Appendix G

Hydrology and Hydraulic Report

HYDROLOGY AND HYDRAULIC REPORT

BREEZE LUXURY TOWNHOMES
CITY OF OCEANSIDE
P16-00004/D16-00016/CUP16-00014/RC16-00013

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January 28, 2019

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CHAPTER 1 – DISCUSSION

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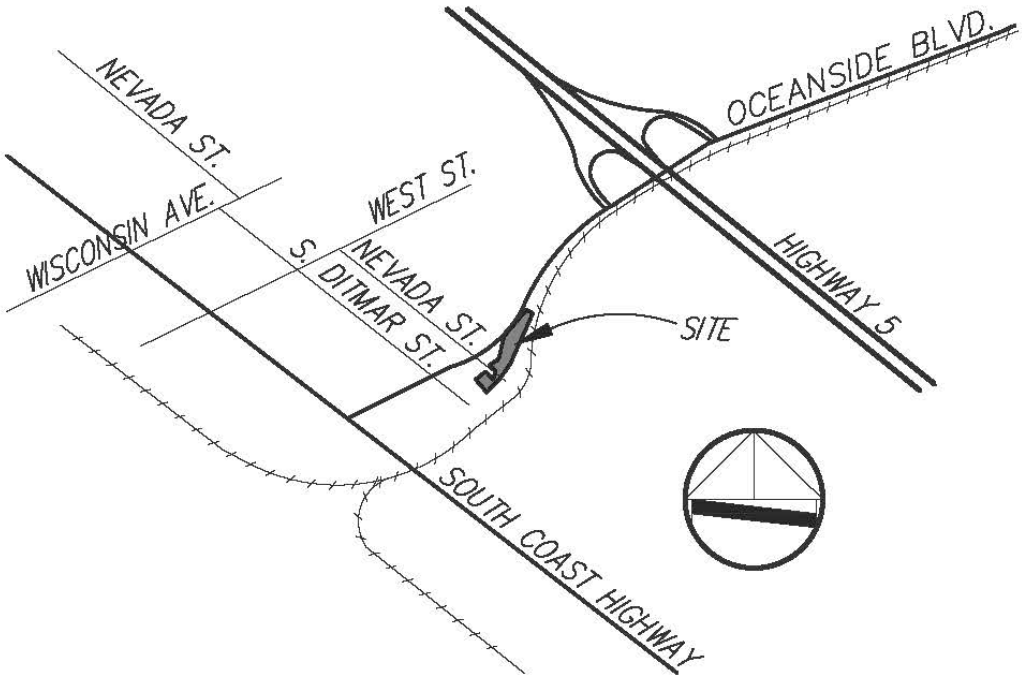

VICINITY MAP

NO SCALE

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1.2 PURPOSE AND SCOPE

The purpose of this report is to publish the results of hydrology and hydraulic computer analysis for the proposed Breeze Luxury Townhomes, located in the City of Oceanside. The scope of this study is to analyze the results of existing and developed condition hydrology calculations and provide recommendations as to the design and size of various hydraulic systems considered as mitigation of any potential adverse effects of the proposed project. The mitigation measures proposed will include flow based BMP calculations and sizing to attenuate the effects of development on storm water discharge. The 100-year, 10-year and 2-year storm frequencies will be analyzed. Information contained in this report will be referred to for the purpose of sizing treatment and mitigation facilities as proposed in the associated Storm Water Quality Mitigation Plan (SWQMP).

1.3 PROJECT DESCRIPTION

The proposed Breeze Luxury Townhome Project is located in the City of Oceanside. The property consists of four parcels: Parcel 1 is known as Assessor's Parcel No. 152-121-06; Parcel 2 is known as Assessor's Parcel No. 152-123-05; Parcel 3 is known as Assessor's Parcel No. 152-32-11; and Parcel 4 is known as Assessor's Parcel No. 152-123-20. The total existing project site consists of approximately 2.66 acres.

Stormwater runoff from the proposed project site is routed to one (1) Point of Concentration (POC); POC-1 located near the southeast corner of the project site. Conveyances from the POC-1 confluence in the concrete channel south of NCTD railroad right-of-way below the project. The proposed drainage pattern mimics the existing drainage pattern with regard to overall area and discharge points.

Treatment of storm water runoff from the site has been addressed in a separate report- "Priority Development Project (PDP) Storm Water Quality Management Plan (SWQMP) for Breeze Luxury Townhomes" by BHA.

This report is based on the hydrologic model used in the technical memorandum "Hydromodification Management Plan: SWMM Modeling for Hydromodification Compliance of Breeze Luxury Townhomes" (HMP Study) by BHA. See SWQMP for copy of HMP Study. An analysis was prepared to model the detention facilities and prove that post-developed peak flows are smaller than pre-developed peak flows for the project's Point of Compliances (POCs).

For this drainage analysis, the pre- and post-developed conditions peak flows were calculated using the Rational Method Hydrograph procedure set forth in the San Diego County Hydrology Manual (SDCHM). This is the prescribed method for drainage areas less than

one square mile. Hydraulic routing was performed in SWMM, as the complex routing structures discharging to the POC have already been built in SWMM for hydromodification analysis: models include LID calculations and Modified Puls routing at the ponding level of the underground detention basins.

1.4 PRE-DEVELOPMENT CONDITIONS

The site is located on the north and south sides of the cul-de-sac at the southeast end of Nevada Street. The property consists of a gentle, southeast sloping vacant lot with steep bluff slopes along the east site of the property that descend to the track bed for the NCTD railroad right-of-way below. The property is bordered on the north by Oceanside Boulevard, on the south by existing residential properties, on the west by similar multi-family residential properties slightly higher in elevation, and on the east by southeasterly descending slopes that abut the railroad right-of-way at their base. Observations from a field reconnaissance on July 28, 2015 indicated that the project site has exposed bedrock materials (where not concealed by vegetation coverage) in the east perimeter slope. The remaining site is covered with sparse vegetation throughout. On-site topography includes elevations ranging from approximately 35 to 52 feet at gradients ranging from 0.75:1.0 to 1.5:1.0 (horizontal to vertical). Near-vertical conditions are locally present along some of the base-of-slope areas.

The project site is located in the San Luis Rey River Subarea (903.11), part of the San Luis Rey Hydrologic Unit (903.00). The site soil quality is predominately "undefined" with regions of Type-A soil by NRCS Web Soil Survey. However, based on the Infiltration Feasibility Condition prepared by Geotechnical Exploration, Inc. "Infiltration Feasibility Condition, Proposed Breeze Luxury Townhome Project", the entire site is regarded as belonging to Type-D due to the low infiltration rate characteristics. No contaminated or hazardous soil was located within the project area, and no evidence of scouring or excessive erosion resulting from concentrated runoff was in evidence at the site.

Existing site drainage is accompanied by sheet flow to the southeast. Runoff from the existing residential developments to the west of Nevada Street is directed to the curb and gutter on Nevada Street. Existing curb outlets at the south end of Nevada Street direct flow to the gentle sloping vacant lot, where runoff travels southeast and over the steep bluff slopes. A concrete brow ditch along the railroad right-of-way collects runoff and directs flow south to an existing Type F catch basin.

Runoff from the existing residential developments located east of Nevada Street sheet flows east and into the vacant lot. Runoff then travels over the steep bluff slopes and into a brow ditch along the railroad right-of-way. The brow ditch directs flow north adjacent to the railroad tracks and into an existing Type F catch basin.

The following tables summarize the results of the existing and proposed condition 100-year runoff information from the site. Please refer to the Existing and Proposed Hydrology Exhibits for drainage patterns and areas.

TABLE 1— Summary of Existing Conditions Peak Flows

Discharge Location	Drainage Area (Ac)	100-Year Peak Flow (cfs)
POC-1	5.52	13.17

1.5 POST-DEVELOPMENT CONDITIONS

The project proposes the development of 34 two and three-story, multi-unit townhome buildings and associated improvements. The structures are to be constructed in level graded pads accessed at the intersection of Ditmar Street and Godfrey Street. Among the storm water improvements will be the installation of a curb inlets, catch basins, and storm drain conveyance systems. Developed onsite runoff will be drained to three (3) separate onsite underground storm water vaults for hydromodification and flow detention (the type of underground stormwater detention vault will be manufactured by StormTrap® or equivalent product), then drained to three (3) separate Modular Wetlands Systems (MWS) for pollutant control. Developed off-site runoff will be intercepted and conveyed in a storm drain through the project. The 2.66 acre project site will be approximately 61% impervious post-development.

Stormwater runoff from the proposed project site is routed to one (1) Point of Concentration (POC). POC-1 located at the southeast corner of the project site and confluence in the concrete channel south of NCTD railroad right-of-way below the project. The proposed drainage pattern mimics the existing drainage pattern with regard to overall area and discharge points.

The project will be split into two (2) Drainage Basins draining to the Basin A and Basins B. Basin A will be comprised primarily of the majority of the project, including Units 1 – 29 and will be directed into two (2) separate detention vaults with a MWS downstream. A modified Type A-4 clean out with two (2) orifices will distribute flows toward each detention vault (39% toward BMP 1A and 61% to BMP 1B) at Node 160. The size of the openings inside the modified Type A-4 clean out are a function of the size of each basin divided by the area of the two basins combined. See the Chapter 5 for junction box details and flow calculations. Once flows are routed via the proposed orifices, the flows are then conveyed via storm drain pipes to the receiving detention vaults, BMP-1A and BMP-1B for treatment and detention. Basin B will encompass Units 30-34. Flows are conveyed via storm drain pipes to the receiving detention vault BMP 2 for treatment and detention. Storm water runoff from the impervious roof and road areas will intercepted by catch basins in the street, and conveyed

via a storm drain system to the underground detention vaults. The detention vault will store runoff from the site and release it at a controlled rate for hydromodification, pollutant control, and detention to reduce the proposed 100-year flows to existing 100-year flow levels. See the "Storm Water Quality Management Plan (SWQMP) for Breeze Luxury Townhomes" by BHA for pollutant and hydromodification control compliance. Treated water from DMA-1A AND DMA-1B will be conveyed via 18"-dia. HDPE storm drain pipe and discharged at the existing Type F catch basin in the southeast corner of the project site at POC-1. Treated water from MWS-2 will be conveyed via 18"-dia HDPE storm drain pipe and discharged at the existing Type F catch basin in the northeast corner of the project site at POC-2. Both conveyances from the Basin A and Basin B confluence in the concrete channel south of NCTD railroad right-of-way below the project.

Off-site run-on from four (4) separate upstream areas; Node 20 - the existing residential developments located east of Nevada Street, Node 50 - Nevada Street cul-de-sac (including new improvements), Node 80 - the existing residential developments west of Nevada Street, and Node 210 – the south east corner of South Ditmar Street and Godfrey Street will bypass the project site storm water treatment facilities and confluence with the proposed storm drain facilities prior to discharging to POC-1. Runoff from Nevada Street cul-de-sac will be intercepted by a curb inlet. The curb inlet will have a low flow orifice to divert the estimated flow generated from new impervious to a MWS located onsite to treat the pollutants. The treated flows will then confluence with the off-site flows to bypass the project site storm water facilities downstream.

Runoff from the undisturbed bluff in the eastern portion of the project in Basins A and Basin B will sheet flow over the bluffs and into the existing and proposed brow ditches to POC-1. The undisturbed bluff areas will bypass the underground storage vaults and will not require storm water treatment.

The potential for runoff from minor street widening of Godfrey Street and South Ditmar Street to run-on to the site will be mitigated by a concrete cross gutter constructed along Godfrey Street. Runoff from the minor widening of Godfrey Street will flow to a proposed vegetated dispersion area located on the south side of Godfrey Street at South Ditmar Street. The vegetated dispersion area has been designed as a site design BMP to slow runoff discharges and reduce volumes through infiltration. The dispersion area will also include soil amendments to improve vegetation support, infiltration capacity and enhance treatment of routed flows. The relatively flat slope of the dispersion area will facilitate sheet flows to mimic existing drainage conditions.

Table 2 summarizes the expected cumulative 100-year peak flows for POC-1 and POC-2.

TABLE 2—Summary of Developed Conditions Peak Flows

Discharge Location	Drainage Area (Ac)	100-Year Peak Flow (cfs)
Pre-Developed Condition	5.52	13.17
Post-Developed Undetained Condition	5.51	19.69
Post-Developed Detained Condition	5.51	12.85
DIFFERENCE	-0.01	-0.32

1.6 GENERAL HYDROLOGIC CONSIDERATIONS

Runoff from the developed project site has been divided into two (2) Basins draining to three (3) BMPs. Basin A will be comprised primarily of the westerly townhome buildings draining to BMP-1A and BMP-1B. Basin B will be comprised primarily of the easterly townhome buildings draining to BMP-2. Both BMP-1A and BMP-1B consists of the underground stormwater detention vault and the downstream MWS-1A and MWS-1B. BMP-2 consists of the underground stormwater detention vault and the downstream MWS-2A. For the purpose of this report, the designation BMP-1A and BMP 1B refers to the combined detention and treatment system for DMA-1A and DMA-1B. The volume required to flow to the MWS for pollutant control treatment is called the water quality (WQ) volume, and is based on pollutant treatment performance standards described in the project's SWQMP. The remaining volume in the underground detention facility is for hydromodification (hydromod) storage. For the purpose of this report, each BMP will include the water quality volume, WQ, and the remaining hydromod portion, HMP. See the table below.

TABLE 3 – Summary of Underground Detention Facility and MWS Annotations:

Area Contributing to:	DMA	BMP	Water Quality Volume	Hydro-modification Volume	MWS
POC-1	DMA-1A	BMP-1A	WQ-1A	HMP-1A	MWS-1A
POC-1	DMA-1B	BMP-1B	WQ-1B	HMP-1B	MWS-1B
POC-1	DMA-2	BMP-2	WQ-2	HMP-2	MWS-2

Storm water will enter the vault through an inflow pipe. The lower portion of the vault is dedicated to storing the WQ volume. The upper portion of the vault, above the WQ volume, is dedicated to storing the HMP volume. Flows will discharge from the vault via a low flow orifice outlet to the downstream MWS. Flows will discharge from the remaining HMP volume via an orifice control set at the top of the WQ volume, such that the 100-year peak flow can be safely discharged without exceeding pre-development conditions. Flows that discharge from the remaining hydromodification tank will be conveyed via storm drain pipe and connect directly to the storm drain system, bypassing treatment in the MWS.

The remaining hydromodification volume is proposed for hydromodification conformance and flood control for the project's POCs. The dimensions required for HMP and flood control conformance is based on the SWMM model that was undertaken for the project. For this drainage analysis, the SWMM model was used, as the complex routing structure to POC-1 and has already been built in SWMM for hydromodification analysis: the model includes detailed routing calculations at the underground detention facilities.

In order to change SWMM for hydromodification to SWMM for 100-year peak flow, changes in the rainfall data, infiltration method, and time interval are required. A general explanation of the changes and reasoning for the selection of SWMM as a hydraulic modelling tool for routing Q100 follows, as well as considerations for typical differences between SWMM and other models.

Rainfall

Precipitation has been obtained from NOAA website at the coordinates of the project (Chapter 6- References).

Rainfall was developed using the SDCHM, where the duration "t" is made equal to the time of concentration to maximize peak flow. However, longer durations up to 360 minutes are used to build the complete hyetograph (precipitation distribution for the 100-year, 6-hour storm event). The 6-hour storm is distributed according to the methodology explained in the SDCHM, where the peak precipitation starts four hours after the beginning of the storm (see intensity tables in Chapter 6- References).

Additionally, SWMM can only use whole numbers as time intervals for the determination of hydrograph: only 1, 5, 10, 15, or 30 minutes are valid time intervals for input. Therefore, after the rainfall and runoff hydrographs are generated, all runoff hydrographs are interpolated to a time interval of 1 minute prior to entry into SWMM. This ensures that the shape of each runoff hydrograph is preserved.

Post-Developed Hydrograph Determination

For the post-developed condition, runoff hydrographs were generated using RickRatHydro (see results in Chapter 4). These hydrographs were then entered into the developed condition SWMM model. SWMM was selected for the hydraulic routing because 1) SWMM allows a more accurate routing procedure in all LIDs than other routing models, and 2) the model was already built for hydromodification modeling, with parameters defined to work under the SWMM framework.

Transforming Intensities into SDCHM Runoff using SWMM

In order to eliminate the effect of additional "routing", the width of the area was assumed so large that the sheet flow distance is extremely short: the width is equal to the area expressed in square feet, which means that the sheet flow length is only one foot. This allows SWMM to produce an instantaneous runoff response. The resulting runoff hydrograph is a 6-hour Rational Method hydrograph, in accordance with the SDCHM.

Another modification is associated with the area of the LID cell: different from hydromodification modelling, the total LID area is given at the DMA level, because the total area is associated with modified effective precipitation. The reason for this modification is because LIDs cannot be defined as 100% impervious. To overcome the problem of counting the LID area twice, the LID/BMP is assigned the real value of its area and the real impervious percentage (0%), and the LID is associated with another storm event called LID rain, which is equal to zero in/hr at all times. Therefore, the LID/BMP area is associated with zero rainfall and does not affect the results. The advantage of proceeding this way is that the total hydrograph will be routed in the LID module before being routed in the surface pond of the biofiltration basin.

LID Routing Considerations

One of the main reasons for selecting SWMM to calculate the 100-year peak flow is because of the ability of SWMM to properly route runoff through a myriad of LID options, including underground facilities, bio-retention cells and others. The LID routine embedded in SWMM can account for the ponding at the surface while water is infiltrating through the amended soil, and can account for the release of water through the underground French Drain. In this case, no biofiltration cell is produced, but as the model was already built in SWMM, the underground routing procedure was also prepared with SWMM.

For the simplified version of the LID model, SWMM assumes that once flow fills the surface pond, all peak flows coming into the LID are equal to all flows discharged out of the LID. This approach is usually appropriate for hydromodification modelling, where hourly runoff

is calculated and the surface volume does not generate a significant change in the hourly discharge. However, it is only an approximation of the real discharge of the LID, because the routing process taking place at the surface level reduces the peak flow. Expected peak flow reduction is sometimes very small but it can be significant, depending on the characteristics of the surface volume and the outlet structure. In order to properly model the routing process in the underground facilities, Modified Puls is performed at the surface level.

In order to account for surface routing, each underground detention facility is divided into two portions: the LID portion (water quality portion), and the surface volume above the invert of the partition weir (remaining hydromodification portion). For the LID portion, the flows leaving through the orifice is directly connected to the outlet. For the surface portion, the volume of ponding is considered as a pond, which requires elevation vs. area table, and an elevation vs. discharge table for use with the Modified Puls Method. The required stage-storage-discharge information and a detailed description of the detention basin outlet structures are provided in the HMP Study. The elevation vs. area tables, and the elevation vs. discharge tables are included in Chapter 4 of this report. Detailed explanations for obtaining those values are included in the HMP Study.

Model Results

The results show that the proposed underground detention facility reduces the peak flow to pre-development conditions for POC-1. The results are displayed in Table 4. It is clear that the underground detention facilities not only satisfy hydromodification criteria, but also allow the reduction of post-development peak flows below pre-development levels for the 6hr-100yr synthetic storm event.

TABLE 4 — Summary of Detention Basin Routing

Area Contributing to:	HMP-BMP	100-Year Peak Inflow (cfs)	100-Year Peak Outflow (cfs)
POC-1	BMP 1A	3.07	0.66
POC-1	BMP 1B	4.48	0.82
POC-1	BMP 2	1.54	0.61

The Rational Method study provided herein incorporates the outlet structure design in the underground detention facilities and is meant to show the site can sufficiently convey the 100-year storm event.

1.7 STUDY METHOD

The method of analysis was based on the Rational Method according to the San Diego County Hydrology Manual (SD HM). The Hydrology and Hydraulic Analysis were done on Hydro Soft by Advanced Engineering Software 2013. The study considers the runoff for a 100-year, 10-year and 2-year storm frequency.

Methodology used for the computation of design rainfall events, runoff coefficients, and rainfall intensity values are consistent with criteria set forth in the "2003 County of San Diego Drainage Design Manual." A more detailed explanation of methodology used for this analysis is listed in Chapter 6 – References of this report.

Drainage basin areas were determined from the topography and proposed grades shown on Preliminary Grading and Drainage Plans for Breeze Luxury Townhomes.

The Rational Method for this project provided the following variable coefficients:

Rainfall Intensity – Initial time of concentration (T_c) values based on Table 3-2 of the SD HM. Precipitation distribution for the 100-year, 10-year and 2-year, 6-hour storm events were obtained from the NOAA Precipitation Frequency Data Server (PFDS), see References.

$I = 7.44x(P_6)x(T_c)^{-0.645}$

P_6 for 100-year storm =2.63"
P_6 for 10-year storm =1.68"
P_6 for 2-year storm =1.13"

Soil Type-D is used as previously discussed the Pre-Development Conditions. Since the proposed site is 95% impervious, the runoff coefficient for post-condition pervious areas is insignificant. This will produce the smallest existing flow rates, requiring the greatest reduction of the proposed flow rates by routing runoff.

Runoff Coefficients – In accordance with the County of San Diego standards, runoff coefficients were based on land use and soil type. The soil conditions used in this study are consistent with Type-D soil qualities. An appropriate runoff coefficient (C) for each type of land use in the subarea was selected from Table 3-1 of SD HM and multiplied by the percentage of total area (A) included in that class. The sum of the products for all land uses is the weighted runoff coefficient ($\sum$[CA]). See Table 1.1 for weighted runoff coefficient "C" calculations.

The Proposed Hydrology Exhibit shows the offsite area, proposed on-site drainage system, and nodal points. Table 5 summarizes the composite C-values calculated in the existing and proposed conditions.

TABLE 5 — Weighted Runoff Coefficient "C" Calculations

Table 5- Weighted Runoff Coefficient "C" Calculations							
Up Node	Down Node	Total Area (ac)	C_1	A_1 (ac)	C_2	A_2 (ac)	C_{comp}
Existing Hydrology-							
10	20	0.19	0.35	0.06	0.87	0.129	0.70
20	30	0.66	0.35	0.19	0.87	0.470	0.72
30	40	0.48	0.35	0.48	0.87	0.000	0.35
40	50	1.37	0.35	1.14	0.55	0.230	0.38
60	70	0.44	0.35	0.14	0.87	0.300	0.70
80	90	2.38	0.35	2.38	0.87	0.000	0.35
Proposed Hydrology-							
10	20	0.466	0.35	0.166	0.87	0.300	0.68
30	40	0.190	0.35	0.061	0.87	0.129	0.70
40	50	0.660	0.35	0.160	0.87	0.500	0.72
70	80	0.230	0.35	0.140	0.87	0.090	0.55
110	120	0.214	0.35	0.004	0.87	0.210	0.86
120	130	0.170	0.35	0.000	0.87	0.170	0.87
130	140	0.335	0.35	0.019	0.87	0.316	0.84
150	150	0.198	0.35	0.016	0.87	0.182	0.83
170	170	0.132	0.35	0.000	0.87	0.132	0.87
17	175	0.063	0.35	0.000	0.87	0.063	0.87
185	185	0.188	0.35	0.012	0.87	0.176	0.84
190	190	0.177	0.35	0.002	0.87	0.175	0.86
210	210	0.030	0.35	0.030	0.87	0.000	0.35
230	230	0.029	0.35	0.011	0.87	0.018	0.67
240	240	0.040	0.35	0.012	0.87	0.028	0.71
270	270	0.783	0.35	0.783	0.87	0.000	0.35
280	290	0.215	0.35	0.000	0.87	0.215	0.87
305	305	0.319	0.35	0.280	0.87	0.039	0.41
310	310	1.070	0.35	1.070	0.87	0.000	0.35

Note: C-values taken from Table 3-1 of San Diego County Hydrology Manual, consistent with on-site existing soil types from the USDA Web Soil Survey. See References.

As mentioned, it is assumed all storm water quality requirements for the project will be met by the MWS. However detailed water quality requirements are not discussed within this report. For further information in regards to storm water quality requirements for the project, please refer to the site specific Storm Water Quality Management Plan (SWQMP).

1.8 CONCLUSIONS

Table 6 below summarizes the results of the existing and proposed condition drainage areas and resultant 100-year peak flow rates at the POC discharge locations from the project site. Please refer to the Existing and Proposed Hydrology Exhibits for drainage patterns and areas.

TABLE 6 — Summary Pre vs. Post Developed Peak Flows

Discharge Location	Drainage Area (Ac)	100-Year Peak Flow (cfs)
Pre-Developed Condition	5.52	13.17
Post-Developed Undetained Condition	5.51	19.69
Post-Developed Detained Condition	5.51	12.85
DIFFERENCE	-0.01	-0.32

As shown in the table above, the development of the Breeze Luxury Townhomes will result in a net decrease of 100-year peak flow discharged from the project site by approximately 0.32 cfs.

See Chapter 3.3 for a summary of the developed and existing condition drainage areas, time of concentration, and resultant peak flow rates for the 2-year, 10-year, and 100-year storm frequencies at the POC-1 and POC-2 discharge locations.

Peak flow rates listed above were generated based on criteria set forth in "San Diego County Hydrology Manual" (methodology presented in Chapter 6 of this report). Rational method output is located in Chapter 3. SWMM modeling results are located in Chapter 4. The hydraulic calculations show that the proposed storm drain facilities can sufficiently convey the anticipated Q_{100} flowrate without any adverse effects. Drainage patterns reflected on the Proposed Hydrology Exhibit will increase the total developed runoff due to an increase in impervious area, however routing runoff by grading flat pads, increasing the overall time of concentration, and implementing underground detention facilities as proposed within this project will decrease the flow rate at the two (2) Points of Compliance. Based on this conclusion, runoff released from the proposed project site will be unlikely to cause any adverse impact to downstream water bodies or existing habitat integrity. Sediment will likely be reduced upon site development.

This project is particularly effective at mitigating the potential impacts that development can have on stormwater runoff. By utilizing the proposed LID systems, this project mitigates both the quantity of runoff generated during storm, and the quality of runoff that will ultimately leave the property. It is our professional opinion that the recommendations provided in this report, and the drainage system as proposed effectively intercept, contain, convey, detain and treat the expected storm water runoff generated by this property to mimic pre-development conditions.

1.9 DECLARATION OF RESPONSIBLE CHARGE

I hereby declare that I am the Engineer of Work for this project, that I have exercised responsible charge over the design of the project as defined in section 6703 of the business and professions code, and that the design is consistent with current standards.

I understand that the check of project drawings and specifications by the City of Oceanside is confined to a review only and does not relieve me, as Engineer of Work, of my responsibilities for project design.

_____

Ronald Holloway Date
R.C.E. 29271

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CHAPTER 2

EXISTING & PROPOSED HYDROLOGY EXHIBITS

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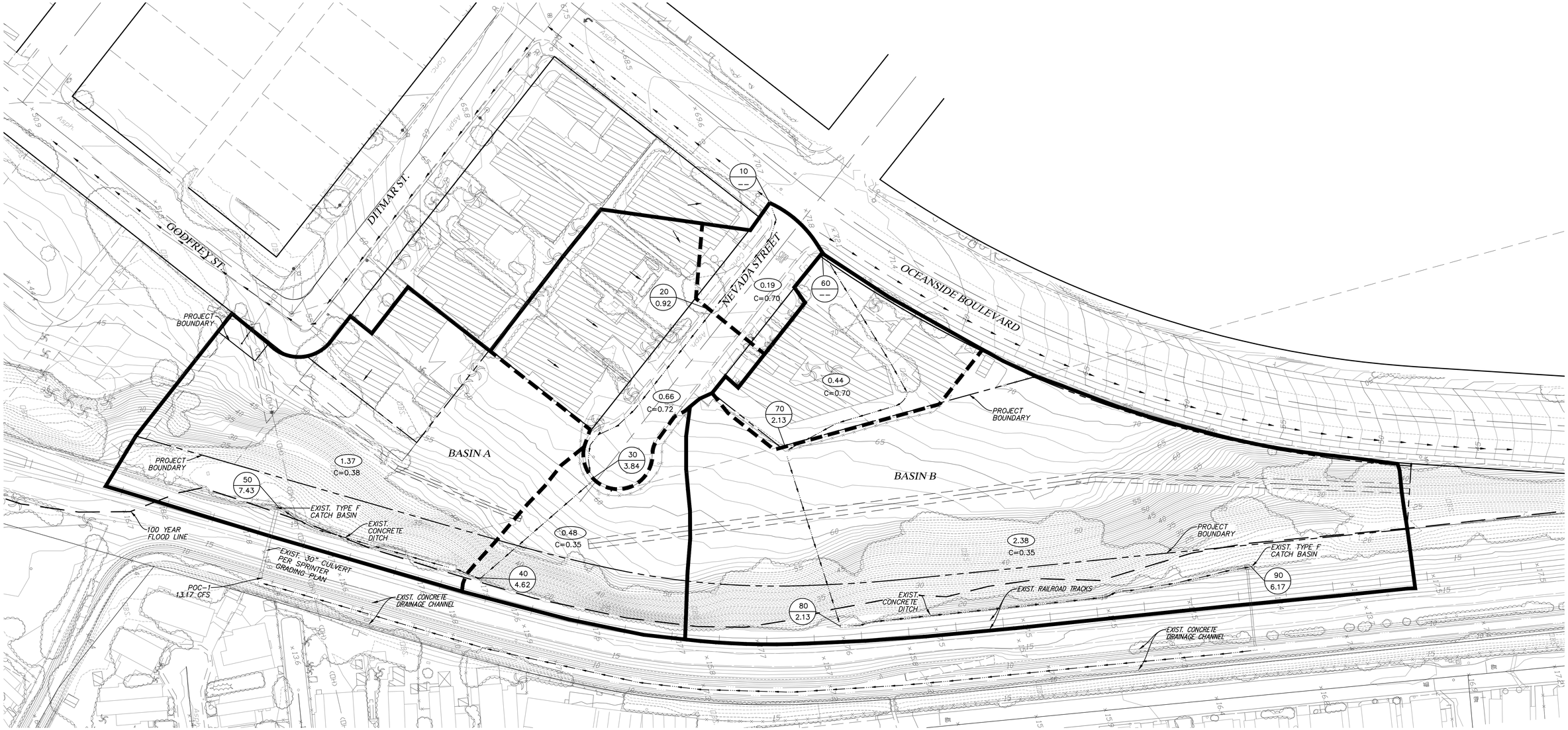
LEGEND

SURFACE NODE	20
SURFACE FLOW, 100 YEAR	0.92
BASIN AREA	0.66
RUNOFF COEFFICIENT	0.72
POC-ID	POC-1
BASIN LIMIT	
SUB-BASIN LIMIT	
PROJECT BOUNDARY	
FLOW PATH	
FLOW DIRECTION	

PROJECT PARCELS	
APN	152-121-06 152-123-05 152-123-20 152-320-11
TOTAL PARCEL AREA	2.66 ACRES

SUMMARY OF RESULTS		
DISCHARGE LOCATION	DRAINAGE AREA (ACRES)	100-YEAR PEAK FLOW (CFS)
POC-1	5.53	13.17



40' 20' 0' 40' 80' 120'

SCALE: 1" = 40'

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EXISTING HYDROLOGY EXHIBIT BREEZE (LUXURY TOWNHOMES)

CITY OF OCEANSIDE, CALIFORNIA

SHEET 1 OF 1

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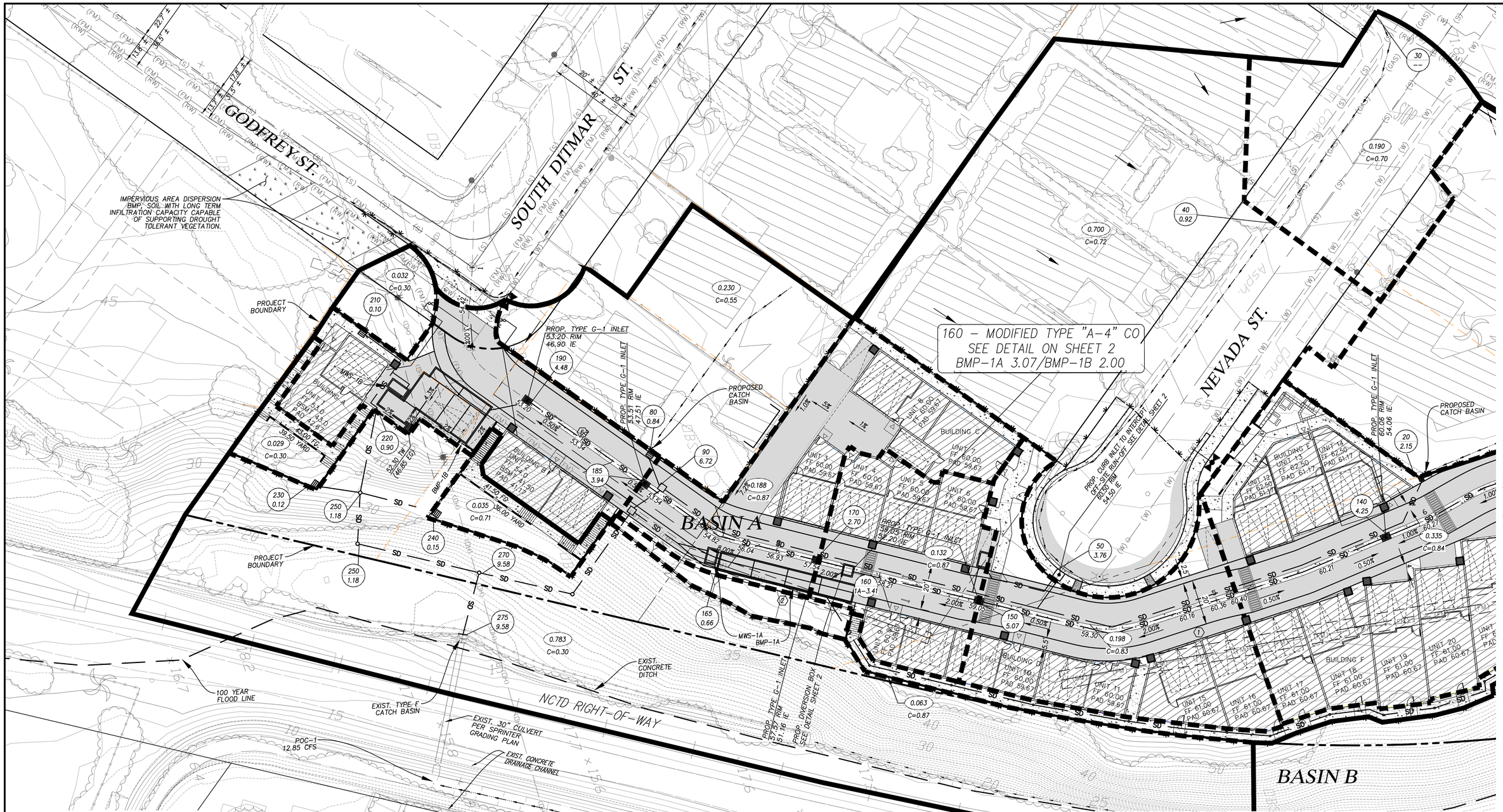

LEGEND

SURFACE NODE	20
SURFACE FLOW, 100 YEAR	2.15
BASIN AREA	0.198
RUNOFF COEFFICIENT	0.83
POC-ID	POC-1
BASIN LIMIT	
SUB-BASIN LIMIT	
PROJECT BOUNDARY	
FLOW PATH	
FLOW DIRECTION	
CATCH BASIN	SD
ROOF DOWNSPOUT	

Discharge Location	Drainage Area (Ac)	100-Year Peak Flow (cfs)
Pre-Developed Condition	5.52	13.17
Post-Developed Undetained Condition	5.51	19.69
Post-Developed Detained Condition	5.51	12.85
DIFFERENCE	-0.01	-0.32

PROJECT CHARACTERISTICS	
PARCEL AREA	2.66ACRES
DISTURBED AREA	2.13 ACRES
PROPOSED IMPERVIOUS AREA	1.72 ACRES
PROPOSED PERVIOUS AREA	0.41 ACRES
SOIL TYPE	D
DEPTH TO GROUNDWATER	> 20 FEET

PROJECT PARCELS	
APN	152-121-06 152-123-05 152-123-20 152-320-11
TOTAL PARCEL AREA	2.66 ACRES

20' 10' 0' 20' 40' 80'

SCALE: 1" = 20'

REGISTERED PROFESSIONAL ENGINEER
RONALD I HOLLOWAY
NO. 29271
CIVIL
STATE OF CALIFORNIA

bHA, Inc.
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5115 AVENIDA ENCINAS
SUITE "L"
CARLSBAD, CA. 92008-4387
(760) 931-8700

PROPOSED HYDROLOGY EXHIBIT BREEZE (LUXURY TOWNHOMES)

CITY OF OCEANSIDE, CALIFORNIA

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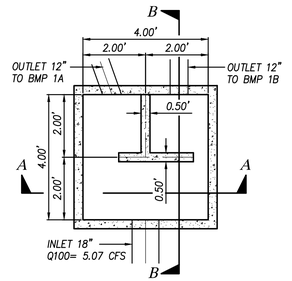
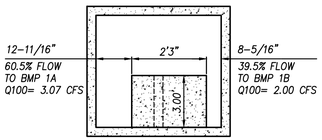
LEGEND

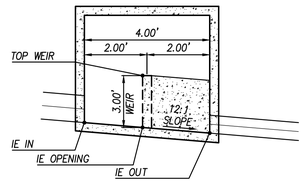
SURFACE NODE / SURFACE FLOW, 100 YEAR	20 / 2.15
BASIN AREA	0.198
RUNOFF COEFFICIENT	0.83
POC–ID	POC–1
BASIN LIMIT	
SUB–BASIN LIMIT	
PROJECT BOUNDARY	
FLOW PATH	
FLOW DIRECTION	
CATCH BASIN	SD
ROOF DOWNSPOUT	



PLAN VIEW



SECTION A-A

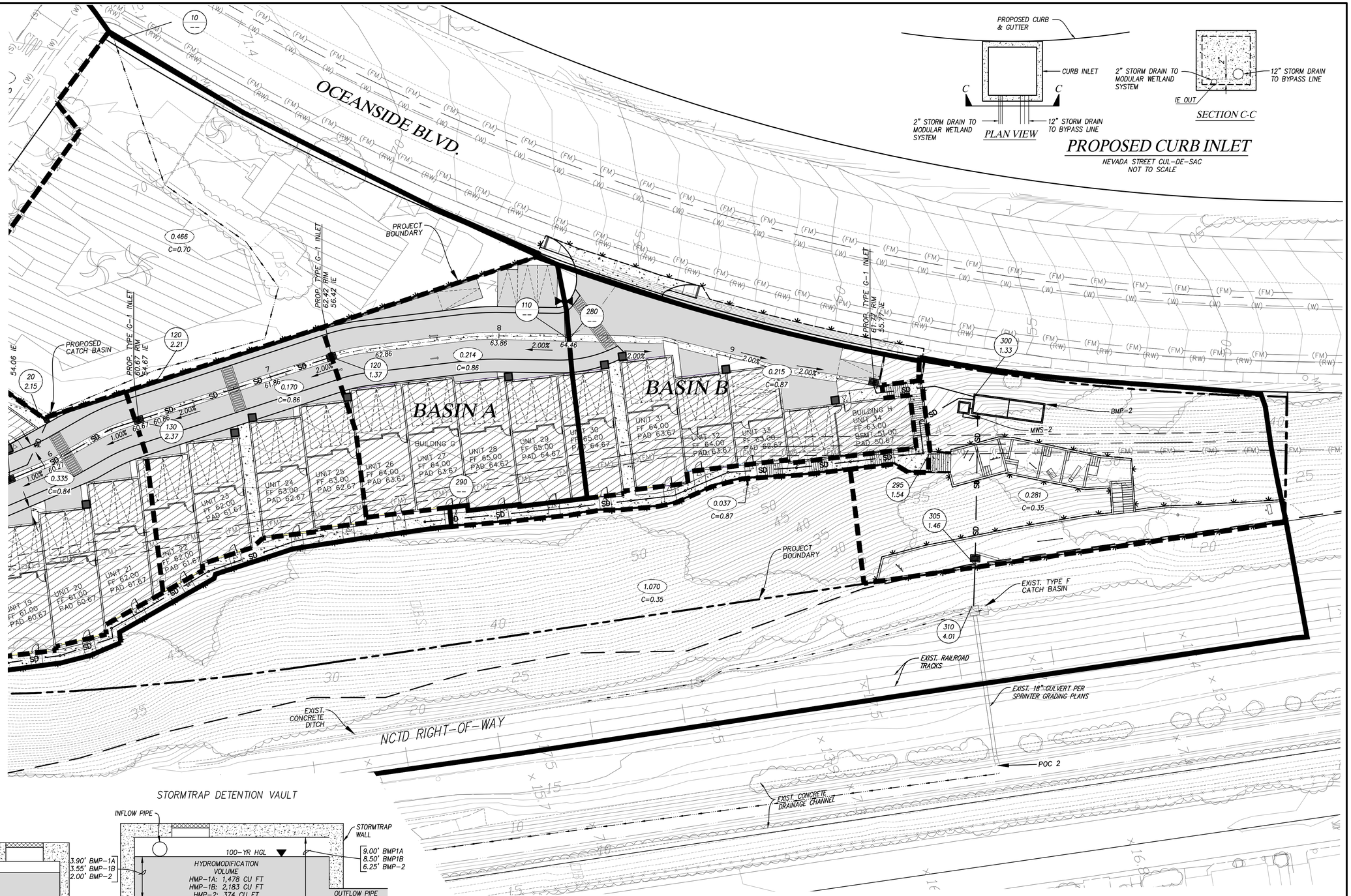


SECTION B-B

MODIFIED TYPE A-4 CLEAN OUT DETAIL

NOT TO SCALE

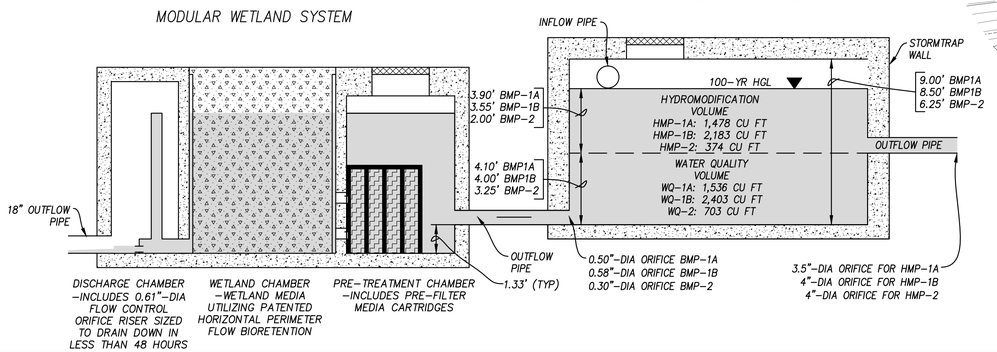
SEE SHEET 1



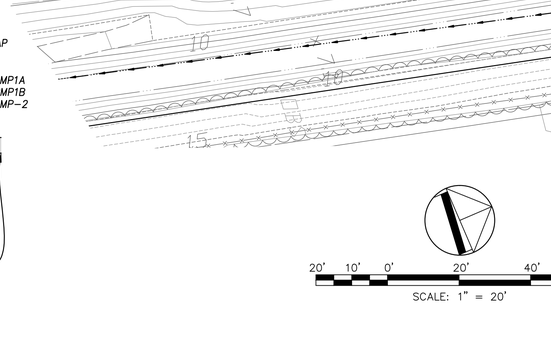
PROPOSED CURB INLET

NEVADA STREET CUL–DE–SAC
NOT TO SCALE

MODULAR WETLAND SYSTEM



STORMTRAP DETENTION VAULT



20' 10' 0' 20' 40' 80'

SCALE: 1" = 20'

REGISTERED PROFESSIONAL ENGINEER
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PROPOSED HYDROLOGY EXHIBIT BREEZE (LUXURY TOWNHOMES)

CITY OF OCEANSIDE, CALIFORNIA

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CHAPTER 3

CALCULATIONS

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CHAPTER 3

CALCULATIONS

3.1 – Existing Condition Hydrology Calculations

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100-YEAR STORM – EXISTING HYDROLOGY

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2014 Advanced Engineering Software (aes)
              Ver. 21.0 Release Date: 06/01/2014  License ID 1459

                              Analysis prepared by:

                                    BHA INC.
                              5115 AVENIDA ENCINAS, SUITE L
                                   CARLSBAD, CA 92008


 ************************** DESCRIPTION OF STUDY *************************
* 100 YEAR EXISTING HYDROLOGY                                            *
*                                                                        *
*                                                                        *
 ************************************************************************

  FILE NAME: K:\HYDRO\0989\989-E1.DAT
  TIME/DATE OF STUDY: 14:07 01/21/2019
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.630
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  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*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     71.50
  DOWNSTREAM ELEVATION(FEET) =     68.30
  ELEVATION DIFFERENCE(FEET) =      3.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.886
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.929
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      0.92
TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.92

****************************************************************************
FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  61
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =   68.30  DOWNSTREAM ELEVATION(FEET) =   61.00
STREET LENGTH(FEET) =   188.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 16.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.020
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0140
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.42
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.22
  HALFSTREET FLOOD WIDTH(FEET) =    4.74
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.53
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.78
STREET FLOW TRAVEL TIME(MIN.) =   0.89   Tc(MIN.) =    5.77
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.315
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7200
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT =  0.716
SUBAREA AREA(ACRES) =    0.66      SUBAREA RUNOFF(CFS) =    3.00
TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       3.84

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.22
FLOW VELOCITY(FEET/SEC.) =  3.80   DEPTH*VELOCITY(FT*FT/SEC.) =   0.95
LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =     288.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     30.00 TO NODE     40.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =     61.00  DOWNSTREAM(FEET) =     17.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   163.00   CHANNEL SLOPE =  0.2699
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.954
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.34
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.92
AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   0.55
Tc(MIN.) =    6.33
SUBAREA AREA(ACRES) =     0.48       SUBAREA RUNOFF(CFS) =    1.00
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.584
  TOTAL AREA(ACRES) =        1.3         PEAK FLOW RATE(CFS) =       4.62

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   5.12
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =     451.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     50.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     17.00  DOWNSTREAM(FEET) =     12.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   167.00   CHANNEL SLOPE =  0.0269
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.729
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.16
  AVERAGE FLOW DEPTH(FEET) =   0.65   TRAVEL TIME(MIN.) =   0.39
  Tc(MIN.) =    6.71
  SUBAREA AREA(ACRES) =     1.37       SUBAREA RUNOFF(CFS) =    2.98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.480
  TOTAL AREA(ACRES) =        2.7         PEAK FLOW RATE(CFS) =       7.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.70   FLOW VELOCITY(FEET/SEC.) =   7.48
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     50.00 =     618.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.71
  RAINFALL INTENSITY(INCH/HR) =   5.73
  TOTAL STREAM AREA(ACRES) =     2.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.43

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     70.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     72.00
  DOWNSTREAM ELEVATION(FEET) =     66.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.963
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.929
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      2.13
  TOTAL AREA(ACRES) =      0.44   TOTAL RUNOFF(CFS) =      2.13
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     70.00 TO NODE     80.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     66.00  DOWNSTREAM(FEET) =     18.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   185.00   CHANNEL SLOPE =  0.2595
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.13
  FLOW VELOCITY(FEET/SEC.) =   3.75   FLOW DEPTH(FEET) =   0.06
  TRAVEL TIME(MIN.) =   0.82   Tc(MIN.) =    4.78
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     80.00 =     285.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     80.00 TO NODE     90.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     18.00  DOWNSTREAM(FEET) =     14.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   606.00   CHANNEL SLOPE =  0.0066
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.403
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.93
  AVERAGE FLOW DEPTH(FEET) =   0.75   TRAVEL TIME(MIN.) =   2.57
  Tc(MIN.) =    7.35
  SUBAREA AREA(ACRES) =     2.38       SUBAREA RUNOFF(CFS) =    4.50
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.405
  TOTAL AREA(ACRES) =        2.8         PEAK FLOW RATE(CFS) =       6.17

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.85   FLOW VELOCITY(FEET/SEC.) =   4.25
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     90.00 =     891.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     90.00 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.) =    7.35
  RAINFALL INTENSITY(INCH/HR) =   5.40
  TOTAL STREAM AREA(ACRES) =     2.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.17

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        7.43     6.71        5.729          2.70
      2        6.17     7.35        5.403          2.82

  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       13.06     6.71       5.729
      2       13.17     7.35       5.403

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      13.17   Tc(MIN.) =    7.35
  TOTAL AREA(ACRES) =        5.5
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     90.00 =     891.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.5  TC(MIN.) =      7.35
  PEAK FLOW RATE(CFS)   =      13.17
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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10-YEAR STORM - EXISTING HYDROLOGY

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
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              Ver. 21.0 Release Date: 06/01/2014  License ID 1459

                            Analysis prepared by:

                                    BHA INC.
                              5115 AVENIDA ENCINAS, SUITE L
                                    CARLSBAD, CA 92008


 ************************* DESCRIPTION OF STUDY *************************
* 10 YEAR EXISTING HYDROLOGY                                             *
*                                                                        *
*                                                                        *
 ************************************************************************

  FILE NAME: K:\HYDRO\0989\989-E10.DAT
  TIME/DATE OF STUDY: 14:08 01/21/2019
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  10.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.680
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  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*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     71.50
  DOWNSTREAM ELEVATION(FEET) =     68.30
```

```
  ELEVATION DIFFERENCE(FEET) =      3.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.886
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.426
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.59
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.59

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   68.30  DOWNSTREAM ELEVATION(FEET) =   61.00
  STREET LENGTH(FEET) =   188.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0140
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.54
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.19
    HALFSTREET FLOOD WIDTH(FEET) =    3.32
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.38
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
  STREET FLOW TRAVEL TIME(MIN.) =   0.93   Tc(MIN.) =    5.81
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.016
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.716
  SUBAREA AREA(ACRES) =    0.66      SUBAREA RUNOFF(CFS) =    1.91
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       2.44

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.22   HALFSTREET FLOOD WIDTH(FEET) =   4.80
  FLOW VELOCITY(FEET/SEC.) =  3.51   DEPTH*VELOCITY(FT*FT/SEC.) =   0.78
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =     288.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     40.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     61.00  DOWNSTREAM(FEET) =     17.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   163.00   CHANNEL SLOPE =  0.2699
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.748
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.14
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   0.66
```

```
  Tc(MIN.) =    6.47
  SUBAREA AREA(ACRES) =     0.48       SUBAREA RUNOFF(CFS) =    0.63
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.584
  TOTAL AREA(ACRES) =        1.3         PEAK FLOW RATE(CFS) =       2.91

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   4.36
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =     451.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     50.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     17.00  DOWNSTREAM(FEET) =     12.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   167.00   CHANNEL SLOPE =  0.0269
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.595
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.85
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.44
  AVERAGE FLOW DEPTH(FEET) =   0.55   TRAVEL TIME(MIN.) =   0.43
  Tc(MIN.) =    6.90
  SUBAREA AREA(ACRES) =     1.37       SUBAREA RUNOFF(CFS) =    1.87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.480
  TOTAL AREA(ACRES) =        2.7         PEAK FLOW RATE(CFS) =       4.66

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.59   FLOW VELOCITY(FEET/SEC.) =   6.69
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     50.00 =     618.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.90
  RAINFALL INTENSITY(INCH/HR) =   3.60
  TOTAL STREAM AREA(ACRES) =     2.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.66

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     70.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     72.00
  DOWNSTREAM ELEVATION(FEET) =     66.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.963
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.426
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.36
```

