

Preliminary  
Drainage Report  
For  
Tentative Tract Map No. 20723  
Adelanto, CA

Prepared  
October 9, 2024

United Engineering Group - California  
10601 Church Street  
Suite 124  
Rancho Cucamonga, CA 91730

Tel: (909) 466-9240

Provided for:

Core Group Consultants, LTD  
17594 W Agave Court  
Goodyear, AZ 85338

Project # 30243

This report has been prepared by or under the direction of the following registered civil engineer who attests to the technical information contained herein. The registered civil engineer has also judged the qualifications of any employees that have provided data and calculations upon which the recommendations, conclusions, and decisions are based.



Christopher F. Lenz, PE 63001

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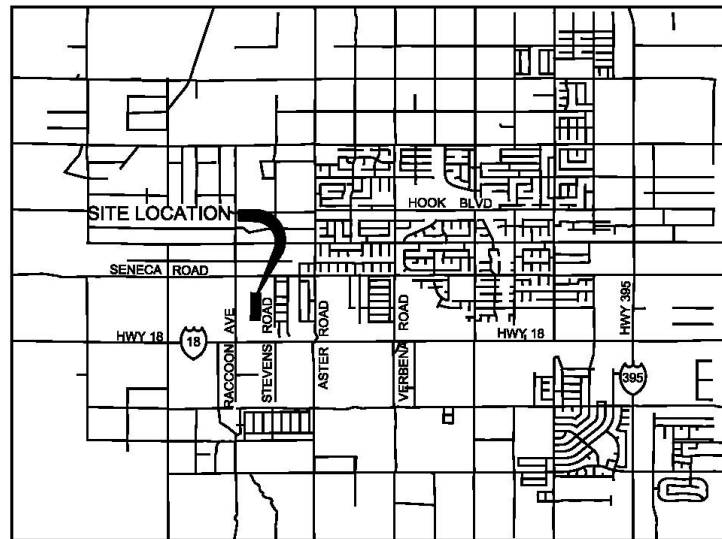
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# I. INTRODUCTION

Tract 20723 is a residential subdivision of approximately 10 acres into 44 single family residential lots, located west of Stevens and South of Seneca Roads in the City of Adelanto. The property is rectangular shaped and is bordered by an existing subdivisions to the east, and open land to the west north, and south. Minimum lot size is 6,009 sf with an average lot size of 7,228 sf.



VICINITY MAP

N.T.S.

The purpose of this study is to provide preliminary analysis of the 10-year and 100-year storm runoff emanating from on-site and off-site areas for the proposed Project. The study will confirm peak flow rates for proposed condition flow rate and stored volume after routing through two a single detention basin. Additional analysis will confirm hydraulic capacity of proposed street sections compared to rationale expected runoff.

The scope of the study includes the following:

- Determination of points of flow concentration and watershed areas
- Determination of the 100-year storm runoff based upon the on-site drainage conditions utilizing the San Bernardino County Flood Control District (SBCFCD) SCS Unit Hydrograph Method
- Determination of the 10-year and 100-year peak flow rates for the off-site area utilizing the San Bernardino County Flood Control District (SBCFCD) Rational Method.

## II. SITE DISCUSSION

The current property is vacant, undeveloped and undisturbed land with uniform slope of approximately 1.6 percent. The topography indicates that the runoff drains primarily in a northwest and northeast direction from the natural ridge line located along the west edges of the site, in the form of sheet flow. There are no defined washes on-site.

## III. RAINFALL DATA

The San Bernardino County Flood Control District (SBCFCD) hydrology Manual, (Reference 1) was used to develop the hydrological parameters for the 10-year and 100-year storm events. The Rational Method was used to determine the peak flow rates associated with the existing project conditions as well as the time of concentration used in the Unit Hydrograph method. In addition, the Unit Hydrograph Method was utilized to determine the runoff volume. Computations were performed using the CivilCADD drainage software for San Bernardino County Developed by CivilDesign Corporation. Rainfall data was taken from NOAA Atlas 14.

Return Period - Duration	Isohyetal (in)
10 year - 1 hour	0.64
2 year - 6 hour	0.84
2 year - 24 hour	1.54
100 year - 1 hour	1.08
100 year - 6 hour	2.34
100 year - 24 hour	4.72

Hydrologic Soil Group “C” and an Antecedent Moisture Conditions (AMC) 2 (10yr) and 3 (100yr) are used for the study area. The percentage impervious is 50, and the SCS runoff is 69. Refer to Appendix C for additional detail.

The project’s post developed runoff is designed to be contained in a single basin that will act as both water quality infiltration, and flood storage for peak runoff mitigation.

## IV. ONSITE RUNOFF

### Existing Condition/Pre-Development

While the runoff from the subject site in the existing condition is primarily sheet flow, there are two concentrations of flow that exit the site and thus have been analyzed. The 1.4 acre area west of the natural ridge line drains northwesterly to the existing northern property line. It is shown as Areas B

and Nodes 201, and 202 on the Existing Conditions Drainage Exhibit in Appendix A. The remaining 7.6 acre area of the project to the east of the natural ridge line drains northeasterly to points along the northern edge of the property and exits the site at the existing northern property line. It is shown as Area A1 and A2, and Nodes 101 to 103 on the Existing Conditions Drainage Exhibit in Appendix A. The peak flow rate and flood volume for each area is as follows; Area A has a peak flow of 12.1 cfs and Area B has a peak flow of 3.0 cfs.

**Proposed Condition/Post Development**

The proposed condition is to utilize a single basin for water quality and flood routing for the site. The design incorporates a controlled basin outlet. The project must tie into the existing street stubs along the eastern property line. The northernmost street has a centerline grade of 3151.8, while the grades along the northern edge of the property are 3154 and above. Thus, discharge via surface flow is not feasible. There is an existing City storm drain that provides a suitable connection. The adjacent tract has a 36” storm drain line in Hampton Lane that bypasses their onsite basin. Per the tract 20401, the offsite flow of 55 cfs carried by that line, includes a 25% bulking addition (11 cfs), and has a time of concentration of 24 minutes. The projects proposed outflow will have a time of concentration of over 2 hours, thus the existing storm drain is a suitable outlet for the detention basin.

The post development 100-year runoff for the entire site is 25.8 cfs. The post development runoff is then routed through the proposed basin to confirm post development runoff can be mitigated to less than pre-development runoff. The bottom 1 foot of the basin acts as water quality retention only, with no outfall, relying solely on infiltration. The volume above serves as detention area for flood storage and volume needed for peak flow mitigation. In order to drain the top flood storage, a drop inlet with 2 orifices drilled in the wall at 1’ and 2’ above the basin bottom. From the drop inlet an 18” pipe will carry the runoff to the 36” storm drain in Hampton Lane. The following tables are the final stage-storage-discharge tables for the basins used in the routing calculations.

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac. Ft)	Outflow (CFS)	(S-O*dt/2) (Ac. Ft)	(S+O*dt/2) (Ac. Ft)
0.000	0.000	0.000	0.000	0.000
1.000	0.290	0.300	0.289	0.291
2.000	0.580	1.260	0.576	0.584
3.000	0.870	3.580	0.858	0.882
4.000	1.150	4.680	1.134	1.166
5.000	1.442	5.540	1.423	1.461

After routing through the proposed basin, the post development 100-year runoff is 4.9 cfs with 1.23 ac-ft stored for the basin. Refer to Appendices D and E for detailed output files for detail.

The primary hydraulic design element studied for this report are the proposed roads within the project that will be used to carry runoff. At the minimum design slope of 1.1% the roads yield a capacity of 52 cfs within the curbs. The curb inlets into the storm drain have been designed and analyzed as 4' curb inlets in sag locations. The storm drain has been preliminarily design using the CivilD program estimates. Details in Appendices E and F and the Proposed Conditions Drainage Exhibit in Appendix A.

## V. OFFSITE RUNOFF

The afore mentioned ridge at the middle of the southern property line, effectively routes offsite flows to the east and west. Thus, no acceptance and routing of offsite flows is needed. The subject site proposes no changes to these offsite drainage patterns.

## VI. STORMWATER TREATMENT

Stormwater treatment is provided by the bottom 1 foot of the basin, where the required volume will infiltrate into the ground. As shown on the Proposed Condition Exhibit, the basin provides the WQ volume below the inverts of the orifice in the drop inlet. Infiltration rates were assumed to match the adjacent property. At 1 in/hr the bottom 1 foot of the basin would infiltrate in 12 hours (with a factor of safety of 2). Water quality calculations were prepared based on the San Bernardino County Model Water Quality Management Plan Guidance document. The following calculations were used in the sizing of the proposed facilities;

- WQ Contributing area - 10.2 acres
- 2 yr 1 hour rainfall - 0.37"
- Impervious ratio - 40% (from SBCFCD hydrology Manual)
- $C_{BMP} = 0.28$
- Drainage Area Region - Desert - Regression Coefficient  $P_6 = 1.2371$
- $P_6 = 1.2371 \times 0.37'' = 0.46''$
- Regression Constant  $a = 1.963$  for 48 hours
- $P_0 = a * C_{BMP} * P_6 = 1.963 \times 0.28 \times 0.46 = 0.253$
- $V_0 = (P_0 * A)/12$ 
  - o  $V_A = (0.253 \times 10.2)/12 = 0.21$  ac-ft

## VII. CONCLUSION

The proposed development of tract 20723, an 10 acre, 44 lot single family detached subdivision can be mitigated as designed and analyzed in this report to be compatible with the City of Adelanto Master Plan of Drainage. The development of the subject site will not significantly change area drainage patterns, impact any of the surrounding properties, or change any of the regional master plan facilities. The site will construct a single combination retention and detention basin of sufficient size to handle water quality through infiltration, and flood mitigation through detention. The streets have been analyzed and are confirmed to contain the 100-year runoff within the curb. The basins, outlet structures, street grades, and curb inlets have been designed and analyzed in conjunction with the Tentative Tract Map to confirm capacity.

## REFERENCES

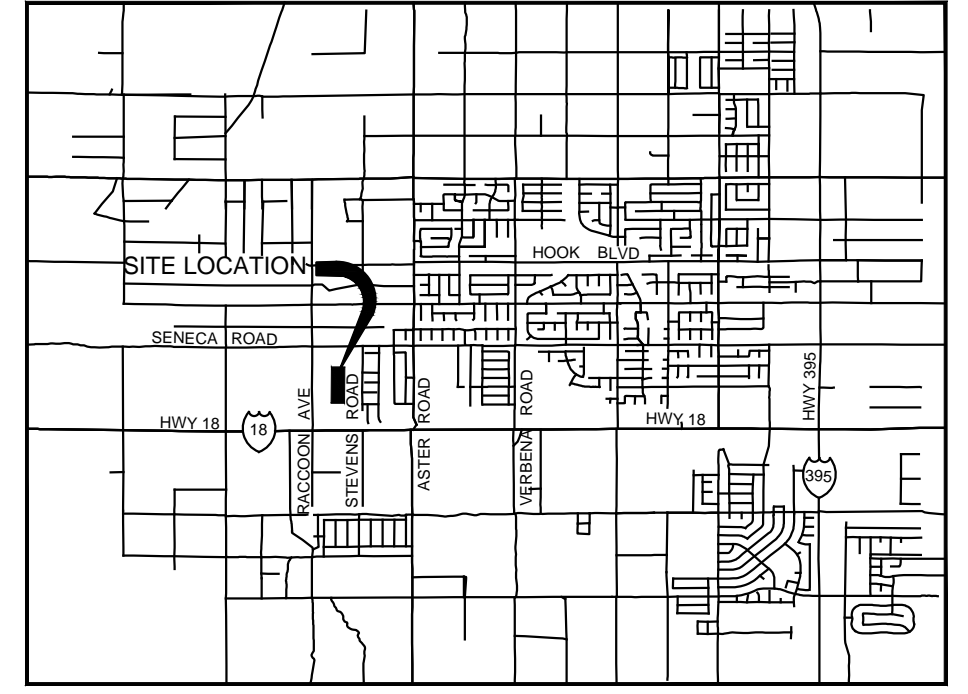
1. San Bernardino County Flood Control and Water Conservation District Hydrology Manual, August 1986.
2. City of Adelanto Drainage Master Plan Update, Figure 3-1 Proposed Systems Map, So and Associates Engineers, March 1992.



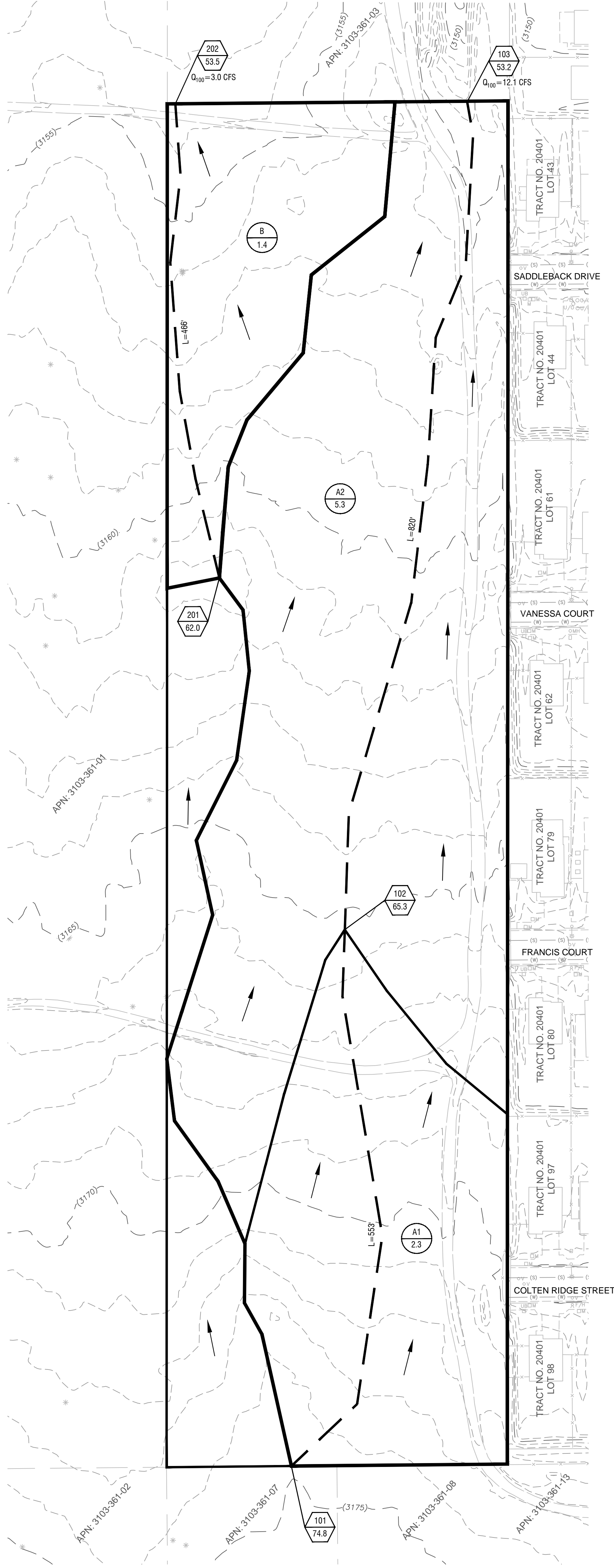
**APPENDIX A:  
PRE AND POST CONDITION EXHIBITS**

# EXISTING CONDITIONS

UNITED ENGINEERING GROUP CA., INC OCTOBER 2024



VICINITY MAP  
N.T.S.



### PROPERTY OWNER

CORE GROUP CONSULTANTS, LTD  
C/O SEAN CARROLL  
17594 W. AGAVE COURT  
GOODYEAR, AZ 85338

### BENCHMARK

DESIGNATION: U-306 ELEV: 3201.19  
CITY OF VICTORVILLE NAVD-29

CONCRETE MONUMENT WITH BRASS CAP STAMPED U.S. COAST & GEODETIC 1936; 54 FT. WEST AND 32 FT. SOUTH OF WELL MONUMENT AT CENTERLINE INTERSECTION OF BALDY MESA ROAD & HIGHWAY 18.

### LEGAL DESCRIPTION

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

PARCEL 1 (APN: 3103-361-05)  
THE EAST ONE-HALF OF THE SOUTHWEST ONE-QUARTER OF THE NORTHWEST ONE-QUARTER OF THE NORTHWEST ONE-QUARTER OF SECTION 19, TOWNSHIP 5 NORTH, RANGE 5 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE CITY OF ADELANTO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT OF SAID LAND ON FILE IN THE DISTRICT LAND OFFICE.

PARCEL 2 (APN: 3103-361-06)  
THE EAST ONE-HALF OF THE NORTHWEST ONE-QUARTER OF THE SOUTHWEST ONE-QUARTER OF THE NORTHWEST ONE-QUARTER OF SECTION 19, TOWNSHIP 5 NORTH, RANGE 5 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE CITY OF ADELANTO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT OF SAID LAND ON FILE IN THE DISTRICT LAND OFFICE.

### LAND USE/ZONING INFORMATION

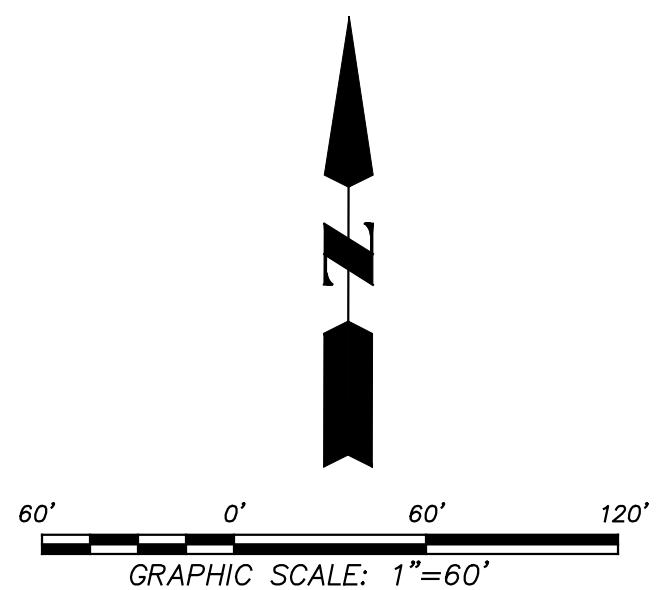
ADJACENT LAND USE:  
NORTH.....VACANT  
SOUTH.....VACANT  
EAST.....SINGLE FAMILY RESIDENTIAL  
WEST.....VACANT

ADJACENT EXISTING ZONING:  
NORTH.....RS-5 (MAX. 5 DU/AC.)  
SOUTH.....C (COMMERCIAL)  
EAST.....R1 (MAX. 4 DU/AC.)  
WEST.....RS-5 (MAX. 5 DU/AC.)

EXISTING ZONING: SINGLE FAMILY RESIDENTIAL (RS-5)  
PROPOSED ZONING: SINGLE FAMILY RESIDENTIAL (RS-5)

### LEGEND

- TRIBUTARY AREA
- FLOWPATH
- FLOW DIRECTION
- NODE/CONCENTRATION POINT  
FLOWLINE ELEVATION 31XX.X
- SUBAREA  
ACRES



REVISIONS		
NO.	DESCRIPTION	DATE



CHRISTOPHER F. LENZ DATE  
R.C.E. No. 63001



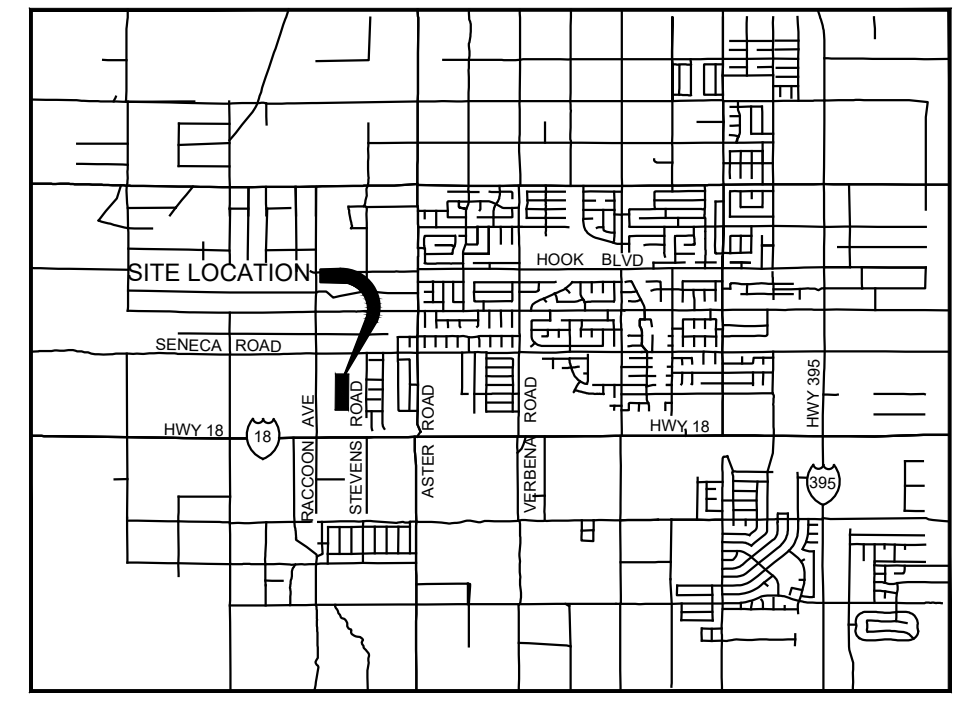
10601 Church Street  
Suite 124  
Rancho Cucamonga,  
CA 91730  
Phone: 909.466.9240  
www.unitedeng.com

**SENECA & HAMPTON**  
DRAINAGE MAP  
**EXISTING CONDITIONS**  
FOR  
TRACT NO. 20723

OCTOBER 2024  
SHEET 1 OF 1  
PROJECT NUMBER  
CA-30243

# PROPOSED CONDITIONS

UNITED ENGINEERING GROUP CA., INC OCTOBER 2024



VICINITY MAP  
N.T.S.

