



DRAINAGE STUDY

HOME DEPOT-SCOTTISH RITE (MISSION VALLEY)

PREPARED FOR

HOME DEPOT U.S.A., INC.
C/O BOB BURNSIDE
4000 W. METROPOLITAN DR. SUITE 100
ORANGE, CA 92868

FUSCOE ENGINEERING, INC
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PROJECT MANAGER
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DATE PREPARED: AUGUST 12, 2020

full circle thinking®

PRELIMINARY DRAINAGE STUDY

THE HOME DEPOT AND SCOTTISH RITE

SAN DIEGO, CA
PTS 657591

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EXP: 06-30-2022

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August 12, 2020



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Introduction

The purpose of this drainage study is to present the preliminary drainage design to support the entitlement process for the proposed Scottish Rite and the Home Depot sites located in the Mission Valley area of San Diego, CA. The criteria used for this drainage study is in accordance with the City of San Diego Drainage Design Manual 2017 (Hydraulics) and the County of San Diego Hydrology Manual 2003 (Hydrology).

This study examines the existing and proposed hydrology of the including any associated offsite drainage areas considered part of the local watershed and presents preliminary design for the project drainage facilities.

Fuscoe Engineering has taken over as the Engineer of Work from a previous preliminary Drainage Study prepared by San Dieguito Engineering (SDE) dated Jan. 14, 2020. This study has utilized information from the previous report and updated it to address plan check comments and design changes.

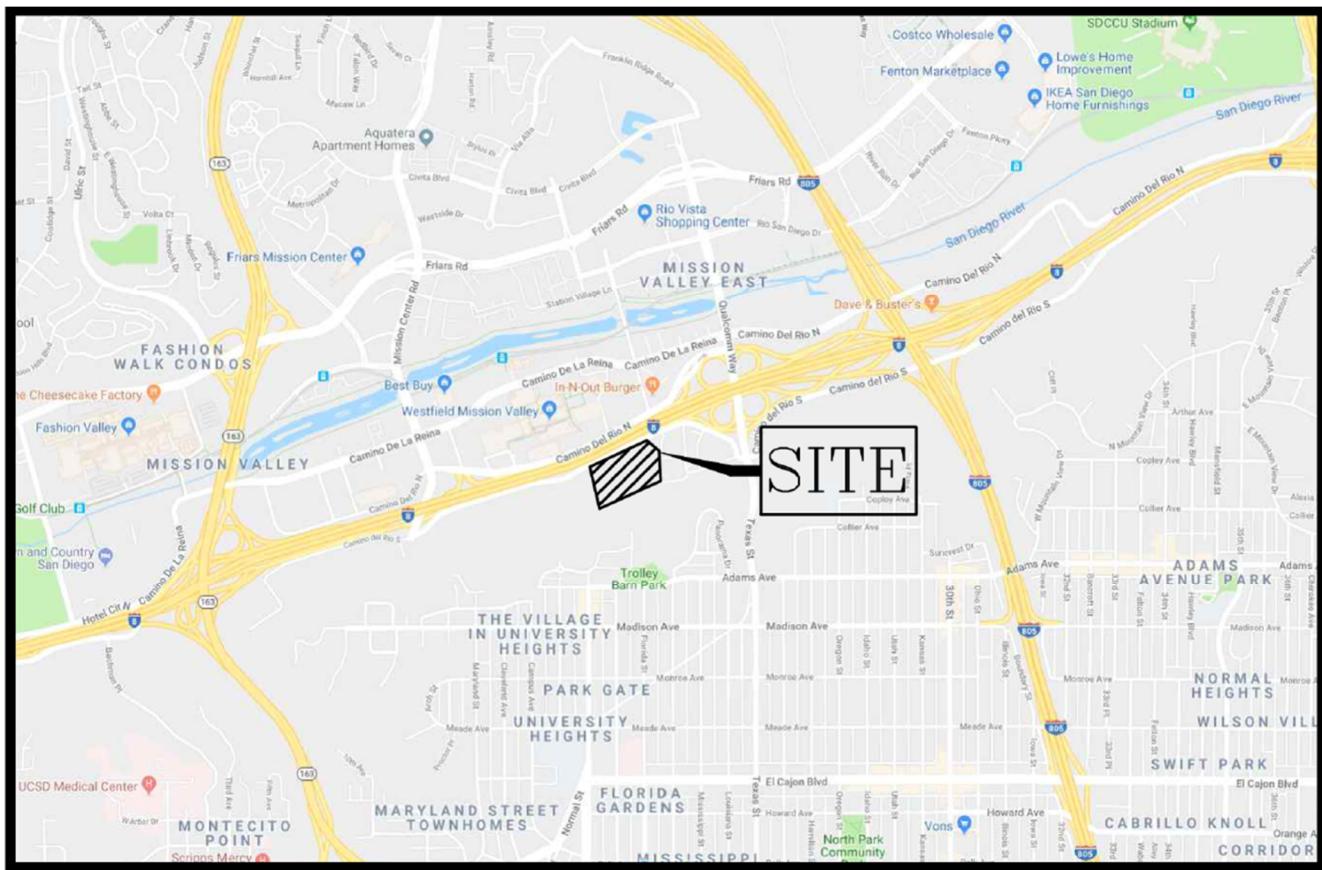
Section 1 – Project Information

1.1 Project Description

The site analyzed within this drainage study encompasses the development of the future the Scottish Rite Center (SRC) and the Home Depot (THD) located within the Mission Valley area of the City of San Diego, CA. The project is located along the southern side of Camino del Rio South, approximately 0.5 miles east of Mission Center Road and 0.3 miles west of Texas Street. See next page for a vicinity map of the site.

The project proposes to construct two building structures for the Scottish Rite Center and a Home Depot. Both sites will also include associated parking and landscaped areas. In addition, THD will include a two-level garage structure located adjacent to Camino del Rio South. Driveways from Camino del Rio South will provide access to the sites.

None of the proposed activities or structures require Regional Water Quality Control Board 401 Certification, U.S. Army Corps of Engineers 404 permit or approval by California Department of Fish and Game.



1.2 Hydrologic Setting

The project site is located in the Mission San Diego Hydrologic Sub-Area (907.11) which is within the Lower San Diego Hydrologic Area within the San Diego Hydrologic Unit Watershed. Exhibit 2 illustrates the project site in the context of the watershed.

1.2.1 Topography

The site is located on the south side of Camino del Rio South and drains from the rear of site towards Camino del Rio South. A grate inlet within the existing Scottish Rite Center parking lot collects a portion of the site runoff. The remaining site runoff sheet flows towards Camino del Rio South. The highest point of the property is located at the rear of the lot (southern boundary) with an elevation of about 57 feet. The property drains over a distance of approximately 475 feet to Camino del Rio South with an average grade of approximately 2.5 percent.

1.2.2 Current and Adjacent Land Use

The eastern portion of the project site is current Scottish Rite Center while the western portion of the site is a car dealership. There are slopes along the entire rear of the site which slope towards the site but whose runoff is collected via terraced channels and catch basins. The existing site is accessed by driveways along Camino del Rio South.

The general plan designation for the area is Commercial Employment, Retail, & Services. The property is zoned as Commercial (Office and limited Industrial with an auto orientation). The assessor's parcel numbers (APNs) are 4380903300 and 4380903400.

Exhibit 3 illustrates the County of San Diego General Plan and Zoning near the project site.

1.2.3 Soil and Vegetation Conditions

A preliminary report of soil investigation was prepared for the project by Moore Twining titled Geotechnical Engineering Investigation- Proposed Home Depot Store- Mission Valley (June 3, 2019). The Soil Survey for the San Diego Area by the United States Department of Agriculture Soil Conservation Service (1973) was also used for reference.

Infiltration testing indicated a vertical infiltration rate ranging from 0.1 to 0.5 inches per hour without any factor of safety applied.

The USDA Soil Survey classifies the site soils as Urban land which is assumed to be soil type 'D'. This is consistent with the clay soils identified in the geotechnical report over the project site. **Exhibit 4** illustrates the soil types and limits. The flat portions of the site contain

minimal if any vegetation. However, the slopes located along the rear of the lot are Terrace escarpments with natural vegetation consisting of grass and bushes.

1.2.4 Existing Drainage Patterns and Facilities

The existing Scottish Rite Center consists of a building and parking lot. Drainage from a portion of the parking lot is collected by an onsite grate and storm drain then conveyed towards the storm drain system along Camino del Rio South. The eastern portion of the site overland flows towards Camino del Rio South where it then flows east within the gutter and is ultimately collected by an existing curb inlet about 500 feet east of the site. The remaining portion of the site sheet flows towards Camino del Rio South before getting collected by the existing curb inlet in front of the site.

The existing auto dealer site will be the future location of the new Scottish Rite Center. Drainage from the backside of the lot is collected via onsite grates and storm pipe which discharge at the from the lot and drain onto Camino del Rio South. The front of the lot sheet flows over land towards Camino del Rio South. Runoff along the Camino del Rio South gutter at this location empties into an existing curb inlet located approximately 70 feet west of the western site boundary.

1.2.5 Floodplain Mapping

The Federal Emergency Management Agency (FEMA) has mapped Special Flood Hazard Areas (SFHAs) for the project site. The project site is within an area on the FEMA Flood Insurance Rate Map designated as an area of minimal flood hazard (Zone X). A Firmette was produced from the FEMA website taken from FIRM Map Panel Number 06073C1619G which is included in **Exhibit 5**.

1.2.6 Downstream Conditions

Analysis of downstream conditions has not been performed as part of this drainage study, as the project site plan has been designed to mitigate storm water flows to below pre-development levels.

1.2.7 Impervious Cover

The site is almost entirely covered with impervious surfaces consisting of roofs, sidewalks, parking lot, and driveway. There are minimal areas with vegetated areas consisting of landscaping around the existing Scottish Rite Center. The project will remove all of the impervious areas and replace them with new impervious and pervious surfaces. However, it is expected that the proposed site will ultimately reduce the amount of impervious surfaces relative to existing

condition.

Section 2 – Methodology and Design Criteria

The design criteria and methodology for Hydrology follow the County of San Diego Hydrology Manual (June 2003) and the Hydraulics for Underground Storm Drain Design follow the City of San Diego Drainage Design Manual (2017) as appropriate for the project site.

2.1 Rational Method

Rational Method Peak Flows were calculated using methodology in the County of San Diego Hydrology Manual for the rational method via AES software. These calculations were performed for both the existing and proposed conditions to quantify differences in the peak rate of discharge. Runoff coefficients were based upon researched soils data and Table 3-1 of the County Hydrology Manual for the existing condition. The proposed condition assumed a Type D Soil, and calculated the weighted runoff coefficient based on the percentage of impervious for each subarea. Time of concentration was calculated per Section 3.1.4 of the County Hydrology Manual and corresponding runoff intensities for the 100-year storm were based upon a 6-hour precipitation of 2.6 inches. See Appendix C for Pre-project and Post-project rational method hydrology calculations.

The peak runoff rates in proposed conditions result in a slight decrease in peak runoff due to a decrease in impervious areas. The facilities have been designed to meet flow control and treatment control criteria per calculations in the SWQMP.

Storm water treatment to mitigate for pollutants will be provided through the various BMPs throughout the site. This mitigation will be provided through biofiltration with either basin-type structures or with modular proprietary devices. Narrative and calculations relative to stormwater treatment are included in the project's Storm Water Quality Management Plan (SWQMP).

2.2 Hydraulic Analysis

The proposed 36in public storm drain is designed in accordance with Section 4.1 of the City of San Diego Drainage Design Manual. StormCAD by Bentley Systems was used to analyze the hydraulic capacity of this storm drain. Output tables and profiles are provided in Appendix D of this report. At the connection point to the existing 36in public storm drain, a tailwater was assumed in order to model the downstream existing hydraulic grade line for the 50-year storm event. Because downstream HGL data was not available, this tailwater was set at the existing top of curb elevation as a conservative measure. Assuming the downstream tailwater and flows generated at the nodes described above, the 36in public storm drain will convey the design flow while maintaining at least 1 foot of freeboard from the hydraulic grade line below the ground surface in accordance with Section 4.1.1 of the Design Manual.

Node 219, 220, and 262 represents the rerouted public storm drainage system that goes through the existing Scottish Rite site. Node 262 represents the ultimate downstream condition prior to connecting into the existing 36in RCP culvert per drawing number 12785-L. The offsite drainage and mitigated onsite flow rates are less than the existing condition at node 262 per **Table 3-1**.

Section 3 – Hydrologic Effect of Project

This section summarizes the quantities and location of storm water runoff from the project site. Discussion of the water quality aspects of the project can be found in the PDP-SWQMP, which is under separate cover from this report.

3.1 Drainage Patterns

The grading and lot line revisions associated with the proposed site will affect the drainage patterns relative to the existing condition drainage. Therefore, the proposed drainage facilities for the site will reconfigure the existing drainage patterns to best mimic and match existing peak flows at the site's three compliance points which are designated on the hydrology maps.

3.2 Impervious Cover

As in existing condition, the majority of the combined THD/SRC site will consist of impervious surfaces such as of roof, sidewalk, parking lot, driveway, and parking garage structure. However, the amount of pervious surfaces for landscaping will be increased as indicated in the site plan and proposed condition hydrology map in **Appendix A**.

3.3 Peak Runoff

The project will not increase the peak 100-year storm discharge from the site at all three compliance points along Camino del Rio South. Refer to Nodes 145, 262, and 310 on the proposed conditions hydrology maps in **Appendix A**.

Table 3-1 on the next page summarizes the hydrologic effects in terms of calculated peak runoff from the project watershed under both existing and proposed conditions. Nodes at points of drainage discharge from the project pre- and post-development (corresponding with **Table 3-1**) are labeled on the hydrology maps in **Appendix A**.

Table 3-1 Summary of Hydrology Analysis

Location	Existing Condition			Proposed Condition			Summary	
	Node	Area (ac)	Q ₁₀₀ (cfs)	Node	Area (cfs)	Q ₁₀₀ (cfs)	Area Delta (ac)	Q ₁₀₀ Delta
West	132	15.0	37.20	145	15.8	36.85	+0.8	-0.35
Central	237	35.6	71.31	262	36.6	70.37	+1.0	-0.94
East	302	3.0	10.15	310	1.6	4.94	-1.4	-5.21
TOTALS:	-	53.52	118.66	-	53.55	112.16	0.4	-6.50

3.4 Project Erosion and Sedimentation

Because runoff over erodible surfaces will be restricted to flows over the individual lots and vegetated cut and fill slopes, and because the proposed grading will limit the flows and velocities of runoff generated, neither erosion or sedimentation are anticipated. Velocities over the proposed lots will be decreased from the existing condition to non-erosive levels. Once flows have exited each lot, the flows are conveyed via impervious surfaces (gutters and storm drain pipes) not subject to erosion.

Section 4 – Summary and Conclusions

This section provides a summary discussion of the potential effects of the proposed project on local water resources in terms of quantity and location.

- The proposed project will not increase the calculated 100-year peak flows towards any of the sites three compliance points.
- There are no City of San Diego Master Plan drainage facilities shown in the approved General Plan that would affect the project.
- The project will not affect the capacity of existing offsite drainage facilities. The project will remove or replace any existing onsite drainage improvements and all storm drainage pipes and facilities will be designed during the Final Engineering phase to convey the 50-year peak flows without causing flooding of proposed structures.
- The rerouted public storm drainage pipe has been designed for 50-year peak flows and meets the City of San Diego design guidelines.

Section 5 – CEQA Summary

This section summarizes the results of the hydrology, hydraulics and drainage analysis in the context of CEQA significance guidelines.

5.1 Drainage

5.1.1 Erosion and/or Sedimentation

Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site?

The project will not alter existing drainage patterns of the site area in a manner that would result in substantial erosion or sedimentation. The project does not alter the course of a stream or river.

- Flows may be concentrated at certain locations, including storm drain outfalls, however, all proposed outfalls will be to non-erosive surfaces. Other storm water Best Management Practices (BMPs) will help preclude significant erosion and/or siltation on- and off-site.

5.1.2 Flooding

Does the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?

The project will not alter existing drainage patterns of the site area in a manner that would result in flooding on- or off-site. The project does not alter the course of a stream or river.

- This drainage study demonstrates that the project will not increase the 100-year peak storm discharge, as compared with existing conditions.

5.1.3 Drainage System Capacity

Does the project create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems?

The project will not create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems.

- The project will not affect any City master-planned drainage facilities
- All proposed drainage facilities will be designed to accommodate the 50-Year storm

5.2 Flood Hazards

5.2.1 Residential Flood Hazard

Would the project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map, including County Floodplain Maps?

The project does not propose to locate any housing within the 100-year flood hazard area.

- The project does not propose any development within the 100-year floodplain or other Special Flood Hazard Area (SFHA) designated by FEMA

5.2.2 Flood Flow

Does the project place within a 100-year flood hazard area structures that would impede or redirect flood flows?

The project does not propose to locate any structures or grading in the floodplain that would impede or redirect flood flows.

- The project does not propose any development within the 100-year floodplain or other Special Flood Hazard Area (SFHA) designated by FEMA

5.2.3 Flood Hazard

Does the project expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of a levee or dam?

The project does not place any people or structures at significant risk of loss, injury or death due to flooding.

- The project does not propose any development within the 100-year floodplain or other Special Flood Hazard Area (SFHA) designated by FEMA
- The project will ensure emergency access during significant flood events. The project is not located behind a levee or below a dam that would present a flood hazard upon its failure.

5.2.4 Other Hazards

Is the project at significant risk of inundation by seiche, tsunami, or mudflow?

The project is not located in an area at risk of inundation by seiche (lake slosh), tsunami, or mudflow.

5.3 Waiver and Release Agreements

The project does not alter downstream flow characteristics significantly, either due to increase in flow or flood condition, diversion of flow, or flow concentration. Therefore, it should not be necessary to obtain waiver and release agreements from any affected property owners.

Section 6 – References

San Diego County Hydrology Manual (June 2003), County of San Diego Department of Public Works Flood Control.

San Diego County Hydraulic Design Manual (September 2014), County of San Diego Department of Public Works Flood Control Section.

San Diego County Drainage Design Manual (December 1973), County of San Diego Department of Public Works Flood Control Section.

Soil Conservation Service (December 1973). Soil Survey, San Diego Area, California

EXHIBIT 1 VICINITY MAP

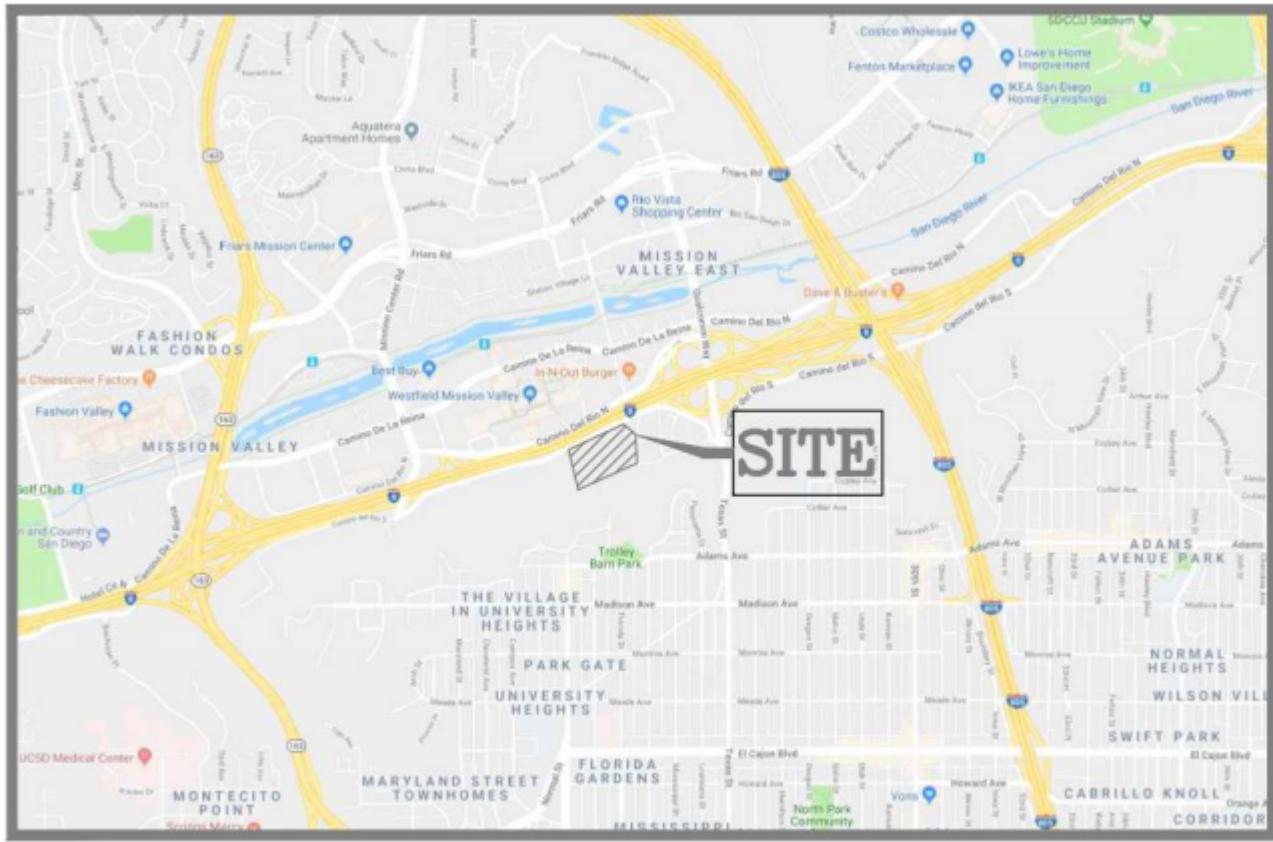


EXHIBIT 2
WATERSHED VICINITY MAP



Caltrans Water Quality Planning Tool

The Water Quality Planning Tool was created to help planners and designers comply with environmental permits. It uses a map interface to find information based on a project's location. **This application is being updated for digital accessibility and will continue to function while updates are in progress.**

Layers

- 303(d) List and TMDLs 2014-2016 ([Legend](#))
- Areas of Special Biological Significance
- Arid and Semi-Arid Regions
- Caltrans Districts
- Caltrans Facilities
- Caltrans Tier 1 Monitoring Sites
- Calwater Watersheds
- Coastal Zone
- Counties
- Geologic Map ([Legend](#))
- High Risk Receiving Watersheds
- Monthly Precipitation
- MS4 Areas
- Post Miles
- Rainfall Distribution
- RWQCB Boundaries
- USGS Topo Maps
- Watershed Boundary Dataset

Risk Level Determination

- Erosivity Index
- K Factor
- R Factor ([calculations](#))
- LS Factor
- Soil Details

