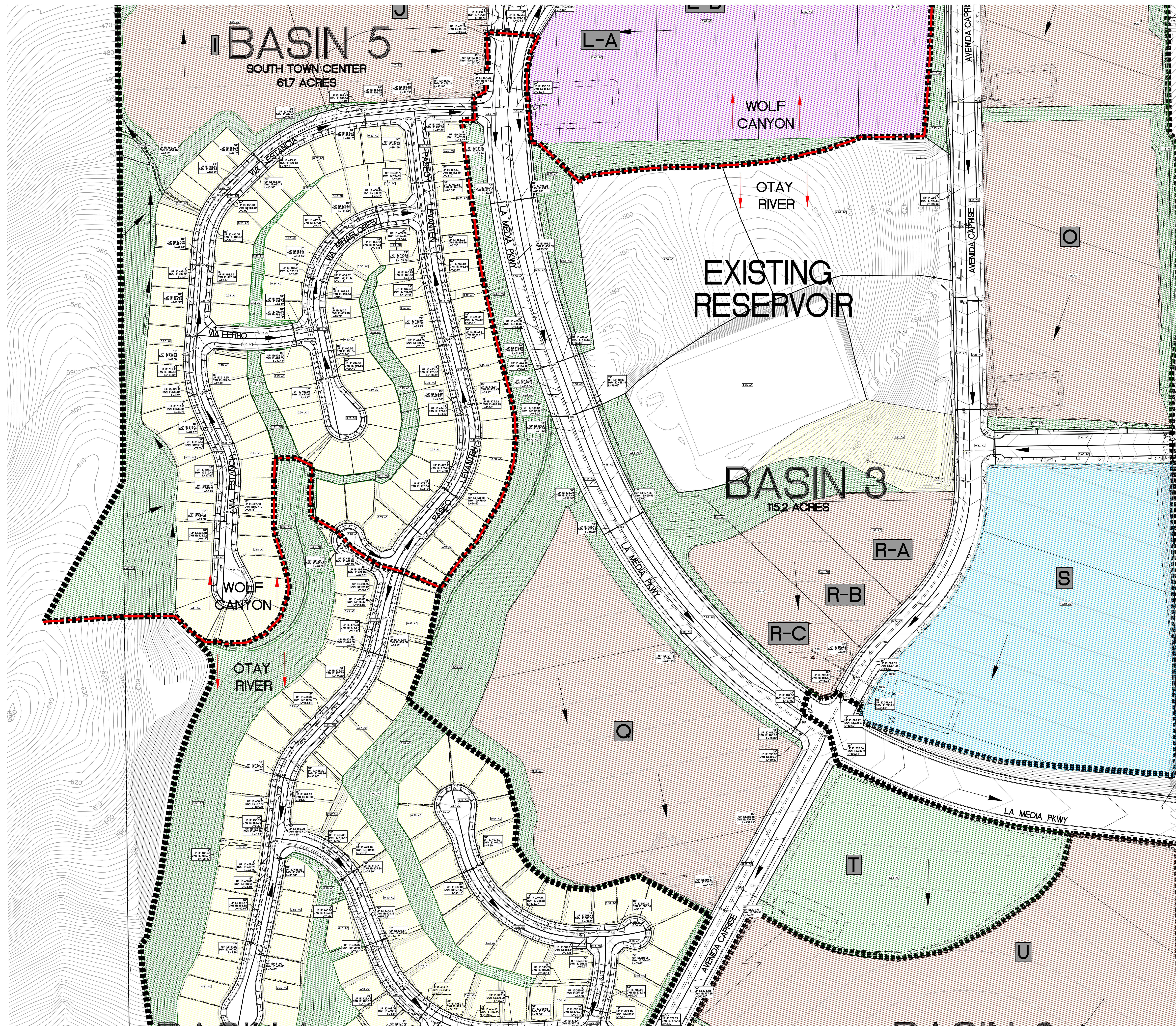
Approved by: SH
Date: 12-30-2019



LEGEND

- MULTI-COMMERCIAL AREA
- MULTI-FAMILY HOUSING
- OPEN SPACE
- SINGLE FAMILY HOUSING
- OPEN SPACE: PARK
- SCHOOL
- WOLF CANYON AND OTAY VALLEY RIVER DIVISION
- BASIN DIVISION

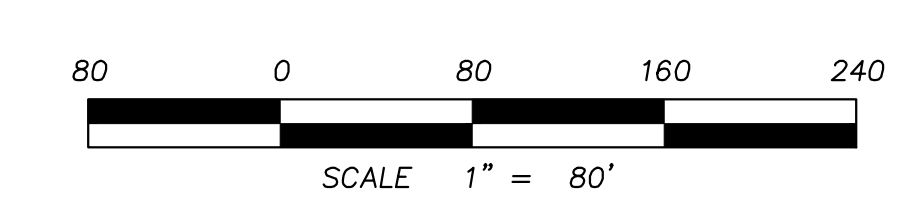
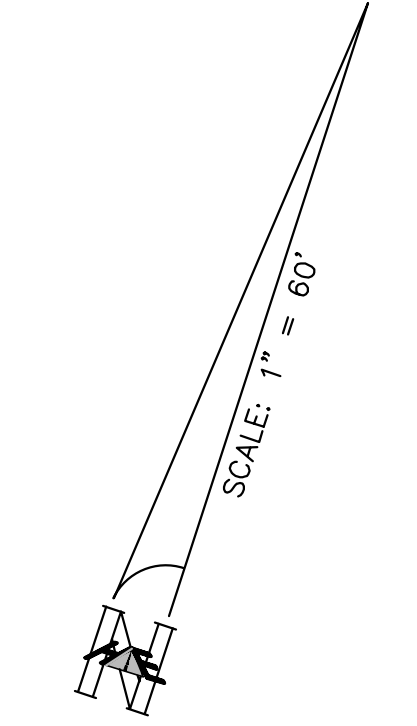




LEGEND

- MULTI-COMMERCIAL AREA
- MULTI-FAMILY HOUSING
- OPEN SPACE
- SINGLE FAMILY HOUSING
- OPEN SPACE- PARK
- SCHOOL
- WOLF CANYON AND OTAY VALLEY RIVER DIVISION
- BASIN DIVISION

PORTION OF LA MEDIA PARKWAY TO DRAIN OFFSITE, SEE APPENDIX O.



DEVELOPED CONDITIONS HYDROLOGY MAP
DRAINAGE STUDY FOR OTAY RANCH VILLAGE 8 WEST
 PER TENTATIVE MAP REVISION DATED _____
 CHULA VISTA TRACT NO. 89-03
 CITY OF CHULA VISTA, CALIFORNIA

VILLAGE 8 WEST
HYDROLOGIC OUTPUT

Preliminary Drainage Study for
Otay Ranch Village 7 R-3, R-4, & R-8

EXISTING CONDITIONS 50-YEAR

For R-4 and Access Road

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 164.00 TO NODE 164.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

=====

USER-SPECIFIED VALUES ARE AS FOLLOWS:
TC(MIN) = 12.00 RAIN INTENSITY(INCH/HOUR) = 3.30
TOTAL AREA(ACRES) = 89.63 TOTAL RUNOFF(CFS) = 213.80

FLOW PROCESS FROM NODE 164.00 TO NODE 783.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 438.66 DOWNSTREAM(FEET) = 427.86
FLOW LENGTH(FEET) = 148.50 MANNING'S N = 0.013
DEPTH OF FLOW IN 39.0 INCH PIPE IS 31.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 29.82
ESTIMATED PIPE DIAMETER(INCH) = 39.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 213.80
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 12.08
LONGEST FLOWPATH FROM NODE 0.00 TO NODE 783.00 = 148.50 FEET.

FLOW PROCESS FROM NODE 783.00 TO NODE 783.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.281
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7800
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 93
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7257
SUBAREA AREA(ACRES) = 3.08 SUBAREA RUNOFF(CFS) = 7.88
TOTAL AREA(ACRES) = 92.7 TOTAL RUNOFF(CFS) = 220.73
TC(MIN.) = 12.08

R-4

FLOW PROCESS FROM NODE 783.00 TO NODE 783.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.281
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7203
 SUBAREA AREA(ACRES) = 1.19 SUBAREA RUNOFF(CFS) = 1.17
 TOTAL AREA(ACRES) = 93.9 TOTAL RUNOFF(CFS) = 221.91
 TC(MIN.) = 12.08

FLOW PROCESS FROM NODE 783.00 TO NODE 172.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 427.53 DOWNSTREAM(FEET) = 426.08
 FLOW LENGTH(FEET) = 288.60 MANNING'S N = 0.013
 DEPTH OF FLOW IN 66.0 INCH PIPE IS 51.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.12
 ESTIMATED PIPE DIAMETER(INCH) = 66.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 221.91
 PIPE TRAVEL TIME(MIN.) = 0.43 Tc(MIN.) = 12.52
 LONGEST FLOWPATH FROM NODE 0.00 TO NODE 172.00 = 437.10 FEET.

FLOW PROCESS FROM NODE 172.00 TO NODE 172.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

FLOW PROCESS FROM NODE 172.00 TO NODE 172.00 IS CODE = 13

>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<

FLOW PROCESS FROM NODE 170.00 TO NODE 170.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 98
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 613.00
 UPSTREAM ELEVATION(FEET) = 463.28
 DOWNSTREAM ELEVATION(FEET) = 457.05
 ELEVATION DIFFERENCE(FEET) = 6.23
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.194
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 60.16
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.796
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 5.85
 TOTAL AREA(ACRES) = 1.16 TOTAL RUNOFF(CFS) = 5.85

FLOW PROCESS FROM NODE 170.00 TO NODE 170.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.796
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 98
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
 SUBAREA AREA(ACRES) = 0.44 SUBAREA RUNOFF(CFS) = 2.22
 TOTAL AREA(ACRES) = 1.6 TOTAL RUNOFF(CFS) = 8.07
 TC(MIN.) = 3.19

FLOW PROCESS FROM NODE 170.00 TO NODE 171.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 448.71 DOWNSTREAM(FEET) = 446.86
 FLOW LENGTH(FEET) = 184.79 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.42
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 8.07
 PIPE TRAVEL TIME(MIN.) = 0.48 Tc(MIN.) = 3.67
 LONGEST FLOWPATH FROM NODE 170.00 TO NODE 171.00 = 797.79 FEET.

FLOW PROCESS FROM NODE 171.00 TO NODE 171.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.796
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7800
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 93
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7882
SUBAREA AREA(ACRES) = 16.05 SUBAREA RUNOFF(CFS) = 72.57
TOTAL AREA(ACRES) = 17.6 TOTAL RUNOFF(CFS) = 80.63
TC(MIN.) = 3.67

FLOW PROCESS FROM NODE 171.00 TO NODE 171.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.796
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7383
SUBAREA AREA(ACRES) = 2.01 SUBAREA RUNOFF(CFS) = 3.50
TOTAL AREA(ACRES) = 19.7 TOTAL RUNOFF(CFS) = 84.13
TC(MIN.) = 3.67

FLOW PROCESS FROM NODE 171.00 TO NODE 171.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.796
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7800
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 93
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7497
SUBAREA AREA(ACRES) = 7.47 SUBAREA RUNOFF(CFS) = 33.77
TOTAL AREA(ACRES) = 27.1 TOTAL RUNOFF(CFS) = 117.90
TC(MIN.) = 3.67

FLOW PROCESS FROM NODE 171.00 TO NODE 172.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 440.73 DOWNSTREAM(FEET) = 428.08
FLOW LENGTH(FEET) = 105.40 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 31.68
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 117.90
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 3.73
LONGEST FLOWPATH FROM NODE 170.00 TO NODE 172.00 = 903.19 FEET.

FLOW PROCESS FROM NODE 172.00 TO NODE 172.00 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)
1 117.90 3.73 5.796 27.13
LONGEST FLOWPATH FROM NODE 170.00 TO NODE 172.00 = 903.19 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 221.91 12.52 3.207 93.90
LONGEST FLOWPATH FROM NODE 0.00 TO NODE 172.00 = 437.10 FEET.

** PEAK FLOW RATE TABLE **

STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 184.01 3.73 5.796
2 287.14 12.52 3.207

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 287.14 Tc(MIN.) = 12.52
TOTAL AREA(ACRES) = 121.0

FLOW PROCESS FROM NODE 172.00 TO NODE 173.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 425.58 DOWNSTREAM(FEET) = 423.39
FLOW LENGTH(FEET) = 312.82 MANNING'S N = 0.013
DEPTH OF FLOW IN 69.0 INCH PIPE IS 52.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.49
ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 287.14
PIPE TRAVEL TIME(MIN.) = 0.39 Tc(MIN.) = 12.90
LONGEST FLOWPATH FROM NODE 170.00 TO NODE 173.00 = 1216.01 FEET.

FLOW PROCESS FROM NODE 173.00 TO NODE 173.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.145
GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 97
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7283
SUBAREA AREA(ACRES) = 1.20 SUBAREA RUNOFF(CFS) = 3.28
TOTAL AREA(ACRES) = 122.2 TOTAL RUNOFF(CFS) = 287.14
TC(MIN.) = 12.90
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 173.00 TO NODE 174.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 423.06 DOWNSTREAM(FEET) = 423.00
FLOW LENGTH(FEET) = 8.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 69.0 INCH PIPE IS 51.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 13.91
ESTIMATED PIPE DIAMETER(INCH) = 69.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 287.14
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 12.91
LONGEST FLOWPATH FROM NODE 170.00 TO NODE 174.00 = 1224.01 FEET.

FLOW PROCESS FROM NODE 174.00 TO NODE 174.00 IS CODE = 81

Preliminary Drainage Study for
Otay Ranch Village 7 R-3, R-4, & R-8

EXISTING CONDITIONS
100-YEAR
For R-8
For R-4 and Access Road

VILLAGE 8 WEST
HYDROLOGIC OUTPUT

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 164.00 TO NODE 164.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

=====

USER-SPECIFIED VALUES ARE AS FOLLOWS:
TC(MIN) = 12.00 RAIN INTENSITY(INCH/HOUR) = 3.74
TOTAL AREA(ACRES) = 89.63 TOTAL RUNOFF(CFS) = 265.69

FLOW PROCESS FROM NODE 164.00 TO NODE 783.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 438.66 DOWNSTREAM(FEET) = 427.86
FLOW LENGTH(FEET) = 148.50 MANNING'S N = 0.013
DEPTH OF FLOW IN 45.0 INCH PIPE IS 31.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 32.22
ESTIMATED PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 265.69
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 12.08
LONGEST FLOWPATH FROM NODE 0.00 TO NODE 783.00 = 148.50 FEET.

FLOW PROCESS FROM NODE 783.00 TO NODE 783.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.730
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7800
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 93
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7912
SUBAREA AREA(ACRES) = 3.08 SUBAREA RUNOFF(CFS) = 8.96
TOTAL AREA(ACRES) = 92.7 TOTAL RUNOFF(CFS) = 273.56
TC(MIN.) = 12.08

R-4

FLOW PROCESS FROM NODE 783.00 TO NODE 783.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.730
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 85
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7849
 SUBAREA AREA(ACRES) = 1.19 SUBAREA RUNOFF(CFS) = 1.33
 TOTAL AREA(ACRES) = 93.9 TOTAL RUNOFF(CFS) = 274.89
 TC(MIN.) = 12.08

FLOW PROCESS FROM NODE 783.00 TO NODE 172.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 427.53 DOWNSTREAM(FEET) = 426.08
 FLOW LENGTH(FEET) = 288.60 MANNING'S N = 0.013
 DEPTH OF FLOW IN 72.0 INCH PIPE IS 55.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.76
 ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 274.89
 PIPE TRAVEL TIME(MIN.) = 0.41 Tc(MIN.) = 12.49
 LONGEST FLOWPATH FROM NODE 0.00 TO NODE 172.00 = 437.10 FEET.

FLOW PROCESS FROM NODE 172.00 TO NODE 172.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

FLOW PROCESS FROM NODE 172.00 TO NODE 172.00 IS CODE = 13

>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<

FLOW PROCESS FROM NODE 170.00 TO NODE 170.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 98
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 613.00
 UPSTREAM ELEVATION(FEET) = 463.28
 DOWNSTREAM ELEVATION(FEET) = 457.05
 ELEVATION DIFFERENCE(FEET) = 6.23
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.194
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 60.16
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.587
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 6.65
 TOTAL AREA(ACRES) = 1.16 TOTAL RUNOFF(CFS) = 6.65

FLOW PROCESS FROM NODE 170.00 TO NODE 170.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.587
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 98
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
 SUBAREA AREA(ACRES) = 0.44 SUBAREA RUNOFF(CFS) = 2.52
 TOTAL AREA(ACRES) = 1.6 TOTAL RUNOFF(CFS) = 9.17
 TC(MIN.) = 3.19

FLOW PROCESS FROM NODE 170.00 TO NODE 171.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 448.71 DOWNSTREAM(FEET) = 446.86
 FLOW LENGTH(FEET) = 184.79 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.56
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 9.17
 PIPE TRAVEL TIME(MIN.) = 0.47 Tc(MIN.) = 3.66
 LONGEST FLOWPATH FROM NODE 170.00 TO NODE 171.00 = 797.79 FEET.

FLOW PROCESS FROM NODE 171.00 TO NODE 171.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.587
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7800
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 93
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7882
SUBAREA AREA(ACRES) = 16.05 SUBAREA RUNOFF(CFS) = 82.46
TOTAL AREA(ACRES) = 17.6 TOTAL RUNOFF(CFS) = 91.63
TC(MIN.) = 3.66

FLOW PROCESS FROM NODE 171.00 TO NODE 171.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.587
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 85
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7383
SUBAREA AREA(ACRES) = 2.01 SUBAREA RUNOFF(CFS) = 3.97
TOTAL AREA(ACRES) = 19.7 TOTAL RUNOFF(CFS) = 95.60
TC(MIN.) = 3.66

FLOW PROCESS FROM NODE 171.00 TO NODE 171.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.587
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7800
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 93
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7497
SUBAREA AREA(ACRES) = 7.47 SUBAREA RUNOFF(CFS) = 38.38
TOTAL AREA(ACRES) = 27.1 TOTAL RUNOFF(CFS) = 133.98
TC(MIN.) = 3.66

FLOW PROCESS FROM NODE 171.00 TO NODE 172.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 440.73 DOWNSTREAM(FEET) = 428.08
FLOW LENGTH(FEET) = 105.40 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 32.14
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 133.98
PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 3.72
LONGEST FLOWPATH FROM NODE 170.00 TO NODE 172.00 = 903.19 FEET.

FLOW PROCESS FROM NODE 172.00 TO NODE 172.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

** MAIN STREAM CONFLUENCE DATA **

Table with 5 columns: STREAM NUMBER, RUNOFF (CFS), Tc (MIN.), INTENSITY (INCH/HOUR), AREA (ACRE). Row 1: 1, 133.98, 3.72, 6.587, 27.13

LONGEST FLOWPATH FROM NODE 170.00 TO NODE 172.00 = 903.19 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

Table with 5 columns: STREAM NUMBER, RUNOFF (CFS), Tc (MIN.), INTENSITY (INCH/HOUR), AREA (ACRE). Row 1: 1, 274.89, 12.49, 3.650, 93.90

LONGEST FLOWPATH FROM NODE 0.00 TO NODE 172.00 = 437.10 FEET.

** PEAK FLOW RATE TABLE **

Table with 4 columns: STREAM NUMBER, RUNOFF (CFS), Tc (MIN.), INTENSITY (INCH/HOUR). Rows: 1 (215.85, 3.72, 6.587), 2 (349.14, 12.49, 3.650)

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 349.14 Tc(MIN.) = 12.49
TOTAL AREA(ACRES) = 121.0

FLOW PROCESS FROM NODE 172.00 TO NODE 173.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 425.58 DOWNSTREAM(FEET) = 423.39
FLOW LENGTH(FEET) = 312.82 MANNING'S N = 0.013
DEPTH OF FLOW IN 75.0 INCH PIPE IS 56.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.22
ESTIMATED PIPE DIAMETER(INCH) = 75.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 349.14
PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 12.85
LONGEST FLOWPATH FROM NODE 170.00 TO NODE 173.00 = 1216.01 FEET.

FLOW PROCESS FROM NODE 173.00 TO NODE 173.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.583
GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .8700
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 97
AREA-AVERAGE RUNOFF COEFFICIENT = 0.7780
SUBAREA AREA(ACRES) = 1.20 SUBAREA RUNOFF(CFS) = 3.74
TOTAL AREA(ACRES) = 122.2 TOTAL RUNOFF(CFS) = 349.14
TC(MIN.) = 12.85
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 173.00 TO NODE 174.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 423.06 DOWNSTREAM(FEET) = 423.00
FLOW LENGTH(FEET) = 8.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 72.0 INCH PIPE IS 57.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.41
ESTIMATED PIPE DIAMETER(INCH) = 72.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 349.14
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 12.86
LONGEST FLOWPATH FROM NODE 170.00 TO NODE 174.00 = 1224.01 FEET.

