Appendix E

Preliminary Hydrology Report

PRELIMINARY HYDROLOGY REPORT

Lewis Center of Educational Research Norton Science and Language Academy San Bernardino Campus

APN: 0136-261-11, 0136-261-23, 0136-261-24, 0136-261-25, 0136-261-26, 0136-261-27, 0136-261-28, 0136-261-29, 0136-261-36, 0136-261-37, 0136-261-41, 0136-261-42, 0136-261-43, 0136-261-44, 0136-261-50, AND 0136-261-57

September 2019

PREPARED FOR:

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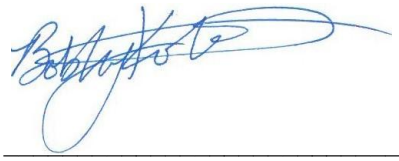
KHA Project # 194144001

Certification by Engineer or Authorized Qualified Designee

I certify under penalty of law that this document and all attachments were prepared under my jurisdiction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathered the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



09/23/2019

Bobby Kohltfarber, PE Date

Contents

References

Hydrology Manual. San Bernardino County, August 1986.

Section 100

100.0 Introduction

Kimley-Horn and Associates has been retained to prepare a Preliminary Drainage Study for the proposed Lewis Center of Educational Research Norton Science and Language Academy San Bernardino Campus Elementary, High School, and Head Start Preschool. The 17.86-acre site is located on the northwest corner of the intersection of Waterman Avenue and Valley Street in the City of San Bernardino, San Bernardino County. The project site encompasses Parcel 1 and Parcel 3 of Tentative Parcel Map 20120. The APNs for the project site are 0136-261-11, 0136-261-23, 0136-261-24, 0136-261-25, 0136-261-26, 0136-261-27, 0136-261-28, 0136-261-29, 0136-261-36, 0136-261-37, 0136-261-41, 0136-261-42, 0136-261-43, 0136-261-44, 0136-261-50, and 0136-261-57. Figure 1-1 contains an aerial photograph that depicts the project location.

In the proposed condition, Parcel 1 will not be phased. Parcel 1 will consist of 9 one-story buildings, 2 two-story buildings, and a gymnasium. The total building area is approximately 89,890 square feet. Parcel 1 will also include landscaping, concrete hardscape, and asphalt parking, the proposed soccer, football and track field, quad areas, and basketball courts.

Parcel 3 for the project will not be phased. Parcel 3 will encompass the proposed 16,855 square foot square Head Start Preschool, with associated landscaping, concrete hardscape, and asphalt parking.

The purpose of this report is to provide information regarding the Storm Water Management System (SWMS) design for the proposed development. This investigation was conducted to evaluate the hydrologic conditions in the existing and proposed conditions of the site. Hydraulic calculations to determine the sizing requirements for the proposed on-site drainage system will be provided in the Final Drainage Study.

Due to the nature of the project, this report will be accompanied by a WQMP. The project proposes to install infiltration basins for the proposed development, following the current NPDES General Permit. The proposed infiltration will be part of Parcel 1. The proposed infiltration basins will treat drainage from both Parcel 1 and Parcel 3. Since the proposed site is a zero-discharge site drainage, the proposed development is not expected to generate additional run-off downstream. There will be no off-site drainage conveyed through the site. Any off-site drainage will be captured and conveyed to Allen Street. Therefore, a hydrology analysis for off-site drainage was not completed. The existing site is approximately 0% impervious. Once developed, Parcel 1 will be approximately 57% impervious and Parcel 3 will be approximately 69% impervious.

100.1 Project Description

The proposed project consists of a proposed Elementary, High School, Gymnasium, track and field, and a Head Start Preschool, with associated commercial landscaping, concrete hardscape and asphalt paving parking. The proposed landscaping will consist of trees, shrubs and drought tolerant native ground cover.

Land use at the proposed site will include indoor food preparation, cooking, indoor and outdoor eating areas, play areas, and classrooms. The proposed project will also include trash enclosures. Expected waste will include food, grease from cooking, trash, and debris.

100.2 Location

The site is located on the northwest corner of the intersection of Waterman Avenue and Valley Street in the City of San Bernardino, San Bernardino County. The project is bounded by Waterman Avenue to the east, an existing school to the north, Allen Street to the west, and Valley Street to the south.

For reference, see **Appendix A**, *Location Map*.

100.3 Methodology

This Hydrology Report is intended to comply with the requirements of the San Bernardino County Hydrology Manual to assist in the proposed development of the existing site into the proposed Lewis Center of Educational Research Norton Science and Language Academy San Bernardino Campus Elementary, High School, and Head Start Preschool. The report includes existing and proposed condition hydrologic analysis to determine if the proposed development's run-off will have any impact on downstream properties.

A rational method analysis for the 10-year and 100-year events in accordance with the San Bernardino Hydrology Manual (SBC, 1986) and the 2010 Addendum was completed to calculate the peak discharges for the existing and proposed project conditions. The combination of the soil and coverage type was used as the basis for selecting the appropriate curve numbers used to calculate the soil loss rate. See Appendix G Figure C-2 and C-3 for curve numbers based on hydrologic soil conditions for pervious areas.

Per the 2010 San Bernardino County Hydrology Manual Addendum, arid regions within San Bernardino County should use NOAA Atlas 14 rainfall atlas and the associated data base (NOAA, 2006) or other local rainfall gauge data for hydrology studies. After review of available data, the NOAA Atlas 14 rainfall data was chosen for this. NOAA Atlas 14 also provides information for the various peak durations required to complete the hydrology analysis for the current study.

According to NOAA Atlas 14, the following are the 1 hour-storm precipitation values that have been utilized for our study:

10-year storm 1-hour intensity (inch/hour)	=	0.835
100-year storm 1-hour intensity (inch/hour)	=	1.32

Appendix G contains the site specific tabular output from NOAA Atlas 14.

The type of soil and soil conditions are major factors affecting infiltration/detention and resultant storm water runoff. The Natural Resources Conservation Service (NRCS) has classified soil into one general hydrologic soil group for comparing infiltration and runoff rates. The group is based on properties that influence runoff, such as water infiltration rate, texture, natural discharge and moisture condition. The runoff potential is based on the amount of runoff at the end of a long duration storm that occurs after wetting and swelling of the soil not protected by vegetation. Using the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey online tool and the

Stormwater Facility Mapping online tool for San Bernardino County, it was determined the hydrologic soil group classification is A. Soil group A is defined as soils having good infiltration rates (low runoff potential). These soils have a good rate of water transmission. See Appendix A for Web Soil Survey

In addition, antecedent moisture condition (AMC) II was used to calculate the 10-year and AMC III or the100-year peak flows based on the AMC map (Figure ADD-1) published with the 2010 addendum. The land use for the drainage area was selected based on the percent pervious that represents the area for the proposed conditions, as shown on Appendix G Figure C-4. The Advance Engineering Software (AES) Hydrosoft package was used to complete the rational method analysis. The results of the rational method analysis are included in Appendix D and E.

100.4 Drainage Characteristics

The site is located in Zone X per the Federal Emergency Management Administration (FEMA) Flood Insurance Rate Map (FIRM) panel 06071C8682J, dated September 2, 2016. Flood Zone X is defined by FEMA as the area determined to be outside the 500-year flood. No portion of the site is located within the special flood hazard area inundated by the 100-year flood.

For reference, see **Appendix B**, *FIRM Map.*

100.4.1 Pre-development Condition

The existing condition of the project site is predominantly vacant, with existing residential development encompassing only a minor portion of the project area. Currently, there is existing storm drain infrastructure along Waterman Avenue, east of the project site, but our project site is currently not tributary to the existing system. Under existing conditions, the project site is composed of two (2) drainage areas. DA-1 drains south-west to Allen Street. DA-2 flows south-west to Valley Street. Storm water flows in a south-west direction and confluences at the intersection of Allen and Valley Street through a cross gutter. Flows continue south along Allen Street, then drain into Twin Creek Channel and ultimately reach the Santa Ana River.

Table 1 shows a summary of the pre-development flows for 10 and 100-year storm events.

Table 1: Existing Hydrology Results

Sub-basin ID	Drainage Area (AC)	Q_{10} (cfs)	Q_{100} (cfs)
DA-1	14.28	12.30	27.79
DA-2	3.58	3.80	8.10
Confluence Flows	17.86	16.09	34.94

See **Appendix D**, *Existing Hydrology Exhibit and Calculations*.

100.4.2 Post-development Condition

The proposed development includes the construction of an Elementary, High School, and Head Start Preschool. The proposed development is located in Parcel 1 and Parcel 3 of TPM 20120. In the proposed condition, Parcel 1 will not be phased. Parcel 1 will consist of 9 one-story buildings, 2 two-story buildings, and a gymnasium. The total building area is approximately 89,890 square feet. Parcel 1 will also include landscaping, concrete hardscape, and asphalt parking, the proposed soccer, football and track field, quad areas, and basketball courts. Parcel 3 for the project will not be phased. Parcel 3 will encompass the proposed 16,855 square foot square Head Start Preschool, with associated landscaping, concrete hardscape, and asphalt parking. See Appendix C for CUP 19-10 which includes the project Site Plan and Preliminary Grading Plan.

The preliminary grading proposed for both Parcel 1 and Parcel 3 will maintain to the maximum extent possible the natural flow pattern of the existing site which drains in the south-west direction. Storm water flows from all phases will be routed to three infiltration basins for storm water mitigation. The proposed infiltration basins are located on the east side of the project area, adjacent to the track and field are, and will be part of Parcel 1.

The post-development drainage areas are comprised of nine (9) drainage areas. Drainage Areas DA-3, DA-4, DA-5, DA-6, DA-7, DA-8, and DA-9 are all within Parcel 1. All drainage from these seven (7) drainage areas will sheet flow through the site and will be intercepted by the proposed inlets located at low points as shown in the Drainage Exhibit. All drainage collected from the inlets will be routed to two infiltration basins connected by an earthen v-ditch. The proposed infiltration basins BMP-1A and BMP-1B, will be sized to treat the additional storm water volume generated from the proposed development in Parcel 1. Drainage Areas DA-1 and DA-2 are within Parcel 3. Storm water drainage from DA-2 and DA-1 will sheet flow through the site and will be intercepted by proposed inlets located at low points as shown in the Drainage Exhibit. All drainage collected from the inlets will be routed to an infiltration basin located above the track and field (northeast corner of the track and field). The proposed infiltration basin BMP-2 will be located within Parcel 1. The proposed infiltration basin will be sized to treat the additional storm water volume generated from the proposed development in Parcel 3.

Table 2 shows a summary of the post-development flows for 10 and 100-year storm events. When comparing the confluence flows from the proposed condition to the existing condition, the proposed condition is expected to increase the peak flows by 5.35 cfs under the 100-year storm event. The peak flows will be attenuated under the proposed condition using the infiltration basins in order to have a zero-discharge site under for any storm event smaller than the 100-year event. Basin routing calculations showing the attenuation will be provided in the Final Drainage Study.

Small area unit hydrographs were analyzed to determine the storm water volume difference between the proposed and existing conditions. The difference between existing and proposed conditions is a volume of 19,166 cubic feet, per the calculations provided in Appendix E. The basin has been sized to capture the design capture volume (DCV) required for water quality purposes. The DCV is 39,262 cubic feet, which exceeds the 19,166 cubic feet increase in volume that would need to be mitigated based on the 100-year condition. Basin storage calculations are included in Appendix E for reference.

Table 2 shows a summary of the post-development flows for 10 and 100-year storm events.

Table 2: Proposed Hydrology Results

Sub-basin ID	Drainage Area (AC)	Q_{10} (cfs)	Q_{100} (cfs)
DA-1	15.62	18.31	34.98
DA-2	2.24	3.00	5.57
Confluence Flows	17.86	21.19	40.29

See **Appendix E**, *Proposed Drainage Exhibit and Calculations*.

100.5 Storm Water Mitigation

The propose development is proposing infiltration basins for storm water mitigation. The proposed infiltration basins were sized to treat the design capture the volume (DCV), as outlined in the WQMP, and to retain the storm water volume required to not create any adverse impacts downstream. Once the infiltration basins exceed their capacity, the flows will spill over the emergency over-flow spillway and continue flowing south as is the case under the existing site conditions. The required DVC for the project is 39,262 c.f. and the volume required to be detained based on the 100-year storm event is 19,166 c.f. The proposed basins have a total volume of 52,090 c.f., which satisfies the volume requirements for both water quality and storm water mitigation. The proposed development will not increase peak discharges currently exiting the site under the 100-year storm event since the site is a zero-discharge site.

100.6 Conclusion

The development of the existing vacant site into the proposed Lewis Center of Educational Research Norton Science and Language Academy San Bernardino Campus Elementary, High School, and Head Start Preschool will not create any adverse impacts downstream by not increasing the storm water peak flow rates and volumes discharging from the site under existing conditions. Instead, the site will be a zero-discharge site in both the 10-year and 100-year storm events through the addition of infiltration basins onsite. Under the proposed development, the storm water will be routed to the proposed infiltration basins to attenuate peak flows, detain storm water volumes, and provide water quality treatment.

Appendix A

Vicinity Map


E Rialto Ave
S Irwin St
San Felipe Rd
E Julia St
S Allen St
S Waterman Ave
PROJECT AREA
S Dorothy St
E Cluster St
E Valley St
Google Earth
© 2018 Google
900 ft
N

Appendix B

FEMA Map

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11 North. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by the San Bernardino County ISD.GIS Department, United States Geological Survey, the Bureau of Land Management, the United States Department of Agriculture, and the National Geodetic Survey. The imagery was flown by U.S. Department of Agriculture Farm Sevice Agency in 2012 and was produced with a 1-meter ground sampling distance.

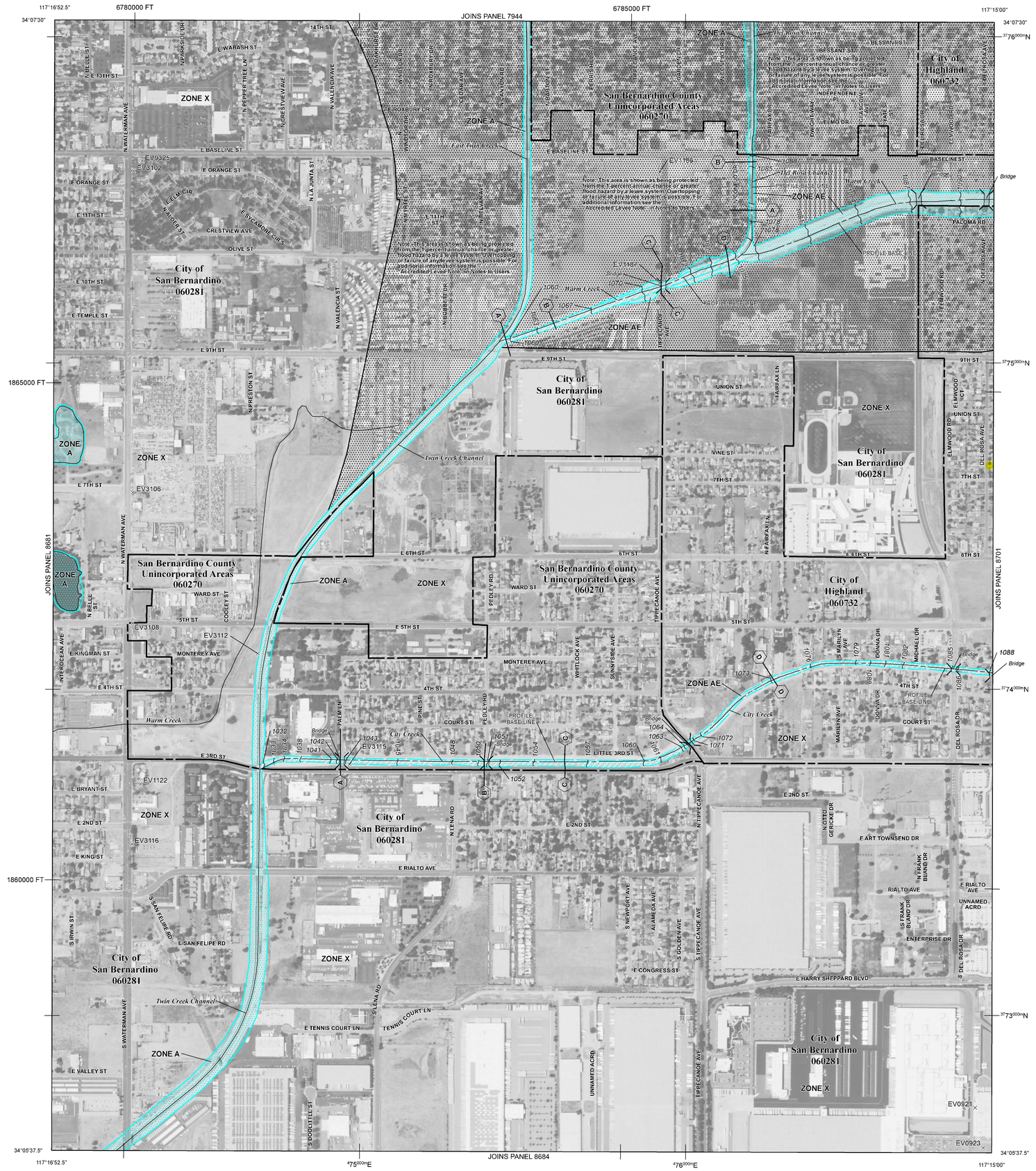
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

ACCREDITED LEVEE NOTES TO USERS: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA website at http://www.fema.gov/business/nfip/index.shtm.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*
* Referenced to the North American Vertical Datum of 1988
A — A — Cross section line
23 — 23 — Transect line
97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4775000mE — 1000-meter Universal Transverse Mercator grid values, zone 11
6000000 FT — 5000-foot grid ticks: California State Plane coordinate system, Zone V (FIPSZONE = 405), Lambert projection
DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories List on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
August 28, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
September 2, 2016 – to change Base Flood Elevations, to add Base Flood Elevations, to change Special Flood Hazard Areas, to add Special Flood Hazard Areas, to change zone designations, to incorporate previously issued Letters of Map Revision, and to reflect updated topographic information.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 250 500 750 1,000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 8682J

FIRM

FLOOD INSURANCE RATE MAP

SAN BERNARDINO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 8682 OF 9400

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HIGHLAND, CITY OF	060732	8682	J
SAN BERNARDINO, CITY OF	060281	8682	J
SAN BERNARDINO COUNTY	060270	8682	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06071C8682J

MAP REVISED
SEPTEMBER 2, 2016

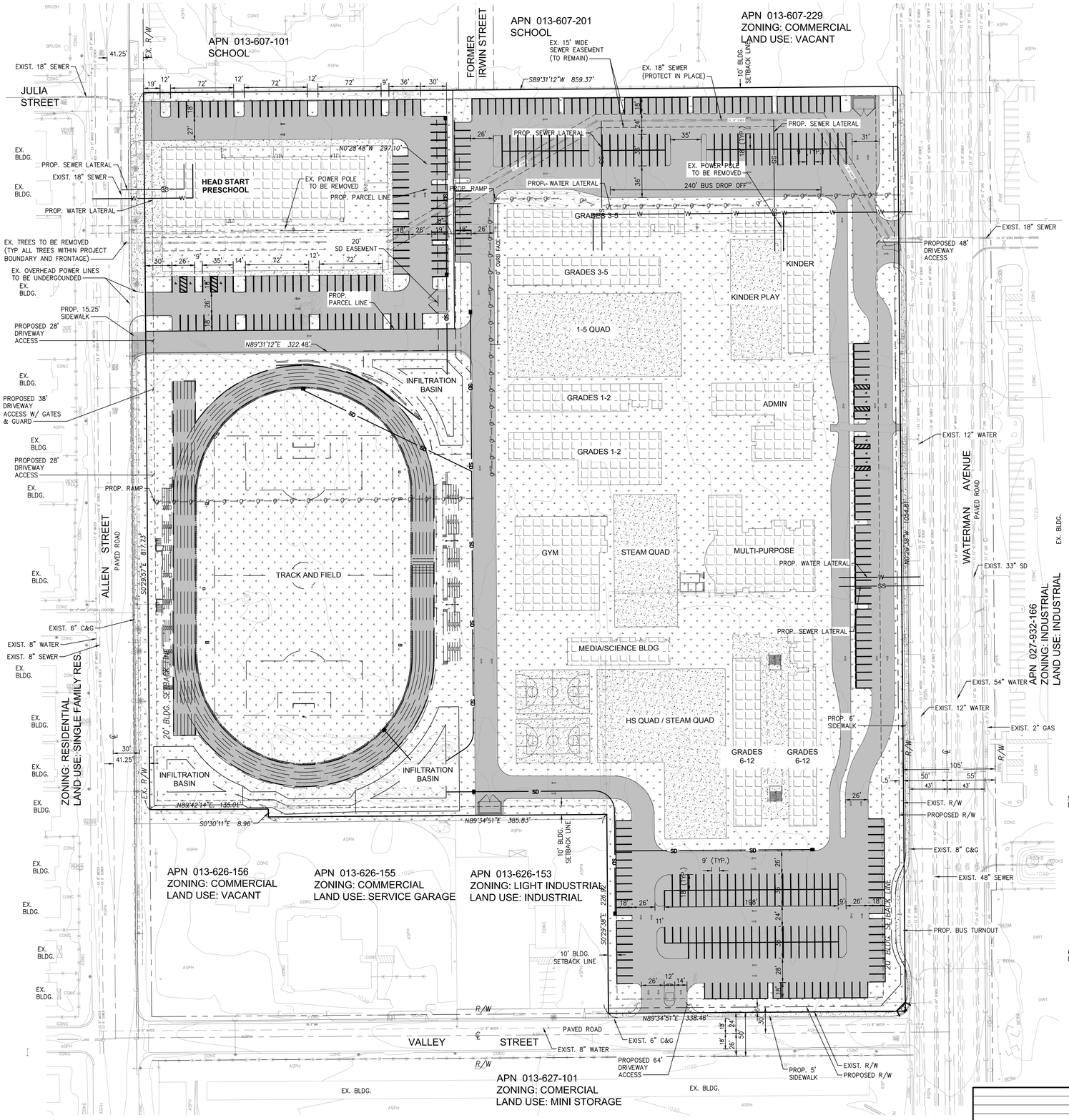
Federal Emergency Management Agency

Appendix C

CUP 19-10

CONDITIONAL USE PERMIT NO. 19-10 FOR WATERMAN SCHOOL HIGHMARK
CITY OF SAN BERNARDINO

OFFICIAL USE ONLY



DENSITY CALCULATIONS TABLE

ITEM	PARCEL I AREA = 95,823 SF 2.77 AC EXISTING	PROPOSED	PERCENTAGE	PARCEL III AREA = 690,794 SF 15.86 AC EXISTING	PROPOSED	PERCENTAGE
PAVED AREA	0 SF	43,736 SF	45.6%	0 SF	178,232 SF	25.8%
LANDSCAPED AREA	0 SF	31,417 SF	32.8%	0 SF	382,204 SF	55.3%
BUILDINGS AREA	0 SF	17,179 SF	18.0%	0 SF	87,890 SF	12.7%
PARKING COUNT	0	106	--	0	309	--

AREA TABLE

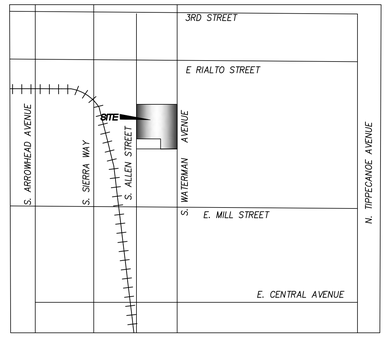
GROSS AREA	786,616 SF	18.05 ACRES (16 PARCELS)
R/W DEDICATIONS	8513 SF	0.20 ACRES
(NOT A PART) PARCEL	95822 SF	2.20 AC
NET CUP AREA	682,281 SF	15.66 AC NET
PHASE 1 AREA	169,834 SF	3.90 AC
PHASE 1A AREA	168,081 SF	3.86 AC
PHASE 2 AREA	344,124 SF	7.90 AC

LEGEND:

- SUBJECT PROPERTY
- LOT LINE
- SETBACK LINE
- RIGHT OF WAY LINE
- CENTERLINE
- EASEMENT LINES
- EXISTING GAS
- EXISTING TELECOM
- EXISTING SANITARY SEWER
- EXISTING WATER
- EXISTING STORM DRAIN
- EXISTING OVERHEAD ELECTRIC
- EXISTING TOPO MAJOR
- EXISTING TOPO MINOR
- EXISTING WATER METER
- EXISTING ELECTRIC VAULT
- EXISTING POWER POLE
- EXISTING FIRE HYDRANT
- PROPOSED BUILDING
- PROPOSED STORM DRAIN
- PROPOSED SANITARY SEWER
- PROPOSED TOPO MAJOR
- PROPOSED TOPO MINOR
- PROPOSED GRADE BREAK LINE
- PROPOSED STORM DRAIN INLET
- PROPOSED SEWER MANHOLE
- PROPOSED CONCRETE WALK
- PROPOSED AC PAVEMENT
- PROPOSED BUILDING
- PROPOSED LANDSCAPING
- PROPOSED ADA PATH OF TRAVEL
- PROPOSED WATER LATERAL

ABBREVIATIONS:

APN	ASSESSOR'S PARCEL NUMBER
ASPH	ASPHALT
C&G	CURB AND GUTTER
COM	COMMUNICATION PULLBOX
CONC	CONCRETE
COR	CORNER
CY	CUBIC YARDS
DWG	DRAWING
E	EAST
EC	EDGE OF CONCRETE
ESMT	EASEMENT
ET	ELECTRICAL TRANSFORMER
EV, EVLT	ELECTRICAL VAULT
EX	EXISTING
FD	FOUND
FEMA	FEDERAL EMERGENCY MANAGEMENT AGENCY
FH	FIRE HYDRANT
FNC	FENCE
GB	GRADE BREAK
GM	GAS METER
IL	INDUSTRIAL LIGHT
INST	INSTRUMENT
INT	INTERSECTION
IPB	IRRIGATION PULLBOX
LP	LOW POINT
LS	LAND SURVEYOR
LTP	LIGHT POLE
MB	MAP BOOK
MKD	MARKED
N	NORTH
NE	NORTHEAST
NTS	NOT TO SCALE
NW	NORWTHEST
OHE	OVERHEAD ELECTRICAL
OIP	OFFICE INDUSTRIAL PARK
OR	OFFICIAL RECORDS
PB	PULLBOX
PIV	POST INDICATOR VALVE
PL	PROPERTY LINE
PP	POWER POLE
PROP	PROPOSED
REL	RELOCATED
REM	REMOVED
RS	RECORD OF SURVEY
R/W	RIGHT OF WAY
S	SOUTH
SB	SAN BERNARDINO
SD	STORM DRAIN
SDCB	STORM DRAIN CATCH BASIN
SDMH	STORM DRAIN MANHOLE
SFN	SEARCHED, FOUND NOTHING
SLPB	STREET LIGHT PULLBOX
SOCAL	SOUTHERN CALIFORNIA
SWR	SEWER
SMH	SEWER MANHOLE
TC	TOP OF CURB
TMH	TELEPHONE MANHOLE
TSPB	TRAFFIC SIGNAL PULLBOX
TYP	TYPICAL
W	WEST
W'LY	WESTERLY
WM	WATER METER



VICINITY MAP
NOT TO SCALE

NOTES

BUILDING SQUARE FOOTAGE = 48,636 SF
EXISTING ZONING: 62% INDUSTRIAL
38% RESIDENTIAL
PROPOSED ZONING: SCHOOL
EXISTING LAND USE: VACANT
PROPOSED LAND USE: SCHOOL

SEWER SERVICE

SAN BERNARDINO PUBLIC WORKS DEPT.
234 SOUTH MT. VIEW
SAN BERNARDINO, CA 92408
(909) 384-5519

GAS SERVICE

SOCAL GAS COMPANY
155 SOUTH G ST.
SAN BERNARDINO, CA 92410
(909) 335-7908

PHONE SERVICE

AT&T
4394 N. UNIVERSITY PKWY AVE. # A
SAN BERNARDINO, CA 92407
(800) 288-2020

NOTE:

SEE SHEET 2 FOR LEGAL DESCRIPTION, EASEMENT NOTES, AND EXISTING PARCEL LINES.

GRADING QUANTITIES

CUT: 19,704 CY
FILL: 19,704 CY
NET: 0 CY

WATER SERVICE

SAN BERNARDINO MUNICIPAL WATER DEPT.
300 NORTH D ST.
SAN BERNARDINO, CA 92401
(909) 384-5141

ELECTRICAL SERVICE

SOUTHERN CALIFORNIA EDISON
7951 REDWOOD AVE.
FONTANA, CA 92336
(909) 357-6116

CABLE SERVICE

SPECTRUM
1078 E. HOSPITALITY LANE # D
SAN BERNARDINO, CA 92408
(888) 892-2253

ASSESSOR'S PARCEL NUMBERS:

0136-261-11, 0136-261-23, 0136-261-24, 0136-261-25, 0136-261-26, 0136-261-27, 0136-261-28, 0136-261-29, 0136-261-36, 0136-261-37, 0136-261-41, 0136-261-42, 0136-261-43, 0136-261-44, 0136-261-50, 0136-261-57.

OWNER OF RECORD

WATERMAN LAND VENTURES, LLC.
4450 MacARTHUR BLVD., SUITE 100
NEWPORT BEACH, CA 92660
WWW.REDALLC.COM
(949) 743-1463

APPLICANT

LEWIS CENTER FOR EDUCATIONAL RESEARCH
c/o LISA LAMB - PRESIDENT/CEO
17500 MANA ROAD
APPLE VALLEY, CA 92307
LLAMB@LCER.ORG.
(760) 946-5414

MAP PREPARER

KIMLEY-HORN AND ASSOCIATES
3880 LEMON STREET, SUITE 420
RIVERSIDE, CA 92501
BOBBY KOHLTFARBER, PE
(951) 543-9870

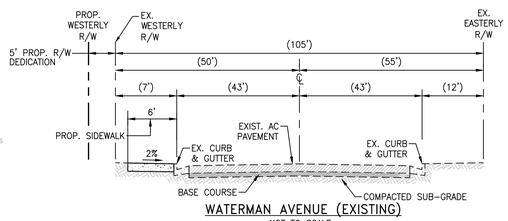
MAP PREPARATION DATE

9/18/2019

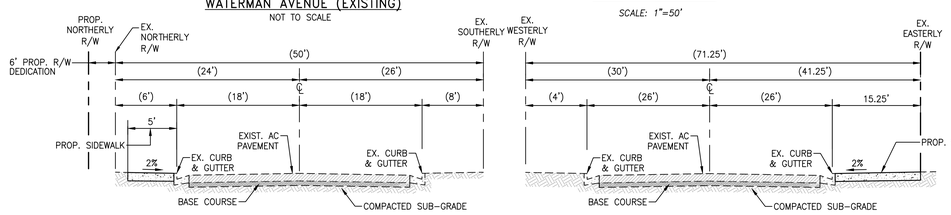
MAP REVISION DATE

REGISTERED PROFESSIONAL ENGINEER BOBBY KOHLTFARBER No. C68141 CIVIL STATE OF CALIFORNIA

EXPIRATION DATE: JUNE 30, 2019



WATERMAN AVENUE (EXISTING)
NOT TO SCALE



VALLEY STREET (EXISTING)
NOT TO SCALE

ALLEN STREET (EXISTING)
NOT TO SCALE

GRAPHIC SCALE IN FEET
0 25 50 100
SCALE: 1"=50'

			SCALE: 1"=50'
			DATE: 05/2019
			DESIGNED: RS
			CHECKED: BK
			PLN CK REF:
REVISIONS	DATE	BY	F.B.

Kimley»Horn
3880 LEMON STREET, SUITE 420, RIVERSIDE, CA 92501
PHONE: 951-543-9868
WWW.KIMLEY-HORN.COM

CONDITIONAL USE PERMIT NO. 19-10 FOR WATERMAN SCHOOL HIGHMARK

CITY OF SAN BERNARDINO

W.O. 194144001
SHEET 1
OF 4 SHEETS
DWG. NO.

ASSESSOR'S PARCEL NUMBERS

APN: 0136-261-23-0-000

SITE ADDRESS

234 S WATERMAN AVE

LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

ALL THAT PORTION OF THE NORTHERLY 3 ACRES OF LOTS 3 AND 10 IN BLOCK 7 OF THE RANCHO SAN BERNARDINO, AS PER PLAT RECORDED IN BOOK 7 OF MAPS, PAGE 2, RECORDS OF SAID COUNTY,

EXCEPTING THEREFROM THE WESTERLY 528 FEET THEREOF.

SAID LAND MORE PARTICULARLY DESCRIBED AS FOLLOWS: BEGINNING AT THE NORTHEAST CORNER OF SAID TRACT; THENCE WEST TO THE NORTHWEST CORNER OF SAID TRACT; THENCE SOUTH ALONG THE WEST LINE OF SAID TRACT TO A POINT 50 FEET NORTH OF THE SOUTH LINE OF SAID TRACT; THENCE EAST 165 FEET; THENCE NORTH TO A POINT 20 FEET SOUTH OF THE NORTH LINE OF SAID TRACT; THENCE AST TO A POINT ON THE EAST LINE OF SAID TRACT 20 FEET SOUTH OF THE POINT OF BEGINNING; THENCE NORTH TO THE POINT OF BEGINNING.

ALSO EXCEPTING THE EAST 8.75 FEET OF THE NORTH 20.00 FEET DEEDED TO THE CITY OF SAN BERNARDINO FOR ROAD PURPOSES IN DEED RECORDED MARCH 25, 1968, BOOK 6996, PAGE 793, OFFICIAL RECORDS.

TITLE REPORT EXCEPTIONS:

THE FOLLOWING EASEMENTS, STATEMENTS AND MATTERS AS DISCLOSED IN FIDELITY NATIONAL TITLE INSURANCE COMPANY COMMITMENT FOR TITLE INSURANCE ORDER NO.: 012-23087557-SG4 DATED SEPTEMBER 19, 2016.

NO RESPONSIBILITY FOR COMPLETENESS, ACCURACY OR CONTENT OF SAID COMMITMENT FOR TITLE INSURANCE IS ASSUMED BY THIS MAP.