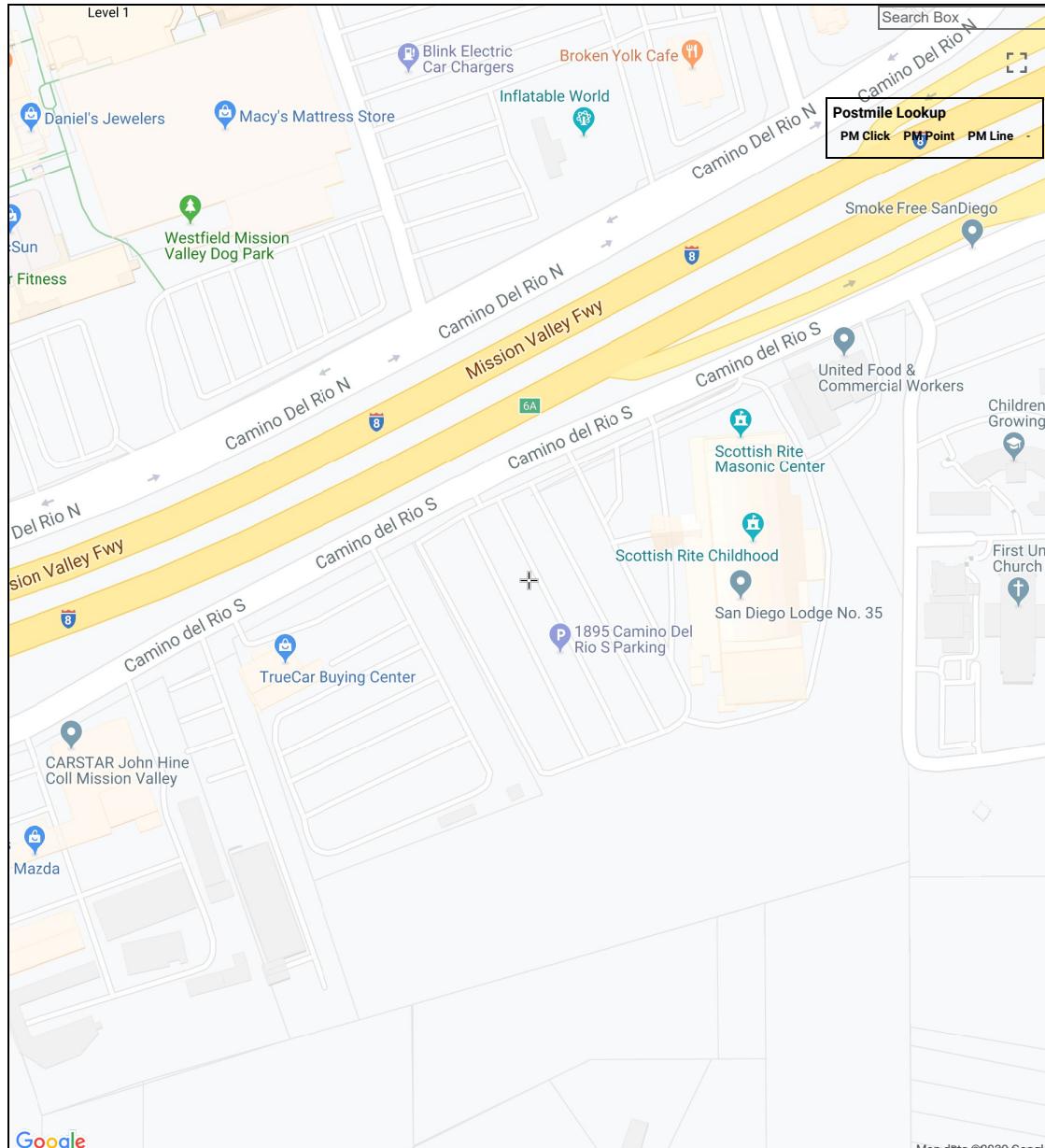
Compliance Storm Events

- 5-yr 24-hr North
- 10-yr 24-hr North
- 5-yr 24-hr South
- 10-yr 24-hr South

Distance and Area

Information

Hover over a layer name for a description.
Additional information, tables, coordinates, and links are below the map.
[Help](#)



Watershed Information

CALWATER WATERSHED

Hydrologic Unit	SAN DIEGO	Hydrologic Area	Lower San Diego	Hydrologic Sub-Area # 907.11
Hydrologic Sub-Area Name	Mission San Diego	Planning Watershed	4907110000	HSA Area (acres)
Latitude, Longitude	32.7672, -117.1449			37059

WATERSHED BOUNDARY DATASET

Watershed: Lower San Diego River Subwatershed: Mission Valley-San Diego River Hydrologic Unit Code: 180703040705
Average Annual Precipitation (inches): 12.74

TMDLs & 303(d) Listed Water Bodies (2014 - 2016 List)

Key: Water body on 303(d) list! Water body with a TMDL

Name	Pollutant	Size	Status

907.00	SAN DIEGO HYDROLOGIC UNIT
907.10	Lower San Diego HA
7.11	Mission San Diego HSA
7.12	Santee HSA
7.13	El Cajon HSA
7.14	Coches HSA
7.15	El Monte HSA
907.20	San Vicente HA
7.21	Fernbrook HSA
7.22	Kimball HSA
7.23	Gower HSA
7.24	Barona HSA
907.30	El Capitan HA
7.31	Conejos Creek HSA
7.32	Glen Oaks HSA
7.33	Alpine HSA
907.40	Boulder Creek HA
7.41	Inaja HSA
7.42	Spencer HSA
7.43	Cuyamaca HSA

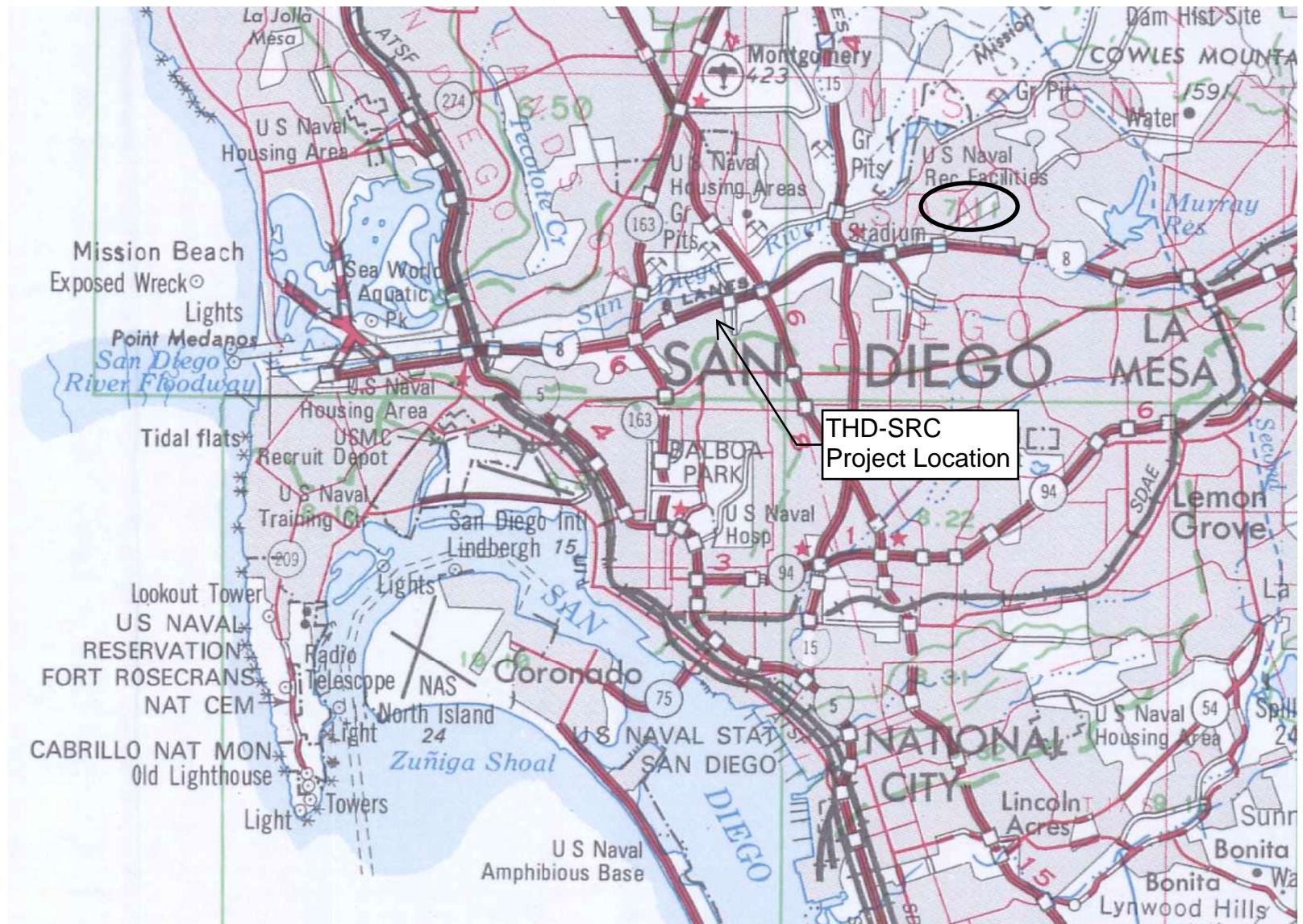


EXHIBIT 3
COUNTY GENERAL PLAN LAND USE/ZONING MAP



THE CITY OF SAN DIEGO
General Plan
Land Use and Community
Planning Element

The General Plan Land Use Map depicts generalized land use within the City of San Diego. The information is a composite of the land use maps adopted for each of the community, specific, precise, subarea and park plan areas. It is intended as a representation of the distribution of land uses throughout the city; although consistent with, it is not a replacement or substitution for community or other adopted land use plans. Please refer to the relevant community or other adopted land use plan documents for more detail regarding planned land uses and land use planning proposals.

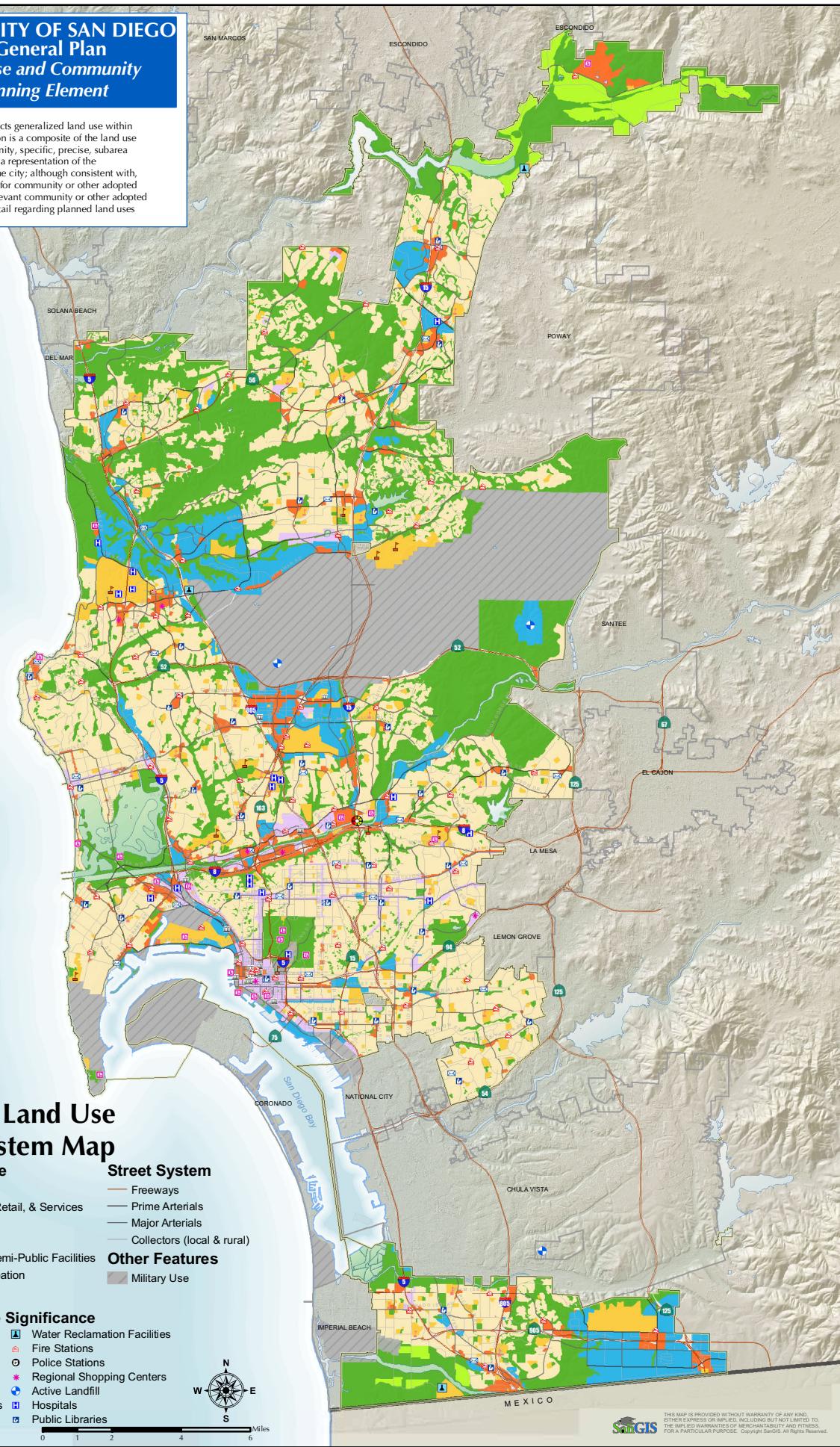
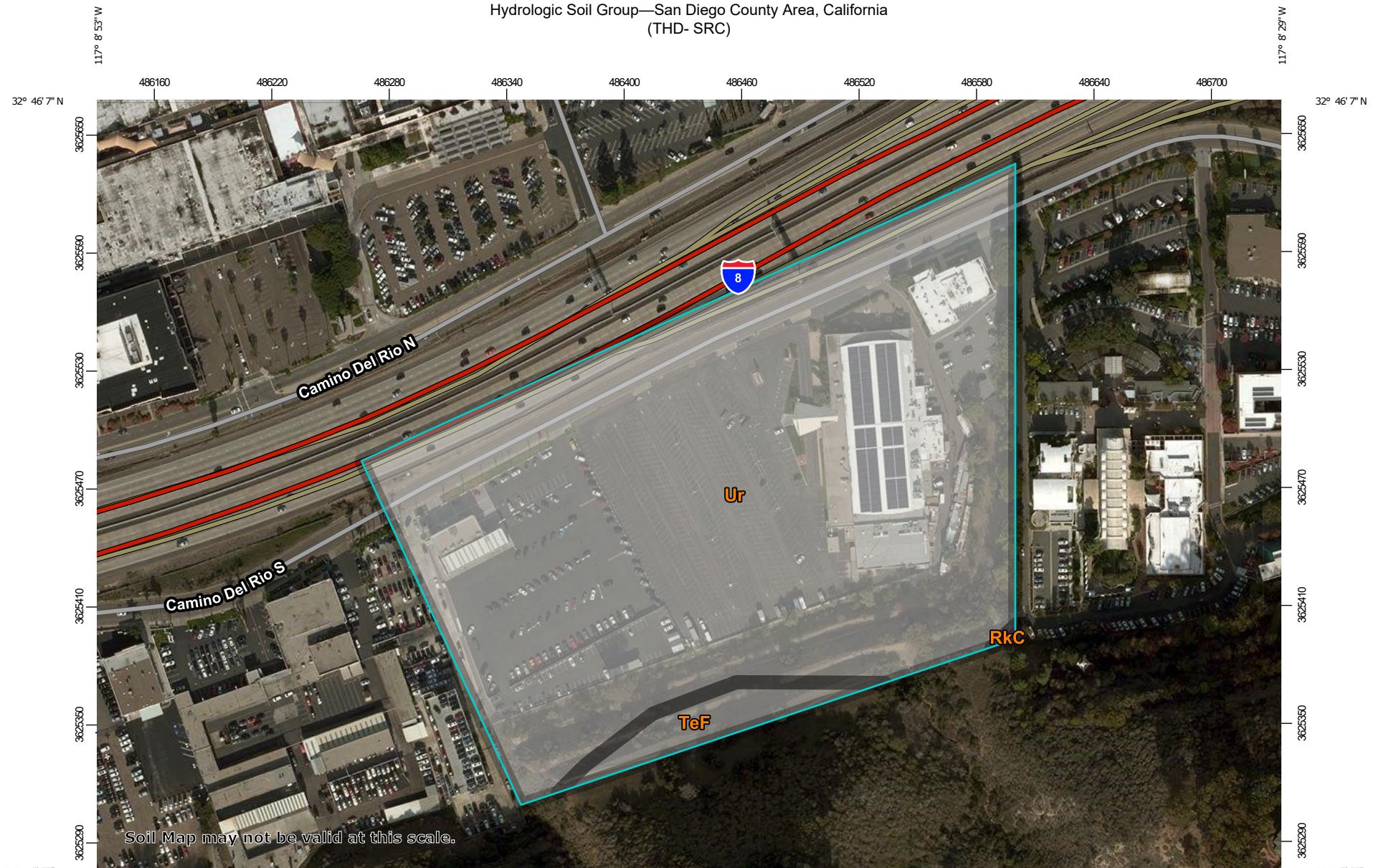


EXHIBIT 4

SOIL TYPES

Hydrologic Soil Group—San Diego County Area, California
(THD- SRC)



Map Scale: 1:2,770 if printed on A landscape (11" x 8.5") sheet.

0 40 80 160 240 Meters

0 100 200 400 600 Feet

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



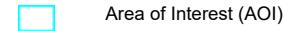
Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

1/2/2020
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MAP LEGEND

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 14, Sep 16, 2019

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

Date(s) aerial images were photographed: Dec 7, 2014—Jan 4, 2015

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
RkC	Reiff fine sandy loam, 5 to 9 percent slopes	A	0.0	0.1%
TeF	Terrace escarpments		0.7	4.0%
Ur	Urban land		15.7	95.9%
Totals for Area of Interest			16.4	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

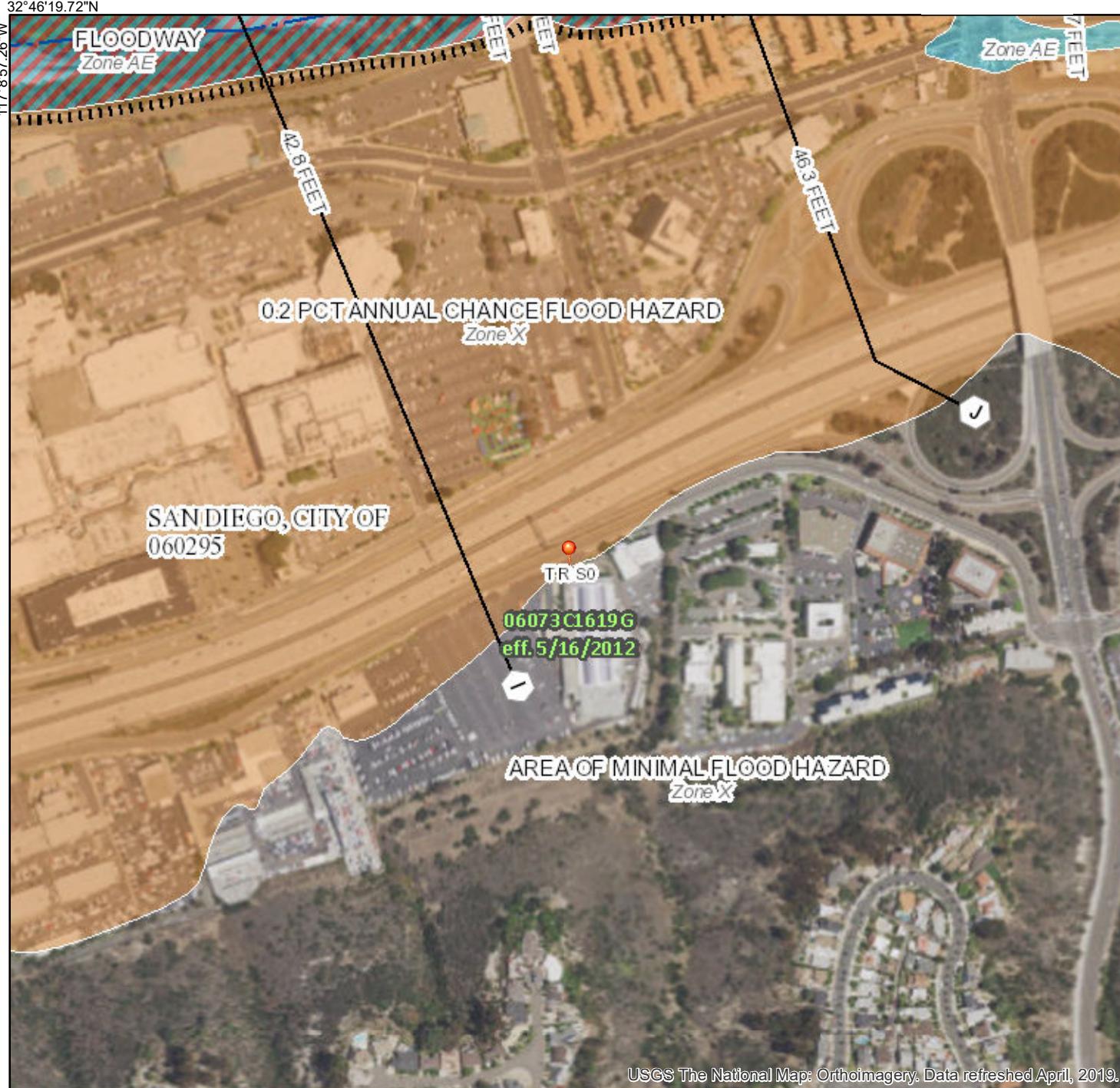


EXHIBIT 5
FEMA FLOOD INSURANCE RATE MAP

National Flood Hazard Layer FIRMette



FEMA



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE)
Zone A, V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee. See Notes. Zone X
- Area with Flood Risk due to Levee Zone D

OTHER AREAS OF FLOOD HAZARD

- Area of Minimal Flood Hazard Zone X
- Effective LOMRs
- Area of Undetermined Flood Hazard Zone D