FLOW PROCESS FROM NODE 174.00 TO NODE 174.00 IS CODE = 81

Preliminary Drainage Study for
Otay Ranch Village 7 R-3, R-4, & R-8

APPENDIX A-3

**ROUGH GRADING
FOR
OTAY RANCH VILLAGE 7 AND OTAY RANCH
VILLAGE 8 WEST**

GRADING NOTES:

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THESE APPROVED PLANS AND APPROVED REVISIONS. ANY CHANGES OR REVISIONS HERETO SHALL BE APPROVED BY THE CITY ENGINEER, AND THE MITIGATION MONITOR PRIOR TO ANY REQUEST FOR INSPECTION.
2. ALL GRADING SHALL BE INSPECTED AND TESTED BY OR UNDER THE DIRECTION OF QUALIFIED REGISTERED ENGINEERS. THE ENGINEER SHALL INSPECT THE EXCAVATION, AND SHALL OBSERVE AND TEST THE EXCAVATION, AND CONSTRUCTION OF FILL. THE ENGINEER SHALL CONDUCT TRENCHES; SUBMIT GEOTECHNICAL OR SOILS REPORTS AS REQUIRED; AND DETERMINE THE SUITABILITY OF ANY FILL MATERIAL UPON COMPLETION OF GRADING OPERATIONS. THE ENGINEER SHALL CONDUCT THE TESTS, OBSERVATIONS AND TESTS MADE BY, OR UNDER DIRECTION OF THE REGISTERED ENGINEER, AND TEST RESULTS SHALL BE SUBMITTED TO THE ENGINEER IN ACCORDANCE WITH THE GEOTECHNICAL ASPECTS OF THE APPROVED GRADING PLANS. ANY APPROVED REVISIONS HERETO, SUBJECT TO THE ENGINEER'S PERMIT AND ORDINANCE NO. 179, SHALL BE CONSIDERED AS PART OF THESE PLANS. ALL EXCAVATIONS AND EMBANKMENTS ARE ACCEPTABLE FOR THEIR INTENDED USE.
3. THE CONTRACTOR SHALL PROPERLY GRADE ALL EXCAVATED SURFACES TO PROVIDE POSITIVE DRAINAGE AND WATER CONTROL. THE CONTRACTOR SHALL CONTROL SURFACE WATER TO AVOID DAMAGE TO ADJACENT PROPERTIES OR TO FINISHED WORK ON THE SITE, AND SHALL TAKE REMEDIAL MEASURES TO PREVENT EROSION OF FRESHLY GRADED AREAS UNTIL SUCH TIME AS PERMANENT DRAINAGE AND EROSION CONTROL MEASURES HAVE BEEN INSTALLED TO THE SATISFACTION OF THE CITY ENGINEER AND THE MITIGATION MONITOR.
4. ALL AREAS TO BE FILLED SHALL BE PREPARED PRIOR TO FILLING, AND SHALL BE PILED IN ACCORDANCE WITH STANDARD SPECIFICATIONS OF GRADING OPERATIONS AND SPECIFICATIONS CONTAINED IN THE SOILS REPORT. ALL VEGETABLE MATTER AND OTHER OBJECTIONABLE MATERIALS SHALL BE REMOVED BY THE CONTRACTOR PRIOR TO THE TIME UPON WHICH THE FILL IS TO BE PLACED. LOOSE FILL AND UNSUITABLE MATERIALS SHALL BE REMOVED TO EXPOSE NATURAL GROUND. THE EXPOSED SOILS SHALL BE SCARIFIED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT AND THEN COMPACTED TO A MINIMUM OF 90% OF ASTM-D1557. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PLACE, SPREAD, WATER AND COMPACT THE FILL IN STRICT ACCORDANCE WITH THE SPECIFICATIONS.
5. CUT AND FILL SLOPES SHALL BE CUT AND TRIMMED TO THE FINISHED GRADE TO PROVIDE SMOOTH SURFACES AND DRAINAGE CONTROL. THE SLOPES OF EXCAVATIONS AND EMBANKMENTS SHALL BE SHARP, TRIMMED, AND FINISHED IN ACCORDANCE WITH THE GRADING NOTES AND AS SPECIFIED IN THE GRADING NOTES AND LEFT IN A HEALTHY AND STABLE CONDITION. ALL STUMPS, ROOTS AND OTHER WASTE MATERIALS EXPOSED ON THE EXCAVATION OF EMBANKMENTS, WHICH ARE LIABLE TO BECOME LOOSE, SHALL BE REMOVED AND DISPOSED OF. THE JOB AND SOILS REPORT SHALL BE FORWARDED TO THE CITY ENGINEER PRIOR TO THE COMMENCEMENT OF THE WORK. THE CITY ENGINEER SHALL REVIEW THE REPORT AND SHALL BE RESPONSIBLE TO PLACE, SPREAD, WATER AND COMPACT THE FILL IN STRICT ACCORDANCE WITH THE SPECIFICATIONS.
6. IF THERE ARE EROSION SCARS ON EXISTING SLOPES WHICH OTHERWISE WOULD NOT BE ELIMINATED BY THE PROPOSED GRADING, THESE SCARS SHALL BE ELIMINATED BY TRIMMING, THE GRADING AND PLANTING. IF THE SCARS ARE IN AREAS OF NATIVE VEGETATION, THE REPAIRS SHOULD BE PERFORMED WITH AN EFFORT TO RESTORE THE NATURAL VEGETATION. ALL SUCH REPAIRS IN AREAS OF NATIVE VEGETATION SHALL BE REVIEWED AND APPROVED BY THE CITY'S MITIGATION MONITORING COORDINATOR PRIOR TO THE BEGINNING OF THE REPAIR WORK.
7. ALL TREES, BRUSH, GRASS, AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF OFF THE SITE BY THE CONTRACTOR SO AS TO LEAVE THE AREAS THAT HAVE BEEN CLEARED WITH A NEAT AND FINISHED APPEARANCE FREE FROM UNSIGHTLY DEBRIS. THE CONTRACTOR SHALL OBTAIN A PERMIT FROM THE CITY ENGINEER PRIOR TO THE DISPOSAL OF ANY SUCH MATERIAL.
8. SUBDRAIN LOCATIONS ARE APPROXIMATE AND ARE FOR ALL SIGNIFICANT FILL CONTACTS. THE ACTUAL LOCATION AND EXTENT OF SUBDRAINS SHALL BE DETERMINED BY THE GEOTECHNICAL CONSULTANT AT THE TIME OF CONSTRUCTION.
9. BY REFERENCE HERE, THE REPORT "GEOTECHNICAL INVESTIGATION, OTAY RANCH VILLAGE 7, R-2 AND COMMUNITY PARK, CHULA VISTA, CALIFORNIA" PREPARED BY GECOM INC. DATED MAY 05, 2004, IS INCLUDED AS PART OF THESE PLANS.
10. CONTRACTOR SHALL VERIFY LOCATIONS OF ALL EXISTING UNDERGROUND UTILITIES LOCATIONS SHOWN ON THESE PLANS AND APPROXIMATE AND SHOWN FOR GENERAL INFORMATION ONLY.
11. WHERE GRADING DOES NOT OCCUR, ALL EXISTING PLANT MATERIAL IS TO BE PROTECTED IN PLACE. NO CONSTRUCTION EQUIPMENT WILL BE ALLOWED TO TRAVEL THROUGH AND DAMAGE PLANT MATERIAL. PLANT MATERIAL TO BE RETAINED IN A NATURAL CONDITION SHALL BE IMPACTED UNDER THE PROTECTION OF THE EROSION CONTROL MEASURES. THE CONTRACTOR SHALL BE RESPONSIBLE TO REPAIR ANY AND ALL DAMAGES TO THESE AREAS.
12. THE CONTRACTOR SHALL FURNISH TO THE ENGINEER OF WORK AS-BUILT PLANS FOR ALL NEW IMPROVEMENTS AND GRADING SHOWN ON THESE PLANS FOR SUBMITTAL TO THE CITY ENGINEER FOR APPROVAL IN ACCORDANCE WITH SECTION 15.04.140 OF THE CHULA VISTA MUNICIPAL CODE.
13. IN THE CASE OF CONFLICTS, THE REQUIREMENTS OF THE EARLHORN, SPECIFICATIONS PREPARED FOR THE PROJECT BY THE ENGINEER OF WORK SHALL GOVERN THE REQUIREMENTS OF THIS PLAN AND THESE NOTES AND THESE PLANS SHALL BE REVISED ACCORDINGLY.

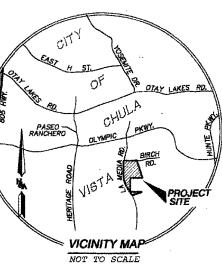
GENERAL NOTES:

1. THE SOILS REPORT TITLED "GEOTECHNICAL INVESTIGATION, OTAY RANCH VILLAGE 7, R-2 AND COMMUNITY PARK, CHULA VISTA, CALIFORNIA" FROM GECOM, INC. DATED MAY 05, 2004, SHALL BE CONSIDERED TO BE PART OF THIS GRADING PLAN. ALL GRADING SHALL BE DONE IN ACCORDANCE WITH THE RECOMMENDATIONS AND SPECIFICATIONS CONTAINED IN THE SAID REPORT.
2. WRITING PERMISSION SHALL BE OBTAINED FOR ANY OFF-SITE GRADING.

AS BUILT	
Signature: _____	Date: _____
Signature: ALISA S. VALDERRAMA	P.E. No. 47945
Printed Name: _____	Discipline: _____
My Registration Expires: _____	

CONSTRUCTION RECORD	
Contractor	C.V. DWS. NO. 02016
Inspector	C.V. DWS. NO. 03063
Date Completed	

ROUGH GRADING PLANS FOR: OTAY RANCH VILLAGE 7 CHULA VISTA, TRACT NO. 05-09



"DIG ALERT" NOTICE:

SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES THAT DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A "PERMIT TO EXCAVATE" WILL BE VALID. FOR YOUR DIG ALERT I.D. NUMBER, CALL UNDERGROUND SERVICE OPERATIONS AT 1-800-422-4133 AT LEAST TWO WORKING DAYS BEFORE YOU DIG.

OWNERS' CERTIFICATE:

IT IS AGREED THAT FIELD CONDITIONS MAY REQUIRE CHANGES TO THESE PLANS. IF IT IS FURTHER AGREED THAT B.S.O. I.C.C. SHALL HAVE THE ENGINEER OF WORK MAKE SUCH CHANGES, ALTERATIONS OR ADDITIONS TO THESE PLANS EXCEPT CHANGES THAT AFFECT OR ARE WITHIN THE SAN DIEGO COUNTY WATER AUTHORITY'S EASEMENT, WHICH THE ENGINEER OF WORK DEEMES NECESSARY AND DESIRABLE FOR THE PROPER COMPLETION OF THE GRADING OPERATIONS, SUCH CHANGES SHALL BE APPROVED BY THE CITY ENGINEER PRIOR TO CONSTRUCTION. ALL CHANGES THAT ARE WITHIN OR AFFECT THE SAN DIEGO COUNTY WATER AUTHORITY'S EASEMENT SHALL BE APPROVED IN WRITING BY THE SAN DIEGO COUNTY WATER AUTHORITY PRIOR TO COMMENCEMENT OF WORK.

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

NAME: OTAY PROJECT L.P.
ADDRESS: 610 WEST ASH STREET, SUITE 1500 SAN DIEGO CA. 92101
TELEPHONE: (619) 234-4050
BY: _____ DATE: 7/10/05

SOILS ENGINEER'S CERTIFICATE:
I, SHAWN WOODEN, A REGISTERED CIVIL ENGINEER OF THE STATE OF CALIFORNIA, PRINCIPALLY DOING BUSINESS IN THE FIELD OF MECHANICAL ENGINEERING, HEREBY CERTIFY THAT A SAMPLING AND STUDY OF THE SOIL CONDITIONS PREVALENT WITHIN THIS SITE WAS MADE BY ME OR UNDER MY DIRECTION BETWEEN THE DATES of 7/10/05 and 7/10/05. ONE COMPLETE COPY OF THE SOILS REPORTS COMPILED FROM THIS STUDY, WITH MY RECOMMENDATIONS, HAS BEEN SUBMITTED TO THE CITY OF CHULA VISTA.

THESE GRADING PLANS HAVE BEEN REVIEWED BY ME OR UNDER MY DIRECTION AND CONFORM TO THE RECOMMENDATIONS MADE IN THE SOILS REPORTS REFERENCED ABOVE.
SIGNED: _____ DATE: 7/10/05
RCE NO. 4185 EXPIRATION DATE: 7/10/11

DECLARATION OF RESPONSIBLE CHARGE:

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT AND THAT I HAVE ASSUMED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 4703 OF THE PROFESSIONAL ENGINEERING ACT AND THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS. I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF CHULA VISTA IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR THE PROJECT DESIGN.

HUNSAKER & ASSOCIATES
SAN DIEGO, INC.
10179 HUNDEKNEWS ST.
BY: ALISA S. VALDERRAMA R.E.C. NO. 47945 DATE: 7/10/05

ENGINEER OF WORK CERTIFICATE:

I HEREBY CERTIFY THAT IN MY PROFESSIONAL OPINION ALL WORK INCORPORATED IN THE GRADING AND DRAINAGE PLANS, SHEET THROUGH SHEET AND AUTHORIZED UNDER PERMIT NO. 05196 HAS BEEN CONSTRUCTED TO THE LINES AND GRADES IN SUBSTANTIAL CONFORMANCE WITH SAID PLANS AND ANY APPROVED REVISIONS.

SIGNED: _____ DATE: _____
PRINTED NAME: _____ P.E. NO.: _____
DISCIPLINE: _____ REGISTRATION EXPIRES: _____

LEGAL DESCRIPTION

PARCEL 1:
A PORTION OF PARCEL 6 OF PARCEL MAP NO. 18471, IN THE CITY OF CHULA VISTA, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, FILED IN THE OFFICE OF THE SAN DIEGO COUNTY RECORDER MAY 10, 2000.

UNDERGROUND SERVICE ALERT

CALL: TOLL FREE
1-800-422-4133
TWO WORKING DAYS BEFORE YOU DIG
"CAUTION: REMEMBER THAT THE USA CENTER BONDING FUND PROVIDES PROTECTION ONLY AND DOES NOT GUARANTEE THE CENTER. THERE COULD BE OTHER UTILITIES LOCATED NEARBY WHICH YOU WILL BE RESPONSIBLE TO IDENTIFY AND INFORM YOU OF WHOM THEY WILL NOTIFY."

Signature: _____	Date: _____
Signature: ALISA S. VALDERRAMA	P.E. No. 47945
Printed Name: _____	Discipline: _____
My Registration Expires: _____	

WORK TO BE DONE:

- THE WORK TO BE DONE CONSISTS OF THE ITEMS INDICATED UNDER THE "LEGEND" SHOWN BELOW AND IS TO BE DONE IN ACCORDANCE WITH THESE PLANS AND THE FOLLOWING LIST OF PRINTED MATERIALS AS CURRENTLY ADOPTED BY THE CHULA VISTA CITY COUNCIL OF THE FOLLOWING:
1. STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (2000 EDITIONS) ("GREENBOOK") AND 2000 SUPPLEMENT.
 2. SAN DIEGO AREA REGIONAL STANDARD DRAWINGS. (2003)
 3. CITY OF CHULA VISTA STANDARD SPECIAL PROVISIONS TO THE "GREENBOOK". (JULY 1997)
 4. DESIGN AND CONSTRUCTION STANDARDS OF THE CITY OF CHULA VISTA (2003)
 5. STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION STANDARD PLANS AND STANDARD SPECIFICATIONS, (JULY, 1995).
 6. STATE OF CALIFORNIA MANUAL OF TRAFFIC CONTROL, (1996).
 7. CALIFORNIA BUILDING CODE (TITLE 24 (1994)).
- ALL REFERENCES ARE TO BE MADE PART OF THESE PLANS. ANY CHANGES OR REVISIONS THEREFOR SHALL BE APPROVED BY THE CITY ENGINEER OR HIS DESIGNEE PRIOR TO ANY REQUEST FOR INSPECTION.

LEGEND	DRAWING NO.	SYMBOL
SUBDIVISION BOUNDARY.....		---
NEIGHBORHOOD BOUNDARY.....		---
UNDERCUT LINE.....		---
LOT LINE.....		---
CORB LINE.....		---
LOT NUMBER.....		---
PAV. ELEVATION.....		---
EXISTING CONTOURS.....		---
PROPOSED FINISH CONTOURS.....		---
EXISTING FINISH SURFACE ELEVATIONS.....		---
FINISH SURFACE ELEVATIONS.....		---
FLOW LINE ELEVATION.....		---
TOP OF CURB.....		---
FINISH GRADE ELEVATION.....		---
STORM DRAIN.....		---
TYPE F CATCH BASIN.....		---
TYPE A CLEANOUT.....		---
B CURB TIEOUT.....		---
CORB OUTLET.....		---
CONCRETE LOG.....		---
CITY SLOPE (2:1 MAXIMUM).....		---
1.5:1 SIDEWAY SLOPE FOR PAV DIFFERENTIAL OF 4" OR LESS.....		---
PIT SLOPE (2:1 MAXIMUM).....		---
1.5:1 SIDEWAY SLOPE FOR PAV DIFFERENTIAL OF 4" OR LESS.....		---
CROSS CUTTER.....		---
(FOR REFERENCE ONLY)		---
DRAINAGE DITCH.....		---
CITY AND FILL LINE.....		---
DAYLIGHT LINE.....		---
RETAINING WALL.....		---
EARTHEN SWALE.....		---
EXISTING TIE.....		---
EXISTING TIE.....		---
EASEMENT LINE.....		---
FLOW DIRECTION.....		---
WING, U-TYPE HEADWALL.....		---
EXISTING SURVEY MONUMENT.....		---
RIP-RAP ENERGY DISSIPATOR.....		---
CONCRETE ENERGY DISSIPATOR.....		---
4" PVC CONNECTION FOR MEDIAN DRAIN.....		---
BIO-FENCE (SHOWN ON EROSION CONTROL PLAN SHEETS 20-24)		---
SILT-FENCE (SHOWN ON EROSION CONTROL PLAN SHEETS 20-24)		---
SUBDRAIN TIE-IN.....		---
SLUMP RESISTANCE.....		---
TYPE C CATCH BASIN.....		---

OWNER DEVELOPER	TOPOGRAPHY SOURCE:
OTAY PROJECT, L.P. 610 WEST ASH STREET SUITE 1500 SAN DIEGO CA. 92101 (619) 234-4050	R. J. LING & ASSOCIATES 3183 HAWLEY AVENUE, SUITE B TUSTIN, CA. 92780 (714) 832-2077 FLOW OCTOBER 2004

ASSESSOR'S PARCEL NOS.	644-030-14
-------------------------------	------------

EARTHWORK QUANTITIES:	
CUT: 3,240,000 C.Y.	
FILL: 3,240,000 C.Y.	
NOTE: GRADING QUANTITIES ARE ESTIMATED FOR BONDING PURPOSES ONLY AND ARE NOT TO BE USED FOR FINAL PAYMENT QUANTITIES.	