⟨1⟩ 1. WATER RIGHTS, CLAIMS OR TITLE TO WATER, WHETHER OR NOT DISCLOSED BY THE PUBLIC RECORDS.

⟨2⟩ 2. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: SOUTHERN CALIFORNIA EDISON COMPANY, A CORPORATION, ITS SUCCESSORS AND ASSIGNS
PURPOSE: PUBLIC UTILITIES
RECORDING DATE: SEPTEMBER 13, 1954, BOOK 3462, PAGE 76, OFFICIAL RECORDS
AFFECTS: THE NORTHERLY 6 FEET OF THE EASTERLY 140 FEET OF LOT 3, BLOCK 7, RSB
(EASEMENT PLOTTED HEREON AS ⟨A⟩)

⟨3⟩ 3. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: SOUTHERN CALIFORNIA EDISON COMPANY, A CORPORATION, ITS SUCCESSORS AND ASSIGNS
PURPOSE: PUBLIC UTILITIES
RECORDING DATE: AUGUST 1, 1955, BOOK 3703, PAGE 547, OFFICIAL RECORDS
AFFECTS: THE NORTH 6 FEET OF THE EAST 145 FEET OF LOT 3, BLOCK 7, RSB
(EASEMENT PLOTTED HEREON AS ⟨B⟩)

⟨4⟩ 4. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: SOUTHERN CALIFORNIA EDISON COMPANY, A CORPORATION, ITS SUCCESSORS AND ASSIGNS
PURPOSE: PUBLIC UTILITIES
RECORDING DATE: DECEMBER 28, 1990, INSTRUMENT NO. 90-0509197, OFFICIAL RECORDS
AFFECTS: AS DESCRIBED THEREIN
(EASEMENT PLOTTED HEREON AS ⟨C⟩)

ASSESSOR'S PARCEL NUMBERS

APN: 0136-261-24-0-000

SITE ADDRESS

232 S WATERMAN AVE

LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

THAT PORTION OF LOT 3, BLOCK 7, OF RANCHO SAN BERNARDINO, AS PER PLAT RECORDED IN BOOK 7, PAGE 2 OF MAPS, RECORDS OF SAID COUNTY, DESCRIBED AS:

BEGINNING AT A POINT ON THE EAST LINE OF SAID LOT 3, DISTANT SOUTH THEREON 20 FEET FROM THE NORTHEAST CORNER OF SAID LOT 3; THENCE WEST PARALLEL WITH THE NORTH LINE OF SAID LOT TO A POINT ON A LINE THAT IS PARALLEL WITH AND DISTANT EAST 693 FEET FROM THE WEST LINE OF LOT 10, SAID BLOCK 7; THENCE SOUTH ALONG SAID PARALLEL LINE TO A POINT ON A LINE THAT IS PARALLEL WITH AND DISTANT NORTH 50 FEET FROM THE SOUTH LINE OF THE NORTH 3 ACRES OF COMBINED LOTS 3 AND 10 OF SAID BLOCK 7; THENCE EAST ALONG SAID PARALLEL LINE TO A POINT ON THE EAST LINE OF SAID LOT 3; THENCE NORTH TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM THE EAST 8.75 FEET THEREOF AS CONVEYED TO THE CITY OF SAN BERNARDINO BY DEED RECORDED NOVEMBER 27, 1967 AS INSTRUMENT NO. 78, IN BOOK 6930, PAGE 31 OF OFFICIAL RECORDS.

APN: 0136-261-24-0-000

ASSESSOR'S PARCEL NUMBERS

APN: 0136-261-25-0-000; 0136-261-26-0-000; 0136-261-27-0-000

SITE ADDRESS

WATERMAN AVE

LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

THE NORTH 10 ½ ACRES OF COMBINED LOTS 3, 4, 9 AND 10, BLOCK 7, RANCHO SAN BERNARDINO, IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 7, PAGE 2 OF MAPS, RECORDS OF SAID COUNTY.

EXCEPT THEREFROM THE WEST 150 FEET OF THE NORTH 3 ACRES OF COMBINED LOTS 10 AND 3 OF SAID BLOCK 7.

ALSO EXCEPT THEREFROM THE EAST 2 ACRES OF THE SOUTH 5 ACRES OF THE NORTH 10 ½ ACRES OF SAID COMBINED LOTS 3, 4, 9 AND 10.

ALSO EXCEPT THEREFROM THAT PORTION DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT 15.95 FEET SOUTH OF THE NORTHWEST CORNER OF LOT 9, OF SAID BLOCK 7, RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER PLAT RECORDED IN BOOK 7, PAGE 2 OF MAPS, RECORDS OF SAID COUNTY; THENCE EASTERLY 135 FEET TO A POINT WHICH IS 16.24 FEET SOUTH OF THE NORTH LINE OF SAID LOT 9; THENCE SOUTH 8.86 FEET; THENCE WEST 135 FEET; THENCE NORTH 9.15 FEET TO THE POINT OF BEGINNING.

ALSO EXCEPT THEREFROM THAT PORTION DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHEAST CORNER OF SAID LOT 3; THENCE WEST ALONG THE NORTH LINE OF SAID LOT 3, A DISTANCE OF 347 FEET, MORE OR LESS, TO A POINT THAT IS 528 FEET EAST OF THE WESTERLY LINE OF SAID LOT 10; THENCE SOUTH PARALLEL WITH LINES OF SAID LOT 10 TO THE NORTHWEST CORNER OF THE LAND CONVEYED TO EDWARD L. FLEMING, ET UX., BY DEED RECORDED JULY 31, 1956 AS INSTRUMENT NO. 202, IN BOOK 4000, PAGE 212 OF OFFICIAL RECORDS OF SAID COUNTY; THENCE EAST ALONG THE NORTH LINE OF SAID FLEMING LAND TO THE NORTHEAST CORNER THEREOF; THENCE NORTH TO THE POINT OF BEGINNING.

ALSO EXCEPT THEREFROM THAT PORTION CONVEYED TO THE CITY OF SAN BERNARDINO BY DEED RECORDED FEBRUARY 23, 1968 AS INSTRUMENT NO. 747, IN BOOK 6979, PAGE 975 OF OFFICIAL RECORDS.

ALSO EXCEPT THEREFROM THE FOLLOWING:

ALL THAT CERTAIN PIECE OF PARCEL OF LAND BEING A PORTION OF LOTS 3, 4, 9 AND 10, BLOCK 7, RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER PLAT RECORDED IN BOOK 7, PAGE 2 OF MAPS, RECORDS OF SAID COUNTY AND BEING DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT IN THE EAST LINE OF ALLEN STREET, SAID POINT BEING ALSO IN THE WEST LINE OF LOT 10, BLOCK 7 OF SAID RANCHO SAN BERNARDINO, SAID POINT BEING SOUTH 1149.73 FEET FROM THE SOUTH LINE OF RIALTO AVENUE; THENCE SOUTH ALONG THE EAST LINE OF ALLEN STREET, BEING ALSO ALONG THE EST LINE OF LOTS 10 AND 9, BLOCK 7 OF RANCHO SAN BERNARDINO, 366.98 FEET TO THE NORTHWEST CORNER OF THE LAND CONVEYED TO ADAR BRANEN, ET UX., BY DEED RECORDED FEBRUARY 28, 1949 AS INSTRUMENT NO. 29, IN BOOK 2366, PAGE 126 OF OFFICIAL RECORDS OF SAID COUNTY; THENCE EASTERLY ALONG THE NORTHERLY LINE OF SAID LAST MENTIONED PROPERTY AND THE EASTERLY PROLONGATION THEREOF 520.39 FEET TO A POINT 347 FEET WEST OF THE WEST OF THE WEST LINE OF WATERMAN AVENUE BEING ALSO THE EAST LINE OF BLOCK 7 OF SAID RANCHO SAN BERNARDINO; THENCE NORTH AND PARALLEL WITH THE WEST LINE OF WATERMAN AVENUE, 366.98 FEET TO THE NORTH LINE OF LOTS 3 AND 10, BLOCK 7, RANCHO SAN BERNARDINO; THENCE WESTERLY ALONG THE NORTH LINE OF SAID LOTS 3 AND 10, 520.89 FEET TO THE POINT OF BEGINNING.

ALSO EXCEPT THEREFROM THE FOLLOWING:

THE EAST 378 FEET OF THE WEST 528 FEET OF THE NORTHERLY 150 FEET OF LOTS 3 AND 10 IN BLOCK 7 OF RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, AS PER PLAT RECORDED IN BOOK 7, PAGE 2 OF MAPS, RECORDS OF SAID COUNTY.

APN: 0136-261-25-0-000; 0136-261-26-0-000; 0136-261-27-0-000

TITLE REPORT EXCEPTIONS:

⟨1⟩ 1. WATER RIGHTS, CLAIMS OR TITLE TO WATER, WHETHER OR NOT DISCLOSED BY THE PUBLIC RECORDS.

⟨2⟩ 2. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: CALIFORNIA ELECTRIC POWER COMPANY
PURPOSE: PUBLIC UTILITIES
RECORDING NO: BOOK 1561, PAGE 408 OF OFFICIAL RECORDS
AFFECTS: A PORTION OF SAID LAND AS MORE PARTICULARLY DESCRIBED IN SAID DOCUMENT
(EASEMENT PLOTTED HEREON AS ⟨D⟩)

ASSESSOR'S PARCEL NUMBERS

APN: 0136-261-28

SITE ADDRESS

S WATERMAN AVE

LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

THE EAST 2 ACRES OF THE SOUTH 5 ACRES OF THE NORTH 10 ½ ACRES OF LOT(S) 3, 4, 9 AND 10 BLOCK 7 OF A 5 ACRE SURVEY OF THE RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 7 PAGE(S) 2 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

EXCEPT THE EAST 7.75 FEET.

ALSO EXCEPT THEREFROM THE INTEREST IN AN UNDIVIDED ½ INTEREST IN AND TO THE 10 INCH WELL AND PUMPING PLANT LOCATED ON SAID LAND.

APN: 0136-261-28

TITLE REPORT EXCEPTIONS:

⟨1⟩ 1. WATER RIGHTS, CLAIMS OR TITLE TO WATER, WHETHER OR NOT DISCLOSED BY THE PUBLIC RECORDS.

⟨2⟩ 2. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: H.C. HORNBECK AND MELISSA J. HORNBECK
PURPOSE: WATER PIPELINES
RECORDING DATE: APRIL 30, 1924
RECORDING NO: BOOK 845 PAGE 94 OF DEEDS
AFFECTS: A PORTION OF SAID LAND AS MORE PARTICULARLY DESCRIBED IN SAID DOCUMENT.
(EASEMENT NOT PLOTTABLE FROM RECORD)

ASSESSOR'S PARCEL NUMBERS

APN: 0136-261-29

SITE ADDRESS

298 S WATERMAN AVE

LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

THE EAST 2 ACRES OF THE SOUTH 5 ACRES OF THE NORTH 15.50 ACRES OF LOTS 3, 4, 9 AND 10 BLOCK 7, RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER PLAT RECORDED IN BOOK 7, PAGE 2, RECORDS OF SAID COUNTY.

EXCEPTING THEREFROM ANY PORTION OF THE ABOVE DESCRIBED PROPERTY LYING WITHIN THE SOUTH 2.25 ACRES OF LOT 4, OR WITHIN THE SOUTH 2.25 ACRES OF LOT 9, IN SAID BLOCK 7.

ALSO EXCEPTING THEREFROM THAT PORTION CONVEYED TO THE CITY OF SAN BERNARDINO, BY DEED RECORDED JULY 16, 1978 AS INSTRUMENT NO. 400, IN BOOK 7060, PAGE 355, OFFICIAL RECORDS.

SAID LAND IS ALSO SHOWN ON LICENSED LAND SURVEYORS MAP FILED IN BOOK 36, PAGE 4, RECORDS OF SURVEY.

APN: 0136-261-29

TITLE REPORT EXCEPTIONS:

⟨1⟩ 1. WATER RIGHTS, CLAIMS OR TITLE TO WATER, WHETHER OR NOT DISCLOSED BY THE PUBLIC RECORDS.

⟨2⟩ 2. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: CITY OF SAN BERNARDINO, A MUNICIPAL CORPORATION
PURPOSE: STREET AND HIGHWAY
RECORDING DATE: DECEMBER 18, 1969
RECORDING NO: 391, IN BOOK 7355, PAGE 854, OFFICIAL RECORDS
AFFECTS: A PORTION OF SAID LAND AS MORE PARTICULARLY DESCRIBED IN SAID DOCUMENT.
(EASEMENT NOT PLOTTABLE FROM RECORD)

⟨3⟩ 3. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: CITY OF SAN BERNARDINO, A MUNICIPAL CORPORATION
PURPOSE: STREET AND HIGHWAY
RECORDING DATE: DECEMBER 15, 1978
RECORDING NO: 1071, IN BOOK 9581, PAGE 1811, OFFICIAL RECORDS
AFFECTS: A PORTION OF SAID LAND AS MORE PARTICULARLY DESCRIBED IN SAID DOCUMENT.
(EASEMENT PLOTTED HEREON AS ⟨E⟩)

ASSESSOR'S PARCEL NUMBERS

APNS 0136-261-11, APN: 0136-261-36 AND 0136-261-50

SITE ADDRESS

241 S ALLEN ST (APNS 0136-261-11)
ALLEN ST (APNS 0136-261-36 & APNS 0136-261-50)

LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCEL 1 (APNS 0136-251-11 AND 0136-261-50):
ALL THAT CERTAIN PIECE OF PARCEL OF LAND BEING A PORTION OF LOTS 3, 4, 9 AND 10, BLOCK 7, RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER PLAT RECORDED IN BOOK 7 OF MAPS, PAGE 2, RECORDS OF SAID COUNTY AND BEING DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT IN THE EAST LINE OF ALLEN STREET SAID POINT BEING ALSO IN THE WEST LINE OF LOT 10, BLOCK 7 OF SAID RANCHO SAN BERNARDINO, SAID POINT BEING SOUTH 1149.73 FEET FROM THE SOUTH LINE OF RIALTO AVENUE; THENCE SOUTH ALONG THE EAST LINE OF ALLEN STREET, BEING ALSO ALONG THE WEST LINE OF LOTS 10 AND 9, BLOCK 7 OF RANCHO SAN BERNARDINO, 366.98 FEET TO THE NORTHWEST CORNER OF THE LAND CONVEYED TO ADAR BRANAN ET UX BY DEED RECORDED FEBRUARY 28, 1949 IN BOOK 2366, PAGE 126 OF OFFICIAL RECORDS OF SAID COUNTY; THENCE EASTERLY ALONG THE NORTHERLY LINE OF SAID LAST MENTIONED PROPERTY AND THE EASTERLY PROLONGATION THEREOF 520.39 FEET TO A POINT 347 FEET WEST OF THE WEST OF THE WEST LINE OF WATERMAN AVENUE BEING ALSO THE EAST LINE OF BLOCK 7, OF SAID RANCHO SAN BERNARDINO; THENCE NORTH AND PARALLEL WITH THE WEST LINE OF WATERMAN AVENUE, 366.98 FEET TO THE NORTH LINE OF LOTS 3 AND 10 BLOCK 7, RANCHO SAN BERNARDINO; THENCE WESTERLY ALONG THE NORTHERLY LINE OF SAID LOTS 3 AND 10 520.89 FEET TO THE POINT OF BEGINNING.

EXCEPT THEREFROM THAT PORTION DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT 15.95 FEET SOUTH OF THE NORTHWEST CORNER OF LOT 9, OF SAID BLOCK 7, RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER PLAT RECORDED IN BOOK 7 OF MAPS, PAGE 2 RECORDS OF SAID COUNTY; THENCE EASTERLY 135 FEET TO A POINT WHICH IS 16.24 FEET SOUTH OF THE NORTH LINE OF SAID LOT 9; THENCE SOUTH 8.86 FEET; THENCE WEST 135 FEET; THENCE NORTH 9.15 FEET TO THE POINT OF BEGINNING.

PARCEL 2 (APN: 0136-261-36):
THE EAST 378 FEET OF THE WEST 528 FEET OF THE NORTHERLY 150 FEET OF LOTS 3 AND 10 IN BLOCK 7 OF RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, AS PER PLAT RECORDED IN BOOK 7 OF MAPS, PAGE 2 RECORDS OF SAID COUNTY.

SURVEYOR'S NOTE: THERE IS AN ERROR IN THE APN FOR PARCEL 1. APN 0136-251-11 SHOULD BE APN 0136-261-11.

ASSESSOR'S PARCEL NUMBERS

APN: 136-261-37

SITE ADDRESS

231 S ALLEN ST

LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

THE WEST 528 FEET OF THE NORTHERLY 3 ACRES OF LOTS 3 AND 10, IN BLOCK 7, OF THE RANCHO SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER PLAT RECORDED IN BOOK 7 OF MAPS, PAGE 2, RECORDS OF SAID COUNTY.

EXCEPT THE EAST 378 FEET OF SAID WEST 528 FEET.
APN: 136-261-37

TITLE REPORT EXCEPTIONS:

⟨1⟩ 1. WATER RIGHTS, CLAIMS OR TITLE TO WATER, WHETHER OR NOT DISCLOSED BY THE PUBLIC RECORDS.

⟨2⟩ 2. EASEMENT(S) IN FAVOR OF THE PUBLIC OVER ANY EXISTING ROADS LYING WITHIN SAID LAND.

ASSESSOR'S PARCEL NUMBERS

APN: 0136-261-41

SITE ADDRESS

195 SOUTH ALLEN STREET

LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF SAN BERNARDINO, IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

THE NORTH ½ OF THE FOLLOWING DESCRIBED PROPERTY:
THAT PORTION OF LOT 11, BLOCK 7, RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER PLAT RECORDED IN BOOK 7, PAGE 2 OF MAPS, RECORDS OF SAID COUNTY, DESCRIBED AS FOLLOWS:
BEGINNING AT A POINT 150 FEET NORTH OF THE SOUTHWEST CORNER OF SAID LOT 11;
THENCE NORTH 150 FEET;
THENCE EAST 290 FEET;
THENCE SOUTH 150 FEET;
THENCE WEST 290 FEET TO THE POINT OF BEGINNING.
APN(s): 0136-261-41-0-000

TITLE REPORT EXCEPTIONS:

⟨1⟩ 1. WATER RIGHTS, CLAIMS OR TITLE TO WATER, WHETHER OR NOT DISCLOSED BY THE PUBLIC RECORDS.

⟨2⟩ 2. A RIGHT OF WAY OF UNDISCLOSED ROUTE AND WIDTH FOR WATER PIPELINES, AS RESERVED IN THE DEED FROM CHARLES W. ALLEN AND E. C. RUTLEDGE, RECORDED IN BOOK 78, PAGE 197 OF DEEDS.

⟨3⟩ 3. AN EASEMENT IN FAVOR OF THE PUBLIC OVER ANY EXISTING ROADS LYING WITHIN SAID LAND.

ASSESSOR'S PARCEL NUMBERS

APN: 0136-261-42

SITE ADDRESS

197 S ALLEN ST

LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

THE SOUTH HALF OF THE FOLLOWING DESCRIBED PROPERTY: THAT PORTION OF LOT 11, BLOCK 7, RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, AS PER PLAT RECORDED IN BOOK 7 OF MAPS, PAGE 2, RECORDS OF SAID COUNTY, DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT 150 FEET NORTH OF THE SOUTHWEST CORNER OF SAID LOT 11; THENCE NORTH 150 FEET; THENCE EAST 290 FEET; THENCE SOUTH 150 FEET; THENCE WEST 290 FEET TO THE POINT OF BEGINNING.
APN: 0136-261-42-0-000

TITLE REPORT EXCEPTIONS:

⟨1⟩ 1. WATER RIGHTS, CLAIMS OR TITLE TO WATER, WHETHER OR NOT DISCLOSED BY THE PUBLIC RECORDS.

⟨2⟩ 2. EASEMENT(S) IN FAVOR OF THE PUBLIC OVER ANY EXISTING ROADS LYING WITHIN SAID LAND.

ASSESSOR'S PARCEL NUMBERS

APN: 0136-261-43

SITE ADDRESS

221 S ALLEN ST

LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

THAT PORTION OF LOT 11, BLOCK 7, RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER PLAT RECORDED IN BOOK 7 OF MAPS, PAGE 2, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHWEST CORNER OF SAID LOT 11; THENCE NORTH 150 FEET; THENCE EAST 290 FEET; THENCE SOUTH 150 FEET; THENCE WEST 290 FEET TO THE POINT OF BEGINNING.

EXCEPT THE NORTH 50 FEET THEREOF AS DESCRIBED IN DEED RECORDED FEBRUARY 10, 1955 IN BOOK 3565, PAGE 240 OFFICIAL RECORDS.
ALSO EXCEPT THE SOUTH 50 FEET THEREOF AS DESCRIBED IN DEED RECORDED MAY 13, 1963 IN BOOK 5907, PAGE 666 OFFICIAL RECORDS.
APN: 0136-261-43-0-000

TITLE REPORT EXCEPTIONS:

⟨1⟩ 1. WATER RIGHTS, CLAIMS OR TITLE TO WATER, WHETHER OR NOT DISCLOSED BY THE PUBLIC RECORDS.

⟨2⟩ 2. EASEMENT(S) IN FAVOR OF THE PUBLIC OVER ANY EXISTING ROADS LYING WITHIN SAID LAND.

ASSESSOR'S PARCEL NUMBERS

APN: 0136-261-44

SITE ADDRESS

227 S ALLEN ST

LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

THAT PORTION OF LOT(S) 11, BLOCK 7, RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 7 PAGE(S) 2, OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

BEGINNING AT THE SOUTHWEST CORNER OF SAID LOT 11; THENCE NORTH 50 FEET; THENCE EAST 290 FEET; THENCE SOUTH 50 FEET; THENCE WEST 290 FEET, TO THE POINT OF BEGINNING.
APN: 0136-261-44-0-000

TITLE REPORT EXCEPTIONS:

⟨1⟩ 1. WATER RIGHTS, CLAIMS OR TITLE TO WATER, WHETHER OR NOT DISCLOSED BY THE PUBLIC RECORDS.

⟨2⟩ 2. EASEMENT(S) IN FAVOR OF THE PUBLIC OVER ANY EXISTING ROADS LYING WITHIN SAID LAND.

ASSESSOR'S PARCEL NUMBERS

APN: 0136-261-57

SITE ADDRESS

S WATERMAN AVE

LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCEL A:
ALL THAT PORTION OF LOT 11, BLOCK 7, RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 7, PAGE 2 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

BEGINNING AT A POINT ON THE CENTER LINE OF IRWIN STREET, AS SHOWN BY MAP OF HEARSH SUBDIVISION, RECORDED IN BOOK 25 OF MAPS, PAGE 62, RECORDS OF SAN BERNARDINO COUNTY, 300 FEET NORTH OF THE SOUTH LINE OF SAID LOT 11; THENCE WEST AT RIGHT ANGLES TO WATERMAN AVENUE, 89.27 FEET, MORE OR LESS, TO A POINT 290 FEET EAST OF THE WEST LINE OF SAID LOT; THENCE AT RIGHT ANGLES SOUTH 75 FEET; THENCE AT RIGHT ANGLES EAST, 89.27 FEET, MORE OR LESS, TO A POINT ON THE SOUTHERLY EXTENSION OF THE CENTER LINE OF SAID IRWIN STREET; THENCE NORTHERLY TO THE POINT OF BEGINNING.

PARCEL B:
A PORTION OF LOTS 2 AND 11 IN BLOCK 7 OF RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 7, PAGE 2, OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, DESCRIBED AS FOLLOWS: COMMENCING AT A POINT ON THE EAST LINE OF SAID LOT 2, 225 FEET NORTH, OF THE SOUTHEAST CORNER OF SAID LOT 2; THENCE NORTH 75 FEET; THENCE WEST AT RIGHT ANGLES TO A POINT 290 FEET EAST OF THE WEST LINE OF SAID LOT 11; THENCE AT RIGHT ANGLES SOUTH 75 FEET; THENCE AT RIGHT ANGLES EAST TO THE POINT OF BEGINNING. SAVING AND EXCEPTING THE EAST 190 FEET THEREOF. ALSO SAVING AND EXCEPTING THAT PORTION LYING WEST OF THE CENTER LINE OF IRWIN STREET EXTENDING SOUTHERLY.

PARCEL C:
A PORTION OF LOT 2, BLOCK 7 OF RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 7, PAGE 2, OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, DESCRIBED AS FOLLOWS:

COMMENCING AT A POINT ON THE EAST LINE OF SAID LOT 2, 262.5 FEET NORTH OF THE SOUTHEAST CORNER OF SAID LOT 2; THENCE NORTH 37.5 FEET; THENCE, WEST AT RIGHT ANGLES, 90 FEET; THENCE SOUTH AT RIGHT ANGLES 37.5 FEET; THENCE EAST AT RIGHT ANGLES TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM THE EAST 8.75 FEET AS CONVEYED TO THE CITY OF SAN BERNARDINO FOR ROAD PURPOSES.

PARCEL C1:
TOGETHER WITH AN EASEMENT FOR DRIVEWAY PURPOSES OVER AND ACROSS THE NORTH 3 FEET OF THAT PORTION OF SAID LOT 2, LYING SOUTH AND ADJACENT TO THE ABOVE DESCRIBED PARCEL.

PARCEL D:
THAT PORTION OF LOT 2, BLOCK 7, RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 7, PAGE 2, OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT A POINT ON THE EAST LINE OF SAID LOT 2, 262-½ FEET NORTH OF THE SOUTHEAST CORNER OF SAID LOT 2; THENCE WEST 90 FEET TO THE SOUTHWEST CORNER OF THAT CERTAIN PARCEL OF LAND DEEDED TO WILLIAM ARMSTRONG, ET UX., BY DEED RECORDED AUGUST 10, 1946, AS INSTRUMENT NO. 83. RECORDS OF SAID COUNTY, FOR TRUE POINT OF BEGINNING; THENCE NORTH 37.5 FEET TO THE NORTHWEST CORNER OF SAID ARMSTRONG LAND; THENCE WEST AT RIGHT ANGLES TO A POINT 100 FEET WEST OF THE NORTHWEST CORNER OF SAID ARMSTRONG LAND; THENCE SOUTH 37.5 FEET TO THE NORTHWEST CORNER OF THAT CERTAIN PARCEL OF LAND DEEDED TO RAYBURN L. DIXON, ET UX., BY DEED RECORDED AUGUST 20, 1946, AS INSTRUMENT NO. 48, RECORDS OF SAID COUNTY; THENCE EAST ALONG THE NORTH LINE OF SAID DIXON LAND TO THE POINT OF BEGINNING.

PARCEL D1:
TOGETHER WITH AN EASEMENT FOR DRIVEWAY PURPOSES OVER AND ACROSS THE NORTH 3 FEET OF THAT PORTION OF SAID LOT 2, LYING SOUTH AND ADJACENT TO THE ABOVE DESCRIBED PARCEL.

PARCEL E:
A PORTION OF LOT 2, BLOCK 7, RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 7, PAGE 2, OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, DESCRIBED AS FOLLOWS:

COMMENCING AT A POINT ON THE EAST LINE OF SAID LOT 2, 225 FEET NORTH OF THE SOUTHEAST CORNER OF SAID LOT 2; THENCE, NORTH 37.5 FEET; THENCE, WEST AT RIGHT ANGLES TO A POINT 190 FEET WEST OF THE EAST LINE OF SAID LOT 2; THENCE SOUTH AT RIGHT ANGLES 37.5 FEET; THENCE AT RIGHT ANGLES EAST TO THE POINT OF BEGINNING.

PARCEL E1:
AN EASEMENT FOR DRIVEWAY PURPOSES OVER AND ACROSS THE SOUTH 3 FEET OF THAT PORTION OF SAID LOT 2, BLOCK 7 RANCHO SAN BERNARDINO, AS PER MAP RECORDED IN BOOK 7, PAGE 2, OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, LYING NORTH AND ADJACENT TO THE PROPERTY DESCRIBED AS PARCEL NO. 5 HEREIN.

PARCEL F:
THAT PORTION OF LOTS 2 AND 11, BLOCK 7, RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 7, PAGE 2, OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHEAST CORNER OF SAID LOT 2; THENCE NORTH 225 FEET; THENCE WEST TO A POINT ON THE SOUTHERLY PROLONGATION OF THE CENTERLINE OF IRWIN STREET AS SHOWN ON THE MAP OF HEARSH SUBDIVISION, AS PER MAP RECORDED IN BOOK 24 OF MAPS, PAGE 62, RECORDS OF SAID COUNTY; AND 225 FEET NORTH OF THE SOUTH LINE OF SAID LOT 11; THENCE SOUTH ALONG SAID SOUTHERLY PROLONGATION OF CENTER LINE OF IRWIN STREET, 225 FEET TO POINT ON SOUTH LINE OF SAID LOT 11; THENCE EAST TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM THAT PROPERTY DEEDED TO THE CITY OF SAN BERNARDINO, BY DEED RECORDED JANUARY 26, 1968, OFFICIAL RECORDS: DESCRIBED AS FOLLOWS:

THE EAST 8.75 FEET OF THE SOUTH 262.50 FEET OF LOT 2, BLOCK 7, RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 7, PAGE 2, OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

THE WESTERLY LINE OF SAID EAST 8.75 FEET BEING 50.00 FEET WEST, MEASURED AT RIGHT ANGLES, FROM THE CENTER LINE OF WATERMAN AVENUE, 82.50 FEET WIDE.

PARCEL G:
THAT PORTION OF LOT 11, BLOCK 7, RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 7, PAGE 2, OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, DESCRIBED AS FOLLOWS:

BEGINNING AT THE INTERSECTION OF THE SOUTHERLY PROLONGATION OF THE CENTER LINE OF IRWIN STREET, AS SHOWN ON MAP OF HEARSH SUBDIVISION, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 24, PAGE 62, OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, WITH THE NORTH LINE OF THE SOUTH 100 FEET OF SAID LOT 11; THENCE SOUTH 100 FEET ALONG SAID PROLONGED CENTER LINE TO THE SOUTH LINE OF SAID LOT; THENCE WEST ALONG SAID SOUTH LINE TO A POINT 290 FEET EAST OF THE SOUTHWEST CORNER OF SAID LOT; THENCE NORTH 100 FEET PARALLEL WITH THE WEST LINE OF SAID LOT; THENCE EAST TO THE POINT OF BEGINNING.

PARCEL H:
THE NORTH 50 FEET OF THAT PORTION OF LOT 11, BLOCK 7, RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 7, PAGE 2, OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHWEST CORNER OF SAID LOT 11; THENCE NORTH 150 FEET; THENCE EAST 290 FEET; THENCE SOUTH 150 FEET; THENCE WEST 290 FEET TO THE POINT OF BEGINNING.

PARCEL I:
THAT PORTION OF LOT 11, BLOCK 7 OF RANCHO SAN BERNARDINO, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 7, PAGE 2, OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, DESCRIBED AS FOLLOWS:

BEGINNING AT THE INTERSECTION OF THE SOUTHERLY PROLONGATION OF THE CENTER LINE OF IRWIN STREET AS SHOWN ON MAP OF HEARSH SUBDIVISION, IN THE CITY OF SAN BERNARDINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 24, PAGE 62, OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, WITH THE NORTH LINE OF THE SOUTH 225 FEET OF SAID LOT 11; THENCE SOUTH ALONG SAID PROLONGED CENTER LINE 125 FEET; THENCE WEST TO A POINT 290 FEET EAST OF THE WEST LINE OF SAID LOT 11, THENCE NORTH PARALLEL WITH THE WEST LINE OF SAID LOT 11, 125 FEET; THENCE EAST TO THE POINT OF BEGINNING.
APN(S): 0137-192-27-0-000

TITLE REPORT EXCEPTIONS:

⟨1⟩ 1. WATER RIGHTS, CLAIMS OR TITLE TO WATER, WHETHER OR NOT DISCLOSED BY THE PUBLIC RECORDS.

⟨2⟩ 2. RIGHTS OF THE PUBLIC TO ANY PORTION OF THE LAND LYING WITHIN THE AREA COMMONLY KNOWN AS ALLEN STREET AND WATERMAN AVENUE.