OTHER AREAS

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

- B 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- (S) Coastal Transect
- ~~~ 513 ~~~ Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

- Digital Data Available
- No Digital Data Available
- Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/2/2020 at 11:11:33 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix A
SAN DIEGO COUNTY HYDROLOGY ISOPLUVIAL MAPS AND EXCERPTS

County of San Diego Hydrology Manual



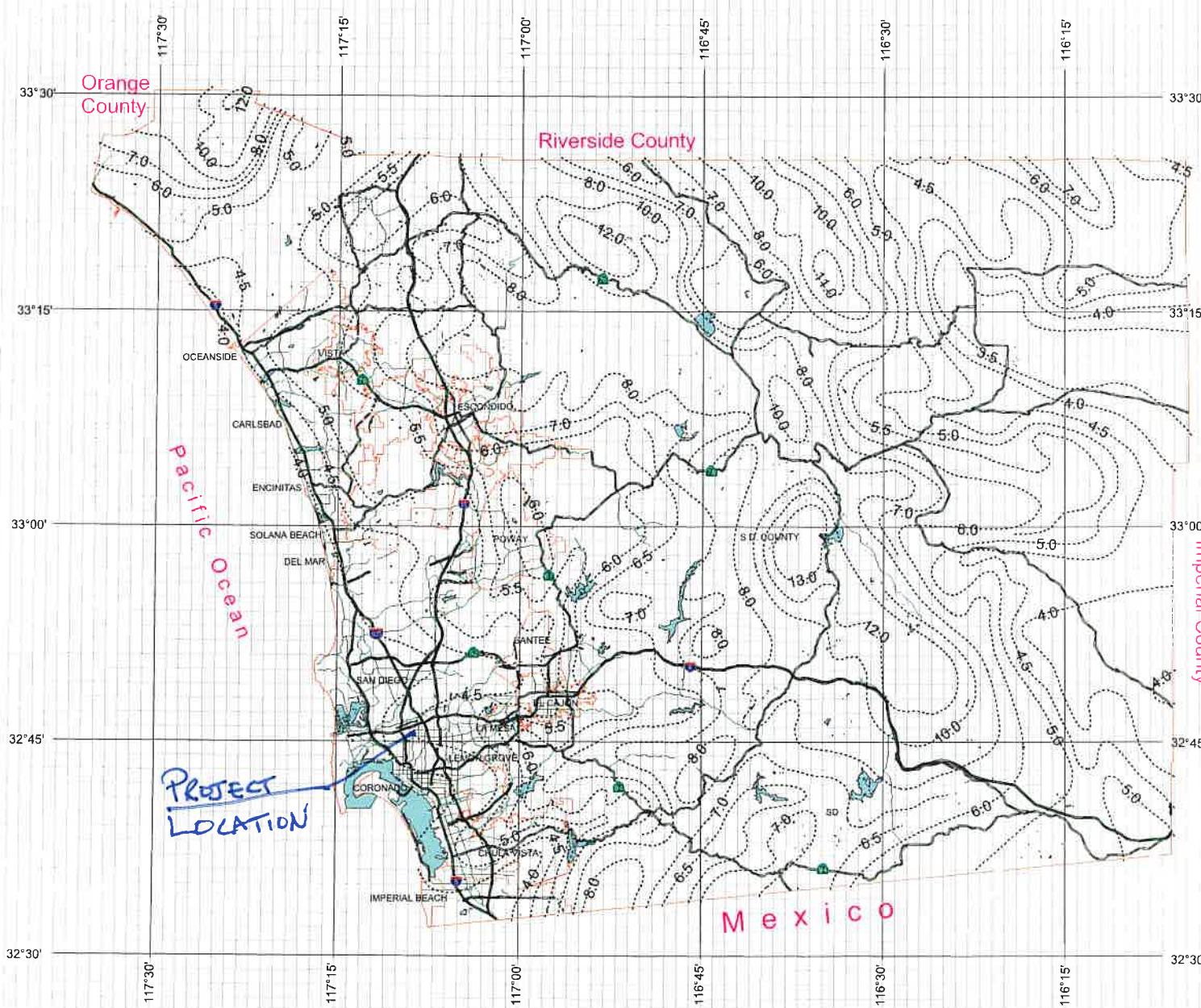
Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

THD - SRC

$P_{24} = 4.6 \text{ in}$



Department of Public Works
Geographic Information Systems



W. F. Pease San Diego County



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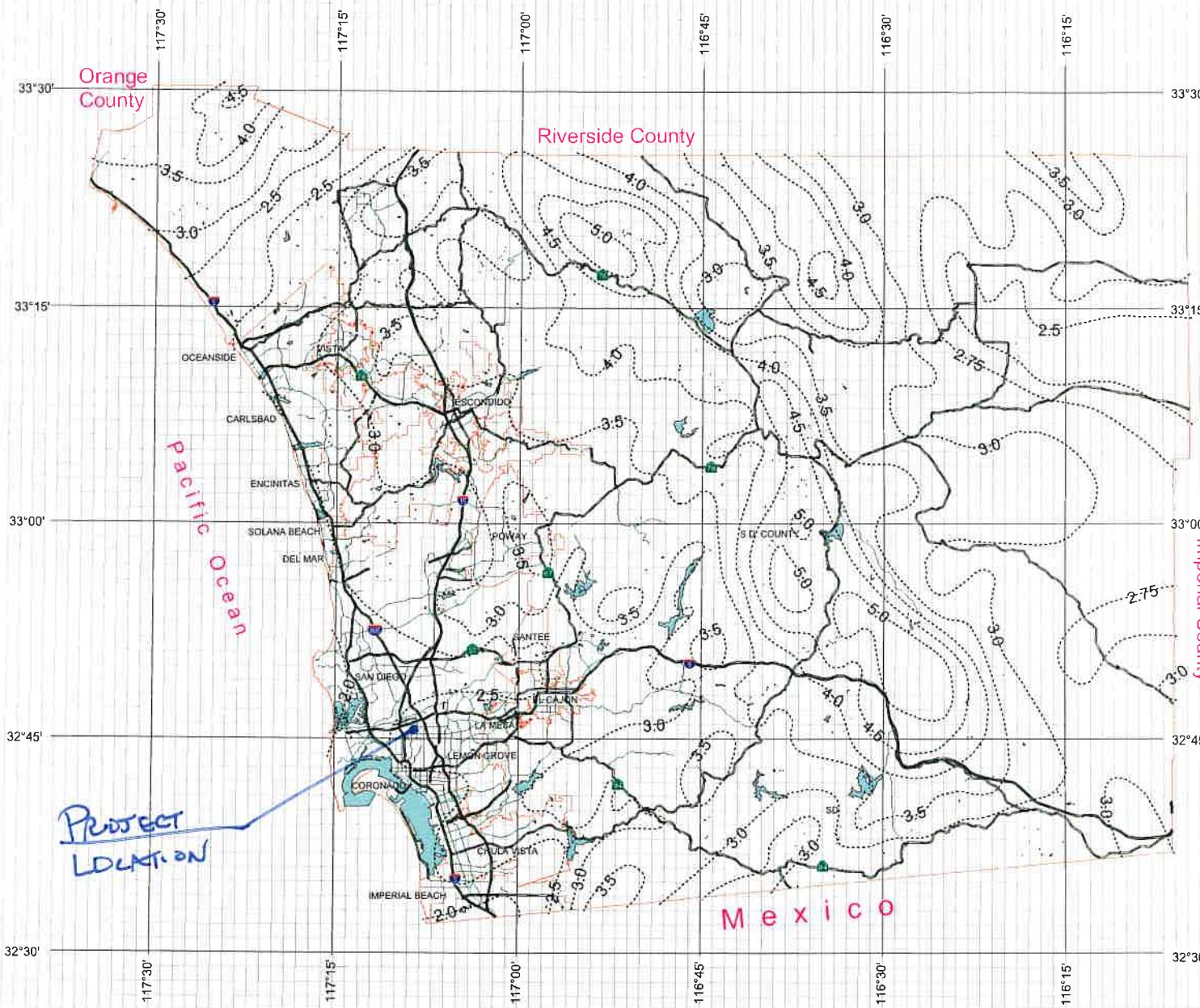
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County of San Diego Hydrology Manual



Rainfall Isopluvials



100 Year Rainfall Event - 6 Hours



THD-SRC

$$P_{L6} = 2.6 \text{ IN}$$



Department of Public Works
Geographic Information Systems



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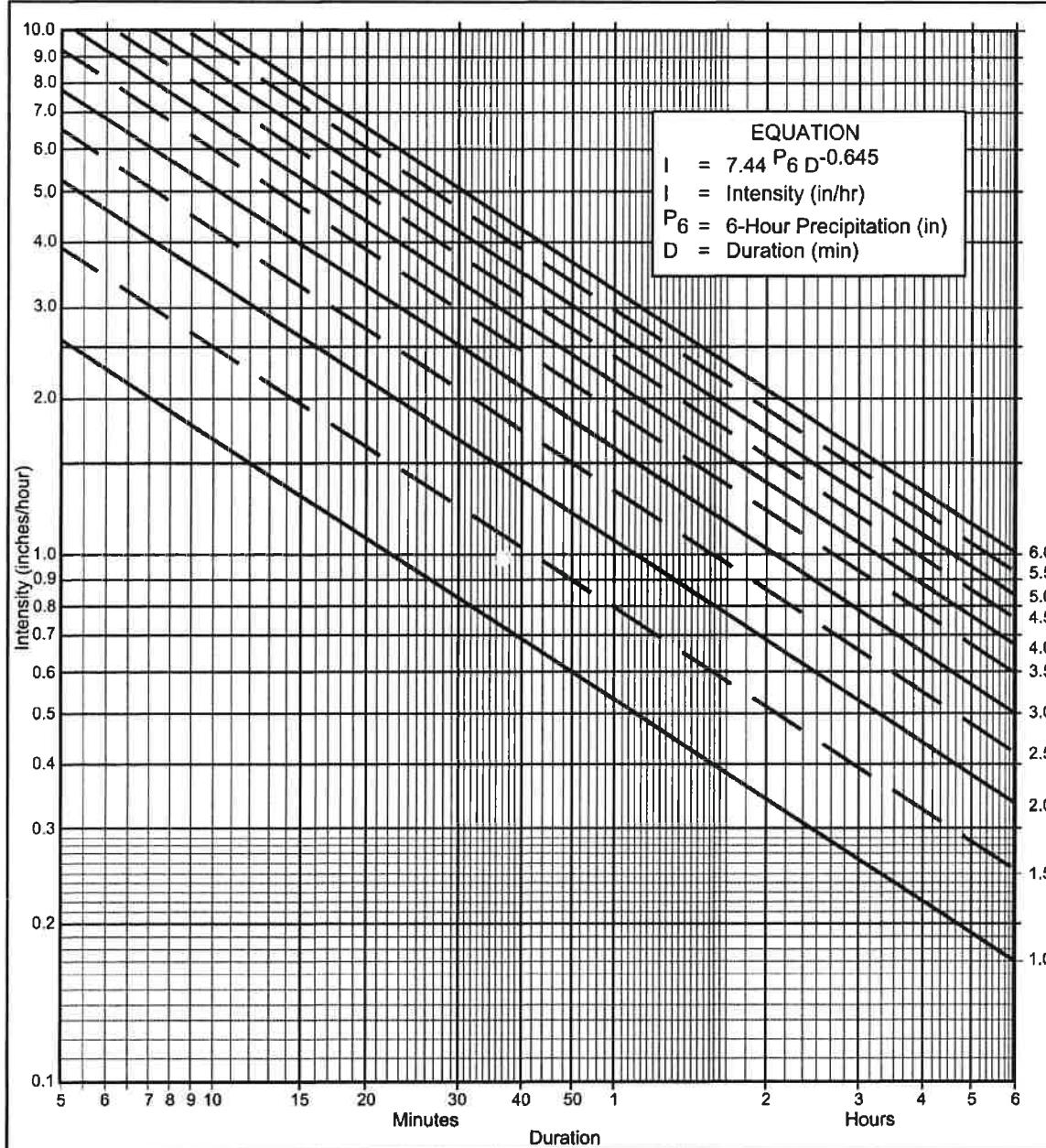
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THD/SRC



Directions for Application:

- (1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).
- (2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicable to Desert).
- (3) Plot 6 hr precipitation on the right side of the chart.
- (4) Draw a line through the point parallel to the plotted lines.
- (5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

- (a) Selected frequency 100 year
- (b) $P_6 = \underline{2.10}$ in., $P_{24} = \frac{4.16}{P_6} = \underline{56.5}$ %⁽²⁾
- (c) Adjusted $P_6^{(2)} = \underline{2.10}$ in.
- (d) $t_x = \underline{\hspace{2cm}}$ min.
- (e) $I = \underline{\hspace{2cm}}$ in./hr.

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

P ₆	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

FIGURE

Intensity-Duration Design Chart - Template

3-1

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

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

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

DU/A = dwelling units per acre

NRCS = National Resources Conservation Service

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

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

Table 3-2

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

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

*See Table 3-1 for more detailed description

Appendix A
EXISTING AND PROPOSED HYDROLOGY MAPS

LEGEND

PROPERTY LINE	
EXISTING STORM DRAIN	
BASIN LIMITS	
SUB-BASIN LIMITS	
INITIAL AREA LIMITS	
FLOW PATH	
DIRECTION OF FLOW	
POINT OF CONFLUENCE DESIGNATION	
(100)	
HYDROLOGY NODE	
EXISTING CONTOUR	
EXISTING PERVIOUS AREA	
BASIN AREA	

EXISTING HYDROLOGY SUMMARY

POC	DESCRIPTION	AREA (AC)	Tc (MIN)	Q100 (CFS)
1	EX. 24" RCP SD	15.0	9.94	37.20
2	EX. 36" RCP CULVERT	35.6	15.32	71.31
3	CAMINO DEL RIO S	3.0	10.16	10.15

-Z-

100' 0' 50' 100'

SCALE: 1" = 100'

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128-020 Existing Hydrology Map

THE HOME DEPOT MISSION VALLEY

EXISTING CONDITIONS HYDROLOGY MAP



LEGEND

PROPERTY LINE	
EXISTING STORM DRAIN	
BASIN LIMITS	
SUB-BASIN LIMITS	
INITIAL AREA LIMITS	
FLOW PATH	
DIRECTION OF FLOW	
POINT OF CONFLUENCE DESIGNATION	
HYDROLOGY NODE	
EXISTING CONTOUR	
EXISTING PERVIOUS AREA	
BASIN AREA	

PROPOSED HYDROLOGY SUMMARY

POC	DESCRIPTION	AREA (AC)	Tc (MIN)	Q100 (CFS)
1	EX. 24" RCP SD	15.8	9.90	36.85
2	EX. 36" RCP CULVERT	36.6	16.37	70.37
3	CAMINO DEL RIO S	1.6	7.31	4.94

-1
-1

100' 0' 50' 100'

THE HOME DEPOT
MISSION VALLEY

EXISTING CONDITIONS
HYDROLOGY MAP

Appendix B

RUNOFF COEFFICIENT CALCULATIONS



Job Name: SCOTTISH RITE & THE HOME DEPOT - MISSION VALLEY
Job #: 128-020
Date: 5/22/2020

Runoff Coefficient Calculations

Runoff Coefficient Variables Per City of San Diego Drainage Design Manual (January 2017)

Assumptions:

PROPOSED CONDITIONS:

TOTAL AREA	2,332,859
TOTAL PERVIOUS	1,346,227
TOTAL IMPERVIOUS	986,632

SCOTTISH RITE AND HOME DEPOT SITE = 424,345 sf

Area Pervious = 47,898 sf
Area Impervious = 376,447 sf

Actual % Impervious = 89
Given C Factor per Table 3-1 = 0.84

EXISTING SLOPE AND PROPOSED TERRACE DRAINS 1,221,553 sf

Area Pervious = 1,221,553 sf
Area Impervious = 0 sf

Actual % Impervious = 0
Given C Factor per Table 3-1 = 0.35

EXISTING COMMERCIAL AREA 53,077 sf

Area Pervious = 13,223 sf
Area Impervious = 39,854 sf

Actual % Impervious = 75
Given C Factor per Table 3-1 = 0.76

EXISTING RESIDENTIAL AREA 546,250 sf

Area Pervious = 63,553 sf
Area Impervious = 482,697 sf

See existing hydrology for C Factors

*See Note (2) on Table A-1 of the SDDDM included in Appendix 3 for Calculated 'C' equation

Appendix C
RATIONAL METHOD CALCULATIONS (AES)
EXISTING/PROPOSED

EXISTING AES CALCULATIONS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003, 1985, 1981 HYDROLOGY MANUAL
(c) Copyright 1982-2016 Advanced Engineering Software (aes)
Ver. 23.0 Release Date: 07/01/2016 License ID 1355

Analysis prepared by:

Fuscoe Engineering
6390 Greenwich Dr Ste 170
San Diego, CA
92122

***** DESCRIPTION OF STUDY *****
* THE HOME DEPOT - MISSION VALLEY - PRE-DEVELOPMENT STUDY *
* SERIES 1 *
* SAN DIEGO, CALIFORNIA *

FILE NAME: SR100EX.DAT
TIME/DATE OF STUDY: 09:52 04/10/2020

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 2.600
SPECIFIED MINIMUM PIPE SIZE(INCH) = 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	0.0313	0.167	0.0150
2	15.0	10.0	0.020/0.020/0.020	0.50	1.50	0.0313	0.125	0.0160

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

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

FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21

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

*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .6800
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 65.00
UPSTREAM ELEVATION(FEET) = 360.00

DOWNSTREAM ELEVATION(FEET) = 359.35
ELEVATION DIFFERENCE(FEET) = 0.65
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.856
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 60.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.187
SUBAREA RUNOFF(CFS) = 0.71
TOTAL AREA(ACRES) = 0.17 TOTAL RUNOFF(CFS) = 0.71

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<

UPSTREAM ELEVATION(FEET) = 359.35 DOWNSTREAM ELEVATION(FEET) = 354.00
STREET LENGTH(FEET) = 315.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.02
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.27
HALFSTREET FLOOD WIDTH(FEET) = 7.23
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.35
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.64
STREET FLOW TRAVEL TIME(MIN.) = 2.23 Tc(MIN.) = 8.09
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.024
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .7400
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.733
SUBAREA AREA(ACRES) = 1.24 SUBAREA RUNOFF(CFS) = 4.61
TOTAL AREA(ACRES) = 1.4 PEAK FLOW RATE(CFS) = 5.18

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.31 HALFSTREET FLOOD WIDTH(FEET) = 9.34
FLOW VELOCITY(FEET/SEC.) = 2.62 DEPTH*VELOCITY(FT*FT/SEC.) = 0.82
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 380.00 FEET.

FLOW PROCESS FROM NODE 102.00 TO NODE 103.00 IS CODE = 51

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

ELEVATION DATA: UPSTREAM(FEET) = 354.00 DOWNSTREAM(FEET) = 70.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 750.00 CHANNEL SLOPE = 0.3787
CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 4.00

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.587
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .4100
S.C.S. CURVE NUMBER (AMC II) = 0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.80
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.21
AVERAGE FLOW DEPTH(FEET) = 0.22 TRAVEL TIME(MIN.) = 1.22
Tc(MIN.) = 9.31
SUBAREA AREA(ACRES) = 4.86 SUBAREA RUNOFF(CFS) = 9.14
AREA-AVERAGE RUNOFF COEFFICIENT = 0.483
TOTAL AREA(ACRES) = 6.3 PEAK FLOW RATE(CFS) = 13.87

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.26 FLOW VELOCITY(FEET/SEC.) = 11.60
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 103.00 = 1130.00 FEET.

FLOW PROCESS FROM NODE 103.00 TO NODE 103.00 IS CODE = 10

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

FLOW PROCESS FROM NODE 110.00 TO NODE 111.00 IS CODE = 21

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

*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .3600
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 345.00
DOWNSTREAM ELEVATION(FEET) = 335.00
ELEVATION DIFFERENCE(FEET) = 10.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.183
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.973
SUBAREA RUNOFF(CFS) = 0.82
TOTAL AREA(ACRES) = 0.38 TOTAL RUNOFF(CFS) = 0.82

FLOW PROCESS FROM NODE 111.00 TO NODE 112.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 335.00 DOWNSTREAM(FEET) = 125.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 575.00 CHANNEL SLOPE = 0.3652
CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 4.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.156

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3520
S.C.S. CURVE NUMBER (AMC II) = 0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.44
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.05
AVERAGE FLOW DEPTH(FEET) = 0.10 TRAVEL TIME(MIN.) = 1.59
Tc(MIN.) = 7.77
SUBAREA AREA(ACRES) = 1.78 SUBAREA RUNOFF(CFS) = 3.22
AREA-AVERAGE RUNOFF COEFFICIENT = 0.353

TOTAL AREA (ACRES) = 2.2 PEAK FLOW RATE (CFS) = 3.93

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.13 FLOW VELOCITY(FEET/SEC.) = 7.28
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 112.00 = 675.00 FEET.

FLOW PROCESS FROM NODE 112.00 TO NODE 117.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 3

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 7.77

RAINFALL INTENSITY(INCH/HR) = 5.16

TOTAL STREAM AREA(ACRES) = 2.16

PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.93

FLOW PROCESS FROM NODE 115.00 TO NODE 116.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA) :

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00

UPSTREAM ELEVATION(FEET) = 135.00

DOWNTSTREAM ELEVATION(FEET) = 125.00

ELEVATION DIFFERENCE(FEET) = 10.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.267

WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.922

SUBAREA RUNOFF(CFS) = 0.39

TOTAL AREA(ACRES) = 0.19 TOTAL RUNOFF(CFS) = 0.39

FLOW PROCESS FROM NODE 116.00 TO NODE 117.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 111.70 DOWNTSTREAM(FEET) = 103.00

FLOW LENGTH(FEET) = 420.00 MANNING'S N = 0.011

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000

DEPTH OF FLOW IN 12.0 INCH PIPE IS 2.1 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 4.15

ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 0.39

PIPE TRAVEL TIME(MIN.) = 1.69 Tc(MIN.) = 7.95

LONGEST FLOWPATH FROM NODE 115.00 TO NODE 117.00 = 520.00 FEET.

FLOW PROCESS FROM NODE 117.00 TO NODE 117.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.078

*USER SPECIFIED(SUBAREA) :

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) = 0.47 SUBAREA RUNOFF(CFS) = 0.84
TOTAL AREA(ACRES) = 0.7 TOTAL RUNOFF(CFS) = 1.17
TC(MIN.) = 7.95

FLOW PROCESS FROM NODE 117.00 TO NODE 122.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 7.95
RAINFALL INTENSITY(INCH/HR) = 5.08
TOTAL STREAM AREA(ACRES) = 0.66
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.17

FLOW PROCESS FROM NODE 120.00 TO NODE 121.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA) :
USER-SPECIFIED RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 160.00
DOWNSTREAM ELEVATION(FEET) = 150.00
ELEVATION DIFFERENCE(FEET) = 10.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.267
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.922
SUBAREA RUNOFF(CFS) = 0.29
TOTAL AREA(ACRES) = 0.14 TOTAL RUNOFF(CFS) = 0.29

FLOW PROCESS FROM NODE 121.00 TO NODE 122.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 150.00 DOWNSTREAM(FEET) = 75.50
FLOW LENGTH(FEET) = 850.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 1.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.63
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.29
PIPE TRAVEL TIME(MIN.) = 2.52 Tc(MIN.) = 8.78
LONGEST FLOWPATH FROM NODE 120.00 TO NODE 122.00 = 950.00 FEET.

FLOW PROCESS FROM NODE 121.00 TO NODE 122.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.763

*USER SPECIFIED(SUBAREA) :

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) = 1.18 SUBAREA RUNOFF(CFS) = 1.97
 TOTAL AREA(ACRES) = 1.3 TOTAL RUNOFF(CFS) = 2.20
 TC(MIN.) = 8.78

FLOW PROCESS FROM NODE 122.00 TO NODE 122.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.78
 RAINFALL INTENSITY(INCH/HR) = 4.76
 TOTAL STREAM AREA(ACRES) = 1.32
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.20

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	3.93	7.77	5.156	2.16
2	1.17	7.95	5.078	0.66
3	2.20	8.78	4.763	1.32

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	7.02	7.77	5.156
2	7.03	7.95	5.078
3	6.93	8.78	4.763

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 7.03 Tc(MIN.) = 7.95

TOTAL AREA(ACRES) = 4.1

LONGEST FLOWPATH FROM NODE 120.00 TO NODE 122.00 = 950.00 FEET.

FLOW PROCESS FROM NODE 122.00 TO NODE 103.00 IS CODE = 11

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

=====

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	7.03	7.95	5.078	4.14

LONGEST FLOWPATH FROM NODE 120.00 TO NODE 103.00 = 950.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	13.87	9.31	4.587	6.27

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 103.00 = 1130.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	18.89	7.95	5.078
2	20.23	9.31	4.587

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 20.23 Tc (MIN.) = 9.31
 TOTAL AREA (ACRES) = 10.4

FLOW PROCESS FROM NODE 103.00 TO NODE 103.00 IS CODE = 12

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

FLOW PROCESS FROM NODE 103.00 TO NODE 132.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM (FEET) = 67.00 DOWNSTREAM (FEET) = 38.50

FLOW LENGTH (FEET) = 495.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.7 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 15.18

ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW (CFS) = 20.23

PIPE TRAVEL TIME (MIN.) = 0.54 Tc (MIN.) = 9.85

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 132.00 = 1625.00 FEET.

FLOW PROCESS FROM NODE 132.00 TO NODE 132.00 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.) = 9.85

RAINFALL INTENSITY (INCH/HR) = 4.42

TOTAL STREAM AREA (ACRES) = 10.40

PEAK FLOW RATE (CFS) AT CONFLUENCE = 20.23

FLOW PROCESS FROM NODE 130.00 TO NODE 131.00 IS CODE = 21

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

=====

*USER SPECIFIED (SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH (FEET) = 100.00

UPSTREAM ELEVATION (FEET) = 66.00

DOWNTREAM ELEVATION (FEET) = 56.00

ELEVATION DIFFERENCE (FEET) = 10.00

SUBAREA OVERLAND TIME OF FLOW (MIN.) = 6.267

WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.922

SUBAREA RUNOFF (CFS) = 0.29

TOTAL AREA (ACRES) = 0.14 TOTAL RUNOFF (CFS) = 0.29

```
*****
FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION #  2 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) =  56.00 DOWNSTREAM ELEVATION(FEET) =  41.50
STREET LENGTH(FEET) = 705.00 CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 8.46
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.35
HALFSTREET FLOOD WIDTH(FEET) = 10.98
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.20
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.11
STREET FLOW TRAVEL TIME(MIN.) = 3.67 Tc(MIN.) = 9.94
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.397
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .8700
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.854
SUBAREA AREA(ACRES) = 4.41 SUBAREA RUNOFF(CFS) = 16.87
TOTAL AREA(ACRES) = 4.5 PEAK FLOW RATE(CFS) = 17.09

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.42 HALFSTREET FLOOD WIDTH(FEET) = 14.65
FLOW VELOCITY(FEET/SEC.) = 3.77 DEPTH*VELOCITY(FT*FT/SEC.) = 1.58
LONGEST FLOWPATH FROM NODE 130.00 TO NODE 132.00 = 805.00 FEET.