CITY OF CHULA VISTA		ENGINEERING DEPARTMENT	
Drawing No. 05017-01		Drawing No. 05-09-9725	
OTAY RANCH - VILLAGE 7		CHULA VISTA TRACT NO. 05-09	

AS BUILT

OTAY RANCH - VILLAGE 7
ROUGH GRADING PLAN

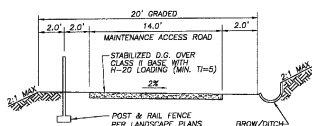
SHEET NO. 25 OF 349

SEE SHEET 09

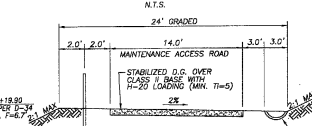
SEE SHEET 15

BEARING/DI TA	RADIUS	LENGTH	REMARKS
1 N 81°18'12" W	218.50'	24' ROP (1750)	
2 N 89°04'48" W	58.00'	24' ROP (1500)	
3 N 89°17'15" E	120.75'	18' ROP (1500)	
4 708.54'	304.00'	394.22'	40' ROP (1500)
5 N 82°47'47" E	100.00'	67.50'	18' ROP (1500)
6 128.06'	304.00'	78.49'	40' ROP (1500)
7 88°28'58"	80.00'	107.27'	40' ROP (1500)
8 19°32'22"	200.00'	69.24'	30' ROP (1500)
9 24°42'21"	200.00'	88.24'	30' ROP (1500)
10 N 73°14'01" W	81.00'	61.00'	24' ROP (1500)
11 N 72°05'11" W	218.52'	72' ROP (1500)	
12 N 80°30'10" E	27.80'	35' ROP (1500)	
13 37°46'08"	80.00'	51.47'	54' ROP (1500)
14 N 13°01'10" E	25.50'	24' ROP (1500)	
15 N 93°24'11" W	100.00'	72' ROP (1750)	
16 N 33°32'55" W	5.00'	18' ROP (1500)	
17 N 33°32'55" W	38.98'	54' ROP (1500)	
18 N 33°32'55" W	17.44'	18' ROP (1500)	
19 67°54'08"	22.50'	26.67'	18' ROP (1500)
20 N 53°17'20" E	85.60'	72' ROP (1500)	
21 83°22'18"	330.00'	72' ROP (1500)	
22 N 62°19'31" E	166.80'	72' ROP (1500)	
23 N 66°11'24" E	71.76'	36' ROP (1500)	
24 N 77°43'42" W	63.38'	18' ROP (1500)	
25 N 17°01'11" E	81.30'	30' ROP (1500)	
26 N 13°45'41" E	167.56'	30' ROP (1500)	
27 N 79°59'00" E	75.00'	30' ROP (1500)	
28 N 82°28'00" E	42.74'	30' ROP (1500)	
29 N 14°02'00" W	128.85'	30' ROP (1500)	
30 N 79°38'00" E	49.21'	30' ROP (1500)	
31 N 14°24'00" W	24.25'	18' ROP (1500)	
32 N 79°38'00" E	160.48'	24' ROP (1500)	

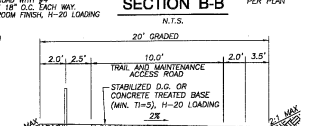
*SEE STORM DRAIN REVELING NOTES ON SH. 2



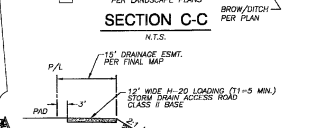
SECTION A-A



SECTION B-B



SECTION C-C



SECTION D-D



SECTION E-E

HUNSAKER & ASSOCIATES
 A N D I L L I C O , I N C
 PLANNING 10715 Hankensville, Suite 300
 HUNTSVILLE, Tennessee 37424
 SURVEYING PH938589-4099 / PH938589-5111

CITY OF CHULA VISTA
 ENGINEERING DEPARTMENT
 Drawing No. **050112-2**
 W.G. No. CR-8723
 O.W.D. No.



AS BUILT	
Signature	Date
AUSA S. VALDANO	P.E. No. 47945
Printed Name	
My Registration Expires	Discipline

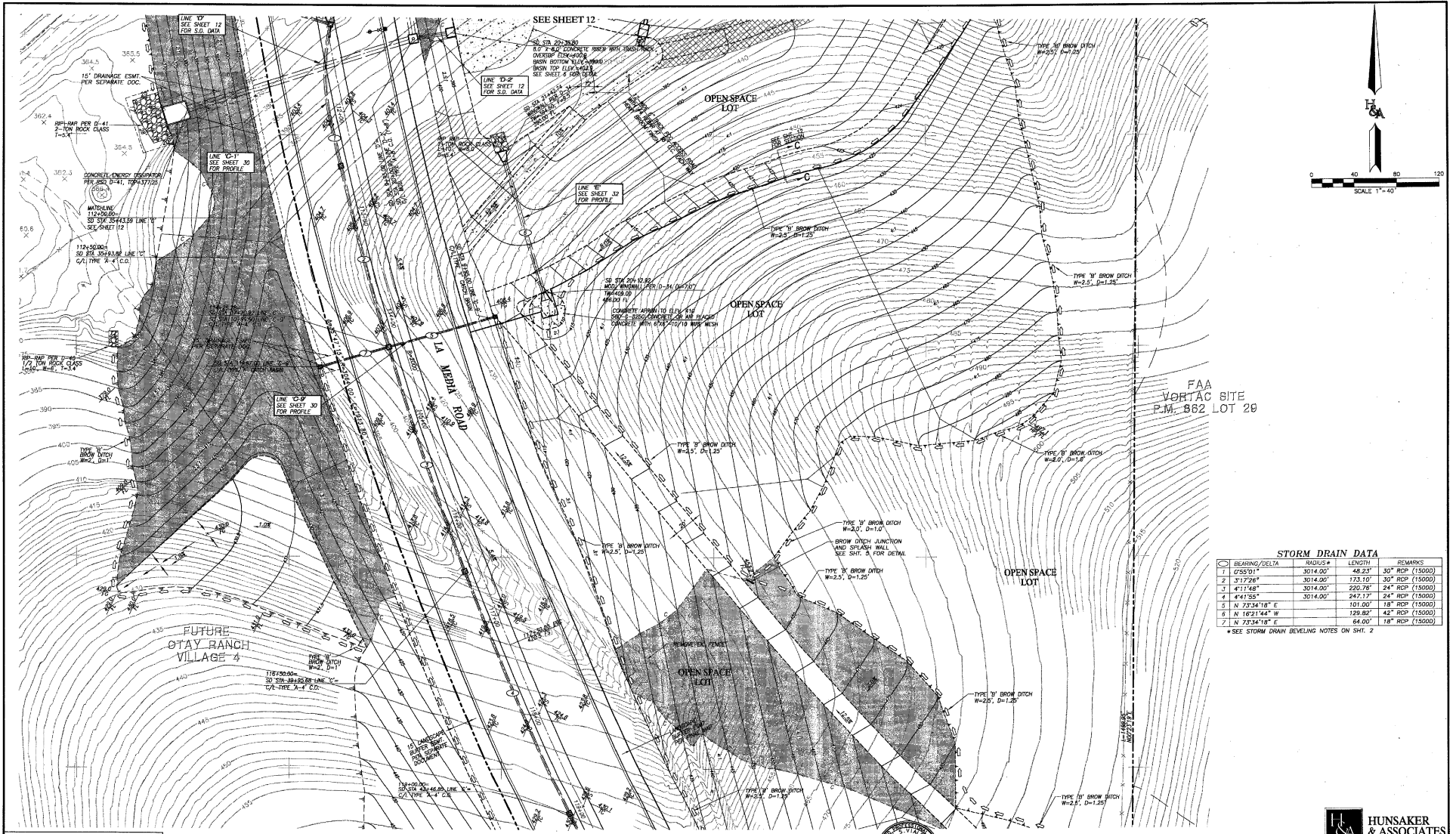
CONSTRUCTION RECORD	REFERENCES	BY	REVISIONS	Date (M/D/Y)	BENCH MARK
Contractor					
Inspector					
Date Completed					

SCALE	Designed By	Drawn By	Checked By
Horizontal			
Vertical			

Submitted	Approved	City Engineer
By <i>[Signature]</i>	By <i>[Signature]</i>	

DESCRIPTION	DATE
DESCRIPTION: 2" HORIZONTAL SCALE (1/4" = 10')	12/31/2005
DATE: 12/31/2005	
ELEVATION: 448.51' (MVDG); 444.23' (MVDG)	

11/13/15 (15) Rough Grading Plans (15) 10/15



SEE SHEET 16

FAA
VORTAC SITE
P.M. 862 LOT 28

STORM DRAIN DATA

NO.	BEARING/DELTA	RADIUS*	LENGTH	30" RCP (1500D)	REMARKS
1	0°55'01"	3014.00'	48.23'	30"	RCP (1500D)
2	3°17'28"	3014.00'	173.10'	30"	RCP (1500D)
3	4°11'48"	3014.00'	220.78'	24"	RCP (1500D)
4	4°41'55"	3014.00'	247.17'	24"	RCP (1500D)
5	N 73°34'18" E	101.00'	18"	18"	RCP (1500D)
6	N 18°21'44" W	128.85'	42"	42"	RCP (1500D)
7	N 73°34'18" E	64.00'	18"	18"	RCP (1500D)

*SEE STORM DRAIN BEVELING NOTES ON SHET. 2

AS BUILT

Signature: ALISA S. VALPANDO P.E. No. 47945
 Printed Name: _____
 My Registration Expires: _____ Discipline: _____

CONSTRUCTION RECORD	REFERENCES	BY	REVISIONS	Date	App'd	BENCH MARK
Contractor						DESCRIPTION OF BENCH MARK USED IN THIS DOCUMENT IS AS INDICATED ON SURVEYOR'S CITY WATER MAIN (D. 48 IN. DIA. 1644) CHULA VISTA CITY 8400 11/10/09 44.83 (NAD83) 444.231 (NAD83)
Inspector						
Date Completed						

SCALE	Designed By	Drawn By	Checked By	Submitted	Approved
Horizontal	B.C.	J.C.	A.S.V.	8/26/2005	8/29/05
Vertical				2/1/05	
	Alisa S. Valpando				
	R.C.E. No. 47945				

CITY OF CHULA VISTA	ENGINEERING DEPARTMENT	Drawing No.
ROUGH GRADING PLANS FOR		05017-15
OTAY RANCH - VILLAGE 7		
CHULA VISTA TRACT NO. 05-09		



HUNSAKER & ASSOCIATES
 P.L.L.C.
 PLANNING, 3079 Fairview St. Suite 200
 INCORPORATED, San Diego, CA 92121
 SURVEYING: PLS000305-0600-PUB000308-0404

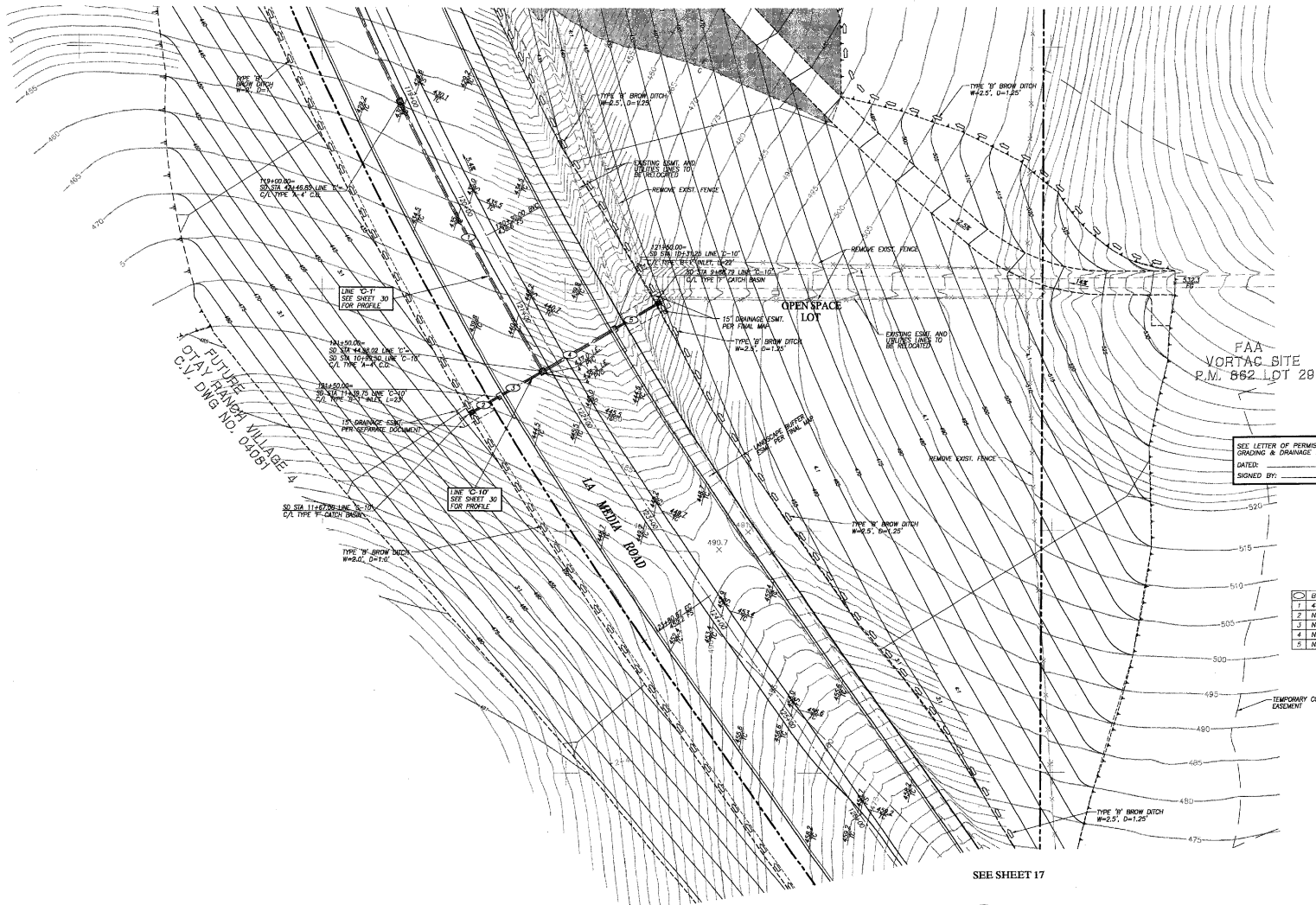
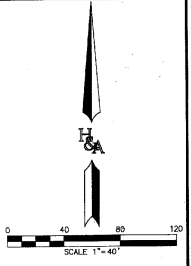
31025113(2)City Rough Grading Plans(1)Page

OTAY RANCH - VILLAGE 7
 ROUGH GRADING PLAN

REV. NO. 205-349

W.O. No. 02-9720
 O.W.D. NO.

SEE SHEET 15



SEE LETTER OF PERMISSION FOR OFFSITE GRADING & DRAINAGE FROM
DATED: _____
SIGNED BY: _____

STORM DRAIN DATA

BEARING/DELTA	RADIUS	LENGTH	REMARKS
1 4°1'55"	3014.00'	247.17'	24" RCP (15000)
2 N 39°44'59" E		23.75'	18" RCP (15000)
3 N 59°44'59" E		38.25'	18" RCP (15000)
4 N 59°44'59" E		64.25'	24" RCP (15000)
5 N 59°44'59" E		38.96'	18" RCP (15000)

TEMPORARY CONSTRUCTION EASEMENT

SEE SHEET 17

AS BUILT

Date _____
 SIGNATURE _____
 ALISA S. MALRANDO P.E. No. 42845
 Printed Name
 My Registration Expires _____ Discipline _____



PLANNING 9079 Hamleton St. Suite 200
ENGINEERING 5400 La Jolla Village Drive
SURVEYING 11855 E. 15th St. Suite 100

CONSTRUCTION RECORD	REFERENCES	BY	REVISIONS	Date	App'd	BENCH MARK	SCALE	Designed By	Drawn By	Checked By	Submitted	Approved	CITY OF CHULA VISTA	ENGINEERING DEPARTMENT	Drawing No.
Contractor _____						DESCRIPTION: FINISHED SURFACE TO BE SET AT ELEVATION OF 4.00 FEET TO THE CENTERLINE OF LA MEDIA ROAD. SEE SHEET 15 FOR DETAILS.	Horizontal	B.G.	J.C.	A.S.V.	8/24/2025	8/24/2025	CITY OF CHULA VISTA		05017-16
Inspector _____						CHULA VISTA TRACT NO. 05-09	Vertical	Alisa S. Malrando	_____	_____	By _____	By _____	ROUGH GRADING PLANS FOR		
Date Completed _____								ALISA S. MALRANDO	R.G.E. No. 47945		Office H&A	City Engineer	ROUGH GRADING PLANS FOR		
													OTAY RANCH - VILLAGE 7		W.D. No. 08-9720
													CHULA VISTA TRACT NO. 05-09		O.W.D. No.

9/25/21 L&C/1 Rough Grading Plans/1-049

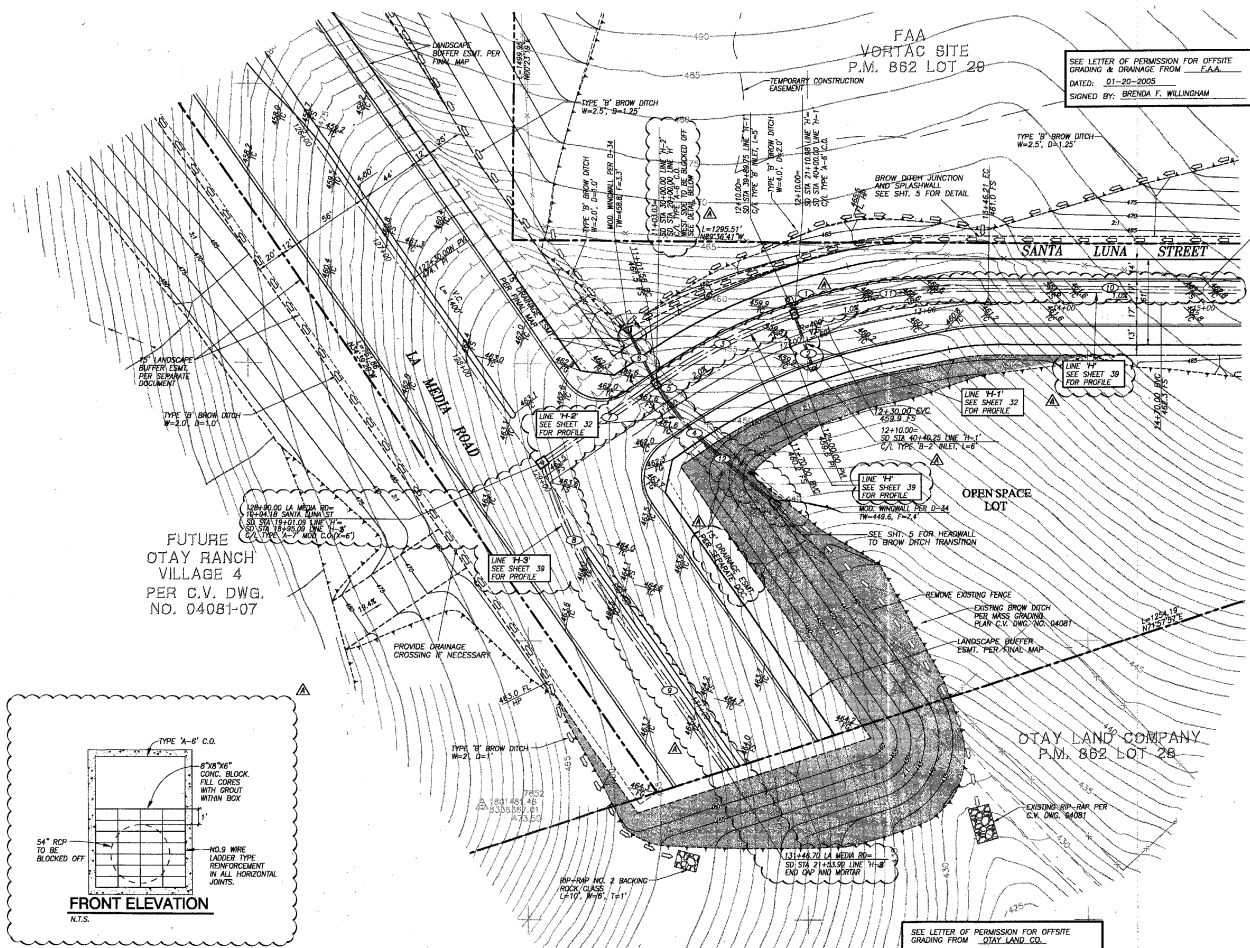
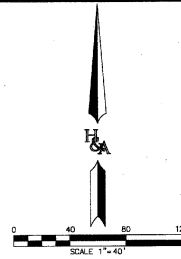
OTAY RANCH - VILLAGE 7
ROUGH GRADING PLAN

DRW. NO. 05-25-349

SEE SHEET 16

FAA
VORTAC SITE
P.M. 862 LOT 28

SEE LETTER OF PERMISSION FOR OFFSITE
GRADING & DRAINAGE FROM FAA.
DATED: 01-30-2005
SIGNED BY: BRENDA F. WILLINGHAM



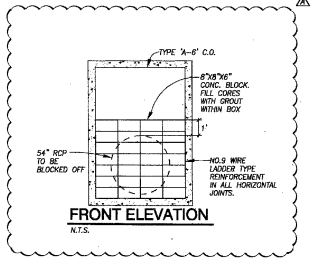
15400.000
SD STA 24+08.27 LINE 1/4
MATCHLINE

SEE SHEET 16

STORM DRAIN DATA

NO.	BEARING/DELTA	RADIUS	LENGTH	REMARKS
1	N 19°07'20" W	5.25'	18" RCP (15000)	
2	N 19°07'20" W	30.25'	18" RCP (15000)	
3	T 14°48'12"	415.00'	24" RCP (15000)	
4	T 2°50'18"	36.58'	24" RCP (15000)	
5	N 34°28'08" W	12.58'	24" RCP (15000)	
6	N 27°22'21" W	38.61'	18" RCP (15000)	
7	N 33°20'40" W	93.41'	20" RCP (15000)	
8	T 07°02'56"	300.00'	104.98' 60" RCP (18500)	
9	N 34°39'20" W	150.85'	60" RCP (18500)	
10	N 88°12'53" W	161.32'	54" RCP (15000)	
11	T 6°40'24"	450.00'	130.97' 54" RCP (15000)	
12	N 48°24'37" W	85.14'	24" RCP (15000)	

FUTURE
OTAY RANCH
VILLAGE 4
PER C.V. DWG.
NO. 04081-07



SEE LETTER OF PERMISSION FOR OFFSITE
GRADING FROM OTAY LAND CO.
DATED: 2-17-05
SIGNED BY: CURT MIDLAND



AS BUILT

Contractor	Signature	Date
Inspector	Printed Name	P.E. No.
Date Completed	My Registration Expires	Discipline

CONSTRUCTION RECORD	REFERENCES	BY	REVISIONS	Date	App'd	BENCH MARK	SCALE	Designed By	Drawn By	Checked By	Submitted	Approved	CITY OF CHULA VISTA	ENGINEERING DEPARTMENT	Drawing No.
		H&A	REVISED STORM DRAIN	01/14/06	CP	DESCRIPTION: 1. MASS DATA (AS SHOWN ON THIS DRAWING) IS THE RESPONSIBILITY OF THE CLIENT. 2. THIS DRAWING IS THE PROPERTY OF HUNSAKER & ASSOCIATES, INC. (H&A). 3. IT IS TO BE KEPT IN THE OFFICE OF H&A. 4. NO PARTS ARE TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF H&A.	Horizontal	B.C.	J.C.	A.S.V.	6/11/06	6/11/06	CITY OF CHULA VISTA		05017-17
							Vertical	Plans Prepared Under Supervision of	Checked	Office					05017-17
								ALISA S. VALPANDO	6/11/06	47945					05017-17

H&A is the registered engineering firm for this project.