```
  TOTAL AREA(ACRES) =      0.44   TOTAL RUNOFF(CFS) =      1.36

****************************************************************************
  FLOW PROCESS FROM NODE     70.00 TO NODE     80.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     66.00  DOWNSTREAM(FEET) =     18.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   185.00   CHANNEL SLOPE =  0.2595
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.36
  FLOW VELOCITY(FEET/SEC.) =   3.15   FLOW DEPTH(FEET) =   0.04
  TRAVEL TIME(MIN.) =   0.98   Tc(MIN.) =    4.94
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     80.00 =     285.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     80.00 TO NODE     90.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     18.00  DOWNSTREAM(FEET) =     14.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   606.00   CHANNEL SLOPE =  0.0066
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.303
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.45
  AVERAGE FLOW DEPTH(FEET) =   0.64   TRAVEL TIME(MIN.) =   2.93
  Tc(MIN.) =    7.87
  SUBAREA AREA(ACRES) =     2.38       SUBAREA RUNOFF(CFS) =    2.75
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.405
  TOTAL AREA(ACRES) =        2.8         PEAK FLOW RATE(CFS) =       3.77

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.71   FLOW VELOCITY(FEET/SEC.) =   3.77
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     90.00 =     891.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     90.00 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.) =    7.87
  RAINFALL INTENSITY(INCH/HR) =   3.30
  TOTAL STREAM AREA(ACRES) =     2.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.77

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        4.66     6.90        3.595          2.70
      2        3.77     7.87        3.303          2.82

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
```

```
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        7.97     6.90       3.595
      2        8.05     7.87       3.303

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       8.05   Tc(MIN.) =    7.87
  TOTAL AREA(ACRES) =        5.5
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     90.00 =     891.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.5  TC(MIN.) =      7.87
  PEAK FLOW RATE(CFS)   =       8.05
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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2-YEAR STORM - EXISTING HYDROLOGY

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2014 Advanced Engineering Software (aes)
              Ver. 21.0 Release Date: 06/01/2014  License ID 1459

                              Analysis prepared by:

                                     BHA INC.
                               5115 AVENIDA ENCINAS, SUITE L
                                    CARLSBAD, CA 92008


 ************************* DESCRIPTION OF STUDY *************************
* 2 YEAR EXISTING HYDROLOGY                                              *
*                                                                        *
*                                                                        *
 ************************************************************************

  FILE NAME: K:\HYDRO\0989\989-E2.DAT
  TIME/DATE OF STUDY: 14:08 01/21/2019
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =   2.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.130
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  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*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ======  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     71.50
```

```
  DOWNSTREAM ELEVATION(FEET) =     68.30
  ELEVATION DIFFERENCE(FEET) =      3.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.886
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.977
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.40

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     30.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   68.30  DOWNSTREAM ELEVATION(FEET) =   61.00
  STREET LENGTH(FEET) =   188.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0140
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.05
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.16
    HALFSTREET FLOOD WIDTH(FEET) =    1.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.98
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.62
  STREET FLOW TRAVEL TIME(MIN.) =   0.79   Tc(MIN.) =    5.67
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.744
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.716
  SUBAREA AREA(ACRES) =    0.66      SUBAREA RUNOFF(CFS) =    1.30
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       1.67

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.20   HALFSTREET FLOOD WIDTH(FEET) =   3.58
  FLOW VELOCITY(FEET/SEC.) =  3.39   DEPTH*VELOCITY(FT*FT/SEC.) =   0.67
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     30.00 =     288.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     40.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     61.00  DOWNSTREAM(FEET) =     17.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   163.00   CHANNEL SLOPE =  0.2699
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.537
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.88
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.69
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   0.74
  Tc(MIN.) =    6.41
  SUBAREA AREA(ACRES) =     0.48       SUBAREA RUNOFF(CFS) =    0.43
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.584
  TOTAL AREA(ACRES) =        1.3         PEAK FLOW RATE(CFS) =       1.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   3.46
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =     451.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     50.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     17.00  DOWNSTREAM(FEET) =     12.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   167.00   CHANNEL SLOPE =  0.0269
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.420
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.74
  AVERAGE FLOW DEPTH(FEET) =   0.48   TRAVEL TIME(MIN.) =   0.48
  Tc(MIN.) =    6.89
  SUBAREA AREA(ACRES) =     1.37       SUBAREA RUNOFF(CFS) =    1.26
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.480
  TOTAL AREA(ACRES) =        2.7         PEAK FLOW RATE(CFS) =       3.14

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.51   FLOW VELOCITY(FEET/SEC.) =   6.07
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     50.00 =     618.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.89
  RAINFALL INTENSITY(INCH/HR) =   2.42
  TOTAL STREAM AREA(ACRES) =     2.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.14

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     70.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     72.00
  DOWNSTREAM ELEVATION(FEET) =     66.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.963
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.977
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
```

```
  SUBAREA RUNOFF(CFS) =      0.92
  TOTAL AREA(ACRES) =      0.44   TOTAL RUNOFF(CFS) =      0.92

****************************************************************************
  FLOW PROCESS FROM NODE     70.00 TO NODE     80.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     66.00  DOWNSTREAM(FEET) =     18.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   185.00   CHANNEL SLOPE =  0.2595
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.92
  FLOW VELOCITY(FEET/SEC.) =   2.58   FLOW DEPTH(FEET) =   0.04
  TRAVEL TIME(MIN.) =   1.19   Tc(MIN.) =    5.16
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     80.00 =     285.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     80.00 TO NODE     90.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     18.00  DOWNSTREAM(FEET) =     14.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   606.00   CHANNEL SLOPE =  0.0066
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.128
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.84
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.10
  AVERAGE FLOW DEPTH(FEET) =   0.54   TRAVEL TIME(MIN.) =   3.26
  Tc(MIN.) =    8.42
  SUBAREA AREA(ACRES) =     2.38       SUBAREA RUNOFF(CFS) =    1.77
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.405
  TOTAL AREA(ACRES) =        2.8         PEAK FLOW RATE(CFS) =       2.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.60   FLOW VELOCITY(FEET/SEC.) =   3.37
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     90.00 =     891.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     90.00 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.) =    8.42
  RAINFALL INTENSITY(INCH/HR) =   2.13
  TOTAL STREAM AREA(ACRES) =     2.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.43

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        3.14     6.89        2.420          2.70
      2        2.43     8.42        2.128          2.82
```

```
  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        5.13     6.89       2.420
      2        5.19     8.42       2.128

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.19   Tc(MIN.) =    8.42
  TOTAL AREA(ACRES) =        5.5
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     90.00 =     891.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.5  TC(MIN.) =      8.42
  PEAK FLOW RATE(CFS)   =       5.19
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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CHAPTER 3

CALCULATIONS

3.2 – Proposed Condition Hydrology Calculations- Undetained

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100-YEAR STORM – PROPOSED HYDROLOGY

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            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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              Ver. 21.0 Release Date: 06/01/2014  License ID 1459

                            Analysis prepared by:

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 ************************* DESCRIPTION OF STUDY *************************
* 100 YEAR PROPOSED HYDROLOGY                                            *
*                                                                        *
*                                                                        *
 ************************************************************************

  FILE NAME: K:\HYDRO\0989\0989P100.DAT
  TIME/DATE OF STUDY: 15:56 01/21/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.630
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  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*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

+--------------------------------------------------------------------------+
| OFFSITE FLOWS                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
```

```
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.929
  SUBAREA RUNOFF(CFS) =      2.28
  TOTAL AREA(ACRES) =      0.47   TOTAL RUNOFF(CFS) =      2.28

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     60.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    50.00  DOWNSTREAM(FEET) =    48.00
  FLOW LENGTH(FEET) =   199.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.63
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.28
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =    5.72
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     60.00 =     219.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.72
  RAINFALL INTENSITY(INCH/HR) =   6.36
  TOTAL STREAM AREA(ACRES) =     0.47
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.28

+----------------------------------------------------------------------------+
| OFFSITE FLOWS                                                              |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     40.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     71.50
  DOWNSTREAM ELEVATION(FEET) =     68.30
  ELEVATION DIFFERENCE(FEET) =      3.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.886
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.929
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.92
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.92

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     50.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>(STANDARD CURB SECTION USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =   68.30  DOWNSTREAM ELEVATION(FEET) =   60.00
  STREET LENGTH(FEET) =   215.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.39
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    4.92
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.32
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
  STREET FLOW TRAVEL TIME(MIN.) =   1.08   Tc(MIN.) =    5.97
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.183
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.716
  SUBAREA AREA(ACRES) =    0.66      SUBAREA RUNOFF(CFS) =    2.94
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       3.76

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.37
  FLOW VELOCITY(FEET/SEC.) =  3.59   DEPTH*VELOCITY(FT*FT/SEC.) =   0.91
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     50.00 =     315.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     60.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.00  DOWNSTREAM(FEET) =    50.00
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.00
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.76
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.00
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     60.00 =     337.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 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.) =    6.00
  RAINFALL INTENSITY(INCH/HR) =   6.16
  TOTAL STREAM AREA(ACRES) =     0.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.76
```

```
  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.28     5.72        6.356          0.47
      2        3.76     6.00        6.163          0.85

  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        5.87     5.72       6.356
      2        5.97     6.00       6.163

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.97   Tc(MIN.) =    6.00
  TOTAL AREA(ACRES) =        1.3
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     60.00 =     337.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     90.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    50.00  DOWNSTREAM(FEET) =    48.00
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.130
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.60
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.97
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =    6.38
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     90.00 =     510.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     90.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.38
  RAINFALL INTENSITY(INCH/HR) =   5.92
  TOTAL STREAM AREA(ACRES) =     1.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.97

+--------------------------------------------------------------------------+
| OFFSITE FLOWS                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     70.00 TO NODE     80.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
```

```
  UPSTREAM ELEVATION(FEET) =     60.50
  DOWNSTREAM ELEVATION(FEET) =     54.30
  ELEVATION DIFFERENCE(FEET) =      6.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.389
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.602
  SUBAREA RUNOFF(CFS) =      0.84
  TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      0.84

****************************************************************************
  FLOW PROCESS FROM NODE     80.00 TO NODE     90.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    49.00  DOWNSTREAM(FEET) =    48.00
  FLOW LENGTH(FEET) =    17.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.74
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.84
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    5.43
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     90.00 =     117.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     90.00 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.) =    5.43
  RAINFALL INTENSITY(INCH/HR) =   6.57
  TOTAL STREAM AREA(ACRES) =     0.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.84

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.97     6.38        5.924          1.32
      2        0.84     5.43        6.569          0.23

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        6.22     5.43       6.569
      2        6.72     6.38       5.924

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       6.72   Tc(MIN.) =    6.38
  TOTAL AREA(ACRES) =        1.6
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     90.00 =     510.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     95.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    42.00  DOWNSTREAM(FEET) =    41.00
```

```
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 115.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.99
  GIVEN PIPE DIAMETER(INCH) = 115.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.72
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    6.39
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     95.00 =     518.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE     95.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| ONSITE FLOWS                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8600
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.929
  SUBAREA RUNOFF(CFS) =      1.37
  TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      1.37

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.50  DOWNSTREAM(FEET) =    51.50
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.24
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.37
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =    5.35
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    130.00 =   10090.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.631
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8644
  SUBAREA AREA(ACRES) =    0.18   SUBAREA RUNOFF(CFS) =    1.06
  TOTAL AREA(ACRES) =        0.4   TOTAL RUNOFF(CFS) =       2.37
  TC(MIN.) =    5.35

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

```
  FLOW PROCESS FROM NODE    130.00 TO NODE    140.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    51.50  DOWNSTREAM(FEET) =    50.00
  FLOW LENGTH(FEET) =    58.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.69
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.37
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    5.50
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    140.00 =   10148.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.518
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8532
  SUBAREA AREA(ACRES) =    0.35   SUBAREA RUNOFF(CFS) =    1.92
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       4.25
  TC(MIN.) =    5.50

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    50.00  DOWNSTREAM(FEET) =    47.50
  FLOW LENGTH(FEET) =   186.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.05
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.25
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =    6.01
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    150.00 =   10334.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.154
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8483
  SUBAREA AREA(ACRES) =    0.21   SUBAREA RUNOFF(CFS) =    1.06
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       5.07
  TC(MIN.) =    6.01

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    160.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    47.50  DOWNSTREAM(FEET) =    46.40
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.29
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.07
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    6.14
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    160.00 =   10390.00 FEET.

+----------------------------------------------------------------------------+
| MODIFIED TYPE "A-4" JUNCTION BOX                                           |
| 60.5% FLOW DIVERTED TO BMP 1A                                              |
| 39.5% FLOW TO BYPASS BMP 1A                                                |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   6.00   RAIN INTENSITY(INCH/HOUR) =  6.16
  TOTAL AREA(ACRES) =     0.59   TOTAL RUNOFF(CFS) =      3.07

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.161
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8510
  SUBAREA AREA(ACRES) =    0.06   SUBAREA RUNOFF(CFS) =    0.34
  TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       3.41
  TC(MIN.) =    6.00

+----------------------------------------------------------------------------+
| OUTFLOW FROM BMP 1A                                                        |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    165.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    46.40  DOWNSTREAM(FEET) =    44.90
  FLOW LENGTH(FEET) =    10.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.77
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.41
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    6.01
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    165.00 =   10400.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE     95.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    23.00  DOWNSTREAM(FEET) =    22.00
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.95
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.41
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    6.12
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE     95.00 =   10444.50 FEET.

+------------------------------------------------------------------------+
| CONFLUENCE WITH OFFSITE BYPASS FLOWS                                   |
|                                                                        |
|                                                                        |
+------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE     95.00 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        3.41     6.12       6.083        0.65
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE     95.00 =   10444.50 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        6.72     6.39       5.917        1.55
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     95.00 =     518.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1       9.85       6.12        6.083
      2      10.04       6.39        5.917

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      10.04   Tc(MIN.) =    6.39
  TOTAL AREA(ACRES) =        2.2

****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE     95.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE    100.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    23.00  DOWNSTREAM(FEET) =    22.00
  FLOW LENGTH(FEET) =    42.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.18
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      10.04
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    6.47
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    100.00 =   10486.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    260.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    22.00  DOWNSTREAM(FEET) =    12.00
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.42
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.04
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.51
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    260.00 =   10531.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| 39.5% FLOW FROM BYPASS IN JUNCTION BOX                                   |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   6.00   RAIN INTENSITY(INCH/HOUR) =  6.16
  TOTAL AREA(ACRES) =     0.38   TOTAL RUNOFF(CFS) =      2.00

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    170.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    46.40  DOWNSTREAM(FEET) =    46.00
  FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.12
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.00
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.03
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    170.00 =   10542.50 FEET.

****************************************************************************
  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) =  6.144
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8534
  SUBAREA AREA(ACRES) =    0.13   SUBAREA RUNOFF(CFS) =    0.71
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       2.70
  TC(MIN.) =    6.03

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    185.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    46.00  DOWNSTREAM(FEET) =    42.00
  FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.45
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.70
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    6.19
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    185.00 =   10624.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    185.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.039
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8578
  SUBAREA AREA(ACRES) =    0.19   SUBAREA RUNOFF(CFS) =    0.99
  TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       3.64
  TC(MIN.) =    6.19

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    190.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    42.00  DOWNSTREAM(FEET) =    41.00
  FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.28
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.64
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    6.35
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    190.00 =   10685.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    190.00 TO NODE    190.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.940
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8583
  SUBAREA AREA(ACRES) =    0.17   SUBAREA RUNOFF(CFS) =    0.89
  TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =       4.48
  TC(MIN.) =    6.35
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    190.00 TO NODE    200.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    41.00  DOWNSTREAM(FEET) =    40.00
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   5.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.10
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.48
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    6.37
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    200.00 =   10700.50 FEET.

+----------------------------------------------------------------------------+
| ENTERING BMP 1B                                                            |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

+----------------------------------------------------------------------------+
| OUTFLOW FROM BMP 1B                                                        |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    220.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    35.75  DOWNSTREAM(FEET) =    35.50
  FLOW LENGTH(FEET) =     2.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.91
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.48
  PIPE TRAVEL TIME(MIN.) =   0.00    Tc(MIN.) =    6.37
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    220.00 =   10702.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.37
  RAINFALL INTENSITY(INCH/HR) =   5.92
  TOTAL STREAM AREA(ACRES) =     0.88
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.48

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.929
  SUBAREA RUNOFF(CFS) =      0.10
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    220.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    47.00  DOWNSTREAM(FEET) =    35.50
  FLOW LENGTH(FEET) =    43.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   0.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.99
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.10
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    5.12
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    220.00 =      63.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 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.) =    5.12
  RAINFALL INTENSITY(INCH/HR) =   6.82
  TOTAL STREAM AREA(ACRES) =     0.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.10

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        4.48     6.37        5.925          0.88
      2        0.10     5.12        6.824          0.03

  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        3.70     5.12       6.824
      2        4.57     6.37       5.925

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.57   Tc(MIN.) =    6.37
  TOTAL AREA(ACRES) =        0.9
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    220.00 =   10702.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    250.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    35.50  DOWNSTREAM(FEET) =    24.00
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.18
```

```
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.57
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.40
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    250.00 =   10737.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.907
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8408
  SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.12
  TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =       4.66
  TC(MIN.) =    6.40

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.907
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7100
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8361
  SUBAREA AREA(ACRES) =    0.04   SUBAREA RUNOFF(CFS) =    0.15
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       4.81
  TC(MIN.) =    6.40

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    260.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    25.00  DOWNSTREAM(FEET) =    12.50
  FLOW LENGTH(FEET) =    29.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.63
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.81
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    6.43
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    260.00 =   10766.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    270.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    12.00  DOWNSTREAM(FEET) =    10.00
  FLOW LENGTH(FEET) =    27.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.58
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.81
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.46
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    270.00 =   10793.50 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 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        4.81     6.46       5.871        0.97
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    270.00 =   10793.50 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       10.04     6.51       5.846        2.20
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    270.00 =   10531.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      14.78       6.46        5.871
      2      14.82       6.51        5.846

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      14.82   Tc(MIN.) =    6.51
  TOTAL AREA(ACRES) =        3.2

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.846
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6836
  SUBAREA AREA(ACRES) =    0.78   SUBAREA RUNOFF(CFS) =    1.60
  TOTAL AREA(ACRES) =        4.0   TOTAL RUNOFF(CFS) =      15.81
  TC(MIN.) =    6.51

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    290.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
```

```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.929
  SUBAREA RUNOFF(CFS) =      1.33
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      1.33

****************************************************************************
  FLOW PROCESS FROM NODE    290.00 TO NODE    300.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    55.00  DOWNSTREAM(FEET) =    43.50
  FLOW LENGTH(FEET) =    48.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.59
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.33
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    5.06
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    300.00 = ********** FEET.

+--------------------------------------------------------------------------+
| ENTERING BMP 5                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

+--------------------------------------------------------------------------+
| OUTFLOW FROM BMP 5                                                       |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    305.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    35.00  DOWNSTREAM(FEET) =    20.00
  FLOW LENGTH(FEET) =    64.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.51
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.33
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    5.15
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    305.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.800
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5783
  SUBAREA AREA(ACRES) =    0.28   SUBAREA RUNOFF(CFS) =    0.67
  TOTAL AREA(ACRES) =       0.5   TOTAL RUNOFF(CFS) =       1.97
  TC(MIN.) =    5.15

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    310.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    20.00  DOWNSTREAM(FEET) =    10.00
  FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.41
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.97
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.17
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    310.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.784
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4228
  SUBAREA AREA(ACRES) =    1.07   SUBAREA RUNOFF(CFS) =    2.54
  TOTAL AREA(ACRES) =        1.6   TOTAL RUNOFF(CFS) =       4.51
  TC(MIN.) =    5.17

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    310.00 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        4.51     5.17       6.784        1.57
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    310.00 = ********** FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       15.81     6.51       5.846        3.96
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    310.00 =   10793.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc       INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      17.06       5.17        6.784
      2      19.69       6.51        5.846

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      19.69   Tc(MIN.) =    6.51
  TOTAL AREA(ACRES) =        5.5
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.5  TC(MIN.) =      6.51
  PEAK FLOW RATE(CFS)   =      19.69
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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10-YEAR STORM – PROPOSED HYDROLOGY

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2014 Advanced Engineering Software (aes)
              Ver. 21.0 Release Date: 06/01/2014  License ID 1459

                            Analysis prepared by:

                                    BHA INC.
                              5115 AVENIDA ENCINAS, SUITE L
                                    CARLSBAD, CA 92008


 ************************* DESCRIPTION OF STUDY *************************
* 10 YEAR PROPOSED HYDROLOGY                                             *
*                                                                        *
*                                                                        *
 ************************************************************************

  FILE NAME: K:\HYDRO\0989\0989P10.DAT
  TIME/DATE OF STUDY: 17:03 01/21/2019
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  10.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.680
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  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*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

+----------------------------------------------------------------------+
| OFFSITE FLOWS                                                        |
|                                                                      |
|                                                                      |
+----------------------------------------------------------------------+

**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  22
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.426
  SUBAREA RUNOFF(CFS) =      1.46
  TOTAL AREA(ACRES) =      0.47   TOTAL RUNOFF(CFS) =      1.46

******************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     60.00 IS CODE =  41
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    50.00  DOWNSTREAM(FEET) =    48.00
  FLOW LENGTH(FEET) =   199.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.16
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.46
  PIPE TRAVEL TIME(MIN.) =   0.80    Tc(MIN.) =    5.80
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     60.00 =     219.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 IS CODE =   1
------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.80
  RAINFALL INTENSITY(INCH/HR) =   4.02
  TOTAL STREAM AREA(ACRES) =     0.47
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.46

+----------------------------------------------------------------------------+
| OFFSITE FLOWS                                                              |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

******************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     40.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     71.50
  DOWNSTREAM ELEVATION(FEET) =     68.30
  ELEVATION DIFFERENCE(FEET) =      3.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.886
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.426
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.59
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.59

******************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     50.00 IS CODE =  61
------------------------------------------------------------------------------
```

```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   68.30  DOWNSTREAM ELEVATION(FEET) =   60.00
  STREET LENGTH(FEET) =   215.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    3.53
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.14
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.62
  STREET FLOW TRAVEL TIME(MIN.) =   1.14   Tc(MIN.) =    6.03
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.923
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.716
  SUBAREA AREA(ACRES) =    0.66      SUBAREA RUNOFF(CFS) =    1.86
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       2.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.22   HALFSTREET FLOOD WIDTH(FEET) =   4.92
  FLOW VELOCITY(FEET/SEC.) =  3.31   DEPTH*VELOCITY(FT*FT/SEC.) =   0.74
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     50.00 =     315.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     60.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.00  DOWNSTREAM(FEET) =    50.00
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.58
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.39
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.06
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     60.00 =     337.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 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.) =    6.06
  RAINFALL INTENSITY(INCH/HR) =   3.91
  TOTAL STREAM AREA(ACRES) =     0.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.39
```

```
  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.46     5.80        4.023          0.47
      2        2.39     6.06        3.909          0.85

  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        3.74     5.80       4.023
      2        3.80     6.06       3.909

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.80   Tc(MIN.) =    6.06
  TOTAL AREA(ACRES) =        1.3
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     60.00 =     337.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     90.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    50.00  DOWNSTREAM(FEET) =    48.00
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.130
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.84
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.80
  PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =    6.66
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     90.00 =     510.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     90.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.66
  RAINFALL INTENSITY(INCH/HR) =   3.68
  TOTAL STREAM AREA(ACRES) =     1.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.80

+--------------------------------------------------------------------------+
| OFFSITE FLOWS                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     70.00 TO NODE     80.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     60.50
  DOWNSTREAM ELEVATION(FEET) =     54.30
  ELEVATION DIFFERENCE(FEET) =      6.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.389
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.217
  SUBAREA RUNOFF(CFS) =      0.53
  TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      0.53

****************************************************************************
  FLOW PROCESS FROM NODE     80.00 TO NODE     90.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    49.00  DOWNSTREAM(FEET) =    48.00
  FLOW LENGTH(FEET) =    17.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.87
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.53
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    5.44
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     90.00 =     117.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     90.00 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.) =    5.44
  RAINFALL INTENSITY(INCH/HR) =   4.19
  TOTAL STREAM AREA(ACRES) =     0.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.53

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        3.80     6.66        3.679          1.32
      2        0.53     5.44        4.193          0.23

  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        3.87     5.44       4.193
      2        4.27     6.66       3.679

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.27   Tc(MIN.) =    6.66
  TOTAL AREA(ACRES) =        1.6
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     90.00 =     510.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     95.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    42.00  DOWNSTREAM(FEET) =    41.00
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 115.0 INCH PIPE IS   2.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.43
  GIVEN PIPE DIAMETER(INCH) = 115.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.27
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    6.67
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     95.00 =     518.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE     95.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| ONSITE FLOWS                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8600
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.426
  SUBAREA RUNOFF(CFS) =      0.88
  TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      0.88

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.50  DOWNSTREAM(FEET) =    51.50
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.77
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.88
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =    5.40
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    130.00 =   10090.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.213
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8644
  SUBAREA AREA(ACRES) =    0.18   SUBAREA RUNOFF(CFS) =    0.67
  TOTAL AREA(ACRES) =        0.4   TOTAL RUNOFF(CFS) =       1.51
  TC(MIN.) =    5.40
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    140.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    51.50  DOWNSTREAM(FEET) =    50.00
  FLOW LENGTH(FEET) =    58.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.92
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.51
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    5.56
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    140.00 =   10148.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.133
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8532
  SUBAREA AREA(ACRES) =    0.35   SUBAREA RUNOFF(CFS) =    1.22
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       2.69
  TC(MIN.) =    5.56

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    50.00  DOWNSTREAM(FEET) =    47.50
  FLOW LENGTH(FEET) =   186.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   6.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.39
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.69
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =    6.14
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    150.00 =   10334.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.879
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8483
  SUBAREA AREA(ACRES) =    0.21   SUBAREA RUNOFF(CFS) =    0.67
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       3.19
  TC(MIN.) =    6.14

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    160.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    47.50  DOWNSTREAM(FEET) =    46.40
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   6.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.48
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.19
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    6.28
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    160.00 =   10390.00 FEET.

+------------------------------------------------------------------------+
| MODIFIED TYPE "A-4" JUNCTION BOX                                       |
| 60.5% FLOW DIVERTED TO BMP 1A                                          |
| 39.5% FLOW TO BYPASS BMP 1A                                            |
+------------------------------------------------------------------------+

**************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   7
--------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   6.00   RAIN INTENSITY(INCH/HOUR) =  3.94
  TOTAL AREA(ACRES) =     0.59   TOTAL RUNOFF(CFS) =      1.93

**************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.935
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8388
  SUBAREA AREA(ACRES) =    0.06   SUBAREA RUNOFF(CFS) =    0.22
  TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       2.15
  TC(MIN.) =    6.00

**************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    165.00 IS CODE =  41
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    46.40  DOWNSTREAM(FEET) =    44.90
  FLOW LENGTH(FEET) =    10.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.09
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.15
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    6.01
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    165.00 =   10400.50 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE     95.00 IS CODE =  41
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    23.00  DOWNSTREAM(FEET) =    22.00
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.4 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.20
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.15
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    6.13
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE     95.00 =   10444.50 FEET.

+----------------------------------------------------------------------------+
| CONFLUENCE WITH OFFSITE BYPASS FLOWS                                       |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE     95.00 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        2.15     6.13       3.880        0.65
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE     95.00 =   10444.50 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        4.27     6.67       3.675        1.55
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     95.00 =     518.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1       6.07       6.13        3.880
      2       6.30       6.67        3.675

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       6.30   Tc(MIN.) =    6.67
  TOTAL AREA(ACRES) =        2.2

****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE     95.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE    100.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    23.00  DOWNSTREAM(FEET) =    22.00
  FLOW LENGTH(FEET) =    42.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.25
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.30
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    6.76
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    100.00 =   10486.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    260.00 IS CODE =  41
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    22.00  DOWNSTREAM(FEET) =    12.00
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   4.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.83
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.30
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.80
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    260.00 =   10531.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| 39.5% FLOW FROM BYPASS IN JUNCTION BOX                                   |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   6.00   RAIN INTENSITY(INCH/HOUR) =  3.94
  TOTAL AREA(ACRES) =     0.38   TOTAL RUNOFF(CFS) =      1.26

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    170.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    46.40  DOWNSTREAM(FEET) =    46.00
  FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   3.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.24
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.26
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.03
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    170.00 =   10542.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    170.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.923
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8447
  SUBAREA AREA(ACRES) =    0.13   SUBAREA RUNOFF(CFS) =    0.45
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       1.71
  TC(MIN.) =    6.03
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    185.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    46.00  DOWNSTREAM(FEET) =    42.00
  FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.39
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.71
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    6.21
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    185.00 =   10624.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    185.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.847
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8515
  SUBAREA AREA(ACRES) =    0.19   SUBAREA RUNOFF(CFS) =    0.63
  TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       2.30
  TC(MIN.) =    6.21

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    190.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    42.00  DOWNSTREAM(FEET) =    41.00
  FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.56
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.30
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    6.40
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    190.00 =   10685.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    190.00 TO NODE    190.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.776
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8532
  SUBAREA AREA(ACRES) =    0.17   SUBAREA RUNOFF(CFS) =    0.57
  TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =       2.83
  TC(MIN.) =    6.40

****************************************************************************
  FLOW PROCESS FROM NODE    190.00 TO NODE    200.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    41.00  DOWNSTREAM(FEET) =    40.00
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   4.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.75
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.83
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.42
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    200.00 =   10700.50 FEET.

+------------------------------------------------------------------------+
| ENTERING BMP 1B                                                        |
|                                                                        |
|                                                                        |
+------------------------------------------------------------------------+

+------------------------------------------------------------------------+
| OUTFLOW FROM BMP 1B                                                    |
|                                                                        |
|                                                                        |
+------------------------------------------------------------------------+

**************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    220.00 IS CODE =  41
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    35.75  DOWNSTREAM(FEET) =    35.50
  FLOW LENGTH(FEET) =     2.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   3.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.19
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.83
  PIPE TRAVEL TIME(MIN.) =   0.00    Tc(MIN.) =    6.43
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    220.00 =   10702.50 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.43
  RAINFALL INTENSITY(INCH/HR) =   3.77
  TOTAL STREAM AREA(ACRES) =     0.88
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.83

**************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =   7
--------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.00   RAIN INTENSITY(INCH/HOUR) =  4.43
  TOTAL AREA(ACRES) =     0.03   TOTAL RUNOFF(CFS) =      0.10

**************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    220.00 IS CODE =  41
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    47.00  DOWNSTREAM(FEET) =    35.50
  FLOW LENGTH(FEET) =    43.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   0.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.09
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.10
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    5.12
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE    220.00 =     160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 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.) =    5.12
  RAINFALL INTENSITY(INCH/HR) =   4.36
  TOTAL STREAM AREA(ACRES) =     0.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.10

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.83     6.43        3.765          0.88
      2        0.10     5.12        4.360          0.03

  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        2.35     5.12       4.360
      2        2.91     6.43       3.765

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.91   Tc(MIN.) =    6.43
  TOTAL AREA(ACRES) =        0.9
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    220.00 =   10702.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    250.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    35.50  DOWNSTREAM(FEET) =    24.00
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.77
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.91
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.46
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    250.00 =   10737.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
```

```
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.753
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8441
  SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.08
  TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =       2.97
  TC(MIN.) =    6.46

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.753
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7100
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8393
  SUBAREA AREA(ACRES) =    0.04   SUBAREA RUNOFF(CFS) =    0.09
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       3.06
  TC(MIN.) =    6.46

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    260.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    25.00  DOWNSTREAM(FEET) =    12.50
  FLOW LENGTH(FEET) =    29.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.93
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.06
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.48
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    260.00 =   10766.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    270.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    12.00  DOWNSTREAM(FEET) =    10.00
  FLOW LENGTH(FEET) =    27.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.18
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.06
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.53
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    270.00 =   10793.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 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        3.06     6.53       3.727        0.97
```

```
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    270.00 =   10793.50 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        6.30     6.80       3.631        2.20
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    270.00 =   10531.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1       9.12       6.53        3.727
      2       9.29       6.80        3.631

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.29   Tc(MIN.) =    6.80
  TOTAL AREA(ACRES) =        3.2

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.631
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6824
  SUBAREA AREA(ACRES) =    0.78   SUBAREA RUNOFF(CFS) =    1.00
  TOTAL AREA(ACRES) =        4.0   TOTAL RUNOFF(CFS) =       9.80
  TC(MIN.) =    6.80

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    290.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.426
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE    290.00 TO NODE    300.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    55.00  DOWNSTREAM(FEET) =    43.50
  FLOW LENGTH(FEET) =    48.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.10
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.85
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    5.07
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    300.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    295.00 TO NODE    295.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.386
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
  SUBAREA AREA(ACRES) =    0.04   SUBAREA RUNOFF(CFS) =    0.14
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       0.98
  TC(MIN.) =    5.07

+--------------------------------------------------------------------------+
| ENTERING BMP 5                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

+--------------------------------------------------------------------------+
| OUTFLOW FROM BMP 5                                                       |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    305.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    35.00  DOWNSTREAM(FEET) =    20.00
  FLOW LENGTH(FEET) =    64.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.43
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.98
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    5.17
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    305.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.334
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5984
  SUBAREA AREA(ACRES) =    0.28   SUBAREA RUNOFF(CFS) =    0.43
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       1.40
  TC(MIN.) =    5.17
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    310.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    20.00  DOWNSTREAM(FEET) =    10.00
  FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.61
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.40
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.19
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    310.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.324
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4331
  SUBAREA AREA(ACRES) =    1.07   SUBAREA RUNOFF(CFS) =    1.62
  TOTAL AREA(ACRES) =        1.6   TOTAL RUNOFF(CFS) =       3.01
  TC(MIN.) =    5.19

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    310.00 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        3.01     5.19       4.324        1.61
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    310.00 = ********** FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        9.80     6.80       3.631        3.96
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    310.00 =   10793.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      10.49       5.19        4.324
      2      12.33       6.80        3.631

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      12.33   Tc(MIN.) =    6.80
  TOTAL AREA(ACRES) =        5.6
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.6  TC(MIN.) =      6.80
  PEAK FLOW RATE(CFS)   =      12.33
============================================================================
============================================================================
```

```
END OF RATIONAL METHOD ANALYSIS
```

2-YEAR STORM – PROPOSED HYDROLOGY

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2014 Advanced Engineering Software (aes)
              Ver. 21.0 Release Date: 06/01/2014  License ID 1459

                              Analysis prepared by:

                                    BHA INC.
                              5115 AVENIDA ENCINAS, SUITE L
                                   CARLSBAD, CA 92008


 ************************** DESCRIPTION OF STUDY *************************
* 2 YEAR PROPOSED HYDROLOGY                                              *
*                                                                        *
*                                                                        *
 **************************************************************************

  FILE NAME: K:\HYDRO\0989\0989P2.DAT
  TIME/DATE OF STUDY: 17:06 01/21/2019
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =   2.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   1.130
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  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*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

+------------------------------------------------------------------------+
| OFFSITE FLOWS                                                          |
|                                                                        |
|                                                                        |
+------------------------------------------------------------------------+

**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  22
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7000
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.977
  SUBAREA RUNOFF(CFS) =      0.98
  TOTAL AREA(ACRES) =      0.47   TOTAL RUNOFF(CFS) =      0.98

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     60.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    50.00  DOWNSTREAM(FEET) =    48.00
  FLOW LENGTH(FEET) =   199.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.73
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.98
  PIPE TRAVEL TIME(MIN.) =   0.89    Tc(MIN.) =    5.89
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     60.00 =     219.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.89
  RAINFALL INTENSITY(INCH/HR) =   2.68
  TOTAL STREAM AREA(ACRES) =     0.47
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.98

+--------------------------------------------------------------------------+
| OFFSITE FLOWS                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     40.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     71.50
  DOWNSTREAM ELEVATION(FEET) =     68.30
  ELEVATION DIFFERENCE(FEET) =      3.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.886
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.977
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.40

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     50.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
```

```
  UPSTREAM ELEVATION(FEET) =   68.30  DOWNSTREAM ELEVATION(FEET) =   60.00
  STREET LENGTH(FEET) =   215.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.03
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.16
    HALFSTREET FLOOD WIDTH(FEET) =    1.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.58
  STREET FLOW TRAVEL TIME(MIN.) =   0.97   Tc(MIN.) =    5.85
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.690
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.716
  SUBAREA AREA(ACRES) =    0.66      SUBAREA RUNOFF(CFS) =    1.28
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       1.64

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.20   HALFSTREET FLOOD WIDTH(FEET) =   3.77
  FLOW VELOCITY(FEET/SEC.) =  3.14   DEPTH*VELOCITY(FT*FT/SEC.) =   0.63
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     50.00 =     315.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     60.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.00  DOWNSTREAM(FEET) =    50.00
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.52
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.64
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    5.89
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     60.00 =     337.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 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.) =    5.89
  RAINFALL INTENSITY(INCH/HR) =   2.68
  TOTAL STREAM AREA(ACRES) =     0.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.64

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
```

```
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.98     5.89        2.679          0.47
      2        1.64     5.89        2.678          0.85

  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        2.61     5.89       2.679
      2        2.62     5.89       2.678

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.62   Tc(MIN.) =    5.89
  TOTAL AREA(ACRES) =        1.3
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     60.00 =     337.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     90.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    50.00  DOWNSTREAM(FEET) =    48.00
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.130
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.33
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.62
  PIPE TRAVEL TIME(MIN.) =   0.87    Tc(MIN.) =    6.76
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     90.00 =     510.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     90.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.76
  RAINFALL INTENSITY(INCH/HR) =   2.45
  TOTAL STREAM AREA(ACRES) =     1.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.62

+--------------------------------------------------------------------------+
| OFFSITE FLOWS                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     70.00 TO NODE     80.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     60.50
  DOWNSTREAM ELEVATION(FEET) =     54.30
```

```
  ELEVATION DIFFERENCE(FEET) =      6.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.389
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.837
  SUBAREA RUNOFF(CFS) =      0.36
  TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      0.36

****************************************************************************
  FLOW PROCESS FROM NODE     80.00 TO NODE     90.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    49.00  DOWNSTREAM(FEET) =    48.00
  FLOW LENGTH(FEET) =    17.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.24
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.36
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    5.44
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     90.00 =     117.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     90.00 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.) =    5.44
  RAINFALL INTENSITY(INCH/HR) =   2.82
  TOTAL STREAM AREA(ACRES) =     0.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.36

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.62     6.76        2.452          1.32
      2        0.36     5.44        2.818          0.23

  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        2.63     5.44       2.818
      2        2.93     6.76       2.452

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.93   Tc(MIN.) =    6.76
  TOTAL AREA(ACRES) =        1.6
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     90.00 =     510.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     95.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    42.00  DOWNSTREAM(FEET) =    41.00
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 115.0 INCH PIPE IS   2.2 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.29
  GIVEN PIPE DIAMETER(INCH) = 115.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.93
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    6.77
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     95.00 =     518.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE     95.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| ONSITE FLOWS                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8600
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.977
  SUBAREA RUNOFF(CFS) =      0.59
  TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      0.59

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.50  DOWNSTREAM(FEET) =    51.50
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.34
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.59
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =    5.45
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    130.00 =   10090.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.817
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8644
  SUBAREA AREA(ACRES) =    0.18   SUBAREA RUNOFF(CFS) =    0.45
  TOTAL AREA(ACRES) =        0.4   TOTAL RUNOFF(CFS) =       1.01
  TC(MIN.) =    5.45

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    140.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    51.50  DOWNSTREAM(FEET) =    50.00
  FLOW LENGTH(FEET) =    58.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.29
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.01
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    5.63
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    140.00 =   10148.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.757
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8532
  SUBAREA AREA(ACRES) =    0.35   SUBAREA RUNOFF(CFS) =    0.81
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       1.80
  TC(MIN.) =    5.63

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    50.00  DOWNSTREAM(FEET) =    47.50
  FLOW LENGTH(FEET) =   186.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   5.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.83
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.80
  PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =    6.27
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    150.00 =   10334.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.572
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8483
  SUBAREA AREA(ACRES) =    0.21   SUBAREA RUNOFF(CFS) =    0.44
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       2.12
  TC(MIN.) =    6.27

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    160.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    47.50  DOWNSTREAM(FEET) =    46.40
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   5.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.80
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.12
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    6.44
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    160.00 =   10390.00 FEET.

+----------------------------------------------------------------------------+
| MODIFIED TYPE "A-4" JUNCTION BOX                                           |
| 60.5% FLOW DIVERTED TO BMP 1A                                              |
| 39.5% FLOW TO BYPASS BMP 1A                                                |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   6.00   RAIN INTENSITY(INCH/HOUR) =  2.65
  TOTAL AREA(ACRES) =     0.59   TOTAL RUNOFF(CFS) =      1.28

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.647
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8283
  SUBAREA AREA(ACRES) =    0.06   SUBAREA RUNOFF(CFS) =    0.15
  TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       1.43
  TC(MIN.) =    6.00

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    165.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    46.40  DOWNSTREAM(FEET) =    44.90
  FLOW LENGTH(FEET) =    10.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.74
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.43
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    6.02
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    165.00 =   10400.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE     95.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    23.00  DOWNSTREAM(FEET) =    22.00
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.55
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.43
```

```
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    6.15
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE     95.00 =   10444.50 FEET.

+----------------------------------------------------------------------------+
| CONFLUENCE WITH OFFSITE BYPASS FLOWS                                       |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE     95.00 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        1.43     6.15       2.606        0.65
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE     95.00 =   10444.50 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        2.93     6.77       2.448        1.55
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     95.00 =     518.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1       4.08       6.15        2.606
      2       4.27       6.77        2.448

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.27   Tc(MIN.) =    6.77
  TOTAL AREA(ACRES) =        2.2

****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE     95.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE    100.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    23.00  DOWNSTREAM(FEET) =    22.00
  FLOW LENGTH(FEET) =    42.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   7.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.51
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.27
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    6.87
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    100.00 =   10486.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    260.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    22.00  DOWNSTREAM(FEET) =    12.00
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   3.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.87
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.27
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.91
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    260.00 =   10531.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| 39.5% FLOW FROM BYPASS IN JUNCTION BOX                                   |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   6.00   RAIN INTENSITY(INCH/HOUR) =  2.65
  TOTAL AREA(ACRES) =     0.38   TOTAL RUNOFF(CFS) =      0.84

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    170.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    46.40  DOWNSTREAM(FEET) =    46.00
  FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   2.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.53
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.84
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.03
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    170.00 =   10542.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    170.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.638
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8392
  SUBAREA AREA(ACRES) =    0.13   SUBAREA RUNOFF(CFS) =    0.30
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       1.14
  TC(MIN.) =    6.03

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    185.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    46.00  DOWNSTREAM(FEET) =    42.00
  FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.54
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.14
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =    6.24
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    185.00 =   10624.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    185.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.580
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8474
  SUBAREA AREA(ACRES) =    0.19   SUBAREA RUNOFF(CFS) =    0.42
  TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       1.54
  TC(MIN.) =    6.24

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    190.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    42.00  DOWNSTREAM(FEET) =    41.00
  FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   4.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.97
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.54
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    6.45
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    190.00 =   10685.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    190.00 TO NODE    190.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.527
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8499
  SUBAREA AREA(ACRES) =    0.17   SUBAREA RUNOFF(CFS) =    0.38
  TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =       1.89
  TC(MIN.) =    6.45

****************************************************************************
  FLOW PROCESS FROM NODE    190.00 TO NODE    200.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    41.00  DOWNSTREAM(FEET) =    40.00
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   3.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.66
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.89
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.48
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    200.00 =   10700.50 FEET.

+----------------------------------------------------------------------------+
| ENTERING BMP 1B                                                            |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

+----------------------------------------------------------------------------+
| OUTFLOW FROM BMP 1B                                                        |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    220.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    35.75  DOWNSTREAM(FEET) =    35.50
  FLOW LENGTH(FEET) =     2.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   3.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.85
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.89
  PIPE TRAVEL TIME(MIN.) =   0.00    Tc(MIN.) =    6.48
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    220.00 =   10702.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.48
  RAINFALL INTENSITY(INCH/HR) =   2.52
  TOTAL STREAM AREA(ACRES) =     0.88
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.89

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.00   RAIN INTENSITY(INCH/HOUR) =  2.98
  TOTAL AREA(ACRES) =     0.03   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    220.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    47.00  DOWNSTREAM(FEET) =    35.50
  FLOW LENGTH(FEET) =    43.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   0.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.09
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.10
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    5.12
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE    220.00 =     160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 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.) =    5.12
  RAINFALL INTENSITY(INCH/HR) =   2.93
  TOTAL STREAM AREA(ACRES) =     0.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.10

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.89     6.48        2.519          0.88
      2        0.10     5.12        2.933          0.03

  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        1.59     5.12       2.933
      2        1.97     6.48       2.519

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.97   Tc(MIN.) =    6.48
  TOTAL AREA(ACRES) =        0.9
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    220.00 =   10702.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    250.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    35.50  DOWNSTREAM(FEET) =    24.00
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.86
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.97
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.52
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    250.00 =   10737.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.510
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6700
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8528
  SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.05
  TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =       2.01
  TC(MIN.) =    6.52

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.510
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7100
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8477
  SUBAREA AREA(ACRES) =    0.04   SUBAREA RUNOFF(CFS) =    0.06
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       2.07
  TC(MIN.) =    6.52

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    260.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    25.00  DOWNSTREAM(FEET) =    12.50
  FLOW LENGTH(FEET) =    29.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.85
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.07
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.54
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    260.00 =   10766.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    270.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    12.00  DOWNSTREAM(FEET) =    10.00
  FLOW LENGTH(FEET) =    27.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.06
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.07
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    6.59
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    270.00 =   10793.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 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        2.07     6.59       2.491        0.97
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    270.00 =   10793.50 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
```

```
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        4.27     6.91       2.417        2.20
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    270.00 =   10531.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1       6.14       6.59        2.491
      2       6.27       6.91        2.417

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       6.27   Tc(MIN.) =    6.91
  TOTAL AREA(ACRES) =        3.2

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.417
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6827
  SUBAREA AREA(ACRES) =    0.78   SUBAREA RUNOFF(CFS) =    0.66
  TOTAL AREA(ACRES) =        4.0   TOTAL RUNOFF(CFS) =       6.53
  TC(MIN.) =    6.91

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    290.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.977
  SUBAREA RUNOFF(CFS) =      0.57
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      0.57

****************************************************************************
  FLOW PROCESS FROM NODE    290.00 TO NODE    300.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    55.00  DOWNSTREAM(FEET) =    43.50
  FLOW LENGTH(FEET) =    48.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.5 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.79
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.57
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    5.08
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    300.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    295.00 TO NODE    295.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.946
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
  SUBAREA AREA(ACRES) =    0.04   SUBAREA RUNOFF(CFS) =    0.09
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       0.66
  TC(MIN.) =    5.08

+--------------------------------------------------------------------------+
| ENTERING BMP 5                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

+--------------------------------------------------------------------------+
| OUTFLOW FROM BMP 5                                                       |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    305.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    35.00  DOWNSTREAM(FEET) =    20.00
  FLOW LENGTH(FEET) =    64.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.17
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.66
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    5.19
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    305.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.908
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5984
  SUBAREA AREA(ACRES) =    0.28   SUBAREA RUNOFF(CFS) =    0.29
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       0.94
  TC(MIN.) =    5.19

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    310.00 IS CODE =  41
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    20.00  DOWNSTREAM(FEET) =    10.00
  FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.74
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.94
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.21
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    310.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
     2 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.900
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4331
  SUBAREA AREA(ACRES) =    1.07   SUBAREA RUNOFF(CFS) =    1.09
  TOTAL AREA(ACRES) =        1.6   TOTAL RUNOFF(CFS) =       2.02
  TC(MIN.) =    5.21

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    310.00 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        2.02     5.21       2.900        1.61
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    310.00 = ********** FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        6.53     6.91       2.417        3.96
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    310.00 =   10793.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1       6.94       5.21        2.900
      2       8.21       6.91        2.417

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       8.21   Tc(MIN.) =    6.91
  TOTAL AREA(ACRES) =        5.6
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.6  TC(MIN.) =      6.91
  PEAK FLOW RATE(CFS)   =       8.21
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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CHAPTER 3

CALCULATIONS

3.3 – Proposed Condition Hydrology Calculations- Detained

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100-YEAR STORM

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2014 Advanced Engineering Software (aes)
              Ver. 21.0 Release Date: 06/01/2014  License ID 1459

                              Analysis prepared by:

                                    BHA INC.
                              5115 AVENIDA ENCINAS, SUITE L
                                    CARLSBAD, CA 92008


 ************************* DESCRIPTION OF STUDY *************************
* PROPOSED DETAINED HYDROLOGY                                            *
*                                                                        *
*                                                                        *
 ************************************************************************

  FILE NAME: K:\HYDRO\0989\0989D100.DAT
  TIME/DATE OF STUDY: 17:07 01/21/2019
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.630
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  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*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

+----------------------------------------------------------------------+
| OFFSITE FLOWS                                                        |
|                                                                      |
|                                                                      |
+----------------------------------------------------------------------+

**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     20.00 IS CODE =  22
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7000
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.929
  SUBAREA RUNOFF(CFS) =      2.28
  TOTAL AREA(ACRES) =      0.47   TOTAL RUNOFF(CFS) =      2.28

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     60.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    50.00  DOWNSTREAM(FEET) =    48.00
  FLOW LENGTH(FEET) =   199.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.63
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.28
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =    5.72
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     60.00 =     805.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.72
  RAINFALL INTENSITY(INCH/HR) =   6.36
  TOTAL STREAM AREA(ACRES) =     0.47
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.28

+--------------------------------------------------------------------------+
| OFFSITE FLOWS                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     40.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     71.50
  DOWNSTREAM ELEVATION(FEET) =     68.30
  ELEVATION DIFFERENCE(FEET) =      3.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.886
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.929
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.92
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.92

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     50.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
```

```
  UPSTREAM ELEVATION(FEET) =   68.30  DOWNSTREAM ELEVATION(FEET) =   60.00
  STREET LENGTH(FEET) =   215.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.39
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    4.92
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.32
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
  STREET FLOW TRAVEL TIME(MIN.) =   1.08   Tc(MIN.) =    5.97
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.183
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.716
  SUBAREA AREA(ACRES) =    0.66      SUBAREA RUNOFF(CFS) =    2.94
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       3.76

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.37
  FLOW VELOCITY(FEET/SEC.) =  3.59   DEPTH*VELOCITY(FT*FT/SEC.) =   0.91
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     50.00 =     315.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     60.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.00  DOWNSTREAM(FEET) =    50.00
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.00
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.76
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.00
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     60.00 =     337.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 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.) =    6.00
  RAINFALL INTENSITY(INCH/HR) =   6.16
  TOTAL STREAM AREA(ACRES) =     0.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.76

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
```

```
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.28     5.72        6.356          0.47
      2        3.76     6.00        6.163          0.85

  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        5.87     5.72       6.356
      2        5.97     6.00       6.163

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.97   Tc(MIN.) =    6.00
  TOTAL AREA(ACRES) =        1.3
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     60.00 =     805.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     90.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    50.00  DOWNSTREAM(FEET) =    48.00
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.130
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.60
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.97
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =    6.38
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     90.00 =     978.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     90.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.38
  RAINFALL INTENSITY(INCH/HR) =   5.92
  TOTAL STREAM AREA(ACRES) =     1.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.97

+--------------------------------------------------------------------------+
| OFFSITE FLOWS                                                            |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     70.00 TO NODE     80.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     60.50
  DOWNSTREAM ELEVATION(FEET) =     54.30
```

```
  ELEVATION DIFFERENCE(FEET) =      6.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.389
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.602
  SUBAREA RUNOFF(CFS) =      0.84
  TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      0.84

****************************************************************************
  FLOW PROCESS FROM NODE     80.00 TO NODE     90.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    49.00  DOWNSTREAM(FEET) =    48.00
  FLOW LENGTH(FEET) =    17.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.74
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.84
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    5.43
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     90.00 =     117.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     90.00 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.) =    5.43
  RAINFALL INTENSITY(INCH/HR) =   6.57
  TOTAL STREAM AREA(ACRES) =     0.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.84

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.97     6.38        5.924          1.32
      2        0.84     5.43        6.569          0.23

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        6.22     5.43       6.569
      2        6.72     6.38       5.924

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       6.72   Tc(MIN.) =    6.38
  TOTAL AREA(ACRES) =        1.6
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     90.00 =     978.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     95.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    42.00  DOWNSTREAM(FEET) =    41.00
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 115.0 INCH PIPE IS   3.2 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.99
  GIVEN PIPE DIAMETER(INCH) = 115.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.72
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    6.39
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     95.00 =     986.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE     95.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| ONSITE FLOWS                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8600
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.929
  SUBAREA RUNOFF(CFS) =      1.37
  TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      1.37

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.50  DOWNSTREAM(FEET) =    51.50
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.24
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.37
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =    5.35
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    130.00 =   10090.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.631
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8644
  SUBAREA AREA(ACRES) =    0.18   SUBAREA RUNOFF(CFS) =    1.06
  TOTAL AREA(ACRES) =        0.4   TOTAL RUNOFF(CFS) =       2.37
  TC(MIN.) =    5.35

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    140.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    51.50  DOWNSTREAM(FEET) =    50.00
  FLOW LENGTH(FEET) =    58.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.69
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.37
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    5.50
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    140.00 =   10148.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.518
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8532
  SUBAREA AREA(ACRES) =    0.35   SUBAREA RUNOFF(CFS) =    1.92
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       4.25
  TC(MIN.) =    5.50

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    50.00  DOWNSTREAM(FEET) =    47.50
  FLOW LENGTH(FEET) =   186.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.05
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.25
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =    6.01
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    150.00 =   10334.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.154
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8483
  SUBAREA AREA(ACRES) =    0.21   SUBAREA RUNOFF(CFS) =    1.06
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       5.07
  TC(MIN.) =    6.01

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    160.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    47.50  DOWNSTREAM(FEET) =    46.40
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.29
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.07
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    6.14
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    160.00 =   10390.00 FEET.

