STORMWATER QUALITY MANAGEMENT PLAN FOR DOLLAR GENERAL

CORPUS CHRISTI NUECES COUNTY, TX

FM 43 (Weber Rd.) & Bratton Rd.
Project No. 24-065

Prepared for:

DOLLAR GENERAL

November 2024

11/27/24

Prepared By:

LINFIELD, HUNTER & JUNIUS, INC.
PROFESSIONAL ENGINEERS,
ARCHITECTS AND SURVEYORS
3608 18th Street, Suite 200
Metairie, Louisiana 70002

DRAINAGE ANALYSIS

BACKGROUND

The proposed ±10,640 S.F. Dollar General development with 35 proposed parking spaces is located on a proposed ±1.188-acre tract of land in the city of Corpus Christi, Texas at the south corner of FM 43 (Weber Rd.) & Bratton Rd. Currently, there is curb and gutter along FM 43 and Bratton Rd. The pre-developed site is relatively flat and drains to both FM 43 & Bratton Rd. The post-developed site drainage was designed to maintain existing drainage patterns. The existing curb inlets and storm sewer along FM 43 flow southward. The receiving water for the storm water runoff from this property is Oso Creek. The TCEQ has classified the aquatic life use for Oso Creek and Oso Bay as "high" to "exceptional". TCEQ also categorized Oso Creek as "Contact Recreation" use. The property contains a 0.08 ac. Drainage easement by 65/158 M.R.C.C.C.T. at the west side of the property. The existing drainage area was calculated to be approximately 1.188 acres (see Figure 1). This project conforms with the Current Storm Water Master Plan and will not adversely impact adjacent properties. The proposed retail land use is consistent with the Master Plan's assumed Neighborhood Commercial (CN-1) land use as permitted in the City of Corpus Christi's Zoning Ordinances. A TCEQ compliant storm water pollution plan will be provided to the City prior to any construction activities.

DESIGN PARAMETERS AND METHODOLOGY

The site drainage analysis was performed for a 5 year, 10 year, 25 year and 100 year design storm frequency. The drainage analysis was based on the guidelines specified in The City of Corpus Christi's Unified Development Code. The rational method was used for both pre-developed and post-developed peak runoff calculations. The runoff coefficients used were 0.30 for grass areas, 0.75 for detention pond areas, and 0.90 for roof and paved areas. The time of concentration for the pre-developed and post-developed site were calculated using the NRCS TR-55 velocity method with a minimum allowable time of concentration of 10 minutes. The rainfall intensity was determined using NOAA Atlas 14 rainfall data. Swale capacity was calculated using Manning's Formula and the Discharge Formula. All rainfall data and runoff parameter sources are consistent with the Corpus Christi Infrastructure Design Manual.

Pre-Developed Runoff

The total pre-developed site analyzed was approximately 1.118 acres. The pre-developed time of concentration was computed to be approximately 27.69 minutes with a corresponding intensity of 4.07 in/hr for the 5 year storm event, 4.79 in/hr for the 10 year storm event, 5.75 in/hr for the 25 year storm event, and 7.25 in/hr for the 100 year storm event. The existing site consists of a vacant grass field (composite runoff coefficient 0.30). Table 1 lists the computed runoff values for the 5 year, 10 year, 25 year, and 100 year design storm frequencies.

Table 1: Pre-Developed Runoff Value – 5 Year, 10 Year, 25 Year, and 100 Year Design Storm Frequency

Storm Event	C	I (in/hr)	A (Acre)	Q (cfs)
5-Year	0.30	4.07	1.188	1.45
10-Year	0.30	4.79	1.188	1.71
25-Year	0.30	5.75	1.188	2.05
100-Year	0.30	7.25	1.188	2.59

Post-Developed Runoff

The post-developed drainage area analyzed was determined to be approximately the same size as the pre-developed area, 1.188 acres, but was further broken down into four (4) different subbasins based on the proposed grades of the site. The post-developed time of concentration for all post-developed drainage areas was determined to be 10 minutes. Using runoff coefficients of 0.30 for grass areas, 075 for detention pond areas, and 0.90 for roofs/pavement areas, composite runoff coefficients were calculated for each drainage area and are summarized in Table 2 below. Table 2 below also provides the acreage of each of the drainage areas, as well as the associated intensity values and peak runoff values for each of the storm events.

Table 2: Post-Developed Runoff Value – 5 Year, 10 Year, 25 Year, and 100 Year Design Storm Frequency

Drainage Area		Time of Concentration (min.)	Composite Runoff Coefficient (C)	I_{5YR} (in/hr)	Q_{5YR} (CFS)	I_{10YR} (in/hr)	Q_{10YR} (CFS)	I_{25YR} (in/hr)	Q_{25YR} (CFS)	I_{100YR} (in/hr)	Q_{100YR} (CFS)
DA 1	0.410 Ac.	10.00	0.75	6.56	2.02	7.76	2.39	9.37	2.88	11.90	3.66
DA 2	0.261 Ac.	10.00	0.90	6.56	1.54	7.76	1.82	9.37	2.20	11.90	2.80
DA 3	0.467 Ac.	10.00	0.69	6.56	2.11	7.76	2.50	9.37	3.02	11.90	3.84
DA 4	0.050 Ac.	10.00	0.30	6.56	0.10	7.76	0.12	9.37	0.14	11.90	0.18
Total	1.188 Ac.	Varies	0.74	Varies	5.77	Varies	6.83	Varies	8.24	Varies	10.48

Detention Storage

The excess runoff between the pre and post-developed condition is to be detained on-site with the use of two (2) surface detention ponds. Detention pond storage and hydraulic routing calculations were performed using the NRCS TR-55 Method in Autodesk Storm and Sanitary program. The outflow orifice was designed to prevent the post-developed flow from exceeding the pre-developed flow for the 5 year, 10 year, 25 year, and 100 year design storm frequency. Listed below are the design parameters of the detention ponds:

South Detention Pond Volume: ±6,405 cubic feet

South Detention Pond Depth: 3.50 feet
West Detention Pond Volume: ±15,259 cubic feet
West Detention Pond Depth: 4.00 feet

Design Storm Duration: 24 hours
Outfall Orifice: 6 inch Orifice

As can be seen from Figure 1, approximately 1.138 acres (drainage areas 1-3) are contributing runoff to the detention pond. The remaining runoff is un-detained and will be allowed to freely flow off-site (drainage area 4). In order to obtain the total post-developed runoff from the site, the un-detained flow is added to the reduced flow from the detention pond. This gives the total reduced post-developed flow rate. Table 3 compares the runoff values of the pre-developed to the post-developed prior to detention while Table 4 compares the runoff values of the pre-developed to the final post-developed site including the proposed detention ponds (see Appendix A).

Table 3: Flow Rate Values (Prior to Detention) – 5 Year, 10 Year, 25 Year, and 100 Year Design Storm Frequency

Storm Event	Predeveloped Runoff (CFS)	Post-developed Runoff (Prior to detention) (CFS)	Increase in overall runoff from Pre-developed to Post-developed (CFS)
5 Year	1.45	5.77	4.32
10 Year	1.71	6.83	5.12
25 Year	2.05	8.24	6.19
100 Year	2.59	10.48	7.89

Table 4: Flow Rate Values (With Detention) – 5 Year, 10 Year, 25 Year, and 100 Year Design Storm Frequency

Storm Event	Predeveloped Runoff (CFS)	Post-developed Runoff (with Detention) (CFS)	Reduction in overall runoff from Pre-developed to Post-developed (CFS)
5 Year	1.45	1.40	0.05
10 Year	1.71	1.56	0.15
25 Year	2.05	1.69	0.36
100 Year	2.59	1.94	0.65

Detention Pond Drawdown Time Calculation

The site is located within an Air Installation Compatible Use Zone (AICUZ) as the site is near Cabaniss Field. Per the Federal Aviation Administration (FAA) Advisory Circular 150/5200-33B 2-3 Sub-Section B: “Storm Water Detention Ponds/Swales should be designed, engineered, constructed, and maintained for a maximum 48-hour detention period after the design storm and remains completely dry between storms. Taking the Max HGL of the south pond during the 100-year storm event, we have determined the max volume of water in the south pond is +/-4,907 C.F. Taking the Max HGL of the west pond during the 100-year storm event, we have determined the max volume of water in the west pond is +/-13,138 C.F. Per the SSA program, the average flow through the 6-inch orifice during the 100-year storm is 0.49 CFS. Using the total maximum volume of water in the ponds and the average flow through the orifice, we have determined it will take approximately 36,827 seconds or 10.2 hours for the ponds to empty which adheres to the maximum 48-hour detention period required by FAA.

SUMMARY OF FINDINGS

Using the methods and criteria stated in this report, the detention ponds and restrictor orifice as designed are sufficient to prevent the total post-developed peak flows from exceeding the pre-developed peak runoff rates for the 5 year, 10 year, 25 year, and 100 year design storm frequencies. A total storage volume of ±21,664 C.F. through two detention ponds with a 6 inch will be provided to meet these requirements.

EQUATIONS

Time of Concentration (T_c):
$T_c = T_{CSF} + T_{CSCF}$

Sheet Flow T_{CSF}:

$$T_{CSF} = \frac{0.007(nL)^{0.8}}{P^{0.5}S^{0.4}} x\ 60$$

where:

T_{CSF} = Sheet Flow Time of Concentration (min.)
n = Manning's Roughness Coefficient
L = Sheet Flow Length (ft.)
P = 2-year, 24-hour rainfall (in.)
S = Slope (ft./ft.)

Shallow Concentrated Flow T_{CSCF}:

$$T_{CSCF} = \frac{L}{3600V}\ x\ 60$$

where:

T_{CSCF} = Shallow Concentrated Flow Time of Concentration (min.)
L = Shallow Concentrated Flow Length (ft.)
V = Velocity (ft/s)
$V=16.135(S)^{0.5}$ grass, $V=20.328(S)^{0.5}$ paved
S = Slope (ft./ft.)

Combined Runoff Coefficient:

$C = (A_{pr}\ C_{prg}+A_{gs}\ C_{gs}) / (A_{pr}+A_{gs})$
where:

C = Combined runoff coefficient
A_{pr} = Area of pavement/roof on site
C_{pr} = Runoff coefficient of pavement/roof
A_{gs} = Area of grass on site
C_{gs} = Runoff coefficient of grass

Runoff (Rational Method)

Q = (A * I * C)
where:

Q = Runoff (cfs)
A = Area of site (acres)
I = Rainfall intensity (in/hr)
C = Runoff Coefficient

Perimeter Swale Capacity

Manning's Formula:

$V = (k / n) * R_h^{2/3} * S^{1/2}$
where:

V = Cross-sectional average velocity (ft/s)
n = Manning's Roughness Coefficient
R_h = Hydraulic radius = A / P_w (ft)
A = Cross-sectional area (ft^2)
P_w = Wetter Perimeter (ft)
S = Longitudinal slope (ft/ft)

Discharge Formula:

$Q = V * A$
where:

Q = Volumetric Flow rate (cfs)
V = Cross-sectional average velocity (ft/s)
A = Cross-sectional area (ft^2)

APPENDIX A

LEGEND

EXISTING FEATURES

OR	EXIST. DROP INLET
—C	EXIST. GUY WIRE
— — — W(SIZE) — — —	EXIST. WATERLINE
— — — G(SIZE) — — —	EXIST. GAS LINE
— — E — — E — —	EXIST. UNDERGROUND ELECTRIC LINE
— — S — — S — —	EXIST. SEWER LINE
— — T — — T — —	EXIST. TELEPHONE LINE
(SIZE)	EXIST. DRAIN LINE
T.B.M.	TEMPORARY BENCHMARK
CS	THE POINT OF CHANGE FROM CIRCULAR CURVE TO SPIRAL
T.C.	TOP OF CASTING/CURB ELEVATION
EL.	ELEVATION
HC	HANDICAP
SMH	SEWER MANHOLE
S	EXIST. SEWER MANHOLE
D	EXIST. DRAIN MANHOLE
	EXIST. FIRE HYDRANT
WV	EXIST. WATER VALVE
WM	EXIST. WATER METER
GM	GAS METER
GV	GAS VALVE
CO	EXIST. SEWER CLEANOUT
	EXIST. SIGN
	EXIST. BOLLARD
	EXIST. FUEL FILLER LIDS
	EXIST. LIGHT POLE
	EXIST. TRAFFIC LIGHT
	HOSE BIB
TS	EXIST. TRAFFIC SIGNALBOX
	EXIST. RIGHT–OF–WAY MARKER
	EXIST. POWER OR TELEPHONE POLE
	EXIST. CATCH BASIN
XCUT	CROSS CUT IN CONC.
	EXIST. BOUNDARY LINE
RCP	REINFORCED CONCRETE PIPE
CMP	CORRUGATED METAL PIPE
INV.	INVERT ELEVATION
CONC.	CONCRETE
S/W	SIDEWALK
×24.95	EXIST. SPOT ELEVATION
FND	FOUND
	OVERHEAD ELECTRIC
	EXIST. TREE OR SHRUB
	EXIST. DITCH
	EXIST. VINYL FENCE
	EXIST. CHAINLINK FENCE
	FOUND IRON PIPE
	EXIST. MAILBOX
	EXIST. TELEPHONE PEDESTAL
	EXIST. ELECTRICAL TRANSFORMER
AC	EXIST. AC UNIT
	EXIST. STEEL POLE
ELEV	EXIST. CONTOURS

NEW FEATURES

	DRAINAGE ARROW
25.95 / 26.45	GUTTER ELEVATION / TOP OF CURB ELEVATION
T.O.C. 24.80	TOP OF CASTING ELEVATION
G.L.	GRADE LINE
T.O.C.	TOP OF CASTING
F.P.G.	FINISHED PAVEMENT GRADE
T.O.D.	TOP OF DITCH
B.O.D.	BOTTOM OF DITCH

GENERAL NOTES:

1. SEE DRAWING C–3 FOR GEOMETRY ASSOCIATED WITH NEW CONSTRUCTION.
2. ELEVATIONS SHOWN REFER TO NAVD88 DATUM.
3. ALL CONSTRUCTION TO BE IN ACCORDANCE WITH THE LATEST CITY OF CORPUS CHRISTI AND STANDARDS AND SPECIFICATIONS.
4. CONCRETE TO DRAIN AS SHOWN.
5. APPROVAL OF THIS PLAN IS NOT AN AUTHORIZATION TO GRADE ADJACENT PROPERTIES WHEN FIELD CONDITIONS WARRANT OFF SITE GRADING, PERMISSION MUST BE OBTAINED FROM THE AFFECTED PROPERTY OWNERS.
6. CONTRACTOR IS RESPONSIBLE FOR ENSURING PROPOSED GRADES AND OTHER IMPROVEMENTS ARE CONSTRUCTED IN ACCORDANCE WITH ADA & TAS ACCESSIBILITY STANDARDS CRITERIA.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR LAYING OUT THE WORK AND VERIFYING ALL MEASUREMENTS AND GRADES AND REPORTING ANY DISCREPANCIES TO THE ENGINEER BEFORE STARTING CONSTRUCTION.
8. THE GRADE IN THE GRASS AND LANDSCAPED AREAS SHALL COME TO THE TOP OF THE PAVEMENT UNLESS OTHERWISE SHOWN ON THE DRAWINGS.
9. CONTRACTOR SHALL CONFIRM ALL EXISTING SLOPES FOR ACCESSIBLE ROUTES AS WELL AS THE ACCESSIBLE PARKING STALLS AND ACCESSIBLE AISLES WITH A SLOPE METER TO CONFIRM MAXIMUM SLOPES ARE NOT EXCEEDED.
10. CONTRACTOR IS REQUIRED TO PROVIDE AS–BUILT SPOT ELEVATIONS ALONG THE ACCESSIBLE ROUTES SHOWN ON THIS PLAN EVERY 10' IN ORDER TO CONFIRM MAXIMUM (2%) CROSS–SLOPE AND MAXIMUM (5%) SLOPES IN THE DIRECTION OF TRAVEL. IN ADDITION, SPOT ELEVATIONS ARE REQUIRED ON ALL CORNERS AND MIDPOINTS OF ACCESSIBLE PARKING STALLS AND ACCESSIBLE AISLES TO CONFIRM MAXIMUM 2% SLOPES ARE NOT EXCEEDED IN ALL DIRECTIONS. THIS INFORMATION SHALL BE PROVIDED A MINIMUM OF 4 WEEKS BEFORE STORE TURNOVER.
11. AT ADJOINING MATERIALS THERE IS TO BE A SMOOTH AND LEVEL TRANSITION OF NO MORE THAN 1/4" VERTICAL CHANGE.
12. CONTRACTOR TO CHECK EXISTING SPOT GRADES AT AREAS OF NEW AND ADJACENT EXISTING SIDEWALK AND/OR PAVING PRIOR TO BEGINNING OF CONSTRUCTION TO VERIFY THAT COMPLIANCE WITH SLOPE LIMITS CAN BE MET.
13. THE ABOVE MAXIMUM SLOPES ARE BASED OFF THE 2012 TAS/ADA REQUIREMENTS WHILE THE DESIGN IS PROPOSED AT LESS THAN THE REQUIREMENTS TO ACCOUNT FOR MINOR GRADING ERRORS IN THE FIELD.
14. SEE MEP DRAWINGS FOR UTILITY LOCATIONS.
15. A TCEQ COMPLIANT STORM WATER POLLUTION PREVENTION PLAN WILL BE PROVIDED TO THE CITY PRIOR TO ANY CONSTRUCTION ACTIVITIES.

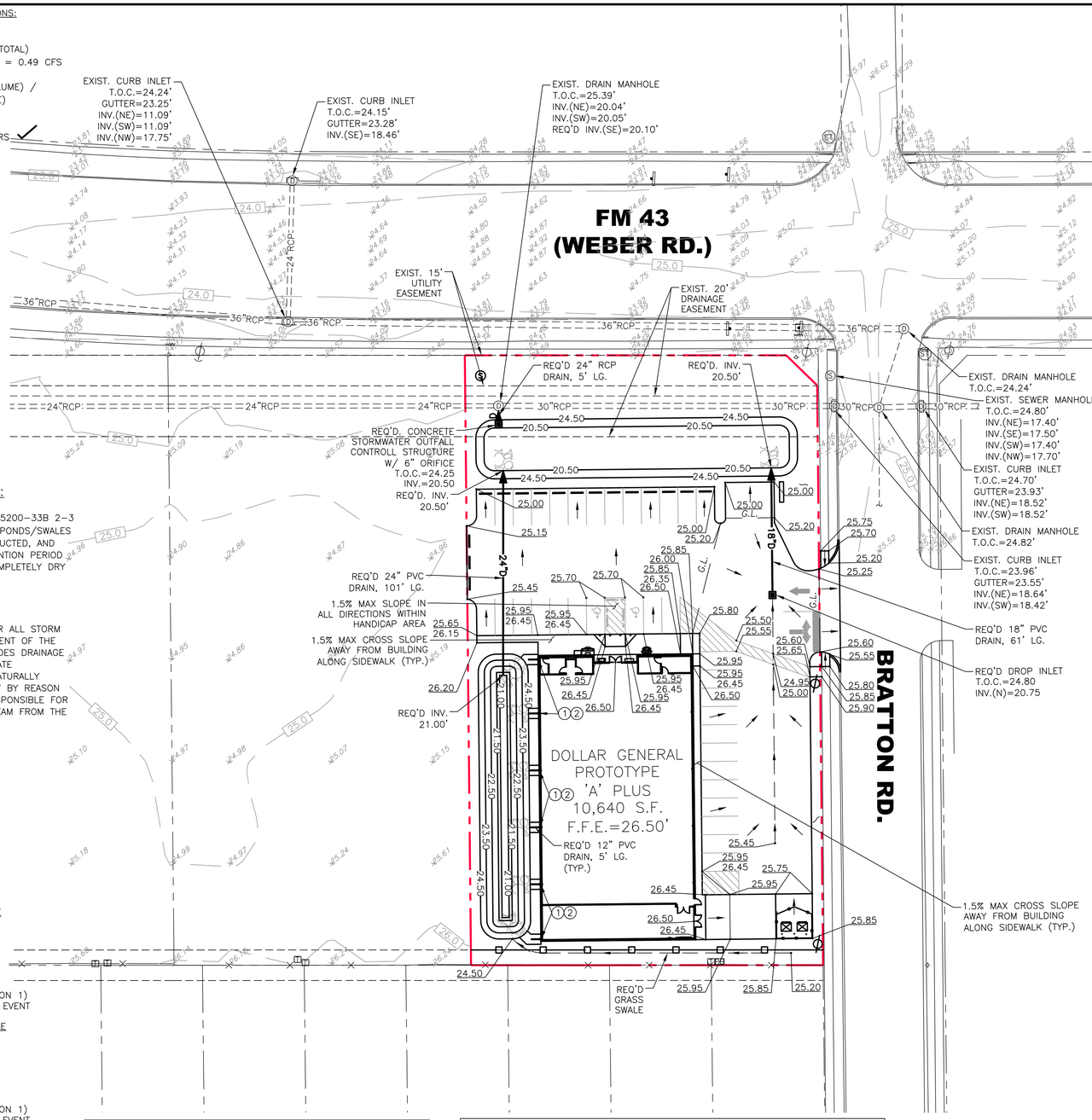
CONSTRUCTION LEGEND

1. SEE MEP DRAWINGS FOR UTILITY LOCATION
2. REQ'D MIN. 5' LONG, 4" PERFORATED LANDSCAPE PIPE STRAPPED TO A 12"X24" CONCRETE SPLASH BLOCK (SEE DETAIL 3, DWG. C–6A)

DETENTION POND DRAWDOWN TIME CALCULATIONS:

100–YR STORM MAX HGL = EL. 24.02 FT
100–YR STORM MAX VOLUME = 18,045 CF (TOTAL)
AVERAGE 100–YR FLOW THROUGH 6" ORIFICE = 0.49 CFS

DRAWDOWN TIME = (100–YR STORM MAX VOLUME) / (AVERAGE 100–YR FLOW THROUGH 6" ORIFICE)
DRAWDOWN TIME = 18,045 CF / 0.49 CFS
= 36,827 SEC
= 10.2 HOURS < 48 HOURS ✓



FAA ADVISORY CIRCULAR NOTE:

PURSUANT TO FAA ADVISORY CIRCULAR 150/5200–33B 2–3 SUB–SECTION B: "STORM WATER DETENTION PONDS/SWALES SHOULD BE DESIGNED, ENGINEERED, CONSTRUCTED, AND MAINTAINED FOR A MAXIMUM 48–HOUR DETENTION PERIOD AFTER THE DESIGN STORM AND REMAINS COMPLETELY DRY BETWEEN STORMS."

CORPUS CHRISTI NOTES:

THE DEVELOPER SHALL BE RESPONSIBLE FOR ALL STORM WATER DRAINAGE CAUSED BY THE DEVELOPMENT OF THE PROPERTY. THIS RESPONSIBILITY ALSO INCLUDES DRAINAGE DIRECTED TO THAT PROPERTY BY THE ULTIMATE DEVELOPMENT AS WELL AS THE DRAINAGE NATURALLY FLOWING ONTO THE THROUGH THE PROPERTY BY REASON OF TOPOGRAPHY. THE OWNER SHALL BE RESPONSIBLE FOR ANY SILT OR SOILS TRANSPORTED DOWNSTREAM FROM THE PROPERTY BY DRAINAGE.

PERIMETER SWALE CAPACITY:

SECTION 1 CAPACITY
$V = (1.486/N)*(R_H)^{2/3}*S^{1/2}$
N = 0.025
$R_H = A/P_W$ = 7.54 FT^2 / 11.07 FT
= 0.68 FT
S = 0.00504 FT/FT
Q = VA

$V = (1.486/0.025)*(0.68)^{2/3}*(0.00504)^{1/2}$
V = 3.26 FT/S
Q = 3.26 * 7.54 = 24.58 CFS

25 YEAR DESIGN FLOW TO PERIMETER SWALE

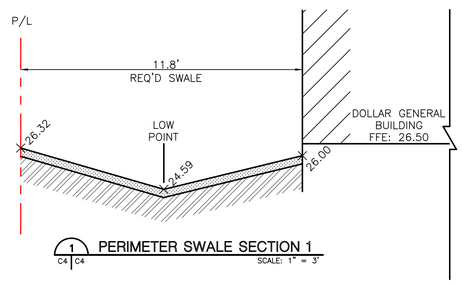
Q = C*I*A
C = 0.30
I = 9.37 IN/HR
A = 0.039 AC.

Q = 0.30*9.37*0.039
Q = 0.11 CFS ⟶ PERIMETER SWALE (SECTION 1) HAS CAPACITY TO HANDLE 25 YEAR STORM EVENT

100 YEAR DESIGN FLOW TO PERIMETER SWALE

Q = C*I*A
C = 0.30
I = 11.90 IN/HR
A = 0.039 AC.

Q = 0.30*11.90*0.039
Q = 0.14 CFS ⟶ PERIMETER SWALE (SECTION 1) HAS CAPACITY TO HANDLE 100 YEAR STORM EVENT



1 C4 PERIMETER SWALE SECTION 1 C4 SCALE: 1" = 3'

SUMMARY OF DETENTION ANALYSIS:

THE DETENTION POND AND RESTRICTOR ORIFICE AS DESIGNED ARE SUFFICIENT TO PREVENT THE TOTAL POST–DEVELOPED PEAK FLOWS FROM EXCEEDING THE PRE–DEVELOPED PEAK RUNOFF RATES FOR THE 5 YEAR, 10 YEAR, 25 YEAR, AND 100 YEAR DESIGN STORM FREQUENCIES. TWO DETENTION PONDS WITH A COMBINED STORAGE VOLUME OF ±21,664 C.F. (3.50' TO 4.00' DEEP) WITH A 6" INCH ORIFICE WILL BE PROVIDED TO MEET THESE REQUIREMENTS.

PRE–DEVELOPED RUNOFF VALUES

STORM EVENT	COMPOSITE C	INTENSITY (IN/HR)	AREA (ACRE)	Q (CFS)
5 YEAR	0.30	4.07	1.188	1.45
10 YEAR	0.30	4.79	1.188	1.71
25 YEAR	0.30	5.75	1.188	2.05
100 YEAR	0.30	7.25	1.188	2.59

FLOW RATE VALUES (PRIOR TO DETENTION)

STORM EVENT	PREDEVELOPED RUNOFF (CFS)	POST–DEVELOPED RUNOFF (PRIOR TO DETENTION) (CFS)	INCREASE IN OVERALL RUNOFF FROM PREDEVELOPED TO POST–DEVELOPED (CFS)
5 YEAR	1.45	5.77	4.32
10 YEAR	1.71	6.83	5.12
25 YEAR	2.05	8.24	6.19
100 YEAR	2.59	10.48	7.89

POST–DEVELOPED RUNOFF VALUES (PRIOR TO DETENTION)

DRAINAGE AREA		COMPOSITE C	INTENSITY$_{5YR}$ (IN/HR)	Q$_{5YR}$ (CFS)	INTENSITY$_{10YR}$ (IN/HR)	Q$_{10YR}$ (CFS)	INTENSITY$_{25YR}$ (IN/HR)	Q$_{25YR}$ (CFS)	INTENSITY$_{100YR}$ (IN/HR)	Q$_{100YR}$ (CFS)
DA 1	0.410	0.75	6.56	2.02	7.76	2.39	9.37	2.88	11.90	3.66
DA 2	0.261	0.90	6.56	1.54	7.76	1.82	9.37	2.20	11.90	2.80
DA 3	0.467	0.69	6.56	2.11	7.76	2.50	9.37	3.02	11.90	3.84
DA 4	0.050	0.30	6.56	0.10	7.76	0.12	9.37	0.14	11.90	0.18
TOTAL	1.188	0.74	VARIES	5.77	VARIES	6.83	VARIES	8.24	VARIES	10.48

FLOW RATE VALUES (WITH DETENTION)

STORM EVENT	PREDEVELOPED RUNOFF (CFS)	POST–DEVELOPED RUNOFF (WITH DETENTION) (CFS)	REDUCTION IN OVERALL RUNOFF FROM PREDEVELOPED TO POST–DEVELOPED (CFS)
5 YEAR	1.45	1.40	0.05
10 YEAR	1.71	1.56	0.15
25 YEAR	2.05	1.69	0.36
100 YEAR	2.59	1.94	0.65

GRADING & DRAINAGE PLAN

24" x 36" SCALE: 1" = 30'

LINFIELD, HUNTER & JUNIUS, INC.
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T.B.P.E. FIRM NO. 11654

SEAL
STATE OF TEXAS
CASEY M. GENOVESE
112246
LICENSED
PROFESSIONAL ENGINEER
11/27/24

REV. NO.	DATE
1	10/02/24
2	11/27/24

DEVELOPER:
THE OVERLAND GROUP
1906 EAST BATTLEFIELD
SPRINGFIELD, MO 65804

TEL: (417) 293–3332

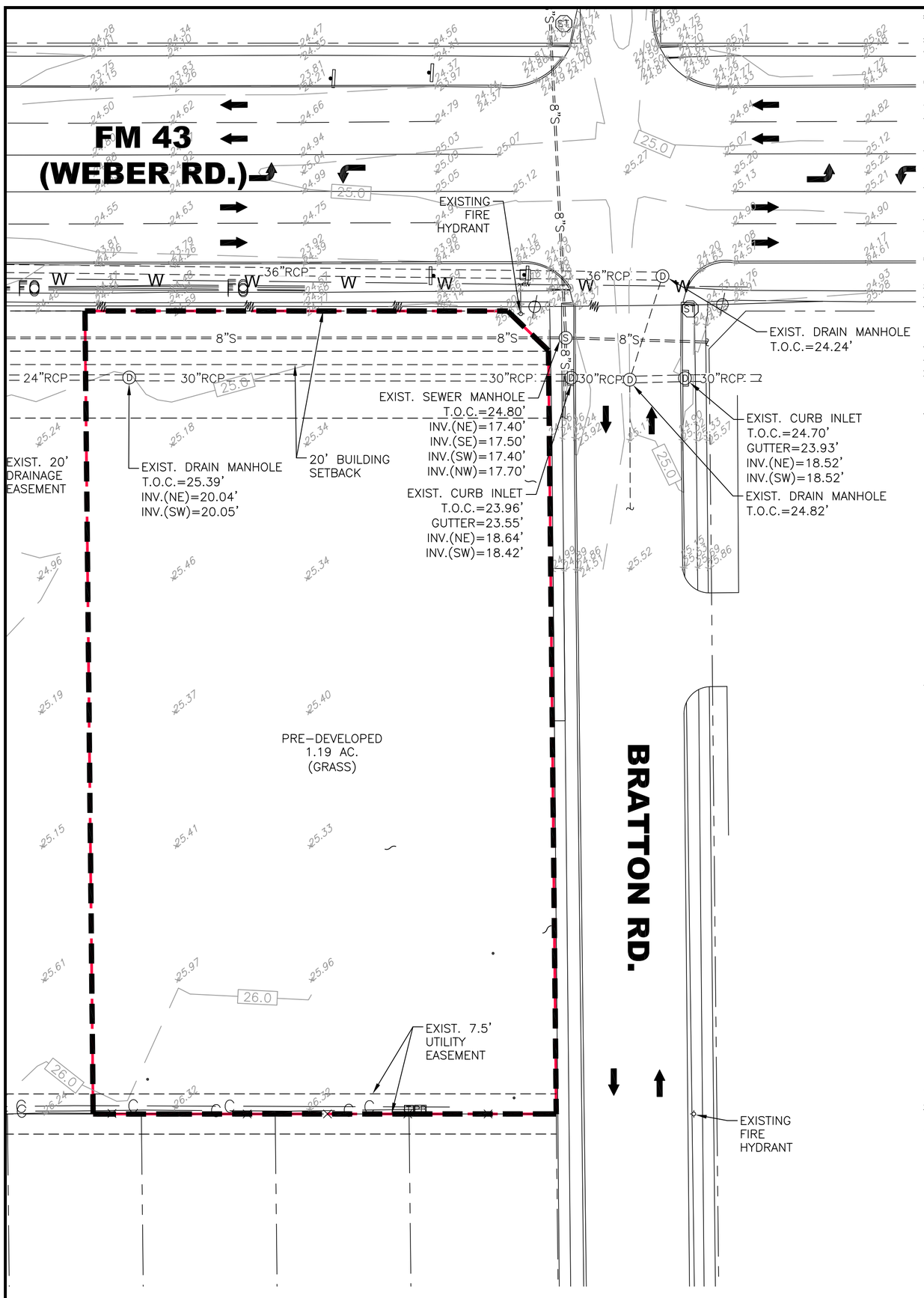
DOLLAR GENERAL
10,640 SQ. FT.
STORE NUMBER: 31090
FM 43 (WEBER RD.) & BRATTON RD.
CORPUS CHRISTI
(NUECES COUNTY), TX

DOLLAR GENERAL – FM 43 (WEBER RD.) & BRATTON RD.
CORPUS CHRISTI (NUECES COUNTY), TX

THIS SHEET: GRADING & DRAINAGE PLAN

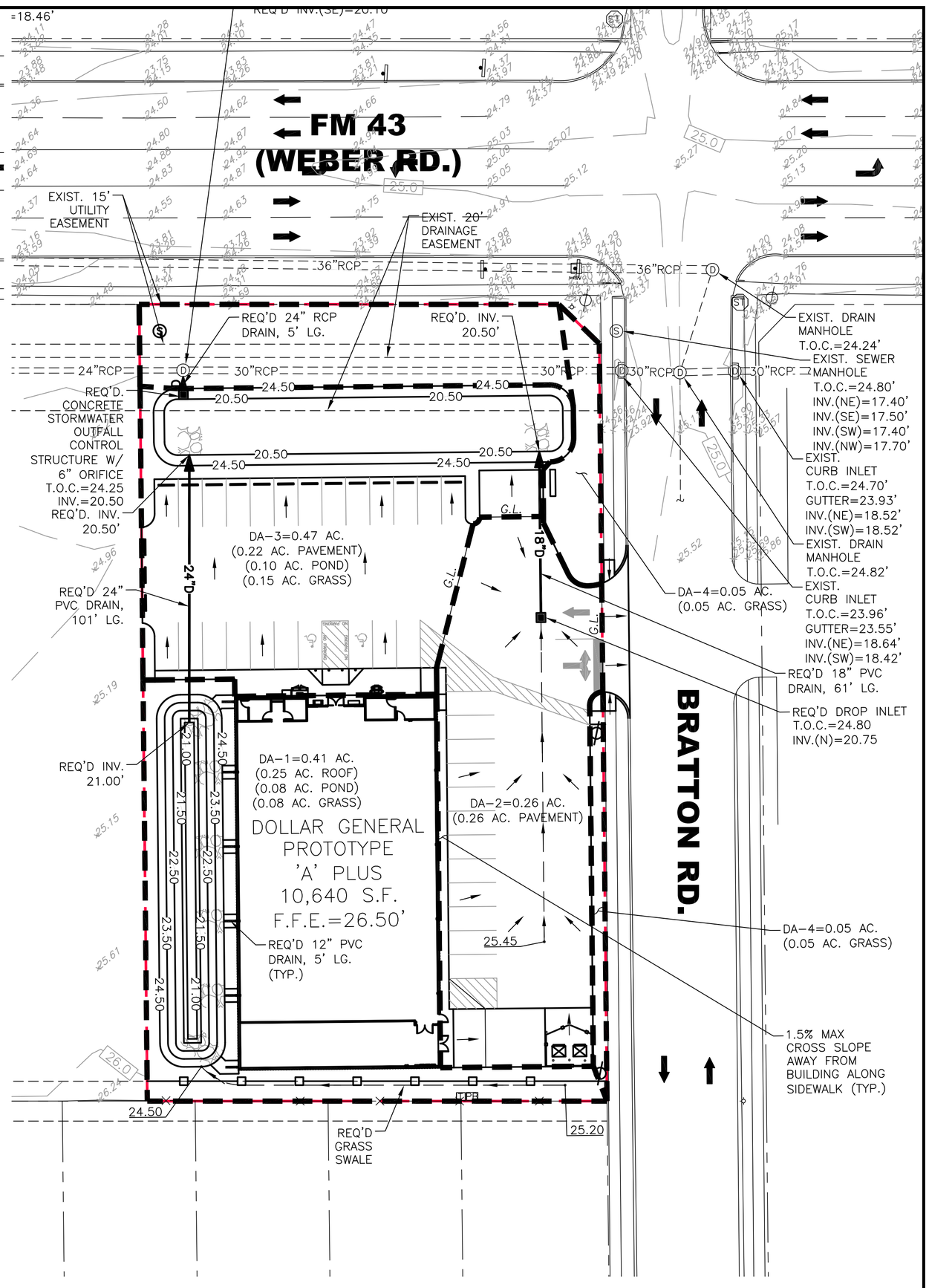
PROJ. NO. 24–065
DATE 07/09/24

C–4



PRE-DEVELOPED PLAN AREA

24"X36" SCALE: 1" = 30'



POST-DEVELOPED PLAN AREA

24"X36" SCALE: 1" = 30'

STATE OF TEXAS
CASEY M. GENOVESE
112246
LICENSED
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FLOW RATE VALUES (PRIOR TO DETENTION)			
STORM EVENT	PREDEVELOPED RUNOFF (CFS)	POST-DEVELOPED RUNOFF (PRIOR TO DETENTION) (CFS)	INCREASE IN OVERALL RUNOFF FROM PREDEVELOPED TO POST-DEVELOPED (CFS)
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100 YEAR	2.59	10.48	7.89