*****
FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.94
RAINFALL INTENSITY(INCH/HR) = 4.40
TOTAL STREAM AREA(ACRES) = 4.55
PEAK FLOW RATE(CFS) AT CONFLUENCE = 17.09

** CONFLUENCE DATA **
STREAM      RUNOFF        Tc        INTENSITY        AREA
NUMBER      (CFS)       (MIN.)     (INCH/HOUR)     (ACRE)
1          20.23        9.85      4.423         10.40
2          17.09        9.94      4.397         4.55

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	37.16	9.85	4.423
2	37.20	9.94	4.397

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 37.20 Tc(MIN.) = 9.94

TOTAL AREA(ACRES) = 15.0

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 132.00 = 1625.00 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 15.0 TC(MIN.) = 9.94

PEAK FLOW RATE(CFS) = 37.20

=====

=====

END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003, 1985, 1981 HYDROLOGY MANUAL

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Analysis prepared by:

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92122

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

* THE HOME DEPOT - MISSION VALLEY - PRE-DEVELOPMENT STUDY *
* SERIES 2 *
* SAN DIEGO, CALIFORNIA *

FILE NAME: SR200EX.DAT
TIME/DATE OF STUDY: 09:33 04/10/2020

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 2.600

SPECIFIED MINIMUM PIPE SIZE(INCH) = 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

NO.	HALF-CROWN TO WIDTH	CROSSFALL	STREET-CROSSFALL: IN- / OUT-/PARK-	CURB SIDE / SIDE/ WAY	GUTTER-GEOMETRIES: HEIGHT (FT)	WIDTH (FT)	LIP (FT)	HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150
2	15.0	10.0	0.020/0.020/0.020	0.020/0.020/0.020	0.50	1.50	0.0313	0.125	0.0160

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 200.00 TO NODE 201.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA) :

USER-SPECIFIED RUNOFF COEFFICIENT = .8500
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 65.00
UPSTREAM ELEVATION(FEET) = 364.50

DOWNSTREAM ELEVATION(FEET) = 363.85
ELEVATION DIFFERENCE(FEET) = 0.65
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.628
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 65.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.850
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 1.34
TOTAL AREA(ACRES) = 0.23 TOTAL RUNOFF(CFS) = 1.34

FLOW PROCESS FROM NODE 201.00 TO NODE 202.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<

UPSTREAM ELEVATION(FEET) = 363.85 DOWNSTREAM ELEVATION(FEET) = 347.00
STREET LENGTH(FEET) = 700.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.74
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.31
HALFSTREET FLOOD WIDTH(FEET) = 9.02
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.08
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.94
STREET FLOW TRAVEL TIME(MIN.) = 3.79 Tc(MIN.) = 7.42
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.311
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .8700
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.868
SUBAREA AREA(ACRES) = 1.88 SUBAREA RUNOFF(CFS) = 8.69
TOTAL AREA(ACRES) = 2.1 PEAK FLOW RATE(CFS) = 9.72

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.35 HALFSTREET FLOOD WIDTH(FEET) = 11.29
FLOW VELOCITY(FEET/SEC.) = 3.49 DEPTH*VELOCITY(FT*FT/SEC.) = 1.23
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 202.00 = 765.00 FEET.

FLOW PROCESS FROM NODE 202.00 TO NODE 202.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 7.42
RAINFALL INTENSITY(INCH/HR) = 5.31

TOTAL STREAM AREA(ACRES) = 2.11
PEAK FLOW RATE(CFS) AT CONFLUENCE = 9.72

FLOW PROCESS FROM NODE 205.00 TO NODE 206.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA) :

USER-SPECIFIED RUNOFF COEFFICIENT = .7100
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 65.00
UPSTREAM ELEVATION(FEET) = 370.00
DOWNSTREAM ELEVATION(FEET) = 369.35
ELEVATION DIFFERENCE(FEET) = 0.65
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.660
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 65.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.324
SUBAREA RUNOFF(CFS) = 0.67
TOTAL AREA(ACRES) = 0.15 TOTAL RUNOFF(CFS) = 0.67

FLOW PROCESS FROM NODE 206.00 TO NODE 202.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 2 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 369.35 DOWNSTREAM ELEVATION(FEET) = 347.00
STREET LENGTH(FEET) = 1300.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00

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) = 0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 8.94

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.36
HALFSTREET FLOOD WIDTH(FEET) = 11.68
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.02
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.08
STREET FLOW TRAVEL TIME(MIN.) = 7.19 Tc(MIN.) = 12.85
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.727

*USER SPECIFIED(SUBAREA) :

USER-SPECIFIED RUNOFF COEFFICIENT = .7900
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.788
SUBAREA AREA(ACRES) = 5.44 SUBAREA RUNOFF(CFS) = 16.02
TOTAL AREA(ACRES) = 5.6 PEAK FLOW RATE(CFS) = 16.42

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.43 HALFSTREET FLOOD WIDTH(FEET) = 14.96

FLOW VELOCITY(FEET/SEC.) = 3.48 DEPTH*VELOCITY(FT*FT/SEC.) = 1.48
LONGEST FLOWPATH FROM NODE 205.00 TO NODE 202.00 = 1365.00 FEET.

FLOW PROCESS FROM NODE 202.00 TO NODE 202.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 12.85
RAINFALL INTENSITY(INCH/HR) = 3.73
TOTAL STREAM AREA(ACRES) = 5.59
PEAK FLOW RATE(CFS) AT CONFLUENCE = 16.42

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	9.72	7.42	5.311	2.11
2	16.42	12.85	3.727	5.59

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	19.21	7.42	5.311
2	23.24	12.85	3.727

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 23.24 Tc(MIN.) = 12.85
TOTAL AREA(ACRES) = 7.7
LONGEST FLOWPATH FROM NODE 205.00 TO NODE 202.00 = 1365.00 FEET.

FLOW PROCESS FROM NODE 202.00 TO NODE 212.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 344.00 DOWNSTREAM(FEET) = 340.00
FLOW LENGTH(FEET) = 155.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 16.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.44
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 23.24
PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 13.07
LONGEST FLOWPATH FROM NODE 205.00 TO NODE 212.00 = 1520.00 FEET.

FLOW PROCESS FROM NODE 212.00 TO NODE 212.00 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.) = 13.07
RAINFALL INTENSITY(INCH/HR) = 3.69

TOTAL STREAM AREA(ACRES) = 7.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 23.24

FLOW PROCESS FROM NODE 210.00 TO NODE 211.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA) :

USER-SPECIFIED RUNOFF COEFFICIENT = .4300
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 65.00
UPSTREAM ELEVATION(FEET) = 360.00
DOWNSTREAM ELEVATION(FEET) = 359.35
ELEVATION DIFFERENCE(FEET) = 0.65
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 9.723
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 65.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.461
SUBAREA RUNOFF(CFS) = 0.25
TOTAL AREA(ACRES) = 0.13 TOTAL RUNOFF(CFS) = 0.25

FLOW PROCESS FROM NODE 211.00 TO NODE 212.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 2 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 359.35 DOWNSTREAM ELEVATION(FEET) = 343.00
STREET LENGTH(FEET) = 545.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00

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) = 0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.28

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.23
HALFSTREET FLOOD WIDTH(FEET) = 5.43
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.76
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.65
STREET FLOW TRAVEL TIME(MIN.) = 3.29 Tc(MIN.) = 13.01
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.697

*USER SPECIFIED(SUBAREA) :

USER-SPECIFIED RUNOFF COEFFICIENT = .4300
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.430
SUBAREA AREA(ACRES) = 2.54 SUBAREA RUNOFF(CFS) = 4.04
TOTAL AREA(ACRES) = 2.7 PEAK FLOW RATE(CFS) = 4.24

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.28 HALFSTREET FLOOD WIDTH(FEET) = 7.46

FLOW VELOCITY(FEET/SEC.) = 3.14 DEPTH*VELOCITY(FT*FT/SEC.) = 0.87
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 212.00 = 610.00 FEET.

FLOW PROCESS FROM NODE 212.00 TO NODE 212.00 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.) = 13.01
RAINFALL INTENSITY(INCH/HR) = 3.70
TOTAL STREAM AREA(ACRES) = 2.67
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.24

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	23.24	13.07	3.686	7.70
2	4.24	13.01	3.697	2.67

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	27.41	13.01	3.697
2	27.47	13.07	3.686

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 27.47 Tc(MIN.) = 13.07
TOTAL AREA(ACRES) = 10.4
LONGEST FLOWPATH FROM NODE 205.00 TO NODE 212.00 = 1520.00 FEET.

FLOW PROCESS FROM NODE 212.00 TO NODE 213.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 340.00 DOWNSTREAM(FEET) = 299.00
FLOW LENGTH(FEET) = 190.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 11.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 26.42
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 27.47
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 13.19
LONGEST FLOWPATH FROM NODE 205.00 TO NODE 213.00 = 1710.00 FEET.

FLOW PROCESS FROM NODE 213.00 TO NODE 213.00 IS CODE = 81

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.664
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.6925
SUBAREA AREA(ACRES) = 0.59 SUBAREA RUNOFF(CFS) = 0.76
TOTAL AREA(ACRES) = 11.0 TOTAL RUNOFF(CFS) = 27.81
TC(MIN.) = 13.19

FLOW PROCESS FROM NODE 213.00 TO NODE 213.00 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.) = 13.19
RAINFALL INTENSITY(INCH/HR) = 3.66
TOTAL STREAM AREA(ACRES) = 10.96
PEAK FLOW RATE(CFS) AT CONFLUENCE = 27.81

FLOW PROCESS FROM NODE 215.00 TO NODE 216.00 IS CODE = 21

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

*USER SPECIFIED(SUBAREA) :
USER-SPECIFIED RUNOFF COEFFICIENT = .7100
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 80.00
UPSTREAM ELEVATION(FEET) = 364.50
DOWNSTREAM ELEVATION(FEET) = 363.70
ELEVATION DIFFERENCE(FEET) = 0.80
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.660
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 65.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.324
SUBAREA RUNOFF(CFS) = 0.85
TOTAL AREA(ACRES) = 0.19 TOTAL RUNOFF(CFS) = 0.85

FLOW PROCESS FROM NODE 216.00 TO NODE 217.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 2 USED)<<<<

UPSTREAM ELEVATION(FEET) = 363.70 DOWNSTREAM ELEVATION(FEET) = 346.00
STREET LENGTH(FEET) = 760.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 6.40
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.32

HALFSTREET FLOOD WIDTH(FEET) = 9.49
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.14
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.99
 STREET FLOW TRAVEL TIME(MIN.) = 4.04 Tc(MIN.) = 9.70
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.469
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) = 0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.757
 SUBAREA AREA(ACRES) = 3.22 SUBAREA RUNOFF(CFS) = 10.94
 TOTAL AREA(ACRES) = 3.4 PEAK FLOW RATE(CFS) = 11.54

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 12.23
 FLOW VELOCITY(FEET/SEC.) = 3.58 DEPTH*VELOCITY(FT*FT/SEC.) = 1.33
 LONGEST FLOWPATH FROM NODE 215.00 TO NODE 217.00 = 840.00 FEET.

 FLOW PROCESS FROM NODE 217.00 TO NODE 213.00 IS CODE = 31

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

=====
 ELEVATION DATA: UPSTREAM(FEET) = 346.00 DOWNSTREAM(FEET) = 299.00
 FLOW LENGTH(FEET) = 115.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 27.96
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 11.54
 PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 9.76
 LONGEST FLOWPATH FROM NODE 215.00 TO NODE 213.00 = 955.00 FEET.

 FLOW PROCESS FROM NODE 213.00 TO NODE 213.00 IS CODE = 1

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

=====
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.76
 RAINFALL INTENSITY(INCH/HR) = 4.45
 TOTAL STREAM AREA(ACRES) = 3.41
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 11.54

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	27.81	13.19	3.664	10.96
2	11.54	9.76	4.449	3.41

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	34.44	9.76	4.449
2	37.31	13.19	3.664

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 37.31 Tc(MIN.) = 13.19

TOTAL AREA(ACRES) = 14.4

LONGEST FLOWPATH FROM NODE 205.00 TO NODE 213.00 = 1710.00 FEET.

FLOW PROCESS FROM NODE 213.00 TO NODE 218.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 299.00 DOWNSTREAM(FEET) = 189.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 420.00 CHANNEL SLOPE = 0.2619

CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 4.00

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.580

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .4000

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 41.79

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 14.58

AVERAGE FLOW DEPTH(FEET) = 0.56 TRAVEL TIME(MIN.) = 0.48

Tc(MIN.) = 13.67

SUBAREA AREA(ACRES) = 6.25 SUBAREA RUNOFF(CFS) = 8.95

AREA-AVERAGE RUNOFF COEFFICIENT = 0.615

TOTAL AREA(ACRES) = 20.6 PEAK FLOW RATE(CFS) = 45.37

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.58 FLOW VELOCITY(FEET/SEC.) = 15.01

LONGEST FLOWPATH FROM NODE 205.00 TO NODE 218.00 = 2130.00 FEET.

FLOW PROCESS FROM NODE 218.00 TO NODE 219.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 189.00 DOWNSTREAM(FEET) = 112.50

CHANNEL LENGTH THRU SUBAREA(FEET) = 705.00 CHANNEL SLOPE = 0.1085

CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 4.00

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.418

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3800

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 51.33

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 11.49

AVERAGE FLOW DEPTH(FEET) = 0.80 TRAVEL TIME(MIN.) = 1.02

Tc(MIN.) = 14.69

SUBAREA AREA(ACRES) = 9.16 SUBAREA RUNOFF(CFS) = 11.90

AREA-AVERAGE RUNOFF COEFFICIENT = 0.542

TOTAL AREA(ACRES) = 29.8 PEAK FLOW RATE(CFS) = 55.21

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.83 FLOW VELOCITY(FEET/SEC.) = 11.77

LONGEST FLOWPATH FROM NODE 205.00 TO NODE 219.00 = 2835.00 FEET.

FLOW PROCESS FROM NODE 219.00 TO NODE 219.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 14.69
RAINFALL INTENSITY(INCH/HR) = 3.42
TOTAL STREAM AREA(ACRES) = 29.78
PEAK FLOW RATE(CFS) AT CONFLUENCE = 55.21

FLOW PROCESS FROM NODE 225.00 TO NODE 226.00 IS CODE = 21

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

*USER SPECIFIED(SUBAREA) :
USER-SPECIFIED RUNOFF COEFFICIENT = .7100
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 65.00
UPSTREAM ELEVATION(FEET) = 358.00
DOWNSTREAM ELEVATION(FEET) = 357.40
ELEVATION DIFFERENCE(FEET) = 0.60
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.709
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 62.69
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.289
SUBAREA RUNOFF(CFS) = 0.49
TOTAL AREA(ACRES) = 0.11 TOTAL RUNOFF(CFS) = 0.49

FLOW PROCESS FROM NODE 226.00 TO NODE 227.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<

UPSTREAM ELEVATION(FEET) = 357.35 DOWNSTREAM ELEVATION(FEET) = 346.00
STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.33
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.23
HALFSTREET FLOOD WIDTH(FEET) = 5.35
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.89
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.67
STREET FLOW TRAVEL TIME(MIN.) = 2.02 Tc(MIN.) = 7.73
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.172
*USER SPECIFIED(SUBAREA) :
USER-SPECIFIED RUNOFF COEFFICIENT = .7400
S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.737
SUBAREA AREA(ACRES) = 0.96 SUBAREA RUNOFF(CFS) = 3.67
TOTAL AREA(ACRES) = 1.1 PEAK FLOW RATE(CFS) = 4.08

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.27 HALFSTREET FLOOD WIDTH(FEET) = 7.15
FLOW VELOCITY(FEET/SEC.) = 3.24 DEPTH*VELOCITY(FT*FT/SEC.) = 0.87
LONGEST FLOWPATH FROM NODE 225.00 TO NODE 227.00 = 415.00 FEET.

FLOW PROCESS FROM NODE 227.00 TO NODE 219.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 346.00 DOWNSTREAM(FEET) = 112.50
FLOW LENGTH(FEET) = 575.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.10
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.08
PIPE TRAVEL TIME(MIN.) = 0.45 Tc(MIN.) = 8.18
LONGEST FLOWPATH FROM NODE 225.00 TO NODE 219.00 = 990.00 FEET.

FLOW PROCESS FROM NODE 219.00 TO NODE 219.00 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.) = 8.18
RAINFALL INTENSITY(INCH/HR) = 4.98
TOTAL STREAM AREA(ACRES) = 1.07
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.08

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	55.21	14.69	3.418	29.78
2	4.08	8.18	4.985	1.07

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	41.93	8.18	4.985
2	58.00	14.69	3.418

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 58.00 Tc(MIN.) = 14.69
TOTAL AREA(ACRES) = 30.8
LONGEST FLOWPATH FROM NODE 205.00 TO NODE 219.00 = 2835.00 FEET.

FLOW PROCESS FROM NODE 219.00 TO NODE 232.00 IS CODE = 31

```
-----  
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<  
=====  
ELEVATION DATA: UPSTREAM(FEET) = 112.50 DOWNSTREAM(FEET) = 43.60  
FLOW LENGTH(FEET) = 650.00 MANNING'S N = 0.013  
DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.7 INCHES  
PIPE-FLOW VELOCITY(FEET/SEC.) = 24.87  
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1  
PIPE-FLOW(CFS) = 58.00  
PIPE TRAVEL TIME(MIN.) = 0.44 Tc(MIN.) = 15.13  
LONGEST FLOWPATH FROM NODE 205.00 TO NODE 232.00 = 3485.00 FEET.  
  
*****  
FLOW PROCESS FROM NODE 232.00 TO NODE 232.00 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.) = 15.13  
RAINFALL INTENSITY(INCH/HR) = 3.35  
TOTAL STREAM AREA(ACRES) = 30.85  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 58.00  
  
*****  
FLOW PROCESS FROM NODE 230.00 TO NODE 231.00 IS CODE = 21  
-----  
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<  
=====  
*USER SPECIFIED(SUBAREA) :  
USER-SPECIFIED RUNOFF COEFFICIENT = .4300  
S.C.S. CURVE NUMBER (AMC II) = 0  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00  
UPSTREAM ELEVATION(FEET) = 67.00  
DOWNSTREAM ELEVATION(FEET) = 57.00  
ELEVATION DIFFERENCE(FEET) = 10.00  
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.598  
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.369  
SUBAREA RUNOFF(CFS) = 0.49  
TOTAL AREA(ACRES) = 0.18 TOTAL RUNOFF(CFS) = 0.49  
  
*****  
FLOW PROCESS FROM NODE 231.00 TO NODE 232.00 IS CODE = 62  
-----  
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<  
>>>>(STREET TABLE SECTION # 2 USED)<<<<  
=====  
UPSTREAM ELEVATION(FEET) = 60.00 DOWNSTREAM ELEVATION(FEET) = 46.00  
STREET LENGTH(FEET) = 430.00 CURB HEIGHT(INCHES) = 6.0  
STREET HALFWIDTH(FEET) = 15.00  
  
DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00  
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) = 0.0160
```

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 7.19
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.31
HALFSTREET FLOOD WIDTH(FEET) = 9.34
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.63
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.14
STREET FLOW TRAVEL TIME(MIN.) = 1.97 Tc(MIN.) = 7.57
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.242
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .8600
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.836
SUBAREA AREA(ACRES) = 3.02 SUBAREA RUNOFF(CFS) = 13.61
TOTAL AREA(ACRES) = 3.2 PEAK FLOW RATE(CFS) = 14.02

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 12.30
FLOW VELOCITY(FEET/SEC.) = 4.30 DEPTH*VELOCITY(FT*FT/SEC.) = 1.60
LONGEST FLOWPATH FROM NODE 230.00 TO NODE 232.00 = 530.00 FEET.

FLOW PROCESS FROM NODE 232.00 TO NODE 232.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 7.57
RAINFALL INTENSITY(INCH/HR) = 5.24
TOTAL STREAM AREA(ACRES) = 3.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 14.02

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	58.00	15.13	3.354	30.85
2	14.02	7.57	5.242	3.20

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	51.13	7.57	5.242
2	66.97	15.13	3.354

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 66.97 Tc(MIN.) = 15.13
TOTAL AREA(ACRES) = 34.0
LONGEST FLOWPATH FROM NODE 205.00 TO NODE 232.00 = 3485.00 FEET.

FLOW PROCESS FROM NODE 232.00 TO NODE 237.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 43.60 DOWNSTREAM(FEET) = 43.00
FLOW LENGTH(FEET) = 100.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 42.0 INCH PIPE IS 31.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.70
ESTIMATED PIPE DIAMETER(INCH) = 42.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 66.97
PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 15.32
LONGEST FLOWPATH FROM NODE 205.00 TO NODE 237.00 = 3585.00 FEET.

FLOW PROCESS FROM NODE 237.00 TO NODE 237.00 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.) = 15.32
RAINFALL INTENSITY(INCH/HR) = 3.33
TOTAL STREAM AREA(ACRES) = 34.05
PEAK FLOW RATE(CFS) AT CONFLUENCE = 66.97

FLOW PROCESS FROM NODE 235.00 TO NODE 236.00 IS CODE = 21

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

*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .8200
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 75.00
UPSTREAM ELEVATION(FEET) = 55.00
DOWNSTREAM ELEVATION(FEET) = 54.25
ELEVATION DIFFERENCE(FEET) = 0.75
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.904
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 60.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.850
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 2.02
TOTAL AREA(ACRES) = 0.36 TOTAL RUNOFF(CFS) = 2.02

FLOW PROCESS FROM NODE 236.00 TO NODE 237.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<

UPSTREAM ELEVATION(FEET) = 54.25 DOWNSTREAM ELEVATION(FEET) = 45.80
STREET LENGTH(FEET) = 248.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.44
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.29
HALFSTREET FLOOD WIDTH(FEET) = 8.09
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.52
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.01
STREET FLOW TRAVEL TIME(MIN.) = 1.17 Tc(MIN.) = 5.08
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.783
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .8700
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.858
SUBAREA AREA(ACRES) = 1.16 SUBAREA RUNOFF(CFS) = 6.85
TOTAL AREA(ACRES) = 1.5 PEAK FLOW RATE(CFS) = 8.85

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) = 10.12
FLOW VELOCITY(FEET/SEC.) = 3.87 DEPTH*VELOCITY(FT*FT/SEC.) = 1.27
LONGEST FLOWPATH FROM NODE 235.00 TO NODE 237.00 = 323.00 FEET.