⟨3⟩ 3. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: B. M. WILSON AND MYRTLE SWIFT WILSON, HUSBAND AND WIFE
PURPOSE: PIPELINES AND INCIDENTAL PURPOSES
RECORDING NO: BOOK 725, PAGE 364 OF DEEDS
THE EXACT LOCATION AND EXTENT OF SAID EASEMENT IS NOT DISCLOSED OF RECORD.
(SAID EASEMENT NOT PLOTTABLE FROM RECORD)

⟨4⟩ 4. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: CALIFORNIA ELECTRIC POWER COMPANY
PURPOSE: PUBLIC UTILITIES AND INCIDENTAL PURPOSES
RECORDING DATE: DECEMBER 15, 1942
RECORDING NO: 1567, PAGE 255 OF OFFICIAL RECORDS
AFFECTS: A PORTION OF SAID LAND AS MORE PARTICULARLY DESCRIBED IN SAID DOCUMENT.
(EASEMENT PLOTTED HEREON AS ⟨F⟩)

⟨5⟩ 5. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: CALIFORNIA ELECTRIC POWER COMPANY
PURPOSE: PUBLIC UTILITIES AND INCIDENTAL PURPOSES
RECORDING DATE: FEBRUARY 4, 1943
RECORDING NO: BOOK 1572, PAGE 339 OF OFFICIAL RECORDS
AFFECTS: A PORTION OF SAID LAND AS MORE PARTICULARLY DESCRIBED IN SAID DOCUMENT.
(CENTERLINE OF SAID EASEMENT PLOTTED HEREON AS ⟨F⟩)

⟨6⟩ 6. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: CALIFORNIA ELECTRIC COMPANY
PURPOSE: POLE LINES, CONDUITS AND INCIDENTAL PURPOSES
RECORDING NO: BOOK 1585, PAGE 30 OF OFFICIAL RECORDS
AFFECTS: A PORTION OF SAID LAND AS MORE PARTICULARLY DESCRIBED IN SAID DOCUMENT.
(CENTERLINE OF SAID EASEMENT PLOTTED HEREON AS ⟨G⟩)

⟨7⟩ 7. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: UNITED STATES OF AMERICA
PURPOSE: CONSTRUCT, OPERATE, USE, MAINTAIN, REPAIR, REPLACE, RENEW, PATROL AND REMOVE SEWER LINE AND ALL APPENDAGES, STRUCTURES AND EQUIPMENT NECESSARY OR CONVENIENT TO BE USED OR INSTALLED IN CONNECTION THEREWITH, INCLUDING ALL APPURTENANCES AND PRIVILEGES, THEREUNTO BELONGING WITH THE RIGHT OF ALL NECESSARY OR CONVENIENT INGRESS AND EGRESS TO AND FROM, OVER AND THROUGH, UNDER, ALONG AND ACROSS SAID LAND AND OTHER ADJOINING LAND OF THE GRANTORS, TOGETHER WITH THE RIGHT TO REMOVE OBSTRUCTING IMPROVEMENTS AND TO OUT AND REMOVE SUCH VEGETATION WITHIN THE LIMITS OF THE LAND COVERED BY SAID EASEMETNS AND RIGHT OF WAY AS MAY BE NECESSARY FOR SUCH PURPOSES AND INCIDENTAL PURPOSES
RECORDING DATE: JUNE 2, 1943
RECORDING NO: BOOK 1605, PAGE 120 OF OFFICIAL RECORDS
AFFECTS: A PORTION OF SAID LAND AS MORE PARTICULARLY DESCRIBED IN SAID DOCUMENT.
(EASEMENT PLOTTED HEREON AS ⟨H⟩)
(A PORTION OF SAID EASEMENT HAS BEEN QUITCLAIMED PER DOCUMENT ENTITLED QUITCLAIM OF EASEMENT, RECORDED APRIL 20, 2009 AS INSTRUMENT NO. 2009-0166147 OF OFFICIAL RECORDS)

⟨8⟩ 8. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: UNITED STATES AMERICA
PURPOSE: OUTFALL, SEWER LINE AND INCIDENTAL PURPOSES
RECORDING NO: BOOK 1643, PAGE 244 OF OFFICIAL RECORDS
AFFECTS: A PORTION OF SAID LAND AS MORE PARTICULARLY DESCRIBED IN SAID DOCUMENT.
(EASEMENT PLOTTED HEREON AS ⟨I⟩)
(A PORTION OF SAID EASEMENT HAS BEEN QUITCLAIMED PER DOCUMENT ENTITLED QUITCLAIM OF EASEMENT, RECORDED APRIL 20, 2009 AS INSTRUMENT NO. 2009-0166147 OF OFFICIAL RECORDS)

⟨9⟩ 9. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: JAMES H. AND BLANCH L. HOWARD
PURPOSE: DRIVEWAY AND INCIDENTAL PURPOSES
RECORDING DATE: AUGUST 10, 1946
RECORDING NO: BOOK 1949, PAGE 159 OF OFFICIAL RECORDS
AFFECTS: A PORTION OF SAID LAND AS MORE PARTICULARLY DESCRIBED IN SAID DOCUMENT.
(EASEMENT PLOTTED HEREON AS ⟨J⟩)

⟨10⟩ 10. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: BLANCH L. HOWARD
PURPOSE: DRIVEWAY AND INCIDENTAL PURPOSES
RECORDING DATE: AUGUST 20, 1946
RECORDING NO: BOOK 1943, PAGE 450 OF OFFICIAL RECORDS
AFFECTS: A PORTION OF SAID LAND AS MORE PARTICULARLY DESCRIBED IN SAID DOCUMENT.
(EASEMENT PLOTTED HEREON AS ⟨K⟩)

⟨11⟩ 11. DEED FROM TYREE FELTZ, ET UX., TO R. N. PARKER, RECORDED OCTOBER 30, 1953, AS INSTRUMENT NO. 178 OF OFFICIAL RECORDS, WHICH RECITES:
"RESERVING AN EASEMENT AND RIGHT OF WAY FOR STREET PURPOSES OVER AND ACROSS THE EAST 20 FEET THEREOF."
(EASEMENT PLOTTED HEREON AS ⟨L⟩)

⟨12⟩ 12. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: TYREE FELTZS AND NANCY FELTZS, HUSBAND AND WIFE
PURPOSE: STREET AND INCIDENTAL PURPOSES
RECORDING NO: BOOK 3631, PATE 87 OF OFFICIAL RECORDS
AFFECTS: A PORTION OF SAID LAND AS MORE PARTICULARLY DESCRIBED IN SAID DOCUMENT.
(EASEMENT PLOTTED HEREON AS ⟨M⟩)

⟨13⟩ 13. DISCREPANCIES, CONFLICTS IN BOUNDARY LINES, SHORTAGE IN AREA, ENCROACHMENTS, OR ANY OTHER MATTERS SHOWN ON
MAP: RECORD OF SURVEY
RECORDING DATE: BOOK 36, PAGE 4 OF RECORDS OF SURVEY

⟨14⟩ 14. DISCREPANCIES, CONFLICTS IN BOUNDARY LINES, SHORTAGE IN AREA, ENCROACHMENTS, OR ANY OTHER MATTERS SHOWN ON
MAP: RECORD OF SURVEY
RECORDING DATE: BOOK 60, PAGE 11 OF RECORDS OF SURVEY

⟨15⟩ 15. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: SOUTHERN CALIFORNIA EDISON COMPANY
PURPOSE: PUBLIC UTILITIES AND INCIDENTAL PURPOSES
RECORDING DATE: FEBRUARY 1, 1991
RECORDING NO: 38777 OF OFFICIAL RECORDS
AFFECTS: A PORTION OF SAID LAND AS MORE PARTICULARLY DESCRIBED IN SAID DOCUMENT.
(PENDING RECEIPT OF EASEMENT DOCUMENT)

⟨16⟩ 16. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: SOUTHERN CALIFORNIA EDISON COMPANY, A CORPORATION, IT'S SUCCESSORS AND/OR ASSIGNS
PURPOSE: PUBLIC UTILITIES AND INCIDENTAL PURPOSES
RECORDING DATE: MAY 14, 2008
RECORDING NO: 2008-0218251 OF OFFICIAL RECORDS
AFFECTS: A PORTION OF SAID LAND AS MORE PARTICULARLY DESCRIBED IN SAID DOCUMENT.
(PENDING RECEIPT OF EASEMENT DOCUMENT)

⟨17⟩ 17. EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: INLAND VALLEY DEVELOPMENT AGENCY, A JOINT POWERS AUTHORITY ESTABLISHED UNDER THE LAWS OF THE STATE OF CALIFORNIA
PURPOSE: SANITARY SEWER AND INCIDENTAL PURPOSES
RECORDING DATE: APRIL 20, 2009
RECORDING NO: 2009-0166146 OF OFFICIAL RECORDS
AFFECTS: A PORTION OF SAID LAND AS MORE PARTICULARLY DESCRIBED IN SAID DOCUMENT.
THE EFFECT OF A DOCUMENT ENTITLED QUITCLAIM OF EASEMENT, RECORDED APRIL 20, 2009 AS INSTRUMENT NO. 2009-0166147 OF OFFICIAL RECORDS.
(EASEMENT PLOTTED HEREON AS ⟨P⟩)

MONUMENT & ESTABLISHMENT NOTES:

[1] FOUND NAIL, FLUSH, PER R3; ACCEPTED AS THE OLD CENTERLINE INTERSECTION OF RIALTO AVENUE AND WATERMAN AVENUE.

[2] FOUND 1" IRON PIPE WITH ILLEGIBLE TAG PER R3, FLUSH; ACCEPTED AS THE CENTERLINE INTERSECTION OF MILL STREET AND WATERMAN AVENUE.

[3] S.F.N.; CENTERLINE INTERSECTION OF RIALTO AVENUE AND WATERMAN AVENUE; ESTABLISHED BY HOLDING RECORD DISTANCE OF 228.47' FROM [1] ALONG THE CENTERLINE OF WATERMAN AVENUE PER R4.

[4] FOUND 1" IRON PIPE WITH MAG NAIL, FLUSH, NO REF; ACCEPTED AS THE CENTERLINE INTERSECTION OF VALLEY STREET AND WATERMAN AVENUE.

[5] FOUND 1" IRON PIPE TAGGED "SBCO" PER CR 189/034, FLUSH; ACCEPTED AS THE CENTERLINE INTERSECTION OF VALLEY STREET AND ALLEN STREET.

[6] FOUND NAIL PER R2, FLUSH; ACCEPTED AS THE CENTERLINE INTERSECTION OF RIALTO AVENUE AND ALLEN STREET.

[7] FOUND 1" IRON PIPE TAGGED "SBCO" PER CR 189/034, FLUSH; ACCEPTED AS THE CENTERLINE INTERSECTION OF VALLEY STREET AND ALLEN STREET.

[8] FOUND 1" IRON PIPE, OPEN, FLUSH; ACCEPTED AS THE SOUTHWEST CORNER OF LOT 14 OF R5.

[9] SOUTHEAST CORNER OF LOT 26 OF R5; ESTABLISHED BY PRORATION BETWEEN [3] AND [4] PER R1; FOUND 1" IRON PIPE, OPEN, FLUSH; 0.29' SOUTHERLY FROM THE ESTABLISHED POINT.

[10] FOUND 1" IRON PIPE TAGGED "LS 2996", FLUSH, PER R6; ACCEPTED A POINT ON THE WESTERLY PROLONGATION OF THE NORTHERLY LINE OF PARCEL 1 OF R6.

[11] FOUND 1" IRON PIPE WITH PLASTIC PLUG STAMPED "LS 4673", FLUSH, NO REF; ACCEPTED AS THE NORTHWEST CORNER OF PARCEL 1 OF R6.

[12] FOUND 1" IRON PIPE TAGGED "RCE 9101", FLUSH, NO REF; ACCEPTED AS THE NORTHEAST CORNER OF PARCEL 1 OF R6.

[13] FOUND 1" IRON PIPE WITH PLASTIC PLUG STAMPED "LS 4673", FLUSH, NO REF; ACCEPTED AS THE MOST NORTHWEST CORNER OF PARCEL 2 OF R6.

[14] FOUND 1" IRON PIPE WITH PLASTIC PLUG STAMPED "LS 4673", FLUSH, NO REF; ACCEPTED AS THE NORTHEAST CORNER OF PARCEL 2 OF R6.

[15] FOUND 1" IRON PIPE TAGGED "RCE 9101", FLUSH, NO REF; ACCEPTED AS THE NORTHWEST CORNER OF EAST 2 ACRES OF THE SOUTH 5 ACRES OF THE NORTH 15.50 ACRES OF LOTS 3, 4, 9, & 10, BLOCK 7 OF R7.

[16] WESTERLY LINE OF EAST 2 ACRES OF THE SOUTH 5 ACRES OF THE NORTH 15.50 ACRES OF LOTS 3, 4, 9, & 10, BLOCK 7 OF R7; ESTABLISHED BY AREA.

[17] ESTABLISHED BY PRORATION BETWEEN [2] AND [3] PER R8.

[18] SOUTHWEST CORNER OF LOT 10 OF R7; ESTABLISHED BY HOLDING A RECORD DISTANCE OF 15.95' ALONG THE EASTERLY LINE OF ALLEN STREET (41.25' HALF WIDTH) PER R8.

[19] ESTABLISHED BY PRORATION BETWEEN [18] AND THE NORTHWEST CORNER OF LOT 12 OF R5 PER R8.

MAP & OTHER REFERENCES:

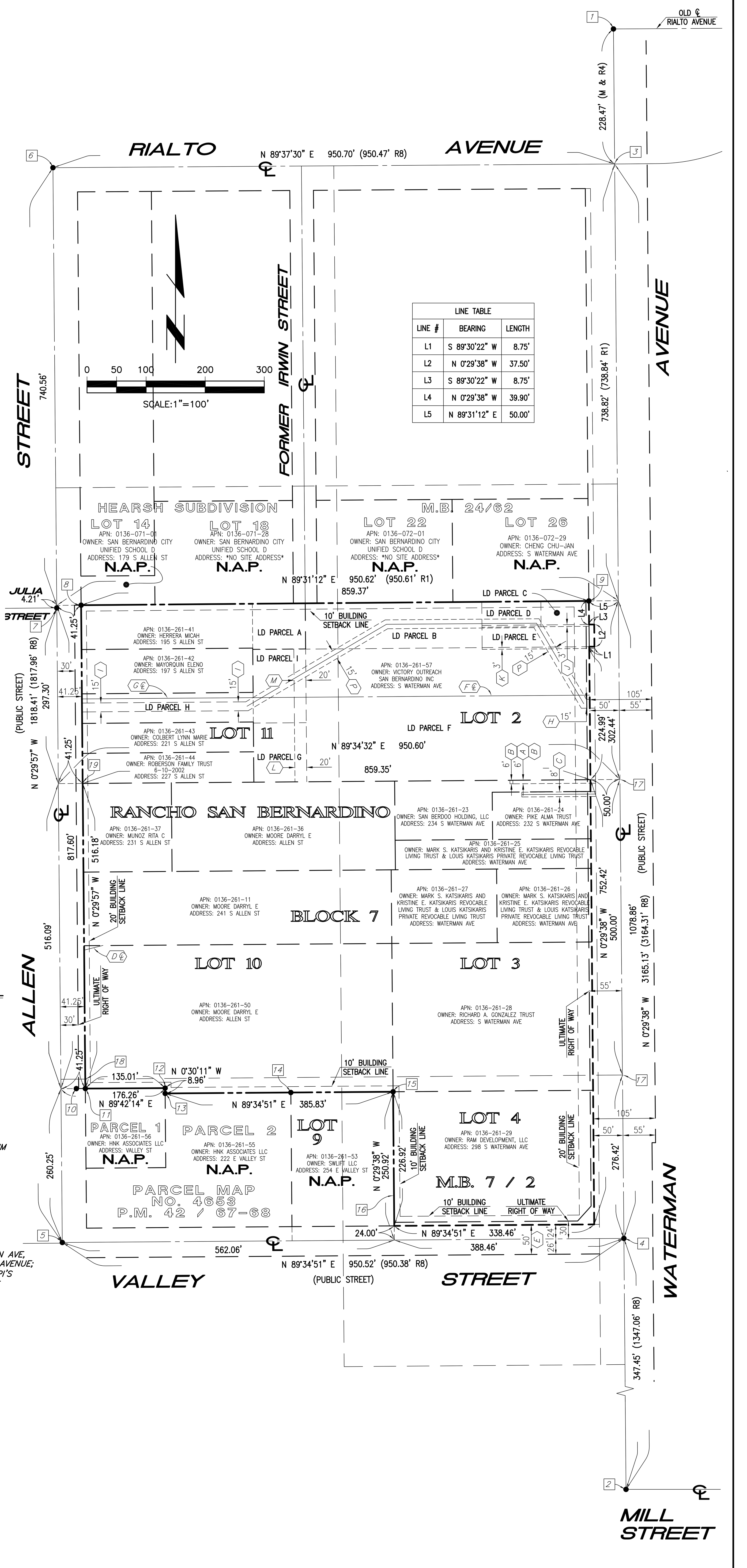
R1	RECORD OF SURVEY	R.S.B. 60/11
R2	RECORD OF SURVEY	R.S.B. 59/24
R3	PARCEL MAP NO. 19573	P.M.B. 243/45-49
R4	RECORD OF SURVEY	R.S.B. 57/62
R5	MAP OF THE HEARSH SUBDIVISION	M.B. 24/62
R6	PARCEL MAP NO. 4653	P.M.B. 42/68
R7	MAP OF THE SURVEY OF SAN BERNARDINO RANCHO	M.B. 7/2
R8	RECORD OF SURVEY	R.S.B. 36/4

BASIS OF BEARINGS:

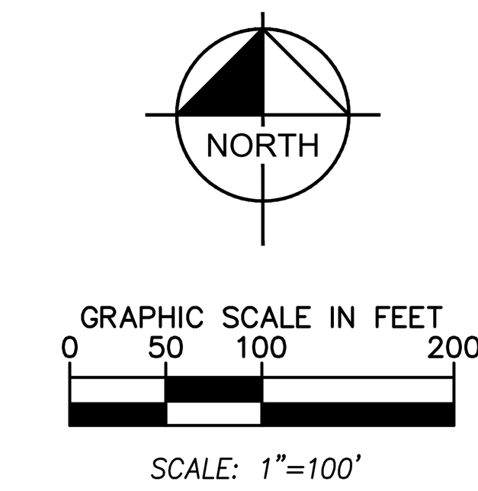
THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORNIA STATE PLANE COORDINATE SYSTEM (CCS83), ZONE 5, NORTH AMERICAN DATUM 1983 (NAD83) BASED LOCALLY ON CONTINUOUSLY OPERATING REFERENCE STATIONS (CORS) "EWPP" AND "GISA" AS SHOWN HEREON (BASIS OF BEARINGS: S 82°35'10.9410" E). ALL BEARINGS SHOWN HEREON ARE GRID BEARINGS.

BENCHMARK:

CITY OF SAN BERNARDINO BENCHMARK NO. B2-1
FOUND BRASS DISK STAMPED "M-524 RESET 1972", ON WATERMAN AVE, 0.35 MILES NORTH OF MILL STREET, 0.2 MILES SOUTH OF RIALTO AVENUE; AT THE SOUTH END OF THE NORTH DRIVEWAY ENTRANCE TO "PEPPI'S COCKTAILS" 237 S. WATERMAN; 32.0 FEET SOUTH OF POWER POLE #1903860E; IN THE TOP OF THE CURB.
ELEVATION = 1024.865' (NGVD '29)



LINE #	BEARING	LENGTH
L1	S 89°30'22" W	8.75'
L2	N 0°29'38" W	37.50'
L3	S 89°30'22" W	8.75'
L4	N 0°29'38" W	39.90'
L5	N 89°31'12" E	50.00'



SCALE: 1"=100'

SCALE: 1"=100'	**Kimley»Horn**	CONDITIONAL USE PERMIT FOR WATERMAN SCHOOL HIGHMARK	W.O. 194144001
DATE: 05/2019	3880 LEMON STREET, SUITE 420, RIVERSIDE, CA 92501	CITY OF SAN BERNARDINO	SHEET 2 OF 4 SHEETS
DESIGNED: RS	PHONE: 951-543-9868		DWG. NO.
CHECKED: BK	WWW.KIMLEY-HORN.COM		
PLN CK REF:			
F.B.			

REVISIONS | DATE | BY

JULIA STREET

ALLEN STREET

PAVED ROAD

WATERMAN AVENUE

PAVED ROAD

EX. BLDG.

EX. BLDG.

EX. BLDG.

EX. BLDG.

EX. BLDG.

EX. BLDG.

EX. BLDG.

EX. TREES TO BE REMOVED (TYP ALL TREES WITHIN PROJECT BOUNDARY AND FRONTAGE)

PROPOSED 28' DRIVEWAY ACCESS

PROPOSED 38' DRIVEWAY ACCESS W/ GATES & GUARD

PROPOSED 28' DRIVEWAY ACCESS

NOT A PART

FF=1020.1

FF=1023.9

FF=1023.5

FF=1025.3

FF=1023.0

FF=1024.7

FF=1023.1

FF=1023.2

FF=1023.8

FF=1023.5

UNDERGROUND STORM DRAIN STORAGE

PROPOSED PARCEL LINE

PROPOSED BASIN BOTTOM ELEVATION= 1013.00

1020.08 FL

1018.97 TC
1018.47 FS

S89°31'12"W 859.37'

1026.50 TC
1026.00 FS

1020.55 TC
FS

N0°28'48"W 297.10'

1019.11 FS
1019.61 TC

1016.81 TC
1013.72 INV

1020.10 TC
1019.60 FS

1017.56 TC
1013.44 INV

1020.07 TC
1019.57 FS

1020.06 TC
1019.56 FS

1016.05 TC
1015.74 INV

1017.72 TC
1015.14 INV

1013.00 INV

1019.81 TC
1017.78 INV

N89°31'12"E 322.48'

1014.44 INV

1024.99 TC
1024.49 FS

1023.32 TC
1022.82 FS

S0°29'57"E 817.73'

N0°29'38"W 1054.81'

2.92%

2.86%

2.06%

1.07%

3.05%

0.30%

0.93%

0.94%

2.94%

2.15%

2.15%

0.21%

2.24%

1.00%

41.25'

30'

105'

50'

55'

5'

R/W

SEE SHEET 4

NORTH

GRAPHIC SCALE IN FEET
0 15 30 60

SCALE: 1"=30'

REVISIONS	DATE	BY

SCALE:	1"=30'
DATE:	05/2019
DESIGNED:	RS
CHECKED:	BK
PLN CK REF:	
F.B.	

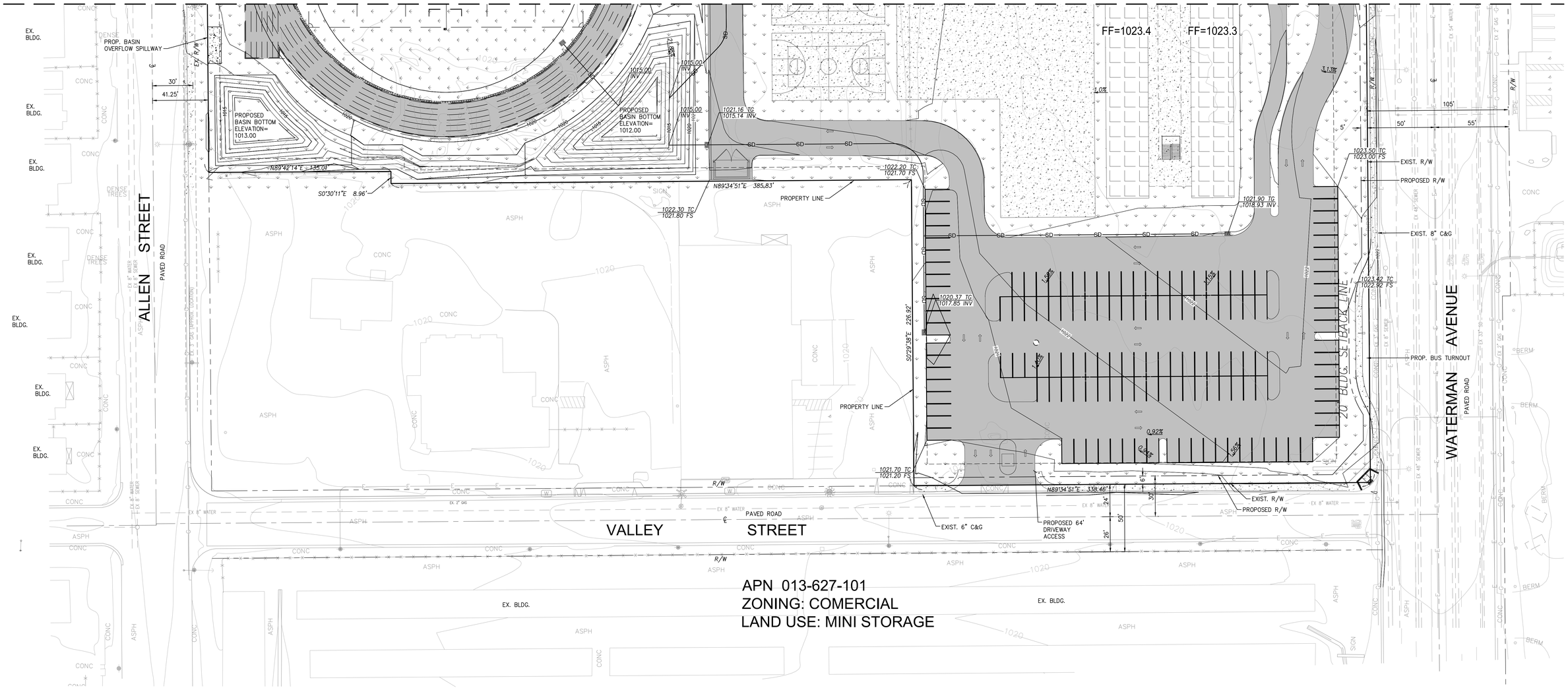
Kimley»Horn
3880 LEMON STREET, SUITE 420, RIVERSIDE, CA 92501
PHONE: 951-543-9868
WWW.KIMLEY-HORN.COM

CONCEPTUAL GRADING PLAN FOR WATERMAN SCHOOL HIGHMARK

CITY OF SAN BERNARDINO

W.O.	194144001
SHEET	3
OF	4 SHEETS
DWG. NO.	

SEE SHEET 3



GRAPHIC SCALE IN FEET
0 15 30 60

REVISIONS	DATE	BY

SCALE: 1"=30'
DATE: 05/2019
DESIGNED: RS
CHECKED: BK
PLN CK REF:
F.B.

Kimley»Horn
3880 LEMON STREET, SUITE 420, RIVERSIDE, CA 92501
PHONE: 951-543-9868
WWW.KIMLEY-HORN.COM

CONCEPTUAL GRADING PLAN FOR WATERMAN SCHOOL HIGHMARK

CITY OF SAN BERNARDINO

W.O. 19414001
SHEET 4
OF 4 SHEETS
DWG. NO.

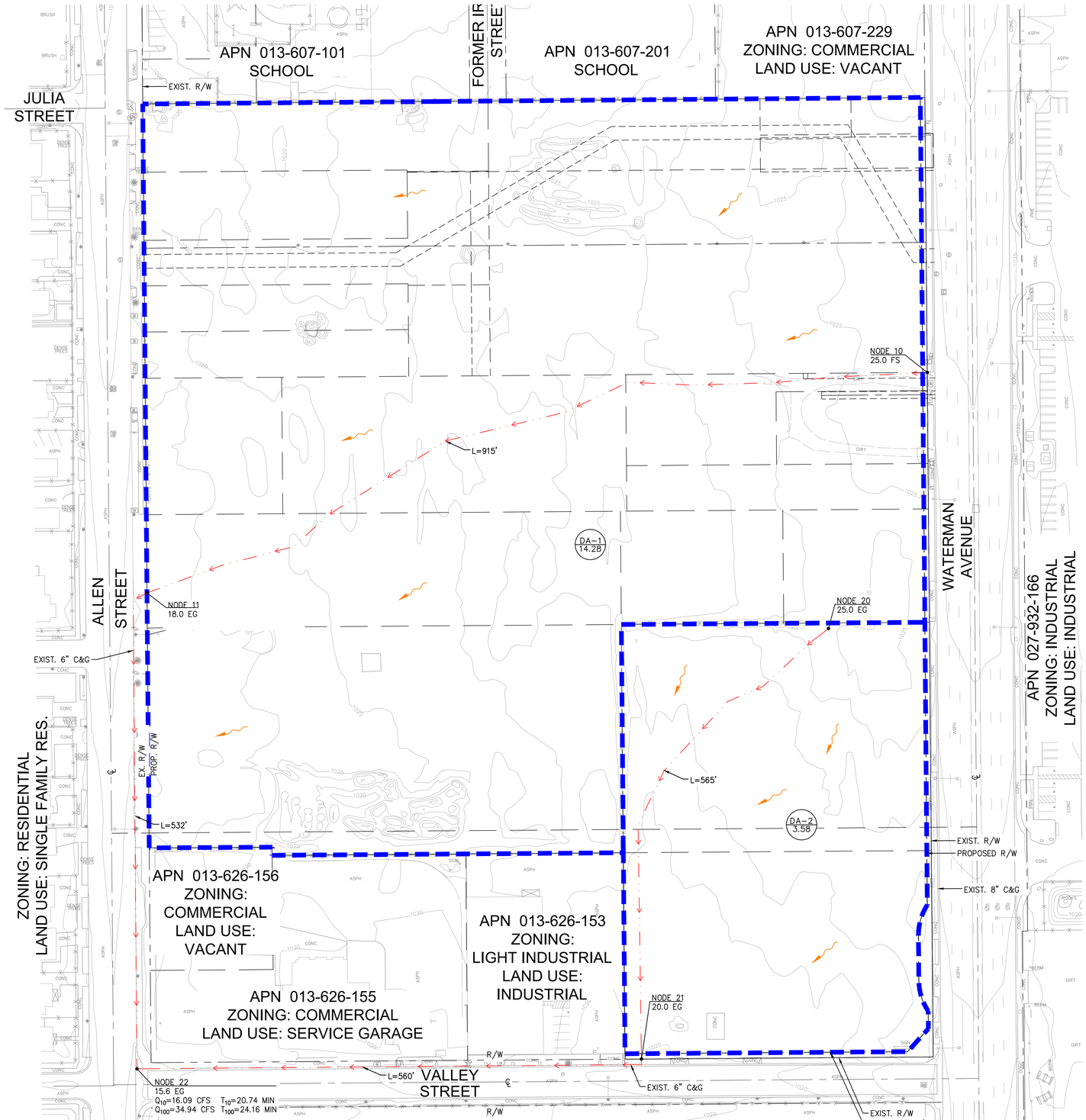
Appendix D

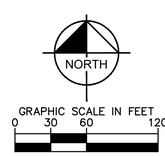
Existing Hydrology Exhibit and Calculations

LEGEND

575	PROPOSED CONTOUR
575	EXISTING CONTOUR
	PROPERTY LINE
	DMA BOUNDARY
	FLOW PATH
	FLOW ARROW
NODE 10 50.00 FS	NODE ID AND ELEVATION
X XX	DMA NAME DMA AREA (IN ACRES)
	RIGHT OF WAY