## PROPERTY OWNER

CORE GROUP CONSULTANTS, LTD  
C/O SEAN CARROLL  
17594 W. AGAVE COURT  
GOODYEAR, AZ 85338

## BENCHMARK

DESIGNATION: U-306 ELEV: 3201.19  
CITY OF VICTORVILLE NAVD-29

CONCRETE MONUMENT WITH BRASS CAP STAMPED U.S. COAST & GEODETIC 1936; 54 FT. WEST AND 32 FT. SOUTH OF WELL MONUMENT AT CENTERLINE INTERSECTION OF BALDY MESA ROAD & HIGHWAY 18.

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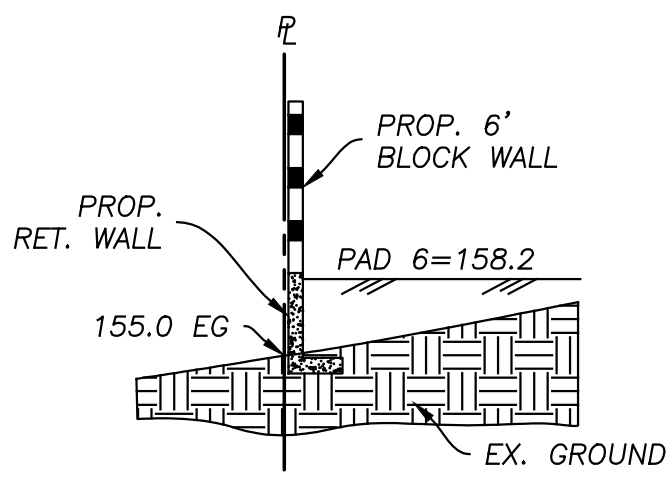
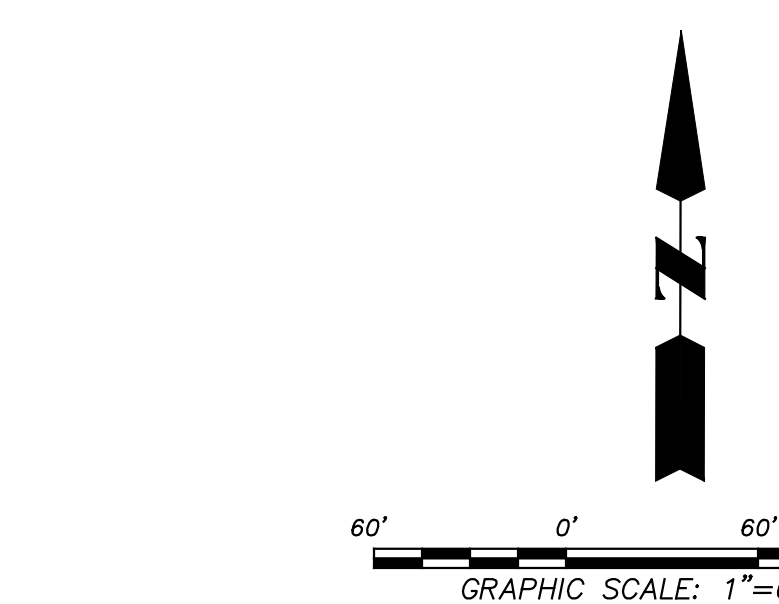
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## GENERAL NOTES

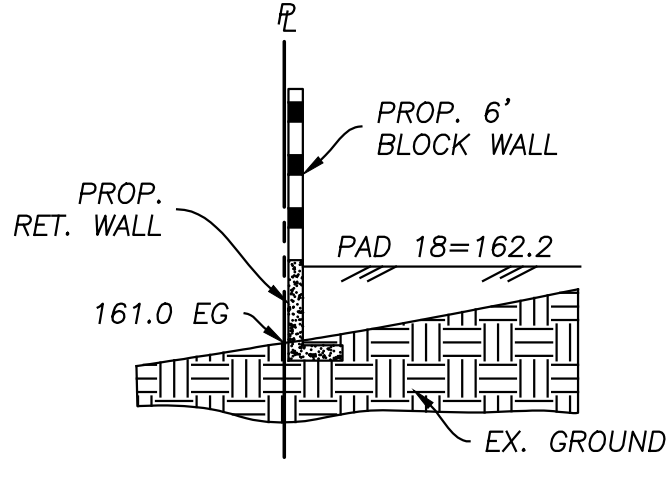
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- TOTAL GROSS AREA = 10.05 AC.  
TOTAL NET AREA = 7.97 AC.  
TOTAL AREA TO BE DEDICATED FOR R/W = 2.08 AC.
- SADDLEBACK DRIVE, VANESSA COURT, FRANCIS COURT, AND COLTEN RIDGE STREET ARE STREETS FOR PUBLIC DEDICATION.
- LOTS 1 THROUGH 48 ARE 5,000 SQ. FT. MIN. (RESIDENTIAL LOTS)
- GROSS DENSITY: 4.78 DU/AC  
NET DENSITY: 6.02 DU/AC  
AVERAGE LOT SIZE = 7,241 SQ. FT.  
MINIMUM LOT SIZE = 6,050 SQ. FT.  
MAXIMUM LOT SIZE = 8,174 SQ. FT.
- TOTAL NUMBER OF RESIDENTIAL LOTS = 48  
TOTAL NUMBER OF LETTERED LOTS = 0
- LINEAR FEET OF STREETS:  
SADDLEBACK DRIVE = 258.9'  
VANESSA COURT = 258.9'  
FRANCIS COURT = 258.8'  
COLTEN RIDGE STREET = 258.8'
- ALL FRONT YARD BUILDING SETBACK LINES (BSL) ARE SHOWN TO AN AVERAGE DEPTH. MINIMUM FRONT YARD BSL = 20'.
- TOPOGRAPHY SOURCE: ARROWHEAD MAPPING.  
CONTOUR INTERVAL: 1 FOOT
- ALL SLOPES ARE 2:1 OR FLATTER UNLESS OTHERWISE NOTED.
- LOT DIMENSION SHOWN HEREIN ARE APPROXIMATE.
- FEMA 100 YEAR FLOOD ZONE "D" (FLOOD HAZARDS ARE UNDETERMINED, BUT POSSIBLE)
- THIS MAP IS COMPILED FROM RECORD INFORMATION ONLY AND IS NOT TO BE USED AS A BOUNDARY SURVEY.
- THE LOCATIONS OF ALL EXISTING UTILITIES SHOWN ON THIS MAP ARE APPROXIMATE. (NO RECORDS AVAILABLE)
- ADD 3100 FEET TO ALL ELEVATIONS SHOWN HEREIN TO OBTAIN TRUE DATUM.

## LEGEND

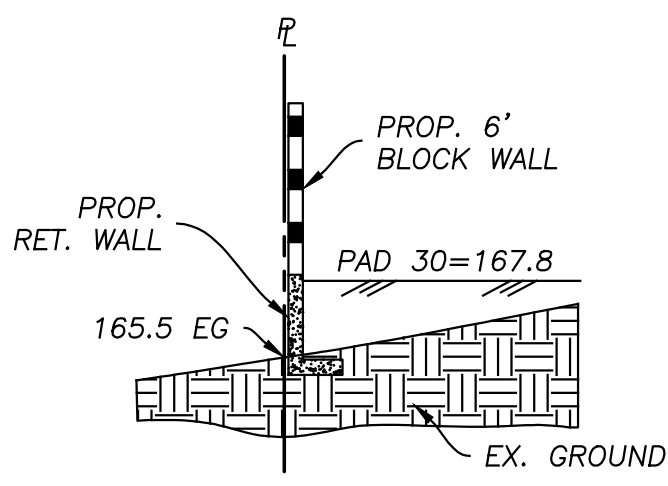
- TRIBUTARY AREA
- FLOWPATH
- FLOW DIRECTION
- HIGHPOINT
- LOWPOINT
- NODE/CONCENTRATION POINT  
FLOWLINE ELEVATION 31XX.X
- SUBAREA  
ACRES
- ADJUST 105 TO X OF SADDLEBACK STORM DRAIN CONNECTION
- BSL BUILDING SETBACK LINE
- FG FINISH GRADE
- FL FLOW LINE
- FS FINISH SURFACE
- LP LOW POINT
- HP HIGH POINT
- GB GRADE BREAK
- TC TOP OF CURB
- (XXX.XX) EXISTING ELEVATION
- 40 LOT NUMBER
- 41.1 PAD PAD ELEVATION
- 2:1 SLOPE (UNLESS NOTED)
- TRACT BOUNDARY
- (S) EXISTING SEWER
- (W) EXISTING WATER
- s PROPOSED SEWER
- w PROPOSED WATER
- PROPOSED STORM DRAIN



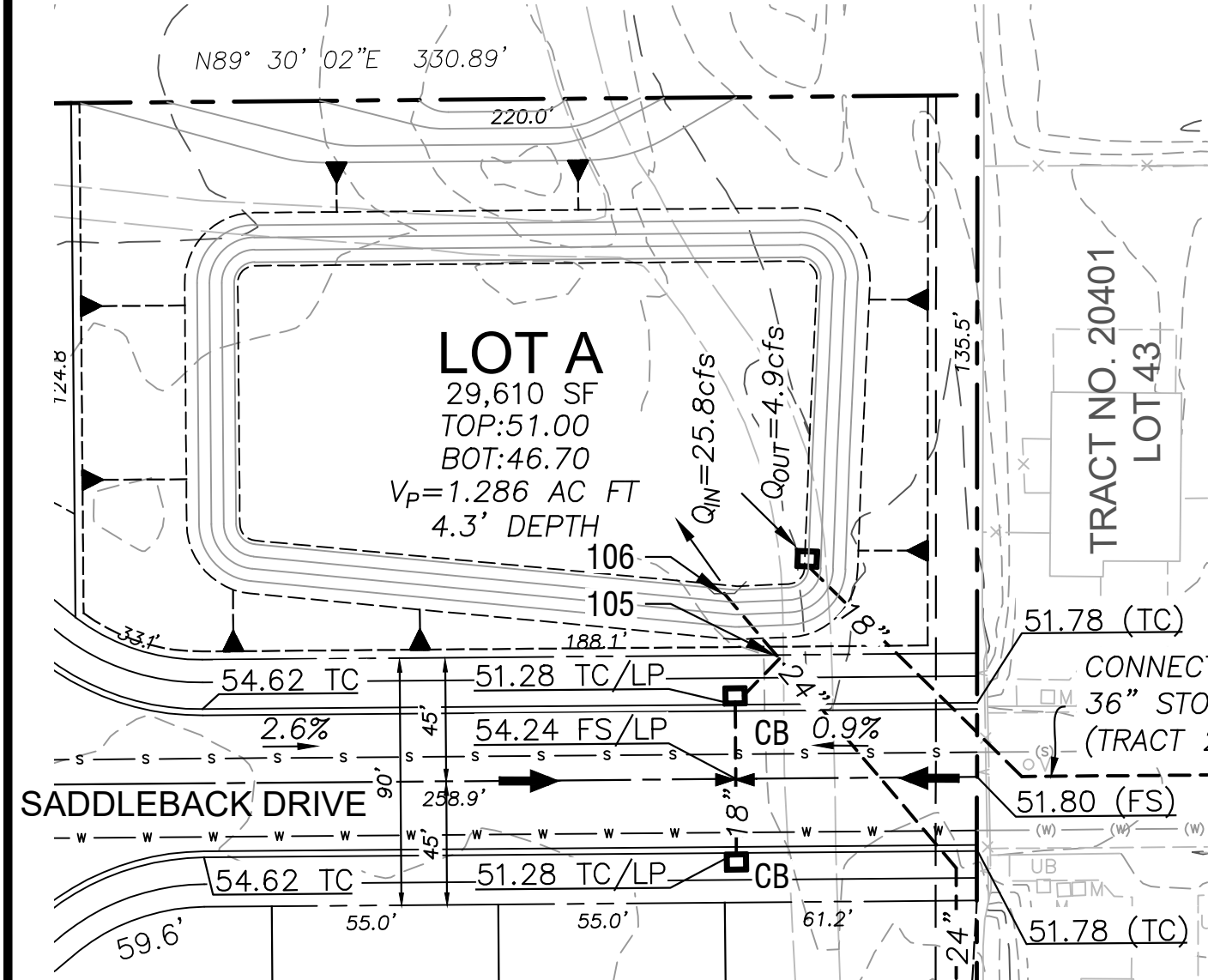
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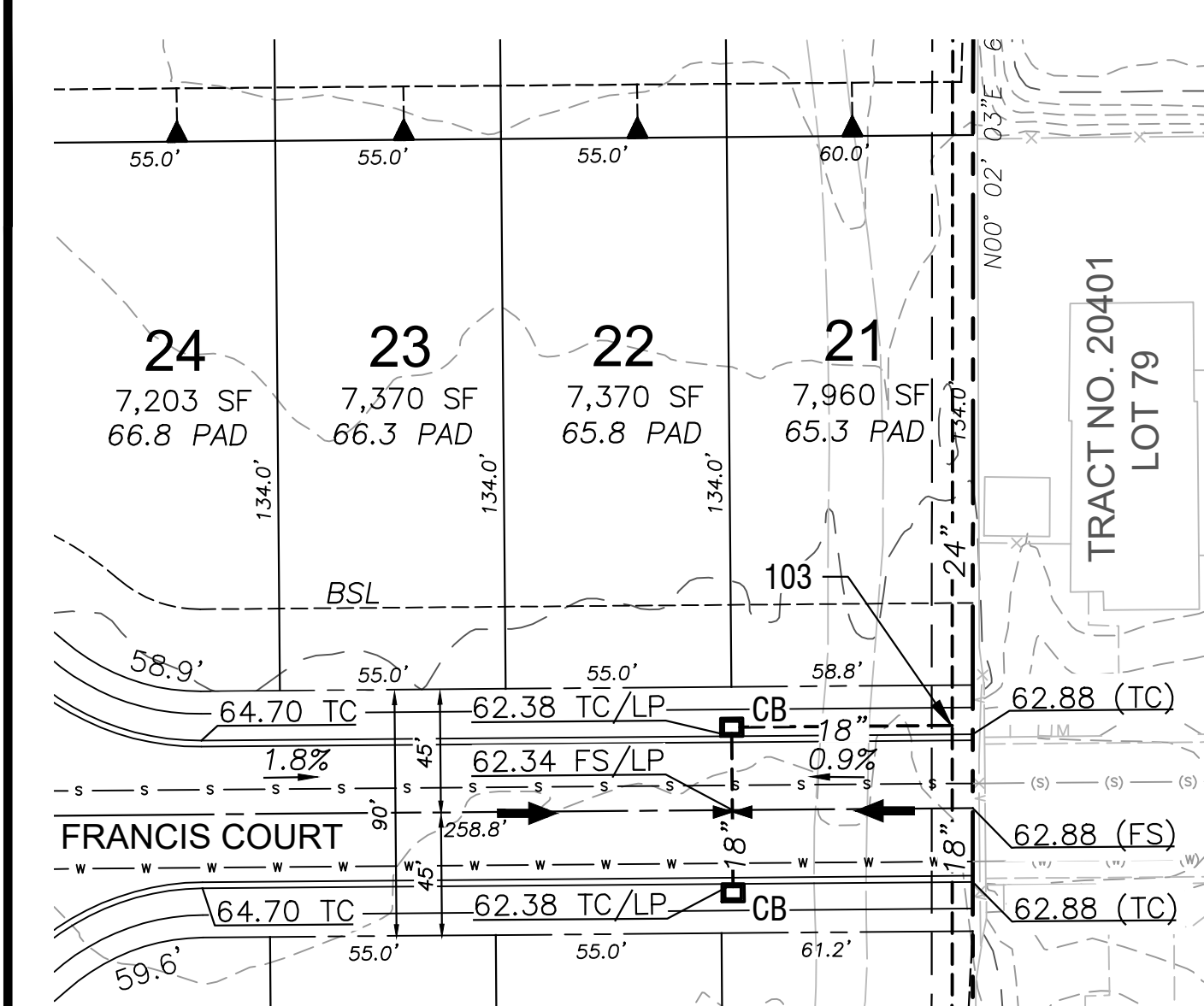
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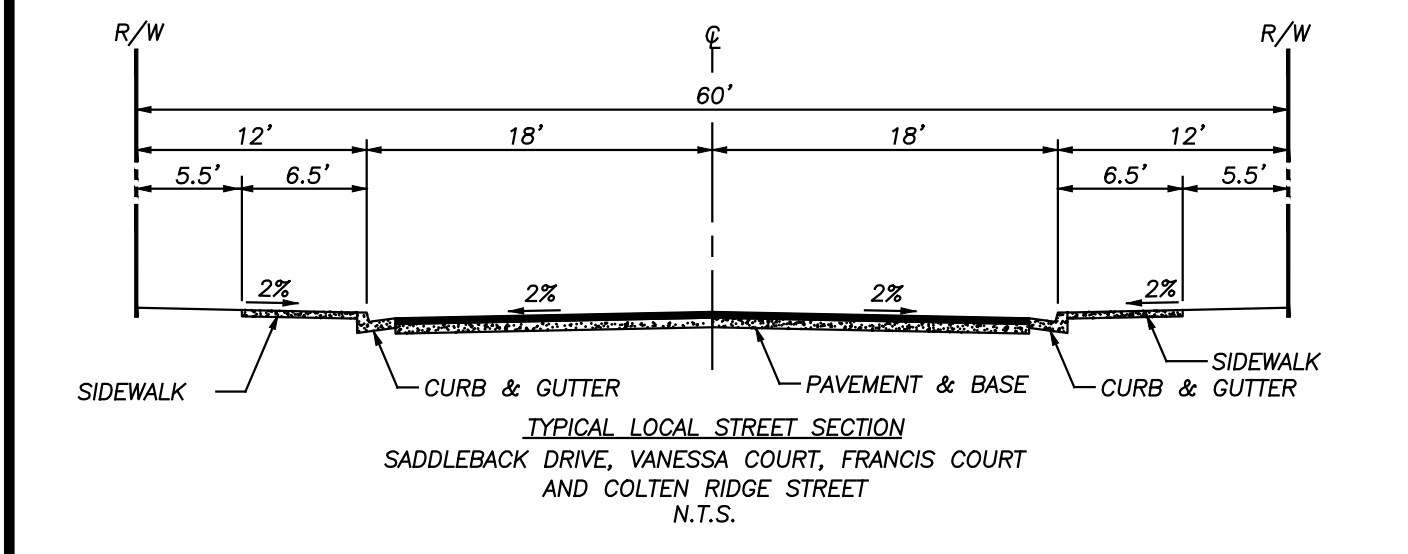
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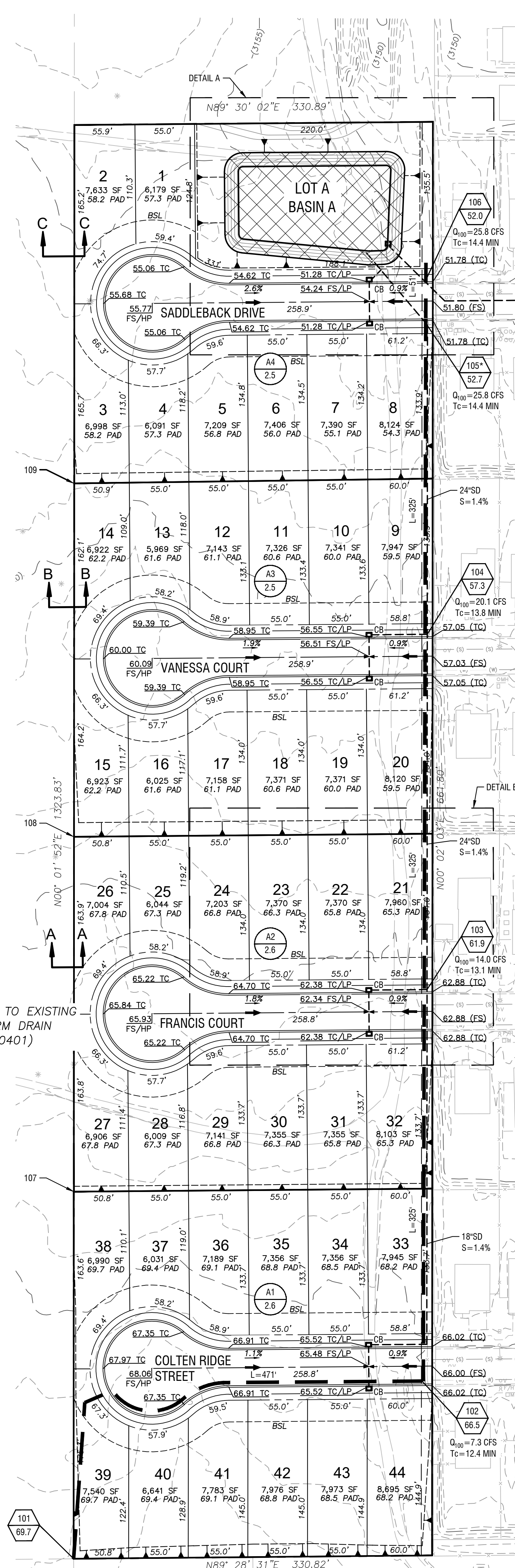
DETAIL A  
N.T.S.



DETAIL B  
N.T.S.



TYPICAL LOCAL STREET SECTION  
SADDLEBACK DRIVE, VANESSA COURT, FRANCIS COURT  
AND COLTEN RIDGE STREET  
N.T.S.



## LAND USE/ZONING INFORMATION

ADJACENT LAND USE:  
NORTH.....VACANT  
SOUTH.....VACANT  
EAST.....SINGLE FAMILY RESIDENTIAL  
WEST.....VACANT

ADJACENT EXISTING ZONING:  
NORTH.....RS-5 (MAX. 5 DU/AC.)  
SOUTH.....C (COMMERCIAL)  
EAST.....R1 (MAX. 4 DU/AC.)  
WEST.....RS-5 (MAX. 5 DU/AC.)