FLOW PROCESS FROM NODE 237.00 TO NODE 237.00 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.) = 5.08
RAINFALL INTENSITY(INCH/HR) = 6.78
TOTAL STREAM AREA(ACRES) = 1.52
PEAK FLOW RATE(CFS) AT CONFLUENCE = 8.85

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	66.97	15.32	3.327	34.05
2	8.85	5.08	6.783	1.52

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	41.70	5.08	6.783
2	71.31	15.32	3.327

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 71.31 Tc(MIN.) = 15.32
TOTAL AREA(ACRES) = 35.6
LONGEST FLOWPATH FROM NODE 205.00 TO NODE 237.00 = 3585.00 FEET.

=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 35.6 TC(MIN.) = 15.32
PEAK FLOW RATE(CFS) = 71.31

=====

END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003, 1985, 1981 HYDROLOGY MANUAL

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Ver. 23.0 Release Date: 07/01/2016 License ID 1355

Analysis prepared by:

Fuscoe Engineering
6390 Greenwich Dr Ste 170
San Diego, CA
92122

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

* THE HOME DEPOT - MISSION VALLEY - PRE-DEVELOPMENT STUDY *
* SERIES 3 *
* SAN DIEGO, CALIFORNIA *

FILE NAME: SR300EX.DAT
TIME/DATE OF STUDY: 09:41 04/10/2020

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 2.600

SPECIFIED MINIMUM PIPE SIZE(INCH) = 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

NO.	HALF-CROWN TO WIDTH	CROSSFALL	STREET-CROSSFALL: IN- / OUT-/PARK-	CURB SIDE / SIDE/ WAY	GUTTER-GEOMETRIES: HEIGHT (FT)	WIDTH (FT)	LIP (FT)	HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150
2	15.0	10.0	0.020/0.020/0.020	0.020/0.020/0.020	0.50	1.50	0.0313	0.125	0.0160

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 1.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth) * (Velocity) Constraint = 1.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 300.00 TO NODE 301.00 IS CODE = 21

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

*USER SPECIFIED(SUBAREA) :

USER-SPECIFIED RUNOFF COEFFICIENT = .3800
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 70.00

DOWNSTREAM ELEVATION (FEET) = 60.00
ELEVATION DIFFERENCE (FEET) = 10.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.016
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.080
SUBAREA RUNOFF(CFS) = 0.58
TOTAL AREA(ACRES) = 0.25 TOTAL RUNOFF(CFS) = 0.58

FLOW PROCESS FROM NODE 301.00 TO NODE 302.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<

=====
UPSTREAM ELEVATION(FEET) = 60.00 DOWNSTREAM ELEVATION(FEET) = 49.00
STREET LENGTH(FEET) = 660.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0150

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.33
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.31
HALFSTREET FLOOD WIDTH(FEET) = 9.41
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.65
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.83
STREET FLOW TRAVEL TIME(MIN.) = 4.14 Tc(MIN.) = 10.16
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.336
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .8200
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.783
SUBAREA AREA(ACRES) = 2.74 SUBAREA RUNOFF(CFS) = 9.74
TOTAL AREA(ACRES) = 3.0 PEAK FLOW RATE(CFS) = 10.15

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 12.38
FLOW VELOCITY(FEET/SEC.) = 3.07 DEPTH*VELOCITY(FT*FT/SEC.) = 1.15
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 760.00 FEET.

=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 3.0 TC(MIN.) = 10.16
PEAK FLOW RATE(CFS) = 10.15

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

**PROPOSED AES CALCULATIONS
50 YEAR STORM EVENT**

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 1355

Analysis prepared by:

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Irvine, California 92606

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

* THD SR

*

* PROPOSED 50 YEAR

*

*

*

FILE NAME: THDPR50.DAT

TIME/DATE OF STUDY: 15:38 05/25/2020

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 50.00

6-HOUR DURATION PRECIPITATION (INCHES) = 2.100

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 0.0313 0.167 0.0150

2 25.0 20.0 0.020/0.020/0.020 0.50 1.50 0.0313 0.125 0.0160

3 15.0 10.0 0.020/0.020/0.020 0.50 1.50 0.0313 0.125 0.0160

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 = 0.1 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21

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

===== *USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .6800

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 77.00

UPSTREAM ELEVATION(FEET) = 360.00

DOWNSTREAM ELEVATION(FEET) = 359.35

ELEVATION DIFFERENCE(FEET) = 0.65

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.213

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 60.32

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.810

SUBAREA RUNOFF(CFS) = 0.52

TOTAL AREA(ACRES) = 0.16 TOTAL RUNOFF(CFS) = 0.52

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 62

----->>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 3 USED)<<<<

=====UPSTREAM ELEVATION(FEET) = 359.35 DOWNSTREAM ELEVATION(FEET) = 354.00

STREET LENGTH(FEET) = 308.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.020

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0160

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0160

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.39

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.31

HALFSTREET FLOOD WIDTH(FEET) = 8.95

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.61

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.80

STREET FLOW TRAVEL TIME(MIN.) = 1.97 Tc(MIN.) = 8.18

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.027

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .7400

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.733

SUBAREA AREA(ACRES) = 1.25 SUBAREA RUNOFF(CFS) = 3.72

TOTAL AREA(ACRES) = 1.4 PEAK FLOW RATE(CFS) = 4.16

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.35 HALFSTREET FLOOD WIDTH(FEET) = 11.37

FLOW VELOCITY(FEET/SEC.) = 2.95 DEPTH*VELOCITY(FT*FT/SEC.) = 1.04

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 385.00 FEET.

FLOW PROCESS FROM NODE 102.00 TO NODE 103.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 354.00 DOWNSTREAM(FEET) = 70.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 801.00 CHANNEL SLOPE = 0.3546

CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 4.00

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.627

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .4100

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 7.87

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.26

AVERAGE FLOW DEPTH(FEET) = 0.19 TRAVEL TIME(MIN.) = 1.44

Tc(MIN.) = 9.62

SUBAREA AREA(ACRES) = 4.92 SUBAREA RUNOFF(CFS) = 7.32

AREA-AVERAGE RUNOFF COEFFICIENT = 0.482

TOTAL AREA(ACRES) = 6.3 PEAK FLOW RATE(CFS) = 11.07

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.24 FLOW VELOCITY(FEET/SEC.) = 10.32

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 103.00 = 1186.00 FEET.

FLOW PROCESS FROM NODE 103.00 TO NODE 103.00 IS CODE = 10

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

FLOW PROCESS FROM NODE 110.00 TO NODE 111.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 121.00

UPSTREAM ELEVATION(FEET) = 345.00

DOWNSHIFT ELEVATION(FEET) = 335.00

ELEVATION DIFFERENCE(FEET) = 10.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.678

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 100.00

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.591

SUBAREA RUNOFF(CFS) = 0.63

TOTAL AREA(ACRES) = 0.39 TOTAL RUNOFF(CFS) = 0.63

FLOW PROCESS FROM NODE 111.00 TO NODE 112.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 335.00 DOWNSHIFT(FEET) = 125.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 436.00 CHANNEL SLOPE = 0.4817

CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 4.00

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.109

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.91

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.80

AVERAGE FLOW DEPTH(FEET) = 0.08 TRAVEL TIME(MIN.) = 1.25

Tc(MIN.) = 7.93

SUBAREA AREA(ACRES) = 1.77 SUBAREA RUNOFF(CFS) = 2.55

AREA-AVERAGE RUNOFF COEFFICIENT = 0.350

TOTAL AREA(ACRES) = 2.2 PEAK FLOW RATE(CFS) = 3.11

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.10 FLOW VELOCITY(FEET/SEC.) = 7.24

LONGEST FLOWPATH FROM NODE 110.00 TO NODE 112.00 = 557.00 FEET.

FLOW PROCESS FROM NODE 112.00 TO NODE 117.00 IS CODE = 1

=====

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

=====

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 7.93

RAINFALL INTENSITY(INCH/HR) = 4.11

TOTAL STREAM AREA(ACRES) = 2.16

PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.11

FLOW PROCESS FROM NODE 115.00 TO NODE 116.00 IS CODE = 21

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

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 205.00

UPSTREAM ELEVATION(FEET) = 117.00

DOWNSTREAM ELEVATION(FEET) = 113.50

ELEVATION DIFFERENCE(FEET) = 3.50

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 10.141

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 80.61

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.506

SUBAREA RUNOFF(CFS) = 0.20

TOTAL AREA(ACRES) = 0.16 TOTAL RUNOFF(CFS) = 0.20

FLOW PROCESS FROM NODE 116.00 TO NODE 117.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 113.50 DOWNSTREAM(FEET) = 105.50

CHANNEL LENGTH THRU SUBAREA(FEET) = 588.00 CHANNEL SLOPE = 0.0136

CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 4.00

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.635

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.46

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.73

AVERAGE FLOW DEPTH(FEET) = 0.06 TRAVEL TIME(MIN.) = 5.65

Tc(MIN.) = 15.79

SUBAREA AREA(ACRES) = 0.56 SUBAREA RUNOFF(CFS) = 0.52

AREA-AVERAGE RUNOFF COEFFICIENT = 0.350

TOTAL AREA(ACRES) = 0.7 PEAK FLOW RATE(CFS) = 0.66

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.08 FLOW VELOCITY(FEET/SEC.) = 2.02

LONGEST FLOWPATH FROM NODE 115.00 TO NODE 117.00 = 793.00 FEET.

FLOW PROCESS FROM NODE 112.00 TO NODE 117.00 IS CODE = 1

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

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

=====TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 15.79

RAINFALL INTENSITY(INCH/HR) = 2.64

TOTAL STREAM AREA(ACRES) = 0.72

PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.66

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	3.11	7.93	4.109	2.16
2	0.66	15.79	2.635	0.72

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	3.44	7.93	4.109
2	2.66	15.79	2.635

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 3.44 Tc(MIN.) = 7.93

TOTAL AREA(ACRES) = 2.9

LONGEST FLOWPATH FROM NODE 115.00 TO NODE 117.00 = 793.00 FEET.

FLOW PROCESS FROM NODE 117.00 TO NODE 122.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 7.93

RAINFALL INTENSITY(INCH/HR) = 4.11

TOTAL STREAM AREA(ACRES) = 2.88

PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.44

FLOW PROCESS FROM NODE 120.00 TO NODE 121.00 IS CODE = 21

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

===== *USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 99.00

UPSTREAM ELEVATION(FEET) = 80.50

DOWNSTREAM ELEVATION(FEET) = 80.10

ELEVATION DIFFERENCE(FEET) = 0.40

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 12.027

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 50.00

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.141

SUBAREA RUNOFF(CFS) = 0.12

TOTAL AREA(ACRES) = 0.11 TOTAL RUNOFF(CFS) = 0.12

FLOW PROCESS FROM NODE 121.00 TO NODE 122.00 IS CODE = 51

----->>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 80.10 DOWNSTREAM(FEET) = 73.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 364.00 CHANNEL SLOPE = 0.0195

CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 4.00

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.674

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.31

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.78

AVERAGE FLOW DEPTH(FEET) = 0.04 TRAVEL TIME(MIN.) = 3.41

Tc(MIN.) = 15.43

SUBAREA AREA(ACRES) = 0.41 SUBAREA RUNOFF(CFS) = 0.38

AREA-AVERAGE RUNOFF COEFFICIENT = 0.350

TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 0.49

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.06 FLOW VELOCITY(FEET/SEC.) = 2.03

LONGEST FLOWPATH FROM NODE 120.00 TO NODE 122.00 = 463.00 FEET.

FLOW PROCESS FROM NODE 122.00 TO NODE 122.00 IS CODE = 1

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

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

=====

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 15.43

RAINFALL INTENSITY(INCH/HR) = 2.67

TOTAL STREAM AREA(ACRES) = 0.52

PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.49

** CONFLUENCE DATA **

STREAM	RUNOFF	Tc	INTENSITY	AREA
NUMBER	(CFS)	(MIN.)	(INCH/HOUR)	(ACRE)
1	3.44	7.93	4.109	2.88
2	0.49	15.43	2.674	0.52

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM	RUNOFF	Tc	INTENSITY
NUMBER	(CFS)	(MIN.)	(INCH/HOUR)
1	3.69	7.93	4.109
2	2.73	15.43	2.674

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 3.69 Tc(MIN.) = 7.93

TOTAL AREA(ACRES) = 3.4

LONGEST FLOWPATH FROM NODE 115.00 TO NODE 122.00 = 793.00 FEET.

FLOW PROCESS FROM NODE 122.00 TO NODE 103.00 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 3.69 7.93 4.109 3.40

LONGEST FLOWPATH FROM NODE 115.00 TO NODE 103.00 = 793.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM RUNOFF Tc INTENSITY AREA

NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)

1 11.07 9.62 3.627 6.33

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 103.00 = 1186.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM RUNOFF Tc INTENSITY

NUMBER (CFS) (MIN.) (INCH/HOUR)

1 12.81 7.93 4.109

2 14.32 9.62 3.627

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 14.32 Tc(MIN.) = 9.62

TOTAL AREA(ACRES) = 9.7

FLOW PROCESS FROM NODE 122.00 TO NODE 103.00 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.) = 9.62

RAINFALL INTENSITY(INCH/HR) = 3.63

TOTAL STREAM AREA(ACRES) = 9.73

PEAK FLOW RATE(CFS) AT CONFLUENCE = 14.32

FLOW PROCESS FROM NODE 130.00 TO NODE 131.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 99.00

UPSTREAM ELEVATION(FEET) = 115.00

DOWNSTREAM ELEVATION(FEET) = 85.00

ELEVATION DIFFERENCE(FEET) = 30.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.235

WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10%, IS USED IN Tc CALCULATION!

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.799

SUBAREA RUNOFF(CFS) = 0.22

TOTAL AREA(ACRES) = 0.13 TOTAL RUNOFF(CFS) = 0.22

FLOW PROCESS FROM NODE 131.00 TO NODE 132.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 85.00 DOWNSTREAM(FEET) = 80.50

CHANNEL LENGTH THRU SUBAREA(FEET) = 271.00 CHANNEL SLOPE = 0.0166

CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 4.00

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.877

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.44

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.85

AVERAGE FLOW DEPTH(FEET) = 0.06 TRAVEL TIME(MIN.) = 2.44

Tc(MIN.) = 8.68

SUBAREA AREA(ACRES) = 0.33 SUBAREA RUNOFF(CFS) = 0.45

AREA-AVERAGE RUNOFF COEFFICIENT = 0.350

TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 0.62

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.07 FLOW VELOCITY(FEET/SEC.) = 2.11

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 132.00 = 370.00 FEET.

FLOW PROCESS FROM NODE 132.00 TO NODE 135.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 80.50 DOWNSTREAM(FEET) = 60.00
FLOW LENGTH(FEET) = 60.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 1.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.49
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.62
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 8.76
LONGEST FLOWPATH FROM NODE 130.00 TO NODE 135.00 = 430.00 FEET.

FLOW PROCESS FROM NODE 133.00 TO NODE 135.00 IS CODE = 51

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 90.00 DOWNSTREAM(FEET) = 60.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 332.00 CHANNEL SLOPE = 0.0904
CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 4.00
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.530
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) = 0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.90
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.34
AVERAGE FLOW DEPTH(FEET) = 0.05 TRAVEL TIME(MIN.) = 1.27
Tc(MIN.) = 10.04
SUBAREA AREA(ACRES) = 0.45 SUBAREA RUNOFF(CFS) = 0.56

AREA-AVERAGE RUNOFF COEFFICIENT = 0.350

TOTAL AREA(ACRES) = 0.9 PEAK FLOW RATE(CFS) = 1.12

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.06 FLOW VELOCITY(FEET/SEC.) = 4.69

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 135.00 = 762.00 FEET.

FLOW PROCESS FROM NODE 135.00 TO NODE 136.00 IS CODE = 51

----->>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

===== ELEVATION DATA: UPSTREAM(FEET) = 60.00 DOWNSTREAM(FEET) = 55.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 476.00 CHANNEL SLOPE = 0.0105

CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 4.00

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.962

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.43

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.53

AVERAGE FLOW DEPTH(FEET) = 0.13 TRAVEL TIME(MIN.) = 3.13

Tc(MIN.) = 13.17

SUBAREA AREA(ACRES) = 0.59 SUBAREA RUNOFF(CFS) = 0.61

AREA-AVERAGE RUNOFF COEFFICIENT = 0.350

TOTAL AREA(ACRES) = 1.5 PEAK FLOW RATE(CFS) = 1.56

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.14 FLOW VELOCITY(FEET/SEC.) = 2.59

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 136.00 = 1238.00 FEET.

FLOW PROCESS FROM NODE 136.00 TO NODE 103.00 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.) = 13.17

RAINFALL INTENSITY(INCH/HR) = 2.96

TOTAL STREAM AREA(ACRES) = 1.50

PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.56

** CONFLUENCE DATA **

STREAM RUNOFF Tc INTENSITY AREA

NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)

1 14.32 9.62 3.627 9.73

2 1.56 13.17 2.962 1.50

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	15.46	9.62	3.627
2	13.25	13.17	2.962

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 15.46 Tc(MIN.) = 9.62

TOTAL AREA(ACRES) = 11.2

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 103.00 = 1238.00 FEET.

FLOW PROCESS FROM NODE 103.00 TO NODE 144.00 IS CODE = 31

----->>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 70.50 DOWNSTREAM(FEET) = 41.50

FLOW LENGTH(FEET) = 450.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 15.0 INCH PIPE IS 12.2 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 14.46

ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 15.46

PIPE TRAVEL TIME(MIN.) = 0.52 Tc(MIN.) = 10.14

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 144.00 = 1688.00 FEET.

FLOW PROCESS FROM NODE 103.00 TO NODE 144.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 3

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 10.14

RAINFALL INTENSITY(INCH/HR) = 3.51

TOTAL STREAM AREA(ACRES) = 11.23

PEAK FLOW RATE(CFS) AT CONFLUENCE = 15.46

FLOW PROCESS FROM NODE 137.00 TO NODE 138.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 105.00

UPSTREAM ELEVATION(FEET) = 56.00

DOWNSTREAM ELEVATION(FEET) = 50.50

ELEVATION DIFFERENCE(FEET) = 5.50

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.563

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 90.48

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.533

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 0.65

TOTAL AREA(ACRES) = 0.14 TOTAL RUNOFF(CFS) = 0.65

FLOW PROCESS FROM NODE 138.00 TO NODE 139.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 50.50 DOWNSTREAM(FEET) = 49.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 243.00 CHANNEL SLOPE = 0.0062

CHANNEL BASE(FEET) = 1.50 "Z" FACTOR = 0.500

MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 0.50

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.533

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.00

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.21

AVERAGE FLOW DEPTH(FEET) = 0.37 TRAVEL TIME(MIN.) = 1.26

Tc(MIN.) = 3.82

SUBAREA AREA(ACRES) = 0.58 SUBAREA RUNOFF(CFS) = 2.70

AREA-AVERAGE RUNOFF COEFFICIENT = 0.840

TOTAL AREA(ACRES) = 0.7 PEAK FLOW RATE(CFS) = 3.35

==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL

CAPACITY(NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
ALLOWABLE DEPTH).

AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.50 FLOW VELOCITY(FEET/SEC.) = 3.82

==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

LONGEST FLOWPATH FROM NODE 137.00 TO NODE 139.00 = 348.00 FEET.

FLOW PROCESS FROM NODE 139.00 TO NODE 144.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 49.00 DOWNSTREAM(FEET) = 39.00

FLOW LENGTH(FEET) = 20.00 MANNING'S N = 0.013

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000

DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.0 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 21.45

ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 3.35

PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 3.84

LONGEST FLOWPATH FROM NODE 137.00 TO NODE 144.00 = 368.00 FEET.

FLOW PROCESS FROM NODE 139.00 TO NODE 144.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 3

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 3.84

RAINFALL INTENSITY(INCH/HR) = 5.53

TOTAL STREAM AREA(ACRES) = 0.72

PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.35

FLOW PROCESS FROM NODE 140.00 TO NODE 141.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 112.00

UPSTREAM ELEVATION(FEET) = 54.00

DOWNSTREAM ELEVATION(FEET) = 50.00

ELEVATION DIFFERENCE(FEET) = 4.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.847

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 86.43

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.533

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 2.74

TOTAL AREA(ACRES) = 0.59 TOTAL RUNOFF(CFS) = 2.74

FLOW PROCESS FROM NODE 141.00 TO NODE 142.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 50.00 DOWNSTREAM(FEET) = 45.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 417.00 CHANNEL SLOPE = 0.0120

CHANNEL BASE(FEET) = 3.00 "Z" FACTOR = 1.000

MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 1.00

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.391

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.16

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.95

AVERAGE FLOW DEPTH(FEET) = 0.50 TRAVEL TIME(MIN.) = 2.36

Tc(MIN.) = 5.21

SUBAREA AREA(ACRES) = 1.07 SUBAREA RUNOFF(CFS) = 4.85

AREA-AVERAGE RUNOFF COEFFICIENT = 0.840

TOTAL AREA(ACRES) = 1.7 PEAK FLOW RATE(CFS) = 7.52

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.63 FLOW VELOCITY(FEET/SEC.) = 3.30

LONGEST FLOWPATH FROM NODE 140.00 TO NODE 142.00 = 529.00 FEET.

FLOW PROCESS FROM NODE 142.00 TO NODE 144.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 45.00 DOWNSTREAM(FEET) = 39.00

FLOW LENGTH(FEET) = 170.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 15.0 INCH PIPE IS 8.8 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 9.99

ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 7.52

PIPE TRAVEL TIME(MIN.) = 0.28 Tc(MIN.) = 5.49

LONGEST FLOWPATH FROM NODE 140.00 TO NODE 144.00 = 699.00 FEET.

FLOW PROCESS FROM NODE 142.00 TO NODE 144.00 IS CODE = 1

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

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

=====

TOTAL NUMBER OF STREAMS = 3

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:

TIME OF CONCENTRATION(MIN.) = 5.49

RAINFALL INTENSITY(INCH/HR) = 5.21

TOTAL STREAM AREA(ACRES) = 1.66

PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.52

** CONFLUENCE DATA **

STREAM RUNOFF Tc INTENSITY AREA

NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)

1 15.46 10.14 3.506 11.23

2 3.35 3.84 5.533 0.72

3 7.52 5.49 5.210 1.66

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM	RUNOFF	Tc	INTENSITY
NUMBER	(CFS)	(MIN.)	(INCH/HOUR)
1	18.40	3.84	5.533
2	21.07	5.49	5.210
3	22.64	10.14	3.506

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 22.64 Tc(MIN.) = 10.14

TOTAL AREA(ACRES) = 13.6

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 144.00 = 1688.00 FEET.

FLOW PROCESS FROM NODE 144.00 TO NODE 145.00 IS CODE = 10

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

=====

FLOW PROCESS FROM NODE 150.00 TO NODE 151.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 167.00

UPSTREAM ELEVATION(FEET) = 52.50

DOWNSTREAM ELEVATION(FEET) = 50.00

ELEVATION DIFFERENCE(FEET) = 2.50

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.360

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 67.46

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.533

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 2.23

TOTAL AREA(ACRES) = 0.48 TOTAL RUNOFF(CFS) = 2.23

FLOW PROCESS FROM NODE 151.00 TO NODE 152.00 IS CODE = 62

----->>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 2 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 50.00 DOWNSTREAM ELEVATION(FEET) = 47.30

STREET LENGTH(FEET) = 160.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 25.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.020

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0160

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0160

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.46

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.34

HALFSTREET FLOOD WIDTH(FEET) = 10.59

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.80

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.94

STREET FLOW TRAVEL TIME(MIN.) = 0.95 Tc(MIN.) = 4.31

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.533

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.840

SUBAREA AREA(ACRES) = 0.53 SUBAREA RUNOFF(CFS) = 2.46

TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 4.69

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 11.99

FLOW VELOCITY(FEET/SEC.) = 3.02 DEPTH*VELOCITY(FT*FT/SEC.) = 1.10

LONGEST FLOWPATH FROM NODE 150.00 TO NODE 152.00 = 327.00 FEET.