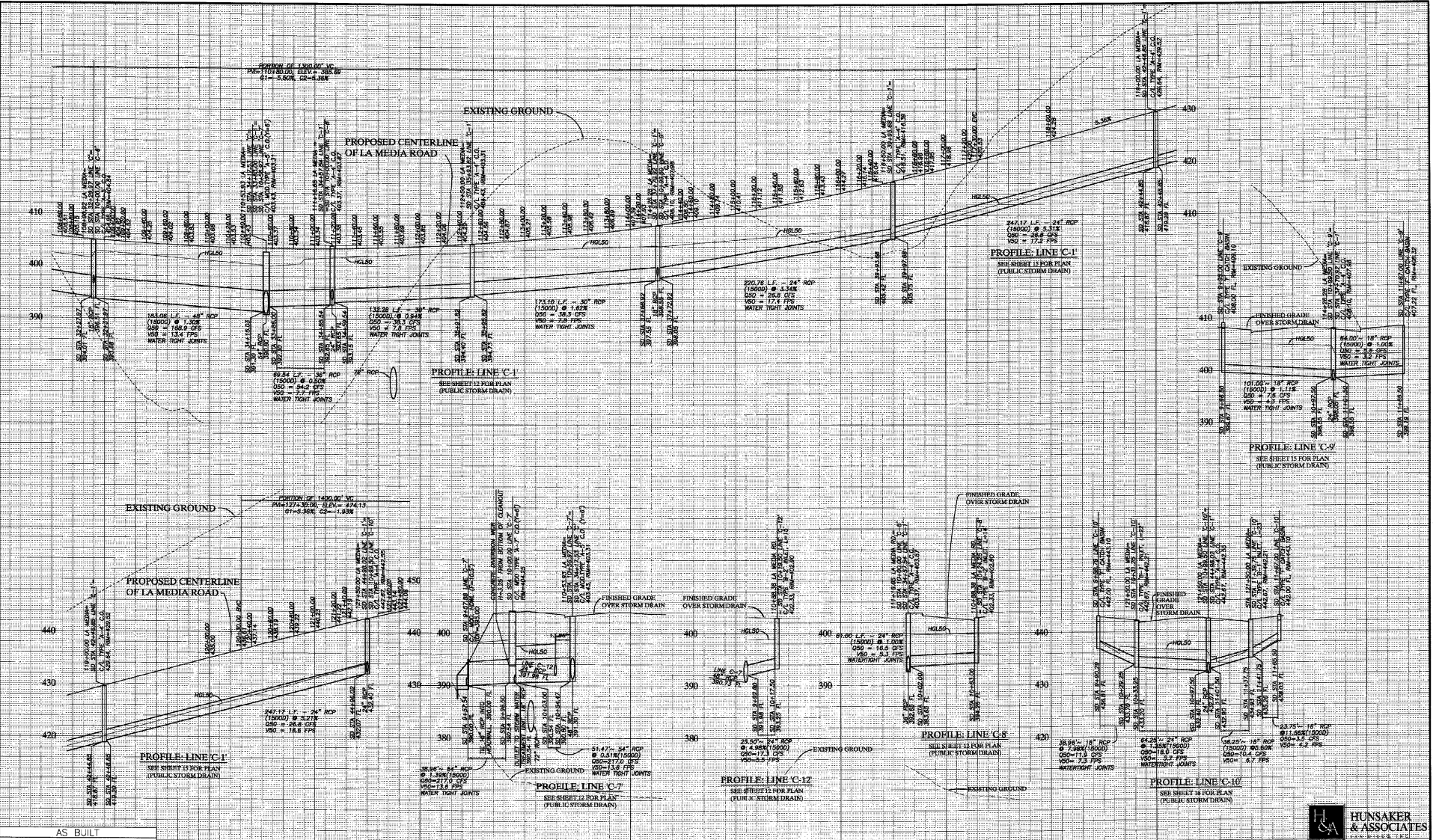
OTAY RANCH - VILLAGE 7
ROUGH GRADING PLAN

PLAN NO. 25-349

HUNSAKER & ASSOCIATES
SAN DIEGO, INC.
PLANNING: 10795 Huamantla St., Suite 200
INGENIERING: San Diego, CA 92121
SURVEYING: PHOENIX/ARIZONA: 709/955-9114

OTAY RANCH - VILLAGE 7
CHULA VISTA TRACT NO. 05-09

O.W.D. NO.



AS BUILT

Signature: ALISA S. VALPANDO
Printed Name: P.E. No. 47945

My Registration Expires: _____
Discipline: _____

CONSTRUCTION RECORD	REFERENCES	BY	REVISIONS	Date	App'd	BENCH MARK

SCALE	Designed By	Drawn By	Checked By	Submitted	Approved
Horizontal 1" = 40'	Alisa S. Valpando	[Signature]	[Signature]	2/1/23	[Signature]
Vertical 1" = 10'	Alisa S. Valpando	[Signature]	[Signature]	2/1/23	[Signature]

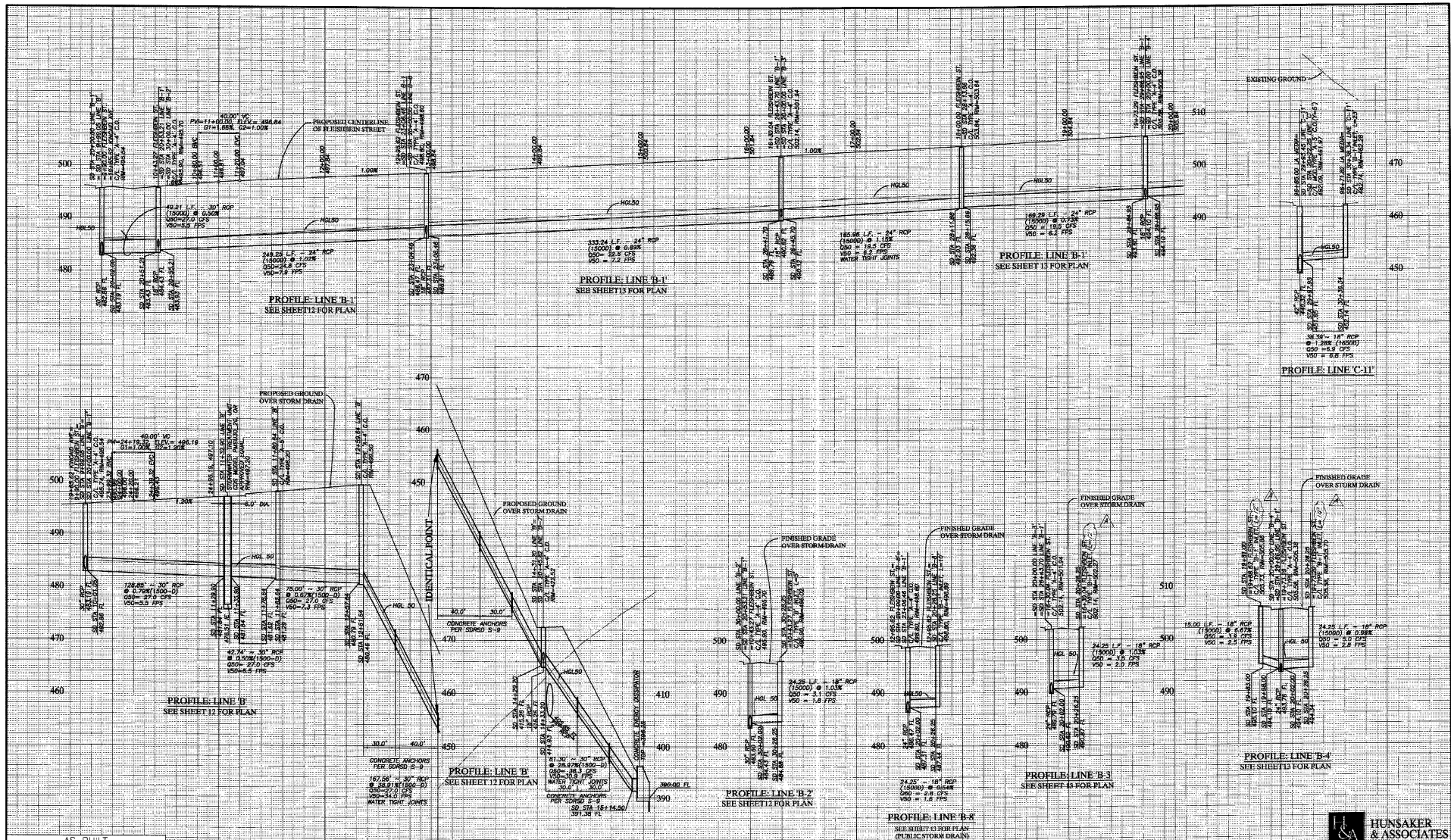
CITY OF CHULA VISTA
ENGINEERING DEPARTMENT
Rough Grading Plans For
OTAY RANCH - VILLAGE 7
CHULA VISTA TRACT NO. 05-09

CONTRACTOR	INSPECTOR	DATE COMPLETED	PROJECT NO.	DRAWING NO.
				05017-30



HUNSAKER & ASSOCIATES
11400 S. HUNSAKER ST. SUITE 200
SAN DIEGO, CA 92131
PH: 619-595-0300 FAX: 619-595-0311

K:\2011\14019\14019.dwg (Plotting Sheet) Plot



AS BUILT	
Signature	Date
ALISA S. VALPANDO	P.E. No. 47945
Printed Name	
My Registration Expires	Discipline

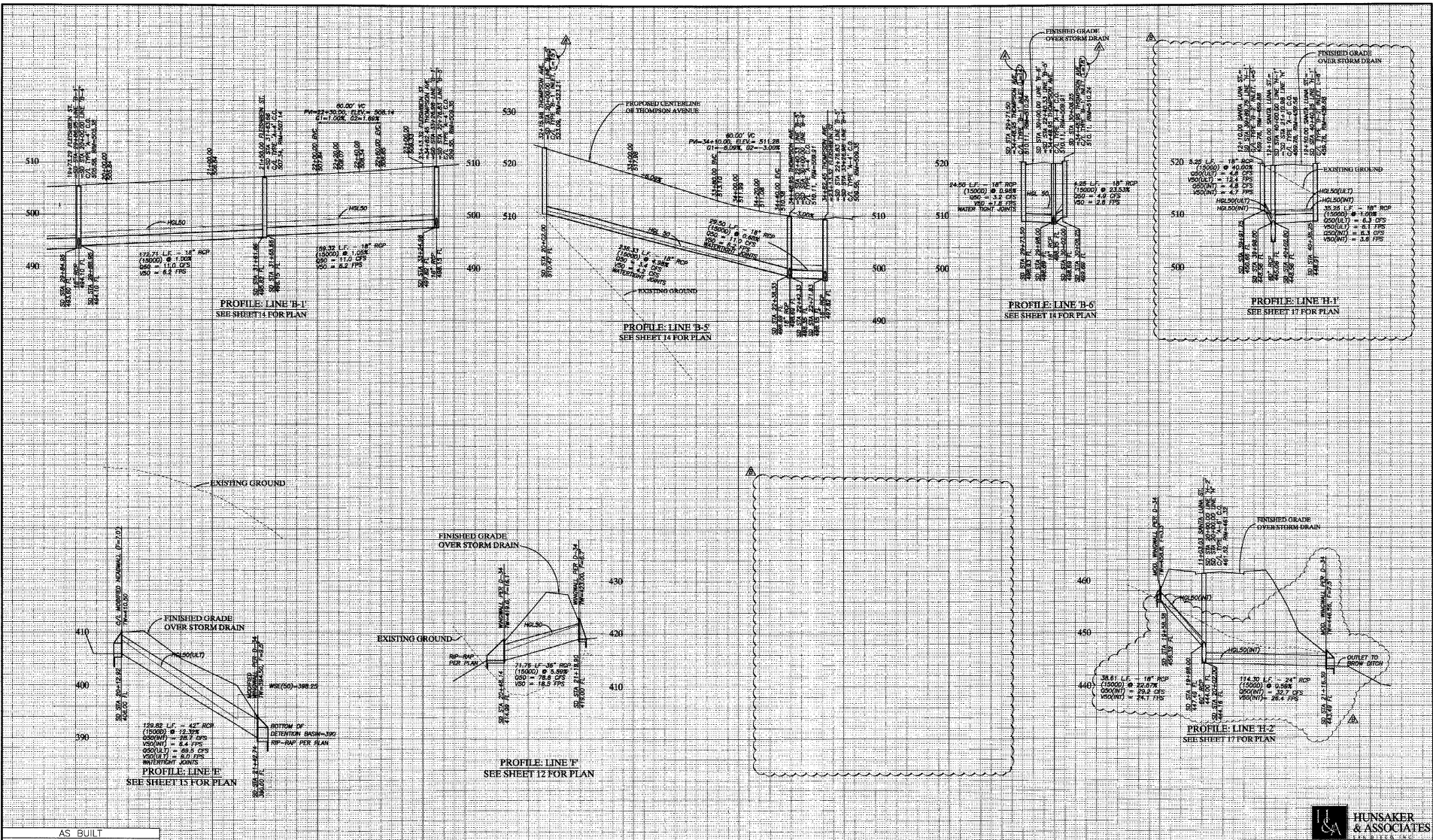
CONSTRUCTION RECORDS	REFERENCES	BY	REVISIONS	Date (App'd)
		N.A.A.	2A. REVISE HOLE LENGTHS	11.9.07

DESCRIPTION	DATE
1. PROPOSED 2" RCP (14.24) BY H&A	11.9.07
2. REVISE HOLE LENGTHS	11.9.07
3. REVISE HOLE LENGTHS	11.9.07
4. REVISE HOLE LENGTHS	11.9.07
5. REVISE HOLE LENGTHS	11.9.07
6. REVISE HOLE LENGTHS	11.9.07
7. REVISE HOLE LENGTHS	11.9.07
8. REVISE HOLE LENGTHS	11.9.07
9. REVISE HOLE LENGTHS	11.9.07
10. REVISE HOLE LENGTHS	11.9.07
11. REVISE HOLE LENGTHS	11.9.07
12. REVISE HOLE LENGTHS	11.9.07
13. REVISE HOLE LENGTHS	11.9.07
14. REVISE HOLE LENGTHS	11.9.07
15. REVISE HOLE LENGTHS	11.9.07
16. REVISE HOLE LENGTHS	11.9.07
17. REVISE HOLE LENGTHS	11.9.07
18. REVISE HOLE LENGTHS	11.9.07
19. REVISE HOLE LENGTHS	11.9.07
20. REVISE HOLE LENGTHS	11.9.07
21. REVISE HOLE LENGTHS	11.9.07
22. REVISE HOLE LENGTHS	11.9.07
23. REVISE HOLE LENGTHS	11.9.07
24. REVISE HOLE LENGTHS	11.9.07
25. REVISE HOLE LENGTHS	11.9.07
26. REVISE HOLE LENGTHS	11.9.07
27. REVISE HOLE LENGTHS	11.9.07
28. REVISE HOLE LENGTHS	11.9.07
29. REVISE HOLE LENGTHS	11.9.07
30. REVISE HOLE LENGTHS	11.9.07
31. REVISE HOLE LENGTHS	11.9.07
32. REVISE HOLE LENGTHS	11.9.07
33. REVISE HOLE LENGTHS	11.9.07
34. REVISE HOLE LENGTHS	11.9.07
35. REVISE HOLE LENGTHS	11.9.07
36. REVISE HOLE LENGTHS	11.9.07
37. REVISE HOLE LENGTHS	11.9.07
38. REVISE HOLE LENGTHS	11.9.07
39. REVISE HOLE LENGTHS	11.9.07
40. REVISE HOLE LENGTHS	11.9.07
41. REVISE HOLE LENGTHS	11.9.07
42. REVISE HOLE LENGTHS	11.9.07
43. REVISE HOLE LENGTHS	11.9.07
44. REVISE HOLE LENGTHS	11.9.07
45. REVISE HOLE LENGTHS	11.9.07
46. REVISE HOLE LENGTHS	11.9.07
47. REVISE HOLE LENGTHS	11.9.07
48. REVISE HOLE LENGTHS	11.9.07
49. REVISE HOLE LENGTHS	11.9.07
50. REVISE HOLE LENGTHS	11.9.07
51. REVISE HOLE LENGTHS	11.9.07
52. REVISE HOLE LENGTHS	11.9.07
53. REVISE HOLE LENGTHS	11.9.07
54. REVISE HOLE LENGTHS	11.9.07
55. REVISE HOLE LENGTHS	11.9.07
56. REVISE HOLE LENGTHS	11.9.07
57. REVISE HOLE LENGTHS	11.9.07
58. REVISE HOLE LENGTHS	11.9.07
59. REVISE HOLE LENGTHS	11.9.07
60. REVISE HOLE LENGTHS	11.9.07
61. REVISE HOLE LENGTHS	11.9.07
62. REVISE HOLE LENGTHS	11.9.07
63. REVISE HOLE LENGTHS	11.9.07
64. REVISE HOLE LENGTHS	11.9.07
65. REVISE HOLE LENGTHS	11.9.07
66. REVISE HOLE LENGTHS	11.9.07
67. REVISE HOLE LENGTHS	11.9.07
68. REVISE HOLE LENGTHS	11.9.07
69. REVISE HOLE LENGTHS	11.9.07
70. REVISE HOLE LENGTHS	11.9.07
71. REVISE HOLE LENGTHS	11.9.07
72. REVISE HOLE LENGTHS	11.9.07
73. REVISE HOLE LENGTHS	11.9.07
74. REVISE HOLE LENGTHS	11.9.07
75. REVISE HOLE LENGTHS	11.9.07
76. REVISE HOLE LENGTHS	11.9.07
77. REVISE HOLE LENGTHS	11.9.07
78. REVISE HOLE LENGTHS	11.9.07
79. REVISE HOLE LENGTHS	11.9.07
80. REVISE HOLE LENGTHS	11.9.07
81. REVISE HOLE LENGTHS	11.9.07
82. REVISE HOLE LENGTHS	11.9.07
83. REVISE HOLE LENGTHS	11.9.07
84. REVISE HOLE LENGTHS	11.9.07
85. REVISE HOLE LENGTHS	11.9.07
86. REVISE HOLE LENGTHS	11.9.07
87. REVISE HOLE LENGTHS	11.9.07
88. REVISE HOLE LENGTHS	11.9.07
89. REVISE HOLE LENGTHS	11.9.07
90. REVISE HOLE LENGTHS	11.9.07
91. REVISE HOLE LENGTHS	11.9.07
92. REVISE HOLE LENGTHS	11.9.07
93. REVISE HOLE LENGTHS	11.9.07
94. REVISE HOLE LENGTHS	11.9.07
95. REVISE HOLE LENGTHS	11.9.07
96. REVISE HOLE LENGTHS	11.9.07
97. REVISE HOLE LENGTHS	11.9.07
98. REVISE HOLE LENGTHS	11.9.07
99. REVISE HOLE LENGTHS	11.9.07
100. REVISE HOLE LENGTHS	11.9.07

SCALE	Designed By	Drawn By	Checked By
Horizontal 1" = 40'	ALISA S. VALPANDO	ALISA S. VALPANDO	ALISA S. VALPANDO
Vertical 1" = 8'			

Submitted	By	Approved	By
11/26/05	ALISA S. VALPANDO	11/26/05	ALISA S. VALPANDO
Date	Office	City Engineer	
11/26/05	H&A		

CITY OF CHULA VISTA	ENGINEERING DEPARTMENT	Drawing No.
ROUGH GRADING PLAN FOR		05017-31
OTAY RANCH - VILLAGE 7		
CHULA VISTA TRACT NO. 05-09		
		W.G. No. 05-9726
		O.W.D. NO.