+----------------------------------------------------------------------------+
| MODIFIED TYPE "A-4" JUNCTION BOX                                           |
| 60.5% FLOW DIVERTED TO BMP 1A                                              |
| 39.5% FLOW TO BYPASS BMP 1A                                                |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   6.00   RAIN INTENSITY(INCH/HOUR) =  6.16
  TOTAL AREA(ACRES) =     0.59   TOTAL RUNOFF(CFS) =      3.07

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.161
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8510
  SUBAREA AREA(ACRES) =    0.06   SUBAREA RUNOFF(CFS) =    0.34
  TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       3.41
  TC(MIN.) =    6.00

+----------------------------------------------------------------------------+
| DETAINED OUTFLOW FROM BMP 1A                                               |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   6.00   RAIN INTENSITY(INCH/HOUR) =  6.16
  TOTAL AREA(ACRES) =     0.59   TOTAL RUNOFF(CFS) =      0.66

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    165.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    46.40  DOWNSTREAM(FEET) =    44.90
  FLOW LENGTH(FEET) =    10.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.52
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.66
```

```
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    6.02
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    165.00 =   10400.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE     95.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    23.00  DOWNSTREAM(FEET) =    22.00
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.48
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.66
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    6.18
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE     95.00 =   10444.50 FEET.

+--------------------------------------------------------------------------+
| CONFLUENCE WITH OFFSITE BYPASS FLOWS                                     |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE     95.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        0.66     6.18       6.042        0.59
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE     95.00 =   10444.50 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        6.72     6.39       5.917        1.55
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     95.00 =     986.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1       7.17       6.18        6.042
      2       7.37       6.39        5.917

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.37   Tc(MIN.) =    6.39
  TOTAL AREA(ACRES) =        2.1

****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE     95.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE    100.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    23.00  DOWNSTREAM(FEET) =    22.00
  FLOW LENGTH(FEET) =    42.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.52
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.37
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    6.47
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    100.00 =   10486.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    260.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    22.00  DOWNSTREAM(FEET) =    12.00
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   5.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.68
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.37
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.51
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    260.00 =   10531.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
==========================================================================

+--------------------------------------------------------------------------+
| 39.5% FLOW FROM BYPASS IN JUNCTION BOX                                   |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   6.00   RAIN INTENSITY(INCH/HOUR) =  6.16
  TOTAL AREA(ACRES) =     0.38   TOTAL RUNOFF(CFS) =      2.00

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    170.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    46.40  DOWNSTREAM(FEET) =    46.00
  FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.12
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.00
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.03
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    170.00 =   10542.50 FEET.

****************************************************************************
  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) =  6.144
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8534
  SUBAREA AREA(ACRES) =    0.13   SUBAREA RUNOFF(CFS) =    0.71
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       2.70
  TC(MIN.) =    6.03

************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    185.00 IS CODE =  41
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    46.00  DOWNSTREAM(FEET) =    42.00
  FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.45
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.70
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    6.19
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    185.00 =   10624.50 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    185.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.039
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8578
  SUBAREA AREA(ACRES) =    0.19   SUBAREA RUNOFF(CFS) =    0.99
  TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       3.64
  TC(MIN.) =    6.19

************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    190.00 IS CODE =  41
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    42.00  DOWNSTREAM(FEET) =    41.00
  FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.28
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.64
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    6.35
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    190.00 =   10685.50 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    190.00 TO NODE    190.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.940
  *USER SPECIFIED(SUBAREA):
```

```
  USER-SPECIFIED RUNOFF COEFFICIENT = .8600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8583
  SUBAREA AREA(ACRES) =    0.17   SUBAREA RUNOFF(CFS) =    0.89
  TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =       4.48
  TC(MIN.) =    6.35

****************************************************************************
  FLOW PROCESS FROM NODE    190.00 TO NODE    200.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    41.00  DOWNSTREAM(FEET) =    40.00
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   5.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.10
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.48
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    6.37
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    200.00 =   10700.50 FEET.

+--------------------------------------------------------------------------+
| ENTERING BMP 1B                                                          |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

+--------------------------------------------------------------------------+
| DETAIN OUTFLOW FROM BMP 1B                                               |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    200.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   6.00   RAIN INTENSITY(INCH/HOUR) =  6.16
  TOTAL AREA(ACRES) =     0.87   TOTAL RUNOFF(CFS) =      0.82

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    220.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    35.75  DOWNSTREAM(FEET) =    35.50
  FLOW LENGTH(FEET) =     2.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   2.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.44
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.82
  PIPE TRAVEL TIME(MIN.) =   0.00    Tc(MIN.) =    6.00
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    220.00 =   10702.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.00
  RAINFALL INTENSITY(INCH/HR) =   6.16
  TOTAL STREAM AREA(ACRES) =     0.87
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.82

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.929
  SUBAREA RUNOFF(CFS) =      0.10
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    220.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    47.00  DOWNSTREAM(FEET) =    35.50
  FLOW LENGTH(FEET) =    43.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   0.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.99
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.10
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    5.12
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    220.00 =      63.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 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.) =    5.12
  RAINFALL INTENSITY(INCH/HR) =   6.82
  TOTAL STREAM AREA(ACRES) =     0.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.10

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.82     6.00        6.158          0.87
      2        0.10     5.12        6.824          0.03

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        0.80     5.12       6.824
      2        0.91     6.00       6.158
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       0.91   Tc(MIN.) =    6.00
  TOTAL AREA(ACRES) =        0.9
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    220.00 =   10702.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    250.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    35.50  DOWNSTREAM(FEET) =    24.00
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.63
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.91
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    6.05
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    250.00 =   10737.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.128
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.1803
  SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.12
  TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =       1.03
  TC(MIN.) =    6.05

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.128
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7100
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.1994
  SUBAREA AREA(ACRES) =    0.04   SUBAREA RUNOFF(CFS) =    0.15
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       1.18
  TC(MIN.) =    6.05

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    260.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    25.00  DOWNSTREAM(FEET) =    12.50
  FLOW LENGTH(FEET) =    29.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.21
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.18
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.08
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    260.00 =   10766.50 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    270.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    12.00  DOWNSTREAM(FEET) =    10.00
  FLOW LENGTH(FEET) =    27.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.67
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.18
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    6.14
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    270.00 =   10793.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 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        1.18     6.14       6.068        0.97
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    270.00 =   10793.50 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        7.37     6.51       5.847        2.14
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    270.00 =   10531.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1       8.14       6.14        6.068
      2       8.51       6.51        5.847

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       8.51   Tc(MIN.) =    6.51
  TOTAL AREA(ACRES) =        3.1

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.847
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4213
  SUBAREA AREA(ACRES) =    0.78   SUBAREA RUNOFF(CFS) =    1.60
  TOTAL AREA(ACRES) =        3.9   TOTAL RUNOFF(CFS) =       9.58
  TC(MIN.) =    6.51
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    290.00 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.929
  SUBAREA RUNOFF(CFS) =      1.33
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      1.33

****************************************************************************
  FLOW PROCESS FROM NODE    290.00 TO NODE    300.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    55.00  DOWNSTREAM(FEET) =    43.50
  FLOW LENGTH(FEET) =    48.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.59
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.33
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    5.06
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    300.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    295.00 TO NODE    295.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.873
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8700
  SUBAREA AREA(ACRES) =    0.04   SUBAREA RUNOFF(CFS) =    0.22
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       1.54
  TC(MIN.) =    5.06

+--------------------------------------------------------------------------+
| ENTERING BMP 5                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

+--------------------------------------------------------------------------+
| DETAINED OUTLFLOW FROM BMP 5                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 IS CODE =   7
----------------------------------------------------------------------------
```

```
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.00   RAIN INTENSITY(INCH/HOUR) =  6.93
  TOTAL AREA(ACRES) =     0.25   TOTAL RUNOFF(CFS) =      0.61

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    305.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    35.00  DOWNSTREAM(FEET) =    20.00
  FLOW LENGTH(FEET) =    64.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.97
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.61
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    5.11
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    305.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.835
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3497
  SUBAREA AREA(ACRES) =    0.28   SUBAREA RUNOFF(CFS) =    0.67
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       1.27
  TC(MIN.) =    5.11

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    310.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    20.00  DOWNSTREAM(FEET) =    10.00
  FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.17
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.27
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.13
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    310.00 = ********** FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.818
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3499
  SUBAREA AREA(ACRES) =    1.07   SUBAREA RUNOFF(CFS) =    2.55
  TOTAL AREA(ACRES) =        1.6   TOTAL RUNOFF(CFS) =       3.82
  TC(MIN.) =    5.13
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    310.00 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        3.82     5.13       6.818        1.60
  LONGEST FLOWPATH FROM NODE    280.00 TO NODE    310.00 = ********** FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        9.58     6.51       5.847        3.89
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    310.00 =   10793.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      11.37       5.13        6.818
      2      12.85       6.51        5.847

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      12.85   Tc(MIN.) =    6.51
  TOTAL AREA(ACRES) =        5.5
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.5  TC(MIN.) =      6.51
  PEAK FLOW RATE(CFS)   =      12.85
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

CHAPTER 3

CALCULATIONS

3.4 – Summary of 100-Year, 10-Year and 2-Year Hydrologic Calculations

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TABLE 7—Summary of 100-Year, 10-Year and 2-Year Hydrologic Calculations

100-Year:

Existing Condition				Developed Undetained Condition			Developed Detained Condition		
POC	Acres	Q (cfs)	Tc (min)	Acres	Q (cfs)	Tc (min)	Acres	Q (cfs)	Tc (min)
1	5.52	13.17	7.35	5.51	19.69	6.51	5.51	12.85	6.51

10-Year:

Existing Condition				Developed Undetained Condition		
POC	Acres	Q (cfs)	Tc (min)	Acres	Q (cfs)	Tc (min)
1	5.52	5.50	7.87	5.51	12.33	6.80

2-Year:

Existing Condition				Developed Undetained Condition		
POC	Acres	Q (cfs)	Tc (min)	Acres	Q (cfs)	Tc (min)
1	5.52	5.19	8.42	5.52	8.21	7.59

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CHAPTER 4

MODIFIED-PULS DETENTION ROUTING (SWMM)

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CHAPTER 4
MODIFIED-PULS DETENTION ROUTING (SWMM)

4.1 – Rational Method Hydrographs

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BMP-1A 100YR

RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 1/19/2019
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 6 MIN.
6 HOUR RAINFALL 2.63 INCHES
BASIN AREA 0.65 ACRES
RUNOFF COEFFICIENT 0.85
PEAK DISCHARGE 3.41 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 6	DISCHARGE (CFS) = 0.1
TIME (MIN) = 12	DISCHARGE (CFS) = 0.1
TIME (MIN) = 18	DISCHARGE (CFS) = 0.1
TIME (MIN) = 24	DISCHARGE (CFS) = 0.1
TIME (MIN) = 30	DISCHARGE (CFS) = 0.1
TIME (MIN) = 36	DISCHARGE (CFS) = 0.1
TIME (MIN) = 42	DISCHARGE (CFS) = 0.1
TIME (MIN) = 48	DISCHARGE (CFS) = 0.1
TIME (MIN) = 54	DISCHARGE (CFS) = 0.1
TIME (MIN) = 60	DISCHARGE (CFS) = 0.1
TIME (MIN) = 66	DISCHARGE (CFS) = 0.1
TIME (MIN) = 72	DISCHARGE (CFS) = 0.1
TIME (MIN) = 78	DISCHARGE (CFS) = 0.1
TIME (MIN) = 84	DISCHARGE (CFS) = 0.1
TIME (MIN) = 90	DISCHARGE (CFS) = 0.1
TIME (MIN) = 96	DISCHARGE (CFS) = 0.1
TIME (MIN) = 102	DISCHARGE (CFS) = 0.1
TIME (MIN) = 108	DISCHARGE (CFS) = 0.1
TIME (MIN) = 114	DISCHARGE (CFS) = 0.1
TIME (MIN) = 120	DISCHARGE (CFS) = 0.1
TIME (MIN) = 126	DISCHARGE (CFS) = 0.1
TIME (MIN) = 132	DISCHARGE (CFS) = 0.1
TIME (MIN) = 138	DISCHARGE (CFS) = 0.1
TIME (MIN) = 144	DISCHARGE (CFS) = 0.1
TIME (MIN) = 150	DISCHARGE (CFS) = 0.2
TIME (MIN) = 156	DISCHARGE (CFS) = 0.2
TIME (MIN) = 162	DISCHARGE (CFS) = 0.2
TIME (MIN) = 168	DISCHARGE (CFS) = 0.2
TIME (MIN) = 174	DISCHARGE (CFS) = 0.2
TIME (MIN) = 180	DISCHARGE (CFS) = 0.2
TIME (MIN) = 186	DISCHARGE (CFS) = 0.2
TIME (MIN) = 192	DISCHARGE (CFS) = 0.2
TIME (MIN) = 198	DISCHARGE (CFS) = 0.3
TIME (MIN) = 204	DISCHARGE (CFS) = 0.3
TIME (MIN) = 210	DISCHARGE (CFS) = 0.3
TIME (MIN) = 216	DISCHARGE (CFS) = 0.3
TIME (MIN) = 222	DISCHARGE (CFS) = 0.4
TIME (MIN) = 228	DISCHARGE (CFS) = 0.5
TIME (MIN) = 234	DISCHARGE (CFS) = 0.7
TIME (MIN) = 240	DISCHARGE (CFS) = 0.9
TIME (MIN) = 246	DISCHARGE (CFS) = 3.41
TIME (MIN) = 252	DISCHARGE (CFS) = 0.5
TIME (MIN) = 258	DISCHARGE (CFS) = 0.4
TIME (MIN) = 264	DISCHARGE (CFS) = 0.3
TIME (MIN) = 270	DISCHARGE (CFS) = 0.2
TIME (MIN) = 276	DISCHARGE (CFS) = 0.2
TIME (MIN) = 282	DISCHARGE (CFS) = 0.2
TIME (MIN) = 288	DISCHARGE (CFS) = 0.2
TIME (MIN) = 294	DISCHARGE (CFS) = 0.2
TIME (MIN) = 300	DISCHARGE (CFS) = 0.1
TIME (MIN) = 306	DISCHARGE (CFS) = 0.1
TIME (MIN) = 312	DISCHARGE (CFS) = 0.1
TIME (MIN) = 318	DISCHARGE (CFS) = 0.1
TIME (MIN) = 324	DISCHARGE (CFS) = 0.1
TIME (MIN) = 330	DISCHARGE (CFS) = 0.1
TIME (MIN) = 336	DISCHARGE (CFS) = 0.1
TIME (MIN) = 342	DISCHARGE (CFS) = 0.1
TIME (MIN) = 348	DISCHARGE (CFS) = 0.1
TIME (MIN) = 354	DISCHARGE (CFS) = 0.1
TIME (MIN) = 360	DISCHARGE (CFS) = 0.1
TIME (MIN) = 366	DISCHARGE (CFS) = 0

BMP-1A LID

RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 1/19/2019
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 6 MIN.
6 HOUR RAINFALL 0.59 INCHES
BASIN AREA 0.65 ACRES
RUNOFF COEFFICIENT 0.85
PEAK DISCHARGE 0.28 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 6	DISCHARGE (CFS) = 0
TIME (MIN) = 12	DISCHARGE (CFS) = 0
TIME (MIN) = 18	DISCHARGE (CFS) = 0
TIME (MIN) = 24	DISCHARGE (CFS) = 0
TIME (MIN) = 30	DISCHARGE (CFS) = 0
TIME (MIN) = 36	DISCHARGE (CFS) = 0
TIME (MIN) = 42	DISCHARGE (CFS) = 0
TIME (MIN) = 48	DISCHARGE (CFS) = 0
TIME (MIN) = 54	DISCHARGE (CFS) = 0
TIME (MIN) = 60	DISCHARGE (CFS) = 0
TIME (MIN) = 66	DISCHARGE (CFS) = 0
TIME (MIN) = 72	DISCHARGE (CFS) = 0
TIME (MIN) = 78	DISCHARGE (CFS) = 0
TIME (MIN) = 84	DISCHARGE (CFS) = 0
TIME (MIN) = 90	DISCHARGE (CFS) = 0
TIME (MIN) = 96	DISCHARGE (CFS) = 0
TIME (MIN) = 102	DISCHARGE (CFS) = 0
TIME (MIN) = 108	DISCHARGE (CFS) = 0
TIME (MIN) = 114	DISCHARGE (CFS) = 0
TIME (MIN) = 120	DISCHARGE (CFS) = 0
TIME (MIN) = 126	DISCHARGE (CFS) = 0
TIME (MIN) = 132	DISCHARGE (CFS) = 0
TIME (MIN) = 138	DISCHARGE (CFS) = 0
TIME (MIN) = 144	DISCHARGE (CFS) = 0
TIME (MIN) = 150	DISCHARGE (CFS) = 0
TIME (MIN) = 156	DISCHARGE (CFS) = 0
TIME (MIN) = 162	DISCHARGE (CFS) = 0
TIME (MIN) = 168	DISCHARGE (CFS) = 0
TIME (MIN) = 174	DISCHARGE (CFS) = 0
TIME (MIN) = 180	DISCHARGE (CFS) = 0
TIME (MIN) = 186	DISCHARGE (CFS) = 0
TIME (MIN) = 192	DISCHARGE (CFS) = 0.1
TIME (MIN) = 198	DISCHARGE (CFS) = 0.1
TIME (MIN) = 204	DISCHARGE (CFS) = 0.1
TIME (MIN) = 210	DISCHARGE (CFS) = 0.1
TIME (MIN) = 216	DISCHARGE (CFS) = 0.1
TIME (MIN) = 222	DISCHARGE (CFS) = 0.1
TIME (MIN) = 228	DISCHARGE (CFS) = 0.1
TIME (MIN) = 234	DISCHARGE (CFS) = 0.2
TIME (MIN) = 240	DISCHARGE (CFS) = 0.7
TIME (MIN) = 246	DISCHARGE (CFS) = 0.28
TIME (MIN) = 252	DISCHARGE (CFS) = 0.1
TIME (MIN) = 258	DISCHARGE (CFS) = 0.1
TIME (MIN) = 264	DISCHARGE (CFS) = 0.1
TIME (MIN) = 270	DISCHARGE (CFS) = 0.1
TIME (MIN) = 276	DISCHARGE (CFS) = 0
TIME (MIN) = 282	DISCHARGE (CFS) = 0
TIME (MIN) = 288	DISCHARGE (CFS) = 0
TIME (MIN) = 294	DISCHARGE (CFS) = 0
TIME (MIN) = 300	DISCHARGE (CFS) = 0
TIME (MIN) = 306	DISCHARGE (CFS) = 0
TIME (MIN) = 312	DISCHARGE (CFS) = 0
TIME (MIN) = 318	DISCHARGE (CFS) = 0
TIME (MIN) = 324	DISCHARGE (CFS) = 0
TIME (MIN) = 330	DISCHARGE (CFS) = 0
TIME (MIN) = 336	DISCHARGE (CFS) = 0
TIME (MIN) = 342	DISCHARGE (CFS) = 0
TIME (MIN) = 348	DISCHARGE (CFS) = 0
TIME (MIN) = 354	DISCHARGE (CFS) = 0
TIME (MIN) = 360	DISCHARGE (CFS) = 0
TIME (MIN) = 366	DISCHARGE (CFS) = 0

BMP-1B 100YR

RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 1/19/2019
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 6 MIN.
6 HOUR RAINFALL 2.63 INCHES
BASIN AREA 0.873 ACRES
RUNOFF COEFFICIENT 0.86
PEAK DISCHARGE 4.48 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 6	DISCHARGE (CFS) = 0.1
TIME (MIN) = 12	DISCHARGE (CFS) = 0.1
TIME (MIN) = 18	DISCHARGE (CFS) = 0.1
TIME (MIN) = 24	DISCHARGE (CFS) = 0.1
TIME (MIN) = 30	DISCHARGE (CFS) = 0.1
TIME (MIN) = 36	DISCHARGE (CFS) = 0.1
TIME (MIN) = 42	DISCHARGE (CFS) = 0.1
TIME (MIN) = 48	DISCHARGE (CFS) = 0.1
TIME (MIN) = 54	DISCHARGE (CFS) = 0.1
TIME (MIN) = 60	DISCHARGE (CFS) = 0.1
TIME (MIN) = 66	DISCHARGE (CFS) = 0.1
TIME (MIN) = 72	DISCHARGE (CFS) = 0.1
TIME (MIN) = 78	DISCHARGE (CFS) = 0.1
TIME (MIN) = 84	DISCHARGE (CFS) = 0.2
TIME (MIN) = 90	DISCHARGE (CFS) = 0.2
TIME (MIN) = 96	DISCHARGE (CFS) = 0.2
TIME (MIN) = 102	DISCHARGE (CFS) = 0.2
TIME (MIN) = 108	DISCHARGE (CFS) = 0.2
TIME (MIN) = 114	DISCHARGE (CFS) = 0.2
TIME (MIN) = 120	DISCHARGE (CFS) = 0.2
TIME (MIN) = 126	DISCHARGE (CFS) = 0.2
TIME (MIN) = 132	DISCHARGE (CFS) = 0.2
TIME (MIN) = 138	DISCHARGE (CFS) = 0.2
TIME (MIN) = 144	DISCHARGE (CFS) = 0.2
TIME (MIN) = 150	DISCHARGE (CFS) = 0.2
TIME (MIN) = 156	DISCHARGE (CFS) = 0.2
TIME (MIN) = 162	DISCHARGE (CFS) = 0.2
TIME (MIN) = 168	DISCHARGE (CFS) = 0.2
TIME (MIN) = 174	DISCHARGE (CFS) = 0.3
TIME (MIN) = 180	DISCHARGE (CFS) = 0.3
TIME (MIN) = 186	DISCHARGE (CFS) = 0.3
TIME (MIN) = 192	DISCHARGE (CFS) = 0.3
TIME (MIN) = 198	DISCHARGE (CFS) = 0.3
TIME (MIN) = 204	DISCHARGE (CFS) = 0.4
TIME (MIN) = 210	DISCHARGE (CFS) = 0.4
TIME (MIN) = 216	DISCHARGE (CFS) = 0.4
TIME (MIN) = 222	DISCHARGE (CFS) = 0.5
TIME (MIN) = 228	DISCHARGE (CFS) = 0.6
TIME (MIN) = 234	DISCHARGE (CFS) = 0.9
TIME (MIN) = 240	DISCHARGE (CFS) = 1.4
TIME (MIN) = 246	DISCHARGE (CFS) = 4.48
TIME (MIN) = 252	DISCHARGE (CFS) = 0.7
TIME (MIN) = 258	DISCHARGE (CFS) = 0.5
TIME (MIN) = 264	DISCHARGE (CFS) = 0.4
TIME (MIN) = 270	DISCHARGE (CFS) = 0.3
TIME (MIN) = 276	DISCHARGE (CFS) = 0.3
TIME (MIN) = 282	DISCHARGE (CFS) = 0.3
TIME (MIN) = 288	DISCHARGE (CFS) = 0.2
TIME (MIN) = 294	DISCHARGE (CFS) = 0.2
TIME (MIN) = 300	DISCHARGE (CFS) = 0.2
TIME (MIN) = 306	DISCHARGE (CFS) = 0.2
TIME (MIN) = 312	DISCHARGE (CFS) = 0.2
TIME (MIN) = 318	DISCHARGE (CFS) = 0.2
TIME (MIN) = 324	DISCHARGE (CFS) = 0.2
TIME (MIN) = 330	DISCHARGE (CFS) = 0.1
TIME (MIN) = 336	DISCHARGE (CFS) = 0.1
TIME (MIN) = 342	DISCHARGE (CFS) = 0.1
TIME (MIN) = 348	DISCHARGE (CFS) = 0.1
TIME (MIN) = 354	DISCHARGE (CFS) = 0.1
TIME (MIN) = 360	DISCHARGE (CFS) = 0.1
TIME (MIN) = 366	DISCHARGE (CFS) = 0

BMP-1 LID

RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 1/19/2019
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 6 MIN.
6 HOUR RAINFALL 0.59 INCHES
BASIN AREA 0.873 ACRES
RUNOFF COEFFICIENT 0.86
PEAK DISCHARGE 0.44 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 6	DISCHARGE (CFS) = 0
TIME (MIN) = 12	DISCHARGE (CFS) = 0
TIME (MIN) = 18	DISCHARGE (CFS) = 0
TIME (MIN) = 24	DISCHARGE (CFS) = 0
TIME (MIN) = 30	DISCHARGE (CFS) = 0
TIME (MIN) = 36	DISCHARGE (CFS) = 0
TIME (MIN) = 42	DISCHARGE (CFS) = 0
TIME (MIN) = 48	DISCHARGE (CFS) = 0
TIME (MIN) = 54	DISCHARGE (CFS) = 0
TIME (MIN) = 60	DISCHARGE (CFS) = 0
TIME (MIN) = 66	DISCHARGE (CFS) = 0
TIME (MIN) = 72	DISCHARGE (CFS) = 0
TIME (MIN) = 78	DISCHARGE (CFS) = 0
TIME (MIN) = 84	DISCHARGE (CFS) = 0
TIME (MIN) = 90	DISCHARGE (CFS) = 0
TIME (MIN) = 96	DISCHARGE (CFS) = 0
TIME (MIN) = 102	DISCHARGE (CFS) = 0
TIME (MIN) = 108	DISCHARGE (CFS) = 0
TIME (MIN) = 114	DISCHARGE (CFS) = 0
TIME (MIN) = 120	DISCHARGE (CFS) = 0
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TIME (MIN) = 138	DISCHARGE (CFS) = 0
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TIME (MIN) = 150	DISCHARGE (CFS) = 0
TIME (MIN) = 156	DISCHARGE (CFS) = 0
TIME (MIN) = 162	DISCHARGE (CFS) = 0.1
TIME (MIN) = 168	DISCHARGE (CFS) = 0.1
TIME (MIN) = 174	DISCHARGE (CFS) = 0.1
TIME (MIN) = 180	DISCHARGE (CFS) = 0.1
TIME (MIN) = 186	DISCHARGE (CFS) = 0.1
TIME (MIN) = 192	DISCHARGE (CFS) = 0.1
TIME (MIN) = 198	DISCHARGE (CFS) = 0.1
TIME (MIN) = 204	DISCHARGE (CFS) = 0.1
TIME (MIN) = 210	DISCHARGE (CFS) = 0.1
TIME (MIN) = 216	DISCHARGE (CFS) = 0.1
TIME (MIN) = 222	DISCHARGE (CFS) = 0.1
TIME (MIN) = 228	DISCHARGE (CFS) = 0.1
TIME (MIN) = 234	DISCHARGE (CFS) = 0.2
TIME (MIN) = 240	DISCHARGE (CFS) = 0.9
TIME (MIN) = 246	DISCHARGE (CFS) = 0.44
TIME (MIN) = 252	DISCHARGE (CFS) = 0.2
TIME (MIN) = 258	DISCHARGE (CFS) = 0.1
TIME (MIN) = 264	DISCHARGE (CFS) = 0.1
TIME (MIN) = 270	DISCHARGE (CFS) = 0.1
TIME (MIN) = 276	DISCHARGE (CFS) = 0.1
TIME (MIN) = 282	DISCHARGE (CFS) = 0.1
TIME (MIN) = 288	DISCHARGE (CFS) = 0.1
TIME (MIN) = 294	DISCHARGE (CFS) = 0
TIME (MIN) = 300	DISCHARGE (CFS) = 0
TIME (MIN) = 306	DISCHARGE (CFS) = 0
TIME (MIN) = 312	DISCHARGE (CFS) = 0
TIME (MIN) = 318	DISCHARGE (CFS) = 0
TIME (MIN) = 324	DISCHARGE (CFS) = 0
TIME (MIN) = 330	DISCHARGE (CFS) = 0
TIME (MIN) = 336	DISCHARGE (CFS) = 0
TIME (MIN) = 342	DISCHARGE (CFS) = 0
TIME (MIN) = 348	DISCHARGE (CFS) = 0
TIME (MIN) = 354	DISCHARGE (CFS) = 0
TIME (MIN) = 360	DISCHARGE (CFS) = 0
TIME (MIN) = 366	DISCHARGE (CFS) = 0

BMP-2 100YR

RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 1/21/2019
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 5 MIN.
6 HOUR RAINFALL 2.63 INCHES
BASIN AREA 0.252 ACRES
RUNOFF COEFFICIENT 0.87
PEAK DISCHARGE 1.54 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 5	DISCHARGE (CFS) = 0
TIME (MIN) = 10	DISCHARGE (CFS) = 0
TIME (MIN) = 15	DISCHARGE (CFS) = 0
TIME (MIN) = 20	DISCHARGE (CFS) = 0
TIME (MIN) = 25	DISCHARGE (CFS) = 0
TIME (MIN) = 30	DISCHARGE (CFS) = 0
TIME (MIN) = 35	DISCHARGE (CFS) = 0
TIME (MIN) = 40	DISCHARGE (CFS) = 0
TIME (MIN) = 45	DISCHARGE (CFS) = 0
TIME (MIN) = 50	DISCHARGE (CFS) = 0
TIME (MIN) = 55	DISCHARGE (CFS) = 0
TIME (MIN) = 60	DISCHARGE (CFS) = 0
TIME (MIN) = 65	DISCHARGE (CFS) = 0
TIME (MIN) = 70	DISCHARGE (CFS) = 0
TIME (MIN) = 75	DISCHARGE (CFS) = 0
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TIME (MIN) = 85	DISCHARGE (CFS) = 0
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TIME (MIN) = 105	DISCHARGE (CFS) = 0
TIME (MIN) = 110	DISCHARGE (CFS) = 0
TIME (MIN) = 115	DISCHARGE (CFS) = 0.1
TIME (MIN) = 120	DISCHARGE (CFS) = 0.1
TIME (MIN) = 125	DISCHARGE (CFS) = 0.1
TIME (MIN) = 130	DISCHARGE (CFS) = 0.1
TIME (MIN) = 135	DISCHARGE (CFS) = 0.1
TIME (MIN) = 140	DISCHARGE (CFS) = 0.1
TIME (MIN) = 145	DISCHARGE (CFS) = 0.1
TIME (MIN) = 150	DISCHARGE (CFS) = 0.1
TIME (MIN) = 155	DISCHARGE (CFS) = 0.1
TIME (MIN) = 160	DISCHARGE (CFS) = 0.1
TIME (MIN) = 165	DISCHARGE (CFS) = 0.1
TIME (MIN) = 170	DISCHARGE (CFS) = 0.1
TIME (MIN) = 175	DISCHARGE (CFS) = 0.1
TIME (MIN) = 180	DISCHARGE (CFS) = 0.1
TIME (MIN) = 185	DISCHARGE (CFS) = 0.1
TIME (MIN) = 190	DISCHARGE (CFS) = 0.1
TIME (MIN) = 195	DISCHARGE (CFS) = 0.1
TIME (MIN) = 200	DISCHARGE (CFS) = 0.1
TIME (MIN) = 205	DISCHARGE (CFS) = 0.1
TIME (MIN) = 210	DISCHARGE (CFS) = 0.1
TIME (MIN) = 215	DISCHARGE (CFS) = 0.1
TIME (MIN) = 220	DISCHARGE (CFS) = 0.1
TIME (MIN) = 225	DISCHARGE (CFS) = 0.2
TIME (MIN) = 230	DISCHARGE (CFS) = 0.2
TIME (MIN) = 235	DISCHARGE (CFS) = 0.3
TIME (MIN) = 240	DISCHARGE (CFS) = 0.4
TIME (MIN) = 245	DISCHARGE (CFS) = 1.54
TIME (MIN) = 250	DISCHARGE (CFS) = 0.2
TIME (MIN) = 255	DISCHARGE (CFS) = 0.2
TIME (MIN) = 260	DISCHARGE (CFS) = 0.1
TIME (MIN) = 265	DISCHARGE (CFS) = 0.1
TIME (MIN) = 270	DISCHARGE (CFS) = 0.1
TIME (MIN) = 275	DISCHARGE (CFS) = 0.1
TIME (MIN) = 280	DISCHARGE (CFS) = 0.1
TIME (MIN) = 285	DISCHARGE (CFS) = 0.1
TIME (MIN) = 290	DISCHARGE (CFS) = 0.1
TIME (MIN) = 295	DISCHARGE (CFS) = 0.1
TIME (MIN) = 300	DISCHARGE (CFS) = 0.1
TIME (MIN) = 305	DISCHARGE (CFS) = 0.1
TIME (MIN) = 310	DISCHARGE (CFS) = 0.1
TIME (MIN) = 315	DISCHARGE (CFS) = 0
TIME (MIN) = 320	DISCHARGE (CFS) = 0
TIME (MIN) = 325	DISCHARGE (CFS) = 0
TIME (MIN) = 330	DISCHARGE (CFS) = 0
TIME (MIN) = 335	DISCHARGE (CFS) = 0
TIME (MIN) = 340	DISCHARGE (CFS) = 0
TIME (MIN) = 345	DISCHARGE (CFS) = 0
TIME (MIN) = 350	DISCHARGE (CFS) = 0
TIME (MIN) = 355	DISCHARGE (CFS) = 0

BMP-2 LID

RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 1/21/2019
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 5 MIN.
6 HOUR RAINFALL 0.59 INCHES
BASIN AREA 0.252 ACRES
RUNOFF COEFFICIENT 0.87
PEAK DISCHARGE 0.13 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 5	DISCHARGE (CFS) = 0
TIME (MIN) = 10	DISCHARGE (CFS) = 0
TIME (MIN) = 15	DISCHARGE (CFS) = 0
TIME (MIN) = 20	DISCHARGE (CFS) = 0
TIME (MIN) = 25	DISCHARGE (CFS) = 0
TIME (MIN) = 30	DISCHARGE (CFS) = 0
TIME (MIN) = 35	DISCHARGE (CFS) = 0
TIME (MIN) = 40	DISCHARGE (CFS) = 0
TIME (MIN) = 45	DISCHARGE (CFS) = 0
TIME (MIN) = 50	DISCHARGE (CFS) = 0
TIME (MIN) = 55	DISCHARGE (CFS) = 0
TIME (MIN) = 60	DISCHARGE (CFS) = 0
TIME (MIN) = 65	DISCHARGE (CFS) = 0
TIME (MIN) = 70	DISCHARGE (CFS) = 0
TIME (MIN) = 75	DISCHARGE (CFS) = 0
TIME (MIN) = 80	DISCHARGE (CFS) = 0
TIME (MIN) = 85	DISCHARGE (CFS) = 0
TIME (MIN) = 90	DISCHARGE (CFS) = 0
TIME (MIN) = 95	DISCHARGE (CFS) = 0
TIME (MIN) = 100	DISCHARGE (CFS) = 0
TIME (MIN) = 105	DISCHARGE (CFS) = 0
TIME (MIN) = 110	DISCHARGE (CFS) = 0
TIME (MIN) = 115	DISCHARGE (CFS) = 0
TIME (MIN) = 120	DISCHARGE (CFS) = 0
TIME (MIN) = 125	DISCHARGE (CFS) = 0
TIME (MIN) = 130	DISCHARGE (CFS) = 0
TIME (MIN) = 135	DISCHARGE (CFS) = 0
TIME (MIN) = 140	DISCHARGE (CFS) = 0
TIME (MIN) = 145	DISCHARGE (CFS) = 0
TIME (MIN) = 150	DISCHARGE (CFS) = 0
TIME (MIN) = 155	DISCHARGE (CFS) = 0
TIME (MIN) = 160	DISCHARGE (CFS) = 0
TIME (MIN) = 165	DISCHARGE (CFS) = 0
TIME (MIN) = 170	DISCHARGE (CFS) = 0
TIME (MIN) = 175	DISCHARGE (CFS) = 0
TIME (MIN) = 180	DISCHARGE (CFS) = 0
TIME (MIN) = 185	DISCHARGE (CFS) = 0
TIME (MIN) = 190	DISCHARGE (CFS) = 0
TIME (MIN) = 195	DISCHARGE (CFS) = 0
TIME (MIN) = 200	DISCHARGE (CFS) = 0
TIME (MIN) = 205	DISCHARGE (CFS) = 0
TIME (MIN) = 210	DISCHARGE (CFS) = 0
TIME (MIN) = 215	DISCHARGE (CFS) = 0
TIME (MIN) = 220	DISCHARGE (CFS) = 0
TIME (MIN) = 225	DISCHARGE (CFS) = 0
TIME (MIN) = 230	DISCHARGE (CFS) = 0
TIME (MIN) = 235	DISCHARGE (CFS) = 0.1
TIME (MIN) = 240	DISCHARGE (CFS) = 0.3
TIME (MIN) = 245	DISCHARGE (CFS) = 0.13
TIME (MIN) = 250	DISCHARGE (CFS) = 0.1
TIME (MIN) = 255	DISCHARGE (CFS) = 0
TIME (MIN) = 260	DISCHARGE (CFS) = 0
TIME (MIN) = 265	DISCHARGE (CFS) = 0
TIME (MIN) = 270	DISCHARGE (CFS) = 0
TIME (MIN) = 275	DISCHARGE (CFS) = 0
TIME (MIN) = 280	DISCHARGE (CFS) = 0
TIME (MIN) = 285	DISCHARGE (CFS) = 0
TIME (MIN) = 290	DISCHARGE (CFS) = 0
TIME (MIN) = 295	DISCHARGE (CFS) = 0
TIME (MIN) = 300	DISCHARGE (CFS) = 0
TIME (MIN) = 305	DISCHARGE (CFS) = 0
TIME (MIN) = 310	DISCHARGE (CFS) = 0
TIME (MIN) = 315	DISCHARGE (CFS) = 0
TIME (MIN) = 320	DISCHARGE (CFS) = 0
TIME (MIN) = 325	DISCHARGE (CFS) = 0
TIME (MIN) = 330	DISCHARGE (CFS) = 0
TIME (MIN) = 335	DISCHARGE (CFS) = 0
TIME (MIN) = 340	DISCHARGE (CFS) = 0
TIME (MIN) = 345	DISCHARGE (CFS) = 0
TIME (MIN) = 350	DISCHARGE (CFS) = 0
TIME (MIN) = 355	DISCHARGE (CFS) = 0

CHAPTER 4

MODIFIED-PULS DETENTION ROUTING (SWMM)

4.2 – Stage-Storage & Stage-Discharge Relationships

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Elevation vs. Area Tables

SURFACE STORAGE WQ-1A

Depth (ft)	Area (ft^2)	Volume (ft^3)
0.00	379	0
0.25	379	95
0.50	379	190
0.75	379	284
1.00	379	379
1.25	379	474
1.50	379	569
1.75	379	663
2.00	379	758
2.25	379	853
2.50	379	948
2.75	379	1042
3.00	379	1137
3.25	379	1232
3.50	379	1327
3.75	379	1421
4.00	379	1516
4.10	379	1554
4.25	379	1611
4.50	379	1706
4.75	379	1800
5.00	379	1895
5.25	379	1990
5.50	379	2085
5.75	379	2179
6.00	379	2274
6.25	379	2369
6.50	379	2464
6.75	379	2558
7.00	379	2653
8.00	379	3032
9.00	379	3411
	BMP TOTAL =	**3411**

Effective Depth:	93.00 in

Outlet Structure for Discharge of BMP-1A

Elevation vs. Discharge Table

Orifice 1

No. of orif:	1	
Dia:	3.5	"
Invert:	4.1	ft
Cg-low:	0.62	

Low Flow Orifice

No. of orif:	1	
Dia:	0.5	"
Invert:	0	ft
Cg-low:	0.620	

***Note: h = head above the invert of the lowest surface discharge opening.**

SWMM

H (ft)	h* (ft)	$Q_{orifice\ 1}$ (cfs)	
0.00	0.000	0.000	
0.25	0.000	0.000	
0.50	0.000	0.000	
0.75	0.000	0.000	
1.00	0.000	0.000	
1.25	0.000	0.000	
1.50	0.000	0.000	
1.75	0.000	0.000	
2.00	0.000	0.000	
2.25	0.000	0.000	
2.50	0.000	0.000	
2.75	0.000	0.000	
3.00	0.000	0.000	
3.25	0.000	0.000	
3.50	0.000	0.000	
3.75	0.000	0.000	
4.00	0.000	0.000	
4.10	0.000	0.000	TOP DCV STORAGE
5.10	1.000	0.332	
6.00	1.900	0.440	
7.00	2.900	0.552	
8.00	3.900	0.644	

Stage Area for STOR-1B

SURFACE STORAGE WQ-1B

Depth (ft)	Area (ft^2)	Volume (ft^3)
0.00	615	0
0.25	615	154
0.50	615	308
0.75	615	461
1.00	615	615
1.25	615	769
1.50	615	923
1.75	615	1076
2.00	615	1230
2.25	615	1384
2.50	615	1538
2.75	615	1691
3.00	615	1845
3.25	615	1999
3.50	615	2153
3.75	615	2306
4.00	615	2460
4.25	615	2614
4.50	615	2768
4.75	615	2921
5.00	615	3075
5.25	615	3229
5.50	615	3383
5.75	615	3536
6.00	615	3690
6.25	615	3844
6.50	615	3998
6.75	615	4151
7.00	615	4305
8.00	615	4920
	BMP TOTAL =	**4920**

Effective Depth:	93.00 in

Outlet Structure for Discharge of WQ-1B

Elevation vs. Discharge Table

Outlet Structure for Discharge of BMP-1B
Elevation vs. Discharge Table

Orifice 1

No. of orif:	1	
Dia:	4	"
Invert:	4	ft
Cg-low:	0.62	

Low Flow Orifice

No. of orif:	1	
Dia:	0.58	"
Invert:	0	ft
Cg-low:	0.620	

***Note: h = head above the invert of the lowest surface discharge opening.**

SWMM

H (ft)	h* (ft)	$Q_{orifice1}$ (cfs)	
0.00	0.000	0.000	
0.25	0.000	0.000	
0.50	0.000	0.000	
0.75	0.000	0.000	
1.00	0.000	0.000	
1.25	0.000	0.000	
1.50	0.000	0.000	
1.75	0.000	0.000	
2.00	0.000	0.000	
2.25	0.000	0.000	
2.50	0.000	0.000	
2.75	0.000	0.000	
3.00	0.000	0.000	
3.25	0.000	0.000	
3.50	0.000	0.000	
3.75	0.000	0.000	
4.00	0.000	0.000	TOP DCV STORAGE
5.00	1.000	0.434	
6.00	2.000	0.588	
7.00	3.000	0.731	
8.00	4.000	0.850	

Stage Area for STOR-5

SURFACE STORAGE WQ-2

Depth (ft)	Area (ft^2)	Volume (ft^3)
0.00	187	0
0.25	187	47
0.50	187	94
0.75	187	140
1.00	187	187
1.25	187	234
1.50	187	281
1.75	187	327
2.00	187	374
2.25	187	421
2.50	187	468
2.75	187	514
3.00	187	561
3.25	187	608
3.50	187	655
3.75	187	701
4.00	187	748
4.25	187	795
4.50	187	842
4.75	187	888
5.00	187	935
5.25	187	982
5.50	187	1029
5.80	187	1085
6.00	187	1122
	BMP TOTAL =	**1122**

Effective Depth:	63.00 in

Outlet Structure for Discharge of BMP-5

Elevation vs. Discharge Table

Orifice 1

No. of orif:	1	
Dia:	4	"
Invert:	3.25	ft
Cg-low:	0.62	

Orifice 2

No. of orif:	1	
Dia:	0.3	"
Invert:	0	ft
Cg-low:	0.620	

***Note: h = head above the invert of the lowest surface discharge opening.**

SWMM

H (ft)	h* (ft)	$Q_{orifice1}$ (cfs)	
0.00	0.000	0.000	
0.25	0.000	0.000	
0.50	0.000	0.000	
0.75	0.000	0.000	
1.00	0.000	0.000	
1.25	0.000	0.000	
1.50	0.000	0.000	
1.75	0.000	0.000	
2.00	0.000	0.000	
2.25	0.000	0.000	
2.50	0.000	0.000	
2.75	0.000	0.000	
3.00	0.000	0.000	
3.80	0.000	0.000	TOP DCV STORAGE
4.80	1.000	0.434	
5.80	2.000	0.670	

CHAPTER 4

MODIFIED-PULS DETENTION ROUTING (SWMM)

4.3 – Underground Detention Vault and MWS Details

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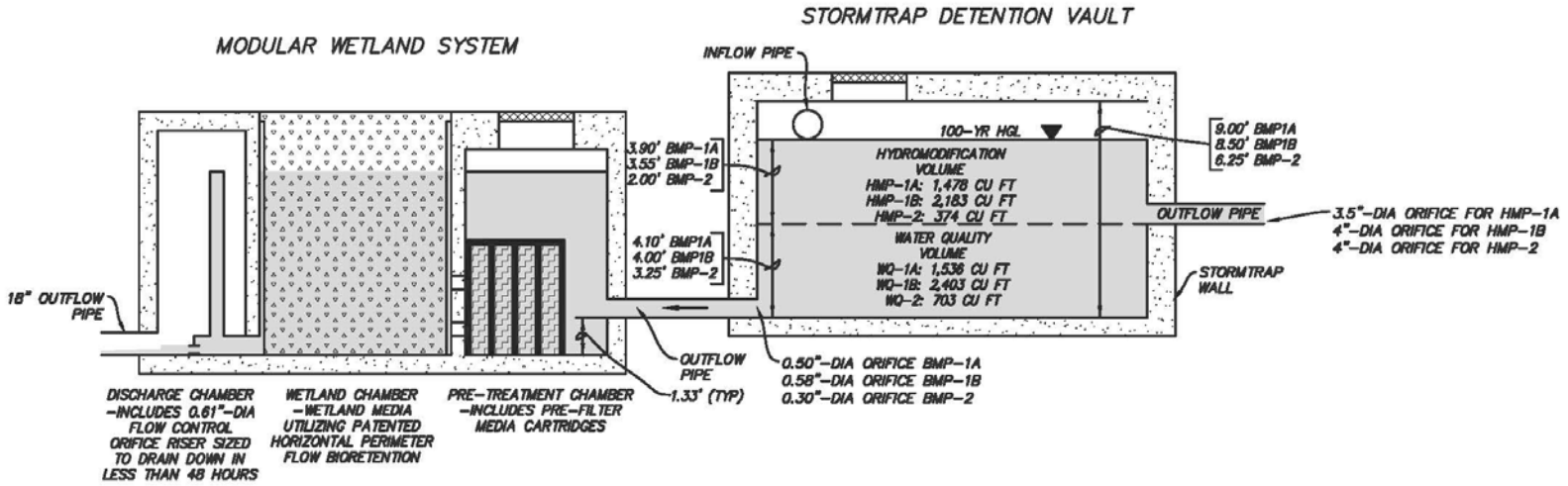
MODULAR WETLAND SYSTEM
STORMTRAP DETENTION VAULT
INFLOW PIPE
100-YR HGL
9.00' BMP1A
8.50' BMP1B
6.25' BMP-2
3.90' BMP-1A
3.55' BMP-1B
2.00' BMP-2
HYDROMODIFICATION VOLUME
HMP-1A: 1,478 CU FT
HMP-1B: 2,183 CU FT
HMP-2: 374 CU FT
OUTFLOW PIPE
3.5"-DIA ORIFICE FOR HMP-1A
4"-DIA ORIFICE FOR HMP-1B
4"-DIA ORIFICE FOR HMP-2
4.10' BMP1A
4.00' BMP1B
3.25' BMP-2
WATER QUALITY VOLUME
WQ-1A: 1,536 CU FT
WQ-1B: 2,403 CU FT
WQ-2: 703 CU FT
STORMTRAP WALL
18" OUTFLOW PIPE
OUTFLOW PIPE
1.33' (TYP)
0.50"-DIA ORIFICE BMP-1A
0.58"-DIA ORIFICE BMP-1B
0.30"-DIA ORIFICE BMP-2
DISCHARGE CHAMBER -INCLUDES 0.61"-DIA FLOW CONTROL ORIFICE RISER SIZED TO DRAIN DOWN IN LESS THAN 48 HOURS
WETLAND CHAMBER -WETLAND MEDIA UTILIZING PATENTED HORIZONTAL PERIMETER FLOW BIORETENTION
PRE-TREATMENT CHAMBER -INCLUDES PRE-FILTER MEDIA CARTRIDGES

Area Contributing to:	DMA	BMP	Water Quality Volume	Hydro-modification Volume	MWS
POC-1	DMA-1A	BMP-1A	WQ-1A	HMP-1A	MWS-1A
POC-1	DMA-1B	BMP-1B	WQ-1B	HMP-1B	MWS-1B
POC-1	DMA-2	BMP-2	WQ-2	HMP-2	MWS-2

SUMMARY OF UNDERGROUND DETENTION BASINS, HMP-BMPS:

BMP	Tributary Area[1] (Ac)	DIMENSIONS						
		Water Quality Vault				Hydromod Vault		
		Annotation	BMP Area (ft^2)	LID orifice[3] (in)	Depth (ft)	Annotation	BMP Area[2] (ft^2)	Outlet orifice[4] (in)
BMP-1A	0.55	WQ-1A	379	0.5	4.10	HMP-1A	379	3.5
BMP-1B	0.86	WQ-1B	615	0.58	4.00	HMP-1B	615	4
BMP-2	0.25	WQ-2	187	0.3	3.25	HMP-2	187	4

Notes: (1): IMP Areas are included in the overall DMA.