EXISTING ZONING: SINGLE FAMILY RESIDENTIAL (RS-5)  
PROPOSED ZONING: SINGLE FAMILY RESIDENTIAL (RS-5)

REVISIONS		
NO.	DESCRIPTION	DATE



CHRISTOPHER F. LENZ DATE  
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**SENECA & HAMPTON**  
DRAINAGE MAP  
**PROPOSED CONDITIONS**  
FOR  
TRACT NO. 20723

OCTOBER 2024  
SHEET 1 OF 1  
PROJECT NUMBER  
CA-30243

# TENTATIVE MAP - TRACT NO. 20723

BEING A SUBDIVISION OF A PORTION OF THE NORTHEAST ¼ OF SECTION 19, TOWNSHIP 5 NORTH, RANGE 5 WEST, SAN BERNARDINO MERIDIAN IN THE CITY OF ADELANTO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

UNITED ENGINEERING GROUP CA., INC

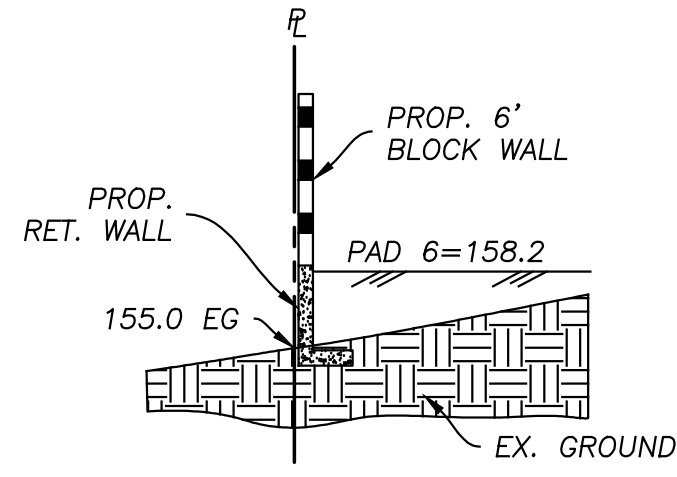
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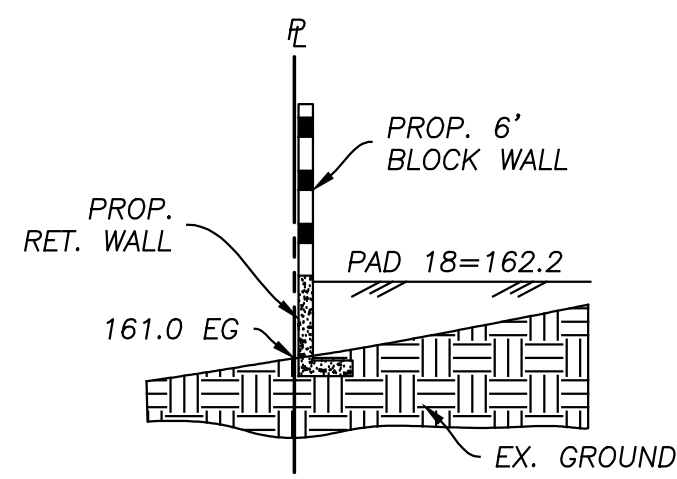
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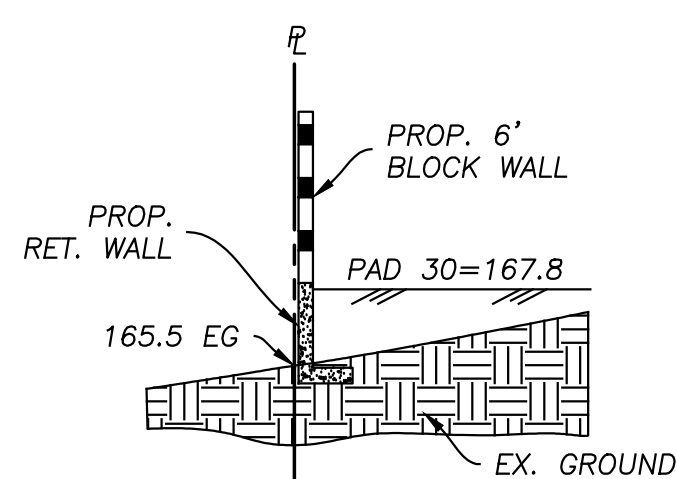
SECTION C - C

N.T.S.



SECTION B - B

N.T.S.



SECTION A - A

N.T.S.

### UTILITY PURVEYORS:

**WATER**  
ADELANTO PUBLIC UTILITY AUTHORITY  
11600 AIR EXPRESSWAY  
ADELANTO, CA. 92301  
(760) 246-2300

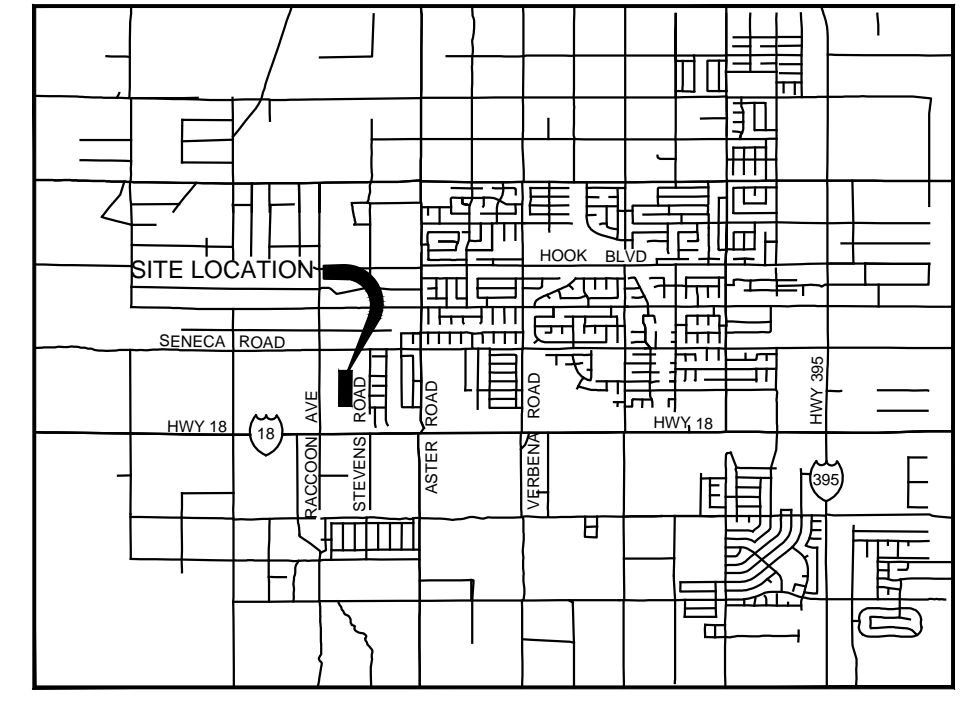
**SEWER**  
ADELANTO PUBLIC UTILITY AUTHORITY  
11600 AIR EXPRESSWAY  
ADELANTO, CA. 92301  
(760) 246-2300

**ELECTRIC**  
SOUTHERN CALIFORNIA EDISON  
12353 HESPERIA ROAD  
VICTORVILLE, CA. 92395  
(800) 684-8123

**GAS**  
SOUTHWEST GAS CORP.  
13471 MARIPOSA ROAD  
VICTORVILLE, CA. 92395  
(877) 860-6020

**TELEPHONE**  
VERIZON  
12133 HESPERIA ROAD  
VICTORVILLE, CA. 92395  
(760) 243-3801

**CABLE**  
SPECTRUM  
12180 RIDGECREST ROAD, #102  
VICTORVILLE, CA. 92395  
(833) 267-6097



VICINITY MAP  
N.T.S.

### GENERAL NOTES:

- ASSESSOR'S PARCEL NUMBER: 3103-361-05 & -06
- THE PROPERTY SHOWN HEREIN CONTAINS THE ENTIRE CONTIGUOUS OWNERSHIP.
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TOTAL NET AREA = 7.97 AC.
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NET DENSITY: 6.02 DU/AC  
AVERAGE LOT SIZE = 7,241 SQ. FT.  
MINIMUM LOT SIZE = 6,050 SQ. FT.  
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TOTAL NUMBER OF LETTERED LOTS = 0
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FRANCIS COURT = 258.8'  
COLTEN RIDGE STREET = 258.8'
- ALL FRONT YARD BUILDING SETBACK LINES (BSL) ARE SHOWN TO AN AVERAGE DEPTH. MINIMUM FRONT YARD BSL = 20'.
- TOPOGRAPHY SOURCE: ARROWHEAD MAPPING.  
CONTOUR INTERVAL: 1 FOOT
- ALL SLOPES ARE 2:1 OR FLATTER UNLESS OTHERWISE NOTED.
- LOT DIMENSION SHOWN HEREIN ARE APPROXIMATE.
- FEMA 100 YEAR FLOOD ZONE "D" (FLOOD HAZARDS ARE UNDETERMINED, BUT POSSIBLE)
- THIS MAP IS COMPILED FROM RECORD INFORMATION ONLY AND IS NOT TO BE USED AS A BOUNDARY SURVEY.
- THE LOCATIONS OF ALL EXISTING UTILITIES SHOWN ON THIS MAP ARE APPROXIMATE. (NO RECORDS AVAILABLE)
- ADD 3100 FEET TO ALL ELEVATIONS SHOWN HEREIN TO OBTAIN TRUE DATUM.

### LAND USE/ZONING INFORMATION:

ADJACENT LAND USE:  
NORTH.....VACANT  
SOUTH.....VACANT  
EAST.....SINGLE FAMILY RESIDENTIAL  
WEST.....VACANT

ADJACENT EXISTING ZONING:  
NORTH.....RS-5 (MAX. 5 DU/AC.)  
SOUTH.....C (COMMERCIAL)  
EAST.....R1 (MAX. 4 DU/AC.)  
WEST.....RS-5 (MAX. 5 DU/AC.)

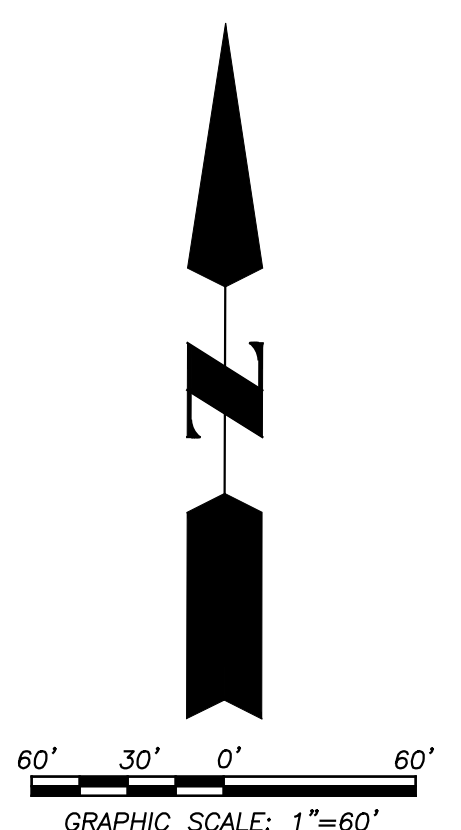
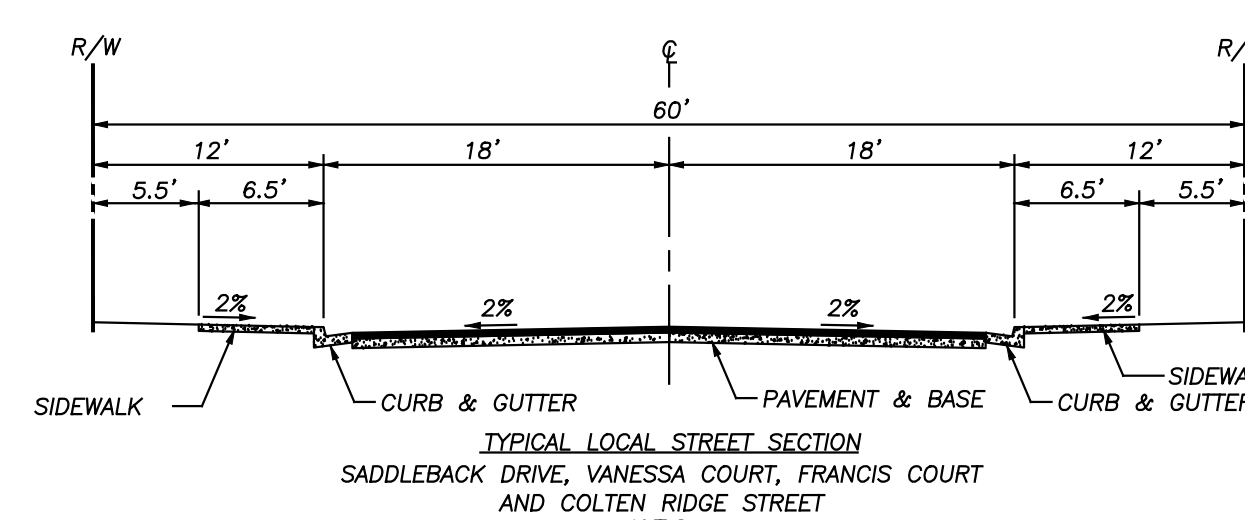
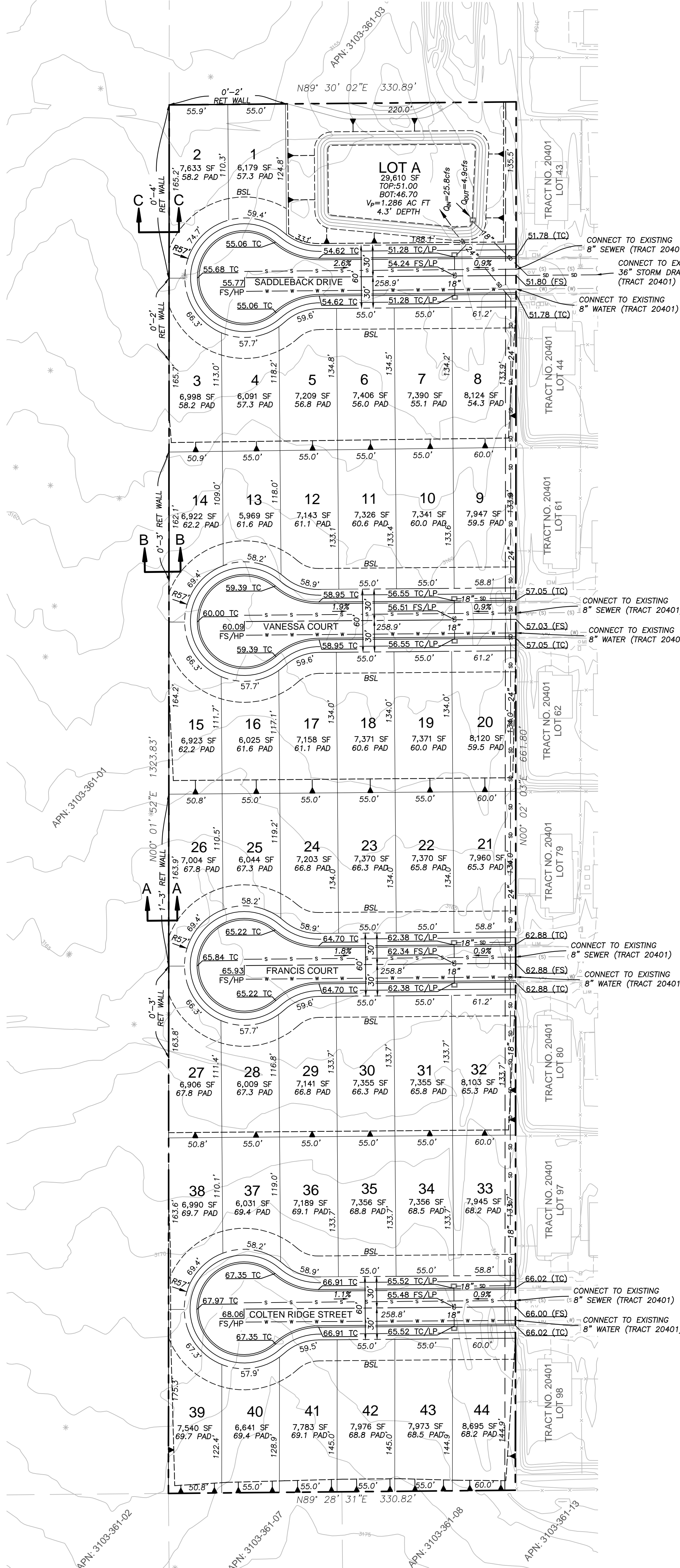
EXISTING ZONING: SINGLE FAMILY RESIDENTIAL (RS-5)  
PROPOSED ZONING: SINGLE FAMILY RESIDENTIAL (RS-5)

### PROPERTY OWNER:

CORE GROUP CONSULTANTS, LTD  
C/O SEAN CARROLL  
17594 W. AGAVE COURT  
GOODYEAR, AZ 85338

### LEGEND

- BSL BUILDING SETBACK LINE
- FG FINISH GRADE
- FL FLOW LINE
- FS FINISH SURFACE
- LP LOW POINT
- HP HIGH POINT
- GB GRADE BREAK
- TC TOP OF CURB
- (XXX.XX) EXISTING ELEVATION
- 40 LOT NUMBER
- 41.1 PAD PAD ELEVATION
- 2:1 SLOPE (UNLESS NOTED)
- TRACT BOUNDARY
- (S) EXISTING SEWER
- (W) EXISTING WATER
- s PROPOSED SEWER
- w PROPOSED WATER
- sd PROPOSED STORM DRAIN



REVISIONS		
NO.	DESCRIPTION	DATE



CHRISTOPHER F. LENZ DATE  
R.C.E. No. 63001

10601 Church Street  
Suite 124  
Rancho Cucamonga,  
CA 91730  
Phone: 909.466.9240  
www.unitedeng.com

**SENECA & HAMPTON**  
**TENTATIVE TRACT MAP**  
**TRACT 20723**

OCTOBER 2024
SHEET 1 OF 1
PROJECT NUMBER CA-30243

**APPENDIX B:  
PROJECT RATIONAL  
HYDROLOGY STUDY INFORMATION**

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005  
Version 7.1

Rational Hydrology Study Date: 09/05/24

-----  
Seneca & Hampton  
Existing Condition  
100 YR flow  
Area A  
-----

-----  
Program License Serial Number 6232  
-----

-----  
\*\*\*\*\* Hydrology Study Control Information \*\*\*\*\*  
-----

-----  
Rational hydrology study storm event year is 100.0  
Computed rainfall intensity:  
Storm year = 100.00 1 hour rainfall = 1.080 (In.)  
Slope used for rainfall intensity curve b = 0.7000  
Soil antecedent moisture condition (AMC) = 3

++++  
++++  
Process from Point/Station 101.000 to Point/Station  
102.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
UNDEVELOPED (average cover) subarea  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 79.00  
Adjusted SCS curve number for AMC 3 = 93.40  
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.129  
(In/Hr)  
Initial subarea data:  
Initial area flow distance = 553.000(Ft.)  
Top (of initial area) elevation = 74.800(Ft.)  
Bottom (of initial area) elevation = 65.300(Ft.)  
Difference in elevation = 9.500(Ft.)  
Slope = 0.01718 s(%)= 1.72  
TC = k(0.706)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 19.902 min.  
Rainfall intensity = 2.338(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area (Q=KCIA) is C = 0.850  
Subarea runoff = 4.574(CFS)

Total initial stream area = 2.300(Ac.)  
Pervious area fraction = 1.000  
Initial area Fm value = 0.129(In/Hr)

++++  
++++

Process from Point/Station 102.000 to Point/Station  
103.000  
\*\*\*\* IRREGULAR CHANNEL FLOW TRAVEL TIME \*\*\*\*

---

Estimated mean flow rate at midpoint of channel = 0.000(CFS)  
Depth of flow = 0.290(Ft.), Average velocity = 1.992(Ft/s)  
\*\*\*\*\* Irregular Channel Data \*\*\*\*\*

-----  
Information entered for subchannel number 1 :  
Point number 'X' coordinate 'Y' coordinate  
1 0.00 1.00  
2 50.00 0.00  
3 100.00 1.00  
Manning's 'N' friction factor = 0.025  
-----

Sub-Channel flow = 8.374(CFS)  
' ' flow top width = 28.994(Ft.)  
' ' velocity = 1.992(Ft/s)  
' ' area = 4.203(Sq.Ft)  
' ' Froude number = 0.922

Upstream point elevation = 65.300(Ft.)  
Downstream point elevation = 53.200(Ft.)  
Flow length = 820.000(Ft.)  
Travel time = 6.86 min.  
Time of concentration = 26.76 min.  
Depth of flow = 0.290(Ft.)  
Average velocity = 1.992(Ft/s)  
Total irregular channel flow = 8.374(CFS)  
Irregular channel normal depth above invert elev. = 0.290(Ft.)  
Average velocity of channel(s) = 1.992(Ft/s)

Adding area flow to channel  
UNDEVELOPED (average cover) subarea  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 79.00  
Adjusted SCS curve number for AMC 3 = 93.40  
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm) = 0.129

(In/Hr)  
Rainfall intensity = 1.901(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area, (total area with  
modified  
rational method)(Q=KCIA) is C = 0.839  
Subarea runoff = 7.546(CFS) for 5.300(Ac.)  
Total runoff = 12.120(CFS)  
Effective area this stream = 7.60(Ac.)  
Total Study Area (Main Stream No. 1) = 7.60(Ac.)  
Area averaged Fm value = 0.129(In/Hr)  
Depth of flow = 0.333(Ft.), Average velocity = 2.185(Ft/s)  
End of computations, Total Study Area = 7.60(Ac.)

The following figures may  
be used for a unit hydrograph study of the same area.  
Note: These figures do not consider reduced effective area  
effects caused by confluences in the rational equation.