FLOW PROCESS FROM NODE 152.00 TO NODE 153.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 47.30 DOWNSTREAM(FEET) = 46.00
FLOW LENGTH(FEET) = 75.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 8.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.82
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.69
PIPE TRAVEL TIME(MIN.) = 0.18 Tc(MIN.) = 4.50
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 153.00 = 402.00 FEET.

FLOW PROCESS FROM NODE 152.00 TO NODE 153.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 4.50
RAINFALL INTENSITY(INCH/HR) = 5.53
TOTAL STREAM AREA(ACRES) = 1.01
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.69

FLOW PROCESS FROM NODE 16.00 TO NODE 161.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 93.00

UPSTREAM ELEVATION(FEET) = 55.30

DOWNSTREAM ELEVATION(FEET) = 54.70

ELEVATION DIFFERENCE(FEET) = 0.60

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.939

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 52.90

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.533

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 0.51

TOTAL AREA(ACRES) = 0.11 TOTAL RUNOFF(CFS) = 0.51

FLOW PROCESS FROM NODE 161.00 TO NODE 162.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 3 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 54.70 DOWNSTREAM ELEVATION(FEET) = 44.00

STREET LENGTH(FEET) = 340.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.020

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0160

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0160

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.14

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.23

HALFSTREET FLOOD WIDTH(FEET) = 5.27

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.87

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.66

STREET FLOW TRAVEL TIME(MIN.) = 1.98 Tc(MIN.) = 5.91

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.965

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.840

SUBAREA AREA(ACRES) = 0.30 SUBAREA RUNOFF(CFS) = 1.25

TOTAL AREA(ACRES) = 0.4 PEAK FLOW RATE(CFS) = 1.71

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.26 HALFSTREET FLOOD WIDTH(FEET) = 6.60

FLOW VELOCITY(FEET/SEC.) = 3.09 DEPTH*VELOCITY(FT*FT/SEC.) = 0.80

LONGEST FLOWPATH FROM NODE 16.00 TO NODE 162.00 = 433.00 FEET.

FLOW PROCESS FROM NODE 162.00 TO NODE 153.00 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.) = 5.91

RAINFALL INTENSITY(INCH/HR) = 4.96

TOTAL STREAM AREA(ACRES) = 0.41

PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.71

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	4.69	4.50	5.533	1.01
2	1.71	5.91	4.965	0.41

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	5.99	4.50	5.533
2	5.92	5.91	4.965

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 5.99 Tc(MIN.) = 4.50

TOTAL AREA(ACRES) = 1.4

LONGEST FLOWPATH FROM NODE 16.00 TO NODE 153.00 = 433.00 FEET.

FLOW PROCESS FROM NODE 155.00 TO NODE 153.00 IS CODE = 81

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

=====

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.533

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.8400

SUBAREA AREA(ACRES) = 0.41 SUBAREA RUNOFF(CFS) = 1.91

TOTAL AREA(ACRES) = 1.8 TOTAL RUNOFF(CFS) = 8.51

TC(MIN.) = 4.50

FLOW PROCESS FROM NODE 153.00 TO NODE 145.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 2 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 43.60 DOWNSTREAM ELEVATION(FEET) = 42.50

STREET LENGTH(FEET) = 275.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 25.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.020

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0160

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0160

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.11

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.44

HALFSTREET FLOOD WIDTH(FEET) = 15.82

AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.74

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.77

STREET FLOW TRAVEL TIME(MIN.) = 2.64 Tc(MIN.) = 7.13

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.400

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.840

SUBAREA AREA(ACRES) = 0.33 SUBAREA RUNOFF(CFS) = 1.22

TOTAL AREA(ACRES) = 2.2 PEAK FLOW RATE(CFS) = 8.51

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.43 HALFSTREET FLOOD WIDTH(FEET) = 15.43

FLOW VELOCITY(FEET/SEC.) = 1.70 DEPTH*VELOCITY(FT*FT/SEC.) = 0.74

LONGEST FLOWPATH FROM NODE 16.00 TO NODE 145.00 = 708.00 FEET.

FLOW PROCESS FROM NODE 153.00 TO NODE 145.00 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	8.51	7.13	4.400	2.16

LONGEST FLOWPATH FROM NODE 16.00 TO NODE 145.00 = 708.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM	RUNOFF	Tc	INTENSITY	AREA
NUMBER	(CFS)	(MIN.)	(INCH/HOUR)	(ACRE)
1	22.64	10.14	3.506	13.61

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 145.00 = 1688.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM	RUNOFF	Tc	INTENSITY
NUMBER	(CFS)	(MIN.)	(INCH/HOUR)
1	24.42	7.13	4.400
2	29.42	10.14	3.506

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 29.42 Tc(MIN.) = 10.14

TOTAL AREA(ACRES) = 15.8

FLOW PROCESS FROM NODE 145.00 TO NODE 145.00 IS CODE = 12

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

=====

FLOW PROCESS FROM NODE 145.00 TO NODE 145.00 IS CODE = 12

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

=====

FLOW PROCESS FROM NODE 218.00 TO NODE 218.00 IS CODE = 7

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

=====

USER-SPECIFIED VALUES ARE AS FOLLOWS:

TC(MIN) = 14.08 RAIN INTENSITY(INCH/HOUR) = 2.84

TOTAL AREA(ACRES) = 20.62 TOTAL RUNOFF(CFS) = 42.37

FLOW PROCESS FROM NODE 218.00 TO NODE 219.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 189.00 DOWNSTREAM(FEET) = 112.50

CHANNEL LENGTH THRU SUBAREA(FEET) = 705.00 CHANNEL SLOPE = 0.1085

CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 4.00

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.709

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3800

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 47.17

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 11.24

AVERAGE FLOW DEPTH(FEET) = 0.76 TRAVEL TIME(MIN.) = 1.05

Tc(MIN.) = 15.13

SUBAREA AREA(ACRES) = 9.31 SUBAREA RUNOFF(CFS) = 9.59

AREA-AVERAGE RUNOFF COEFFICIENT = 0.617

TOTAL AREA(ACRES) = 29.9 PEAK FLOW RATE(CFS) = 50.04

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.79 FLOW VELOCITY(FEET/SEC.) = 11.38

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 219.00 = 2393.00 FEET.

FLOW PROCESS FROM NODE 219.00 TO NODE 219.00 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.) = 15.13

RAINFALL INTENSITY(INCH/HR) = 2.71

TOTAL STREAM AREA(ACRES) = 29.93

PEAK FLOW RATE(CFS) AT CONFLUENCE = 50.04

FLOW PROCESS FROM NODE 225.00 TO NODE 226.00 IS CODE = 21

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

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .7100

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 65.00

UPSTREAM ELEVATION(FEET) = 358.00

DOWNSTREAM ELEVATION(FEET) = 357.35

ELEVATION DIFFERENCE(FEET) = 0.65

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.438

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 60.00

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.241

SUBAREA RUNOFF(CFS) = 0.41

TOTAL AREA(ACRES) = 0.11 TOTAL RUNOFF(CFS) = 0.41

FLOW PROCESS FROM NODE 226.00 TO NODE 227.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 3 USED)<<<<

UPSTREAM ELEVATION(FEET) = 357.35 DOWNSTREAM ELEVATION(FEET) = 346.00

STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00

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) = 0.0160

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0160

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.93

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.22

HALFSTREET FLOOD WIDTH(FEET) = 4.75

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.80

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.62

STREET FLOW TRAVEL TIME(MIN.) = 2.08 Tc(MIN.) = 7.52

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.252

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .7400

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.737

SUBAREA AREA(ACRES) = 0.96 SUBAREA RUNOFF(CFS) = 3.02

TOTAL AREA(ACRES) = 1.1 PEAK FLOW RATE(CFS) = 3.35

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.26 HALFSTREET FLOOD WIDTH(FEET) = 6.52

FLOW VELOCITY(FEET/SEC.) = 3.08 DEPTH*VELOCITY(FT*FT/SEC.) = 0.79

LONGEST FLOWPATH FROM NODE 225.00 TO NODE 227.00 = 415.00 FEET.

FLOW PROCESS FROM NODE 227.00 TO NODE 219.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 346.00 DOWNSTREAM(FEET) = 112.50

FLOW LENGTH(FEET) = 575.00 MANNING'S N = 0.013

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000

DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.2 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 19.92

ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 3.35

PIPE TRAVEL TIME(MIN.) = 0.48 Tc(MIN.) = 8.00

LONGEST FLOWPATH FROM NODE 225.00 TO NODE 219.00 = 990.00 FEET.

FLOW PROCESS FROM NODE 219.00 TO NODE 219.00 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.) = 8.00

RAINFALL INTENSITY(INCH/HR) = 4.09

TOTAL STREAM AREA(ACRES) = 1.07

PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.35

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	50.04	15.13	2.709	29.93
2	3.35	8.00	4.086	1.07

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	29.83	8.00	4.086
2	52.27	15.13	2.709

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 52.27 Tc(MIN.) = 15.13

TOTAL AREA(ACRES) = 31.0

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 219.00 = 2393.00 FEET.

FLOW PROCESS FROM NODE 219.00 TO NODE 220.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 112.50 DOWNSTREAM(FEET) = 46.00

FLOW LENGTH(FEET) = 950.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.1 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 20.51

ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 52.27

PIPE TRAVEL TIME(MIN.) = 0.77 Tc(MIN.) = 15.90

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 220.00 = 3343.00 FEET.

FLOW PROCESS FROM NODE 219.00 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.) = 15.90

RAINFALL INTENSITY(INCH/HR) = 2.62

TOTAL STREAM AREA(ACRES) = 31.00

PEAK FLOW RATE(CFS) AT CONFLUENCE = 52.27

FLOW PROCESS FROM NODE 230.00 TO NODE 232.00 IS CODE = 21

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

=====
*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00

UPSTREAM ELEVATION(FEET) = 100.00

DOWNSTREAM ELEVATION(FEET) = 97.00

ELEVATION DIFFERENCE(FEET) = 3.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.625

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 60.00

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.533

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 5.48

TOTAL AREA(ACRES) = 1.18 TOTAL RUNOFF(CFS) = 5.48

FLOW PROCESS FROM NODE 232.00 TO NODE 232.00 IS CODE = 81

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

=====50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.533

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.8400

SUBAREA AREA(ACRES) = 0.23 SUBAREA RUNOFF(CFS) = 1.07

TOTAL AREA(ACRES) = 1.4 TOTAL RUNOFF(CFS) = 6.55

TC(MIN.) = 3.63

FLOW PROCESS FROM NODE 232.00 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.) = 3.63

RAINFALL INTENSITY(INCH/HR) = 5.53

TOTAL STREAM AREA(ACRES) = 1.41

PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.55

** CONFLUENCE DATA **

STREAM	RUNOFF	Tc	INTENSITY	AREA
NUMBER	(CFS)	(MIN.)	(INCH/HOUR)	(ACRE)
1	52.27	15.90	2.624	31.00
2	6.55	3.63	5.533	1.41

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM	RUNOFF	Tc	INTENSITY
NUMBER	(CFS)	(MIN.)	(INCH/HOUR)
1	31.34	3.63	5.533
2	55.37	15.90	2.624

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 55.37 Tc(MIN.) = 15.90

TOTAL AREA(ACRES) = 32.4

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 220.00 = 3343.00 FEET.

FLOW PROCESS FROM NODE 220.00 TO NODE 262.00 IS CODE = 31

----->>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====ELEVATION DATA: UPSTREAM(FEET) = 46.00 DOWNSTREAM(FEET) = 38.00

FLOW LENGTH(FEET) = 385.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 30.0 INCH PIPE IS 24.2 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 13.03

ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 55.37

PIPE TRAVEL TIME(MIN.) = 0.49 Tc(MIN.) = 16.39

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 262.00 = 3728.00 FEET.

FLOW PROCESS FROM NODE 262.00 TO NODE 262.00 IS CODE = 10

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

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

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

=====*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 200.00

UPSTREAM ELEVATION(FEET) = 100.00

DOWNSTREAM ELEVATION(FEET) = 98.00

ELEVATION DIFFERENCE(FEET) = 2.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.625

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 60.00

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.533

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 7.95

TOTAL AREA(ACRES) = 1.71 TOTAL RUNOFF(CFS) = 7.95

FLOW PROCESS FROM NODE 251.00 TO NODE 252.00 IS CODE = 31

----->>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 40.00 DOWNSTREAM(FEET) = 33.00

FLOW LENGTH(FEET) = 710.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.2 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 6.23

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 7.95

PIPE TRAVEL TIME(MIN.) = 1.90 Tc(MIN.) = 5.53

LONGEST FLOWPATH FROM NODE 250.00 TO NODE 252.00 = 910.00 FEET.

FLOW PROCESS FROM NODE 251.00 TO NODE 252.00 IS CODE = 81

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

=====
50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.187

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.8400

SUBAREA AREA(ACRES) = 0.85 SUBAREA RUNOFF(CFS) = 3.70

TOTAL AREA(ACRES) = 2.6 TOTAL RUNOFF(CFS) = 11.15

TC(MIN.) = 5.53

FLOW PROCESS FROM NODE 252.00 TO NODE 258.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 52.00 DOWNSTREAM(FEET) = 42.00

FLOW LENGTH(FEET) = 275.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 15.0 INCH PIPE IS 11.7 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 10.84

ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 11.15

PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 5.95

LONGEST FLOWPATH FROM NODE 250.00 TO NODE 258.00 = 1185.00 FEET.

FLOW PROCESS FROM NODE 258.00 TO NODE 258.00 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.) = 5.95

RAINFALL INTENSITY(INCH/HR) = 4.95

TOTAL STREAM AREA(ACRES) = 2.56

PEAK FLOW RATE(CFS) AT CONFLUENCE = 11.15

FLOW PROCESS FROM NODE 255.00 TO NODE 257.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 281.00

UPSTREAM ELEVATION(FEET) = 100.00

DOWNSTREAM ELEVATION(FEET) = 97.00

ELEVATION DIFFERENCE(FEET) = 3.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.577

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 61.01

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.533

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 4.83

TOTAL AREA(ACRES) = 1.04 TOTAL RUNOFF(CFS) = 4.83

FLOW PROCESS FROM NODE 257.00 TO NODE 258.00 IS CODE = 31

----->>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====ELEVATION DATA: UPSTREAM(FEET) = 45.00 DOWNSTREAM(FEET) = 42.00

FLOW LENGTH(FEET) = 225.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.1 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 6.21

ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 4.83

PIPE TRAVEL TIME(MIN.) = 0.60 Tc(MIN.) = 4.18

LONGEST FLOWPATH FROM NODE 255.00 TO NODE 258.00 = 506.00 FEET.

FLOW PROCESS FROM NODE 257.00 TO NODE 258.00 IS CODE = 81

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

=====50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.533

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .4000

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.7493

SUBAREA AREA(ACRES) = 0.27 SUBAREA RUNOFF(CFS) = 0.60

TOTAL AREA(ACRES) = 1.3 TOTAL RUNOFF(CFS) = 5.43

TC(MIN.) = 4.18

FLOW PROCESS FROM NODE 258.00 TO NODE 258.00 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.) = 4.18

RAINFALL INTENSITY(INCH/HR) = 5.53

TOTAL STREAM AREA(ACRES) = 1.31

PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.43

** CONFLUENCE DATA **

STREAM RUNOFF Tc INTENSITY AREA

NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)

1 11.15 5.95 4.946 2.56

2 5.43 4.18 5.533 1.31

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	13.27	4.18	5.533
2	16.01	5.95	4.946

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 16.01 Tc(MIN.) = 5.95

TOTAL AREA(ACRES) = 3.9

LONGEST FLOWPATH FROM NODE 250.00 TO NODE 258.00 = 1185.00 FEET.

FLOW PROCESS FROM NODE 258.00 TO NODE 262.00 IS CODE = 31

----->>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 42.00 DOWNSTREAM(FEET) = 40.00

FLOW LENGTH(FEET) = 175.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 21.0 INCH PIPE IS 17.1 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 7.62

ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 16.01

PIPE TRAVEL TIME(MIN.) = 0.38 Tc(MIN.) = 6.33

LONGEST FLOWPATH FROM NODE 250.00 TO NODE 262.00 = 1360.00 FEET.

FLOW PROCESS FROM NODE 262.00 TO NODE 262.00 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	16.01	6.33	4.751	3.87

LONGEST FLOWPATH FROM NODE 250.00 TO NODE 262.00 = 1360.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM	RUNOFF	Tc	INTENSITY	AREA
NUMBER	(CFS)	(MIN.)	(INCH/HOUR)	(ACRE)
1	55.37	16.39	2.573	32.41

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 262.00 = 3728.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM	RUNOFF	Tc	INTENSITY
NUMBER	(CFS)	(MIN.)	(INCH/HOUR)
1	37.40	6.33	4.751
2	64.04	16.39	2.573

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 64.04 Tc(MIN.) = 16.39

TOTAL AREA(ACRES) = 36.3

FLOW PROCESS FROM NODE 262.00 TO NODE 262.00 IS CODE = 12

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

=====

FLOW PROCESS FROM NODE 262.00 TO NODE 262.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 16.39

RAINFALL INTENSITY(INCH/HR) = 2.57

TOTAL STREAM AREA(ACRES) = 36.28

PEAK FLOW RATE(CFS) AT CONFLUENCE = 64.04

FLOW PROCESS FROM NODE 260.00 TO NODE 262.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00

UPSTREAM ELEVATION(FEET) = 51.50

DOWNSTREAM ELEVATION(FEET) = 48.50

ELEVATION DIFFERENCE(FEET) = 3.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.625

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 60.00

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.533

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 1.30

TOTAL AREA(ACRES) = 0.28 TOTAL RUNOFF(CFS) = 1.30

FLOW PROCESS FROM NODE 262.00 TO NODE 262.00 IS CODE = 1

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

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

=====TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 3.63

RAINFALL INTENSITY(INCH/HR) = 5.53

TOTAL STREAM AREA(ACRES) = 0.28

PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.30

** CONFLUENCE DATA **

STREAM RUNOFF Tc INTENSITY AREA

NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)

1 64.04 16.39 2.573 36.28

2 1.30 3.63 5.533 0.28

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	15.47	3.63	5.533
2	64.65	16.39	2.573

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 64.65 Tc(MIN.) = 16.39

TOTAL AREA(ACRES) = 36.6

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 262.00 = 3728.00 FEET.

FLOW PROCESS FROM NODE 300.00 TO NODE 301.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 10.00

UPSTREAM ELEVATION(FEET) = 70.00

DOWNSHIFT STREAM ELEVATION(FEET) = 60.00

ELEVATION DIFFERENCE(FEET) = 10.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 1.982

WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10%, IS USED IN Tc CALCULATION!

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.533

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 0.39

TOTAL AREA(ACRES) = 0.20 TOTAL RUNOFF(CFS) = 0.39

FLOW PROCESS FROM NODE 301.00 TO NODE 302.00 IS CODE = 62

----->>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 3 USED)<<<<

=====UPSTREAM ELEVATION(FEET) = 60.00 DOWNSTREAM ELEVATION(FEET) = 49.00

STREET LENGTH(FEET) = 395.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00

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) = 0.0160

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0160

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.01

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.23

HALFSTREET FLOOD WIDTH(FEET) = 5.12

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.65

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.61

STREET FLOW TRAVEL TIME(MIN.) = 2.49 Tc(MIN.) = 4.47

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.533

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .6600

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.603

SUBAREA AREA(ACRES) = 0.89 SUBAREA RUNOFF(CFS) = 3.25

TOTAL AREA(ACRES) = 1.1 PEAK FLOW RATE(CFS) = 3.64

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.27 HALFSTREET FLOOD WIDTH(FEET) = 7.07

FLOW VELOCITY(FEET/SEC.) = 2.94 DEPTH*VELOCITY(FT*FT/SEC.) = 0.79

LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 405.00 FEET.

FLOW PROCESS FROM NODE 302.00 TO NODE 309.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 48.00 DOWNSTREAM(FEET) = 45.00

FLOW LENGTH(FEET) = 205.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.8 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 5.88

ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 3.64

PIPE TRAVEL TIME(MIN.) = 0.58 Tc(MIN.) = 5.05

LONGEST FLOWPATH FROM NODE 300.00 TO NODE 309.00 = 610.00 FEET.

FLOW PROCESS FROM NODE 309.00 TO NODE 310.00 IS CODE = 81

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

50 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.498

***USER SPECIFIED(SUBAREA):**

USER-SPECIFIED RUNOFF COEFFICIENT = .7600

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.6551

SUBAREA AREA(ACRES) = 0.54 SUBAREA RUNOFF(CFS) = 2.26

TOTAL AREA(ACRES) = 1.6 TOTAL RUNOFF(CFS) = 5.87

TC(MIN.) = 5.05

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.6 TC(MIN.) = 5.05

PEAK FLOW RATE(CFS) = 5.87

END OF RATIONAL METHOD ANALYSIS

PROPOSED AES CALCULATIONS 100 YEAR STORM EVENT

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 1355

Analysis prepared by:

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Irvine, California 92606

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

* THD SR

*

* PROPOSED 100 YEAR

*

*

*

FILE NAME: THDPR100.DAT

TIME/DATE OF STUDY: 00:03 05/24/2020

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00

6-HOUR DURATION PRECIPITATION (INCHES) = 2.600

SPECIFIED MINIMUM PIPE SIZE(INCH) = 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 0.0313 0.167 0.0150

2 25.0 20.0 0.020/0.020/0.020 0.50 1.50 0.0313 0.125 0.0160

3 15.0 10.0 0.020/0.020/0.020 0.50 1.50 0.0313 0.125 0.0160

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 = 0.1 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21

>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .6800

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 77.00

UPSTREAM ELEVATION(FEET) = 360.00

DOWNSTREAM ELEVATION(FEET) = 359.35

ELEVATION DIFFERENCE(FEET) = 0.65

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.213

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 60.32

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.955

SUBAREA RUNOFF(CFS) = 0.65

TOTAL AREA(ACRES) = 0.16 TOTAL RUNOFF(CFS) = 0.65

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 62

----->>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 3 USED)<<<<

=====UPSTREAM ELEVATION(FEET) = 359.35 DOWNSTREAM ELEVATION(FEET) = 354.00

STREET LENGTH(FEET) = 308.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.020

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0160

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0160

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.98

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.32

HALFSTREET FLOOD WIDTH(FEET) = 9.80

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.76

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.89

STREET FLOW TRAVEL TIME(MIN.) = 1.86 Tc(MIN.) = 8.07

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.029

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .7400

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.733

SUBAREA AREA(ACRES) = 1.25 SUBAREA RUNOFF(CFS) = 4.65

TOTAL AREA(ACRES) = 1.4 PEAK FLOW RATE(CFS) = 5.20

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.37 HALFSTREET FLOOD WIDTH(FEET) = 12.38

FLOW VELOCITY(FEET/SEC.) = 3.15 DEPTH*VELOCITY(FT*FT/SEC.) = 1.18

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 385.00 FEET.

FLOW PROCESS FROM NODE 102.00 TO NODE 103.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 354.00 DOWNSTREAM(FEET) = 70.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 801.00 CHANNEL SLOPE = 0.3546

CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 4.00

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.551

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .4100

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 9.84

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.87

AVERAGE FLOW DEPTH(FEET) = 0.22 TRAVEL TIME(MIN.) = 1.35

Tc(MIN.) = 9.43

SUBAREA AREA(ACRES) = 4.92 SUBAREA RUNOFF(CFS) = 9.18

AREA-AVERAGE RUNOFF COEFFICIENT = 0.482

TOTAL AREA(ACRES) = 6.3 PEAK FLOW RATE(CFS) = 13.88

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.27 FLOW VELOCITY(FEET/SEC.) = 11.24

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 103.00 = 1186.00 FEET.