AS BUILT

Date _____

SIGNATURE _____ P.E. No. 47945

Printed Name _____

My Registration Expires _____ Discipline _____

CONSTRUCTION RECORD	REFERENCES	BY	REVISIONS	Date	App'd	BENCH MARK
Contractor _____			1. REVISED INLET LINES	11/20/09	ASB	DISCUSSION: 1" BENCH MARK (ELEVATION) IN WELL MOUNTAIN @ 244 INTERSECTION OF BURNING A. CITY AREA MAP OF 1940 (P.L. 43.5, 1944). CHULA VISTA MAP 8040.
Inspector _____			2. REVISED STORM DRAIN ON SHT. 39	11/19/09	ASB	REVISION: 44-231 (NOV2009)
Date Completed _____						

SCALE	Designed By	Drawn By	Checked By	Submitted	Approved
Horizontal: 1" = 40'	J.S.	Y.C.	A.S.V.	6/11/06	5/19/06
Vertical: 1" = 8'	Plans Prepared Under Supervision Of <i>Alisa S. Valpando</i>	Draftsman	City Engineer	By <i>Alisa S. Valpando</i>	By <i>Alisa S. Valpando</i>
	R.C.E. No. 47945			Office <i>Ch</i>	City Engineer <i>Ch</i>

CITY OF CHULA VISTA
ENGINEERING DEPARTMENT

ROUGH GRADING PLANS FOR:
OTAY RANCH - VILLAGE 7
CHULA VISTA TRACT NO. 05-09

ENGINEERING DEPARTMENT	Drawing No.
05017-32	05017-32
PLANNING: 1979 Hazardous S. Side 200	
ENGINEERING: San Diego, CA 92101	
SURVEYING: FH85802-4100 - P208/08-1014	
H.W. No. DR-9726	
O.W.D. No. _____	



MASS GRADING PLANS FOR

CHULA VISTA TRACT NO 19-03

OTAY RANCH, VILLAGE 8 WEST PHASE 1 IN THE CITY OF CHULA VISTA, CALIFORNIA

A. GRADING NOTES:

- 1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THESE APPROVED PLANS AND APPROVED REVISIONS...
2. ALL GRADING SHALL BE INSPECTED AND TESTED BY OR UNDER THE DIRECTION OF A QUALIFIED SOILS ENGINEER...
3. THE CONTRACTOR SHALL PROPERLY GRADE ALL EXCAVATED SURFACES TO PROVIDE POSITIVE DRAINAGE...
4. ALL AREAS TO BE FILLED SHALL BE PREPARED PRIOR TO FILLING, AND FILL SHALL BE PLACED IN ACCORDANCE WITH STANDARD SPECIFICATIONS...
5. CUT AND FILL SLOPES SHALL BE CUT AND TRIMMED TO THE FINISHED GRADE TO PRODUCE SMOOTH SURFACES...
6. IF THERE ARE EROSION SCARS ON EXISTING SLOPES WHICH OTHERWISE WOULD NOT BE ELIMINATED BY THE PROPOSED GRADING...
7. ALL TREES, BRUSH, GRASS, AND OTHER OBJECTIONABLE MATERIAL SHALL BE COLLECTED, PILED OR OTHERWISE DISPOSED...
8. SUBDRAIN LOCATIONS SHOWN ARE APPROXIMATE AND ARE RECOMMENDED FOR ALL SIGNIFICANT FILL CANYONS...
9. BY REFERENCE HERE, THE REPORT TITLED GEOTECHNICAL INVESTIGATION, VILLAGE 8 WEST OTAY RANCH CHULA VISTA, CA...
10. CONTRACTOR SHALL VERIFY LOCATIONS OF ALL EXISTING UNDERGROUND UTILITIES...
11. WHERE GRADING DOES NOT OCCUR, ALL EXISTING PLANT MATERIAL IS TO BE PROTECTED IN PLACE...
12. THE CONTRACTOR SHALL FURNISH TO THE ENGINEER OF WORK AS-BUILT PLANS FOR ALL NEW IMPROVEMENTS AND GRADING...
13. IN THE CASE OF CONFLICTS, THE REQUIREMENTS OF THE EARTHWORK SPECIFICATIONS PREPARED FOR THE PROJECT BY THE SOILS ENGINEER SHALL GOVERN THE REQUIREMENTS OF THIS PLAN AND THESE NOTES SHALL BE REVISED ACCORDINGLY.

C. GENERAL NOTES:

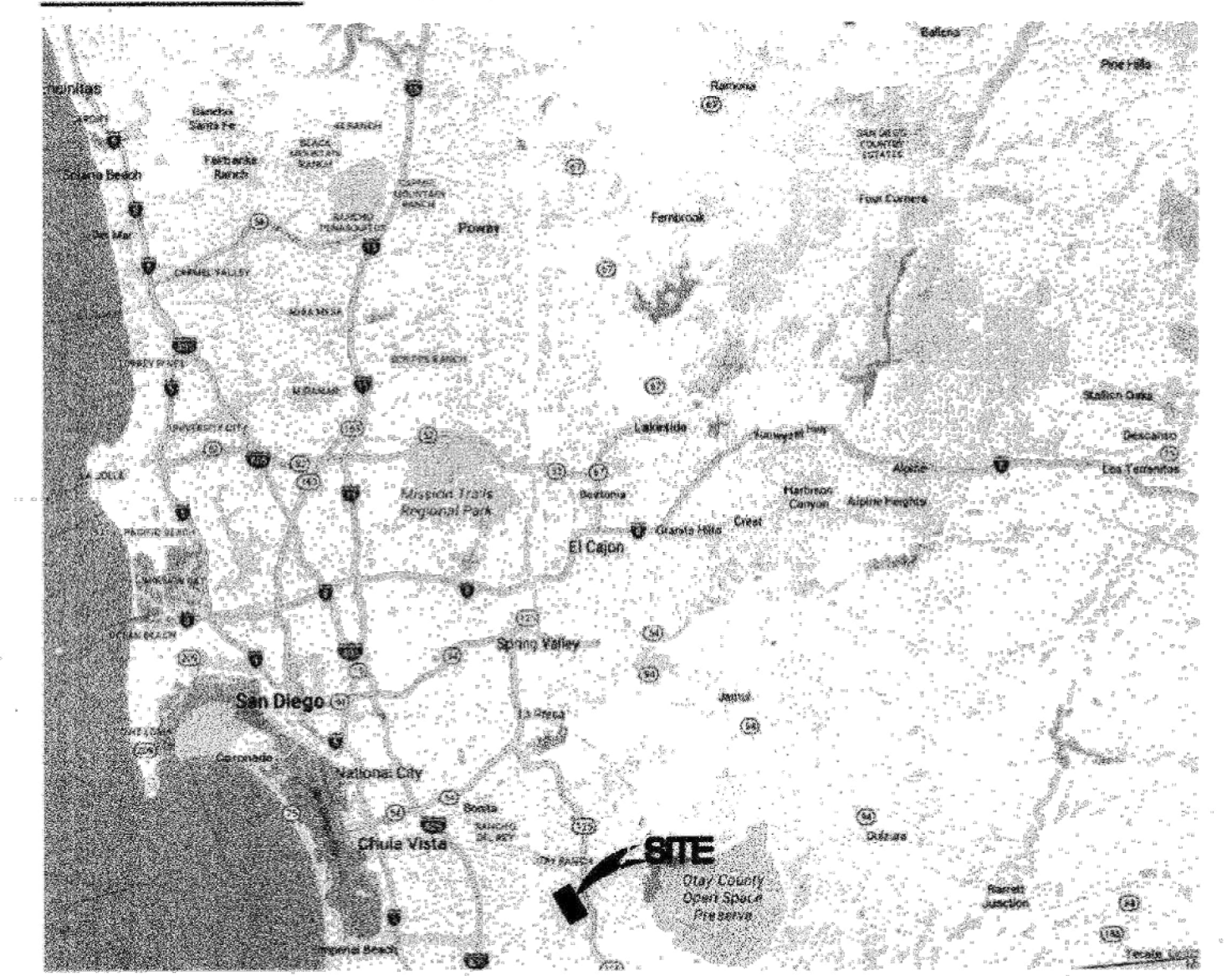
- 1. THE SOILS REPORT TITLED GEOTECHNICAL INVESTIGATION, VILLAGE 8 WEST OTAY RANCH, CHULA VISTA, CA, DATED JUNE 30, 2014, FROM ADVANCED GEOTECHNICAL SOLUTIONS, INC. SHALL BE CONSIDERED TO BE PART OF THIS GRADING PLAN...
2. STORM DRAINS ARE SHOWN FOR INFORMATIONAL PURPOSES ONLY...
3. WRITTEN PERMISSION SHALL BE OBTAINED FOR ANY OFF-SITE GRADING...
4. CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS REQUIRED TO PROTECT ADJACENT PROPERTIES DURING GRADING OPERATIONS...
5. THE DEVELOPER/CONTRACTOR SHALL BE RESPONSIBLE FOR SURVEY MONUMENTS AND/OR VERTICAL CONTROL BENCHMARKS WHICH ARE DISTURBED OR DESTROYED BY CONSTRUCTION...
6. THE CONTRACTOR SHALL DESIGN, CONSTRUCT, AND MAINTAIN ALL SAFETY DEVICES, INCLUDING SHORING...
7. ALL FLOWS SHOWN ARE FOR 50-YEAR STORM, EXCEPT AS NOTED...
8. ALL SEDIMENTATION BASINS, OUTLET PIPES AND DITCHES ARE PRIVATE UNLESS OTHERWISE NOTED...
9. THE OWNER MUST OBTAIN AN EXCAVATION PERMIT FROM THE DIVISION OF OCCUPATIONAL SAFETY AND HEALTH (D.O.S.H.)...
10. GRADING EQUIPMENT SHALL NOT USE OR BLOCK TRAFFIC LANES DURING GRADING ACTIVITY...
11. DUST GENERATED BY CONSTRUCTION ACTIVITIES SHALL COMPLY WITH LOCAL DUST CONTROL...

D. PRECONSTRUCTION CONFERENCE:

THE CONTRACTOR SHALL NOT BEGIN ANY WORK ON THIS PROJECT UNTIL A PRECONSTRUCTION CONFERENCE IS HELD WITH THE ENGINEER OF WORK, THE SOILS ENGINEER, DEVELOPER, CONTRACTOR, OTAY WATER DISTRICT INSPECTOR, AND CITY ENGINEER.

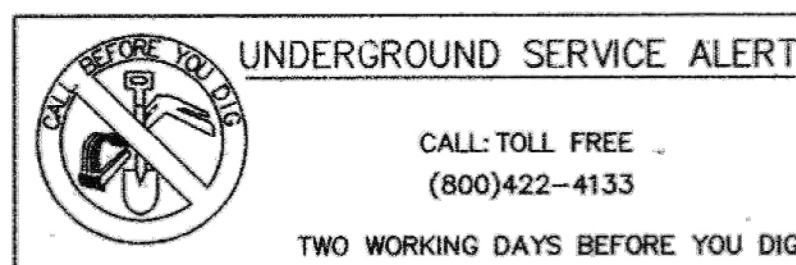
E. SHEET INDEX:

- 1. TITLE SHEET NOTES
2. NOTES
3-4. KEY MAP AND STREET SECTIONS
5-6. GRADING DETAILS
7-9. GRADING PLANS
10-11. EROSION CONTROL PLANS
12-13. STORM DRAIN PROFILES
14. CDS UNIT DETAILS
15-16. PROJECT MITIGATION MEASURES
17. ROCK RETAIN WALL AREA ADDITION
18. LOT 3 WALL PROFILES
19. LOT 3 WALL DETAILS



B. DIG ALERT NOTICE

IMPORTANT NOTICE SECTION 4215/4217 OF THE GOVERNMENT CODE REQUIRES THAT A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A "PERMIT TO EXCAVATE" WILL BE VALID. PER YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1-800-422-4133 TWO WORKING DAYS BEFORE YOU DIG.



"CAUTION": REMEMBER THAT THE USA CENTER NOTIFIES ONLY THOSE UTILITIES BELONGING TO THE CENTER. THERE COULD BE OTHER UTILITIES PRESENT AT THE WORK SITE. THE CENTER WILL INFORM YOU OF WHOM THEY WILL NOTIFY.

AS BUILT and UTILITY NOTE table with columns for Signature, Date, P.E. No., Discipline, and a detailed utility note section.

ENGINEER OF WORK CERTIFICATE

I HEREBY CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THE IMPROVEMENTS SHOWN ON THIS SET OF PLANS (SHEETS 1-56 & 61-72) HAVE BEEN INSTALLED AND CONSTRUCTED IN SUBSTANTIAL CONFORMANCE WITH SAID PLANS, APPROPRIATE STANDARDS, AND ANY DISCRETIONARY APPROVAL(S) FOR THE PROJECT.

CITY OF SAN DIEGO, CALIFORNIA DEVELOPMENT SERVICES DEPARTMENT

THE CITY OF SAN DIEGO LAND DEVELOPMENT REVIEW HAS REVIEWED AND APPROVED THE SCOPE OF WORK AFFECTING THE AREA IN CLOSE PROXIMITY TO AND WITHIN THE LIMITS OF THE WATERLINE EASEMENT. ANY CHANGES TO THE SCOPE AS COVERED BY THE REVIEW SHALL REQUIRE APPROVAL BY THE CITY OF SAN DIEGO THROUGH A CONSTRUCTION CHANGE REVIEW.

CONSTRUCTION RECORD table listing contract numbers, dates, and descriptions of construction activities.

CITY OF SAN DIEGO, CALIFORNIA DEVELOPMENT SERVICES DEPARTMENT table with columns for Date, App'd, Scale, and Design/Check/Submitted/Approved dates.

CONSTRUCTION CHANGE table listing revision numbers, dates, and descriptions of changes.

REVISIONS TO PAD ELEV. FOR LOT 3 table with columns for BY, REVISION, DATE APP'D, and DESCRIPTION.

L. LEGAL DESCRIPTION

BEING PORTIONS OF LOTS 27 AND 28 OF OTAY RANCH, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 862, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, FEBRUARY 7, 1900.

M. ASSESSOR'S PARCEL NO.

APN 644-070-12.14 APN 644-070-13 (NOT A PART, CITY OF SAN DIEGO RESERVOIR)

N. CALIFORNIA COORDINATES

BASIS OF COORDINATES IS THE CALIFORNIA COORDINATE SYSTEM NORTH AMERICAN DATUM 1983 (NAD83) PER THE CITY OF CHULA VISTA SURVEY CONTROL NETWORK

O. AS BUILT

THE CONTRACTOR SHALL FURNISH TO THE ENGINEER OF WORK, AS-BUILT PLANS FOR ALL NEW IMPROVEMENTS AND GRADING SHOWN ON THESE PLANS FOR SUBMITTAL TO THE CITY ENGINEER FOR APPROVAL IN ACCORDANCE WITH SECTION 15.04.140 OF THE CHULA VISTA MUNICIPAL CODE

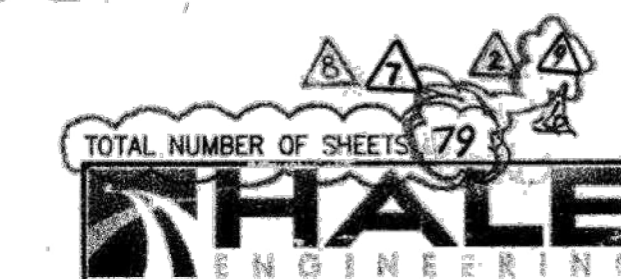
P. WORK TO BE DONE:

THE WORK TO BE DONE CONSISTS OF THE ITEMS INDICATED UNDER THE "LEGEND" SHOWN BELOW, AND IS TO BE DONE IN ACCORDANCE WITH THESE PLANS AND THE FOLLOWING LIST OR PRINTED MATERIALS AS CURRENTLY ADOPTED BY THE CITY OF CHULA VISTA CITY COUNCIL INCLUDING THE FOLLOWING:

- 1. 2012 STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION ("GREENBOOK") AND 2012 REGIONAL SUPPLEMENT AMENDMENTS (TO THE GREENBOOK).
2. 2012 SAN DIEGO AREA REGIONAL STANDARD DRAWINGS.
3. 2015 CITY OF CHULA VISTA STANDARD SPECIAL PROVISIONS (TO THE GREENBOOK).
4. 2002 DESIGN AND CONSTRUCTION STANDARDS OF THE CITY OF CHULA VISTA.
5. PORTION OF THE STATE STANDARD SPECIFICATIONS, STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, DATED JULY 2010 AND ALL SUBSEQUENT ADDITIONS AND REVISIONS.
6. PORTION OF THE STATE STANDARD PLANS, STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, DATED JULY 2010 AND ALL SUBSEQUENT ADDITIONS AND REVISIONS.
7. 2012 CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES ("CA-MUTCD") AND ALL SUBSEQUENT ADDITIONS AND REVISIONS.
8. WATER AGENCIES STANDARDS SPECIFICATIONS FOR WATER, RECYCLED WATER AND SEWER FACILITIES, LATEST EDITION.
ALL REFERENCES ARE TO BE MADE PART OF THESE PLANS. ANY CHANGES OR REVISIONS THEREFROM, SHALL BE APPROVED BY THE CITY ENGINEER, OR HIS DESIGNEE, PRIOR TO ANY REQUEST FOR INSPECTION.

Q. LEGEND:

Legend table with columns for DESCRIPTION, REF. DWG., SYMBOLOGY, and symbols for various items like LOT NUMBERS, PAD ELEVATION, SUBDIVISION BOUNDARY, PROPOSED LOT LINE, etc.