Area averaged pervious area fraction( $A_p$ ) = 1.000  
Area averaged SCS curve number = 79.0



San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005  
Version 7.1

Rational Hydrology Study Date: 09/05/24

-----  
Seneca & Hampton  
Existing Condition  
100 year  
Area B  
-----

-----  
Program License Serial Number 6232  
-----

-----  
\*\*\*\*\* Hydrology Study Control Information \*\*\*\*\*  
-----

-----  
Rational hydrology study storm event year is 100.0  
Computed rainfall intensity:  
Storm year = 100.00 1 hour rainfall = 1.080 (In.)  
Slope used for rainfall intensity curve b = 0.7000  
Soil antecedent moisture condition (AMC) = 3

++++  
++++  
Process from Point/Station 201.000 to Point/Station  
202.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*  
-----

-----  
UNDEVELOPED (average cover) subarea  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 79.00  
Adjusted SCS curve number for AMC 3 = 93.40  
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.129  
(In/Hr)  
Initial subarea data:  
Initial area flow distance = 466.000(Ft.)  
Top (of initial area) elevation = 62.000(Ft.)  
Bottom (of initial area) elevation = 53.500(Ft.)  
Difference in elevation = 8.500(Ft.)  
Slope = 0.01824 s(%)= 1.82  
TC = k(0.706)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 18.363 min.  
Rainfall intensity = 2.474(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area (Q=KCIA) is C = 0.853  
Subarea runoff = 2.955(CFS)

Total initial stream area = 1.400 (Ac.)  
Pervious area fraction = 1.000  
Initial area Fm value = 0.129 (In/Hr)  
End of computations, Total Study Area = 1.40 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction ( $A_p$ ) = 1.000

Area averaged SCS curve number = 79.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005  
Version 7.1

Rational Hydrology Study Date: 09/05/24

-----  
Seneca & Hampton  
Proposed Condition  
100 year  
Single Northeast Basin Inlet Flow  
-----

-----  
Program License Serial Number 6232  
-----

-----  
\*\*\*\*\* Hydrology Study Control Information \*\*\*\*\*  
-----

-----  
Rational hydrology study storm event year is 100.0  
Computed rainfall intensity:  
Storm year = 100.00 1 hour rainfall = 1.080 (In.)  
Slope used for rainfall intensity curve b = 0.7000  
Soil antecedent moisture condition (AMC) = 3

++++  
++++  
Process from Point/Station 101.000 to Point/Station  
102.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*  
-----

-----  
RESIDENTIAL(5 - 7 dwl/acre)  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 69.00  
Adjusted SCS curve number for AMC 3 = 86.20  
Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.131  
(In/Hr)  
Initial subarea data:  
Initial area flow distance = 471.000(Ft.)  
Top (of initial area) elevation = 69.700(Ft.)  
Bottom (of initial area) elevation = 66.500(Ft.)  
Difference in elevation = 3.200(Ft.)  
Slope = 0.00679 s(%)= 0.68  
TC = k(0.389)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 12.380 min.  
Rainfall intensity = 3.260(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area (Q=KCIA) is C = 0.864  
Subarea runoff = 7.322(CFS)

Total initial stream area = 2.600 (Ac.)  
Pervious area fraction = 0.500  
Initial area Fm value = 0.131 (In/Hr)

++++  
++++

Process from Point/Station 102.000 to Point/Station  
103.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 66.500 (Ft.)  
Downstream point/station elevation = 61.900 (Ft.)  
Pipe length = 325.00 (Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 7.322 (CFS)  
Nearest computed pipe diameter = 15.00 (In.)  
Calculated individual pipe flow = 7.322 (CFS)  
Normal flow depth in pipe = 11.70 (In.)  
Flow top width inside pipe = 12.43 (In.)  
Critical Depth = 12.95 (In.)  
Pipe flow velocity = 7.13 (Ft/s)  
Travel time through pipe = 0.76 min.  
Time of concentration (TC) = 13.14 min.

++++  
++++

Process from Point/Station 107.000 to Point/Station  
103.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

RESIDENTIAL(5 - 7 dwl/acre)  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 69.00  
Adjusted SCS curve number for AMC 3 = 86.20  
Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.131

(In/Hr)  
Time of concentration = 13.14 min.  
Rainfall intensity = 3.127 (In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area, (total area with  
modified  
rational method) (Q=KCIA) is C = 0.862  
Subarea runoff = 6.699 (CFS) for 2.600 (Ac.)  
Total runoff = 14.022 (CFS)  
Effective area this stream = 5.20 (Ac.)  
Total Study Area (Main Stream No. 1) = 5.20 (Ac.)  
Area averaged Fm value = 0.131 (In/Hr)

++++  
++++

Process from Point/Station 103.000 to Point/Station  
104.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 61.900 (Ft.)  
Downstream point/station elevation = 57.300 (Ft.)  
Pipe length = 325.00 (Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 14.022 (CFS)  
Nearest computed pipe diameter = 21.00 (In.)  
Calculated individual pipe flow = 14.022 (CFS)  
Normal flow depth in pipe = 13.50 (In.)  
Flow top width inside pipe = 20.12 (In.)  
Critical Depth = 16.69 (In.)  
Pipe flow velocity = 8.59 (Ft/s)  
Travel time through pipe = 0.63 min.  
Time of concentration (TC) = 13.77 min.

++++  
++++  
Process from Point/Station 108.000 to Point/Station  
104.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

RESIDENTIAL (5 - 7 dwl/acre)  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil (AMC 2) = 69.00  
Adjusted SCS curve number for AMC 3 = 86.20  
Pervious ratio (Ap) = 0.5000 Max loss rate (Fm) = 0.131  
(In/Hr)  
Time of concentration = 13.77 min.  
Rainfall intensity = 3.026 (In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area, (total area with  
modified  
rational method) (Q=KCIA) is C = 0.861  
Subarea runoff = 6.042 (CFS) for 2.500 (Ac.)  
Total runoff = 20.063 (CFS)  
Effective area this stream = 7.70 (Ac.)  
Total Study Area (Main Stream No. 1) = 7.70 (Ac.)  
Area averaged Fm value = 0.131 (In/Hr)

++++  
++++  
Process from Point/Station 104.000 to Point/Station  
105.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 57.300 (Ft.)  
Downstream point/station elevation = 52.700 (Ft.)  
Pipe length = 325.00 (Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 20.063 (CFS)  
Nearest computed pipe diameter = 24.00 (In.)  
Calculated individual pipe flow = 20.063 (CFS)  
Normal flow depth in pipe = 15.45 (In.)  
Flow top width inside pipe = 22.99 (In.)  
Critical Depth = 19.29 (In.)  
Pipe flow velocity = 9.39 (Ft/s)

Travel time through pipe = 0.58 min.  
Time of concentration (TC) = 14.35 min.

++++  
Process from Point/Station 109.000 to Point/Station  
105.000

\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

RESIDENTIAL(5 - 7 dwl/acre)  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 69.00  
Adjusted SCS curve number for AMC 3 = 86.20  
Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.131  
(In/Hr)  
Time of concentration = 14.35 min.  
Rainfall intensity = 2.940(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area, (total area with  
modified  
rational method)(Q=KCIA) is C = 0.860  
Subarea runoff = 5.728(CFS) for 2.500(Ac.)  
Total runoff = 25.791(CFS)  
Effective area this stream = 10.20(Ac.)  
Total Study Area (Main Stream No. 1) = 10.20(Ac.)  
Area averaged Fm value = 0.131(In/Hr)

++++  
Process from Point/Station 105.000 to Point/Station  
106.000

\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 52.700(Ft.)  
Downstream point/station elevation = 52.000(Ft.)  
Pipe length = 51.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 25.791(CFS)  
Nearest computed pipe diameter = 24.00(In.)  
Calculated individual pipe flow = 25.791(CFS)  
Normal flow depth in pipe = 19.13(In.)  
Flow top width inside pipe = 19.31(In.)  
Critical Depth = 21.38(In.)  
Pipe flow velocity = 9.61(Ft/s)  
Travel time through pipe = 0.09 min.  
Time of concentration (TC) = 14.44 min.  
End of computations, Total Study Area = 10.20 (Ac.)  
The following figures may  
be used for a unit hydrograph study of the same area.  
Note: These figures do not consider reduced effective area  
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500  
Area averaged SCS curve number = 69.0

**APPENDIX C:  
PROJECT SCS UNIT HYDROGRAPH  
HYDROLOGY STUDY INFORMATION**

Unit Hydrograph Analysis

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version

7.0

Study date 09/05/24

+++++

-----  
San Bernardino County Synthetic Unit Hydrology Method  
Manual date - August 1986

-----  
Program License Serial Number 6232

---  
Seneca & Hampton  
Proposed Condition  
100 year  
3 hr  
-----

--  
Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
10.20	1	0.64

-----  
--  
Rainfall data for year 2  
10.20 6 0.84  
-----

---  
Rainfall data for year 2  
10.20 24 1.54  
-----

---  
Rainfall data for year 100  
10.20 1 1.08  
-----



```
--
Rainfall data for year 100
      10.20          6          2.34
-----
```

```
--
Rainfall data for year 100
      10.20         24          4.72
-----
```

```
+++++
```

```
***** Area-averaged max loss rate, Fm *****
```

Fm	SCS curve No. (AMCII) (In/Hr)	SCS curve NO. (AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)
0.078	69.0	86.2	10.20	1.000	0.262	0.300

```
Area-averaged adjusted loss rate Fm (In/Hr) = 0.078
```

```
***** Area-Averaged low loss rate fraction, Yb *****
```

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
3.06	0.300	69.0	86.2	1.60	0.683
7.14	0.700	98.0	98.0	0.20	0.950

```
Area-averaged catchment yield fraction, Y = 0.870
```

```
Area-averaged low loss fraction, Yb = 0.130
```

```
User entry of time of concentration = 0.260 (hours)
```

```
+++++
```

```
++
```

```
Watershed area = 10.20 (Ac.)
Catchment Lag time = 0.208 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 40.0641
Hydrograph baseflow = 0.00 (CFS)
Average maximum watershed loss rate (Fm) = 0.078 (In/Hr)
Average low loss rate fraction (Yb) = 0.130 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall = 0.512 (In)
Computed peak 30-minute rainfall = 0.877 (In)
Specified peak 1-hour rainfall = 1.080 (In)
Computed peak 3-hour rainfall = 1.735 (In)
Specified peak 6-hour rainfall = 2.340 (In)
Specified peak 24-hour rainfall = 4.720 (In)
```

```
Rainfall depth area reduction factors:
```

```
Using a total area of 10.20 (Ac.) (Ref: fig. E-4)
```

5-minute factor = 1.000	Adjusted rainfall = 0.512 (In)
30-minute factor = 1.000	Adjusted rainfall = 0.877 (In)
1-hour factor = 1.000	Adjusted rainfall = 1.079 (In)
3-hour factor = 1.000	Adjusted rainfall = 1.735 (In)
6-hour factor = 1.000	Adjusted rainfall = 2.340 (In)

24-hour factor = 1.000      Adjusted rainfall = 4.720(In)

---

U n i t   H y d r o g r a p h

+++++

+++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
--------------------	--------------------------	----------------------------

---

(K =            123.36 (CFS))

1	2.755	3.399
2	18.770	19.756
3	49.245	37.593
4	65.688	20.283
5	74.847	11.298
6	80.916	7.486
7	85.280	5.384
8	88.633	4.136
9	91.058	2.991
10	93.036	2.440
11	94.603	1.932
12	95.871	1.564
13	96.878	1.242
14	97.624	0.921
15	98.109	0.599
16	98.552	0.546
17	99.033	0.593
18	99.481	0.553
19	99.757	0.341
20	100.000	0.299

---

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
---------------------	--------------------------------	-----------------------

1	0.5122	0.5122
2	0.6306	0.1184
3	0.7122	0.0816
4	0.7764	0.0642
5	0.8301	0.0538
6	0.8768	0.0467
7	0.9183	0.0415
8	0.9558	0.0375
9	0.9902	0.0344
10	1.0220	0.0318
11	1.0517	0.0296
12	1.0795	0.0278
13	1.1175	0.0380
14	1.1538	0.0363
15	1.1887	0.0349
16	1.2223	0.0336
17	1.2547	0.0324
18	1.2861	0.0314
19	1.3165	0.0304
20	1.3460	0.0295
21	1.3746	0.0287
22	1.4025	0.0279
23	1.4297	0.0272

24	1.4562	0.0265
25	1.4821	0.0259
26	1.5075	0.0253
27	1.5322	0.0248
28	1.5565	0.0243
29	1.5803	0.0238
30	1.6036	0.0233
31	1.6264	0.0229
32	1.6489	0.0225
33	1.6710	0.0221
34	1.6926	0.0217
35	1.7140	0.0213
36	1.7350	0.0210

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0210	0.0027	0.0183
2	0.0213	0.0028	0.0186
3	0.0221	0.0029	0.0192
4	0.0225	0.0029	0.0195
5	0.0233	0.0030	0.0203
6	0.0238	0.0031	0.0207
7	0.0248	0.0032	0.0216
8	0.0253	0.0033	0.0220
9	0.0265	0.0034	0.0231
10	0.0272	0.0035	0.0237
11	0.0287	0.0037	0.0249
12	0.0295	0.0038	0.0257
13	0.0314	0.0041	0.0273
14	0.0324	0.0042	0.0282
15	0.0349	0.0045	0.0304
16	0.0363	0.0047	0.0316
17	0.0278	0.0036	0.0242
18	0.0296	0.0039	0.0258
19	0.0344	0.0045	0.0299
20	0.0375	0.0049	0.0327
21	0.0467	0.0061	0.0406
22	0.0538	0.0065	0.0472
23	0.0816	0.0065	0.0750
24	0.1184	0.0065	0.1119
25	0.5122	0.0065	0.5057
26	0.0642	0.0065	0.0577
27	0.0415	0.0054	0.0361
28	0.0318	0.0041	0.0277
29	0.0380	0.0049	0.0330
30	0.0336	0.0044	0.0292
31	0.0304	0.0040	0.0264
32	0.0279	0.0036	0.0243
33	0.0259	0.0034	0.0225
34	0.0243	0.0032	0.0211
35	0.0229	0.0030	0.0199
36	0.0217	0.0028	0.0189

Total soil rain loss = 0.15(In)  
 Total effective rainfall = 1.58(In)  
 Peak flow rate in flood hydrograph = 24.48(CFS)

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3 - H O U R S T O R M  
 R u n o f f H y d r o g r a p h

-----  
 --  
 Hydrograph in 5 Minute intervals ((CFS))  
 -----

Time(h+m) Volume Ac.Ft Q(CFS) 0 7.5 15.0 22.5  
 30.0

Time(h+m)	Volume	Ac.Ft	Q(CFS)	0	7.5	15.0	22.5
0+ 5	0.0004		0.06	Q			
0+10	0.0033		0.42	Q			
0+15	0.0110		1.12	VQ			
0+20	0.0215		1.51	V Q			
0+25	0.0336		1.76	V Q			
0+30	0.0469		1.94	VQ			
0+35	0.0614		2.09	VQ			
0+40	0.0767		2.23	Q			
0+45	0.0929		2.35	VQ			
0+50	0.1100		2.47	Q			
0+55	0.1278		2.59	Q			
1+ 0	0.1465		2.71	QV			
1+ 5	0.1661		2.84	QV			
1+10	0.1865		2.97	Q V			
1+15	0.2080		3.12	Q V			
1+20	0.2305		3.27	Q V			
1+25	0.2541		3.43	Q V			
1+30	0.2777		3.43	Q V			
1+35	0.3003		3.28	Q V			
1+40	0.3233		3.34	Q V			
1+45	0.3478		3.56	Q V			

	1+50	0.3747	3.92		Q	V		
	1+55	0.4060	4.54		Q	V		
	2+ 0	0.4451	5.68		Q	V		
	2+ 5	0.5074	9.05			Q V		
	2+10	0.6275	17.42				V   Q	
	2+15	0.7961	24.48				V	Q
	2+20	0.9054	15.88				Q	V
	2+25	0.9796	10.77			Q		V
	2+30	1.0372	8.36			Q		V
	2+35	1.0862	7.11			Q		V
	2+40	1.1287	6.18			Q		V
	2+45	1.1654	5.32			Q		V
	2+50	1.1982	4.76			Q		V
	2+55	1.2276	4.26			Q		V
	3+ 0	1.2541	3.86			Q		V
	3+ 5	1.2778	3.44			Q		V
	3+10	1.2967	2.75			Q		V
	3+15	1.3091	1.80			Q		V
	3+20	1.3183	1.33	Q				
V	3+25	1.3257	1.08	Q				
V	3+30	1.3317	0.87	Q				
V	3+35	1.3360	0.62	Q				
V	3+40	1.3393	0.48	Q				
V	3+45	1.3411	0.26	Q				
V	3+50	1.3425	0.20	Q				
V	3+55	1.3435	0.15	Q				
V	4+ 0	1.3443	0.12	Q				
V	4+ 5	1.3449	0.09	Q				
V	4+10	1.3454	0.06	Q				
V	4+15	1.3457	0.05	Q				

V	4+20	1.3459	0.04	Q			
V	4+25	1.3461	0.02	Q			
V	4+30	1.3462	0.01	Q			
V	4+35	1.3462	0.01	Q			
V							

---



```
--
Rainfall data for year 100
      10.20          6          2.34
-----
```

```
--
Rainfall data for year 100
      10.20         24          4.72
-----
```

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```

\*\*\*\*\* Area-averaged max loss rate, Fm \*\*\*\*\*

Fm	SCS curve No. (AMCII) (In/Hr)	SCS curve NO. (AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)
0.078	69.0	86.2	10.20	1.000	0.262	0.300

Area-averaged adjusted loss rate Fm (In/Hr) = 0.078

\*\*\*\*\* Area-Averaged low loss rate fraction, Yb \*\*\*\*\*

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
3.06	0.300	69.0	86.2	1.60	0.683
7.14	0.700	98.0	98.0	0.20	0.950

Area-averaged catchment yield fraction, Y = 0.870

Area-averaged low loss fraction, Yb = 0.130

User entry of time of concentration = 0.260 (hours)