VICINITY MAP
NOT TO SCALE





CUP NO. 19-10

Kimley»Horn

EXISTING DRAINAGE MAP
WATERMAN SCHOOL HIGHMARK
5/28/2019

```
******************************************************************************
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             Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* WATERMAN SCHOOL HIGHMARK                                              *
* 10 YEAR EXISTING CONDITION                                            *
* LA 05/24/19 WSH10E.RES                                                *
 ************************************************************************

  FILE NAME: WSH10E.DAT
  TIME/DATE OF STUDY: 09:06 05/24/2019
==============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8350

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

******************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   915.00
  ELEVATION DATA: UPSTREAM(FEET) =     25.00  DOWNSTREAM(FEET) =     18.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   21.281
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.555
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "GRASS"                   A       14.28      0.60     1.000    67   21.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     12.30
  TOTAL AREA(ACRES) =     14.28   PEAK FLOW RATE(CFS) =     12.30

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     22.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   18.00  DOWNSTREAM ELEVATION(FEET) =   15.60
  STREET LENGTH(FEET) =   532.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  24.00
  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) =   0.0130
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.55
    HALFSTREET FLOOD WIDTH(FEET) =   23.22
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.70
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.47
  STREET FLOW TRAVEL TIME(MIN.) =   3.28   Tc(MIN.) =   24.57
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.427
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                A        0.01      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.01      SUBAREA RUNOFF(CFS) =    0.01
  EFFECTIVE AREA(ACRES) =     14.29    AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       14.3        PEAK FLOW RATE(CFS) =      12.30
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.55   HALFSTREET FLOOD WIDTH(FEET) =  23.22
  FLOW VELOCITY(FEET/SEC.) =  2.70   DEPTH*VELOCITY(FT*FT/SEC.) =   1.47
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     22.00 =    1447.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   565.00
  ELEVATION DATA: UPSTREAM(FEET) =     25.00  DOWNSTREAM(FEET) =     20.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.045
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.777
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "GRASS"                    A        3.58      0.60     1.000    67   17.04
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.80
  TOTAL AREA(ACRES) =      3.58   PEAK FLOW RATE(CFS) =      3.80

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   20.00  DOWNSTREAM ELEVATION(FEET) =   15.60
  STREET LENGTH(FEET) =   560.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 26.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  16.00
  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) =   0.0130
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.80
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.78
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.53
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.91
  STREET FLOW TRAVEL TIME(MIN.) =   3.69   Tc(MIN.) =   20.74
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.579
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.01      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.01      SUBAREA RUNOFF(CFS) =    0.01
  EFFECTIVE AREA(ACRES) =      3.59    AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       3.80
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.78
  FLOW VELOCITY(FEET/SEC.) =  2.52   DEPTH*VELOCITY(FT*FT/SEC.) =   0.91
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =    1125.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1        3.80   20.74    1.579  0.60( 0.60) 1.00       3.6      20.00
LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =    1125.00 FEET.

** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       12.30   24.57    1.427  0.60( 0.60) 1.00      14.3      10.00
LONGEST FLOWPATH FROM NODE     10.00 TO NODE     22.00 =    1447.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       16.09   20.74    1.579  0.60( 0.60) 1.00      15.7      20.00
    2       15.51   24.57    1.427  0.60( 0.60) 1.00      17.9      10.00
  TOTAL AREA(ACRES) =        17.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =       16.09  Tc(MIN.) =   20.740
EFFECTIVE AREA(ACRES) =     15.65  AREA-AVERAGED Fm(INCH/HR) =  0.60
AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       17.9
LONGEST FLOWPATH FROM NODE     10.00 TO NODE     22.00 =    1447.00 FEET.
================================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =       17.9  TC(MIN.) =     20.74
EFFECTIVE AREA(ACRES) =     15.65  AREA-AVERAGED Fm(INCH/HR)=  0.60
AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 0.999
PEAK FLOW RATE(CFS)   =      16.09

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       16.09   20.74    1.579  0.60( 0.60) 1.00      15.7      20.00
    2       15.51   24.57    1.427  0.60( 0.60) 1.00      17.9      10.00
================================================================================
================================================================================
END OF RATIONAL METHOD ANALYSIS
```

```
******************************************************************************
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            Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* WATERMAN SCHOOL HIGHMARK                                              *
* 100 YEAR EXISTING CONDITION                                           *
* LA 05/24/19 WSH100E.RES                                               *
 ************************************************************************

  FILE NAME: WSH100E.DAT
  TIME/DATE OF STUDY: 09:09 05/24/2019
==============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.3200

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

******************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   915.00
  ELEVATION DATA: UPSTREAM(FEET) =     25.00  DOWNSTREAM(FEET) =     18.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   21.281
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.458
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```
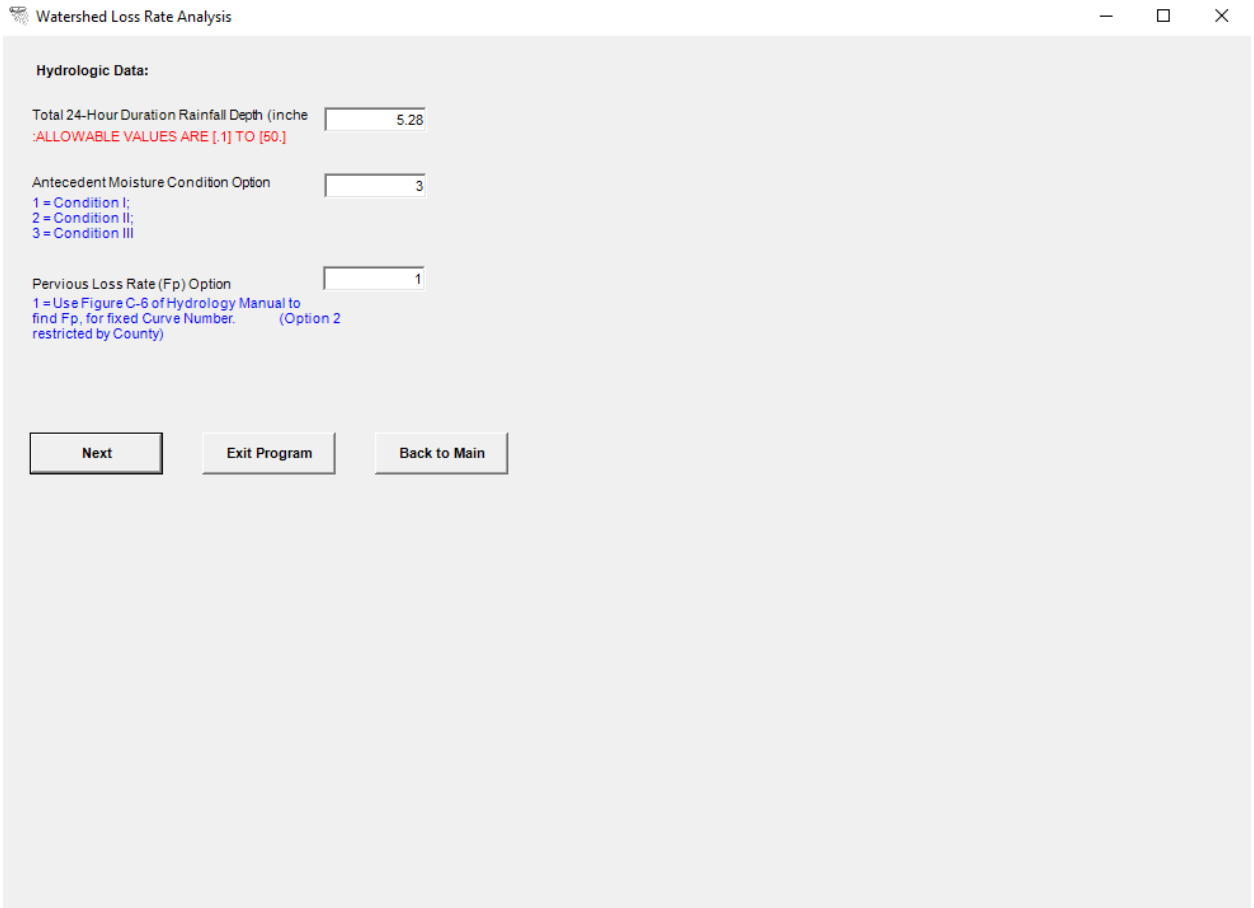
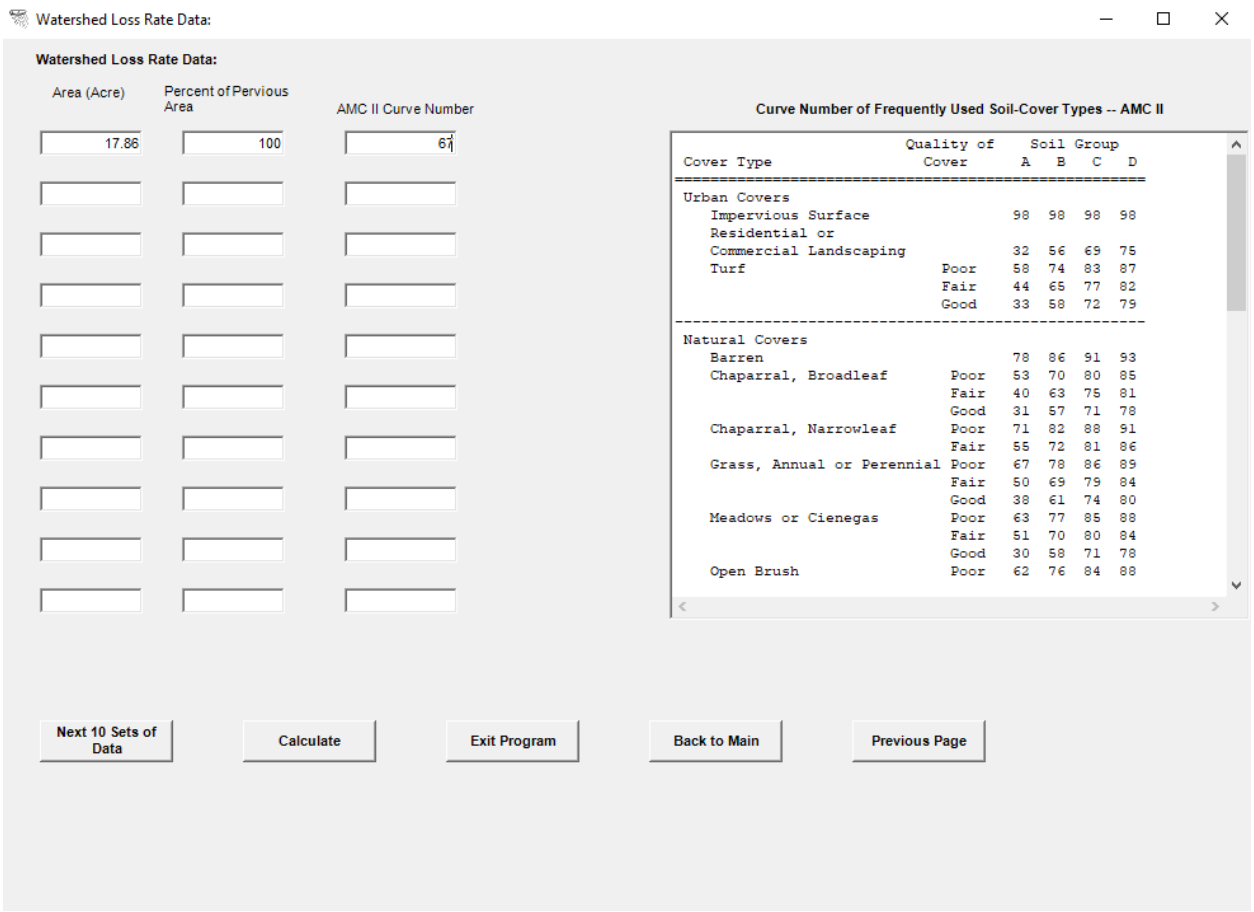

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "GRASS"                   A       14.28      0.30     1.000    85   21.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     27.79
  TOTAL AREA(ACRES) =     14.28   PEAK FLOW RATE(CFS) =     27.79

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     22.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   18.00  DOWNSTREAM ELEVATION(FEET) =   15.60
  STREET LENGTH(FEET) =   532.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  24.00
  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) =   0.0130
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      27.80
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.69
    HALFSTREET FLOOD WIDTH(FEET) =   37.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.08
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.13
  STREET FLOW TRAVEL TIME(MIN.) =   2.88   Tc(MIN.) =   24.16
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.278
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                A        0.01      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.01      SUBAREA RUNOFF(CFS) =    0.02
  EFFECTIVE AREA(ACRES) =     14.29    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       14.3        PEAK FLOW RATE(CFS) =      27.79
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.69   HALFSTREET FLOOD WIDTH(FEET) =  37.84
  FLOW VELOCITY(FEET/SEC.) =  3.08   DEPTH*VELOCITY(FT*FT/SEC.) =   2.13
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     22.00 =    1447.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   565.00
  ELEVATION DATA: UPSTREAM(FEET) =     25.00  DOWNSTREAM(FEET) =     20.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.045
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.809
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "GRASS"                    A        3.58      0.30     1.000    85   17.04
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      8.10
  TOTAL AREA(ACRES) =      3.58   PEAK FLOW RATE(CFS) =      8.10

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   20.00  DOWNSTREAM ELEVATION(FEET) =   15.60
  STREET LENGTH(FEET) =   560.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 26.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  16.00
  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) =   0.0130
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.11
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   16.03
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.02
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.35
  STREET FLOW TRAVEL TIME(MIN.) =   3.09   Tc(MIN.) =   20.14
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.01      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.01      SUBAREA RUNOFF(CFS) =    0.02
  EFFECTIVE AREA(ACRES) =      3.59    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       8.10
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  16.03
  FLOW VELOCITY(FEET/SEC.) =  3.01   DEPTH*VELOCITY(FT*FT/SEC.) =   1.35
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =    1125.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1        8.10   20.14    2.541  0.30( 0.30) 1.00       3.6      20.00
LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =    1125.00 FEET.

** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       27.79   24.16    2.278  0.30( 0.30) 1.00      14.3      10.00
LONGEST FLOWPATH FROM NODE     10.00 TO NODE     22.00 =    1447.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       34.34   20.14    2.541  0.30( 0.30) 1.00      15.5      20.00
    2       34.94   24.16    2.278  0.30( 0.30) 1.00      17.9      10.00
  TOTAL AREA(ACRES) =        17.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =       34.94  Tc(MIN.) =   24.159
EFFECTIVE AREA(ACRES) =     17.88  AREA-AVERAGED Fm(INCH/HR) =  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       17.9
LONGEST FLOWPATH FROM NODE     10.00 TO NODE     22.00 =    1447.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =       17.9  TC(MIN.) =     24.16
EFFECTIVE AREA(ACRES) =     17.88  AREA-AVERAGED Fm(INCH/HR)=  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.999
PEAK FLOW RATE(CFS)   =      34.94

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       34.34   20.14    2.541  0.30( 0.30) 1.00      15.5      20.00
    2       34.94   24.16    2.278  0.30( 0.30) 1.00      17.9      10.00
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

OW LOSS FRACTION AMC III EXISITING CONDITION 100-YR





==========

*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)

AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 5.28 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	17.86	100.00	67.(AMC II)	0.296	0.687

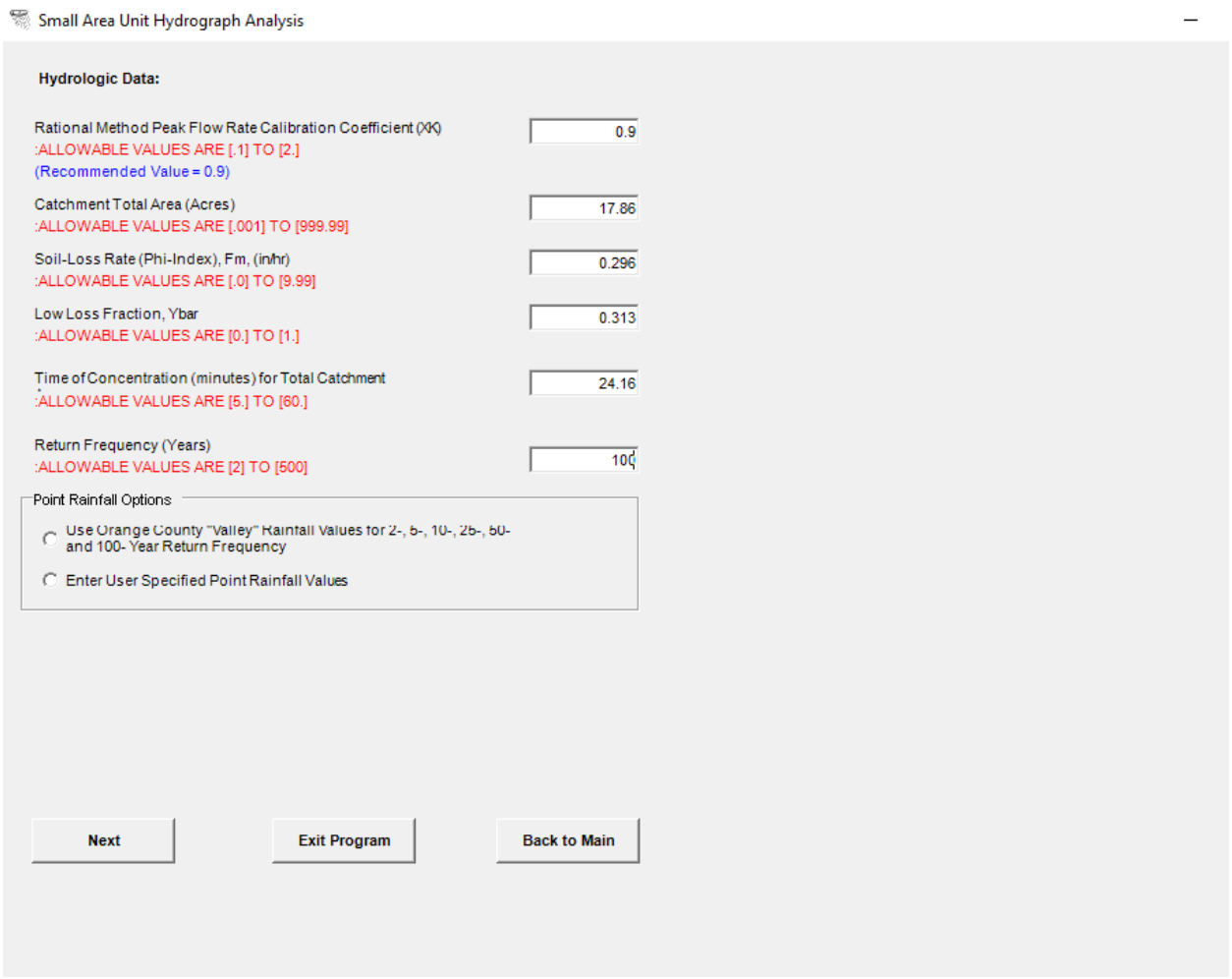
TOTAL AREA (Acres) = 17.86

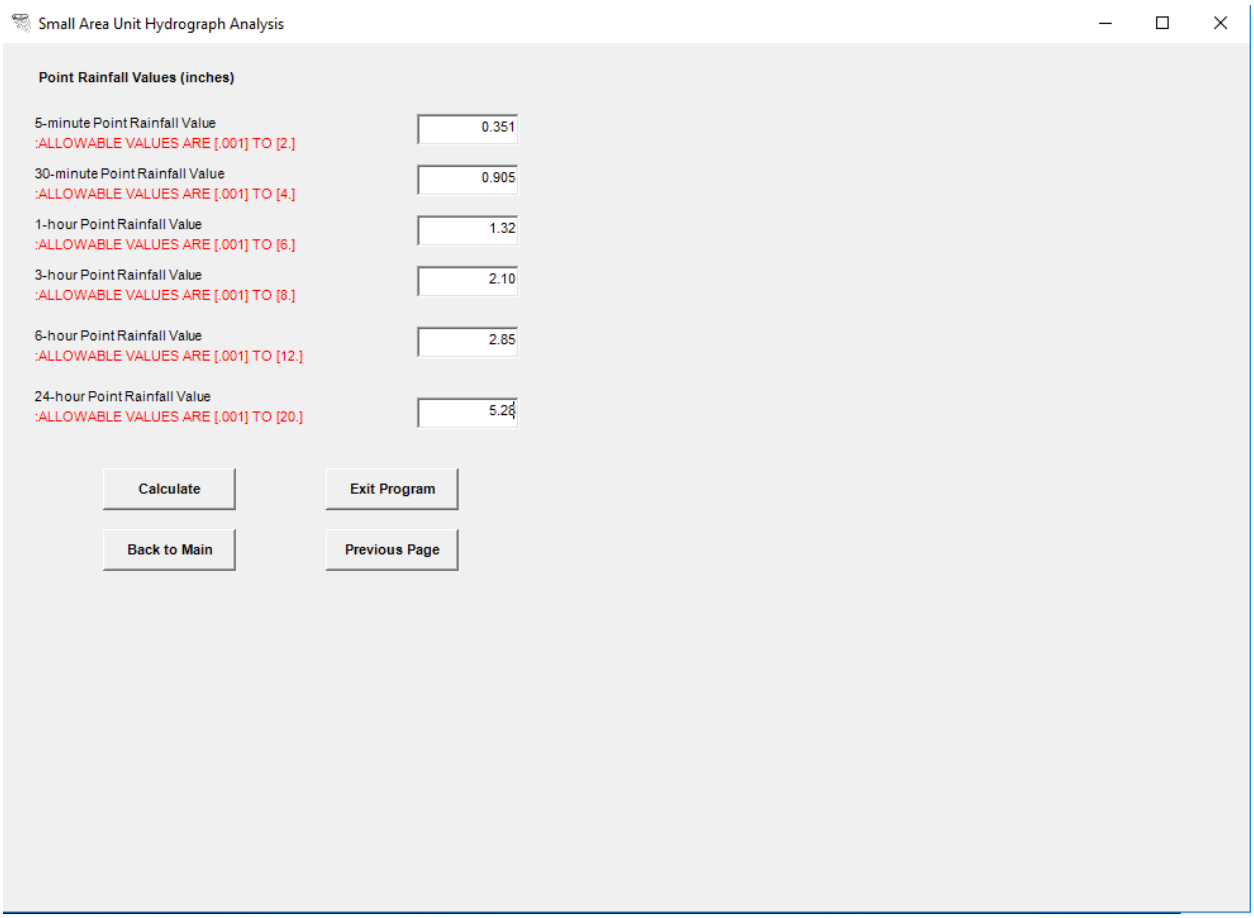
AREA-AVERAGED LOSS RATE, Fm (in./hr.) = 0.296

AREA-AVERAGED LOW LOSS FRACTION, Y = 0.313

==========

Small Unit Hydrograph Existing 100-YR




Small Area Unit Hydrograph Analysis
Point Rainfall Values (inches)
5-minute Point Rainfall Value
:ALLOWABLE VALUES ARE [.001] TO [2.]
0.351
30-minute Point Rainfall Value
:ALLOWABLE VALUES ARE [.001] TO [4.]
0.905
1-hour Point Rainfall Value
:ALLOWABLE VALUES ARE [.001] TO [6.]
1.32
3-hour Point Rainfall Value
:ALLOWABLE VALUES ARE [.001] TO [8.]
2.10
6-hour Point Rainfall Value
:ALLOWABLE VALUES ARE [.001] TO [12.]
2.85
24-hour Point Rainfall Value
:ALLOWABLE VALUES ARE [.001] TO [20.]
5.28
Calculate
Exit Program
Back to Main
Previous Page

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 17.86
SOIL-LOSS RATE, Fm,(INCH/HR) = 0.296
LOW LOSS FRACTION = 0.313
TIME OF CONCENTRATION(MIN.) = 24.16
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 100
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.35
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.90
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.32
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.10
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.85
24-HOUR POINT RAINFALL VALUE(INCHES) = 5.28

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 5.01
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 2.85

****

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	7.5	15.0	22.5	30.0
0.30	0.0133	1.08	.Q	.	.	.	.
0.70	0.0495	1.09	.Q	.	.	.	.
1.10	0.0861	1.11	.Q	.	.	.	.
1.50	0.1234	1.12	.Q	.	.	.	.
1.91	0.1612	1.15	.Q	.	.	.	.
2.31	0.1996	1.16	.Q	.	.	.	.
2.71	0.2386	1.18	.Q	.	.	.	.
3.11	0.2782	1.20	.Q	.	.	.	.
3.52	0.3185	1.23	.Q	.	.	.	.
3.92	0.3596	1.24	.Q	.	.	.	.
4.32	0.4013	1.27	.Q	.	.	.	.
4.73	0.4439	1.29	.Q	.	.	.	.
5.13	0.4873	1.32	.Q	.	.	.	.
5.53	0.5316	1.34	.Q	.	.	.	.
5.93	0.5768	1.38	.Q	.	.	.	.
6.34	0.6230	1.40	.Q	.	.	.	.
6.74	0.6702	1.44	.Q	.	.	.	.
7.14	0.7185	1.46	.Q	.	.	.	.
7.54	0.7680	1.51	. Q	.	.	.	.
7.95	0.8188	1.54	. Q	.	.	.	.
8.35	0.8710	1.60	. Q	.	.	.	.
8.75	0.9247	1.63	. Q	.	.	.	.
9.15	0.9800	1.69	. Q	.	.	.	.
9.56	1.0370	1.73	. Q	.	.	.	.

```
 9.96    1.0959    1.81  . Q     .       .       .       .
10.36    1.1570    1.86  . Q     .       .       .       .
10.77    1.2204    1.95  . Q     .       .       .       .
11.17    1.2863    2.01  . Q     .       .       .       .
11.57    1.3553    2.13  . Q     .       .       .       .
11.97    1.4275    2.20  . Q     .       .       .       .
12.38    1.5033    2.35  .  Q    .       .       .       .
12.78    1.5830    2.44  .  Q    .       .       .       .
13.18    1.6681    2.67  .  Q    .       .       .       .
13.58    1.7593    2.81  .  Q    .       .       .       .
13.99    1.8588    3.17  .   Q   .       .       .       .
14.39    1.9669    3.33  .   Q   .       .       .       .
14.79    2.0872    3.90  .    Q  .       .       .       .
15.19    2.2249    4.38  .    Q  .       .       .       .
15.60    2.4148    7.04  .      Q.       .       .       .
16.00    2.6989   10.04  .       .  Q    .       .       .
16.40    3.3229   27.46  .       .       .       .    Q  .
16.81    3.8642    5.07  .    Q  .       .       .       .
17.21    4.0074    3.54  .   Q   .       .       .       .
17.61    4.1158    2.97  .  Q    .       .       .       .
18.01    4.2077    2.55  .  Q    .       .       .       .
18.42    4.2881    2.28  .  Q    .       .       .       .
18.82    4.3605    2.07  . Q     .       .       .       .
19.22    4.4266    1.90  . Q     .       .       .       .
19.62    4.4878    1.77  . Q     .       .       .       .
20.03    4.5448    1.66  . Q     .       .       .       .
20.43    4.5986    1.57  . Q     .       .       .       .
20.83    4.6494    1.49  .Q      .       .       .       .
21.23    4.6978    1.42  .Q      .       .       .       .
21.64    4.7440    1.36  .Q      .       .       .       .
22.04    4.7883    1.30  .Q      .       .       .       .
22.44    4.8308    1.26  .Q      .       .       .       .
22.85    4.8719    1.21  .Q      .       .       .       .
23.25    4.9115    1.17  .Q      .       .       .       .
23.65    4.9499    1.14  .Q      .       .       .       .
24.05    4.9872    1.10  .Q      .       .       .       .
24.46    5.0055    0.00  Q       .       .       .       .
```

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1449.6
10%	265.8
20%	72.5
30%	48.3
40%	24.2

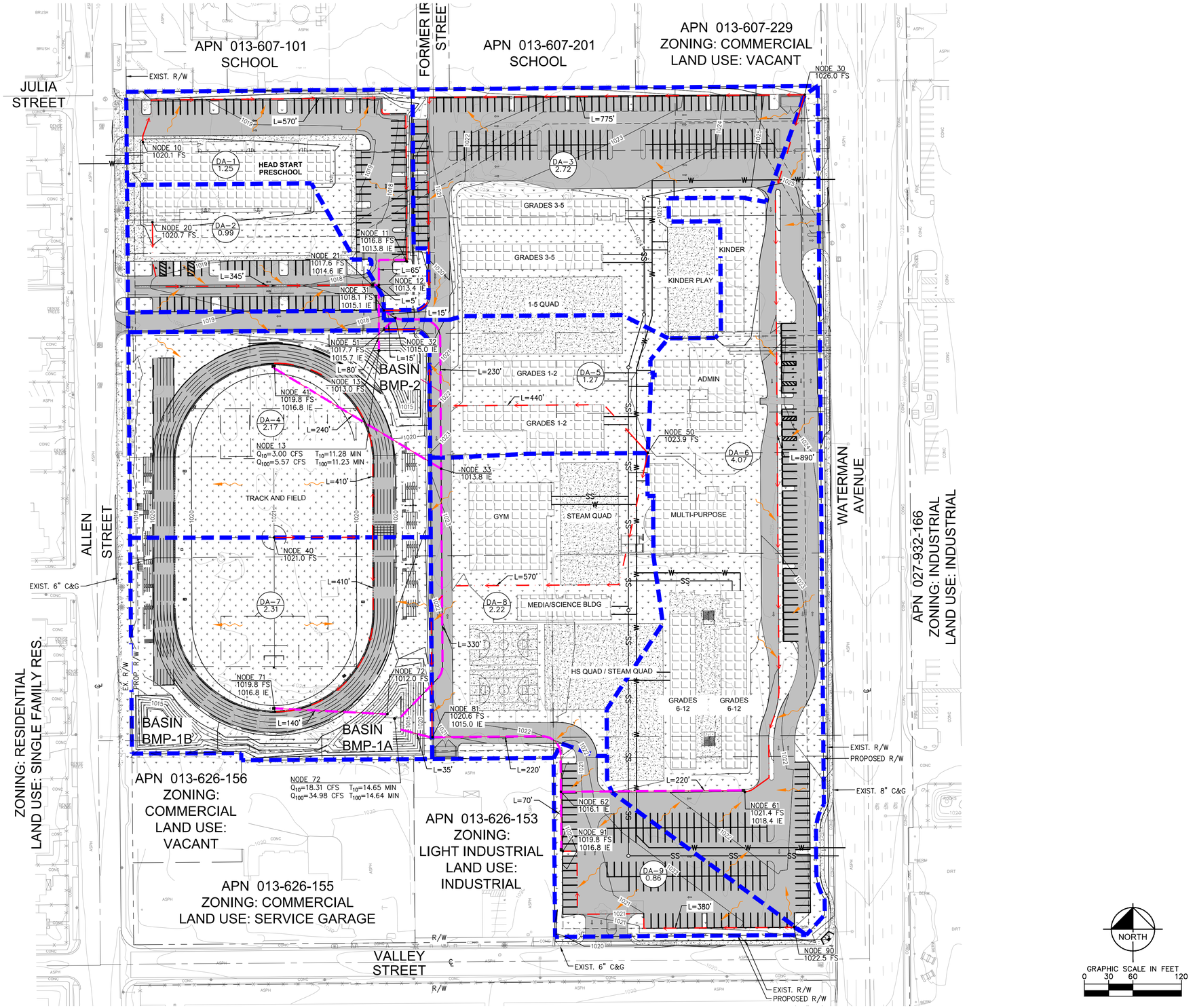
50%	24.2
60%	24.2
70%	24.2
80%	24.2
90%	24.2

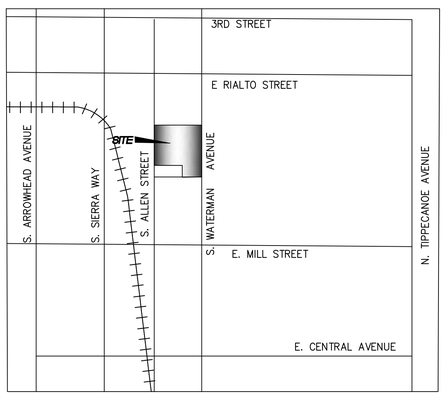
Appendix E

Proposed Hydrology Exhibit and Calculations

LEGEND

575	PROPOSED CONTOUR
575	EXISTING CONTOUR
	PROPERTY LINE
	DMA BOUNDARY
	PROPOSED STORM DRAIN
	FLOW PATH
	FLOW ARROW
NODE 10 50.00 FS	NODE ID AND ELEVATION
X XX	DA NAME DA AREA (IN ACRES)
	RIGHT OF WAY





VICINITY MAP
NOT TO SCALE

NORTH

GRAPHIC SCALE IN FEET
0 30 60 120

CUP NO. 19-10

Kimley»Horn

PROPOSED DRAINAGE MAP
WATERMAN SCHOOL HIGHMARK
9/9/2019

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2011 Advanced Engineering Software (aes)
            Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:

                      Kimley-Horn and Associates, Inc.
                             765 The City Drive
                                 Suite 200
                              Orange, CA 92868

 ************************ DESCRIPTION OF STUDY ************************
* NSLA                                                                *
* 10-YEAR PROPOSED CONDITION                                          *
* XO 09/19/19 WSH10P.RES                                              *
 **********************************************************************

  FILE NAME: WSH10P.DAT
  TIME/DATE OF STUDY: 11:58 09/19/2019
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8350

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
```

```
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   775.00
  ELEVATION DATA: UPSTREAM(FEET) =     26.00  DOWNSTREAM(FEET) =     18.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.755
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.937
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  SCHOOL                     A        2.72      0.98     0.600    32   14.76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      3.31
  TOTAL AREA(ACRES) =      2.72   PEAK FLOW RATE(CFS) =      3.31

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    15.10  DOWNSTREAM(FEET) =    15.00
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.74
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.31
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   14.81
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =     790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 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.) =   14.81
```

```
  RAINFALL INTENSITY(INCH/HR) =   1.93
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       2.72
  TOTAL STREAM AREA(ACRES) =       2.72
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.31

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     51.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   440.00
  ELEVATION DATA: UPSTREAM(FEET) =     23.90  DOWNSTREAM(FEET) =     17.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.028
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.307
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  SCHOOL                     A        1.27      0.98     0.600    32   11.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      1.97
  TOTAL AREA(ACRES) =      1.27   PEAK FLOW RATE(CFS) =      1.97

****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     32.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    15.70  DOWNSTREAM(FEET) =    15.00
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.63
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.97
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   11.06
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     32.00 =     455.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

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

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 11.06
RAINFALL INTENSITY(INCH/HR) = 2.30
AREA-AVERAGED Fm(INCH/HR) = 0.59
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.60
EFFECTIVE STREAM AREA(ACRES) = 1.27
TOTAL STREAM AREA(ACRES) = 1.27
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.97

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.31	14.81	1.933	0.98(0.59)	0.60	2.7	30.00
2	1.97	11.06	2.304	0.98(0.59)	0.60	1.3	50.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	5.12	11.06	2.304	0.98(0.59)	0.60	3.3	50.00
2	4.85	14.81	1.933	0.98(0.59)	0.60	4.0	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 5.12 Tc(MIN.) = 11.06
EFFECTIVE AREA(ACRES) = 3.30 AREA-AVERAGED Fm(INCH/HR) = 0.59
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 4.0
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 32.00 = 790.00 FEET.

****

FLOW PROCESS FROM NODE 32.00 TO NODE 33.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 15.00 DOWNSTREAM(FEET) = 13.80
FLOW LENGTH(FEET) = 230.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.81
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.12
PIPE TRAVEL TIME(MIN.) = 0.80 Tc(MIN.) = 11.85

```
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     33.00 =    1020.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 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.) =   11.85
 RAINFALL INTENSITY(INCH/HR) =   2.21
 AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       3.30
 TOTAL STREAM AREA(ACRES) =       3.99
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.12

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     41.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   410.00
 ELEVATION DATA: UPSTREAM(FEET) =     21.00  DOWNSTREAM(FEET) =     19.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.680
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.943
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 SCHOOL                     A        2.17      0.98     0.600    32   14.68
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA RUNOFF(CFS) =      2.65
 TOTAL AREA(ACRES) =      2.17   PEAK FLOW RATE(CFS) =      2.65

****************************************************************************
 FLOW PROCESS FROM NODE     41.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    16.80  DOWNSTREAM(FEET) =    13.80
 FLOW LENGTH(FEET) =   240.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.9 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.65
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.65
  PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =   15.39
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     33.00 =     650.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 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.) =   15.39
  RAINFALL INTENSITY(INCH/HR) =   1.89
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       2.17
  TOTAL STREAM AREA(ACRES) =       2.17
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.65

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.12   11.85    2.209  0.98( 0.59) 0.60       3.3      50.00
      1        4.85   15.65    1.870  0.98( 0.59) 0.60       4.0      30.00
      2        2.65   15.39    1.889  0.98( 0.59) 0.60       2.2      40.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.66   11.85    2.209  0.98( 0.59) 0.60       5.0      50.00
      2        7.53   15.39    1.889  0.98( 0.59) 0.60       6.1      40.00
      3        7.47   15.65    1.870  0.98( 0.59) 0.60       6.2      30.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.66    Tc(MIN.) =    11.85
  EFFECTIVE AREA(ACRES) =       4.97   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        6.2
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     33.00 =    1020.00 FEET.