TOTAL NUMBER OF SHEETS 79

CITY OF CHULA VISTA DEVELOPMENT SERVICES DEPARTMENT MASS GRADING PLANS FOR CHULA VISTA TRACT NO. 19-03 PHASE 1 OTAY RANCH, VILLAGE 8 WEST DRAWING NO. 14011-01

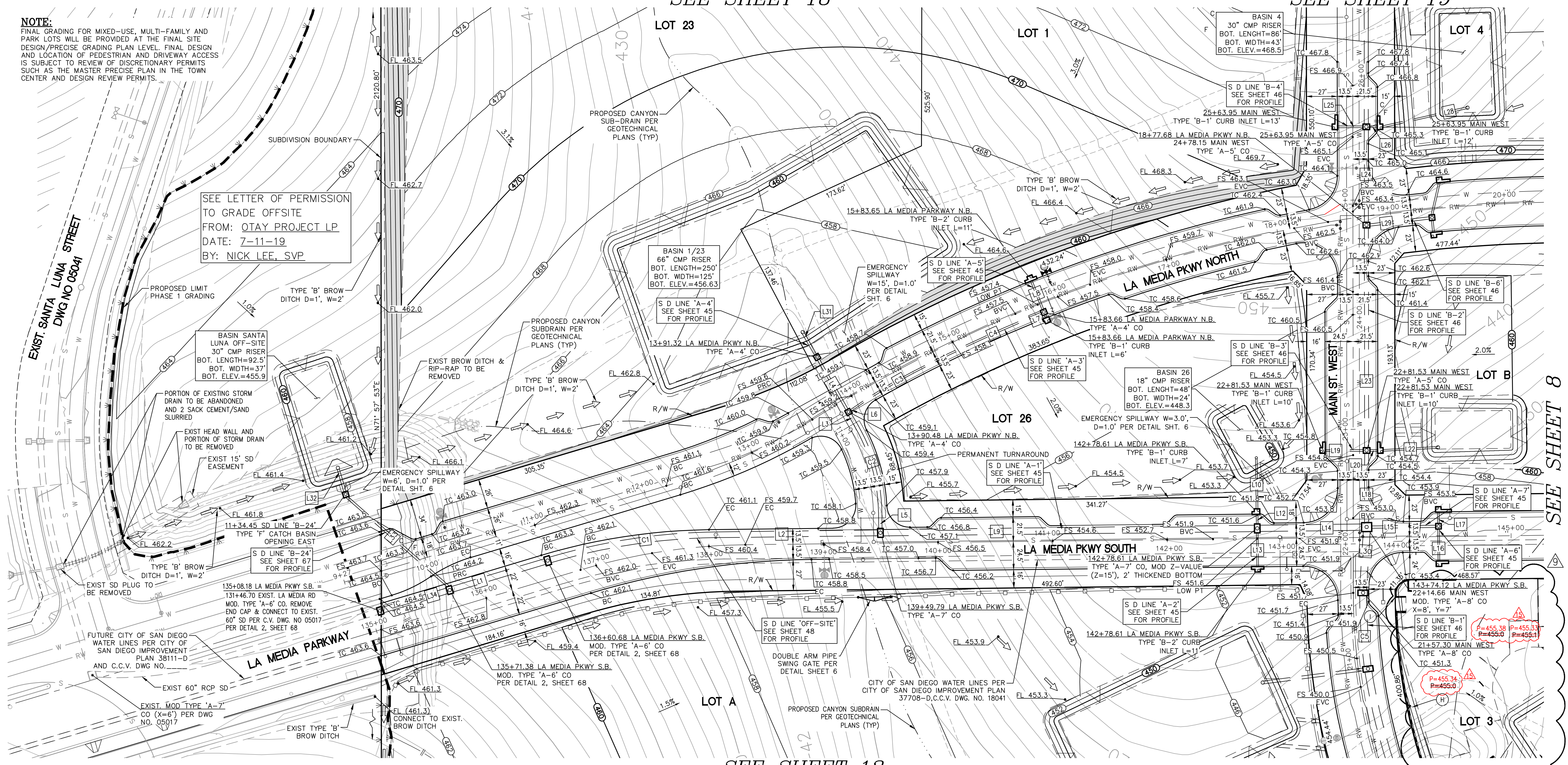
REPLACEMENT SHEET 7/18/18

SEE SHEET 18

SEE SHEET 19

NOTE: FINAL GRADING FOR MIXED-USE, MULTI-FAMILY AND PARK LOTS WILL BE PROVIDED AT THE FINAL SITE DESIGN/PRECISE GRADING PLAN LEVEL. FINAL DESIGN AND LOCATION OF PEDESTRIAN AND DRIVEWAY ACCESS IS SUBJECT TO REVIEW OF DISCRETIONARY PERMITS SUCH AS THE MASTER PRECISE PLAN IN THE TOWN CENTER AND DESIGN REVIEW PERMITS.

SEE LETTER OF PERMISSION TO GRADE OFFSITE FROM: OTAY PROJECT LP DATE: 7-11-19 BY: NICK LEE, SVP



SEE SHEET 13

SEE SHEET 14

SEE SHEET 8

SCALE: 1" = 40'

SCALE 1" = 40'

CITY OF SAN DIEGO, CALIFORNIA DEVELOPMENT SERVICES DEPARTMENT THE CITY OF SAN DIEGO LAND DEVELOPMENT REVIEW HAS REVIEWED AND APPROVED THE SCOPE OF WORK AFFECTING THE AREA IN CLOSE PROXIMITY TO AND WITHIN THE LIMITS OF THE WATERLINE EASEMENT. ANY CHANGES TO THE SCOPE AS COVERED BY THE REVIEW SHALL REQUIRE APPROVAL BY THE CITY OF SAN DIEGO THROUGH A CONSTRUCTION CHANGE REVIEW.

By: For the City Engineer Date AS BUILT SIGNATURE DATE P.E. No. My Registration Expires Discipline

Table with 4 columns of STORM DRAIN DATA (1500-D) containing bearing/delta, radius, length, description, and profile sheet information for various storm drain segments.

RETAINING WALL NOTES:

- (W) RETAINING WALL 'W' PROFILE PER SHEET 78 (X) RETAINING WALL 'X' PROFILE PER SHEET 78



NOTE: STORM DRAIN LINES 'A-1', 'A-2', 'A-6', 'A-7' & 'A-8' STATION IS FROM LA MEDIA PARKWAY SOUTH ONE WAY. STORM DRAIN LINES 'A-3', 'A-5', 'B-6' & 'B-7' STATION IS FROM LA MEDIA PARKWAY NORTH ONE WAY. STORM DRAIN LINES 'B-1' THROUGH 'B-4', 'B-16' & 'B-17' STATION IS FROM MAIN WEST ONE WAY. STORM DRAIN LINE 'A-4' STATION IS FROM LA MEDIA PARKWAY NORTH & SOUTH ONE WAY.

STORM DRAIN NOTE: THE RADIUS OF PIPES IN CURVES SHALL BE BASED ON STANDARD OR SINGLE BEVEL OR DOUBLE BEVEL PIPE WITHOUT BREAKING JOINTS AND SHALL COMPLY WITH CITY OF SAN DIEGO DRAINAGE DESIGN MANUAL, TABLE 1-1103.7A.

CONSTRUCTION RECORD table with columns for CONTRACTOR, INSPECTOR, DATE COMPLETED, and REVISIONS.

REVISIONS table with columns for By, Description, Date, and App'd.

DATUM CITY OF CHULA VISTA BENCH MARK NO. 5072 ELEVATION 446.361 NAVD 88 DESCRIPTION: 3" BRASS DISK (LS4324) WELL MON @ CL INT. RUTGERS & OTAY LAKES. PT. NO. 5072 PER ROS 14841

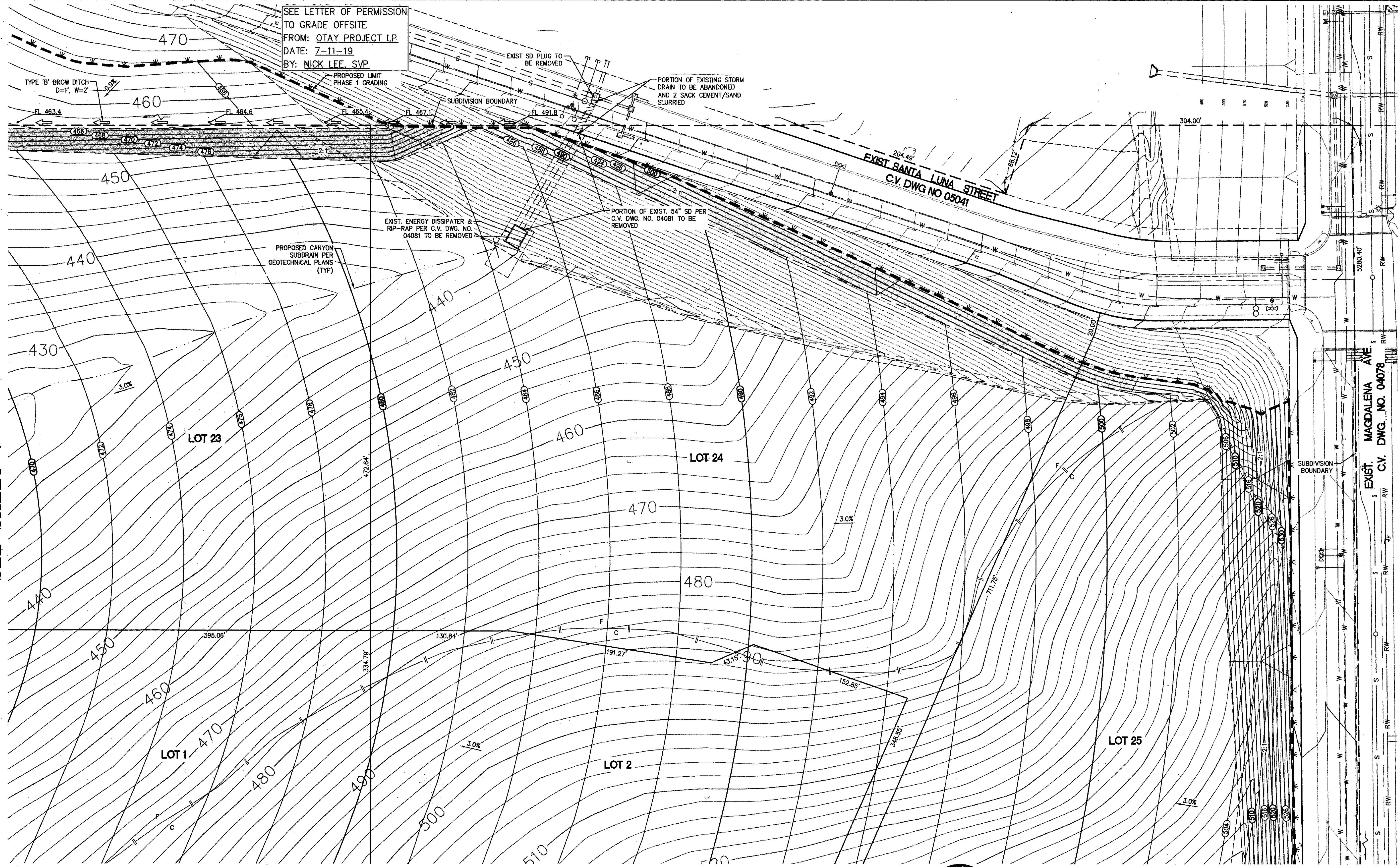
SCALE HORIZONTAL 1"=40' VERTICAL NO SCALE

Designed By: JAH Drawn By: MUL Checked By: JAH Plans Prepared Under Supervision Of: JOHN A. HAYES R.C.E. No. 58003

Submitted: By: Approved: For the City Engineer

CITY OF CHULA VISTA DEVELOPMENT SERVICES DEPARTMENT CHULA VISTA TRACT NO. 19-03 PHASE 1 OTAY RANCH, VILLAGE 8 WEST DRAWING NO. 14011-07

SEE LETTER OF PERMISSION
TO GRADE OFFSITE
FROM: OTAY PROJECT LP
DATE: 7-11-19
BY: NICK LEE, SVP

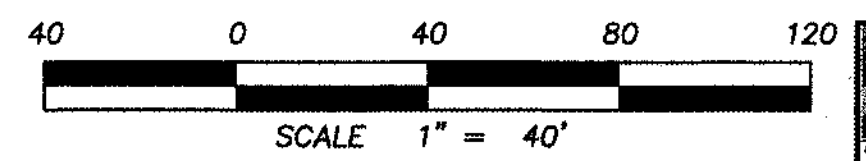
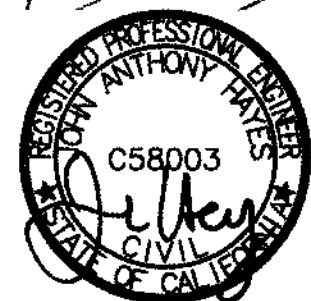


SEE SHEET 7

SEE SHEET 19

AS BUILT
SIGNATURE _____ DATE _____
Printed Name _____ P.E. No. _____
My Registration Expires _____ Discipline _____

NOTE:
FINAL GRADING FOR MIXED-USE, MULTI-FAMILY AND PARK LOTS WILL BE PROVIDED AT THE FINAL SITE DESIGN/PRECISE GRADING PLAN LEVEL. FINAL DESIGN AND LOCATION OF PEDESTRIAN AND DRIVEWAY ACCESS IS SUBJECT TO REVIEW OF DISCRETIONARY PERMITS SUCH AS THE MASTER PRECISE PLAN IN THE TOWN CENTER AND DESIGN REVIEW PERMITS.



CONSTRUCTION RECORD	
CONTRACTOR:	INSPECTOR:
DATE COMPLETED:	

By	Date	App'd	REVISIONS
HE	3/5/19	SH	REMOVE GRADING RESTRICTION (404 PERMIT)
HE	7/22/19	SH	ADD BROW DITCH
HE	10/12/20	SH	REPLACEMENT SET DATE

DATUM
CITY OF CHULA VISTA BENCH MARK NO. 5072
ELEVATION 446.361 NAVD 88
DESCRIPTION: 3" BRASS DISK (LS4324) WELL
MON @ CL INT. RUTGERS & OTAY LAKES. PT.
NO. 5072 PER ROS 14841

SCALE	Designed By:	Drawn By:	Checked By:
HORIZONTAL 1"=40'	JAH	M.J.L.	JAH
VERTICAL NO SCALE	Plans Prepared Under Supervision Of: JOHN A. HAYES	Date: 10/12/20	R.C.E. No. 58003

Submitted: 10/27/20
By: [Signature]
Planning: _____ Landscape: _____

Approved: 10/29/2020
By: [Signature]
For the City Engineer

CITY OF CHULA VISTA DEVELOPMENT SERVICES DEPARTMENT
MASS GRADING PLANS FOR
CHULA VISTA TRACT NO. 19-03 PHASE 1
OTAY RANCH, VILLAGE 8 WEST

DRAWING NO. 14011-18
W.O. No. OR-651G
TM 19-03 REPLACES VILLAGE 8 WEST TM 09-04 APPROVED 11/08/13
REPLACEMENT SHEET

DRAFT 5/19/21

10/12/20

STORM DRAIN DATA (1500-D)					
	BEARING/Delta	RADIUS	LENGTH	DESCRIPTION	PROFILE SHT.
C1	21° 00' 24"	549.00'	201.28'	72" RCP*	SHT. 46
C2	6° 38' 20"	545.50'	63.21'	24" RCP	SHT. 48
C3	5° 39' 01"	545.50'	53.80'	18" RCP	SHT. 48
C4	10° 05' 18"	262.00'	46.13'	48" RCP	SHT. 48
C5	2° 01' 06"	1996.50'	70.33'	48" RCP	SHT. 48
C6	3° 54' 28"	1996.50'	136.17'	48" RCP	SHT. 48
C7	1° 46' 49"	1996.50'	62.04'	48" RCP	SHT. 47
C8	14° 53' 04"	549.00'	142.62'	72" RCP*	SHT. 46
L1	S25° 24' 20"E	--	88.63'	30" RCP*	SHT. 55
L3	S64° 24' 04"E	--	32.67'	18" RCP*	SHT. 48
L4	S64° 30' 26"E	--	5.67'	18" RCP*	SHT. 48
L5	S25° 37' 15"W	--	219.58'	72" RCP*	SHT. 46
L6	S42° 38' 57"E	--	33.26'	18" RCP	SHT. 48
L7	S50° 33' 42"E	--	9.42'	18" RCP	SHT. 48
L8	S43° 11' 51"E	--	51.69'	48" RCP	SHT. 48
L9	S19° 15' 14"E	--	87.97'	48" RCP	SHT. 48
L10	S18° 22' 04"E	--	10.04'	48" RCP	SHT. 48
L11	N52° 44' 08"E	--	77.92'	18" RCP	SHT. 48
L12	S6° 13' 03"E	--	63.82'	18" RCP	SHT. 48
L13	S37° 15' 52"E	--	21.92'	18" RCP	SHT. 48
L14	S26° 21' 32"E	--	24.91'	48" RCP	SHT. 48
L15	S23° 49' 43"E	--	24.15'	18" RCP	SHT. 48
L16	S24° 32' 44"E	--	17.17'	18" RCP	SHT. 48
L17	S71° 19' 30"W	--	111.05'	48" RCP	SHT. 47
L18	S18° 40' 30"E	--	17.17'	18" RCP*	SHT. 50
L19	S71° 19' 30"W	--	183.48'	48" RCP*	SHT. 47
L20	S0° 49' 25"E	--	63.75'	60" RCP	SHT. 48
L21	S83° 47' 59"E	--	30.36'	60" RCP	SHT. 48
L22	S16° 34' 40"E	--	84.07'	6" PVC	SHT. 48
L23	N64° 22' 50"W	--	128.18'	72" RCP	SHT. 46
L24	N64° 25' 08"W	--	8.68'	72" RCP	SHT. 46
L25	S25° 37' 20"W	--	34.36'	72" RCP*	SHT. 46
L26	S41° 23' 59"E	--	39.99'	24" RCP	SHT. 67
L27	S51° 45' 39"E	--	80.64'	18" CMP	SHT. 67

* WATER TIGHT JOINTS TO BE USED

STORM DRAIN NOTE:

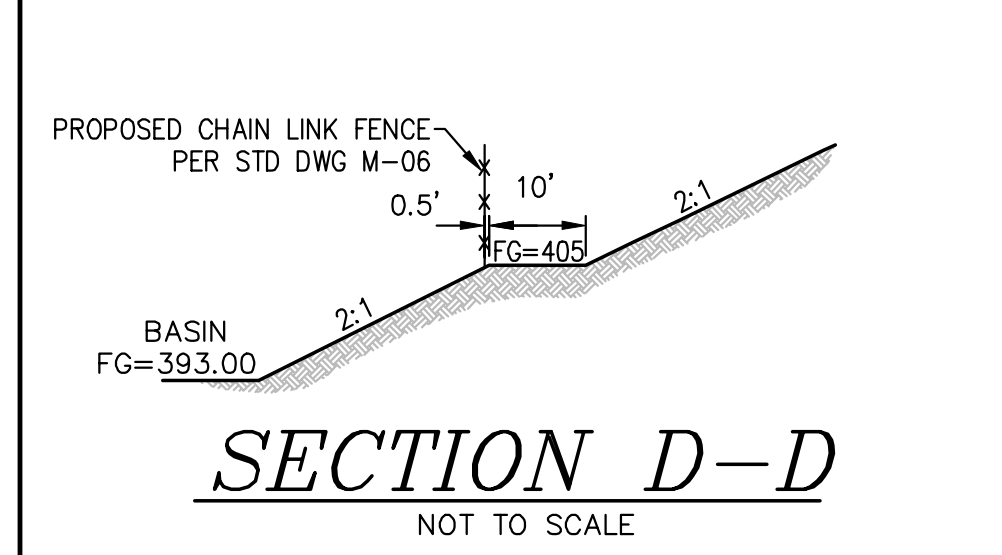
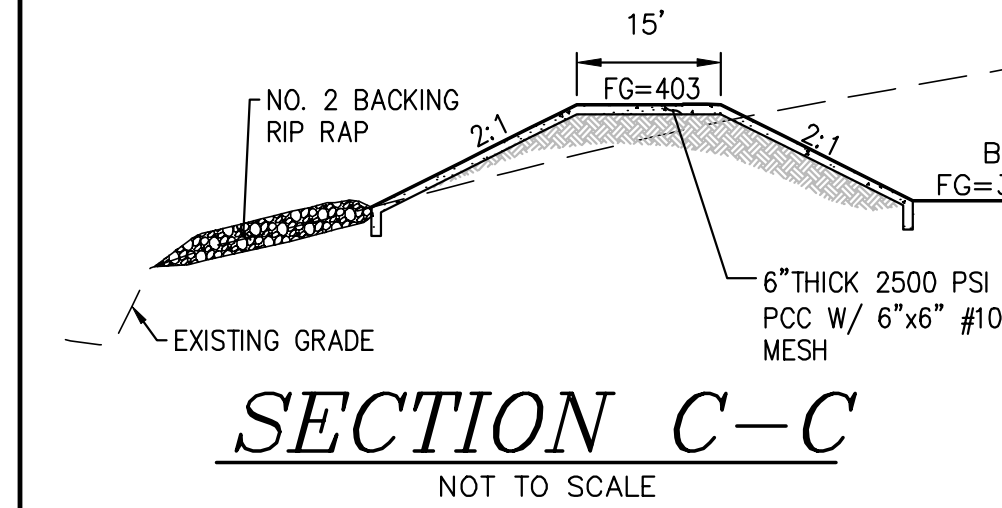
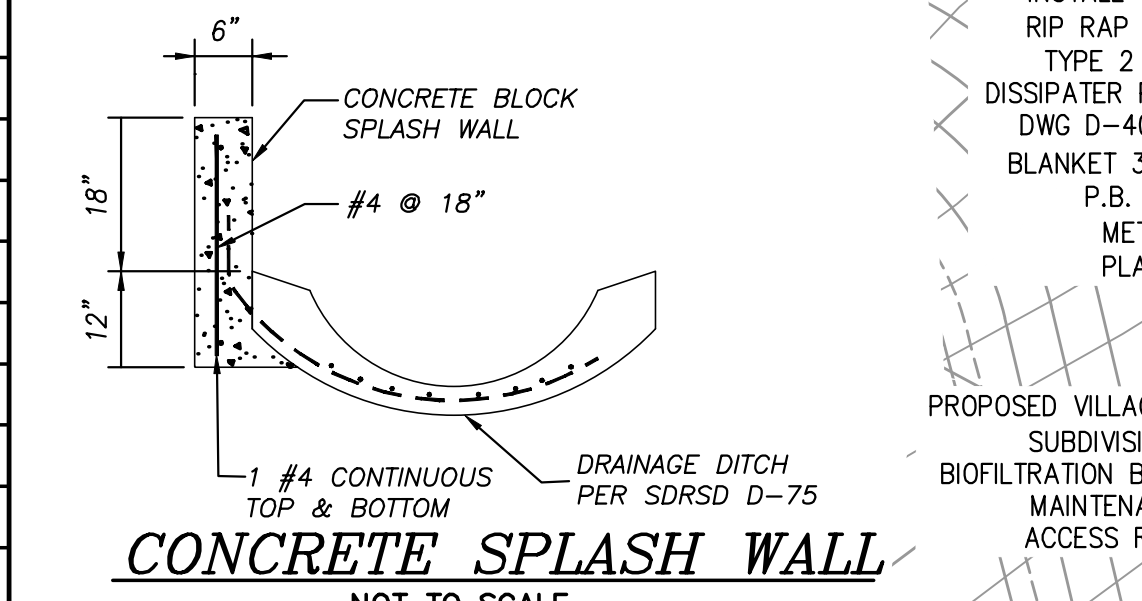
- THE RADIUS OF PIPES IN CURVES SHALL BE BASED ON STANDARD OR SINGLE BEVEL OR DOUBLE BEVEL PIPE WITHOUT BREAKING JOINTS AND SHALL COMPLY WITH CITY OF SAN DIEGO DRAINAGE DESIGN MANUAL, TABLE 1-1103.7A.
- THE 6" SUB-DRAIN PIPE SHALL BE SCHEDULE 40 PVC PIPE WITH PERFORATIONS (SLOTS OR HOLES) EVERY 6 INCHES. PROVIDE CLEANOUTS AT EVERY SUB-DRAIN CONNECTION.