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```

Watershed area =      10.20 (Ac.)
Catchment Lag time =   0.208 hours
Unit interval =      5.000 minutes
Unit interval percentage of lag time = 40.0641
Hydrograph baseflow =   0.00 (CFS)
Average maximum watershed loss rate(Fm) = 0.078 (In/Hr)
Average low loss rate fraction (Yb) = 0.130 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall = 0.512 (In)
Computed peak 30-minute rainfall = 0.877 (In)
Specified peak 1-hour rainfall = 1.080 (In)
Computed peak 3-hour rainfall = 1.735 (In)
Specified peak 6-hour rainfall = 2.340 (In)
Specified peak 24-hour rainfall = 4.720 (In)

```

Rainfall depth area reduction factors:

Using a total area of 10.20 (Ac.) (Ref: fig. E-4)

5-minute factor = 1.000	Adjusted rainfall = 0.512 (In)
30-minute factor = 1.000	Adjusted rainfall = 0.877 (In)
1-hour factor = 1.000	Adjusted rainfall = 1.079 (In)
3-hour factor = 1.000	Adjusted rainfall = 1.735 (In)
6-hour factor = 1.000	Adjusted rainfall = 2.340 (In)



24-hour factor = 1.000      Adjusted rainfall = 4.720(In)

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U n i t   H y d r o g r a p h

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Interval Number	'S' Graph Mean values	Unit Hydrograph (CFS)
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(K =            123.36 (CFS))

1	2.755	3.399
2	18.770	19.756
3	49.245	37.593
4	65.688	20.283
5	74.847	11.298
6	80.916	7.486
7	85.280	5.384
8	88.633	4.136
9	91.058	2.991
10	93.036	2.440
11	94.603	1.932
12	95.871	1.564
13	96.878	1.242
14	97.624	0.921
15	98.109	0.599
16	98.552	0.546
17	99.033	0.593
18	99.481	0.553
19	99.757	0.341
20	100.000	0.299

---

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5122	0.5122
2	0.6306	0.1184
3	0.7122	0.0816
4	0.7764	0.0642
5	0.8301	0.0538
6	0.8768	0.0467
7	0.9183	0.0415
8	0.9558	0.0375
9	0.9902	0.0344
10	1.0220	0.0318
11	1.0517	0.0296
12	1.0795	0.0278
13	1.1175	0.0380
14	1.1538	0.0363
15	1.1887	0.0349
16	1.2223	0.0336
17	1.2547	0.0324
18	1.2861	0.0314
19	1.3165	0.0304
20	1.3460	0.0295
21	1.3746	0.0287
22	1.4025	0.0279
23	1.4297	0.0272

24	1.4562	0.0265
25	1.4821	0.0259
26	1.5075	0.0253
27	1.5322	0.0248
28	1.5565	0.0243
29	1.5803	0.0238
30	1.6036	0.0233
31	1.6264	0.0229
32	1.6489	0.0225
33	1.6710	0.0221
34	1.6926	0.0217
35	1.7140	0.0213
36	1.7350	0.0210
37	1.7556	0.0206
38	1.7759	0.0203
39	1.7959	0.0200
40	1.8157	0.0197
41	1.8351	0.0195
42	1.8543	0.0192
43	1.8732	0.0189
44	1.8919	0.0187
45	1.9103	0.0184
46	1.9285	0.0182
47	1.9465	0.0180
48	1.9643	0.0178
49	1.9819	0.0176
50	1.9992	0.0174
51	2.0164	0.0172
52	2.0333	0.0170
53	2.0501	0.0168
54	2.0667	0.0166
55	2.0832	0.0164
56	2.0994	0.0163
57	2.1155	0.0161
58	2.1315	0.0159
59	2.1472	0.0158
60	2.1629	0.0156
61	2.1784	0.0155
62	2.1937	0.0153
63	2.2089	0.0152
64	2.2240	0.0151
65	2.2389	0.0149
66	2.2537	0.0148
67	2.2684	0.0147
68	2.2829	0.0145
69	2.2973	0.0144
70	2.3116	0.0143
71	2.3258	0.0142
72	2.3399	0.0141

---

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
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1	0.0141	0.0018	0.0123
2	0.0142	0.0018	0.0123
3	0.0144	0.0019	0.0126
4	0.0145	0.0019	0.0127

5	0.0148	0.0019	0.0129
6	0.0149	0.0019	0.0130
7	0.0152	0.0020	0.0132
8	0.0153	0.0020	0.0133
9	0.0156	0.0020	0.0136
10	0.0158	0.0021	0.0137
11	0.0161	0.0021	0.0140
12	0.0163	0.0021	0.0141
13	0.0166	0.0022	0.0144
14	0.0168	0.0022	0.0146
15	0.0172	0.0022	0.0149
16	0.0174	0.0023	0.0151
17	0.0178	0.0023	0.0155
18	0.0180	0.0023	0.0156
19	0.0184	0.0024	0.0160
20	0.0187	0.0024	0.0162
21	0.0192	0.0025	0.0167
22	0.0195	0.0025	0.0169
23	0.0200	0.0026	0.0174
24	0.0203	0.0026	0.0177
25	0.0210	0.0027	0.0183
26	0.0213	0.0028	0.0186
27	0.0221	0.0029	0.0192
28	0.0225	0.0029	0.0195
29	0.0233	0.0030	0.0203
30	0.0238	0.0031	0.0207
31	0.0248	0.0032	0.0216
32	0.0253	0.0033	0.0220
33	0.0265	0.0034	0.0231
34	0.0272	0.0035	0.0237
35	0.0287	0.0037	0.0249
36	0.0295	0.0038	0.0257
37	0.0314	0.0041	0.0273
38	0.0324	0.0042	0.0282
39	0.0349	0.0045	0.0304
40	0.0363	0.0047	0.0316
41	0.0278	0.0036	0.0242
42	0.0296	0.0039	0.0258
43	0.0344	0.0045	0.0299
44	0.0375	0.0049	0.0327
45	0.0467	0.0061	0.0406
46	0.0538	0.0065	0.0472
47	0.0816	0.0065	0.0750
48	0.1184	0.0065	0.1119
49	0.5122	0.0065	0.5057
50	0.0642	0.0065	0.0577
51	0.0415	0.0054	0.0361
52	0.0318	0.0041	0.0277
53	0.0380	0.0049	0.0330
54	0.0336	0.0044	0.0292
55	0.0304	0.0040	0.0264
56	0.0279	0.0036	0.0243
57	0.0259	0.0034	0.0225
58	0.0243	0.0032	0.0211
59	0.0229	0.0030	0.0199
60	0.0217	0.0028	0.0189
61	0.0206	0.0027	0.0180
62	0.0197	0.0026	0.0172
63	0.0189	0.0025	0.0165
64	0.0182	0.0024	0.0158

65	0.0176	0.0023	0.0153
66	0.0170	0.0022	0.0148
67	0.0164	0.0021	0.0143
68	0.0159	0.0021	0.0139
69	0.0155	0.0020	0.0135
70	0.0151	0.0020	0.0131
71	0.0147	0.0019	0.0128
72	0.0143	0.0019	0.0124

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 --  
 Total soil rain loss = 0.23(In)  
 Total effective rainfall = 2.11(In)  
 Peak flow rate in flood hydrograph = 24.48(CFS)  
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 6 - H O U R S T O R M  
 R u n o f f H y d r o g r a p h  
 -----

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 --  
 Hydrograph in 5 Minute intervals ((CFS))  
 -----

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	7.5	15.0	22.5
30.0						
0+ 5	0.0003	0.04	Q			
0+10	0.0022	0.28	Q			
0+15	0.0074	0.75	Q			
0+20	0.0143	1.00	VQ			
0+25	0.0223	1.15	VQ			
0+30	0.0309	1.26	VQ			
0+35	0.0402	1.34	VQ			
0+40	0.0499	1.41	Q			
0+45	0.0600	1.47	Q			
0+50	0.0704	1.52	VQ			
0+55	0.0812	1.56	VQ			
1+ 0	0.0922	1.60	Q			
1+ 5	0.1035	1.64	Q			
1+10	0.1150	1.68	Q			
1+15	0.1268	1.71	Q			

1+20	0.1388	1.74	QV			
1+25	0.1510	1.78	QV			
1+30	0.1635	1.81	QV			
1+35	0.1763	1.85	QV			
1+40	0.1892	1.88	Q V			
1+45	0.2025	1.92	Q V			
1+50	0.2159	1.95	Q V			
1+55	0.2297	1.99	Q V			
2+ 0	0.2437	2.03	Q V			
2+ 5	0.2580	2.08	Q V			
2+10	0.2726	2.12	Q V			
2+15	0.2875	2.17	Q V			
2+20	0.3028	2.22	Q V			
2+25	0.3185	2.28	Q V			
2+30	0.3345	2.33	Q V			
2+35	0.3510	2.40	Q V			
2+40	0.3680	2.46	Q V			
2+45	0.3855	2.54	Q V			
2+50	0.4035	2.62	Q V			
2+55	0.4221	2.70	Q V			
3+ 0	0.4414	2.80	Q V			
3+ 5	0.4614	2.91	Q V			
3+10	0.4822	3.02	Q V			
3+15	0.5039	3.16	Q V			
3+20	0.5267	3.30	Q V			
3+25	0.5504	3.45	Q V			
3+30	0.5741	3.44	Q V			
3+35	0.5967	3.28	Q V			
3+40	0.6197	3.34	Q V			
3+45	0.6442	3.56	Q V			

	3+50	0.6712	3.92		Q		V		
	3+55	0.7024	4.54		Q		V		
	4+ 0	0.7415	5.68		Q		V		
	4+ 5	0.8039	9.05				Q	V	
	4+10	0.9239	17.42					V	Q
	4+15	1.0925	24.48					V	
	4+20	1.2018	15.88					Q	V
	4+25	1.2760	10.77				Q		V
	4+30	1.3336	8.36					Q	V
	4+35	1.3826	7.11				Q		V
	4+40	1.4251	6.18				Q		V
	4+45	1.4618	5.32				Q		V
	4+50	1.4946	4.76				Q		V
	4+55	1.5240	4.26				Q		V
	5+ 0	1.5505	3.86				Q		V
	5+ 5	1.5746	3.50				Q		V
	5+10	1.5964	3.17				Q		V
	5+15	1.6162	2.87				Q		V
	5+20	1.6349	2.72				Q		V
	5+25	1.6529	2.62				Q		V
	5+30	1.6700	2.48				Q		V
	5+35	1.6856	2.27				Q		V
	5+40	1.7004	2.14				Q		V
	5+45	1.7136	1.93				Q		V
	5+50	1.7264	1.85				Q		V
	5+55	1.7387	1.79				Q		V
V	6+ 0	1.7506	1.73				Q		
V	6+ 5	1.7619	1.64				Q		
V	6+10	1.7712	1.35				Q		
V	6+15	1.7770	0.85				Q		

V	6+20	1.7811	0.58	Q			
V	6+25	1.7840	0.43	Q			
V	6+30	1.7862	0.32	Q			
V	6+35	1.7880	0.25	Q			
V	6+40	1.7893	0.19	Q			
V	6+45	1.7903	0.15	Q			
V	6+50	1.7911	0.12	Q			
V	6+55	1.7917	0.09	Q			
V	7+ 0	1.7922	0.07	Q			
V	7+ 5	1.7926	0.05	Q			
V	7+10	1.7928	0.04	Q			
V	7+15	1.7930	0.03	Q			
V	7+20	1.7932	0.02	Q			
V	7+25	1.7933	0.02	Q			
V	7+30	1.7934	0.01	Q			
V	7+35	1.7934	0.00	Q			
V							

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Unit Hydrograph Analysis

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version

7.0

Study date 09/05/24

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San Bernardino County Synthetic Unit Hydrology Method  
Manual date - August 1986

Program License Serial Number 6232

Seneca & Hampton  
Proposed Condition  
100 year  
24 hr

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
10.20	1	0.64

Rainfall data for year 2		
10.20	6	0.84

Rainfall data for year 2		
10.20	24	1.54

Rainfall data for year 100		
10.20	1	1.08



```
--
Rainfall data for year 100
      10.20          6          2.34
-----
```

```
--
Rainfall data for year 100
      10.20         24          4.72
-----
```

```
+++++
```

```
***** Area-averaged max loss rate, Fm *****
```

Fm	SCS curve No. (AMCII) (In/Hr)	SCS curve NO. (AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)
0.078	69.0	86.2	10.20	1.000	0.262	0.300

```
Area-averaged adjusted loss rate Fm (In/Hr) = 0.078
```

```
***** Area-Averaged low loss rate fraction, Yb *****
```

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
3.06	0.300	69.0	86.2	1.60	0.683
7.14	0.700	98.0	98.0	0.20	0.950

```
Area-averaged catchment yield fraction, Y = 0.870
```

```
Area-averaged low loss fraction, Yb = 0.130
```

```
User entry of time of concentration = 0.260 (hours)
```

```
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```

```
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```

```
Watershed area = 10.20 (Ac.)
Catchment Lag time = 0.208 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 40.0641
Hydrograph baseflow = 0.00 (CFS)
Average maximum watershed loss rate (Fm) = 0.078 (In/Hr)
Average low loss rate fraction (Yb) = 0.130 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall = 0.512 (In)
Computed peak 30-minute rainfall = 0.877 (In)
Specified peak 1-hour rainfall = 1.080 (In)
Computed peak 3-hour rainfall = 1.735 (In)
Specified peak 6-hour rainfall = 2.340 (In)
Specified peak 24-hour rainfall = 4.720 (In)
```