POST-DEVELOPED RUNOFF VALUES (PRIOR TO DETENTION)										
DRAINAGE AREA		COMPOSITE C	$INTENSITY_{5YR}$ (IN/HR)	Q_{5YR} (CFS)	$INTENSITY_{10YR}$ (IN/HR)	Q_{10YR} (CFS)	$INTENSITY_{25YR}$ (IN/HR)	Q_{25YR} (CFS)	$INTENSITY_{100YR}$ (IN/HR)	Q_{100YR} (CFS)
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TOTAL	1.188	0.74	VARIES	5.77	VARIES	6.83	VARIES	8.24	VARIES	10.48

FLOW RATE VALUES (WITH DETENTION)			
STORM EVENT	PREDEVELOPED RUNOFF (CFS)	POST-DEVELOPED RUNOFF (WITH DETENTION) (CFS)	REDUCTION IN OVERALL RUNOFF FROM PREDEVELOPED TO POST-DEVELOPED (CFS)
5 YEAR	1.45	1.40	0.05
10 YEAR	1.71	1.56	0.15
25 YEAR	2.05	1.69	0.36
100 YEAR	2.59	1.94	0.65

1 OF 1

DATE 11/27/24

PROJ. NO. 24-065

DOLLAR GENERAL - FM 43 (WEBER RD.) & BRATTON RD.
CORPUS CHRISTI (NUECES COUNTY), TX

THIS SHEET:
FIGURE 1 - DRAINAGE AREA PLAN

REV. NO. | DATE

SEAL

LINFIELD, HUNTER & JUNIUS, INC.
PROFESSIONAL ENGINEERS, ARCHITECTS AND SURVEYORS
3608 18th Street, Suite 200
Metairie, Louisiana 70002
T.B.P.E. FIRM NO. 11654
PHONE: (504) 833-5300
FAX: (504) 833-5350

NOAA Atlas 14, Volume 11, Version 2
Location name: Corpus Christi, Texas, USA*
Latitude: 27.6922°, Longitude: -97.4164°
Elevation: 25 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Annual exceedance probability (1/years)								
	1/2	1/5	1/10	1/25	1/50	1/100	1/200	1/500	1/1000
5-min	**0.527** (0.400-0.690)	**0.688** (0.524-0.901)	**0.812** (0.610-1.08)	**0.980** (0.715-1.35)	**1.11** (0.790-1.57)	**1.25** (0.859-1.81)	**1.38** (0.925-2.05)	**1.55** (1.01-2.38)	**1.68** (1.06-2.65)
10-min	**0.837** (0.635-1.10)	**1.09** (0.833-1.43)	**1.29** (0.971-1.72)	**1.56** (1.14-2.15)	**1.78** (1.26-2.52)	**1.99** (1.37-2.88)	**2.19** (1.47-3.26)	**2.45** (1.59-3.77)	**2.64** (1.67-4.17)
15-min	**1.06** (0.806-1.39)	**1.38** (1.05-1.81)	**1.63** (1.22-2.16)	**1.96** (1.43-2.69)	**2.22** (1.58-3.14)	**2.48** (1.71-3.60)	**2.74** (1.84-4.07)	**3.08** (2.00-4.73)	**3.33** (2.10-5.26)
30-min	**1.51** (1.15-1.98)	**1.96** (1.49-2.56)	**2.30** (1.73-3.06)	**2.76** (2.01-3.79)	**3.12** (2.21-4.40)	**3.48** (2.40-5.04)	**3.84** (2.58-5.72)	**4.33** (2.81-6.67)	**4.70** (2.98-7.43)
60-min	**1.98** (1.50-2.59)	**2.58** (1.97-3.38)	**3.05** (2.29-4.06)	**3.68** (2.68-5.05)	**4.17** (2.96-5.89)	**4.68** (3.23-6.78)	**5.20** (3.50-7.74)	**5.92** (3.85-9.13)	**6.49** (4.10-10.2)
2-hr	**2.41** (1.84-3.12)	**3.23** (2.47-4.19)	**3.87** (2.93-5.11)	**4.76** (3.49-6.49)	**5.48** (3.90-7.67)	**6.24** (4.33-8.97)	**7.06** (4.76-10.4)	**8.22** (5.36-12.5)	**9.16** (5.82-14.3)
3-hr	**2.66** (2.03-3.42)	**3.62** (2.77-4.67)	**4.38** (3.32-5.77)	**5.46** (4.02-7.42)	**6.34** (4.54-8.85)	**7.31** (5.08-10.4)	**8.36** (5.65-12.2)	**9.87** (6.44-15.0)	**11.1** (7.07-17.2)
6-hr	**3.09** (2.36-3.92)	**4.30** (3.32-5.50)	**5.29** (4.04-6.91)	**6.71** (4.97-9.05)	**7.89** (5.68-10.9)	**9.21** (6.43-13.0)	**10.7** (7.24-15.5)	**12.8** (8.39-19.2)	**14.6** (9.30-22.3)
12-hr	**3.54** (2.72-4.44)	**5.01** (3.88-6.36)	**6.22** (4.78-8.07)	**8.00** (5.97-10.7)	**9.51** (6.89-13.1)	**11.2** (7.87-15.7)	**13.1** (8.92-18.8)	**15.8** (10.4-23.5)	**18.1** (11.6-27.5)
24-hr	**4.01** (3.09-4.98)	**5.76** (4.49-7.25)	**7.22** (5.58-9.30)	**9.37** (7.04-12.5)	**11.2** (8.17-15.3)	**13.3** (9.37-18.4)	**15.6** (10.7-22.1)	**18.9** (12.5-27.7)	**21.6** (13.9-32.4)
2-day	**4.47** (3.47-5.52)	**6.60** (5.19-8.26)	**8.36** (6.50-10.7)	**10.9** (8.23-14.4)	**13.0** (9.56-17.6)	**15.4** (10.9-21.2)	**18.0** (12.4-25.3)	**21.8** (14.4-31.5)	**24.8** (16.0-36.7)
3-day	**4.78** (3.73-5.89)	**7.10** (5.60-8.84)	**8.99** (7.02-11.4)	**11.7** (8.88-15.4)	**14.0** (10.3-18.8)	**16.5** (11.8-22.6)	**19.3** (13.3-26.9)	**23.2** (15.4-33.3)	**26.3** (17.0-38.7)
4-day	**5.07** (3.98-6.25)	**7.51** (5.95-9.34)	**9.47** (7.42-12.0)	**12.3** (9.30-16.0)	**14.6** (10.7-19.5)	**17.1** (12.2-23.3)	**19.9** (13.7-27.6)	**23.9** (15.9-34.2)	**27.1** (17.6-39.6)
7-day	**5.80** (4.60-7.16)	**8.40** (6.71-10.4)	**10.5** (8.23-13.2)	**13.3** (10.1-17.2)	**15.6** (11.5-20.6)	**18.1** (12.9-24.4)	**20.8** (14.5-28.7)	**24.9** (16.7-35.4)	**28.3** (18.4-41.0)
10-day	**6.37** (5.09-7.87)	**9.11** (7.31-11.3)	**11.2** (8.88-14.1)	**14.2** (10.7-18.2)	**16.4** (12.1-21.5)	**18.8** (13.5-25.3)	**21.6** (15.1-29.7)	**25.8** (17.3-36.4)	**29.3** (19.1-42.1)
20-day	**7.85** (6.34-9.67)	**11.0** (8.90-13.6)	**13.4** (10.6-16.7)	**16.6** (12.7-21.1)	**19.0** (14.1-24.7)	**21.5** (15.5-28.7)	**24.4** (17.1-33.1)	**28.4** (19.2-39.7)	**31.8** (20.8-45.2)
30-day	**9.04** (7.33-11.1)	**12.5** (10.2-15.4)	**15.1** (12.1-18.8)	**18.6** (14.2-23.5)	**21.1** (15.7-27.4)	**23.8** (17.2-31.5)	**26.7** (18.7-36.0)	**30.7** (20.7-42.5)	**33.9** (22.2-47.8)
45-day	**10.7** (8.75-13.2)	**14.7** (12.0-18.0)	**17.6** (14.1-21.8)	**21.4** (16.5-27.0)	**24.2** (18.1-31.2)	**27.0** (19.6-35.5)	**30.0** (21.1-40.2)	**34.0** (23.0-46.8)	**37.2** (24.4-52.1)
60-day	**12.2** (10.0-15.0)	**16.6** (13.6-20.2)	**19.8** (15.9-24.4)	**23.9** (18.5-30.1)	**27.0** (20.2-34.6)	**29.9** (21.8-39.2)	**33.0** (23.3-44.1)	**37.1** (25.2-50.8)	**40.3** (26.5-56.1)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of annual maxima series (AMS).

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

Please refer to NOAA Atlas 14 document for more information.

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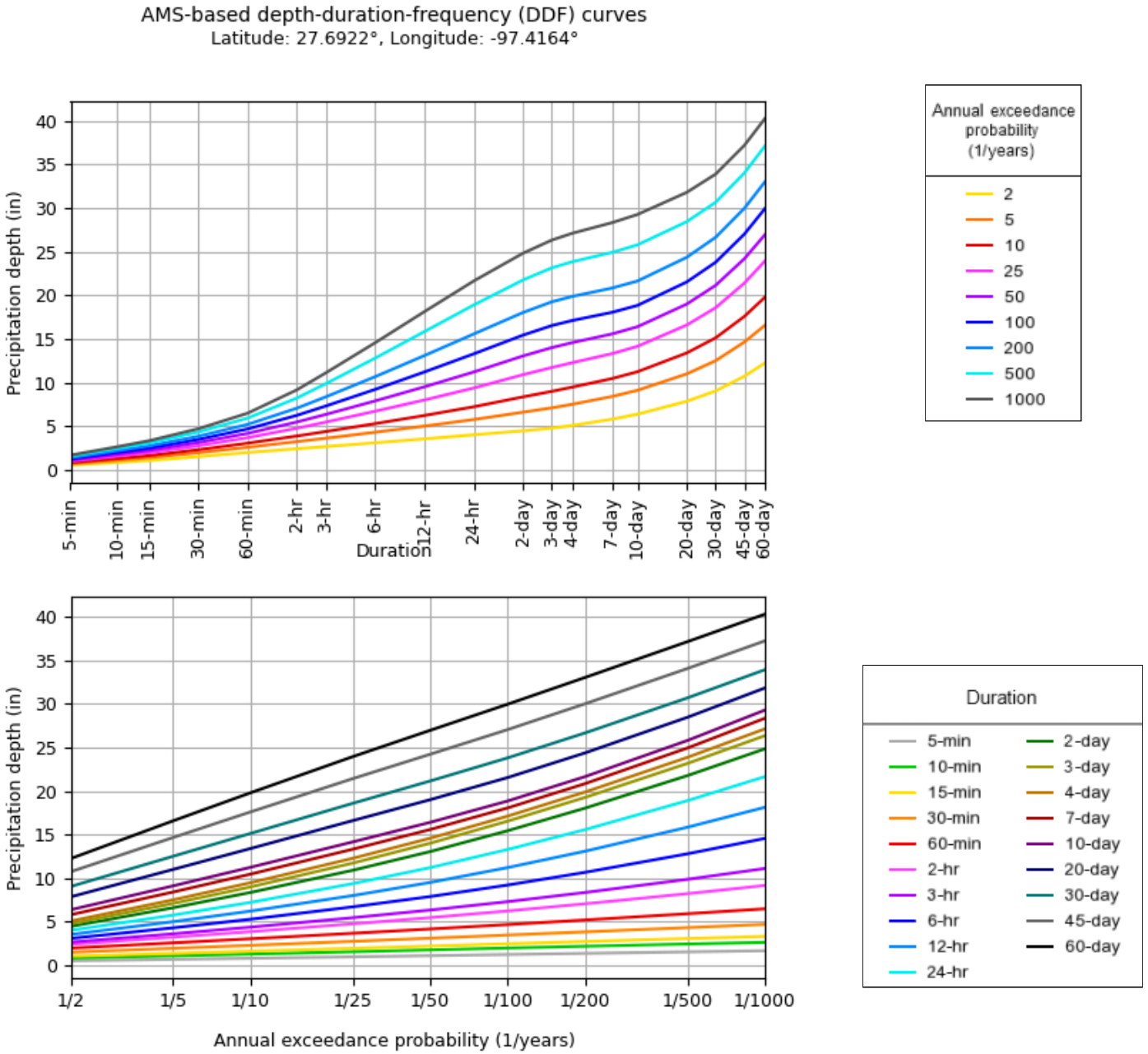
PF graphical



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Maps & aerials

Small scale terrain

NOAA Atlas 14, Volume 11, Version 2
Location name: Corpus Christi, Texas, USA*
Latitude: 27.6922°, Longitude: -97.4164°
Elevation: 25 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Annual exceedance probability (1/years)								
	1/2	1/5	1/10	1/25	1/50	1/100	1/200	1/500	1/1000
5-min	**6.32** (4.80-8.28)	**8.26** (6.29-10.8)	**9.74** (7.32-13.0)	**11.8** (8.58-16.2)	**13.3** (9.48-18.9)	**15.0** (10.3-21.7)	**16.5** (11.1-24.6)	**18.6** (12.1-28.6)	**20.1** (12.7-31.8)
10-min	**5.02** (3.81-6.57)	**6.56** (5.00-8.60)	**7.76** (5.83-10.3)	**9.37** (6.85-12.9)	**10.7** (7.58-15.1)	**11.9** (8.23-17.3)	**13.2** (8.83-19.6)	**14.7** (9.54-22.6)	**15.8** (10.0-25.0)
15-min	**4.24** (3.22-5.56)	**5.52** (4.20-7.23)	**6.50** (4.89-8.66)	**7.83** (5.72-10.8)	**8.88** (6.30-12.6)	**9.93** (6.85-14.4)	**11.0** (7.36-16.3)	**12.3** (7.99-18.9)	**13.3** (8.42-21.0)
30-min	**3.02** (2.30-3.96)	**3.91** (2.98-5.13)	**4.60** (3.45-6.12)	**5.52** (4.02-7.58)	**6.23** (4.42-8.80)	**6.96** (4.80-10.1)	**7.69** (5.16-11.4)	**8.66** (5.62-13.3)	**9.40** (5.95-14.9)
60-min	**1.98** (1.50-2.59)	**2.58** (1.97-3.38)	**3.05** (2.29-4.06)	**3.68** (2.68-5.05)	**4.17** (2.96-5.89)	**4.68** (3.23-6.78)	**5.20** (3.50-7.74)	**5.92** (3.85-9.13)	**6.49** (4.10-10.2)
2-hr	**1.21** (0.919-1.56)	**1.61** (1.24-2.10)	**1.94** (1.46-2.56)	**2.38** (1.74-3.25)	**2.74** (1.95-3.84)	**3.12** (2.16-4.48)	**3.53** (2.38-5.20)	**4.11** (2.68-6.27)	**4.58** (2.91-7.16)
3-hr	**0.886** (0.675-1.14)	**1.20** (0.923-1.56)	**1.46** (1.11-1.92)	**1.82** (1.34-2.47)	**2.11** (1.51-2.95)	**2.43** (1.69-3.48)	**2.78** (1.88-4.07)	**3.28** (2.15-4.98)	**3.70** (2.35-5.74)
6-hr	**0.516** (0.394-0.654)	**0.718** (0.553-0.919)	**0.883** (0.674-1.15)	**1.12** (0.829-1.51)	**1.32** (0.948-1.82)	**1.54** (1.07-2.18)	**1.78** (1.21-2.58)	**2.14** (1.40-3.20)	**2.43** (1.55-3.73)
12-hr	**0.294** (0.225-0.368)	**0.415** (0.322-0.527)	**0.516** (0.396-0.669)	**0.664** (0.495-0.889)	**0.789** (0.571-1.08)	**0.930** (0.653-1.30)	**1.09** (0.740-1.56)	**1.31** (0.864-1.95)	**1.50** (0.964-2.28)
24-hr	**0.167** (0.128-0.207)	**0.240** (0.187-0.302)	**0.300** (0.232-0.387)	**0.390** (0.293-0.519)	**0.467** (0.340-0.636)	**0.553** (0.390-0.768)	**0.648** (0.444-0.919)	**0.787** (0.519-1.15)	**0.901** (0.580-1.35)
2-day	**0.093** (0.072-0.114)	**0.137** (0.108-0.171)	**0.174** (0.135-0.222)	**0.227** (0.171-0.299)	**0.271** (0.199-0.367)	**0.321** (0.227-0.442)	**0.375** (0.258-0.527)	**0.453** (0.300-0.656)	**0.517** (0.334-0.765)
3-day	**0.066** (0.051-0.081)	**0.098** (0.077-0.122)	**0.124** (0.097-0.158)	**0.162** (0.123-0.213)	**0.194** (0.142-0.261)	**0.229** (0.163-0.313)	**0.267** (0.184-0.373)	**0.321** (0.213-0.462)	**0.365** (0.236-0.537)
4-day	**0.052** (0.041-0.065)	**0.078** (0.061-0.097)	**0.098** (0.077-0.125)	**0.127** (0.096-0.167)	**0.151** (0.111-0.202)	**0.178** (0.126-0.242)	**0.207** (0.143-0.287)	**0.248** (0.165-0.355)	**0.282** (0.183-0.413)
7-day	**0.034** (0.027-0.042)	**0.050** (0.039-0.062)	**0.062** (0.048-0.078)	**0.079** (0.060-0.102)	**0.092** (0.068-0.122)	**0.107** (0.076-0.145)	**0.124** (0.086-0.171)	**0.148** (0.099-0.210)	**0.168** (0.109-0.244)
10-day	**0.026** (0.021-0.032)	**0.037** (0.030-0.047)	**0.046** (0.036-0.058)	**0.058** (0.044-0.075)	**0.068** (0.050-0.089)	**0.078** (0.056-0.105)	**0.090** (0.062-0.123)	**0.107** (0.072-0.151)	**0.121** (0.079-0.175)
20-day	**0.016** (0.013-0.020)	**0.022** (0.018-0.028)	**0.027** (0.022-0.034)	**0.034** (0.026-0.043)	**0.039** (0.029-0.051)	**0.044** (0.032-0.059)	**0.050** (0.035-0.068)	**0.059** (0.039-0.082)	**0.066** (0.043-0.094)
30-day	**0.012** (0.010-0.015)	**0.017** (0.014-0.021)	**0.020** (0.016-0.026)	**0.025** (0.019-0.032)	**0.029** (0.021-0.037)	**0.033** (0.023-0.043)	**0.036** (0.025-0.049)	**0.042** (0.028-0.058)	**0.047** (0.030-0.066)
45-day	**0.009** (0.008-0.012)	**0.013** (0.011-0.016)	**0.016** (0.013-0.020)	**0.019** (0.015-0.024)	**0.022** (0.016-0.028)	**0.025** (0.018-0.032)	**0.027** (0.019-0.037)	**0.031** (0.021-0.043)	**0.034** (0.022-0.048)
60-day	**0.008** (0.006-0.010)	**0.011** (0.009-0.014)	**0.013** (0.011-0.016)	**0.016** (0.012-0.020)	**0.018** (0.013-0.023)	**0.020** (0.015-0.027)	**0.022** (0.016-0.030)	**0.025** (0.017-0.035)	**0.027** (0.018-0.038)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of annual maxima series (AMS).

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

Please refer to NOAA Atlas 14 document for more information.

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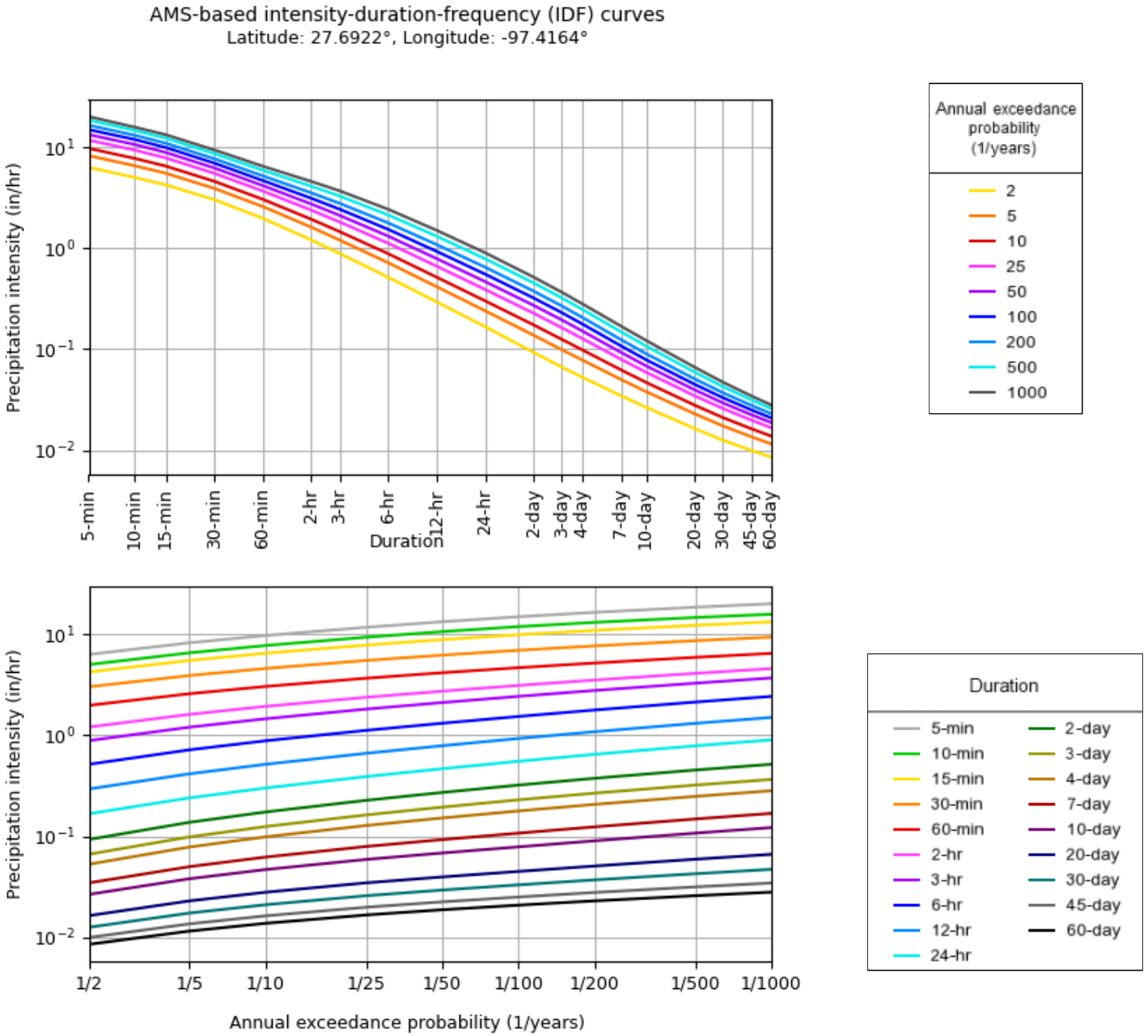
PF graphical



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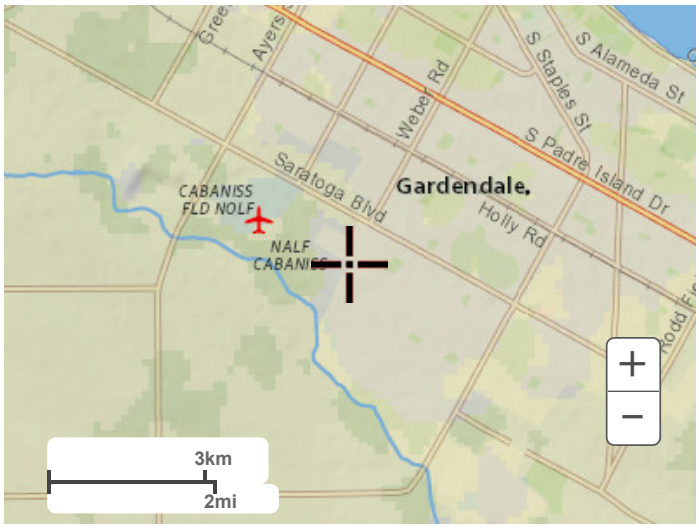
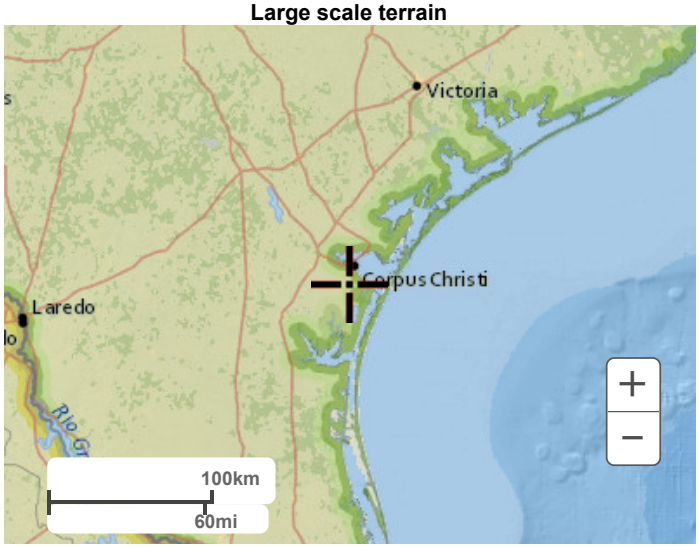
Maps & aerials

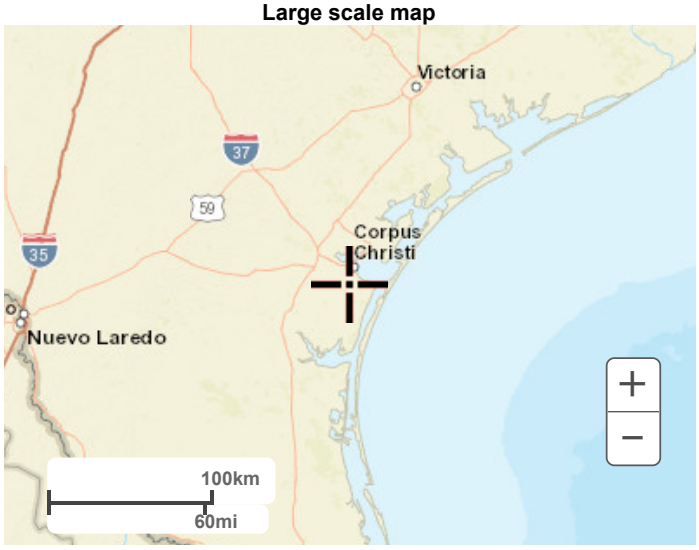
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

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

Disclaimer

5-YEAR

Project Description

File Name	24-065 RATIONAL METHOD.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Nov 04, 2024	00:00:00
End Analysis On	Nov 05, 2024	00:00:00
Start Reporting On	Nov 04, 2024	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	5
Nodes	3
Junctions	0
Outfalls	3
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	0
Channels	0
Pipes	0
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	5 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	POST-DEVELOPED_DA-1	0.41	0.7500	1.09	0.82	0.34	2.02	0 00:10:00
2	POST-DEVELOPED_DA-2	0.26	0.9000	1.09	0.98	0.26	1.54	0 00:10:00
3	POST-DEVELOPED_DA-3	0.47	0.6900	1.09	0.75	0.35	2.11	0 00:10:00
4	POST-DEVELOPED_DA-4	0.05	0.3000	1.09	0.33	0.02	0.10	0 00:10:00
5	PRE-DEVELOPED-DA	1.19	0.3000	1.88	0.56	0.67	1.45	0 00:27:41

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	POST-DETAINED-OUTFALL	Outfall	0.00					0.00	0.00					
2	POST-UNDETAINED-OUTFALL	Outfall	0.00					0.00	0.00					
3	PRE-DEVELOPED-OUTFALL	Outfall	0.00					0.00	0.00					

Subbasin Hydrology

Subbasin : POST-DEVELOPED_DA-1

Input Data

Area (ac) 0.41
Weighted Runoff Coefficient 0.7500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
ROOF	0.25	D	0.90
POND	0.08	D	0.75
PAVEMENT	0.00	D	0.90
GRASS	0.08	D	0.30
Composite Area & Weighted Runoff Coeff.	0.41		0.75

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

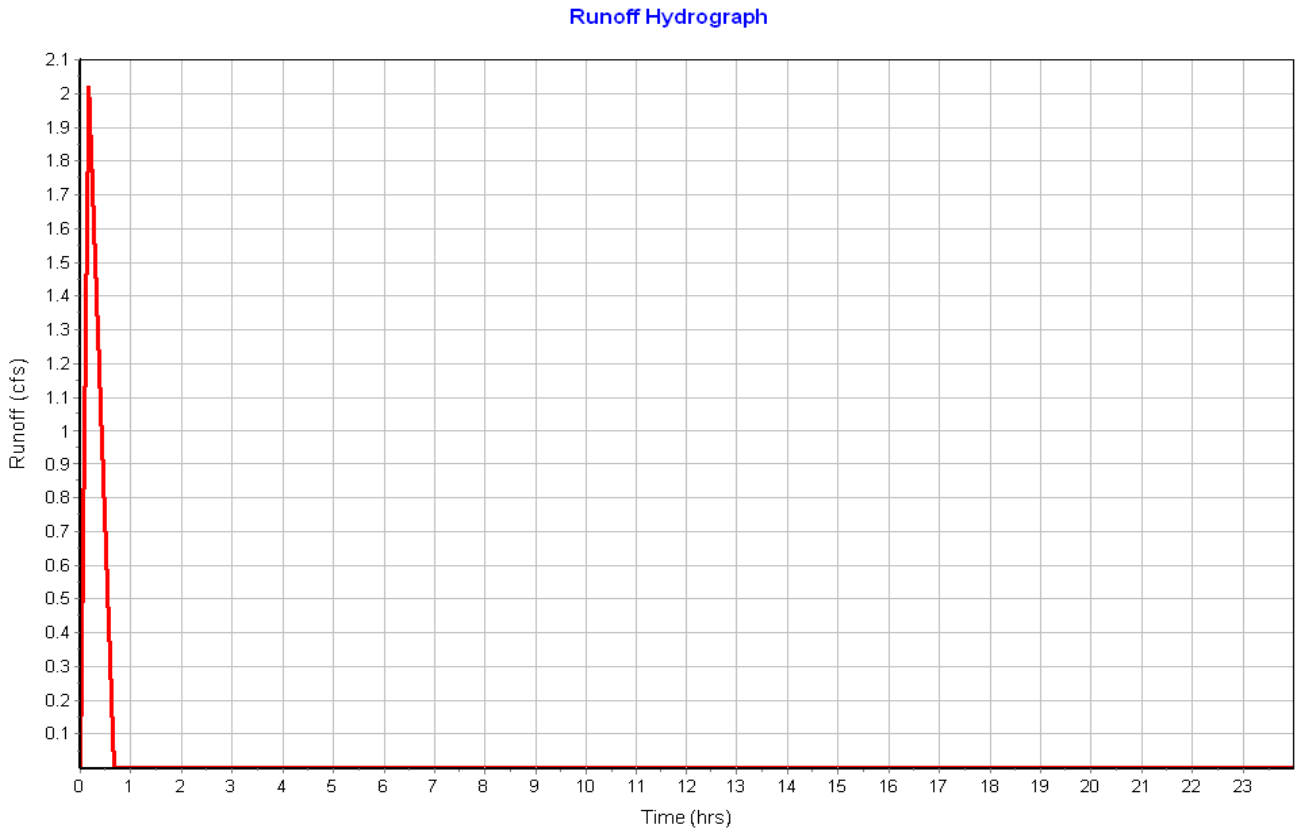
Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

User-Defined TOC override (minutes): 10

Subbasin Runoff Results

Total Rainfall (in) 1.09
Total Runoff (in) 0.82
Peak Runoff (cfs) 2.02
Rainfall Intensity 6.560
Weighted Runoff Coefficient 0.7500
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-1



Subbasin : POST-DEVELOPED_DA-2

Input Data

Area (ac) 0.26
Weighted Runoff Coefficient 0.9000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
PAVEMENT	0.26	D	0.90
Composite Area & Weighted Runoff Coeff.	0.26		0.90

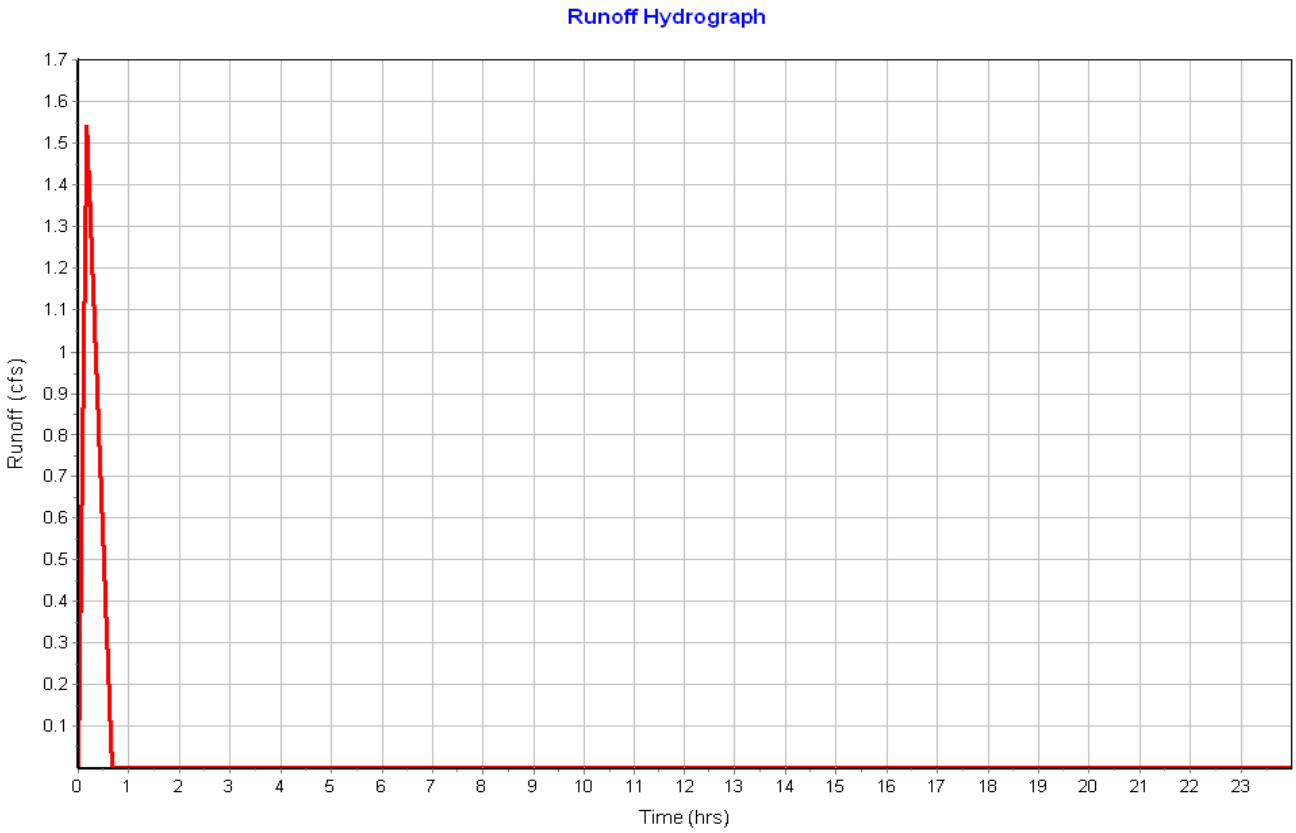
Time of Concentration

User-Defined TOC override (minutes): 10

Subbasin Runoff Results

Total Rainfall (in) 1.09
Total Runoff (in) 0.98
Peak Runoff (cfs) 1.54
Rainfall Intensity 6.560
Weighted Runoff Coefficient 0.9000
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-2



Subbasin : POST-DEVELOPED_DA-3

Input Data

Area (ac) 0.47
Weighted Runoff Coefficient 0.6900

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
PAVEMENT	0.22	D	0.90
POND	0.10	D	0.75
GRASS	0.14	D	0.30
Composite Area & Weighted Runoff Coeff.	0.46		0.69