FLOW PROCESS FROM NODE 103.00 TO NODE 103.00 IS CODE = 10

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

FLOW PROCESS FROM NODE 110.00 TO NODE 111.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 121.00

UPSTREAM ELEVATION(FEET) = 345.00

DOWNSHIFT ELEVATION(FEET) = 335.00

ELEVATION DIFFERENCE(FEET) = 10.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.678

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 100.00

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.684

SUBAREA RUNOFF(CFS) = 0.78

TOTAL AREA(ACRES) = 0.39 TOTAL RUNOFF(CFS) = 0.78

FLOW PROCESS FROM NODE 111.00 TO NODE 112.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 335.00 DOWNSHIFT(FEET) = 125.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 436.00 CHANNEL SLOPE = 0.4817

CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 4.00

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.149

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.38

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.56

AVERAGE FLOW DEPTH(FEET) = 0.09 TRAVEL TIME(MIN.) = 1.11

Tc(MIN.) = 7.79

SUBAREA AREA(ACRES) = 1.77 SUBAREA RUNOFF(CFS) = 3.19

AREA-AVERAGE RUNOFF COEFFICIENT = 0.350

TOTAL AREA(ACRES) = 2.2 PEAK FLOW RATE(CFS) = 3.89

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.12 FLOW VELOCITY(FEET/SEC.) = 7.84

LONGEST FLOWPATH FROM NODE 110.00 TO NODE 112.00 = 557.00 FEET.

FLOW PROCESS FROM NODE 112.00 TO NODE 117.00 IS CODE = 1

=====

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

=====

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 7.79

RAINFALL INTENSITY(INCH/HR) = 5.15

TOTAL STREAM AREA(ACRES) = 2.16

PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.89

FLOW PROCESS FROM NODE 115.00 TO NODE 116.00 IS CODE = 21

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

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 205.00

UPSTREAM ELEVATION(FEET) = 117.00

DOWNSTREAM ELEVATION(FEET) = 113.50

ELEVATION DIFFERENCE(FEET) = 3.50

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 10.141

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 80.61

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.341

SUBAREA RUNOFF(CFS) = 0.24

TOTAL AREA(ACRES) = 0.16 TOTAL RUNOFF(CFS) = 0.24

FLOW PROCESS FROM NODE 116.00 TO NODE 117.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 113.50 DOWNSTREAM(FEET) = 105.50

CHANNEL LENGTH THRU SUBAREA(FEET) = 588.00 CHANNEL SLOPE = 0.0136

CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 4.00

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.344

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.57

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.94

AVERAGE FLOW DEPTH(FEET) = 0.07 TRAVEL TIME(MIN.) = 5.06

Tc(MIN.) = 15.20

SUBAREA AREA(ACRES) = 0.56 SUBAREA RUNOFF(CFS) = 0.66

AREA-AVERAGE RUNOFF COEFFICIENT = 0.350

TOTAL AREA(ACRES) = 0.7 PEAK FLOW RATE(CFS) = 0.84

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.09 FLOW VELOCITY(FEET/SEC.) = 2.27

LONGEST FLOWPATH FROM NODE 115.00 TO NODE 117.00 = 793.00 FEET.

FLOW PROCESS FROM NODE 112.00 TO NODE 117.00 IS CODE = 1

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

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

=====TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 15.20

RAINFALL INTENSITY(INCH/HR) = 3.34

TOTAL STREAM AREA(ACRES) = 0.72

PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.84

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	3.89	7.79	5.149	2.16
2	0.84	15.20	3.344	0.72

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	4.32	7.79	5.149
2	3.37	15.20	3.344

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 4.32 Tc(MIN.) = 7.79

TOTAL AREA(ACRES) = 2.9

LONGEST FLOWPATH FROM NODE 115.00 TO NODE 117.00 = 793.00 FEET.

FLOW PROCESS FROM NODE 117.00 TO NODE 122.00 IS CODE = 1

=====

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

=====

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 7.79

RAINFALL INTENSITY(INCH/HR) = 5.15

TOTAL STREAM AREA(ACRES) = 2.88

PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.32

FLOW PROCESS FROM NODE 120.00 TO NODE 121.00 IS CODE = 21

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

===== *USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 99.00

UPSTREAM ELEVATION(FEET) = 80.50

DOWNSTREAM ELEVATION(FEET) = 80.10

ELEVATION DIFFERENCE(FEET) = 0.40

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 12.027

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 50.00

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.889

SUBAREA RUNOFF(CFS) = 0.15

TOTAL AREA(ACRES) = 0.11 TOTAL RUNOFF(CFS) = 0.15

FLOW PROCESS FROM NODE 121.00 TO NODE 122.00 IS CODE = 51

----->>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 80.10 DOWNSTREAM(FEET) = 73.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 364.00 CHANNEL SLOPE = 0.0195

CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 4.00

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.335

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.39

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.87

AVERAGE FLOW DEPTH(FEET) = 0.05 TRAVEL TIME(MIN.) = 3.24

Tc(MIN.) = 15.26

SUBAREA AREA(ACRES) = 0.41 SUBAREA RUNOFF(CFS) = 0.48

AREA-AVERAGE RUNOFF COEFFICIENT = 0.350

TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 0.61

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.07 FLOW VELOCITY(FEET/SEC.) = 2.23

LONGEST FLOWPATH FROM NODE 120.00 TO NODE 122.00 = 463.00 FEET.

FLOW PROCESS FROM NODE 122.00 TO NODE 122.00 IS CODE = 1

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

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

=====

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 15.26

RAINFALL INTENSITY(INCH/HR) = 3.34

TOTAL STREAM AREA(ACRES) = 0.52

PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.61

** CONFLUENCE DATA **

STREAM	RUNOFF	Tc	INTENSITY	AREA
NUMBER	(CFS)	(MIN.)	(INCH/HOUR)	(ACRE)
1	4.32	7.79	5.149	2.88
2	0.61	15.26	3.335	0.52

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM	RUNOFF	Tc	INTENSITY
NUMBER	(CFS)	(MIN.)	(INCH/HOUR)
1	4.63	7.79	5.149
2	3.41	15.26	3.335

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 4.63 Tc(MIN.) = 7.79

TOTAL AREA(ACRES) = 3.4

LONGEST FLOWPATH FROM NODE 115.00 TO NODE 122.00 = 793.00 FEET.

FLOW PROCESS FROM NODE 122.00 TO NODE 103.00 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 4.63 7.79 5.149 3.40

LONGEST FLOWPATH FROM NODE 115.00 TO NODE 103.00 = 793.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM RUNOFF Tc INTENSITY AREA

NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)

1 13.88 9.43 4.551 6.33

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 103.00 = 1186.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM RUNOFF Tc INTENSITY

NUMBER (CFS) (MIN.) (INCH/HOUR)

1 16.10 7.79 5.149

2 17.98 9.43 4.551

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 17.98 Tc(MIN.) = 9.43

TOTAL AREA(ACRES) = 9.7

FLOW PROCESS FROM NODE 122.00 TO NODE 103.00 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.) = 9.43

RAINFALL INTENSITY(INCH/HR) = 4.55

TOTAL STREAM AREA(ACRES) = 9.73

PEAK FLOW RATE(CFS) AT CONFLUENCE = 17.98

FLOW PROCESS FROM NODE 130.00 TO NODE 131.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 99.00

UPSTREAM ELEVATION(FEET) = 115.00

DOWNSTREAM ELEVATION(FEET) = 85.00

ELEVATION DIFFERENCE(FEET) = 30.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.235

WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10%, IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.941

SUBAREA RUNOFF(CFS) = 0.27

TOTAL AREA(ACRES) = 0.13 TOTAL RUNOFF(CFS) = 0.27

FLOW PROCESS FROM NODE 131.00 TO NODE 132.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 85.00 DOWNSTREAM(FEET) = 80.50

CHANNEL LENGTH THRU SUBAREA(FEET) = 271.00 CHANNEL SLOPE = 0.0166

CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 4.00

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.881

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.55

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.03

AVERAGE FLOW DEPTH(FEET) = 0.07 TRAVEL TIME(MIN.) = 2.22

Tc(MIN.) = 8.46

SUBAREA AREA(ACRES) = 0.33 SUBAREA RUNOFF(CFS) = 0.56

AREA-AVERAGE RUNOFF COEFFICIENT = 0.350

TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 0.79

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.08 FLOW VELOCITY(FEET/SEC.) = 2.33

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 132.00 = 370.00 FEET.

FLOW PROCESS FROM NODE 132.00 TO NODE 135.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 80.50 DOWNSTREAM(FEET) = 60.00
FLOW LENGTH(FEET) = 60.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 1.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.23
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.79
PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 8.54
LONGEST FLOWPATH FROM NODE 130.00 TO NODE 135.00 = 430.00 FEET.

FLOW PROCESS FROM NODE 133.00 TO NODE 135.00 IS CODE = 51

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 90.00 DOWNSTREAM(FEET) = 60.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 332.00 CHANNEL SLOPE = 0.0904
CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 4.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.432
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) = 0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.14
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.31
AVERAGE FLOW DEPTH(FEET) = 0.06 TRAVEL TIME(MIN.) = 1.28
Tc(MIN.) = 9.82
SUBAREA AREA(ACRES) = 0.45 SUBAREA RUNOFF(CFS) = 0.70

AREA-AVERAGE RUNOFF COEFFICIENT = 0.350

TOTAL AREA(ACRES) = 0.9 PEAK FLOW RATE(CFS) = 1.41

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.07 FLOW VELOCITY(FEET/SEC.) = 4.76

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 135.00 = 762.00 FEET.

FLOW PROCESS FROM NODE 135.00 TO NODE 136.00 IS CODE = 51

----->>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

===== ELEVATION DATA: UPSTREAM(FEET) = 60.00 DOWNSTREAM(FEET) = 55.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 476.00 CHANNEL SLOPE = 0.0105

CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 4.00

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.763

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.80

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.80

AVERAGE FLOW DEPTH(FEET) = 0.15 TRAVEL TIME(MIN.) = 2.84

Tc(MIN.) = 12.66

SUBAREA AREA(ACRES) = 0.59 SUBAREA RUNOFF(CFS) = 0.78

AREA-AVERAGE RUNOFF COEFFICIENT = 0.350

TOTAL AREA(ACRES) = 1.5 PEAK FLOW RATE(CFS) = 1.98

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.16 FLOW VELOCITY(FEET/SEC.) = 2.80

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 136.00 = 1238.00 FEET.

FLOW PROCESS FROM NODE 136.00 TO NODE 103.00 IS CODE = 1

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

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

=====TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 12.66

RAINFALL INTENSITY(INCH/HR) = 3.76

TOTAL STREAM AREA(ACRES) = 1.50

PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.98

** CONFLUENCE DATA **

STREAM RUNOFF Tc INTENSITY AREA

NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)

1 17.98 9.43 4.551 9.73

2 1.98 12.66 3.763 1.50

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	19.45	9.43	4.551
2	16.84	12.66	3.763

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 19.45 Tc(MIN.) = 9.43

TOTAL AREA(ACRES) = 11.2

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 103.00 = 1238.00 FEET.

FLOW PROCESS FROM NODE 103.00 TO NODE 144.00 IS CODE = 31

----->>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 70.50 DOWNSTREAM(FEET) = 41.50

FLOW LENGTH(FEET) = 450.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.8 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 15.79

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 19.45

PIPE TRAVEL TIME(MIN.) = 0.48 Tc(MIN.) = 9.90

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 144.00 = 1688.00 FEET.

FLOW PROCESS FROM NODE 103.00 TO NODE 144.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 3

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 9.90

RAINFALL INTENSITY(INCH/HR) = 4.41

TOTAL STREAM AREA(ACRES) = 11.23

PEAK FLOW RATE(CFS) AT CONFLUENCE = 19.45

FLOW PROCESS FROM NODE 137.00 TO NODE 138.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 105.00

UPSTREAM ELEVATION(FEET) = 56.00

DOWNSTREAM ELEVATION(FEET) = 50.50

ELEVATION DIFFERENCE(FEET) = 5.50

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.563

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 90.48

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.850

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 0.81

TOTAL AREA(ACRES) = 0.14 TOTAL RUNOFF(CFS) = 0.81

FLOW PROCESS FROM NODE 138.00 TO NODE 139.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 50.50 DOWNSTREAM(FEET) = 49.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 243.00 CHANNEL SLOPE = 0.0062

CHANNEL BASE(FEET) = 1.50 "Z" FACTOR = 0.500

MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 0.50

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.850

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.47

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.42

AVERAGE FLOW DEPTH(FEET) = 0.42 TRAVEL TIME(MIN.) = 1.18

Tc(MIN.) = 3.75

SUBAREA AREA(ACRES) = 0.58 SUBAREA RUNOFF(CFS) = 3.34

AREA-AVERAGE RUNOFF COEFFICIENT = 0.840

TOTAL AREA(ACRES) = 0.7 PEAK FLOW RATE(CFS) = 4.14

==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL

CAPACITY(NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
ALLOWABLE DEPTH).

AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.50 FLOW VELOCITY(FEET/SEC.) = 4.73

==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

LONGEST FLOWPATH FROM NODE 137.00 TO NODE 139.00 = 348.00 FEET.

FLOW PROCESS FROM NODE 139.00 TO NODE 144.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 49.00 DOWNSTREAM(FEET) = 39.00

FLOW LENGTH(FEET) = 20.00 MANNING'S N = 0.013

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000

DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.4 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 22.82

ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 4.14

PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 3.76

LONGEST FLOWPATH FROM NODE 137.00 TO NODE 144.00 = 368.00 FEET.

FLOW PROCESS FROM NODE 139.00 TO NODE 144.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 3

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 3.76

RAINFALL INTENSITY(INCH/HR) = 6.85

TOTAL STREAM AREA(ACRES) = 0.72

PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.14

FLOW PROCESS FROM NODE 140.00 TO NODE 141.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 112.00

UPSTREAM ELEVATION(FEET) = 54.00

DOWNSTREAM ELEVATION(FEET) = 50.00

ELEVATION DIFFERENCE(FEET) = 4.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.847

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 86.43

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.850

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 3.40

TOTAL AREA(ACRES) = 0.59 TOTAL RUNOFF(CFS) = 3.40

FLOW PROCESS FROM NODE 141.00 TO NODE 142.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 50.00 DOWNSTREAM(FEET) = 45.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 417.00 CHANNEL SLOPE = 0.0120

CHANNEL BASE(FEET) = 3.00 "Z" FACTOR = 1.000

MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 1.00

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.797

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 6.45

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.14

AVERAGE FLOW DEPTH(FEET) = 0.58 TRAVEL TIME(MIN.) = 2.21

Tc(MIN.) = 5.06

SUBAREA AREA(ACRES) = 1.07 SUBAREA RUNOFF(CFS) = 6.11

AREA-AVERAGE RUNOFF COEFFICIENT = 0.840

TOTAL AREA(ACRES) = 1.7 PEAK FLOW RATE(CFS) = 9.48

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.72 FLOW VELOCITY(FEET/SEC.) = 3.54

LONGEST FLOWPATH FROM NODE 140.00 TO NODE 142.00 = 529.00 FEET.

FLOW PROCESS FROM NODE 142.00 TO NODE 144.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 45.00 DOWNSTREAM(FEET) = 39.00

FLOW LENGTH(FEET) = 170.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 15.0 INCH PIPE IS 10.4 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 10.48

ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 9.48

PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) = 5.33

LONGEST FLOWPATH FROM NODE 140.00 TO NODE 144.00 = 699.00 FEET.

FLOW PROCESS FROM NODE 142.00 TO NODE 144.00 IS CODE = 1

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

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

=====

TOTAL NUMBER OF STREAMS = 3

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:

TIME OF CONCENTRATION(MIN.) = 5.33

RAINFALL INTENSITY(INCH/HR) = 6.57

TOTAL STREAM AREA(ACRES) = 1.66

PEAK FLOW RATE(CFS) AT CONFLUENCE = 9.48

** CONFLUENCE DATA **

STREAM RUNOFF Tc INTENSITY AREA

NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)

1 19.45 9.90 4.409 11.23

2 4.14 3.76 6.850 0.72

3 9.48 5.33 6.573 1.66

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM	RUNOFF	Tc	INTENSITY
NUMBER	(CFS)	(MIN.)	(INCH/HOUR)
1	23.35	3.76	6.850
2	26.50	5.33	6.573
3	28.48	9.90	4.409

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 28.48 Tc(MIN.) = 9.90

TOTAL AREA(ACRES) = 13.6

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 144.00 = 1688.00 FEET.

FLOW PROCESS FROM NODE 144.00 TO NODE 145.00 IS CODE = 10

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

=====

FLOW PROCESS FROM NODE 150.00 TO NODE 151.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 167.00

UPSTREAM ELEVATION(FEET) = 52.50

DOWNSTREAM ELEVATION(FEET) = 50.00

ELEVATION DIFFERENCE(FEET) = 2.50

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.360

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 67.46

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.850

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 2.76

TOTAL AREA(ACRES) = 0.48 TOTAL RUNOFF(CFS) = 2.76

FLOW PROCESS FROM NODE 151.00 TO NODE 152.00 IS CODE = 62

----->>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 2 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 50.00 DOWNSTREAM ELEVATION(FEET) = 47.30

STREET LENGTH(FEET) = 160.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 25.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.020

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0160

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0160

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 4.29

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.36

HALFSTREET FLOOD WIDTH(FEET) = 11.52

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.96

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.06

STREET FLOW TRAVEL TIME(MIN.) = 0.90 Tc(MIN.) = 4.26

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.850

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.840

SUBAREA AREA(ACRES) = 0.53 SUBAREA RUNOFF(CFS) = 3.05

TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 5.81

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.39 HALFSTREET FLOOD WIDTH(FEET) = 13.09

FLOW VELOCITY(FEET/SEC.) = 3.17 DEPTH*VELOCITY(FT*FT/SEC.) = 1.23

LONGEST FLOWPATH FROM NODE 150.00 TO NODE 152.00 = 327.00 FEET.

FLOW PROCESS FROM NODE 152.00 TO NODE 153.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 47.30 DOWNSTREAM(FEET) = 46.00

FLOW LENGTH(FEET) = 75.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.4 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 7.15

ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 5.81

PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 4.43

LONGEST FLOWPATH FROM NODE 150.00 TO NODE 153.00 = 402.00 FEET.

FLOW PROCESS FROM NODE 152.00 TO NODE 153.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 4.43

RAINFALL INTENSITY(INCH/HR) = 6.85

TOTAL STREAM AREA(ACRES) = 1.01

PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.81

FLOW PROCESS FROM NODE 16.00 TO NODE 161.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 93.00

UPSTREAM ELEVATION(FEET) = 55.30

DOWNSTREAM ELEVATION(FEET) = 54.70

ELEVATION DIFFERENCE(FEET) = 0.60

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.939

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 52.90

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.850

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 0.63

TOTAL AREA(ACRES) = 0.11 TOTAL RUNOFF(CFS) = 0.63

FLOW PROCESS FROM NODE 161.00 TO NODE 162.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 3 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 54.70 DOWNSTREAM ELEVATION(FEET) = 44.00

STREET LENGTH(FEET) = 340.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.020

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0160

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0160

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.41

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.25

HALFSTREET FLOOD WIDTH(FEET) = 5.98

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.97

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.73

STREET FLOW TRAVEL TIME(MIN.) = 1.91 Tc(MIN.) = 5.85

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.194

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.840

SUBAREA AREA(ACRES) = 0.30 SUBAREA RUNOFF(CFS) = 1.56

TOTAL AREA(ACRES) = 0.4 PEAK FLOW RATE(CFS) = 2.13

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.27 HALFSTREET FLOOD WIDTH(FEET) = 7.38

FLOW VELOCITY(FEET/SEC.) = 3.22 DEPTH*VELOCITY(FT*FT/SEC.) = 0.88

LONGEST FLOWPATH FROM NODE 16.00 TO NODE 162.00 = 433.00 FEET.

FLOW PROCESS FROM NODE 162.00 TO NODE 153.00 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.) = 5.85

RAINFALL INTENSITY(INCH/HR) = 6.19

TOTAL STREAM AREA(ACRES) = 0.41

PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.13

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	5.81	4.43	6.850	1.01
2	2.13	5.85	6.194	0.41

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	7.43	4.43	6.850
2	7.39	5.85	6.194

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 7.43 Tc(MIN.) = 4.43

TOTAL AREA(ACRES) = 1.4

LONGEST FLOWPATH FROM NODE 16.00 TO NODE 153.00 = 433.00 FEET.

FLOW PROCESS FROM NODE 155.00 TO NODE 153.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.850

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.8400

SUBAREA AREA(ACRES) = 0.41 SUBAREA RUNOFF(CFS) = 2.36

TOTAL AREA(ACRES) = 1.8 TOTAL RUNOFF(CFS) = 10.53

TC(MIN.) = 4.43

FLOW PROCESS FROM NODE 153.00 TO NODE 145.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 2 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 43.60 DOWNSTREAM ELEVATION(FEET) = 42.50

STREET LENGTH(FEET) = 275.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 25.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 20.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.020

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) = 0.0160

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0160

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 11.30

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.47

HALFSTREET FLOOD WIDTH(FEET) = 17.23

AVERAGE FLOW VELOCITY(FEET/SEC.) = 1.83

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.86

STREET FLOW TRAVEL TIME(MIN.) = 2.50 Tc(MIN.) = 6.94

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.546

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.840

SUBAREA AREA(ACRES) = 0.33 SUBAREA RUNOFF(CFS) = 1.54

TOTAL AREA(ACRES) = 2.2 PEAK FLOW RATE(CFS) = 10.53

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.46 HALFSTREET FLOOD WIDTH(FEET) = 16.76

FLOW VELOCITY(FEET/SEC.) = 1.80 DEPTH*VELOCITY(FT*FT/SEC.) = 0.83

LONGEST FLOWPATH FROM NODE 16.00 TO NODE 145.00 = 708.00 FEET.

FLOW PROCESS FROM NODE 153.00 TO NODE 145.00 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 10.53 6.94 5.546 2.16

LONGEST FLOWPATH FROM NODE 16.00 TO NODE 145.00 = 708.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM RUNOFF Tc INTENSITY AREA

NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)

1 28.48 9.90 4.409 13.61

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 145.00 = 1688.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM RUNOFF Tc INTENSITY

NUMBER (CFS) (MIN.) (INCH/HOUR)

1 30.48 6.94 5.546

2 36.85 9.90 4.409

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 36.85 Tc(MIN.) = 9.90

TOTAL AREA(ACRES) = 15.8

FLOW PROCESS FROM NODE 145.00 TO NODE 145.00 IS CODE = 12

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

=====

FLOW PROCESS FROM NODE 145.00 TO NODE 145.00 IS CODE = 12

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

=====

FLOW PROCESS FROM NODE 218.00 TO NODE 218.00 IS CODE = 7

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

=====

USER-SPECIFIED VALUES ARE AS FOLLOWS:

TC(MIN) = 14.08 RAIN INTENSITY(INCH/HOUR) = 3.51

TOTAL AREA(ACRES) = 20.62 TOTAL RUNOFF(CFS) = 42.37

FLOW PROCESS FROM NODE 218.00 TO NODE 219.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 189.00 DOWNSTREAM(FEET) = 112.50

CHANNEL LENGTH THRU SUBAREA(FEET) = 705.00 CHANNEL SLOPE = 0.1085

CHANNEL BASE(FEET) = 4.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 4.00

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.355

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3800

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 48.31

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 11.26

AVERAGE FLOW DEPTH(FEET) = 0.77 TRAVEL TIME(MIN.) = 1.04

Tc(MIN.) = 15.12

SUBAREA AREA(ACRES) = 9.31 SUBAREA RUNOFF(CFS) = 11.87

AREA-AVERAGE RUNOFF COEFFICIENT = 0.521

TOTAL AREA(ACRES) = 29.9 PEAK FLOW RATE(CFS) = 52.33

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.81 FLOW VELOCITY(FEET/SEC.) = 11.57

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 219.00 = 2393.00 FEET.