(2): As the underground system has vertical walls, the area is constant at any depth. Total depth of detention vaults for BMP-1A is 3.90', BMP-1B is 3.55' and BMP-2 is 2.00'ft. Total depth of for BMP-1A IS 9.0', BMP-1B IS 8.50' AND BMP-2 IS 6.25'.

(3): Diameter of LID orifice with invert at bottom of undergound WQ vault; tied with hydromod min threshold (50%Q2) and a maximum 36 hour drawdown time.

(5): Diameter of orifice with invert at bottom of undergound HMP vault; tied with maximum 36 hour drawdown time.

SUMMARY OF TREATMENT CONTROL BMPS:

BMP	Tributary Area[1] (Ac)	DIMENSIONS		
		Volume Provided[2] (ft^3)	Treatment Flow Provided[3] (cfs)	Model Number
MWS-1A	0.55	1,024	0.018	MWS-L-4-4-C-UG
MWS-1B	0.86	1,602	0.025	MWS-L-4-6-V-UG
MWS-2	0.25	703	0.005	MWS-L-4-4-C-UG

Notes: (1): IMP Areas are included in the overall DMA.

(2): For volume-based BMPs

(3): For flow-based BMPs

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CHAPTER 4

MODIFIED-PULS DETENTION ROUTING (SWMM)

4.4 – SWMM Input Data

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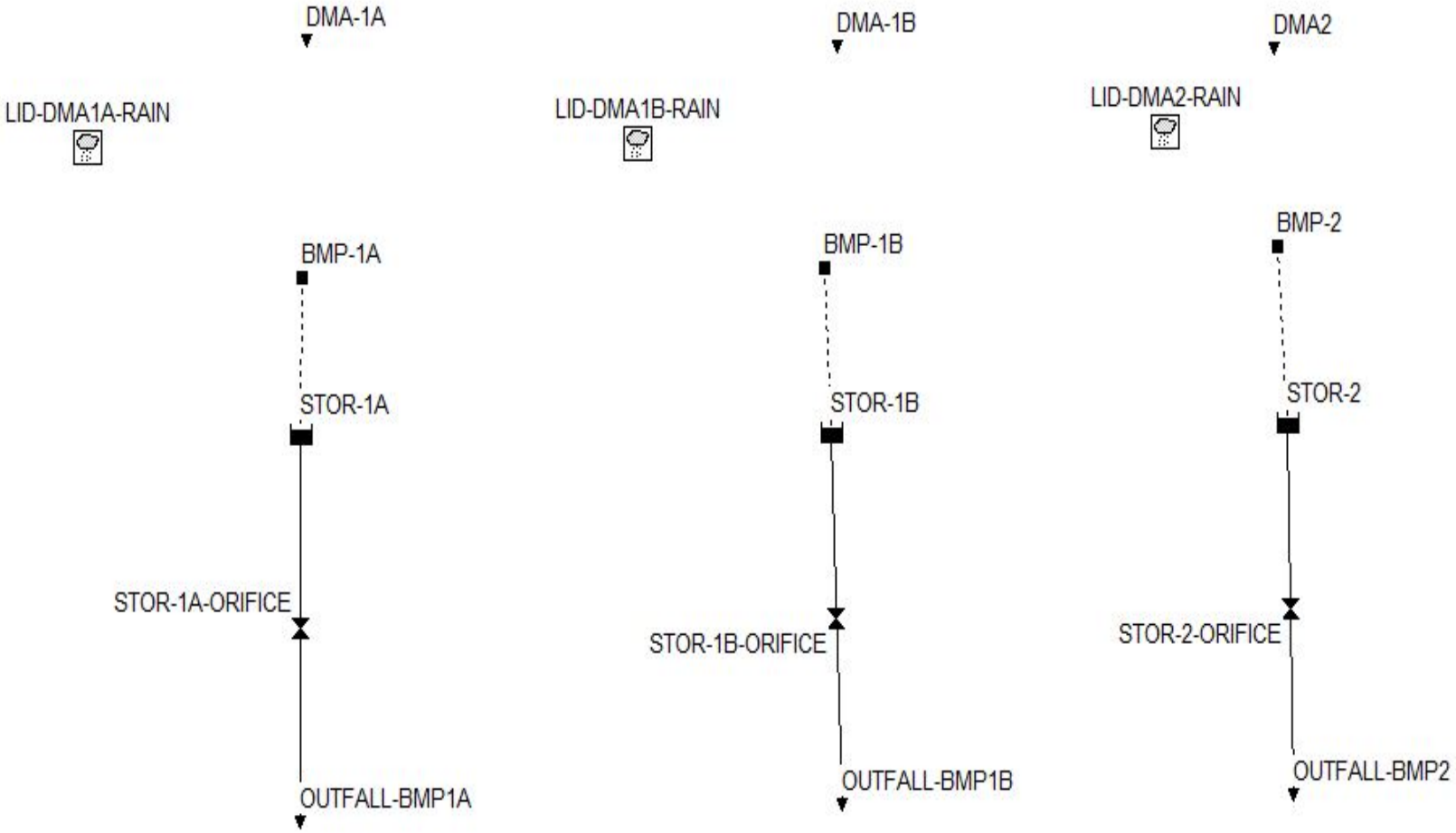
POST-DEV


DMA-1A
LID-DMA1A-RAIN
BMP-1A
STOR-1A
STOR-1A-ORIFICE
OUTFALL-BMP1A
DMA-1B
LID-DMA1B-RAIN
BMP-1B
STOR-1B
STOR-1B-ORIFICE
OUTFALL-BMP1B
DMA2
LID-DMA2-RAIN
BMP-2
STOR-2
STOR-2-ORIFICE
OUTFALL-BMP2

```
 [TITLE]
;;Project Title/Notes
Breeze Luxury Townhomes, Post-Developed Mitigated Runoff Condition

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

START_DATE           01/01/2019
START_TIME           00:00:00
REPORT_START_DATE    01/01/2019
REPORT_START_TIME    00:00:00
END_DATE             01/01/2019
END_TIME             06:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:01:00
WET_STEP             00:01:00
DRY_STEP             00:01:00
ROUTING_STEP         0:01:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          0.03   0.05   0.08   0.11   0.13   0.15   0.15   0.13   0.11   0.08   0.04   0.02
```

```
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
OCEANSIDE        INTENSITY 1:00     1.0      TIMESERIES OCEANSIDE
LID-DMA1A-RAIN   INTENSITY 0:06     1.0      TIMESERIES LID-DMA1A-RAINTS
LID-DMA1B-RAIN   INTENSITY 0:06     1.0      TIMESERIES LID-BMP1B-RAINTS
LID-DMA2-RAIN    INTENSITY 0:05     1.0      TIMESERIES LID-DMA2RAINTS

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ----------------
BMP-1A           LID-DMA1A-RAIN   STOR-1A          0.0087   100      7        0        0
BMP-1B           LID-DMA1B-RAIN   STOR-1B          0.01412  100      19       0        0
BMP-2            LID-DMA2-RAIN    STOR-2           0.00429  100      7        0        0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
BMP-1A           0.012      .10        0.05       0.1        25         OUTLET
BMP-1B           0.012      0.10       0.05       .1         25         OUTLET
BMP-2            0.012      0.10       0.05       .1         25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
BMP-1A           9          0.01875    0.3
BMP-1B           9          0.01875    0.3
BMP-2            9          0.01875    0.3

[LID_CONTROLS]
;;Name           Type/Layer Parameters
;;-------------- ---------- ----------
BMP-1A           RB
BMP-1A           STORAGE    49.2       0.99       0          0
BMP-1A           DRAIN      0.1537     0.5        0          0

BMP-1B           RB
BMP-1B           STORAGE    48         0.75       0.5        0
BMP-1B           DRAIN      0.1508     0.5        0          0

BMP-5            RB
BMP-5            STORAGE    39         0.75       0.5        0
BMP-5            DRAIN      0.1287     0.5        0          0
```

```
[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSat    FromImp    ToPerv     RptFile
DrainTo
;;-------------- ---------------- ------- ---------- ---------- ---------- ---------- ---------- ----------------------
-- ----------------
BMP-1A           BMP-1A           1       378.97     0          0          100        0
BMP-1B           BMP-1B           1       615.07     0          0          0          0
BMP-2            BMP-5            1       186.87     0          0          0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
OUTFALL-BMP1A    0          FREE                        NO
DMA-1A           0          FREE                        NO       BMP-1A
DMA-1B           0          FREE                        NO       BMP-1B
OUTFALL-BMP1B    0          FREE                        NO
DMA2             0          FREE                        NO       BMP-2
OUTFALL-BMP2     0          FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params            N/A      Fevap    Psi      Ksat
IMD
;;-------------- -------- ---------- ---------- ---------- ---------------------------- -------- --------          ---
----- --------
STOR-1A          0        3.9        0          TABULAR    STORAGE-1A                   0        1
STOR-1B          0        4.0        0          TABULAR    STORAGE-1B                   0        1
STOR-2           0        2          0          TABULAR    STORAGE-2                    0        1

[OUTLETS]
;;Name           From Node        To Node          Offset     Type            QTable/Qcoeff    Qexpon     Gated
;;-------------- ---------------- ---------------- ---------- --------------- ---------------- ---------- --------
STOR-1A-ORIFICE  STOR-1A          OUTFALL-BMP1A    0          TABULAR/DEPTH   ORIFICE-1A                  NO
STOR-1B-ORIFICE  STOR-1B          OUTFALL-BMP1B    0          TABULAR/DEPTH   STOR-1BORIFICE             NO
STOR-2-ORIFICE   STOR-2           OUTFALL-BMP2     0          TABULAR/DEPTH   STOR-2ORIFICE              NO

[INFLOWS]
;;Node           Constituent      Time Series      Type     Mfactor  Sfactor  Baseline Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
DMA-1A           FLOW             100YR-DMA1A-RAIN FLOW     1.0      1.0
DMA-1B           FLOW             100YR-DMA1B-RAIN FLOW     1.0      1.0
DMA2             FLOW             100YR-DMA2RAIN   FLOW     1.0      1.0

[CURVES]
;;Name           Type       X-Value    Y-Value
```

```
;;-------------- ---------- ---------- ----------
STOR-1AORIFICE   Rating     0.000      0.000
STOR-1AORIFICE              1.000      0.434
STOR-1AORIFICE              1.900      0.572
STOR-1AORIFICE              2.900      0.718
STOR-1AORIFICE              3.90       0.839
;
STOR-1BORIFICE   Rating     0.000      0.018
STOR-1BORIFICE              1.000      0.455
STOR-1BORIFICE              2.000      0.610
STOR-1BORIFICE              3.000      0.755
STOR-1BORIFICE              4.0        0.876
;
STOR-5-ORIFICE   Rating     0.000      0.016
STOR-5-ORIFICE              1.000      0.453
STOR-5-ORIFICE              2.000      0.609
;
ORIFICE-1A       Rating     0.000      0.014
ORIFICE-1A                  1.000      0.348
ORIFICE-1A                  1.900      0.457
ORIFICE-1A                  2.900      0.570
ORIFICE-1A                  3.900      0.663
;
STOR-2ORIFICE    Rating     0.000      0.018
STOR-2ORIFICE               1.550      0.454
STOR-2ORIFICE               2.550      0.692
;
STORAGE-1A       Storage    0          379
STORAGE-1A                  0.15       379
STORAGE-1A                  0.40       379
STORAGE-1A                  0.65       379
STORAGE-1A                  0.90       379
STORAGE-1A                  1.15       379
STORAGE-1A                  1.40       379
STORAGE-1A                  1.65       379
STORAGE-1A                  1.90       379
STORAGE-1A                  2.15       379
STORAGE-1A                  2.40       379
STORAGE-1A                  2.65       379
STORAGE-1A                  2.90       379
STORAGE-1A                  3.90       379
STORAGE-1A                  4.90       379
;
STORAGE-1B       Storage    0          615
STORAGE-1B                  0.25       615
```

```
STORAGE-1B                0.50       615
STORAGE-1B                0.75       615
STORAGE-1B                1.00       615
STORAGE-1B                1.25       615
STORAGE-1B                1.50       615
STORAGE-1B                1.75       615
STORAGE-1B                2.00       615
STORAGE-1B                2.25       615
STORAGE-1B                2.50       615
STORAGE-1B                2.75       615
STORAGE-1B                3.00       615
STORAGE-1B                4.00       615
;
STORAGE-2        Storage  0          187
STORAGE-2                 0.25       187
STORAGE-2                 0.50       187
STORAGE-2                 0.75       187
STORAGE-2                 1.00       187
STORAGE-2                 1.25       187
STORAGE-2                 1.50       187
STORAGE-2                 1.75       187
STORAGE-2                 2.00       187
STORAGE-2                 2.25       187
STORAGE-2                 2.55       187
STORAGE-2                 2.75       187

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
OCEANSIDE        FILE "K:\Library\Stormwater\SWMM\RAIN GAGES\Oceanside Rain Data.dat"
;
100YR-DMA1A-RAIN            0:00       0
100YR-DMA1A-RAIN            0:06       0.1
100YR-DMA1A-RAIN            0:12       0.1
100YR-DMA1A-RAIN            0:18       0.1
100YR-DMA1A-RAIN            0:24       0.1
100YR-DMA1A-RAIN            0:30       0.1
100YR-DMA1A-RAIN            0:36       0.1
100YR-DMA1A-RAIN            0:42       0.1
100YR-DMA1A-RAIN            0:48       0.1
100YR-DMA1A-RAIN            0:54       0.1
100YR-DMA1A-RAIN            1:00       0.1
100YR-DMA1A-RAIN            1:06       0.1
100YR-DMA1A-RAIN            1:12       0.1
100YR-DMA1A-RAIN            1:18       0.1
```

```
100YR-DMA1A-RAIN          1:24      0.1
100YR-DMA1A-RAIN          1:30      0.1
100YR-DMA1A-RAIN          1:36      0.1
100YR-DMA1A-RAIN          1:42      0.1
100YR-DMA1A-RAIN          1:48      0.1
100YR-DMA1A-RAIN          1:54      0.1
100YR-DMA1A-RAIN          2:00      0.1
100YR-DMA1A-RAIN          2:06      0.1
100YR-DMA1A-RAIN          2:12      0.1
100YR-DMA1A-RAIN          2:18      0.1
100YR-DMA1A-RAIN          2:24      0.1
100YR-DMA1A-RAIN          2:30      0.2
100YR-DMA1A-RAIN          2:36      0.2
100YR-DMA1A-RAIN          2:42      0.2
100YR-DMA1A-RAIN          2:48      0.2
100YR-DMA1A-RAIN          2:54      0.2
100YR-DMA1A-RAIN          3:00      0.2
100YR-DMA1A-RAIN          3:06      0.2
100YR-DMA1A-RAIN          3:12      0.2
100YR-DMA1A-RAIN          3:18      0.3
100YR-DMA1A-RAIN          3:24      0.3
100YR-DMA1A-RAIN          3:30      0.3
100YR-DMA1A-RAIN          3:36      0.3
100YR-DMA1A-RAIN          3:42      0.4
100YR-DMA1A-RAIN          3:48      0.5
100YR-DMA1A-RAIN          3:54      0.7
100YR-DMA1A-RAIN          4:00      0.9
100YR-DMA1A-RAIN          4:06      3.41
100YR-DMA1A-RAIN          4:12      0.5
100YR-DMA1A-RAIN          4:18      0.4
100YR-DMA1A-RAIN          4:24      0.3
100YR-DMA1A-RAIN          4:30      0.2
100YR-DMA1A-RAIN          4:36      0.2
100YR-DMA1A-RAIN          4:42      0.2
100YR-DMA1A-RAIN          4:48      0.2
100YR-DMA1A-RAIN          4:54      0.2
100YR-DMA1A-RAIN          5:00      0.1
100YR-DMA1A-RAIN          5:06      0.1
100YR-DMA1A-RAIN          5:12      0.1
100YR-DMA1A-RAIN          5:18      0.1
100YR-DMA1A-RAIN          5:24      0.1
100YR-DMA1A-RAIN          5:30      0.1
100YR-DMA1A-RAIN          5:36      0.1
100YR-DMA1A-RAIN          5:42      0.1
100YR-DMA1A-RAIN          5:48      0.1
```

```
100YR-DMA1A-RAIN          5:54       0.1
100YR-DMA1A-RAIN          6:00       0.1
100YR-DMA1A-RAIN          6:06       0
;
100YR-DMA1B-RAIN          0:00       0
100YR-DMA1B-RAIN          0:06       0.1
100YR-DMA1B-RAIN          0:12       0.1
100YR-DMA1B-RAIN          0:18       0.1
100YR-DMA1B-RAIN          0:24       0.1
100YR-DMA1B-RAIN          0:30       0.1
100YR-DMA1B-RAIN          0:36       0.1
100YR-DMA1B-RAIN          0:42       0.1
100YR-DMA1B-RAIN          0:48       0.1
100YR-DMA1B-RAIN          0:54       0.1
100YR-DMA1B-RAIN          1:00       0.1
100YR-DMA1B-RAIN          1:06       0.1
100YR-DMA1B-RAIN          1:12       0.1
100YR-DMA1B-RAIN          1:18       0.1
100YR-DMA1B-RAIN          1:24       0.2
100YR-DMA1B-RAIN          1:30       0.2
100YR-DMA1B-RAIN          1:36       0.2
100YR-DMA1B-RAIN          1:42       0.2
100YR-DMA1B-RAIN          1:48       0.2
100YR-DMA1B-RAIN          1:54       0.2
100YR-DMA1B-RAIN          2:00       0.2
100YR-DMA1B-RAIN          2:06       0.2
100YR-DMA1B-RAIN          2:12       0.2
100YR-DMA1B-RAIN          2:18       0.2
100YR-DMA1B-RAIN          2:24       0.2
100YR-DMA1B-RAIN          2:30       0.2
100YR-DMA1B-RAIN          2:36       0.2
100YR-DMA1B-RAIN          2:42       0.2
100YR-DMA1B-RAIN          2:48       0.2
100YR-DMA1B-RAIN          2:54       0.3
100YR-DMA1B-RAIN          3:00       0.3
100YR-DMA1B-RAIN          3:06       0.3
100YR-DMA1B-RAIN          3:12       0.3
100YR-DMA1B-RAIN          3:18       0.3
100YR-DMA1B-RAIN          3:24       0.4
100YR-DMA1B-RAIN          3:30       0.4
100YR-DMA1B-RAIN          3:36       0.4
100YR-DMA1B-RAIN          3:42       0.5
100YR-DMA1B-RAIN          3:48       0.6
100YR-DMA1B-RAIN          3:54       0.9
100YR-DMA1B-RAIN          4:00       1.4
```

```
100YR-DMA1B-RAIN          4:06      4.48
100YR-DMA1B-RAIN          4:12      0.7
100YR-DMA1B-RAIN          4:18      0.5
100YR-DMA1B-RAIN          4:24      0.4
100YR-DMA1B-RAIN          4:30      0.3
100YR-DMA1B-RAIN          4:36      0.3
100YR-DMA1B-RAIN          4:42      0.3
100YR-DMA1B-RAIN          4:48      0.2
100YR-DMA1B-RAIN          4:54      0.2
100YR-DMA1B-RAIN          5:00      0.2
100YR-DMA1B-RAIN          5:06      0.2
100YR-DMA1B-RAIN          5:12      0.2
100YR-DMA1B-RAIN          5:18      0.2
100YR-DMA1B-RAIN          5:24      0.2
100YR-DMA1B-RAIN          5:30      0.1
100YR-DMA1B-RAIN          5:36      0.1
100YR-DMA1B-RAIN          5:42      0.1
100YR-DMA1B-RAIN          5:48      0.1
100YR-DMA1B-RAIN          5:54      0.1
100YR-DMA1B-RAIN          6:00      0.1
100YR-DMA1B-RAIN          6:06      0
;
LID-DMA1A-RAIN            0:00      0
LID-DMA1A-RAIN            0:06      0
LID-DMA1A-RAIN            0:12      0
LID-DMA1A-RAIN            0:18      0
LID-DMA1A-RAIN            0:24      0
LID-DMA1A-RAIN            0:30      0
LID-DMA1A-RAIN            0:36      0
LID-DMA1A-RAIN            0:42      0
LID-DMA1A-RAIN            0:48      0
LID-DMA1A-RAIN            0:54      0
LID-DMA1A-RAIN            1:00      0
LID-DMA1A-RAIN            1:06      0
LID-DMA1A-RAIN            1:12      0
LID-DMA1A-RAIN            1:18      0
LID-DMA1A-RAIN            1:24      0
LID-DMA1A-RAIN            1:30      0
LID-DMA1A-RAIN            1:36      0
LID-DMA1A-RAIN            1:42      0
LID-DMA1A-RAIN            1:48      0
LID-DMA1A-RAIN            1:54      0
LID-DMA1A-RAIN            2:00      0
LID-DMA1A-RAIN            2:06      0
LID-DMA1A-RAIN            2:12      0
```

```
LID-DMA1A-RAIN             2:18       0
LID-DMA1A-RAIN             2:24       0
LID-DMA1A-RAIN             2:30       0
LID-DMA1A-RAIN             2:36       0
LID-DMA1A-RAIN             2:42       0
LID-DMA1A-RAIN             2:48       0
LID-DMA1A-RAIN             2:54       0
LID-DMA1A-RAIN             3:00       0
LID-DMA1A-RAIN             3:06       0
LID-DMA1A-RAIN             3:12       0
LID-DMA1A-RAIN             3:18       0.1
LID-DMA1A-RAIN             3:24       0.1
LID-DMA1A-RAIN             3:30       0.1
LID-DMA1A-RAIN             3:36       0.1
LID-DMA1A-RAIN             3:42       0.1
LID-DMA1A-RAIN             3:48       0.1
LID-DMA1A-RAIN             3:54       0.1
LID-DMA1A-RAIN             4:00       0.6
LID-DMA1A-RAIN             4:06       0.29
LID-DMA1A-RAIN             4:12       0.1
LID-DMA1A-RAIN             4:18       0.1
LID-DMA1A-RAIN             4:24       0.1
LID-DMA1A-RAIN             4:30       0
LID-DMA1A-RAIN             4:36       0
LID-DMA1A-RAIN             4:42       0
LID-DMA1A-RAIN             4:48       0
LID-DMA1A-RAIN             4:54       0
LID-DMA1A-RAIN             5:00       0
LID-DMA1A-RAIN             5:06       0
LID-DMA1A-RAIN             5:12       0
LID-DMA1A-RAIN             5:18       0
LID-DMA1A-RAIN             5:24       0
LID-DMA1A-RAIN             5:30       0
LID-DMA1A-RAIN             5:36       0
LID-DMA1A-RAIN             5:42       0
LID-DMA1A-RAIN             5:48       0
LID-DMA1A-RAIN             5:54       0
LID-DMA1A-RAIN             6:00       0
LID-DMA1A-RAIN             6:06       0
;
LID-DMA1A-RAINTS           0:00       0
LID-DMA1A-RAINTS           0:06       0
LID-DMA1A-RAINTS           0:12       0
LID-DMA1A-RAINTS           0:18       0
LID-DMA1A-RAINTS           0:24       0
```

```
LID-DMA1A-RAINTS          0:30      0
LID-DMA1A-RAINTS          0:36      0
LID-DMA1A-RAINTS          0:42      0
LID-DMA1A-RAINTS          0:48      0
LID-DMA1A-RAINTS          0:54      0
LID-DMA1A-RAINTS          1:00      0
LID-DMA1A-RAINTS          1:06      0
LID-DMA1A-RAINTS          1:12      0
LID-DMA1A-RAINTS          1:18      0
LID-DMA1A-RAINTS          1:24      0
LID-DMA1A-RAINTS          1:30      0
LID-DMA1A-RAINTS          1:36      0
LID-DMA1A-RAINTS          1:42      0
LID-DMA1A-RAINTS          1:48      0
LID-DMA1A-RAINTS          1:54      0
LID-DMA1A-RAINTS          2:00      0
LID-DMA1A-RAINTS          2:06      0
LID-DMA1A-RAINTS          2:12      0
LID-DMA1A-RAINTS          2:18      0
LID-DMA1A-RAINTS          2:24      0
LID-DMA1A-RAINTS          2:30      0
LID-DMA1A-RAINTS          2:36      0
LID-DMA1A-RAINTS          2:42      0
LID-DMA1A-RAINTS          2:48      0
LID-DMA1A-RAINTS          2:54      0
LID-DMA1A-RAINTS          3:00      0
LID-DMA1A-RAINTS          3:06      0
LID-DMA1A-RAINTS          3:12      0
LID-DMA1A-RAINTS          3:18      0.1
LID-DMA1A-RAINTS          3:24      0.1
LID-DMA1A-RAINTS          3:30      0.1
LID-DMA1A-RAINTS          3:36      0.1
LID-DMA1A-RAINTS          3:42      0.1
LID-DMA1A-RAINTS          3:48      0.1
LID-DMA1A-RAINTS          3:54      0.1
LID-DMA1A-RAINTS          4:00      0.6
LID-DMA1A-RAINTS          4:06      0.29
LID-DMA1A-RAINTS          4:12      0.1
LID-DMA1A-RAINTS          4:18      0.1
LID-DMA1A-RAINTS          4:24      0.1
LID-DMA1A-RAINTS          4:30      0
LID-DMA1A-RAINTS          4:36      0
LID-DMA1A-RAINTS          4:42      0
LID-DMA1A-RAINTS          4:48      0
LID-DMA1A-RAINTS          4:54      0
```

```
LID-DMA1A-RAINTS           5:00       0
LID-DMA1A-RAINTS           5:06       0
LID-DMA1A-RAINTS           5:12       0
LID-DMA1A-RAINTS           5:18       0
LID-DMA1A-RAINTS           5:24       0
LID-DMA1A-RAINTS           5:30       0
LID-DMA1A-RAINTS           5:36       0
LID-DMA1A-RAINTS           5:42       0
LID-DMA1A-RAINTS           5:48       0
LID-DMA1A-RAINTS           5:54       0
LID-DMA1A-RAINTS           6:00       0
LID-DMA1A-RAINTS           6:06       0
;
LID-BMP1B-RAINTS           0:00       0
LID-BMP1B-RAINTS           0:06       0
LID-BMP1B-RAINTS           0:12       0
LID-BMP1B-RAINTS           0:18       0
LID-BMP1B-RAINTS           0:24       0
LID-BMP1B-RAINTS           0:30       0
LID-BMP1B-RAINTS           0:36       0
LID-BMP1B-RAINTS           0:42       0
LID-BMP1B-RAINTS           0:48       0
LID-BMP1B-RAINTS           0:54       0
LID-BMP1B-RAINTS           1:00       0
LID-BMP1B-RAINTS           1:06       0
LID-BMP1B-RAINTS           1:12       0
LID-BMP1B-RAINTS           1:18       0
LID-BMP1B-RAINTS           1:24       0
LID-BMP1B-RAINTS           1:30       0
LID-BMP1B-RAINTS           1:36       0
LID-BMP1B-RAINTS           1:42       0
LID-BMP1B-RAINTS           1:48       0
LID-BMP1B-RAINTS           1:54       0
LID-BMP1B-RAINTS           2:00       0
LID-BMP1B-RAINTS           2:06       0
LID-BMP1B-RAINTS           2:12       0
LID-BMP1B-RAINTS           2:18       0
LID-BMP1B-RAINTS           2:24       0
LID-BMP1B-RAINTS           2:30       0
LID-BMP1B-RAINTS           2:36       0
LID-BMP1B-RAINTS           2:42       0
LID-BMP1B-RAINTS           2:48       0
LID-BMP1B-RAINTS           2:54       0
LID-BMP1B-RAINTS           3:00       0
LID-BMP1B-RAINTS           3:06       0
```

```
LID-BMP1B-RAINTS          3:12      0.1
LID-BMP1B-RAINTS          3:18      0.1
LID-BMP1B-RAINTS          3:24      0.1
LID-BMP1B-RAINTS          3:30      0.1
LID-BMP1B-RAINTS          3:36      0.1
LID-BMP1B-RAINTS          3:42      0.1
LID-BMP1B-RAINTS          3:48      0.1
LID-BMP1B-RAINTS          3:54      0.2
LID-BMP1B-RAINTS          4:00      0.7
LID-BMP1B-RAINTS          4:06      0.28
LID-BMP1B-RAINTS          4:12      0.1
LID-BMP1B-RAINTS          4:18      0.1
LID-BMP1B-RAINTS          4:24      0.1
LID-BMP1B-RAINTS          4:30      0.1
LID-BMP1B-RAINTS          4:36      0
LID-BMP1B-RAINTS          4:42      0
LID-BMP1B-RAINTS          4:48      0
LID-BMP1B-RAINTS          4:54      0
LID-BMP1B-RAINTS          5:00      0
LID-BMP1B-RAINTS          5:06      0
LID-BMP1B-RAINTS          5:12      0
LID-BMP1B-RAINTS          5:18      0
LID-BMP1B-RAINTS          5:24      0
LID-BMP1B-RAINTS          5:30      0
LID-BMP1B-RAINTS          5:36      0
LID-BMP1B-RAINTS          5:42      0
LID-BMP1B-RAINTS          5:48      0
LID-BMP1B-RAINTS          5:54      0
LID-BMP1B-RAINTS          6:00      0
LID-BMP1B-RAINTS          6:06      0
;
100YR-DMA5-RAIN           0:00      0
100YR-DMA5-RAIN           0:05      0
100YR-DMA5-RAIN           0:10      0
100YR-DMA5-RAIN           0:15      0
100YR-DMA5-RAIN           0:20      0
100YR-DMA5-RAIN           0:25      0
100YR-DMA5-RAIN           0:30      0
100YR-DMA5-RAIN           0:35      0
100YR-DMA5-RAIN           0:40      0
100YR-DMA5-RAIN           0:45      0
100YR-DMA5-RAIN           0:50      0
100YR-DMA5-RAIN           0:55      0
100YR-DMA5-RAIN           1:00      0
100YR-DMA5-RAIN           1:05      0
```

```
100YR-DMA5-RAIN            1:10      0
100YR-DMA5-RAIN            1:15      0
100YR-DMA5-RAIN            1:20      0
100YR-DMA5-RAIN            1:25      0
100YR-DMA5-RAIN            1:30      0
100YR-DMA5-RAIN            1:35      0
100YR-DMA5-RAIN            1:40      0
100YR-DMA5-RAIN            1:45      0
100YR-DMA5-RAIN            1:50      0
100YR-DMA5-RAIN            1:55      0.1
100YR-DMA5-RAIN            2:00      0.1
100YR-DMA5-RAIN            2:05      0.1
100YR-DMA5-RAIN            2:10      0.1
100YR-DMA5-RAIN            2:15      0.1
100YR-DMA5-RAIN            2:20      0.1
100YR-DMA5-RAIN            2:25      0.1
100YR-DMA5-RAIN            2:30      0.1
100YR-DMA5-RAIN            2:35      0.1
100YR-DMA5-RAIN            2:40      0.1
100YR-DMA5-RAIN            2:45      0.1
100YR-DMA5-RAIN            2:50      0.1
100YR-DMA5-RAIN            2:55      0.1
100YR-DMA5-RAIN            3:00      0.1
100YR-DMA5-RAIN            3:05      0.1
100YR-DMA5-RAIN            3:10      0.1
100YR-DMA5-RAIN            3:15      0.1
100YR-DMA5-RAIN            3:20      0.1
100YR-DMA5-RAIN            3:25      0.1
100YR-DMA5-RAIN            3:30      0.1
100YR-DMA5-RAIN            3:35      0.1
100YR-DMA5-RAIN            3:40      0.1
100YR-DMA5-RAIN            3:45      0.2
100YR-DMA5-RAIN            3:50      0.2
100YR-DMA5-RAIN            3:55      0.3
100YR-DMA5-RAIN            4:00      0.4
100YR-DMA5-RAIN            4:05      1.54
100YR-DMA5-RAIN            4:10      0.2
100YR-DMA5-RAIN            4:15      0.1
100YR-DMA5-RAIN            4:20      0.1
100YR-DMA5-RAIN            4:25      0.1
100YR-DMA5-RAIN            4:30      0.1
100YR-DMA5-RAIN            4:35      0.1
100YR-DMA5-RAIN            4:40      0.1
100YR-DMA5-RAIN            4:45      0.1
100YR-DMA5-RAIN            4:50      0.1
```

```
100YR-DMA5-RAIN          4:55      0.1
100YR-DMA5-RAIN          5:00      0.1
100YR-DMA5-RAIN          5:05      0.1
100YR-DMA5-RAIN          5:10      0.1
100YR-DMA5-RAIN          5:15      0
100YR-DMA5-RAIN          5:20      0
100YR-DMA5-RAIN          5:25      0
100YR-DMA5-RAIN          5:30      0
100YR-DMA5-RAIN          5:35      0
100YR-DMA5-RAIN          5:40      0
100YR-DMA5-RAIN          5:45      0
100YR-DMA5-RAIN          5:50      0
100YR-DMA5-RAIN          5:55      0
100YR-DMA5-RAIN          6:00      0
100YR-DMA5-RAIN          6:05      0
;
LID-DMA5-RAINTS          0:00      0
LID-DMA5-RAINTS          0:05      0
LID-DMA5-RAINTS          0:10      0
LID-DMA5-RAINTS          0:15      0
LID-DMA5-RAINTS          0:20      0
LID-DMA5-RAINTS          0:25      0
LID-DMA5-RAINTS          0:30      0
LID-DMA5-RAINTS          0:35      0
LID-DMA5-RAINTS          0:40      0
LID-DMA5-RAINTS          0:45      0
LID-DMA5-RAINTS          0:50      0
LID-DMA5-RAINTS          0:55      0
LID-DMA5-RAINTS          1:00      0
LID-DMA5-RAINTS          1:05      0
LID-DMA5-RAINTS          1:10      0
LID-DMA5-RAINTS          1:15      0
LID-DMA5-RAINTS          1:20      0
LID-DMA5-RAINTS          1:25      0
LID-DMA5-RAINTS          1:30      0
LID-DMA5-RAINTS          1:35      0
LID-DMA5-RAINTS          1:40      0
LID-DMA5-RAINTS          1:45      0
LID-DMA5-RAINTS          1:50      0
LID-DMA5-RAINTS          1:55      0
LID-DMA5-RAINTS          2:00      0
LID-DMA5-RAINTS          2:05      0
LID-DMA5-RAINTS          2:10      0
LID-DMA5-RAINTS          2:15      0
LID-DMA5-RAINTS          2:20      0
```

```
LID-DMA5-RAINTS           2:25       0
LID-DMA5-RAINTS           2:30       0
LID-DMA5-RAINTS           2:35       0
LID-DMA5-RAINTS           2:40       0
LID-DMA5-RAINTS           2:45       0
LID-DMA5-RAINTS           2:50       0
LID-DMA5-RAINTS           2:55       0
LID-DMA5-RAINTS           3:00       0
LID-DMA5-RAINTS           3:05       0
LID-DMA5-RAINTS           3:10       0
LID-DMA5-RAINTS           3:15       0
LID-DMA5-RAINTS           3:20       0
LID-DMA5-RAINTS           3:25       0
LID-DMA5-RAINTS           3:30       0
LID-DMA5-RAINTS           3:35       0
LID-DMA5-RAINTS           3:40       0
LID-DMA5-RAINTS           3:45       0
LID-DMA5-RAINTS           3:50       0
LID-DMA5-RAINTS           3:55       0.1
LID-DMA5-RAINTS           4:00       0.3
LID-DMA5-RAINTS           4:05       0.13
LID-DMA5-RAINTS           4:10       0.1
LID-DMA5-RAINTS           4:15       0
LID-DMA5-RAINTS           4:20       0
LID-DMA5-RAINTS           4:25       0
LID-DMA5-RAINTS           4:30       0
LID-DMA5-RAINTS           4:35       0
LID-DMA5-RAINTS           4:40       0
LID-DMA5-RAINTS           4:45       0
LID-DMA5-RAINTS           4:50       0
LID-DMA5-RAINTS           4:55       0
LID-DMA5-RAINTS           5:00       0
LID-DMA5-RAINTS           5:05       0
LID-DMA5-RAINTS           5:10       0
LID-DMA5-RAINTS           5:15       0
LID-DMA5-RAINTS           5:20       0
LID-DMA5-RAINTS           5:25       0
LID-DMA5-RAINTS           5:30       0
LID-DMA5-RAINTS           5:35       0
LID-DMA5-RAINTS           5:40       0
LID-DMA5-RAINTS           5:45       0
LID-DMA5-RAINTS           5:50       0
LID-DMA5-RAINTS           5:55       0
LID-DMA5-RAINTS           6:00       0
;
```

```
LID-DMA2RAINTS             0:00       0
LID-DMA2RAINTS             0:05       0
LID-DMA2RAINTS             0:10       0
LID-DMA2RAINTS             0:15       0
LID-DMA2RAINTS             0:20       0
LID-DMA2RAINTS             0:25       0
LID-DMA2RAINTS             0:30       0
LID-DMA2RAINTS             0:35       0
LID-DMA2RAINTS             0:40       0
LID-DMA2RAINTS             0:45       0
LID-DMA2RAINTS             0:50       0
LID-DMA2RAINTS             0:55       0
LID-DMA2RAINTS             1:00       0
LID-DMA2RAINTS             1:05       0
LID-DMA2RAINTS             1:10       0
LID-DMA2RAINTS             1:15       0
LID-DMA2RAINTS             1:20       0
LID-DMA2RAINTS             1:25       0
LID-DMA2RAINTS             1:30       0
LID-DMA2RAINTS             1:35       0
LID-DMA2RAINTS             1:40       0
LID-DMA2RAINTS             1:45       0
LID-DMA2RAINTS             1:50       0
LID-DMA2RAINTS             1:55       0
LID-DMA2RAINTS             2:00       0
LID-DMA2RAINTS             2:05       0
LID-DMA2RAINTS             2:10       0
LID-DMA2RAINTS             2:15       0
LID-DMA2RAINTS             2:20       0
LID-DMA2RAINTS             2:25       0
LID-DMA2RAINTS             2:30       0
LID-DMA2RAINTS             2:35       0
LID-DMA2RAINTS             2:40       0
LID-DMA2RAINTS             2:45       0
LID-DMA2RAINTS             2:50       0
LID-DMA2RAINTS             2:55       0
LID-DMA2RAINTS             3:00       0
LID-DMA2RAINTS             3:05       0
LID-DMA2RAINTS             3:10       0
LID-DMA2RAINTS             3:15       0
LID-DMA2RAINTS             3:20       0
LID-DMA2RAINTS             3:25       0
LID-DMA2RAINTS             3:30       0
LID-DMA2RAINTS             3:35       0
LID-DMA2RAINTS             3:40       0
```

```
LID-DMA2RAINTS          3:45      0
LID-DMA2RAINTS          3:50      0
LID-DMA2RAINTS          3:55      0.1
LID-DMA2RAINTS          4:00      0.3
LID-DMA2RAINTS          4:05      0.13
LID-DMA2RAINTS          4:10      0.1
LID-DMA2RAINTS          4:15      0
LID-DMA2RAINTS          4:20      0
LID-DMA2RAINTS          4:25      0
LID-DMA2RAINTS          4:30      0
LID-DMA2RAINTS          4:35      0
LID-DMA2RAINTS          4:40      0
LID-DMA2RAINTS          4:45      0
LID-DMA2RAINTS          4:50      0
LID-DMA2RAINTS          4:55      0
LID-DMA2RAINTS          5:00      0
LID-DMA2RAINTS          5:05      0
LID-DMA2RAINTS          5:10      0
LID-DMA2RAINTS          5:15      0
LID-DMA2RAINTS          5:20      0
LID-DMA2RAINTS          5:25      0
LID-DMA2RAINTS          5:30      0
LID-DMA2RAINTS          5:35      0
LID-DMA2RAINTS          5:40      0
LID-DMA2RAINTS          5:45      0
LID-DMA2RAINTS          5:50      0
LID-DMA2RAINTS          5:55      0
LID-DMA2RAINTS          6:00      0
LID-DMA2RAINTS          6:05      0
;
100YR-DMA2RAIN          0:00      0
100YR-DMA2RAIN          0:05      0
100YR-DMA2RAIN          0:10      0
100YR-DMA2RAIN          0:15      0
100YR-DMA2RAIN          0:20      0
100YR-DMA2RAIN          0:25      0
100YR-DMA2RAIN          0:30      0
100YR-DMA2RAIN          0:35      0
100YR-DMA2RAIN          0:40      0
100YR-DMA2RAIN          0:45      0
100YR-DMA2RAIN          0:50      0
100YR-DMA2RAIN          0:55      0
100YR-DMA2RAIN          1:00      0
100YR-DMA2RAIN          1:05      0
100YR-DMA2RAIN          1:10      0
```

```
100YR-DMA2RAIN            1:15      0
100YR-DMA2RAIN            1:20      0
100YR-DMA2RAIN            1:25      0
100YR-DMA2RAIN            1:30      0
100YR-DMA2RAIN            1:35      0
100YR-DMA2RAIN            1:40      0
100YR-DMA2RAIN            1:45      0
100YR-DMA2RAIN            1:50      0
100YR-DMA2RAIN            1:55      0.1
100YR-DMA2RAIN            2:00      0.1
100YR-DMA2RAIN            2:05      0.1
100YR-DMA2RAIN            2:10      0.1
100YR-DMA2RAIN            2:15      0.1
100YR-DMA2RAIN            2:20      0.1
100YR-DMA2RAIN            2:25      0.1
100YR-DMA2RAIN            2:30      0.1
100YR-DMA2RAIN            2:35      0.1
100YR-DMA2RAIN            2:40      0.1
100YR-DMA2RAIN            2:45      0.1
100YR-DMA2RAIN            2:50      0.1
100YR-DMA2RAIN            2:55      0.1
100YR-DMA2RAIN            3:00      0.1
100YR-DMA2RAIN            3:05      0.1
100YR-DMA2RAIN            3:10      0.1
100YR-DMA2RAIN            3:15      0.1
100YR-DMA2RAIN            3:20      0.1
100YR-DMA2RAIN            3:25      0.1
100YR-DMA2RAIN            3:30      0.1
100YR-DMA2RAIN            3:35      0.1
100YR-DMA2RAIN            3:40      0.1
100YR-DMA2RAIN            3:45      0.2
100YR-DMA2RAIN            3:50      0.2
100YR-DMA2RAIN            3:55      0.3
100YR-DMA2RAIN            4:00      0.4
100YR-DMA2RAIN            4:05      1.54
100YR-DMA2RAIN            4:10      0.2
100YR-DMA2RAIN            4:15      0.1
100YR-DMA2RAIN            4:20      0.1
100YR-DMA2RAIN            4:25      0.1
100YR-DMA2RAIN            4:30      0.1
100YR-DMA2RAIN            4:35      0.1
100YR-DMA2RAIN            4:40      0.1
100YR-DMA2RAIN            4:45      0.1
100YR-DMA2RAIN            4:50      0.1
100YR-DMA2RAIN            4:55      0.1
```

```
100YR-DMA2RAIN              5:00       0.1
100YR-DMA2RAIN              5:05       0.1
100YR-DMA2RAIN              5:10       0.1
100YR-DMA2RAIN              5:15       0
100YR-DMA2RAIN              5:20       0
100YR-DMA2RAIN              5:25       0
100YR-DMA2RAIN              5:30       0
100YR-DMA2RAIN              5:35       0
100YR-DMA2RAIN              5:40       0
100YR-DMA2RAIN              5:45       0
100YR-DMA2RAIN              5:50       0
100YR-DMA2RAIN              5:55       0
100YR-DMA2RAIN              6:00       0
100YR-DMA2RAIN              6:05       0

[REPORT]
;;Reporting Options
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 191.920 4920.830 1021.827 5718.627
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OUTFALL-BMP1A    99.027             5255.922
DMA-1A           102.499            5611.849
DMA-1B           395.054            5609.245
OUTFALL-BMP1B    397.658            5263.735
DMA2             635.521            5608.376
OUTFALL-BMP2     645.939            5268.076
STOR-1A          99.027             5431.281
STOR-1B          391.581            5432.149
STOR-2           642.529            5436.947

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

```
[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
BMP-1A           99.895             5504.203
BMP-1B           388.977            5507.675
BMP-1B           385.504            5509.411
BMP-2            637.257            5518.093

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OCEANSIDE        757.548            5779.526
LID-DMA1A-RAIN   -16.867            5561.498
LID-DMA1B-RAIN   285.671            5563.235
LID-DMA2-RAIN    576.924            5568.443
```

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CHAPTER 4

MODIFIED-PULS DETENTION ROUTING (SWMM)

4.5 – SWMM Summary Report

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```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)
  ---------------------------------------------------------------

  Breeze Luxury Townhomes, Post-Developed Mitigated Runoff Condition


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

  ****************
  Analysis Options
  ****************
  Flow Units ............... CFS
  Process Models:
    Rainfall/Runoff ........ YES
    RDII ................... NO
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... YES
    Ponding Allowed ........ NO
    Water Quality .......... NO
  Infiltration Method ...... GREEN_AMPT
  Flow Routing Method ...... KINWAVE
  Starting Date ............ 01/01/2019 00:00:00
  Ending Date .............. 01/01/2019 06:00:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 00:01:00
  Wet Time Step ............ 00:01:00
  Dry Time Step ............ 00:01:00
  Routing Time Step ........ 60.00 sec


  *************************        Volume         Depth
  Runoff Quantity Continuity     acre-feet        inches
  *************************     ---------       -------
  Total Precipitation ......         0.000         0.188
  Outfall Runon ............         0.321       142.079
  Evaporation Loss .........         0.000         0.000
  Infiltration Loss ........         0.000         0.000
  Surface Runoff ...........         0.206        91.019
  LID Drainage .............         0.010         4.376
```

```
Final Storage ............          0.106        46.868
Continuity Error (%) .....          0.000


**************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------     ---------
Dry Weather Inflow .......          0.000         0.000
Wet Weather Inflow .......          0.215         0.070
Groundwater Inflow .......          0.000         0.000
RDII Inflow ..............          0.000         0.000
External Inflow ..........          0.321         0.105
External Outflow .........          0.523         0.170
Flooding Loss ............          0.005         0.002
Evaporation Loss .........          0.000         0.000
Exfiltration Loss ........          0.000         0.000
Initial Stored Volume ....          0.000         0.000
Final Stored Volume ......          0.008         0.003
Continuity Error (%) .....         -0.054


*******************************
Highest Flow Instability Indexes
*******************************
Link STOR-1B-ORIFICE (38)
Link STOR-1A-ORIFICE (38)
Link STOR-2-ORIFICE (21)


************************
Routing Time Step Summary
************************
Minimum Time Step           :    60.00 sec
Average Time Step           :    60.00 sec
Maximum Time Step           :    60.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     1.00
Percent Not Converging      :     0.00


**************************
Subcatchment Runoff Summary
**************************

-----------------------------------------------------------------------------------------------------
```

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
BMP-1A	0.19	163.40	0.00	0.00	114.39	0.03	3.41	0.699
BMP-1B	0.23	135.59	0.00	0.00	87.81	0.03	4.48	0.647
BMP-2	0.05	120.21	0.00	0.00	81.84	0.01	1.54	0.681

****
LID Performance Summary
****

Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Initial Storage in	Final Storage in	Continuity Error %
BMP-1A	BMP-1A	163.59	0.00	0.00	109.48	4.91	0.00	49.20	-0.00
BMP-1B	BMP-1B	135.81	0.00	0.00	83.30	4.52	0.00	48.00	0.00
BMP-2	BMP-5	120.26	0.00	0.00	79.02	2.83	0.00	38.43	-0.01

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
OUTFALL-BMP1A	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
DMA-1A	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
DMA-1B	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
OUTFALL-BMP1B	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
DMA2	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
OUTFALL-BMP2	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
STOR-1A	STORAGE	0.64	3.90	3.90	0 04:15	3.90
STOR-1B	STORAGE	0.62	3.55	3.55	0 04:15	3.55
STOR-2	STORAGE	0.18	2.00	2.00	0 04:12	2.00

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
OUTFALL-BMP1A	OUTFALL	0.00	0.66	0 04:15	0	0.025	0.000
DMA-1A	OUTFALL	3.41	3.41	0 04:07	0.0386	0.0386	0.000
DMA-1B	OUTFALL	4.48	4.48	0 04:07	0.052	0.052	0.000
OUTFALL-BMP1B	OUTFALL	0.00	0.82	0 04:15	0	0.0318	0.000
DMA2	OUTFALL	1.54	1.54	0 04:06	0.014	0.014	0.000
OUTFALL-BMP2	OUTFALL	0.00	0.56	0 04:12	0	0.00903	0.000
STOR-1A	STORAGE	3.41	3.41	0 04:09	0.027	0.027	-0.153
STOR-1B	STORAGE	4.48	4.48	0 04:09	0.0336	0.0336	-0.130
STOR-2	STORAGE	1.54	1.54	0 04:08	0.00953	0.00953	-0.093

****
Node Flooding Summary
****

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate CFS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 gal	Maximum Ponded Volume 1000 ft3
STOR-1A	0.07	1.05	0 04:13	0.001	0.000
STOR-2	0.07	0.58	0 04:10	0.001	0.000

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
STOR-1A	0.244	16	0	0	1.478	100	0 04:12	0.66
STOR-1B	0.383	16	0	0	2.185	89	0 04:15	0.82
STOR-2	0.033	9	0	0	0.374	100	0 04:09	0.56

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
OUTFALL-BMP1A	85.28	0.18	0.66	0.025
DMA-1A	99.72	0.24	3.41	0.039
DMA-1B	99.72	0.32	4.48	0.052
OUTFALL-BMP1B	83.89	0.23	0.82	0.032
DMA2	56.67	0.15	1.54	0.014
OUTFALL-BMP2	58.89	0.09	0.56	0.009
System	80.69	1.23	10.68	0.170

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
STOR-1A-ORIFICE	DUMMY	0.66	0 04:15			
STOR-1B-ORIFICE	DUMMY	0.82	0 04:15			
STOR-2-ORIFICE	DUMMY	0.56	0 04:12			

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Tue Jan 22 10:36:45 2019
Analysis ended on: Tue Jan 22 10:36:45 2019
Total elapsed time: < 1 sec