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

```
 FLOW PROCESS FROM NODE     33.00 TO NODE     72.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    13.80  DOWNSTREAM(FEET) =    12.00
 FLOW LENGTH(FEET) =   330.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.26
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.66
 PIPE TRAVEL TIME(MIN.) =   1.04    Tc(MIN.) =   12.90
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     72.00 =    1350.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     72.00 TO NODE     72.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.90
 RAINFALL INTENSITY(INCH/HR) =   2.10
 AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       4.97
 TOTAL STREAM AREA(ACRES) =       6.16
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.66

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     71.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   410.00
 ELEVATION DATA: UPSTREAM(FEET) =     21.00  DOWNSTREAM(FEET) =     19.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.680
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.943
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 SCHOOL                     A        2.31      0.98     0.600    32   14.68
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
```

```
  SUBAREA RUNOFF(CFS) =      2.82
  TOTAL AREA(ACRES) =      2.31   PEAK FLOW RATE(CFS) =      2.82

****************************************************************************
  FLOW PROCESS FROM NODE     71.00 TO NODE     72.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    16.80  DOWNSTREAM(FEET) =    12.00
  FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.25
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.82
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   14.96
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     72.00 =     550.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     72.00 TO NODE     72.00 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.) =   14.96
  RAINFALL INTENSITY(INCH/HR) =   1.92
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       2.31
  TOTAL STREAM AREA(ACRES) =       2.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.82

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.66   12.90    2.100  0.98( 0.59) 0.60       5.0      50.00
      1        7.53   16.43    1.816  0.98( 0.59) 0.60       6.1      40.00
      1        7.47   16.69    1.799  0.98( 0.59) 0.60       6.2      30.00
      2        2.82   14.96    1.921  0.98( 0.59) 0.60       2.3      40.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)		(ACRES)	NODE
1	10.42	12.90	2.100	0.98(0.59)	0.60	7.0	50.00
2	10.41	14.96	1.921	0.98(0.59)	0.60	7.9	40.00
3	10.13	16.43	1.816	0.98(0.59)	0.60	8.4	40.00
4	10.03	16.69	1.799	0.98(0.59)	0.60	8.5	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 10.42 Tc(MIN.) = 12.90
EFFECTIVE AREA(ACRES) = 6.96 AREA-AVERAGED Fm(INCH/HR) = 0.58
AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 8.5
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 72.00 = 1350.00 FEET.

****
FLOW PROCESS FROM NODE 72.00 TO NODE 72.00 IS CODE = 10

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

****
FLOW PROCESS FROM NODE 30.00 TO NODE 61.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==
INITIAL SUBAREA FLOW-LENGTH(FEET) = 890.00
ELEVATION DATA: UPSTREAM(FEET) = 26.00 DOWNSTREAM(FEET) = 21.40

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 17.864
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.727
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
SCHOOL	A	4.07	0.98	0.600	32	17.86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA RUNOFF(CFS) = 4.18
TOTAL AREA(ACRES) = 4.07 PEAK FLOW RATE(CFS) = 4.18

****
FLOW PROCESS FROM NODE 61.00 TO NODE 62.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 18.40 DOWNSTREAM(FEET) = 16.10
FLOW LENGTH(FEET) = 220.00 MANNING'S N = 0.012

```
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.94
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.18
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   18.48
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     62.00 =    1110.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     62.00 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.) =   18.48
  RAINFALL INTENSITY(INCH/HR) =   1.69
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       4.07
  TOTAL STREAM AREA(ACRES) =       4.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.18

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     91.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   380.00
  ELEVATION DATA: UPSTREAM(FEET) =     22.50  DOWNSTREAM(FEET) =     19.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.926
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.201
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  SCHOOL                     A        0.86      0.98     0.600    32   11.93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      1.25
  TOTAL AREA(ACRES) =      0.86   PEAK FLOW RATE(CFS) =      1.25

****************************************************************************
  FLOW PROCESS FROM NODE     91.00 TO NODE     62.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    16.80  DOWNSTREAM(FEET) =    16.10
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.30
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.25
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   12.20
  LONGEST FLOWPATH FROM NODE     90.00 TO NODE     62.00 =     450.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     62.00 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.) =   12.20
  RAINFALL INTENSITY(INCH/HR) =   2.17
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       0.86
  TOTAL STREAM AREA(ACRES) =       0.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.25

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.18   18.48    1.693  0.98( 0.59) 0.60       4.1      30.00
      2        1.25   12.20    2.172  0.98( 0.59) 0.60       0.9      90.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.21   12.20    2.172  0.97( 0.58) 0.60       3.5      90.00
      2        5.06   18.48    1.693  0.98( 0.59) 0.60       4.9      30.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.21    Tc(MIN.) =    12.20
  EFFECTIVE AREA(ACRES) =       3.55   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        4.9
```

```
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     62.00 =    1110.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     62.00 TO NODE     81.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    16.10  DOWNSTREAM(FEET) =    15.00
 FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.74
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.21
 PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   12.97
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     81.00 =    1330.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     81.00 TO NODE     81.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.97
 RAINFALL INTENSITY(INCH/HR) =   2.09
 AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.97
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       3.55
 TOTAL STREAM AREA(ACRES) =       4.93
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.21

****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     81.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   570.00
 ELEVATION DATA: UPSTREAM(FEET) =     23.90  DOWNSTREAM(FEET) =     20.60

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.612
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.949
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
```

```
  SCHOOL                    A        2.22      0.98     0.600    32   14.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      2.72
  TOTAL AREA(ACRES) =      2.22   PEAK FLOW RATE(CFS) =      2.72

****************************************************************************
  FLOW PROCESS FROM NODE     81.00 TO NODE     81.00 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.) =   14.61
  RAINFALL INTENSITY(INCH/HR) =   1.95
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       2.22
  TOTAL STREAM AREA(ACRES) =       2.22
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.72

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.21   12.97    2.093  0.97( 0.58) 0.60       3.5      90.00
      1        5.06   19.26    1.651  0.98( 0.59) 0.60       4.9      30.00
      2        2.72   14.61    1.949  0.98( 0.59) 0.60       2.2      50.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.88   12.97    2.093  0.98( 0.59) 0.60       5.5      90.00
      2        7.89   14.61    1.949  0.98( 0.59) 0.60       6.1      50.00
      3        7.19   19.26    1.651  0.98( 0.59) 0.60       7.2      30.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.89    Tc(MIN.) =    14.61
  EFFECTIVE AREA(ACRES) =       6.13   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        7.2
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     81.00 =    1330.00 FEET.

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

```
 FLOW PROCESS FROM NODE     81.00 TO NODE     72.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    15.00  DOWNSTREAM(FEET) =    12.00
 FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.24
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.89
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   14.65
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     72.00 =    1365.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     72.00 TO NODE     72.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        7.88   13.01    2.089  0.98( 0.59) 0.60       5.5      90.00
     2        7.89   14.65    1.946  0.98( 0.59) 0.60       6.1      50.00
     3        7.19   19.30    1.649  0.98( 0.59) 0.60       7.2      30.00
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     72.00 =    1365.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       10.42   12.90    2.100  0.98( 0.59) 0.60       7.0      50.00
     2       10.41   14.96    1.921  0.98( 0.59) 0.60       7.9      40.00
     3       10.13   16.43    1.816  0.98( 0.59) 0.60       8.4      40.00
     4       10.03   16.69    1.799  0.98( 0.59) 0.60       8.5      30.00
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     72.00 =    1350.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       18.30   12.90    2.100  0.98( 0.59) 0.60      12.4      50.00
     2       18.31   13.01    2.089  0.98( 0.59) 0.60      12.5      90.00
     3       18.30   14.65    1.946  0.98( 0.59) 0.60      13.9      50.00
     4       18.25   14.96    1.921  0.98( 0.59) 0.60      14.1      40.00
     5       17.75   16.43    1.816  0.98( 0.59) 0.60      14.9      40.00
     6       17.62   16.69    1.799  0.98( 0.59) 0.60      15.0      30.00
     7       15.98   19.30    1.649  0.98( 0.59) 0.60      15.6      30.00
   TOTAL AREA(ACRES) =       15.6
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       18.31  Tc(MIN.) =   13.009
  EFFECTIVE AREA(ACRES) =     12.53  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       15.6
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     72.00 =    1365.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     72.00 TO NODE     72.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   570.00
  ELEVATION DATA: UPSTREAM(FEET) =     20.10  DOWNSTREAM(FEET) =     16.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.612
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.949
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  SCHOOL                     A        1.25      0.98     0.600    32   14.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      1.53
  TOTAL AREA(ACRES) =      1.25   PEAK FLOW RATE(CFS) =      1.53

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    13.80  DOWNSTREAM(FEET) =    13.40
  FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.79
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.53
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   14.90
```

```
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     635.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 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.) =   14.90
 RAINFALL INTENSITY(INCH/HR) =   1.93
 AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       1.25
 TOTAL STREAM AREA(ACRES) =       1.25
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.53

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   345.00
 ELEVATION DATA: UPSTREAM(FEET) =     20.70  DOWNSTREAM(FEET) =     17.60

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.948
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.317
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 SCHOOL                     A        0.99      0.98     0.600    32   10.95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA RUNOFF(CFS) =      1.54
 TOTAL AREA(ACRES) =      0.99   PEAK FLOW RATE(CFS) =      1.54

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    14.60  DOWNSTREAM(FEET) =    13.40
 FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.1 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.98
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.54
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   10.95
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     12.00 =     350.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.95
  RAINFALL INTENSITY(INCH/HR) =   2.32
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       0.99
  TOTAL STREAM AREA(ACRES) =       0.99
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.54

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.53   14.90    1.926  0.98( 0.59) 0.60       1.2      10.00
      2        1.54   10.95    2.317  0.97( 0.59) 0.60       1.0      20.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        3.00   10.95    2.317  0.98( 0.59) 0.60       1.9      20.00
      2        2.73   14.90    1.926  0.98( 0.59) 0.60       2.2      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.00    Tc(MIN.) =    10.95
  EFFECTIVE AREA(ACRES) =       1.91   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        2.2
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     635.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    13.40  DOWNSTREAM(FEET) =    13.00
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.14
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.00
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   11.28
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     72.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        3.00   11.28    2.277  0.98( 0.59) 0.60       1.9      20.00
      2        2.73   15.23    1.901  0.98( 0.59) 0.60       2.2      10.00
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     72.00 =     715.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       18.30   12.90    2.100  0.98( 0.59) 0.60      12.4      50.00
      2       18.31   13.01    2.089  0.98( 0.59) 0.60      12.5      90.00
      3       18.30   14.65    1.946  0.98( 0.59) 0.60      13.9      50.00
      4       18.25   14.96    1.921  0.98( 0.59) 0.60      14.1      40.00
      5       17.75   16.43    1.816  0.98( 0.59) 0.60      14.9      40.00
      6       17.62   16.69    1.799  0.98( 0.59) 0.60      15.0      30.00
      7       15.98   19.30    1.649  0.98( 0.59) 0.60      15.6      30.00
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     72.00 =    1365.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       20.86   11.28    2.277  0.98( 0.59) 0.60      12.8      20.00
      2       21.19   12.90    2.100  0.98( 0.59) 0.60      14.5      50.00
      3       21.19   13.01    2.089  0.98( 0.59) 0.60      14.6      90.00
      4       21.07   14.65    1.946  0.98( 0.59) 0.60      16.1      50.00
      5       21.00   14.96    1.921  0.98( 0.59) 0.60      16.4      40.00
      6       20.89   15.23    1.901  0.98( 0.59) 0.60      16.5      10.00
      7       20.30   16.43    1.816  0.98( 0.59) 0.60      17.2      40.00
      8       20.14   16.69    1.799  0.98( 0.59) 0.60      17.3      30.00
```

9	18.19	19.30	1.649	0.98(0.59)	0.60	17.9	30.00

TOTAL AREA(ACRES) = 17.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 21.19 Tc(MIN.) = 13.009
EFFECTIVE AREA(ACRES) = 14.59 AREA-AVERAGED Fm(INCH/HR) = 0.59
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 17.9
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 72.00 = 1365.00 FEET.

==========

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 17.9 TC(MIN.) = 13.01
EFFECTIVE AREA(ACRES) = 14.59 AREA-AVERAGED Fm(INCH/HR)= 0.59
AREA-AVERAGED Fp(INCH/HR) = 0.98 AREA-AVERAGED Ap = 0.600
PEAK FLOW RATE(CFS) = 21.19

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	20.86	11.28	2.277	0.98(0.59)	0.60	12.8	20.00
2	21.19	12.90	2.100	0.98(0.59)	0.60	14.5	50.00
3	21.19	13.01	2.089	0.98(0.59)	0.60	14.6	90.00
4	21.07	14.65	1.946	0.98(0.59)	0.60	16.1	50.00
5	21.00	14.96	1.921	0.98(0.59)	0.60	16.4	40.00
6	20.89	15.23	1.901	0.98(0.59)	0.60	16.5	10.00
7	20.30	16.43	1.816	0.98(0.59)	0.60	17.2	40.00
8	20.14	16.69	1.799	0.98(0.59)	0.60	17.3	30.00
9	18.19	19.30	1.649	0.98(0.59)	0.60	17.9	30.00

==========
==========

END OF RATIONAL METHOD ANALYSIS

```
**************************************************************************
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                          Analysis prepared by:

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                                 Suite 200
                              Orange, CA 92868

 ************************ DESCRIPTION OF STUDY ************************
* NSLA                                                                *
* 100-YEAR PROPOSED CONDITIONS                                        *
* XO 09/19/19 WSH100P.RES                                             *
 **********************************************************************

  FILE NAME: WSH100P.DAT
  TIME/DATE OF STUDY: 11:52 09/19/2019
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.3200

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
```

```
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   775.00
  ELEVATION DATA: UPSTREAM(FEET) =     26.00  DOWNSTREAM(FEET) =     18.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.755
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.063
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  SCHOOL                     A        2.72      0.74     0.600    52   14.76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      6.41
  TOTAL AREA(ACRES) =      2.72   PEAK FLOW RATE(CFS) =      6.41

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    15.10  DOWNSTREAM(FEET) =    15.00
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.56
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.41
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   14.80
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =     790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 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.) =   14.80
```

```
  RAINFALL INTENSITY(INCH/HR) =   3.06
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       2.72
  TOTAL STREAM AREA(ACRES) =       2.72
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.41

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     51.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   440.00
  ELEVATION DATA: UPSTREAM(FEET) =     23.90  DOWNSTREAM(FEET) =     17.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.028
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.647
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  SCHOOL                     A        1.27      0.74     0.600    52   11.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      3.66
  TOTAL AREA(ACRES) =      1.27   PEAK FLOW RATE(CFS) =      3.66

****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     32.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    15.70  DOWNSTREAM(FEET) =    15.00
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.72
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.66
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   11.05
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     32.00 =     455.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.05
  RAINFALL INTENSITY(INCH/HR) =   3.64
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       1.27
  TOTAL STREAM AREA(ACRES) =       1.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.66

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.41   14.80    3.057  0.74( 0.45) 0.60       2.7      30.00
      2        3.66   11.05    3.642  0.74( 0.45) 0.60       1.3      50.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        9.52   11.05    3.642  0.74( 0.45) 0.60       3.3      50.00
      2        9.40   14.80    3.057  0.74( 0.45) 0.60       4.0      30.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.52    Tc(MIN.) =    11.05
  EFFECTIVE AREA(ACRES) =       3.30   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        4.0
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =     790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    15.00  DOWNSTREAM(FEET) =    13.80
  FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.56
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.52
  PIPE TRAVEL TIME(MIN.) =   0.69    Tc(MIN.) =   11.74
```

```
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     33.00 =    1020.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 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.) =   11.74
 RAINFALL INTENSITY(INCH/HR) =   3.51
 AREA-AVERAGED Fm(INCH/HR) =  0.45
 AREA-AVERAGED Fp(INCH/HR) =  0.74
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       3.30
 TOTAL STREAM AREA(ACRES) =       3.99
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.52

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     41.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   410.00
 ELEVATION DATA: UPSTREAM(FEET) =     21.00  DOWNSTREAM(FEET) =     19.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.680
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 SCHOOL                     A        2.17      0.74     0.600    52   14.68
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA RUNOFF(CFS) =      5.13
 TOTAL AREA(ACRES) =      2.17   PEAK FLOW RATE(CFS) =      5.13

****************************************************************************
 FLOW PROCESS FROM NODE     41.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    16.80  DOWNSTREAM(FEET) =    13.80
 FLOW LENGTH(FEET) =   240.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.0 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.66
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.13
  PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =   15.28
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     33.00 =     650.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 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.) =   15.28
  RAINFALL INTENSITY(INCH/HR) =   3.00
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       2.17
  TOTAL STREAM AREA(ACRES) =       2.17
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.13

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        9.52   11.74    3.512  0.74( 0.45) 0.60       3.3      50.00
      1        9.40   15.49    2.975  0.74( 0.45) 0.60       4.0      30.00
      2        5.13   15.28    2.999  0.74( 0.45) 0.60       2.2      40.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       14.25   11.74    3.512  0.74( 0.45) 0.60       5.0      50.00
      2       14.53   15.28    2.999  0.74( 0.45) 0.60       6.1      40.00
      3       14.48   15.49    2.975  0.74( 0.45) 0.60       6.2      30.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      14.53    Tc(MIN.) =    15.28
  EFFECTIVE AREA(ACRES) =       6.12   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        6.2
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     33.00 =    1020.00 FEET.

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

```
 FLOW PROCESS FROM NODE     33.00 TO NODE     72.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    13.80  DOWNSTREAM(FEET) =    12.00
 FLOW LENGTH(FEET) =   330.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.27
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.53
 PIPE TRAVEL TIME(MIN.) =   0.88    Tc(MIN.) =   16.16
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     72.00 =    1350.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     72.00 TO NODE     72.00 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.) =   16.16
 RAINFALL INTENSITY(INCH/HR) =   2.90
 AREA-AVERAGED Fm(INCH/HR) =  0.45
 AREA-AVERAGED Fp(INCH/HR) =  0.74
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       6.12
 TOTAL STREAM AREA(ACRES) =       6.16
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.53

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     71.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   410.00
 ELEVATION DATA: UPSTREAM(FEET) =     21.00  DOWNSTREAM(FEET) =     19.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.680
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 SCHOOL                     A        2.31      0.74     0.600    52   14.68
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
```

```
  SUBAREA RUNOFF(CFS) =      5.46
  TOTAL AREA(ACRES) =      2.31   PEAK FLOW RATE(CFS) =      5.46

****************************************************************************
  FLOW PROCESS FROM NODE     71.00 TO NODE     72.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    16.80  DOWNSTREAM(FEET) =    12.00
  FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.81
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.46
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   14.92
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     72.00 =     550.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     72.00 TO NODE     72.00 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.) =   14.92
  RAINFALL INTENSITY(INCH/HR) =   3.04
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       2.31
  TOTAL STREAM AREA(ACRES) =       2.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.46

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       14.25   12.62    3.363  0.74( 0.45) 0.60       5.0      50.00
      1       14.53   16.16    2.900  0.74( 0.45) 0.60       6.1      40.00
      1       14.48   16.37    2.878  0.74( 0.45) 0.60       6.2      30.00
      2        5.46   14.92    3.043  0.74( 0.45) 0.60       2.3      40.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)		(ACRES)	NODE
1	19.44	12.62	3.363	0.74(0.45)	0.60	6.9	50.00
2	19.90	14.92	3.043	0.74(0.45)	0.60	8.0	40.00
3	19.70	16.16	2.900	0.74(0.45)	0.60	8.4	40.00
4	19.59	16.37	2.878	0.74(0.45)	0.60	8.5	30.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 19.90 Tc(MIN.) = 14.92
EFFECTIVE AREA(ACRES) = 8.03 AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 8.5
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 72.00 = 1350.00 FEET.

****
FLOW PROCESS FROM NODE 72.00 TO NODE 72.00 IS CODE = 10

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

****
FLOW PROCESS FROM NODE 30.00 TO NODE 61.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==
INITIAL SUBAREA FLOW-LENGTH(FEET) = 890.00
ELEVATION DATA: UPSTREAM(FEET) = 26.00 DOWNSTREAM(FEET) = 21.40

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 17.864
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.731
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
SCHOOL	A	4.07	0.74	0.600	52	17.86

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.600
SUBAREA RUNOFF(CFS) = 8.37
TOTAL AREA(ACRES) = 4.07 PEAK FLOW RATE(CFS) = 8.37

****
FLOW PROCESS FROM NODE 61.00 TO NODE 62.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 18.40 DOWNSTREAM(FEET) = 16.10
FLOW LENGTH(FEET) = 220.00 MANNING'S N = 0.012

```
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.02
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.37
  PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =   18.39
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     62.00 =    1110.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     62.00 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.) =   18.39
  RAINFALL INTENSITY(INCH/HR) =   2.68
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       4.07
  TOTAL STREAM AREA(ACRES) =       4.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.37

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     91.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   380.00
  ELEVATION DATA: UPSTREAM(FEET) =     22.50  DOWNSTREAM(FEET) =     19.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.926
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.480
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  SCHOOL                     A        0.86      0.74     0.600    52   11.93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      2.35
  TOTAL AREA(ACRES) =      0.86   PEAK FLOW RATE(CFS) =      2.35

****************************************************************************
  FLOW PROCESS FROM NODE     91.00 TO NODE     62.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    16.80  DOWNSTREAM(FEET) =    16.10
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.05
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.35
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   12.16
  LONGEST FLOWPATH FROM NODE     90.00 TO NODE     62.00 =     450.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     62.00 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.) =   12.16
  RAINFALL INTENSITY(INCH/HR) =   3.44
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       0.86
  TOTAL STREAM AREA(ACRES) =       0.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.35

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        8.37   18.39    2.684  0.74( 0.45) 0.60       4.1      30.00
      2        2.35   12.16    3.440  0.74( 0.45) 0.60       0.9      90.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        9.75   12.16    3.440  0.74( 0.45) 0.60       3.6      90.00
      2       10.13   18.39    2.684  0.74( 0.45) 0.60       4.9      30.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      10.13    Tc(MIN.) =    18.39
  EFFECTIVE AREA(ACRES) =       4.93   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        4.9
```

```
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     62.00 =    1110.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     62.00 TO NODE     81.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    16.10  DOWNSTREAM(FEET) =    15.00
 FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.52
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.13
 PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =   19.05
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     81.00 =    1330.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     81.00 TO NODE     81.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   19.05
 RAINFALL INTENSITY(INCH/HR) =   2.63
 AREA-AVERAGED Fm(INCH/HR) =  0.45
 AREA-AVERAGED Fp(INCH/HR) =  0.74
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       4.93
 TOTAL STREAM AREA(ACRES) =       4.93
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.13

****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     81.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   570.00
 ELEVATION DATA: UPSTREAM(FEET) =     23.90  DOWNSTREAM(FEET) =     20.60

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.612
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.081
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
```

```
  SCHOOL                    A        2.22      0.74     0.600    52   14.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      5.27
  TOTAL AREA(ACRES) =      2.22   PEAK FLOW RATE(CFS) =      5.27

****************************************************************************
  FLOW PROCESS FROM NODE     81.00 TO NODE     81.00 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.) =   14.61
  RAINFALL INTENSITY(INCH/HR) =   3.08
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       2.22
  TOTAL STREAM AREA(ACRES) =       2.22
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.27

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        9.75   12.82    3.331  0.74( 0.45) 0.60       3.6      90.00
      1       10.13   19.05    2.627  0.74( 0.45) 0.60       4.9      30.00
      2        5.27   14.61    3.081  0.74( 0.45) 0.60       2.2      50.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       14.82   12.82    3.331  0.74( 0.45) 0.60       5.5      90.00
      2       15.13   14.61    3.081  0.74( 0.45) 0.60       6.2      50.00
      3       14.49   19.05    2.627  0.74( 0.45) 0.60       7.2      30.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      15.13    Tc(MIN.) =    14.61
  EFFECTIVE AREA(ACRES) =       6.17   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        7.2
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     81.00 =    1330.00 FEET.

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

```
 FLOW PROCESS FROM NODE     81.00 TO NODE     72.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    15.00  DOWNSTREAM(FEET) =    12.00
 FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.89
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.13
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   14.64
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     72.00 =    1365.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     72.00 TO NODE     72.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       14.82   12.86    3.326  0.74( 0.45) 0.60       5.5      90.00
     2       15.13   14.64    3.076  0.74( 0.45) 0.60       6.2      50.00
     3       14.49   19.08    2.625  0.74( 0.45) 0.60       7.2      30.00
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     72.00 =    1365.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       19.44   12.62    3.363  0.74( 0.45) 0.60       6.9      50.00
     2       19.90   14.92    3.043  0.74( 0.45) 0.60       8.0      40.00
     3       19.70   16.16    2.900  0.74( 0.45) 0.60       8.4      40.00
     4       19.59   16.37    2.878  0.74( 0.45) 0.60       8.5      30.00
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     72.00 =    1350.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       34.18   12.62    3.363  0.74( 0.45) 0.60      12.3      50.00
     2       34.31   12.86    3.326  0.74( 0.45) 0.60      12.5      90.00
     3       34.97   14.64    3.076  0.74( 0.45) 0.60      14.1      50.00
     4       34.98   14.92    3.043  0.74( 0.45) 0.60      14.3      40.00
     5       34.61   16.16    2.900  0.74( 0.45) 0.60      14.9      40.00
     6       34.47   16.37    2.878  0.74( 0.45) 0.60      15.0      30.00
     7       32.04   19.08    2.625  0.74( 0.45) 0.60      15.6      30.00
   TOTAL AREA(ACRES) =        15.6
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       34.98  Tc(MIN.) =   14.918
  EFFECTIVE AREA(ACRES) =     14.25  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       15.6
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     72.00 =    1365.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     72.00 TO NODE     72.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   570.00
  ELEVATION DATA: UPSTREAM(FEET) =     20.10  DOWNSTREAM(FEET) =     16.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.612
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.081
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  SCHOOL                     A        1.25      0.74     0.600    52   14.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      2.96
  TOTAL AREA(ACRES) =      1.25   PEAK FLOW RATE(CFS) =      2.96

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    13.80  DOWNSTREAM(FEET) =    13.40
  FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.47
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.96
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   14.85
```

```
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     635.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 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.) =   14.85
 RAINFALL INTENSITY(INCH/HR) =   3.05
 AREA-AVERAGED Fm(INCH/HR) =  0.45
 AREA-AVERAGED Fp(INCH/HR) =  0.74
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       1.25
 TOTAL STREAM AREA(ACRES) =       1.25
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.96

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   345.00
 ELEVATION DATA: UPSTREAM(FEET) =     20.70  DOWNSTREAM(FEET) =     17.60

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.948
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.663
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 SCHOOL                     A        0.99      0.74     0.600    52   10.95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA RUNOFF(CFS) =      2.87
 TOTAL AREA(ACRES) =      0.99   PEAK FLOW RATE(CFS) =      2.87

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    14.60  DOWNSTREAM(FEET) =    13.40
 FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.9 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.84
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.87
  PIPE TRAVEL TIME(MIN.) =   0.00    Tc(MIN.) =   10.95
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     12.00 =     350.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.95
  RAINFALL INTENSITY(INCH/HR) =   3.66
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       0.99
  TOTAL STREAM AREA(ACRES) =       0.99
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.87