```
Rainfall depth area reduction factors:
```

```
Using a total area of 10.20 (Ac.) (Ref: fig. E-4)
```

5-minute factor = 1.000	Adjusted rainfall = 0.512 (In)
30-minute factor = 1.000	Adjusted rainfall = 0.877 (In)
1-hour factor = 1.000	Adjusted rainfall = 1.079 (In)
3-hour factor = 1.000	Adjusted rainfall = 1.735 (In)
6-hour factor = 1.000	Adjusted rainfall = 2.340 (In)

24-hour factor = 1.000      Adjusted rainfall = 4.720(In)

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U n i t   H y d r o g r a p h

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Interval Number	'S' Graph Mean values	Unit Hydrograph (CFS)
--------------------	--------------------------	--------------------------

---

(K =      123.36 (CFS))

1	2.755	3.399
2	18.770	19.756
3	49.245	37.593
4	65.688	20.283
5	74.847	11.298
6	80.916	7.486
7	85.280	5.384
8	88.633	4.136
9	91.058	2.991
10	93.036	2.440
11	94.603	1.932
12	95.871	1.564
13	96.878	1.242
14	97.624	0.921
15	98.109	0.599
16	98.552	0.546
17	99.033	0.593
18	99.481	0.553
19	99.757	0.341
20	100.000	0.299

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Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
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1	0.5122	0.5122
2	0.6306	0.1184
3	0.7122	0.0816
4	0.7764	0.0642
5	0.8301	0.0538
6	0.8768	0.0467
7	0.9183	0.0415
8	0.9558	0.0375
9	0.9902	0.0344
10	1.0220	0.0318
11	1.0517	0.0296
12	1.0795	0.0278
13	1.1175	0.0380
14	1.1538	0.0363
15	1.1887	0.0349
16	1.2223	0.0336
17	1.2547	0.0324
18	1.2861	0.0314
19	1.3165	0.0304
20	1.3460	0.0295
21	1.3746	0.0287
22	1.4025	0.0279
23	1.4297	0.0272

24	1.4562	0.0265
25	1.4821	0.0259
26	1.5075	0.0253
27	1.5322	0.0248
28	1.5565	0.0243
29	1.5803	0.0238
30	1.6036	0.0233
31	1.6264	0.0229
32	1.6489	0.0225
33	1.6710	0.0221
34	1.6926	0.0217
35	1.7140	0.0213
36	1.7350	0.0210
37	1.7556	0.0206
38	1.7759	0.0203
39	1.7959	0.0200
40	1.8157	0.0197
41	1.8351	0.0195
42	1.8543	0.0192
43	1.8732	0.0189
44	1.8919	0.0187
45	1.9103	0.0184
46	1.9285	0.0182
47	1.9465	0.0180
48	1.9643	0.0178
49	1.9819	0.0176
50	1.9992	0.0174
51	2.0164	0.0172
52	2.0333	0.0170
53	2.0501	0.0168
54	2.0667	0.0166
55	2.0832	0.0164
56	2.0994	0.0163
57	2.1155	0.0161
58	2.1315	0.0159
59	2.1472	0.0158
60	2.1629	0.0156
61	2.1784	0.0155
62	2.1937	0.0153
63	2.2089	0.0152
64	2.2240	0.0151
65	2.2389	0.0149
66	2.2537	0.0148
67	2.2684	0.0147
68	2.2829	0.0145
69	2.2973	0.0144
70	2.3116	0.0143
71	2.3258	0.0142
72	2.3399	0.0141
73	2.3563	0.0164
74	2.3726	0.0163
75	2.3888	0.0162
76	2.4048	0.0161
77	2.4208	0.0160
78	2.4367	0.0159
79	2.4524	0.0158
80	2.4681	0.0157
81	2.4837	0.0156
82	2.4991	0.0155
83	2.5145	0.0154

84	2.5298	0.0153
85	2.5450	0.0152
86	2.5601	0.0151
87	2.5751	0.0150
88	2.5901	0.0149
89	2.6049	0.0149
90	2.6197	0.0148
91	2.6344	0.0147
92	2.6490	0.0146
93	2.6636	0.0145
94	2.6780	0.0145
95	2.6924	0.0144
96	2.7067	0.0143
97	2.7209	0.0142
98	2.7351	0.0142
99	2.7492	0.0141
100	2.7632	0.0140
101	2.7772	0.0140
102	2.7910	0.0139
103	2.8049	0.0138
104	2.8186	0.0138
105	2.8323	0.0137
106	2.8459	0.0136
107	2.8595	0.0136
108	2.8730	0.0135
109	2.8864	0.0134
110	2.8998	0.0134
111	2.9131	0.0133
112	2.9263	0.0133
113	2.9395	0.0132
114	2.9527	0.0131
115	2.9658	0.0131
116	2.9788	0.0130
117	2.9918	0.0130
118	3.0047	0.0129
119	3.0175	0.0129
120	3.0303	0.0128
121	3.0431	0.0128
122	3.0558	0.0127
123	3.0685	0.0127
124	3.0811	0.0126
125	3.0936	0.0126
126	3.1061	0.0125
127	3.1186	0.0125
128	3.1310	0.0124
129	3.1433	0.0124
130	3.1556	0.0123
131	3.1679	0.0123
132	3.1801	0.0122
133	3.1923	0.0122
134	3.2044	0.0121
135	3.2165	0.0121
136	3.2285	0.0120
137	3.2405	0.0120
138	3.2525	0.0120
139	3.2644	0.0119
140	3.2762	0.0119
141	3.2881	0.0118
142	3.2999	0.0118
143	3.3116	0.0117

144	3.3233	0.0117
145	3.3350	0.0117
146	3.3466	0.0116
147	3.3582	0.0116
148	3.3697	0.0115
149	3.3812	0.0115
150	3.3927	0.0115
151	3.4041	0.0114
152	3.4155	0.0114
153	3.4269	0.0114
154	3.4382	0.0113
155	3.4495	0.0113
156	3.4607	0.0112
157	3.4719	0.0112
158	3.4831	0.0112
159	3.4942	0.0111
160	3.5053	0.0111
161	3.5164	0.0111
162	3.5274	0.0110
163	3.5384	0.0110
164	3.5494	0.0110
165	3.5604	0.0109
166	3.5713	0.0109
167	3.5821	0.0109
168	3.5930	0.0108
169	3.6038	0.0108
170	3.6146	0.0108
171	3.6253	0.0107
172	3.6360	0.0107
173	3.6467	0.0107
174	3.6574	0.0107
175	3.6680	0.0106
176	3.6786	0.0106
177	3.6891	0.0106
178	3.6997	0.0105
179	3.7102	0.0105
180	3.7207	0.0105
181	3.7311	0.0104
182	3.7415	0.0104
183	3.7519	0.0104
184	3.7623	0.0104
185	3.7726	0.0103
186	3.7829	0.0103
187	3.7932	0.0103
188	3.8035	0.0103
189	3.8137	0.0102
190	3.8239	0.0102
191	3.8341	0.0102
192	3.8442	0.0101
193	3.8543	0.0101
194	3.8644	0.0101
195	3.8745	0.0101
196	3.8845	0.0100
197	3.8946	0.0100
198	3.9046	0.0100
199	3.9145	0.0100
200	3.9245	0.0099
201	3.9344	0.0099
202	3.9443	0.0099
203	3.9542	0.0099

204	3.9640	0.0098
205	3.9738	0.0098
206	3.9836	0.0098
207	3.9934	0.0098
208	4.0032	0.0098
209	4.0129	0.0097
210	4.0226	0.0097
211	4.0323	0.0097
212	4.0419	0.0097
213	4.0516	0.0096
214	4.0612	0.0096
215	4.0708	0.0096
216	4.0804	0.0096
217	4.0899	0.0096
218	4.0994	0.0095
219	4.1089	0.0095
220	4.1184	0.0095
221	4.1279	0.0095
222	4.1373	0.0094
223	4.1468	0.0094
224	4.1562	0.0094
225	4.1655	0.0094
226	4.1749	0.0094
227	4.1842	0.0093
228	4.1936	0.0093
229	4.2029	0.0093
230	4.2121	0.0093
231	4.2214	0.0093
232	4.2306	0.0092
233	4.2399	0.0092
234	4.2491	0.0092
235	4.2582	0.0092
236	4.2674	0.0092
237	4.2766	0.0091
238	4.2857	0.0091
239	4.2948	0.0091
240	4.3039	0.0091
241	4.3129	0.0091
242	4.3220	0.0090
243	4.3310	0.0090
244	4.3400	0.0090
245	4.3490	0.0090
246	4.3580	0.0090
247	4.3670	0.0090
248	4.3759	0.0089
249	4.3848	0.0089
250	4.3937	0.0089
251	4.4026	0.0089
252	4.4115	0.0089
253	4.4203	0.0089
254	4.4292	0.0088
255	4.4380	0.0088
256	4.4468	0.0088
257	4.4556	0.0088
258	4.4643	0.0088
259	4.4731	0.0087
260	4.4818	0.0087
261	4.4905	0.0087
262	4.4992	0.0087
263	4.5079	0.0087

264	4.5166	0.0087
265	4.5252	0.0087
266	4.5339	0.0086
267	4.5425	0.0086
268	4.5511	0.0086
269	4.5597	0.0086
270	4.5682	0.0086
271	4.5768	0.0086
272	4.5853	0.0085
273	4.5939	0.0085
274	4.6024	0.0085
275	4.6109	0.0085
276	4.6194	0.0085
277	4.6278	0.0085
278	4.6363	0.0084
279	4.6447	0.0084
280	4.6531	0.0084
281	4.6615	0.0084
282	4.6699	0.0084
283	4.6783	0.0084
284	4.6866	0.0084
285	4.6950	0.0083
286	4.7033	0.0083
287	4.7116	0.0083
288	4.7199	0.0083

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0083	0.0011	0.0072
2	0.0083	0.0011	0.0072
3	0.0083	0.0011	0.0073
4	0.0084	0.0011	0.0073
5	0.0084	0.0011	0.0073
6	0.0084	0.0011	0.0073
7	0.0084	0.0011	0.0073
8	0.0084	0.0011	0.0074
9	0.0085	0.0011	0.0074
10	0.0085	0.0011	0.0074
11	0.0085	0.0011	0.0074
12	0.0085	0.0011	0.0074
13	0.0086	0.0011	0.0075
14	0.0086	0.0011	0.0075
15	0.0086	0.0011	0.0075
16	0.0086	0.0011	0.0075
17	0.0087	0.0011	0.0075
18	0.0087	0.0011	0.0076
19	0.0087	0.0011	0.0076
20	0.0087	0.0011	0.0076
21	0.0088	0.0011	0.0076
22	0.0088	0.0011	0.0076
23	0.0088	0.0011	0.0077
24	0.0088	0.0011	0.0077
25	0.0089	0.0012	0.0077
26	0.0089	0.0012	0.0077
27	0.0089	0.0012	0.0078
28	0.0089	0.0012	0.0078

29	0.0090	0.0012	0.0078
30	0.0090	0.0012	0.0078
31	0.0090	0.0012	0.0079
32	0.0090	0.0012	0.0079
33	0.0091	0.0012	0.0079
34	0.0091	0.0012	0.0079
35	0.0091	0.0012	0.0080
36	0.0092	0.0012	0.0080
37	0.0092	0.0012	0.0080
38	0.0092	0.0012	0.0080
39	0.0093	0.0012	0.0081
40	0.0093	0.0012	0.0081
41	0.0093	0.0012	0.0081
42	0.0093	0.0012	0.0081
43	0.0094	0.0012	0.0082
44	0.0094	0.0012	0.0082
45	0.0094	0.0012	0.0082
46	0.0095	0.0012	0.0082
47	0.0095	0.0012	0.0083
48	0.0095	0.0012	0.0083
49	0.0096	0.0012	0.0083
50	0.0096	0.0012	0.0083
51	0.0096	0.0013	0.0084
52	0.0097	0.0013	0.0084
53	0.0097	0.0013	0.0084
54	0.0097	0.0013	0.0085
55	0.0098	0.0013	0.0085
56	0.0098	0.0013	0.0085
57	0.0098	0.0013	0.0086
58	0.0099	0.0013	0.0086
59	0.0099	0.0013	0.0086
60	0.0099	0.0013	0.0087
61	0.0100	0.0013	0.0087
62	0.0100	0.0013	0.0087
63	0.0101	0.0013	0.0088
64	0.0101	0.0013	0.0088
65	0.0101	0.0013	0.0088
66	0.0102	0.0013	0.0089
67	0.0102	0.0013	0.0089
68	0.0103	0.0013	0.0089
69	0.0103	0.0013	0.0090
70	0.0103	0.0013	0.0090
71	0.0104	0.0014	0.0090
72	0.0104	0.0014	0.0091
73	0.0105	0.0014	0.0091
74	0.0105	0.0014	0.0091
75	0.0106	0.0014	0.0092
76	0.0106	0.0014	0.0092
77	0.0107	0.0014	0.0093
78	0.0107	0.0014	0.0093
79	0.0107	0.0014	0.0093
80	0.0108	0.0014	0.0094
81	0.0108	0.0014	0.0094
82	0.0109	0.0014	0.0095
83	0.0109	0.0014	0.0095
84	0.0110	0.0014	0.0095
85	0.0110	0.0014	0.0096
86	0.0111	0.0014	0.0096
87	0.0111	0.0014	0.0097
88	0.0112	0.0015	0.0097



89	0.0112	0.0015	0.0098
90	0.0113	0.0015	0.0098
91	0.0114	0.0015	0.0099
92	0.0114	0.0015	0.0099
93	0.0115	0.0015	0.0100
94	0.0115	0.0015	0.0100
95	0.0116	0.0015	0.0101
96	0.0116	0.0015	0.0101
97	0.0117	0.0015	0.0102
98	0.0117	0.0015	0.0102
99	0.0118	0.0015	0.0103
100	0.0119	0.0015	0.0103
101	0.0120	0.0016	0.0104
102	0.0120	0.0016	0.0104
103	0.0121	0.0016	0.0105
104	0.0121	0.0016	0.0105
105	0.0122	0.0016	0.0106
106	0.0123	0.0016	0.0107
107	0.0124	0.0016	0.0108
108	0.0124	0.0016	0.0108
109	0.0125	0.0016	0.0109
110	0.0126	0.0016	0.0109
111	0.0127	0.0016	0.0110
112	0.0127	0.0017	0.0111
113	0.0128	0.0017	0.0111
114	0.0129	0.0017	0.0112
115	0.0130	0.0017	0.0113
116	0.0130	0.0017	0.0113
117	0.0131	0.0017	0.0114
118	0.0132	0.0017	0.0115
119	0.0133	0.0017	0.0116
120	0.0134	0.0017	0.0116
121	0.0135	0.0018	0.0117
122	0.0136	0.0018	0.0118
123	0.0137	0.0018	0.0119
124	0.0138	0.0018	0.0120
125	0.0139	0.0018	0.0121
126	0.0140	0.0018	0.0121
127	0.0141	0.0018	0.0123
128	0.0142	0.0018	0.0123
129	0.0143	0.0019	0.0124
130	0.0144	0.0019	0.0125
131	0.0145	0.0019	0.0126
132	0.0146	0.0019	0.0127
133	0.0148	0.0019	0.0129
134	0.0149	0.0019	0.0129
135	0.0150	0.0020	0.0131
136	0.0151	0.0020	0.0131
137	0.0153	0.0020	0.0133
138	0.0154	0.0020	0.0134
139	0.0156	0.0020	0.0135
140	0.0157	0.0020	0.0136
141	0.0159	0.0021	0.0138
142	0.0160	0.0021	0.0139
143	0.0162	0.0021	0.0141
144	0.0163	0.0021	0.0142
145	0.0141	0.0018	0.0123
146	0.0142	0.0018	0.0123
147	0.0144	0.0019	0.0126
148	0.0145	0.0019	0.0127

149	0.0148	0.0019	0.0129
150	0.0149	0.0019	0.0130
151	0.0152	0.0020	0.0132
152	0.0153	0.0020	0.0133
153	0.0156	0.0020	0.0136
154	0.0158	0.0021	0.0137
155	0.0161	0.0021	0.0140
156	0.0163	0.0021	0.0141
157	0.0166	0.0022	0.0144
158	0.0168	0.0022	0.0146
159	0.0172	0.0022	0.0149
160	0.0174	0.0023	0.0151
161	0.0178	0.0023	0.0155
162	0.0180	0.0023	0.0156
163	0.0184	0.0024	0.0160
164	0.0187	0.0024	0.0162
165	0.0192	0.0025	0.0167
166	0.0195	0.0025	0.0169
167	0.0200	0.0026	0.0174
168	0.0203	0.0026	0.0177
169	0.0210	0.0027	0.0183
170	0.0213	0.0028	0.0186
171	0.0221	0.0029	0.0192
172	0.0225	0.0029	0.0195
173	0.0233	0.0030	0.0203
174	0.0238	0.0031	0.0207
175	0.0248	0.0032	0.0216
176	0.0253	0.0033	0.0220
177	0.0265	0.0034	0.0231
178	0.0272	0.0035	0.0237
179	0.0287	0.0037	0.0249
180	0.0295	0.0038	0.0257
181	0.0314	0.0041	0.0273
182	0.0324	0.0042	0.0282
183	0.0349	0.0045	0.0304
184	0.0363	0.0047	0.0316
185	0.0278	0.0036	0.0242
186	0.0296	0.0039	0.0258
187	0.0344	0.0045	0.0299
188	0.0375	0.0049	0.0327
189	0.0467	0.0061	0.0406
190	0.0538	0.0065	0.0472
191	0.0816	0.0065	0.0750
192	0.1184	0.0065	0.1119
193	0.5122	0.0065	0.5057
194	0.0642	0.0065	0.0577
195	0.0415	0.0054	0.0361
196	0.0318	0.0041	0.0277
197	0.0380	0.0049	0.0330
198	0.0336	0.0044	0.0292
199	0.0304	0.0040	0.0264
200	0.0279	0.0036	0.0243
201	0.0259	0.0034	0.0225
202	0.0243	0.0032	0.0211
203	0.0229	0.0030	0.0199
204	0.0217	0.0028	0.0189
205	0.0206	0.0027	0.0180
206	0.0197	0.0026	0.0172
207	0.0189	0.0025	0.0165
208	0.0182	0.0024	0.0158

209	0.0176	0.0023	0.0153
210	0.0170	0.0022	0.0148
211	0.0164	0.0021	0.0143
212	0.0159	0.0021	0.0139
213	0.0155	0.0020	0.0135
214	0.0151	0.0020	0.0131
215	0.0147	0.0019	0.0128
216	0.0143	0.0019	0.0124
217	0.0164	0.0021	0.0143
218	0.0161	0.0021	0.0140
219	0.0158	0.0020	0.0137
220	0.0155	0.0020	0.0135
221	0.0152	0.0020	0.0132
222	0.0149	0.0019	0.0130
223	0.0147	0.0019	0.0128
224	0.0145	0.0019	0.0126
225	0.0142	0.0019	0.0124
226	0.0140	0.0018	0.0122
227	0.0138	0.0018	0.0120
228	0.0136	0.0018	0.0119
229	0.0134	0.0017	0.0117
230	0.0133	0.0017	0.0115
231	0.0131	0.0017	0.0114
232	0.0129	0.0017	0.0112
233	0.0128	0.0017	0.0111
234	0.0126	0.0016	0.0110
235	0.0125	0.0016	0.0108
236	0.0123	0.0016	0.0107
237	0.0122	0.0016	0.0106
238	0.0120	0.0016	0.0105
239	0.0119	0.0015	0.0104
240	0.0118	0.0015	0.0103
241	0.0117	0.0015	0.0101
242	0.0115	0.0015	0.0100
243	0.0114	0.0015	0.0099
244	0.0113	0.0015	0.0098
245	0.0112	0.0015	0.0098
246	0.0111	0.0014	0.0097
247	0.0110	0.0014	0.0096
248	0.0109	0.0014	0.0095
249	0.0108	0.0014	0.0094
250	0.0107	0.0014	0.0093
251	0.0106	0.0014	0.0092
252	0.0105	0.0014	0.0092
253	0.0104	0.0014	0.0091
254	0.0104	0.0013	0.0090
255	0.0103	0.0013	0.0089
256	0.0102	0.0013	0.0089
257	0.0101	0.0013	0.0088
258	0.0100	0.0013	0.0087
259	0.0100	0.0013	0.0087
260	0.0099	0.0013	0.0086
261	0.0098	0.0013	0.0085
262	0.0098	0.0013	0.0085
263	0.0097	0.0013	0.0084
264	0.0096	0.0013	0.0084
265	0.0096	0.0012	0.0083
266	0.0095	0.0012	0.0083
267	0.0094	0.0012	0.0082
268	0.0094	0.0012	0.0081

269	0.0093	0.0012	0.0081
270	0.0092	0.0012	0.0080
271	0.0092	0.0012	0.0080
272	0.0091	0.0012	0.0079
273	0.0091	0.0012	0.0079
274	0.0090	0.0012	0.0078
275	0.0090	0.0012	0.0078
276	0.0089	0.0012	0.0077
277	0.0089	0.0012	0.0077
278	0.0088	0.0011	0.0077
279	0.0087	0.0011	0.0076
280	0.0087	0.0011	0.0076
281	0.0087	0.0011	0.0075
282	0.0086	0.0011	0.0075
283	0.0086	0.0011	0.0074
284	0.0085	0.0011	0.0074
285	0.0085	0.0011	0.0074
286	0.0084	0.0011	0.0073
287	0.0084	0.0011	0.0073
288	0.0083	0.0011	0.0072

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 --  
 -----  
 --  
 Total soil rain loss = 0.54(In)  
 Total effective rainfall = 4.18(In)  
 Peak flow rate in flood hydrograph = 24.48 (CFS)  
 -----

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 +++  
 ++  
 24 - H O U R S T O R M  
 R u n o f f H y d r o g r a p h  
 -----

--  
 Hydrograph in 5 Minute intervals ((CFS))  
 -----

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	7.5	15.0	22.5
30.0						
0+ 5	0.0002	0.02	Q			
0+10	0.0013	0.17	Q			
0+15	0.0043	0.44	Q			
0+20	0.0084	0.59	Q			
0+25	0.0130	0.67	Q			
0+30	0.0180	0.73	Q			
0+35	0.0233	0.77	VQ			
0+40	0.0288	0.80	VQ			
0+45	0.0344	0.82	VQ			

0+50	0.0402	0.84	VQ			
0+55	0.0461	0.86	VQ			
1+ 0	0.0521	0.87	VQ			
1+ 5	0.0582	0.88	VQ			
1+10	0.0644	0.89	VQ			
1+15	0.0705	0.90	VQ			
1+20	0.0768	0.90	VQ			
1+25	0.0831	0.91	VQ			
1+30	0.0894	0.92	IQ			
1+35	0.0957	0.92	IQ			
1+40	0.1021	0.93	IQ			
1+45	0.1085	0.93	IQ			
1+50	0.1150	0.93	IQ			
1+55	0.1214	0.94	IQ			
2+ 0	0.1279	0.94	IQ			
2+ 5	0.1344	0.94	IQ			
2+10	0.1409	0.94	IQ			
2+15	0.1474	0.95	IQ			
2+20	0.1539	0.95	IQ			
2+25	0.1605	0.95	IQ			
2+30	0.1671	0.96	IQ			
2+35	0.1737	0.96	IQ			
2+40	0.1803	0.96	IQV			
2+45	0.1869	0.96	IQV			
2+50	0.1936	0.97	IQV			
2+55	0.2003	0.97	IQV			
3+ 0	0.2070	0.97	IQV			
3+ 5	0.2137	0.98	IQV			
3+10	0.2204	0.98	IQV			
3+15	0.2272	0.98	IQV			

3+20	0.2340	0.98	QV			
3+25	0.2408	0.99	QV			
3+30	0.2476	0.99	QV			
3+35	0.2544	0.99	QV			
3+40	0.2613	1.00	QV			
3+45	0.2682	1.00	Q V			
3+50	0.2751	1.00	Q V			
3+55	0.2821	1.01	Q V			
4+ 0	0.2890	1.01	Q V			
4+ 5	0.2960	1.01	Q V			
4+10	0.3030	1.02	Q V			
4+15	0.3100	1.02	Q V			
4+20	0.3171	1.02	Q V			
4+25	0.3242	1.03	Q V			
4+30	0.3313	1.03	Q V			
4+35	0.3384	1.04	Q V			
4+40	0.3456	1.04	Q V			
4+45	0.3527	1.04	Q V			
4+50	0.3599	1.05	Q V			
4+55	0.3672	1.05	Q V			
5+ 0	0.3744	1.05	Q V			
5+ 5	0.3817	1.06	Q V			
5+10	0.3890	1.06	Q V			
5+15	0.3964	1.07	Q V			
5+20	0.4037	1.07	Q V			
5+25	0.4111	1.07	Q V			
5+30	0.4185	1.08	Q V			
5+35	0.4260	1.08	Q V			
5+40	0.4335	1.09	Q V			
5+45	0.4410	1.09	Q V			

5+50	0.4485	1.09	Q	V			
5+55	0.4561	1.10	Q	V			
6+ 0	0.4637	1.10	Q	V			
6+ 5	0.4713	1.11	Q	V			
6+10	0.4789	1.11	Q	V			
6+15	0.4866	1.12	Q	V			
6+20	0.4943	1.12	Q	V			
6+25	0.5021	1.13	Q	V			
6+30	0.5099	1.13	Q	V			
6+35	0.5177	1.13	Q	V			
6+40	0.5255	1.14	Q	V			
6+45	0.5334	1.14	Q	V			
6+50	0.5413	1.15	Q	V			
6+55	0.5493	1.15	Q	V			
7+ 0	0.5573	1.16	Q	V			
7+ 5	0.5653	1.16	Q	V			
7+10	0.5733	1.17	Q	V			
7+15	0.5814	1.17	Q	V			
7+20	0.5896	1.18	Q	V			
7+25	0.5977	1.19	Q	V			
7+30	0.6059	1.19	Q	V			
7+35	0.6142	1.20	Q	V			
7+40	0.6225	1.20	Q	V			
7+45	0.6308	1.21	Q	V			
7+50	0.6391	1.21	Q	V			
7+55	0.6475	1.22	Q	V			
8+ 0	0.6560	1.23	Q	V			
8+ 5	0.6645	1.23	Q	V			
8+10	0.6730	1.24	Q	V			
8+15	0.6816	1.24	Q	V			

8+20	0.6902	1.25	Q	V			
8+25	0.6988	1.26	Q	V			
8+30	0.7075	1.26	Q	V			
8+35	0.7163	1.27	Q	V			
8+40	0.7251	1.28	Q	V			
8+45	0.7339	1.28	Q	V			
8+50	0.7428	1.29	Q	V			
8+55	0.7518	1.30	Q	V			
9+ 0	0.7607	1.31	Q	V			
9+ 5	0.7698	1.31	Q	V			
9+10	0.7789	1.32	Q	V			
9+15	0.7880	1.33	Q	V			
9+20	0.7972	1.34	Q	V			
9+25	0.8065	1.34	Q	V			
9+30	0.8158	1.35	Q	V			
9+35	0.8251	1.36	Q	V			
9+40	0.8346	1.37	Q	V			
9+45	0.8440	1.38	Q	V			
9+50	0.8536	1.39	Q	V			
9+55	0.8632	1.39	Q	V			
10+ 0	0.8729	1.40	Q	V			
10+ 5	0.8826	1.41	Q	V			
10+10	0.8924	1.42	Q	V			
10+15	0.9022	1.43	Q	V			
10+20	0.9121	1.44	Q	V			
10+25	0.9221	1.45	Q	V			
10+30	0.9322	1.46	Q	V			
10+35	0.9423	1.47	Q	V			
10+40	0.9525	1.48	Q	V			
10+45	0.9628	1.49	Q	V			



10+50	0.9732	1.50	Q	V		
10+55	0.9836	1.52	Q	V		
11+ 0	0.9941	1.53	Q	V		
11+ 5	1.0047	1.54	Q	V		
11+10	1.0154	1.55	Q	V		
11+15	1.0262	1.56	Q	V		
11+20	1.0370	1.58	Q	V		
11+25	1.0480	1.59	Q	V		
11+30	1.0590	1.60	Q	V		
11+35	1.0701	1.62	Q	V		
11+40	1.0813	1.63	Q	V		
11+45	1.0927	1.64	Q	V		
11+50	1.1041	1.66	Q	V		
11+55	1.1156	1.68	Q	V		
12+ 0	1.1273	1.69	Q	V		
12+ 5	1.1390	1.70	Q	V		
12+10	1.1505	1.67	Q	V		
12+15	1.1616	1.61	Q	V		
12+20	1.1726	1.59	Q	V		
12+25	1.1834	1.58	Q	V		
12+30	1.1944	1.58	Q	V		
12+35	1.2053	1.59	Q	V		
12+40	1.2164	1.60	Q	V		
12+45	1.2275	1.62	Q	V		
12+50	1.2388	1.63	Q	V		
12+55	1.2501	1.65	Q	V		
13+ 0	1.2617	1.67	Q	V		
13+ 5	1.2733	1.69	Q	V		
13+10	1.2851	1.72	Q	V		
13+15	1.2971	1.74	Q	V		

13+20	1.3093	1.77	Q		V		
13+25	1.3217	1.79	Q		V		
13+30	1.3342	1.82	Q		V		
13+35	1.3470	1.85	Q		V		
13+40	1.3600	1.88	Q		V		
13+45	1.3732	1.92	Q		V		
13+50	1.3866	1.95	Q		V		
13+55	1.4004	1.99	Q		V		
14+ 0	1.4144	2.03	Q		V		
14+ 5	1.4287	2.08	Q		V		
14+10	1.4433	2.12	Q		V		
14+15	1.4582	2.17	Q		V		
14+20	1.4735	2.22	Q		V		
14+25	1.4892	2.28	Q		V		
14+30	1.5052	2.33	Q		V		
14+35	1.5217	2.40	Q		V		
14+40	1.5387	2.46	Q		V		
14+45	1.5562	2.54	Q		V		
14+50	1.5742	2.62	Q		V		
14+55	1.5928	2.70	Q		V		
15+ 0	1.6121	2.80	Q		V		
15+ 5	1.6321	2.91	Q		V		
15+10	1.6529	3.02	Q		V		
15+15	1.6746	3.16	Q		V		
15+20	1.6974	3.30	Q		V		
15+25	1.7211	3.45	Q		V		
15+30	1.7448	3.44	Q		V		
15+35	1.7674	3.28	Q		V		
15+40	1.7904	3.34	Q		V		
15+45	1.8149	3.56	Q		V		

15+50	1.8419	3.92		Q		V	
15+55	1.8731	4.54		Q		V	
16+ 0	1.9122	5.68		Q		V	
16+ 5	1.9746	9.05			Q	V	
16+10	2.0946	17.42				Q	
16+15	2.2632	24.48				V	Q
16+20	2.3726	15.88				Q	V
16+25	2.4467	10.77			Q		V
16+30	2.5043	8.36			Q		V
16+35	2.5533	7.11			Q		V
16+40	2.5959	6.18			Q		V
16+45	2.6325	5.32			Q		V
16+50	2.6653	4.76			Q		V
16+55	2.6947	4.26			Q		V
17+ 0	2.7212	3.86			Q		V
17+ 5	2.7453	3.50			Q		V
17+10	2.7671	3.17			Q		V
17+15	2.7869	2.87			Q		V
17+20	2.8056	2.72			Q		V
17+25	2.8236	2.62			Q		V
17+30	2.8407	2.48			Q		V
17+35	2.8563	2.27			Q		V
17+40	2.8711	2.14			Q		V
17+45	2.8843	1.93			Q		V
17+50	2.8971	1.85			Q		V
17+55	2.9094	1.79			Q		V
18+ 0	2.9213	1.73			Q		V
18+ 5	2.9329	1.68			Q		V
18+10	2.9445	1.68			Q		V
18+15	2.9563	1.71			Q		V

18+20	2.9681	1.71	Q			V
18+25	2.9798	1.70	Q			V
18+30	2.9913	1.68	Q			V
18+35	3.0027	1.66	Q			V
18+40	3.0140	1.63	Q			V
18+45	3.0251	1.61	Q			V
18+50	3.0360	1.59	Q			V
18+55	3.0468	1.56	Q			V
19+ 0	3.0574	1.54	Q			V
19+ 5	3.0679	1.52	Q			V
19+10	3.0782	1.50	Q			V
19+15	3.0883	1.48	Q			V
19+20	3.0984	1.46	Q			V
19+25	3.1083	1.44	Q			V
19+30	3.1181	1.42	Q			V
19+35	3.1277	1.40	Q			V
19+40	3.1373	1.38	Q			V
19+45	3.1467	1.37	Q			V
19+50	3.1560	1.35	Q			V
19+55	3.1652	1.34	Q			V
20+ 0	3.1743	1.32	Q			V
20+ 5	3.1833	1.30	Q			V
20+10	3.1921	1.29	Q			V
20+15	3.2009	1.28	Q			V
20+20	3.2096	1.26	Q			V
20+25	3.2182	1.25	Q			V
20+30	3.2268	1.24	Q			V
20+35	3.2352	1.23	Q			V
20+40	3.2436	1.21	Q			V
20+45	3.2518	1.20	Q			V

20+50	3.2600	1.19	Q				V
20+55	3.2682	1.18	Q				V
21+ 0	3.2762	1.17	Q				V
21+ 5	3.2842	1.16	Q				V
21+10	3.2921	1.15	Q				V
21+15	3.2999	1.14	Q				V
21+20	3.3077	1.13	Q				V
21+25	3.3154	1.12	Q				V
21+30	3.3231	1.11	Q				V
21+35	3.3307	1.10	Q				V
21+40	3.3382	1.09	Q				V
21+45	3.3457	1.08	Q				V
21+50	3.3531	1.08	Q				V
21+55	3.3604	1.07	Q				V
22+ 0	3.3677	1.06	Q				V
22+ 5	3.3750	1.05	Q				V
22+10	3.3822	1.05	Q				V
22+15	3.3893	1.04	Q				V
22+20	3.3964	1.03	Q				V
22+25	3.4035	1.02	Q				V
22+30	3.4105	1.02	Q				V
22+35	3.4174	1.01	Q				V
22+40	3.4244	1.00	Q				V
22+45	3.4312	1.00	Q				V
22+50	3.4380	0.99	Q				V
22+55	3.4448	0.98	Q				V
23+ 0	3.4516	0.98	Q				V
23+ 5	3.4583	0.97	Q				V
23+10	3.4649	0.97	Q				
23+15	3.4715	0.96	Q				

V	23+20	3.4781	0.95	Q			
V	23+25	3.4846	0.95	Q			
V	23+30	3.4911	0.94	Q			
V	23+35	3.4976	0.94	Q			
V	23+40	3.5040	0.93	Q			
V	23+45	3.5104	0.93	Q			
V	23+50	3.5167	0.92	Q			
V	23+55	3.5231	0.92	Q			
V	24+ 0	3.5293	0.91	Q			
V	24+ 5	3.5354	0.88	Q			
V	24+10	3.5405	0.74	Q			
V	24+15	3.5437	0.46	Q			
V	24+20	3.5458	0.31	Q			
V	24+25	3.5474	0.23	Q			
V	24+30	3.5486	0.17	Q			
V	24+35	3.5495	0.13	Q			
V	24+40	3.5502	0.10	Q			
V	24+45	3.5508	0.08	Q			
V	24+50	3.5512	0.06	Q			
V	24+55	3.5515	0.05	Q			
V	25+ 0	3.5518	0.04	Q			
V	25+ 5	3.5520	0.03	Q			
V	25+10	3.5521	0.02	Q			
V	25+15	3.5523	0.02	Q			
V	25+20	3.5524	0.01	Q			
V	25+25	3.5524	0.01	Q			
V	25+30	3.5524	0.00	Q			
V	25+35	3.5525	0.00	Q			
V							

---

FLOOD HYDROGRAPH ROUTING PROGRAM  
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005  
Study date: 09/05/24

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Seneca & Hampton  
Basin Routing  
100yr 24hr  
With assumed 2"/hr infiltration FS=2 = 1"/hr used  
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--  
Program License Serial Number 6232  
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--  
\*\*\*\*\* HYDROGRAPH INFORMATION  
\*\*\*\*\*

From study/file name: hamptonpro.rte  
\*\*\*\*\*HYDROGRAPH  
DATA\*\*\*\*\*  
Number of intervals = 307  
Time interval = 5.0 (Min.)  
Maximum/Peak flow rate = 24.481 (CFS)  
Total volume = 3.552 (Ac.Ft)  
Status of hydrographs being held in storage  
Stream 1 Stream 2 Stream 3 Stream 4 Stream 5  
Peak (CFS) 0.000 0.000 0.000 0.000  
0.000  
Vol (Ac.Ft) 0.000 0.000 0.000 0.000  
0.000  
\*\*\*\*\*  
\*\*\*\*\*

++++  
++++  
Process from Point/Station 106.000 to Point/Station  
107.000  
\*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

-----  
User entry of depth-outflow-storage data  
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--  
Total number of inflow hydrograph intervals = 307  
Hydrograph time unit = 5.000 (Min.)  
Initial depth in storage basin = 0.00 (Ft.)  
-----  
--