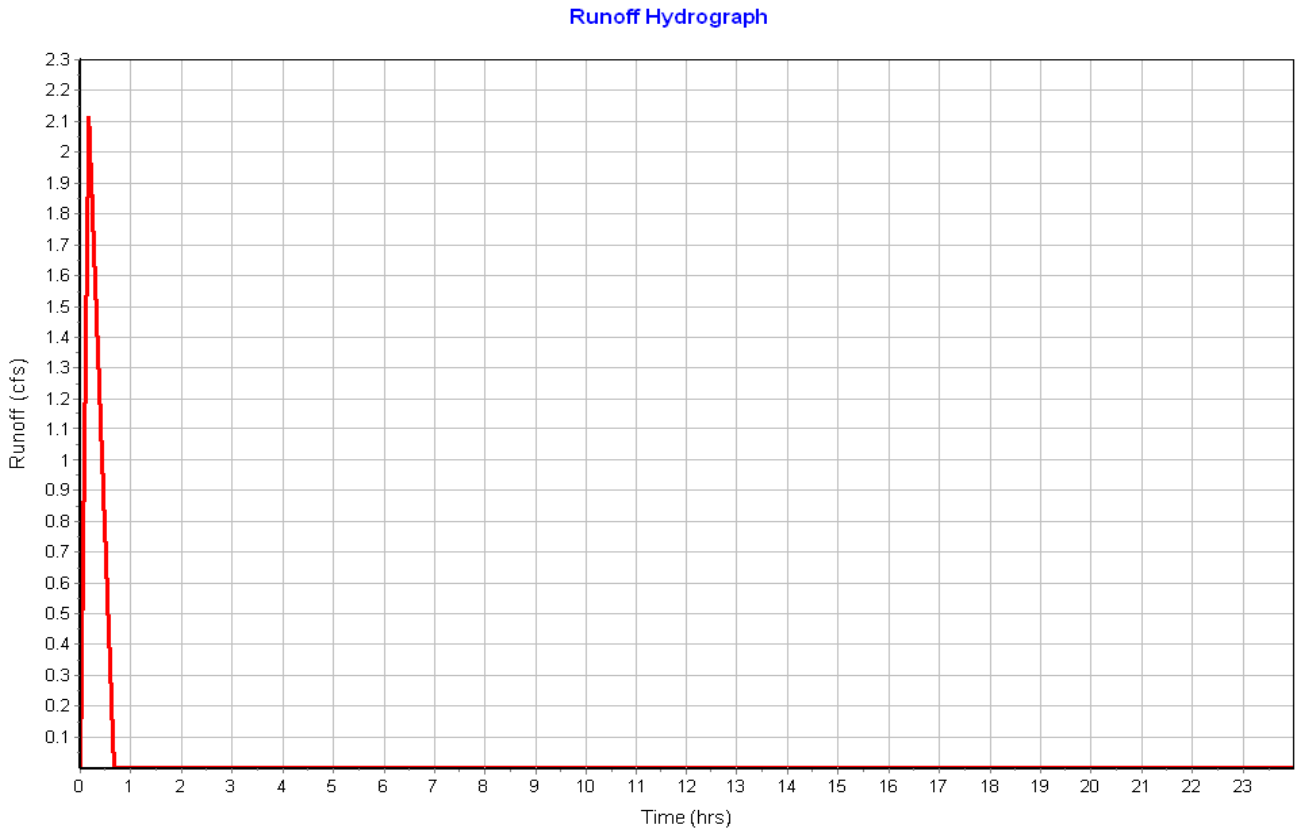
Time of Concentration

User-Defined TOC override (minutes): 10

Subbasin Runoff Results

Total Rainfall (in) 1.09
Total Runoff (in) 0.75
Peak Runoff (cfs) 2.11
Rainfall Intensity 6.560
Weighted Runoff Coefficient 0.6900
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-3



Subbasin : POST-DEVELOPED_DA-4

Input Data

Area (ac) 0.05
Weighted Runoff Coefficient 0.3000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
GRASS	0.05	D	0.30
Composite Area & Weighted Runoff Coeff.	0.05		0.30

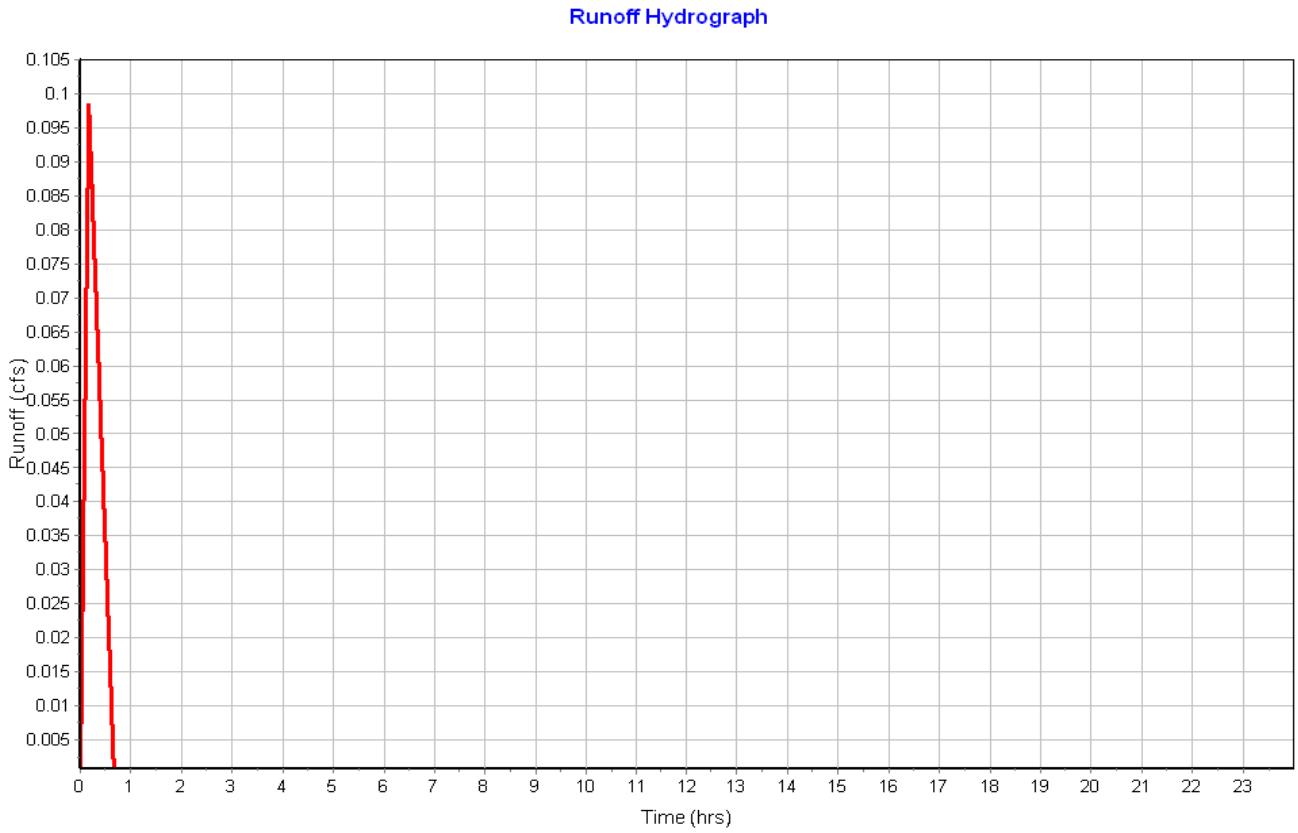
Time of Concentration

User-Defined TOC override (minutes): 10

Subbasin Runoff Results

Total Rainfall (in) 1.09
Total Runoff (in) 0.33
Peak Runoff (cfs) 0.10
Rainfall Intensity 6.560
Weighted Runoff Coefficient 0.3000
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-4



Subbasin : PRE-DEVELOPED-DA

Input Data

Area (ac) 1.19
Weighted Runoff Coefficient 0.3000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
GRASS	1.19	D	0.30
Composite Area & Weighted Runoff Coeff.	1.19		0.30

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.40	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	0.99	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.01	0.00	0.00
Velocity (ft/sec) :	0.07	0.00	0.00
Computed Flow Time (min) :	25.41	0.00	0.00

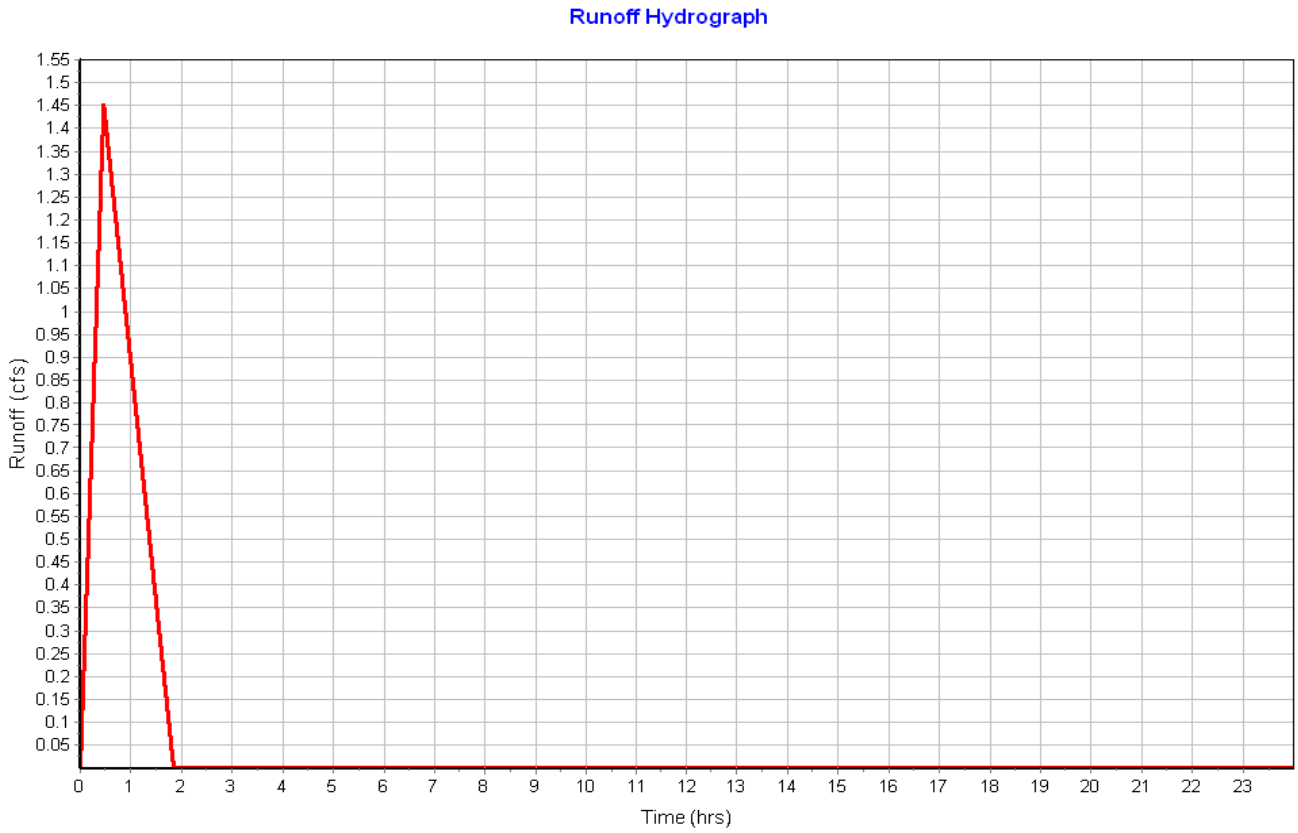
Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	98.41	0.00	0.00
Slope (%) :	0.2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	0.72	0.00	0.00
Computed Flow Time (min) :	2.28	0.00	0.00

Total TOC (min) 27.69

Subbasin Runoff Results

Total Rainfall (in) 1.88
Total Runoff (in) 0.56
Peak Runoff (cfs) 1.45
Rainfall Intensity 4.069
Weighted Runoff Coefficient 0.3000
Time of Concentration (days hh:mm:ss) 0 00:27:41

Subbasin : PRE-DEVELOPED-DA



10-YEAR

Project Description

File Name ..... 24-065 SCS METHOD.SPF

Project Options

Flow Units ..... CFS
Elevation Type ..... Elevation
Hydrology Method ..... SCS TR-55
Time of Concentration (TOC) Method ..... SCS TR-55
Link Routing Method ..... Hydrodynamic
Enable Overflow Ponding at Nodes ..... YES
Skip Steady State Analysis Time Periods ... NO

Analysis Options

Start Analysis On ..... Nov 04, 2024 00:00:00
End Analysis On ..... Nov 05, 2024 00:00:00
Start Reporting On ..... Nov 04, 2024 00:00:00
Antecedent Dry Days ..... 0 days
Runoff (Dry Weather) Time Step ..... 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step ..... 0 00:05:00 days hh:mm:ss
Reporting Time Step ..... 0 00:05:00 days hh:mm:ss
Routing Time Step ..... 15 seconds

Number of Elements

	Qty
Rain Gages	4
Subbasins	3
Nodes	5
Junctions	2
Outfalls	1
Flow Diversions	0
Inlets	0
Storage Nodes	2
Links	4
Channels	0
Pipes	3
Pumps	0
Orifices	1
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	100-YEAR	Time Series	100-YEAR	Cumulative	inches	Texas	Nueces	100	11.30	SCS Type II 24-hr
2	10-YEAR	Time Series	10-YEAR	Cumulative	inches	Texas	Nueces	10	7.30	SCS Type II 24-hr
3	25-YEAR	Time Series	25-YEAR	Cumulative	inches	Texas	Nueces	25	8.60	SCS Type II 24-hr
4	5-YEAR	Time Series	5-YEAR	Cumulative	inches	Texas	Nueces	5	6.10	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	POST-DEVELOPED_DA-1	0.41	92.81	6.10	5.26	2.16	2.76	0 00:10:00
2	POST-DEVELOPED_DA-2	0.26	98.00	6.10	5.86	1.53	1.84	0 00:10:00
3	POST-DEVELOPED_DA-3	0.47	90.78	6.10	5.03	2.35	3.06	0 00:10:00

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)
1	DROP-INLET	Junction	20.75	24.80	20.75	0.00	0.00	1.80	22.54	0.00	2.26	0 00:00	0.00
2	OUTFALL-CNTRL-STRUC	Junction	20.50	24.25	20.50	0.00	0.00	1.28	20.80	0.00	3.45	0 00:00	0.00
3	POST-DETAINED-OUTFALL	Outfall	0.00					1.30	0.00				
4	SOUTH-POND	Storage Node	21.00	24.50	21.00		0.00	2.71	22.54				0.00
5	WEST-POND	Storage Node	20.50	24.50	20.50		0.00	5.84	22.54				0.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)
1	18-IN-PVC	Pipe	DROP-INLET	WEST-POND	61.00	20.75	20.50	0.4100	18.000	0.0130	1.75	6.72	0.26	1.22	1.50	1.00	63.00
2	24-IN-PVC	Pipe	SOUTH-POND	WEST-POND	101.00	21.00	20.50	0.5000	24.000	0.0130	1.25	15.92	0.08	1.52	1.77	0.89	0.00
3	24-IN-RCP	Pipe	OUTFALL-CNTRL-STRUC	POST-DETAINED-OUTFALL	5.00	20.50	20.10	8.0000	24.000	0.0150	1.30	55.45	0.02	5.39	0.26	0.13	0.00
4	6-IN-ORIFICE	Orifice	WEST-POND	OUTFALL-CNTRL-STRUC		20.50	20.50		6.000		1.28						

Subbasin Hydrology

Subbasin : POST-DEVELOPED_DA-1

Input Data

Area (ac) 0.41
Weighted Curve Number 92.81
Rain Gage ID 5-YEAR

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	0.25	D	98.00
POND	0.08	D	90.00
Paved parking & roofs	0.00	D	98.00
> 75% grass cover, Good	0.08	D	80.00
Composite Area & Weighted CN	0.41		92.81

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

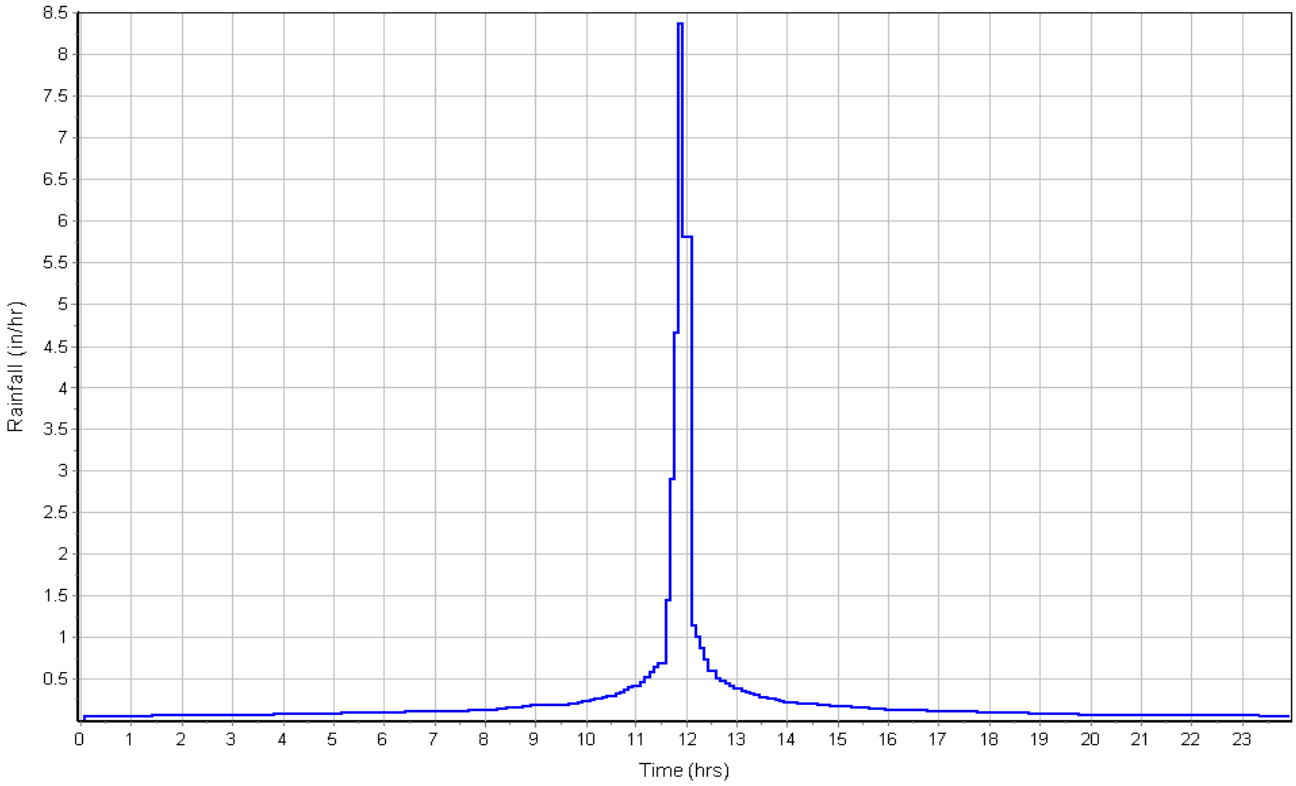
User-Defined TOC override (minutes): 10

Subbasin Runoff Results

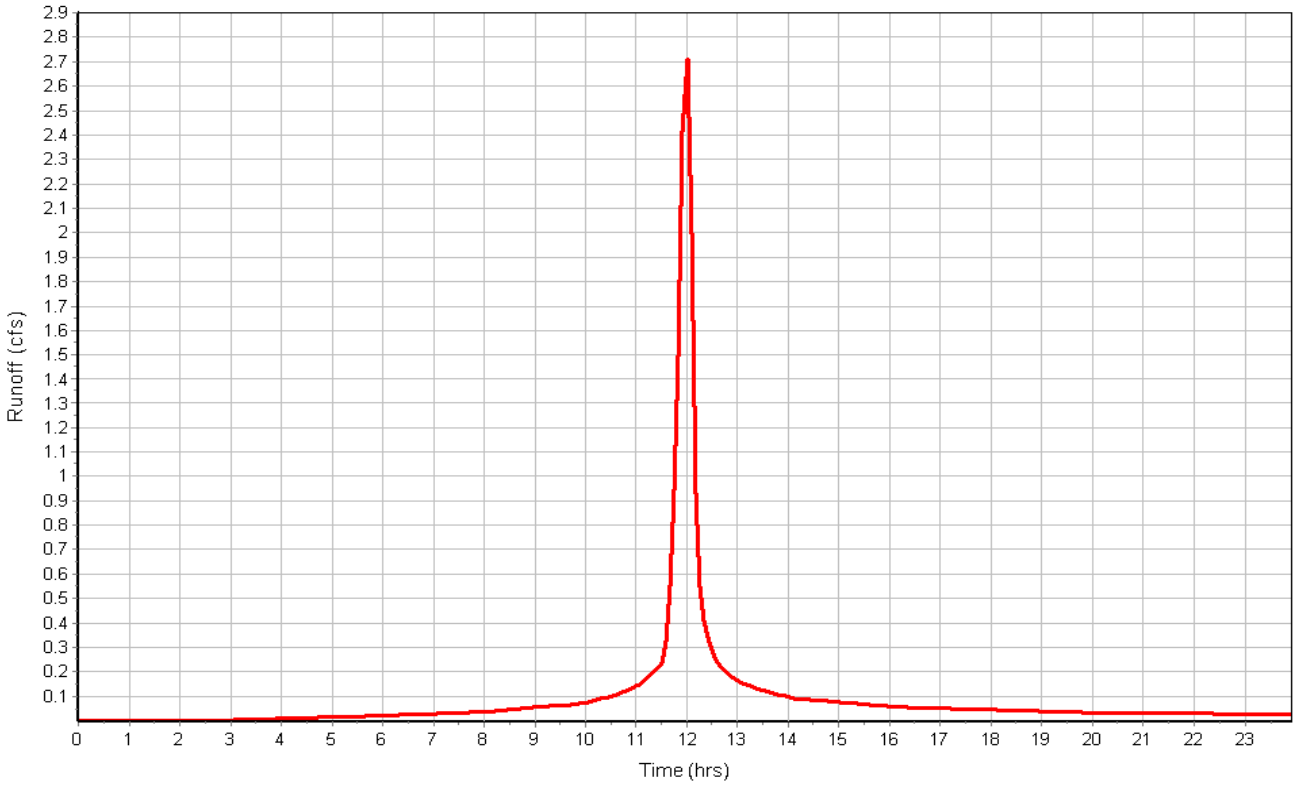
Total Rainfall (in) 6.10
Total Runoff (in) 5.26
Peak Runoff (cfs) 2.76
Weighted Curve Number 92.81
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-1

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : POST-DEVELOPED_DA-2

Input Data

Area (ac) 0.26
Weighted Curve Number 98.00
Rain Gage ID 5-YEAR

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	0.26	D	98.00
Composite Area & Weighted CN	0.26		98.00

Time of Concentration

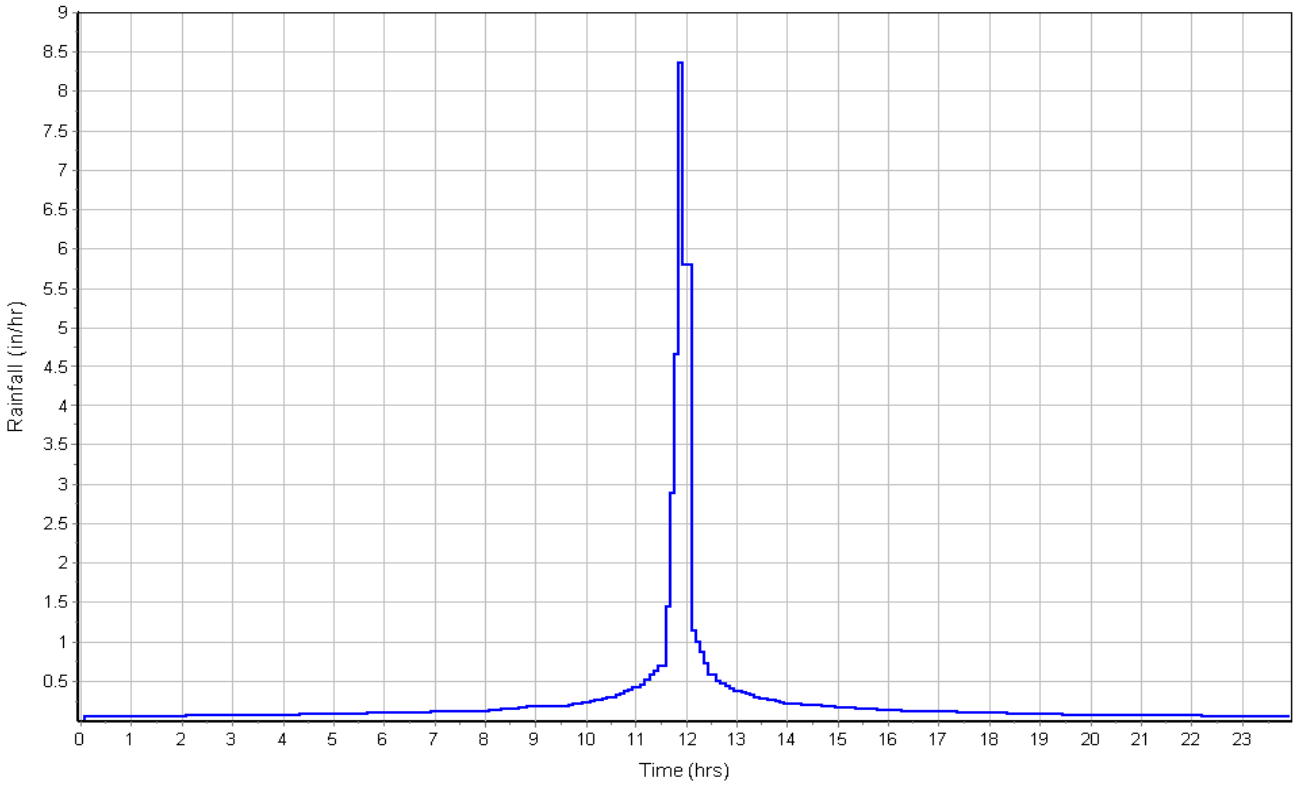
User-Defined TOC override (minutes): 10

Subbasin Runoff Results

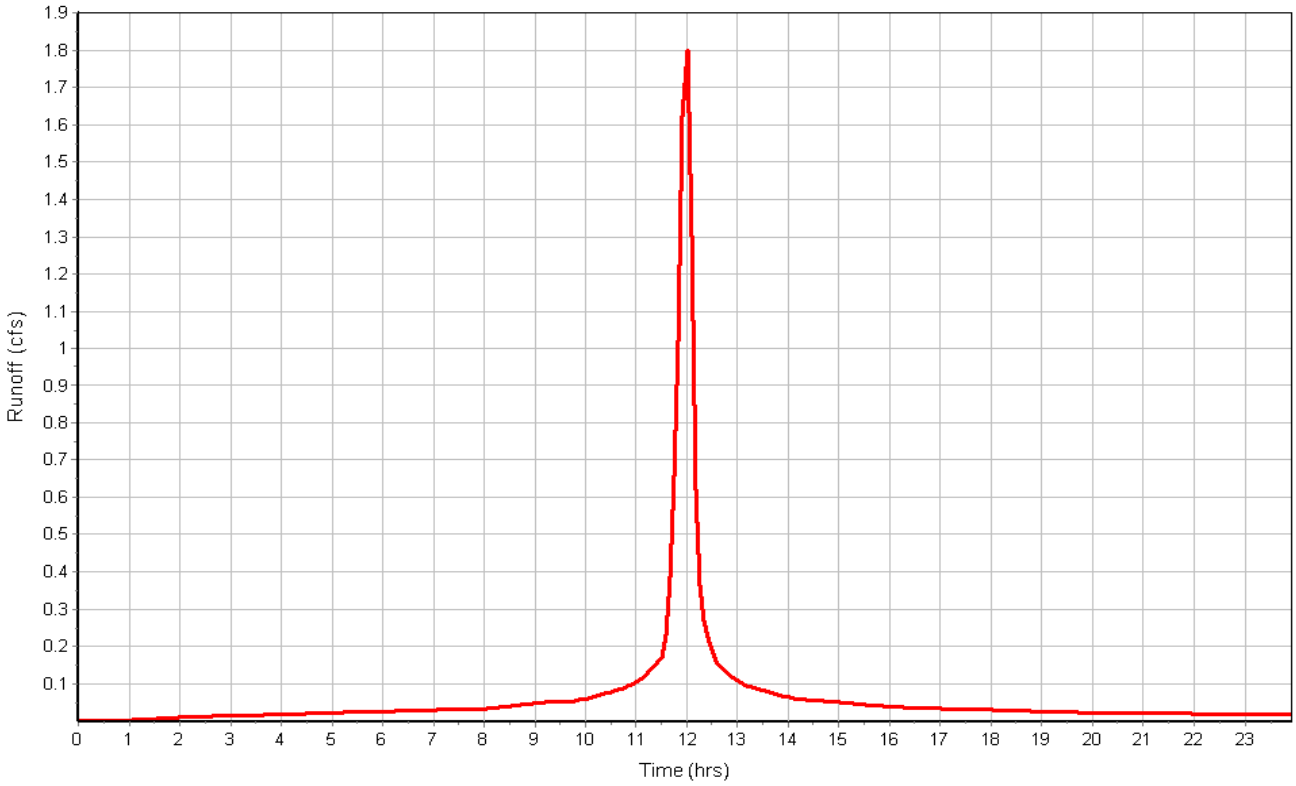
Total Rainfall (in) 6.10
Total Runoff (in) 5.86
Peak Runoff (cfs) 1.84
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-2

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : POST-DEVELOPED_DA-3

Input Data

Area (ac) 0.47
Weighted Curve Number 90.78
Rain Gage ID 5-YEAR

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	0.22	D	98.00
POND	0.10	D	90.00
> 75% grass cover, Good	0.14	D	80.00
Composite Area & Weighted CN	0.46		90.78

Time of Concentration

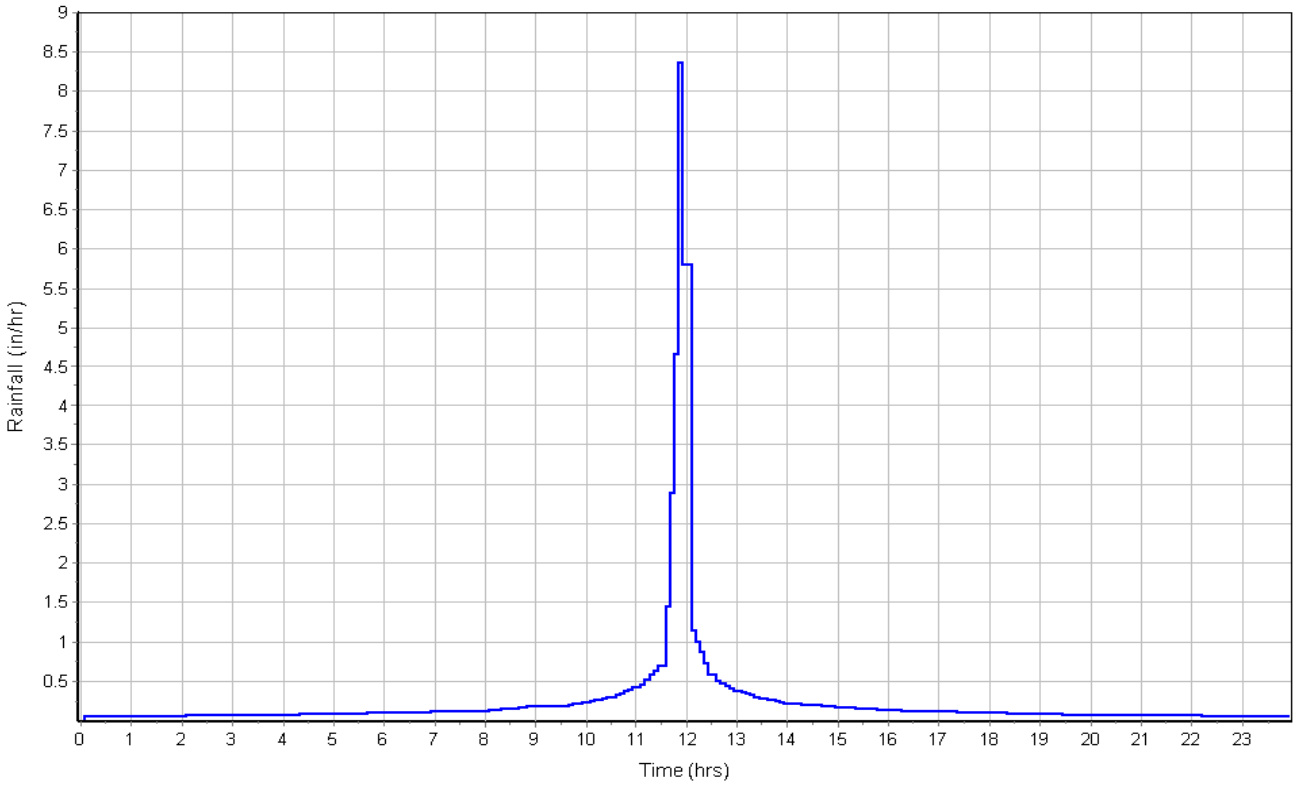
User-Defined TOC override (minutes): 10

Subbasin Runoff Results

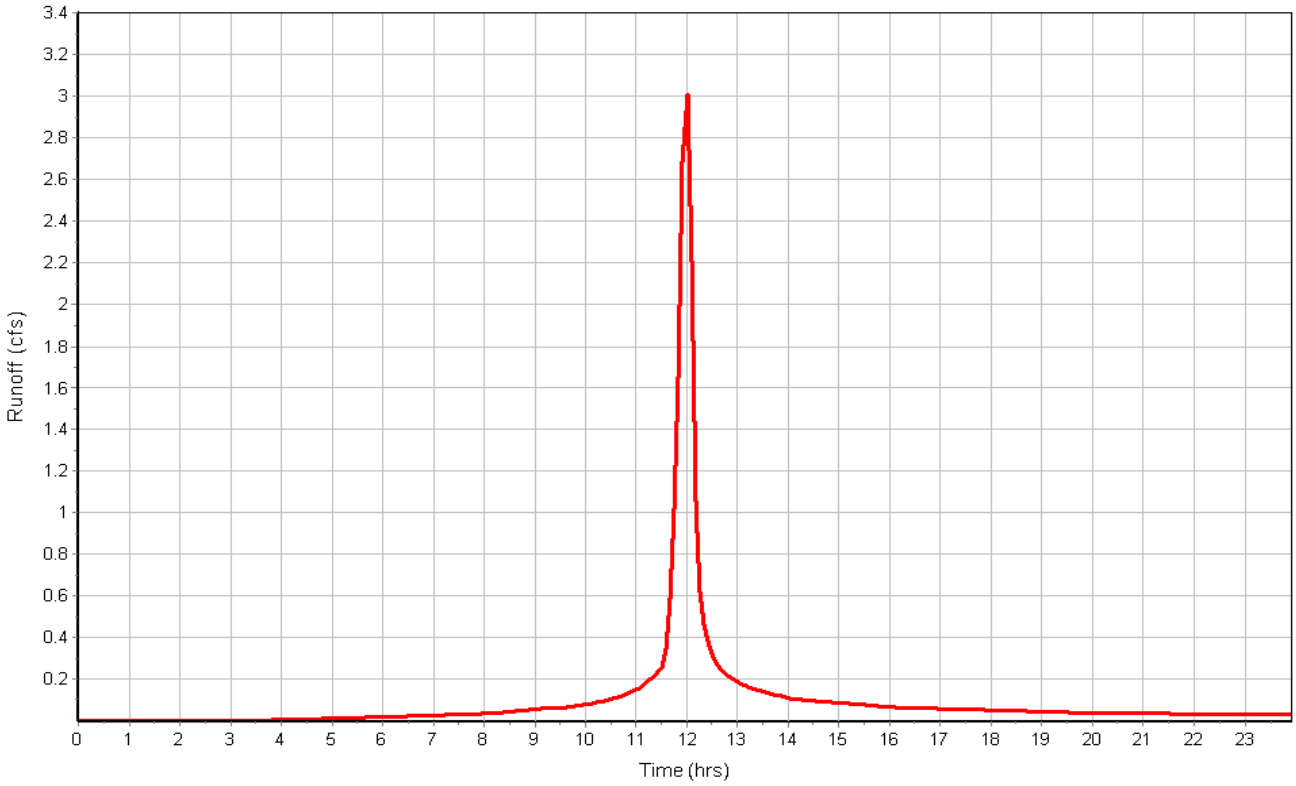
Total Rainfall (in) 6.10
Total Runoff (in) 5.03
Peak Runoff (cfs) 3.06
Weighted Curve Number 90.78
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-3

Rainfall Intensity Graph



Runoff Hydrograph



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	DROP-INLET	20.75	24.80	4.05	20.75	0.00	0.00	-24.80	0.00	0.00
2	OUTFALL-CNTRL-STRUC	20.50	24.25	3.75	20.50	0.00	0.00	-24.25	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	DROP-INLET	1.80	1.80	22.54	1.79	0.00	2.26	21.01	0.26	0 12:22	0 00:00	0.00	0.00
2	OUTFALL-CNTRL-STRUC	1.28	0.00	20.80	0.30	0.00	3.45	20.60	0.10	0 12:30	0 00:00	0.00	0.00

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	18-IN-PVC	61.00	20.75	0.00	20.50	0.00	0.25	0.4100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	24-IN-PVC	101.00	21.00	0.00	20.50	0.00	0.50	0.5000	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
3	24-IN-RCP	5.00	20.50	0.00	20.10	20.10	0.40	8.0000	CIRCULAR	24.000	24.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	18-IN-PVC	1.75	0 12:05	6.72	0.26	1.22	0.83	1.50	1.00	63.00		SURCHARGED
2	24-IN-PVC	1.25	0 12:00	15.92	0.08	1.52	1.11	1.77	0.89	0.00		Calculated
3	24-IN-RCP	1.30	0 12:28	55.45	0.02	5.39	0.02	0.26	0.13	0.00		Calculated