NOTE:

- STORM DRAIN LINES 'B-1', 'B-11', PORTION OF 'B-12', 'B-14', 'B-15', 'B-16', 'B-21' & 'D-1' STATION IS FROM MAIN WEST ONE WAY.
- STORM DRAIN LINES 'B-13', PORTION OF 'B-12', 'B-15', 'B-22', 'C-3', 'C-14' & 'C-15' STATION IS FROM MAIN EAST ONE WAY.
- THE LOCATION OF FENCING AND ACCESS GATES IN ASSOCIATION WITH THE BIOFILTRATION BASIN SHALL ALLOW FOR A 10' WIDE LANDSCAPE BUFFER TO HELP SCREEN THE VIEW OF THE BASIN FROM THE ADJACENT LOTS AND STREET RIGHT-OF-WAYS. SEE THE APPROVED LANDSCAPE PLANS FOR FENCE TYPE AND MATERIAL. DWG NO. 14015

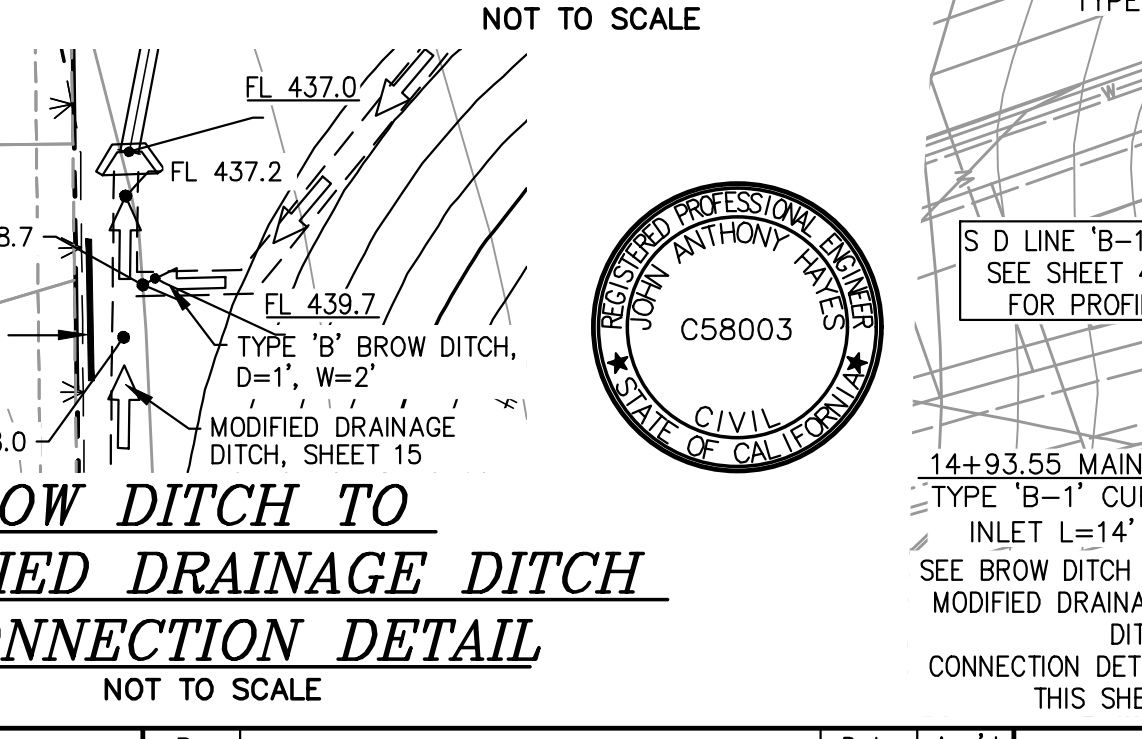
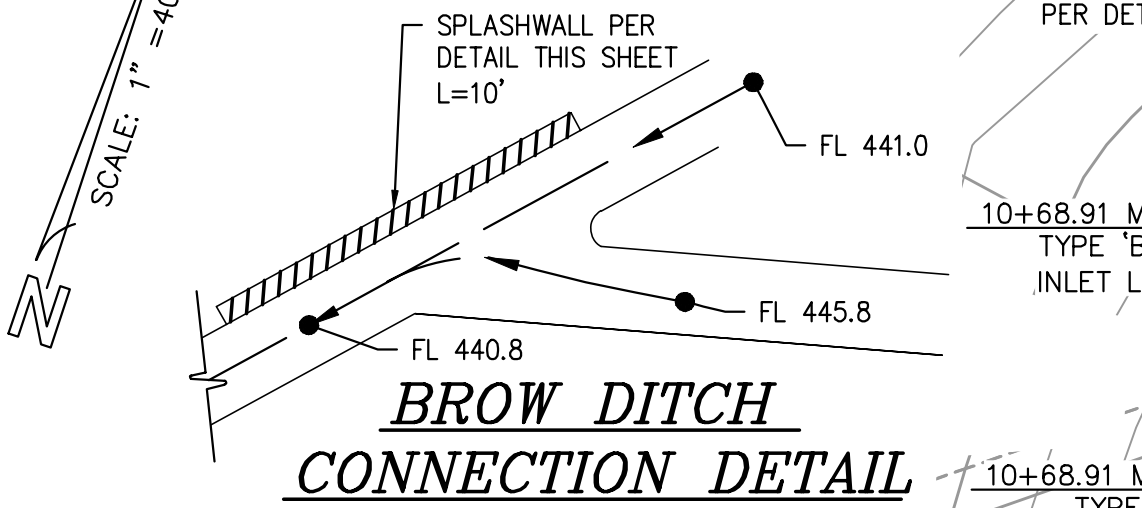
RETAINING WALL NOTES:

- (A) RETAINING WALL 'A' PROFILE AND SECTION DETAIL PER SHEET 71
- (F) RETAINING WALL 'F' PROFILE AND SECTION DETAIL PER SHEET 72
- (G) CABLE GUARDRAIL DETAIL PER SHEET 75
- (P) RETAINING WALL 'P' PROFILE AND SECTION DETAIL PER SHEET 77
- (Q) RETAINING WALL 'Q' PROFILE AND SECTION DETAIL PER SHEET 77
- (R) RETAINING WALL 'R' PROFILE AND SECTION DETAIL PER SHEET 77
- (S) RETAINING WALL 'S' PROFILE PER SHEET 78
- (T) RETAINING WALL 'T' PROFILE PER SHEET 78
- (U) RETAINING WALL 'U' PROFILE PER SHEET 78
- (V) RETAINING WALL 'V' PROFILE PER SHEET 78
- (W) RETAINING WALL 'W' PROFILE AND SECTION DETAIL PER SHEET 78
- (Z) RETAINING WALL 'Z' PROFILE PER SHEET 78



SEE LETTER OF PERMISSION TO GRADE AND DRAIN OFFSITE FROM: OTAY VALLEY QUARRY, LLC
DATE: 12/04/18
BY: CHUCK MILLER, MANAGER

NOTE:
FINAL GRADING FOR MIXED-USE, MULTI-FAMILY AND PARK LOTS WILL BE PROVIDED AT THE FINAL SITE DESIGN/PRECISE GRADING PLAN LEVEL. FINAL DESIGN AND LOCATION OF PEDESTRIAN AND DRIVEWAY ACCESS IS SUBJECT TO REVIEW OF DISCRETIONARY PERMITS SUCH AS THE MASTER PRECISE PLAN IN THE TOWN CENTER, AND DESIGN REVIEW PERMITS.



CITY OF SAN DIEGO, CALIFORNIA DEVELOPMENT SERVICES DEPARTMENT
THE CITY OF SAN DIEGO LAND DEVELOPMENT REVIEW HAS REVIEWED AND APPROVED THE SCOPE OF WORK AFFECTING THE AREA IN CLOSE PROXIMITY TO AND WITHIN THE LIMITS OF THE WATERLINE EASEMENT. ANY CHANGES TO THE SCOPE AS COVERED BY THE REVIEW SHALL REQUIRE APPROVAL BY THE CITY OF SAN DIEGO THROUGH A CONSTRUCTION CHANGE REVIEW.

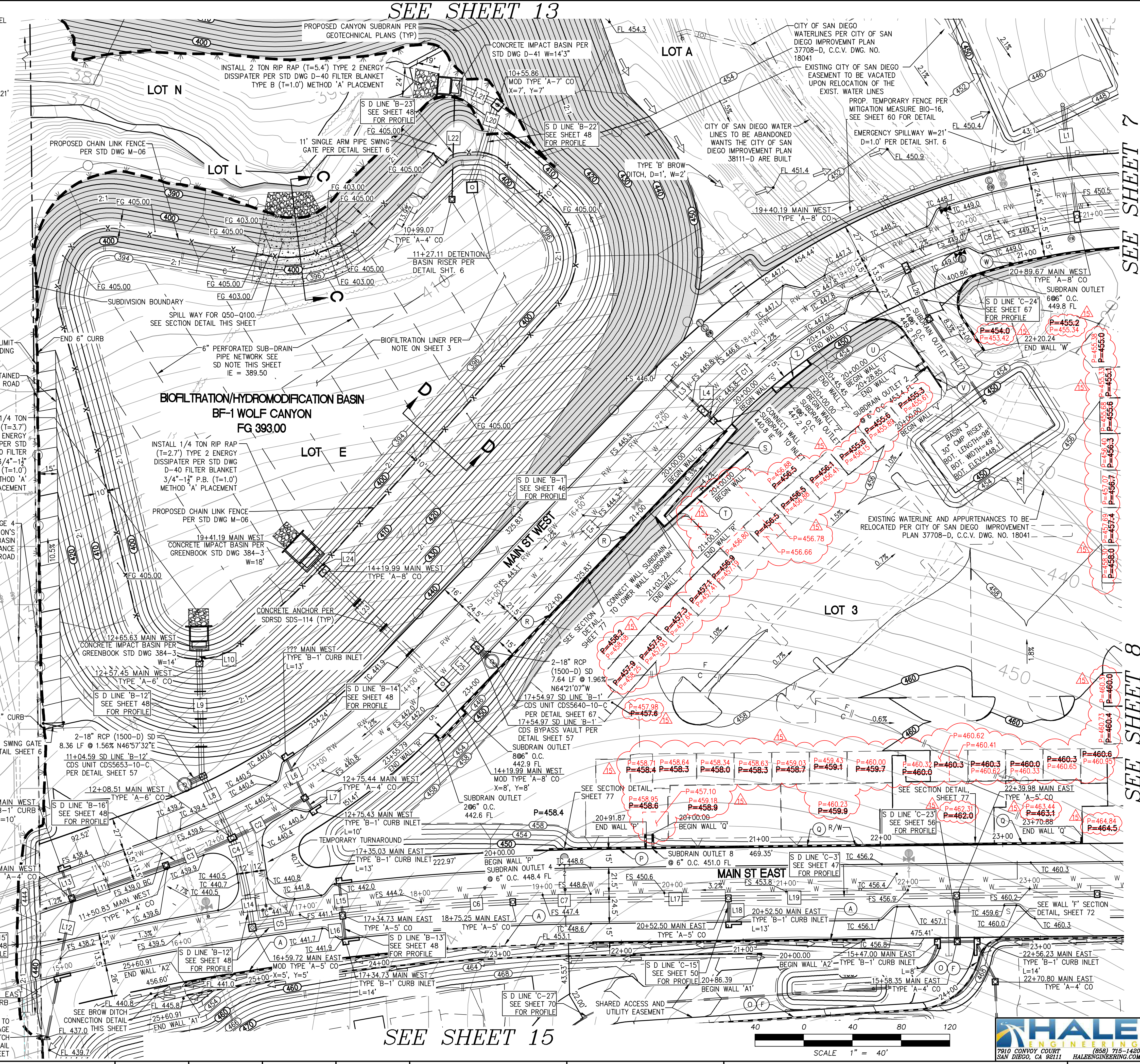
By: _____ For the City Engineer Date _____

AS BUILT

Signature: _____ Date: _____

Printed Name: _____ P.E. No.: _____
My Registration Expires: _____ Discipline: _____

CONSTRUCTION RECORD	REFERENCES	By	REVISIONS	Date	App'd	DATUM	SCALE	Designed By:	Drawn By:	Checked By:	Submitted:	Approved:
CONTRACTOR:	C.C.V. DWG. NO. 05040	W.O. OR-651-1	HE	REMOVE GRADING RESTRICTION	3/5/19	SH	CITY OF CHULA VISTA BENCH MARK NO. 5072 ELEVATION 446.361 NAVD 88	JAH	MUL	JAH	By:	For the City Engineer
INSPECTOR:	C.C.V. DWG. NO. 05017	OP SW-219	HE	(V4, 404 PERMIT), ADJUST SD LINE 'B-15'			DESCRIPTION: 3" BRASS DISK (LS4324) WELL MON @ CL INT. RUTGERS & OTAY LAKES. PT. NO. 5072 PER ROS 14841	Plans Prepared Under Supervision Of:	Date: 11/13/20		By:	
DATE COMPLETED:	C.C.V. DWG. NO. 04089	CCV DWG NO. 18041	HE	ADD MSCP FENCING	4/5/19	CB		JOHN A. HAYES	R.C.E. No. 58003		By:	
	C.C.V. DWG. NO. 04081		HE	REVISE ENERGY DISSIPATER	9/26/19	CB					By:	
	C.C.V. DWG. NO. 04068		HE	REPLACEMENT SET, DATE 10/16/20	10/16/20	CB					By:	
	C.C.V. DWG. NO. 04078		HE	REPLACEMENT SHEET FOR LOT 3	10/16/20	CB					By:	
	C.C.V. DWG. NO. 02025		HE	REVISIONS TO PAD ELEV. FOR LOT 3	11/28/20	CB					By:	



CONTRACTOR:	INSPECTOR:	DATE COMPLETED:	REFERENCES:	By:	REVISIONS:	Date:	App'd:	DATUM:	SCALE:	Designed By:	Drawn By:	Checked By:	Submitted:	Approved:
C.C.V. DWG. NO. 05040	C.C.V. DWG. NO. 05017	C.C.V. DWG. NO. 04089	W.O. OR-651-1	HE	REMOVE GRADING RESTRICTION	3/5/19	SH	CITY OF CHULA VISTA BENCH MARK NO. 5072 ELEVATION 446.361 NAVD 88	HORIZONTAL	JAH	MUL	JAH	By:	For the City Engineer
C.C.V. DWG. NO. 04081	C.C.V. DWG. NO. 04068	C.C.V. DWG. NO. 04078	OP SW-219	HE	(V4, 404 PERMIT), ADJUST SD LINE 'B-15'			DESCRIPTION: 3" BRASS DISK (LS4324) WELL MON @ CL INT. RUTGERS & OTAY LAKES. PT. NO. 5072 PER ROS 14841	VERTICAL	Plans Prepared Under Supervision Of:	Date: 11/13/20		By:	
C.C.V. DWG. NO. 04089	C.C.V. DWG. NO. 04081	C.C.V. DWG. NO. 04068	CCV DWG NO. 18041	HE	ADD MSCP FENCING	4/5/19	CB		NO SCALE	JOHN A. HAYES	R.C.E. No. 58003		By:	
C.C.V. DWG. NO. 04081	C.C.V. DWG. NO. 04068	C.C.V. DWG. NO. 04078		HE	REVISE ENERGY DISSIPATER	9/26/19	CB						By:	
C.C.V. DWG. NO. 04068	C.C.V. DWG. NO. 04078	C.C.V. DWG. NO. 02025		HE	REPLACEMENT SET, DATE 10/16/20	10/16/20	CB						By:	
C.C.V. DWG. NO. 04078	C.C.V. DWG. NO. 02025			HE	REPLACEMENT SHEET FOR LOT 3	10/16/20	CB						By:	
C.C.V. DWG. NO. 02025				HE	REVISIONS TO PAD ELEV. FOR LOT 3	11/28/20	CB						By:	

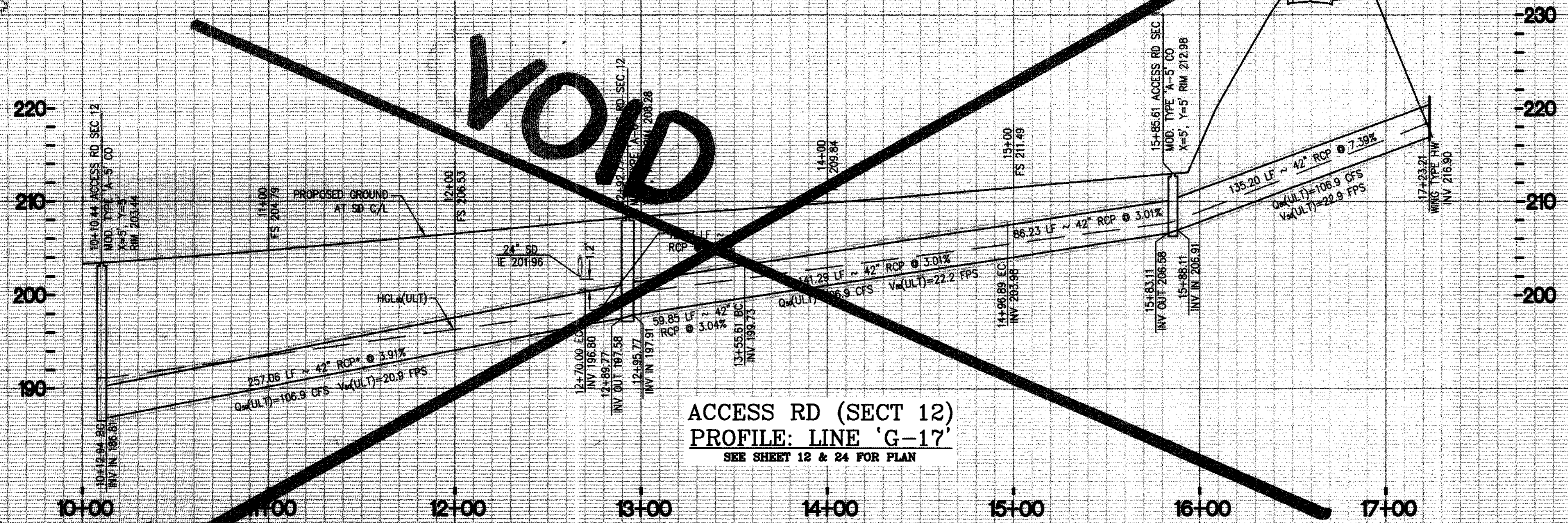
CITY OF CHULA VISTA DEVELOPMENT SERVICES DEPARTMENT
MASS GRADING PLANS FOR CHULA VISTA TRACT NO. 19-03 PHASE 1 OTAY RANCH, VILLAGE 8 WEST