```

--
Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)
-----

```

```

-----
--
Depth vs. Storage and Depth vs. Discharge data:
Basin Depth  Storage  Outflow  (S-O*dt/2)  (S+O*dt/2)
(Ft.)        (Ac.Ft)   (CFS)    (Ac.Ft)    (Ac.Ft)
-----

```

```

0.000      0.000      0.000      0.000      0.000
4.000      2.000      0.300      1.999      2.001
5.000      2.200     11.000      2.162      2.238
-----

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Hydrograph Detention Basin Routing
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Graph values: 'I'= unit inflow; 'O'=outflow at time shown
-----

```

```

---
Time      Inflow  Outflow  Storage
Depth
(Hours)   (CFS)   (CFS)   (Ac.Ft) .0    6.1   12.24  18.36  24.48
(Ft.)
0.083    0.02    0.00    0.000 O    |    |    |    |
0.00
0.167    0.17    0.00    0.001 O    |    |    |    |
0.00
0.250    0.44    0.00    0.003 O    |    |    |    |
0.01
0.333    0.59    0.00    0.006 O    |    |    |    |
0.01
0.417    0.67    0.00    0.011 O    |    |    |    |
0.02
0.500    0.73    0.00    0.015 O    |    |    |    |
0.03
0.583    0.77    0.00    0.021 OI   |    |    |    |
0.04
0.667    0.80    0.00    0.026 OI   |    |    |    |
0.05
0.750    0.82    0.00    0.031 OI   |    |    |    |
0.06
0.833    0.84    0.01    0.037 OI   |    |    |    |
0.07
0.917    0.86    0.01    0.043 OI   |    |    |    |
0.09
1.000    0.87    0.01    0.049 OI   |    |    |    |
0.10
1.083    0.88    0.01    0.055 OI   |    |    |    |
0.11
1.167    0.89    0.01    0.061 OI   |    |    |    |
0.12
1.250    0.90    0.01    0.067 OI   |    |    |    |
0.13
1.333    0.90    0.01    0.073 OI   |    |    |    |

```



0.15									
1.417	0.91	0.01	0.079	OI					
0.16									
1.500	0.92	0.01	0.086	OI					
0.17									
1.583	0.92	0.01	0.092	OI					
0.18									
1.667	0.93	0.01	0.098	OI					
0.20									
1.750	0.93	0.02	0.104	OI					
0.21									
1.833	0.93	0.02	0.111	OI					
0.22									
1.917	0.94	0.02	0.117	OI					
0.23									
2.000	0.94	0.02	0.123	OI					
0.25									
2.083	0.94	0.02	0.130	OI					
0.26									
2.167	0.94	0.02	0.136	OI					
0.27									
2.250	0.95	0.02	0.142	OI					
0.28									
2.333	0.95	0.02	0.149	OI					
0.30									
2.417	0.95	0.02	0.155	OI					
0.31									
2.500	0.96	0.02	0.162	OI					
0.32									
2.583	0.96	0.03	0.168	OI					
0.34									
2.667	0.96	0.03	0.174	OI					
0.35									
2.750	0.96	0.03	0.181	OI					
0.36									
2.833	0.97	0.03	0.187	OI					
0.37									
2.917	0.97	0.03	0.194	OI					
0.39									
3.000	0.97	0.03	0.200	OI					
0.40									
3.083	0.98	0.03	0.207	OI					
0.41									
3.167	0.98	0.03	0.213	OI					
0.43									
3.250	0.98	0.03	0.220	OI					
0.44									
3.333	0.98	0.03	0.226	OI					
0.45									
3.417	0.99	0.03	0.233	OI					
0.47									
3.500	0.99	0.04	0.240	OI					
0.48									
3.583	0.99	0.04	0.246	OI					
0.49									
3.667	1.00	0.04	0.253	OI					
0.51									
3.750	1.00	0.04	0.259	OI					
0.52									
3.833	1.00	0.04	0.266	OI					

0.53									
3.917	1.01	0.04	0.273	OI					
0.55									
4.000	1.01	0.04	0.279	OI					
0.56									
4.083	1.01	0.04	0.286	OI					
0.57									
4.167	1.02	0.04	0.293	OI					
0.59									
4.250	1.02	0.04	0.299	OI					
0.60									
4.333	1.02	0.05	0.306	OI					
0.61									
4.417	1.03	0.05	0.313	OI					
0.63									
4.500	1.03	0.05	0.320	OI					
0.64									
4.583	1.04	0.05	0.326	OI					
0.65									
4.667	1.04	0.05	0.333	OI					
0.67									
4.750	1.04	0.05	0.340	OI					
0.68									
4.833	1.05	0.05	0.347	OI					
0.69									
4.917	1.05	0.05	0.354	OI					
0.71									
5.000	1.05	0.05	0.361	OI					
0.72									
5.083	1.06	0.06	0.367	OI					
0.73									
5.167	1.06	0.06	0.374	OI					
0.75									
5.250	1.07	0.06	0.381	OI					
0.76									
5.333	1.07	0.06	0.388	OI					
0.78									
5.417	1.07	0.06	0.395	OI					
0.79									
5.500	1.08	0.06	0.402	OI					
0.80									
5.583	1.08	0.06	0.409	OI					
0.82									
5.667	1.09	0.06	0.416	OI					
0.83									
5.750	1.09	0.06	0.423	OI					
0.85									
5.833	1.09	0.06	0.430	OI					
0.86									
5.917	1.10	0.07	0.438	OI					
0.88									
6.000	1.10	0.07	0.445	OI					
0.89									
6.083	1.11	0.07	0.452	OI					
0.90									
6.167	1.11	0.07	0.459	OI					
0.92									
6.250	1.12	0.07	0.466	OI					
0.93									
6.333	1.12	0.07	0.473	OI					

0.95									
6.417	1.13	0.07	0.481	OI					
0.96									
6.500	1.13	0.07	0.488	OI					
0.98									
6.583	1.13	0.07	0.495	OI					
0.99									
6.667	1.14	0.08	0.502	OI					
1.00									
6.750	1.14	0.08	0.510	OI					
1.02									
6.833	1.15	0.08	0.517	OI					
1.03									
6.917	1.15	0.08	0.525	OI					
1.05									
7.000	1.16	0.08	0.532	OI					
1.06									
7.083	1.16	0.08	0.539	OI					
1.08									
7.167	1.17	0.08	0.547	OI					
1.09									
7.250	1.17	0.08	0.554	OI					
1.11									
7.333	1.18	0.08	0.562	OI					
1.12									
7.417	1.19	0.09	0.570	OI					
1.14									
7.500	1.19	0.09	0.577	OI					
1.15									
7.583	1.20	0.09	0.585	OI					
1.17									
7.667	1.20	0.09	0.592	OI					
1.18									
7.750	1.21	0.09	0.600	OI					
1.20									
7.833	1.21	0.09	0.608	OI					
1.22									
7.917	1.22	0.09	0.616	OI					
1.23									
8.000	1.23	0.09	0.623	OI					
1.25									
8.083	1.23	0.09	0.631	OI					
1.26									
8.167	1.24	0.10	0.639	OI					
1.28									
8.250	1.24	0.10	0.647	OI					
1.29									
8.333	1.25	0.10	0.655	OI					
1.31									
8.417	1.26	0.10	0.663	OI					
1.33									
8.500	1.26	0.10	0.671	OI					
1.34									
8.583	1.27	0.10	0.679	OI					
1.36									
8.667	1.28	0.10	0.687	OI					
1.37									
8.750	1.28	0.10	0.695	OI					
1.39									
8.833	1.29	0.11	0.703	OI					

1.41									
8.917	1.30	0.11	0.711	OI					
1.42									
9.000	1.31	0.11	0.720	OI					
1.44									
9.083	1.31	0.11	0.728	OI					
1.46									
9.167	1.32	0.11	0.736	OI					
1.47									
9.250	1.33	0.11	0.744	OI					
1.49									
9.333	1.34	0.11	0.753	OI					
1.51									
9.417	1.34	0.11	0.761	OI					
1.52									
9.500	1.35	0.12	0.770	OI					
1.54									
9.583	1.36	0.12	0.778	OI					
1.56									
9.667	1.37	0.12	0.787	OI					
1.57									
9.750	1.38	0.12	0.796	OI					
1.59									
9.833	1.39	0.12	0.804	OI					
1.61									
9.917	1.39	0.12	0.813	OI					
1.63									
10.000	1.40	0.12	0.822	OI					
1.64									
10.083	1.41	0.12	0.831	OI					
1.66									
10.167	1.42	0.13	0.839	OI					
1.68									
10.250	1.43	0.13	0.848	OI					
1.70									
10.333	1.44	0.13	0.857	OI					
1.71									
10.417	1.45	0.13	0.866	OI					
1.73									
10.500	1.46	0.13	0.876	OI					
1.75									
10.583	1.47	0.13	0.885	OI					
1.77									
10.667	1.48	0.13	0.894	OI					
1.79									
10.750	1.49	0.14	0.903	OI					
1.81									
10.833	1.50	0.14	0.913	OI					
1.83									
10.917	1.52	0.14	0.922	OI					
1.84									
11.000	1.53	0.14	0.932	OI					
1.86									
11.083	1.54	0.14	0.941	O I					
1.88									
11.167	1.55	0.14	0.951	O I					
1.90									
11.250	1.56	0.14	0.961	O I					
1.92									
11.333	1.58	0.15	0.971	O I					

1.94									
11.417	1.59	0.15	0.980	O I					
1.96									
11.500	1.60	0.15	0.990	O I					
1.98									
11.583	1.62	0.15	1.000	O I					
2.00									
11.667	1.63	0.15	1.011	O I					
2.02									
11.750	1.64	0.15	1.021	O I					
2.04									
11.833	1.66	0.15	1.031	O I					
2.06									
11.917	1.68	0.16	1.042	O I					
2.08									
12.000	1.69	0.16	1.052	O I					
2.10									
12.083	1.70	0.16	1.063	O I					
2.13									
12.167	1.67	0.16	1.073	O I					
2.15									
12.250	1.61	0.16	1.083	O I					
2.17									
12.333	1.59	0.16	1.093	O I					
2.19									
12.417	1.58	0.17	1.103	O I					
2.21									
12.500	1.58	0.17	1.113	O I					
2.23									
12.583	1.59	0.17	1.123	O I					
2.25									
12.667	1.60	0.17	1.132	O I					
2.26									
12.750	1.62	0.17	1.142	O I					
2.28									
12.833	1.63	0.17	1.152	O I					
2.30									
12.917	1.65	0.17	1.162	O I					
2.32									
13.000	1.67	0.18	1.173	O I					
2.35									
13.083	1.69	0.18	1.183	O I					
2.37									
13.167	1.72	0.18	1.194	O I					
2.39									
13.250	1.74	0.18	1.204	O I					
2.41									
13.333	1.77	0.18	1.215	O I					
2.43									
13.417	1.79	0.18	1.226	O I					
2.45									
13.500	1.82	0.19	1.237	O I					
2.47									
13.583	1.85	0.19	1.249	O I					
2.50									
13.667	1.88	0.19	1.260	O I					
2.52									
13.750	1.92	0.19	1.272	O I					
2.54									
13.833	1.95	0.19	1.284	O I					

2.57									
13.917	1.99	0.19	1.296	O I					
2.59									
14.000	2.03	0.20	1.309	O I					
2.62									
14.083	2.08	0.20	1.322	O I					
2.64									
14.167	2.12	0.20	1.335	O I					
2.67									
14.250	2.17	0.20	1.348	O I					
2.70									
14.333	2.22	0.20	1.362	O I					
2.72									
14.417	2.28	0.21	1.376	O I					
2.75									
14.500	2.33	0.21	1.390	O I					
2.78									
14.583	2.40	0.21	1.405	O I					
2.81									
14.667	2.46	0.21	1.420	O I					
2.84									
14.750	2.54	0.22	1.436	O I					
2.87									
14.833	2.62	0.22	1.452	O I					
2.90									
14.917	2.70	0.22	1.469	O I					
2.94									
15.000	2.80	0.22	1.487	O I					
2.97									
15.083	2.91	0.23	1.505	O I					
3.01									
15.167	3.02	0.23	1.524	O I					
3.05									
15.250	3.16	0.23	1.543	O I					
3.09									
15.333	3.30	0.23	1.564	O I					
3.13									
15.417	3.45	0.24	1.586	O I					
3.17									
15.500	3.44	0.24	1.608	O I					
3.22									
15.583	3.28	0.24	1.629	O I					
3.26									
15.667	3.34	0.25	1.650	O I					
3.30									
15.750	3.56	0.25	1.672	O I					
3.34									
15.833	3.92	0.25	1.696	O I					
3.39									
15.917	4.54	0.26	1.723	O I					
3.45									
16.000	5.68	0.26	1.757	O I					
3.51									
16.083	9.05	0.27	1.806	O		I			
3.61									
16.167	17.42	0.28	1.895	O			I		
3.79									
16.250	24.48	1.99	2.032	O					I
4.16									
16.333	15.88	7.65	2.137		O		I		

4.69									
16.417	10.77	9.41	2.170				O I		
4.85									
16.500	8.36	9.46	2.171				I O		
4.86									
16.583	7.11	8.92	2.161				I O		
4.81									
16.667	6.18	8.22	2.148				I O		
4.74									
16.750	5.32	7.45	2.134				I O		
4.67									
16.833	4.76	6.70	2.120				I O		
4.60									
16.917	4.26	6.02	2.107				I O		
4.53									
17.000	3.86	5.41	2.096				I O		
4.48									
17.083	3.50	4.87	2.085				I O		
4.43									
17.167	3.17	4.39	2.076				IO		
4.38									
17.250	2.87	3.96	2.068				I O		
4.34									
17.333	2.72	3.60	2.062				IO		
4.31									
17.417	2.62	3.31	2.056				IO		
4.28									
17.500	2.48	3.07	2.052				IO		
4.26									
17.583	2.27	2.86	2.048				IO		
4.24									
17.667	2.14	2.65	2.044				IO		
4.22									
17.750	1.93	2.46	2.040				IO		
4.20									
17.833	1.85	2.28	2.037				O		
4.19									
17.917	1.79	2.14	2.034				O		
4.17									
18.000	1.73	2.02	2.032				O		
4.16									
18.083	1.68	1.92	2.030				O		
4.15									
18.167	1.68	1.85	2.029				O		
4.14									
18.250	1.71	1.80	2.028				O		
4.14									
18.333	1.71	1.77	2.028				O		
4.14									
18.417	1.70	1.75	2.027				O		
4.14									
18.500	1.68	1.73	2.027				O		
4.13									
18.583	1.66	1.71	2.026				O		
4.13									
18.667	1.63	1.69	2.026				O		
4.13									
18.750	1.61	1.67	2.026				O		
4.13									
18.833	1.59	1.65	2.025				O		

4.13									
18.917	1.56	1.62	2.025	O					
4.12									
19.000	1.54	1.60	2.024	O					
4.12									
19.083	1.52	1.58	2.024	IO					
4.12									
19.167	1.50	1.56	2.024	IO					
4.12									
19.250	1.48	1.54	2.023	IO					
4.12									
19.333	1.46	1.51	2.023	O					
4.11									
19.417	1.44	1.49	2.022	O					
4.11									
19.500	1.42	1.47	2.022	O					
4.11									
19.583	1.40	1.45	2.022	O					
4.11									
19.667	1.38	1.44	2.021	O					
4.11									
19.750	1.37	1.42	2.021	O					
4.10									
19.833	1.35	1.40	2.021	O					
4.10									
19.917	1.34	1.38	2.020	O					
4.10									
20.000	1.32	1.36	2.020	O					
4.10									
20.083	1.30	1.35	2.020	O					
4.10									
20.167	1.29	1.33	2.019	O					
4.10									
20.250	1.28	1.32	2.019	O					
4.10									
20.333	1.26	1.30	2.019	O					
4.09									
20.417	1.25	1.29	2.018	O					
4.09									
20.500	1.24	1.27	2.018	O					
4.09									
20.583	1.23	1.26	2.018	O					
4.09									
20.667	1.21	1.25	2.018	O					
4.09									
20.750	1.20	1.24	2.017	O					
4.09									
20.833	1.19	1.22	2.017	O					
4.09									
20.917	1.18	1.21	2.017	O					
4.09									
21.000	1.17	1.20	2.017	O					
4.08									
21.083	1.16	1.19	2.017	O					
4.08									
21.167	1.15	1.18	2.016	O					
4.08									
21.250	1.14	1.17	2.016	O					
4.08									
21.333	1.13	1.16	2.016	O					



0.03									
413.917	0.00	0.00	0.016	O					
0.03									
414.000	0.00	0.00	0.016	O					
0.03									
414.083	0.00	0.00	0.016	O					
0.03									
414.167	0.00	0.00	0.016	O					
0.03									
414.250	0.00	0.00	0.016	O					
0.03									
414.333	0.00	0.00	0.016	O					
0.03									
414.417	0.00	0.00	0.016	O					
0.03									
414.500	0.00	0.00	0.016	O					
0.03									
414.583	0.00	0.00	0.016	O					
0.03									
414.667	0.00	0.00	0.016	O					
0.03									
414.750	0.00	0.00	0.016	O					
0.03									
414.833	0.00	0.00	0.016	O					
0.03									
414.917	0.00	0.00	0.016	O					
0.03									
415.000	0.00	0.00	0.016	O					
0.03									
415.083	0.00	0.00	0.016	O					
0.03									
415.167	0.00	0.00	0.016	O					
0.03									
415.250	0.00	0.00	0.016	O					
0.03									
415.333	0.00	0.00	0.016	O					
0.03									
415.417	0.00	0.00	0.016	O					
0.03									
415.500	0.00	0.00	0.016	O					
0.03									
415.583	0.00	0.00	0.016	O					
0.03									
415.667	0.00	0.00	0.016	O					
0.03									
415.750	0.00	0.00	0.016	O					
0.03									
415.833	0.00	0.00	0.016	O					
0.03									
415.917	0.00	0.00	0.016	O					
0.03									
416.000	0.00	0.00	0.016	O					
0.03									
416.083	0.00	0.00	0.016	O					
0.03									
416.167	0.00	0.00	0.016	O					
0.03									
416.250	0.00	0.00	0.016	O					
0.03									
416.333	0.00	0.00	0.016	O					

0.03								
416.417	0.00	0.00	0.016	O				
0.03								
416.500	0.00	0.00	0.016	O				
0.03								
416.583	0.00	0.00	0.016	O				
0.03								
416.667	0.00	0.00	0.016	O				
0.03								

Remaining water in basin = 0.02 (Ac.Ft)

```

*****HYDROGRAPH
DATA*****
      Number of intervals = 5001
      Time interval = 5.0 (Min.)
      Maximum/Peak flow rate = 9.462 (CFS)
      Total volume = 3.537 (Ac.Ft)
      Status of hydrographs being held in storage
      Stream 1 Stream 2 Stream 3 Stream 4 Stream 5
Peak (CFS) 0.000 0.000 0.000 0.000
Vol (Ac.Ft) 0.000 0.000 0.000 0.000
*****