Storage Nodes

Storage Node : SOUTH-POND

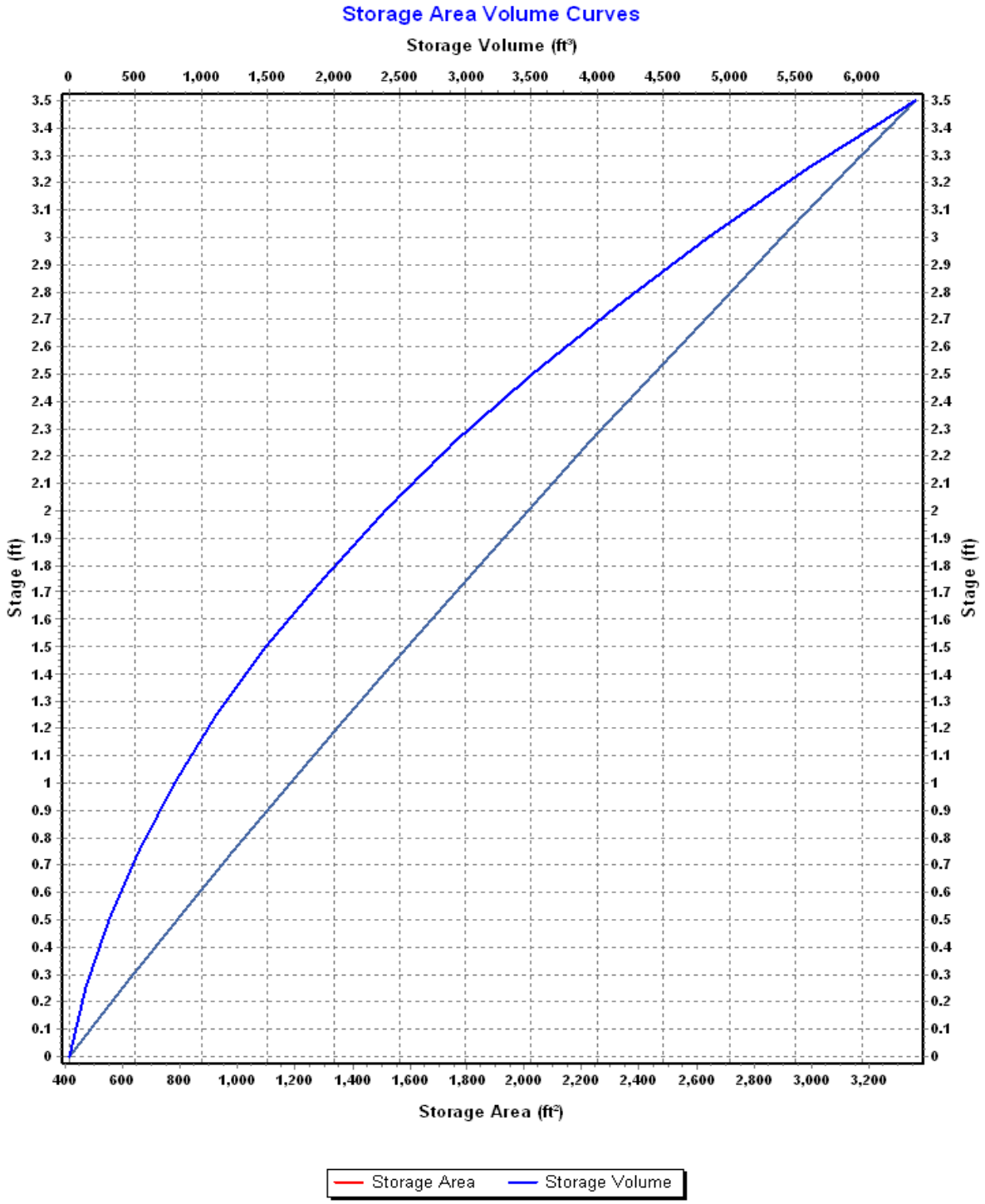
Input Data

Invert Elevation (ft)	21.00
Max (Rim) Elevation (ft)	24.50
Max (Rim) Offset (ft)	3.50
Initial Water Elevation (ft)	21.00
Initial Water Depth (ft)	0.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : SOUTH-POND-STORAGE

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	416.00	0.000
0.25	602.04	127.26
0.50	792.58	301.59
0.75	987.14	524.05
1.00	1185.23	795.60
1.25	1386.85	1117.11
1.50	1592.01	1489.47
1.75	1800.71	1913.56
2.00	2012.94	2390.27
2.25	2228.70	2920.48
2.50	2448.00	3505.07
2.75	2670.83	4144.92
3.00	2897.19	4840.92
3.25	3127.09	5593.96
3.50	3360.53	6404.91


Storage Area Volume Curves
Storage Volume (ft³)
0
500
1,000
1,500
2,000
2,500
3,000
3,500
4,000
4,500
5,000
5,500
6,000
Stage (ft)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
2.1
2.2
2.3
2.4
2.5
2.6
2.7
2.8
2.9
3
3.1
3.2
3.3
3.4
3.5
Storage Area (ft²)
400
600
800
1,000
1,200
1,400
1,600
1,800
2,000
2,200
2,400
2,600
2,800
3,000
3,200
Storage Area
Storage Volume

Storage Node : SOUTH-POND (continued)

Output Summary Results

Peak Inflow (cfs)	2.71
Peak Lateral Inflow (cfs)	2.71
Peak Outflow (cfs)	1.25
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	22.54
Max HGL Depth Attained (ft)	1.54
Average HGL Elevation Attained (ft)	21.20
Average HGL Depth Attained (ft)	0.2
Time of Max HGL Occurrence (days hh:mm)	0 12:23
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : WEST-POND

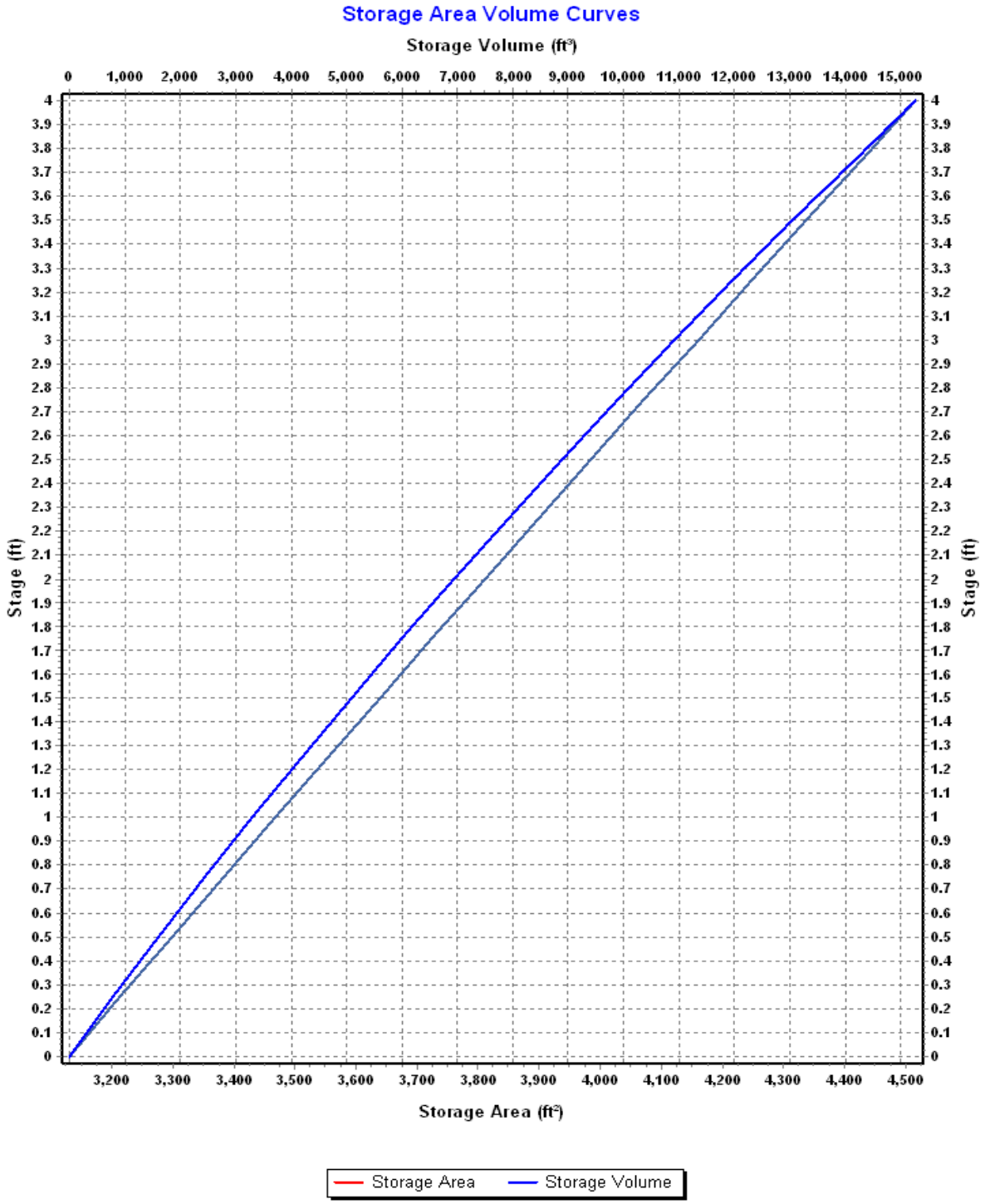
Input Data

Invert Elevation (ft)	20.50
Max (Rim) Elevation (ft)	24.50
Max (Rim) Offset (ft)	4.00
Initial Water Elevation (ft)	20.50
Initial Water Depth (ft)	0.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : WEST-POND-STORAGE

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	3131.17	0.000
0.25	3214.73	793.24
0.50	3298.68	1607.42
0.75	3383.02	2442.63
1.00	3467.76	3298.98
1.25	3552.89	4176.56
1.50	3638.41	5075.47
1.75	3724.33	5995.81
2.00	3810.64	6937.68
2.25	3897.34	7901.18
2.50	3984.43	8886.40
2.75	4071.92	9893.44
3.00	4159.79	10922.40
3.25	4248.07	11973.38
3.50	4336.73	13046.48
3.75	4425.79	14141.80
4.00	4515.24	15259.43


Storage Area Volume Curves
Storage Volume (ft³)
0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000 9,000 10,000 11,000 12,000 13,000 14,000 15,000
Stage (ft)
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 4
Stage (ft)
Storage Area (ft²)
3,200 3,300 3,400 3,500 3,600 3,700 3,800 3,900 4,000 4,100 4,200 4,300 4,400 4,500
Storage Area
Storage Volume

Storage Node : WEST-POND (continued)

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	6-IN-ORIFICE	Side	CIRCULAR	No	6.00			20.50	0.61

Output Summary Results

Peak Inflow (cfs)	5.84
Peak Lateral Inflow (cfs)	3.00
Peak Outflow (cfs)	1.28
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	22.54
Max HGL Depth Attained (ft)	2.04
Average HGL Elevation Attained (ft)	20.88
Average HGL Depth Attained (ft)	0.38
Time of Max HGL Occurrence (days hh:mm)	0 12:23
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

10-YEAR

Project Description

File Name	24-065 RATIONAL METHOD.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Nov 04, 2024	00:00:00
End Analysis On	Nov 05, 2024	00:00:00
Start Reporting On	Nov 04, 2024	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	5
Nodes	3
Junctions	0
Outfalls	3
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	0
Channels	0
Pipes	0
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	10 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	POST-DEVELOPED_DA-1	0.41	0.7500	1.29	0.97	0.40	2.39	0 00:10:00
2	POST-DEVELOPED_DA-2	0.26	0.9000	1.29	1.16	0.30	1.82	0 00:10:00
3	POST-DEVELOPED_DA-3	0.47	0.6900	1.29	0.89	0.42	2.50	0 00:10:00
4	POST-DEVELOPED_DA-4	0.05	0.3000	1.29	0.39	0.02	0.12	0 00:10:00
5	PRE-DEVELOPED-DA	1.19	0.3000	2.21	0.66	0.79	1.71	0 00:27:41

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	POST-DETAINED-OUTFALL	Outfall	0.00					0.00	0.00					
2	POST-UNDETAINED-OUTFALL	Outfall	0.00					0.00	0.00					
3	PRE-DEVELOPED-OUTFALL	Outfall	0.00					0.00	0.00					

Subbasin Hydrology

Subbasin : POST-DEVELOPED_DA-1

Input Data

Area (ac) 0.41
Weighted Runoff Coefficient 0.7500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
ROOF	0.25	D	0.90
POND	0.08	D	0.75
PAVEMENT	0.00	D	0.90
GRASS	0.08	D	0.30
Composite Area & Weighted Runoff Coeff.	0.41		0.75

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

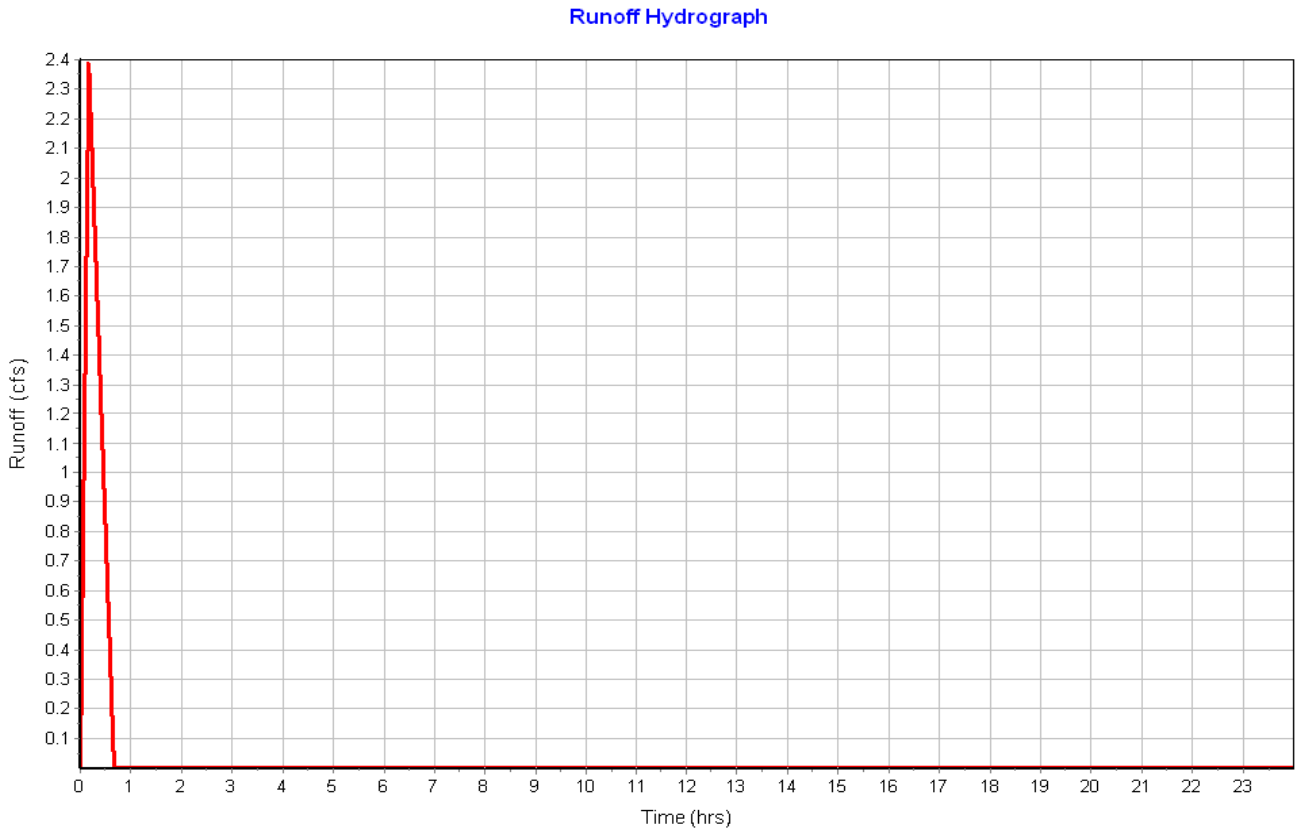
Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

User-Defined TOC override (minutes): 10

Subbasin Runoff Results

Total Rainfall (in) 1.29
Total Runoff (in) 0.97
Peak Runoff (cfs) 2.39
Rainfall Intensity 7.760
Weighted Runoff Coefficient 0.7500
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-1



Subbasin : POST-DEVELOPED_DA-2

Input Data

Area (ac) 0.26
Weighted Runoff Coefficient 0.9000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
PAVEMENT	0.26	D	0.90
Composite Area & Weighted Runoff Coeff.	0.26		0.90

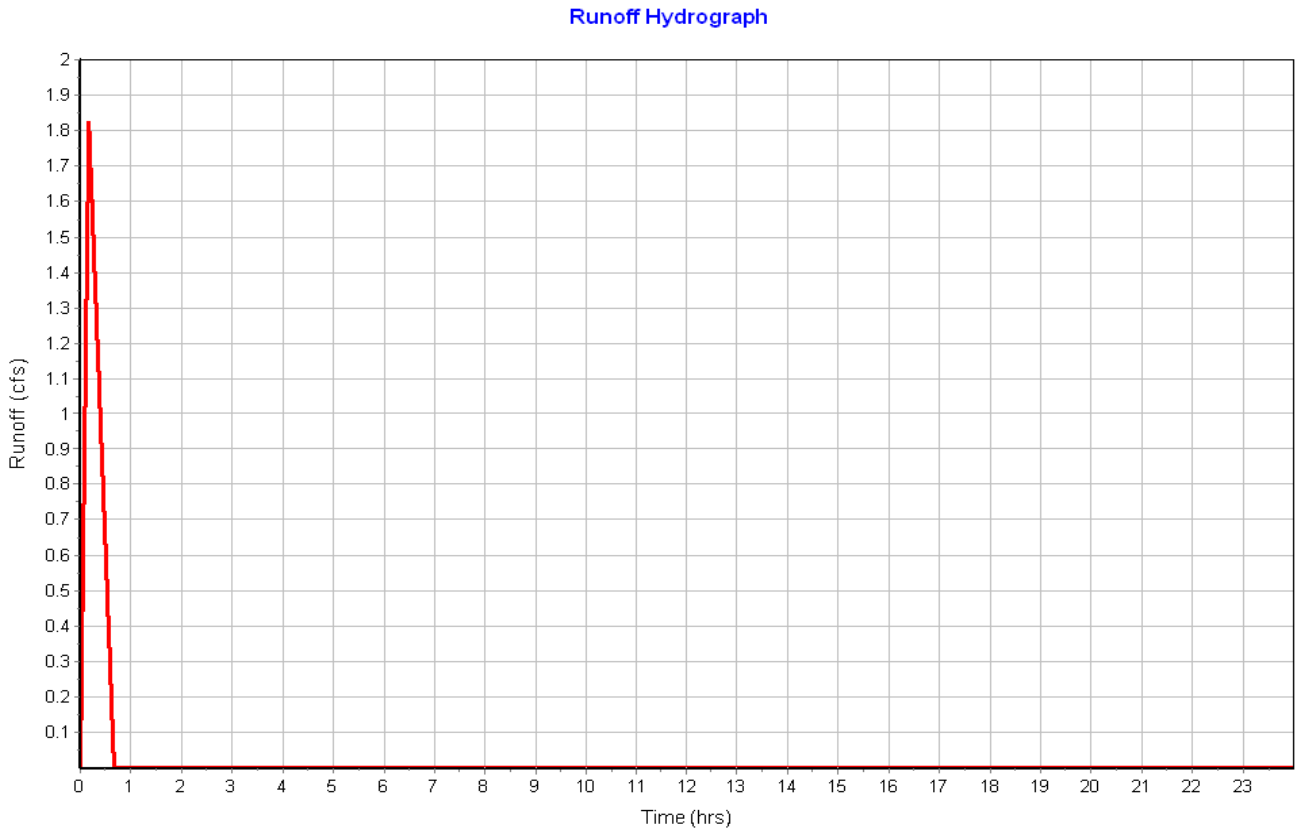
Time of Concentration

User-Defined TOC override (minutes): 10

Subbasin Runoff Results

Total Rainfall (in) 1.29
Total Runoff (in) 1.16
Peak Runoff (cfs) 1.82
Rainfall Intensity 7.760
Weighted Runoff Coefficient 0.9000
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-2



Subbasin : POST-DEVELOPED_DA-3

Input Data

Area (ac) 0.47
Weighted Runoff Coefficient 0.6900

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
PAVEMENT	0.22	D	0.90
POND	0.10	D	0.75
GRASS	0.14	D	0.30
Composite Area & Weighted Runoff Coeff.	0.46		0.69

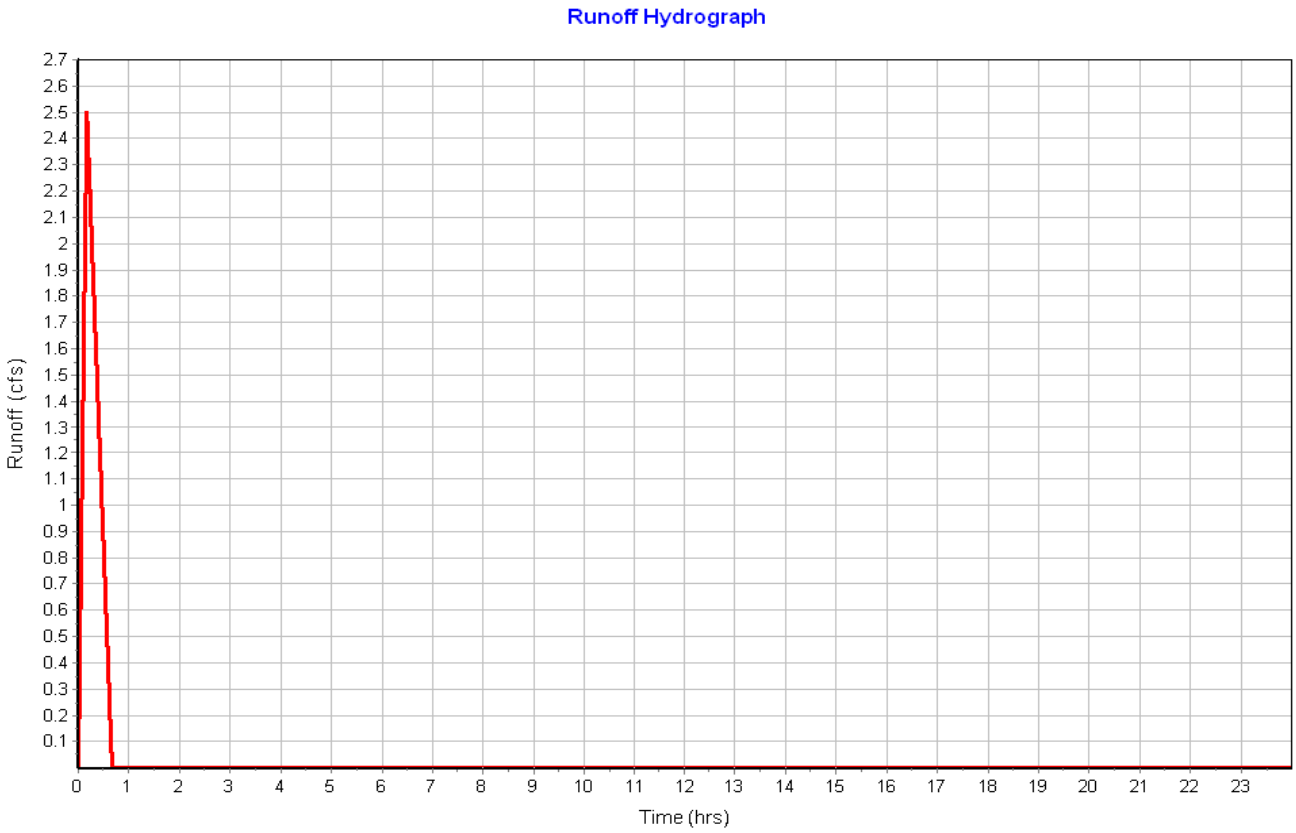
Time of Concentration

User-Defined TOC override (minutes): 10

Subbasin Runoff Results

Total Rainfall (in) 1.29
Total Runoff (in) 0.89
Peak Runoff (cfs) 2.50
Rainfall Intensity 7.760
Weighted Runoff Coefficient 0.6900
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-3



Subbasin : POST-DEVELOPED_DA-4

Input Data

Area (ac) 0.05
Weighted Runoff Coefficient 0.3000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
GRASS	0.05	D	0.30
Composite Area & Weighted Runoff Coeff.	0.05		0.30

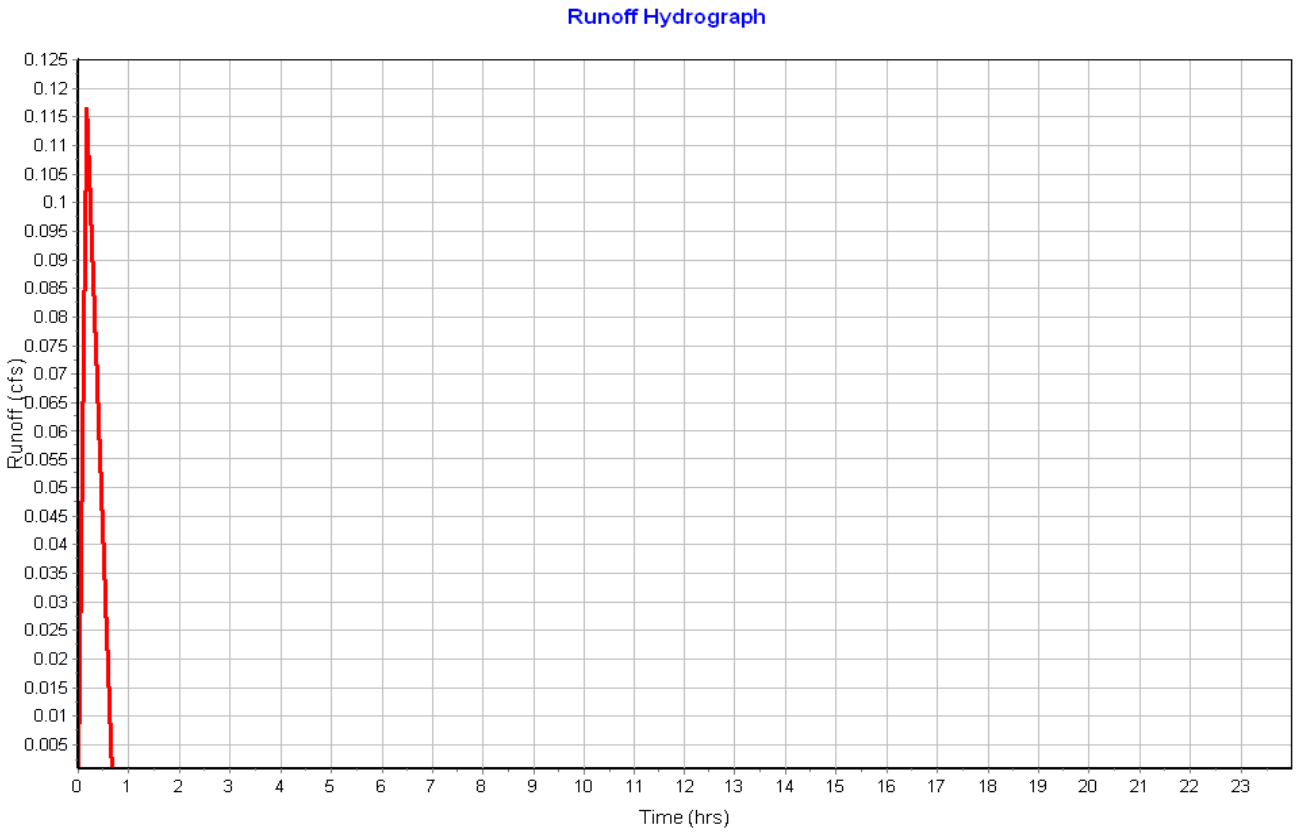
Time of Concentration

User-Defined TOC override (minutes): 10

Subbasin Runoff Results

Total Rainfall (in) 1.29
Total Runoff (in) 0.39
Peak Runoff (cfs) 0.12
Rainfall Intensity 7.760
Weighted Runoff Coefficient 0.3000
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-4



Subbasin : PRE-DEVELOPED-DA

Input Data

Area (ac) 1.19
Weighted Runoff Coefficient 0.3000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
GRASS	1.19	D	0.30
Composite Area & Weighted Runoff Coeff.	1.19		0.30

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.40	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	0.99	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.01	0.00	0.00
Velocity (ft/sec) :	0.07	0.00	0.00
Computed Flow Time (min) :	25.41	0.00	0.00

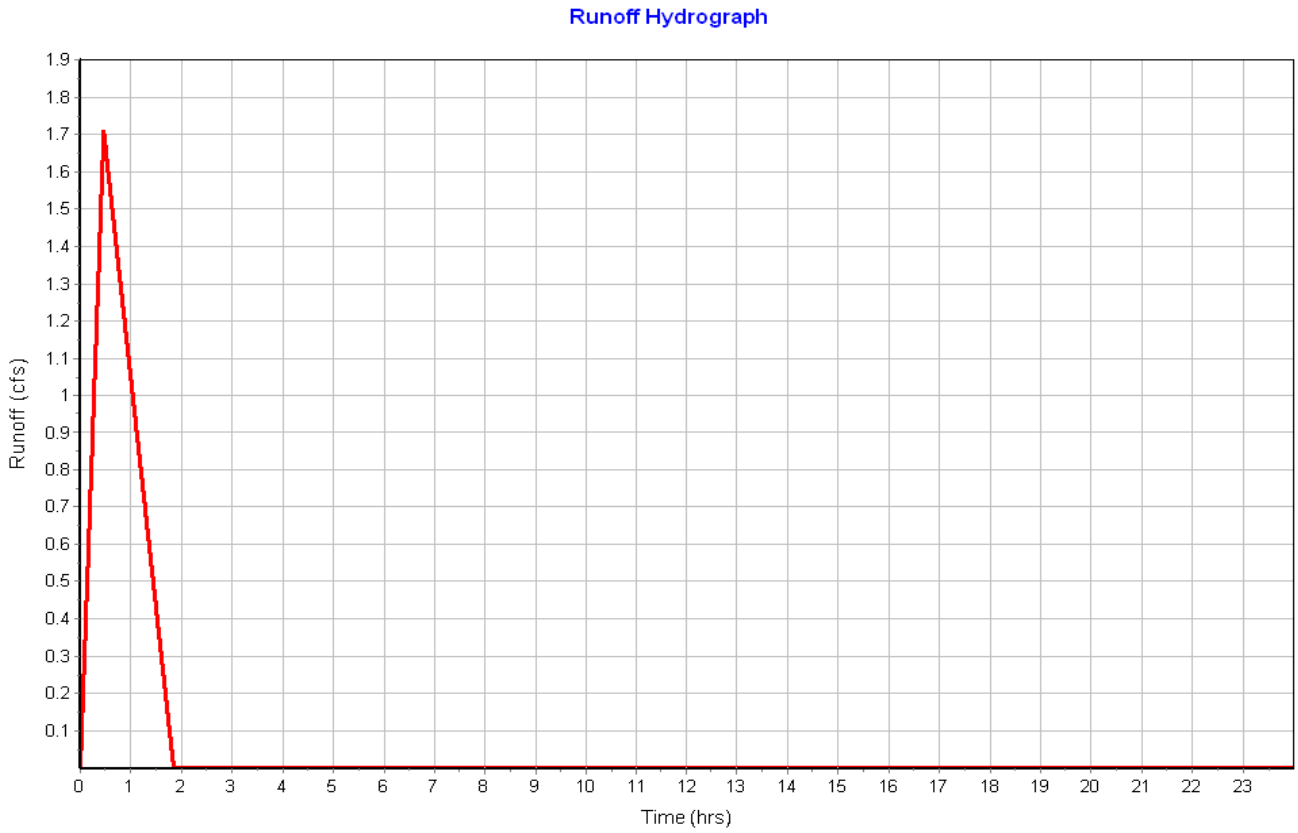
Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	98.41	0.00	0.00
Slope (%) :	0.2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	0.72	0.00	0.00
Computed Flow Time (min) :	2.28	0.00	0.00

Total TOC (min) 27.69

Subbasin Runoff Results

Total Rainfall (in) 2.21
Total Runoff (in) 0.66
Peak Runoff (cfs) 1.71
Rainfall Intensity 4.788
Weighted Runoff Coefficient 0.3000
Time of Concentration (days hh:mm:ss) 0 00:27:41

Subbasin : PRE-DEVELOPED-DA



10-YEAR

Project Description

File Name ..... 24-065 SCS METHOD.SPF

Project Options

Flow Units ..... CFS
Elevation Type ..... Elevation
Hydrology Method ..... SCS TR-55
Time of Concentration (TOC) Method ..... SCS TR-55
Link Routing Method ..... Hydrodynamic
Enable Overflow Ponding at Nodes ..... YES
Skip Steady State Analysis Time Periods ... NO

Analysis Options

Start Analysis On ..... Nov 04, 2024 00:00:00
End Analysis On ..... Nov 05, 2024 00:00:00
Start Reporting On ..... Nov 04, 2024 00:00:00
Antecedent Dry Days ..... 0 days
Runoff (Dry Weather) Time Step ..... 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step ..... 0 00:05:00 days hh:mm:ss
Reporting Time Step ..... 0 00:05:00 days hh:mm:ss
Routing Time Step ..... 15 seconds

Number of Elements

	Qty
Rain Gages	4
Subbasins	3
Nodes	5
Junctions	2
Outfalls	1
Flow Diversions	0
Inlets	0
Storage Nodes	2
Links	4
Channels	0
Pipes	3
Pumps	0
Orifices	1
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	100-YEAR	Time Series	100-YEAR	Cumulative	inches	Texas	Nueces	100	11.30	SCS Type II 24-hr
2	10-YEAR	Time Series	10-YEAR	Cumulative	inches	Texas	Nueces	10	7.30	SCS Type II 24-hr
3	25-YEAR	Time Series	25-YEAR	Cumulative	inches	Texas	Nueces	25	8.60	SCS Type II 24-hr
4	5-YEAR	Time Series	5-YEAR	Cumulative	inches	Texas	Nueces	5	6.10	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	POST-DEVELOPED_DA-1	0.41	92.81	7.30	6.45	2.64	3.34	0 00:10:00
2	POST-DEVELOPED_DA-2	0.26	98.00	7.30	7.06	1.84	2.21	0 00:10:00
3	POST-DEVELOPED_DA-3	0.47	90.78	7.30	6.21	2.90	3.74	0 00:10:00

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)
1	DROP-INLET	Junction	20.75	24.80	20.75	0.00	0.00	2.16	22.91	0.00	1.89	0 00:00	0.00
2	OUTFALL-CNTRL-STRUC	Junction	20.50	24.25	20.50	0.00	0.00	1.40	20.82	0.00	3.43	0 00:00	0.00
3	POST-DETAINED-OUTFALL	Outfall	0.00					1.44	0.00				
4	SOUTH-POND	Storage Node	21.00	24.50	21.00		0.00	3.27	22.91				0.00
5	WEST-POND	Storage Node	20.50	24.50	20.50		0.00	6.83	22.91				0.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)
1	18-IN-PVC	Pipe	DROP-INLET	WEST-POND	61.00	20.75	20.50	0.4100	18.000	0.0130	2.12	6.72	0.32	1.29	1.50	1.00	112.00
2	24-IN-PVC	Pipe	SOUTH-POND	WEST-POND	101.00	21.00	20.50	0.5000	24.000	0.0130	1.27	15.92	0.08	1.37	1.96	0.98	0.00
3	24-IN-RCP	Pipe	OUTFALL-CNTRL-STRUC	POST-DETAINED-OUTFALL	5.00	20.50	20.10	8.0000	24.000	0.0150	1.44	55.45	0.03	5.50	0.27	0.14	0.00
4	6-IN-ORIFICE	Orifice	WEST-POND	OUTFALL-CNTRL-STRUC		20.50	20.50		6.000		1.40						

Subbasin Hydrology

Subbasin : POST-DEVELOPED_DA-1

Input Data

Area (ac) 0.41
Weighted Curve Number 92.81
Rain Gage ID 10-YEAR

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	0.25	D	98.00
POND	0.08	D	90.00
Paved parking & roofs	0.00	D	98.00
> 75% grass cover, Good	0.08	D	80.00
Composite Area & Weighted CN	0.41		92.81