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.96   14.85    3.050  0.74( 0.45) 0.60       1.2      10.00
      2        2.87   10.95    3.662  0.74( 0.45) 0.60       1.0      20.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.57   10.95    3.662  0.74( 0.45) 0.60       1.9      20.00
      2        5.29   14.85    3.050  0.74( 0.45) 0.60       2.2      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.57    Tc(MIN.) =    10.95
  EFFECTIVE AREA(ACRES) =       1.91   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        2.2
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     635.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    13.40  DOWNSTREAM(FEET) =    13.00
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.82
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.57
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   11.23
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     72.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.57   11.23    3.608  0.74( 0.45) 0.60       1.9      20.00
      2        5.29   15.13    3.016  0.74( 0.45) 0.60       2.2      10.00
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     72.00 =     715.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       34.18   12.62    3.363  0.74( 0.45) 0.60      12.3      50.00
      2       34.31   12.86    3.326  0.74( 0.45) 0.60      12.5      90.00
      3       34.97   14.64    3.076  0.74( 0.45) 0.60      14.1      50.00
      4       34.98   14.92    3.043  0.74( 0.45) 0.60      14.3      40.00
      5       34.61   16.16    2.900  0.74( 0.45) 0.60      14.9      40.00
      6       34.47   16.37    2.878  0.74( 0.45) 0.60      15.0      30.00
      7       32.04   19.08    2.625  0.74( 0.45) 0.60      15.6      30.00
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     72.00 =    1365.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       38.52   11.23    3.608  0.74( 0.45) 0.60      12.9      20.00
      2       39.64   12.62    3.363  0.74( 0.45) 0.60      14.4      50.00
      3       39.76   12.86    3.326  0.74( 0.45) 0.60      14.6      90.00
      4       40.29   14.64    3.076  0.74( 0.45) 0.60      16.3      50.00
      5       40.29   14.92    3.043  0.74( 0.45) 0.60      16.5      40.00
      6       40.20   15.13    3.016  0.74( 0.45) 0.60      16.6      10.00
      7       39.65   16.16    2.900  0.74( 0.45) 0.60      17.2      40.00
      8       39.47   16.37    2.878  0.74( 0.45) 0.60      17.3      30.00
```

9	36.52	19.08	2.625	0.74(0.45)	0.60	17.9	30.00

TOTAL AREA(ACRES) = 17.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 40.29 Tc(MIN.) = 14.645
EFFECTIVE AREA(ACRES) = 16.26 AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 17.9
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 72.00 = 1365.00 FEET.

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END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 17.9 TC(MIN.) = 14.64
EFFECTIVE AREA(ACRES) = 16.26 AREA-AVERAGED Fm(INCH/HR)= 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.600
PEAK FLOW RATE(CFS) = 40.29

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	38.52	11.23	3.608	0.74(0.45)	0.60	12.9	20.00
2	39.64	12.62	3.363	0.74(0.45)	0.60	14.4	50.00
3	39.76	12.86	3.326	0.74(0.45)	0.60	14.6	90.00
4	40.29	14.64	3.076	0.74(0.45)	0.60	16.3	50.00
5	40.29	14.92	3.043	0.74(0.45)	0.60	16.5	40.00
6	40.20	15.13	3.016	0.74(0.45)	0.60	16.6	10.00
7	39.65	16.16	2.900	0.74(0.45)	0.60	17.2	40.00
8	39.47	16.37	2.878	0.74(0.45)	0.60	17.3	30.00
9	36.52	19.08	2.625	0.74(0.45)	0.60	17.9	30.00

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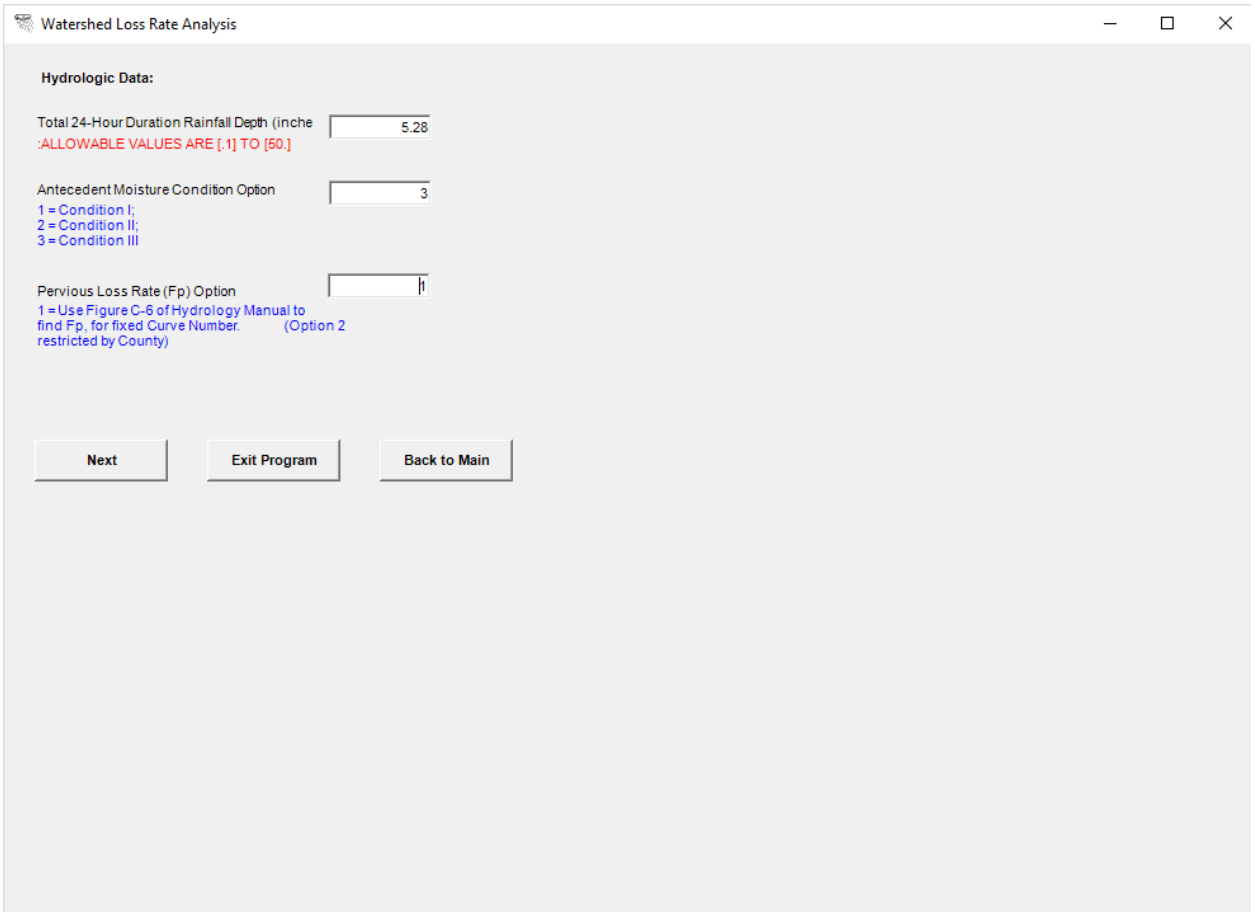
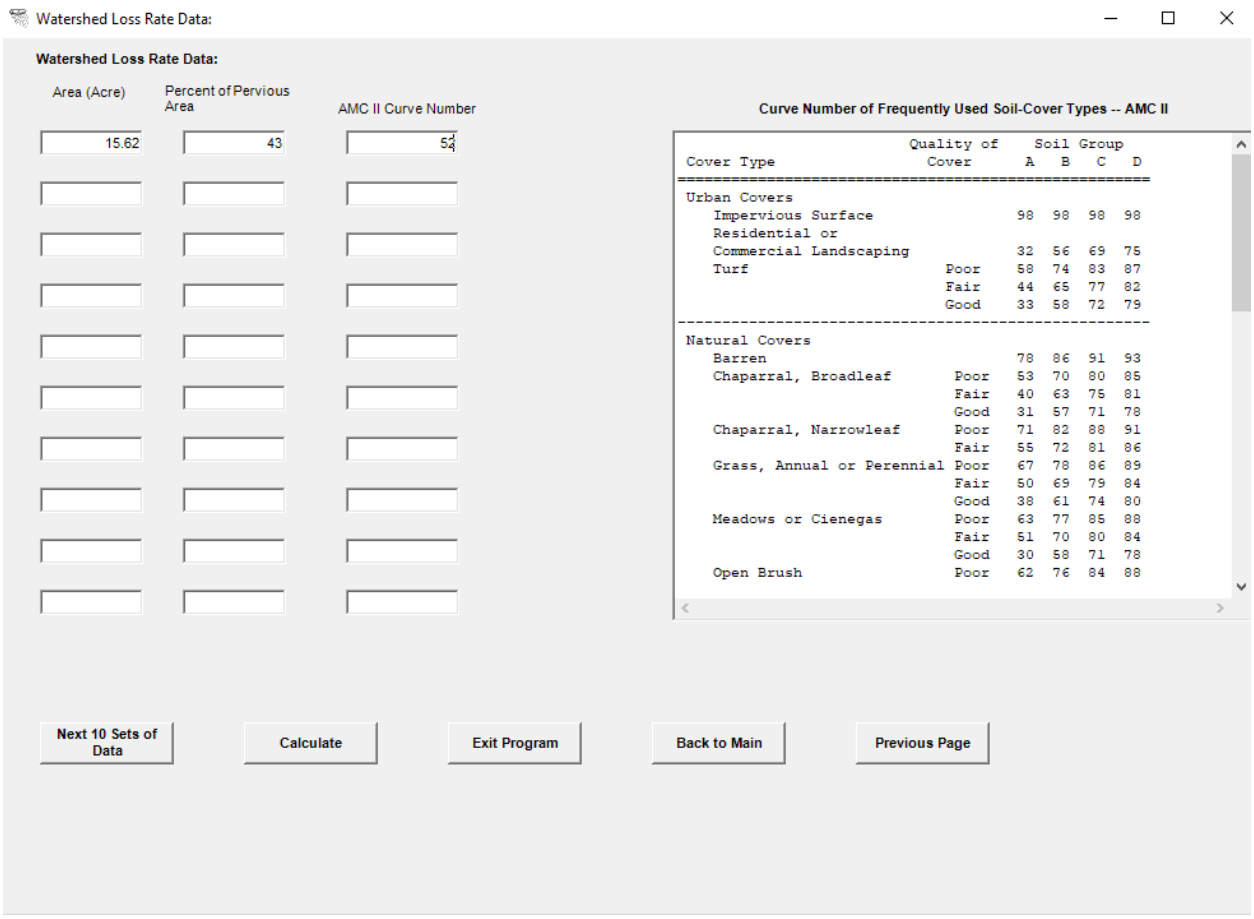
END OF RATIONAL METHOD ANALYSIS

LOW LOSS FRACTION AMC III PROPOSED CONDITION 100-YR DA1





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*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)

AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 5.28 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	15.62	43.00	52.(AMC II)	0.471	0.741

TOTAL AREA (Acres) = 15.62

AREA-AVERAGED LOSS RATE, Fm (in./hr.) = 0.203

AREA-AVERAGED LOW LOSS FRACTION, Y = 0.259

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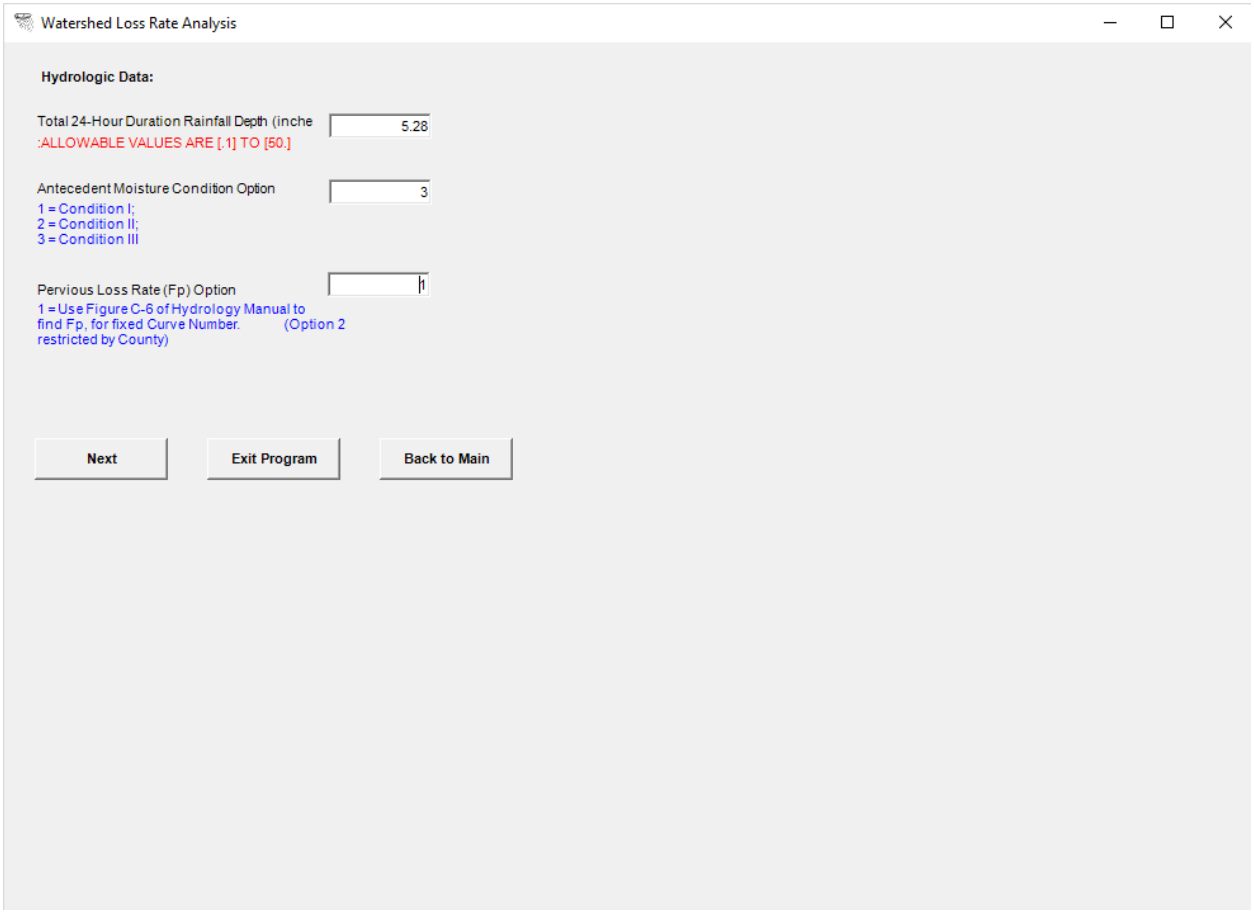
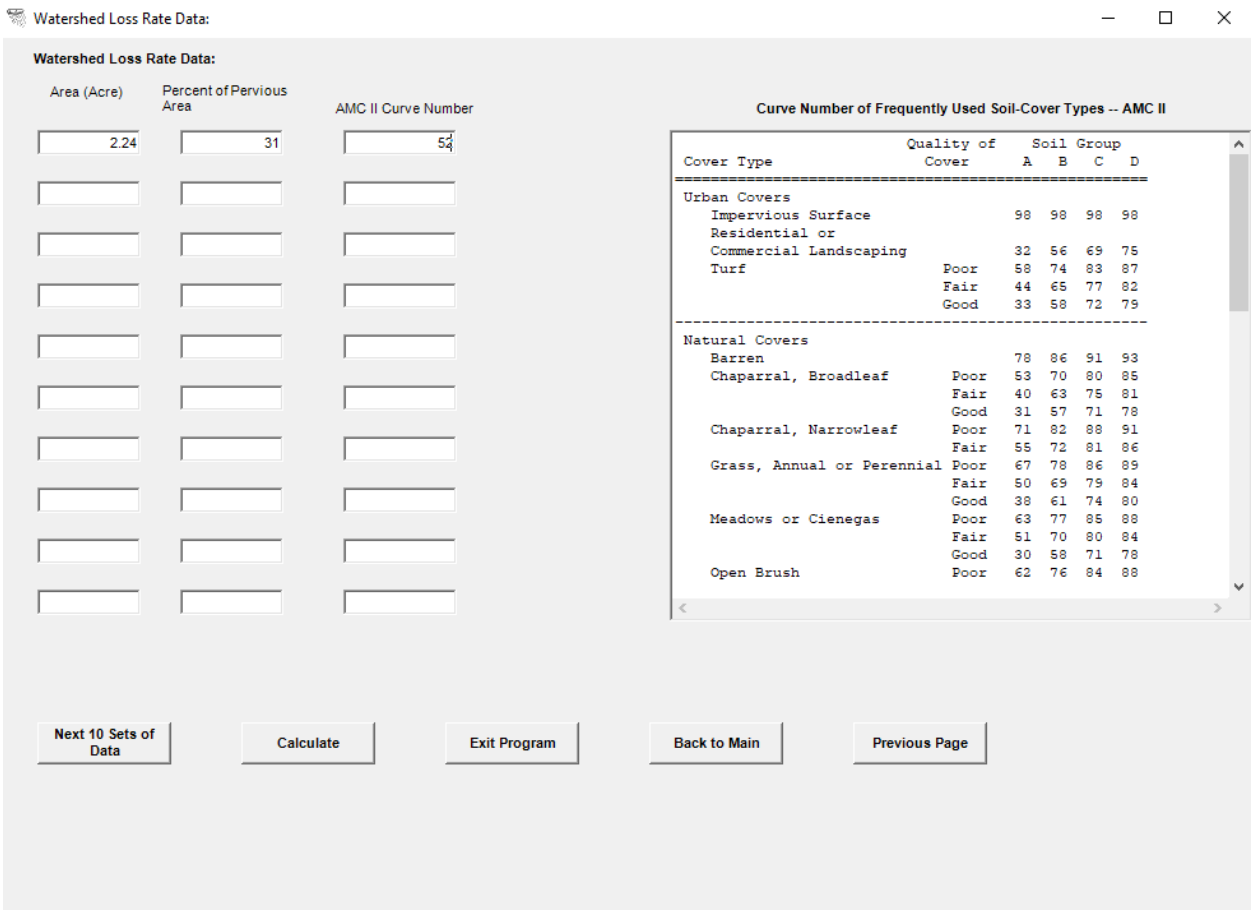
LOW LOSS FRACTION AMC III PROPOSED CONDITION 100-YR DA2





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*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)

AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 5.28 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	2.24	31.00	52.(AMC II)	0.471	0.801

TOTAL AREA (Acres) = 2.24

AREA-AVERAGED LOSS RATE, Fm (in./hr.) = 0.146

AREA-AVERAGED LOW LOSS FRACTION, Y = 0.199

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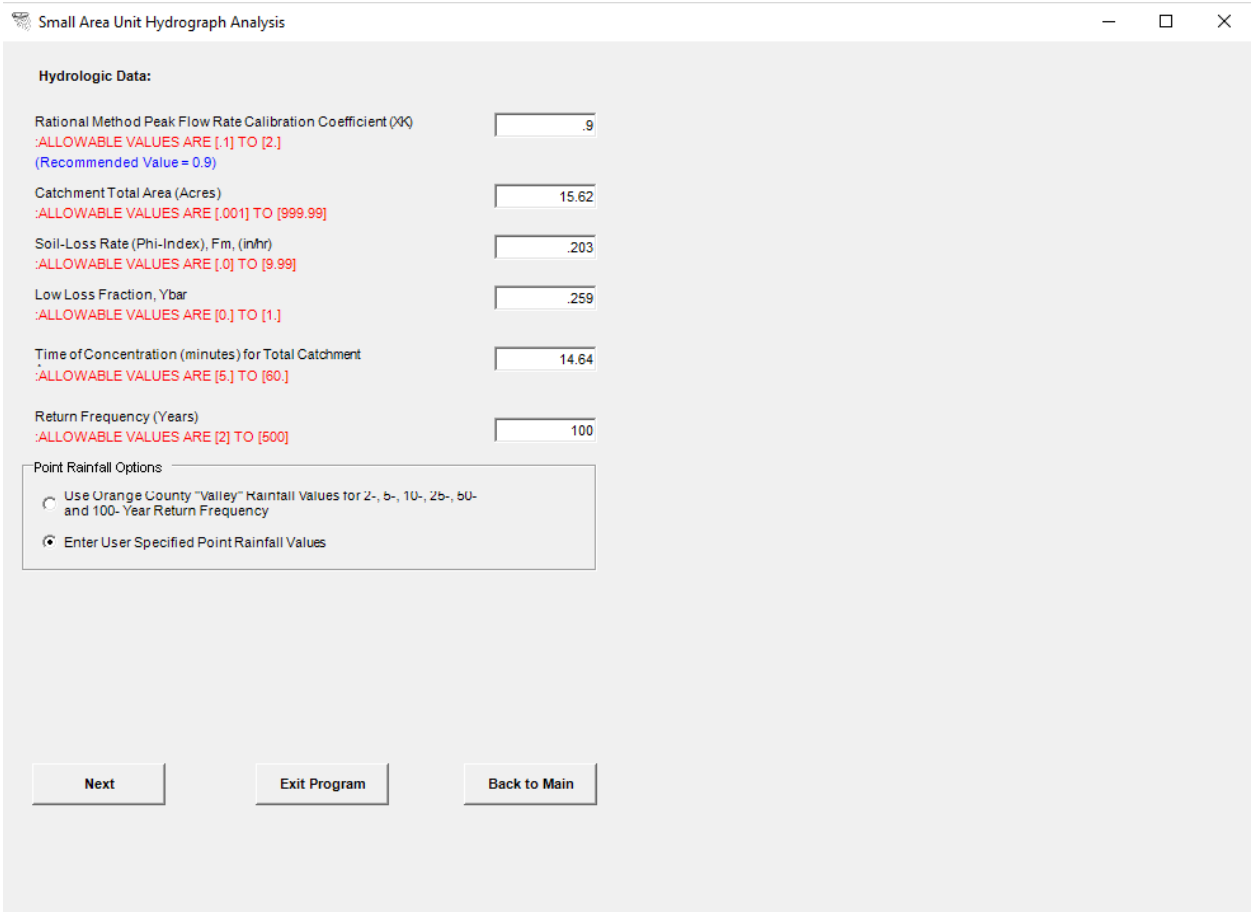
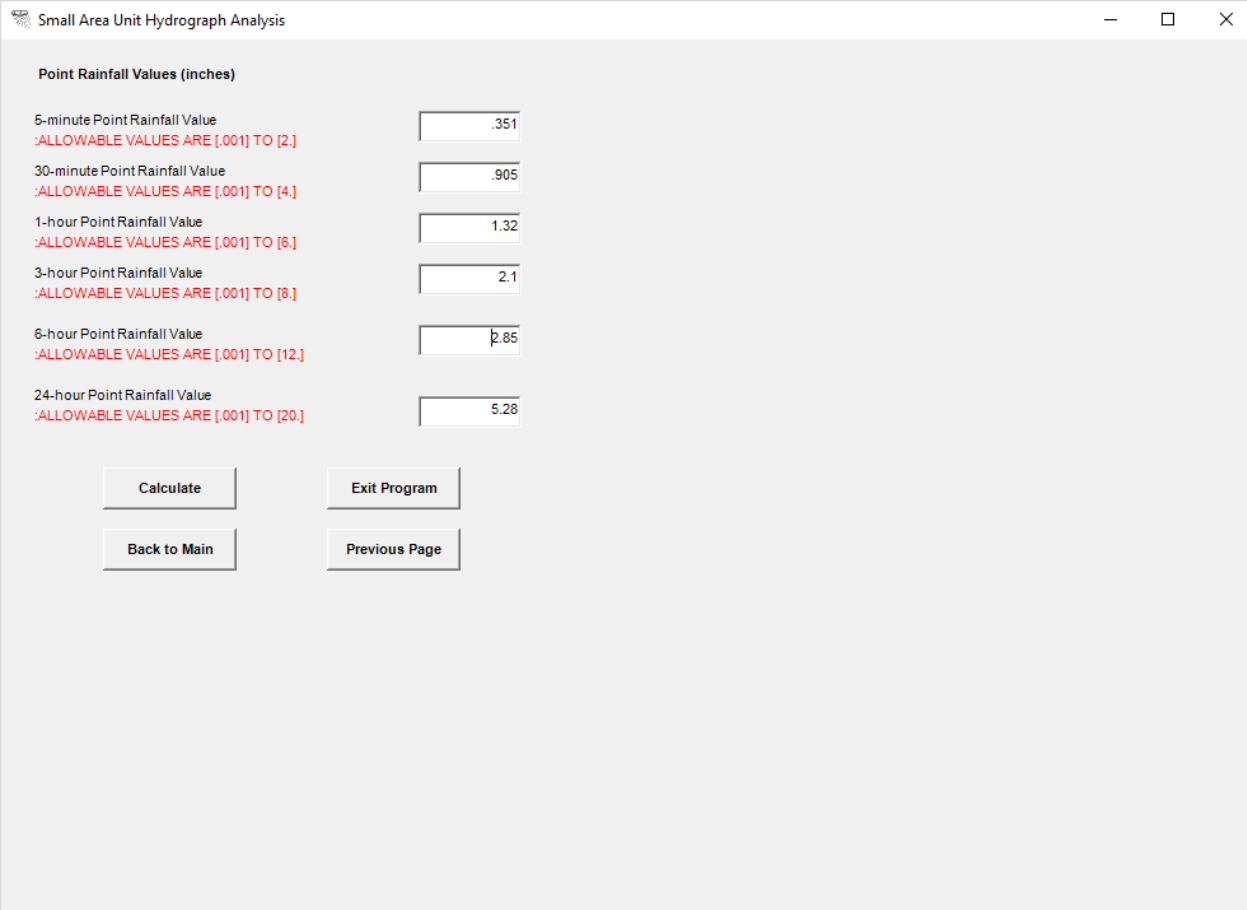
Small Unit Hydrograph Proposed 100-YR (DA-1)





RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 15.62
SOIL-LOSS RATE, Fm,(INCH/HR) = 0.203
LOW LOSS FRACTION = 0.259
TIME OF CONCENTRATION(MIN.) = 14.64
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 100
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.35
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.90
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.32
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.10
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.85
24-HOUR POINT RAINFALL VALUE(INCHES) = 5.28

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 4.72
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 2.16

****

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	10.0	20.0	30.0	40.0
0.14	0.0059	1.02	.Q	.	.	.	.
0.38	0.0265	1.02	.Q	.	.	.	.
0.63	0.0473	1.04	.Q	.	.	.	.
0.87	0.0683	1.04	.Q	.	.	.	.
1.12	0.0894	1.05	.Q	.	.	.	.
1.36	0.1107	1.06	.Q	.	.	.	.
1.60	0.1323	1.07	.Q	.	.	.	.
1.85	0.1540	1.08	.Q	.	.	.	.
2.09	0.1759	1.09	.Q	.	.	.	.
2.34	0.1981	1.10	.Q	.	.	.	.
2.58	0.2204	1.12	.Q	.	.	.	.
2.82	0.2430	1.12	.Q	.	.	.	.
3.07	0.2658	1.14	.Q	.	.	.	.
3.31	0.2889	1.15	.Q	.	.	.	.
3.56	0.3122	1.16	.Q	.	.	.	.
3.80	0.3357	1.17	.Q	.	.	.	.
4.04	0.3596	1.19	.Q	.	.	.	.
4.29	0.3836	1.20	.Q	.	.	.	.
4.53	0.4080	1.22	.Q	.	.	.	.
4.78	0.4326	1.23	.Q	.	.	.	.
5.02	0.4575	1.25	.Q	.	.	.	.
5.26	0.4828	1.26	.Q	.	.	.	.
5.51	0.5083	1.28	.Q	.	.	.	.
5.75	0.5342	1.29	.Q	.	.	.	.
6.00	0.5604	1.31	.Q	.	.	.	.
6.24	0.5870	1.32	.Q	.	.	.	.
6.48	0.6139	1.35	.Q	.	.	.	.
6.73	0.6412	1.36	.Q	.	.	.	.
6.97	0.6689	1.39	.Q	.	.	.	.
7.22	0.6970	1.40	.Q	.	.	.	.
7.46	0.7255	1.43	.Q	.	.	.	.
7.70	0.7545	1.44	.Q	.	.	.	.
7.95	0.7839	1.48	.Q	.	.	.	.
8.19	0.8139	1.49	.Q	.	.	.	.
8.44	0.8443	1.53	.Q	.	.	.	.
8.68	0.8753	1.55	.Q	.	.	.	.
8.92	0.9068	1.58	.Q	.	.	.	.
9.17	0.9390	1.60	.Q	.	.	.	.
9.41	0.9717	1.65	.Q	.	.	.	.
9.66	1.0051	1.67	.Q	.	.	.	.
9.90	1.0393	1.72	.Q	.	.	.	.
10.14	1.0741	1.74	.Q	.	.	.	.
10.39	1.1098	1.79	.Q	.	.	.	.
10.63	1.1463	1.82	.Q	.	.	.	.
10.88	1.1837	1.89	.Q	.	.	.	.
11.12	1.2220	1.92	.Q	.	.	.	.

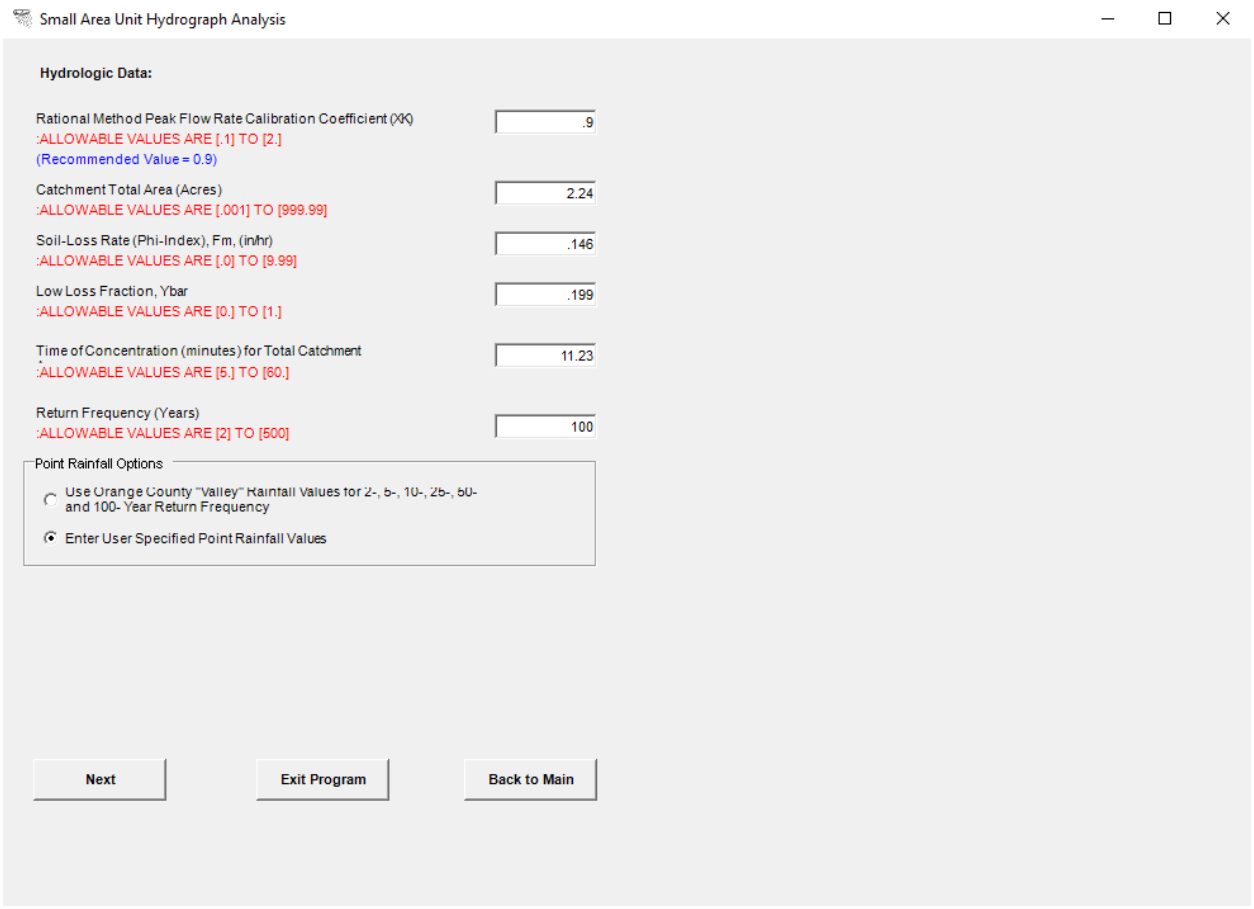
11.36	1.2614	1.99	.Q . . . .
11.61	1.3019	2.03	. Q . . . .
11.85	1.3436	2.11	. Q . . . .
12.10	1.3867	2.16	. Q . . . .
12.34	1.4310	2.24	. Q . . . .
12.58	1.4766	2.29	. Q . . . .
12.83	1.5241	2.41	. Q . . . .
13.07	1.5734	2.48	. Q . . . .
13.32	1.6250	2.64	. Q . . . .
13.56	1.6791	2.73	. Q . . . .
13.80	1.7361	2.93	. Q . . . .
14.05	1.7964	3.05	. Q . . . .
14.29	1.8595	3.20	. Q . . . .
14.54	1.9258	3.38	. Q . . . .
14.78	1.9984	3.82	. Q . . . .
15.02	2.0782	4.10	. Q . . . .
15.27	2.1691	4.91	. Q . . . .
15.51	2.2758	5.68	. Q . . . .
15.76	2.4323	9.84	. Q. . . .
16.00	2.6620	12.94	. . Q . . .
16.24	3.1235	32.83	. . . . Q .
16.49	3.5358	8.06	. Q . . . .
16.73	3.6620	4.46	. Q . . . .
16.98	3.7430	3.58	. Q . . . .
17.22	3.8108	3.15	. Q . . . .
17.46	3.8710	2.82	. Q . . . .
17.71	3.9252	2.56	. Q . . . .
17.95	3.9747	2.35	. Q . . . .
18.20	4.0205	2.19	. Q . . . .
18.44	4.0635	2.07	. Q . . . .
18.68	4.1040	1.95	.Q . . . .
18.93	4.1424	1.85	.Q . . . .
19.17	4.1789	1.77	.Q . . . .
19.42	4.2138	1.69	.Q . . . .
19.66	4.2472	1.62	.Q . . . .
19.90	4.2794	1.56	.Q . . . .
20.15	4.3104	1.51	.Q . . . .
20.39	4.3403	1.46	.Q . . . .
20.64	4.3693	1.41	.Q . . . .
20.88	4.3974	1.37	.Q . . . .
21.12	4.4247	1.34	.Q . . . .
21.37	4.4513	1.30	.Q . . . .
21.61	4.4772	1.27	.Q . . . .
21.86	4.5024	1.24	.Q . . . .
22.10	4.5270	1.21	.Q . . . .
22.34	4.5511	1.18	.Q . . . .
22.59	4.5747	1.16	.Q . . . .
22.83	4.5977	1.13	.Q . . . .
23.08	4.6203	1.11	.Q . . . .
23.32	4.6425	1.09	.Q . . . .
23.56	4.6642	1.07	.Q . . . .

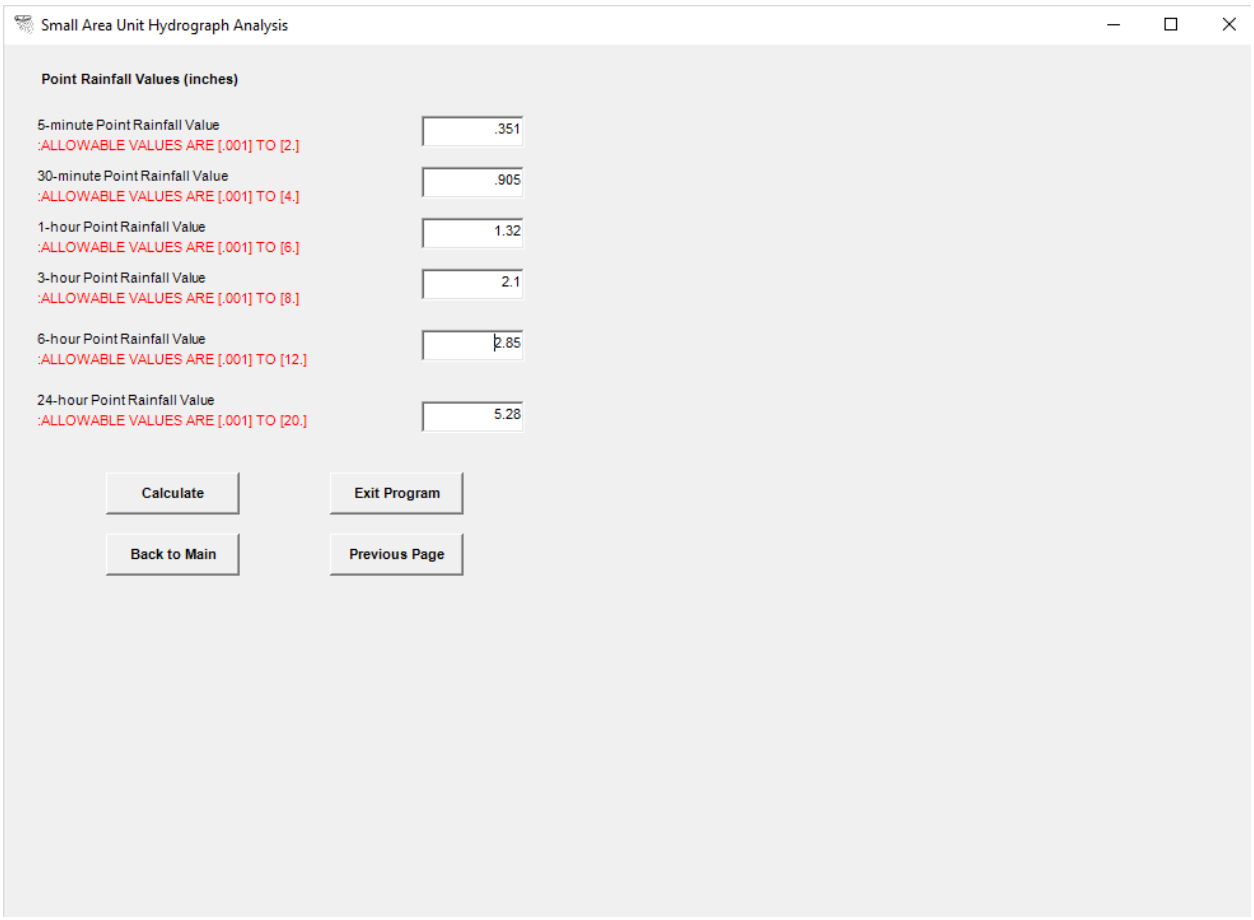
23.81	4.6855	1.05	.Q	.	.	.	.
24.05	4.7065	1.03	.Q	.	.	.	.
24.30	4.7169	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1449.4
10%	161.0
20%	58.6
30%	29.3
40%	14.6
50%	14.6
60%	14.6
70%	14.6
80%	14.6
90%	14.6

Small Unit Hydrograph Proposed 100-YR (DA-2)





RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 2.24
SOIL-LOSS RATE, Fm,(INCH/HR) = 0.146
LOW LOSS FRACTION = 0.199
TIME OF CONCENTRATION(MIN.) = 11.23
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 100
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.35
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.90
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.32
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.10
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.85
24-HOUR POINT RAINFALL VALUE(INCHES) = 5.28

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.73
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.26

****

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.09	0.0006	0.16 Q	.	.	.	.	
0.28	0.0030	0.16 Q	.	.	.	.	
0.47	0.0055	0.16 Q	.	.	.	.	
0.65	0.0080	0.16 Q	.	.	.	.	
0.84	0.0105	0.16 Q	.	.	.	.	
1.03	0.0130	0.16 Q	.	.	.	.	
1.21	0.0155	0.16 Q	.	.	.	.	
1.40	0.0181	0.17 Q	.	.	.	.	
1.59	0.0206	0.17 Q	.	.	.	.	
1.78	0.0232	0.17 Q	.	.	.	.	
1.96	0.0258	0.17 Q	.	.	.	.	
2.15	0.0284	0.17 Q	.	.	.	.	
2.34	0.0311	0.17 Q	.	.	.	.	
2.52	0.0337	0.17 Q	.	.	.	.	
2.71	0.0364	0.17 Q	.	.	.	.	
2.90	0.0391	0.18 Q	.	.	.	.	
3.09	0.0419	0.18 Q	.	.	.	.	
3.27	0.0446	0.18 Q	.	.	.	.	
3.46	0.0474	0.18 Q	.	.	.	.	
3.65	0.0502	0.18 Q	.	.	.	.	
3.83	0.0530	0.18 Q	.	.	.	.	
4.02	0.0558	0.18 Q	.	.	.	.	
4.21	0.0587	0.19 Q	.	.	.	.	
4.40	0.0616	0.19 Q	.	.	.	.	
4.58	0.0645	0.19 Q	.	.	.	.	
4.77	0.0674	0.19 Q	.	.	.	.	
4.96	0.0704	0.19 Q	.	.	.	.	
5.14	0.0734	0.19 Q	.	.	.	.	
5.33	0.0764	0.20 Q	.	.	.	.	
5.52	0.0794	0.20 Q	.	.	.	.	
5.71	0.0825	0.20 Q	.	.	.	.	
5.89	0.0856	0.20 Q	.	.	.	.	
6.08	0.0888	0.20 Q	.	.	.	.	
6.27	0.0920	0.21 Q	.	.	.	.	
6.45	0.0952	0.21 Q	.	.	.	.	
6.64	0.0984	0.21 Q	.	.	.	.	
6.83	0.1017	0.21 Q	.	.	.	.	
7.02	0.1050	0.22 Q	.	.	.	.	
7.20	0.1084	0.22 Q	.	.	.	.	
7.39	0.1118	0.22 Q	.	.	.	.	
7.58	0.1152	0.22 Q	.	.	.	.	
7.76	0.1187	0.23 Q	.	.	.	.	
7.95	0.1222	0.23 Q	.	.	.	.	
8.14	0.1258	0.23 Q	.	.	.	.	
8.33	0.1294	0.24 Q	.	.	.	.	
8.51	0.1330	0.24 Q	.	.	.	.	
8.70	0.1367	0.24 Q	.	.	.	.	

8.89	0.1405	0.24	Q	.	.	.	.
9.07	0.1443	0.25	Q	.	.	.	.
9.26	0.1482	0.25	.Q	.	.	.	.
9.45	0.1521	0.26	.Q	.	.	.	.
9.64	0.1561	0.26	.Q	.	.	.	.
9.82	0.1602	0.27	.Q	.	.	.	.
10.01	0.1643	0.27	.Q	.	.	.	.
10.20	0.1685	0.27	.Q	.	.	.	.
10.39	0.1727	0.28	.Q	.	.	.	.
10.57	0.1771	0.28	.Q	.	.	.	.
10.76	0.1815	0.29	.Q	.	.	.	.
10.95	0.1860	0.30	.Q	.	.	.	.
11.13	0.1906	0.30	.Q	.	.	.	.
11.32	0.1953	0.31	.Q	.	.	.	.
11.51	0.2001	0.31	.Q	.	.	.	.
11.70	0.2051	0.32	.Q	.	.	.	.
11.88	0.2101	0.33	.Q	.	.	.	.
12.07	0.2152	0.34	.Q	.	.	.	.
12.26	0.2205	0.34	.Q	.	.	.	.
12.44	0.2259	0.35	.Q	.	.	.	.
12.63	0.2314	0.36	.Q	.	.	.	.
12.82	0.2371	0.38	.Q	.	.	.	.
13.01	0.2430	0.38	.Q	.	.	.	.
13.19	0.2491	0.40	.Q	.	.	.	.
13.38	0.2554	0.41	.Q	.	.	.	.
13.57	0.2619	0.43	.Q	.	.	.	.
13.75	0.2687	0.45	.Q	.	.	.	.
13.94	0.2758	0.47	.Q	.	.	.	.
14.13	0.2833	0.49	.Q	.	.	.	.
14.32	0.2910	0.51	. Q	.	.	.	.
14.50	0.2990	0.53	. Q	.	.	.	.
14.69	0.3075	0.58	. Q	.	.	.	.
14.88	0.3167	0.61	. Q	.	.	.	.
15.06	0.3268	0.69	. Q	.	.	.	.
15.25	0.3378	0.74	. Q	.	.	.	.
15.44	0.3511	0.98	. Q	.	.	.	.
15.63	0.3685	1.27	. Q	.	.	.	.
15.81	0.3917	1.72	. Q	.	.	.	.
16.00	0.4226	2.27	. Q.	.	.	.	.
16.19	0.4828	5.50	. .	. Q	.	.	.
16.37	0.5367	1.47	. Q	.	.	.	.
16.56	0.5543	0.81	. Q	.	.	.	.
16.75	0.5655	0.65	. Q	.	.	.	.
16.94	0.5748	0.55	. Q	.	.	.	.