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CHAPTER 5

REFERENCES

5.1 – Methodology – Rational Method Peak Flow Determination

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NOAA Atlas 14, Volume 6, Version 2
Location name: Oceanside, California, USA*
Latitude: 33.1848°, Longitude: -117.3658°
Elevation: 62.15 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.141 (0.118–0.169)	0.178 (0.150–0.214)	0.231 (0.193–0.278)	0.276 (0.229–0.336)	0.342 (0.274–0.431)	0.396 (0.310–0.511)	0.455 (0.347–0.602)	0.519 (0.384–0.708)	0.612 (0.434–0.873)	0.691 (0.472–1.02)
10-min	0.202 (0.170–0.242)	0.255 (0.215–0.307)	0.331 (0.277–0.398)	0.396 (0.329–0.481)	0.490 (0.393–0.618)	0.568 (0.445–0.732)	0.652 (0.497–0.862)	0.744 (0.551–1.01)	0.878 (0.622–1.25)	0.990 (0.676–1.47)
15-min	0.244 (0.205–0.293)	0.309 (0.260–0.371)	0.400 (0.335–0.482)	0.478 (0.397–0.582)	0.593 (0.475–0.747)	0.687 (0.538–0.885)	0.788 (0.601–1.04)	0.899 (0.666–1.23)	1.06 (0.752–1.51)	1.20 (0.818–1.77)
30-min	0.345 (0.290–0.414)	0.437 (0.367–0.525)	0.566 (0.474–0.682)	0.677 (0.562–0.823)	0.839 (0.672–1.06)	0.972 (0.761–1.25)	1.12 (0.851–1.48)	1.27 (0.943–1.74)	1.50 (1.07–2.14)	1.70 (1.16–2.51)
60-min	0.456 (0.384–0.548)	0.578 (0.486–0.695)	0.748 (0.627–0.902)	0.895 (0.744–1.09)	1.11 (0.889–1.40)	1.29 (1.01–1.66)	1.48 (1.13–1.95)	1.68 (1.25–2.30)	1.99 (1.41–2.83)	2.24 (1.53–3.32)
2-hr	0.611 (0.515–0.734)	0.760 (0.639–0.913)	0.966 (0.810–1.17)	1.14 (0.950–1.39)	1.40 (1.12–1.77)	1.61 (1.26–2.08)	1.84 (1.41–2.44)	2.09 (1.55–2.85)	2.45 (1.74–3.50)	2.76 (1.88–4.08)
3-hr	0.713 (0.600–0.855)	0.883 (0.743–1.06)	1.12 (0.938–1.35)	1.32 (1.10–1.61)	1.61 (1.29–2.03)	1.85 (1.45–2.38)	2.10 (1.60–2.78)	2.37 (1.76–3.24)	2.77 (1.96–3.95)	3.10 (2.12–4.58)
6-hr	0.904 (0.761–1.09)	1.13 (0.947–1.35)	1.43 (1.20–1.72)	1.68 (1.40–2.05)	2.04 (1.64–2.57)	2.33 (1.82–3.00)	2.63 (2.01–3.48)	2.95 (2.18–4.02)	3.40 (2.41–4.85)	3.76 (2.57–5.57)
12-hr	1.12 (0.939–1.34)	1.42 (1.20–1.71)	1.83 (1.54–2.21)	2.17 (1.80–2.63)	2.63 (2.10–3.31)	2.98 (2.34–3.84)	3.35 (2.55–4.43)	3.72 (2.76–5.08)	4.24 (3.00–6.04)	4.64 (3.17–6.87)
24-hr	1.34 (1.19–1.55)	1.76 (1.56–2.04)	2.31 (2.03–2.68)	2.75 (2.40–3.21)	3.34 (2.82–4.03)	3.78 (3.14–4.66)	4.24 (3.43–5.34)	4.70 (3.71–6.08)	5.32 (4.04–7.16)	5.80 (4.26–8.07)
2-day	1.64 (1.44–1.89)	2.16 (1.91–2.51)	2.85 (2.50–3.31)	3.40 (2.97–3.98)	4.14 (3.50–5.00)	4.71 (3.90–5.80)	5.28 (4.28–6.65)	5.86 (4.62–7.58)	6.64 (5.04–8.94)	7.25 (5.32–10.1)
3-day	1.83 (1.61–2.11)	2.42 (2.13–2.80)	3.20 (2.81–3.71)	3.82 (3.34–4.47)	4.67 (3.95–5.64)	5.33 (4.41–6.56)	5.99 (4.85–7.54)	6.66 (5.25–8.62)	7.57 (5.74–10.2)	8.28 (6.08–11.5)
4-day	1.98 (1.75–2.29)	2.63 (2.32–3.04)	3.48 (3.06–4.04)	4.17 (3.64–4.88)	5.12 (4.33–6.18)	5.84 (4.84–7.19)	6.58 (5.33–8.29)	7.33 (5.78–9.49)	8.36 (6.34–11.3)	9.16 (6.72–12.7)
7-day	2.28 (2.01–2.64)	3.05 (2.68–3.53)	4.06 (3.57–4.71)	4.89 (4.26–5.72)	6.02 (5.09–7.27)	6.90 (5.72–8.50)	7.80 (6.32–9.83)	8.74 (6.89–11.3)	10.0 (7.59–13.5)	11.0 (8.07–15.3)
10-day	2.53 (2.23–2.93)	3.39 (2.99–3.93)	4.54 (3.99–5.27)	5.49 (4.79–6.42)	6.79 (5.74–8.20)	7.81 (6.47–9.62)	8.86 (7.17–11.2)	9.95 (7.84–12.9)	11.4 (8.68–15.4)	12.6 (9.26–17.5)
20-day	3.09 (2.73–3.58)	4.18 (3.69–4.84)	5.66 (4.98–6.57)	6.90 (6.02–8.07)	8.63 (7.30–10.4)	10.0 (8.29–12.3)	11.4 (9.26–14.4)	12.9 (10.2–16.7)	15.1 (11.4–20.3)	16.7 (12.3–23.3)
30-day	3.64 (3.21–4.21)	4.93 (4.35–5.71)	6.71 (5.90–7.79)	8.22 (7.17–9.61)	10.4 (8.75–12.5)	12.1 (10.0–14.8)	13.9 (11.2–17.5)	15.8 (12.4–20.4)	18.5 (14.0–24.9)	20.7 (15.2–28.7)
45-day	4.30 (3.80–4.97)	5.83 (5.13–6.74)	7.94 (6.98–9.22)	9.76 (8.51–11.4)	12.4 (10.5–14.9)	14.5 (12.0–17.8)	16.7 (13.6–21.1)	19.2 (15.1–24.8)	22.6 (17.2–30.5)	25.5 (18.7–35.4)
60-day	4.95 (4.37–5.72)	6.67 (5.88–7.72)	9.09 (7.99–10.5)	11.2 (9.75–13.1)	14.2 (12.0–17.2)	16.7 (13.9–20.6)	19.4 (15.7–24.4)	22.3 (17.6–28.9)	26.5 (20.1–35.7)	30.0 (22.0–41.7)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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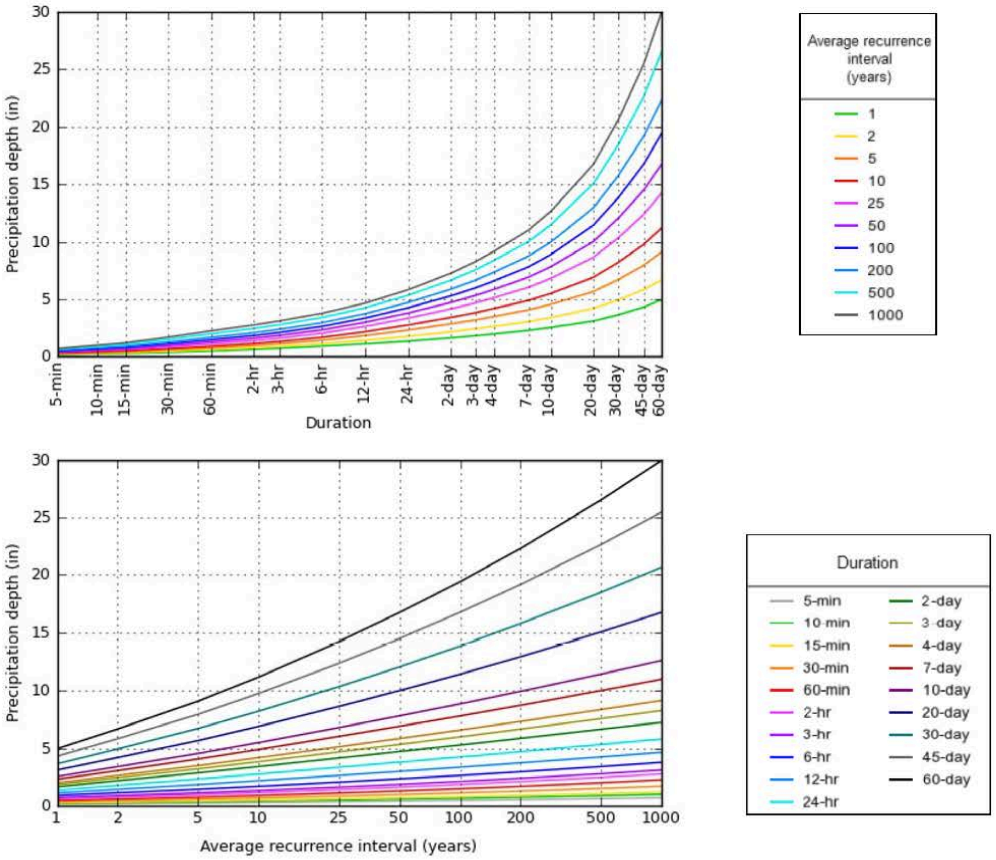
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 33.1848°, Longitude: -117.3658°



NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Wed Apr 19 19:33:08 2017

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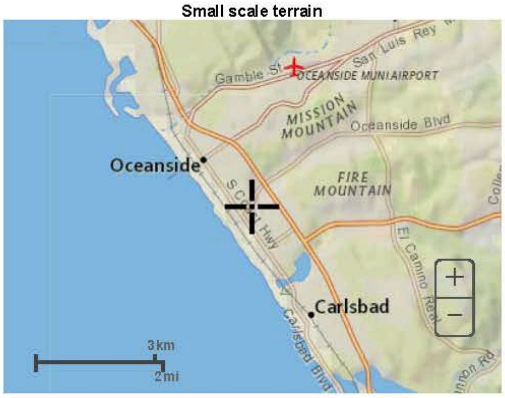
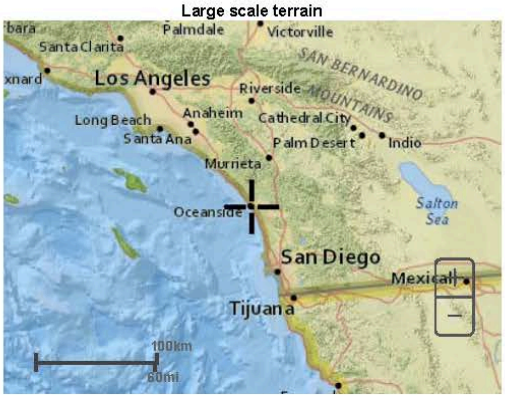
Maps & aerials

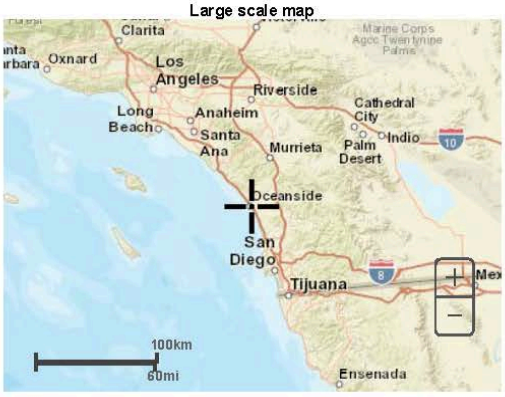
Small scale terrain



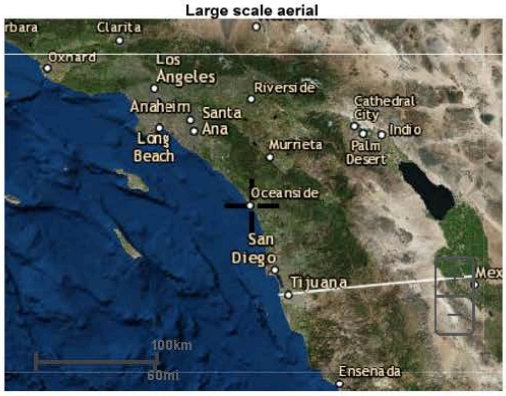
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

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

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

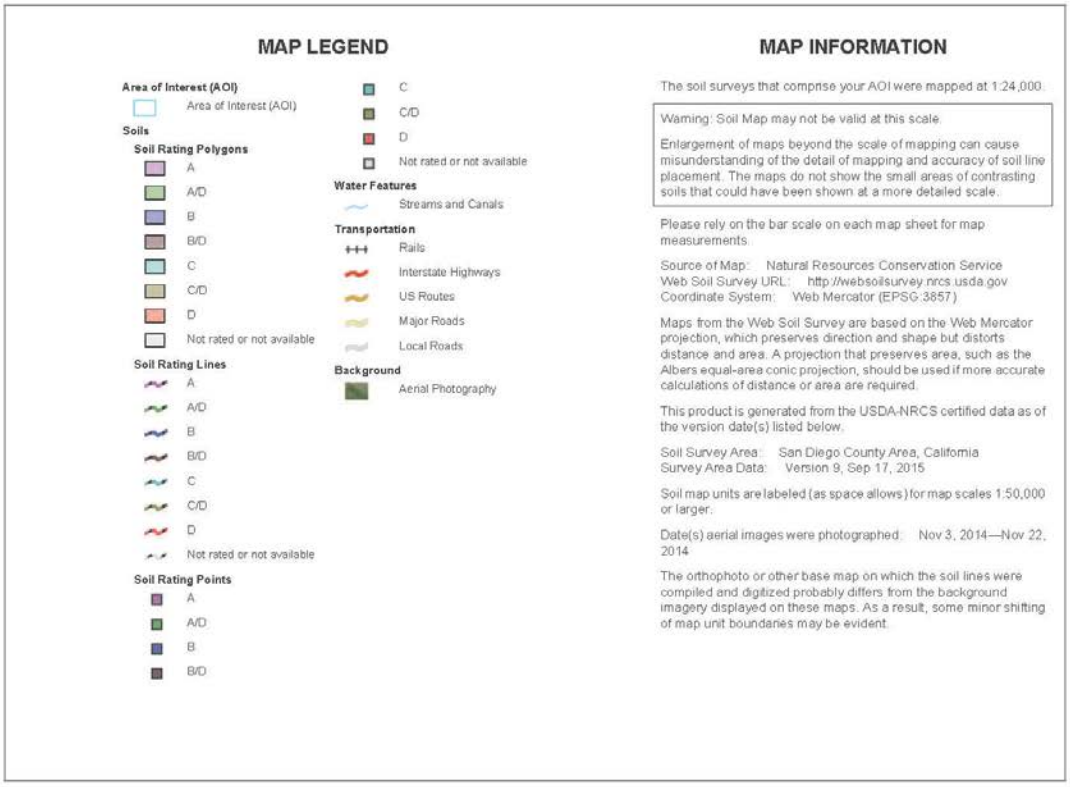
$$C = 0.90 \times (\% \text{ Impervious}) + C_p \times (1 - \% \text{ Impervious})$$

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

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


Hydrologic Soil Group—San Diego County Area, California
(OCEANSIDE GATEWAY APTS)
117° 22' 1" W
117° 21' 50" W
33° 11' 13" N
33° 11' 1" N
465770
465810
465850
465890
465930
465970
466010
466050
3672080
3672040
3672000
3671960
3671920
3671880
3671840
3671800
3671760
3671720
Reese St
Oceanside Blvd
Oceanside
Md
TeF
TuB
TuB
Beechwood Ln
Loma Alta Creek
Map Scale: 1:1,840 if printed on A portrait (8.5" x 11") sheet.
Meters
0 25 50 100 150
Feet
0 50 100 200 300
N
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84
USDA
Natural Resources
Conservation Service
Web Soil Survey
National Cooperative Soil Survey
12/9/2015
Page 1 of 4

Hydrologic Soil Group—San Diego County Area, California
(OCEANSIDE GATEWAY APTS)



Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Md	Made land		2.0	67.1%
TeF	Terrace escarpments		0.7	22.5%
TuB	Tujunga sand, 0 to 5 percent slopes	A	0.3	10.3%
Totals for Area of Interest			**2.9**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

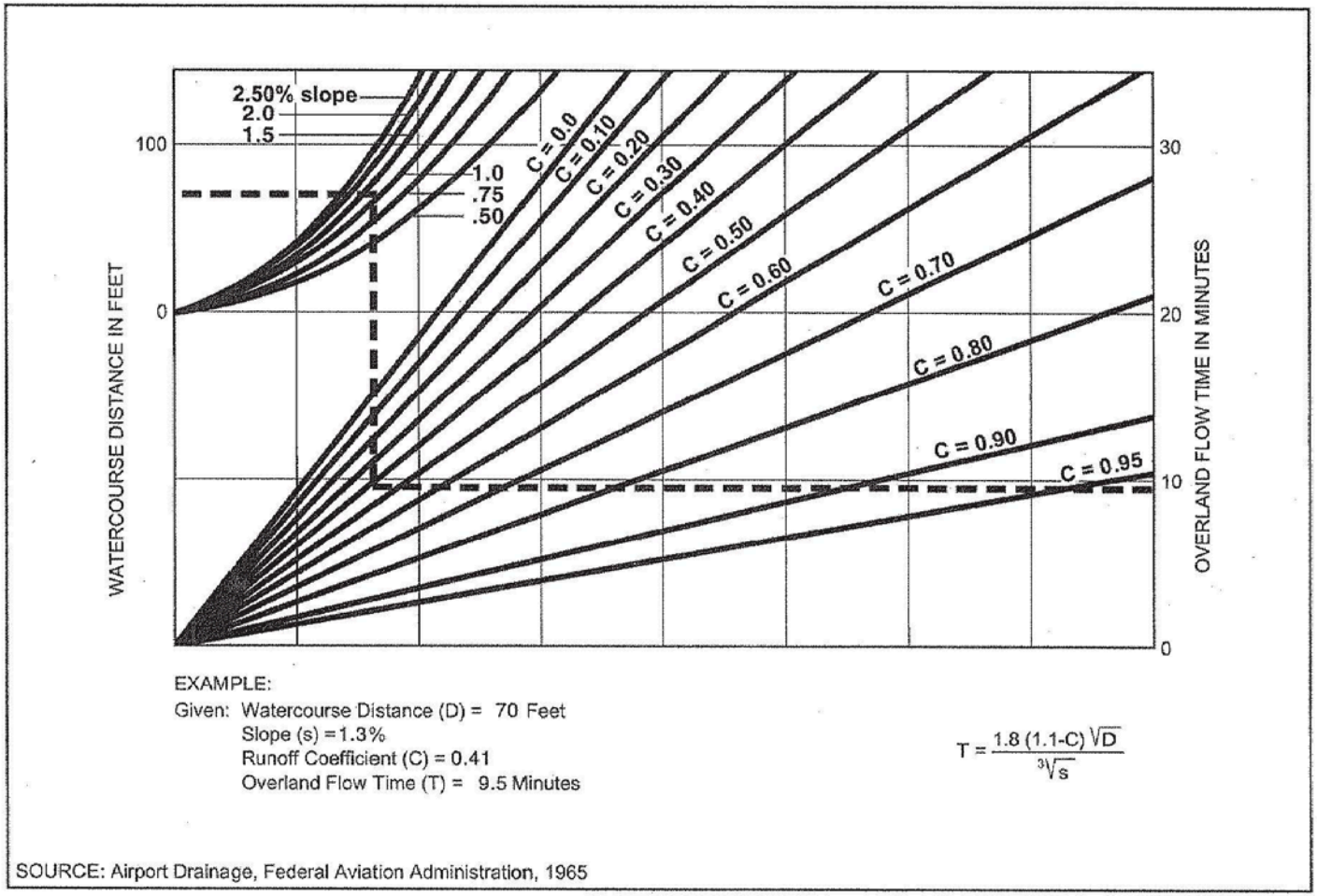
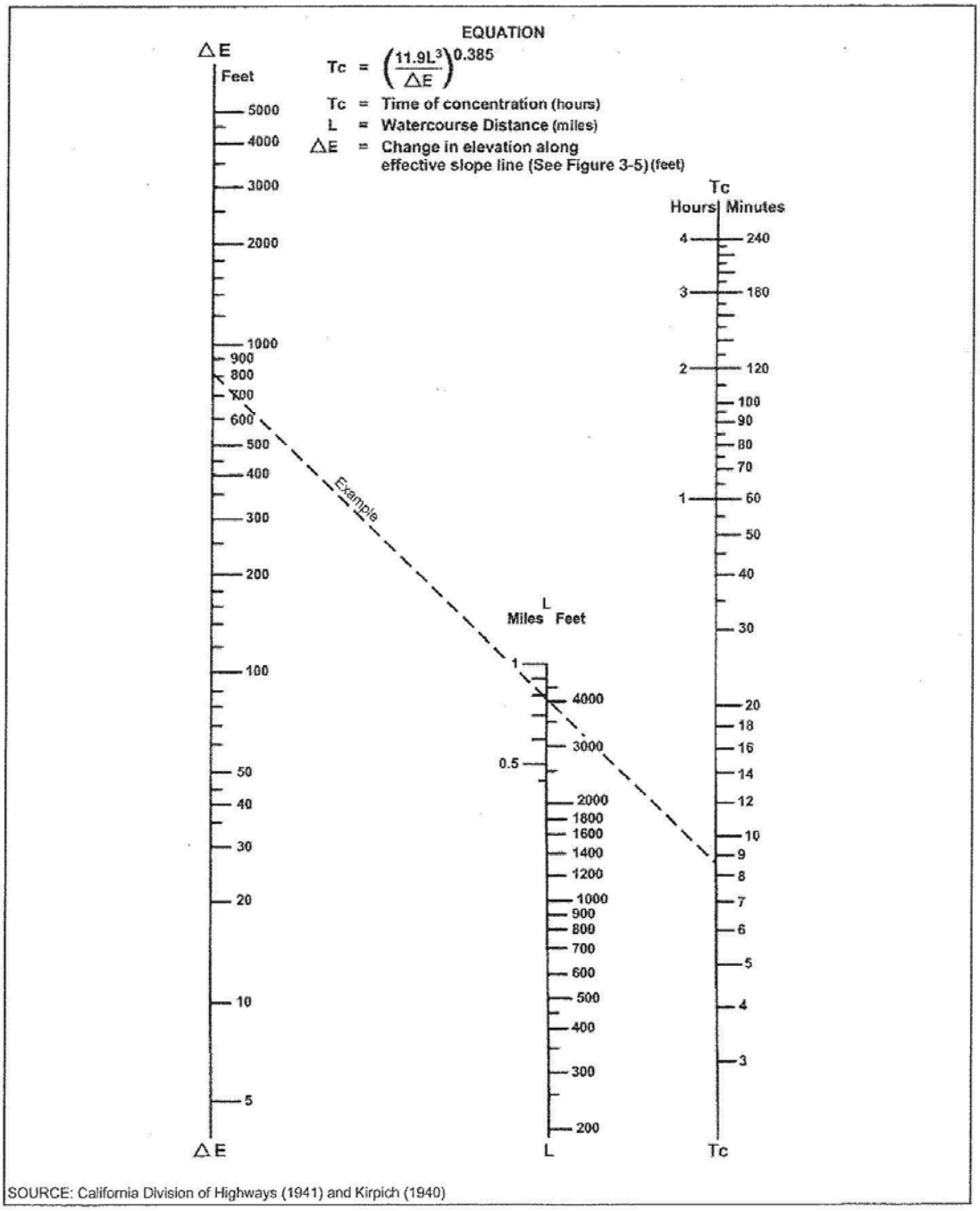


FIGURE 3-3

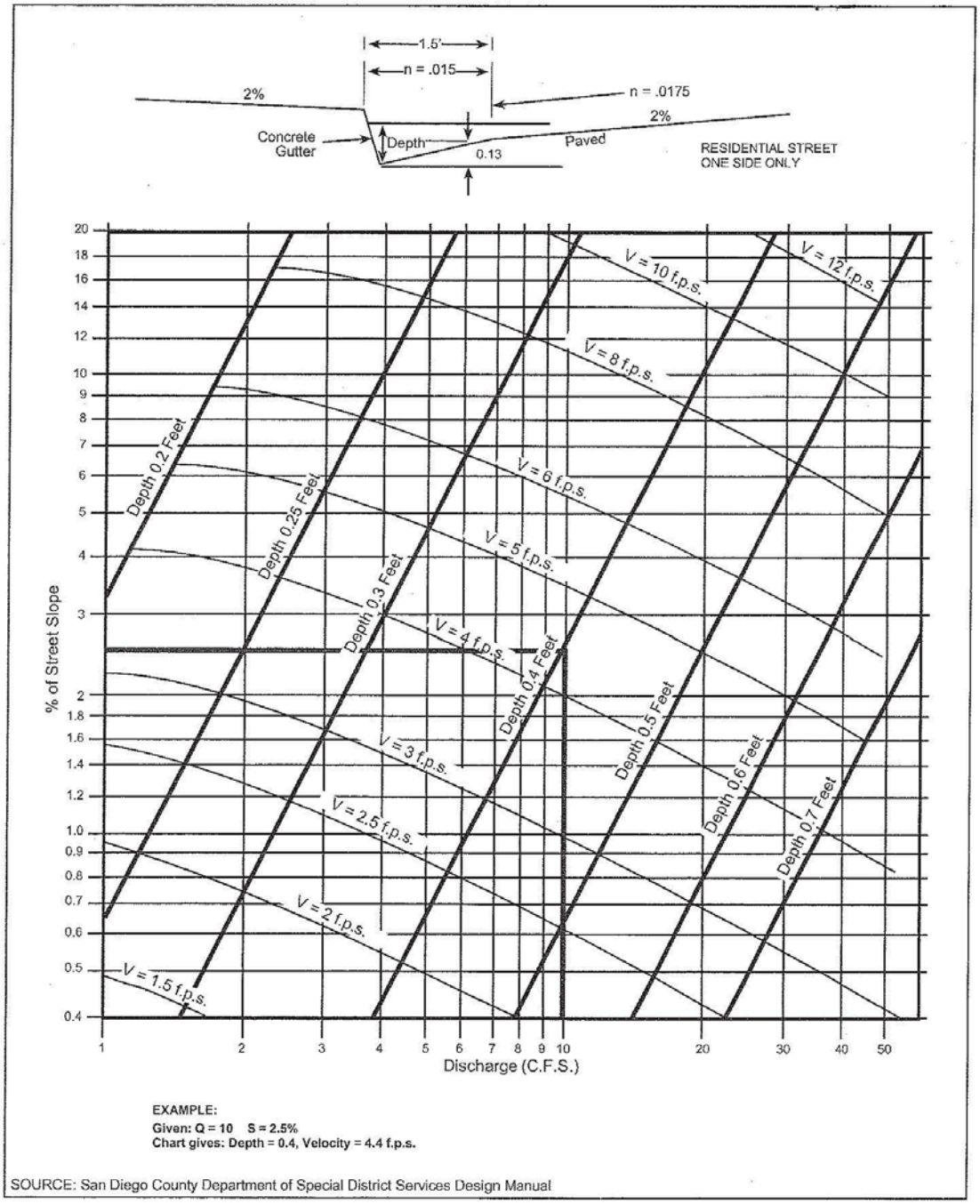
Rational Formula - Overland Time of Flow Nomograph



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

FIGURE 3-4

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

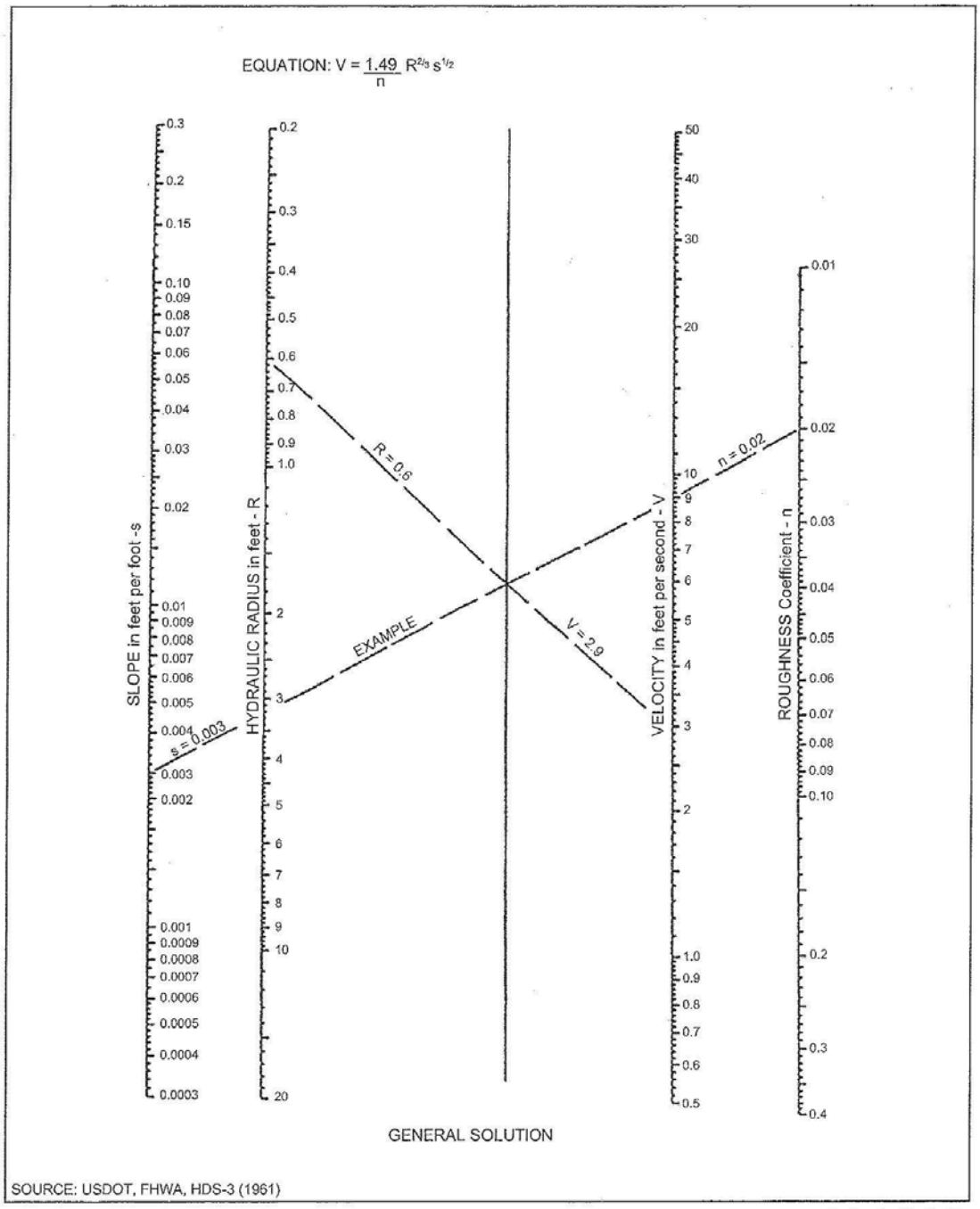


EXAMPLE:
Given: Q = 10 S = 2.5%
Chart gives: Depth = 0.4, Velocity = 4.4 f.p.s.

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

FIGURE 3-6

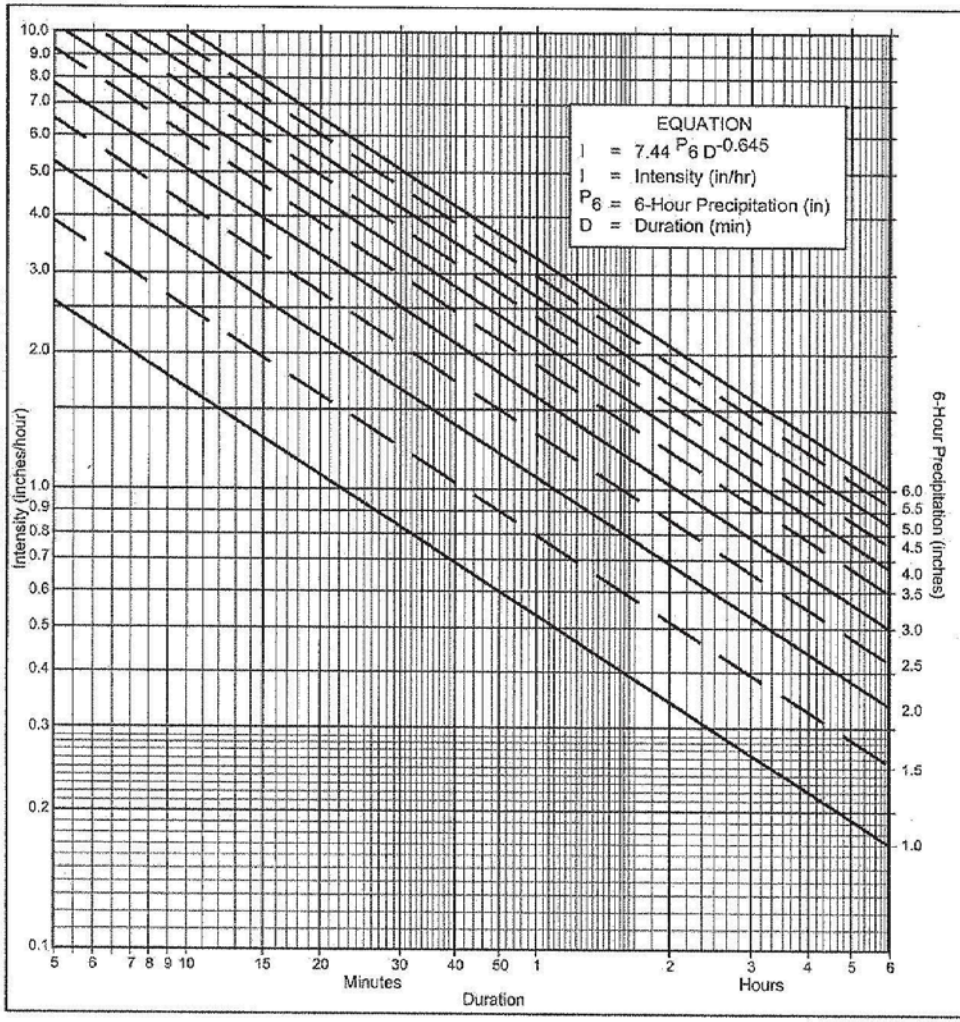
Gutter and Roadway Discharge - Velocity Chart



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

FIGURE 3-7

Manning's Equation Nomograph



Directions for Application:

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

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

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

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

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

Application Form:

(a) Selected frequency _____ year

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

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

(d) t_x = _____ min.

(e) I = _____ in./hr.

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

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

Intensity-Duration Design Chart - Template

FIGURE 3-1

3.2 Developing Input Data for the Rational Method

This section describes the development of the necessary data to perform RM calculations. Section 3.3 describes the RM calculation process. Input data for calculating peak flows and T_c's with the RM should be developed as follows:

1. On a topographic base map, outline the overall drainage area boundary, showing adjacent drains, existing and proposed drains, and overland flow paths.

2. Verify the accuracy of the drainage map in the field.

3. Divide the drainage area into subareas by locating significant points of interest. These divisions should be based on topography, soil type, and land use. Ensure that an appropriate first subarea is delineated. For natural areas, the first subarea flow path length should be less than or equal to 4,000 feet plus the overland flow length (Table 3-2). For developed areas, the initial subarea flow path length should be consistent with Table 3-2. The topography and slope within the initial subarea should be generally uniform.

4. Working from upstream to downstream, assign a number representing each subarea in the drainage system to each point of interest. Figure 3-8 provides guidelines for node numbers for geographic information system (GIS)-based studies.

5. Measure each subarea in the drainage area to determine its size in acres (A).

6. Determine the length and effective slope of the flow path in each subarea.

7. Identify the soil type for each subarea.

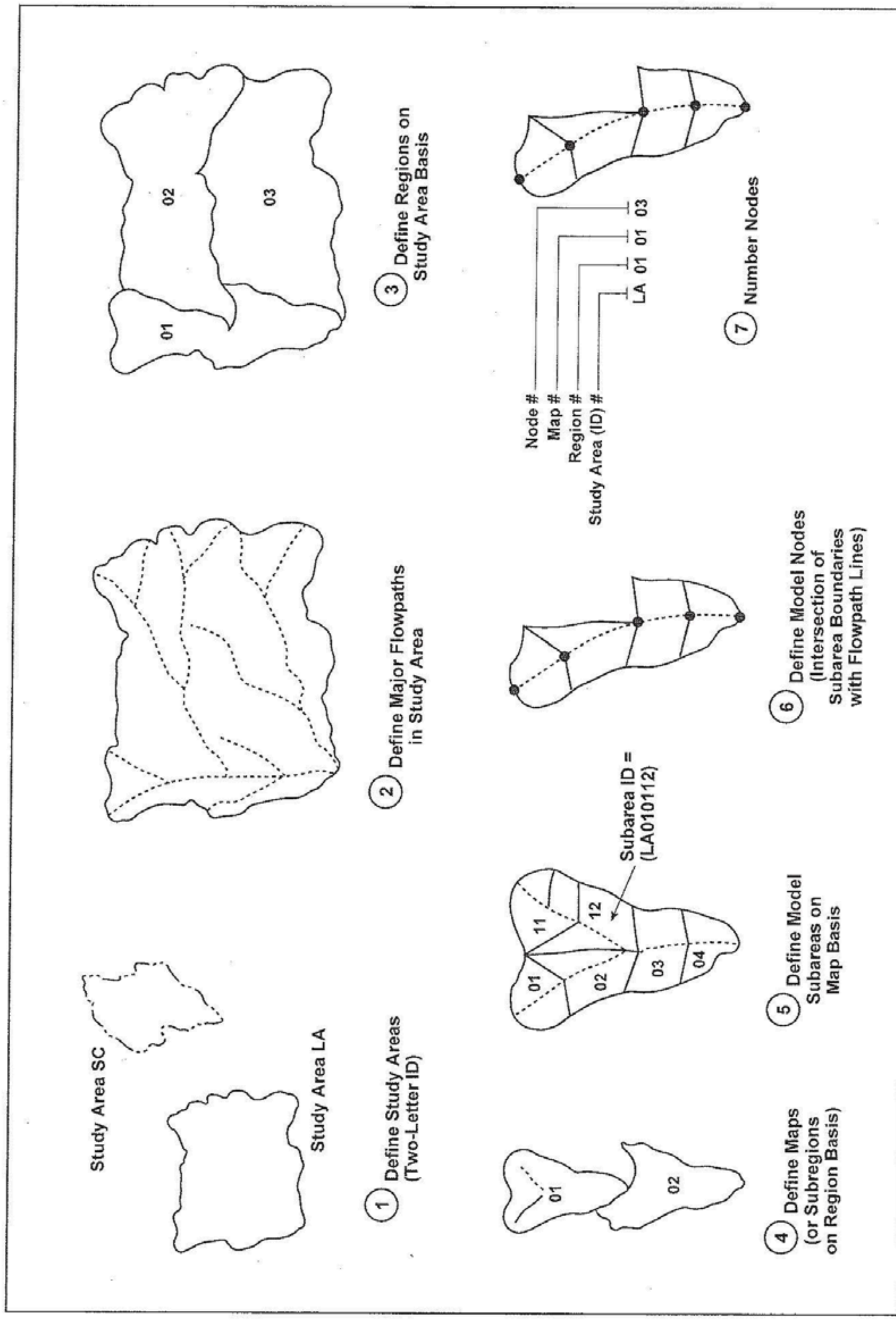

Study Area SC
Study Area LA
1 Define Study Areas (Two-Letter ID)
2 Define Major Flowpaths in Study Area
3 Define Regions on Study Area Basis
01
02
03
4 Define Maps (or Subregions on Region Basis)
5 Define Model Subareas on Map Basis
Subarea ID = (LA010112)
01
02
03
04
11
12
6 Define Model Nodes (Intersection of Subarea Boundaries with Flowpath Lines)
Node #
Map #
Region #
Study Area (ID) #
LA 01 01 03
7 Number Nodes
GIS/Hydrologic Model Data Base Linkage Setup: Nodes, Subareas, Links

FIGURE 3-8

8. Determine the runoff coefficient (C) for each subarea based on Table 3-1. If the subarea contains more than one type of development classification, use a proportionate average for C. In determining C for the subarea, use future land use taken from the applicable community plan, Multiple Species Conservation Plan, National Forest land use plan, etc.

9. Calculate the CA value for the subarea.

10. Calculate the Σ(CA) value(s) for the subareas upstream of the point(s) of interest.

11. Determine P_6 and P_{24} for the study using the isopluvial maps provided in Appendix B. If necessary, adjust the value for P_6 to be within 45% to 65% of the value for P_{24}.

See Section 3.3 for a description of the RM calculation process.

3.3 Performing Rational Method Calculations

This section describes the RM calculation process. Using the input data, calculation of peak flows and T_c's should be performed as follows:

1. Determine T_i for the first subarea. Use Table 3-2 or Figure 3-3 as discussed in Section 3.1.4. If the watershed is natural, the travel time to the downstream end of the first subarea can be added to T_i to obtain the T_c. Refer to paragraph 3.1.4.2 (a).

2. Determine I for the subarea using Figure 3-1. If T_i was less than 5 minutes, use the 5 minute time to determine intensity for calculating the flow.

3. Calculate the peak discharge flow rate for the subarea, where $Q_p = \Sigma(CA)\, I$.
In case that the downstream flow rate is less than the upstream flow rate, due to the long travel time that is not offset by the additional subarea runoff, use the upstream peak flow for design purposes until downstream flows increase again.

4. Estimate the T_t to the next point of interest.

5. Add the T_t to the previous T_c to obtain a new T_c.

6. Continue with step 2, above, until the final point of interest is reached.

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

3.4 Modified Rational Method (for Junction Analysis)

The purpose of this section is to describe the steps necessary to develop a hydrology report for a small watershed using the MRM. It is necessary to use the MRM if the watershed contains junctions of independent drainage systems. The process is based on the design manuals of the City/County of San Diego. The general process description for using this method, including an example of the application of this method, is described below.

The engineer should only use the MRM for drainage areas up to approximately 1 square mile in size. If the watershed will significantly exceed 1 square mile then the NRCS method described in Section 4 should be used. The engineer may choose to use either the RM or the MRM for calculations for up to an approximately 1-square-mile area and then transition the study to the NRCS method for additional downstream areas that exceed approximately 1 square mile. The transition process is described in Section 4.

3.4.1 Modified Rational Method General Process Description

The general process for the MRM differs from the RM only when a junction of independent drainage systems is reached. The peak Q, T_c, and I for each of the independent drainage systems at the point of the junction are calculated by the RM. The independent drainage systems are then combined using the MRM procedure described below. The peak Q, T_c, and I for each of the independent drainage systems at the point of the junction must be calculated prior to using the MRM procedure to combine the independent drainage systems, as these

values will be used for the MRM calculations. After the independent drainage systems have been combined, RM calculations are continued to the next point of interest.

3.4.2 Procedure for Combining Independent Drainage Systems at a Junction

Calculate the peak Q, T_c, and I for each of the independent drainage systems at the point of the junction. These values will be used for the MRM calculations.

At the junction of two or more independent drainage systems, the respective peak flows are combined to obtain the maximum flow out of the junction at T_c. Based on the approximation that total runoff increases directly in proportion to time, a general equation may be written to determine the maximum Q and its corresponding T_c using the peak Q, T_c, and I for each of the independent drainage systems at the point immediately before the junction. The general equation requires that contributing Q's be numbered in order of increasing T_c.

Let Q_1, T_1, and I_1 correspond to the tributary area with the shortest T_c. Likewise, let Q_2, T_2, and I_2 correspond to the tributary area with the next longer T_c; Q_3, T_3, and I_3 correspond to the tributary area with the next longer T_c; and so on. When only two independent drainage systems are combined, leave Q_3, T_3, and I_3 out of the equation. Combine the independent drainage systems using the junction equation below:

Junction Equation: $T_1 < T_2 < T_3$

$$Q_{T1} = Q_1 + \frac{T_1}{T_2} Q_2 + \frac{T_1}{T_3} Q_3$$

$$Q_{T2} = Q_2 + \frac{I_2}{I_1} Q_1 + \frac{T_2}{T_3} Q_3$$

$$Q_{T3} = Q_3 + \frac{I_3}{I_1} Q_1 + \frac{I_3}{I_2} Q_2$$

Calculate Q_{T1}, Q_{T2}, and Q_{T3}. Select the largest Q and use the T_c associated with that Q for further calculations (see the three Notes for options). If the largest calculated Q's are equal (e.g., $Q_{T1} = Q_{T2} > Q_{T3}$), use the shorter of the T_c's associated with that Q.

This equation may be expanded for a junction of more than three independent drainage systems using the same concept. The concept is that when Q from a selected subarea (e.g., Q_2) is combined with Q from another subarea with a shorter T_c (e.g., Q_1), the Q from the subarea with the shorter T_c is reduced by the ratio of the I's (I_2/I_1); and when Q from a selected subarea (e.g., Q_2) is combined with Q from another subarea with a longer T_c (e.g., Q_3), the Q from the subarea with the longer T_c is reduced by the ratio of the T_c's (T_2/T_3).

Note #1: At a junction of two independent drainage systems that have the same T_c, the tributary flows may be added to obtain the Q_p.

$$Q_p = Q_1 + Q_2 \text{; when } T_1 = T_2 \text{; and } T_c = T_1 = T_2$$

This can be verified by using the junction equation above. Let Q_3, T_3, and $I_3 = 0$. When T_1 and T_2 are the same, I_1 and I_2 are also the same, and T_1/T_2 and $I_2/I_1 = 1$. T_1/T_2 and I_2/I_1 are cancelled from the equations. At this point, $Q_{T1} = Q_{T2} = Q_1 + Q_2$.

Note #2: In the upstream part of a watershed, a conservative computation is acceptable. When the times of concentration (T_c's) are relatively close in magnitude (within 10%), use the shorter T_c for the intensity and the equation $Q = \Sigma(CA)I$.

Note #3: . An optional method of determining the T_c is to use the equation
$T_c = [(\Sigma (CA)7.44\ P_6)/Q]^{1.55}$

This equation is from $Q = \Sigma(CA)I = \Sigma(CA)(7.44\ P_6/T_c^{.645})$ and solving for T_c. The advantage in this option is that the T_c is consistent with the peak flow Q, and avoids inappropriate fluctuation in downstream flows in some cases.

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CHAPTER 5

REFERENCES

5.2 – StormTrap® Details

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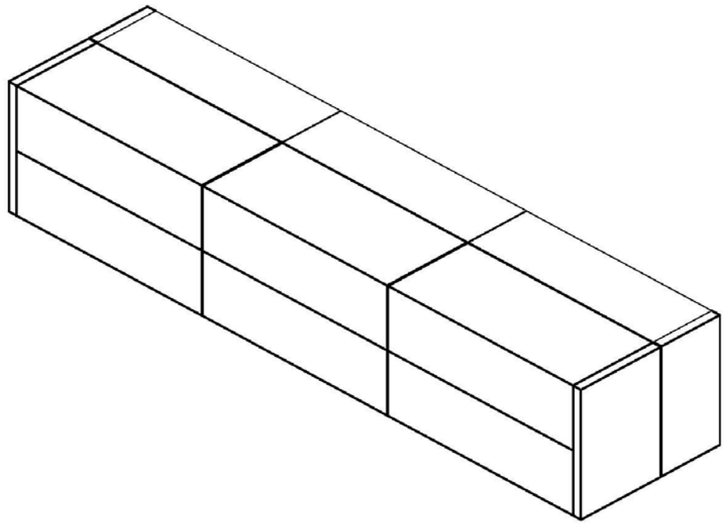
StormTrap®

MODULAR CONCRETE
STORMWATER MANAGEMENT



BREEZE LUXURY APTS - BASIN 1A
OCEANSIDE, CA

SHEET INDEX

STORMTRAP CONTACT INFORMATION

STORM TRAP SUPPLIER: STORMTRAP
CONTACT NAME: CHARLIE CARTER
CELL PHONE: 760-212-5628
SALES EMAIL: CCARTER@STORMTRAP.COM

StormTrap
PATENTS LISTED AT: [HTTP://STORMTRAP.COM/PATENT]
1287 WINDHAM PARKWAY
ROMEOVILLE, IL 60446
P:815-941-4549 / F:331-318-5347

ENGINEER INFORMATION:
BHA ENGINEERS
5115 AVENIDA ENCINAS
CARLSBAD, CA 92008
760-931-8700

PROJECT INFORMATION:
BREEZE LUXURY APTS
BASIN 1A
OCEANSIDE, CA

CURRENT ISSUE DATE:
1/24/2019

ISSUED FOR:
PRELIMINARY

REV.	DATE:	ISSUED FOR:	DWN BY:
1	1/24/2019	PRELIMINARY	GS

SCALE:
NTS

SHEET TITLE:
COVER SHEET

SHEET NUMBER:
0.0

STRUCTURAL DESIGN LOADING CRITERIA

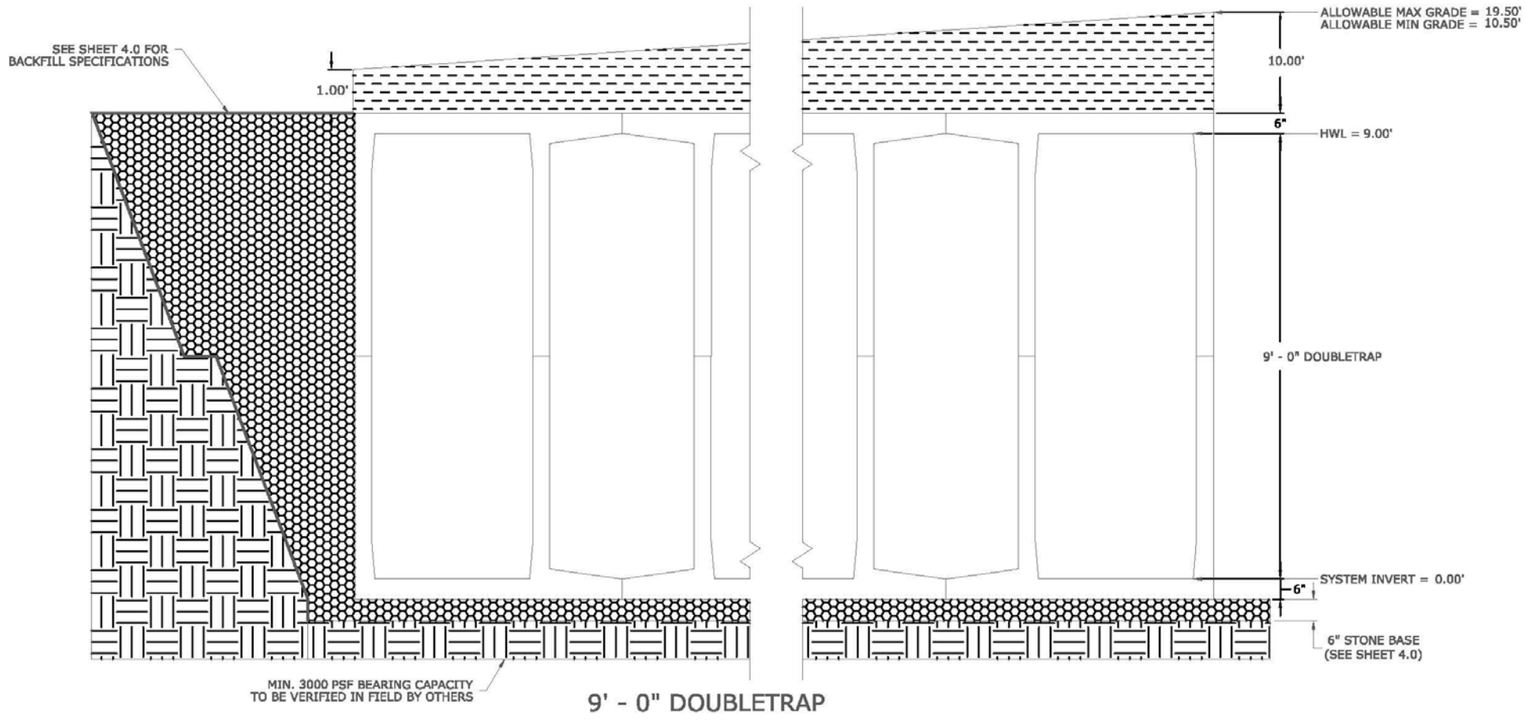
LIVE LOADING:	AASHTO HS-20 HIGHWAY LOADING
GROUND WATER TABLE:	BELOW INVERT OF SYSTEM
SOIL BEARING PRESSURE:	3000 PSF
SOIL DENSITY:	120 PCF
EQUIVALENT UNSATURATED LATERAL ACTIVE EARTH PRESSURE:	35 PSF / FT.
EQUIVALENT SATURATED LATERAL ACTIVE EARTH PRESSURE:	80 PSF/FT. (IF WATER TABLE PRESENT)
APPLICABLE CODES:	AASHTO ACI-318
BACKFILL TYPE:	SEE SHEET 4.0 FOR BACKFILL OPTIONS

STORMTRAP SYSTEM INFORMATION

WATER STORAGE PROV:	4,124.99 CUBIC FEET
UNIT HEADROOM:	9' - 0" DOUBLETRAP
UNIT QUANTITY:	12 TOTAL UNITS

SITE SPECIFIC DESIGN CRITERIA

1. STORMTRAP UNITS SHALL BE MANUFACTURED AND INSTALLED ACCORDING TO SHOP DRAWINGS APPROVED BY THE INSTALLING CONTRACTOR AND ENGINEER OF RECORD. THE SHOP DRAWINGS SHALL INDICATE SIZE AND LOCATION OF ROOF OPENINGS AND INLET/ OUTLET PIPE TYPES, SIZES, INVERT ELEVATIONS AND SIZE OF OPENINGS.
2. COVER RANGE: MIN. 1.00' MAX. 10.00CONSULT STORMTRAP FOR ADDITIONAL COVER OPTIONS.
3. ALL DIMENSIONS AND SOIL CONDITIONS, INCLUDING BUT NOT LIMITED TO GROUNDWATER AND SOIL BEARING CAPACITY ARE REQUIRED TO BE VERIFIED IN THE FIELD BY OTHERS PRIOR TO STORMTRAP INSTALLATION.
4. FOR STRUCTURAL CALCULATIONS THE GROUND WATER TABLE IS ASSUMED TO BE BELOW INVERT OF SYSTEM . IF WATER TABLE IS DIFFERENT THAN ASSUMED, CONTACT STORMTRAP.