DRAWING NO. 14011-14

19-03 REPLACES VILLAGE 8 WEST TM 09-04 APPROVED 11/28/13

REPLACEMENT SHEET

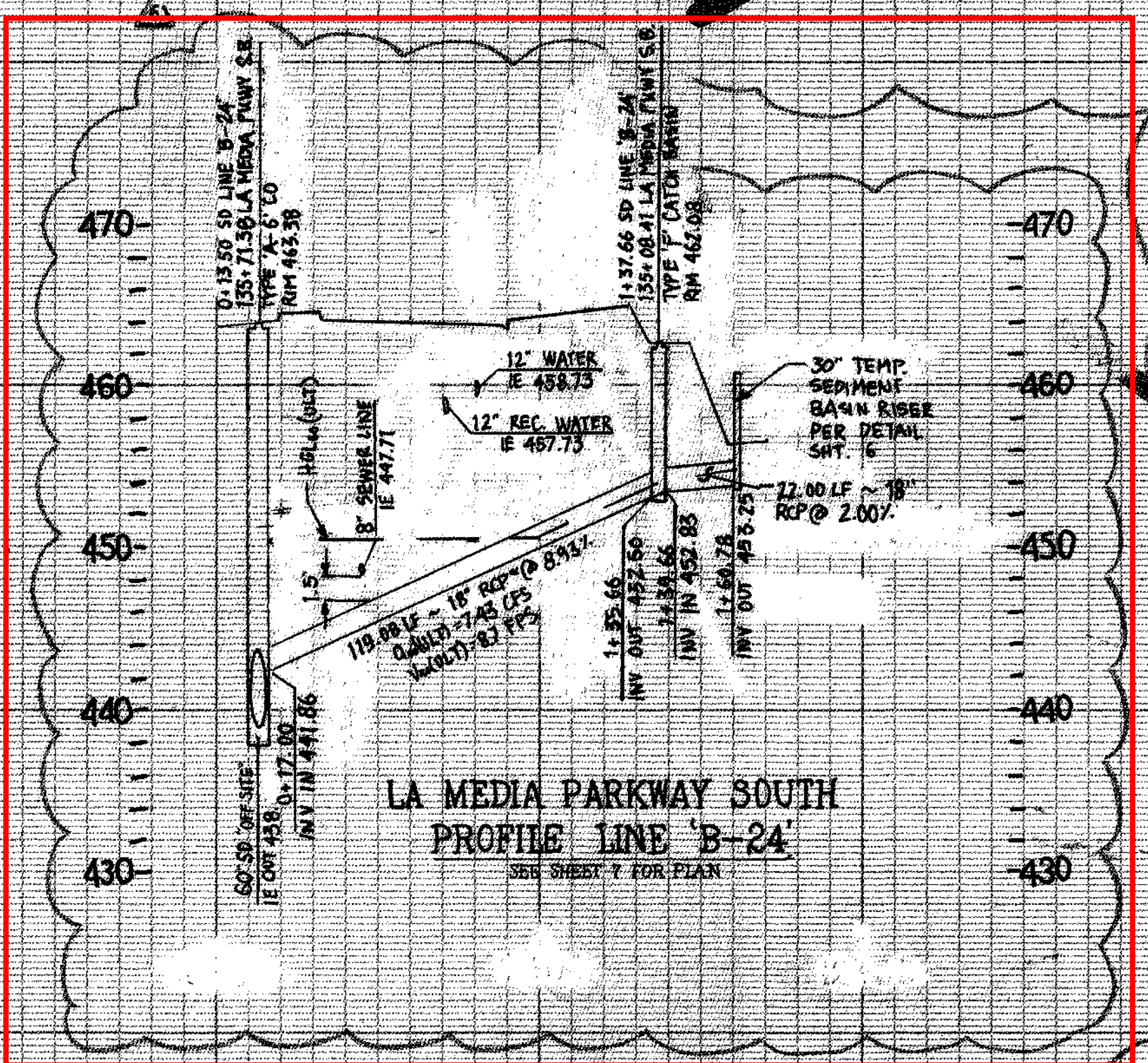




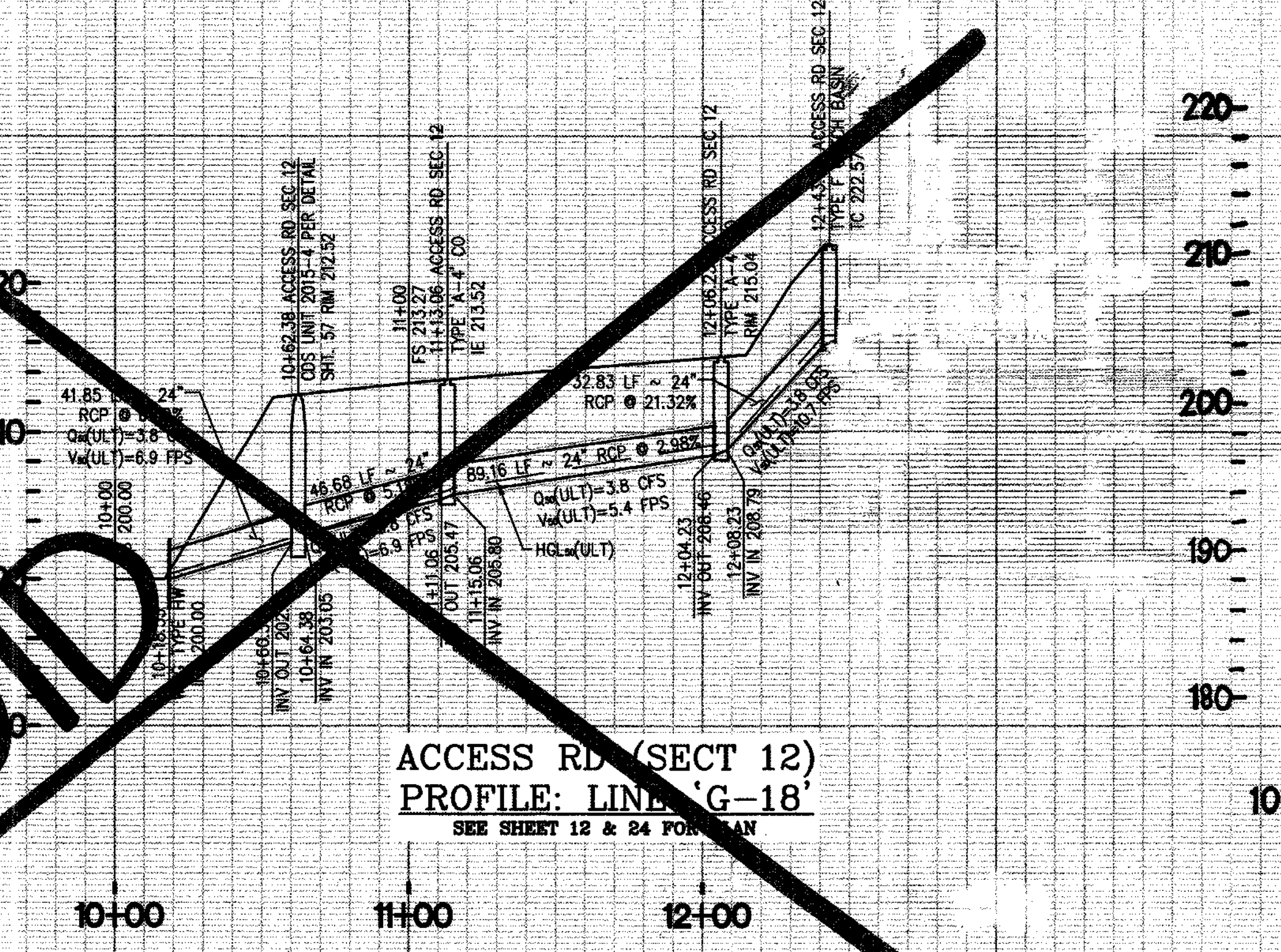
ACCESS RD (SECT 12)
PROFILE: LINE 'G-17'
SEE SHEET 12 & 24 FOR PLAN



ACCESS RD (SECT 12)
PROFILE: LINE 'G-17'
SEE SHEET 12 & 24 FOR PLAN



LA MEDIA PARKWAY SOUTH
PROFILE: LINE 'B-24'
SEE SHEET 7 FOR PLAN



ACCESS RD (SECT 12)
PROFILE: LINE 'G-18'
SEE SHEET 12 & 24 FOR PLAN

STORM DRAIN NOTE:
*WATER TIGHT JOINTS SHALL BE USED FOR ALL STORM DRAIN PIPE THAT HAS A GRADE GREATER THAN 20% OR HAS A HGL THAT IS 1' HIGHER THAN THE TOP OF PIPE.



AS BUILT

SIGNATURE _____ DATE _____

Printed Name _____ P.E. No. _____

My Registration Expires _____ Discipline _____

CONTRACTOR:	REFERENCES:
CONTRACTOR:	W.O. OR-851-T
INSPECTOR:	CP SW-219
DATE COMPLETED:	

By	REVISIONS	Date	App'd
HE	REMOVAL AND ADJUSTMENT OF SD SIZE AND LOCATION, ADDED SD CONCRETE ANCHORS.	3-5-19 SH	
HE	ADD SD PROFILE LINE 'B-24'	7/23/18 SH	
HE	STORM DRAIN REVISIONS	1-8-20 SH	
HE	UPDATE TITLE BLOCK	10/17/20 SH	

DATUM	SCALE	Designed By:	Drawn By:	Checked By:
CITY OF CHULA VISTA BENCH MARK NO. 5072 ELEVATION 446.361 NAVD 88	HORIZONTAL	JAH	M.L.	JAH
DESCRIPTION: 3" BRASS DISK (LS4324) WELL MON @ CL INT. RUTGERS & OTAY LAKES. PT. NO. 5072 PER RDS 14541	NO SCALE			
	VERTICAL			
	NO SCALE			

Submitted:	By:	Approved:
9/18/18	JAH	JAH
8/24/18	JAH	JAH

Submitted:	By:	Approved:
9/18/18	JAH	JAH
8/24/18	JAH	JAH

Submitted:	By:	Approved:
9/18/18	JAH	JAH
8/24/18	JAH	JAH

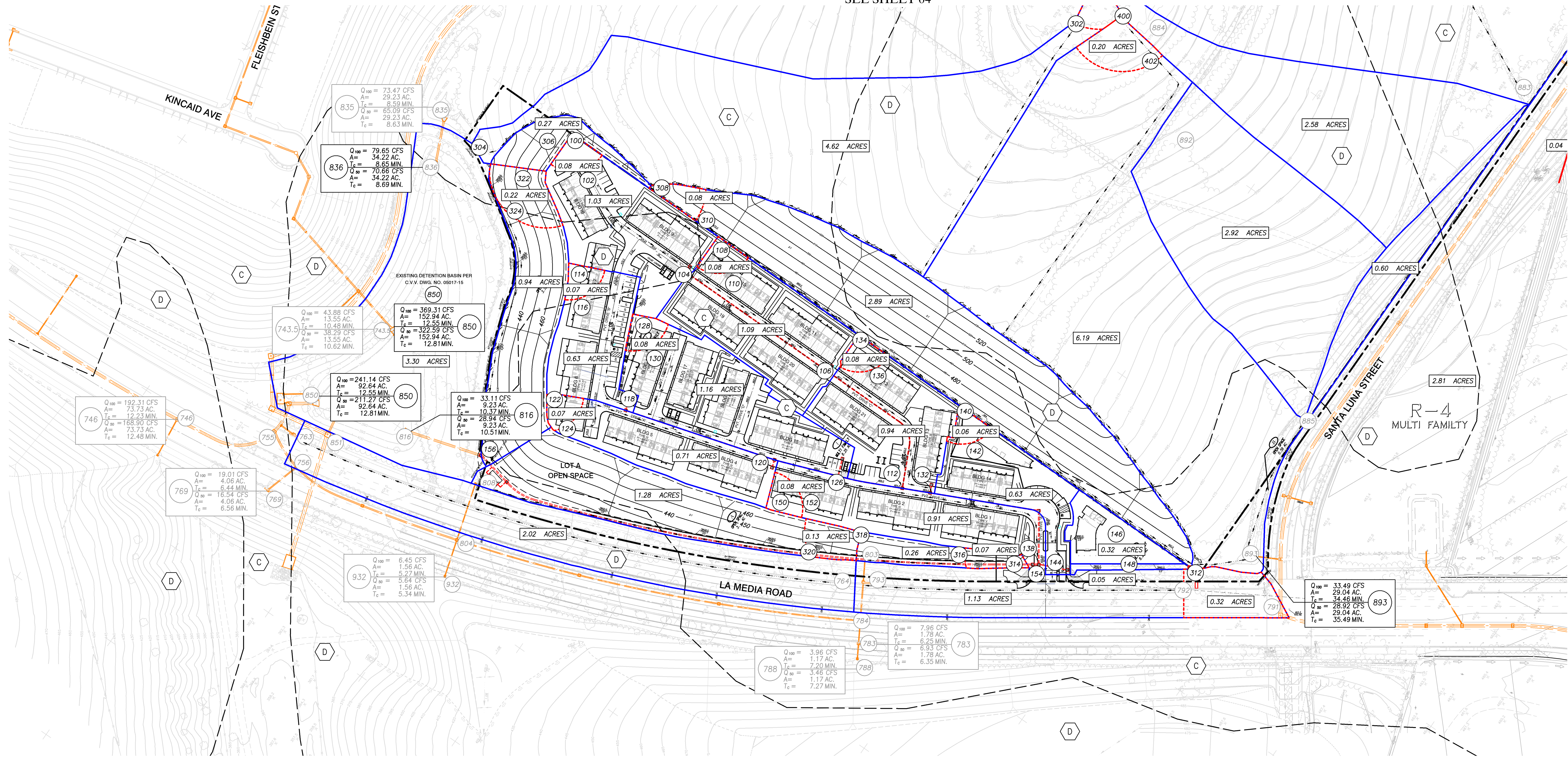
CITY OF CHULA VISTA DEVELOPMENT SERVICES DEPARTMENT	DRAWING NO.
MASS GRADING PLANS FOR CHULA VISTA TRACT NO. 19-03 PHASE 1 OTAY RANCH, VILLAGE 8 WEST	14011-56

W.O. No.	OR-851C
14011-56	OR-851C

Preliminary Drainage Study for
Otay Ranch Village 7 R-3, R-4, & R-8

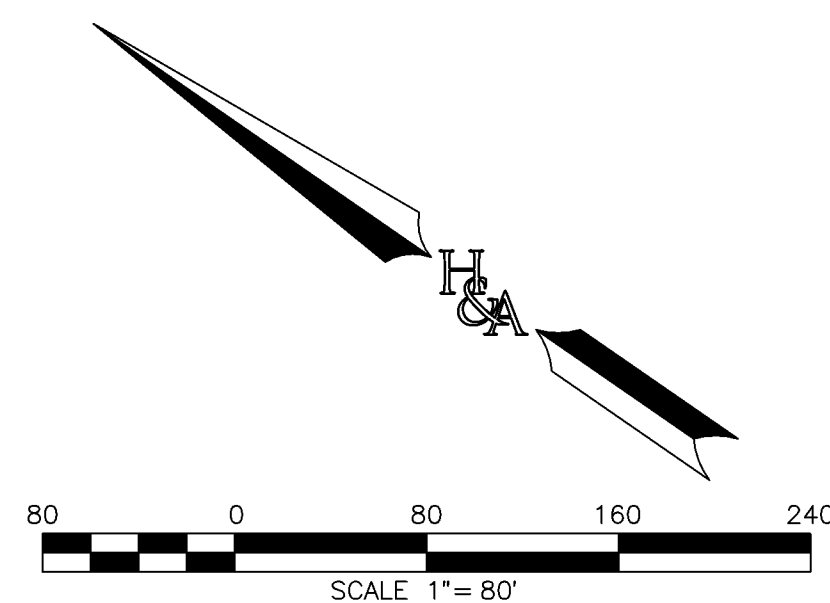
APPENDIX A-4
DESIGN REVIEW HYDROLOGY MAPS
(ULTIMATE CONDITIONS)
FOR REFERENCE ONLY

SEE SHEET 04



LEGEND

- PROJECT BOUNDARY
- DRAINAGE BOUNDARY
- INITIAL SUBAREA
- FLOW DIRECTION
- XX.XX ACRES AREA
- X HYDROLOGIC SOIL TYPE & BOUNDARY
- XXX NODE NUMBER
- XXX NODE NUMBER (ROUGH GRADING HYDROLOGY STUDY FOR OTAY RANCH VILLAGE 7 DWG. NO. 05017-15)
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN



PREPARED BY:



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

**HYDROLOGY MAP
 ULTIMATE CONDITION
 OTAY VILLAGE 7, R-8
 CITY OF CHULA VISTA, CALIFORNIA**

**MAP
 3
 OF
 4**

M.O.# 2807-0153

R-8
MULTI FAMILY




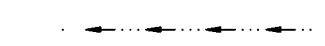
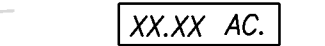
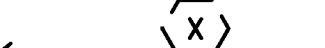
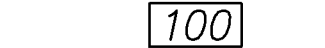


VORTAC SITE

SANTA LUNA STREET

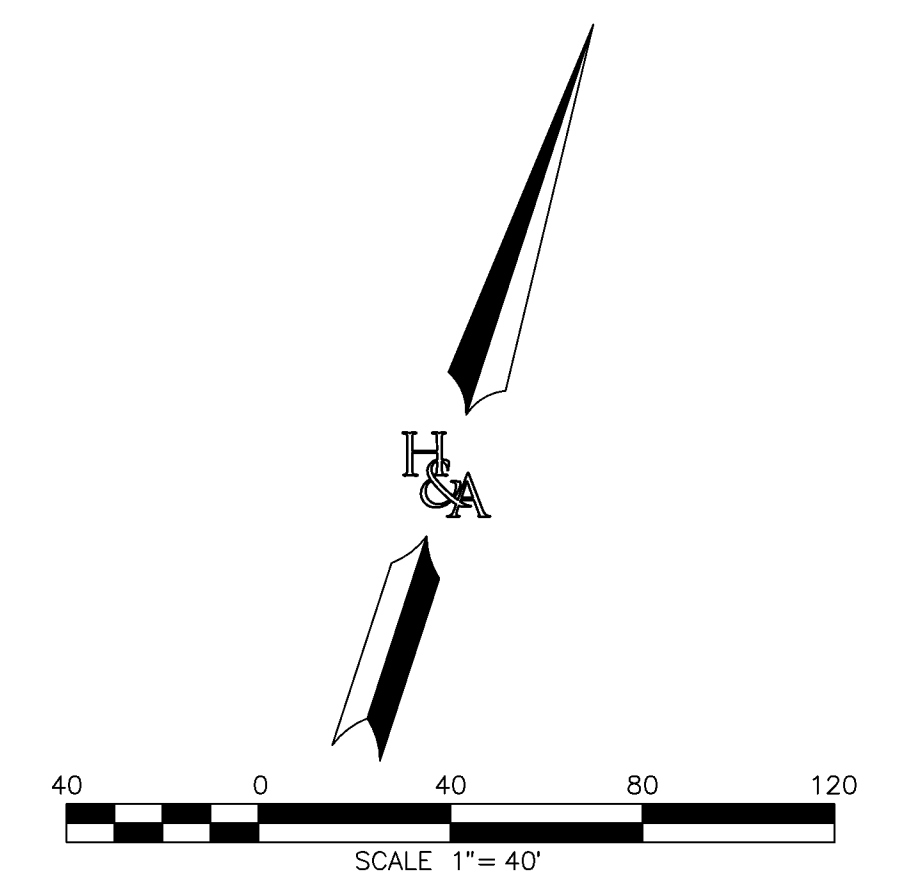
LA MEDIA ROAD

VILLAGE 8
WEST

LEGEND

-  PROJECT BOUNDARY
-  DRAINAGE BOUNDARY
-  INITIAL SUBAREA
-  FLOW DIRECTION
-  AREA
-  HYDROLOGIC SOIL TYPE
-  NODE NUMBER
-  EXISTING STORM DRAIN
-  PROPOSED STORM DRAIN

164
 $Q_{SOPR} = 221.44$ CFS
 $A = 92.75$ AC.
 $T_c = 12.08$ MIN.
 $Q_{SOEX} = 221.91$ CFS
 $A = 93.90$ AC.
 $T_c = 12.08$ MIN.



PREPARED BY:



PLANNING 9707 Waples Street
 ENGINEERING San Diego, Ca 92121
 SURVEYING PH(619)558-4500 - FX(619)558-1414

HYDROLOGY MAP
 DEVELOPED CONDITION
OTAY VILLAGE 7, R-4
 CITY OF CHULA VISTA, CALIFORNIA

MAP
1
 OF
1
 M.O.# 2807-0153