FLOW PROCESS FROM NODE 219.00 TO NODE 219.00 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.) = 15.12

RAINFALL INTENSITY(INCH/HR) = 3.35

TOTAL STREAM AREA(ACRES) = 29.93

PEAK FLOW RATE(CFS) AT CONFLUENCE = 52.33

FLOW PROCESS FROM NODE 225.00 TO NODE 226.00 IS CODE = 21

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

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .7100

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 65.00

UPSTREAM ELEVATION(FEET) = 358.00

DOWNSTREAM ELEVATION(FEET) = 357.35

ELEVATION DIFFERENCE(FEET) = 0.65

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.438

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 60.00

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.489

SUBAREA RUNOFF(CFS) = 0.51

TOTAL AREA(ACRES) = 0.11 TOTAL RUNOFF(CFS) = 0.51

FLOW PROCESS FROM NODE 226.00 TO NODE 227.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 3 USED)<<<<

UPSTREAM ELEVATION(FEET) = 357.35 DOWNSTREAM ELEVATION(FEET) = 346.00

STREET LENGTH(FEET) = 350.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00

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) = 0.0160

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0160

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.40

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.23

HALFSTREET FLOOD WIDTH(FEET) = 5.43

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.90

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.68

STREET FLOW TRAVEL TIME(MIN.) = 2.01 Tc(MIN.) = 7.45

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.298

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .7400

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.737

SUBAREA AREA(ACRES) = 0.96 SUBAREA RUNOFF(CFS) = 3.76

TOTAL AREA(ACRES) = 1.1 PEAK FLOW RATE(CFS) = 4.18

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.27 HALFSTREET FLOOD WIDTH(FEET) = 7.23

FLOW VELOCITY(FEET/SEC.) = 3.26 DEPTH*VELOCITY(FT*FT/SEC.) = 0.88

LONGEST FLOWPATH FROM NODE 225.00 TO NODE 227.00 = 415.00 FEET.

FLOW PROCESS FROM NODE 227.00 TO NODE 219.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 346.00 DOWNSTREAM(FEET) = 112.50

FLOW LENGTH(FEET) = 575.00 MANNING'S N = 0.013

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000

DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.6 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 21.23

ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 4.18

PIPE TRAVEL TIME(MIN.) = 0.45 Tc(MIN.) = 7.90

LONGEST FLOWPATH FROM NODE 225.00 TO NODE 219.00 = 990.00 FEET.

FLOW PROCESS FROM NODE 219.00 TO NODE 219.00 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.) = 7.90

RAINFALL INTENSITY(INCH/HR) = 5.10

TOTAL STREAM AREA(ACRES) = 1.07

PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.18

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	52.33	15.12	3.355	29.93
2	4.18	7.90	5.100	1.07

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	31.51	7.90	5.100
2	55.08	15.12	3.355

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 55.08 Tc(MIN.) = 15.12

TOTAL AREA(ACRES) = 31.0

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 219.00 = 2393.00 FEET.

FLOW PROCESS FROM NODE 219.00 TO NODE 220.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 112.50 DOWNSTREAM(FEET) = 46.00

FLOW LENGTH(FEET) = 950.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 24.0 INCH PIPE IS 19.1 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 20.59

ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 55.08

PIPE TRAVEL TIME(MIN.) = 0.77 Tc(MIN.) = 15.89

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 220.00 = 3343.00 FEET.

FLOW PROCESS FROM NODE 219.00 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.) = 15.89

RAINFALL INTENSITY(INCH/HR) = 3.25

TOTAL STREAM AREA(ACRES) = 31.00

PEAK FLOW RATE(CFS) AT CONFLUENCE = 55.08

FLOW PROCESS FROM NODE 230.00 TO NODE 232.00 IS CODE = 21

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

=====
*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00

UPSTREAM ELEVATION(FEET) = 100.00

DOWNSTREAM ELEVATION(FEET) = 97.00

ELEVATION DIFFERENCE(FEET) = 3.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.625

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 60.00

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.850

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 6.79

TOTAL AREA(ACRES) = 1.18 TOTAL RUNOFF(CFS) = 6.79

FLOW PROCESS FROM NODE 232.00 TO NODE 232.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.850

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.8400

SUBAREA AREA(ACRES) = 0.23 SUBAREA RUNOFF(CFS) = 1.32

TOTAL AREA(ACRES) = 1.4 TOTAL RUNOFF(CFS) = 8.11

TC(MIN.) = 3.63

FLOW PROCESS FROM NODE 232.00 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.) = 3.63

RAINFALL INTENSITY(INCH/HR) = 6.85

TOTAL STREAM AREA(ACRES) = 1.41

PEAK FLOW RATE(CFS) AT CONFLUENCE = 8.11

** CONFLUENCE DATA **

STREAM	RUNOFF	Tc	INTENSITY	AREA
NUMBER	(CFS)	(MIN.)	(INCH/HOUR)	(ACRE)
1	55.08	15.89	3.249	31.00
2	8.11	3.63	6.850	1.41

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	34.24	3.63	6.850
2	58.93	15.89	3.249

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 58.93 Tc(MIN.) = 15.89

TOTAL AREA(ACRES) = 32.4

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 220.00 = 3343.00 FEET.

FLOW PROCESS FROM NODE 220.00 TO NODE 262.00 IS CODE = 31

----->>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====ELEVATION DATA: UPSTREAM(FEET) = 46.00 DOWNSTREAM(FEET) = 38.00

FLOW LENGTH(FEET) = 385.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.6 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 13.57

ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 58.93

PIPE TRAVEL TIME(MIN.) = 0.47 Tc(MIN.) = 16.37

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 262.00 = 3728.00 FEET.

FLOW PROCESS FROM NODE 262.00 TO NODE 262.00 IS CODE = 10

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

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

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

=====*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 200.00

UPSTREAM ELEVATION(FEET) = 100.00

DOWNSTREAM ELEVATION(FEET) = 98.00

ELEVATION DIFFERENCE(FEET) = 2.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.625

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 60.00

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.850

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 9.84

TOTAL AREA(ACRES) = 1.71 TOTAL RUNOFF(CFS) = 9.84

FLOW PROCESS FROM NODE 251.00 TO NODE 252.00 IS CODE = 31

----->>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 40.00 DOWNSTREAM(FEET) = 33.00

FLOW LENGTH(FEET) = 710.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.7 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 6.38

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 9.84

PIPE TRAVEL TIME(MIN.) = 1.85 Tc(MIN.) = 5.48

LONGEST FLOWPATH FROM NODE 250.00 TO NODE 252.00 = 910.00 FEET.

FLOW PROCESS FROM NODE 251.00 TO NODE 252.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.458

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.8400

SUBAREA AREA(ACRES) = 0.85 SUBAREA RUNOFF(CFS) = 4.61

TOTAL AREA(ACRES) = 2.6 TOTAL RUNOFF(CFS) = 13.89

TC(MIN.) = 5.48

FLOW PROCESS FROM NODE 252.00 TO NODE 258.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 52.00 DOWNSTREAM(FEET) = 42.00

FLOW LENGTH(FEET) = 275.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.4 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 11.74

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 13.89

PIPE TRAVEL TIME(MIN.) = 0.39 Tc(MIN.) = 5.87

LONGEST FLOWPATH FROM NODE 250.00 TO NODE 258.00 = 1185.00 FEET.

FLOW PROCESS FROM NODE 258.00 TO NODE 258.00 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.) = 5.87

RAINFALL INTENSITY(INCH/HR) = 6.18

TOTAL STREAM AREA(ACRES) = 2.56

PEAK FLOW RATE(CFS) AT CONFLUENCE = 13.89

FLOW PROCESS FROM NODE 255.00 TO NODE 257.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 281.00

UPSTREAM ELEVATION(FEET) = 100.00

DOWNSTREAM ELEVATION(FEET) = 97.00

ELEVATION DIFFERENCE(FEET) = 3.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.577

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 61.01

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.850

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 5.98

TOTAL AREA(ACRES) = 1.04 TOTAL RUNOFF(CFS) = 5.98

FLOW PROCESS FROM NODE 257.00 TO NODE 258.00 IS CODE = 31

----->>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====ELEVATION DATA: UPSTREAM(FEET) = 45.00 DOWNSTREAM(FEET) = 42.00

FLOW LENGTH(FEET) = 225.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 15.0 INCH PIPE IS 10.6 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 6.47

ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 5.98

PIPE TRAVEL TIME(MIN.) = 0.58 Tc(MIN.) = 4.16

LONGEST FLOWPATH FROM NODE 255.00 TO NODE 258.00 = 506.00 FEET.

FLOW PROCESS FROM NODE 257.00 TO NODE 258.00 IS CODE = 81

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

=====100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.850

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .4000

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.7493

SUBAREA AREA(ACRES) = 0.27 SUBAREA RUNOFF(CFS) = 0.74

TOTAL AREA(ACRES) = 1.3 TOTAL RUNOFF(CFS) = 6.72

TC(MIN.) = 4.16

FLOW PROCESS FROM NODE 258.00 TO NODE 258.00 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.) = 4.16

RAINFALL INTENSITY(INCH/HR) = 6.85

TOTAL STREAM AREA(ACRES) = 1.31

PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.72

** CONFLUENCE DATA **

STREAM RUNOFF Tc INTENSITY AREA

NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)

1 13.89 5.87 6.178 2.56

2 6.72 4.16 6.850 1.31

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	16.56	4.16	6.850
2	19.95	5.87	6.178

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 19.95 Tc(MIN.) = 5.87

TOTAL AREA(ACRES) = 3.9

LONGEST FLOWPATH FROM NODE 250.00 TO NODE 258.00 = 1185.00 FEET.

FLOW PROCESS FROM NODE 258.00 TO NODE 262.00 IS CODE = 31

----->>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 42.00 DOWNSTREAM(FEET) = 40.00

FLOW LENGTH(FEET) = 175.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.3 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 8.23

ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 19.95

PIPE TRAVEL TIME(MIN.) = 0.35 Tc(MIN.) = 6.22

LONGEST FLOWPATH FROM NODE 250.00 TO NODE 262.00 = 1360.00 FEET.

FLOW PROCESS FROM NODE 262.00 TO NODE 262.00 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	19.95	6.22	5.948	3.87

LONGEST FLOWPATH FROM NODE 250.00 TO NODE 262.00 = 1360.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM	RUNOFF	Tc	INTENSITY	AREA
NUMBER	(CFS)	(MIN.)	(INCH/HOUR)	(ACRE)
1	58.93	16.37	3.188	32.41

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 262.00 = 3728.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM	RUNOFF	Tc	INTENSITY
NUMBER	(CFS)	(MIN.)	(INCH/HOUR)
1	42.36	6.22	5.948
2	69.62	16.37	3.188

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 69.62 Tc(MIN.) = 16.37

TOTAL AREA(ACRES) = 36.3

FLOW PROCESS FROM NODE 262.00 TO NODE 262.00 IS CODE = 12

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

=====

FLOW PROCESS FROM NODE 262.00 TO NODE 262.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 16.37

RAINFALL INTENSITY(INCH/HR) = 3.19

TOTAL STREAM AREA(ACRES) = 36.28

PEAK FLOW RATE(CFS) AT CONFLUENCE = 69.62

FLOW PROCESS FROM NODE 260.00 TO NODE 262.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00

UPSTREAM ELEVATION(FEET) = 51.50

DOWNSTREAM ELEVATION(FEET) = 48.50

ELEVATION DIFFERENCE(FEET) = 3.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.625

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 60.00

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.850

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 1.61

TOTAL AREA(ACRES) = 0.28 TOTAL RUNOFF(CFS) = 1.61

FLOW PROCESS FROM NODE 262.00 TO NODE 262.00 IS CODE = 1

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

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

=====TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 3.63

RAINFALL INTENSITY(INCH/HR) = 6.85

TOTAL STREAM AREA(ACRES) = 0.28

PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.61

** CONFLUENCE DATA **

STREAM RUNOFF Tc INTENSITY AREA

NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)

1 69.62 16.37 3.188 36.28

2 1.61 3.63 6.850 0.28

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO

CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	17.03	3.63	6.850
2	70.37	16.37	3.188

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 70.37 Tc(MIN.) = 16.37

TOTAL AREA(ACRES) = 36.6

LONGEST FLOWPATH FROM NODE 130.00 TO NODE 262.00 = 3728.00 FEET.

FLOW PROCESS FROM NODE 300.00 TO NODE 301.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .3500

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 10.00

UPSTREAM ELEVATION(FEET) = 70.00

DOWNSHIFT STREAM ELEVATION(FEET) = 60.00

ELEVATION DIFFERENCE(FEET) = 10.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 1.982

WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.850

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 0.48

TOTAL AREA(ACRES) = 0.20 TOTAL RUNOFF(CFS) = 0.48

FLOW PROCESS FROM NODE 301.00 TO NODE 302.00 IS CODE = 62

----->>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 3 USED)<<<<

=====UPSTREAM ELEVATION(FEET) = 60.00 DOWNSTREAM ELEVATION(FEET) = 49.00

STREET LENGTH(FEET) = 395.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 15.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00

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) = 0.0160

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0160

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.49

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.24

HALFSTREET FLOOD WIDTH(FEET) = 5.82

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.73

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.66

STREET FLOW TRAVEL TIME(MIN.) = 2.41 Tc(MIN.) = 4.40

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.850

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .6600

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.603

SUBAREA AREA(ACRES) = 0.89 SUBAREA RUNOFF(CFS) = 4.02

TOTAL AREA(ACRES) = 1.1 PEAK FLOW RATE(CFS) = 4.50

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.28 HALFSTREET FLOOD WIDTH(FEET) = 7.77

FLOW VELOCITY(FEET/SEC.) = 3.12 DEPTH*VELOCITY(FT*FT/SEC.) = 0.88

LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 405.00 FEET.

FLOW PROCESS FROM NODE 302.00 TO NODE 309.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====
ELEVATION DATA: UPSTREAM(FEET) = 48.00 DOWNSTREAM(FEET) = 45.00

FLOW LENGTH(FEET) = 205.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 15.0 INCH PIPE IS 8.4 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 6.33

ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 4.50

PIPE TRAVEL TIME(MIN.) = 0.54 Tc(MIN.) = 4.94

LONGEST FLOWPATH FROM NODE 300.00 TO NODE 309.00 = 610.00 FEET.

FLOW PROCESS FROM NODE 309.00 TO NODE 310.00 IS CODE = 81

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.850

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .7600

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.6551

SUBAREA AREA(ACRES) = 0.54 SUBAREA RUNOFF(CFS) = 2.81

TOTAL AREA(ACRES) = 1.6 TOTAL RUNOFF(CFS) = 7.31

TC(MIN.) = 4.94

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.6 TC(MIN.) = 4.94

PEAK FLOW RATE(CFS) = 7.31

END OF RATIONAL METHOD ANALYSIS

Appendix D

HYDRAULIC CALCULATIONS



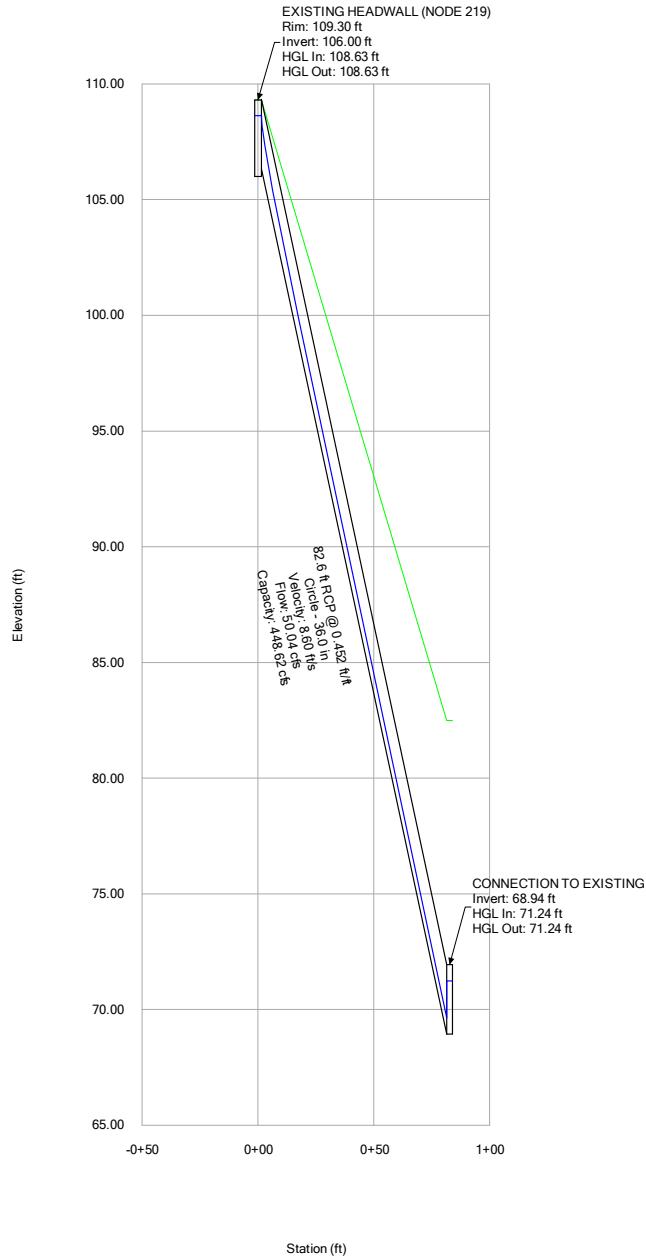
THE HOME DEPOT - MISSION VALLEY

PUBLIC STORM SEWER

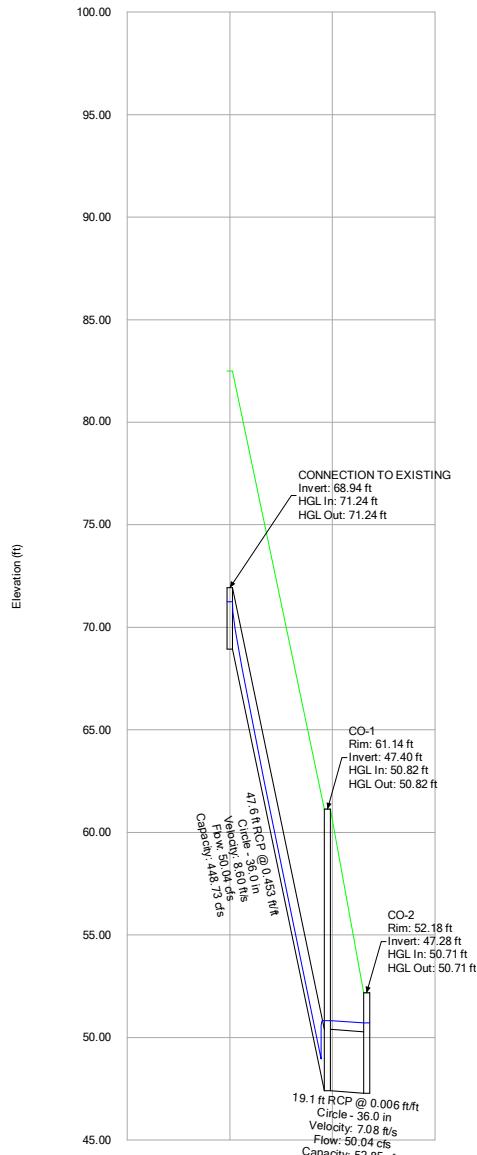
Active Scenario: 50-YEAR

Label	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
1	EXISTING HEADWALL (NODE 219)	CONNECTION TO EXISTING	106.33	68.94	82.6	0.452	36.0	0.013	50.04	41.90	0.71	448.62	108.63	69.65
2	CONNECTION TO EXISTING	CO-1	68.94	47.40	47.6	0.453	36.0	0.013	50.04	41.91	3.42	448.73	71.24	50.82
3	CO-1	CO-2	47.40	47.28	19.1	0.006	36.0	0.013	50.04	7.08	3.43	52.85	50.82	50.71
4	CO-2	CO-3	47.28	45.01	388.4	0.006	36.0	0.013	50.04	7.08	3.52	50.99	50.71	48.53
5	CO-3	CO-4	45.01	44.33	42.4	0.016	36.0	0.013	50.04	7.08	3.96	84.50	48.53	48.29
6	CO-4	CO-5 (NODE 220)	44.33	42.60	263.7	0.007	36.0	0.013	50.04	7.08	4.20	54.02	48.29	46.80
7	CO-5 (NODE 220)	DEFLECTION 1	42.60	41.12	230.0	0.006	36.0	0.013	55.37	7.83	4.10	53.50	46.80	45.22
8	DEFLECTION 1	PROP CLEANOUT CONNECTION	41.12	40.93	31.5	0.006	36.0	0.013	55.37	7.83	4.07	51.81	45.22	45.00

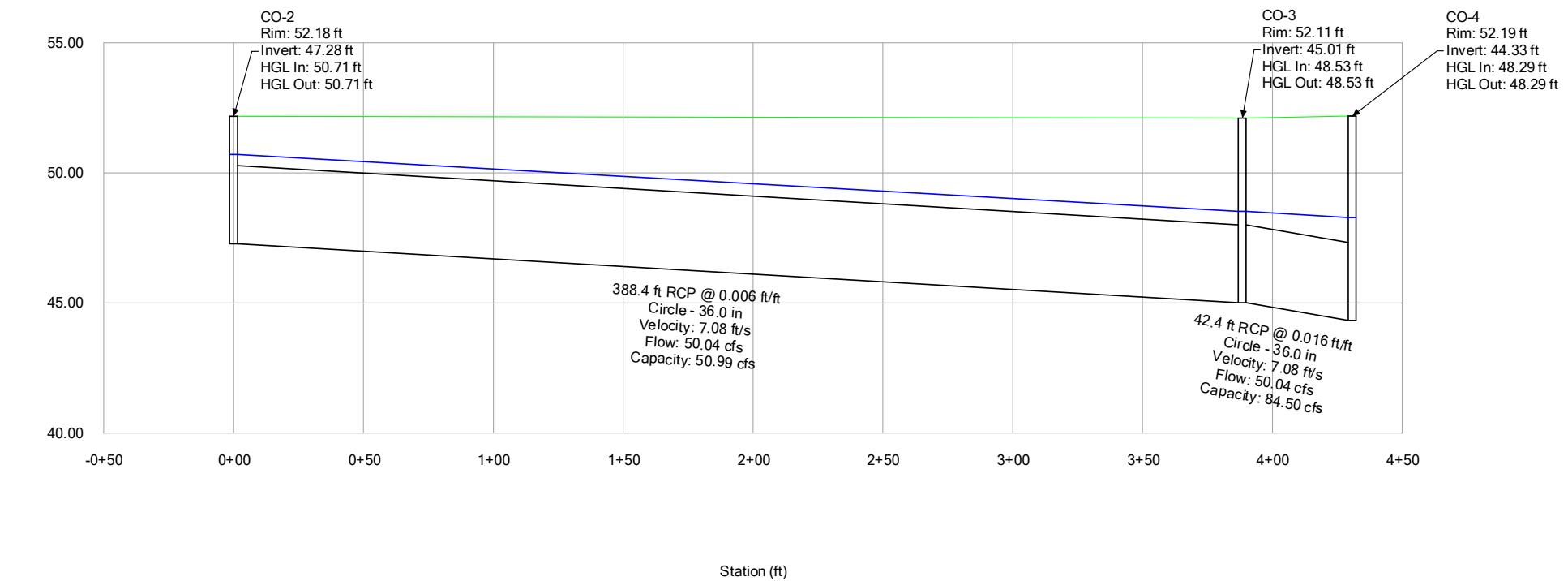
THE HOME DEPOT - MISSION VALLEY
PUBLIC STORM SEWER
Active Scenario: 50-YEAR



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