StormTrap
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SHEET TITLE:

DOUBLETRAP DESIGN CRITERIA

SHEET NUMBER:

1.0

BILL OF MATERIALS

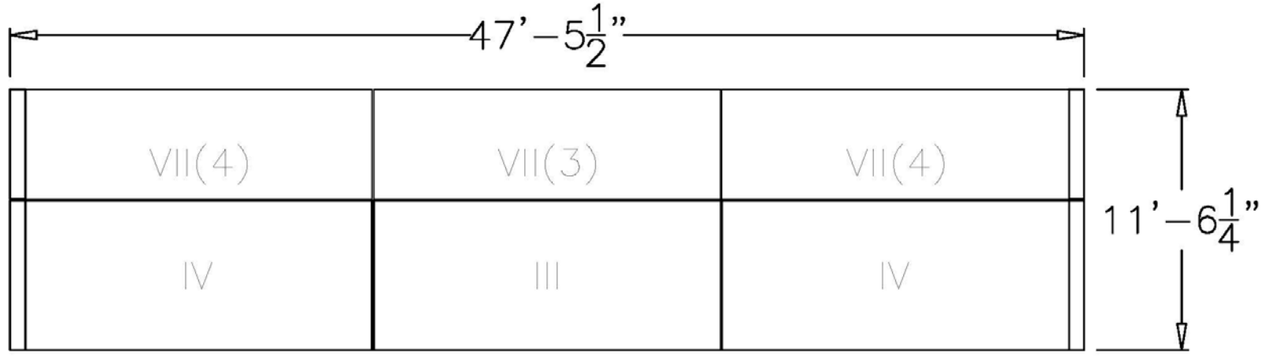
QTY.	UNIT TYPE	DESCRIPTION	TOP WEIGHT	BASE WEIGHT
1	VII(3)	9' - 0" DOUBLETRAP	12547	12446
2	VII(4)	9' - 0" DOUBLETRAP	13585	13484
1	III	9' - 0" DOUBLETRAP	14779	14678
2	IV	9' - 0" DOUBLETRAP	15817	15716
0	VII	9' - 0" DOUBLETRAP	14365	14365
0	SPIV	9' - 0" DOUBLETRAP	VARIES	VARIES
4	PANEL	8" THICK PANELS	VARIES	
2	JOINT WRAP	150' PER ROLL		
16	JOINT TAPE	14.5' PER ROLL		

LOADING DISCLAIMER:

STORMTRAP IS NOT DESIGNED TO ACCEPT ANY ADDITIONAL LOADINGS FROM NEARBY STRUCTURES NEXT TO OR OVER THE TOP OF STORMTRAP. IF ADDITIONAL LOADING CONSIDERATIONS ARE REQUIRED FOR STRUCTURAL DESIGN OF STORMTRAP, PLEASE CONTACT STORMTRAP IMMEDIATELY.

DESIGN CRITERIA
ALLOWABLE MAX GRADE = 19.50'
ALLOWABLE MIN GRADE = 10.50'
INSIDE HEIGHT ELEVATION = 9.00'
SYSTEM INVERT = 0.00'

NOTES:
1. DIMENSIONING OF STORMTRAP SYSTEM SHOWN BELOW ALLOW FOR A 3/4" GAP BETWEEN EACH MODULE.
2. ALL DIMENSIONS TO BE VERIFIED IN THE FIELD BY OTHERS.
3. SEE SHEET 3.0 FOR INSTALLATION SPECIFICATIONS.
4. SP - INDICATES A MODULE WITH MODIFICATIONS.
5. P - INDICATES A MODULE WITH A PANEL ATTACHMENT.
6. CONTRACTORS RESPONSIBILITY TO ENSURE CONSISTENCY/ACCURACY TO FINAL ENGINEER OF RECORD PLAN SET.



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ENGINEER INFORMATION:

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DOUBLETRAP SYSTEM LAYOUT

SHEET NUMBER:

2.0

STORMTRAP INSTALLATION SPECIFICATIONS

1. STORMTRAP SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C891, STANDARD FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES, THE FOLLOWING ADDITIONS AND/OR EXCEPTIONS SHALL APPLY:

2. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO ENSURE THAT PROPER/ADEQUATE EQUIPMENT IS USED TO SET/INSTALL THE MODULES.

3. STORMTRAP MODULES CAN BE PLACED ON A LEVEL, 6" FOUNDATION OF ¾" AGGREGATE EXTENDING 2'-0" PAST THE OUTSIDE OF THE SYSTEM (SEE DETAIL 1) AND SHALL BE PLACED ON PROPERLY COMPACTED SOILS (SEE SHEET 1.0 FOR SOIL BEARING CAPACITY REQUIREMENTS), AND IN ACCORDANCE WITH ASTM C891 STANDARD PRACTICE FOR INSTALLATION OF UNDERGROUND PRECAST UTILITY STRUCTURES.

4. THE STORMTRAP MODULES SHALL BE PLACED SUCH THAT THE MAXIMUM SPACE BETWEEN ADJACENT MODULES DOES NOT EXCEED ¾" (SEE DETAIL 2). IF THE SPACE EXCEEDS ¾", THE MODULES SHALL BE RESET WITH APPROPRIATE ADJUSTMENT MADE TO LINE AND GRADE TO BRING THE SPACE INTO SPECIFICATION.

5. STORMTRAP MODULES ARE NOT WATERTIGHT. IF A WATERTIGHT SOLUTION IS REQUIRED, CONTACT STORMTRAP FOR RECOMMENDATIONS. THE WATERTIGHT APPLICATION IS TO BE PROVIDED AND IMPLEMENTED BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT THE SELECTED WATERTIGHT SOLUTION PERFORMS AS SPECIFIED BY THE MANUFACTURER.

6. THE PERIMETER HORIZONTAL JOINT BETWEEN THE TOP AND BASE LEG CONNECTION OF THE STORMTRAP MODULES SHALL BE SEALED WITH PREFORMED MASTIC JOINT TAPE ACCORDING TO ASTM C891, 8.8 AND 8.12. (SEE DETAIL 3). THE MASTIC JOINT TAPE DOES NOT PROVIDE A WATERTIGHT SEAL. THE SOLE PURPOSE OF THE JOINT TAPE IS TO PROVIDE A SILT AND SOIL TIGHT SYSTEM.

7. ALL EXTERIOR JOINTS BETWEEN ADJACENT STORMTRAP MODULES SHALL BE SEALED WITH 8" WIDE PRE-FORMED, COLD-APPLIED, SELF-ADHERING ELASTOMERIC RESIN, BONDED TO A WOVEN , HIGHLY PUNCTURE RESISTANT POLYMER WRAP, CONFORMING TO ASTM C891 AND SHALL BE INTEGRATED WITH PRIMER SEALANT AS APPROVED BY STORMTRAP (SEE DETAILS 3 & 4). THE JOINT WRAP DOES NOT PROVIDE A WATERTIGHT SEAL. THE SOLE PURPOSE OF THE JOINT WRAP IS TO PROVIDE A SILT AND SOIL TIGHT SYSTEM. THE ADHESIVE EXTERIOR JOINT WRAP SHALL BE INSTALLED ACCORDING TO THE FOLLOWING INSTALLATION INSTRUCTIONS:

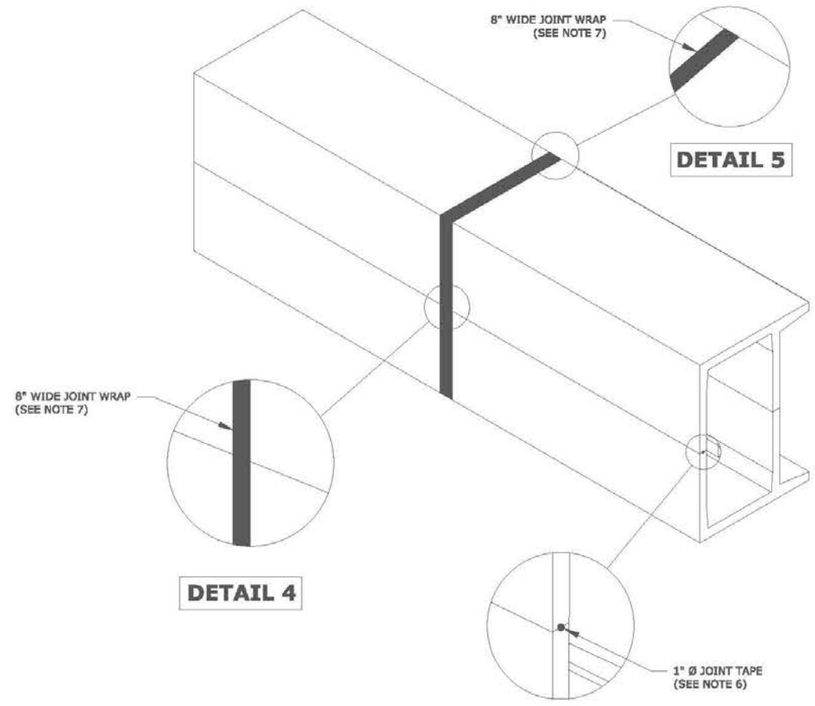
   7.1. USE A BRUSH OR WET CLOTH TO THOROUGHLY CLEAN THE OUTSIDE SURFACE AT THE POINT WHERE JOINT WRAP IS TO BE APPLIED.

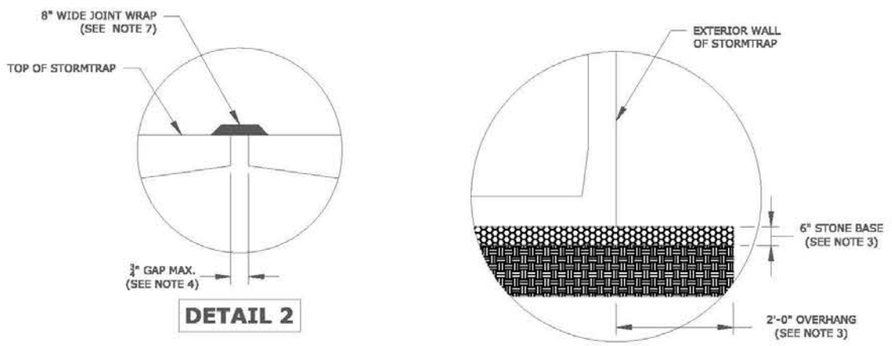
   7.2. A RELEASE PAPER PROTECTS THE ADHESIVE SIDE OF THE JOINT WRAP. PLACE THE ADHESIVE TAPE (ADHESIVE SIDE DOWN) AROUND THE STRUCTURE, REMOVING THE RELEASE PAPER AS YOU GO. PRESS THE JOINT WRAP FIRMLY AGAINST THE STORMTRAP MODULE SURFACE WHEN APPLYING.

8. IF THE CONTRACTOR NEEDS TO CANCEL ANY SHIPMENTS, THEY MUST DO SO 48 HOURS PRIOR TO THEIR SCHEDULED ARRIVAL AT THE JOB SITE. IF CANCELED AFTER THAT TIME, PLEASE CONTACT THE PROJECT MANAGER.

9. IF THE STORMTRAP MODULE(S) IS DAMAGED IN ANY WAY PRIOR, DURING, OR AFTER INSTALL, STORMTRAP MUST BE CONTACTED IMMEDIATELY TO ASSESS THE DAMAGE AND TO DETERMINE WHETHER OR NOT THE MODULE(S) WILL NEED TO BE REPLACED. IF ANY MODULE ARRIVES AT THE JOBSITE DAMAGED DO NOT UNLOAD IT; CONTACT STORMTRAP IMMEDIATELY. ANY DAMAGE NOT REPORTED BEFORE THE TRUCK IS UNLOADED WILL BE THE CONTRACTOR'S RESPONSIBILITY.

10. STORMTRAP MODULES CANNOT BE ALTERED IN ANY WAY AFTER MANUFACTURING WITHOUT WRITTEN CONSENT FROM STORMTRAP.





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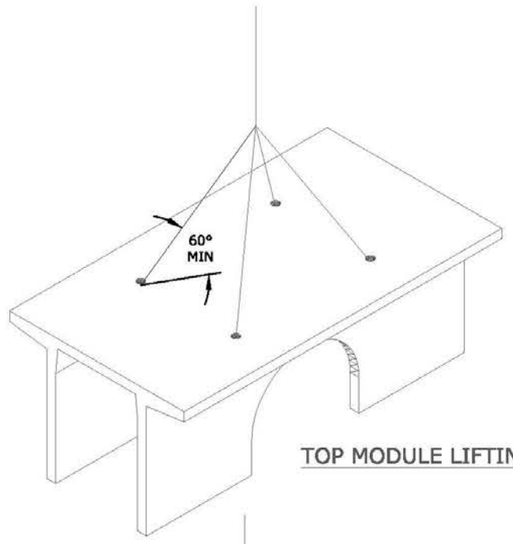
DOUBLETRAP INSTALLATION SPECIFICATIONS

SHEET NUMBER:

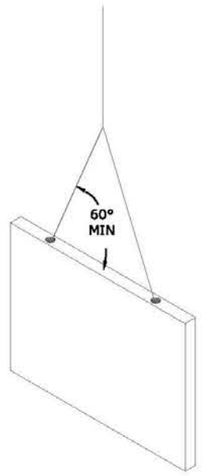
3.0

END PANEL ERECTION/INSTALLATION NOTES

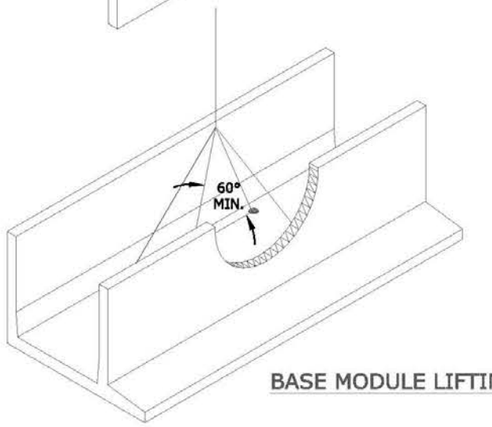
1. END PANELS WILL BE SUPPLIED TO CLOSE OFF OPEN ENDS OF ROWS.
2. PANELS SHALL BE INSTALLED IN A TILT UP FASHION DIRECTLY ADJACENT TO OPEN END OF MODULE (REFER TO SHEET 2.0 FOR END PANEL LOCATIONS).
3. CONNECTION HOOKS WILL BE SUPPLIED WITH END PANELS TO SECURELY CONNECT PANEL TO ADJACENT STORMTRAP MODULE (SEE PANEL CONNECTION ELEVATION VIEW).
4. ONCE CONNECTION HOOK IS ATTACHED, LIFTING CLUTCHES MAY BE REMOVED.
5. JOINT WRAP SHALL BE PLACED AROUND PERIMETER JOINT PANEL (SEE SHEET 3.0).



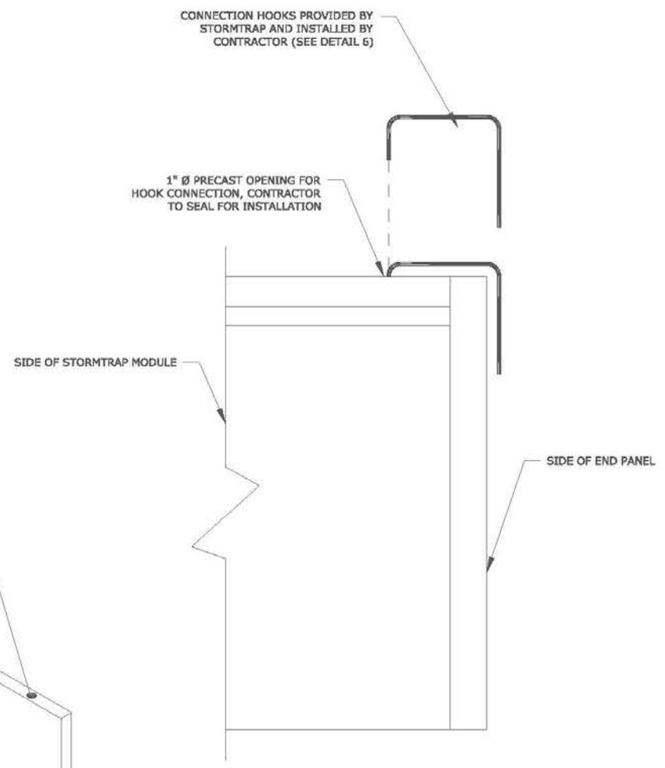
TOP MODULE LIFTING DETAIL



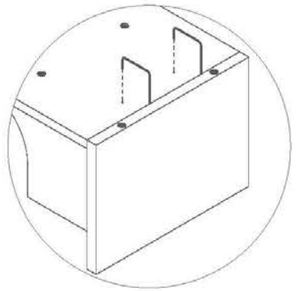
END PANEL LIFTING DETAIL



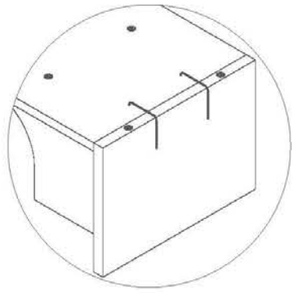
BASE MODULE LIFTING DETAIL



PANEL CONNECTION ELEVATION VIEW



STEP 1



STEP 2

DETAIL 6

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3.1

ZONE CHART

ZONES	ZONE DESCRIPTIONS	REMARKS
ZONE 1	FOUNDATION AGGREGATE	#5 (¾") STONE AGGREGATE (SEE NOTE 4 FOR DESCRIPTION)
ZONE 2	BACKFILL	UNIFIED SOILS CLASSIFICATION (GW, GP, SW, SP) - SEE BELOW FOR APPROVED BACKFILL OPTIONS
ZONE 3	FINAL COVER OVERTOP	MATERIALS NOT TO EXCEED 120 PCF

FILL DEPTH	TRACK WIDTH	MAX VEHICLE WEIGHT (KIPS)	MAX GROUND PRESSURE
12"	12"	51.8	1690 psf
	18"	56.1	1219 psf
	24"	68.1	1111 psf
	30"	76.7	1000 psf
	36"	85.0	924 psf

NOTE:
TRACK LENGTH NOT TO EXCEED 15'-4".
ONLY TWO TRACKS PER VEHICLE.

APPROVED ZONE 2 BACKFILL OPTIONS

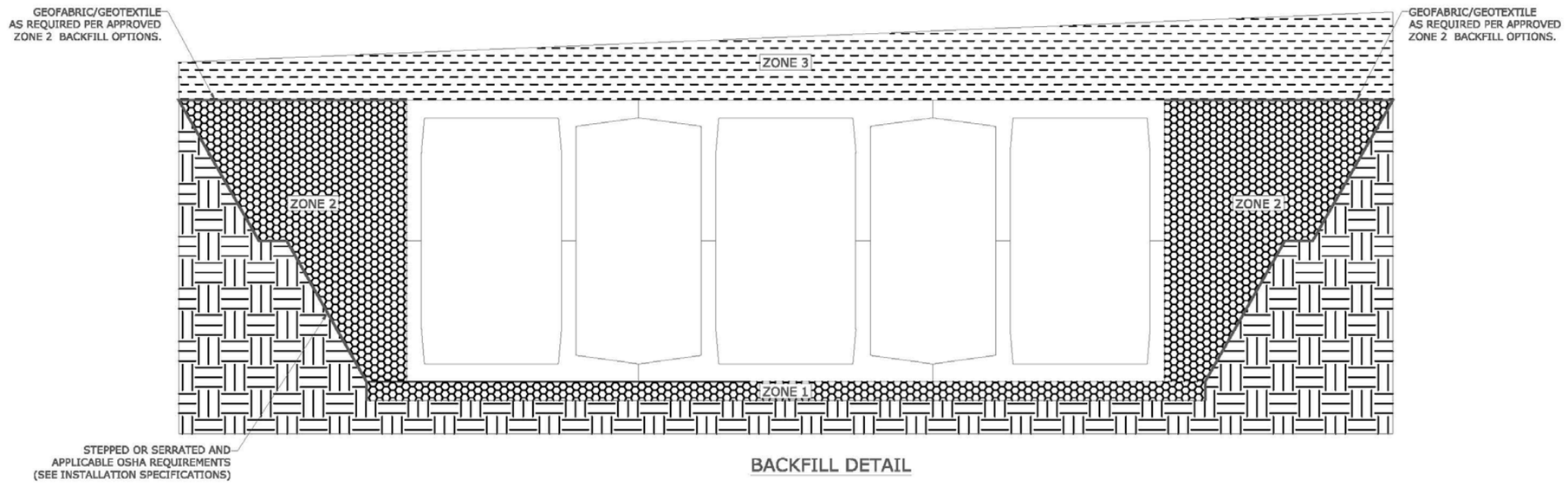
OPTION	REMARKS
¾" STONE AGGREGATE	THE STONE AGGREGATE SHALL CONSIST OF WASHED, CLEAN AND FREE DRAINING ANGULAR MATERIAL. THE SIZE OF THIS MATERIAL SHALL HAVE 100% PASSING THE 1" SIEVE WITH 0% TO 5% PASSING THE #8 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE BACKFILL (ASTM SIZE #57) AS DETERMINED BY THE GEOTECHNICAL ENGINEER.
SAND	IMPORTED PURE SAND IS PERMITTED TO BE USED AS BACKFILL IF IT IS CLEAN AND FREE DRAINING. THE SAND USED FOR BACKFILLING SHALL HAVE LESS THAN 40% PASSING #40 SIEVE AND LESS THAN 5% PASSING #200 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE SAND BACKFILL.
CRUSHED CONCRETE AGGREGATE	CLEAN, FREE DRAINING CRUSHED CONCRETE AGGREGATE MATERIAL CAN BE USED AS BACKFILL FOR STORMTRAP'S MODULES. THE SIZE OF THIS MATERIAL SHALL HAVE 100% PASSING THE 1" SIEVE WITH 0% TO 5% PASSING THE #8 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE BACKFILL.
ROAD PACK	STONE AGGREGATE 100% PASSING THE 1-1/2" SIEVE WITH LESS THAN 12% PASSING THE #200 SIEVE (ASTM SIZE #467). GEOFABRIC AS PER GEOTECHNICAL ENGINEER RECOMMENDATION.

STORMTRAP ZONE INSTALLATION SPECIFICATIONS/PROCEDURES

1. THE FILL PLACED AROUND THE STORMTRAP MODULES MUST DEPOSITED ON BOTH SIDES AT THE SAME TIME AND TO APPROXIMATELY THE SAME ELEVATION. AT NO TIME SHALL THE FILL BEHIND ONE SIDE WALL BE MORE THAN 2'-0" HIGHER THAN THE FILL ON THE OPPOSITE SIDE. BACKFILL SHALL EITHER BE COMPACTED AND/OR VIBRATED TO ENSURE THAT BACKFILL AGGREGATE/STONE MATERIAL IS WELL SEATED AND PROPERLY INTER LOCKED. CARE SHALL BE TAKEN TO PREVENT ANY WEDGING ACTION AGAINST THE STRUCTURE, AND ALL SLOPES WITHIN THE AREA TO BE BACKFILLED MUST BE STEPPED OR SERRATED TO PREVENT WEDGING ACTION. CARE SHALL ALSO BE TAKEN AS NOT TO DISRUPT THE JOINT WRAP FROM THE JOINT DURING THE BACKFILL PROCESS. BACKFILL MUST BE FREE-DRAINING MATERIAL. SEE ZONE 2 BACKFILL CHART ON THIS PAGE FOR APPROVED BACKFILL OPTIONS. IF NATIVE EARTH IS SUSCEPTIBLE TO MIGRATION, CONFIRM WITH GEOTECHNICAL ENGINEER AND PROVIDE PROTECTION AS REQUIRED (PROVIDED BY OTHERS).
2. DURING PLACEMENT OF MATERIAL OVERTOP THE SYSTEM, AT NO TIME SHALL MACHINERY BE USED OVERTOP THAT EXCEEDS THE DESIGN LIMITATIONS OF THE SYSTEM. WHEN PLACEMENT OF MATERIAL OVERTOP, MATERIAL SHALL BE PLACED SUCH THAT THE DIRECTION OF PLACEMENT IS PARALLEL WITH THE OVERALL LONGITUDINAL DIRECTION OF THE SYSTEM WHENEVER POSSIBLE.
3. THE FILL PLACED OVERTOP THE SYSTEM SHALL BE PLACED AT A MINIMUM OF 6" LIFTS. AT NO TIME SHALL MACHINERY OR VEHICLES GREATER THAN THE DESIGN HS-20 LOADING CRITERIA TRAVEL OVERTOP THE SYSTEM WITHOUT THE MINIMUM DESIGN COVERAGE. IF TRAVEL IS NECESSARY OVERTOP THE SYSTEM PRIOR TO ACHIEVING THE MINIMUM DESIGN COVER, IT MAY BE NECESSARY TO REDUCE THE ULTIMATE LOAD/BURDEN OF THE OPERATING MACHINERY SO AS TO NOT EXCEED THE DESIGN CAPACITY OF THE SYSTEM. IN SOME CASES, IN ORDER TO ACHIEVE REQUIRED COMPACTION, HAND COMPACTION MAY BE NECESSARY IN ORDER NOT TO EXCEED THE ALLOTTED DESIGN LOADING. SEE CHART FOR TRACKED VEHICLE WIDTH AND ALLOWABLE MAXIMUM PRESSURE PER TRACK.
4. STONE AGGREGATE FOUNDATION IN ZONE 1 MAY BE REQUIRED FOR THE FOLLOWING:

   A.) INFILTRATION - IF INFILTRATION IS REQUIRED, A FREE DRAINING MATERIAL SHALL BE USED AT A DEPTH DETERMINED BY THE EOR. FREE DRAINING AGGREGATE IS DEFINED AS 80% AGGREGATE RETAINED ON ½" SIEVE, MAJORITY OF AGGREGATE SIZE BETWEEN ½" AND 1", AND ONLY 5% OF MATERIAL PASSING #3/8" SIEVE.

   B.) LEVELING - STORMTRAP RECOMMENDS STONE SUBBASE FOR LEVELING PURPOSES ONLY (OPTIONAL).



BACKFILL DETAIL

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4.0

RECOMMENDED ACCESS OPENING SPECIFICATION

1. A TYPICAL ACCESS OPENING FOR THE STORMTRAP SYSTEM ARE 2'-0" IN DIAMETER. ACCESS OPENINGS LARGER THAN 3'-0" IN DIAMETER NEED TO BE APPROVED BY STORMTRAP. ALL OPENINGS MUST RETAIN AT LEAST 1'-0" OF CLEARANCE FROM THE END OF THE STORMTRAP MODULE UNLESS NOTED OTHERWISE. ALL ACCESS OPENINGS TO BE LOCATED ON INSIDE LEG UNLESS OTHERWISE SPECIFIED.
2. PLASTIC COATED STEEL STEPS PRODUCED BY M.A. INDUSTRIES PART #PS3-PFC OR APPROVED EQUAL (SEE STEP DETAIL) ARE PROVIDED INSIDE ANY MODULE WHERE DEEMED NECESSARY. THE HIGHEST STEP IN THE MODULE IS TO BE PLACED A DISTANCE OF 1'-0" FROM THE INSIDE EDGE OF THE STORMTRAP MODULES. ALL ENSUING STEPS SHALL BE PLACED AT A DISTANCE BETWEEN 10" MIN AND 14" MAX BETWEEN THEM. STEPS MAY BE MOVED OR ALTERED TO AVOID OPENINGS OR OTHER IRREGULARITIES IN THE MODULE.
3. STORMTRAP LIFTING INSERTS MAY BE RELOCATED TO AVOID INTERFERENCE WITH ACCESS OPENINGS OR THE CENTER OF GRAVITY OF THE MODULE AS NEEDED.
4. STORMTRAP ACCESS OPENINGS MAY BE RELOCATED TO AVOID INTERFERENCE WITH INLET AND/OR OUTLET PIPE OPENINGS SO PLACEMENT OF STEPS IS ATTAINABLE.
5. ACCESS OPENINGS SHOULD BE LOCATED IN ORDER TO MEET THE APPROPRIATE MUNICIPAL REQUIREMENTS. STORMTRAP RECOMMENDS AT LEAST TWO ACCESS OPENINGS PER SYSTEM FOR ACCESS AND INSPECTION.
6. USE PRECAST ADJUSTING RINGS AS NEEDED TO MEET GRADE. STORMTRAP RECOMMENDS FOR COVER OVER 2' TO USE PRECAST BARREL OR CONE INSPECTIONS. (PROVIDED BY OTHERS)

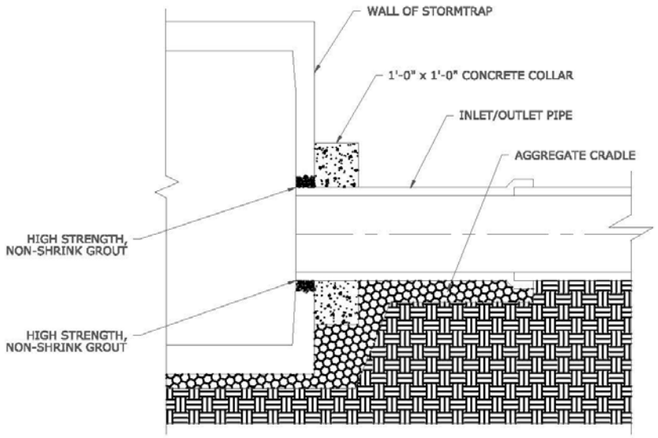
RECOMMENDED PIPE OPENING SPECIFICATION

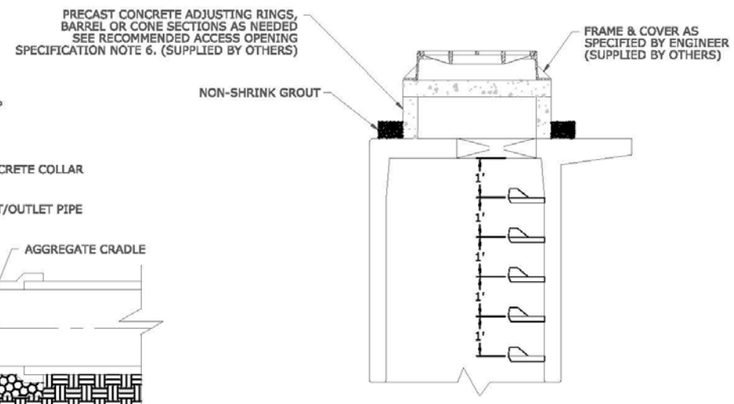
1. MINIMUM EDGE DISTANCE FOR AN OPENING ON THE OUTSIDE WALL SHALL BE NO LESS THAN 1'-0".
2. MAXIMUM OPENING SIZE TO BE DETERMINED BY THE MODULE HEIGHT. PREFERRED OPENING SIZE Ø 36" OR LESS. ANY OPENING NEEDED THAT DOES NOT FIT THIS CRITERIA SHALL BE BROUGHT TO THE ATTENTION OF STORMTRAP FOR REVIEW.
3. CONNECTING PIPES SHALL BE INSTALLED WITH A 1'-0" CONCRETE COLLAR, AND AN AGGREGATE CRADLE FOR AT LEAST ONE PIPE LENGTH (SEE PIPE CONNECTION DETAIL). A STRUCTURAL GRADE CONCRETE OR HIGH STRENGTH, NON-SHRINK GROUT WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI SHALL BE USED.
4. THE ANNULAR SPACE BETWEEN THE PIPE AND THE HOLE SHALL BE FILLED WITH HIGH STRENGTH NON-SHRINK GROUT.

RECOMMENDED PIPE INSTALLATION INSTRUCTIONS

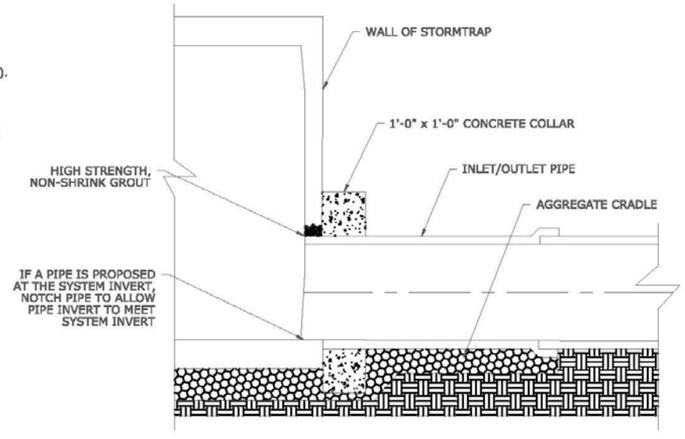
1. CLEAN AND LIGHTLY LUBRICATE ALL OF THE PIPE TO BE INSERTED INTO STORMTRAP.
2. IF PIPE IS CUT, CARE SHOULD BE TAKEN TO ALLOW NO SHARP EDGES. BEVEL AND LUBRICATE LEAD END OF PIPE.
3. ALIGN CENTER OF PIPE TO CORRECT ELEVATION AND INSERT INTO OPENING.

NOTE: ALL ANCILLARY PRODUCTS/SPECIFICATIONS RECOMMENDED AND SHOWN ON THIS SHEET ARE RECOMMENDATIONS ONLY AND SUBJECT TO CHANGE PER THE INSTALLING CONTRACTOR AND/OR PER LOCAL MUNICIPAL CODE/REQUIREMENTS.

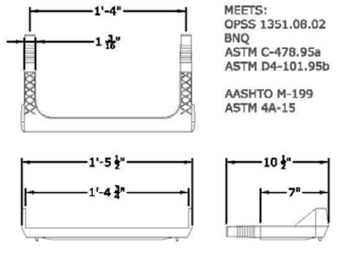




RISER / STAIR DETAIL



PIPE CONNECTION DETAIL



MEETS:
OPSS 1351.08.02
BNQ
ASTM C-478.95a
ASTM D4-101.95b

AASHTO M-199
ASTM 4A-15

STEP DETAIL

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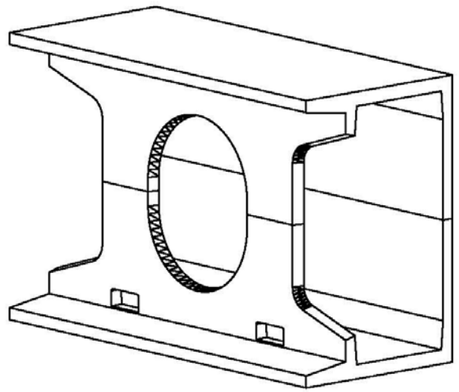
5.0



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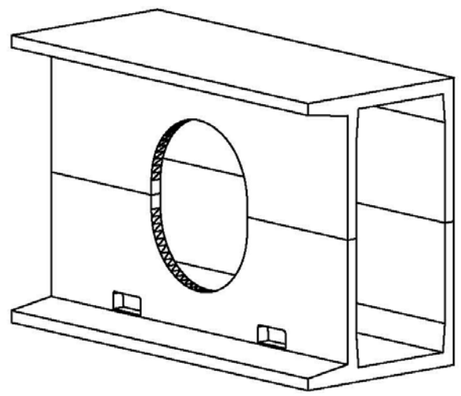

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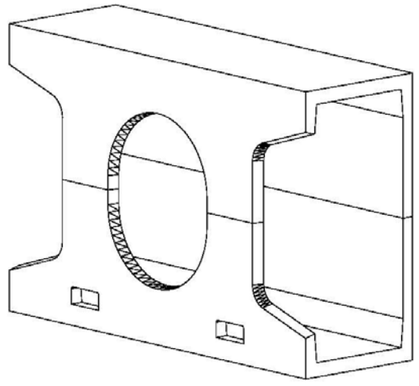
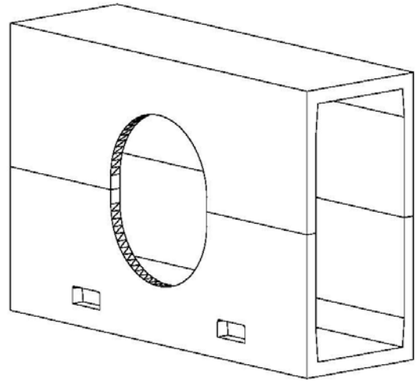


TYPE VII(3)



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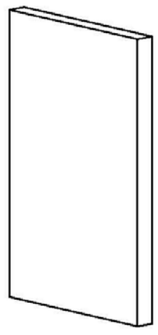
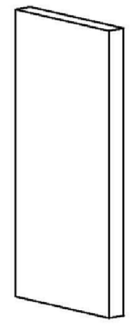


TYPE IV
END PANEL



TYPE VII
END PANEL

NOTES:
1. OPENING LOCATIONS AND SHAPES MAY VARY.
2. SP - INDICATES A MODULE WITH MODIFICATIONS.
3. P - INDICATES A MODULE WITH A PANEL ATTACHMENT.
4. POCKET WINDOW OPENINGS ARE OPTIONAL.

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PROJECT INFORMATION:

BREEZE LUXURY APTS

BASIN 1A

OCEANSIDE, CA

CURRENT ISSUE DATE:

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SHEET TITLE:

DOUBLETRAP
MODULE TYPES

SHEET NUMBER:

6.0

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MODULAR CONCRETE
STORMWATER MANAGEMENT

SHEET INDEX	
PAGE	DESCRIPTION
0.0	COVER SHEET
1.0	DOUBLETRAP DESIGN CRITERIA
2.0	DOUBLETRAP SYSTEM LAYOUT
3.0	DOUBLETRAP INSTALLATION SPECIFICATIONS
3.1	DOUBLETRAP INSTALLATION SPECIFICATIONS
4.0	DOUBLETRAP BACKFILL SPECIFICATIONS
5.0	RECOMMENDED PIPE / ACCESS OPENING SPECIFICATIONS
6.0	DOUBLETRAP MODULE TYPES

STORMTRAP CONTACT INFORMATION

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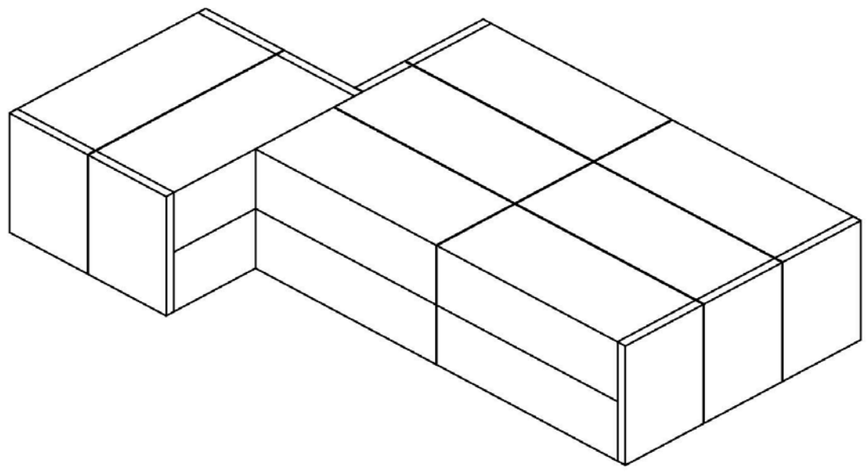
CONTACT NAME: CHARLIE CARTER
CELL PHONE: 760-212-5628
SALES EMAIL: CCARTER@STORMTRAP.COM



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COVER SHEET

SHEET NUMBER:

0.0

STRUCTURAL DESIGN LOADING CRITERIA

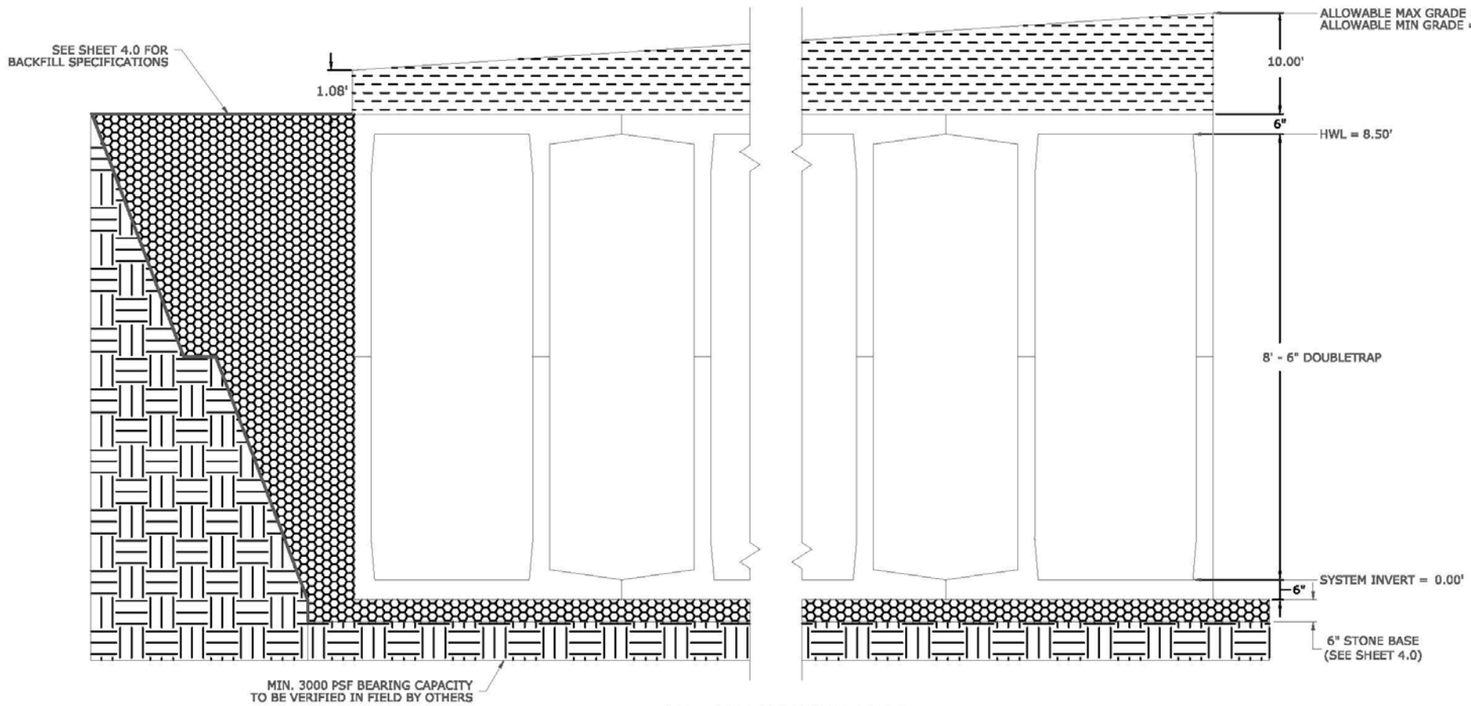
LIVE LOADING:	AASHTO HS-20 HIGHWAY LOADING
GROUND WATER TABLE:	BELOW INVERT OF SYSTEM
SOIL BEARING PRESSURE:	3000 PSF
SOIL DENSITY:	120 PCF
EQUIVALENT UNSATURATED LATERAL ACTIVE EARTH PRESSURE:	35 PSF / FT.
EQUIVALENT SATURATED LATERAL ACTIVE EARTH PRESSURE:	80 PSF/FT. (IF WATER TABLE PRESENT)
APPLICABLE CODES:	AASHTO ACI-318
BACKFILL TYPE:	SEE SHEET 4.0 FOR BACKFILL OPTIONS

STORMTRAP SYSTEM INFORMATION

WATER STORAGE PROV:	6,079.41 CUBIC FEET
UNIT HEADROOM:	8' - 6" DOUBLETRAP
UNIT QUANTITY:	16 TOTAL UNITS

SITE SPECIFIC DESIGN CRITERIA

1. STORMTRAP UNITS SHALL BE MANUFACTURED AND INSTALLED ACCORDING TO SHOP DRAWINGS APPROVED BY THE INSTALLING CONTRACTOR AND ENGINEER OF RECORD. THE SHOP DRAWINGS SHALL INDICATE SIZE AND LOCATION OF ROOF OPENINGS AND INLET/ OUTLET PIPE TYPES, SIZES, INVERT ELEVATIONS AND SIZE OF OPENINGS.
2. COVER RANGE: MIN. 1.08' MAX. 10.00CONSULT STORMTRAP FOR ADDITIONAL COVER OPTIONS.
3. ALL DIMENSIONS AND SOIL CONDITIONS, INCLUDING BUT NOT LIMITED TO GROUNDWATER AND SOIL BEARING CAPACITY ARE REQUIRED TO BE VERIFIED IN THE FIELD BY OTHERS PRIOR TO STORMTRAP INSTALLATION.
4. FOR STRUCTURAL CALCULATIONS THE GROUND WATER TABLE IS ASSUMED TO BE BELOW INVERT OF SYSTEM . IF WATER TABLE IS DIFFERENT THAN ASSUMED, CONTACT STORMTRAP.



8' - 6" DOUBLETRAP

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DOUBLETRAP DESIGN CRITERIA

SHEET NUMBER:

1.0

BILL OF MATERIALS

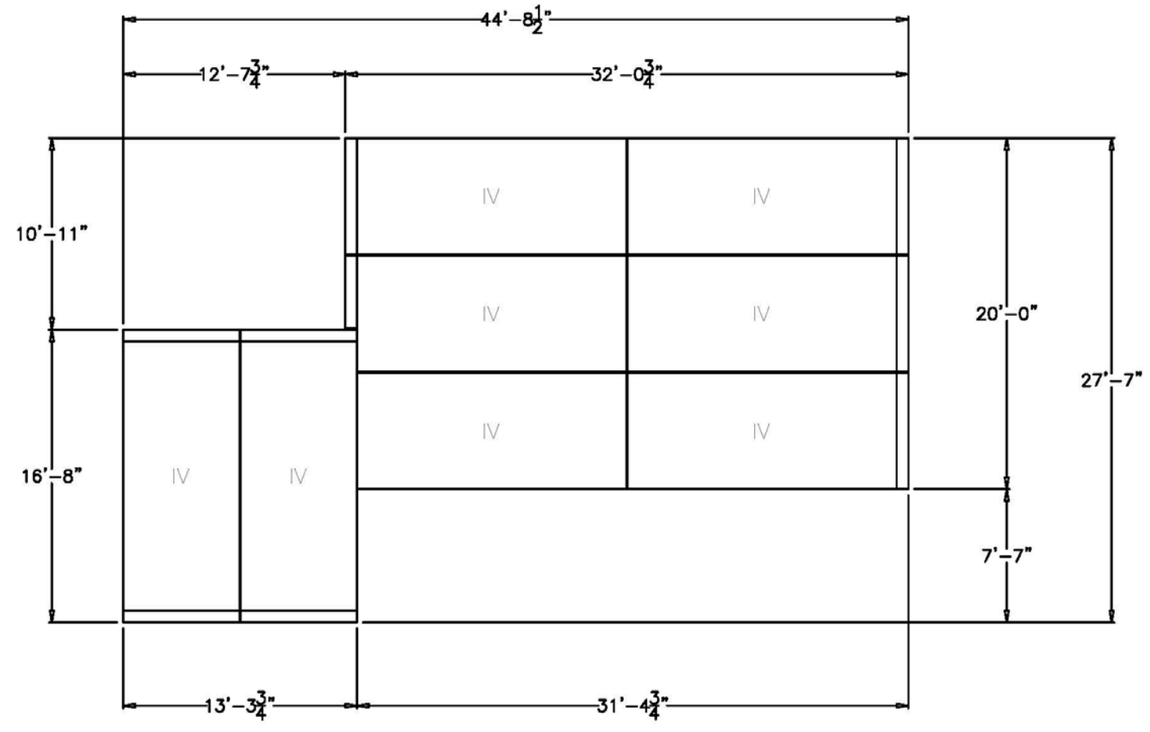
QTY.	UNIT TYPE	DESCRIPTION	TOP WEIGHT	BASE WEIGHT
0	I	8' - 6" DOUBLETRAP	15035	14833
0	II	8' - 6" DOUBLETRAP	16942	16740
0	III	8' - 6" DOUBLETRAP	14463	14362
8	IV	8' - 6" DOUBLETRAP	15417	15316
0	VII	8' - 6" DOUBLETRAP	13886	13886
0	SPIV	8' - 6" DOUBLETRAP	VARIES	VARIES
9	PANEL	8" THICK PANELS	6294	
3	JOINT WRAP	150' PER ROLL		
16	JOINT TAPE	14.5' PER ROLL		

LOADING DISCLAIMER:

STORMTRAP IS NOT DESIGNED TO ACCEPT ANY ADDITIONAL LOADINGS FROM NEARBY STRUCTURES NEXT TO OR OVER THE TOP OF STORMTRAP. IF ADDITIONAL LOADING CONSIDERATIONS ARE REQUIRED FOR STRUCTURAL DESIGN OF STORMTRAP, PLEASE CONTACT STORMTRAP IMMEDIATELY.

DESIGN CRITERIA
ALLOWABLE MAX GRADE = 19.00'
ALLOWABLE MIN GRADE = 10.08'
INSIDE HEIGHT ELEVATION = 8.50'
SYSTEM INVERT = 0.00'

NOTES:
1. DIMENSIONING OF STORMTRAP SYSTEM SHOWN BELOW ALLOW FOR A 3/4" GAP BETWEEN EACH MODULE.
2. ALL DIMENSIONS TO BE VERIFIED IN THE FIELD BY OTHERS.
3. SEE SHEET 3.0 FOR INSTALLATION SPECIFICATIONS.
4. SP - INDICATES A MODULE WITH MODIFICATIONS.
5. P - INDICATES A MODULE WITH A PANEL ATTACHMENT.
6. CONTRACTORS RESPONSIBILITY TO ENSURE CONSISTENCY/ACCURACY TO FINAL ENGINEER OF RECORD PLAN SET.