17.12	0.5828	0.49	.Q	.	.	.	.
17.31	0.5901	0.46	.Q	.	.	.	.
17.50	0.5969	0.42	.Q	.	.	.	.
17.68	0.6032	0.39	.Q	.	.	.	.
17.87	0.6091	0.37	.Q	.	.	.	.
18.06	0.6147	0.35	.Q	.	.	.	.
18.25	0.6199	0.33	.Q	.	.	.	.

18.43	0.6250	0.32	.Q	.	.	.	.
18.62	0.6298	0.30	.Q	.	.	.	.
18.81	0.6344	0.29	.Q	.	.	.	.
18.99	0.6388	0.28	.Q	.	.	.	.
19.18	0.6431	0.27	.Q	.	.	.	.
19.37	0.6472	0.26	.Q	.	.	.	.
19.56	0.6512	0.25	.Q	.	.	.	.
19.74	0.6551	0.25	Q	.	.	.	.
19.93	0.6588	0.24	Q	.	.	.	.
20.12	0.6625	0.23	Q	.	.	.	.
20.30	0.6660	0.23	Q	.	.	.	.
20.49	0.6695	0.22	Q	.	.	.	.
20.68	0.6729	0.22	Q	.	.	.	.
20.87	0.6762	0.21	Q	.	.	.	.
21.05	0.6795	0.21	Q	.	.	.	.
21.24	0.6827	0.20	Q	.	.	.	.
21.43	0.6858	0.20	Q	.	.	.	.
21.61	0.6888	0.20	Q	.	.	.	.
21.80	0.6918	0.19	Q	.	.	.	.
21.99	0.6947	0.19	Q	.	.	.	.
22.18	0.6976	0.19	Q	.	.	.	.
22.36	0.7005	0.18	Q	.	.	.	.
22.55	0.7033	0.18	Q	.	.	.	.
22.74	0.7060	0.18	Q	.	.	.	.
22.93	0.7087	0.17	Q	.	.	.	.
23.11	0.7114	0.17	Q	.	.	.	.
23.30	0.7140	0.17	Q	.	.	.	.
23.49	0.7166	0.17	Q	.	.	.	.
23.67	0.7191	0.16	Q	.	.	.	.
23.86	0.7216	0.16	Q	.	.	.	.
24.05	0.7241	0.16	Q	.	.	.	.
24.24	0.7254	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1448.7
10%	146.0
20%	56.1
30%	33.7
40%	22.5
50%	11.2
60%	11.2
70%	11.2
80%	11.2
90%	11.2

Basin
Project: Waterman School Highmark
Basin Description: BMP1

Contour Elevation	Contour Area (sq. ft)	Depth (ft)	Incremental Volume Avg. End (cu. ft)	Cumulative Volume Avg. End (cu. ft)
1,013.000	7,258.11	N/A	N/A	0.00
1,014.000	9,479.48	1.000	8368.79	8368.79
1,015.000	11,877.03	1.000	10678.25	19047.05
1,016.000	14,381.77	1.000	13129.40	32176.45
1,017.000	16,993.56	1.000	15687.67	47864.11

Appendix F

Geotechnical Investigation and Percolation Test Results

A1924108996

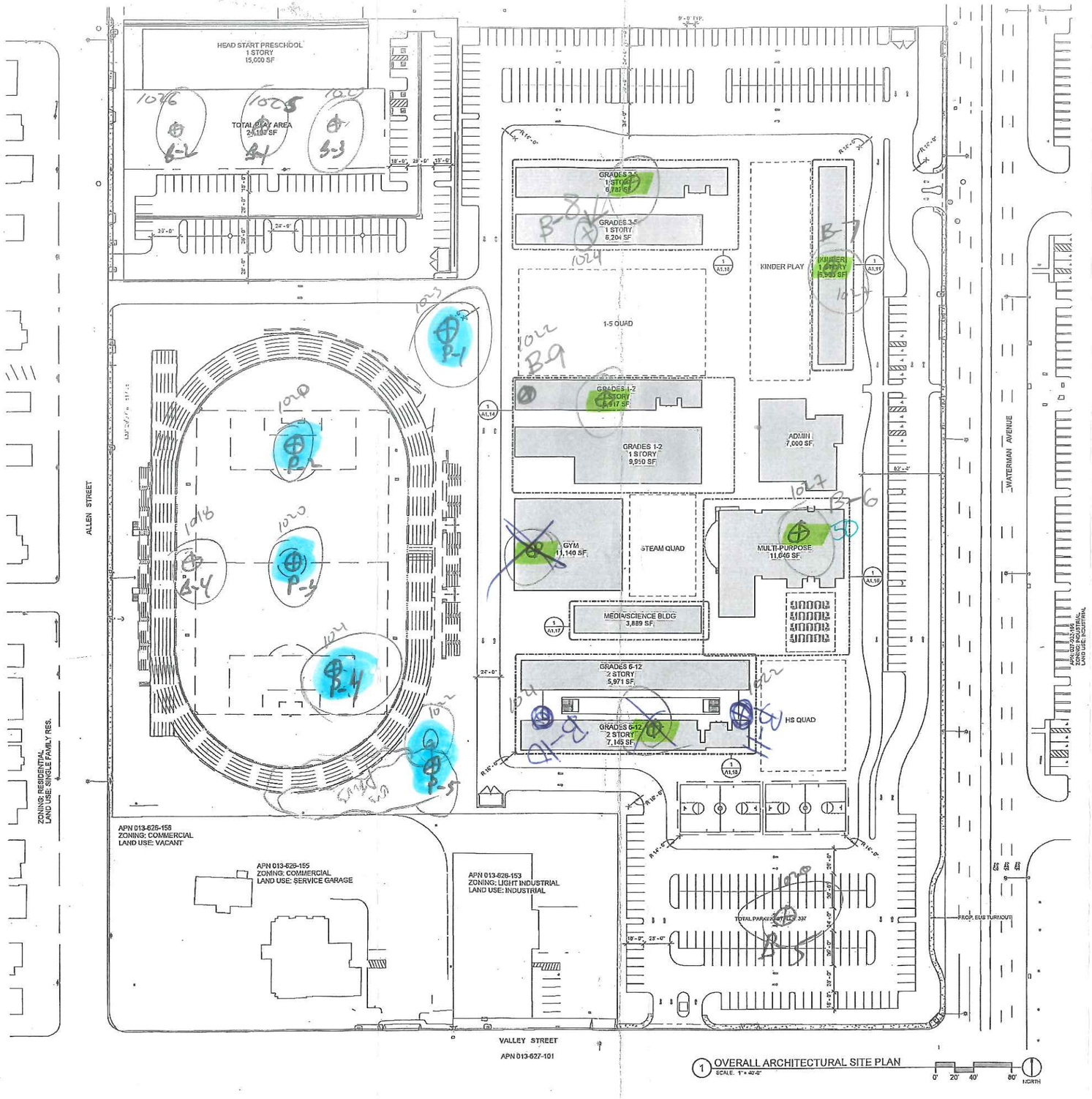
Qya,

Proposed Boring Plan Revised 8/16/19

16 Total Borings

5 Pond,

11 Groundwater,



GENERAL NOTES

1. DO NOT VERIFY DIMENSIONS PRIOR TO THE COMMENCEMENT OF ANY SITE WORK OR FOR SHOP DRAWINGS.
2. REFER TO LANDSCAPE DRAWINGS FOR ADDITIONAL SITE INFORMATION REGARDING EXISTING SITE FURNISHINGS.
3. REFER TO CIVIL DRAWINGS FOR PARKING, STREET, CURB GUTTER/CHB AND STRIPING INFORMATION.
4. REFER TO CIVIL DRAWINGS FOR HORIZONTAL CONTROL.
5. REFER TO CIVIL DRAWINGS FOR STREET DEVELOPMENT OUTSIDE OF PROPERTY LINE.
6. REFER TO CIVIL DRAWINGS FOR ADDITIONAL INFORMATION ON SCOPE OF WORK AND DEMOLITION.
7. ALL SITE / RETAINING WALLS TO HAVE ANTI-GRAFFITI COATING.

KEYNOTES

tsk
316 West 2nd Street
PH
Los Angeles, CA 90012
phone: 213.614.0500
fax: 213.929.2247
www.tska.com

Consultant

PLEASE RECYCLE

Project
NORTON SCIENCE AND LANGUAGE ACADEMY
San Bernardino, CA

Job No: 19-047.00

Owner
NSLA

SCHEMATIC DESIGN

REVISIONS		
REV	DATE	DESCRIPTION

Sheet Title
OVERALL SITE PLAN

Date: 08/13/2019
Sheet No:
AS1.01

PERCOLATION TEST REPORT

Project Name:		Norton Academy			**Project No.:**		T2883-22-01
Test Hole No.:		P-1			**Date Excavated:**		9/5/2019
Length of Test Pipe:			59.0	inches	**Soil Classification:**		SM
Height of Pipe above Ground:			0.0	inches	**Presoak Date:**		9/5/2019
Depth of Test Hole:			59.0	inches	**Perc Test Date:**		9/6/2019
Check for Sandy Soil Criteria Tested by:				PDT	**Percolation Tested by:**		PDT
Water level measured from BOTTOM of hole							

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	7:33 AM 7:58 AM	25	25	20.8	2.0	18.7	1.3
2	7:58 AM 8:23 AM	25	50	20.6	7.1	13.6	1.8
			Soil Criteria: SANDY				

Percolation Test

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Head (ft)	Final Water Head (ft)	Δ in Water Level (ft)	Percolation Rate (min/ft)
1	8:37 AM 8:47 AM	10	10	20.0	15.2	4.8	2.1
2	8:47 AM 8:57 AM	10	20	20.0	16.4	3.6	2.8
3	8:57 AM 9:07 AM	10	30	20.0	15.8	4.2	2.4
4	9:07 AM 9:17 AM	10	40	20.0	15.8	4.2	2.4
5	9:17 AM 9:27 AM	10	50	20.0	15.6	4.4	2.3
6	9:27 AM 9:37 AM	10	60	20.0	15.6	4.4	2.3

Percolation Rate (in/hr):	2.69				
Radius of test hole (in):	4				**Figure A-6**
Average Head (ft):	17.8				

PERCOLATION TEST REPORT

Project Name:		Norton Academy			**Project No.:**		T2883-22-01
Test Hole No.:		P-5			**Date Excavated:**		9/5/2019
Length of Test Pipe:			60.0	inches	**Soil Classification:**		SM
Height of Pipe above Ground:			0.0	inches	**Presoak Date:**		9/5/2019
Depth of Test Hole:			60.0	inches	**Perc Test Date:**		9/6/2019
Check for Sandy Soil Criteria Tested by:				PDT	**Percolation Tested by:**		PDT
Water level measured from BOTTOM of hole							

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	7:43 AM 8:08 AM	25	25	20.04	2.64	17.40	1.44
2	8:08 AM 8:33 AM	25	50	20.04	5.64	14.40	1.74
			Soil Criteria: Normal				

Percolation Test

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Head (in)	Final Water Head (in)	Δ in Water Level (in)	Percolation Rate (min/in)
1	10:03 AM 10:13 AM	10	10	20.0	16.2	3.8	2.6
2	10:13 AM 10:23 AM	10	20	18.0	15.6	2.4	4.2
3	10:23 AM 10:33 AM	10	30	20.0	16.8	3.2	3.1
4	10:33 AM 10:43 AM	10	40	20.0	16.2	3.8	2.6
5	10:43 AM 10:53 AM	10	50	20.0	16.2	3.8	2.6
6	10:53 AM 11:03 AM	10	60	20.0	16.2	3.8	2.6

Percolation Rate (in/hr):	2.29				
Radius of test hole (in):	4				**Figure A-6**
Average Head (ft):	18.1				

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for San Bernardino County Southwestern Part, California

Waterman School Highmark

May 8, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:2,060 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 30 60 120 180

Feet
0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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 Bernardino County Southwestern Part, California
Survey Area Data: Version 10, Sep 12, 2018

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

Date(s) aerial images were photographed: Jan 5, 2015—Jan 18, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Gr	Grangeville fine sandy loam, warm MAAT, MLRA 19	18.5	100.0%
Totals for Area of Interest		**18.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

San Bernardino County Southwestern Part, California

Gr—Grangeville fine sandy loam, warm MAAT, MLRA 19

Map Unit Setting

National map unit symbol: 2vncy
Elevation: 490 to 1,430 feet
Mean annual precipitation: 11 to 17 inches
Mean annual air temperature: 64 to 66 degrees F
Frost-free period: 271 to 365 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Grangeville and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Grangeville

Setting

Landform: Flood plains, alluvial fans
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

A - 0 to 12 inches: fine sandy loam
C - 12 to 79 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 2 percent
Salinity, maximum in profile: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 3.0
Available water storage in profile: Moderate (about 7.9 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Unnamed, hydric

Percent of map unit: 5 percent

Landform: Depressions, alluvial fans, flood plains
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

San emigdio, fine sandy loam

Percent of map unit: 5 percent
Landform: Alluvial fans, flood plains
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Chino

Percent of map unit: 5 percent
Landform: Flood plains, alluvial fans
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

References

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Appendix G

Hydrology Reference Material

NOAA Atlas 14, Volume 6, Version 2
Location name: San Bernardino, California, USA*
Latitude: 34.098°, Longitude: -117.2803°
Elevation: 1024.97 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**1.26** (1.06-1.54)	**1.68** (1.39-2.04)	**2.23** (1.85-2.71)	**2.68** (2.20-3.29)	**3.28** (2.60-4.16)	**3.74** (2.90-4.86)	**4.21** (3.19-5.62)	**4.70** (3.46-6.44)	**5.36** (3.78-7.68)	**5.88** (4.01-8.71)
10-min	**0.906** (0.756-1.10)	**1.21** (1.00-1.46)	**1.60** (1.33-1.94)	**1.91** (1.57-2.35)	**2.35** (1.87-2.99)	**2.68** (2.08-3.48)	**3.02** (2.29-4.02)	**3.37** (2.48-4.62)	**3.84** (2.71-5.50)	**4.21** (2.87-6.25)
15-min	**0.732** (0.608-0.888)	**0.972** (0.808-1.18)	**1.29** (1.07-1.57)	**1.54** (1.27-1.90)	**1.89** (1.50-2.41)	**2.16** (1.68-2.81)	**2.43** (1.84-3.24)	**2.72** (2.00-3.72)	**3.10** (2.19-4.44)	**3.40** (2.31-5.04)
30-min	**0.542** (0.452-0.660)	**0.722** (0.600-0.878)	**0.958** (0.794-1.17)	**1.15** (0.944-1.41)	**1.41** (1.12-1.79)	**1.61** (1.25-2.09)	**1.81** (1.37-2.41)	**2.02** (1.49-2.77)	**2.30** (1.63-3.30)	**2.53** (1.72-3.75)
60-min	**0.395** (0.329-0.480)	**0.526** (0.437-0.639)	**0.696** (0.577-0.849)	**0.835** (0.686-1.03)	**1.02** (0.813-1.30)	**1.17** (0.908-1.52)	**1.32** (0.998-1.75)	**1.47** (1.08-2.02)	**1.68** (1.18-2.40)	**1.84** (1.25-2.73)
2-hr	**0.283** (0.236-0.344)	**0.368** (0.306-0.448)	**0.479** (0.397-0.584)	**0.569** (0.468-0.700)	**0.692** (0.549-0.880)	**0.785** (0.610-1.02)	**0.880** (0.667-1.17)	**0.978** (0.720-1.34)	**1.11** (0.783-1.59)	**1.21** (0.825-1.80)
3-hr	**0.231** (0.192-0.281)	**0.298** (0.248-0.362)	**0.385** (0.319-0.470)	**0.456** (0.375-0.560)	**0.552** (0.438-0.702)	**0.626** (0.486-0.813)	**0.700** (0.531-0.933)	**0.777** (0.572-1.07)	**0.880** (0.621-1.26)	**0.960** (0.654-1.42)
6-hr	**0.160** (0.134-0.195)	**0.205** (0.171-0.249)	**0.264** (0.219-0.322)	**0.311** (0.256-0.383)	**0.376** (0.299-0.478)	**0.426** (0.331-0.553)	**0.476** (0.361-0.634)	**0.527** (0.388-0.723)	**0.597** (0.422-0.855)	**0.651** (0.444-0.965)
12-hr	**0.106** (0.088-0.128)	**0.135** (0.113-0.165)	**0.175** (0.145-0.213)	**0.207** (0.170-0.254)	**0.250** (0.198-0.318)	**0.283** (0.220-0.368)	**0.317** (0.240-0.422)	**0.352** (0.259-0.482)	**0.398** (0.281-0.570)	**0.435** (0.296-0.645)
24-hr	**0.071** (0.062-0.081)	**0.092** (0.081-0.106)	**0.119** (0.105-0.138)	**0.142** (0.124-0.165)	**0.172** (0.146-0.208)	**0.196** (0.163-0.241)	**0.220** (0.178-0.277)	**0.245** (0.193-0.317)	**0.278** (0.211-0.375)	**0.304** (0.223-0.425)
2-day	**0.043** (0.038-0.049)	**0.057** (0.050-0.065)	**0.075** (0.066-0.086)	**0.090** (0.078-0.105)	**0.110** (0.093-0.133)	**0.126** (0.105-0.155)	**0.142** (0.115-0.179)	**0.159** (0.125-0.206)	**0.182** (0.138-0.246)	**0.200** (0.146-0.279)
3-day	**0.031** (0.027-0.035)	**0.041** (0.036-0.047)	**0.055** (0.048-0.064)	**0.066** (0.058-0.077)	**0.082** (0.070-0.099)	**0.094** (0.078-0.116)	**0.107** (0.087-0.135)	**0.120** (0.095-0.156)	**0.139** (0.105-0.187)	**0.153** (0.112-0.213)
4-day	**0.025** (0.022-0.028)	**0.033** (0.029-0.038)	**0.045** (0.039-0.052)	**0.054** (0.048-0.063)	**0.068** (0.057-0.081)	**0.078** (0.065-0.096)	**0.089** (0.072-0.112)	**0.100** (0.079-0.130)	**0.116** (0.088-0.156)	**0.128** (0.094-0.179)
7-day	**0.016** (0.014-0.018)	**0.022** (0.019-0.025)	**0.030** (0.027-0.035)	**0.037** (0.032-0.043)	**0.046** (0.039-0.056)	**0.054** (0.045-0.066)	**0.061** (0.050-0.077)	**0.069** (0.055-0.090)	**0.081** (0.061-0.109)	**0.090** (0.066-0.125)
10-day	**0.012** (0.011-0.014)	**0.017** (0.015-0.019)	**0.023** (0.020-0.027)	**0.029** (0.025-0.033)	**0.036** (0.030-0.043)	**0.042** (0.035-0.052)	**0.048** (0.039-0.061)	**0.055** (0.043-0.071)	**0.064** (0.048-0.086)	**0.071** (0.052-0.099)
20-day	**0.007** (0.007-0.009)	**0.010** (0.009-0.012)	**0.015** (0.013-0.017)	**0.018** (0.016-0.021)	**0.023** (0.019-0.028)	**0.027** (0.022-0.033)	**0.031** (0.025-0.039)	**0.035** (0.028-0.046)	**0.041** (0.031-0.056)	**0.046** (0.034-0.065)
30-day	**0.006** (0.005-0.007)	**0.008** (0.007-0.009)	**0.011** (0.010-0.013)	**0.014** (0.012-0.017)	**0.018** (0.015-0.022)	**0.021** (0.018-0.026)	**0.024** (0.020-0.031)	**0.028** (0.022-0.036)	**0.033** (0.025-0.044)	**0.037** (0.027-0.051)
45-day	**0.005** (0.004-0.005)	**0.007** (0.006-0.008)	**0.009** (0.008-0.010)	**0.011** (0.010-0.013)	**0.014** (0.012-0.017)	**0.017** (0.014-0.020)	**0.019** (0.016-0.024)	**0.022** (0.017-0.028)	**0.026** (0.020-0.035)	**0.029** (0.021-0.040)
60-day	**0.004** (0.004-0.005)	**0.006** (0.005-0.007)	**0.008** (0.007-0.009)	**0.010** (0.008-0.011)	**0.012** (0.010-0.015)	**0.014** (0.012-0.017)	**0.016** (0.013-0.021)	**0.019** (0.015-0.024)	**0.022** (0.017-0.030)	**0.025** (0.018-0.034)

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

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

Please refer to NOAA Atlas 14 document for more information.