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**APPENDIX D:  
BASIN ROUTING STUDY INFORMATION**

FLOOD HYDROGRAPH ROUTING PROGRAM  
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005  
Study date: 10/02/24

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Seneca & Hampton  
Basin Routing  
100yr 24hr  
With assumed 2"/hr infiltration FS=2 = 1"/hr used  
-----

--  
Program License Serial Number 6232  
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\*\*\*\*\* HYDROGRAPH INFORMATION  
\*\*\*\*\*

From study/file name: hamptonpro.rte  
\*\*\*\*\*HYDROGRAPH  
DATA\*\*\*\*\*  
Number of intervals = 307  
Time interval = 5.0 (Min.)  
Maximum/Peak flow rate = 24.481 (CFS)  
Total volume = 3.552 (Ac.Ft)  
Status of hydrographs being held in storage  
Stream 1 Stream 2 Stream 3 Stream 4 Stream 5  
Peak (CFS) 0.000 0.000 0.000 0.000  
0.000  
Vol (Ac.Ft) 0.000 0.000 0.000 0.000  
0.000  
\*\*\*\*\*  
\*\*\*\*\*

++++  
++++  
Process from Point/Station 106.000 to Point/Station  
107.000  
\*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

-----  
User entry of depth-outflow-storage data  
-----

--  
Total number of inflow hydrograph intervals = 307  
Hydrograph time unit = 5.000 (Min.)  
Initial depth in storage basin = 0.00 (Ft.)  
-----  
--

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--
Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)
-----

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Depth vs. Storage and Depth vs. Discharge data:
Basin Depth  Storage  Outflow  (S-O*dt/2)  (S+O*dt/2)
(Ft.)        (Ac.Ft)   (CFS)    (Ac.Ft)    (Ac.Ft)
-----
0.000        0.000    0.000    0.000      0.000
1.000        0.290    0.300    0.289      0.291
2.000        0.580    1.260    0.576      0.584
3.000        0.870    3.580    0.858      0.882
4.000        1.150    4.680    1.134      1.166
5.000        1.442    5.540    1.423      1.461
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Hydrograph Detention Basin Routing
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Graph values: 'I'= unit inflow; 'O'=outflow at time shown
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---
Time   Inflow  Outflow  Storage
Depth
(Hours) (CFS)   (CFS)   (Ac.Ft)
(Ft.)
0.083  0.02    0.00    0.000
0.00   0.167  0.00    0.001
0.00   0.250  0.00    0.003
0.01   0.333  0.01    0.006
0.02   0.417  0.01    0.011
0.04   0.500  0.02    0.015
0.05   0.583  0.02    0.020
0.07   0.667  0.03    0.026
0.09   0.750  0.03    0.031
0.11   0.833  0.04    0.036
0.13   0.917  0.04    0.042
0.14   1.000  0.05    0.048
0.16   1.083  0.06    0.053
0.18   1.167  0.06    0.059
0.20

```

















18.750	1.61	3.71	0.903	I O			
3.12							
18.833	1.59	3.65	0.888	I O			
3.07							
18.917	1.56	3.60	0.874	I O			
3.02							
19.000	1.54	3.50	0.861	I O			
2.97							
19.083	1.52	3.40	0.847	I O			
2.92							
19.167	1.50	3.30	0.835	I O			
2.88							
19.250	1.48	3.20	0.823	I O			
2.84							
19.333	1.46	3.11	0.811	I O			
2.80							
19.417	1.44	3.02	0.800	I O			
2.76							
19.500	1.42	2.93	0.789	I O			
2.72							
19.583	1.40	2.85	0.779	I O			
2.69							
19.667	1.38	2.77	0.769	I O			
2.65							
19.750	1.37	2.70	0.760	I O			
2.62							
19.833	1.35	2.63	0.751	I O			
2.59							
19.917	1.34	2.56	0.742	I O			
2.56							
20.000	1.32	2.49	0.734	I O			
2.53							
20.083	1.30	2.43	0.726	I O			
2.50							
20.167	1.29	2.37	0.719	I O			
2.48							
20.250	1.28	2.31	0.711	I O			
2.45							
20.333	1.26	2.25	0.704	IO			
2.43							
20.417	1.25	2.20	0.698	IO			
2.41							
20.500	1.24	2.15	0.691	IO			
2.38							
20.583	1.23	2.10	0.685	IO			
2.36							
20.667	1.21	2.05	0.679	IO			
2.34							
20.750	1.20	2.01	0.673	IO			
2.32							
20.833	1.19	1.96	0.668	IO			
2.30							
20.917	1.18	1.92	0.663	IO			
2.29							
21.000	1.17	1.88	0.658	IO			
2.27							
21.083	1.16	1.84	0.653	IO			
2.25							
21.167	1.15	1.81	0.648	IO			
2.24							



93.750	0.00	0.00	0.001	O				
0.00								
93.833	0.00	0.00	0.001	O				
0.00								
93.917	0.00	0.00	0.001	O				
0.00								
94.000	0.00	0.00	0.001	O				
0.00								
94.083	0.00	0.00	0.001	O				
0.00								
94.167	0.00	0.00	0.001	O				
0.00								
94.250	0.00	0.00	0.001	O				
0.00								
94.333	0.00	0.00	0.001	O				
0.00								
94.417	0.00	0.00	0.001	O				
0.00								
94.500	0.00	0.00	0.001	O				
0.00								
94.583	0.00	0.00	0.001	O				
0.00								
94.667	0.00	0.00	0.001	O				
0.00								
94.750	0.00	0.00	0.001	O				
0.00								
94.833	0.00	0.00	0.001	O				
0.00								
94.917	0.00	0.00	0.001	O				
0.00								
95.000	0.00	0.00	0.001	O				
0.00								
95.083	0.00	0.00	0.001	O				
0.00								
95.167	0.00	0.00	0.001	O				
0.00								
95.250	0.00	0.00	0.001	O				
0.00								
95.333	0.00	0.00	0.001	O				
0.00								
95.417	0.00	0.00	0.001	O				
0.00								
95.500	0.00	0.00	0.001	O				
0.00								
95.583	0.00	0.00	0.001	O				
0.00								
95.667	0.00	0.00	0.001	O				
0.00								
95.750	0.00	0.00	0.001	O				
0.00								
95.833	0.00	0.00	0.001	O				
0.00								
95.917	0.00	0.00	0.001	O				
0.00								
96.000	0.00	0.00	0.001	O				
0.00								
96.083	0.00	0.00	0.001	O				
0.00								

\*\*\*\*\*HYDROGRAPH

DATA\*\*\*\*\*

Number of intervals = 1153  
Time interval = 5.0 (Min.)  
Maximum/Peak flow rate = 4.913 (CFS)  
Total volume = 3.552 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

0.000

0.000

\*\*\*\*\*

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# **APPENDIX E: PROJECT HYDRAULIC CALCULATIONS**

# Inlet Report

## Tract 20723 - Catch Basin Capacity

### Curb Inlet

Location	= Sag
Curb Length (ft)	= 4.00
Throat Height (in)	= 6.00
Grate Area (sqft)	= -0-
Grate Width (ft)	= -0-
Grate Length (ft)	= -0-

### Gutter

Slope, Sw (ft/ft)	= 0.020
Slope, Sx (ft/ft)	= 0.020
Local Depr (in)	= 2.00
Gutter Width (ft)	= 2.00
Gutter Slope (%)	= -0-
Gutter n-value	= -0-

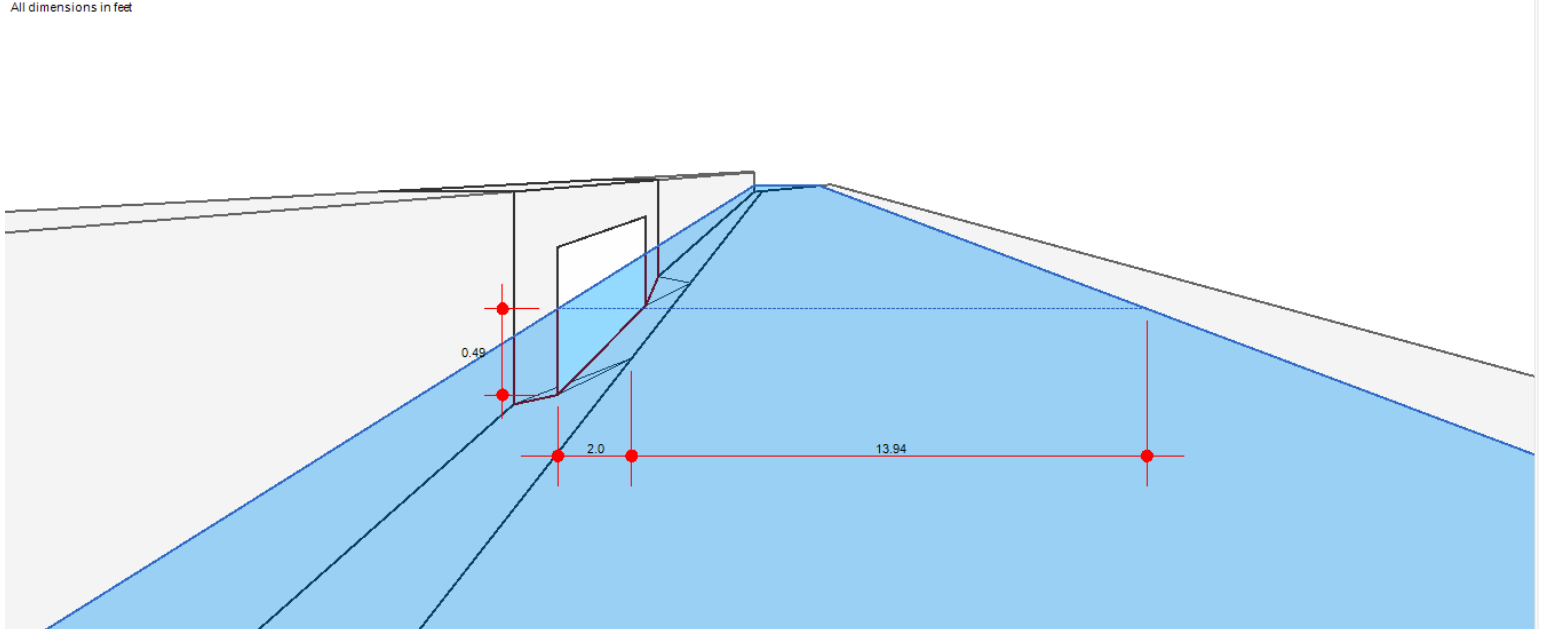
### Calculations

Compute by:	Known Q
Q (cfs)	= 3.15

### Highlighted

Q Total (cfs)	= 3.15
Q Capt (cfs)	= 3.15
Q Bypass (cfs)	= -0-
Depth at Inlet (in)	= 5.83
Efficiency (%)	= 100
Gutter Spread (ft)	= 15.94
Gutter Vel (ft/s)	= -0-
Bypass Spread (ft)	= -0-
Bypass Depth (in)	= -0-

All dimensions in feet



# Channel Report

## Tract 20723 - Street Capacity

### User-defined

Invert Elev (ft) = 0.50  
Slope (%) = 1.10  
N-Value = 0.015

### Highlighted

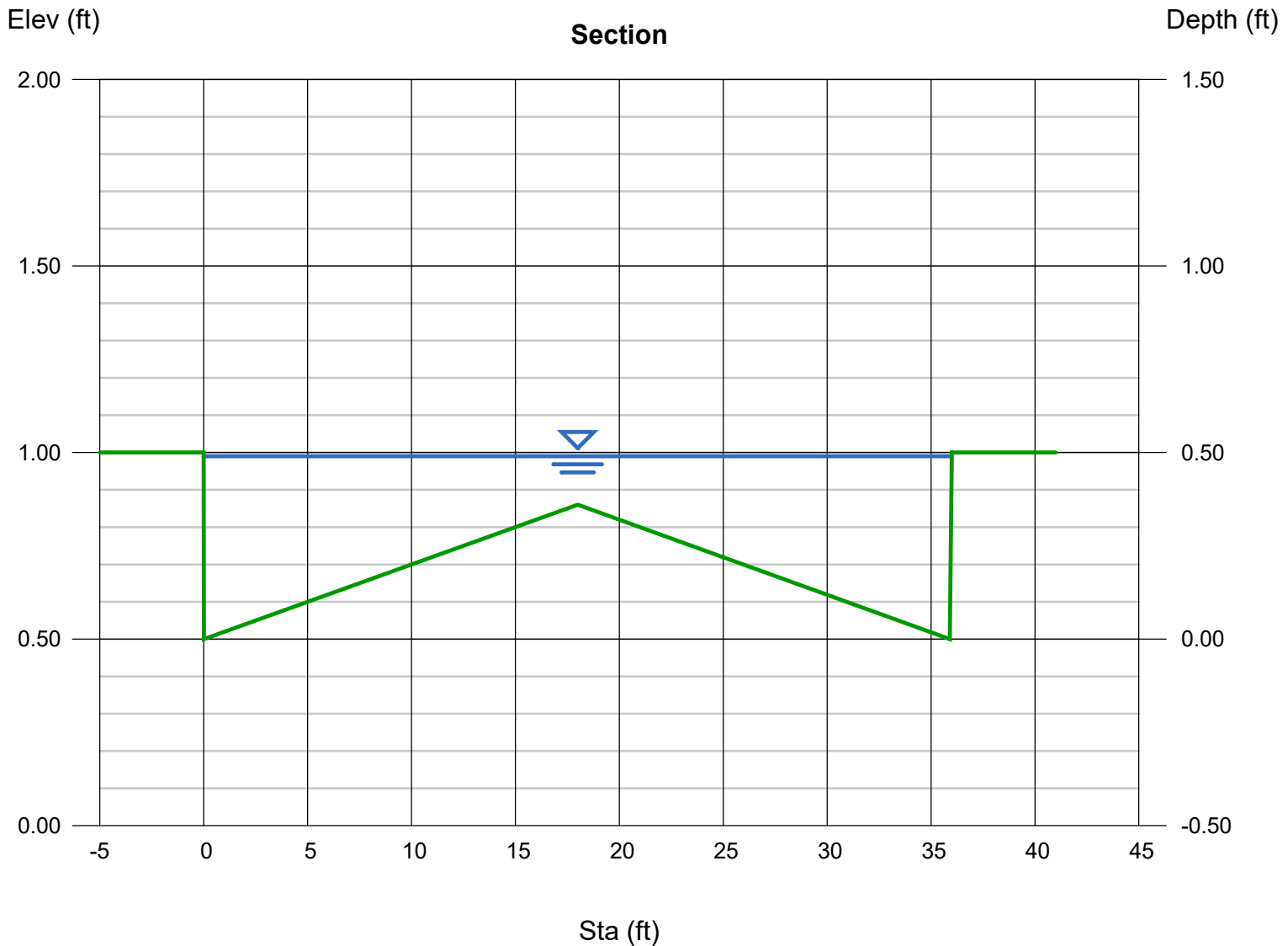
Depth (ft) = 0.49  
Q (cfs) = 52.29  
Area (sqft) = 11.15  
Velocity (ft/s) = 4.69  
Wetted Perim (ft) = 36.89  
Crit Depth, Yc (ft) = 0.50  
Top Width (ft) = 36.00  
EGL (ft) = 0.83

### Calculations

Compute by: Known Depth  
Known Depth (ft) = 0.49

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

(0.00, 1.00)-(0.01, 0.50, 0.015)-(18.00, 0.86, 0.015)-(35.90, 0.50, 0.015)-(36.00, 1.00, 0.015)



San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005  
Version 7.1

Rational Hydrology Study Date: 09/05/24

-----  
Seneca & Hampton  
Proposed Condition  
100 year  
Single Northeast Basin Inlet Flow  
-----

-----  
Program License Serial Number 6232  
-----

-----  
\*\*\*\*\* Hydrology Study Control Information \*\*\*\*\*  
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-----  
Rational hydrology study storm event year is 100.0  
Computed rainfall intensity:  
Storm year = 100.00 1 hour rainfall = 1.080 (In.)  
Slope used for rainfall intensity curve b = 0.7000  
Soil antecedent moisture condition (AMC) = 3

++++  
++++  
Process from Point/Station 101.000 to Point/Station  
102.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
RESIDENTIAL(5 - 7 dwl/acre)  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 69.00  
Adjusted SCS curve number for AMC 3 = 86.20  
Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.131  
(In/Hr)  
Initial subarea data:  
Initial area flow distance = 471.000(Ft.)  
Top (of initial area) elevation = 69.700(Ft.)  
Bottom (of initial area) elevation = 66.500(Ft.)  
Difference in elevation = 3.200(Ft.)  
Slope = 0.00679 s(%)= 0.68  
TC = k(0.389)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 12.380 min.  
Rainfall intensity = 3.260(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area (Q=KCIA) is C = 0.864  
Subarea runoff = 7.322(CFS)

Total initial stream area = 2.600 (Ac.)  
Pervious area fraction = 0.500  
Initial area Fm value = 0.131 (In/Hr)

++++  
Process from Point/Station 102.000 to Point/Station

103.000

\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 66.500 (Ft.)  
Downstream point/station elevation = 61.900 (Ft.)  
Pipe length = 325.00 (Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 7.322 (CFS)  
Nearest computed pipe diameter =                      **USE 18" PIPE**  
Calculated individual pipe flow = 7.322 (CFS)  
Normal flow depth in pipe = 11.70 (In.)  
Flow top width inside pipe = 12.43 (In.)  
Critical Depth = 12.95 (In.)  
Pipe flow velocity = 7.13 (Ft/s)  
Travel time through pipe = 0.76 min.  
Time of concentration (TC) = 13.14 min.

++++  
Process from Point/Station 107.000 to Point/Station

103.000

\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

RESIDENTIAL(5 - 7 dwl/acre)  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 69.00  
Adjusted SCS curve number for AMC 3 = 86.20  
Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.131

(In/Hr)

Time of concentration = 13.14 min.  
Rainfall intensity = 3.127 (In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area, (total area with

modified

rational method) (Q=KCIA) is C = 0.862  
Subarea runoff = 6.699 (CFS) for 2.600 (Ac.)  
Total runoff = 14.022 (CFS)  
Effective area this stream = 5.20 (Ac.)  
Total Study Area (Main Stream No. 1) = 5.20 (Ac.)  
Area averaged Fm value = 0.131 (In/Hr)

++++  
Process from Point/Station 103.000 to Point/Station

104.000

\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 61.900 (Ft.)  
Downstream point/station elevation = 57.300 (Ft.)  
Pipe length = 325.00 (Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 14.022 (CFS)  
Nearest computed pipe diameter =                      USE 24" PIPE  
Calculated individual pipe flow = 14.022 (CFS)  
Normal flow depth in pipe = 13.50 (In.)  
Flow top width inside pipe = 20.12 (In.)  
Critical Depth = 16.69 (In.)  
Pipe flow velocity = 8.59 (Ft/s)  
Travel time through pipe = 0.63 min.  
Time of concentration (TC) = 13.77 min.

++++  
++++  
Process from Point/Station 108.000 to Point/Station  
104.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

RESIDENTIAL (5 - 7 dwl/acre)  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil (AMC 2) = 69.00  
Adjusted SCS curve number for AMC 3 = 86.20  
Pervious ratio (Ap) = 0.5000 Max loss rate (Fm) = 0.131  
(In/Hr)  
Time of concentration = 13.77 min.  
Rainfall intensity = 3.026 (In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area, (total area with  
modified  
rational method) (Q=KCIA) is C = 0.861  
Subarea runoff = 6.042 (CFS) for 2.500 (Ac.)  
Total runoff = 20.063 (CFS)  
Effective area this stream = 7.70 (Ac.)  
Total Study Area (Main Stream No. 1) = 7.70 (Ac.)  
Area averaged Fm value = 0.131 (In/Hr)

++++  
++++  
Process from Point/Station 104.000 to Point/Station  
105.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 57.300 (Ft.)  
Downstream point/station elevation = 52.700 (Ft.)  
Pipe length = 325.00 (Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 20.063 (CFS)  
Nearest computed pipe diameter =                       
Calculated individual pipe flow = 20.063 (CFS)  
Normal flow depth in pipe = 15.45 (In.)  
Flow top width inside pipe = 22.99 (In.)  
Critical Depth = 19.29 (In.)  
Pipe flow velocity = 9.39 (Ft/s)

Travel time through pipe = 0.58 min.  
Time of concentration (TC) = 14.35 min.

++++  
105.000 Process from Point/Station 109.000 to Point/Station

\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

RESIDENTIAL(5 - 7 dwl/acre)  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
SCS curve number for soil(AMC 2) = 69.00  
Adjusted SCS curve number for AMC 3 = 86.20  
Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.131  
(In/Hr)  
Time of concentration = 14.35 min.  
Rainfall intensity = 2.940(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area, (total area with  
modified rational method)(Q=KCIA) is C = 0.860  
Subarea runoff = 5.728(CFS) for 2.500(Ac.)  
Total runoff = 25.791(CFS)  
Effective area this stream = 10.20(Ac.)  
Total Study Area (Main Stream No. 1) = 10.20(Ac.)  
Area averaged Fm value = 0.131(In/Hr)

++++  
106.000 Process from Point/Station 105.000 to Point/Station

\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 52.700(Ft.)  
Downstream point/station elevation = 52.000(Ft.)  
Pipe length = 51.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 25.791(CFS)  
Nearest computed pipe diameter =                       
Calculated individual pipe flow = 25.791(CFS)  
Normal flow depth in pipe = 19.13(In.)  
Flow top width inside pipe = 19.31(In.)  
Critical Depth = 21.38(In.)  
Pipe flow velocity = 9.61(Ft/s)  
Travel time through pipe = 0.09 min.  
Time of concentration (TC) = 14.44 min.  
End of computations, Total Study Area = 10.20 (Ac.)  
The following figures may  
be used for a unit hydrograph study of the same area.  
Note: These figures do not consider reduced effective area  
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.500  
Area averaged SCS curve number = 69.0