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DOUBLETRAP SYSTEM LAYOUT

SHEET NUMBER:

2.0

STORMTRAP INSTALLATION SPECIFICATIONS

1. STORMTRAP SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C891, STANDARD FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES, THE FOLLOWING ADDITIONS AND/OR EXCEPTIONS SHALL APPLY:

2. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO ENSURE THAT PROPER/ADEQUATE EQUIPMENT IS USED TO SET/INSTALL THE MODULES.

3. STORMTRAP MODULES CAN BE PLACED ON A LEVEL, 6" FOUNDATION OF ¾" AGGREGATE EXTENDING 2'-0" PAST THE OUTSIDE OF THE SYSTEM (SEE DETAIL 1) AND SHALL BE PLACED ON PROPERLY COMPACTED SOILS (SEE SHEET 1.0 FOR SOIL BEARING CAPACITY REQUIREMENTS), AND IN ACCORDANCE WITH ASTM C891 STANDARD PRACTICE FOR INSTALLATION OF UNDERGROUND PRECAST UTILITY STRUCTURES.

4. THE STORMTRAP MODULES SHALL BE PLACED SUCH THAT THE MAXIMUM SPACE BETWEEN ADJACENT MODULES DOES NOT EXCEED ¾" (SEE DETAIL 2). IF THE SPACE EXCEEDS ¾", THE MODULES SHALL BE RESET WITH APPROPRIATE ADJUSTMENT MADE TO LINE AND GRADE TO BRING THE SPACE INTO SPECIFICATION.

5. STORMTRAP MODULES ARE NOT WATERTIGHT. IF A WATERTIGHT SOLUTION IS REQUIRED, CONTACT STORMTRAP FOR RECOMMENDATIONS. THE WATERTIGHT APPLICATION IS TO BE PROVIDED AND IMPLEMENTED BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT THE SELECTED WATERTIGHT SOLUTION PERFORMS AS SPECIFIED BY THE MANUFACTURER.

6. THE PERIMETER HORIZONTAL JOINT BETWEEN THE TOP AND BASE LEG CONNECTION OF THE STORMTRAP MODULES SHALL BE SEALED WITH PREFORMED MASTIC JOINT TAPE ACCORDING TO ASTM C891, 8.8 AND 8.12. (SEE DETAIL 3). THE MASTIC JOINT TAPE DOES NOT PROVIDE A WATERTIGHT SEAL. THE SOLE PURPOSE OF THE JOINT TAPE IS TO PROVIDE A SILT AND SOIL TIGHT SYSTEM.

7. ALL EXTERIOR JOINTS BETWEEN ADJACENT STORMTRAP MODULES SHALL BE SEALED WITH 8" WIDE PRE-FORMED, COLD-APPLIED, SELF-ADHERING ELASTOMERIC RESIN, BONDED TO A WOVEN , HIGHLY PUNCTURE RESISTANT POLYMER WRAP, CONFORMING TO ASTM C891 AND SHALL BE INTEGRATED WITH PRIMER SEALANT AS APPROVED BY STORMTRAP (SEE DETAILS 3 & 4). THE JOINT WRAP DOES NOT PROVIDE A WATERTIGHT SEAL. THE SOLE PURPOSE OF THE JOINT WRAP IS TO PROVIDE A SILT AND SOIL TIGHT SYSTEM. THE ADHESIVE EXTERIOR JOINT WRAP SHALL BE INSTALLED ACCORDING TO THE FOLLOWING INSTALLATION INSTRUCTIONS:

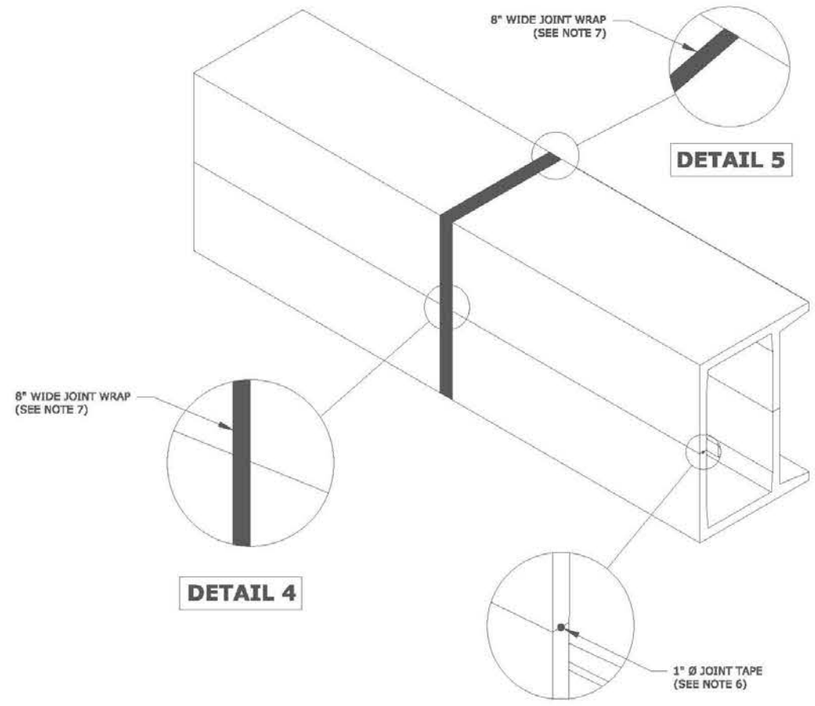
   7.1. USE A BRUSH OR WET CLOTH TO THOROUGHLY CLEAN THE OUTSIDE SURFACE AT THE POINT WHERE JOINT WRAP IS TO BE APPLIED.

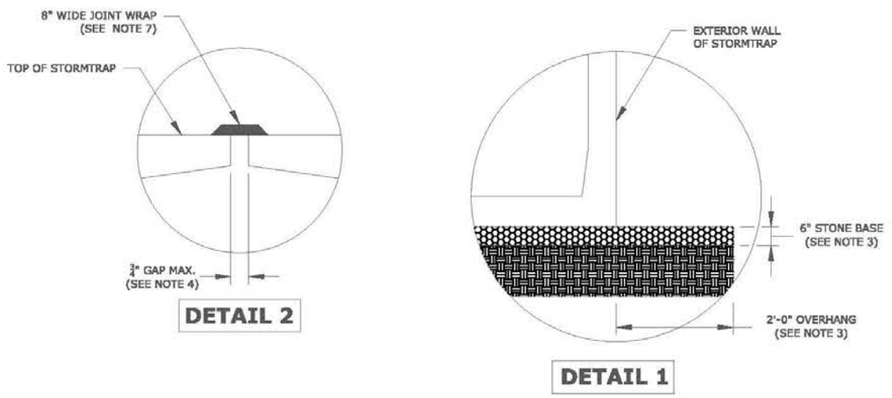
   7.2. A RELEASE PAPER PROTECTS THE ADHESIVE SIDE OF THE JOINT WRAP. PLACE THE ADHESIVE TAPE (ADHESIVE SIDE DOWN) AROUND THE STRUCTURE, REMOVING THE RELEASE PAPER AS YOU GO. PRESS THE JOINT WRAP FIRMLY AGAINST THE STORMTRAP MODULE SURFACE WHEN APPLYING.

8. IF THE CONTRACTOR NEEDS TO CANCEL ANY SHIPMENTS, THEY MUST DO SO 48 HOURS PRIOR TO THEIR SCHEDULED ARRIVAL AT THE JOB SITE. IF CANCELED AFTER THAT TIME, PLEASE CONTACT THE PROJECT MANAGER.

9. IF THE STORMTRAP MODULE(S) IS DAMAGED IN ANY WAY PRIOR, DURING, OR AFTER INSTALL, STORMTRAP MUST BE CONTACTED IMMEDIATELY TO ASSESS THE DAMAGE AND TO DETERMINE WHETHER OR NOT THE MODULE(S) WILL NEED TO BE REPLACED. IF ANY MODULE ARRIVES AT THE JOBSITE DAMAGED DO NOT UNLOAD IT; CONTACT STORMTRAP IMMEDIATELY. ANY DAMAGE NOT REPORTED BEFORE THE TRUCK IS UNLOADED WILL BE THE CONTRACTOR'S RESPONSIBILITY.

10. STORMTRAP MODULES CANNOT BE ALTERED IN ANY WAY AFTER MANUFACTURING WITHOUT WRITTEN CONSENT FROM STORMTRAP.





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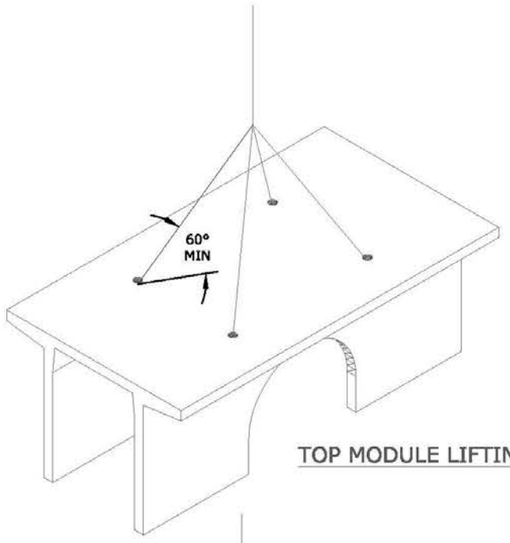
DOUBLETRAP INSTALLATION SPECIFICATIONS

SHEET NUMBER:

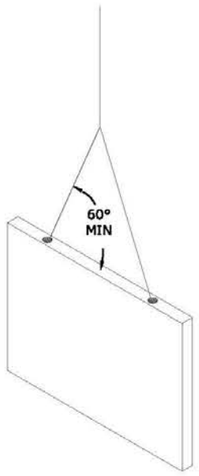
3.0

END PANEL ERECTION/INSTALLATION NOTES

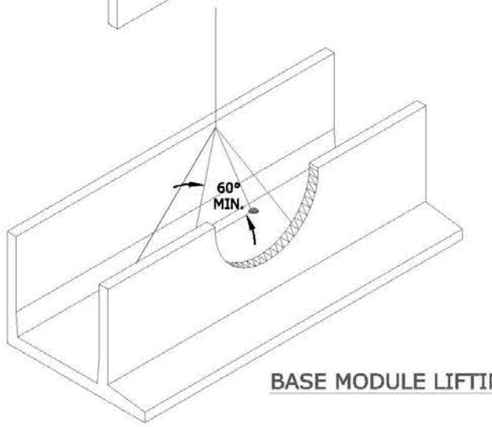
1. END PANELS WILL BE SUPPLIED TO CLOSE OFF OPEN ENDS OF ROWS.
2. PANELS SHALL BE INSTALLED IN A TILT UP FASHION DIRECTLY ADJACENT TO OPEN END OF MODULE (REFER TO SHEET 2.0 FOR END PANEL LOCATIONS).
3. CONNECTION HOOKS WILL BE SUPPLIED WITH END PANELS TO SECURELY CONNECT PANEL TO ADJACENT STORMTRAP MODULE (SEE PANEL CONNECTION ELEVATION VIEW).
4. ONCE CONNECTION HOOK IS ATTACHED, LIFTING CLUTCHES MAY BE REMOVED.
5. JOINT WRAP SHALL BE PLACED AROUND PERIMETER JOINT PANEL (SEE SHEET 3.0).



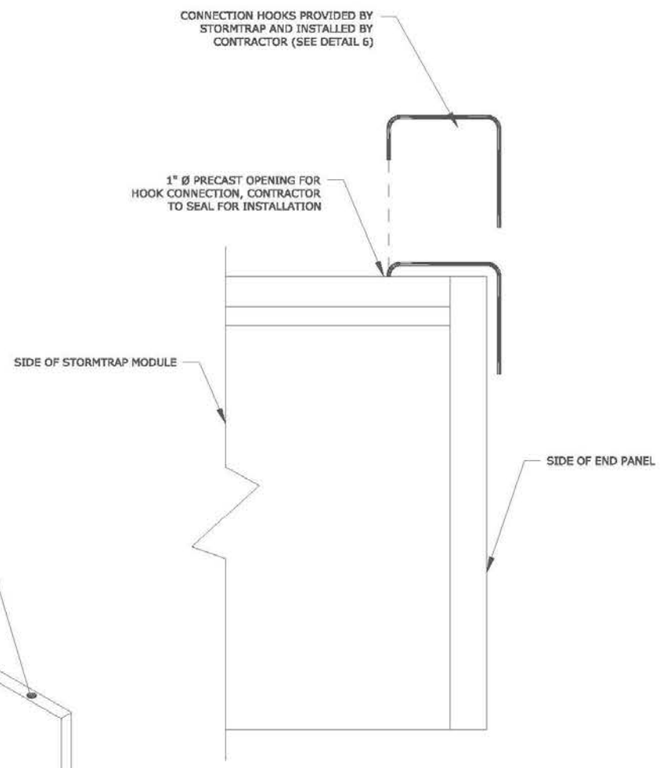
TOP MODULE LIFTING DETAIL



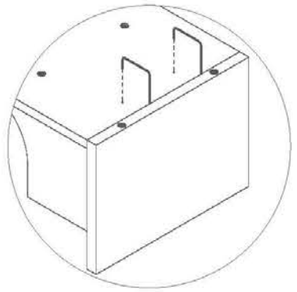
END PANEL LIFTING DETAIL



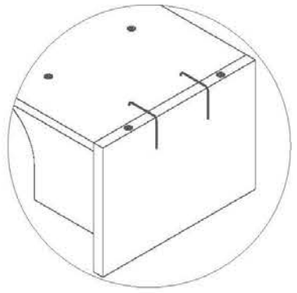
BASE MODULE LIFTING DETAIL



PANEL CONNECTION ELEVATION VIEW



STEP 1



STEP 2

DETAIL 6

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SHEET NUMBER:

3.1

ZONE CHART

ZONES	ZONE DESCRIPTIONS	REMARKS
ZONE 1	FOUNDATION AGGREGATE	#5 (¾") STONE AGGREGATE (SEE NOTE 4 FOR DESCRIPTION)
ZONE 2	BACKFILL	UNIFIED SOILS CLASSIFICATION (GW, GP, SW, SP) - SEE BELOW FOR APPROVED BACKFILL OPTIONS
ZONE 3	FINAL COVER OVERTOP	MATERIALS NOT TO EXCEED 120 PCF

FILL DEPTH	TRACK WIDTH	MAX VEHICLE WEIGHT (KIPS)	MAX GROUND PRESSURE
12"	12"	51.8	1690 psf
	18"	56.1	1219 psf
	24"	68.1	1111 psf
	30"	76.7	1000 psf
	36"	85.0	924 psf

NOTE:
TRACK LENGTH NOT TO EXCEED 15'-4".
ONLY TWO TRACKS PER VEHICLE.

APPROVED ZONE 2 BACKFILL OPTIONS

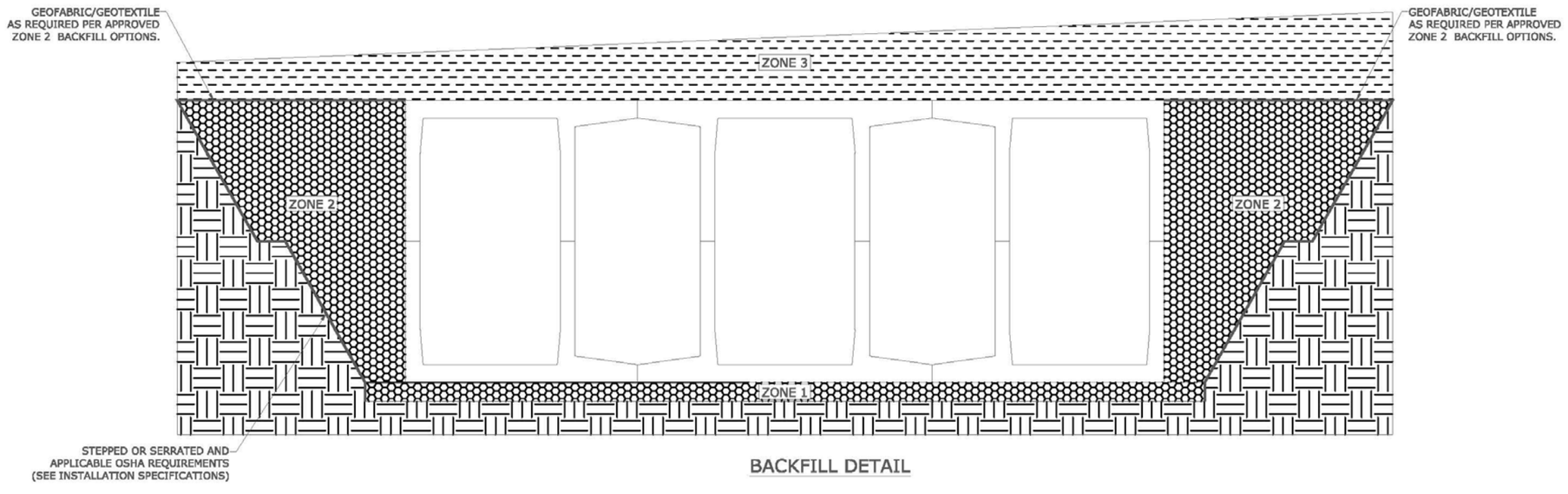
OPTION	REMARKS
¾" STONE AGGREGATE	THE STONE AGGREGATE SHALL CONSIST OF WASHED, CLEAN AND FREE DRAINING ANGULAR MATERIAL. THE SIZE OF THIS MATERIAL SHALL HAVE 100% PASSING THE 1" SIEVE WITH 0% TO 5% PASSING THE #8 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE BACKFILL (ASTM SIZE #57) AS DETERMINED BY THE GEOTECHNICAL ENGINEER.
SAND	IMPORTED PURE SAND IS PERMITTED TO BE USED AS BACKFILL IF IT IS CLEAN AND FREE DRAINING. THE SAND USED FOR BACKFILLING SHALL HAVE LESS THAN 40% PASSING #40 SIEVE AND LESS THAN 5% PASSING #200 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE SAND BACKFILL.
CRUSHED CONCRETE AGGREGATE	CLEAN, FREE DRAINING CRUSHED CONCRETE AGGREGATE MATERIAL CAN BE USED AS BACKFILL FOR STORMTRAP'S MODULES. THE SIZE OF THIS MATERIAL SHALL HAVE 100% PASSING THE 1" SIEVE WITH 0% TO 5% PASSING THE #8 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE BACKFILL.
ROAD PACK	STONE AGGREGATE 100% PASSING THE 1-1/2" SIEVE WITH LESS THAN 12% PASSING THE #200 SIEVE (ASTM SIZE #467). GEOFABRIC AS PER GEOTECHNICAL ENGINEER RECOMMENDATION.

STORMTRAP ZONE INSTALLATION SPECIFICATIONS/PROCEDURES

1. THE FILL PLACED AROUND THE STORMTRAP MODULES MUST DEPOSITED ON BOTH SIDES AT THE SAME TIME AND TO APPROXIMATELY THE SAME ELEVATION. AT NO TIME SHALL THE FILL BEHIND ONE SIDE WALL BE MORE THAN 2'-0" HIGHER THAN THE FILL ON THE OPPOSITE SIDE. BACKFILL SHALL EITHER BE COMPACTED AND/OR VIBRATED TO ENSURE THAT BACKFILL AGGREGATE/STONE MATERIAL IS WELL SEATED AND PROPERLY INTER LOCKED. CARE SHALL BE TAKEN TO PREVENT ANY WEDGING ACTION AGAINST THE STRUCTURE, AND ALL SLOPES WITHIN THE AREA TO BE BACKFILLED MUST BE STEPPED OR SERRATED TO PREVENT WEDGING ACTION. CARE SHALL ALSO BE TAKEN AS NOT TO DISRUPT THE JOINT WRAP FROM THE JOINT DURING THE BACKFILL PROCESS. BACKFILL MUST BE FREE-DRAINING MATERIAL. SEE ZONE 2 BACKFILL CHART ON THIS PAGE FOR APPROVED BACKFILL OPTIONS. IF NATIVE EARTH IS SUSCEPTIBLE TO MIGRATION, CONFIRM WITH GEOTECHNICAL ENGINEER AND PROVIDE PROTECTION AS REQUIRED (PROVIDED BY OTHERS).
2. DURING PLACEMENT OF MATERIAL OVERTOP THE SYSTEM, AT NO TIME SHALL MACHINERY BE USED OVERTOP THAT EXCEEDS THE DESIGN LIMITATIONS OF THE SYSTEM. WHEN PLACEMENT OF MATERIAL OVERTOP, MATERIAL SHALL BE PLACED SUCH THAT THE DIRECTION OF PLACEMENT IS PARALLEL WITH THE OVERALL LONGITUDINAL DIRECTION OF THE SYSTEM WHENEVER POSSIBLE.
3. THE FILL PLACED OVERTOP THE SYSTEM SHALL BE PLACED AT A MINIMUM OF 6" LIFTS. AT NO TIME SHALL MACHINERY OR VEHICLES GREATER THAN THE DESIGN HS-20 LOADING CRITERIA TRAVEL OVERTOP THE SYSTEM WITHOUT THE MINIMUM DESIGN COVERAGE. IF TRAVEL IS NECESSARY OVERTOP THE SYSTEM PRIOR TO ACHIEVING THE MINIMUM DESIGN COVER, IT MAY BE NECESSARY TO REDUCE THE ULTIMATE LOAD/BURDEN OF THE OPERATING MACHINERY SO AS TO NOT EXCEED THE DESIGN CAPACITY OF THE SYSTEM. IN SOME CASES, IN ORDER TO ACHIEVE REQUIRED COMPACTION, HAND COMPACTION MAY BE NECESSARY IN ORDER NOT TO EXCEED THE ALLOTTED DESIGN LOADING. SEE CHART FOR TRACKED VEHICLE WIDTH AND ALLOWABLE MAXIMUM PRESSURE PER TRACK.
4. STONE AGGREGATE FOUNDATION IN ZONE 1 MAY BE REQUIRED FOR THE FOLLOWING:

   A.) INFILTRATION - IF INFILTRATION IS REQUIRED, A FREE DRAINING MATERIAL SHALL BE USED AT A DEPTH DETERMINED BY THE EOR. FREE DRAINING AGGREGATE IS DEFINED AS 80% AGGREGATE RETAINED ON ½" SIEVE, MAJORITY OF AGGREGATE SIZE BETWEEN ½" AND 1", AND ONLY 5% OF MATERIAL PASSING #3/8" SIEVE.

   B.) LEVELING - STORMTRAP RECOMMENDS STONE SUBBASE FOR LEVELING PURPOSES ONLY (OPTIONAL).



BACKFILL DETAIL

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SCALE:

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SHEET TITLE:

DOUBLETRAP BACKFILL SPECIFICATIONS

SHEET NUMBER:

4.0

RECOMMENDED ACCESS OPENING SPECIFICATION

1. A TYPICAL ACCESS OPENING FOR THE STORMTRAP SYSTEM ARE 2'-0" IN DIAMETER. ACCESS OPENINGS LARGER THAN 3'-0" IN DIAMETER NEED TO BE APPROVED BY STORMTRAP. ALL OPENINGS MUST RETAIN AT LEAST 1'-0" OF CLEARANCE FROM THE END OF THE STORMTRAP MODULE UNLESS NOTED OTHERWISE. ALL ACCESS OPENINGS TO BE LOCATED ON INSIDE LEG UNLESS OTHERWISE SPECIFIED.
2. PLASTIC COATED STEEL STEPS PRODUCED BY M.A. INDUSTRIES PART #PS3-PFC OR APPROVED EQUAL (SEE STEP DETAIL) ARE PROVIDED INSIDE ANY MODULE WHERE DEEMED NECESSARY. THE HIGHEST STEP IN THE MODULE IS TO BE PLACED A DISTANCE OF 1'-0" FROM THE INSIDE EDGE OF THE STORMTRAP MODULES. ALL ENSUING STEPS SHALL BE PLACED AT A DISTANCE BETWEEN 10" MIN AND 14" MAX BETWEEN THEM. STEPS MAY BE MOVED OR ALTERED TO AVOID OPENINGS OR OTHER IRREGULARITIES IN THE MODULE.
3. STORMTRAP LIFTING INSERTS MAY BE RELOCATED TO AVOID INTERFERENCE WITH ACCESS OPENINGS OR THE CENTER OF GRAVITY OF THE MODULE AS NEEDED.
4. STORMTRAP ACCESS OPENINGS MAY BE RELOCATED TO AVOID INTERFERENCE WITH INLET AND/OR OUTLET PIPE OPENINGS SO PLACEMENT OF STEPS IS ATTAINABLE.
5. ACCESS OPENINGS SHOULD BE LOCATED IN ORDER TO MEET THE APPROPRIATE MUNICIPAL REQUIREMENTS. STORMTRAP RECOMMENDS AT LEAST TWO ACCESS OPENINGS PER SYSTEM FOR ACCESS AND INSPECTION.
6. USE PRECAST ADJUSTING RINGS AS NEEDED TO MEET GRADE. STORMTRAP RECOMMENDS FOR COVER OVER 2' TO USE PRECAST BARREL OR CONE INSPECTIONS. (PROVIDED BY OTHERS)

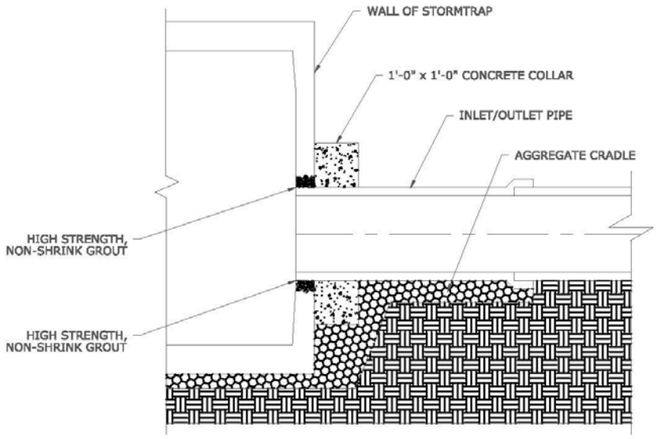
RECOMMENDED PIPE OPENING SPECIFICATION

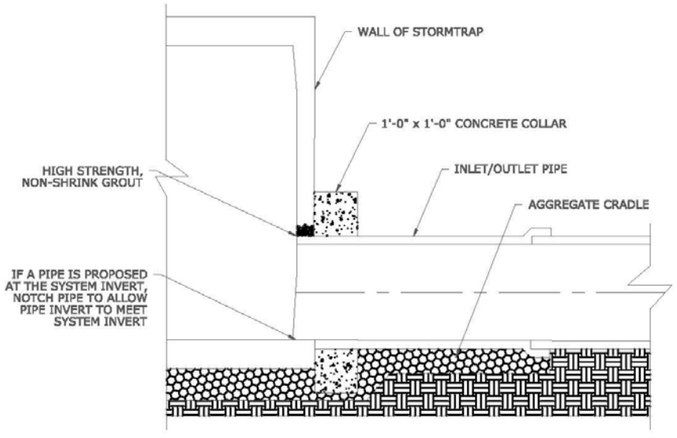
1. MINIMUM EDGE DISTANCE FOR AN OPENING ON THE OUTSIDE WALL SHALL BE NO LESS THAN 1'-0".
2. MAXIMUM OPENING SIZE TO BE DETERMINED BY THE MODULE HEIGHT. PREFERRED OPENING SIZE Ø 36" OR LESS. ANY OPENING NEEDED THAT DOES NOT FIT THIS CRITERIA SHALL BE BROUGHT TO THE ATTENTION OF STORMTRAP FOR REVIEW.
3. CONNECTING PIPES SHALL BE INSTALLED WITH A 1'-0" CONCRETE COLLAR, AND AN AGGREGATE CRADLE FOR AT LEAST ONE PIPE LENGTH (SEE PIPE CONNECTION DETAIL). A STRUCTURAL GRADE CONCRETE OR HIGH STRENGTH, NON-SHRINK GROUT WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI SHALL BE USED.
4. THE ANNULAR SPACE BETWEEN THE PIPE AND THE HOLE SHALL BE FILLED WITH HIGH STRENGTH NON-SHRINK GROUT.

RECOMMENDED PIPE INSTALLATION INSTRUCTIONS

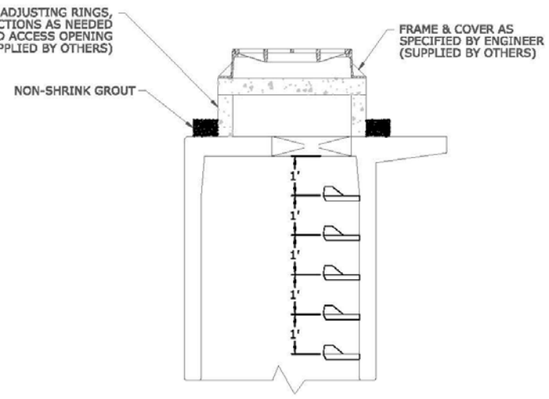
1. CLEAN AND LIGHTLY LUBRICATE ALL OF THE PIPE TO BE INSERTED INTO STORMTRAP.
2. IF PIPE IS CUT, CARE SHOULD BE TAKEN TO ALLOW NO SHARP EDGES. BEVEL AND LUBRICATE LEAD END OF PIPE.
3. ALIGN CENTER OF PIPE TO CORRECT ELEVATION AND INSERT INTO OPENING.

NOTE: ALL ANCILLARY PRODUCTS/SPECIFICATIONS RECOMMENDED AND SHOWN ON THIS SHEET ARE RECOMMENDATIONS ONLY AND SUBJECT TO CHANGE PER THE INSTALLING CONTRACTOR AND/OR PER LOCAL MUNICIPAL CODE/REQUIREMENTS.

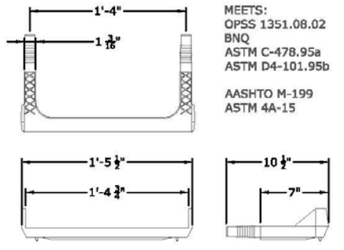




PIPE CONNECTION DETAIL



RISER / STAIR DETAIL



MEETS:
OPSS 1351.08.02
BNQ
ASTM C-478.95a
ASTM D4-101.95b

AASHTO M-199
ASTM 4A-15

STEP DETAIL

StormTrap
PATENTS LISTED AT: [HTTP://STORMTRAP.COM/PATENT]
1287 WINDHAM PARKWAY
ROMEOVILLE, IL 60446
P:815-941-4549 / F:331-318-5347

ENGINEER INFORMATION:

BHA ENGINEERS
5115 AVENIDA ENCINAS
CARLSBAD, CA 92008
760-931-8700

PROJECT INFORMATION:

BREEZE LUXURY APTS
BASIN 1B
OCEANSIDE, CA

CURRENT ISSUE DATE:

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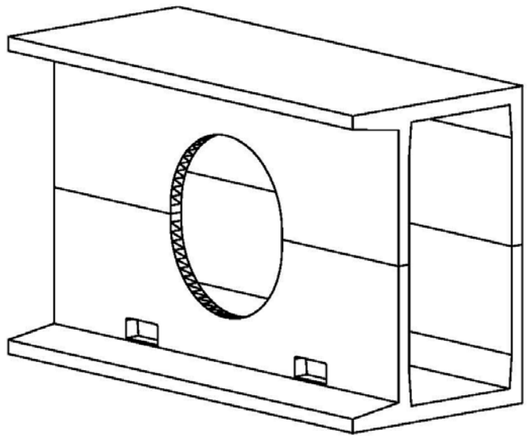
SHEET TITLE:

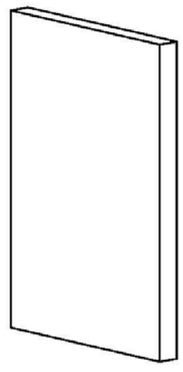
RECOMMENDED PIPE / ACCESS OPENING SPECIFICATIONS

SHEET NUMBER:

5.0



TYPE IV



TYPE IV
END PANEL

NOTES:
1. OPENING LOCATIONS AND SHAPES MAY VARY.
2. SP - INDICATES A MODULE WITH MODIFICATIONS.
3. P - INDICATES A MODULE WITH A PANEL ATTACHMENT.
4. POCKET WINDOW OPENINGS ARE OPTIONAL.

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SHEET TITLE:

DOUBLETRAP
MODULE TYPES

SHEET NUMBER:

6.0

BMP-2

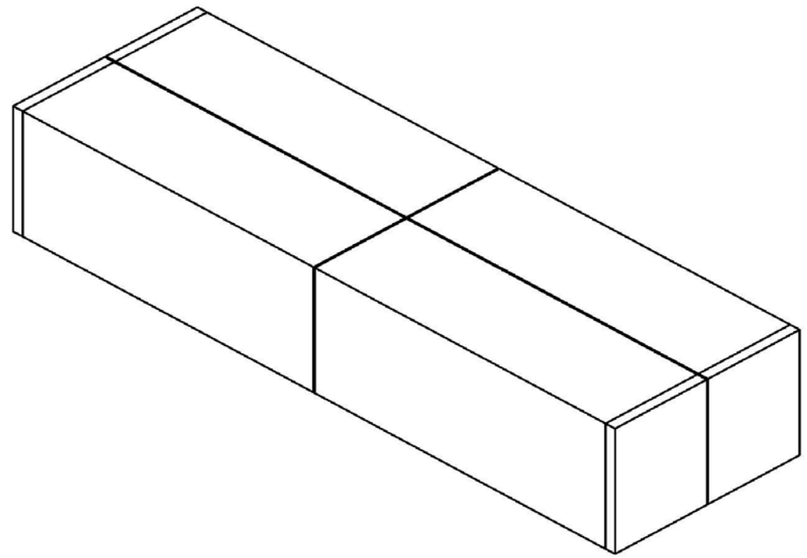
StormTrap®

MODULAR CONCRETE
STORMWATER MANAGEMENT

SHEET INDEX

STORMTRAP CONTACT INFORMATION

STORM TRAP SUPPLIER: STORMTRAP
CONTACT NAME: CHARLIE CARTER
CELL PHONE: 760-212-5628
SALES EMAIL: CCARTER@STORMTRAP.COM



BREEZE LUXURY APTS - BASIN 2
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SHEET TITLE:

COVER SHEET

SHEET NUMBER:

0.0

STRUCTURAL DESIGN LOADING CRITERIA

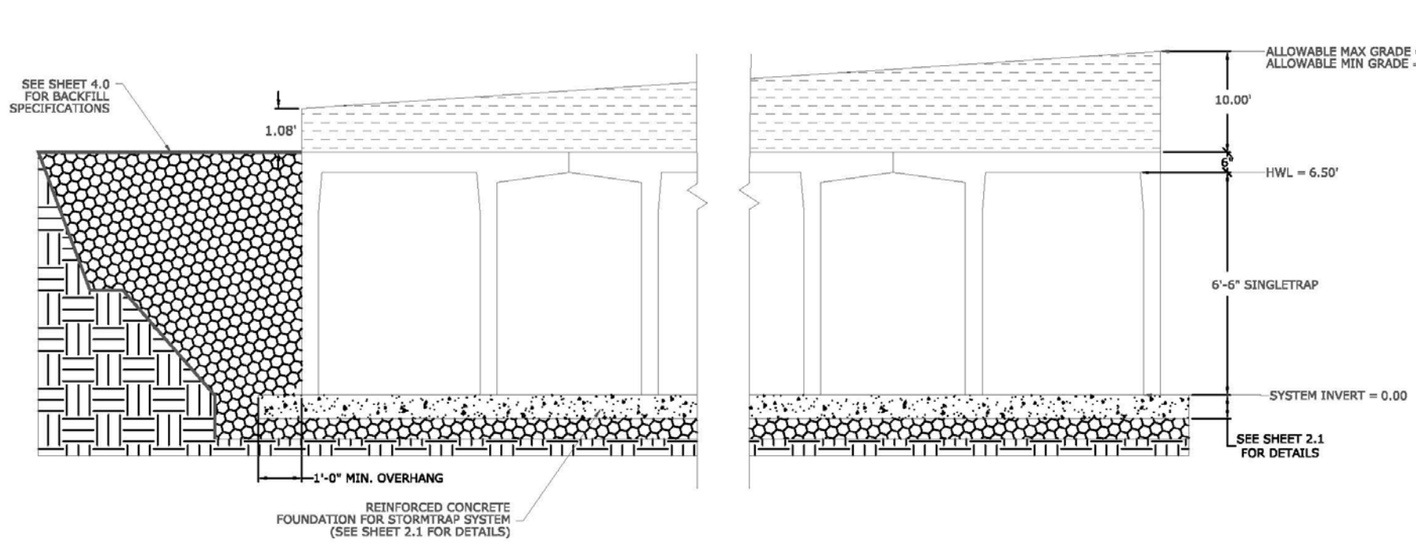
LIVE LOADING:	AASHTO HS-20 HIGHWAY LOADING
GROUND WATER TABLE:	BELOW INVERT OF SYSTEM
SOIL BEARING PRESSURE:	3000 PSF
SOIL DENSITY:	120 PCF
EQUIVALENT UNSATURATED LATERAL ACTIVE EARTH PRESSURE:	35 PSF / FT.
EQUIVALENT SATURATED LATERAL ACTIVE EARTH PRESSURE:	80 PSF/FT. (IF WATER TABLE PRESENT)
APPLICABLE CODES:	AASHTO ACI-318
BACKFILL TYPE:	SEE SHEET 4.0 FOR BACKFILL OPTIONS

STORMTRAP SYSTEM INFORMATION

WATER STORAGE PROV:	1,520.76 CUBIC FEET
UNIT HEADROOM:	6'-6" SINGLETRAP
UNIT QUANTITY:	4 TOTAL PIECES

SITE SPECIFIC DESIGN CRITERIA

1. STORMTRAP UNITS SHALL BE MANUFACTURED AND INSTALLED ACCORDING TO SHOP DRAWINGS APPROVED BY THE INSTALLING CONTRACTOR AND ENGINEER OF RECORD. THE SHOP DRAWINGS SHALL INDICATE SIZE AND LOCATION OF ROOF OPENINGS AND INLET/ OUTLET PIPE TYPES, SIZES, INVERT ELEVATIONS AND SIZE OF OPENINGS.
2. COVER RANGE: MIN. 1.08' MAX. 10.00'CONSULT STORMTRAP FOR ADDITIONAL COVER OPTIONS.
3. ALL DIMENSIONS AND SOIL CONDITIONS, INCLUDING BUT NOT LIMITED TO GROUNDWATER AND SOIL BEARING CAPACITY ARE REQUIRED TO BE VERIFIED IN THE FIELD BY OTHERS PRIOR TO STORMTRAP INSTALLATION.
4. FOR STRUCTURAL CALCULATIONS THE GROUND WATER TABLE IS ASSUMED TO BE BELOW INVERT OF SYSTEM . IF WATER TABLE IS DIFFERENT THAN ASSUMED, CONTACT STORMTRAP.



6'-6" SINGLETRAP

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SINGLETRAP DESIGN CRITERIA

SHEET NUMBER:

1.0

BILL OF MATERIALS

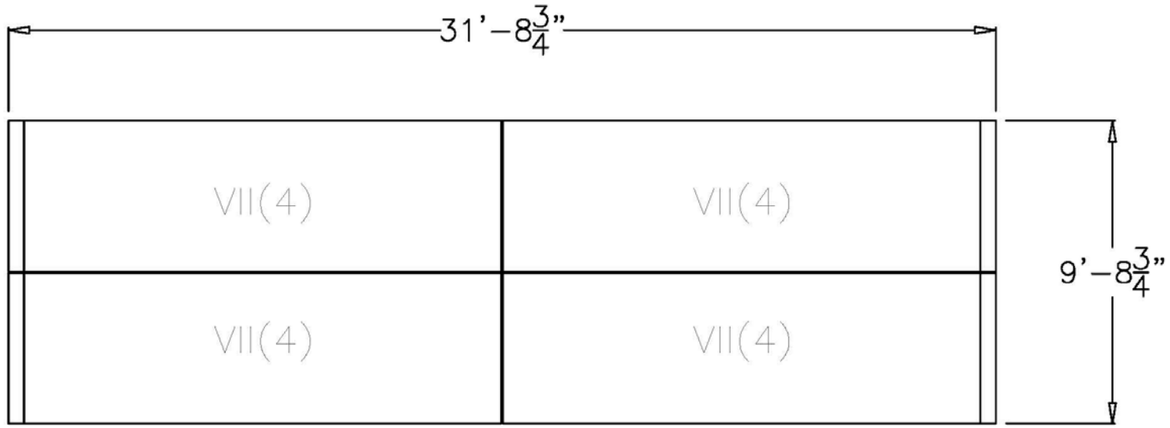
QTY.	UNIT TYPE	DESCRIPTION	WEIGHT
0	I	6'-6" SINGLETRAP	15900
0	II	6'-6" SINGLETRAP	18762
0	III	6'-6" SINGLETRAP	16254
0	IV	6'-6" SINGLETRAP	17685
4	VII(4)	6'-6" SINGLETRAP	20786
0	SPIV	6'-6" SINGLETRAP	VARIES
4	PANEL	6" THICK PANELS	VARIES
2	JOINT WRAP	150' PER ROLL	
16	JOINT TAPE	14.5' PER ROLL	

LOADING DISCLAIMER:

STORMTRAP IS NOT DESIGNED TO ACCEPT ANY ADDITIONAL LOADINGS FROM NEARBY STRUCTURES NEXT TO OR OVER THE TOP OF STORMTRAP. IF ADDITIONAL LOADING CONSIDERATIONS ARE REQUIRED FOR STRUCTURAL DESIGN OF STORMTRAP, PLEASE CONTACT STORMTRAP IMMEDIATELY.

DESIGN CRITERIA
ALLOWABLE MAX GRADE = 17.00'
ALLOWABLE MIN GRADE = 15.08'
INSIDE HEIGHT ELEVATION = 6.50'
SYSTEM INVERT = 0.00

NOTES:
1. DIMENSIONING OF STORMTRAP SYSTEM SHOWN BELOW ALLOW FOR A 3/4" GAP BETWEEN EACH MODULE.
2. ALL DIMENSIONS TO BE VERIFIED IN THE FIELD BY OTHERS.
3. SEE SHEET 3.0 FOR INSTALLATION SPECIFICATIONS.
4. SP - INDICATES A MODULE WITH MODIFICATIONS.
5. P - INDICATES A MODULE WITH A PANEL ATTACHMENT.
6. CONTRACTORS RESPONSIBILITY TO ENSURE CONSISTENCY/ACCURACY TO FINAL ENGINEER OF RECORD PLAN SET.



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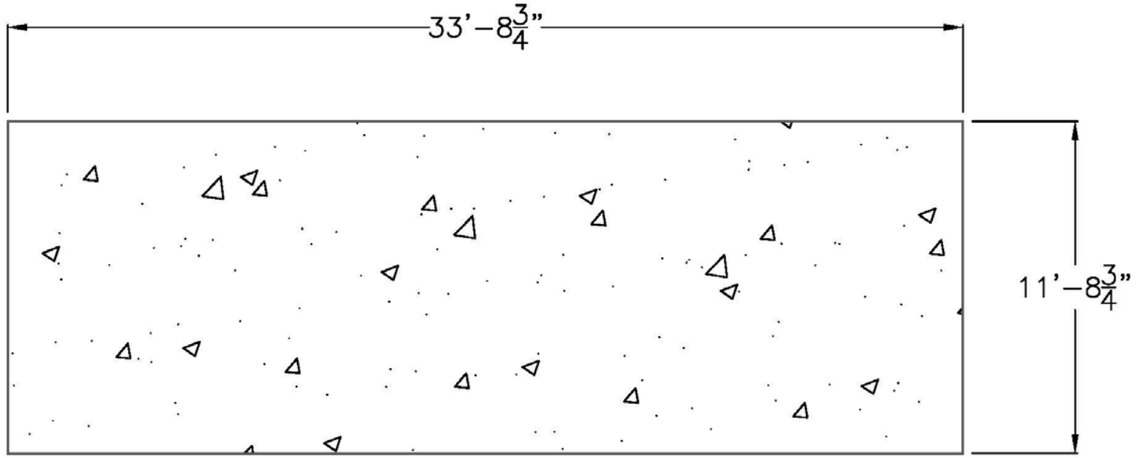
SHEET TITLE:

SINGLETRAP SYSTEM LAYOUT

SHEET NUMBER:

2.0



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SHEET TITLE:

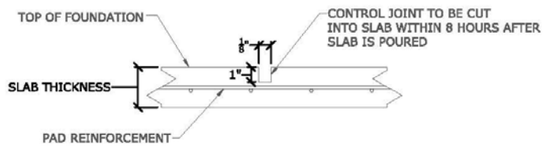
SINGLETRAP FOUNDATION LAYOUT

SHEET NUMBER:

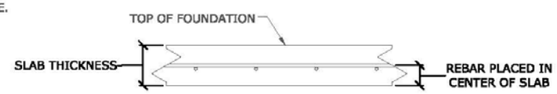
2.1

NOTES:

1. CONCRETE STRENGTH @ 28 DAYS, 5%-8% ENTRAINED AIR, 4" MAX. SLUMP.
2. NET ALLOWABLE SOIL PRESSURE AS INDICATED ON SHEET 1.0.
3. SOIL CONDITIONS TO BE VERIFIED ON SITE BY OTHERS.
4. REBAR: ASTM A-615 GRADE 60. BLACK BAR.
5. DIMENSION OF FOUNDATION MUST HAVE 1'-0" OVERHANG BEYOND EXTERNAL FACE OF MODULE.
6. DIMENSION OF STORMTRAP SYSTEM ALLOW FOR A 3/4" GAP BETWEEN EACH MODULE.
7. ALL DIMENSIONS TO BE VERIFIED IN THE FIELD BY OTHERS.
8. THE CONTROL JOINTS SHALL BE BETWEEN (IF REQUIRED BY ENGINEER OF RECORD) 16'-0" TO 24'-0" MAX APART.
9. SEE SHEET 3.0 FOR INSTALLATION SPECIFICATIONS.



CONTROL JOINT DETAIL

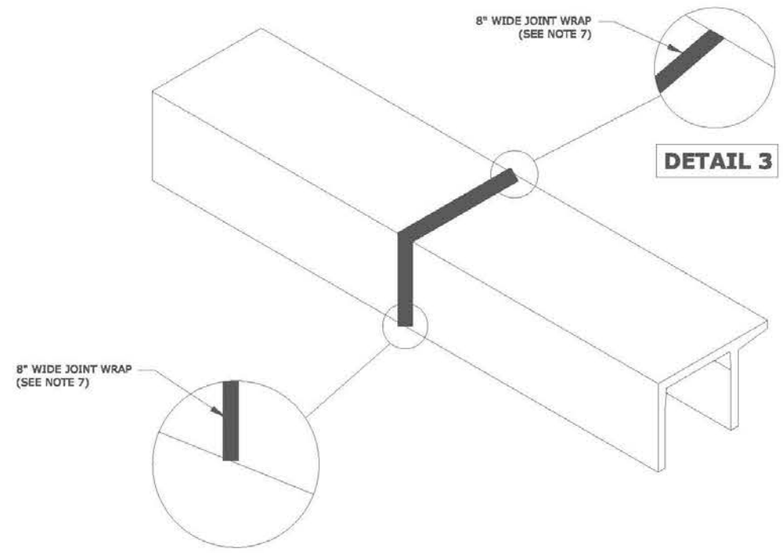


STORMTRAP FOUNDATION DETAIL

MAXIMUM SYSTEM COVER	SLAB THICKNESS	CONCRETE STRENGTH	REINFORCEMENT (BOTH DIRECTIONS)
6" - 12"	0'-8"	4000 PSI	#4 @ 18" O.C.
>1'-0" - 2'-0"	0'-8"	4000 PSI	#4 @ 16" O.C.
>2'-0" - 3'-0"	0'-8"	4000 PSI	#4 @ 12" O.C.
>3'-0" - 4'-0"	0'-8"	4000 PSI	#4 @ 12" O.C.
>4'-0" - 5'-0"	0'-8"	4000 PSI	#5 @ 18" O.C.
>5'-0" - 6'-0"	0'-8"	4000 PSI	#5 @ 16" O.C.
>6'-0" - 7'-0"	0'-8"	4000 PSI	#5 @ 16" O.C.
>7'-0" - 8'-0"	0'-9"	4000 PSI	#5 @ 12" O.C.
>8'-0" - 9'-0"	0'-10"	4000 PSI	#5 @ 12" O.C.
>9'-0" - 10'-0"	0'-10"	4500 PSI	#5 @ 12" O.C.

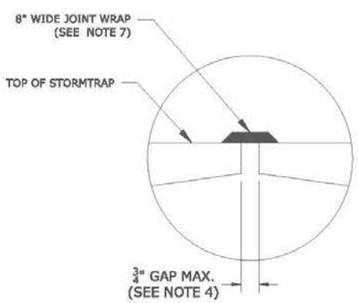
STORMTRAP INSTALLATION SPECIFICATIONS

1. STORMTRAP SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C891, STANDARD FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES, THE FOLLOWING ADDITIONS AND/OR EXCEPTIONS SHALL APPLY:
2. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO ENSURE THAT PROPER/ADEQUATE EQUIPMENT IS USED TO SET/INSTALL THE MODULES.
3. STORMTRAP MODULES SHALL BE PLACED ON A LEVEL CONCRETE FOUNDATION (SEE SHEET 2.1) WITH A 1'-0" OVERHANG ON ALL SIDES THAT SHALL BE POURED IN PLACE BY INSTALLING CONTRACTOR. A QUALIFIED GEOTECHNICAL ENGINEER WILL BE EMPLOYED, BY OWNER, TO PROVIDE ASSISTANCE IN EVALUATING THE EXISTING SOIL CONDITIONS TO ENSURE THAT THE SOIL BEARING PRESSURE MEETS OR EXCEEDS THE STRUCTURAL DESIGN LOADING CRITERIA AS SPECIFIED ON SHEET 1.0.
4. THE STORMTRAP MODULES SHALL BE PLACED SUCH THAT THE MAXIMUM SPACE BETWEEN ADJACENT MODULES DOES NOT EXCEED $\frac{3}{4}$" (SEE DETAIL 2). IF THE SPACE EXCEEDS $\frac{3}{4}$", THE MODULES SHALL BE RESET WITH APPROPRIATE ADJUSTMENT MADE TO LINE AND GRADE TO BRING THE SPACE INTO SPECIFICATION.
5. STORMTRAP MODULES ARE NOT WATERTIGHT. IF A WATERTIGHT SOLUTION IS REQUIRED, CONTACT STORMTRAP FOR RECOMMENDATIONS. THE WATERTIGHT APPLICATION IS TO BE PROVIDED AND IMPLEMENTED BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT THE SELECTED WATERTIGHT SOLUTION PERFORMS AS SPECIFIED BY THE MANUFACTURER.
6. THE PERIMETER HORIZONTAL JOINT BETWEEN THE STORMTRAP MODULES AND THE CONCRETE FOUNDATION SHALL BE SEALED TO THE FOUNDATION WITH PRE-FORMED MASTIC JOINT SEALER ACCORDING TO ASTM C891, 8.8 AND 8.12 (SEE DETAIL 1). THE MASTIC JOINT TAPE DOES NOT PROVIDE A WATERTIGHT SEAL. THE SOLE PURPOSE OF THE JOINT TAPE IS TO PROVIDE A SILT AND SOIL TIGHT SYSTEM.
7. ALL EXTERIOR JOINTS BETWEEN ADJACENT STORMTRAP MODULES SHALL BE SEALED WITH 8" WIDE PRE-FORMED, COLD-APPLIED, SELF-ADHERING ELASTOMERIC RESIN, BONDED TO A WOVEN , HIGHLY PUNCTURE RESISTANT POLYMER WRAP, CONFORMING TO ASTM C891 AND SHALL BE INTEGRATED WITH PRIMER SEALANT AS APPROVED BY STORMTRAP (SEE DETAILS 3 & 4). THE JOINT WRAP DOES NOT PROVIDE A WATERTIGHT SEAL. THE SOLE PURPOSE OF THE JOINT WRAP IS TO PROVIDE A SILT AND SOIL TIGHT SYSTEM. THE ADHESIVE EXTERIOR JOINT WRAP SHALL BE INSTALLED ACCORDING TO THE FOLLOWING INSTALLATION INSTRUCTIONS:
   - 7.1. USE A BRUSH OR WET CLOTH TO THOROUGHLY CLEAN THE OUTSIDE SURFACE AT THE POINT WHERE JOINT WRAP IS TO BE APPLIED.
   - 7.2. A RELEASE PAPER PROTECTS THE ADHESIVE SIDE OF THE JOINT WRAP. PLACE THE ADHESIVE TAPE (ADHESIVE SIDE DOWN) AROUND THE STRUCTURE, REMOVING THE RELEASE PAPER AS YOU GO. PRESS THE JOINT WRAP FIRMLY AGAINST THE STORMTRAP MODULE SURFACE WHEN APPLYING.
8. IF THE CONTRACTOR NEEDS TO CANCEL ANY SHIPMENTS, THEY MUST DO SO 48 HOURS PRIOR TO THEIR SCHEDULED ARRIVAL AT THE JOB SITE. IF CANCELED AFTER THAT TIME, PLEASE CONTACT THE PROJECT MANAGER.
9. IF THE STORMTRAP MODULE(S) IS DAMAGED IN ANY WAY PRIOR, DURING, OR AFTER INSTALL, STORMTRAP MUST BE CONTACTED IMMEDIATELY TO ASSESS THE DAMAGE AND DETERMINE WHETHER OR NOT THE MODULE(S) WILL NEED TO BE REPLACED. IF ANY MODULE ARRIVES AT THE JOBSITE DAMAGED DO NOT UNLOAD IT; CONTACT STORMTRAP IMMEDIATELY. ANY DAMAGE NOT REPORTED BEFORE THE TRUCK IS UNLOADED WILL BE THE CONTRACTOR'S RESPONSIBILITY.
10. STORMTRAP MODULES CANNOT BE ALTERED IN ANY WAY AFTER MANUFACTURING WITHOUT WRITTEN CONSENT FROM STORMTRAP.