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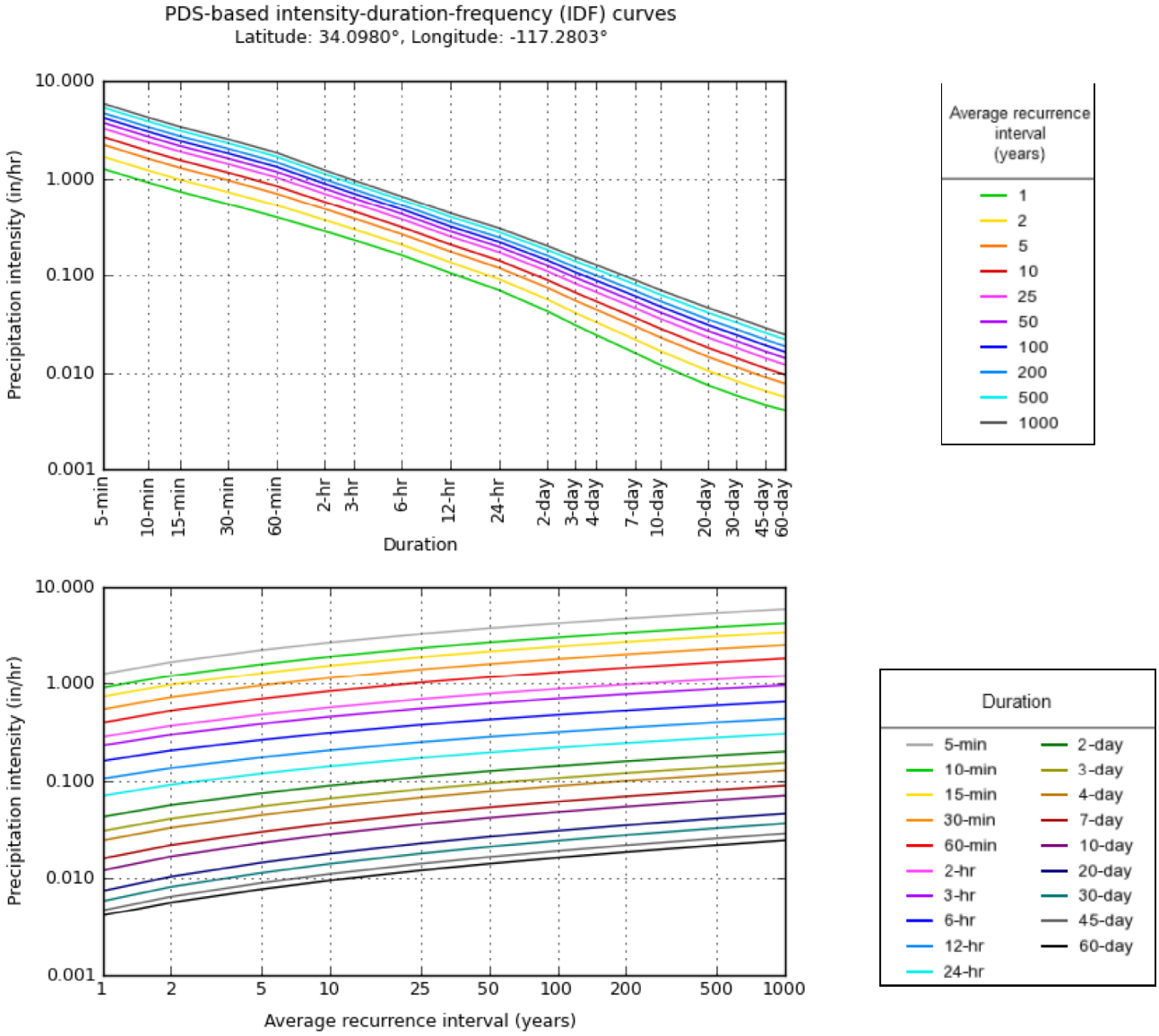
PF graphical



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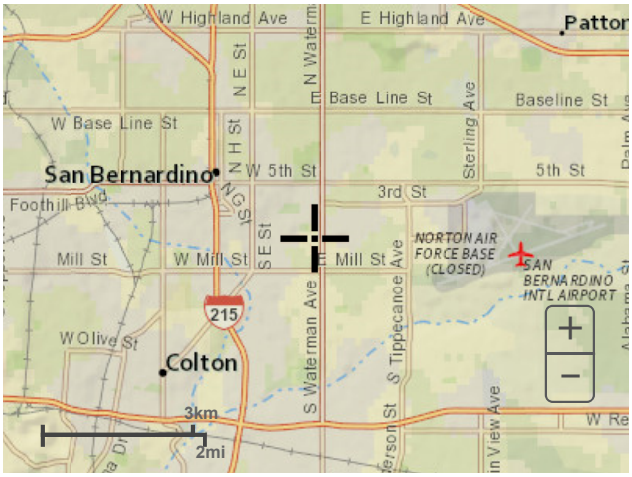
Maps & aerials

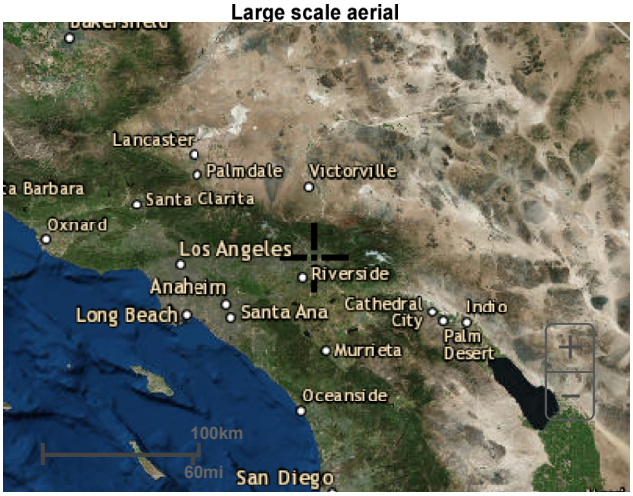
Small scale terrain



Large scale terrain

Large scale map

Large scale aerial



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National Oceanic and Atmospheric Administration
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1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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NOAA Atlas 14, Volume 6, Version 2
Location name: San Bernardino, California, USA*
Latitude: 34.098°, Longitude: -117.2803°
Elevation: 1024.97 ft**
* source: ESRI Maps
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POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.105 (0.088-0.128)	0.140 (0.116-0.170)	0.186 (0.154-0.226)	0.223 (0.183-0.274)	0.273 (0.217-0.347)	0.312 (0.242-0.405)	0.351 (0.266-0.468)	0.392 (0.288-0.537)	0.447 (0.315-0.640)	0.490 (0.334-0.726)
10-min	0.151 (0.126-0.183)	0.201 (0.167-0.244)	0.266 (0.221-0.324)	0.319 (0.262-0.392)	0.391 (0.311-0.498)	0.447 (0.347-0.580)	0.503 (0.381-0.670)	0.561 (0.413-0.770)	0.640 (0.452-0.917)	0.702 (0.478-1.04)
15-min	0.183 (0.152-0.222)	0.243 (0.202-0.295)	0.322 (0.267-0.392)	0.386 (0.317-0.474)	0.473 (0.376-0.602)	0.540 (0.420-0.702)	0.608 (0.461-0.811)	0.679 (0.500-0.931)	0.775 (0.547-1.11)	0.849 (0.578-1.26)
30-min	0.271 (0.226-0.330)	0.361 (0.300-0.439)	0.479 (0.397-0.583)	0.574 (0.472-0.706)	0.704 (0.559-0.895)	0.803 (0.624-1.04)	0.905 (0.686-1.21)	1.01 (0.744-1.39)	1.15 (0.813-1.65)	1.26 (0.860-1.87)
60-min	0.395 (0.329-0.480)	0.526 (0.437-0.639)	0.696 (0.577-0.849)	0.835 (0.686-1.03)	1.02 (0.813-1.30)	1.17 (0.908-1.52)	1.32 (0.998-1.75)	1.47 (1.08-2.02)	1.68 (1.18-2.40)	1.84 (1.25-2.73)
2-hr	0.566 (0.471-0.687)	0.736 (0.612-0.895)	0.958 (0.794-1.17)	1.14 (0.936-1.40)	1.38 (1.10-1.76)	1.57 (1.22-2.04)	1.76 (1.33-2.35)	1.96 (1.44-2.68)	2.22 (1.57-3.18)	2.42 (1.65-3.59)
3-hr	0.694 (0.578-0.843)	0.895 (0.744-1.09)	1.16 (0.959-1.41)	1.37 (1.13-1.68)	1.66 (1.32-2.11)	1.88 (1.46-2.44)	2.10 (1.59-2.80)	2.33 (1.72-3.20)	2.64 (1.87-3.78)	2.88 (1.96-4.27)
6-hr	0.961 (0.800-1.17)	1.23 (1.02-1.49)	1.58 (1.31-1.93)	1.87 (1.53-2.29)	2.25 (1.79-2.87)	2.55 (1.98-3.31)	2.85 (2.16-3.80)	3.16 (2.33-4.33)	3.58 (2.52-5.12)	3.90 (2.66-5.78)
12-hr	1.27 (1.06-1.54)	1.63 (1.36-1.98)	2.11 (1.74-2.57)	2.49 (2.05-3.06)	3.01 (2.39-3.83)	3.41 (2.65-4.43)	3.82 (2.89-5.09)	4.24 (3.12-5.81)	4.80 (3.39-6.87)	5.24 (3.57-7.77)
24-hr	1.69 (1.50-1.95)	2.20 (1.94-2.54)	2.86 (2.52-3.31)	3.40 (2.98-3.97)	4.14 (3.50-4.98)	4.70 (3.90-5.78)	5.28 (4.28-6.65)	5.87 (4.63-7.60)	6.68 (5.06-9.01)	7.31 (5.35-10.2)
2-day	2.06 (1.82-2.37)	2.72 (2.40-3.14)	3.59 (3.17-4.15)	4.31 (3.77-5.02)	5.29 (4.48-6.37)	6.05 (5.02-7.44)	6.83 (5.53-8.60)	7.64 (6.02-9.89)	8.74 (6.62-11.8)	9.61 (7.03-13.4)
3-day	2.21 (1.96-2.55)	2.96 (2.62-3.41)	3.95 (3.49-4.57)	4.78 (4.18-5.57)	5.91 (5.01-7.12)	6.80 (5.64-8.36)	7.71 (6.25-9.72)	8.67 (6.83-11.2)	9.98 (7.55-13.5)	11.0 (8.06-15.4)
4-day	2.36 (2.09-2.72)	3.18 (2.82-3.67)	4.29 (3.79-4.97)	5.21 (4.56-6.08)	6.49 (5.50-7.82)	7.49 (6.22-9.21)	8.53 (6.91-10.7)	9.61 (7.58-12.4)	11.1 (8.41-15.0)	12.3 (9.00-17.2)
7-day	2.69 (2.39-3.11)	3.70 (3.27-4.27)	5.06 (4.46-5.85)	6.19 (5.41-7.22)	7.77 (6.58-9.36)	9.01 (7.48-11.1)	10.3 (8.35-13.0)	11.7 (9.20-15.1)	13.6 (10.3-18.3)	15.1 (11.0-21.0)
10-day	2.91 (2.58-3.36)	4.04 (3.57-4.66)	5.57 (4.91-6.44)	6.84 (5.99-7.98)	8.64 (7.31-10.4)	10.1 (8.34-12.4)	11.5 (9.34-14.5)	13.1 (10.3-16.9)	15.3 (11.6-20.6)	17.0 (12.4-23.7)
20-day	3.58 (3.17-4.12)	5.03 (4.44-5.80)	7.00 (6.17-8.10)	8.66 (7.58-10.1)	11.0 (9.33-13.3)	12.9 (10.7-15.8)	14.8 (12.0-18.7)	16.9 (13.3-21.9)	19.9 (15.0-26.8)	22.2 (16.2-31.0)
30-day	4.22 (3.74-4.86)	5.92 (5.24-6.83)	8.25 (7.28-9.55)	10.2 (8.95-11.9)	13.0 (11.0-15.7)	15.3 (12.7-18.8)	17.6 (14.3-22.2)	20.1 (15.8-26.0)	23.6 (17.9-31.9)	26.5 (19.4-36.9)
45-day	5.06 (4.48-5.84)	7.04 (6.23-8.12)	9.75 (8.60-11.3)	12.1 (10.6-14.1)	15.3 (13.0-18.5)	18.0 (14.9-22.1)	20.7 (16.8-26.1)	23.7 (18.7-30.7)	27.9 (21.1-37.6)	31.3 (22.9-43.6)
60-day	5.95 (5.27-6.86)	8.16 (7.22-9.41)	11.2 (9.88-13.0)	13.8 (12.1-16.1)	17.5 (14.8-21.1)	20.5 (17.0-25.2)	23.6 (19.1-29.7)	26.9 (21.2-34.9)	31.7 (24.0-42.7)	35.5 (26.0-49.5)

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

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

Please refer to NOAA Atlas 14 document for more information.

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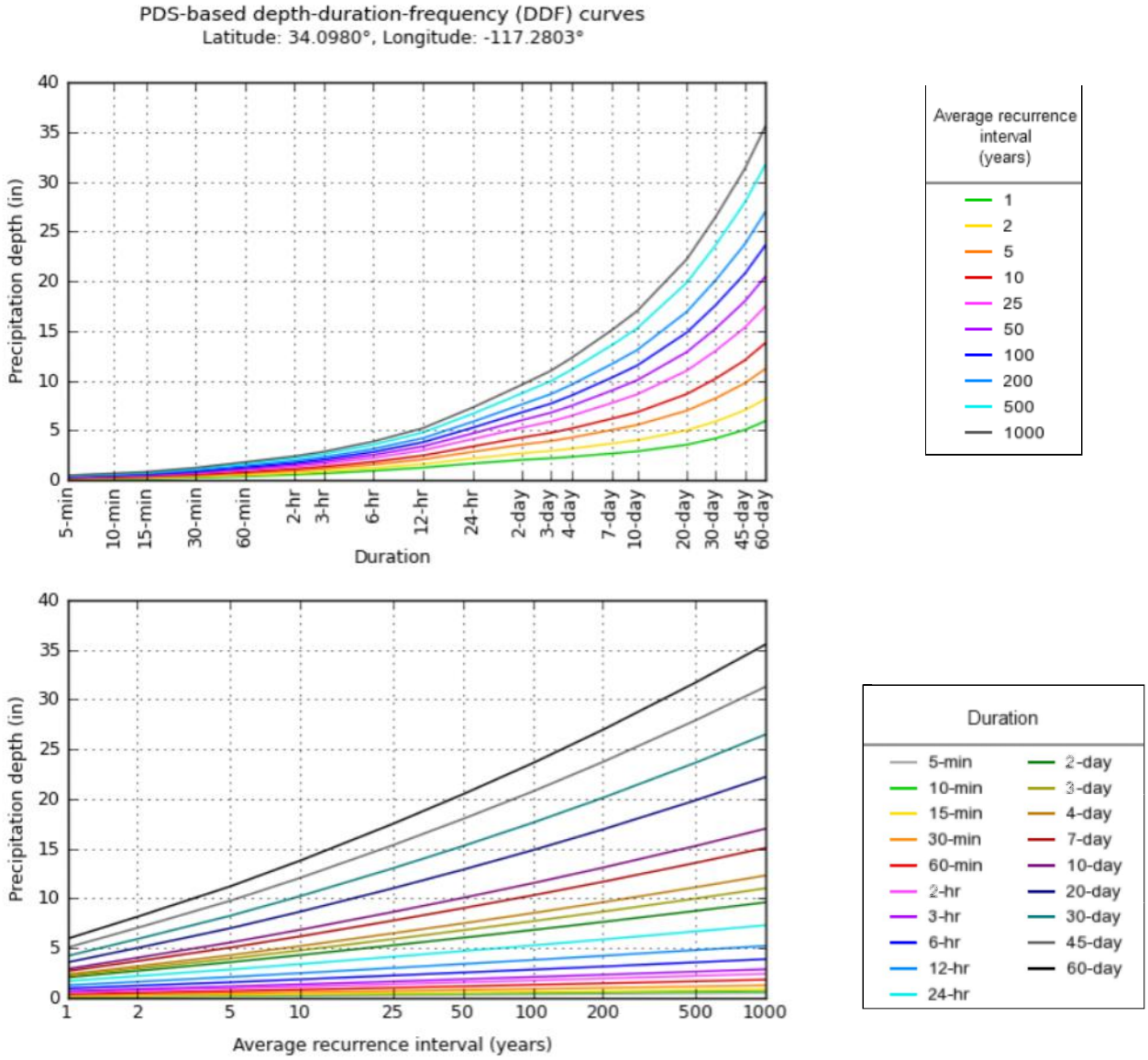
PF graphical



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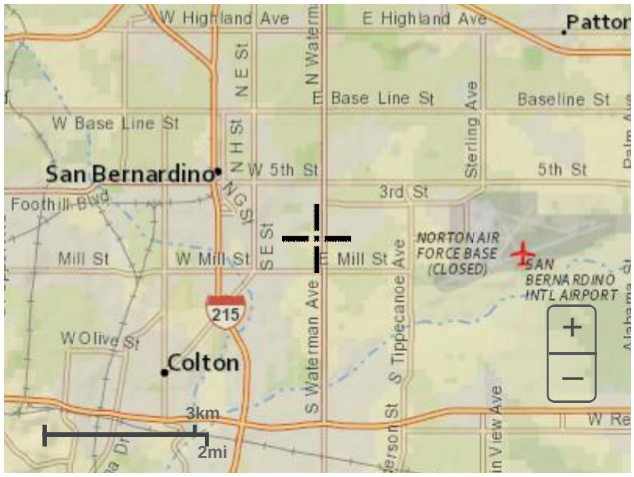
Maps & aerials

Small scale terrain



Large scale terrain

Large scale map

Large scale aerial

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1325 East West Highway
Silver Spring, MD 20910
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Disclaimer

Residential Landscaping (Lawn, Shrubs, etc.) - The pervious portions of commercial establishments, single and multiple family dwellings, trailer parks and schools where the predominant land cover is lawn, shrubbery and trees.

Row Crops - Lettuce, tomatoes, beets, tulips or any field crop planted in rows far enough apart that most of the soil surface is exposed to rainfall impact throughout the growing season. At plowing, planting and harvest times it is equivalent to fallow.

Small Grain - Wheat, oats, barley, flax, etc. planted in rows close enough that the soil surface is not exposed except during planting and shortly thereafter.

Legumes - Alfalfa, sweetclover, timothy, etc. and combinations are either planted in close rows or broadcast.

Fallow - Fallow land is land plowed but not yet seeded or tilled.

Woodland - grass - Areas with an open cover of broadleaf or coniferous trees usually live oak and pines, with the intervening ground space occupied by annual grasses or weeds. The trees may occur singly or in small clumps. Canopy density, the amount of ground surface shaded at high noon, is from 20 to 50 percent.

Woodland - Areas on which coniferous or broadleaf trees predominate. The canopy density is at least 50 percent. Open areas may have a cover of annual or perennial grasses or of brush. Herbaceous plant cover under the trees is usually sparse because of leaf or needle litter accumulation.

Chaparral - Land on which the principal vegetation consists of evergreen shrubs with broad, hard, stiff leaves such as manzonita, ceanothus and scrub oak. The brush cover is usually dense or moderately dense. Diffusely branched evergreen shrubs with fine needle-like leaves, such as chamise and redchank, with dense high growth are also included in this soil cover.

Annual Grass - Land on which the principal vegetation consists of annual grasses and weeds such as annual bromes, wild barley, soft chess, ryegrass and filaree.

Irrigated Pasture - Irrigated land planted to perennial grasses and legumes for production of forage and which is cultivated only to establish or renew the stand of plants. Dry land pasture is considered as annual grass.

Meadow - Land areas with seasonally high water table, locally called cienegas. Principal vegetation consists of sod-forming grasses interspersed with other plants.

Orchard (Deciduous) - Land planted to such deciduous trees as apples, apricots, pears, walnuts, and almonds.

Orchard (Evergreen) - Land planted to evergreen trees which include citrus and avocados and coniferous plantings.

Turf - Golf courses, parks and similar lands where the predominant cover is irrigated mowed close-grown turf grass. Parks in which trees are dense may be classified as woodland.

Curve (1) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparral, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparral, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	71	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent.)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	25	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		77	86	91	94

Ex Condition

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HYDROLOGY MANUAL

CURVE NUMBERS FOR PERVIOUS AREAS

Figure C-3 (1 of 2)

Curve (1) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
AGRICULTURAL COVERS (Continued)					
Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Evergreen (Citrus, avocados, etc.)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland (Annual grasses)	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Pasture, Irrigated (Legumes and perennial grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops (Field crops - tomatoes, sugar beets, etc.)	Poor	72	81	88	91
	Good	67	78	85	89
Small grain (Wheat, oats, barley, etc.)	Poor	65	76	84	88
	Good	63	75	83	87

Notes:

1. All curve numbers are for Antecedent Moisture Condition (AMC) II.
2. Quality of cover definitions:

   Poor-Heavily grazed, regularly burned areas, or areas of high burn potential. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.

   Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.

   Good-Heavy or dense cover with more than 75 percent of the ground surface protected.
3. See Figure C-2 for definition of cover types.

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HYDROLOGY MANUAL

CURVE NUMBERS FOR PERVIOUS AREAS

Figure C-3 (2 of 2)

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent (2)
Natural or Agriculture	0 - 0	0
Public Park	10 - 25	15
School	30 - 50	40
Single Family Residential: (3)		
2.5 acre lots	5 - 15	10
1 acre lots	10 - 25	20
2 dwellings/acre	20 - 40	30
3-4 dwellings/acre	30 - 50	40
5-7 dwellings/acre	35 - 55	50
8-10 dwellings/acre	50 - 70	60
More than 10 dwellings/acre	65 - 90	80
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 - 100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area shall always be made, and a review of aerial photos, where available, may assist in estimating the percentage of impervious cover in developed areas.

3. For typical equestrian subdivisions increase impervious area 5 percent over the values recommended in the table above.

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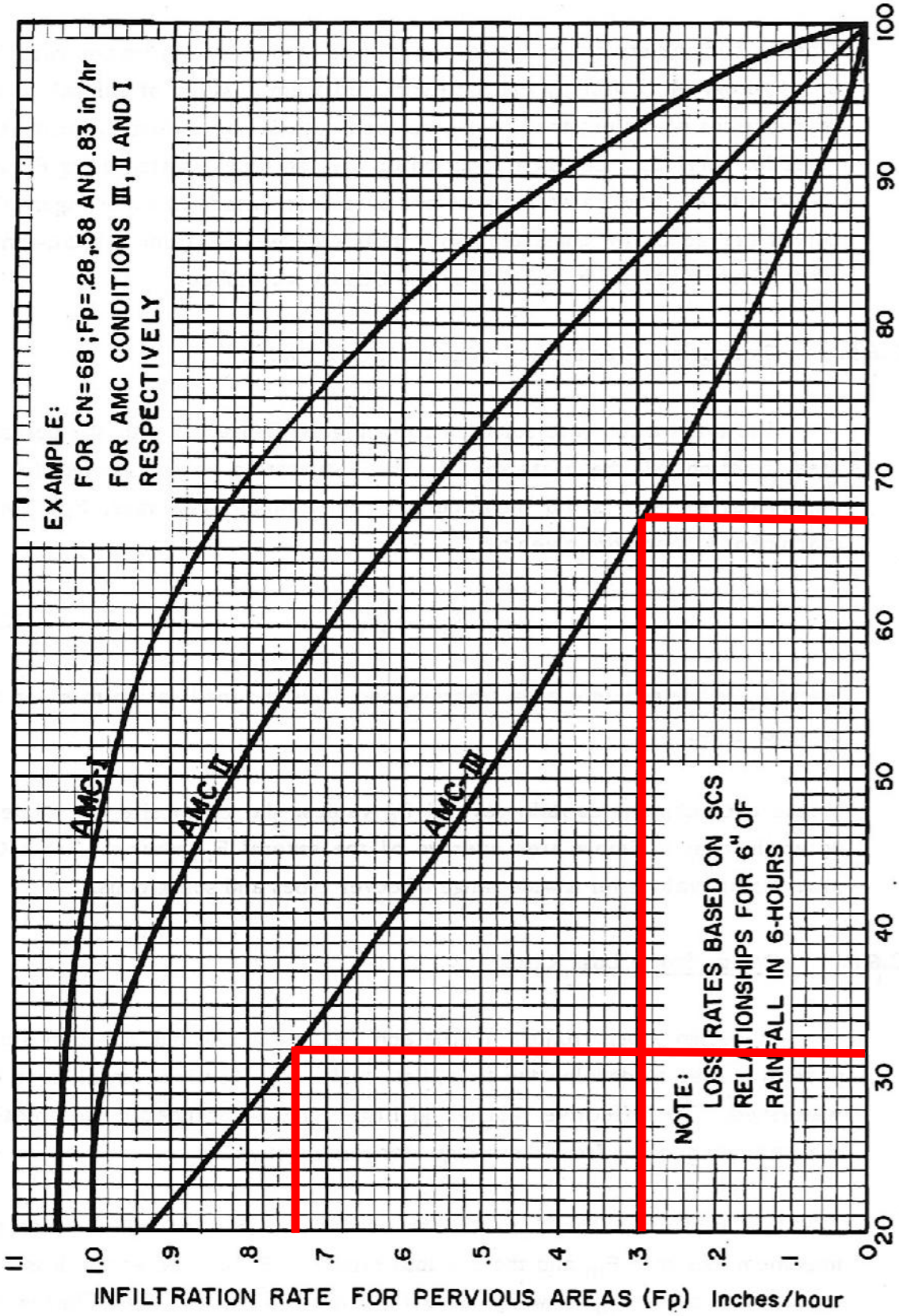
ACTUAL IMPERVIOUS COVER FOR DEVELOPED AREAS

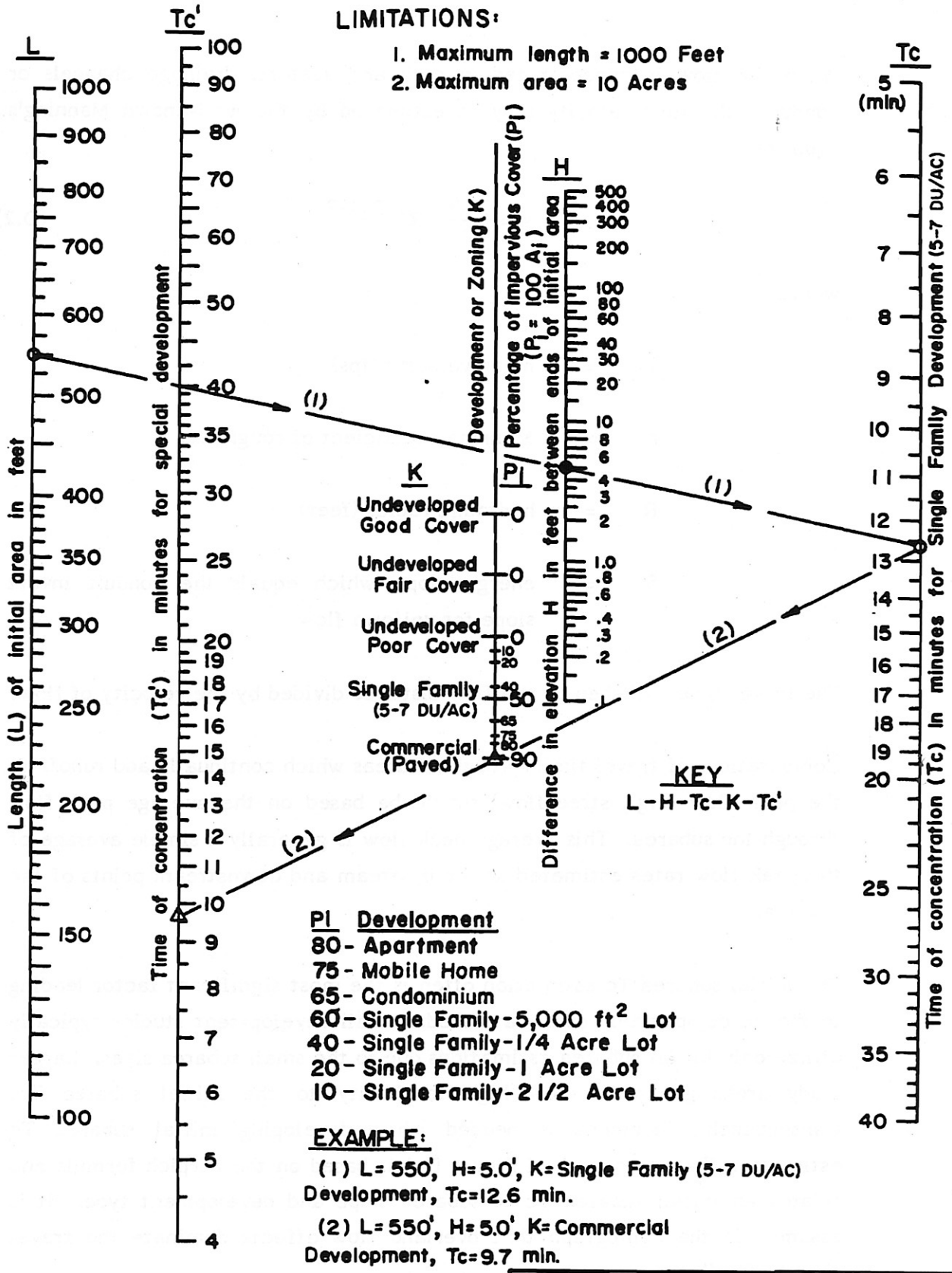
Figure C-4



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

INFILTRATION RATE FOR PERVIOUS AREAS VERSUS SCS CURVE NUMBERS

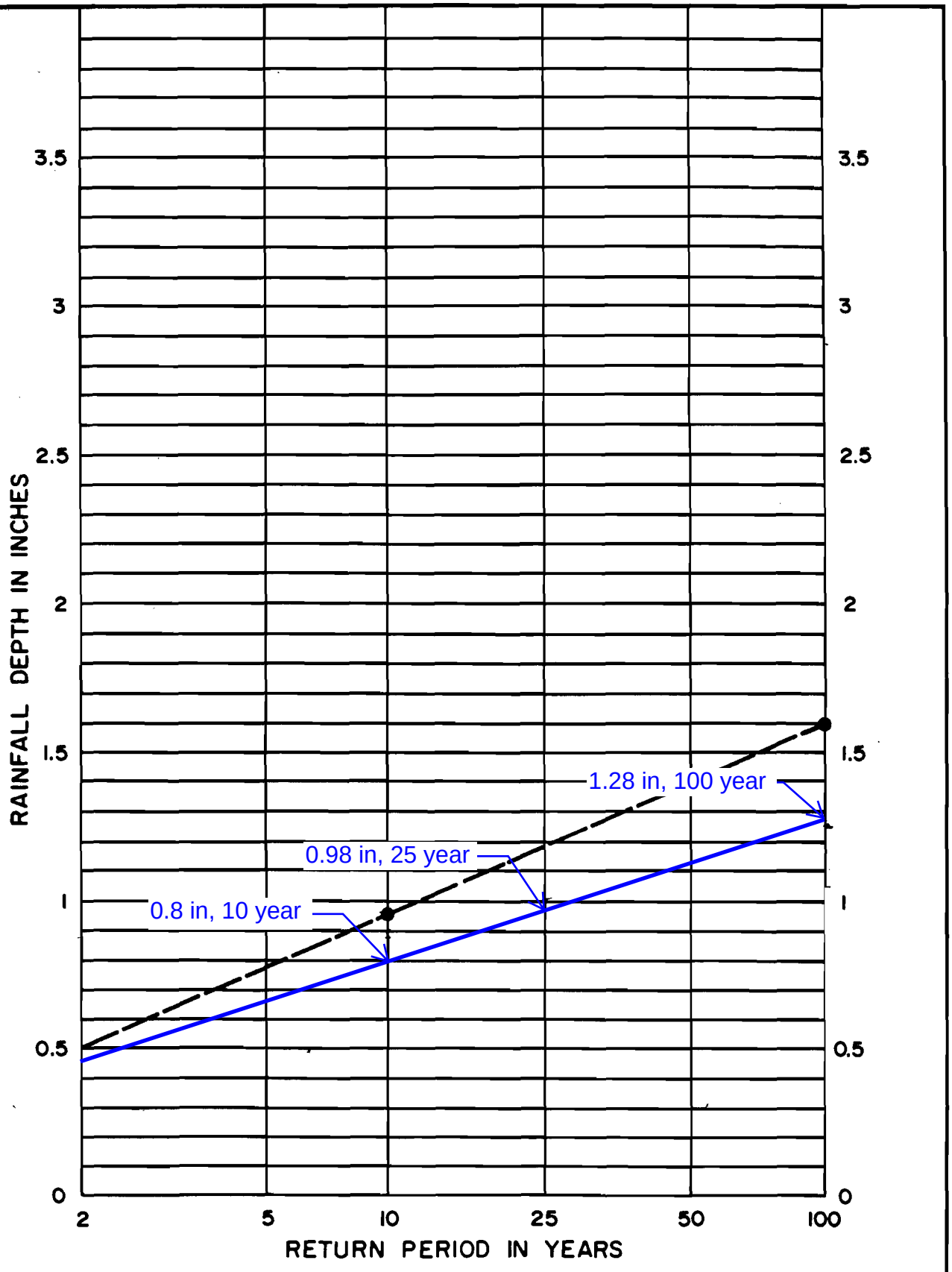
Figure C-6



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1



NOTE:

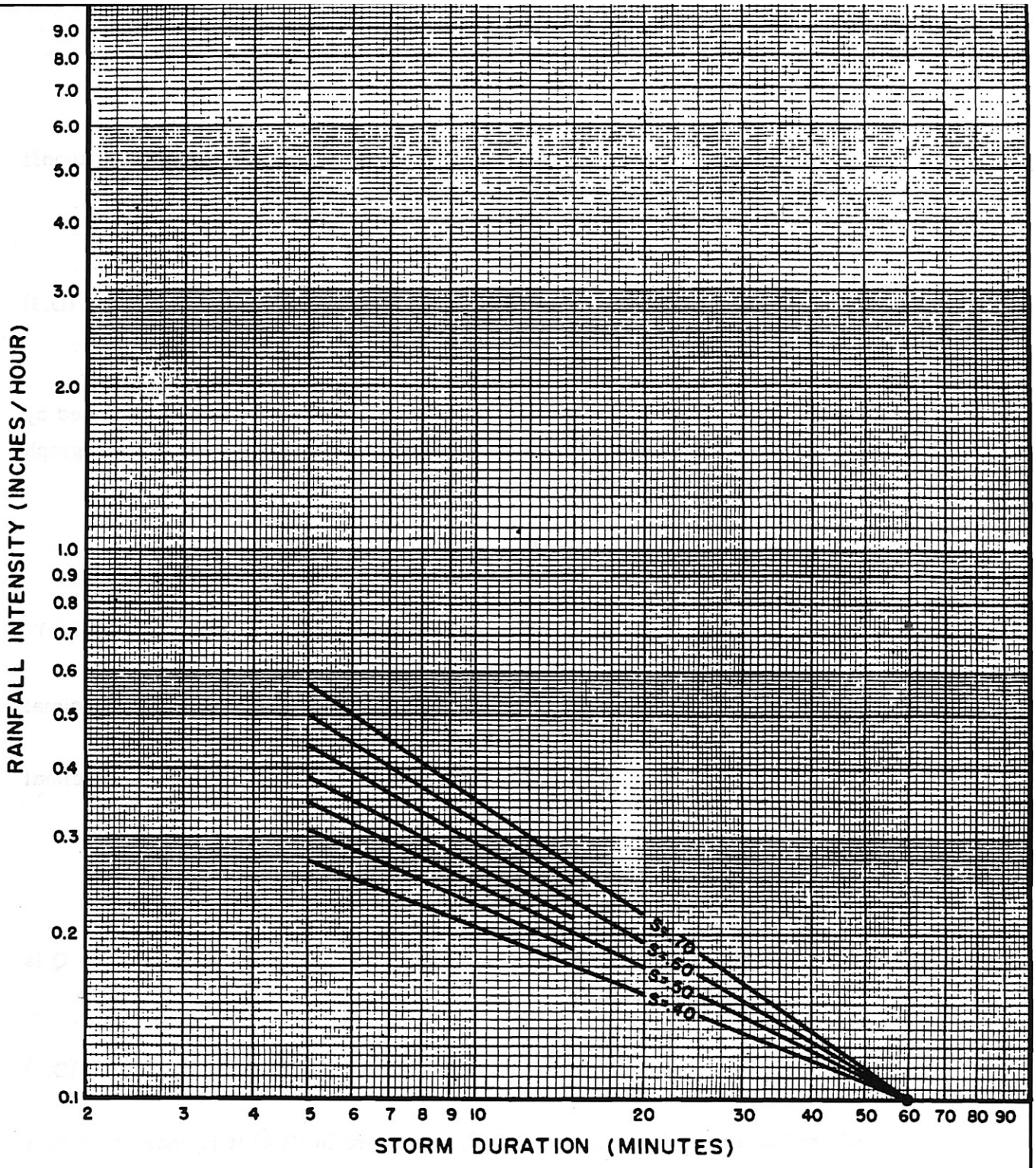
1. FOR INTERMEDIATE RETURN PERIODS PLOT 10-YEAR AND 100-YEAR ONE HOUR VALUES FROM MAPS, THEN CONNECT POINTS AND READ VALUE FOR DESIRED RETURN PERIOD. FOR EXAMPLE GIVEN 10-YEAR ONE HOUR = 0.95" AND 100-YEAR ONE HOUR = 1.60", 25-YEAR ONE HOUR = 1.18".

REFERENCE: NOAA ATLAS 2, VOLUME XI - CAL., 1973

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

RAINFALL DEPTH VERSUS RETURN PERIOD FOR PARTIAL DURATION SERIES

FIGURE D-2



DESIGN STORM FREQUENCY = _____ YEARS

ONE HOUR POINT RAINFALL = _____ INCHES

LOG-LOG SLOPE = _____

PROJECT LOCATION = _____

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

INTENSITY - DURATION CURVES CALCULATION SHEET

FIGURE D-3

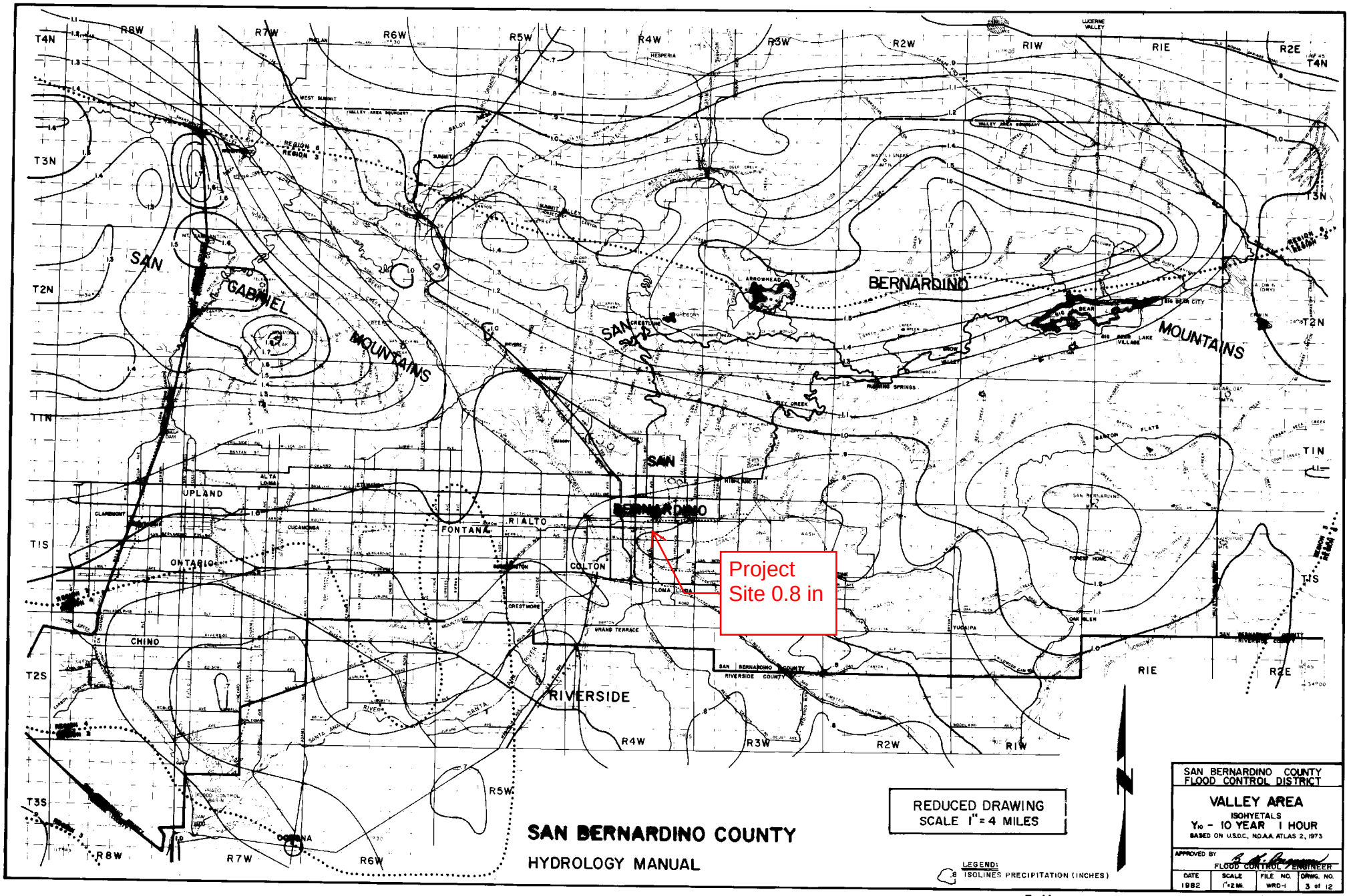

Project Site 0.8 in
SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
.8 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
Yo - 10 YEAR 1 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973
APPROVED BY
FLOOD CONTROL ENGINEER
DATE 1982
SCALE 1"=2 MI.
FILE NO. WRD-1
DRWG. NO. 3 of 12

FIGURE B-3

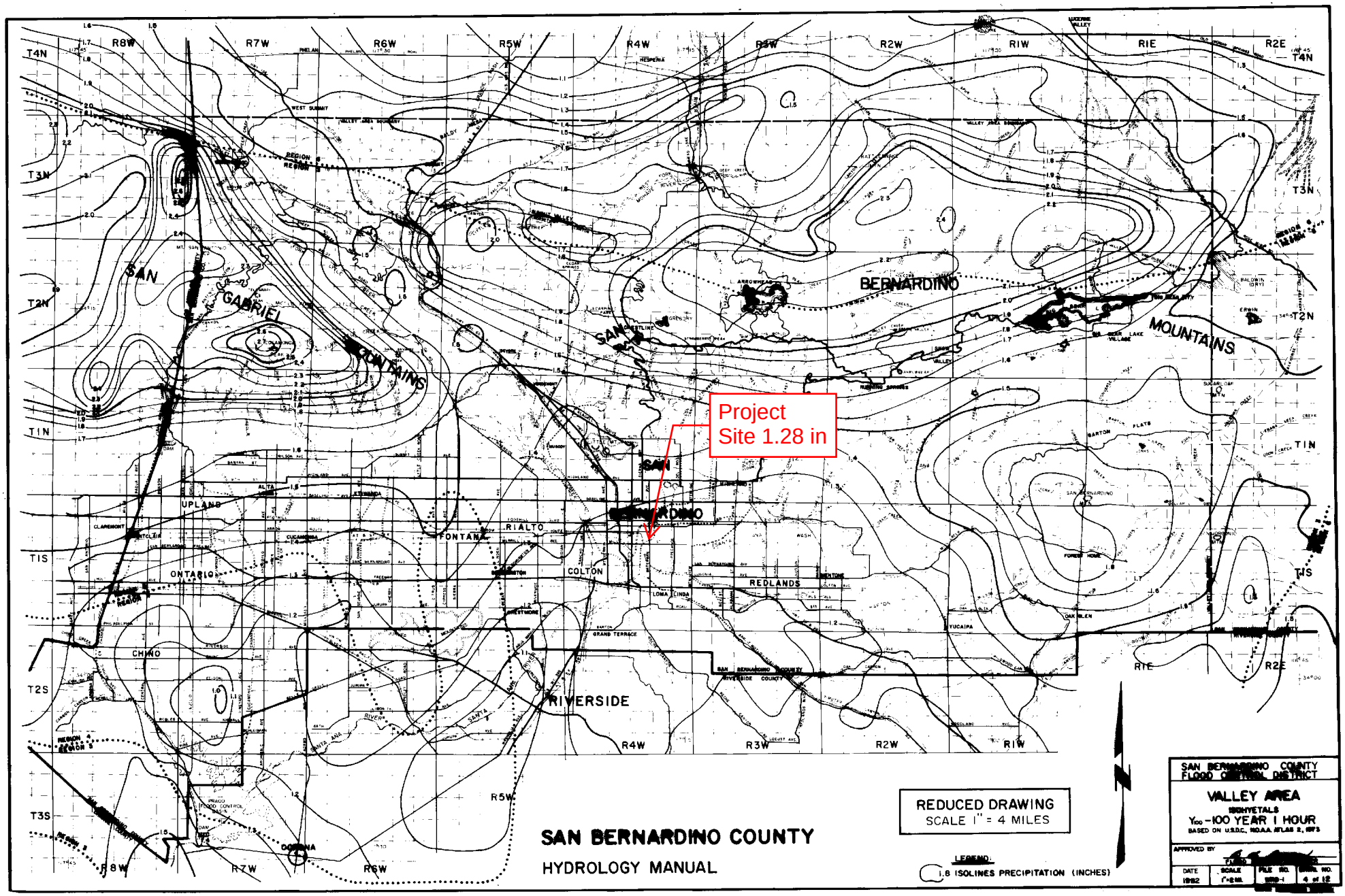

Project
Site 1.28 in
SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
1.8 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
Y100 - 100 YEAR 1 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973
APPROVED BY
DATE
1982
SCALE
1"=2 MI.
FILE NO.
4 of 12
SHEET NO.
SAN BERNARDINO MOUNTAINS
RIVERSIDE
UPLAND
ONTARIO
CHINO
FONTANA
RIALTO
COLTON
REDLANDS
YUCAIPA
CLAREMONT
SAN GABRIEL MOUNTAINS
T4N
T3N
T2N
T1N
T1S
T2S
T3S
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E

FIGURE B-4