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

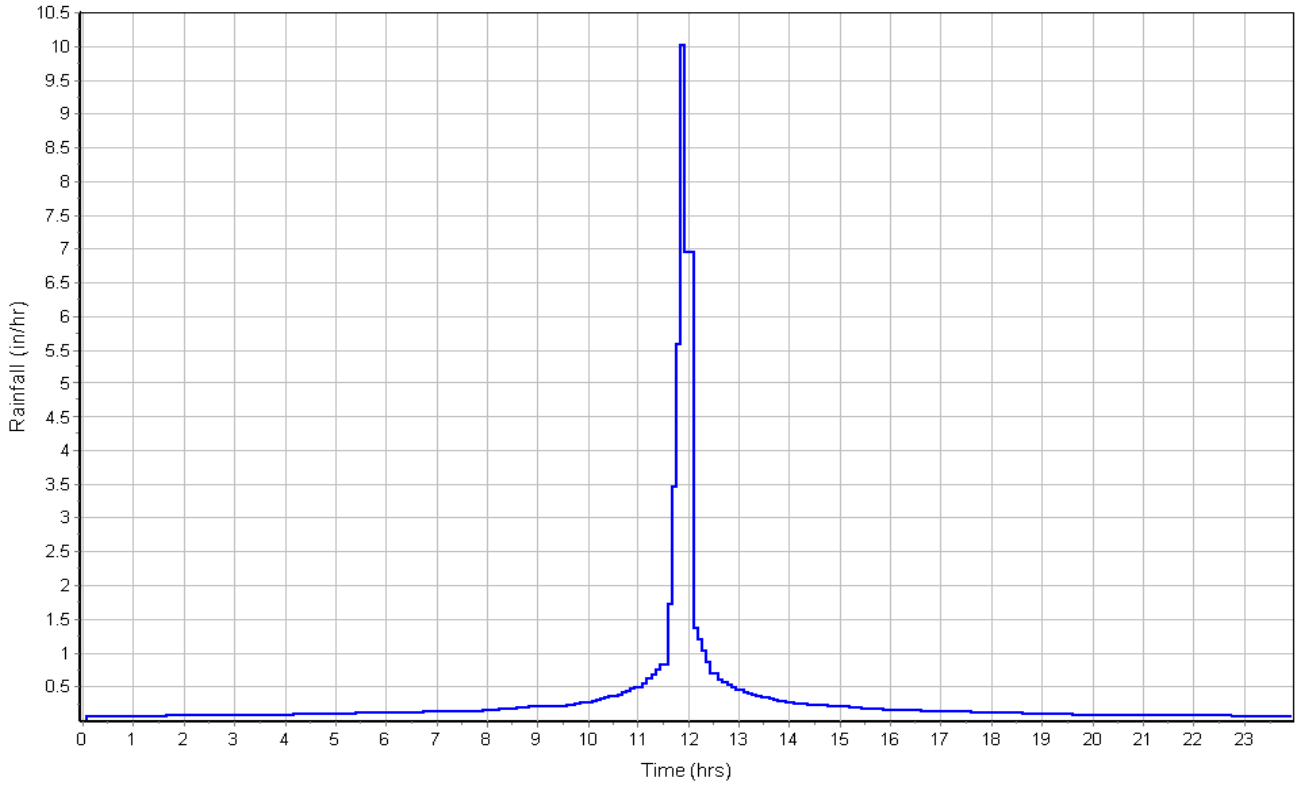
User-Defined TOC override (minutes): 10

Subbasin Runoff Results

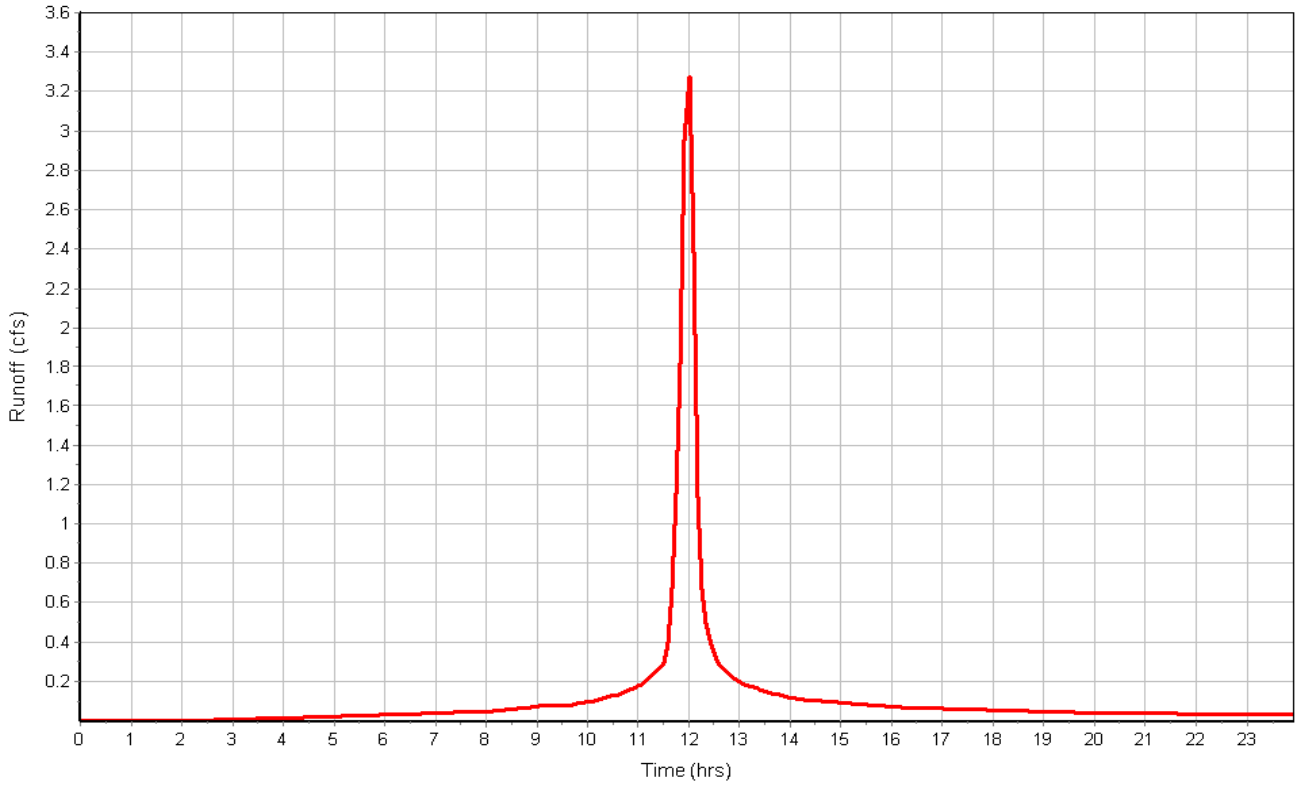
Total Rainfall (in) 7.30
Total Runoff (in) 6.45
Peak Runoff (cfs) 3.34
Weighted Curve Number 92.81
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-1

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : POST-DEVELOPED_DA-2

Input Data

Area (ac) 0.26
Weighted Curve Number 98.00
Rain Gage ID 10-YEAR

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	0.26	D	98.00
Composite Area & Weighted CN	0.26		98.00

Time of Concentration

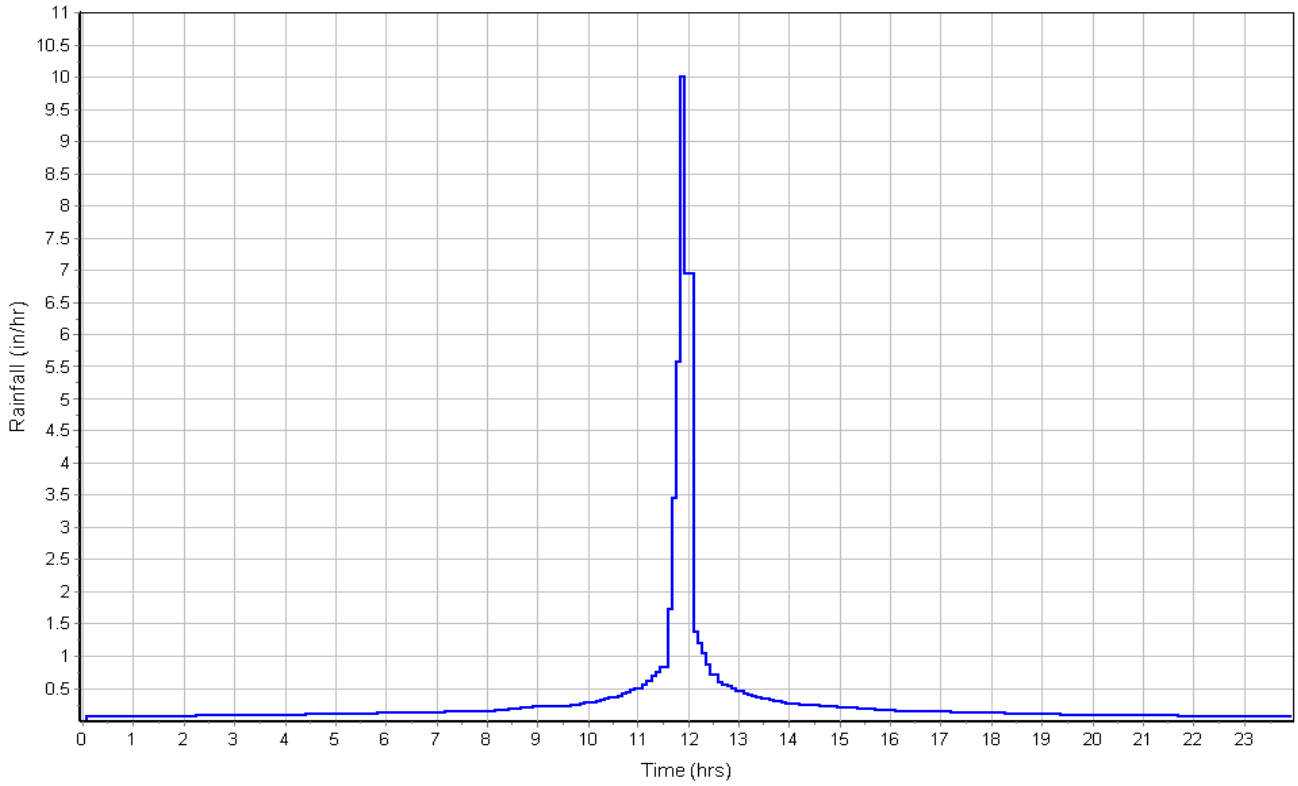
User-Defined TOC override (minutes): 10

Subbasin Runoff Results

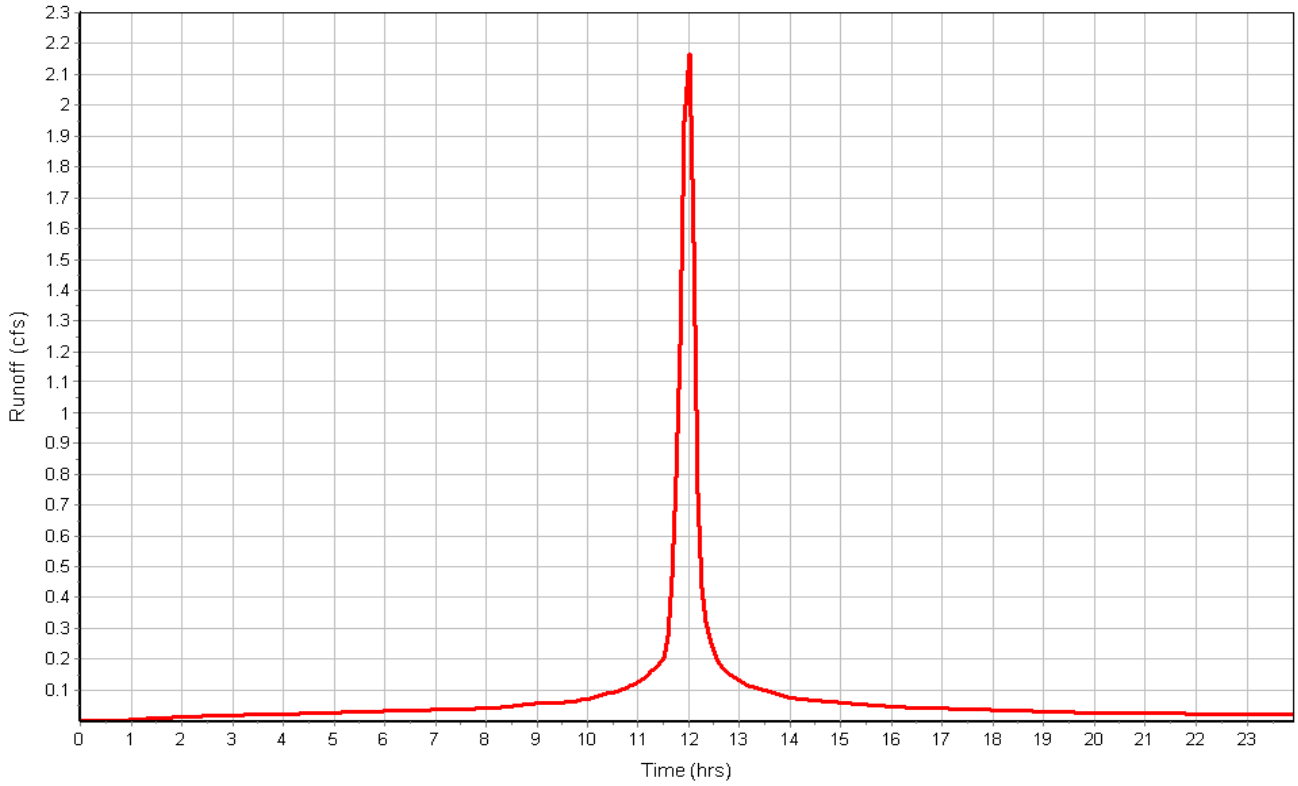
Total Rainfall (in) 7.30
Total Runoff (in) 7.06
Peak Runoff (cfs) 2.21
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-2

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : POST-DEVELOPED_DA-3

Input Data

Area (ac) 0.47
Weighted Curve Number 90.78
Rain Gage ID 10-YEAR

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	0.22	D	98.00
POND	0.10	D	90.00
> 75% grass cover, Good	0.14	D	80.00
Composite Area & Weighted CN	0.46		90.78

Time of Concentration

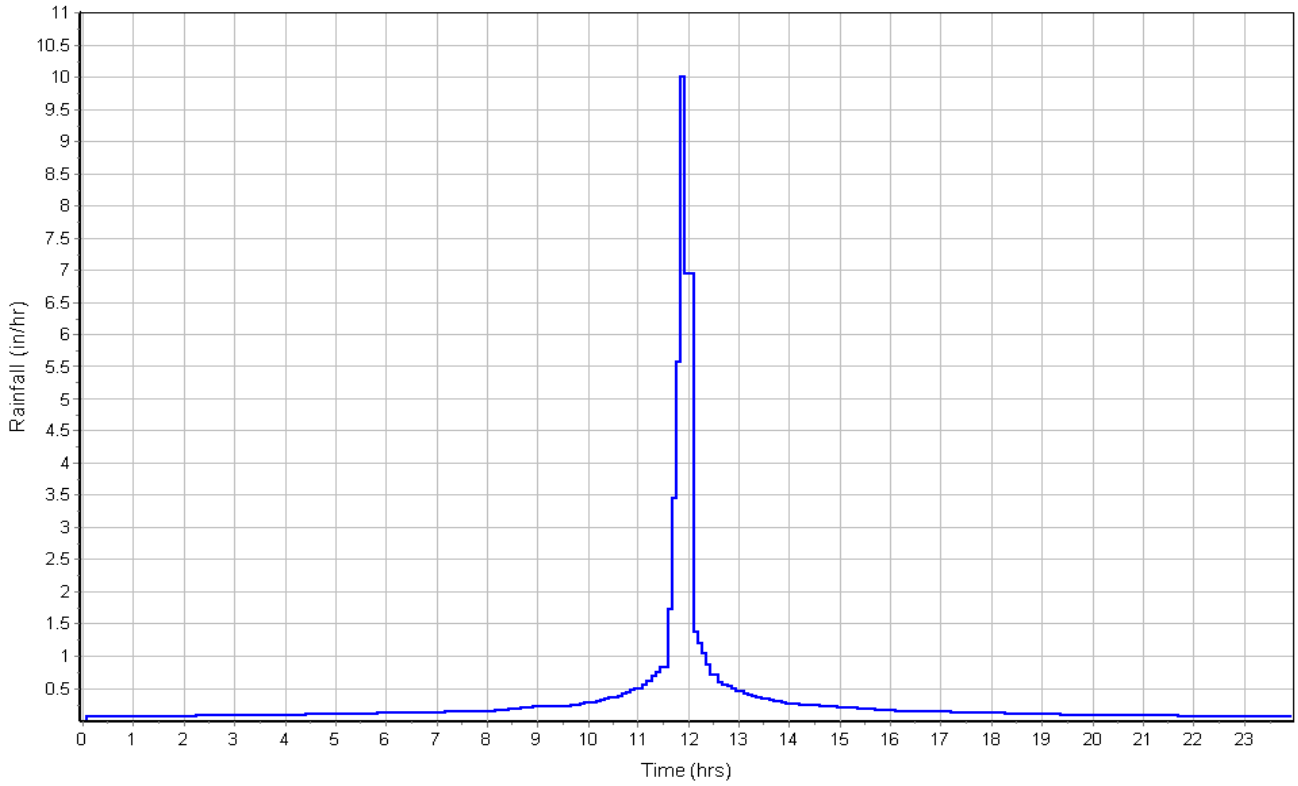
User-Defined TOC override (minutes): 10

Subbasin Runoff Results

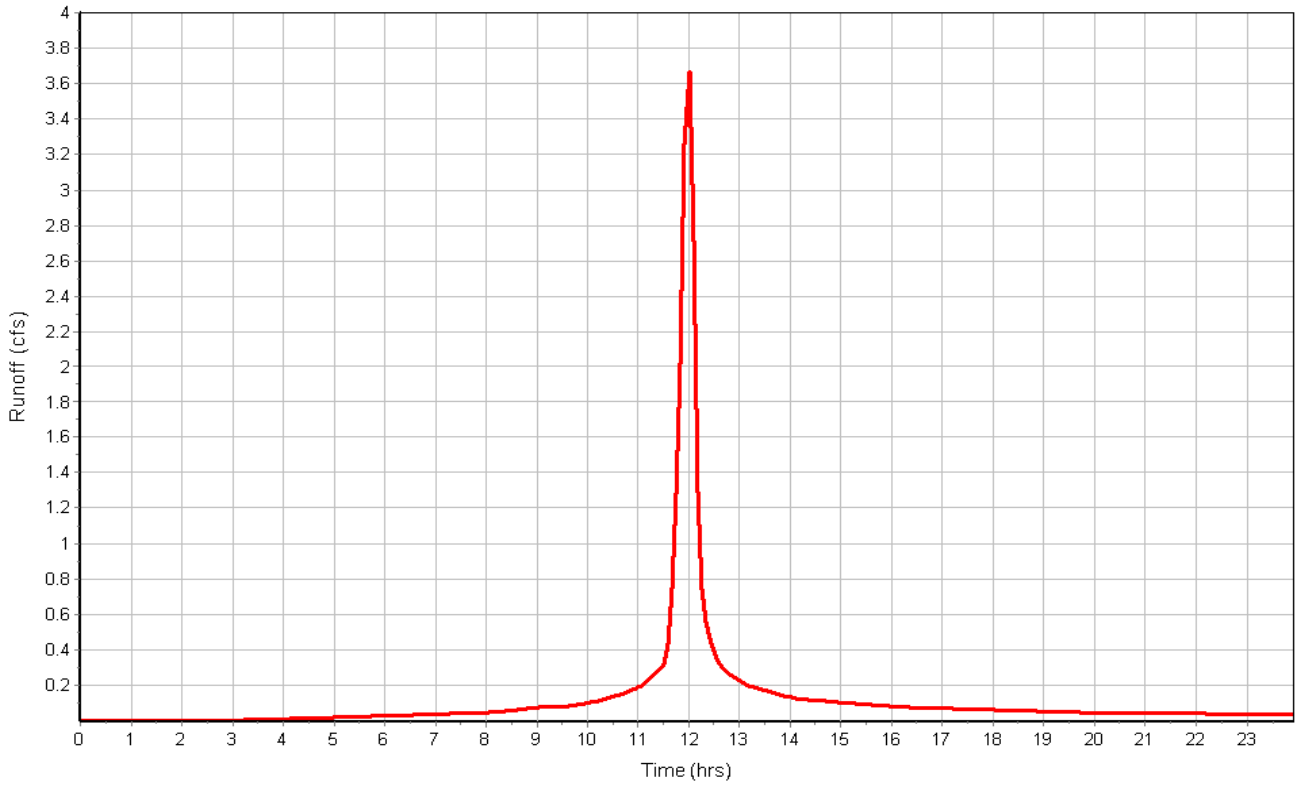
Total Rainfall (in) 7.30
Total Runoff (in) 6.21
Peak Runoff (cfs) 3.74
Weighted Curve Number 90.78
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-3

Rainfall Intensity Graph



Runoff Hydrograph



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	DROP-INLET	20.75	24.80	4.05	20.75	0.00	0.00	-24.80	0.00	0.00
2	OUTFALL-CNTRL-STRUC	20.50	24.25	3.75	20.50	0.00	0.00	-24.25	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	DROP-INLET	2.16	2.16	22.91	2.16	0.00	1.89	21.08	0.33	0 12:25	0 00:00	0.00	0.00
2	OUTFALL-CNTRL-STRUC	1.40	0.00	20.82	0.32	0.00	3.43	20.61	0.11	0 12:24	0 00:00	0.00	0.00

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	18-IN-PVC	61.00	20.75	0.00	20.50	0.00	0.25	0.4100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	24-IN-PVC	101.00	21.00	0.00	20.50	0.00	0.50	0.5000	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
3	24-IN-RCP	5.00	20.50	0.00	20.10	20.10	0.40	8.0000	CIRCULAR	24.000	24.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	18-IN-PVC	2.12	0 12:05	6.72	0.32	1.29	0.79	1.50	1.00	112.00		SURCHARGED
2	24-IN-PVC	1.27	0 12:00	15.92	0.08	1.37	1.23	1.96	0.98	0.00		Calculated
3	24-IN-RCP	1.44	0 12:22	55.45	0.03	5.50	0.02	0.27	0.14	0.00		Calculated

Storage Nodes

Storage Node : SOUTH-POND

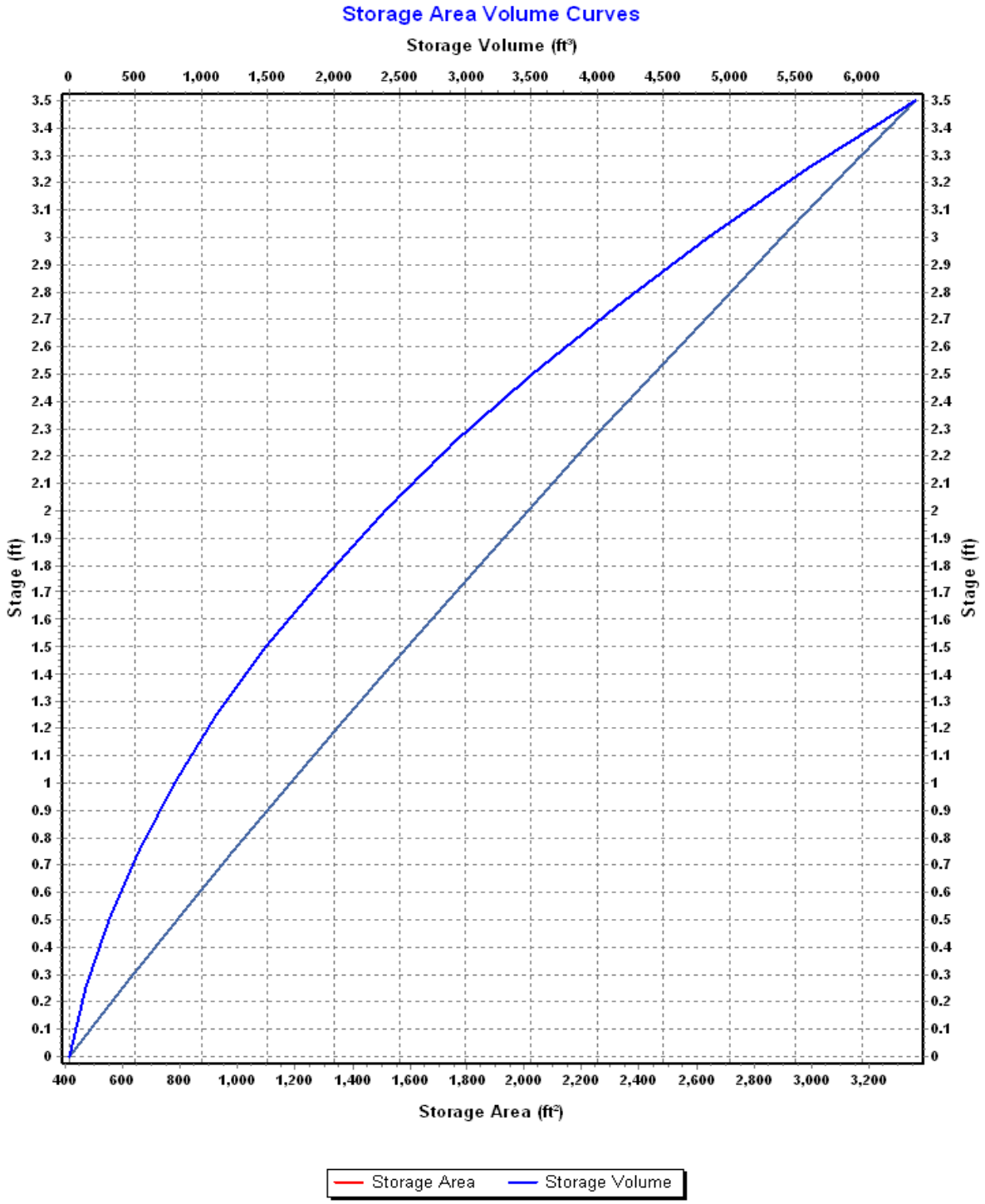
Input Data

Invert Elevation (ft)	21.00
Max (Rim) Elevation (ft)	24.50
Max (Rim) Offset (ft)	3.50
Initial Water Elevation (ft)	21.00
Initial Water Depth (ft)	0.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : SOUTH-POND-STORAGE

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	416.00	0.000
0.25	602.04	127.26
0.50	792.58	301.59
0.75	987.14	524.05
1.00	1185.23	795.60
1.25	1386.85	1117.11
1.50	1592.01	1489.47
1.75	1800.71	1913.56
2.00	2012.94	2390.27
2.25	2228.70	2920.48
2.50	2448.00	3505.07
2.75	2670.83	4144.92
3.00	2897.19	4840.92
3.25	3127.09	5593.96
3.50	3360.53	6404.91


Storage Area Volume Curves
Storage Volume (ft³)
0
500
1,000
1,500
2,000
2,500
3,000
3,500
4,000
4,500
5,000
5,500
6,000
Stage (ft)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
2.1
2.2
2.3
2.4
2.5
2.6
2.7
2.8
2.9
3
3.1
3.2
3.3
3.4
3.5
Storage Area (ft²)
400
600
800
1,000
1,200
1,400
1,600
1,800
2,000
2,200
2,400
2,600
2,800
3,000
3,200
Storage Area
Storage Volume

Storage Node : SOUTH-POND (continued)

Output Summary Results

Peak Inflow (cfs)	3.27
Peak Lateral Inflow (cfs)	3.27
Peak Outflow (cfs)	1.27
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	22.91
Max HGL Depth Attained (ft)	1.91
Average HGL Elevation Attained (ft)	21.26
Average HGL Depth Attained (ft)	0.26
Time of Max HGL Occurrence (days hh:mm)	0 12:24
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : WEST-POND

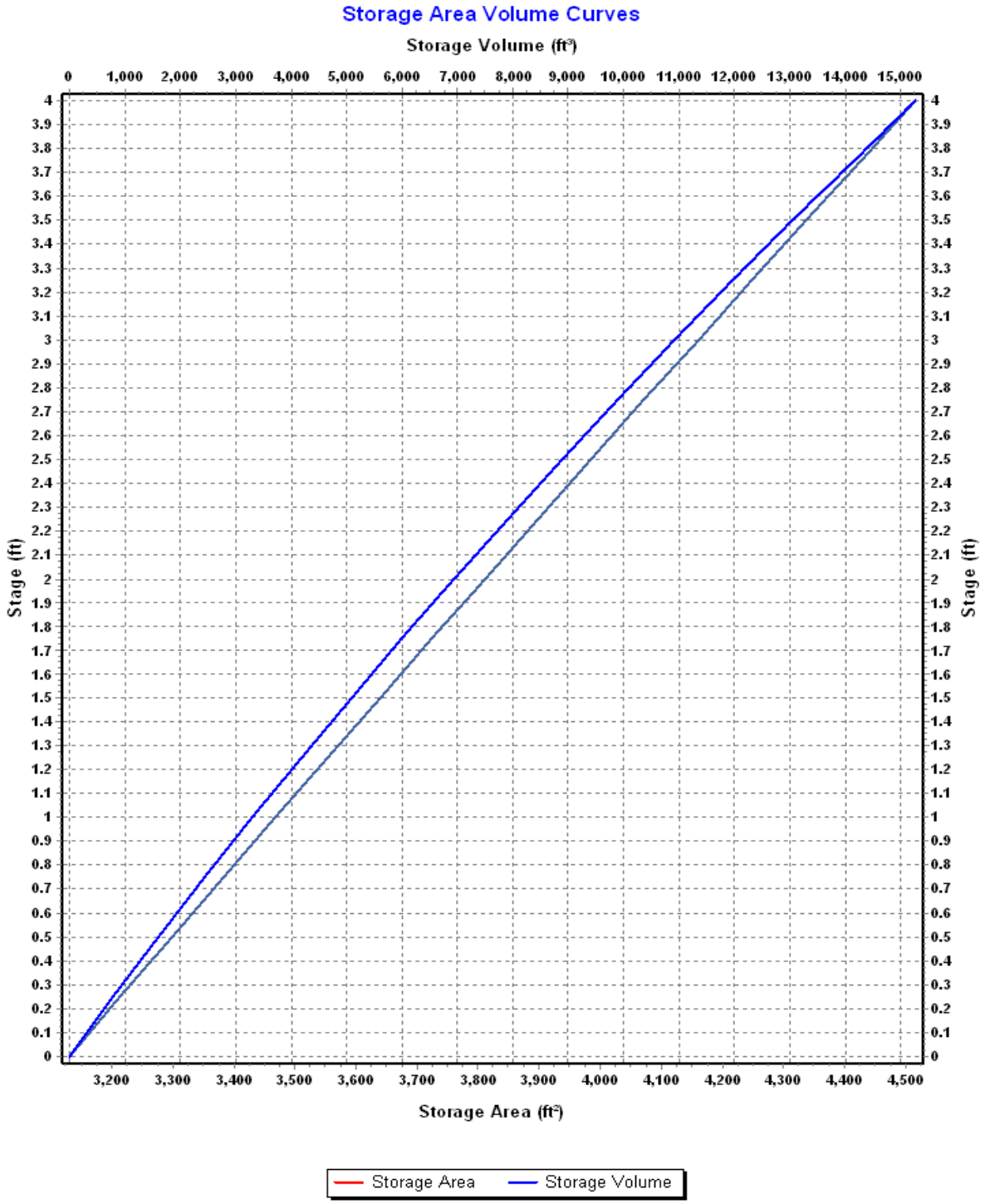
Input Data

Invert Elevation (ft)	20.50
Max (Rim) Elevation (ft)	24.50
Max (Rim) Offset (ft)	4.00
Initial Water Elevation (ft)	20.50
Initial Water Depth (ft)	0.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : WEST-POND-STORAGE

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	3131.17	0.000
0.25	3214.73	793.24
0.50	3298.68	1607.42
0.75	3383.02	2442.63
1.00	3467.76	3298.98
1.25	3552.89	4176.56
1.50	3638.41	5075.47
1.75	3724.33	5995.81
2.00	3810.64	6937.68
2.25	3897.34	7901.18
2.50	3984.43	8886.40
2.75	4071.92	9893.44
3.00	4159.79	10922.40
3.25	4248.07	11973.38
3.50	4336.73	13046.48
3.75	4425.79	14141.80
4.00	4515.24	15259.43


Storage Area Volume Curves
Storage Volume (ft³)
0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000 9,000 10,000 11,000 12,000 13,000 14,000 15,000
Stage (ft)
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 4
Stage (ft)
Storage Area (ft²)
3,200 3,300 3,400 3,500 3,600 3,700 3,800 3,900 4,000 4,100 4,200 4,300 4,400 4,500
Storage Area
Storage Volume

Storage Node : WEST-POND (continued)

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	6-IN-ORIFICE	Side	CIRCULAR	No	6.00			20.50	0.61

Output Summary Results

Peak Inflow (cfs)	6.83
Peak Lateral Inflow (cfs)	3.66
Peak Outflow (cfs)	1.40
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	22.91
Max HGL Depth Attained (ft)	2.41
Average HGL Elevation Attained (ft)	20.97
Average HGL Depth Attained (ft)	0.47
Time of Max HGL Occurrence (days hh:mm)	0 12:24
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

25-YEAR

Project Description

File Name	24-065 RATIONAL METHOD.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Nov 04, 2024	00:00:00
End Analysis On	Nov 05, 2024	00:00:00
Start Reporting On	Nov 04, 2024	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	5
Nodes	3
Junctions	0
Outfalls	3
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	0
Channels	0
Pipes	0
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	25 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	POST-DEVELOPED_DA-1	0.41	0.7500	1.56	1.17	0.48	2.88	0 00:10:00
2	POST-DEVELOPED_DA-2	0.26	0.9000	1.56	1.41	0.37	2.20	0 00:10:00
3	POST-DEVELOPED_DA-3	0.47	0.6900	1.56	1.08	0.50	3.02	0 00:10:00
4	POST-DEVELOPED_DA-4	0.05	0.3000	1.56	0.47	0.02	0.14	0 00:10:00
5	PRE-DEVELOPED-DA	1.19	0.3000	2.65	0.80	0.94	2.05	0 00:27:41

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	POST-DETAINED-OUTFALL	Outfall	0.00					0.00	0.00					
2	POST-UNDETAINED-OUTFALL	Outfall	0.00					0.00	0.00					
3	PRE-DEVELOPED-OUTFALL	Outfall	0.00					0.00	0.00					

Subbasin Hydrology

Subbasin : POST-DEVELOPED_DA-1

Input Data

Area (ac) 0.41
Weighted Runoff Coefficient 0.7500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
ROOF	0.25	D	0.90
POND	0.08	D	0.75
PAVEMENT	0.00	D	0.90
GRASS	0.08	D	0.30
Composite Area & Weighted Runoff Coeff.	0.41		0.75

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

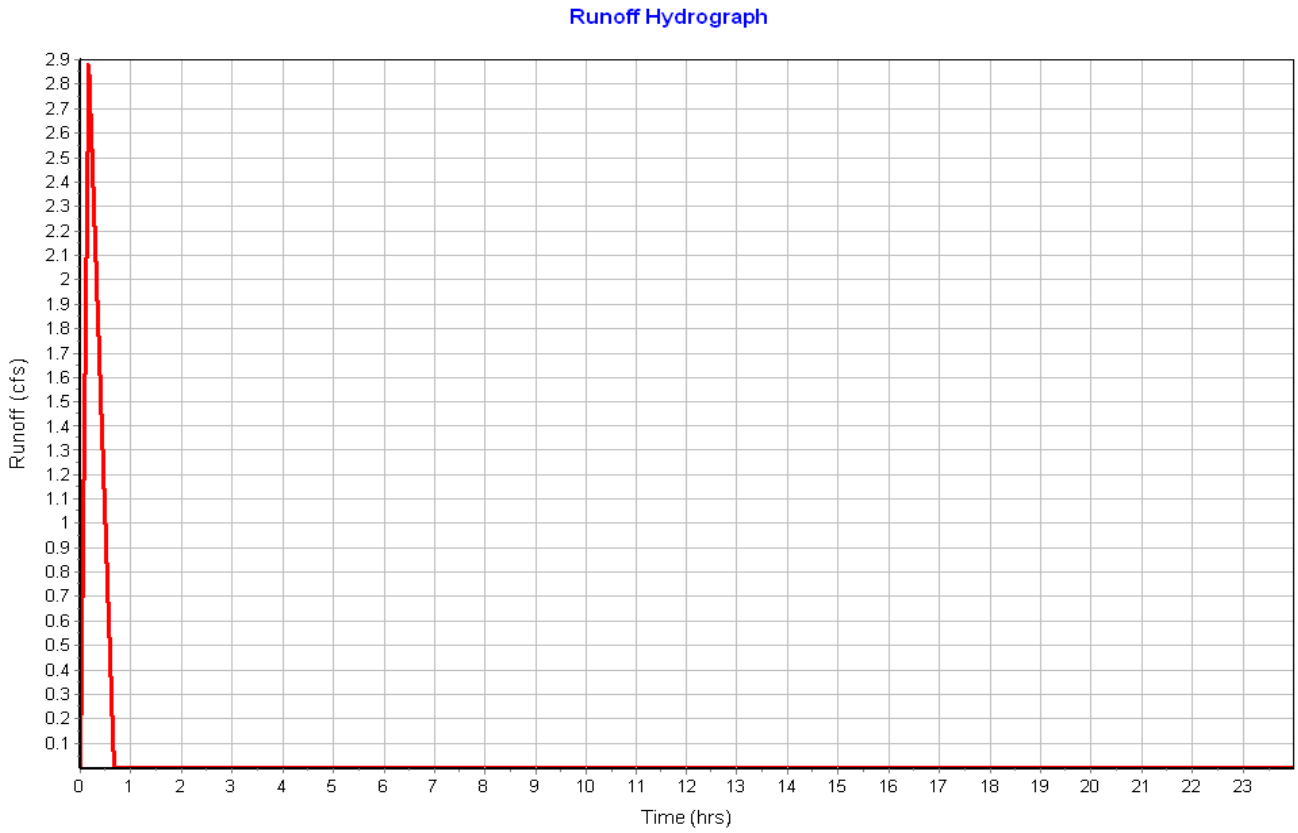
Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

User-Defined TOC override (minutes): 10

Subbasin Runoff Results

Total Rainfall (in) 1.56
Total Runoff (in) 1.17
Peak Runoff (cfs) 2.88
Rainfall Intensity 9.370
Weighted Runoff Coefficient 0.7500
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-1



Subbasin : POST-DEVELOPED_DA-2

Input Data

Area (ac) 0.26
Weighted Runoff Coefficient 0.9000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
PAVEMENT	0.26	D	0.90
Composite Area & Weighted Runoff Coeff.	0.26		0.90

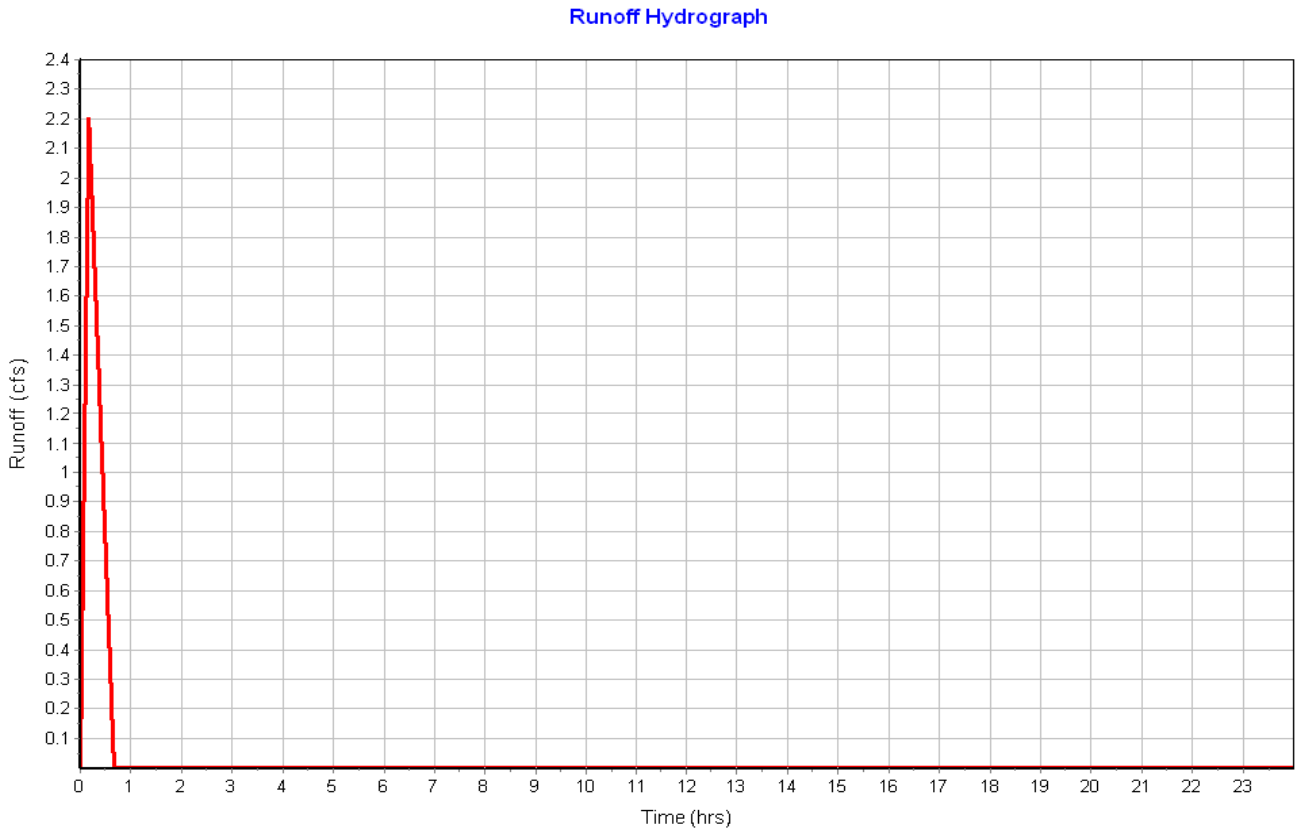
Time of Concentration

User-Defined TOC override (minutes): 10

Subbasin Runoff Results

Total Rainfall (in) 1.56
Total Runoff (in) 1.41
Peak Runoff (cfs) 2.20
Rainfall Intensity 9.370
Weighted Runoff Coefficient 0.9000
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-2



Subbasin : POST-DEVELOPED_DA-3

Input Data

Area (ac) 0.47
Weighted Runoff Coefficient 0.6900

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
PAVEMENT	0.22	D	0.90
POND	0.10	D	0.75
GRASS	0.14	D	0.30
Composite Area & Weighted Runoff Coeff.	0.46		0.69

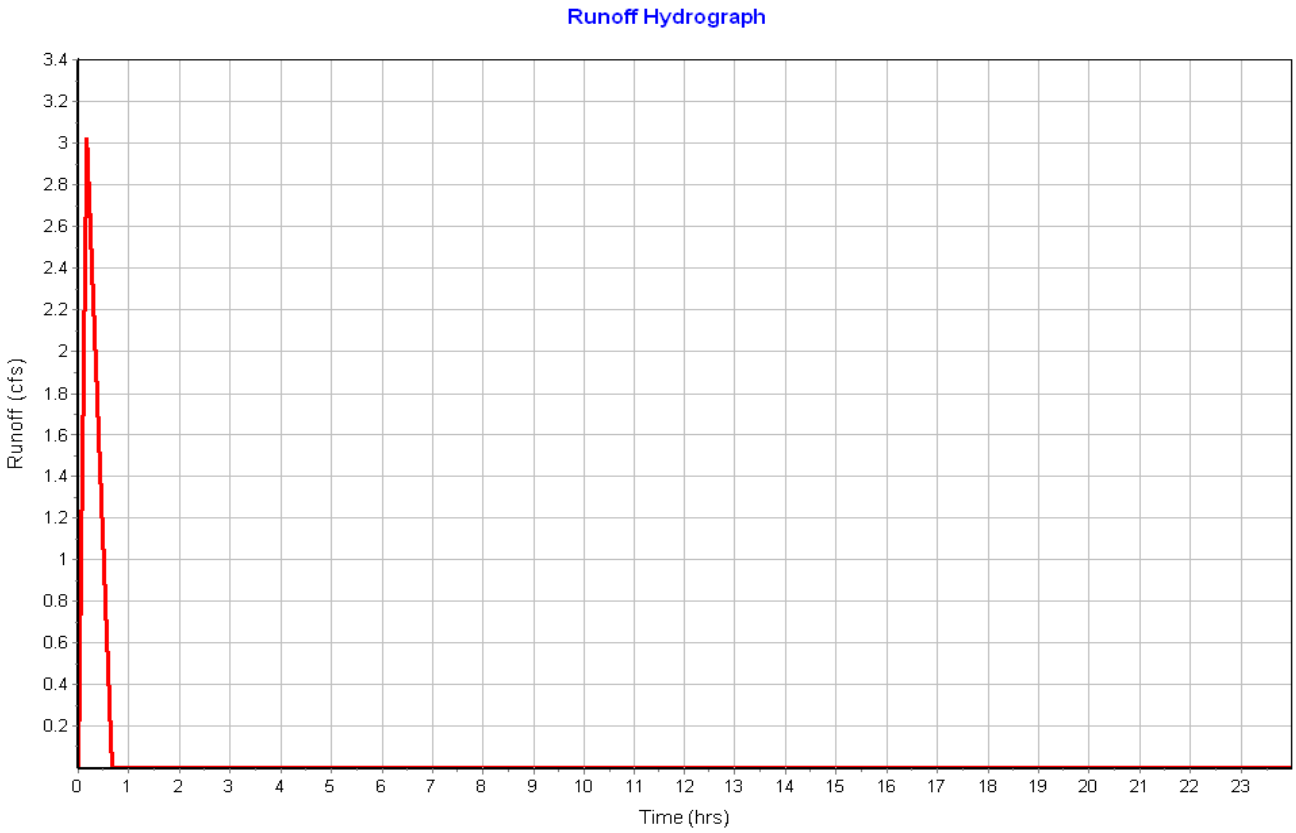
Time of Concentration

User-Defined TOC override (minutes): 10

Subbasin Runoff Results

Total Rainfall (in) 1.56
Total Runoff (in) 1.08
Peak Runoff (cfs) 3.02
Rainfall Intensity 9.370
Weighted Runoff Coefficient 0.6900
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-3



Subbasin : POST-DEVELOPED_DA-4

Input Data

Area (ac) 0.05
Weighted Runoff Coefficient 0.3000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
GRASS	0.05	D	0.30
Composite Area & Weighted Runoff Coeff.	0.05		0.30

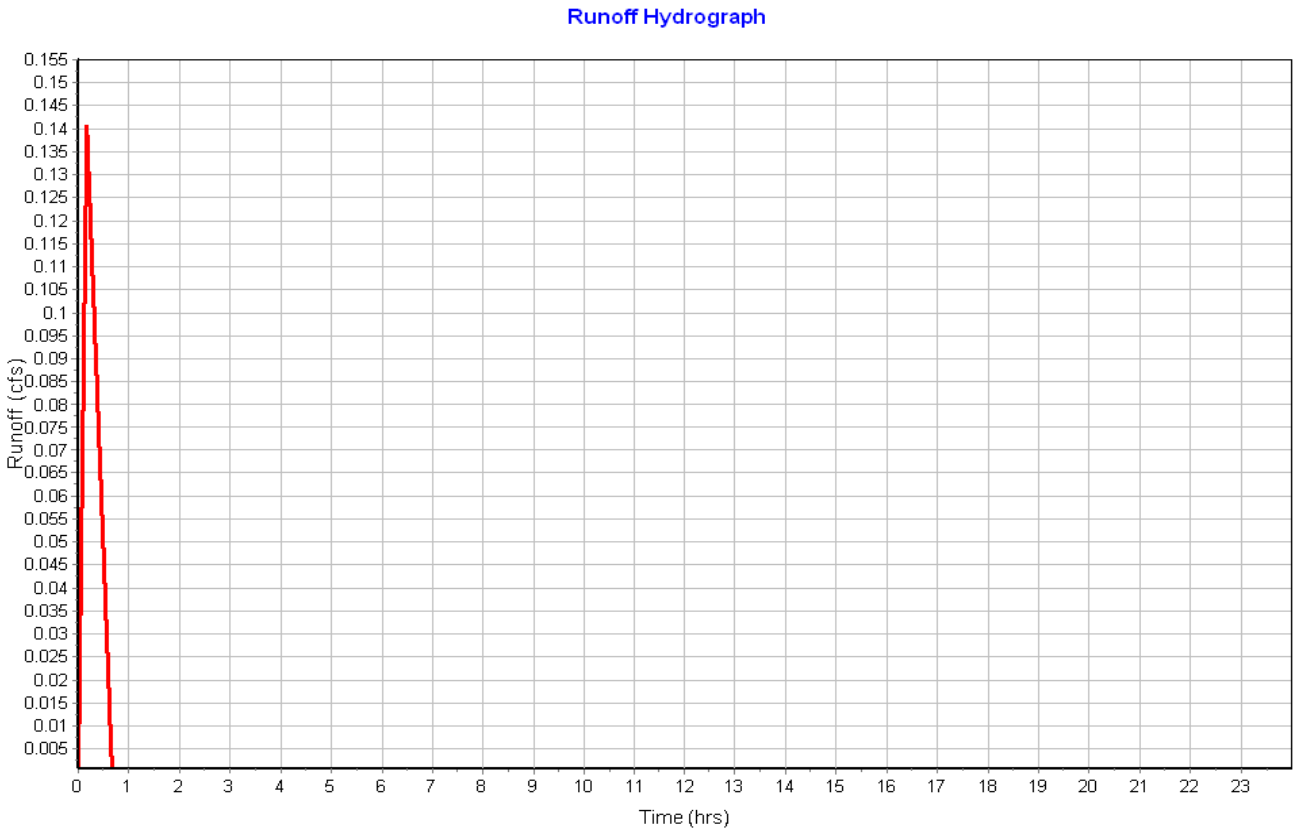
Time of Concentration

User-Defined TOC override (minutes): 10

Subbasin Runoff Results

Total Rainfall (in) 1.56
Total Runoff (in) 0.47
Peak Runoff (cfs) 0.14
Rainfall Intensity 9.370
Weighted Runoff Coefficient 0.3000
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-4



Subbasin : PRE-DEVELOPED-DA

Input Data

Area (ac) 1.19
Weighted Runoff Coefficient 0.3000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
GRASS	1.19	D	0.30
Composite Area & Weighted Runoff Coeff.	1.19		0.30

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.40	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	0.99	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.01	0.00	0.00
Velocity (ft/sec) :	0.07	0.00	0.00
Computed Flow Time (min) :	25.41	0.00	0.00

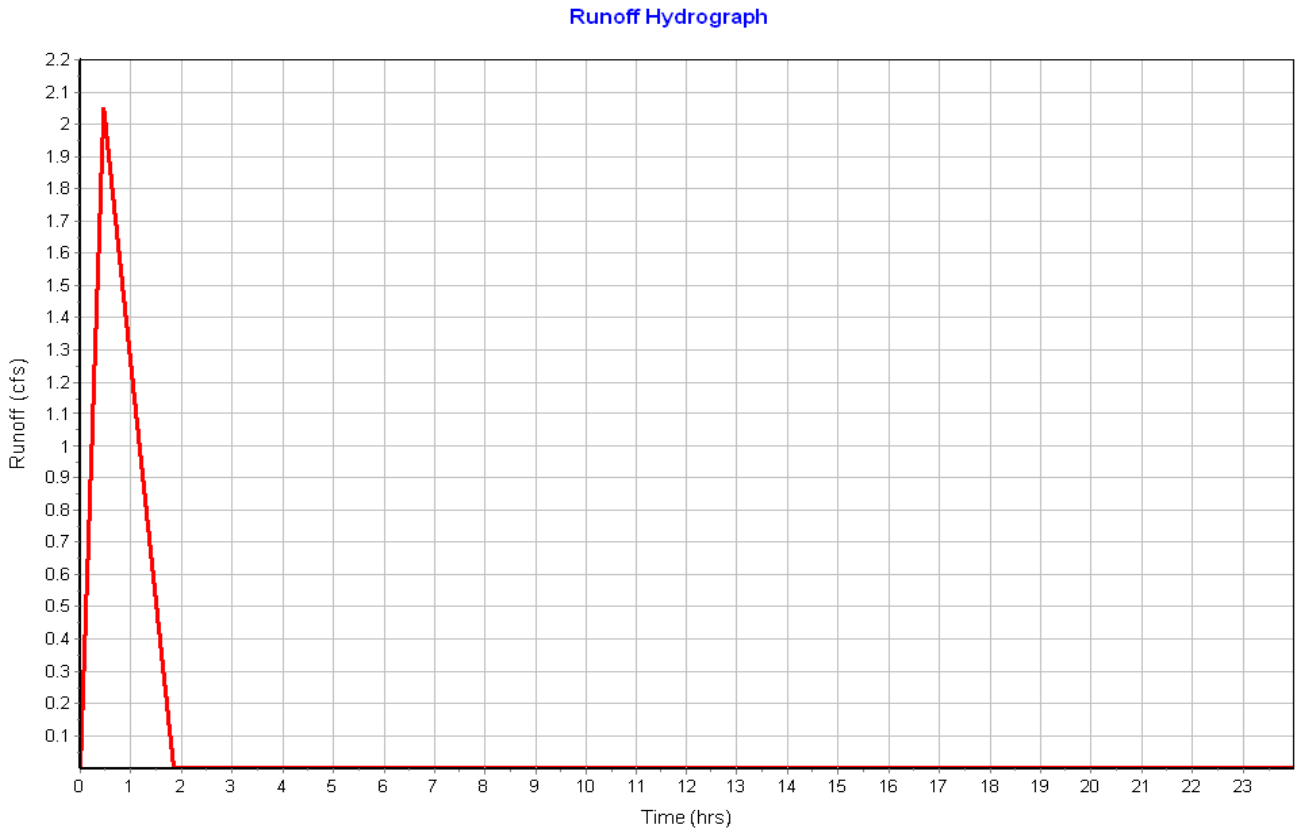
Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	98.41	0.00	0.00
Slope (%) :	0.2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	0.72	0.00	0.00
Computed Flow Time (min) :	2.28	0.00	0.00

Total TOC (min) 27.69

Subbasin Runoff Results

Total Rainfall (in) 2.65
Total Runoff (in) 0.80
Peak Runoff (cfs) 2.05
Rainfall Intensity 5.748
Weighted Runoff Coefficient 0.3000
Time of Concentration (days hh:mm:ss) 0 00:27:41

Subbasin : PRE-DEVELOPED-DA



25-YEAR

Project Description

File Name ..... 24-065 SCS METHOD.SPF

Project Options

Flow Units ..... CFS
Elevation Type ..... Elevation
Hydrology Method ..... SCS TR-55
Time of Concentration (TOC) Method ..... SCS TR-55
Link Routing Method ..... Hydrodynamic
Enable Overflow Ponding at Nodes ..... YES
Skip Steady State Analysis Time Periods ... NO

Analysis Options

Start Analysis On ..... Nov 04, 2024 00:00:00
End Analysis On ..... Nov 05, 2024 00:00:00
Start Reporting On ..... Nov 04, 2024 00:00:00
Antecedent Dry Days ..... 0 days
Runoff (Dry Weather) Time Step ..... 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step ..... 0 00:05:00 days hh:mm:ss
Reporting Time Step ..... 0 00:05:00 days hh:mm:ss
Routing Time Step ..... 15 seconds

Number of Elements

	Qty
Rain Gages	4
Subbasins	3
Nodes	5
Junctions	2
Outfalls	1
Flow Diversions	0
Inlets	0
Storage Nodes	2
Links	4
Channels	0
Pipes	3
Pumps	0
Orifices	1
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	100-YEAR	Time Series	100-YEAR	Cumulative	inches	Texas	Nueces	100	11.30	SCS Type II 24-hr
2	10-YEAR	Time Series	10-YEAR	Cumulative	inches	Texas	Nueces	10	7.30	SCS Type II 24-hr
3	25-YEAR	Time Series	25-YEAR	Cumulative	inches	Texas	Nueces	25	8.60	SCS Type II 24-hr
4	5-YEAR	Time Series	5-YEAR	Cumulative	inches	Texas	Nueces	5	6.10	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	POST-DEVELOPED_DA-1	0.41	92.81	8.60	7.74	3.17	3.97	0 00:10:00
2	POST-DEVELOPED_DA-2	0.26	98.00	8.60	8.36	2.18	2.60	0 00:10:00
3	POST-DEVELOPED_DA-3	0.47	90.78	8.60	7.49	3.50	4.46	0 00:10:00

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)
1	DROP-INLET	Junction	20.75	24.80	20.75	0.00	0.00	2.54	23.29	0.00	1.51	0 00:00	0.00
2	OUTFALL-CNTRL-STRUC	Junction	20.50	24.25	20.50	0.00	0.00	1.52	20.84	0.00	3.41	0 00:00	0.00
3	POST-DETAINED-OUTFALL	Outfall	0.00					1.55	0.00				
4	SOUTH-POND	Storage Node	21.00	24.50	21.00		0.00	3.88	23.29				0.00
5	WEST-POND	Storage Node	20.50	24.50	20.50		0.00	7.85	23.29				0.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)
1	18-IN-PVC	Pipe	DROP-INLET	WEST-POND	61.00	20.75	20.50	0.4100	18.000	0.0130	2.50	6.72	0.37	1.41	1.50	1.00	157.00
2	24-IN-PVC	Pipe	SOUTH-POND	WEST-POND	101.00	21.00	20.50	0.5000	24.000	0.0130	1.28	15.92	0.08	1.12	2.00	1.00	67.00
3	24-IN-RCP	Pipe	OUTFALL-CNTRL-STRUC	POST-DETAINED-OUTFALL	5.00	20.50	20.10	8.0000	24.000	0.0150	1.55	55.45	0.03	5.68	0.28	0.14	0.00
4	6-IN-ORIFICE	Orifice	WEST-POND	OUTFALL-CNTRL-STRUC		20.50	20.50		6.000		1.52						

Subbasin Hydrology

Subbasin : POST-DEVELOPED_DA-1

Input Data

Area (ac) 0.41
Weighted Curve Number 92.81
Rain Gage ID 25-YEAR

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	0.25	D	98.00
POND	0.08	D	90.00
Paved parking & roofs	0.00	D	98.00
> 75% grass cover, Good	0.08	D	80.00
Composite Area & Weighted CN	0.41		92.81

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

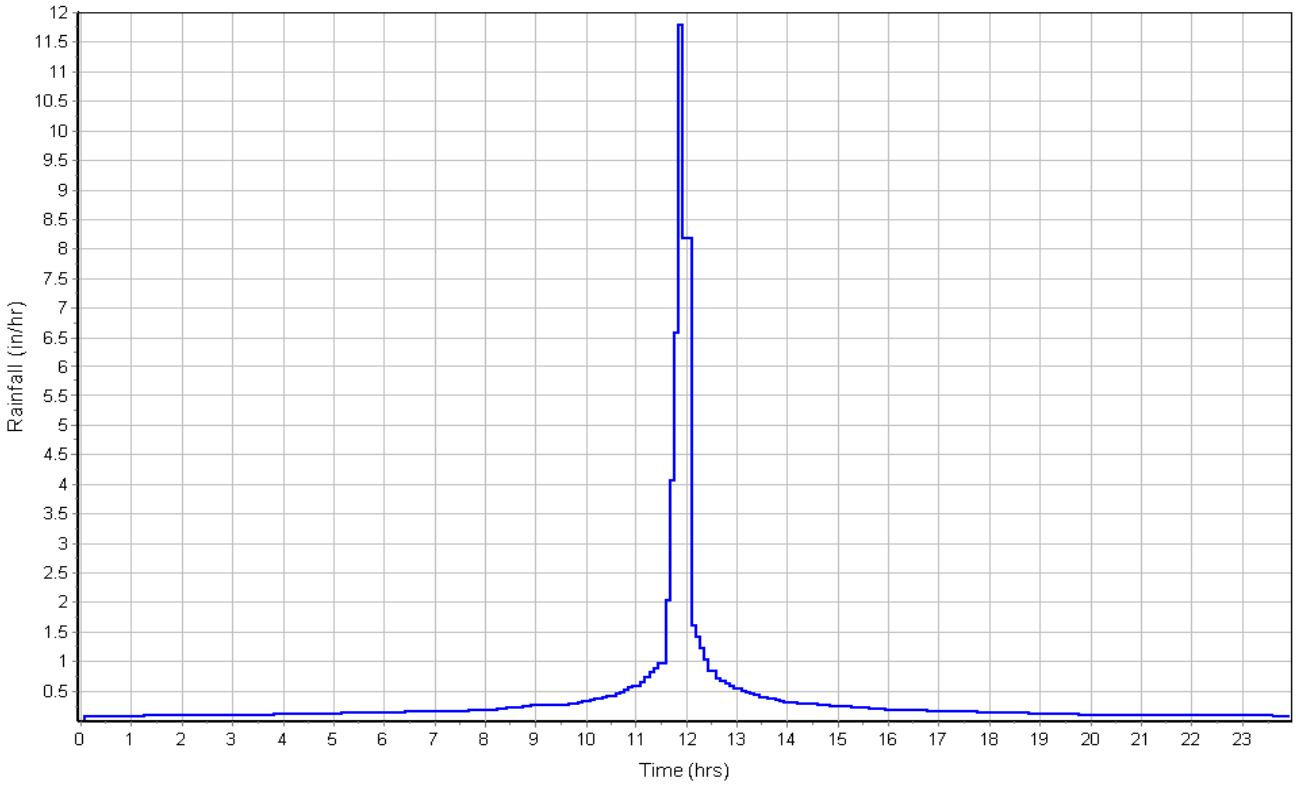
User-Defined TOC override (minutes): 10

Subbasin Runoff Results

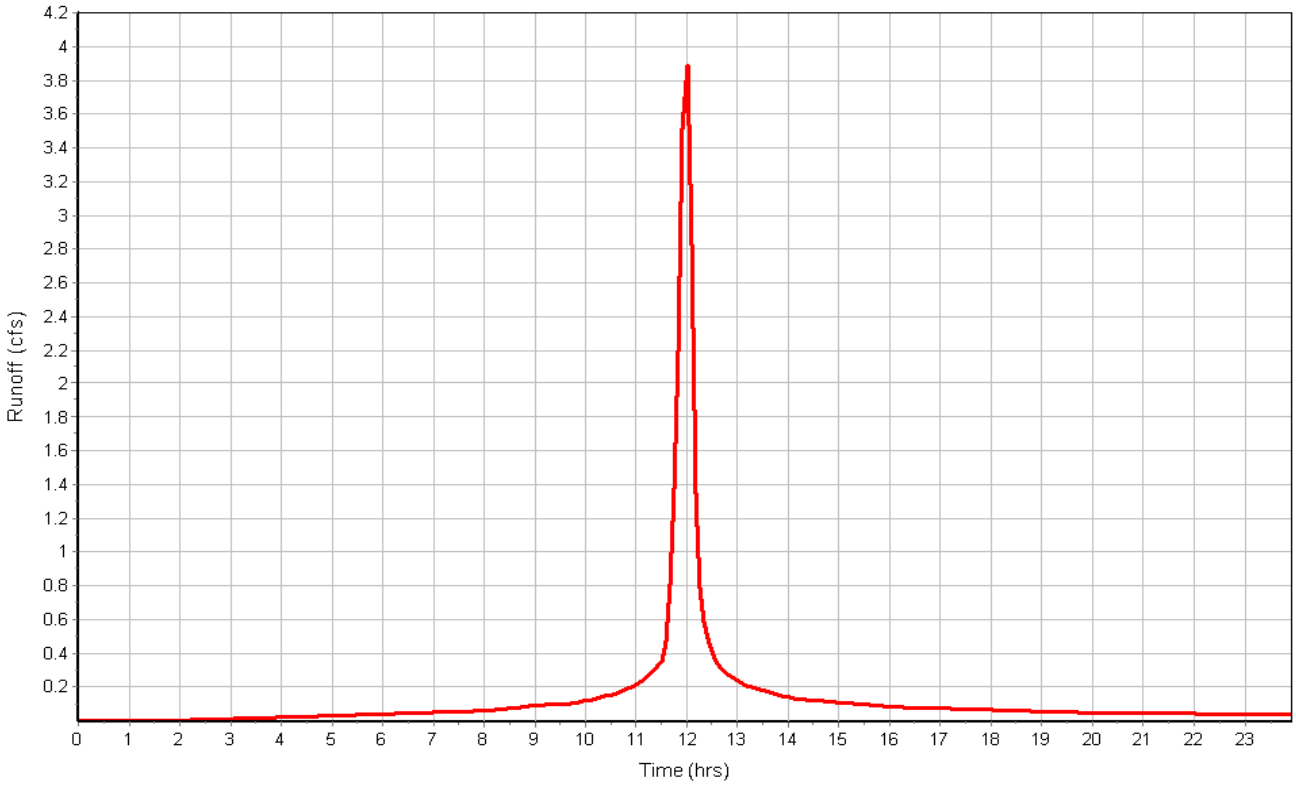
Total Rainfall (in) 8.60
Total Runoff (in) 7.74
Peak Runoff (cfs) 3.97
Weighted Curve Number 92.81
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-1

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : POST-DEVELOPED_DA-2

Input Data

Area (ac) 0.26
Weighted Curve Number 98.00
Rain Gage ID 25-YEAR

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	0.26	D	98.00
Composite Area & Weighted CN	0.26		98.00

Time of Concentration

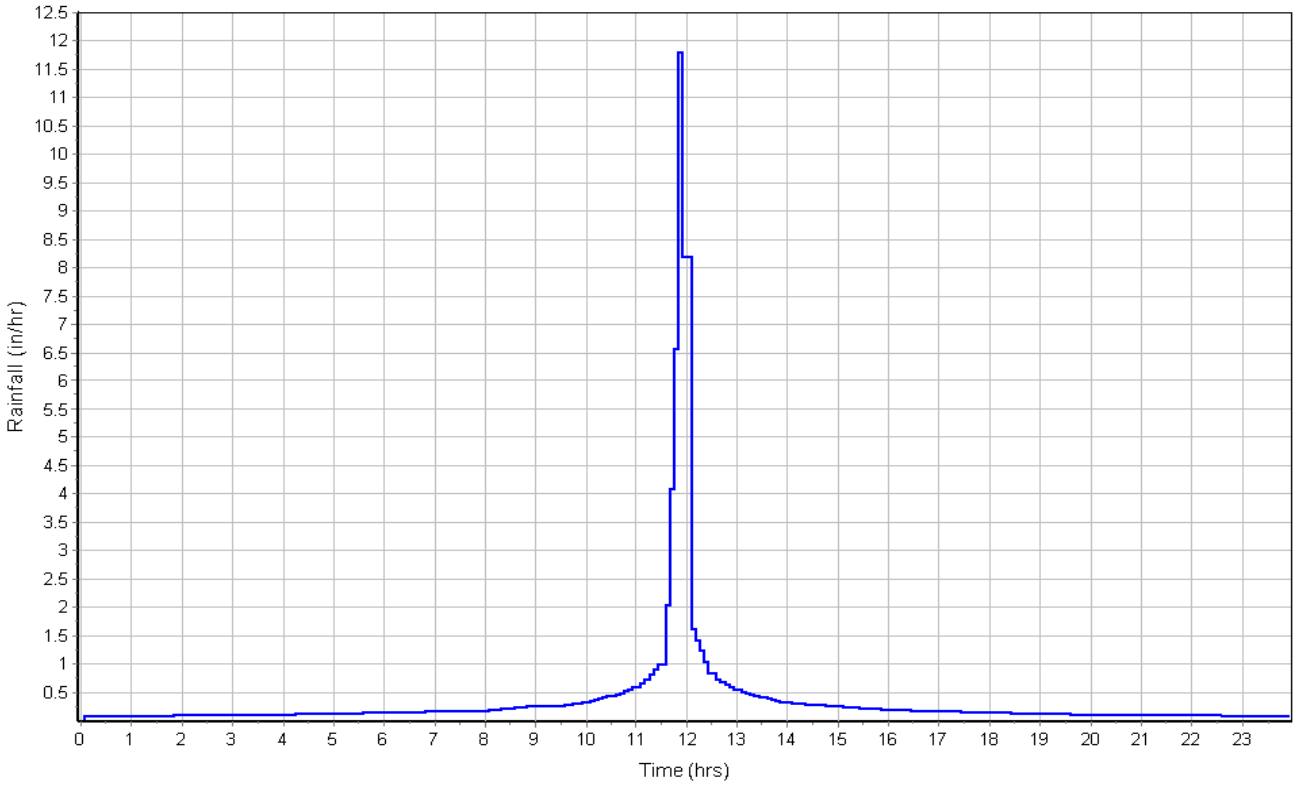
User-Defined TOC override (minutes): 10

Subbasin Runoff Results

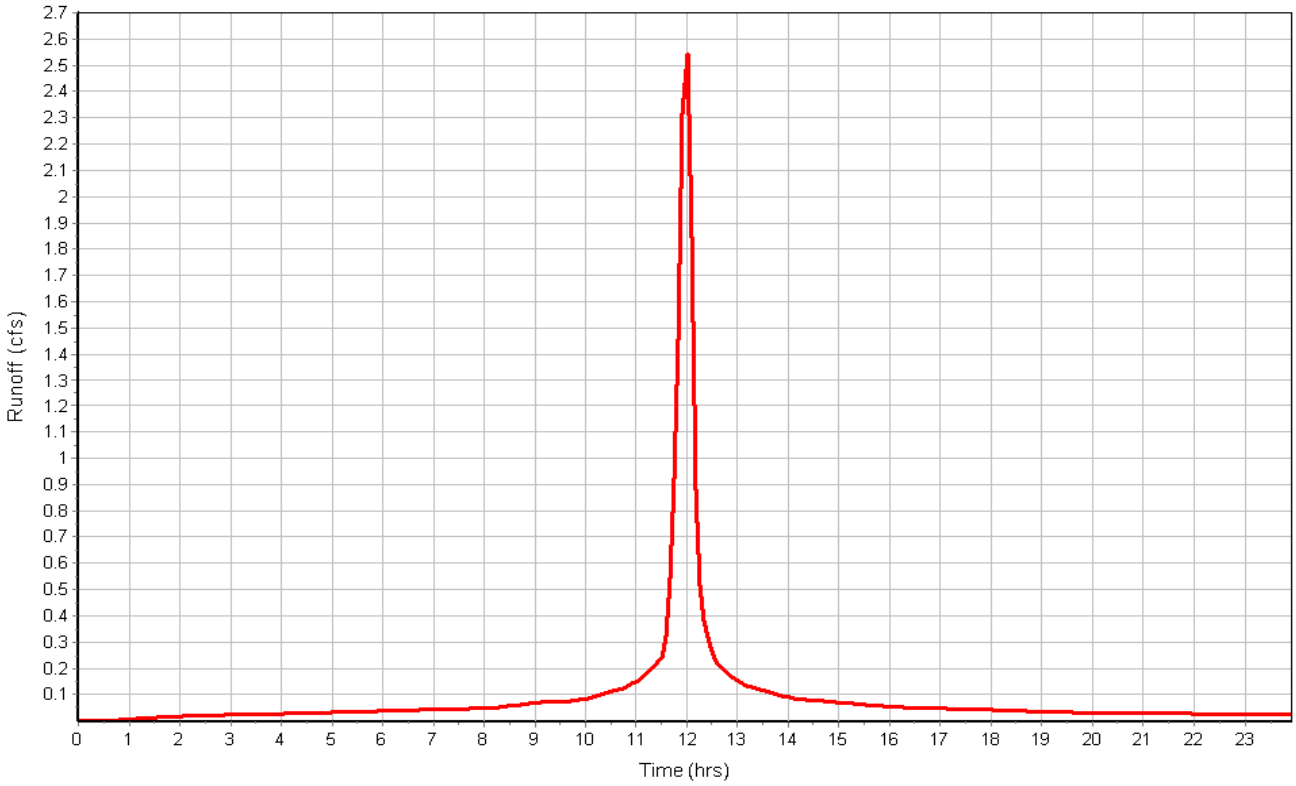
Total Rainfall (in) 8.60
Total Runoff (in) 8.36
Peak Runoff (cfs) 2.60
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-2

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : POST-DEVELOPED_DA-3

Input Data

Area (ac) 0.47
Weighted Curve Number 90.78
Rain Gage ID 25-YEAR

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	0.22	D	98.00
POND	0.10	D	90.00
> 75% grass cover, Good	0.14	D	80.00
Composite Area & Weighted CN	0.46		90.78

Time of Concentration

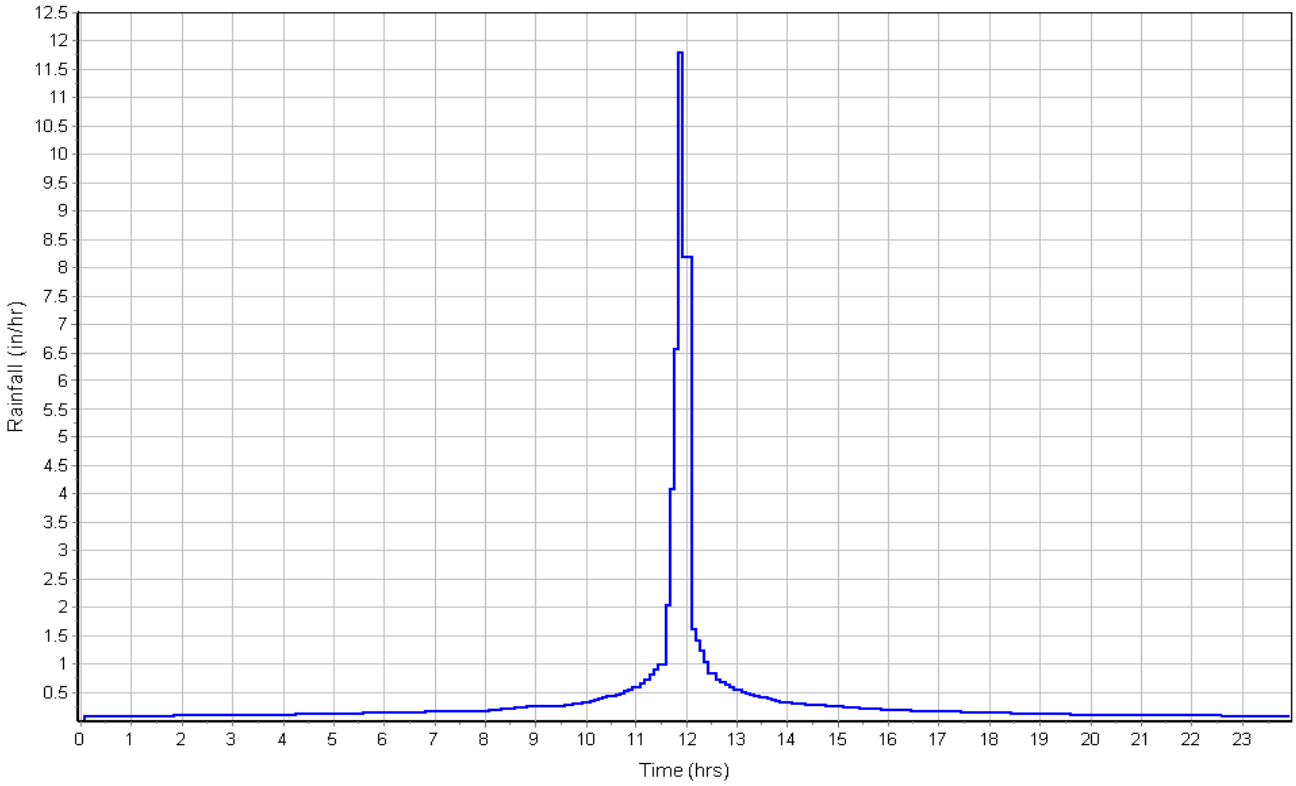
User-Defined TOC override (minutes): 10

Subbasin Runoff Results

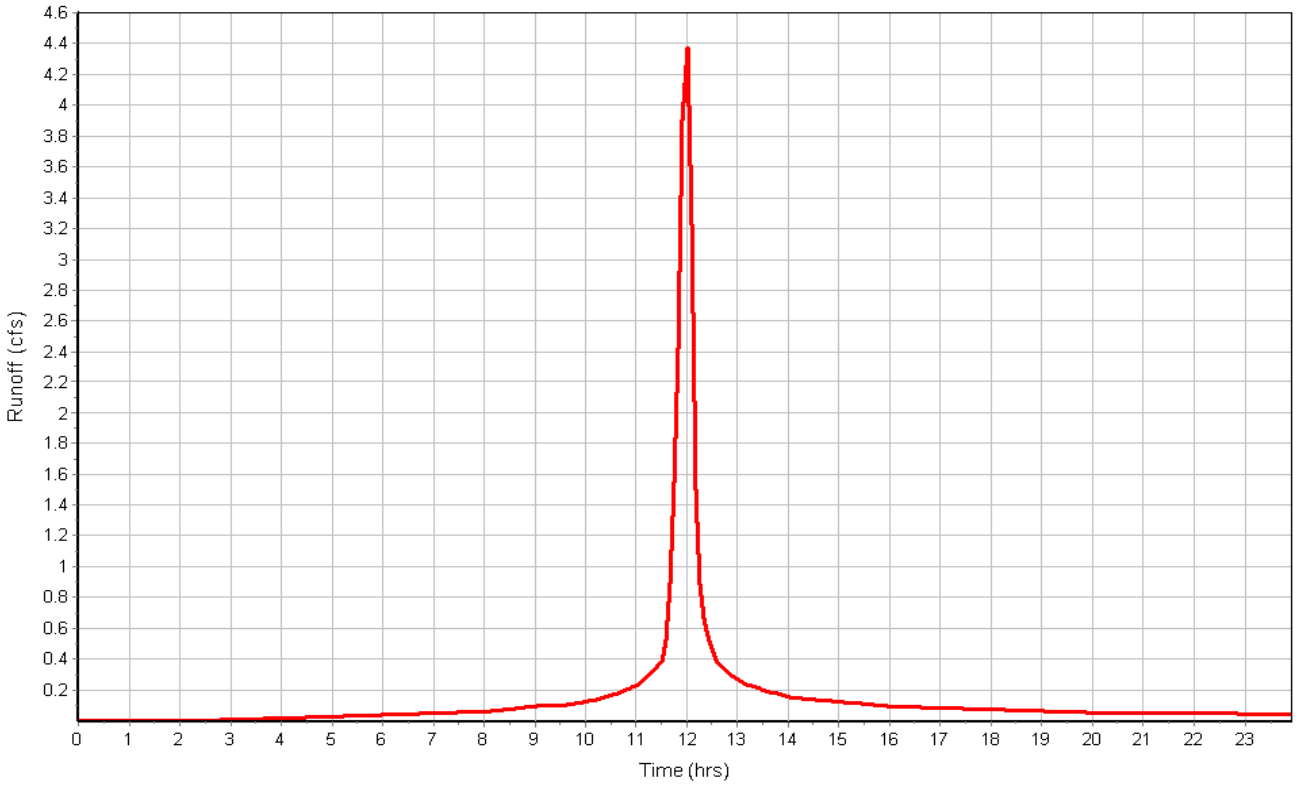
Total Rainfall (in) 8.60
Total Runoff (in) 7.49
Peak Runoff (cfs) 4.46
Weighted Curve Number 90.78
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-3

Rainfall Intensity Graph



Runoff Hydrograph



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	DROP-INLET	20.75	24.80	4.05	20.75	0.00	0.00	-24.80	0.00	0.00
2	OUTFALL-CNTRL-STRUC	20.50	24.25	3.75	20.50	0.00	0.00	-24.25	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	DROP-INLET	2.54	2.54	23.29	2.54	0.00	1.51	21.17	0.42	0 12:27	0 00:00	0.00	0.00
2	OUTFALL-CNTRL-STRUC	1.52	0.00	20.84	0.34	0.00	3.41	20.62	0.12	0 12:30	0 00:00	0.00	0.00

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	18-IN-PVC	61.00	20.75	0.00	20.50	0.00	0.25	0.4100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	24-IN-PVC	101.00	21.00	0.00	20.50	0.00	0.50	0.5000	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
3	24-IN-RCP	5.00	20.50	0.00	20.10	20.10	0.40	8.0000	CIRCULAR	24.000	24.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	18-IN-PVC	2.50	0 12:05	6.72	0.37	1.41	0.72	1.50	1.00	157.00		SURCHARGED
2	24-IN-PVC	1.28	0 11:58	15.92	0.08	1.12	1.50	2.00	1.00	67.00		SURCHARGED
3	24-IN-RCP	1.55	0 12:25	55.45	0.03	5.68	0.01	0.28	0.14	0.00		Calculated

Storage Nodes

Storage Node : SOUTH-POND

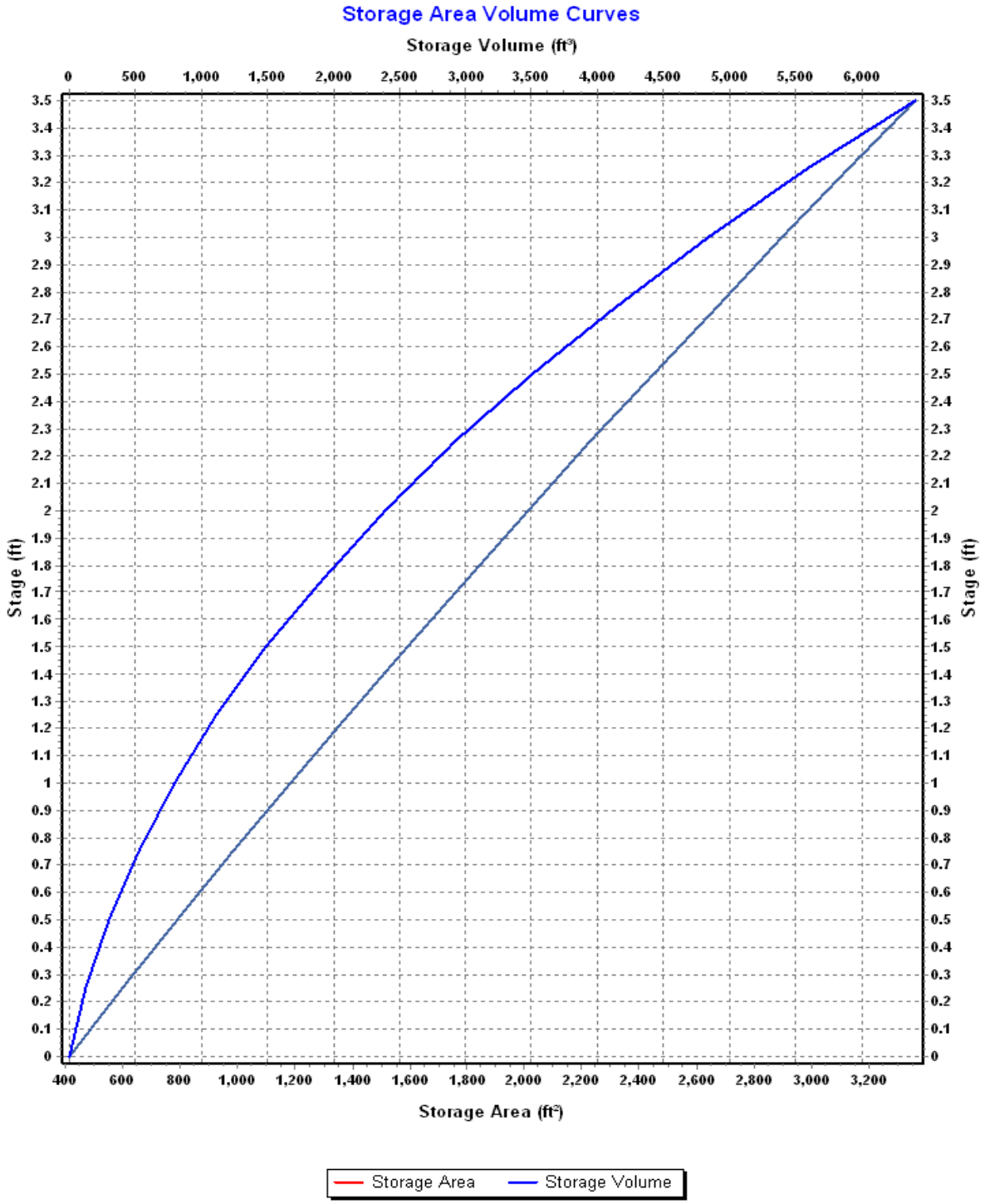
Input Data

Invert Elevation (ft)	21.00
Max (Rim) Elevation (ft)	24.50
Max (Rim) Offset (ft)	3.50
Initial Water Elevation (ft)	21.00
Initial Water Depth (ft)	0.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : SOUTH-POND-STORAGE

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	416.00	0.000
0.25	602.04	127.26
0.50	792.58	301.59
0.75	987.14	524.05
1.00	1185.23	795.60
1.25	1386.85	1117.11
1.50	1592.01	1489.47
1.75	1800.71	1913.56
2.00	2012.94	2390.27
2.25	2228.70	2920.48
2.50	2448.00	3505.07
2.75	2670.83	4144.92
3.00	2897.19	4840.92
3.25	3127.09	5593.96
3.50	3360.53	6404.91


Storage Area Volume Curves
Storage Volume (ft³)
0
500
1,000
1,500
2,000
2,500
3,000
3,500
4,000
4,500
5,000
5,500
6,000
Stage (ft)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
2.1
2.2
2.3
2.4
2.5
2.6
2.7
2.8
2.9
3
3.1
3.2
3.3
3.4
3.5
Storage Area (ft²)
400
600
800
1,000
1,200
1,400
1,600
1,800
2,000
2,200
2,400
2,600
2,800
3,000
3,200
Storage Area
Storage Volume

Storage Node : SOUTH-POND (continued)

Output Summary Results

Peak Inflow (cfs)	3.88
Peak Lateral Inflow (cfs)	3.88
Peak Outflow (cfs)	1.28
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	23.29
Max HGL Depth Attained (ft)	2.29
Average HGL Elevation Attained (ft)	21.34
Average HGL Depth Attained (ft)	0.34
Time of Max HGL Occurrence (days hh:mm)	0 12:27
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : WEST-POND

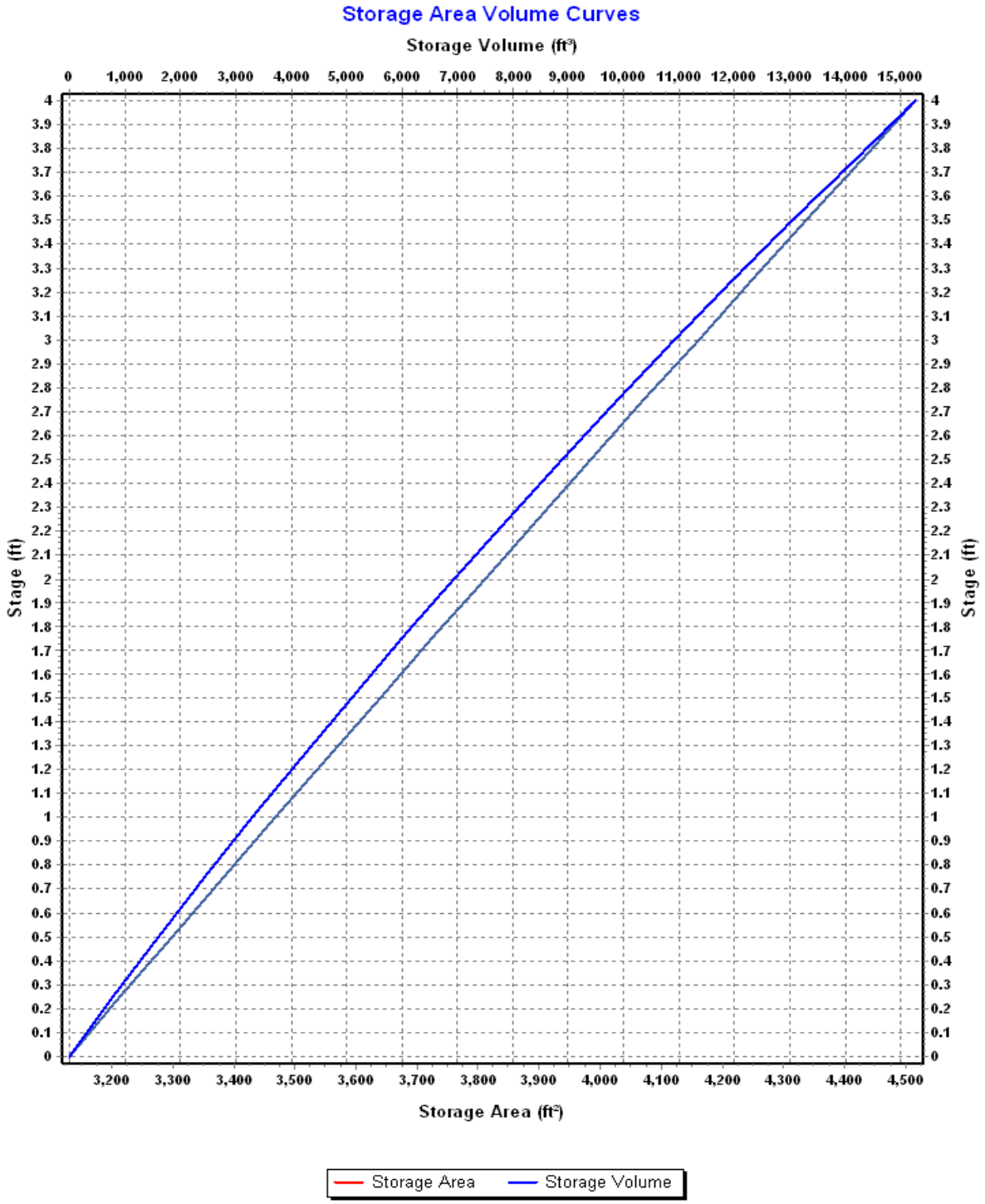
Input Data

Invert Elevation (ft)	20.50
Max (Rim) Elevation (ft)	24.50
Max (Rim) Offset (ft)	4.00
Initial Water Elevation (ft)	20.50
Initial Water Depth (ft)	0.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : WEST-POND-STORAGE

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	3131.17	0.000
0.25	3214.73	793.24
0.50	3298.68	1607.42
0.75	3383.02	2442.63
1.00	3467.76	3298.98
1.25	3552.89	4176.56
1.50	3638.41	5075.47
1.75	3724.33	5995.81
2.00	3810.64	6937.68
2.25	3897.34	7901.18
2.50	3984.43	8886.40
2.75	4071.92	9893.44
3.00	4159.79	10922.40
3.25	4248.07	11973.38
3.50	4336.73	13046.48
3.75	4425.79	14141.80
4.00	4515.24	15259.43


Storage Area Volume Curves
Storage Volume (ft³)
0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000 9,000 10,000 11,000 12,000 13,000 14,000 15,000
Stage (ft)
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 4
Stage (ft)
Storage Area (ft²)
3,200 3,300 3,400 3,500 3,600 3,700 3,800 3,900 4,000 4,100 4,200 4,300 4,400 4,500
Storage Area
Storage Volume

Storage Node : WEST-POND (continued)

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	6-IN-ORIFICE	Side	CIRCULAR	No	6.00			20.50	0.61

Output Summary Results

Peak Inflow (cfs)	7.85
Peak Lateral Inflow (cfs)	4.37
Peak Outflow (cfs)	1.52
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	23.29
Max HGL Depth Attained (ft)	2.79
Average HGL Elevation Attained (ft)	21.07
Average HGL Depth Attained (ft)	0.57
Time of Max HGL Occurrence (days hh:mm)	0 12:27
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

100-YEAR

Project Description

File Name	24-065 RATIONAL METHOD.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Nov 04, 2024	00:00:00
End Analysis On	Nov 05, 2024	00:00:00
Start Reporting On	Nov 04, 2024	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	5
Nodes	3
Junctions	0
Outfalls	3
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	0
Channels	0
Pipes	0
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	100 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	POST-DEVELOPED_DA-1	0.41	0.7500	1.98	1.49	0.61	3.66	0 00:10:00
2	POST-DEVELOPED_DA-2	0.26	0.9000	1.98	1.79	0.47	2.80	0 00:10:00
3	POST-DEVELOPED_DA-3	0.47	0.6900	1.98	1.37	0.64	3.84	0 00:10:00
4	POST-DEVELOPED_DA-4	0.05	0.3000	1.98	0.60	0.03	0.18	0 00:10:00
5	PRE-DEVELOPED-DA	1.19	0.3000	3.34	1.00	1.19	2.59	0 00:27:41

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	POST-DETAINED-OUTFALL	Outfall	0.00					0.00	0.00					
2	POST-UNDETAINED-OUTFALL	Outfall	0.00					0.00	0.00					
3	PRE-DEVELOPED-OUTFALL	Outfall	0.00					0.00	0.00					

Subbasin Hydrology

Subbasin : POST-DEVELOPED_DA-1

Input Data

Area (ac) 0.41
Weighted Runoff Coefficient 0.7500

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
ROOF	0.25	D	0.90
POND	0.08	D	0.75
PAVEMENT	0.00	D	0.90
GRASS	0.08	D	0.30
Composite Area & Weighted Runoff Coeff.	0.41		0.75

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

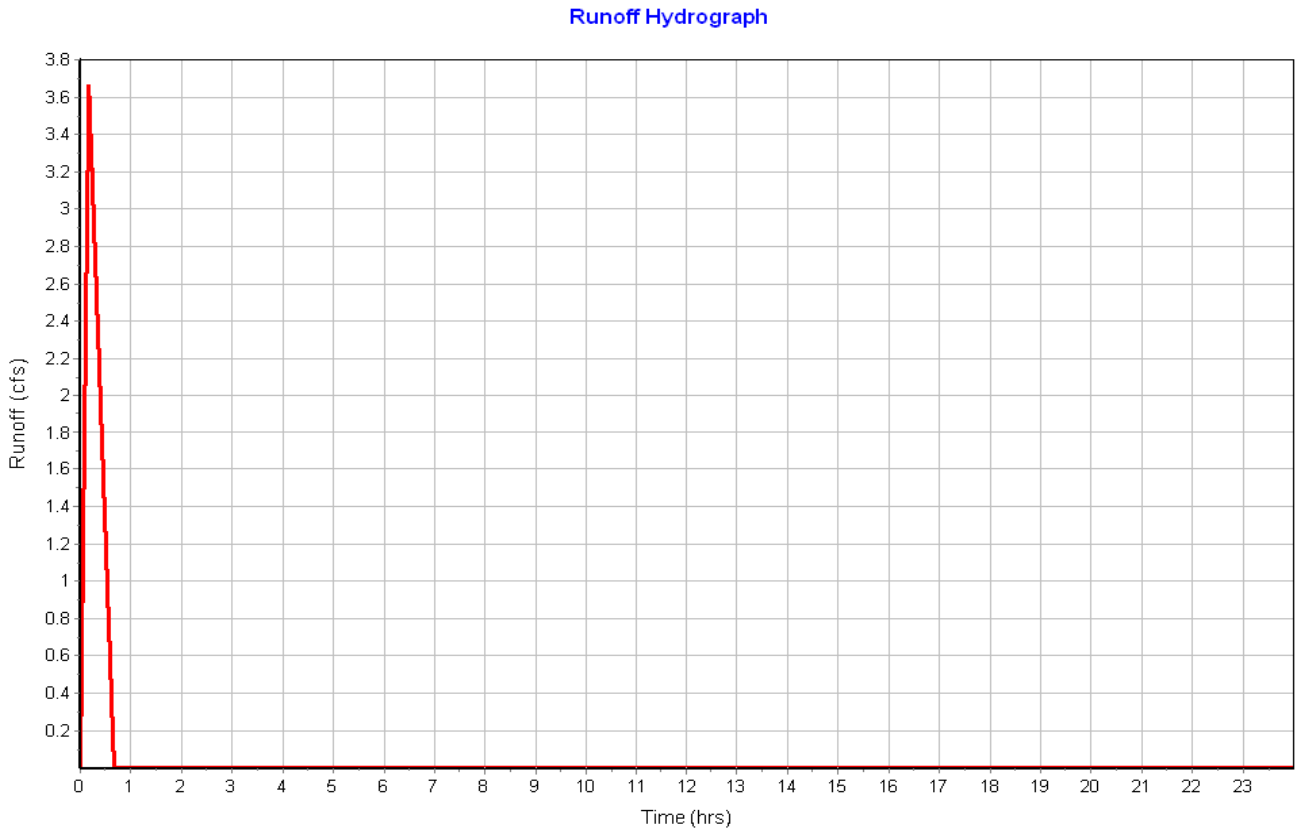
Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

User-Defined TOC override (minutes): 10

Subbasin Runoff Results

Total Rainfall (in) 1.98
Total Runoff (in) 1.49
Peak Runoff (cfs) 3.66
Rainfall Intensity 11.900
Weighted Runoff Coefficient 0.7500
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-1



Subbasin : POST-DEVELOPED_DA-2

Input Data

Area (ac) 0.26
Weighted Runoff Coefficient 0.9000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
PAVEMENT	0.26	D	0.90
Composite Area & Weighted Runoff Coeff.	0.26		0.90

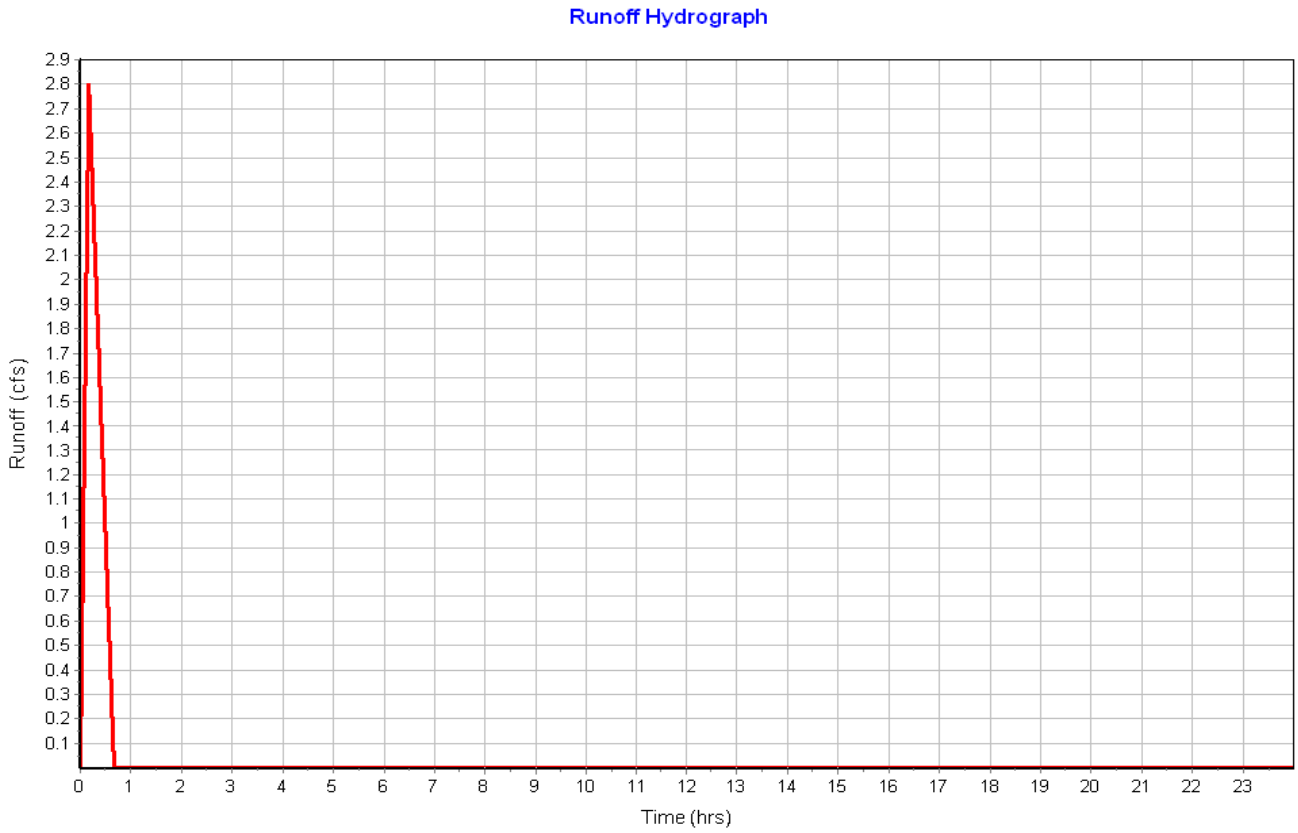
Time of Concentration

User-Defined TOC override (minutes): 10

Subbasin Runoff Results

Total Rainfall (in) 1.98
Total Runoff (in) 1.79
Peak Runoff (cfs) 2.80
Rainfall Intensity 11.900
Weighted Runoff Coefficient 0.9000
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-2



Subbasin : POST-DEVELOPED_DA-3

Input Data

Area (ac) 0.47
Weighted Runoff Coefficient 0.6900

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
PAVEMENT	0.22	D	0.90
POND	0.10	D	0.75
GRASS	0.14	D	0.30
Composite Area & Weighted Runoff Coeff.	0.46		0.69

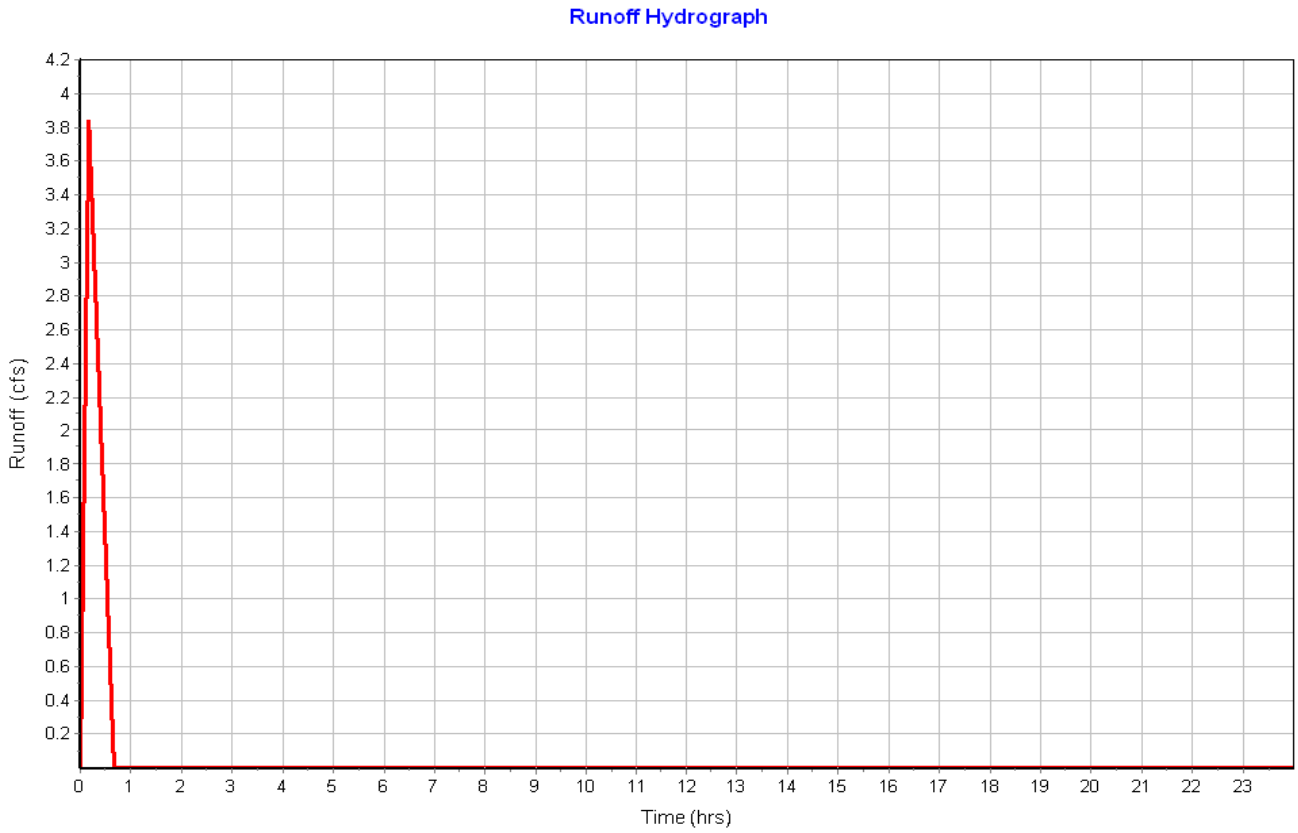
Time of Concentration

User-Defined TOC override (minutes): 10

Subbasin Runoff Results

Total Rainfall (in) 1.98
Total Runoff (in) 1.37
Peak Runoff (cfs) 3.84
Rainfall Intensity 11.900
Weighted Runoff Coefficient 0.6900
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-3



Subbasin : POST-DEVELOPED_DA-4

Input Data

Area (ac) 0.05
Weighted Runoff Coefficient 0.3000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
GRASS	0.05	D	0.30
Composite Area & Weighted Runoff Coeff.	0.05		0.30

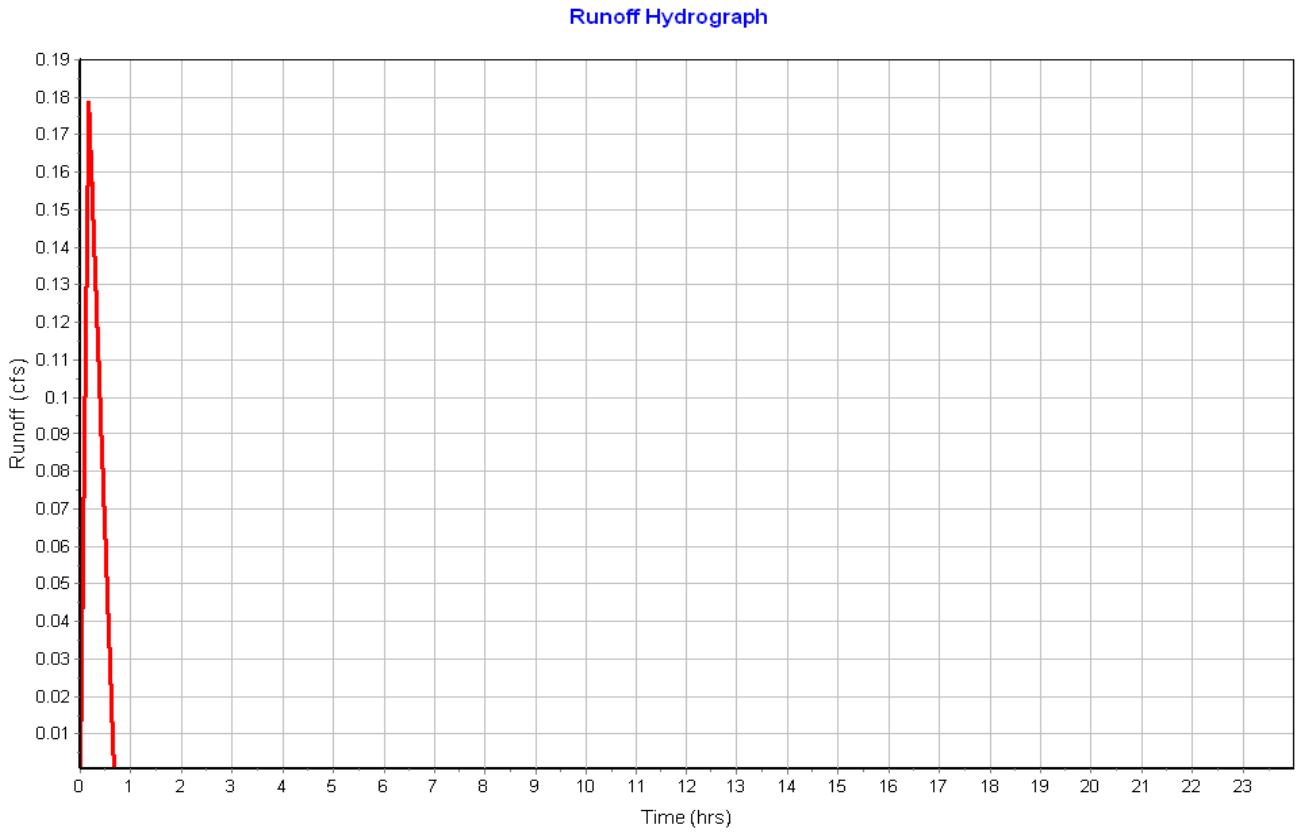
Time of Concentration

User-Defined TOC override (minutes): 10

Subbasin Runoff Results

Total Rainfall (in) 1.98
Total Runoff (in) 0.60
Peak Runoff (cfs) 0.18
Rainfall Intensity 11.900
Weighted Runoff Coefficient 0.3000
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-4



Subbasin : PRE-DEVELOPED-DA

Input Data

Area (ac) 1.19
Weighted Runoff Coefficient 0.3000

Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
GRASS	1.19	D	0.30
Composite Area & Weighted Runoff Coeff.	1.19		0.30

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.40	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	0.99	0.00	0.00
2 yr, 24 hr Rainfall (in) :	4.01	0.00	0.00
Velocity (ft/sec) :	0.07	0.00	0.00
Computed Flow Time (min) :	25.41	0.00	0.00

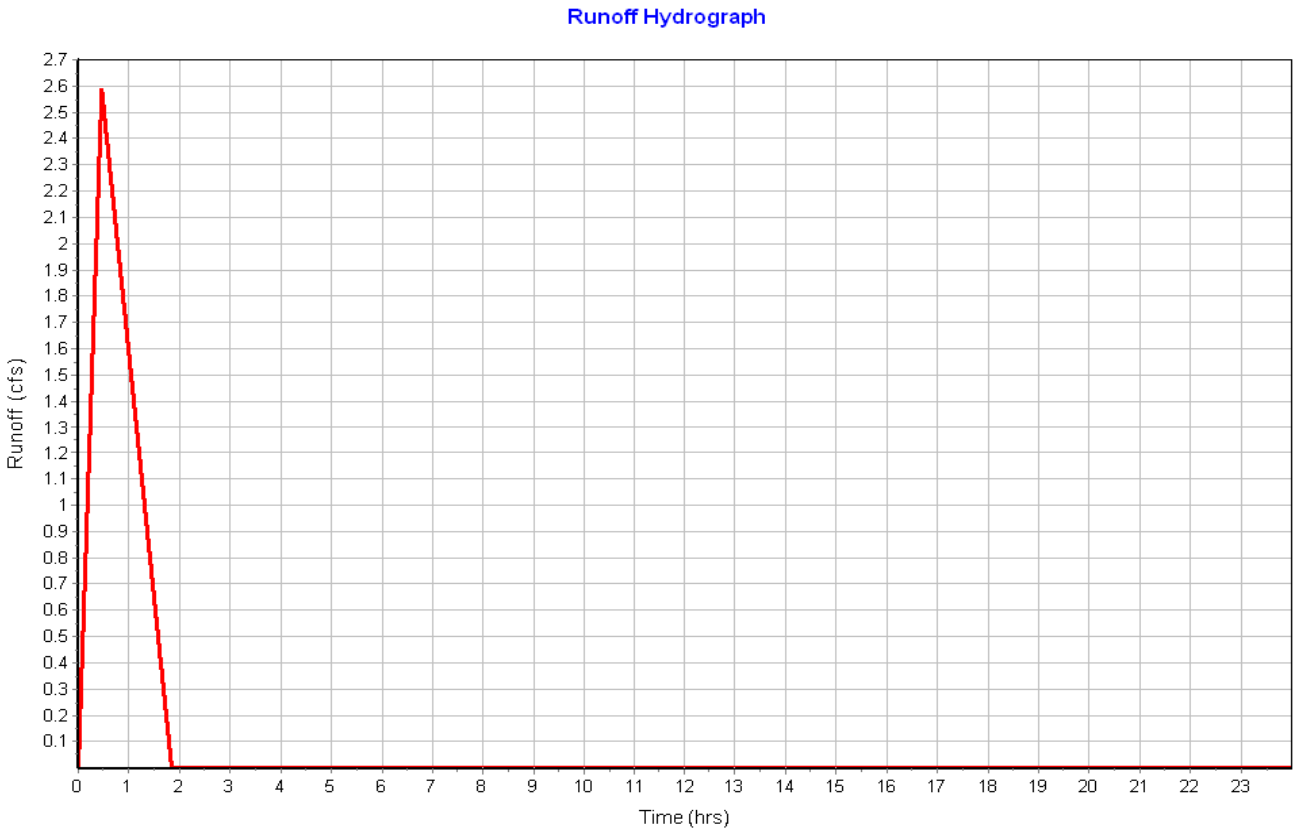
Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	98.41	0.00	0.00
Slope (%) :	0.2	0.00	0.00
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	0.72	0.00	0.00
Computed Flow Time (min) :	2.28	0.00	0.00

Total TOC (min) 27.69

Subbasin Runoff Results

Total Rainfall (in) 3.34
Total Runoff (in) 1.00
Peak Runoff (cfs) 2.59
Rainfall Intensity 7.252
Weighted Runoff Coefficient 0.3000
Time of Concentration (days hh:mm:ss) 0 00:27:41

Subbasin : PRE-DEVELOPED-DA



100-YEAR

Project Description

File Name ..... 24-065 SCS METHOD.SPF

Project Options

Flow Units ..... CFS
Elevation Type ..... Elevation
Hydrology Method ..... SCS TR-55
Time of Concentration (TOC) Method ..... SCS TR-55
Link Routing Method ..... Hydrodynamic
Enable Overflow Ponding at Nodes ..... YES
Skip Steady State Analysis Time Periods ... NO

Analysis Options

Start Analysis On ..... Nov 04, 2024 00:00:00
End Analysis On ..... Nov 05, 2024 00:00:00
Start Reporting On ..... Nov 04, 2024 00:00:00
Antecedent Dry Days ..... 0 days
Runoff (Dry Weather) Time Step ..... 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step ..... 0 00:05:00 days hh:mm:ss
Reporting Time Step ..... 0 00:05:00 days hh:mm:ss
Routing Time Step ..... 15 seconds

Number of Elements

	Qty
Rain Gages	4
Subbasins	3
Nodes	5
Junctions	2
Outfalls	1
Flow Diversions	0
Inlets	0
Storage Nodes	2
Links	4
Channels	0
Pipes	3
Pumps	0
Orifices	1
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	100-YEAR	Time Series	100-YEAR	Cumulative	inches	Texas	Nueces	100	11.30	SCS Type II 24-hr
2	10-YEAR	Time Series	10-YEAR	Cumulative	inches	Texas	Nueces	10	7.30	SCS Type II 24-hr
3	25-YEAR	Time Series	25-YEAR	Cumulative	inches	Texas	Nueces	25	8.60	SCS Type II 24-hr
4	5-YEAR	Time Series	5-YEAR	Cumulative	inches	Texas	Nueces	5	6.10	SCS Type II 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	POST-DEVELOPED_DA-1	0.41	92.81	11.30	10.42	4.27	5.27	0 00:10:00
2	POST-DEVELOPED_DA-2	0.26	98.00	11.30	11.06	2.89	3.43	0 00:10:00
3	POST-DEVELOPED_DA-3	0.47	90.78	11.30	10.17	4.75	5.95	0 00:10:00

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)
1	DROP-INLET	Junction	20.75	24.80	20.75	0.00	0.00	3.34	24.02	0.00	0.78	0 00:00	0.00
2	OUTFALL-CNTRL-STRUC	Junction	20.50	24.25	20.50	0.00	0.00	1.72	20.87	0.00	3.38	0 00:00	0.00
3	POST-DETAINED-OUTFALL	Outfall	0.00					1.76	0.00				
4	SOUTH-POND	Storage Node	21.00	24.50	21.00		0.00	5.15	24.02				0.00
5	WEST-POND	Storage Node	20.50	24.50	20.50		0.00	9.83	24.02				0.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)
1	18-IN-PVC	Pipe	DROP-INLET	WEST-POND	61.00	20.75	20.50	0.4100	18.000	0.0130	3.27	6.72	0.49	1.85	1.50	1.00	244.00
2	24-IN-PVC	Pipe	SOUTH-POND	WEST-POND	101.00	21.00	20.50	0.5000	24.000	0.0130	1.22	15.92	0.08	0.73	2.00	1.00	161.00
3	24-IN-RCP	Pipe	OUTFALL-CNTRL-STRUC	POST-DETAINED-OUTFALL	5.00	20.50	20.10	8.0000	24.000	0.0150	1.76	55.45	0.03	5.81	0.30	0.15	0.00
4	6-IN-ORIFICE	Orifice	WEST-POND	OUTFALL-CNTRL-STRUC		20.50	20.50		6.000		1.72						

Subbasin Hydrology

Subbasin : POST-DEVELOPED_DA-1

Input Data

Area (ac) 0.41
Weighted Curve Number 92.81
Rain Gage ID 100-YEAR

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	0.25	D	98.00
POND	0.08	D	90.00
Paved parking & roofs	0.00	D	98.00
> 75% grass cover, Good	0.08	D	80.00
Composite Area & Weighted CN	0.41		92.81

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

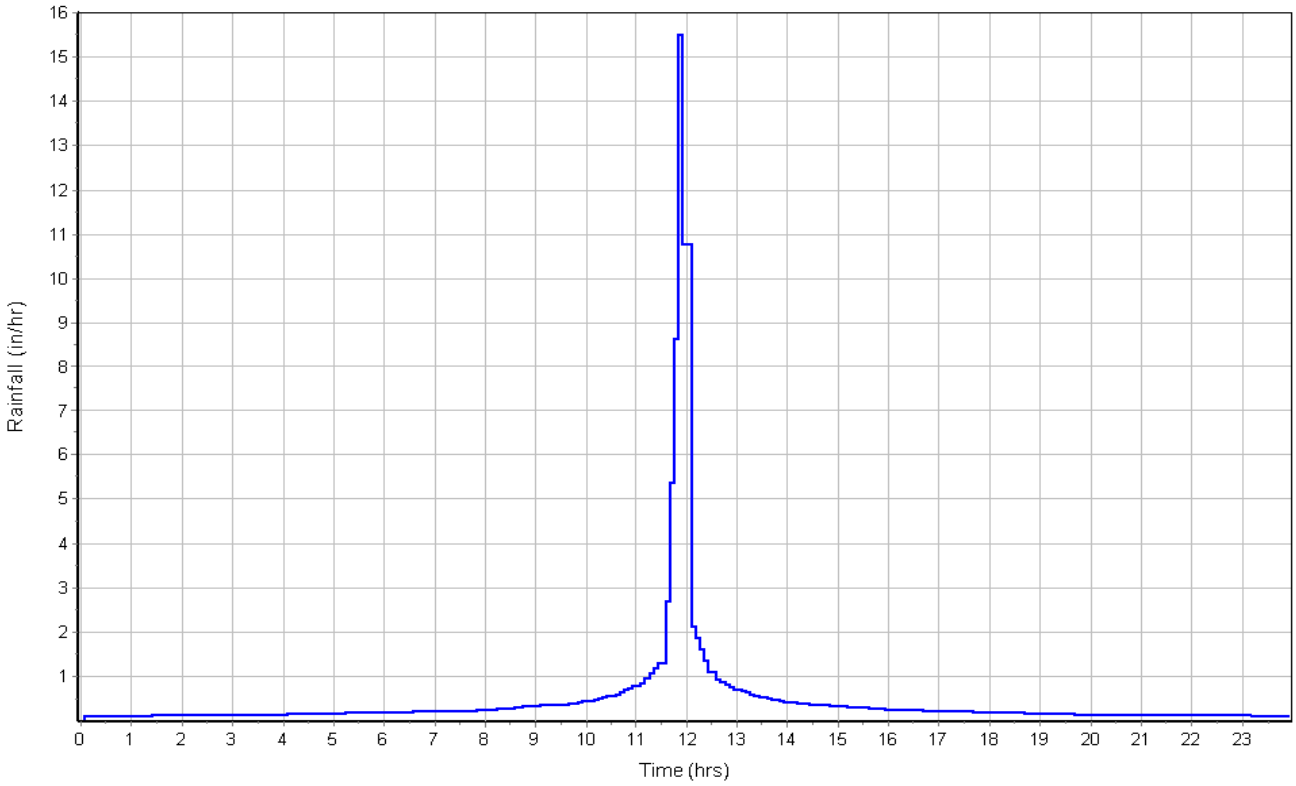
User-Defined TOC override (minutes): 10

Subbasin Runoff Results

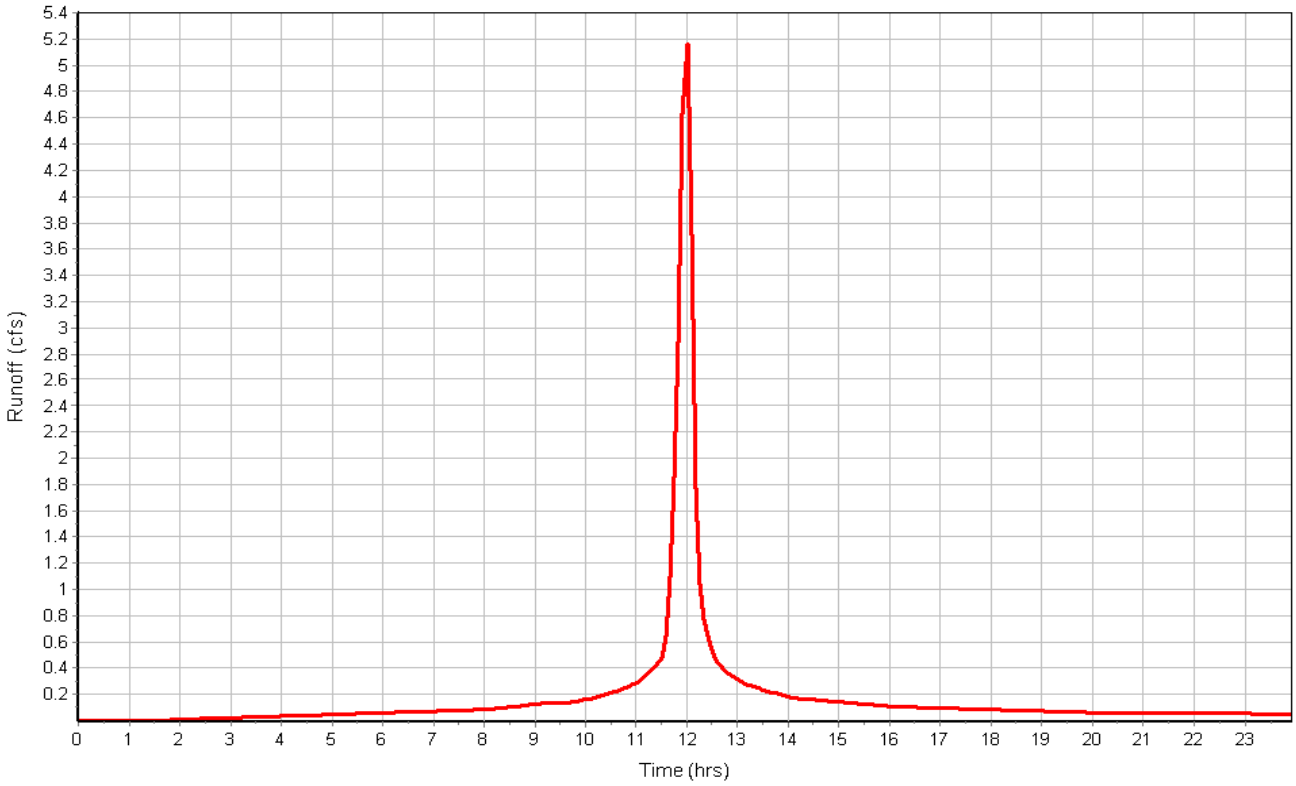
Total Rainfall (in) 11.30
Total Runoff (in) 10.42
Peak Runoff (cfs) 5.27
Weighted Curve Number 92.81
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-1

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : POST-DEVELOPED_DA-2

Input Data

Area (ac) 0.26
Weighted Curve Number 98.00
Rain Gage ID 100-YEAR

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	0.26	D	98.00
Composite Area & Weighted CN	0.26		98.00

Time of Concentration

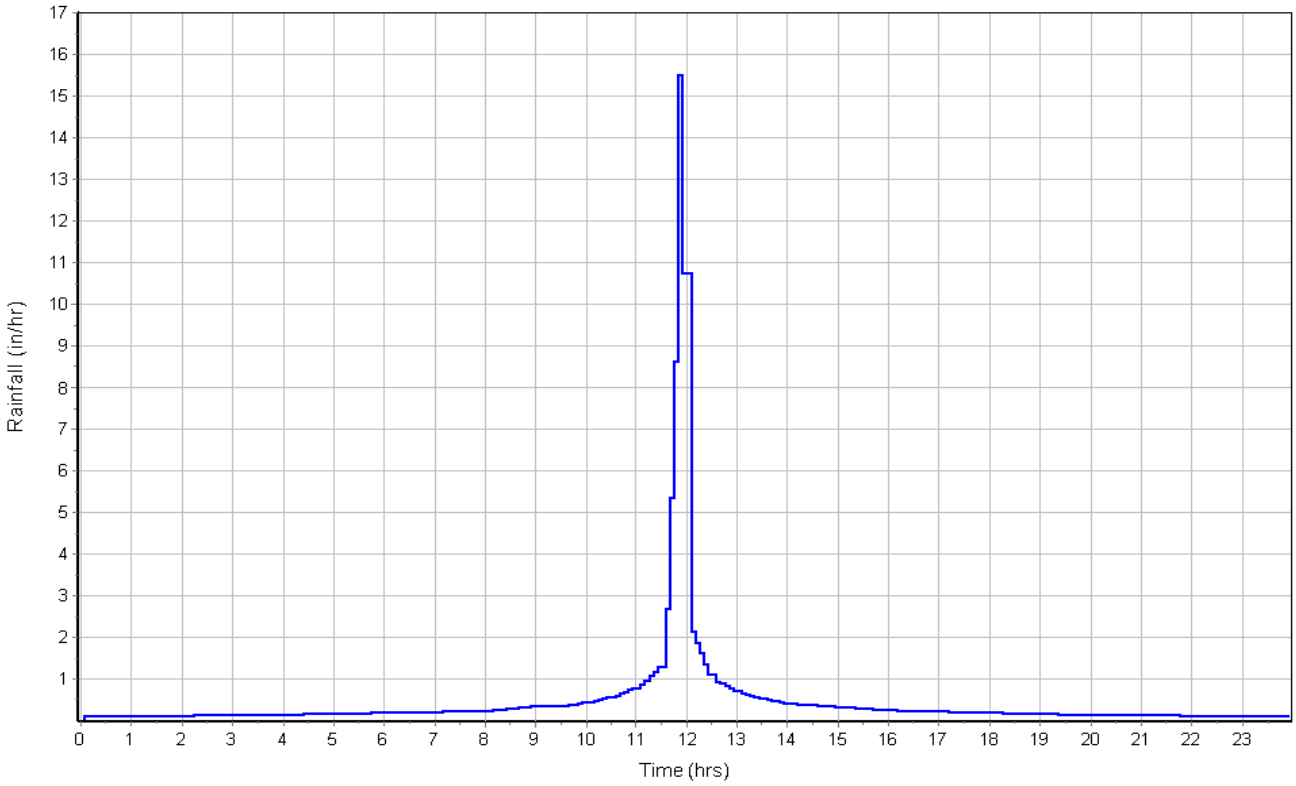
User-Defined TOC override (minutes): 10

Subbasin Runoff Results

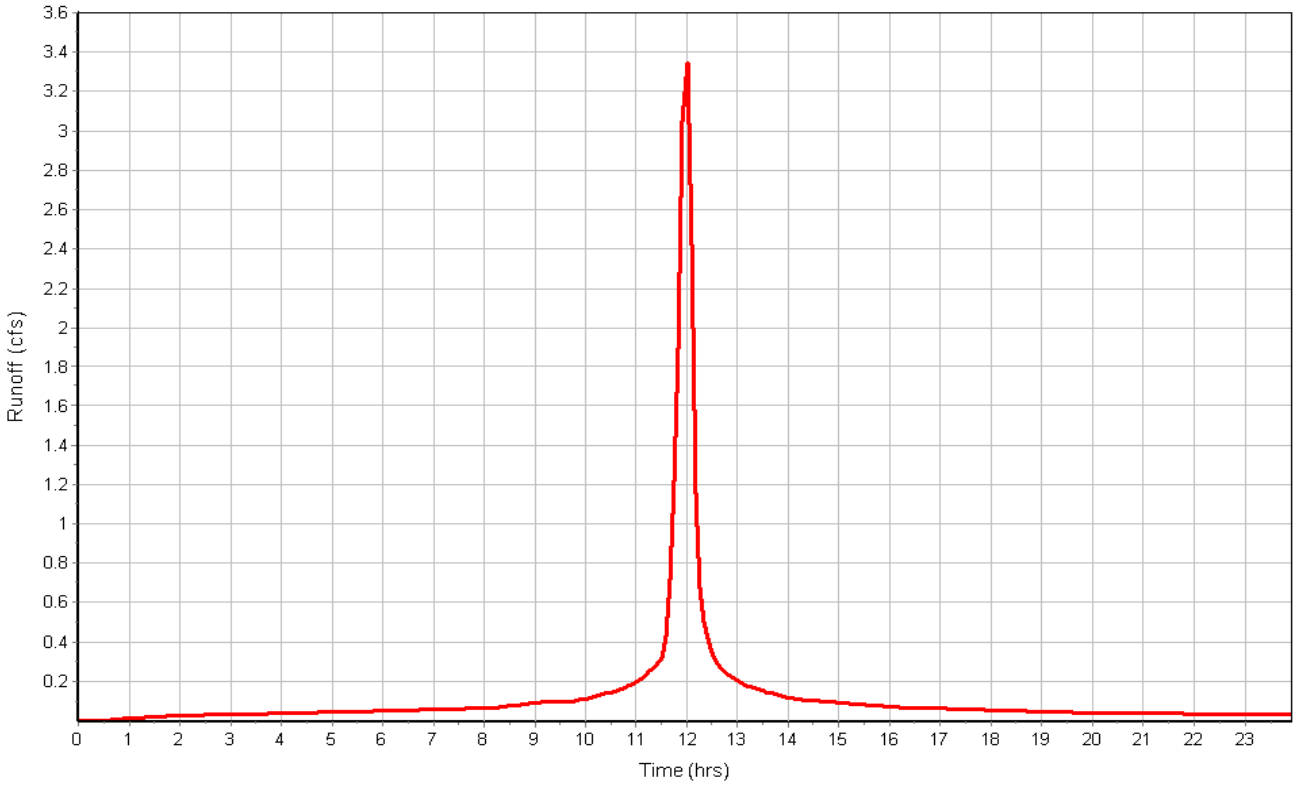
Total Rainfall (in) 11.30
Total Runoff (in) 11.06
Peak Runoff (cfs) 3.43
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-2

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : POST-DEVELOPED_DA-3

Input Data

Area (ac) 0.47
Weighted Curve Number 90.78
Rain Gage ID 100-YEAR

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Paved parking & roofs	0.22	D	98.00
POND	0.10	D	90.00
> 75% grass cover, Good	0.14	D	80.00
Composite Area & Weighted CN	0.46		90.78

Time of Concentration

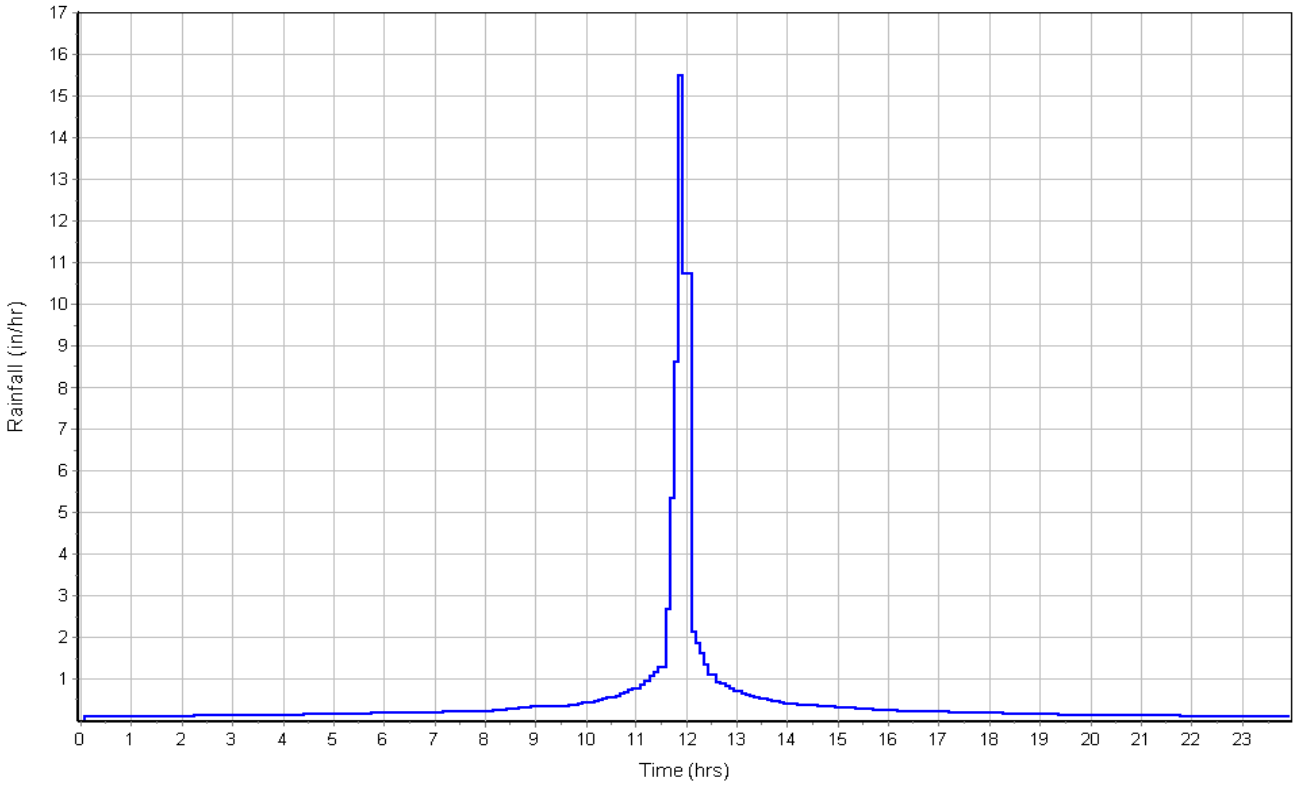
User-Defined TOC override (minutes): 10

Subbasin Runoff Results

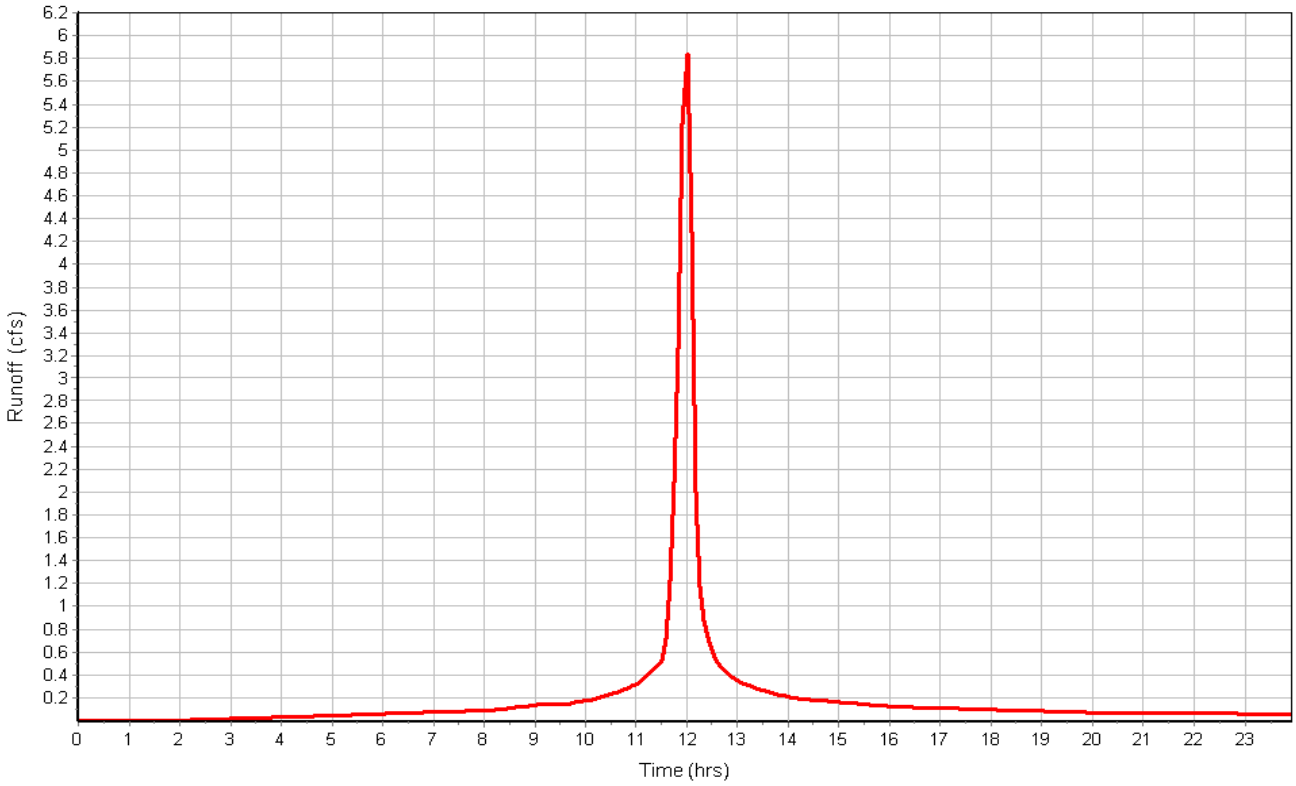
Total Rainfall (in) 11.30
Total Runoff (in) 10.17
Peak Runoff (cfs) 5.95
Weighted Curve Number 90.78
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : POST-DEVELOPED_DA-3

Rainfall Intensity Graph



Runoff Hydrograph



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	DROP-INLET	20.75	24.80	4.05	20.75	0.00	0.00	-24.80	0.00	0.00
2	OUTFALL-CNTRL-STRUC	20.50	24.25	3.75	20.50	0.00	0.00	-24.25	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	DROP-INLET	3.34	3.34	24.02	3.27	0.00	0.78	21.38	0.63	0 12:31	0 00:00	0.00	0.00
2	OUTFALL-CNTRL-STRUC	1.72	0.00	20.87	0.37	0.00	3.38	20.65	0.15	0 12:31	0 00:00	0.00	0.00

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	18-IN-PVC	61.00	20.75	0.00	20.50	0.00	0.25	0.4100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	24-IN-PVC	101.00	21.00	0.00	20.50	0.00	0.50	0.5000	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
3	24-IN-RCP	5.00	20.50	0.00	20.10	20.10	0.40	8.0000	CIRCULAR	24.000	24.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	18-IN-PVC	3.27	0 12:04	6.72	0.49	1.85	0.55	1.50	1.00	244.00		SURCHARGED
2	24-IN-PVC	1.22	0 11:57	15.92	0.08	0.73	2.31	2.00	1.00	161.00		SURCHARGED
3	24-IN-RCP	1.76	0 12:30	55.45	0.03	5.81	0.01	0.30	0.15	0.00		Calculated

Storage Nodes

Storage Node : SOUTH-POND

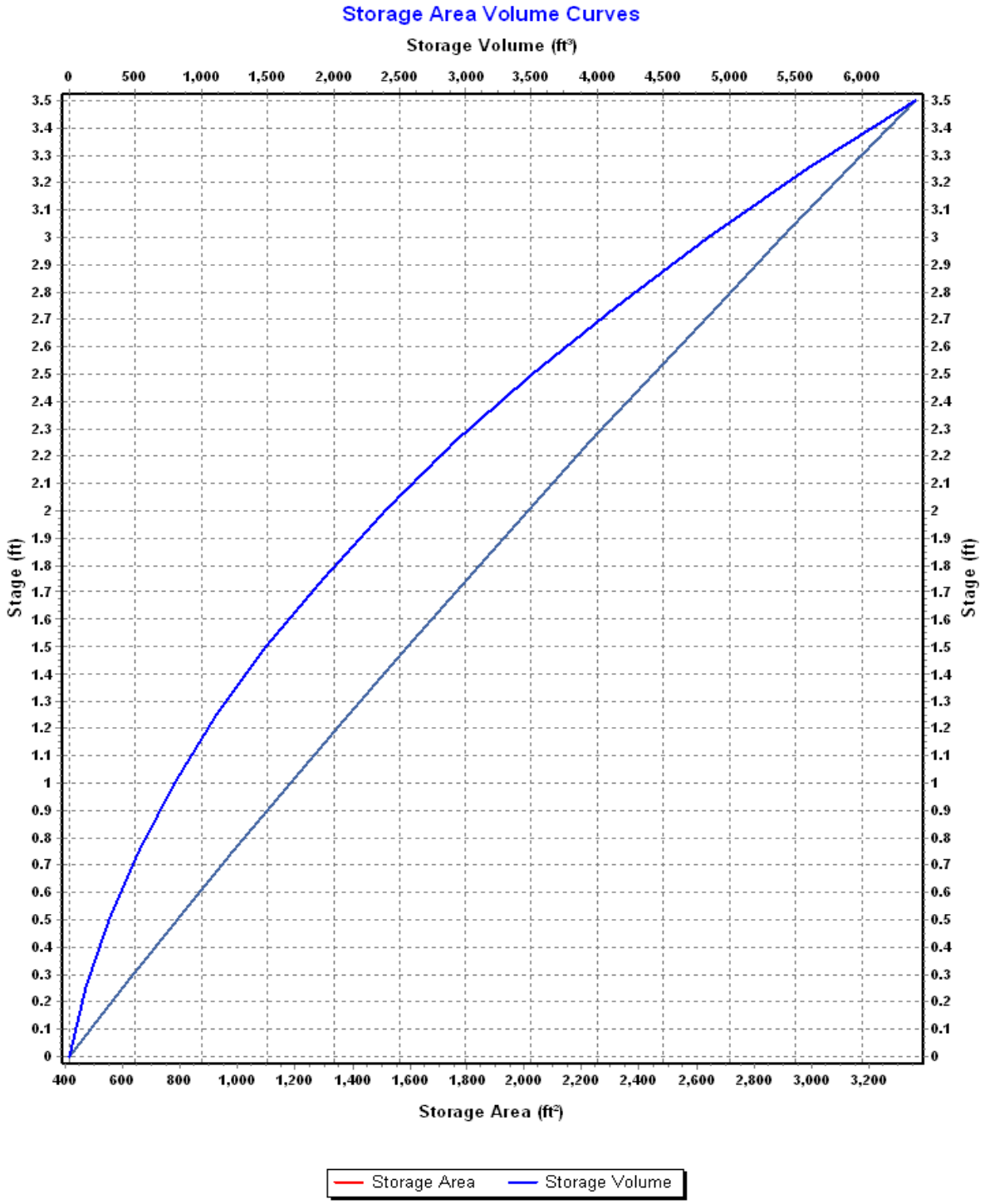
Input Data

Invert Elevation (ft)	21.00
Max (Rim) Elevation (ft)	24.50
Max (Rim) Offset (ft)	3.50
Initial Water Elevation (ft)	21.00
Initial Water Depth (ft)	0.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : SOUTH-POND-STORAGE

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	416.00	0.000
0.25	602.04	127.26
0.50	792.58	301.59
0.75	987.14	524.05
1.00	1185.23	795.60
1.25	1386.85	1117.11
1.50	1592.01	1489.47
1.75	1800.71	1913.56
2.00	2012.94	2390.27
2.25	2228.70	2920.48
2.50	2448.00	3505.07
2.75	2670.83	4144.92
3.00	2897.19	4840.92
3.25	3127.09	5593.96
3.50	3360.53	6404.91


Storage Area Volume Curves
Storage Volume (ft³)
0
500
1,000
1,500
2,000
2,500
3,000
3,500
4,000
4,500
5,000
5,500
6,000
Stage (ft)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
2.1
2.2
2.3
2.4
2.5
2.6
2.7
2.8
2.9
3
3.1
3.2
3.3
3.4
3.5
Storage Area (ft²)
400
600
800
1,000
1,200
1,400
1,600
1,800
2,000
2,200
2,400
2,600
2,800
3,000
3,200
Storage Area
Storage Volume

Storage Node : SOUTH-POND (continued)

Output Summary Results

Peak Inflow (cfs)	5.15
Peak Lateral Inflow (cfs)	5.15
Peak Outflow (cfs)	1.22
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	24.02
Max HGL Depth Attained (ft)	3.02
Average HGL Elevation Attained (ft)	21.53
Average HGL Depth Attained (ft)	0.53
Time of Max HGL Occurrence (days hh:mm)	0 12:31
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : WEST-POND

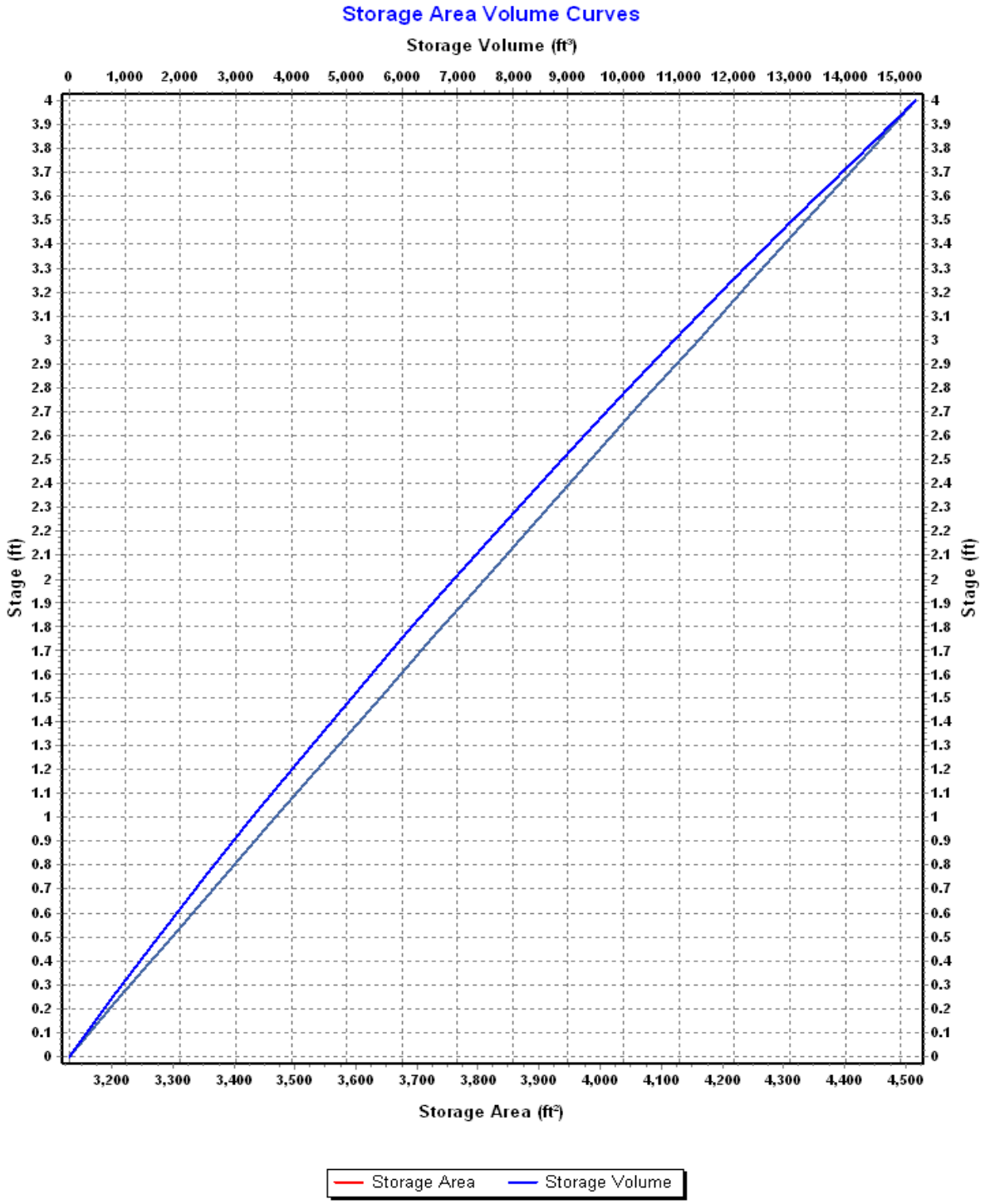
Input Data

Invert Elevation (ft)	20.50
Max (Rim) Elevation (ft)	24.50
Max (Rim) Offset (ft)	4.00
Initial Water Elevation (ft)	20.50
Initial Water Depth (ft)	0.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : WEST-POND-STORAGE

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	3131.17	0.000
0.25	3214.73	793.24
0.50	3298.68	1607.42
0.75	3383.02	2442.63
1.00	3467.76	3298.98
1.25	3552.89	4176.56
1.50	3638.41	5075.47
1.75	3724.33	5995.81
2.00	3810.64	6937.68
2.25	3897.34	7901.18
2.50	3984.43	8886.40
2.75	4071.92	9893.44
3.00	4159.79	10922.40
3.25	4248.07	11973.38
3.50	4336.73	13046.48
3.75	4425.79	14141.80
4.00	4515.24	15259.43


Storage Area Volume Curves
Storage Volume (ft³)
0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000 9,000 10,000 11,000 12,000 13,000 14,000 15,000
Stage (ft)
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 4
Stage (ft)
3,200 3,300 3,400 3,500 3,600 3,700 3,800 3,900 4,000 4,100 4,200 4,300 4,400 4,500
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : WEST-POND (continued)

Outflow Orifices

SN	Element ID	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (in)	Rectangular Orifice Height (in)	Rectangular Orifice Width (in)	Orifice Invert Elevation (ft)	Orifice Coefficient
1	6-IN-ORIFICE	Side	CIRCULAR	No	6.00			20.50	0.61

Output Summary Results

Peak Inflow (cfs)	9.83
Peak Lateral Inflow (cfs)	5.83
Peak Outflow (cfs)	1.72
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	24.02
Max HGL Depth Attained (ft)	3.52
Average HGL Elevation Attained (ft)	21.30
Average HGL Depth Attained (ft)	0.8
Time of Max HGL Occurrence (days hh:mm)	0 12:31
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00