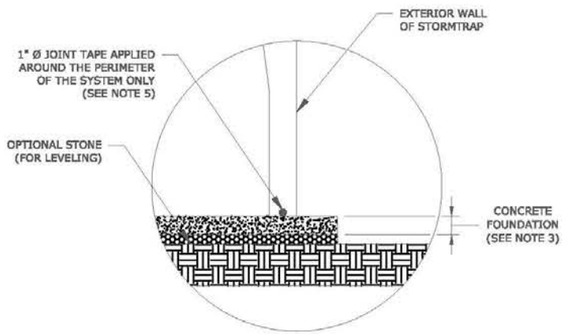


DETAIL 3

DETAIL 4



DETAIL 2



DETAIL 1

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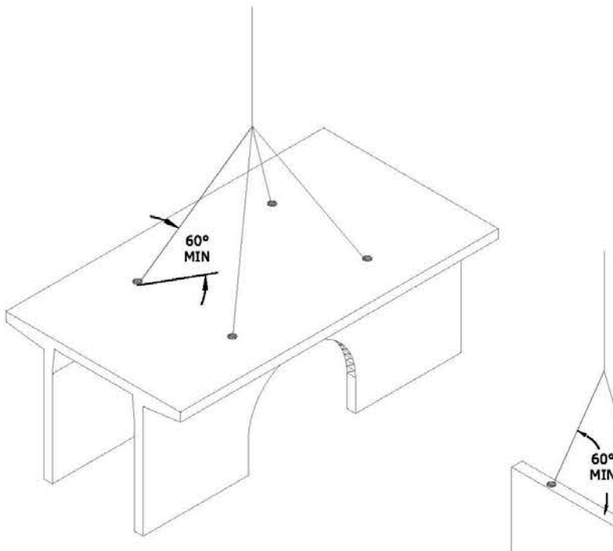
SINGLETRAP INSTALLATION SPECIFICATIONS

SHEET NUMBER:

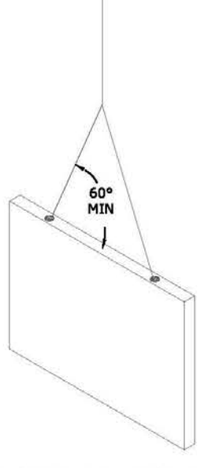
3.0

END PANEL ERECTION/INSTALLATION NOTES

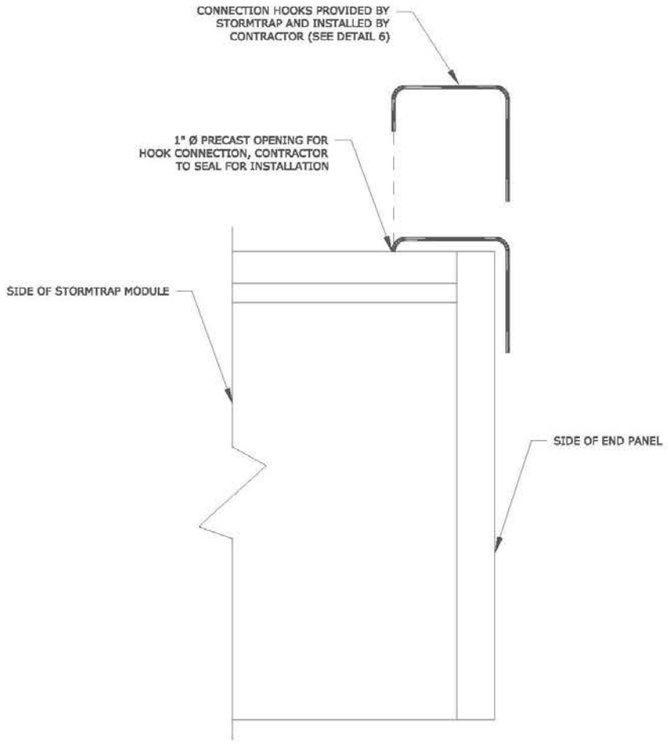
1. END PANELS WILL BE SUPPLIED TO CLOSE OFF OPEN ENDS OF ROWS.
2. PANELS SHALL BE INSTALLED IN A TILT UP FASHION DIRECTLY ADJACENT TO OPEN END OF MODULE (REFER TO SHEET 2.0 FOR END PANEL LOCATIONS).
3. CONNECTION HOOKS WILL BE SUPPLIED WITH END PANELS TO SECURELY CONNECT PANEL TO ADJACENT STORMTRAP MODULE (SEE PANEL CONNECTION ELEVATION VIEW).
4. ONCE CONNECTION HOOKS ARE ATTACHED, LIFTING CLUTCHES MAY BE REMOVED.
5. JOINT WRAP SHALL BE PLACED AROUND PERIMETER JOINT PANEL (SEE SHEET 3.0).



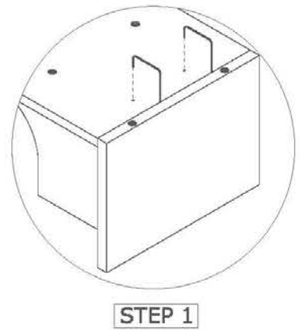
MODULE LIFTING DETAIL



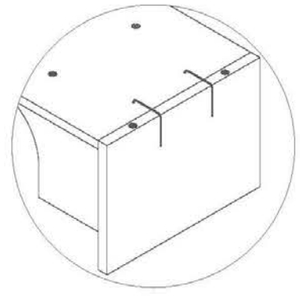
END PANEL LIFTING DETAIL



PANEL CONNECTION ELEVATION VIEW



STEP 1



STEP 2

DETAIL 6

StormTrap

PATENTS LISTED AT: [HTTP://STORMTRAP.COM/PATENT]

1287 WINDHAM PARKWAY
ROMEOVILLE, IL 60446
P:815-941-4549 / F:331-318-5347

ENGINEER INFORMATION:

BHA ENGINEERS
5115 AVENIDA ENCINAS
CARLSBAD, CA 92008
760-931-8700

PROJECT INFORMATION:

BREEZE LUXURY APTS

BASIN 2

OCEANSIDE, CA

CURRENT ISSUE DATE:

1/24/2019

ISSUED FOR:

PRELIMINARY

REV.	DATE:	ISSUED FOR:	DWN BY:
1	1/24/2019	PRELIMINARY	GS

SCALE:

NTS

SHEET TITLE:

SINGLETRAP INSTALLATION SPECIFICATIONS

SHEET NUMBER:

3.1

ZONE CHART

ZONES	ZONE DESCRIPTIONS	REMARKS
ZONE 1	FOUNDATION AGGREGATE	#5 (¾") STONE AGGREGATE (SEE NOTE 4 FOR DESCRIPTION)
ZONE 2	BACKFILL	UNIFIED SOILS CLASSIFICATION (GW, GP, SW, SP) - SEE BELOW FOR APPROVED BACKFILL OPTIONS
ZONE 3	FINAL COVER OVERTOP	MATERIALS NOT TO EXCEED 120 PCF

APPROVED ZONE 2 BACKFILL OPTIONS

OPTION	REMARKS
¾" STONE AGGREGATE	THE STONE AGGREGATE SHALL CONSIST OF WASHED, CLEAN AND FREE DRAINING ANGULAR MATERIAL. THE SIZE OF THIS MATERIAL SHALL HAVE 100% PASSING THE 1" SIEVE WITH 0% TO 5% PASSING THE #8 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE BACKFILL (ASTM SIZE #57) AS DETERMINED BY THE GEOTECHNICAL ENGINEER.
SAND	IMPORTED PURE SAND IS PERMITTED TO BE USED AS BACKFILL IF IT IS CLEAN AND FREE DRAINING. THE SAND USED FOR BACKFILLING SHALL HAVE LESS THAN 40% PASSING #40 SIEVE AND LESS THAN 5% PASSING #200 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE SAND BACKFILL.
CRUSHED CONCRETE AGGREGATE	CLEAN, FREE DRAINING CRUSHED CONCRETE AGGREGATE MATERIAL CAN BE USED AS BACKFILL FOR STORMTRAP'S MODULES. THE SIZE OF THIS MATERIAL SHALL HAVE 100% PASSING THE 1" SIEVE WITH 0% TO 5% PASSING THE #8 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE BACKFILL.
ROAD PACK	STONE AGGREGATE 100% PASSING THE 1-1/2" SIEVE WITH LESS THAN 12% PASSING THE #200 SIEVE (ASTM SIZE #467). GEOFABRIC AS PER GEOTECHNICAL ENGINEER RECOMMENDATION.

FILL DEPTH	TRACK WIDTH	MAX VEHICLE WEIGHT (KIPS)	MAX GROUND PRESSURE
12"	12"	51.8	1690 psf
	18"	56.1	1219 psf
	24"	68.1	1111 psf
	30"	76.7	1000 psf
	36"	85.0	924 psf

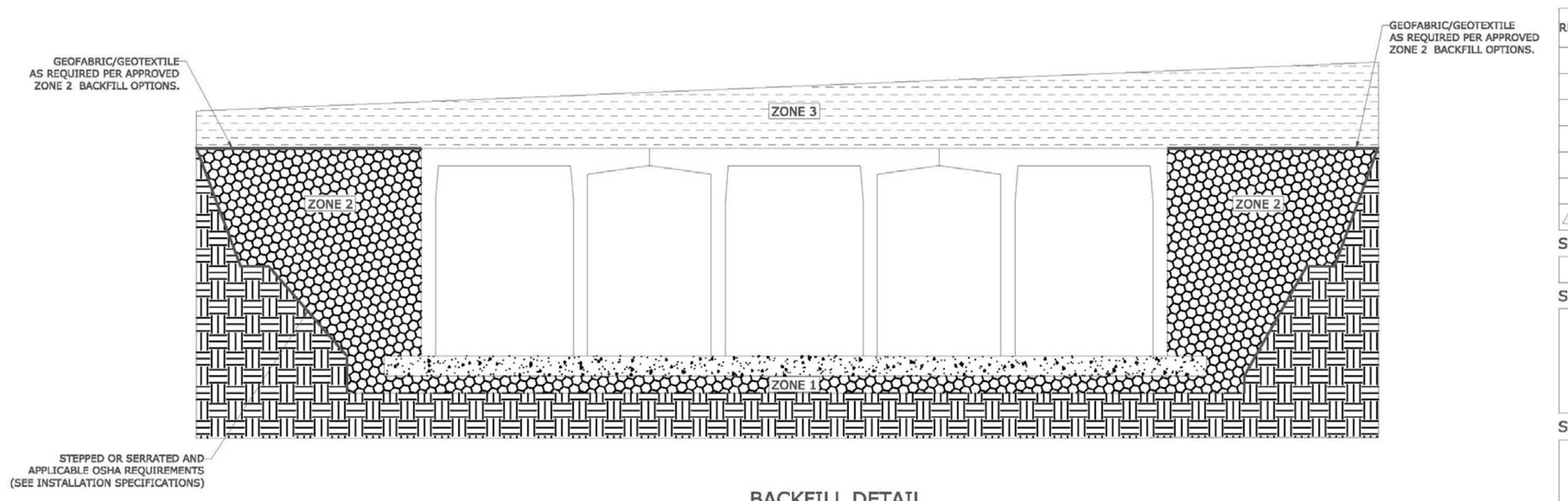
NOTE:
TRACK LENGTH NOT TO EXCEED 15'-4".
ONLY TWO TRACKS PER VEHICLE.

STORMTRAP ZONE INSTALLATION SPECIFICATIONS/PROCEDURES

1. THE FILL PLACED AROUND THE STORMTRAP MODULES MUST DEPOSITED ON BOTH SIDES AT THE SAME TIME AND TO APPROXIMATELY THE SAME ELEVATION. AT NO TIME SHALL THE FILL BEHIND ONE SIDE WALL BE MORE THAN 2'-0" HIGHER THAN THE FILL ON THE OPPOSITE SIDE. BACKFILL SHALL EITHER BE COMPACTED AND/OR VIBRATED TO ENSURE THAT BACKFILL AGGREGATE/STONE MATERIAL IS WELL SEATED AND PROPERLY INTER LOCKED. CARE SHALL BE TAKEN TO PREVENT ANY WEDGING ACTION AGAINST THE STRUCTURE, AND ALL SLOPES WITHIN THE AREA TO BE BACKFILLED MUST BE STEPPED OR SERRATED TO PREVENT WEDGING ACTION. CARE SHALL ALSO BE TAKEN AS NOT TO DISRUPT THE JOINT WRAP FROM THE JOINT DURING THE BACKFILL PROCESS. BACKFILL MUST BE FREE-DRAINING MATERIAL. SEE ZONE 2 BACKFILL CHART ON THIS PAGE FOR APPROVED BACKFILL OPTIONS. IF NATIVE EARTH IS SUSCEPTIBLE TO MIGRATION, CONFIRM WITH GEOTECHNICAL ENGINEER AND PROVIDE PROTECTION AS REQUIRED (PROVIDED BY OTHERS).
2. DURING PLACEMENT OF MATERIAL OVERTOP THE SYSTEM, AT NO TIME SHALL MACHINERY BE USED OVERTOP THAT EXCEEDS THE DESIGN LIMITATIONS OF THE SYSTEM. WHEN PLACEMENT OF MATERIAL OVERTOP, MATERIAL SHALL BE PLACED SUCH THAT THE DIRECTION OF PLACEMENT IS PARALLEL WITH THE OVERALL LONGITUDINAL DIRECTION OF THE SYSTEM WHENEVER POSSIBLE.
3. THE FILL PLACED OVERTOP THE SYSTEM SHALL BE PLACED AT A MINIMUM OF 6" LIFTS. AT NO TIME SHALL MACHINERY OR VEHICLES GREATER THAN THE DESIGN HS-20 LOADING CRITERIA TRAVEL OVERTOP THE SYSTEM WITHOUT THE MINIMUM DESIGN COVERAGE. IF TRAVEL IS NECESSARY OVERTOP THE SYSTEM PRIOR TO ACHIEVING THE MINIMUM DESIGN COVER, IT MAY BE NECESSARY TO REDUCE THE ULTIMATE LOAD/BURDEN OF THE OPERATING MACHINERY SO AS TO NOT EXCEED THE DESIGN CAPACITY OF THE SYSTEM. IN SOME CASES, IN ORDER TO ACHIEVE REQUIRED COMPACTION, HAND COMPACTION MAY BE NECESSARY IN ORDER NOT TO EXCEED THE ALLOTTED DESIGN LOADING. SEE CHART FOR TRACKED VEHICLE WIDTH AND ALLOWABLE MAXIMUM PRESSURE PER TRACK.
4. STONE AGGREGATE FOUNDATION IN ZONE 1 MAY BE REQUIRED FOR THE FOLLOWING:

   A.) INFILTRATION - IF INFILTRATION IS REQUIRED, A FREE DRAINING MATERIAL SHALL BE USED AT A DEPTH DETERMINED BY THE EOR. FREE DRAINING AGGREGATE IS DEFINED AS 80% AGGREGATE RETAINED ON ½" SIEVE, MAJORITY OF AGGREGATE SIZE BETWEEN ½" AND 1", AND ONLY 5% OF MATERIAL PASSING #3/8" SIEVE.

   B.) LEVELING - STORMTRAP RECOMMENDS STONE SUBBASE FOR LEVELING PURPOSES ONLY (OPTIONAL).



BACKFILL DETAIL

StormTrap
PATENTS LISTED AT: [HTTP://STORMTRAP.COM/PATENT]
1287 WINDHAM PARKWAY
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SINGLETRAP BACKFILL SPECIFICATIONS

SHEET NUMBER:

4.0

RECOMMENDED ACCESS OPENING SPECIFICATION

1. A TYPICAL ACCESS OPENING FOR THE STORMTRAP SYSTEM ARE 2'-0" IN DIAMETER. ACCESS OPENINGS LARGER THAN 3'-0" IN DIAMETER NEED TO BE APPROVED BY STORMTRAP. ALL OPENINGS MUST RETAIN AT LEAST 1'-0" OF CLEARANCE FROM THE END OF THE STORMTRAP MODULE UNLESS NOTED OTHERWISE. ALL ACCESS OPENINGS TO BE LOCATED ON INSIDE LEG UNLESS OTHERWISE SPECIFIED.
2. PLASTIC COATED STEEL STEPS PRODUCED BY M.A. INDUSTRIES PART #PS3-PFC OR APPROVED EQUAL (SEE STEP DETAIL) ARE PROVIDED INSIDE ANY MODULE WHERE DEEMED NECESSARY. THE HIGHEST STEP IN THE MODULE IS TO BE PLACED A DISTANCE OF 1'-0" FROM THE INSIDE EDGE OF THE STORMTRAP MODULES. ALL ENSUING STEPS SHALL BE PLACED AT A DISTANCE BETWEEN 10" MIN AND 14" MAX BETWEEN THEM. STEPS MAY BE MOVED OR ALTERED TO AVOID OPENINGS OR OTHER IRREGULARITIES IN THE MODULE.
3. STORMTRAP LIFTING INSERTS MAY BE RELOCATED TO AVOID INTERFERENCE WITH ACCESS OPENINGS OR THE CENTER OF GRAVITY OF THE MODULE AS NEEDED.
4. STORMTRAP ACCESS OPENINGS MAY BE RELOCATED TO AVOID INTERFERENCE WITH INLET AND/OR OUTLET PIPE OPENINGS SO PLACEMENT OF STEPS IS ATTAINABLE.
5. ACCESS OPENINGS SHOULD BE LOCATED IN ORDER TO MEET THE APPROPRIATE MUNICIPAL REQUIREMENTS. STORMTRAP RECOMMENDS AT LEAST TWO ACCESS OPENINGS PER SYSTEM FOR ACCESS AND INSPECTION.
6. USE PRECAST ADJUSTING RINGS AS NEEDED TO MEET GRADE. STORMTRAP RECOMMENDS FOR COVER OVER 2' TO USE PRECAST BARREL OR CONE INSPECTIONS. (PROVIDED BY OTHERS)

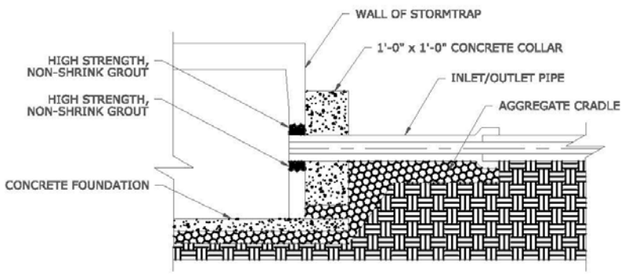
RECOMMENDED PIPE OPENING SPECIFICATION

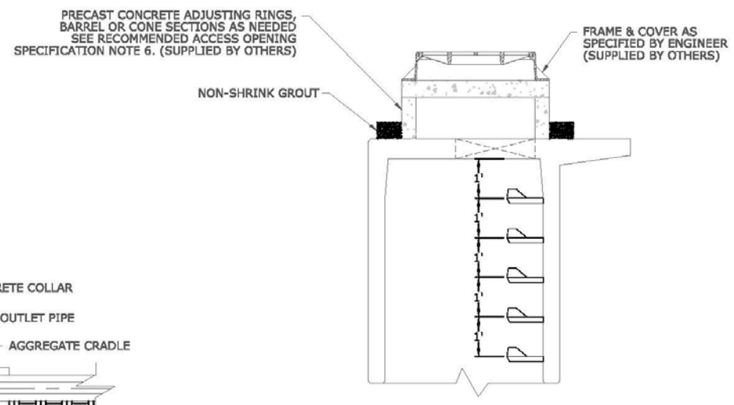
1. MINIMUM EDGE DISTANCE FOR AN OPENING ON THE OUTSIDE WALL SHALL BE NO LESS THAN 1'-0".
2. MAXIMUM OPENING SIZE TO BE DETERMINED BY THE MODULE HEIGHT. PREFERRED OPENING SIZE Ø 36" OR LESS. ANY OPENING NEEDED THAT DOES NOT FIT THIS CRITERIA SHALL BE BROUGHT TO THE ATTENTION OF STORMTRAP FOR REVIEW.
3. CONNECTING PIPES SHALL BE INSTALLED WITH A 1'-0" CONCRETE COLLAR, AND AN AGGREGATE CRADLE FOR AT LEAST ONE PIPE LENGTH (SEE PIPE CONNECTION DETAIL). A STRUCTURAL GRADE CONCRETE OR HIGH STRENGTH, NON-SHRINK GROUT WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI SHALL BE USED.
4. THE ANNULAR SPACE BETWEEN THE PIPE AND THE HOLE SHALL BE FILLED WITH HIGH STRENGTH NON-SHRINK GROUT.

RECOMMENDED PIPE INSTALLATION INSTRUCTIONS

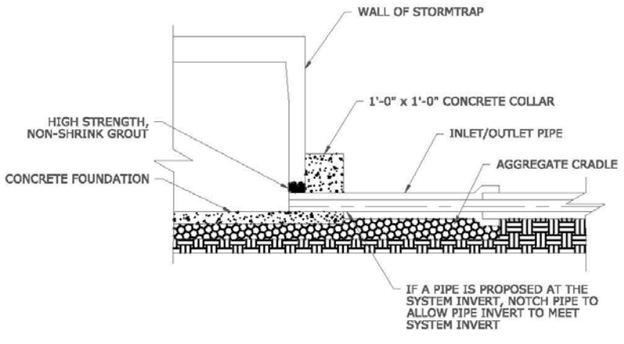
1. CLEAN AND LIGHTLY LUBRICATE ALL OF THE PIPE TO BE INSERTED INTO STORMTRAP.
2. IF PIPE IS CUT, CARE SHOULD BE TAKEN TO ALLOW NO SHARP EDGES. BEVEL AND LUBRICATE LEAD END OF PIPE.
3. ALIGN CENTER OF PIPE TO CORRECT ELEVATION AND INSERT INTO OPENING.

NOTE: ALL ANCILLARY PRODUCTS/SPECIFICATIONS RECOMMENDED AND SHOWN ON THIS SHEET ARE RECOMMENDATIONS ONLY AND SUBJECT TO CHANGE PER THE INSTALLING CONTRACTOR AND/OR PER LOCAL MUNICIPAL CODE/REQUIREMENTS.

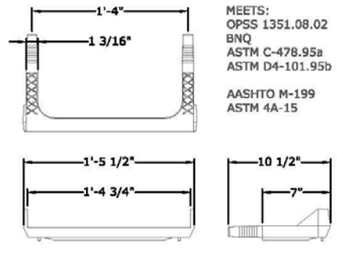




RISER / STAIR DETAIL



PIPE CONNECTION DETAIL



STEP DETAIL

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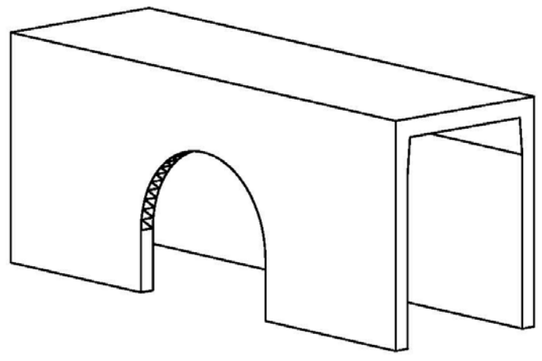
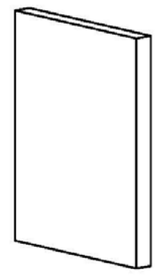
RECOMMENDED PIPE / ACCESS OPENING SPECIFICATIONS

SHEET NUMBER:

5.0



TYPE VII



TYPE VII
END PANEL

NOTES:
1. OPENING LOCATIONS AND SHAPES MAY VARY.
2. SP - INDICATES A MODULE WITH MODIFICATIONS.
3. P - INDICATES A MODULE WITH A PANEL ATTACHMENT.
4. POCKET WINDOW OPENINGS ARE OPTIONAL.

StormTrap

PATENTS LISTED AT: [HTTP://STORMTRAP.COM/PATENT]

1287 WINDHAM PARKWAY
ROMEOVILLE, IL 60446
P:815-941-4549 / F:331-318-5347

ENGINEER INFORMATION:

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SHEET TITLE:

SINGLETRAP
MODULE TYPES

SHEET NUMBER:

6.0

CHAPTER 5

REFERENCES

5.3 – Modular Wetland System Details

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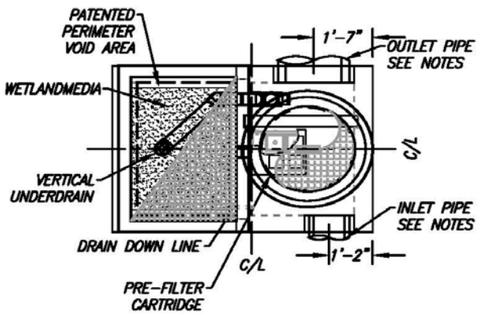
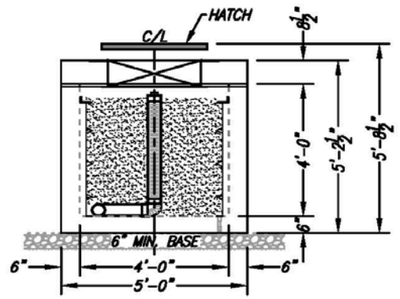
SITE SPECIFIC DATA			
PROJECT ID#		4085	
PROJECT NAME		BREEZE LUXURY APARTMENTS	
PROJECT LOCATION		OCEANSIDE, CA	
STRUCTURE ID		UNIT 1A	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
2279.00			
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	52.02	PVC	10"
INLET PIPE 2			
OUTLET PIPE	50.69	PVC	18"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	55.80	55.80	55.80
SURFACE LOAD	PARKWAY	PARKWAY	PARKWAY
FRAME & COVER	ø30"	30"X48"	N/A
WETLANDMEDIA VOLUME (CY)			1.30
WETLANDMEDIA DELIVERY METHOD			PER CONTRACT
ORIFICE SIZE (DIA. INCHES)			ø0.62"
NOTES: PRELIMINARY, NOT FOR CONSTRUCTION. EOR TO PROVIDE AN ORIFICE AND DISCHARGE AT 0.01825CFS INTO MWS.			



PLAN VIEW



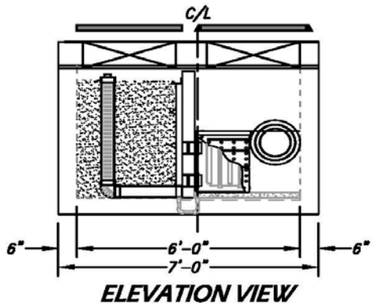
LEFT END VIEW

INSTALLATION NOTES

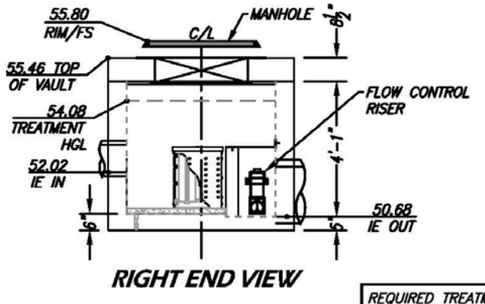
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURERS STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT MANUFACTURER.



ELEVATION VIEW



RIGHT END VIEW

REQUIRED TREATMENT VOLUME (CF)	2279
DRAINDOWN DURATION (HOURS)	34
AVERAGE DISCHARGE RATE PER MWS UNIT(GPM)	8.31
OPERATING HEAD (FT)	3.4
WETLANDMEDIA INFILTRATION RATE (IN/HR) OR	26
WETLANDMEDIA LOADING RATE (GPM/SF) OR	0.26

Bio Clean
A Forterra Company

MWS-L-4-6-4-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

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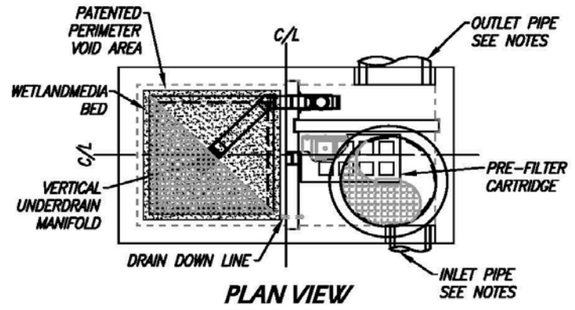
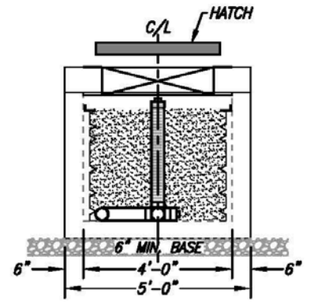
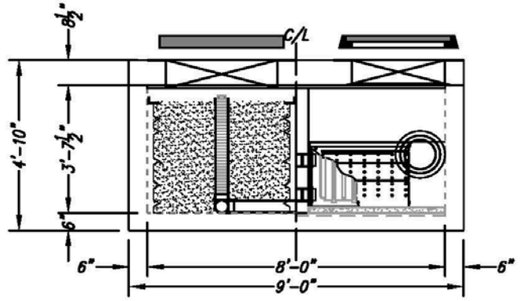
SITE SPECIFIC DATA			
PROJECT ID		4085.00	
PROJECT NAME		BREZZE LUXURY APARTMENTS	
PROJECT LOCATION		OCEANSIDE, CA	
STRUCTURE ID		UNIT 1B	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
3198.00			
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	49.52	PVC	10"
INLET PIPE 2			
OUTLET PIPE	48.19	PVC	18"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	53.30	53.30	53.30
SURFACE LOAD	H20 DIRECT	H20 DIRECT	H20 DIRECT
FRAME & COVER	ø30"	36"X36"	N/A
WETLANDMEDIA VOLUME (CY)			1.55
WETLANDMEDIA DELIVERY METHOD			PER CONTRACT
ORIFICE SIZE (DIA. INCHES)			ø0.75"
NOTES: PRELIMINARY, NOT FOR CONSTRUCTION. EOR TO PROVIDE AN ORIFICE AND DISCHARGE AT 0.02456CFS INTO MWS.			



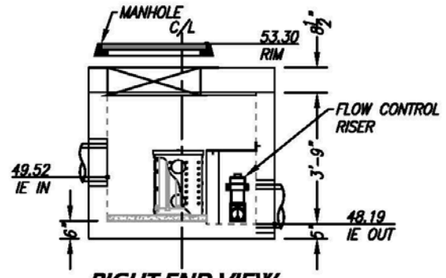
PLAN VIEW



LEFT END VIEW
BIOFILTRATION



ELEVATION VIEW



RIGHT END VIEW
PRETREATMENT/DISCHARGE

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3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURERS STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT MANUFACTURER.

REQUIRED TREATMENT VOLUME (CF)	3198
DRAINDOWN DURATION (HOURS)	32
AVERAGE DISCHARGE RATE PER MWS UNIT(GPM)	12.31
OPERATING HEAD (FT)	3.2
WETLANDMEDIA INFILTRATION RATE (IN/HR)	26
OR	
WETLANDMEDIA LOADING RATE (GPM/SF)	0.26

Bio Clean
A Forterra Company

MWS-L-4-8-3'-8"-UG-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

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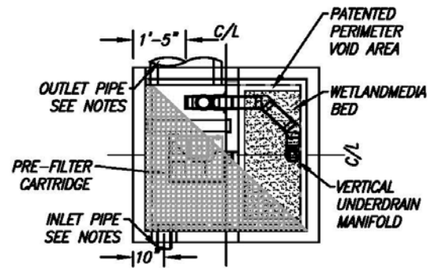
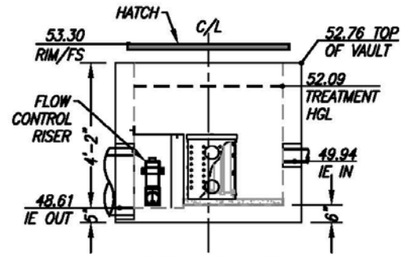
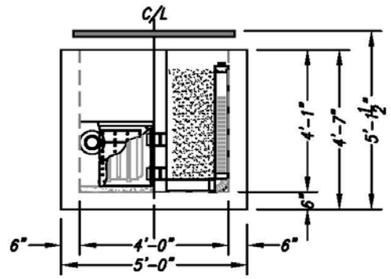
SITE SPECIFIC DATA			
PROJECT NUMBER		4085	
PROJECT NAME		BREEZE LUXURY APARTMENTS	
PROJECT LOCATION		OCEANSIDE, CA	
STRUCTURE ID		UNIT 2	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
1139			
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPES	49.94	N/K	4"
OUTLET PIPE	48.61	N/K	18"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	53.30	53.30	53.30
SURFACE LOAD	PEDESTRIAN	N/A	N/A
FRAME & COVER	48"X48"	N/A	N/A
WETLANDMEDIA VOLUME (CY)			0.72
WETLANDMEDIA DELIVERY METHOD			PER CONTRACT
ORIFICE SIZE (DIA. INCHES)			ø0.52"
NOTES: PRELIMINARY, NOT FOR CONSTRUCTION.			



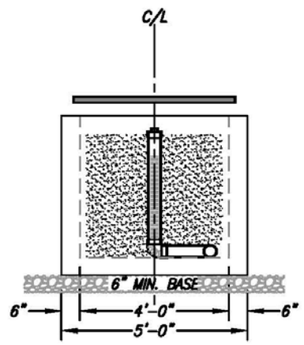
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURERS STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
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5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.

GENERAL NOTES

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2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT MANUFACTURER.

REQUIRED TREATMENT VOLUME (CF)	1139
DRAINDOWN DURATION (HOURS)	24
AVERAGE DISCHARGE RATE PER MWS UNIT(GPM)	5.92
OPERATING HEAD (FT)	3.4
WETLANDMEDIA INFILTRATION RATE (IN/HR) OR	26
WETLANDMEDIA LOADING RATE (GPM/SF)	0.26

Bio Clean
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MWS-L-4-4-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

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SITE SPECIFIC DATA			
PROJECT NUMBER		----	
PROJECT NAME		----	
PROJECT LOCATION		----	
STRUCTURE ID		----	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			N/A
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	----	N/K	N/K
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE	----	N/K	N/K
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	----	----	----
SURFACE LOAD	H-20 DIRECT	H-20 DIRECT	H-20 DIRECT
FRAME & COVER	36" X 60"		
WETLANDMEDIA VOLUME (CY)			TBD
WETLANDMEDIA DELIVERY METHOD			PER CONTRACT
ORIFICE SIZE (DIA. INCHES)			TBD
NOTES: PRELIMINARY, NOT FOR CONSTRUCTION.			

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
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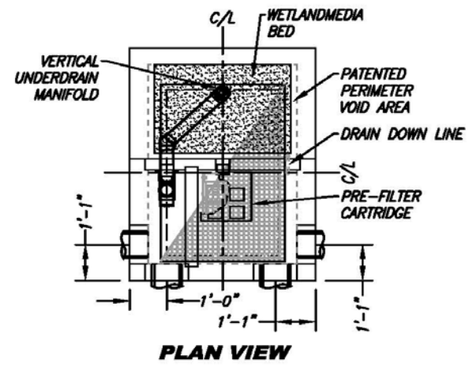
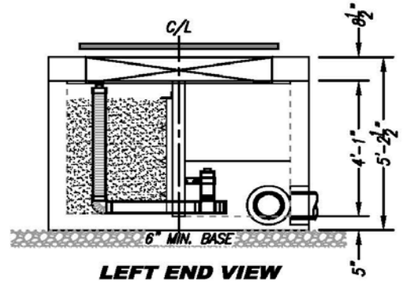
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING MODULAR WETLANDS FOR ACTIVATION OF UNIT. MANUFACTURES WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A MODULAR WETLANDS REPRESENTATIVE.

GENERAL NOTES

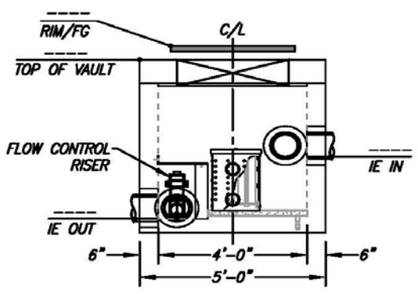
1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT MANUFACTURER.



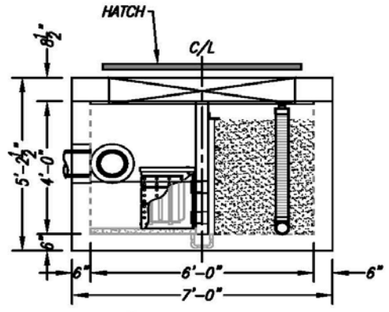
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.073
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.6
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

Bio Clean
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MWS-L-4-6-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

10/25/17 CSOLAR

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CHAPTER 5

REFERENCES

5.4 Modified Type A-4 Clean Out (Node 160) Details and Calculations

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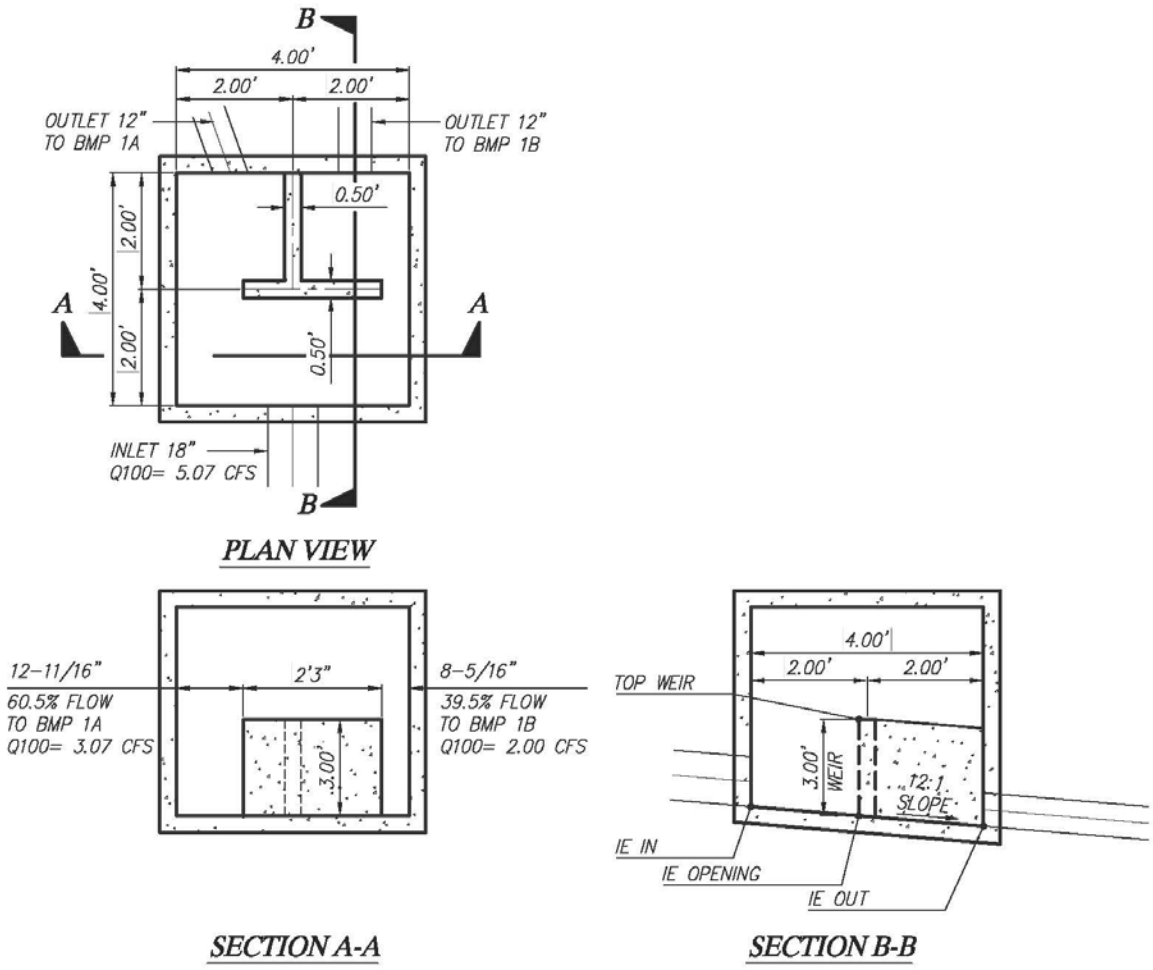

MODIFIED TYPE A-4 CLEAN OUT DETAIL

NOT TO SCALE

Breeze Luxury Townhomes

FLOW CALCAULATION FOR JUNCTION BOX - NODE 160

JN. 1005-1326-100

1/29/2019

TOTAL OPENING WIDTH = 21" (100%) Q100 = 5.07 CFS

$Q = 1.49/n\ AR^{2/3}S^{1/2}$

BMP-1A OPENING WIDTH = 12-11/16" (60.5%) Q100 = 3.07 CFS						**BMP-1B OPENING WIDTH = 8-5/16" (39.5%) Q100 = 2.00 CFS**						**Total Q (cfs)**
Depth (ft)	Coefficient n	Area (sf)	slope s	R	Q (cfs)	Depth (ft)	Coefficient n	Area (sf)	slope s	R	Q (cfs)	
0.05	0.013	0.05	0.083	0.046	0.22	0.05	0.013	0.03	0.083	0.044	0.14	**0.36**
0.10	0.013	0.11	0.056	0.084	0.54	0.10	0.013	0.07	0.056	0.078	0.34	**0.88**
0.15	0.013	0.16	0.084	0.117	1.25	0.15	0.013	0.10	0.084	0.105	0.76	**2.01**
0.20	0.013	0.21	0.111	0.145	2.22	0.20	0.013	0.14	0.111	0.127	1.33	**3.55**
0.25	0.013	0.26	0.139	0.170	3.45	0.25	0.013	0.17	0.139	0.145	2.03	**5.48**
0.30	0.013	0.32	0.167	0.191	4.91	0.30	0.013	0.21	0.167	0.161	2.86	**7.77**
0.35	0.013	0.37	0.195	0.211	6.60	0.35	0.013	0.24	0.195	0.174	3.80	**10.40**
0.40	0.013	0.42	0.223	0.228	8.49	0.40	0.013	0.28	0.223	0.186	4.85	**13.34**
0.45	0.013	0.48	0.251	0.243	10.59	0.45	0.013	0.31	0.251	0.196	6.00	**16.58**

CHAPTER 5

REFERENCES

5.5 Infiltration Feasibility Condition Letter Prepared by "Geotechnical Exploration, Inc."

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Geotechnical Exploration, Inc.

SOIL AND FOUNDATION ENGINEERING ● GROUNDWATER ● ENGINEERING GEOLOGY

14 January 2019
(Revised 15 January 2019)

Oceanside-Nevada, LP
P.O. Box 531
Rancho Santa Fe, CA 92067
Attn: Mr. Howard Jacobs

Job No. 15-10805

Subject: **Infiltration Feasibility Condition**
Proposed Breeze Luxury Townhome Project
A.P.N. 152-121-06, 152-123-05 and 152-320-11
1200 Block of S. Nevada Street
Oceanside, California

Dear Mr. Jacobs:

In accordance with the request of your civil engineer, Mr. Bruce Rice with BHA Inc., we have prepared this letter regarding the infiltration feasibility conditions at the subject site. Our evaluation is based on review of our "*Report of Geotechnical Investigation Update*", dated September 28, 2018 for the subject site, our geologic reconnaissance and site observations, review of the geologic map for the area of the subject site, and review of the USDA Web Soil Survey, as well as our past experience with materials similar to those encountered at the site.

It is our understanding, based on review of the "Architectural Plans", prepared by Bob Abrams Architect, dated September 13, 2018, that the site will be developed with two-story and three-story over a basement residential townhomes and associated improvements. Based on review on the "*Preliminary Grading & Drainage Plan*", prepared by bha, Inc, the site is divided into two DMAs with three proprietary bio-filtration modular wetland systems proposed.

Since the time of our most recent geotechnical investigation conducted in 2016, the site remains relatively unchanged and no grading has occurred. The irregular, roughly arcuate-shaped site, consisting of approximately 2.24 acres, is located on the north and south sides of the cul-de-sac at the southeast end of Nevada Street. The property consists of a gentle, southeast sloping vacant lot with steep bluff slopes along the east side of the property that descend to the track bed for the NCTD railroad right-of-way below. The slope ranges in height from 35 to 52 feet at gradients ranging from 0.75:1.0 to 1.5:1.0 (horizontal to vertical). Near-vertical conditions

7420 TRADE STREET ● SAN DIEGO, CA. 92121 ● (858) 549-7222 ● FAX: (858) 549-1604 ● EMAIL: geotech@gei-sd.com

are locally present along some of the base-of-slope areas. The area of the proposed site development predominately covers the entire site.

We understand that grading for the new buildings will include cuts of approximately 14 feet or less with retaining walls up to 12 feet in height for the proposed basement levels of the townhomes along the south and southeast portions of the project. Based on our review of our previously noted report, the site is underlain by formational materials of the San Onofre Breccia (Tso). The encountered soil profile across the site consists of 2 to 4 feet of fill/topsoil/colluvium overlying the formational materials. In addition, the on-site colluvial soils are considered to possess a medium expansion potential.

Based on our review of available published information including the *"Geologic Map of the Oceanside 30' X 60' Quadrangle,"* by Michael P. Kennedy and Siang S. Tan (2008), the geologic materials underlying the site are referred to as *"San Onofre Breccia (Tso) (middle Miocence) – Marine sedimentary breccia, green, greenish gray, gray, brown, and white, massive-to well-bedded, well indurated breccia with interbedded conglomerate, sandstone, siltstone, and mudstone".* In our opinion, based on subsurface investigation, the very dense clayey gravel formational soils have poor infiltration rate characteristics.

Based on our review of the USDA Web Soil Survey and the USDA Soil Survey (1973) Map Sheet 22, the on-site soils on the southwestern portion of the site (approximately 30% of the proposed site development) are mapped as belonging to Hydrologic Group A, which indicates high infiltration rates. The on-site soils on the northern, eastern and southern portions of the site (approximately 70% of the proposed site development) are mapped as belonging to Hydrologic Group D, which indicates low infiltration rates. In our opinion, based on review of our geotechnical investigation report, we would regard the entire site as belonging to Hydrologic Soil Group D due to the low infiltration rate characteristics that are typical of colluvial and very dense bedrock materials that were encountered across the site. In addition, we did not encounter any soils on the site that exhibit high infiltration rate characteristics belonging to Hydrologic Soil Group A. (Refer to Appendix A for USDA Web Soil Survey Map).

Based on review of our *"Report of Geotechnical Investigation Update"* for the subject site, our geologic reconnaissance and site observations, review of the geologic map for the area of the subject site, and review of the USDA Web Soil Survey, as well as our past experience with materials similar to those encountered at the site, it is our professional opinion that the design of full or partial storm water infiltration BMPs are not considered feasible on the subject site. Our conclusions are based on the existing colluvial soils encountered on the site with a medium expansion potential, proposed

basement and site retaining walls proposed along the southeastern portion of the site in the direction of on-site drainage, and existing natural and cut slopes. In addition, the laboratory test results indicate that the on-site colluvial soils are clay, which prohibit the vertical migration of water through the soils, and exhibit medium expansive soil characteristics. As such, we recommend that all proposed proprietary bio-filtration modular wetland systems be completely enclosed and discharged to an approved drainage facility.

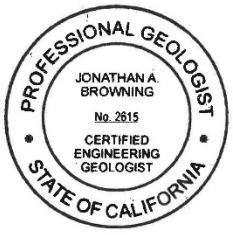
This opportunity to be of continued service is sincerely appreciated. If you have any questions concerning this matter, please contact our office. Reference to our **Job No. 15-10805** will help to expedite a response to your inquiries.

Respectfully submitted,

GEOTECHNICAL EXPLORATION, INC.

Jaime A. Cerros, P.E.
R.C.E. 34422/G.E. 2007
Senior Geotechnical Engineer

Jonathan A. Browning
P.G. 9012/C.E.G. 2615
Senior Project Geologist



APPENDIX A

USDA WEB SOIL SURVEY


Hydrologic Soil Group—San Diego County Area, California
(Breeze Apartments)
117° 22' 2" W
117° 21' 52" W
33° 11' 10" N
33° 10' 59" N
465760
465800
465840
465880
465920
465960
466000
3671950
3671910
3671870
3671830
3671790
3671750
3671710
3671670
S Nevada St
Oceanside
Oceanside Blvd
S Ditmar St
Godfrey St
Beechwood Ln
Marwood Ln
TeF
Md
TuB
TuB
Soil Map may not be valid at this scale.
Map Scale: 1:1,630 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0 20 40 80 120
Feet
0 50 100 200 300
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84
USDA
Natural Resources
Conservation Service
Web Soil Survey
National Cooperative Soil Survey
1/10/2019
Page 1 of 4

Hydrologic Soil Group—San Diego County Area, California
(Breeze Apartments)

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 13, Sep 12, 2018

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

Date(s) aerial images were photographed: Nov 3, 2014—Nov 22, 2014

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
Md	Made land		0.9	42.6%
TeF	Terrace escarpments		0.6	28.4%
TuB	Tujunga sand, 0 to 5 percent slopes	A	0.6	29.0%
Totals for Area of Interest			**2.2**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher