

# FINAL HYDROLOGY REPORT

For

**BCIF Harvill Business Center  
Harvill at Water Industrial  
APN(s): 317-270-006, 010, 015, 016  
PPT220002**

## PROJECT LOCATION

West of Harvill Avenue between Water Street and Orange Avenue  
County of Riverside, CA

## DEVELOPER

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C65195, Exp 09/30/2023  
Dated: 04/24/23

## PREPARATION DATE

October 6<sup>th</sup>, 2022  
Revised Jan 14<sup>th</sup>, 2023  
Revised April, 24, 2023

## HZ PROJECT NUMBER

R313963.01

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## **Introduction**

This final hydrology report has been prepared for BCIF Harvill Business Center LP. This project proposes to build an industrial warehouse building consisting of approximately 434,800 SF on approximately 20.6 gross acres of undeveloped land. The project is bound by Water Street on the north, Harvill Avenue on the east, Orange Avenue on the south and rural residential lots on the west. The project is located in the Perris area, an unincorporated part of the County of Riverside, California.

## **Purpose**

The purpose of this report is to determine the drainage facility requirements for this project. This report combines both the offsite and onsite hydrology and hydraulic calculations. The hydrology maps and calculations reflect the tributary areas and the 10-year and 100-year ( $Q_{100}$ ) flows.

## **Existing Condition and Watersheds**

There are three main watersheds tributary to our proposed site. These watersheds are designated in the enclosed hydrology map (in Appendix A) as “H”, “J” and “K”. Approximately 191 acres from the southwest hills and the westerly properties drain towards our site. In this report we focus on watershed “H” but all three are described hereon. Summary tables are included below showing the 100-year runoff flow rates.

Please note that the offsite hydrology map in Appendix A uses a large scale (USGS) map and topo. For this reason, areas were rounded to the nearest acre. The onsite related hydrology is more precise and uses a site-specific aerial topography. The flow rates are consistent, but not identical.

### Watershed “H”

Watershed “H” (shown in green shades) starts at the peak of the southwest hills. The watershed runoff travels from the hills to the valley and discharges near the Tobacco Road and Water Ave intersection and is conveyed in Water Street to the east. This area consists of approximately 104 acres that generate 171.3 cfs (148 cfs per MDP) during a 100-year storm. At our westerly property line on Water Street, the flow consists of 164.3 cfs. A portion of the runoff (approximately 33 cfs) is intercepted by the existing inlets at the Water Street and Harvill Avenue intersection southwest corner and conveyed easterly in an existing 30-inch RCP pipe. Any flow in excess of 33 cfs currently ponds and spills over Harvill Ave and flows east on Water Street.

A second portion of watershed H north of our site was also analyzed to determine the flow rates that contribute to MDP line H-10 in Harvill Ave extending from Water Street to Placentia Avenue. Subareas H.1 and H.2 appear to discharge approximately 200-feet south of the Placentia Ave and Harvill intersection. Subarea H.3 discharges at the southwest corner of the said intersection.

### Watershed “J”

The southerly watershed “J” (shown in red shades) discharges near the Tobacco Road and Orange Ave intersection and surface flows east on Orange Avenue. This area consists of approximately 108 acres that generate 181.4 cfs (140 cfs per MDP) during a 100-year storm. The runoff is intercepted by inlets at the Harvill Avenue intersection and conveyed east in the existing 54-inch public storm drain (MDP Line J-9). At our westerly property line on Orange Avenue, the flow consists of 119.9 cfs.

### Watershed “K”

The third watershed “K” (shown in blue shades) starts at Tobacco Road and surface flows to the east, just west of Harvill Avenue, where it is intercepted and conveyed across Harvill Ave via existing dual 39-inch culverts. Then the drainage discharges to an open earthen swale and is directed to a future MDP Line K-20 under the 215 freeway. This area consists of approximately 28 acres (to Harvill Ave) which generates 48.1 cfs in a 100-year storm. Therefore, maximum allowed 100-yr outflow from our site is restricted to the existing 48.1 cfs per the offsite hydrology (and 49.8 per the onsite existing condition hydrology).

At our westerly property line, the tributary flow consists of 21.6 cfs per the offsite hydrology calculations. For reference only, watershed “K” was extended to the 215-Fwy to compare our flow rate with that used in the MDP. It was determined that approximately 58 acres generate 90.5 cfs (70 cfs per MDP) near the 215-Fwy in a 100-year storm.

### **Onsite Existing Condition**

The existing site grades range from a maximum elevation of ±1557 mean sea level (msl) in the west region of the site to a minimum elevation of ±1524 msl in the east region of the site, at approximately a 3.0% gradient. Area A-1 corresponds with subarea H-6 on the offsite drainage map and drains north to the Water St and Harvill Ave intersection. Areas B-2 and B-4 correspond with area K-2 on the offsite drainage map and drain east to Harvill Ave. Area C-2 corresponds with a portion of subarea J-5 on the offsite drainage map and drains south to Orange Avenue. See the Existing Condition Hydrology Map in Appendix A for drainage area.

In order to accurately compare unit hydrographs of the existing site and proposed site (for mitigation purposes), the unit hydrograph for the existing drainage condition will be considered as draining to a single point, onto Harvill Avenue.

### **Proposed Condition**

#### Proposed Offsite Improvements

Our project proposes significant storm drain improvements from our westerly project boundary east to Harvill Avenue. Improvements in Water Street include a 36-inch storm drain line (MDP Line H-10) along with a riser inlet at the westerly end of the project and

a catch basin at the easterly end, just west of Harvill Avenue. Improvements in Orange Avenue include a 30-inch storm drain line (MDP Line J-9) along with a riser inlet at the westerly end. Future developments are expected to extend these lines to Tobacco Road to intercept and convey the offsite flow from the hills.

Riverside County Flood Control District and Water Conservation District (RCFC&WCD) has conditioned the project to provide downstream improvement of MDP Line H-10 in Harvill Ave extending from Water Street to Placentia Avenue. The most downstream segment will consist of a 54-inch storm drain line and will extend approximately 200-feet south of the Placentia Ave and Harvill intersection where it will intercept runoff from Subareas H.1 and H.2. From there, the line will consist of 48-inches and will extend to the Harvill Ave and Water Street intersection. Hydraulic calculations have been performed using flow rates from two sources, the MDP flow rates and the rational method site specific rates. The tables shown on the Hydrology Map list both rates.

#### Onsite Condition

In the proposed condition, the onsite has been designed to generally drain in the same direction as the existing undeveloped condition. In compliance with the county and state guidelines the site has been designed to incorporate an on-site bio-retention basin to treat the storm water. The site will generally be graded to drain toward the east of the project site. The storm water will then be allowed to discharge onto the open bio-retention basin and disperse into the filter media within the bottom of the basin. The basin has been sized to capture and treat the storm water while providing peak storm mitigation. The onsite bio-retention basin will slow down and reduce the storm water volume and rate of runoff during the 2-year, 5-year, 10-year, and 100-year storm events for the 1-hour, 3-hour, 6-hour, and 24-hour durations to reduce offsite flow rates to below existing undeveloped conditions.

The runoff from the southern half of the roof area, southwestern aisle, southern drive aisle and parking area, and southern half of the truck aisle will be intercepted by catch basins that connect to the proposed storm drain Line A and then conveyed to the basin.

The runoff from the northern half of the roof, northern drive aisle, and northern half of the truck aisle will be intercepted by catch basins that connect to the proposed storm drain Line B and then conveyed to the basin.

The landscaping along the eastern side of the site will be directed to flow to the basin by a landscaped swale. The landscaping along the northeastern and southeastern corners of the site are self-treating and will drain to the street.

The basin outlet (riser opening) is located six inches above the basin bottom. Excess volume beyond the design capture volume will be detained and then released at a controlled rate. The outlet size will be restricted to mitigate the peak storm and restrict post-development flow from exceeding pre-development flow. The overflow from the

basin will be collected by a 36-inch riser with a 10-inch orifice plate and flow to a proposed 18-inch line that drains to an existing public storm drain culvert in Harvill Avenue. See Appendix A for the Proposed Condition Hydrology Map.

It is our intention to mimic existing offsite drainage patterns and conditions and to mitigate developed flow to less than undeveloped flow. Runoff generated from offsite northwesterly side will be intercepted by a proposed concrete U-channel along our westerly property line and conveyed in a pipe to the north to MDP Line H-10 (in Water Street). Said line will connect to the Harvill Avenue portion of the MDP Line H-10 consisting of 48-inches. Runoff generated from offsite southwesterly portion will be intercepted by a proposed concrete U-channel along our westerly property line and conveyed in a pipe to the south to MDP Line J-9 (in Orange Ave).

The proposed bio-retention basin will be used to provide water quality treatment and peak storm mitigation. Our basin routing calculations demonstrate that a maximum of 6.3 cfs will leave our site during a 100-year storm which is much less than the allowed discharge of 48.1 cfs (42.8 cfs per UH) mentioned above. It's important to note that the existing dual 39-inch laterals that cross Harvill Ave were sized for 107 cfs as shown on Line "J" on the As-builts plans included in Appendix "F", the reference section of this report. Line "J" corresponds with MDP line K-20, but was oversized since only 48.1 cfs is expected. Therefore, each existing pipe is currently conveying about 24 cfs, but was designed to convey 54 cfs. In the developed condition, the culverts will convey even less, 6.3 cfs from the basin plus approximately 1.7 cfs generated within the western half of Harvill Avenue.

The broad-crested concrete spillway is proposed at the southeast area of the basin and was sized to handle 100-yr flow discharge consisting of 40.9 cfs. Sizing calculation can be found in Appendix F.

### **Hydrologic Analysis**

The hydrologic analysis has been prepared in accordance with the Riverside County Flood Control & Water Conservation District (RCFC&WCD) Hydrology Manual Rational method using CIVILD software version 7.1. CIVILD hydrology calculations are included in Appendix B and indicate flow data at each node. Unit hydrograph and detention routing calculations are included in Appendices C and D.

The Perris Valley rainfall intensity plate was selected in the program. The 100-year, 1 hour rainfall and the 2-year, 1 hour rainfall rates from the isohyetal maps in the Hydrology Manual are shown for reference. The hydrologic soil type for the site is mostly "B" (except for the hillside areas which is "C") and was taken from the soils map in the Hydrology Manual. See Appendix C for reference maps. An AMC I was used for

the 2-year and 5 year storms and an AMC II was used for 10-year and 100-year storm events.

Low Loss Rates were determined using the following:

- Undeveloped Condition --> LOW LOSS = 90%
- Developed Condition --> LOW LOSS = .9 - (.8 X % IMPERVIOUS)
- Basin Site --> LOW LOSS = 10%

## Results

The required capture volume is 32,939 cubic feet of storm water per the current water quality management plan guidance material. The basin has been sized to capture and treat 37,671 cubic feet of storm water. Unit hydrograph calculations were prepared to establish existing condition flow (Q's) for the 2-year, 5-year, 10-year, and 100-year storms at 1-hour, 3-hour, 6-hour, and 24-hour durations. Results from the detention routing calculations indicate the proposed peak flows (Q's) are mitigated utilizing a 10-inch orifice outlet control. The highest water surface elevation in the basin occurs during the 24-hour 100-year storm and reaches elevation 1525.8, which is lower than the top of the basin and drains within 24 hours in all cases. The routing discharge will be reduced to less than existing discharge for the 2-year, 5-year, 10-year, and 100-year storms at 1-hour, 3-hour, and 6-hour durations. The 24-hour during is slightly higher than the existing, but is less than 1-cfs. We anticipate that evapotranspiration alone will result in a loss of more than 1-cfs, thus allowing all models to be in compliance.

## Summary Tables

<b>2 YEAR STORM</b>	<b>1 Hour</b>	<b>3 Hour</b>	<b>6 Hour</b>	<b>24 Hour</b>
<b>Existing Condition Q<sub>out</sub> (cfs)</b> From Unit Hydrograph Study for Existing Condition	6.3	3.1	2.2	0.5
<b>Proposed Condition Max. Q<sub>out</sub> (cfs) after Routing</b> From Routing Calcs	1.5	1.7	1.7	1.4
<b>WSE</b>	1522.3	1522.9	1523.3	1521.8

<b>5 YEAR STORM</b>	<b>1 Hour</b>	<b>3 Hour</b>	<b>6 Hour</b>	<b>24 Hour</b>
<b>Existing Condition Q<sub>out</sub> (cfs)</b> From Unit Hydrograph Study for Existing Condition	10.8	6.3	4.8	0.6
<b>Proposed Condition Max. Q<sub>out</sub> (cfs) after Routing</b> From Routing Calcs	1.7	1.8	2.0	1.8
<b>WSE</b>	1523.3	1523.6	1523.7	1523.5

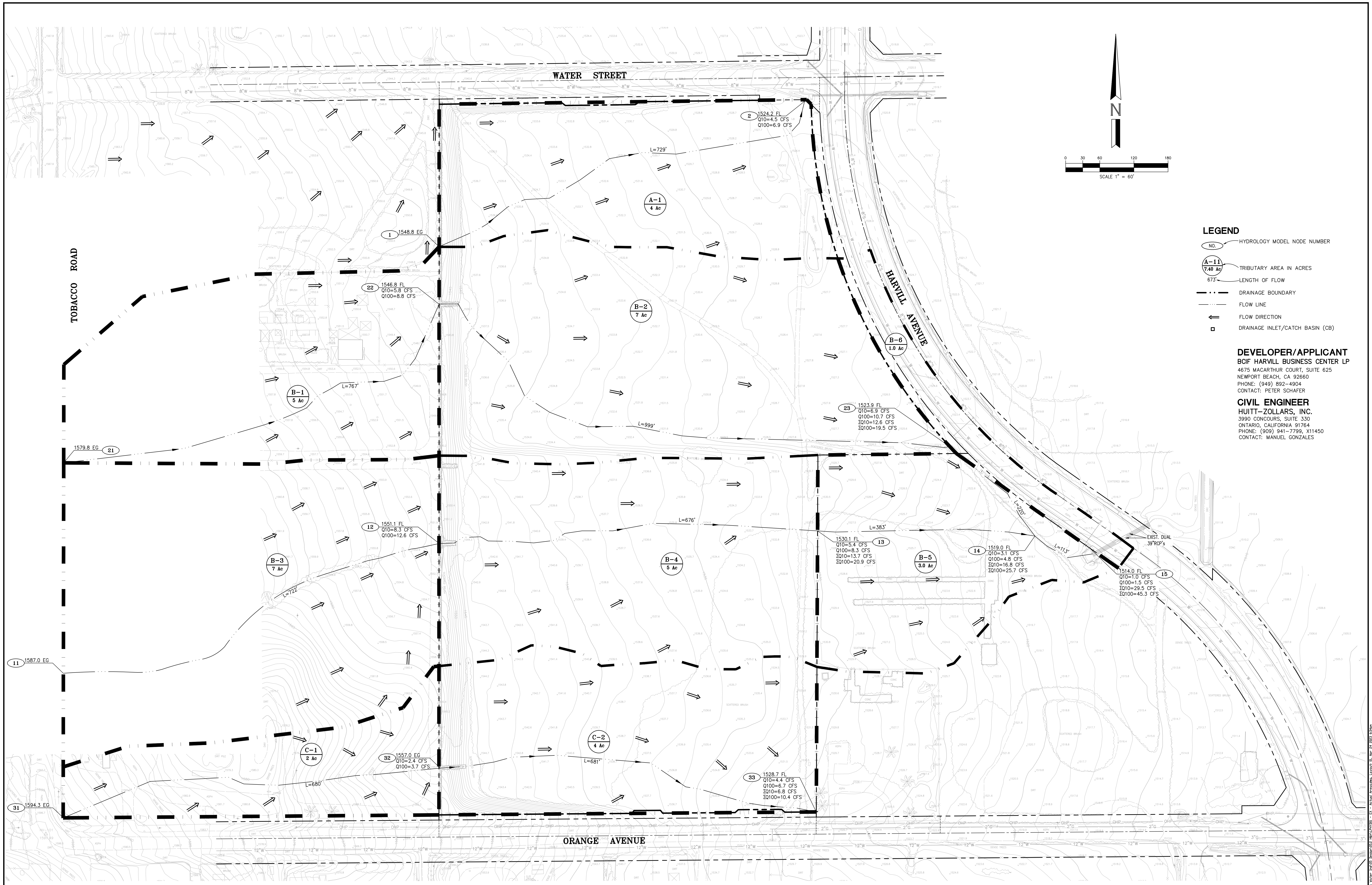


<b>10 YEAR STORM</b>	<b>1 Hour</b>	<b>3 Hour</b>	<b>6 Hour</b>	<b>24 Hour</b>
<b>Existing Condition Q<sub>out</sub> (cfs)</b> From Unit Hydrograph Study for Existing Condition	18.5	12.3	10.7	3.4
<b>Proposed Condition Max. Q<sub>out</sub> (cfs) after Routing</b> From Routing Calcs	2.4	4.1	4.3	4.0
<b>WSE</b>	1523.8	1524.2	1524.3	1524.2

<b>100 YEAR STORM</b>	<b>1 Hour</b>	<b>3 Hour</b>	<b>6 Hour</b>	<b>24 Hour</b>
<b>Existing Condition Q<sub>out</sub> (cfs)</b> From Unit Hydrograph Study for Existing Condition	32.7	21.7	19.1	8.0
<b>Proposed Condition Max. Q<sub>out</sub> (cfs) after Routing</b> From Routing Calcs	5.0	5.9	6.2	6.3
<b>WSE</b>	1524.7	1525.5	1525.8	1525.8

All proposed project site drainage and storm drain facilities will be sized adequately for 100-year storm event. The concrete spillway in the basin will also be sized for 100-yr flow discharge. Storm drain hydraulic calculations using WSPG are included in Appendix E. Catch basin sizing and Street Capacity calculations using AES' Hele 1 module are included in Appendix F.

Appendix A  
Existing Condition Hydrology Map  
Proposed Condition Hydrology Map



- LEGEND**
- (NO.) HYDROLOGY MODEL NODE NUMBER
  - (A-1) TRIBUTARY AREA IN ACRES
  - 673' LENGTH OF FLOW
  - DRAINAGE BOUNDARY
  - FLOW LINE
  - ← FLOW DIRECTION
  - DRAINAGE INLET/CATCH BASIN (CB)

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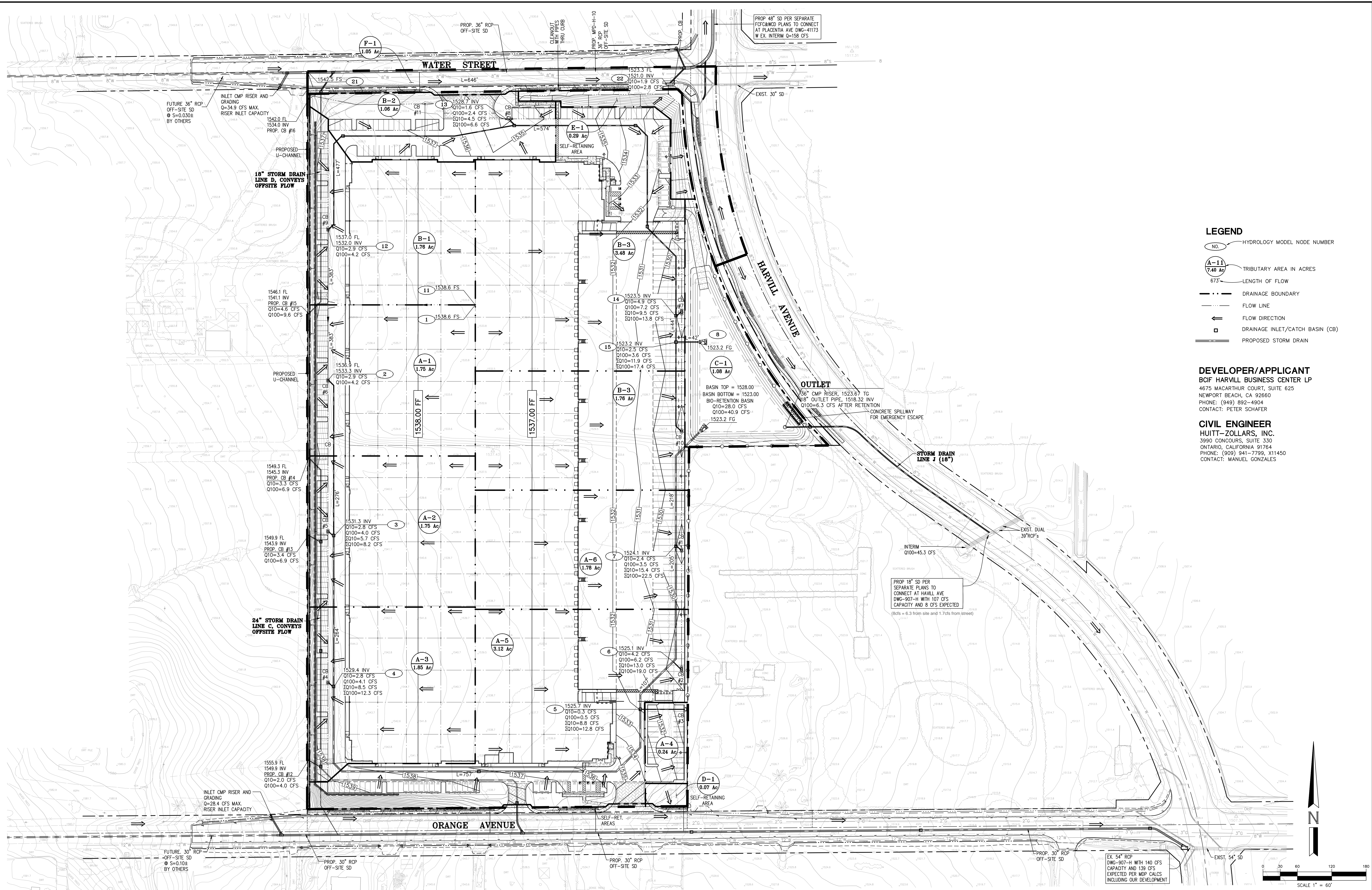
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**COUNTY OF RIVERSIDE**

EXIST. CONDITION HYDROLOGY MAP  
 BCIF HARVILL BUSINESS CENTER  
 WATER STREET AND ORANGE AVE  
 AT HARVILL AVENUE - PPT220002

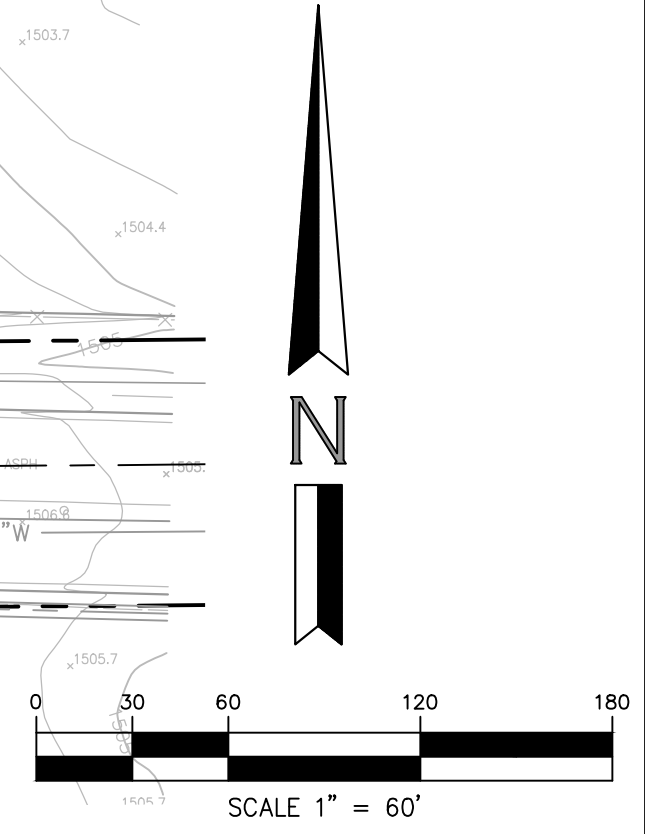
**SHEET 1 OF 1**



- LEGEND**
- (NO.) HYDROLOGY MODEL NODE NUMBER
  - (A-11) 7.40 Ac TRIBUTARY AREA IN ACRES
  - 675' LENGTH OF FLOW
  - DRAINAGE BOUNDARY
  - FLOW LINE
  - ← FLOW DIRECTION
  - DRAINAGE INLET/CATCH BASIN (CB)
  - PROPOSED STORM DRAIN

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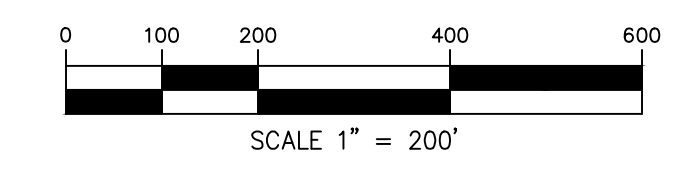
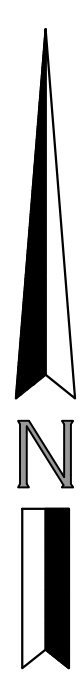
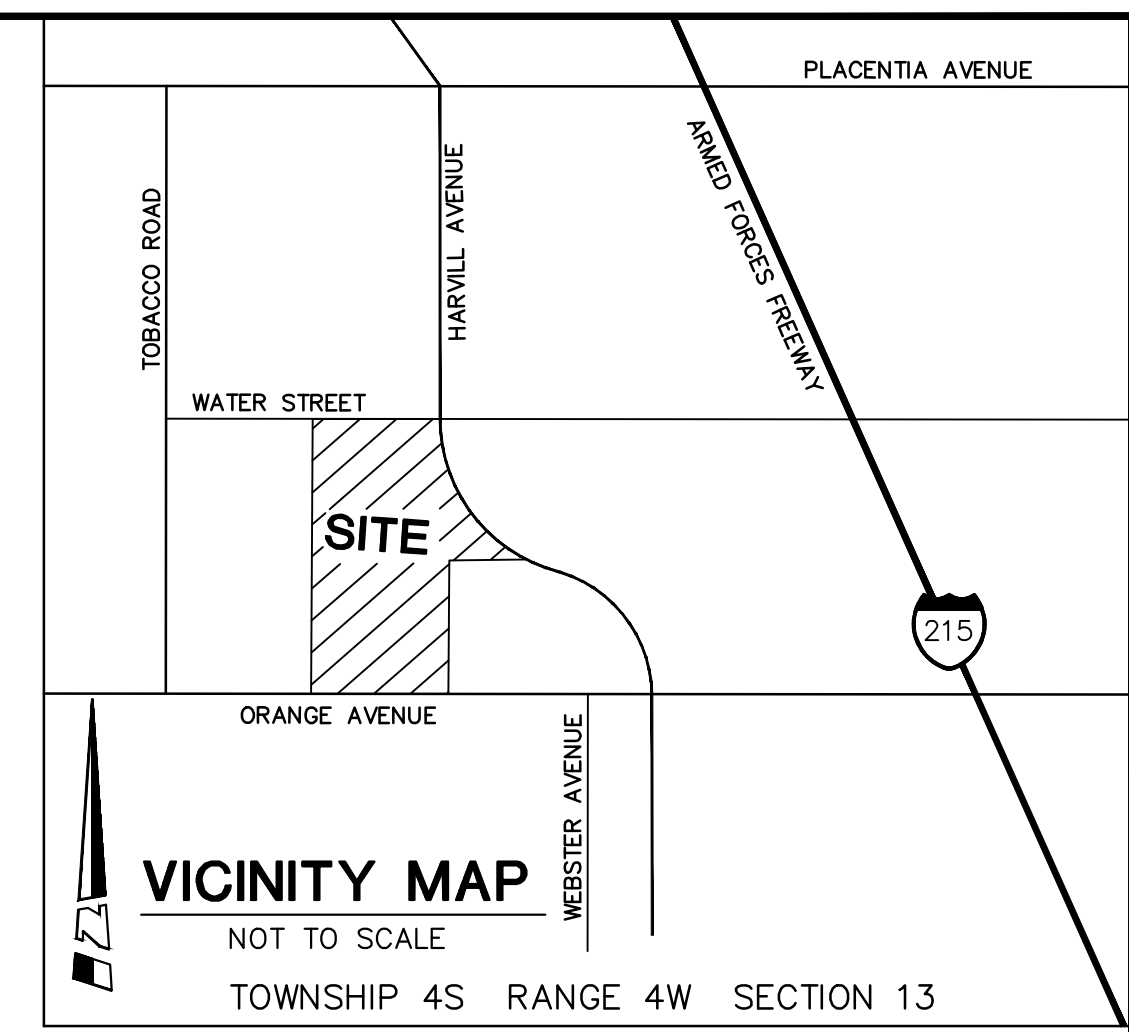
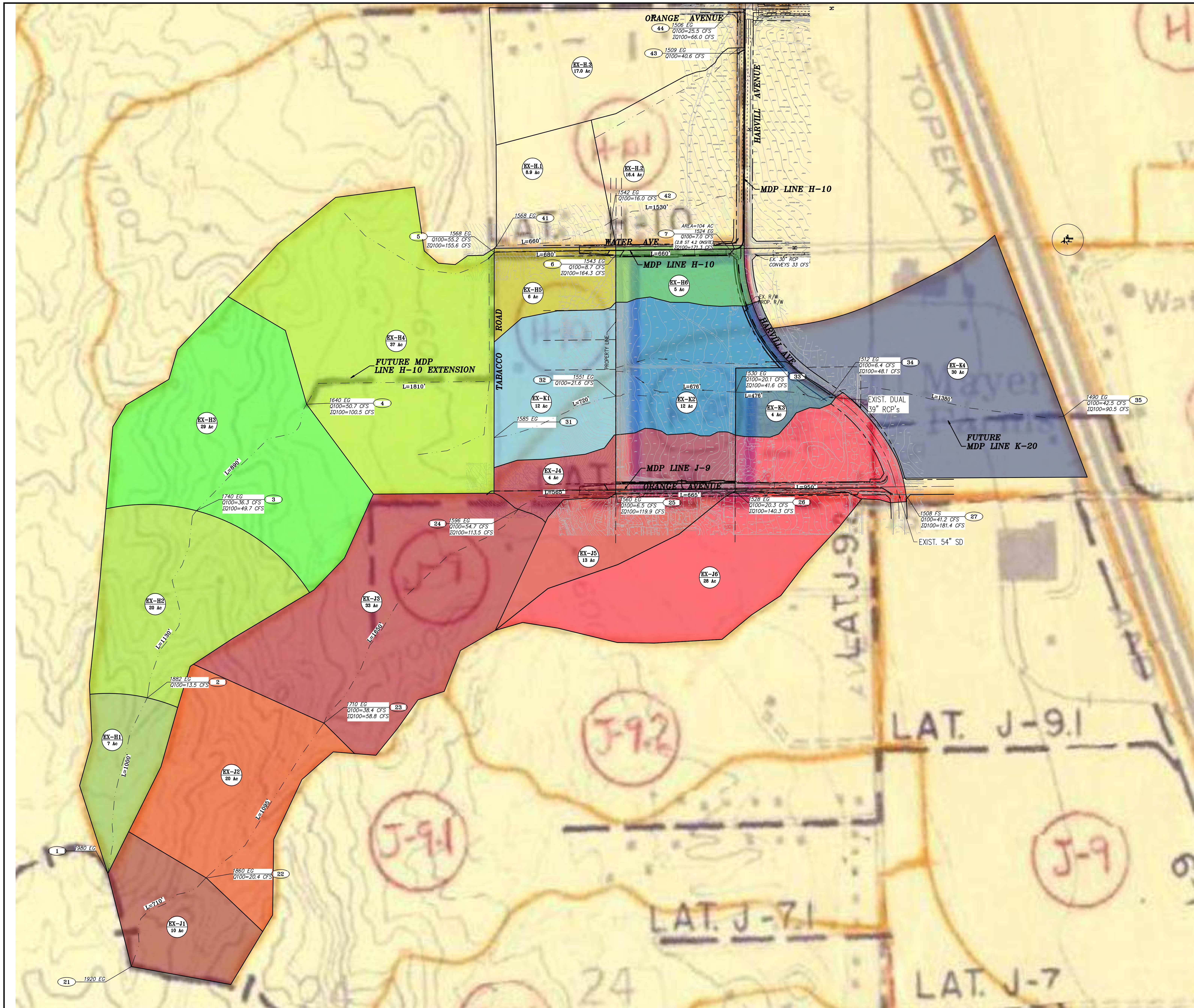
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**COUNTY OF RIVERSIDE**  
**PROPOSED CONDITION**  
**HYDROLOGY MAP**  
**BCIF HARVILL BUSINESS CENTER**  
**WATER STREET AND ORANGE AVE**  
**AT HARVILL AVENUE - PPT220002**

**SHEET**  
**1 OF 1**



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AREA H.1			
Total Area = 42.3	MDP Prorated Rational Method		Total Q = 44
Area	Q, Flow (cfs)	Flow (cfs)	
H.1	8.9	9.3	17.4
H.2	16.4	17.0	27.3
H.3	17.0	17.7	28.3
<b>Total</b>	<b>42.3</b>	<b>44.0</b>	<b>73.0</b>

AREA H			
Total Area = 104	MDP Prorated Rational Method		Total Q = 146
Area	Q, Flow (cfs)	Flow (cfs)	Ex 10yr
H1	7	9.8	13.5
H2	20	28.1	36.3
H3	29	40.7	50.7
H4	37	51.9	55.2
H5	6	8.4	8.7
H6	5	7.0	7.0
<b>Total</b>	<b>104</b>	<b>146</b>	<b>111.8</b>

Tributary to proposed Site (Acres) H1-H5: 99  
Tributary Runoff at Westerly Bndry: 164.3

AREA J			
Total Area = 108	MDP Prorated Rational Method		Total Q = 140
Area	Q, Flow (cfs)	Flow (cfs)	
J1	10	11.6	20.4
J2	20	23.2	38.4
J3	33	38.3	54.7
J4	4	4.6	6.5
J5	13	15.1	20.3
J6	28	46.0	41.2
<b>Total</b>	<b>108</b>	<b>139</b>	<b>181.4</b>

Tributary to proposed Site (Acres) J1-J5: 80  
Tributary Runoff at Westerly Bndry: 140.3

AREA K			
Total Area = 58	MDP Prorated Rational Method		Total Q = 70
Area	Q, Flow (cfs)	Flow (cfs)	
K1	12	14.5	21.6
K2	12	14.5	20.1
K3	4	4.8	6.4
K4	30	36.2	42.5
<b>Total</b>	<b>58</b>	<b>70.0</b>	<b>90.5</b>

Tributary to proposed Site (Acres) J1-J5: 12  
Tributary Runoff at Westerly Bndry: 21.6

TOTAL OFFSITE TRIBUTARY AREA TO SITE = 191 AC  
TOTAL STUDY AREA = 270 AC

Appendix B  
100-year Rational Method Hydrologic Analysis  
-Existing Condition  
-Proposed Condition

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963Q2EA.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
2 YEAR 1 HOUR STORM EVENT - EXISTING CONDITION AREA A  
3963Q2EA  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
10 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 2.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.542(In/Hr)  
Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 1.000 to Point/Station 2.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 729.000(Ft.)  
Top (of initial area) elevation = 1548.800(Ft.)  
Bottom (of initial area) elevation = 1524.200(Ft.)  
Difference in elevation = 24.600(Ft.)  
Slope = 0.03374 s(percent)= 3.37  
TC = k(0.530)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 14.579 min.  
Rainfall intensity = 1.085(In/Hr) for a 2.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.500  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 60.60  
Pervious area fraction = 1.000; Impervious fraction = 0.000

Initial subarea runoff = 2.171 (CFS)

Total initial stream area = 4.000 (Ac.)

Pervious area fraction = 1.000

End of computations, total study area = 4.00 (Ac.)

The following figures may

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

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

Area averaged RI index number = 78.0



Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963Q2EB.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
2 YEAR 1 HOUR STORM EVENT - EXISTING CONDITION AREA B  
3963Q2EB  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
10 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 2.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.542(In/Hr)  
Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 11.000 to Point/Station 12.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 722.000(Ft.)  
Top (of initial area) elevation = 1587.000(Ft.)  
Bottom (of initial area) elevation = 1551.100(Ft.)  
Difference in elevation = 35.900(Ft.)  
Slope = 0.04972 s(percent)= 4.97  
TC = k(0.530)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 13.439 min.  
Rainfall intensity = 1.129(In/Hr) for a 2.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.509  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 60.60  
Pervious area fraction = 1.000; Impervious fraction = 0.000

Initial subarea runoff = 4.023(CFS)  
Total initial stream area = 7.000(Ac.)  
Pervious area fraction = 1.000

+++++  
Process from Point/Station 12.000 to Point/Station 13.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1551.100(Ft.)  
End of natural channel elevation = 1530.100(Ft.)  
Length of natural channel = 676.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 5.460(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 3.80(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0311  
Corrected/adjusted channel slope = 0.0311  
Travel time = 2.97 min. TC = 16.41 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.487  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 60.60  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.024(In/Hr) for a 2.0 year storm  
Subarea runoff = 2.495(CFS) for 5.000(Ac.)  
Total runoff = 6.518(CFS) Total area = 12.000(Ac.)

+++++  
Process from Point/Station 13.000 to Point/Station 14.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1530.100(Ft.)  
End of natural channel elevation = 1519.000(Ft.)  
Length of natural channel = 383.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 7.332(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 3.94(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0290  
Corrected/adjusted channel slope = 0.0290  
Travel time = 1.62 min. TC = 18.03 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.477  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 60.60  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 0.978(In/Hr) for a 2.0 year storm  
Subarea runoff = 1.399(CFS) for 3.000(Ac.)  
Total runoff = 7.917(CFS) Total area = 15.000(Ac.)

++++  
Process from Point/Station 14.000 to Point/Station 14.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:  
In Main Stream number: 1  
Stream flow area = 15.000(Ac.)  
Runoff from this stream = 7.917(CFS)  
Time of concentration = 18.03 min.  
Rainfall intensity = 0.978(In/Hr)  
Program is now starting with Main Stream No. 2

++++  
Process from Point/Station 21.000 to Point/Station 22.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 767.000(Ft.)  
Top (of initial area) elevation = 1579.800(Ft.)  
Bottom (of initial area) elevation = 1546.800(Ft.)  
Difference in elevation = 33.000(Ft.)  
Slope = 0.04302 s(percent)= 4.30  
TC =  $k(0.530) * [(length^3)/(elevation\ change)]^{0.2}$   
Initial area time of concentration = 14.173 min.  
Rainfall intensity = 1.100(In/Hr) for a 2.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.503  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 60.60  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Initial subarea runoff = 2.768(CFS)  
Total initial stream area = 5.000(Ac.)  
Pervious area fraction = 1.000

++++  
Process from Point/Station 22.000 to Point/Station 23.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1546.800(Ft.)  
End of natural channel elevation = 1523.900(Ft.)  
Length of natural channel = 999.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 4.706(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{0.5}))$   
Velocity using mean channel flow = 3.15(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0229

Corrected/adjusted channel slope = 0.0229

Travel time = 5.29 min. TC = 19.46 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.469

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 1) = 60.60

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 0.942(In/Hr) for a 2.0 year storm

Subarea runoff = 3.089(CFS) for 7.000(Ac.)

Total runoff = 5.857(CFS) Total area = 12.000(Ac.)

++++  
Process from Point/Station 23.000 to Point/Station 14.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1523.900(Ft.)

End of natural channel elevation = 1519.000(Ft.)

Length of natural channel = 22.000(Ft.)

Estimated mean flow rate at midpoint of channel = 5.857(CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$

Velocity using mean channel flow = 10.34(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.2227

Corrected/adjusted channel slope = 0.2227

Travel time = 0.04 min. TC = 19.50 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.468

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 1) = 60.60

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 0.941(In/Hr) for a 2.0 year storm

Subarea runoff = 0.000(CFS) for 0.000(Ac.)

Total runoff = 5.857(CFS) Total area = 12.000(Ac.)

++++  
Process from Point/Station 14.000 to Point/Station 14.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:

In Main Stream number: 2

Stream flow area = 12.000 (Ac.)  
 Runoff from this stream = 5.857 (CFS)  
 Time of concentration = 19.50 min.  
 Rainfall intensity = 0.941 (In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
------------	-----------------	----------	----------------------------

1	7.917	18.03	0.978
2	5.857	19.50	0.941

Largest stream flow has longer or shorter time of concentration

Qp = 7.917 + sum of  
 Qa Tb/Ta  
 5.857 \* 0.925 = 5.416  
 Qp = 13.333

Total of 2 main streams to confluence:

Flow rates before confluence point:

7.917 5.857

Area of streams before confluence:

15.000 12.000

Results of confluence:

Total flow rate = 13.333 (CFS)

Time of concentration = 18.028 min.

Effective stream area after confluence = 27.000 (Ac.)

\*\*\*\*\*  
 Process from Point/Station 14.000 to Point/Station 15.000  
 \*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

Top of natural channel elevation = 1519.000 (Ft.)

End of natural channel elevation = 1514.000 (Ft.)

Length of natural channel = 112.000 (Ft.)

Estimated mean flow rate at midpoint of channel = 13.333 (CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity (ft/s) =  $(7 + 8(q(\text{English Units})^{.352}) (\text{slope}^{.5}))$

Velocity using mean channel flow = 5.69 (Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0446

Corrected/adjusted channel slope = 0.0446

Travel time = 0.33 min. TC = 18.36 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.475

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil (AMC 1) = 60.60

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 0.969 (In/Hr) for a 2.0 year storm

Subarea runoff = 0.000 (CFS) for 0.000 (Ac.)

Total runoff = 13.333(CFS) Total area = 27.000(Ac.)

+++++  
Process from Point/Station 15.000 to Point/Station 15.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.475  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 60.60  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Time of concentration = 18.36 min.  
Rainfall intensity = 0.969(In/Hr) for a 2.0 year storm  
Subarea runoff = 0.460(CFS) for 1.000(Ac.)  
Total runoff = 13.793(CFS) Total area = 28.000(Ac.)  
End of computations, total study area = 28.00 (Ac.)  
The following figures may  
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000  
Area averaged RI index number = 78.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963Q2EC.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
2 YEAR 1 HOUR STORM EVENT - EXISTING CONDITION AREA C  
3963Q2EC  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)

For the [ Perris Valley ] area used.

10 year storm 10 minute intensity = 1.880(In/Hr)

100 year storm 60 minute intensity = 0.780(In/Hr)

100 year storm 10 minute intensity = 2.690(In/Hr)

100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 2.0

Calculated rainfall intensity data:

1 hour intensity = 0.542(In/Hr)

Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 31.000 to Point/Station 32.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 680.000(Ft.)

Top (of initial area) elevation = 1594.300(Ft.)

Bottom (of initial area) elevation = 1557.000(Ft.)

Difference in elevation = 37.300(Ft.)

Slope = 0.05485 s(percent)= 5.49

TC = k(0.530)\*[(length^3)/(elevation change)]^0.2

Initial area time of concentration = 12.866 min.

Rainfall intensity = 1.153(In/Hr) for a 2.0 year storm

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.514

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 1) = 60.60

Pervious area fraction = 1.000; Impervious fraction = 0.000

Initial subarea runoff = 1.185 (CFS)  
Total initial stream area = 2.000 (Ac.)  
Pervious area fraction = 1.000

+++++  
Process from Point/Station 32.000 to Point/Station 33.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1557.000 (Ft.)  
End of natural channel elevation = 1528.700 (Ft.)  
Length of natural channel = 681.000 (Ft.)  
Estimated mean flow rate at midpoint of channel = 2.370 (CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity (ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 3.64 (Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0416  
Corrected/adjusted channel slope = 0.0416  
Travel time = 3.12 min. TC = 15.99 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.490  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 60.60  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.037 (In/Hr) for a 2.0 year storm  
Subarea runoff = 2.033 (CFS) for 4.000 (Ac.)  
**Total runoff = 3.218 (CFS)** Total area = 6.000 (Ac.)  
End of computations, total study area = 6.00 (Ac.)  
The following figures may  
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction ( $A_p$ ) = 1.000  
Area averaged RI index number = 78.0



Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963Q5EA.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
5 YEAR 1 HOUR STORM EVENT - EXISTING CONDITION AREA A  
3963Q5EA  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 5.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
100 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 5.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.678(In/Hr)  
Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 1.000 to Point/Station 2.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 729.000(Ft.)  
Top (of initial area) elevation = 1548.800(Ft.)  
Bottom (of initial area) elevation = 1524.200(Ft.)  
Difference in elevation = 24.600(Ft.)  
Slope = 0.03374 s(percent)= 3.37  
TC = k(0.530)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 14.579 min.  
Rainfall intensity = 1.355(In/Hr) for a 5.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.549  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 60.60  
Pervious area fraction = 1.000; Impervious fraction = 0.000

Initial subarea runoff = 2.976(CFS)

Total initial stream area = 4.000(Ac.)

Pervious area fraction = 1.000

End of computations, total study area = 4.00 (Ac.)

The following figures may

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

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

Area averaged RI index number = 78.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963Q5EB.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
5 YEAR 1 HOUR STORM EVENT - EXISTING CONDITION AREA B  
3963Q5EB  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 5.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
100 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 5.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.678(In/Hr)  
Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 11.000 to Point/Station 12.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 722.000(Ft.)  
Top (of initial area) elevation = 1587.000(Ft.)  
Bottom (of initial area) elevation = 1551.100(Ft.)  
Difference in elevation = 35.900(Ft.)  
Slope = 0.04972 s(percent)= 4.97  
TC = k(0.530)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 13.439 min.  
Rainfall intensity = 1.411(In/Hr) for a 5.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.557  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 60.60  
Pervious area fraction = 1.000; Impervious fraction = 0.000

Initial subarea runoff = 5.504(CFS)  
Total initial stream area = 7.000(Ac.)  
Pervious area fraction = 1.000

+++++  
Process from Point/Station 12.000 to Point/Station 13.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1551.100(Ft.)  
End of natural channel elevation = 1530.100(Ft.)  
Length of natural channel = 676.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 7.470(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 4.10(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0311  
Corrected/adjusted channel slope = 0.0311  
Travel time = 2.75 min. TC = 16.19 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.538  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 60.60  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.288(In/Hr) for a 5.0 year storm  
Subarea runoff = 3.463(CFS) for 5.000(Ac.)  
Total runoff = 8.967(CFS) Total area = 12.000(Ac.)

+++++  
Process from Point/Station 13.000 to Point/Station 14.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1530.100(Ft.)  
End of natural channel elevation = 1519.000(Ft.)  
Length of natural channel = 383.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 10.087(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 4.26(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0290  
Corrected/adjusted channel slope = 0.0290  
Travel time = 1.50 min. TC = 17.69 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.528  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 60.60  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.233(In/Hr) for a 5.0 year storm  
Subarea runoff = 1.955(CFS) for 3.000(Ac.)  
Total runoff = 10.921(CFS) Total area = 15.000(Ac.)

++++  
Process from Point/Station 14.000 to Point/Station 14.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:  
In Main Stream number: 1  
Stream flow area = 15.000(Ac.)  
Runoff from this stream = 10.921(CFS)  
Time of concentration = 17.69 min.  
Rainfall intensity = 1.233(In/Hr)  
Program is now starting with Main Stream No. 2

++++  
Process from Point/Station 21.000 to Point/Station 22.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 767.000(Ft.)  
Top (of initial area) elevation = 1579.800(Ft.)  
Bottom (of initial area) elevation = 1546.800(Ft.)  
Difference in elevation = 33.000(Ft.)  
Slope = 0.04302 s(percent)= 4.30  
TC = k(0.530)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 14.173 min.  
Rainfall intensity = 1.374(In/Hr) for a 5.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.552  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 60.60  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Initial subarea runoff = 3.792(CFS)  
Total initial stream area = 5.000(Ac.)  
Pervious area fraction = 1.000

++++  
Process from Point/Station 22.000 to Point/Station 23.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1546.800(Ft.)  
End of natural channel elevation = 1523.900(Ft.)  
Length of natural channel = 999.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 6.447(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)  
Velocity using mean channel flow = 3.39(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0229

Corrected/adjusted channel slope = 0.0229

Travel time = 4.91 min. TC = 19.08 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.520

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 1) = 60.60

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 1.188(In/Hr) for a 5.0 year storm

Subarea runoff = 4.327(CFS) for 7.000(Ac.)

Total runoff = 8.120(CFS) Total area = 12.000(Ac.)

++++  
Process from Point/Station 23.000 to Point/Station 14.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1523.900(Ft.)

End of natural channel elevation = 1519.000(Ft.)

Length of natural channel = 22.000(Ft.)

Estimated mean flow rate at midpoint of channel = 8.120(CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{0.5}))$

Velocity using mean channel flow = 11.19(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.2227

Corrected/adjusted channel slope = 0.2227

Travel time = 0.03 min. TC = 19.11 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.520

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 1) = 60.60

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 1.187(In/Hr) for a 5.0 year storm

Subarea runoff = 0.000(CFS) for 0.000(Ac.)

Total runoff = 8.120(CFS) Total area = 12.000(Ac.)

++++  
Process from Point/Station 14.000 to Point/Station 14.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:

In Main Stream number: 2

Stream flow area = 12.000 (Ac.)  
 Runoff from this stream = 8.120 (CFS)  
 Time of concentration = 19.11 min.  
 Rainfall intensity = 1.187 (In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	10.921	17.69	1.233
2	8.120	19.11	1.187

Largest stream flow has longer or shorter time of concentration

Qp = 10.921 + sum of  
 Qa Tb/Ta  
 8.120 \* 0.925 = 7.515  
 Qp = 18.436

Total of 2 main streams to confluence:  
 Flow rates before confluence point:  
 10.921 8.120  
 Area of streams before confluence:  
 15.000 12.000

Results of confluence:  
 Total flow rate = 18.436 (CFS)  
 Time of concentration = 17.687 min.  
 Effective stream area after confluence = 27.000 (Ac.)

\*\*\*\*\*  
 Process from Point/Station 14.000 to Point/Station 15.000  
 \*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1519.000 (Ft.)  
 End of natural channel elevation = 1514.000 (Ft.)  
 Length of natural channel = 112.000 (Ft.)  
 Estimated mean flow rate at midpoint of channel = 18.436 (CFS)

Natural valley channel type used  
 L.A. County flood control district formula for channel velocity:  
 Velocity (ft/s) = (7 + 8(q(English Units)<sup>0.352</sup>)(slope<sup>0.5</sup>)  
 Velocity using mean channel flow = 6.19 (Ft/s)

Correction to map slope used on extremely rugged channels with  
 drops and waterfalls (Plate D-6.2)  
 Normal channel slope = 0.0446  
 Corrected/adjusted channel slope = 0.0446  
 Travel time = 0.30 min. TC = 17.99 min.

Adding area flow to channel  
 UNDEVELOPED (poor cover) subarea  
 Runoff Coefficient = 0.527  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 1.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 0.000  
 RI index for soil (AMC 1) = 60.60  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Rainfall intensity = 1.223 (In/Hr) for a 5.0 year storm  
 Subarea runoff = 0.000 (CFS) for 0.000 (Ac.)

Total runoff = 18.436(CFS) Total area = 27.000(Ac.)

++++  
Process from Point/Station 15.000 to Point/Station 15.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.527  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 60.60  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Time of concentration = 17.99 min.  
Rainfall intensity = 1.223(In/Hr) for a 5.0 year storm  
Subarea runoff = 0.644(CFS) for 1.000(Ac.)  
Total runoff = 19.080(CFS) Total area = 28.000(Ac.)  
End of computations, total study area = 28.00 (Ac.)  
The following figures may  
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000  
Area averaged RI index number = 78.0



Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963Q5EC.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
5 YEAR 1 HOUR STORM EVENT - EXISTING CONDITION AREA C  
3963Q5EC  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 5.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
10 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 5.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.678(In/Hr)  
Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 31.000 to Point/Station 32.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 680.000(Ft.)  
Top (of initial area) elevation = 1594.300(Ft.)  
Bottom (of initial area) elevation = 1557.000(Ft.)  
Difference in elevation = 37.300(Ft.)  
Slope = 0.05485 s(percent)= 5.49  
TC = k(0.530)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 12.866 min.  
Rainfall intensity = 1.441(In/Hr) for a 5.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.562  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 60.60  
Pervious area fraction = 1.000; Impervious fraction = 0.000

Initial subarea runoff = 1.620 (CFS)  
Total initial stream area = 2.000 (Ac.)  
Pervious area fraction = 1.000

+++++  
Process from Point/Station 32.000 to Point/Station 33.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1557.000 (Ft.)  
End of natural channel elevation = 1528.700 (Ft.)  
Length of natural channel = 681.000 (Ft.)  
Estimated mean flow rate at midpoint of channel = 3.239 (CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity (ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 3.89 (Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0416  
Corrected/adjusted channel slope = 0.0416  
Travel time = 2.92 min. TC = 15.78 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.541  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil (AMC 1) = 60.60  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.304 (In/Hr) for a 5.0 year storm  
Subarea runoff = 2.819 (CFS) for 4.000 (Ac.)  
Total runoff = 4.439 (CFS) Total area = 6.000 (Ac.)  
End of computations, total study area = 6.00 (Ac.)  
The following figures may  
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction ( $A_p$ ) = 1.000  
Area averaged RI index number = 78.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963q10ea.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
10 YEAR 1 HOUR STORM EVENT - EXISTING CONDITION AREA A  
3963Q10EA  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
10 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 10.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.780(In/Hr)  
Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 1.000 to Point/Station 2.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 729.000(Ft.)  
Top (of initial area) elevation = 1548.800(Ft.)  
Bottom (of initial area) elevation = 1524.200(Ft.)  
Difference in elevation = 24.600(Ft.)  
Slope = 0.03374 s(percent)= 3.37  
TC = k(0.530)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 14.579 min.  
Rainfall intensity = 1.560(In/Hr) for a 10.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.725  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000

Initial subarea runoff = 4.526(CFS)

Total initial stream area = 4.000(Ac.)

Pervious area fraction = 1.000

End of computations, total study area = 4.00 (Ac.)

The following figures may

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

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

Area averaged RI index number = 78.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963q10eb.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
10 YEAR 1 HOUR STORM EVENT - EXISTING CONDITION AREA B  
3963Q10EB  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
10 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 10.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.780(In/Hr)  
Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 11.000 to Point/Station 12.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 722.000(Ft.)  
Top (of initial area) elevation = 1587.000(Ft.)  
Bottom (of initial area) elevation = 1551.100(Ft.)  
Difference in elevation = 35.900(Ft.)  
Slope = 0.04972 s(percent)= 4.97  
TC = k(0.530)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 13.439 min.  
Rainfall intensity = 1.624(In/Hr) for a 10.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.731  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000

Initial subarea runoff = 8.305(CFS)  
Total initial stream area = 7.000(Ac.)  
Pervious area fraction = 1.000

++++  
Process from Point/Station 12.000 to Point/Station 13.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1551.100(Ft.)  
End of natural channel elevation = 1530.100(Ft.)  
Length of natural channel = 676.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 11.271(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 4.54(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0311  
Corrected/adjusted channel slope = 0.0311  
Travel time = 2.48 min. TC = 15.92 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.719  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.494(In/Hr) for a 10.0 year storm  
Subarea runoff = 5.372(CFS) for 5.000(Ac.)  
Total runoff = 13.677(CFS) Total area = 12.000(Ac.)

++++  
Process from Point/Station 13.000 to Point/Station 14.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1530.100(Ft.)  
End of natural channel elevation = 1519.000(Ft.)  
Length of natural channel = 383.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 15.387(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 4.76(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0290  
Corrected/adjusted channel slope = 0.0290  
Travel time = 1.34 min. TC = 17.26 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.713  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.436(In/Hr) for a 10.0 year storm  
Subarea runoff = 3.073(CFS) for 3.000(Ac.)  
Total runoff = 16.750(CFS) Total area = 15.000(Ac.)

++++  
Process from Point/Station 14.000 to Point/Station 14.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:  
In Main Stream number: 1  
Stream flow area = 15.000(Ac.)  
Runoff from this stream = 16.750(CFS)  
Time of concentration = 17.26 min.  
Rainfall intensity = 1.436(In/Hr)  
Program is now starting with Main Stream No. 2

++++  
Process from Point/Station 21.000 to Point/Station 22.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 767.000(Ft.)  
Top (of initial area) elevation = 1579.800(Ft.)  
Bottom (of initial area) elevation = 1546.800(Ft.)  
Difference in elevation = 33.000(Ft.)  
Slope = 0.04302 s(percent)= 4.30  
TC = k(0.530)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 14.173 min.  
Rainfall intensity = 1.582(In/Hr) for a 10.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.727  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Initial subarea runoff = 5.751(CFS)  
Total initial stream area = 5.000(Ac.)  
Pervious area fraction = 1.000

++++  
Process from Point/Station 22.000 to Point/Station 23.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1546.800(Ft.)  
End of natural channel elevation = 1523.900(Ft.)  
Length of natural channel = 999.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 9.777(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)  
Velocity using mean channel flow = 3.76(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0229

Corrected/adjusted channel slope = 0.0229

Travel time = 4.43 min. TC = 18.60 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.708

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 2) = 78.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 1.385(In/Hr) for a 10.0 year storm

Subarea runoff = 6.860(CFS) for 7.000(Ac.)

Total runoff = 12.612(CFS) Total area = 12.000(Ac.)

++++  
Process from Point/Station 23.000 to Point/Station 14.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1523.900(Ft.)

End of natural channel elevation = 1519.000(Ft.)

Length of natural channel = 22.000(Ft.)

Estimated mean flow rate at midpoint of channel = 12.612(CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$

Velocity using mean channel flow = 12.52(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.2227

Corrected/adjusted channel slope = 0.2227

Travel time = 0.03 min. TC = 18.63 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.708

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 2) = 78.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 1.384(In/Hr) for a 10.0 year storm

Subarea runoff = 0.000(CFS) for 0.000(Ac.)

Total runoff = 12.612(CFS) Total area = 12.000(Ac.)

++++  
Process from Point/Station 14.000 to Point/Station 14.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:

In Main Stream number: 2



Stream flow area = 12.000 (Ac.)  
 Runoff from this stream = 12.612 (CFS)  
 Time of concentration = 18.63 min.  
 Rainfall intensity = 1.384 (In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	16.750	17.26	1.436
2	12.612	18.63	1.384

Largest stream flow has longer or shorter time of concentration

Qp = 16.750 + sum of  
 Qa Tb/Ta  
 12.612 \* 0.927 = 11.687  
 Qp = 28.438

Total of 2 main streams to confluence:  
 Flow rates before confluence point:  
 16.750 12.612  
 Area of streams before confluence:  
 15.000 12.000

Results of confluence:  
 Total flow rate = 28.438 (CFS)  
 Time of concentration = 17.262 min.  
 Effective stream area after confluence = 27.000 (Ac.)

\*\*\*\*\*  
 Process from Point/Station 14.000 to Point/Station 15.000  
 \*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1519.000 (Ft.)  
 End of natural channel elevation = 1514.000 (Ft.)  
 Length of natural channel = 112.000 (Ft.)  
 Estimated mean flow rate at midpoint of channel = 28.438 (CFS)

Natural valley channel type used  
 L.A. County flood control district formula for channel velocity:  
 Velocity (ft/s) = (7 + 8(q(English Units)<sup>0.352</sup>)(slope<sup>0.5</sup>)  
 Velocity using mean channel flow = 6.97 (Ft/s)

Correction to map slope used on extremely rugged channels with  
 drops and waterfalls (Plate D-6.2)  
 Normal channel slope = 0.0446  
 Corrected/adjusted channel slope = 0.0446  
 Travel time = 0.27 min. TC = 17.53 min.

Adding area flow to channel  
 UNDEVELOPED (poor cover) subarea  
 Runoff Coefficient = 0.712  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 1.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 0.000  
 RI index for soil (AMC 2) = 78.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Rainfall intensity = 1.425 (In/Hr) for a 10.0 year storm  
 Subarea runoff = 0.000 (CFS) for 0.000 (Ac.)

Total runoff = 28.438 (CFS) Total area = 27.000 (Ac.)

+++++  
Process from Point/Station 15.000 to Point/Station 15.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.712  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Time of concentration = 17.53 min.  
Rainfall intensity = 1.425 (In/Hr) for a 10.0 year storm  
Subarea runoff = 1.015 (CFS) for 1.000 (Ac.)  
Total runoff = 29.453 (CFS) Total area = 28.000 (Ac.)  
End of computations, total study area = 28.00 (Ac.)  
The following figures may  
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000  
Area averaged RI index number = 78.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963q10ec.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
10 YEAR 1 HOUR STORM EVENT - EXISTING CONDITION AREA C  
3963Q10EC  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
10 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 10.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.780(In/Hr)  
Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 31.000 to Point/Station 32.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 680.000(Ft.)  
Top (of initial area) elevation = 1594.300(Ft.)  
Bottom (of initial area) elevation = 1557.000(Ft.)  
Difference in elevation = 37.300(Ft.)  
Slope = 0.05485 s(percent)= 5.49  
TC = k(0.530)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 12.866 min.  
Rainfall intensity = 1.659(In/Hr) for a 10.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.734  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000

Initial subarea runoff = 2.434(CFS)  
Total initial stream area = 2.000(Ac.)  
Pervious area fraction = 1.000

+++++  
Process from Point/Station 32.000 to Point/Station 33.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1557.000(Ft.)  
End of natural channel elevation = 1528.700(Ft.)  
Length of natural channel = 681.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 4.868(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 4.27(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0416  
Corrected/adjusted channel slope = 0.0416  
Travel time = 2.66 min. TC = 15.52 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.721  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.513(In/Hr) for a 10.0 year storm  
Subarea runoff = 4.362(CFS) for 4.000(Ac.)  
Total runoff = 6.796(CFS) Total area = 6.000(Ac.)  
End of computations, total study area = 6.00 (Ac.)  
The following figures may  
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction( $A_p$ ) = 1.000  
Area averaged RI index number = 78.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963q100ea.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR 1 HOUR STORM EVENT - EXISTING CONDITION AREA A  
3963q100ea  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
10 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0  
Calculated rainfall intensity data:  
1 hour intensity = 1.120(In/Hr)  
Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 1.000 to Point/Station 2.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 729.000(Ft.)  
Top (of initial area) elevation = 1548.800(Ft.)  
Bottom (of initial area) elevation = 1524.200(Ft.)  
Difference in elevation = 24.600(Ft.)  
Slope = 0.03374 s(percent)= 3.37  
TC = k(0.530)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 14.579 min.  
Rainfall intensity = 2.240(In/Hr) for a 100.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.771  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000

Initial subarea runoff = 6.905(CFS)

Total initial stream area = 4.000(Ac.)

Pervious area fraction = 1.000

End of computations, total study area = 4.00 (Ac.)

The following figures may

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

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

Area averaged RI index number = 78.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963q100eb.out

-----  
BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR 1 HOUR STORM EVENT - EXISTING CONDITION AREA B  
3963q100eb  
CB  
-----

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

English (in-lb) Units used in input data file  
-----

Program License Serial Number 6145  
-----

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
10 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0  
Calculated rainfall intensity data:  
1 hour intensity = 1.120(In/Hr)  
Slope of intensity duration curve = 0.4900

+++++  
Process from Point/Station 11.000 to Point/Station 12.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 722.000(Ft.)  
Top (of initial area) elevation = 1587.000(Ft.)  
Bottom (of initial area) elevation = 1551.100(Ft.)  
Difference in elevation = 35.900(Ft.)  
Slope = 0.04972 s(percent)= 4.97  
TC = k(0.530)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 13.439 min.  
Rainfall intensity = 2.331(In/Hr) for a 100.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.775  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000

Initial subarea runoff = 12.647(CFS)  
Total initial stream area = 7.000(Ac.)  
Pervious area fraction = 1.000

++++  
Process from Point/Station 12.000 to Point/Station 13.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1551.100(Ft.)  
End of natural channel elevation = 1530.100(Ft.)  
Length of natural channel = 676.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 17.164(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 5.07(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0311  
Corrected/adjusted channel slope = 0.0311  
Travel time = 2.22 min. TC = 15.66 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.767  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 2.163(In/Hr) for a 100.0 year storm  
Subarea runoff = 8.291(CFS) for 5.000(Ac.)  
Total runoff = 20.939(CFS) Total area = 12.000(Ac.)

++++  
Process from Point/Station 13.000 to Point/Station 14.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1530.100(Ft.)  
End of natural channel elevation = 1519.000(Ft.)  
Length of natural channel = 383.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 23.556(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 5.33(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0290  
Corrected/adjusted channel slope = 0.0290  
Travel time = 1.20 min. TC = 16.86 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea



Runoff Coefficient = 0.763  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 2.086(In/Hr) for a 100.0 year storm  
Subarea runoff = 4.773(CFS) for 3.000(Ac.)  
Total runoff = 25.711(CFS) Total area = 15.000(Ac.)

++++  
Process from Point/Station 14.000 to Point/Station 14.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:  
In Main Stream number: 1  
Stream flow area = 15.000(Ac.)  
Runoff from this stream = 25.711(CFS)  
Time of concentration = 16.86 min.  
Rainfall intensity = 2.086(In/Hr)  
Program is now starting with Main Stream No. 2

++++  
Process from Point/Station 21.000 to Point/Station 22.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 767.000(Ft.)  
Top (of initial area) elevation = 1579.800(Ft.)  
Bottom (of initial area) elevation = 1546.800(Ft.)  
Difference in elevation = 33.000(Ft.)  
Slope = 0.04302 s(percent)= 4.30  
TC = k(0.530)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 14.173 min.  
Rainfall intensity = 2.271(In/Hr) for a 100.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.772  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Initial subarea runoff = 8.770(CFS)  
Total initial stream area = 5.000(Ac.)  
Pervious area fraction = 1.000

++++  
Process from Point/Station 22.000 to Point/Station 23.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1546.800(Ft.)  
End of natural channel elevation = 1523.900(Ft.)  
Length of natural channel = 999.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 14.908(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)  
Velocity using mean channel flow = 4.20(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0229

Corrected/adjusted channel slope = 0.0229

Travel time = 3.97 min. TC = 18.14 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.758

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 2) = 78.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 2.013(In/Hr) for a 100.0 year storm

Subarea runoff = 10.683(CFS) for 7.000(Ac.)

Total runoff = 19.453(CFS) Total area = 12.000(Ac.)

++++  
Process from Point/Station 23.000 to Point/Station 14.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1523.900(Ft.)

End of natural channel elevation = 1519.000(Ft.)

Length of natural channel = 22.000(Ft.)

Estimated mean flow rate at midpoint of channel = 19.453(CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$

Velocity using mean channel flow = 14.04(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.2227

Corrected/adjusted channel slope = 0.2227

Travel time = 0.03 min. TC = 18.17 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.758

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 2) = 78.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 2.011(In/Hr) for a 100.0 year storm

Subarea runoff = 0.000(CFS) for 0.000(Ac.)

Total runoff = 19.453(CFS) Total area = 12.000(Ac.)

++++  
Process from Point/Station 14.000 to Point/Station 14.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:

In Main Stream number: 2

Stream flow area = 12.000 (Ac.)  
 Runoff from this stream = 19.453 (CFS)  
 Time of concentration = 18.17 min.  
 Rainfall intensity = 2.011 (In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
------------	-----------------	----------	----------------------------

1	25.711	16.86	2.086
2	19.453	18.17	2.011

Largest stream flow has longer or shorter time of concentration

Qp = 25.711 + sum of  
 Qa Tb/Ta  
 19.453 \* 0.928 = 18.051  
 Qp = 43.763

Total of 2 main streams to confluence:

Flow rates before confluence point:  
 25.711 19.453

Area of streams before confluence:  
 15.000 12.000

Results of confluence:

Total flow rate = 43.763 (CFS)  
 Time of concentration = 16.859 min.  
 Effective stream area after confluence = 27.000 (Ac.)

\*\*\*\*\*  
 Process from Point/Station 14.000 to Point/Station 15.000  
 \*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1519.000 (Ft.)  
 End of natural channel elevation = 1514.000 (Ft.)  
 Length of natural channel = 112.000 (Ft.)  
 Estimated mean flow rate at midpoint of channel = 43.763 (CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity (ft/s) =  $(7 + 8(q(\text{English Units})^{.352}) (\text{slope}^{.5}))$

Velocity using mean channel flow = 7.87 (Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0446

Corrected/adjusted channel slope = 0.0446

Travel time = 0.24 min. TC = 17.10 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.762

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil (AMC 2) = 78.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 2.072 (In/Hr) for a 100.0 year storm

Subarea runoff = 0.000 (CFS) for 0.000 (Ac.)

Total runoff = 43.763(CFS) Total area = 27.000(Ac.)

+++++  
Process from Point/Station 15.000 to Point/Station 15.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.762  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Time of concentration = 17.10 min.  
Rainfall intensity = 2.072(In/Hr) for a 100.0 year storm  
Subarea runoff = 1.578(CFS) for 1.000(Ac.)  
Total runoff = 45.341(CFS) Total area = 28.000(Ac.)  
End of computations, total study area = 28.00 (Ac.)  
The following figures may  
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000  
Area averaged RI index number = 78.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963q100ec.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR 1 HOUR STORM EVENT - EXISTING CONDITION AREA C  
3963Q100EC  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
10 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0  
Calculated rainfall intensity data:  
1 hour intensity = 1.120(In/Hr)  
Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 31.000 to Point/Station 32.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 680.000(Ft.)  
Top (of initial area) elevation = 1594.300(Ft.)  
Bottom (of initial area) elevation = 1557.000(Ft.)  
Difference in elevation = 37.300(Ft.)  
Slope = 0.05485 s(percent)= 5.49  
TC = k(0.530)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 12.866 min.  
Rainfall intensity = 2.382(In/Hr) for a 100.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.777  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000

Initial subarea runoff = 3.702(CFS)  
Total initial stream area = 2.000(Ac.)  
Pervious area fraction = 1.000

+++++  
Process from Point/Station 32.000 to Point/Station 33.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1557.000(Ft.)  
End of natural channel elevation = 1528.700(Ft.)  
Length of natural channel = 681.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 7.405(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 4.73(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0416  
Corrected/adjusted channel slope = 0.0416  
Travel time = 2.40 min. TC = 15.27 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.768  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 2.190(In/Hr) for a 100.0 year storm  
Subarea runoff = 6.729(CFS) for 4.000(Ac.)  
**Total runoff = 10.431(CFS)** Total area = 6.000(Ac.)  
End of computations, total study area = 6.00 (Ac.)  
The following figures may  
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction( $A_p$ ) = 1.000  
Area averaged RI index number = 78.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963Q2P.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
2 YEAR 1 HOUR STORM EVENT - PROPOSED CONDITION  
3963Q2P  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
100 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 2.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.542(In/Hr)  
Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 1.000 to Point/Station 2.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 383.000(Ft.)  
Top (of initial area) elevation = 1538.600(Ft.)  
Bottom (of initial area) elevation = 1537.000(Ft.)  
Difference in elevation = 1.600(Ft.)  
Slope = 0.00418 s(percent)= 0.42  
TC = k(0.300)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 9.688 min.  
Rainfall intensity = 1.325(In/Hr) for a 2.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.842  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900

Initial subarea runoff = 1.954(CFS)  
Total initial stream area = 1.750(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 2.000 to Point/Station 3.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1533.600(Ft.)  
Downstream point/station elevation = 1531.300(Ft.)  
Pipe length = 276.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 1.954(CFS)  
Nearest computed pipe diameter = 12.00(In.)  
Calculated individual pipe flow = 1.954(CFS)  
Normal flow depth in pipe = 6.70(In.)  
Flow top width inside pipe = 11.92(In.)  
Critical Depth = 7.15(In.)  
Pipe flow velocity = 4.33(Ft/s)  
Travel time through pipe = 1.06 min.  
Time of concentration (TC) = 10.75 min.

++++  
Process from Point/Station 3.000 to Point/Station 3.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.841  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 10.75 min.  
Rainfall intensity = 1.259(In/Hr) for a 2.0 year storm  
Subarea runoff = 1.854(CFS) for 1.750(Ac.)  
Total runoff = 3.808(CFS) Total area = 3.500(Ac.)

++++  
Process from Point/Station 3.000 to Point/Station 4.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1531.300(Ft.)  
Downstream point/station elevation = 1529.400(Ft.)  
Pipe length = 264.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 3.808(CFS)  
Nearest computed pipe diameter = 15.00(In.)  
Calculated individual pipe flow = 3.808(CFS)  
Normal flow depth in pipe = 9.20(In.)  
Flow top width inside pipe = 14.61(In.)  
Critical Depth = 9.46(In.)  
Pipe flow velocity = 4.82(Ft/s)  
Travel time through pipe = 0.91 min.  
Time of concentration (TC) = 11.66 min.

++++  
Process from Point/Station 4.000 to Point/Station 4.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---



COMMERCIAL subarea type  
Runoff Coefficient = 0.840  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 11.66 min.  
Rainfall intensity = 1.210(In/Hr) for a 2.0 year storm  
Subarea runoff = 1.882(CFS) for 1.850(Ac.)  
Total runoff = 5.689(CFS) Total area = 5.350(Ac.)

++++  
Process from Point/Station 4.000 to Point/Station 5.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1529.400(Ft.)  
Downstream point/station elevation = 1525.700(Ft.)  
Pipe length = 757.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 5.689(CFS)  
Nearest computed pipe diameter = 18.00(In.)  
Calculated individual pipe flow = 5.689(CFS)  
Normal flow depth in pipe = 11.91(In.)  
Flow top width inside pipe = 17.04(In.)  
Critical Depth = 11.04(In.)  
Pipe flow velocity = 4.59(Ft/s)  
Travel time through pipe = 2.75 min.  
Time of concentration (TC) = 14.41 min.

++++  
Process from Point/Station 5.000 to Point/Station 5.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.838  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 14.41 min.  
Rainfall intensity = 1.091(In/Hr) for a 2.0 year storm  
Subarea runoff = 0.220(CFS) for 0.240(Ac.)  
Total runoff = 5.909(CFS) Total area = 5.590(Ac.)

++++  
Process from Point/Station 5.000 to Point/Station 6.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1525.700(Ft.)  
Downstream point/station elevation = 1525.100(Ft.)  
Pipe length = 107.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 5.909(CFS)  
Nearest computed pipe diameter = 18.00(In.)  
Calculated individual pipe flow = 5.909(CFS)  
Normal flow depth in pipe = 11.65(In.)  
Flow top width inside pipe = 17.20(In.)  
Critical Depth = 11.26(In.)

Pipe flow velocity = 4.89(Ft/s)  
Travel time through pipe = 0.36 min.  
Time of concentration (TC) = 14.78 min.

++++  
Process from Point/Station 6.000 to Point/Station 6.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.838  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 14.78 min.  
Rainfall intensity = 1.078(In/Hr) for a 2.0 year storm  
Subarea runoff = 2.818(CFS) for 3.120(Ac.)  
Total runoff = 8.727(CFS) Total area = 8.710(Ac.)

++++  
Process from Point/Station 6.000 to Point/Station 7.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1525.100(Ft.)  
Downstream point/station elevation = 1524.100(Ft.)  
Pipe length = 205.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 8.727(CFS)  
Nearest computed pipe diameter = 21.00(In.)  
Calculated individual pipe flow = 8.727(CFS)  
Normal flow depth in pipe = 14.06(In.)  
Flow top width inside pipe = 19.75(In.)  
Critical Depth = 13.17(In.)  
Pipe flow velocity = 5.10(Ft/s)  
Travel time through pipe = 0.67 min.  
Time of concentration (TC) = 15.45 min.

++++  
Process from Point/Station 7.000 to Point/Station 7.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.838  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 15.45 min.  
Rainfall intensity = 1.055(In/Hr) for a 2.0 year storm  
Subarea runoff = 1.572(CFS) for 1.780(Ac.)  
Total runoff = 10.299(CFS) Total area = 10.490(Ac.)

++++  
Process from Point/Station 7.000 to Point/Station 8.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1524.100(Ft.)  
Downstream point/station elevation = 1523.000(Ft.)  
Pipe length = 218.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 10.299(CFS)  
Nearest computed pipe diameter = 21.00(In.)  
Calculated individual pipe flow = 10.299(CFS)  
Normal flow depth in pipe = 15.80(In.)  
Flow top width inside pipe = 18.13(In.)  
Critical Depth = 14.36(In.)  
Pipe flow velocity = 5.31(Ft/s)  
Travel time through pipe = 0.68 min.  
Time of concentration (TC) = 16.13 min.

++++  
Process from Point/Station 8.000 to Point/Station 8.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:  
In Main Stream number: 1  
Stream flow area = 10.490(Ac.)  
Runoff from this stream = 10.299(CFS)  
Time of concentration = 16.13 min.  
Rainfall intensity = 1.032(In/Hr)  
Program is now starting with Main Stream No. 2

++++  
Process from Point/Station 11.000 to Point/Station 12.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 383.000(Ft.)  
Top (of initial area) elevation = 1538.600(Ft.)  
Bottom (of initial area) elevation = 1537.000(Ft.)  
Difference in elevation = 1.600(Ft.)  
Slope = 0.00418 s(percent) = 0.42  
TC =  $k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$   
Initial area time of concentration = 9.688 min.  
Rainfall intensity = 1.325(In/Hr) for a 2.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.842  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 1.965(CFS)  
Total initial stream area = 1.760(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 12.000 to Point/Station 13.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1532.000(Ft.)  
Downstream point/station elevation = 1528.200(Ft.)  
Pipe length = 477.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 1.965(CFS)  
Nearest computed pipe diameter = 12.00(In.)  
Calculated individual pipe flow = 1.965(CFS)  
Normal flow depth in pipe = 6.82(In.)

Flow top width inside pipe = 11.89(In.)  
Critical Depth = 7.17(In.)  
Pipe flow velocity = 4.26(Ft/s)  
Travel time through pipe = 1.87 min.  
Time of concentration (TC) = 11.55 min.

++++  
Process from Point/Station 13.000 to Point/Station 13.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.841  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 11.55 min.  
Rainfall intensity = 1.216(In/Hr) for a 2.0 year storm  
Subarea runoff = 1.083(CFS) for 1.060(Ac.)  
Total runoff = 3.048(CFS) Total area = 2.820(Ac.)

++++  
Process from Point/Station 13.000 to Point/Station 14.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1528.200(Ft.)  
Downstream point/station elevation = 1523.400(Ft.)  
Pipe length = 574.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 3.048(CFS)  
Nearest computed pipe diameter = 12.00(In.)  
Calculated individual pipe flow = 3.048(CFS)  
Normal flow depth in pipe = 9.21(In.)  
Flow top width inside pipe = 10.14(In.)  
Critical Depth = 8.97(In.)  
Pipe flow velocity = 4.71(Ft/s)  
Travel time through pipe = 2.03 min.  
Time of concentration (TC) = 13.58 min.

++++  
Process from Point/Station 14.000 to Point/Station 14.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.839  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 13.58 min.  
Rainfall intensity = 1.123(In/Hr) for a 2.0 year storm  
Subarea runoff = 3.279(CFS) for 3.480(Ac.)  
Total runoff = 6.327(CFS) Total area = 6.300(Ac.)

++++  
Process from Point/Station 14.000 to Point/Station 15.000

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

---

Upstream point/station elevation = 1523.400(Ft.)  
Downstream point/station elevation = 1523.200(Ft.)  
Pipe length = 44.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 6.327(CFS)  
Nearest computed pipe diameter = 18.00(In.)  
Calculated individual pipe flow = 6.327(CFS)  
Normal flow depth in pipe = 13.27(In.)  
Flow top width inside pipe = 15.85(In.)  
Critical Depth = 11.66(In.)  
Pipe flow velocity = 4.53(Ft/s)  
Travel time through pipe = 0.16 min.  
Time of concentration (TC) = 13.74 min.

+++++  
Process from Point/Station 15.000 to Point/Station 15.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.839  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 13.74 min.  
Rainfall intensity = 1.117(In/Hr) for a 2.0 year storm  
Subarea runoff = 1.648(CFS) for 1.760(Ac.)  
Total runoff = 7.975(CFS) Total area = 8.060(Ac.)

+++++  
Process from Point/Station 15.000 to Point/Station 8.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1523.200(Ft.)  
Downstream point/station elevation = 1523.000(Ft.)  
Pipe length = 42.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 7.975(CFS)  
Nearest computed pipe diameter = 21.00(In.)  
Calculated individual pipe flow = 7.975(CFS)  
Normal flow depth in pipe = 13.31(In.)  
Flow top width inside pipe = 20.23(In.)  
Critical Depth = 12.57(In.)  
Pipe flow velocity = 4.96(Ft/s)  
Travel time through pipe = 0.14 min.  
Time of concentration (TC) = 13.89 min.

+++++  
Process from Point/Station 8.000 to Point/Station 8.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:

In Main Stream number: 2  
Stream flow area = 8.060(Ac.)  
Runoff from this stream = 7.975(CFS)  
Time of concentration = 13.89 min.  
Rainfall intensity = 1.111(In/Hr)  
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
------------	-----------------	----------	----------------------------

1	10.299	16.13	1.032
2	7.975	13.89	1.111

Largest stream flow has longer time of concentration

$Q_p = 10.299 + \text{sum of } Q_b \cdot I_a/I_b$   
 $Q_p = 10.299 + 7.975 * 0.929 = 17.710$

Total of 2 main streams to confluence:

Flow rates before confluence point:

10.299      7.975

Area of streams before confluence:

10.490      8.060

Results of confluence:

Total flow rate = 17.710 (CFS)

Time of concentration = 16.131 min.

Effective stream area after confluence = 18.550 (Ac.)

++++++  
 Process from Point/Station 8.000 to Point/Station 8.000  
 \*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

COMMERCIAL subarea type

Runoff Coefficient = 0.837

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 1) = 36.00

Pervious area fraction = 0.100; Impervious fraction = 0.900

Time of concentration = 16.13 min.

Rainfall intensity = 1.032 (In/Hr) for a 2.0 year storm

Subarea runoff = 0.934 (CFS) for 1.080 (Ac.)

Total runoff = 18.643 (CFS) Total area = 19.630 (Ac.)

End of computations, total study area = 19.63 (Ac.)

The following figures may

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

Area averaged pervious area fraction(Ap) = 0.100

Area averaged RI index number = 56.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963Q5P.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
5 YEAR 1 HOUR STORM EVENT - PROPOSED CONDITION  
3963Q5P  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 5.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)

For the [ Perris Valley ] area used.

10 year storm 10 minute intensity = 1.880(In/Hr)

100 year storm 60 minute intensity = 0.780(In/Hr)

100 year storm 10 minute intensity = 2.690(In/Hr)

100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 5.0

Calculated rainfall intensity data:

1 hour intensity = 0.678(In/Hr)

Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 1.000 to Point/Station 2.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 383.000(Ft.)

Top (of initial area) elevation = 1538.600(Ft.)

Bottom (of initial area) elevation = 1537.000(Ft.)

Difference in elevation = 1.600(Ft.)

Slope = 0.00418 s(percent)= 0.42

TC = k(0.300)\*[(length^3)/(elevation change)]^0.2

Initial area time of concentration = 9.688 min.

Rainfall intensity = 1.656(In/Hr) for a 5.0 year storm

COMMERCIAL subarea type

Runoff Coefficient = 0.847

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 1) = 36.00

Pervious area fraction = 0.100; Impervious fraction = 0.900

Initial subarea runoff = 2.455(CFS)  
Total initial stream area = 1.750(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 2.000 to Point/Station 3.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1533.600(Ft.)  
Downstream point/station elevation = 1531.300(Ft.)  
Pipe length = 276.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 2.455(CFS)  
Nearest computed pipe diameter = 12.00(In.)  
Calculated individual pipe flow = 2.455(CFS)  
Normal flow depth in pipe = 7.79(In.)  
Flow top width inside pipe = 11.45(In.)  
Critical Depth = 8.05(In.)  
Pipe flow velocity = 4.55(Ft/s)  
Travel time through pipe = 1.01 min.  
Time of concentration (TC) = 10.70 min.

++++  
Process from Point/Station 3.000 to Point/Station 3.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.846  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 10.70 min.  
Rainfall intensity = 1.577(In/Hr) for a 5.0 year storm  
Subarea runoff = 2.335(CFS) for 1.750(Ac.)  
Total runoff = 4.790(CFS) Total area = 3.500(Ac.)

++++  
Process from Point/Station 3.000 to Point/Station 4.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1531.300(Ft.)  
Downstream point/station elevation = 1529.400(Ft.)  
Pipe length = 264.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 4.790(CFS)  
Nearest computed pipe diameter = 15.00(In.)  
Calculated individual pipe flow = 4.790(CFS)  
Normal flow depth in pipe = 10.85(In.)  
Flow top width inside pipe = 13.42(In.)  
Critical Depth = 10.65(In.)  
Pipe flow velocity = 5.03(Ft/s)  
Travel time through pipe = 0.87 min.  
Time of concentration (TC) = 11.57 min.

++++  
Process from Point/Station 4.000 to Point/Station 4.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---



COMMERCIAL subarea type  
Runoff Coefficient = 0.845  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 11.57 min.  
Rainfall intensity = 1.518(In/Hr) for a 5.0 year storm  
Subarea runoff = 2.373(CFS) for 1.850(Ac.)  
Total runoff = 7.163(CFS) Total area = 5.350(Ac.)

++++  
Process from Point/Station 4.000 to Point/Station 5.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1529.400(Ft.)  
Downstream point/station elevation = 1525.700(Ft.)  
Pipe length = 757.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 7.163(CFS)  
Nearest computed pipe diameter = 18.00(In.)  
Calculated individual pipe flow = 7.163(CFS)  
Normal flow depth in pipe = 14.37(In.)  
Flow top width inside pipe = 14.45(In.)  
Critical Depth = 12.45(In.)  
Pipe flow velocity = 4.74(Ft/s)  
Travel time through pipe = 2.66 min.  
Time of concentration (TC) = 14.24 min.

++++  
Process from Point/Station 5.000 to Point/Station 5.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.843  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 14.24 min.  
Rainfall intensity = 1.371(In/Hr) for a 5.0 year storm  
Subarea runoff = 0.277(CFS) for 0.240(Ac.)  
Total runoff = 7.440(CFS) Total area = 5.590(Ac.)

++++  
Process from Point/Station 5.000 to Point/Station 6.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1525.700(Ft.)  
Downstream point/station elevation = 1525.100(Ft.)  
Pipe length = 107.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 7.440(CFS)  
Nearest computed pipe diameter = 18.00(In.)  
Calculated individual pipe flow = 7.440(CFS)  
Normal flow depth in pipe = 13.95(In.)  
Flow top width inside pipe = 15.04(In.)  
Critical Depth = 12.67(In.)

Pipe flow velocity = 5.06(Ft/s)  
Travel time through pipe = 0.35 min.  
Time of concentration (TC) = 14.59 min.

++++  
Process from Point/Station 6.000 to Point/Station 6.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.843  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 14.59 min.  
Rainfall intensity = 1.355(In/Hr) for a 5.0 year storm  
Subarea runoff = 3.563(CFS) for 3.120(Ac.)  
Total runoff = 11.003(CFS) Total area = 8.710(Ac.)

++++  
Process from Point/Station 6.000 to Point/Station 7.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1525.100(Ft.)  
Downstream point/station elevation = 1524.100(Ft.)  
Pipe length = 205.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 11.003(CFS)  
Nearest computed pipe diameter = 21.00(In.)  
Calculated individual pipe flow = 11.003(CFS)  
Normal flow depth in pipe = 17.11(In.)  
Flow top width inside pipe = 16.32(In.)  
Critical Depth = 14.85(In.)  
Pipe flow velocity = 5.25(Ft/s)  
Travel time through pipe = 0.65 min.  
Time of concentration (TC) = 15.24 min.

++++  
Process from Point/Station 7.000 to Point/Station 7.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.842  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 15.24 min.  
Rainfall intensity = 1.326(In/Hr) for a 5.0 year storm  
Subarea runoff = 1.988(CFS) for 1.780(Ac.)  
Total runoff = 12.991(CFS) Total area = 10.490(Ac.)

++++  
Process from Point/Station 7.000 to Point/Station 8.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1524.100(Ft.)  
Downstream point/station elevation = 1523.000(Ft.)  
Pipe length = 218.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 12.991(CFS)  
Nearest computed pipe diameter = 24.00(In.)  
Calculated individual pipe flow = 12.991(CFS)  
Normal flow depth in pipe = 16.36(In.)  
Flow top width inside pipe = 22.36(In.)  
Critical Depth = 15.56(In.)  
Pipe flow velocity = 5.69(Ft/s)  
Travel time through pipe = 0.64 min.  
Time of concentration (TC) = 15.88 min.

++++  
Process from Point/Station 8.000 to Point/Station 8.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:  
In Main Stream number: 1  
Stream flow area = 10.490(Ac.)  
Runoff from this stream = 12.991(CFS)  
Time of concentration = 15.88 min.  
Rainfall intensity = 1.300(In/Hr)  
Program is now starting with Main Stream No. 2

++++  
Process from Point/Station 11.000 to Point/Station 12.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 383.000(Ft.)  
Top (of initial area) elevation = 1538.600(Ft.)  
Bottom (of initial area) elevation = 1537.000(Ft.)  
Difference in elevation = 1.600(Ft.)  
Slope = 0.00418 s(percent) = 0.42  
TC =  $k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$   
Initial area time of concentration = 9.688 min.  
Rainfall intensity = 1.656(In/Hr) for a 5.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.847  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 2.469(CFS)  
Total initial stream area = 1.760(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 12.000 to Point/Station 13.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1532.000(Ft.)  
Downstream point/station elevation = 1528.200(Ft.)  
Pipe length = 477.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 2.469(CFS)  
Nearest computed pipe diameter = 12.00(In.)  
Calculated individual pipe flow = 2.469(CFS)  
Normal flow depth in pipe = 7.95(In.)

Flow top width inside pipe = 11.35(In.)  
Critical Depth = 8.07(In.)  
Pipe flow velocity = 4.47(Ft/s)  
Travel time through pipe = 1.78 min.  
Time of concentration (TC) = 11.46 min.

++++  
Process from Point/Station 13.000 to Point/Station 13.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.845  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 11.46 min.  
Rainfall intensity = 1.525(In/Hr) for a 5.0 year storm  
Subarea runoff = 1.366(CFS) for 1.060(Ac.)  
Total runoff = 3.835(CFS) Total area = 2.820(Ac.)

++++  
Process from Point/Station 13.000 to Point/Station 14.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1528.200(Ft.)  
Downstream point/station elevation = 1523.400(Ft.)  
Pipe length = 574.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 3.835(CFS)  
Nearest computed pipe diameter = 15.00(In.)  
Calculated individual pipe flow = 3.835(CFS)  
Normal flow depth in pipe = 8.80(In.)  
Flow top width inside pipe = 14.77(In.)  
Critical Depth = 9.50(In.)  
Pipe flow velocity = 5.12(Ft/s)  
Travel time through pipe = 1.87 min.  
Time of concentration (TC) = 13.33 min.

++++  
Process from Point/Station 14.000 to Point/Station 14.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.844  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 13.33 min.  
Rainfall intensity = 1.416(In/Hr) for a 5.0 year storm  
Subarea runoff = 4.158(CFS) for 3.480(Ac.)  
Total runoff = 7.992(CFS) Total area = 6.300(Ac.)

++++  
Process from Point/Station 14.000 to Point/Station 15.000

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

---

Upstream point/station elevation = 1523.400(Ft.)  
Downstream point/station elevation = 1523.200(Ft.)  
Pipe length = 44.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 7.992(CFS)  
Nearest computed pipe diameter = 21.00(In.)  
Calculated individual pipe flow = 7.992(CFS)  
Normal flow depth in pipe = 13.55(In.)  
Flow top width inside pipe = 20.10(In.)  
Critical Depth = 12.58(In.)  
Pipe flow velocity = 4.87(Ft/s)  
Travel time through pipe = 0.15 min.  
Time of concentration (TC) = 13.48 min.

+++++  
Process from Point/Station 15.000 to Point/Station 15.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.844  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 13.48 min.  
Rainfall intensity = 1.408(In/Hr) for a 5.0 year storm  
Subarea runoff = 2.091(CFS) for 1.760(Ac.)  
Total runoff = 10.083(CFS) Total area = 8.060(Ac.)

+++++  
Process from Point/Station 15.000 to Point/Station 8.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1523.200(Ft.)  
Downstream point/station elevation = 1523.000(Ft.)  
Pipe length = 42.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 10.083(CFS)  
Nearest computed pipe diameter = 21.00(In.)  
Calculated individual pipe flow = 10.083(CFS)  
Normal flow depth in pipe = 15.91(In.)  
Flow top width inside pipe = 17.99(In.)  
Critical Depth = 14.19(In.)  
Pipe flow velocity = 5.16(Ft/s)  
Travel time through pipe = 0.14 min.  
Time of concentration (TC) = 13.62 min.

+++++  
Process from Point/Station 8.000 to Point/Station 8.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:  
In Main Stream number: 2  
Stream flow area = 8.060(Ac.)  
Runoff from this stream = 10.083(CFS)  
Time of concentration = 13.62 min.  
Rainfall intensity = 1.401(In/Hr)  
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
------------	-----------------	----------	----------------------------

1	12.991	15.88	1.300
2	10.083	13.62	1.401

Largest stream flow has longer time of concentration

$Q_p = 12.991 + \text{sum of } Q_b \cdot I_a/I_b$   
 $10.083 * 0.928 = 9.353$   
 $Q_p = 22.344$

Total of 2 main streams to confluence:

Flow rates before confluence point:

12.991      10.083

Area of streams before confluence:

10.490      8.060

Results of confluence:

Total flow rate = 22.344 (CFS)

Time of concentration = 15.878 min.

Effective stream area after confluence = 18.550 (Ac.)

++++++  
 Process from Point/Station 8.000 to Point/Station 8.000  
 \*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

COMMERCIAL subarea type

Runoff Coefficient = 0.842

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 1) = 36.00

Pervious area fraction = 0.100; Impervious fraction = 0.900

Time of concentration = 15.88 min.

Rainfall intensity = 1.300 (In/Hr) for a 5.0 year storm

Subarea runoff = 1.182 (CFS) for 1.080 (Ac.)

Total runoff = 23.526 (CFS) Total area = 19.630 (Ac.)

End of computations, total study area = 19.63 (Ac.)

The following figures may

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

Area averaged pervious area fraction(Ap) = 0.100

Area averaged RI index number = 56.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963q10p.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
10 YEAR 1 HOUR STORM EVENT - PROPOSED CONDITION  
3963Q10P  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
10 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 10.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.780(In/Hr)  
Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 1.000 to Point/Station 2.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 383.000(Ft.)  
Top (of initial area) elevation = 1538.600(Ft.)  
Bottom (of initial area) elevation = 1537.000(Ft.)  
Difference in elevation = 1.600(Ft.)  
Slope = 0.00418 s(percent)= 0.42  
TC = k(0.300)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 9.688 min.  
Rainfall intensity = 1.906(In/Hr) for a 10.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.868  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900

Initial subarea runoff = 2.896(CFS)  
Total initial stream area = 1.750(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 2.000 to Point/Station 3.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1533.600(Ft.)  
Downstream point/station elevation = 1531.300(Ft.)  
Pipe length = 276.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 2.896(CFS)  
Nearest computed pipe diameter = 12.00(In.)  
Calculated individual pipe flow = 2.896(CFS)  
Normal flow depth in pipe = 8.82(In.)  
Flow top width inside pipe = 10.59(In.)  
Critical Depth = 8.76(In.)  
Pipe flow velocity = 4.68(Ft/s)  
Travel time through pipe = 0.98 min.  
Time of concentration (TC) = 10.67 min.

++++  
Process from Point/Station 3.000 to Point/Station 3.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.867  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 10.67 min.  
Rainfall intensity = 1.818(In/Hr) for a 10.0 year storm  
Subarea runoff = 2.759(CFS) for 1.750(Ac.)  
Total runoff = 5.654(CFS) Total area = 3.500(Ac.)

++++  
Process from Point/Station 3.000 to Point/Station 4.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1531.300(Ft.)  
Downstream point/station elevation = 1529.400(Ft.)  
Pipe length = 264.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 5.654(CFS)  
Nearest computed pipe diameter = 18.00(In.)  
Calculated individual pipe flow = 5.654(CFS)  
Normal flow depth in pipe = 10.41(In.)  
Flow top width inside pipe = 17.78(In.)  
Critical Depth = 11.01(In.)  
Pipe flow velocity = 5.34(Ft/s)  
Travel time through pipe = 0.82 min.  
Time of concentration (TC) = 11.49 min.

++++  
Process from Point/Station 4.000 to Point/Station 4.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---



COMMERCIAL subarea type  
Runoff Coefficient = 0.866  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 11.49 min.  
Rainfall intensity = 1.753(In/Hr) for a 10.0 year storm  
Subarea runoff = 2.809(CFS) for 1.850(Ac.)  
Total runoff = 8.464(CFS) Total area = 5.350(Ac.)

++++  
Process from Point/Station 4.000 to Point/Station 5.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1529.400(Ft.)  
Downstream point/station elevation = 1525.700(Ft.)  
Pipe length = 757.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 8.464(CFS)  
Nearest computed pipe diameter = 21.00(In.)  
Calculated individual pipe flow = 8.464(CFS)  
Normal flow depth in pipe = 13.75(In.)  
Flow top width inside pipe = 19.97(In.)  
Critical Depth = 12.96(In.)  
Pipe flow velocity = 5.07(Ft/s)  
Travel time through pipe = 2.49 min.  
Time of concentration (TC) = 13.98 min.

++++  
Process from Point/Station 5.000 to Point/Station 5.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.864  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 13.98 min.  
Rainfall intensity = 1.592(In/Hr) for a 10.0 year storm  
Subarea runoff = 0.330(CFS) for 0.240(Ac.)  
Total runoff = 8.794(CFS) Total area = 5.590(Ac.)

++++  
Process from Point/Station 5.000 to Point/Station 6.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1525.700(Ft.)  
Downstream point/station elevation = 1525.100(Ft.)  
Pipe length = 107.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 8.794(CFS)  
Nearest computed pipe diameter = 21.00(In.)  
Calculated individual pipe flow = 8.794(CFS)  
Normal flow depth in pipe = 13.45(In.)  
Flow top width inside pipe = 20.15(In.)  
Critical Depth = 13.22(In.)

Pipe flow velocity = 5.40(Ft/s)  
Travel time through pipe = 0.33 min.  
Time of concentration (TC) = 14.31 min.

++++  
Process from Point/Station 6.000 to Point/Station 6.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.864  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 14.31 min.  
Rainfall intensity = 1.574(In/Hr) for a 10.0 year storm  
Subarea runoff = 4.244(CFS) for 3.120(Ac.)  
Total runoff = 13.038(CFS) Total area = 8.710(Ac.)

++++  
Process from Point/Station 6.000 to Point/Station 7.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1525.100(Ft.)  
Downstream point/station elevation = 1524.100(Ft.)  
Pipe length = 205.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 13.038(CFS)  
Nearest computed pipe diameter = 24.00(In.)  
Calculated individual pipe flow = 13.038(CFS)  
Normal flow depth in pipe = 16.62(In.)  
Flow top width inside pipe = 22.15(In.)  
Critical Depth = 15.58(In.)  
Pipe flow velocity = 5.62(Ft/s)  
Travel time through pipe = 0.61 min.  
Time of concentration (TC) = 14.92 min.

++++  
Process from Point/Station 7.000 to Point/Station 7.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.864  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 14.92 min.  
Rainfall intensity = 1.543(In/Hr) for a 10.0 year storm  
Subarea runoff = 2.371(CFS) for 1.780(Ac.)  
Total runoff = 15.409(CFS) Total area = 10.490(Ac.)

++++  
Process from Point/Station 7.000 to Point/Station 8.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1524.100(Ft.)  
Downstream point/station elevation = 1523.000(Ft.)  
Pipe length = 218.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 15.409(CFS)  
Nearest computed pipe diameter = 24.00(In.)  
Calculated individual pipe flow = 15.409(CFS)  
Normal flow depth in pipe = 18.84(In.)  
Flow top width inside pipe = 19.71(In.)  
Critical Depth = 16.97(In.)  
Pipe flow velocity = 5.82(Ft/s)  
Travel time through pipe = 0.62 min.  
Time of concentration (TC) = 15.54 min.

++++  
Process from Point/Station 8.000 to Point/Station 8.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:  
In Main Stream number: 1  
Stream flow area = 10.490(Ac.)  
Runoff from this stream = 15.409(CFS)  
Time of concentration = 15.54 min.  
Rainfall intensity = 1.512(In/Hr)  
Program is now starting with Main Stream No. 2

++++  
Process from Point/Station 11.000 to Point/Station 12.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 383.000(Ft.)  
Top (of initial area) elevation = 1538.600(Ft.)  
Bottom (of initial area) elevation = 1537.000(Ft.)  
Difference in elevation = 1.600(Ft.)  
Slope = 0.00418 s(percent) = 0.42  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Initial area time of concentration = 9.688 min.  
Rainfall intensity = 1.906(In/Hr) for a 10.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.868  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 2.912(CFS)  
Total initial stream area = 1.760(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 12.000 to Point/Station 13.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1532.000(Ft.)  
Downstream point/station elevation = 1528.200(Ft.)  
Pipe length = 477.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 2.912(CFS)  
Nearest computed pipe diameter = 12.00(In.)  
Calculated individual pipe flow = 2.912(CFS)  
Normal flow depth in pipe = 9.04(In.)

Flow top width inside pipe = 10.35(In.)  
Critical Depth = 8.78(In.)  
Pipe flow velocity = 4.59(Ft/s)  
Travel time through pipe = 1.73 min.  
Time of concentration (TC) = 11.42 min.

++++  
Process from Point/Station 13.000 to Point/Station 13.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.866  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 11.42 min.  
Rainfall intensity = 1.759(In/Hr) for a 10.0 year storm  
Subarea runoff = 1.615(CFS) for 1.060(Ac.)  
Total runoff = 4.527(CFS) Total area = 2.820(Ac.)

++++  
Process from Point/Station 13.000 to Point/Station 14.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1528.200(Ft.)  
Downstream point/station elevation = 1523.400(Ft.)  
Pipe length = 574.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 4.527(CFS)  
Nearest computed pipe diameter = 15.00(In.)  
Calculated individual pipe flow = 4.527(CFS)  
Normal flow depth in pipe = 9.84(In.)  
Flow top width inside pipe = 14.25(In.)  
Critical Depth = 10.35(In.)  
Pipe flow velocity = 5.31(Ft/s)  
Travel time through pipe = 1.80 min.  
Time of concentration (TC) = 13.22 min.

++++  
Process from Point/Station 14.000 to Point/Station 14.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.865  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 13.22 min.  
Rainfall intensity = 1.637(In/Hr) for a 10.0 year storm  
Subarea runoff = 4.926(CFS) for 3.480(Ac.)  
Total runoff = 9.453(CFS) Total area = 6.300(Ac.)

++++  
Process from Point/Station 14.000 to Point/Station 15.000

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

---

Upstream point/station elevation = 1523.400(Ft.)  
Downstream point/station elevation = 1523.200(Ft.)  
Pipe length = 44.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 9.453(CFS)  
Nearest computed pipe diameter = 21.00(In.)  
Calculated individual pipe flow = 9.453(CFS)  
Normal flow depth in pipe = 15.35(In.)  
Flow top width inside pipe = 18.62(In.)  
Critical Depth = 13.73(In.)  
Pipe flow velocity = 5.01(Ft/s)  
Travel time through pipe = 0.15 min.  
Time of concentration (TC) = 13.37 min.

+++++  
Process from Point/Station 15.000 to Point/Station 15.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.865  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 13.37 min.  
Rainfall intensity = 1.628(In/Hr) for a 10.0 year storm  
Subarea runoff = 2.478(CFS) for 1.760(Ac.)  
Total runoff = 11.931(CFS) Total area = 8.060(Ac.)

+++++  
Process from Point/Station 15.000 to Point/Station 8.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1523.200(Ft.)  
Downstream point/station elevation = 1523.000(Ft.)  
Pipe length = 42.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 11.931(CFS)  
Nearest computed pipe diameter = 24.00(In.)  
Calculated individual pipe flow = 11.931(CFS)  
Normal flow depth in pipe = 15.70(In.)  
Flow top width inside pipe = 22.83(In.)  
Critical Depth = 14.89(In.)  
Pipe flow velocity = 5.47(Ft/s)  
Travel time through pipe = 0.13 min.  
Time of concentration (TC) = 13.50 min.

+++++  
Process from Point/Station 8.000 to Point/Station 8.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:  
In Main Stream number: 2  
Stream flow area = 8.060(Ac.)  
Runoff from this stream = 11.931(CFS)  
Time of concentration = 13.50 min.  
Rainfall intensity = 1.620(In/Hr)  
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
------------	-----------------	----------	----------------------------

1	15.409	15.54	1.512
2	11.931	13.50	1.620

Largest stream flow has longer time of concentration

$Q_p = 15.409 + \text{sum of } Q_b \cdot I_a/I_b$   
 $11.931 * 0.933 = 11.133$   
 $Q_p = 26.542$

Total of 2 main streams to confluence:

Flow rates before confluence point:

15.409      11.931

Area of streams before confluence:

10.490      8.060

Results of confluence:

Total flow rate = 26.542 (CFS)

Time of concentration = 15.544 min.

Effective stream area after confluence = 18.550 (Ac.)

++++++  
 Process from Point/Station 8.000 to Point/Station 8.000  
 \*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

COMMERCIAL subarea type

Runoff Coefficient = 0.863

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 2) = 56.00

Pervious area fraction = 0.100; Impervious fraction = 0.900

Time of concentration = 15.54 min.

Rainfall intensity = 1.512 (In/Hr) for a 10.0 year storm

Subarea runoff = 1.409 (CFS) for 1.080 (Ac.)

Total runoff = 27.951 (CFS) Total area = 19.630 (Ac.)

End of computations, total study area = 19.63 (Ac.)

The following figures may

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

Area averaged pervious area fraction(Ap) = 0.100

Area averaged RI index number = 56.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963q100p.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR 1 HOUR STORM EVENT - PROPOSED CONDITION  
3963Q100P  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
10 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0  
Calculated rainfall intensity data:  
1 hour intensity = 1.120(In/Hr)  
Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 1.000 to Point/Station 2.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 383.000(Ft.)  
Top (of initial area) elevation = 1538.600(Ft.)  
Bottom (of initial area) elevation = 1537.000(Ft.)  
Difference in elevation = 1.600(Ft.)  
Slope = 0.00418 s(percent)= 0.42  
TC = k(0.300)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 9.688 min.  
Rainfall intensity = 2.737(In/Hr) for a 100.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.875  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900

Initial subarea runoff = 4.191(CFS)  
Total initial stream area = 1.750(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 2.000 to Point/Station 3.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1533.600(Ft.)  
Downstream point/station elevation = 1531.300(Ft.)  
Pipe length = 276.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 4.191(CFS)  
Nearest computed pipe diameter = 15.00(In.)  
Calculated individual pipe flow = 4.191(CFS)  
Normal flow depth in pipe = 9.34(In.)  
Flow top width inside pipe = 14.54(In.)  
Critical Depth = 9.95(In.)  
Pipe flow velocity = 5.22(Ft/s)  
Travel time through pipe = 0.88 min.  
Time of concentration (TC) = 10.57 min.

++++  
Process from Point/Station 3.000 to Point/Station 3.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.874  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 10.57 min.  
Rainfall intensity = 2.623(In/Hr) for a 100.0 year storm  
Subarea runoff = 4.013(CFS) for 1.750(Ac.)  
Total runoff = 8.204(CFS) Total area = 3.500(Ac.)

++++  
Process from Point/Station 3.000 to Point/Station 4.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1531.300(Ft.)  
Downstream point/station elevation = 1529.400(Ft.)  
Pipe length = 264.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 8.204(CFS)  
Nearest computed pipe diameter = 18.00(In.)  
Calculated individual pipe flow = 8.204(CFS)  
Normal flow depth in pipe = 13.62(In.)  
Flow top width inside pipe = 15.45(In.)  
Critical Depth = 13.32(In.)  
Pipe flow velocity = 5.72(Ft/s)  
Travel time through pipe = 0.77 min.  
Time of concentration (TC) = 11.34 min.

++++  
Process from Point/Station 4.000 to Point/Station 4.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---



COMMERCIAL subarea type  
Runoff Coefficient = 0.874  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 11.34 min.  
Rainfall intensity = 2.534(In/Hr) for a 100.0 year storm  
Subarea runoff = 4.095(CFS) for 1.850(Ac.)  
Total runoff = 12.299(CFS) Total area = 5.350(Ac.)

++++  
Process from Point/Station 4.000 to Point/Station 5.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1529.400(Ft.)  
Downstream point/station elevation = 1525.700(Ft.)  
Pipe length = 757.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 12.299(CFS)  
Nearest computed pipe diameter = 24.00(In.)  
Calculated individual pipe flow = 12.299(CFS)  
Normal flow depth in pipe = 15.91(In.)  
Flow top width inside pipe = 22.69(In.)  
Critical Depth = 15.13(In.)  
Pipe flow velocity = 5.56(Ft/s)  
Travel time through pipe = 2.27 min.  
Time of concentration (TC) = 13.61 min.

++++  
Process from Point/Station 5.000 to Point/Station 5.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.872  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 13.61 min.  
Rainfall intensity = 2.317(In/Hr) for a 100.0 year storm  
Subarea runoff = 0.485(CFS) for 0.240(Ac.)  
Total runoff = 12.784(CFS) Total area = 5.590(Ac.)

++++  
Process from Point/Station 5.000 to Point/Station 6.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1525.700(Ft.)  
Downstream point/station elevation = 1525.100(Ft.)  
Pipe length = 107.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 12.784(CFS)  
Nearest computed pipe diameter = 24.00(In.)  
Calculated individual pipe flow = 12.784(CFS)  
Normal flow depth in pipe = 15.57(In.)  
Flow top width inside pipe = 22.91(In.)  
Critical Depth = 15.43(In.)

Pipe flow velocity = 5.92(Ft/s)  
Travel time through pipe = 0.30 min.  
Time of concentration (TC) = 13.91 min.

++++  
Process from Point/Station 6.000 to Point/Station 6.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.872  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 13.91 min.  
Rainfall intensity = 2.293(In/Hr) for a 100.0 year storm  
Subarea runoff = 6.236(CFS) for 3.120(Ac.)  
Total runoff = 19.020(CFS) Total area = 8.710(Ac.)

++++  
Process from Point/Station 6.000 to Point/Station 7.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1525.100(Ft.)  
Downstream point/station elevation = 1524.100(Ft.)  
Pipe length = 205.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 19.020(CFS)  
Nearest computed pipe diameter = 27.00(In.)  
Calculated individual pipe flow = 19.020(CFS)  
Normal flow depth in pipe = 19.64(In.)  
Flow top width inside pipe = 24.05(In.)  
Critical Depth = 18.29(In.)  
Pipe flow velocity = 6.14(Ft/s)  
Travel time through pipe = 0.56 min.  
Time of concentration (TC) = 14.46 min.

++++  
Process from Point/Station 7.000 to Point/Station 7.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.871  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 14.46 min.  
Rainfall intensity = 2.249(In/Hr) for a 100.0 year storm  
Subarea runoff = 3.488(CFS) for 1.780(Ac.)  
Total runoff = 22.508(CFS) Total area = 10.490(Ac.)

++++  
Process from Point/Station 7.000 to Point/Station 8.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1524.100(Ft.)  
Downstream point/station elevation = 1523.000(Ft.)  
Pipe length = 218.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 22.508(CFS)  
Nearest computed pipe diameter = 27.00(In.)  
Calculated individual pipe flow = 22.508(CFS)  
Normal flow depth in pipe = 22.73(In.)  
Flow top width inside pipe = 19.70(In.)  
Critical Depth = 19.93(In.)  
Pipe flow velocity = 6.30(Ft/s)  
Travel time through pipe = 0.58 min.  
Time of concentration (TC) = 15.04 min.

++++  
Process from Point/Station 8.000 to Point/Station 8.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:  
In Main Stream number: 1  
Stream flow area = 10.490(Ac.)  
Runoff from this stream = 22.508(CFS)  
Time of concentration = 15.04 min.  
Rainfall intensity = 2.206(In/Hr)  
Program is now starting with Main Stream No. 2

++++  
Process from Point/Station 11.000 to Point/Station 12.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 383.000(Ft.)  
Top (of initial area) elevation = 1538.600(Ft.)  
Bottom (of initial area) elevation = 1537.000(Ft.)  
Difference in elevation = 1.600(Ft.)  
Slope = 0.00418 s(percent) = 0.42  
TC =  $k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$   
Initial area time of concentration = 9.688 min.  
Rainfall intensity = 2.737(In/Hr) for a 100.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.875  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 4.215(CFS)  
Total initial stream area = 1.760(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 12.000 to Point/Station 13.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1532.000(Ft.)  
Downstream point/station elevation = 1528.200(Ft.)  
Pipe length = 477.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 4.215(CFS)  
Nearest computed pipe diameter = 15.00(In.)  
Calculated individual pipe flow = 4.215(CFS)  
Normal flow depth in pipe = 9.53(In.)

Flow top width inside pipe = 14.44(In.)  
Critical Depth = 9.97(In.)  
Pipe flow velocity = 5.13(Ft/s)  
Travel time through pipe = 1.55 min.  
Time of concentration (TC) = 11.24 min.

++++  
Process from Point/Station 13.000 to Point/Station 13.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.874  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 11.24 min.  
Rainfall intensity = 2.545(In/Hr) for a 100.0 year storm  
Subarea runoff = 2.357(CFS) for 1.060(Ac.)  
Total runoff = 6.572(CFS) Total area = 2.820(Ac.)

++++  
Process from Point/Station 13.000 to Point/Station 14.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1528.200(Ft.)  
Downstream point/station elevation = 1523.400(Ft.)  
Pipe length = 574.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 6.572(CFS)  
Nearest computed pipe diameter = 18.00(In.)  
Calculated individual pipe flow = 6.572(CFS)  
Normal flow depth in pipe = 10.93(In.)  
Flow top width inside pipe = 17.58(In.)  
Critical Depth = 11.90(In.)  
Pipe flow velocity = 5.85(Ft/s)  
Travel time through pipe = 1.63 min.  
Time of concentration (TC) = 12.87 min.

++++  
Process from Point/Station 14.000 to Point/Station 14.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.873  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 12.87 min.  
Rainfall intensity = 2.381(In/Hr) for a 100.0 year storm  
Subarea runoff = 7.230(CFS) for 3.480(Ac.)  
Total runoff = 13.802(CFS) Total area = 6.300(Ac.)

++++  
Process from Point/Station 14.000 to Point/Station 15.000

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

---

Upstream point/station elevation = 1523.400(Ft.)  
Downstream point/station elevation = 1523.200(Ft.)  
Pipe length = 44.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 13.802(CFS)  
Nearest computed pipe diameter = 24.00(In.)  
Calculated individual pipe flow = 13.802(CFS)  
Normal flow depth in pipe = 17.88(In.)  
Flow top width inside pipe = 20.92(In.)  
Critical Depth = 16.05(In.)  
Pipe flow velocity = 5.50(Ft/s)  
Travel time through pipe = 0.13 min.  
Time of concentration (TC) = 13.00 min.

+++++  
Process from Point/Station 15.000 to Point/Station 15.000  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

COMMERCIAL subarea type  
Runoff Coefficient = 0.872  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Time of concentration = 13.00 min.  
Rainfall intensity = 2.369(In/Hr) for a 100.0 year storm  
Subarea runoff = 3.638(CFS) for 1.760(Ac.)  
Total runoff = 17.440(CFS) Total area = 8.060(Ac.)

+++++  
Process from Point/Station 15.000 to Point/Station 8.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1523.200(Ft.)  
Downstream point/station elevation = 1523.000(Ft.)  
Pipe length = 42.00(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 17.440(CFS)  
Nearest computed pipe diameter = 27.00(In.)  
Calculated individual pipe flow = 17.440(CFS)  
Normal flow depth in pipe = 18.54(In.)  
Flow top width inside pipe = 25.05(In.)  
Critical Depth = 17.51(In.)  
Pipe flow velocity = 5.99(Ft/s)  
Travel time through pipe = 0.12 min.  
Time of concentration (TC) = 13.12 min.

+++++  
Process from Point/Station 8.000 to Point/Station 8.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:  
In Main Stream number: 2  
Stream flow area = 8.060(Ac.)  
Runoff from this stream = 17.440(CFS)  
Time of concentration = 13.12 min.  
Rainfall intensity = 2.359(In/Hr)  
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
------------	-----------------	----------	----------------------------

1	22.508	15.04	2.206
2	17.440	13.12	2.359

Largest stream flow has longer time of concentration

$Q_p = 22.508 + \text{sum of } Q_b \cdot I_a/I_b$   
 $17.440 * 0.935 = 16.312$   
 $Q_p = 38.821$

Total of 2 main streams to confluence:

Flow rates before confluence point:

22.508      17.440

Area of streams before confluence:

10.490      8.060

Results of confluence:

Total flow rate = 38.821(CFS)

Time of concentration = 15.040 min.

Effective stream area after confluence = 18.550 (Ac.)

++++++  
 Process from Point/Station 8.000 to Point/Station 8.000  
 \*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

COMMERCIAL subarea type

Runoff Coefficient = 0.871

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 2) = 56.00

Pervious area fraction = 0.100; Impervious fraction = 0.900

Time of concentration = 15.04 min.

Rainfall intensity = 2.206(In/Hr) for a 100.0 year storm

Subarea runoff = 2.075(CFS) for 1.080(Ac.)

Total runoff = 40.896(CFS) Total area = 19.630(Ac.)

End of computations, total study area = 19.63 (Ac.)

The following figures may

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

Area averaged pervious area fraction(Ap) = 0.100

Area averaged RI index number = 56.0

**OFFSITE RATIONAL METHOD  
CALCULATIONS - EXIST. TRIBUTARY  
AREAS**

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 09/07/22

File:3963q10exoff.out

-----  
BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
10 YEAR STORM EVENT - EXISTING OFFSITE "H" WATERSHED  
3963Q10EXOFF

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

English (in-lb) Units used in input data file

-----  
Program License Serial Number 6145

-----  
Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)

For the [ Perris Valley ] area used.

10 year storm 10 minute intensity = 1.880(In/Hr)

10 year storm 60 minute intensity = 0.780(In/Hr)

100 year storm 10 minute intensity = 2.690(In/Hr)

100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.780(In/Hr)

Slope of intensity duration curve = 0.4900

++++  
Process from Point/Station 1.000 to Point/Station 2.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 1000.000(Ft.)

Top (of initial area) elevation = 1980.000(Ft.)



Bottom (of initial area) elevation = 1882.000(Ft.)  
 Difference in elevation = 98.000(Ft.)  
 Slope = 0.09800 s(percent)= 9.80  
 $TC = k(0.530)*[(length^3)/(elevation\ change)]^{0.2}$   
 Initial area time of concentration = 13.367 min.  
 Rainfall intensity = 1.628(In/Hr) for a 10.0 year storm  
 UNDEVELOPED (poor cover) subarea  
 Runoff Coefficient = 0.794  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 1.000  
 Decimal fraction soil group D = 0.000  
 RI index for soil(AMC 2) = 86.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Initial subarea runoff = 9.049(CFS)  
 Total initial stream area = 7.000(Ac.)  
 Pervious area fraction = 1.000

++++++  
 Process from Point/Station 2.000 to Point/Station 3.000  
 \*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1882.000(Ft.)  
 End of natural channel elevation = 1740.000(Ft.)  
 Length of natural channel = 1130.000(Ft.)  
 Estimated mean flow rate at midpoint of channel = 21.977(CFS)

Natural valley channel type used  
 L.A. County flood control district formula for channel velocity:  
 $Velocity(ft/s) = (7 + 8(q(English\ Units)^{.352})(slope^{0.5}))$   
 Velocity using mean channel flow = 10.56(Ft/s)

Correction to map slope used on extremely rugged channels with  
 drops and waterfalls (Plate D-6.2)  
 Normal channel slope = 0.1257  
 Corrected/adjusted channel slope = 0.1180  
 Travel time = 1.78 min. TC = 15.15 min.

Adding area flow to channel  
 UNDEVELOPED (poor cover) subarea  
 Runoff Coefficient = 0.788  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 1.000  
 Decimal fraction soil group D = 0.000  
 RI index for soil(AMC 2) = 86.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Rainfall intensity = 1.531(In/Hr) for a 10.0 year storm

Subarea runoff = 24.136(CFS) for 20.000(Ac.)  
Total runoff = 33.186(CFS) Total area = 27.000(Ac.)

++++  
Process from Point/Station 3.000 to Point/Station 4.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1740.000(Ft.)  
End of natural channel elevation = 1640.000(Ft.)  
Length of natural channel = 890.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 51.007(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 12.83(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.1124  
Corrected/adjusted channel slope = 0.1087  
Travel time = 1.16 min. TC = 16.31 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.785  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 86.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.477(In/Hr) for a 10.0 year storm  
Subarea runoff = 33.606(CFS) for 29.000(Ac.)  
Total runoff = 66.791(CFS) Total area = 56.000(Ac.)

++++  
Process from Point/Station 4.000 to Point/Station 5.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1640.000(Ft.)  
End of natural channel elevation = 1568.000(Ft.)  
Length of natural channel = 1810.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 88.856(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:

Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)  
Velocity using mean channel flow = 9.14(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0398  
Corrected/adjusted channel slope = 0.0398  
Travel time = 3.30 min. TC = 19.61 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.704

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 2) = 78.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 1.349(In/Hr) for a 10.0 year storm

Subarea runoff = 35.137(CFS) for 37.000(Ac.)

Total runoff = 101.929(CFS) Total area = 93.000(Ac.)

++++  
Process from Point/Station 5.000 to Point/Station 6.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1568.000(Ft.)  
End of natural channel elevation = 1543.000(Ft.)  
Length of natural channel = 680.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 105.217(CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)

Velocity using mean channel flow = 9.24(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0368  
Corrected/adjusted channel slope = 0.0368  
Travel time = 1.23 min. TC = 20.83 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.699

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.310(In/Hr) for a 10.0 year storm  
Subarea runoff = 5.495(CFS) for 6.000(Ac.)  
Total runoff = 107.423(CFS) Total area = 99.000(Ac.)

++++  
Process from Point/Station 6.000 to Point/Station 7.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1543.000(Ft.)  
End of natural channel elevation = 1524.000(Ft.)  
Length of natural channel = 660.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 110.136(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)  
Velocity using mean channel flow = 8.29(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0288  
Corrected/adjusted channel slope = 0.0288  
Travel time = 1.33 min. TC = 22.16 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.694  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.271(In/Hr) for a 10.0 year storm  
Subarea runoff = 4.412(CFS) for 5.000(Ac.)  
Total runoff = 111.836(CFS) Total area = 104.000(Ac.)  
End of computations, total study area = 104.00 (Ac.)  
The following figures may  
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000  
Area averaged RI index number = 82.3

Riverside County Rational Hydrology Program

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

Rational Hydrology Study

Date: 09/07/22

File:3963q10exoff2.out

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BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
10 YEAR STORM EVENT -EXISTING OFFSITE "J" WATERSHED  
3963Q10EXOFF2

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

English (in-lb) Units used in input data file

-----  
Program License Serial Number 6145

-----  
Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)

For the [ Perris Valley ] area used.

10 year storm 10 minute intensity = 1.880(In/Hr)

10 year storm 60 minute intensity = 0.780(In/Hr)

100 year storm 10 minute intensity = 2.690(In/Hr)

100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.780(In/Hr)

Slope of intensity duration curve = 0.4900

++++  
Process from Point/Station 21.000 to Point/Station 22.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 710.000(Ft.)

Top (of initial area) elevation = 1920.000(Ft.)

Bottom (of initial area) elevation = 1860.000(Ft.)  
 Difference in elevation = 60.000(Ft.)  
 Slope = 0.08451 s(percent)= 8.45  
 $TC = k(0.530)*[(length^3)/(elevation\ change)]^{0.2}$   
 Initial area time of concentration = 12.006 min.  
 Rainfall intensity = 1.716(In/Hr) for a 10.0 year storm  
 UNDEVELOPED (poor cover) subarea  
 Runoff Coefficient = 0.799  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 1.000  
 Decimal fraction soil group D = 0.000  
 RI index for soil(AMC 2) = 86.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Initial subarea runoff = 13.709(CFS)  
 Total initial stream area = 10.000(Ac.)  
 Pervious area fraction = 1.000

++++++  
 Process from Point/Station 22.000 to Point/Station 23.000  
 \*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1860.000(Ft.)  
 End of natural channel elevation = 1710.000(Ft.)  
 Length of natural channel = 1095.000(Ft.)  
 Estimated mean flow rate at midpoint of channel = 27.417(CFS)

Natural valley channel type used  
 L.A. County flood control district formula for channel velocity:  
 $Velocity(ft/s) = (7 + 8(q(English\ Units)^{.352})(slope^{0.5}))$   
 Velocity using mean channel flow = 11.59(Ft/s)

Correction to map slope used on extremely rugged channels with  
 drops and waterfalls (Plate D-6.2)  
 Normal channel slope = 0.1370  
 Corrected/adjusted channel slope = 0.1259  
 Travel time = 1.57 min. TC = 13.58 min.

Adding area flow to channel  
 UNDEVELOPED (poor cover) subarea  
 Runoff Coefficient = 0.793  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 1.000  
 Decimal fraction soil group D = 0.000  
 RI index for soil(AMC 2) = 86.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Rainfall intensity = 1.615(In/Hr) for a 10.0 year storm

Subarea runoff = 25.631(CFS) for 20.000(Ac.)  
Total runoff = 39.340(CFS) Total area = 30.000(Ac.)

++++  
Process from Point/Station 23.000 to Point/Station 24.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1710.000(Ft.)  
End of natural channel elevation = 1596.000(Ft.)  
Length of natural channel = 1650.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 60.977(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 10.78(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0691  
Corrected/adjusted channel slope = 0.0691  
Travel time = 2.55 min. TC = 16.13 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.718  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.485(In/Hr) for a 10.0 year storm  
Subarea runoff = 35.181(CFS) for 33.000(Ac.)  
Total runoff = 74.521(CFS) Total area = 63.000(Ac.)

++++  
Process from Point/Station 24.000 to Point/Station 25.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1596.000(Ft.)  
End of natural channel elevation = 1560.000(Ft.)  
Length of natural channel = 565.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 76.887(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:

Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)  
Velocity using mean channel flow = 11.08(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0637  
Corrected/adjusted channel slope = 0.0637  
Travel time = 0.85 min. TC = 16.98 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.714

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 2) = 78.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 1.448(In/Hr) for a 10.0 year storm

Subarea runoff = 4.137(CFS) for 4.000(Ac.)

Total runoff = 78.658(CFS) Total area = 67.000(Ac.)

++++  
Process from Point/Station 25.000 to Point/Station 26.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1560.000(Ft.)  
End of natural channel elevation = 1528.000(Ft.)  
Length of natural channel = 665.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 86.289(CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)

Velocity using mean channel flow = 9.96(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0481  
Corrected/adjusted channel slope = 0.0481  
Travel time = 1.11 min. TC = 18.10 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.710

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000



Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.403(In/Hr) for a 10.0 year storm  
Subarea runoff = 12.950(CFS) for 13.000(Ac.)  
Total runoff = 91.608(CFS) Total area = 80.000(Ac.)

++++  
Process from Point/Station 26.000 to Point/Station 27.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1528.000(Ft.)  
End of natural channel elevation = 1508.000(Ft.)  
Length of natural channel = 950.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 107.639(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 7.04(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0211  
Corrected/adjusted channel slope = 0.0211  
Travel time = 2.25 min. TC = 20.34 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.701  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.325(In/Hr) for a 10.0 year storm  
Subarea runoff = 26.011(CFS) for 28.000(Ac.)  
Total runoff = 117.619(CFS) Total area = 108.000(Ac.)  
End of computations, total study area = 108.00 (Ac.)  
The following figures may  
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction( $A_p$ ) = 1.000  
Area averaged RI index number = 80.2

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 09/07/22

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BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
10 YEAR STORM EVENT - EXISTING OFFSITE "K" WATERSHED  
3963Q10EX0FF3

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

English (in-lb) Units used in input data file

-----  
Program License Serial Number 6145

-----  
Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)

For the [ Perris Valley ] area used.

10 year storm 10 minute intensity = 1.880(In/Hr)

10 year storm 60 minute intensity = 0.780(In/Hr)

100 year storm 10 minute intensity = 2.690(In/Hr)

100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.780(In/Hr)

Slope of intensity duration curve = 0.4900

++++  
Process from Point/Station 31.000 to Point/Station 32.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 720.000(Ft.)

Top (of initial area) elevation = 1585.000(Ft.)

Bottom (of initial area) elevation = 1551.000(Ft.)  
 Difference in elevation = 34.000(Ft.)  
 Slope = 0.04722 s(percent)= 4.72  
 $TC = k(0.530)*[(length^3)/(elevation\ change)]^{0.2}$   
 Initial area time of concentration = 13.564 min.  
 Rainfall intensity = 1.616(In/Hr) for a 10.0 year storm  
 UNDEVELOPED (poor cover) subarea  
 Runoff Coefficient = 0.730  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 1.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 0.000  
 RI index for soil(AMC 2) = 78.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Initial subarea runoff = 14.161(CFS)  
 Total initial stream area = 12.000(Ac.)  
 Pervious area fraction = 1.000

++++++  
 Process from Point/Station 32.000 to Point/Station 33.000  
 \*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1551.000(Ft.)  
 End of natural channel elevation = 1530.000(Ft.)  
 Length of natural channel = 676.000(Ft.)  
 Estimated mean flow rate at midpoint of channel = 21.242(CFS)

Natural valley channel type used  
 L.A. County flood control district formula for channel velocity:  
 $Velocity(ft/s) = (7 + 8(q(English\ Units)^{.352})(slope^{0.5}))$   
 Velocity using mean channel flow = 5.37(Ft/s)

Correction to map slope used on extremely rugged channels with  
 drops and waterfalls (Plate D-6.2)  
 Normal channel slope = 0.0311  
 Corrected/adjusted channel slope = 0.0311  
 Travel time = 2.10 min. TC = 15.66 min.

Adding area flow to channel  
 UNDEVELOPED (poor cover) subarea  
 Runoff Coefficient = 0.720  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 1.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 0.000  
 RI index for soil(AMC 2) = 78.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Rainfall intensity = 1.506(In/Hr) for a 10.0 year storm

Subarea runoff = 13.018(CFS) for 12.000(Ac.)  
Total runoff = 27.179(CFS) Total area = 24.000(Ac.)

++++  
Process from Point/Station 33.000 to Point/Station 34.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1530.000(Ft.)  
End of natural channel elevation = 1512.000(Ft.)  
Length of natural channel = 476.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 29.444(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 6.48(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0378  
Corrected/adjusted channel slope = 0.0378  
Travel time = 1.22 min. TC = 16.89 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.715  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.452(In/Hr) for a 10.0 year storm  
Subarea runoff = 4.151(CFS) for 4.000(Ac.)  
Total runoff = 31.330(CFS) Total area = 28.000(Ac.)

++++  
Process from Point/Station 34.000 to Point/Station 35.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1512.000(Ft.)  
End of natural channel elevation = 1490.000(Ft.)  
Length of natural channel = 1380.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 48.114(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:

Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 4.83(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0159

Corrected/adjusted channel slope = 0.0159

Travel time = 4.76 min. TC = 21.65 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.696

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 2) = 78.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 1.285(In/Hr) for a 10.0 year storm

Subarea runoff = 26.851(CFS) for 30.000(Ac.)

Total runoff = 58.181(CFS) Total area = 58.000(Ac.)

End of computations, total study area = 58.00 (Ac.)

The following figures may

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

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

Area averaged RI index number = 78.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 09/07/22

File:3963Q100EXOFF.out

-----  
BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - EXISTING OFFSITE "H" WATERSHED  
3963Q100EXOFF

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

English (in-lb) Units used in input data file

-----  
Program License Serial Number 6145

-----  
Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
10 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0  
Calculated rainfall intensity data:  
1 hour intensity = 1.120(In/Hr)  
Slope of intensity duration curve = 0.4900

++++  
Process from Point/Station 1.000 to Point/Station 2.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 1000.000(Ft.)  
Top (of initial area) elevation = 1980.000(Ft.)

Bottom (of initial area) elevation = 1882.000(Ft.)  
 Difference in elevation = 98.000(Ft.)  
 Slope = 0.09800 s(percent)= 9.80  
 $TC = k(0.530)*[(length^3)/(elevation\ change)]^{0.2}$   
 Initial area time of concentration = 13.367 min.  
 Rainfall intensity = 2.338(In/Hr) for a 100.0 year storm  
 UNDEVELOPED (poor cover) subarea  
 Runoff Coefficient = 0.824  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 1.000  
 Decimal fraction soil group D = 0.000  
 RI index for soil(AMC 2) = 86.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Initial subarea runoff = 13.475(CFS)  
 Total initial stream area = 7.000(Ac.)  
 Pervious area fraction = 1.000

++++++  
 Process from Point/Station 2.000 to Point/Station 3.000  
 \*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1882.000(Ft.)  
 End of natural channel elevation = 1740.000(Ft.)  
 Length of natural channel = 1130.000(Ft.)  
 Estimated mean flow rate at midpoint of channel = 32.725(CFS)

Natural valley channel type used  
 L.A. County flood control district formula for channel velocity:  
 $Velocity(ft/s) = (7 + 8(q(English\ Units)^{.352})(slope^{0.5}))$   
 Velocity using mean channel flow = 11.78(Ft/s)

Correction to map slope used on extremely rugged channels with  
 drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.1257  
 Corrected/adjusted channel slope = 0.1180  
 Travel time = 1.60 min. TC = 14.97 min.

Adding area flow to channel  
 UNDEVELOPED (poor cover) subarea  
 Runoff Coefficient = 0.820  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 1.000  
 Decimal fraction soil group D = 0.000  
 RI index for soil(AMC 2) = 86.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Rainfall intensity = 2.212(In/Hr) for a 100.0 year storm

Subarea runoff = 36.253(CFS) for 20.000(Ac.)  
Total runoff = 49.728(CFS) Total area = 27.000(Ac.)

++++  
Process from Point/Station 3.000 to Point/Station 4.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1740.000(Ft.)  
End of natural channel elevation = 1640.000(Ft.)  
Length of natural channel = 890.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 76.433(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 14.44(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.1124  
Corrected/adjusted channel slope = 0.1087  
Travel time = 1.03 min. TC = 15.99 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.817  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 86.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 2.141(In/Hr) for a 100.0 year storm  
Subarea runoff = 50.734(CFS) for 29.000(Ac.)  
Total runoff = 100.462(CFS) Total area = 56.000(Ac.)

++++  
Process from Point/Station 4.000 to Point/Station 5.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1640.000(Ft.)  
End of natural channel elevation = 1568.000(Ft.)  
Length of natural channel = 1810.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 133.650(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:



Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)  
Velocity using mean channel flow = 10.33(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0398  
Corrected/adjusted channel slope = 0.0398  
Travel time = 2.92 min. TC = 18.91 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.756  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.972(In/Hr) for a 100.0 year storm  
Subarea runoff = 55.152(CFS) for 37.000(Ac.)  
Total runoff = 155.614(CFS) Total area = 93.000(Ac.)

++++  
Process from Point/Station 5.000 to Point/Station 6.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1568.000(Ft.)  
End of natural channel elevation = 1543.000(Ft.)  
Length of natural channel = 680.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 160.634(CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)  
Velocity using mean channel flow = 10.51(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0368  
Corrected/adjusted channel slope = 0.0368  
Travel time = 1.08 min. TC = 19.99 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.753  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.919(In/Hr) for a 100.0 year storm  
Subarea runoff = 8.666(CFS) for 6.000(Ac.)  
Total runoff = 164.279(CFS) Total area = 99.000(Ac.)

++++  
Process from Point/Station 6.000 to Point/Station 7.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1543.000(Ft.)  
End of natural channel elevation = 1524.000(Ft.)  
Length of natural channel = 660.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 168.428(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)  
Velocity using mean channel flow = 9.44(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0288  
Corrected/adjusted channel slope = 0.0288  
Travel time = 1.17 min. TC = 21.16 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.749  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.867(In/Hr) for a 100.0 year storm  
Subarea runoff = 6.991(CFS) for 5.000(Ac.)  
Total runoff = 171.271(CFS) Total area = 104.000(Ac.)  
End of computations, total study area = 104.00 (Ac.)  
The following figures may be used for a unit hydrograph study of the same area.  
Approx. 4 AC is removed generating 4.2 cfs

Area averaged pervious area fraction(Ap) = 1.000  
Area averaged RI index number = 82.3

Tributary Flow to the Water and Harvill  
SWC Intersection after Development:  
= 171.3 - 4.2 = 167.1 cfs

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 09/07/22

File:3963q100exoff2.out

-----  
BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT -EXISTING OFFSITE "J" WATERSHED  
3963Q100EXOFF2

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

English (in-lb) Units used in input data file

-----  
Program License Serial Number 6145

-----  
Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)

For the [ Perris Valley ] area used.

10 year storm 10 minute intensity = 1.880(In/Hr)

10 year storm 60 minute intensity = 0.780(In/Hr)

100 year storm 10 minute intensity = 2.690(In/Hr)

100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.120(In/Hr)

Slope of intensity duration curve = 0.4900

++++  
Process from Point/Station 21.000 to Point/Station 22.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 710.000(Ft.)

Top (of initial area) elevation = 1920.000(Ft.)

Bottom (of initial area) elevation = 1860.000(Ft.)  
 Difference in elevation = 60.000(Ft.)  
 Slope = 0.08451 s(percent)= 8.45  
 $TC = k(0.530)*[(length^3)/(elevation\ change)]^{0.2}$   
 Initial area time of concentration = 12.006 min.  
 Rainfall intensity = 2.464(In/Hr) for a 100.0 year storm  
 UNDEVELOPED (poor cover) subarea  
 Runoff Coefficient = 0.827  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 1.000  
 Decimal fraction soil group D = 0.000  
 RI index for soil(AMC 2) = 86.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Initial subarea runoff = 20.379(CFS)  
 Total initial stream area = 10.000(Ac.)  
 Pervious area fraction = 1.000

++++++  
 Process from Point/Station 22.000 to Point/Station 23.000  
 \*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1860.000(Ft.)  
 End of natural channel elevation = 1710.000(Ft.)  
 Length of natural channel = 1095.000(Ft.)  
 Estimated mean flow rate at midpoint of channel = 40.758(CFS)

Natural valley channel type used  
 L.A. County flood control district formula for channel velocity:  
 $Velocity(ft/s) = (7 + 8(q(English\ Units)^{.352})(slope^{0.5}))$   
 Velocity using mean channel flow = 12.95(Ft/s)

Correction to map slope used on extremely rugged channels with  
 drops and waterfalls (Plate D-6.2)  
 Normal channel slope = 0.1370  
 Corrected/adjusted channel slope = 0.1259  
 Travel time = 1.41 min. TC = 13.42 min.

Adding area flow to channel  
 UNDEVELOPED (poor cover) subarea  
 Runoff Coefficient = 0.823  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 1.000  
 Decimal fraction soil group D = 0.000  
 RI index for soil(AMC 2) = 86.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Rainfall intensity = 2.333(In/Hr) for a 100.0 year storm

Subarea runoff = 38.427(CFS) for 20.000(Ac.)  
Total runoff = 58.806(CFS) Total area = 30.000(Ac.)

++++  
Process from Point/Station 23.000 to Point/Station 24.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1710.000(Ft.)  
End of natural channel elevation = 1596.000(Ft.)  
Length of natural channel = 1650.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 91.149(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 12.14(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0691  
Corrected/adjusted channel slope = 0.0691  
Travel time = 2.27 min. TC = 15.68 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.767  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 2.162(In/Hr) for a 100.0 year storm  
Subarea runoff = 54.686(CFS) for 33.000(Ac.)  
Total runoff = 113.491(CFS) Total area = 63.000(Ac.)

++++  
Process from Point/Station 24.000 to Point/Station 25.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1596.000(Ft.)  
End of natural channel elevation = 1560.000(Ft.)  
Length of natural channel = 565.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 117.094(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:

Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)  
Velocity using mean channel flow = 12.56(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0637  
Corrected/adjusted channel slope = 0.0637  
Travel time = 0.75 min. TC = 16.43 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.764

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 2) = 78.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 2.113(In/Hr) for a 100.0 year storm

Subarea runoff = 6.456(CFS) for 4.000(Ac.)

Total runoff = 119.948(CFS) Total area = 67.000(Ac.)

++++  
Process from Point/Station 25.000 to Point/Station 26.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1560.000(Ft.)

End of natural channel elevation = 1528.000(Ft.)

Length of natural channel = 665.000(Ft.)

Estimated mean flow rate at midpoint of channel = 131.585(CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)

Velocity using mean channel flow = 11.31(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0481  
Corrected/adjusted channel slope = 0.0481  
Travel time = 0.98 min. TC = 17.41 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.761

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 2.054(In/Hr) for a 100.0 year storm  
Subarea runoff = 20.308(CFS) for 13.000(Ac.)  
Total runoff = 140.256(CFS) Total area = 80.000(Ac.)

++++  
Process from Point/Station 26.000 to Point/Station 27.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1528.000(Ft.)  
End of natural channel elevation = 1508.000(Ft.)  
Length of natural channel = 950.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 164.801(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 8.02(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0211  
Corrected/adjusted channel slope = 0.0211  
Travel time = 1.98 min. TC = 19.39 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.754  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.948(In/Hr) for a 100.0 year storm  
Subarea runoff = 41.153(CFS) for 28.000(Ac.)  
Total runoff = 181.409(CFS) Total area = 108.000(Ac.)  
End of computations, total study area = 108.00 (Ac.)  
The following figures may  
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction( $A_p$ ) = 1.000  
Area averaged RI index number = 80.2

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 09/07/22

File:3963q100exoff3.out

-----  
BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - EXISTING OFFSITE "K" WATERSHED  
3963Q100EX0FF3

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

English (in-lb) Units used in input data file

-----  
Program License Serial Number 6145

-----  
Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)

For the [ Perris Valley ] area used.

10 year storm 10 minute intensity = 1.880(In/Hr)

10 year storm 60 minute intensity = 0.780(In/Hr)

100 year storm 10 minute intensity = 2.690(In/Hr)

100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.120(In/Hr)

Slope of intensity duration curve = 0.4900

++++  
Process from Point/Station 31.000 to Point/Station 32.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 720.000(Ft.)

Top (of initial area) elevation = 1585.000(Ft.)



Bottom (of initial area) elevation = 1551.000(Ft.)  
 Difference in elevation = 34.000(Ft.)  
 Slope = 0.04722 s(percent)= 4.72  
 $TC = k(0.530)*[(length^3)/(elevation\ change)]^{0.2}$   
 Initial area time of concentration = 13.564 min.  
 Rainfall intensity = 2.321(In/Hr) for a 100.0 year storm  
 UNDEVELOPED (poor cover) subarea  
 Runoff Coefficient = 0.775  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 1.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 0.000  
 RI index for soil(AMC 2) = 78.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Initial subarea runoff = 21.570(CFS)  
 Total initial stream area = 12.000(Ac.)  
 Pervious area fraction = 1.000

++++++  
 Process from Point/Station 32.000 to Point/Station 33.000  
 \*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1551.000(Ft.)  
 End of natural channel elevation = 1530.000(Ft.)  
 Length of natural channel = 676.000(Ft.)  
 Estimated mean flow rate at midpoint of channel = 32.355(CFS)

Natural valley channel type used  
 L.A. County flood control district formula for channel velocity:  
 $Velocity(ft/s) = (7 + 8(q(English\ Units)^{.352})(slope^{0.5}))$   
 Velocity using mean channel flow = 6.03(Ft/s)

Correction to map slope used on extremely rugged channels with  
 drops and waterfalls (Plate D-6.2)  
 Normal channel slope = 0.0311  
 Corrected/adjusted channel slope = 0.0311  
 Travel time = 1.87 min. TC = 15.43 min.

Adding area flow to channel  
 UNDEVELOPED (poor cover) subarea  
 Runoff Coefficient = 0.768  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 1.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 0.000  
 RI index for soil(AMC 2) = 78.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Rainfall intensity = 2.179(In/Hr) for a 100.0 year storm

Subarea runoff = 20.065(CFS) for 12.000(Ac.)  
Total runoff = 41.635(CFS) Total area = 24.000(Ac.)

++++  
Process from Point/Station 33.000 to Point/Station 34.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1530.000(Ft.)  
End of natural channel elevation = 1512.000(Ft.)  
Length of natural channel = 476.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 45.105(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 7.31(Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0378  
Corrected/adjusted channel slope = 0.0378  
Travel time = 1.09 min. TC = 16.52 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.764  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 2.107(In/Hr) for a 100.0 year storm  
Subarea runoff = 6.437(CFS) for 4.000(Ac.)  
Total runoff = 48.072(CFS) Total area = 28.000(Ac.)

++++  
Process from Point/Station 34.000 to Point/Station 35.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1512.000(Ft.)  
End of natural channel elevation = 1490.000(Ft.)  
Length of natural channel = 1380.000(Ft.)  
Estimated mean flow rate at midpoint of channel = 73.825(CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:

Velocity(ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 5.48(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0159

Corrected/adjusted channel slope = 0.0159

Travel time = 4.20 min. TC = 20.72 min.

Adding area flow to channel

UNDEVELOPED (poor cover) subarea

Runoff Coefficient = 0.750

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 1.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 2) = 78.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 1.886(In/Hr) for a 100.0 year storm

Subarea runoff = 42.450(CFS) for 30.000(Ac.)

Total runoff = 90.523(CFS) Total area = 58.000(Ac.)

End of computations, total study area = 58.00 (Ac.)

The following figures may

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

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

Area averaged RI index number = 78.0

**OFFSITE RATIONAL METHOD  
CALCULATIONS - EXIST. AREAS H-1,  
H-2, & H-3**

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963q100e0ffsite.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR 1 HOUR STORM EVENT - EXISTING OFFSITE CONDITION  
3963Q100EOFFSITE  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
10 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0  
Calculated rainfall intensity data:  
1 hour intensity = 1.120(In/Hr)  
Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 41.000 to Point/Station 42.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 660.000(Ft.)  
Top (of initial area) elevation = 1568.000(Ft.)  
Bottom (of initial area) elevation = 1542.000(Ft.)  
Difference in elevation = 26.000(Ft.)  
Slope = 0.03939 s(percent)= 3.94  
TC = k(0.530)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 13.583 min.  
Rainfall intensity = 2.319(In/Hr) for a 100.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.774  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000

Initial subarea runoff = 15.985 (CFS)  
Total initial stream area = 8.900 (Ac.)  
Pervious area fraction = 1.000

++++  
Process from Point/Station 42.000 to Point/Station 43.000  
\*\*\*\* NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

---

Top of natural channel elevation = 1542.000 (Ft.)  
End of natural channel elevation = 1509.000 (Ft.)  
Length of natural channel = 1530.000 (Ft.)  
Estimated mean flow rate at midpoint of channel = 30.712 (CFS)

Natural valley channel type used  
L.A. County flood control district formula for channel velocity:  
Velocity (ft/s) =  $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$   
Velocity using mean channel flow = 4.95 (Ft/s)

Correction to map slope used on extremely rugged channels with  
drops and waterfalls (Plate D-6.2)  
Normal channel slope = 0.0216  
Corrected/adjusted channel slope = 0.0216  
Travel time = 5.15 min. TC = 18.73 min.

Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.756  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.981 (In/Hr) for a 100.0 year storm  
Subarea runoff = 24.577 (CFS) for 16.400 (Ac.)  
Total runoff = 40.561 (CFS) Total area = 25.300 (Ac.)

++++  
Process from Point/Station 44.0 0 to Point/Station 44.0  
\*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

---

UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.756  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 78.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Time of concentration = 18.73 min.  
Rainfall intensity = 1.981 (In/Hr) for a 100.0 year storm  
Subarea runoff = 25.476 (CFS) for 17.000 (Ac.)  
Total runoff = 66.037 (CFS) Total area = 42.300 (Ac.)  
End of computations, total study area = 42.30 (Ac.)

The following figures may  
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000  
Area averaged RI index number = 78.0

# OFFSITE RATIONAL METHOD CALCULATIONS - WATER ST

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963Q2POFFSITE.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
2 YEAR 1 HOUR STORM EVENT - WATER STREET  
3963Q2POFFSITE  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
10 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 2.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.542(In/Hr)  
Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 21.000 to Point/Station 22.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 646.000(Ft.)  
Top (of initial area) elevation = 1542.500(Ft.)  
Bottom (of initial area) elevation = 1523.300(Ft.)  
Difference in elevation = 19.200(Ft.)  
Slope = 0.02972 s(percent)= 2.97  
TC = k(0.300)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 8.065 min.  
Rainfall intensity = 1.450(In/Hr) for a 2.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.844  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900



Initial subarea runoff = 1.285 (CFS)  
Total initial stream area = 1.050 (Ac.)  
Pervious area fraction = 0.100  
End of computations, total study area = 1.05 (Ac.)  
The following figures may  
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction( $A_p$ ) = 0.100  
Area averaged RI index number = 56.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963Q5POFFSITE.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
5 YEAR 1 HOUR STORM EVENT - WATER STREET  
3963Q5POFFSITE  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 5.00 Antecedent Moisture Condition = 1

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
10 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 5.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.678(In/Hr)  
Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 21.000 to Point/Station 22.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 646.000(Ft.)  
Top (of initial area) elevation = 1542.500(Ft.)  
Bottom (of initial area) elevation = 1523.300(Ft.)  
Difference in elevation = 19.200(Ft.)  
Slope = 0.02972 s(percent)= 2.97  
TC = k(0.300)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 8.065 min.  
Rainfall intensity = 1.812(In/Hr) for a 5.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.849  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 1) = 36.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900

Initial subarea runoff = 1.615 (CFS)  
Total initial stream area = 1.050 (Ac.)  
Pervious area fraction = 0.100  
End of computations, total study area = 1.05 (Ac.)  
The following figures may  
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction( $A_p$ ) = 0.100  
Area averaged RI index number = 56.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963q10poffsite.out

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
10 YEAR 1 HOUR STORM EVENT - WATER STREET  
3963Q10POFFSITE  
CB

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

English (in-lb) Units used in input data file

Program License Serial Number 6145

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
10 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 10.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.780(In/Hr)  
Slope of intensity duration curve = 0.4900

\*\*\*\*\*  
Process from Point/Station 21.000 to Point/Station 22.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 646.000(Ft.)  
Top (of initial area) elevation = 1542.500(Ft.)  
Bottom (of initial area) elevation = 1523.300(Ft.)  
Difference in elevation = 19.200(Ft.)  
Slope = 0.02972 s(percent)= 2.97  
TC = k(0.300)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 8.065 min.  
Rainfall intensity = 2.085(In/Hr) for a 10.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.870  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900

Initial subarea runoff = 1.905 (CFS)

Total initial stream area = 1.050 (Ac.)

Pervious area fraction = 0.100

End of computations, total study area = 1.05 (Ac.)

The following figures may

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

Area averaged pervious area fraction ( $A_p$ ) = 0.100

Area averaged RI index number = 56.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1  
Rational Hydrology Study Date: 04/24/23 File:3963q100poffsite.out

-----  
BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR 1 HOUR STORM EVENT - WATER STREET  
3963Q100POFFSITE  
CB  
-----

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

English (in-lb) Units used in input data file  
-----

Program License Serial Number 6145  
-----

Rational Method Hydrology Program based on  
Riverside County Flood Control & Water Conservation District  
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)  
For the [ Perris Valley ] area used.  
10 year storm 10 minute intensity = 1.880(In/Hr)  
10 year storm 60 minute intensity = 0.780(In/Hr)  
100 year storm 10 minute intensity = 2.690(In/Hr)  
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0  
Calculated rainfall intensity data:  
1 hour intensity = 1.120(In/Hr)  
Slope of intensity duration curve = 0.4900

+++++  
Process from Point/Station 21.000 to Point/Station 22.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 646.000(Ft.)  
Top (of initial area) elevation = 1542.500(Ft.)  
Bottom (of initial area) elevation = 1523.300(Ft.)  
Difference in elevation = 19.200(Ft.)  
Slope = 0.02972 s(percent)= 2.97  
TC = k(0.300)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 8.065 min.  
Rainfall intensity = 2.994(In/Hr) for a 100.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.877  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 1.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 0.000  
RI index for soil(AMC 2) = 56.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900

Initial subarea runoff = 2.756(CFS)

Total initial stream area = 1.050(Ac.)

Pervious area fraction = 0.100

End of computations, total study area = 1.05 (Ac.)

The following figures may

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

Area averaged pervious area fraction( $A_p$ ) = 0.100

Area averaged RI index number = 56.0

Appendix C  
Unit Hydrograph Calculations  
-Existing Condition: 1, 3, 6, 24 HR  
-Proposed Condition: 1, 3, 6, 24 HR

For 2-yr, 5-yr, 10-yr and 100-yr Storm Events



Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHVDQ2E12.out

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-----

Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrgraph for 2 Year 1 Hour Storm - Existing Condition  
3963UNIHVDQ2E  
CB

-----  
Drainage Area = 19.10 (Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.10 (Ac.) = 0.030 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.245 Hr.  
Lag time = 14.69 Min.  
25% of lag time = 3.67 Min.  
40% of lag time = 5.88 Min.  
Unit time = 5.00 Min.  
Duration of storm = 1 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	0.47	8.98

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	1.25	23.88

STORM EVENT (YEAR) = 2.00  
Area Averaged 2-Year Rainfall = 0.470 (In)  
Area Averaged 100-Year Rainfall = 1.250 (In)

Point rain (area averaged) = 0.470 (In)  
Areal adjustment factor = 99.98 %  
Adjusted average point rain = 0.470 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.100                    78.00                    0.000  
 Total Area Entered =        19.10(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
78.0	60.6	0.464	0.000	0.464	1.000	0.464
						Sum (F) = 0.464

Area averaged mean soil loss (F) (In/Hr) = 0.464

Minimum soil loss rate ((In/Hr)) = 0.232

(for 24 hour storm duration)

Soil low loss rate (decimal) = 0.900

-----  
 Slope of intensity-duration curve for a 1 hour storm =0.5000  
 -----

U n i t   H y d r o g r a p h  
 VALLEY S-Curve

-----  
 Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	34.041	3.449
2	0.167	68.083	13.382
3	0.250	102.124	22.444
4	0.333	136.166	19.875
5	0.417	170.207	10.805
6	0.500	204.248	6.140
7	0.583	238.290	4.406
8	0.667	272.331	3.443
9	0.750	306.373	2.781
10	0.833	340.414	2.179
11	0.917	374.455	1.902
12	1.000	408.497	1.507
13	1.083	442.538	1.204
14	1.167	476.580	1.069
15	1.250	510.621	1.010
16	1.333	544.662	0.813
17	1.417	578.704	0.701
18	1.500	612.745	0.605
19	1.583	646.786	0.503
20	1.667	680.828	0.421
21	1.750	714.869	0.341
22	1.833	748.911	0.340
23	1.917	782.952	0.340
24	2.000	816.993	0.341
		Sum = 100.000	Sum= 19.249

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	4.20	0.237	0.464	0.213	0.02
2	0.17	4.30	0.242	0.464	0.218	0.02
3	0.25	5.00	0.282	0.464	0.254	0.03
4	0.33	5.00	0.282	0.464	0.254	0.03
5	0.42	5.80	0.327	0.464	0.294	0.03
6	0.50	6.50	0.367	0.464	0.330	0.04
7	0.58	7.40	0.417	0.464	0.376	0.04
8	0.67	8.60	0.485	0.464	---	0.02
9	0.75	12.30	0.694	0.464	---	0.23

10	0.83	29.10	1.641	0.464	---	1.18
11	0.92	6.80	0.383	0.464	0.345	0.04
12	1.00	5.00	0.282	0.464	0.254	0.03
Sum =		100.0				Sum = 1.7

Flood volume = Effective rainfall 0.14(In)  
times area 19.1(Ac.)/[ (In)/(Ft.) ] = 0.2(Ac.Ft)  
Total soil loss = 0.33(In)  
Total soil loss = 0.521(Ac.Ft)  
Total rainfall = 0.47(In)  
Flood volume = 9885.2 Cubic Feet  
Total soil loss = 22695.7 Cubic Feet

-----  
**Peak flow rate of this hydrograph = 6.277(CFS)**  
-----

+++++

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

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

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0001	0.02	Q				
0+10	0.0006	0.08	Q				
0+15	0.0019	0.18	Q				
0+20	0.0039	0.29	VQ				
0+25	0.0063	0.36	Q				
0+30	0.0092	0.42	Q				
0+35	0.0125	0.48	QV				
0+40	0.0162	0.53	Q				
0+45	0.0209	0.68	QV				
0+50	0.0333	1.81	V Q				
0+55	0.0633	4.35		V	Q		
1+ 0	0.1065	6.28			V	Q	
1+ 5	0.1434	5.36			Q	V	
1+10	0.1648	3.10		Q			
1+15	0.1776	1.86				V	
1+20	0.1868	1.33				V	
1+25	0.1939	1.03				V	
1+30	0.1996	0.83				V	
1+35	0.2041	0.66	Q			V	
1+40	0.2080	0.57	Q			V	
1+45	0.2111	0.45	Q			V	
1+50	0.2137	0.37	Q			V	
1+55	0.2159	0.33	Q			V	
2+ 0	0.2180	0.30	Q			V	
2+ 5	0.2197	0.25	Q			V	
2+10	0.2212	0.21	Q			V	
2+15	0.2224	0.18	Q			V	
2+20	0.2234	0.15	Q			V	
2+25	0.2243	0.12	Q			V	
2+30	0.2250	0.10	Q			V	
2+35	0.2257	0.10	Q			V	
2+40	0.2263	0.10	Q			V	
2+45	0.2269	0.08	Q			V	
2+50	0.2269	0.00	Q			V	
2+55	0.2269	0.00	Q			V	V

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHVDQ2E32.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrgraph for 2 Year 3 Hour Storm - Existing Condition  
3963UNIHVDQ2E  
CB

-----  
Drainage Area = 19.10 (Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.10 (Ac.) = 0.030 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.245 Hr.  
Lag time = 14.69 Min.  
25% of lag time = 3.67 Min.  
40% of lag time = 5.88 Min.  
Unit time = 5.00 Min.  
Duration of storm = 3 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	0.80	15.28

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	1.93	36.86

STORM EVENT (YEAR) = 2.00  
Area Averaged 2-Year Rainfall = 0.800 (In)  
Area Averaged 100-Year Rainfall = 1.930 (In)

Point rain (area averaged) = 0.800 (In)  
Areal adjustment factor = 99.99 %  
Adjusted average point rain = 0.800 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.100                    78.00                    0.000  
 Total Area Entered =        19.10(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
78.0	60.6	0.464	0.000	0.464	1.000	0.464
						Sum (F) = 0.464

Area averaged mean soil loss (F) (In/Hr) = 0.464  
 Minimum soil loss rate ((In/Hr)) = 0.232  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.900

-----  
 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	34.041	3.449
2	0.167	68.083	13.382
3	0.250	102.124	22.444
4	0.333	136.166	19.875
5	0.417	170.207	10.805
6	0.500	204.248	6.140
7	0.583	238.290	4.406
8	0.667	272.331	3.443
9	0.750	306.373	2.781
10	0.833	340.414	2.179
11	0.917	374.455	1.902
12	1.000	408.497	1.507
13	1.083	442.538	1.204
14	1.167	476.580	1.069
15	1.250	510.621	1.010
16	1.333	544.662	0.813
17	1.417	578.704	0.701
18	1.500	612.745	0.605
19	1.583	646.786	0.503
20	1.667	680.828	0.421
21	1.750	714.869	0.341
22	1.833	748.911	0.340
23	1.917	782.952	0.340
24	2.000	816.993	0.341
Sum = 100.000			Sum= 19.249

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
			Max	Low	
1	0.08	1.30	0.464	0.112	0.01
2	0.17	1.30	0.464	0.112	0.01
3	0.25	1.10	0.464	0.095	0.01
4	0.33	1.50	0.464	0.130	0.01
5	0.42	1.50	0.464	0.130	0.01
6	0.50	1.80	0.464	0.156	0.02
7	0.58	1.50	0.464	0.130	0.01
8	0.67	1.80	0.464	0.156	0.02
9	0.75	1.80	0.464	0.156	0.02
10	0.83	1.50	0.464	0.130	0.01
11	0.92	1.60	0.464	0.138	0.02

12	1.00	1.80	0.173	0.464	0.156	0.02
13	1.08	2.20	0.211	0.464	0.190	0.02
14	1.17	2.20	0.211	0.464	0.190	0.02
15	1.25	2.20	0.211	0.464	0.190	0.02
16	1.33	2.00	0.192	0.464	0.173	0.02
17	1.42	2.60	0.250	0.464	0.225	0.02
18	1.50	2.70	0.259	0.464	0.233	0.03
19	1.58	2.40	0.230	0.464	0.207	0.02
20	1.67	2.70	0.259	0.464	0.233	0.03
21	1.75	3.30	0.317	0.464	0.285	0.03
22	1.83	3.10	0.298	0.464	0.268	0.03
23	1.92	2.90	0.278	0.464	0.251	0.03
24	2.00	3.00	0.288	0.464	0.259	0.03
25	2.08	3.10	0.298	0.464	0.268	0.03
26	2.17	4.20	0.403	0.464	0.363	0.04
27	2.25	5.00	0.480	0.464	---	0.02
28	2.33	3.50	0.336	0.464	0.302	0.03
29	2.42	6.80	0.653	0.464	---	0.19
30	2.50	7.30	0.701	0.464	---	0.24
31	2.58	8.20	0.787	0.464	---	0.32
32	2.67	5.90	0.566	0.464	---	0.10
33	2.75	2.00	0.192	0.464	0.173	0.02
34	2.83	1.80	0.173	0.464	0.156	0.02
35	2.92	1.80	0.173	0.464	0.156	0.02
36	3.00	0.60	0.058	0.464	0.052	0.01
Sum =	100.0				Sum =	1.5

Flood volume = Effective rainfall 0.13 (In)  
times area 19.1 (Ac.) / [(In) / (Ft.)] = 0.2 (Ac.Ft)  
Total soil loss = 0.67 (In)  
Total soil loss = 1.073 (Ac.Ft)  
Total rainfall = 0.80 (In)  
Flood volume = 8727.6 Cubic Feet  
Total soil loss = 46734.1 Cubic Feet

Peak flow rate of this hydrograph = 3.141 (CFS)

+++++

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

Hydrograph in 5 Minute intervals ((CFS))

Time (h+m)	Volume Ac.Ft	Q (CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0001	0.01	Q				
0+10	0.0003	0.04	Q				
0+15	0.0010	0.09	Q				
0+20	0.0019	0.14	Q				
0+25	0.0031	0.17	Q				
0+30	0.0044	0.19	Q				
0+35	0.0059	0.22	QV				
0+40	0.0076	0.24	QV				
0+45	0.0093	0.26	Q				
0+50	0.0112	0.27	QV				
0+55	0.0131	0.28	QV				
1+ 0	0.0150	0.28	QV				
1+ 5	0.0169	0.28	Q V				
1+10	0.0190	0.31	Q V				
1+15	0.0213	0.33	Q V				
1+20	0.0237	0.35	Q V				
1+25	0.0263	0.36	Q V				
1+30	0.0289	0.38	Q V				

1+35	0.0316	0.40	Q	V					
1+40	0.0346	0.42	Q	V					
1+45	0.0376	0.44	Q	V					
1+50	0.0408	0.47	Q	V					
1+55	0.0443	0.50	Q	V					
2+ 0	0.0478	0.52	Q	V					
2+ 5	0.0514	0.52	Q	V					
2+10	0.0551	0.53	Q	V					
2+15	0.0589	0.56	Q	V					
2+20	0.0628	0.56	Q	V					
2+25	0.0672	0.65	Q	V					
2+30	0.0748	1.09	Q	V					
2+35	0.0884	1.98	Q	V					
2+40	0.1082	2.88	Q	V					
2+45	0.1298	3.14	Q	V					
2+50	0.1476	2.59	Q	V					
2+55	0.1597	1.75	Q	V					
3+ 0	0.1680	1.21	Q	V					
3+ 5	0.1744	0.92	Q	V					
3+10	0.1793	0.72	Q	V					
3+15	0.1832	0.56	Q	V					
3+20	0.1862	0.44	Q	V					
3+25	0.1886	0.35	Q	V					
3+30	0.1906	0.29	Q	V					
3+35	0.1923	0.24	Q	V					
3+40	0.1937	0.21	Q	V					
3+45	0.1949	0.18	Q	V					
3+50	0.1960	0.15	Q	V					
3+55	0.1969	0.13	Q	V					
4+ 0	0.1976	0.11	Q	V					
4+ 5	0.1983	0.09	Q	V					
4+10	0.1988	0.08	Q	V					
4+15	0.1992	0.07	Q	V					
4+20	0.1997	0.06	Q	V					
4+25	0.2000	0.05	Q	V					
4+30	0.2002	0.03	Q	V					
4+35	0.2003	0.01	Q	V					
4+40	0.2003	0.00	Q	V					
4+45	0.2003	0.00	Q	V					
4+50	0.2004	0.00	Q	V					
4+55	0.2004	0.00	Q	V					

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Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHVDQ2E62.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrgraph for 2 Year 6 Hour Storm - Existing Condition  
3963UNIHVDQ2E  
CB

-----  
Drainage Area = 19.10 (Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.10 (Ac.) = 0.030 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.245 Hr.  
Lag time = 14.69 Min.  
25% of lag time = 3.67 Min.  
40% of lag time = 5.88 Min.  
Unit time = 5.00 Min.  
Duration of storm = 6 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	1.10	21.01

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	2.60	49.66

STORM EVENT (YEAR) = 2.00  
Area Averaged 2-Year Rainfall = 1.100 (In)  
Area Averaged 100-Year Rainfall = 2.600 (In)

Point rain (area averaged) = 1.100 (In)  
Areal adjustment factor = 99.99 %  
Adjusted average point rain = 1.100 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %



19.100                    78.00                    0.000  
 Total Area Entered =        19.10(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
78.0	60.6	0.464	0.000	0.464	1.000	0.464
						Sum (F) = 0.464

Area averaged mean soil loss (F) (In/Hr) = 0.464  
 Minimum soil loss rate ((In/Hr)) = 0.232  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.900

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 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
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Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	34.041	3.449
2	0.167	68.083	13.382
3	0.250	102.124	22.444
4	0.333	136.166	19.875
5	0.417	170.207	10.805
6	0.500	204.248	6.140
7	0.583	238.290	4.406
8	0.667	272.331	3.443
9	0.750	306.373	2.781
10	0.833	340.414	2.179
11	0.917	374.455	1.902
12	1.000	408.497	1.507
13	1.083	442.538	1.204
14	1.167	476.580	1.069
15	1.250	510.621	1.010
16	1.333	544.662	0.813
17	1.417	578.704	0.701
18	1.500	612.745	0.605
19	1.583	646.786	0.503
20	1.667	680.828	0.421
21	1.750	714.869	0.341
22	1.833	748.911	0.340
23	1.917	782.952	0.340
24	2.000	816.993	0.341
Sum = 100.000			Sum= 19.249

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
			Max	Low	
1	0.08	0.066	0.464	0.059	0.01
2	0.17	0.079	0.464	0.071	0.01
3	0.25	0.079	0.464	0.071	0.01
4	0.33	0.079	0.464	0.071	0.01
5	0.42	0.079	0.464	0.071	0.01
6	0.50	0.092	0.464	0.083	0.01
7	0.58	0.092	0.464	0.083	0.01
8	0.67	0.092	0.464	0.083	0.01
9	0.75	0.092	0.464	0.083	0.01
10	0.83	0.092	0.464	0.083	0.01
11	0.92	0.092	0.464	0.083	0.01



times area        19.1(Ac.)/[ (In)/(Ft.) ] =        0.2(Ac.Ft)  
 Total soil loss =        0.97(In)  
 Total soil loss =        1.536(Ac.Ft)  
 Total rainfall =        1.10(In)  
 Flood volume =        9335.4 Cubic Feet  
 Total soil loss =        66925.9 Cubic Feet

Peak flow rate of this hydrograph = 2.243(CFS)

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

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q				
0+10	0.0002	0.02	Q				
0+15	0.0006	0.05	Q				
0+20	0.0011	0.09	Q				
0+25	0.0019	0.10	Q				
0+30	0.0027	0.12	Q				
0+35	0.0035	0.13	Q				
0+40	0.0045	0.14	Q				
0+45	0.0055	0.15	QV				
0+50	0.0065	0.15	QV				
0+55	0.0076	0.16	QV				
1+ 0	0.0087	0.16	QV				
1+ 5	0.0099	0.17	QV				
1+10	0.0111	0.18	Q V				
1+15	0.0124	0.18	Q V				
1+20	0.0136	0.19	Q V				
1+25	0.0150	0.19	Q V				
1+30	0.0163	0.19	Q V				
1+35	0.0176	0.20	Q V				
1+40	0.0190	0.20	Q V				
1+45	0.0204	0.20	Q V				
1+50	0.0217	0.20	Q V				
1+55	0.0231	0.20	Q V				
2+ 0	0.0245	0.20	Q V				
2+ 5	0.0259	0.21	Q V				
2+10	0.0273	0.21	Q V				
2+15	0.0288	0.21	Q V				
2+20	0.0303	0.22	Q V				
2+25	0.0318	0.22	Q V				
2+30	0.0333	0.22	Q V				
2+35	0.0349	0.22	Q V				
2+40	0.0364	0.22	Q V				
2+45	0.0380	0.23	Q V				
2+50	0.0395	0.23	Q V				
2+55	0.0412	0.24	Q V				
3+ 0	0.0428	0.24	Q V				
3+ 5	0.0445	0.24	Q V				
3+10	0.0462	0.25	Q V				
3+15	0.0480	0.25	Q V				
3+20	0.0498	0.26	Q V				
3+25	0.0516	0.27	Q V				
3+30	0.0535	0.27	Q V				
3+35	0.0554	0.29	Q V				
3+40	0.0575	0.30	Q V				
3+45	0.0597	0.32	Q V				

3+50	0.0620	0.33	Q	V			
3+55	0.0644	0.34	Q	V			
4+ 0	0.0668	0.36	Q	V			
4+ 5	0.0694	0.37	Q	V			
4+10	0.0720	0.38	Q	V			
4+15	0.0747	0.40	Q	V			
4+20	0.0776	0.42	Q	V			
4+25	0.0806	0.44	Q	V			
4+30	0.0838	0.46	Q	V			
4+35	0.0871	0.48	Q	V			
4+40	0.0905	0.50	Q	V			
4+45	0.0941	0.52	Q	V			
4+50	0.0978	0.54	Q	V			
4+55	0.1016	0.56	Q	V			
5+ 0	0.1056	0.57	Q	V			
5+ 5	0.1097	0.60	Q	V			
5+10	0.1138	0.61	Q	V			
5+15	0.1180	0.60	Q	V			
5+20	0.1224	0.64	Q	V			
5+25	0.1283	0.86	Q	V			
5+30	0.1379	1.39	Q	V			
5+35	0.1518	2.02	Q	V			
5+40	0.1672	2.24	Q	V			
5+45	0.1795	1.78	Q	V			
5+50	0.1873	1.13	Q	V			
5+55	0.1926	0.77	Q	V			
6+ 0	0.1967	0.59	Q	V			
6+ 5	0.1999	0.48	Q	V			
6+10	0.2026	0.38	Q	V			
6+15	0.2046	0.30	Q	V			
6+20	0.2063	0.25	Q	V			
6+25	0.2077	0.20	Q	V			
6+30	0.2089	0.17	Q	V			
6+35	0.2098	0.14	Q	V			
6+40	0.2107	0.13	Q	V			
6+45	0.2114	0.10	Q	V			
6+50	0.2120	0.09	Q	V			
6+55	0.2125	0.07	Q	V			
7+ 0	0.2130	0.06	Q	V			
7+ 5	0.2133	0.05	Q	V			
7+10	0.2136	0.04	Q	V			
7+15	0.2139	0.04	Q	V			
7+20	0.2141	0.03	Q	V			
7+25	0.2142	0.02	Q	V			
7+30	0.2143	0.00	Q	V			
7+35	0.2143	0.00	Q	V			
7+40	0.2143	0.00	Q	V			
7+45	0.2143	0.00	Q	V			
7+50	0.2143	0.00	Q	V			
7+55	0.2143	0.00	Q	V			

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHVDQ2E242.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

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English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

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Black Creek - Harvill at Water Industrial  
Unit Hydrgraph for 2 Year 24 Hour Storm - Existing Condition  
3963UNIHVDQ2E  
CB

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Drainage Area = 19.10(Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.10(Ac.) = 0.030 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.245 Hr.  
Lag time = 14.69 Min.  
25% of lag time = 3.67 Min.  
40% of lag time = 5.88 Min.  
Unit time = 5.00 Min.  
Duration of storm = 24 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	1.85	35.34

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	5.00	95.50

STORM EVENT (YEAR) = 2.00  
Area Averaged 2-Year Rainfall = 1.850 (In)  
Area Averaged 100-Year Rainfall = 5.000 (In)

Point rain (area averaged) = 1.850 (In)  
Areal adjustment factor = 100.00 %  
Adjusted average point rain = 1.850 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.100                    78.00                    0.000  
 Total Area Entered =        19.10(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
78.0	60.6	0.464	0.000	0.464	1.000	0.464
						Sum (F) = 0.464

Area averaged mean soil loss (F) (In/Hr) = 0.464  
 Minimum soil loss rate ((In/Hr)) = 0.232  
 (for 24 hour storm duration)  
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 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
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Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	34.041	3.449
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3	0.250	102.124	22.444
4	0.333	136.166	19.875
5	0.417	170.207	10.805
6	0.500	204.248	6.140
7	0.583	238.290	4.406
8	0.667	272.331	3.443
9	0.750	306.373	2.781
10	0.833	340.414	2.179
11	0.917	374.455	1.902
12	1.000	408.497	1.507
13	1.083	442.538	1.204
14	1.167	476.580	1.069
15	1.250	510.621	1.010
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17	1.417	578.704	0.701
18	1.500	612.745	0.605
19	1.583	646.786	0.503
20	1.667	680.828	0.421
21	1.750	714.869	0.341
22	1.833	748.911	0.340
23	1.917	782.952	0.340
24	2.000	816.993	0.341
		Sum = 100.000	Sum= 19.249

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max   Low	Effective (In/Hr)
1	0.08	0.07	0.015   0.822	0.013
2	0.17	0.07	0.015   0.819	0.013
3	0.25	0.07	0.015   0.815	0.013
4	0.33	0.10	0.022   0.812	0.020
5	0.42	0.10	0.022   0.809	0.020
6	0.50	0.10	0.022   0.806	0.020
7	0.58	0.10	0.022   0.803	0.020
8	0.67	0.10	0.022   0.800	0.020
9	0.75	0.10	0.022   0.796	0.020
10	0.83	0.13	0.030   0.793	0.027
11	0.92	0.13	0.030   0.790	0.027

12	1.00	0.13	0.030	0.787	0.027	0.00
13	1.08	0.10	0.022	0.784	0.020	0.00
14	1.17	0.10	0.022	0.781	0.020	0.00
15	1.25	0.10	0.022	0.778	0.020	0.00
16	1.33	0.10	0.022	0.775	0.020	0.00
17	1.42	0.10	0.022	0.772	0.020	0.00
18	1.50	0.10	0.022	0.769	0.020	0.00
19	1.58	0.10	0.022	0.765	0.020	0.00
20	1.67	0.10	0.022	0.762	0.020	0.00
21	1.75	0.10	0.022	0.759	0.020	0.00
22	1.83	0.13	0.030	0.756	0.027	0.00
23	1.92	0.13	0.030	0.753	0.027	0.00
24	2.00	0.13	0.030	0.750	0.027	0.00
25	2.08	0.13	0.030	0.747	0.027	0.00
26	2.17	0.13	0.030	0.744	0.027	0.00
27	2.25	0.13	0.030	0.741	0.027	0.00
28	2.33	0.13	0.030	0.738	0.027	0.00
29	2.42	0.13	0.030	0.735	0.027	0.00
30	2.50	0.13	0.030	0.732	0.027	0.00
31	2.58	0.17	0.037	0.729	0.033	0.00
32	2.67	0.17	0.037	0.726	0.033	0.00
33	2.75	0.17	0.037	0.723	0.033	0.00
34	2.83	0.17	0.037	0.720	0.033	0.00
35	2.92	0.17	0.037	0.717	0.033	0.00
36	3.00	0.17	0.037	0.714	0.033	0.00
37	3.08	0.17	0.037	0.711	0.033	0.00
38	3.17	0.17	0.037	0.708	0.033	0.00
39	3.25	0.17	0.037	0.705	0.033	0.00
40	3.33	0.17	0.037	0.702	0.033	0.00
41	3.42	0.17	0.037	0.699	0.033	0.00
42	3.50	0.17	0.037	0.697	0.033	0.00
43	3.58	0.17	0.037	0.694	0.033	0.00
44	3.67	0.17	0.037	0.691	0.033	0.00
45	3.75	0.17	0.037	0.688	0.033	0.00
46	3.83	0.20	0.044	0.685	0.040	0.00
47	3.92	0.20	0.044	0.682	0.040	0.00
48	4.00	0.20	0.044	0.679	0.040	0.00
49	4.08	0.20	0.044	0.676	0.040	0.00
50	4.17	0.20	0.044	0.673	0.040	0.00
51	4.25	0.20	0.044	0.670	0.040	0.00
52	4.33	0.23	0.052	0.668	0.047	0.01
53	4.42	0.23	0.052	0.665	0.047	0.01
54	4.50	0.23	0.052	0.662	0.047	0.01
55	4.58	0.23	0.052	0.659	0.047	0.01
56	4.67	0.23	0.052	0.656	0.047	0.01
57	4.75	0.23	0.052	0.653	0.047	0.01
58	4.83	0.27	0.059	0.651	0.053	0.01
59	4.92	0.27	0.059	0.648	0.053	0.01
60	5.00	0.27	0.059	0.645	0.053	0.01
61	5.08	0.20	0.044	0.642	0.040	0.00
62	5.17	0.20	0.044	0.639	0.040	0.00
63	5.25	0.20	0.044	0.637	0.040	0.00
64	5.33	0.23	0.052	0.634	0.047	0.01
65	5.42	0.23	0.052	0.631	0.047	0.01
66	5.50	0.23	0.052	0.628	0.047	0.01
67	5.58	0.27	0.059	0.626	0.053	0.01
68	5.67	0.27	0.059	0.623	0.053	0.01
69	5.75	0.27	0.059	0.620	0.053	0.01
70	5.83	0.27	0.059	0.617	0.053	0.01
71	5.92	0.27	0.059	0.615	0.053	0.01
72	6.00	0.27	0.059	0.612	0.053	0.01
73	6.08	0.30	0.067	0.609	0.060	0.01
74	6.17	0.30	0.067	0.606	0.060	0.01

75	6.25	0.30	0.067	0.604	0.060	0.01
76	6.33	0.30	0.067	0.601	0.060	0.01
77	6.42	0.30	0.067	0.598	0.060	0.01
78	6.50	0.30	0.067	0.596	0.060	0.01
79	6.58	0.33	0.074	0.593	0.067	0.01
80	6.67	0.33	0.074	0.590	0.067	0.01
81	6.75	0.33	0.074	0.588	0.067	0.01
82	6.83	0.33	0.074	0.585	0.067	0.01
83	6.92	0.33	0.074	0.582	0.067	0.01
84	7.00	0.33	0.074	0.580	0.067	0.01
85	7.08	0.33	0.074	0.577	0.067	0.01
86	7.17	0.33	0.074	0.574	0.067	0.01
87	7.25	0.33	0.074	0.572	0.067	0.01
88	7.33	0.37	0.081	0.569	0.073	0.01
89	7.42	0.37	0.081	0.567	0.073	0.01
90	7.50	0.37	0.081	0.564	0.073	0.01
91	7.58	0.40	0.089	0.561	0.080	0.01
92	7.67	0.40	0.089	0.559	0.080	0.01
93	7.75	0.40	0.089	0.556	0.080	0.01
94	7.83	0.43	0.096	0.554	0.087	0.01
95	7.92	0.43	0.096	0.551	0.087	0.01
96	8.00	0.43	0.096	0.549	0.087	0.01
97	8.08	0.50	0.111	0.546	0.100	0.01
98	8.17	0.50	0.111	0.543	0.100	0.01
99	8.25	0.50	0.111	0.541	0.100	0.01
100	8.33	0.50	0.111	0.538	0.100	0.01
101	8.42	0.50	0.111	0.536	0.100	0.01
102	8.50	0.50	0.111	0.533	0.100	0.01
103	8.58	0.53	0.118	0.531	0.107	0.01
104	8.67	0.53	0.118	0.528	0.107	0.01
105	8.75	0.53	0.118	0.526	0.107	0.01
106	8.83	0.57	0.126	0.523	0.113	0.01
107	8.92	0.57	0.126	0.521	0.113	0.01
108	9.00	0.57	0.126	0.518	0.113	0.01
109	9.08	0.63	0.141	0.516	0.127	0.01
110	9.17	0.63	0.141	0.514	0.127	0.01
111	9.25	0.63	0.141	0.511	0.127	0.01
112	9.33	0.67	0.148	0.509	0.133	0.01
113	9.42	0.67	0.148	0.506	0.133	0.01
114	9.50	0.67	0.148	0.504	0.133	0.01
115	9.58	0.70	0.155	0.501	0.140	0.02
116	9.67	0.70	0.155	0.499	0.140	0.02
117	9.75	0.70	0.155	0.497	0.140	0.02
118	9.83	0.73	0.163	0.494	0.147	0.02
119	9.92	0.73	0.163	0.492	0.147	0.02
120	10.00	0.73	0.163	0.489	0.147	0.02
121	10.08	0.50	0.111	0.487	0.100	0.01
122	10.17	0.50	0.111	0.485	0.100	0.01
123	10.25	0.50	0.111	0.482	0.100	0.01
124	10.33	0.50	0.111	0.480	0.100	0.01
125	10.42	0.50	0.111	0.478	0.100	0.01
126	10.50	0.50	0.111	0.475	0.100	0.01
127	10.58	0.67	0.148	0.473	0.133	0.01
128	10.67	0.67	0.148	0.471	0.133	0.01
129	10.75	0.67	0.148	0.468	0.133	0.01
130	10.83	0.67	0.148	0.466	0.133	0.01
131	10.92	0.67	0.148	0.464	0.133	0.01
132	11.00	0.67	0.148	0.462	0.133	0.01
133	11.08	0.63	0.141	0.459	0.127	0.01
134	11.17	0.63	0.141	0.457	0.127	0.01
135	11.25	0.63	0.141	0.455	0.127	0.01
136	11.33	0.63	0.141	0.453	0.127	0.01
137	11.42	0.63	0.141	0.450	0.127	0.01



138	11.50	0.63	0.141	0.448	0.127	0.01
139	11.58	0.57	0.126	0.446	0.113	0.01
140	11.67	0.57	0.126	0.444	0.113	0.01
141	11.75	0.57	0.126	0.441	0.113	0.01
142	11.83	0.60	0.133	0.439	0.120	0.01
143	11.92	0.60	0.133	0.437	0.120	0.01
144	12.00	0.60	0.133	0.435	0.120	0.01
145	12.08	0.83	0.185	0.433	0.166	0.02
146	12.17	0.83	0.185	0.431	0.166	0.02
147	12.25	0.83	0.185	0.428	0.166	0.02
148	12.33	0.87	0.192	0.426	0.173	0.02
149	12.42	0.87	0.192	0.424	0.173	0.02
150	12.50	0.87	0.192	0.422	0.173	0.02
151	12.58	0.93	0.207	0.420	0.186	0.02
152	12.67	0.93	0.207	0.418	0.186	0.02
153	12.75	0.93	0.207	0.416	0.186	0.02
154	12.83	0.97	0.215	0.413	0.193	0.02
155	12.92	0.97	0.215	0.411	0.193	0.02
156	13.00	0.97	0.215	0.409	0.193	0.02
157	13.08	1.13	0.252	0.407	0.226	0.03
158	13.17	1.13	0.252	0.405	0.226	0.03
159	13.25	1.13	0.252	0.403	0.226	0.03
160	13.33	1.13	0.252	0.401	0.226	0.03
161	13.42	1.13	0.252	0.399	0.226	0.03
162	13.50	1.13	0.252	0.397	0.226	0.03
163	13.58	0.77	0.170	0.395	0.153	0.02
164	13.67	0.77	0.170	0.393	0.153	0.02
165	13.75	0.77	0.170	0.391	0.153	0.02
166	13.83	0.77	0.170	0.389	0.153	0.02
167	13.92	0.77	0.170	0.387	0.153	0.02
168	14.00	0.77	0.170	0.385	0.153	0.02
169	14.08	0.90	0.200	0.383	0.180	0.02
170	14.17	0.90	0.200	0.381	0.180	0.02
171	14.25	0.90	0.200	0.379	0.180	0.02
172	14.33	0.87	0.192	0.377	0.173	0.02
173	14.42	0.87	0.192	0.375	0.173	0.02
174	14.50	0.87	0.192	0.373	0.173	0.02
175	14.58	0.87	0.192	0.371	0.173	0.02
176	14.67	0.87	0.192	0.370	0.173	0.02
177	14.75	0.87	0.192	0.368	0.173	0.02
178	14.83	0.83	0.185	0.366	0.166	0.02
179	14.92	0.83	0.185	0.364	0.166	0.02
180	15.00	0.83	0.185	0.362	0.166	0.02
181	15.08	0.80	0.178	0.360	0.160	0.02
182	15.17	0.80	0.178	0.358	0.160	0.02
183	15.25	0.80	0.178	0.356	0.160	0.02
184	15.33	0.77	0.170	0.355	0.153	0.02
185	15.42	0.77	0.170	0.353	0.153	0.02
186	15.50	0.77	0.170	0.351	0.153	0.02
187	15.58	0.63	0.141	0.349	0.127	0.01
188	15.67	0.63	0.141	0.347	0.127	0.01
189	15.75	0.63	0.141	0.346	0.127	0.01
190	15.83	0.63	0.141	0.344	0.127	0.01
191	15.92	0.63	0.141	0.342	0.127	0.01
192	16.00	0.63	0.141	0.340	0.127	0.01
193	16.08	0.13	0.030	0.339	0.027	0.00
194	16.17	0.13	0.030	0.337	0.027	0.00
195	16.25	0.13	0.030	0.335	0.027	0.00
196	16.33	0.13	0.030	0.333	0.027	0.00
197	16.42	0.13	0.030	0.332	0.027	0.00
198	16.50	0.13	0.030	0.330	0.027	0.00
199	16.58	0.10	0.022	0.328	0.020	0.00
200	16.67	0.10	0.022	0.327	0.020	0.00

201	16.75	0.10	0.022	0.325	0.020	0.00
202	16.83	0.10	0.022	0.323	0.020	0.00
203	16.92	0.10	0.022	0.322	0.020	0.00
204	17.00	0.10	0.022	0.320	0.020	0.00
205	17.08	0.17	0.037	0.319	0.033	0.00
206	17.17	0.17	0.037	0.317	0.033	0.00
207	17.25	0.17	0.037	0.315	0.033	0.00
208	17.33	0.17	0.037	0.314	0.033	0.00
209	17.42	0.17	0.037	0.312	0.033	0.00
210	17.50	0.17	0.037	0.311	0.033	0.00
211	17.58	0.17	0.037	0.309	0.033	0.00
212	17.67	0.17	0.037	0.308	0.033	0.00
213	17.75	0.17	0.037	0.306	0.033	0.00
214	17.83	0.13	0.030	0.304	0.027	0.00
215	17.92	0.13	0.030	0.303	0.027	0.00
216	18.00	0.13	0.030	0.301	0.027	0.00
217	18.08	0.13	0.030	0.300	0.027	0.00
218	18.17	0.13	0.030	0.299	0.027	0.00
219	18.25	0.13	0.030	0.297	0.027	0.00
220	18.33	0.13	0.030	0.296	0.027	0.00
221	18.42	0.13	0.030	0.294	0.027	0.00
222	18.50	0.13	0.030	0.293	0.027	0.00
223	18.58	0.10	0.022	0.291	0.020	0.00
224	18.67	0.10	0.022	0.290	0.020	0.00
225	18.75	0.10	0.022	0.289	0.020	0.00
226	18.83	0.07	0.015	0.287	0.013	0.00
227	18.92	0.07	0.015	0.286	0.013	0.00
228	19.00	0.07	0.015	0.284	0.013	0.00
229	19.08	0.10	0.022	0.283	0.020	0.00
230	19.17	0.10	0.022	0.282	0.020	0.00
231	19.25	0.10	0.022	0.280	0.020	0.00
232	19.33	0.13	0.030	0.279	0.027	0.00
233	19.42	0.13	0.030	0.278	0.027	0.00
234	19.50	0.13	0.030	0.277	0.027	0.00
235	19.58	0.10	0.022	0.275	0.020	0.00
236	19.67	0.10	0.022	0.274	0.020	0.00
237	19.75	0.10	0.022	0.273	0.020	0.00
238	19.83	0.07	0.015	0.272	0.013	0.00
239	19.92	0.07	0.015	0.270	0.013	0.00
240	20.00	0.07	0.015	0.269	0.013	0.00
241	20.08	0.10	0.022	0.268	0.020	0.00
242	20.17	0.10	0.022	0.267	0.020	0.00
243	20.25	0.10	0.022	0.266	0.020	0.00
244	20.33	0.10	0.022	0.264	0.020	0.00
245	20.42	0.10	0.022	0.263	0.020	0.00
246	20.50	0.10	0.022	0.262	0.020	0.00
247	20.58	0.10	0.022	0.261	0.020	0.00
248	20.67	0.10	0.022	0.260	0.020	0.00
249	20.75	0.10	0.022	0.259	0.020	0.00
250	20.83	0.07	0.015	0.258	0.013	0.00
251	20.92	0.07	0.015	0.257	0.013	0.00
252	21.00	0.07	0.015	0.256	0.013	0.00
253	21.08	0.10	0.022	0.255	0.020	0.00
254	21.17	0.10	0.022	0.254	0.020	0.00
255	21.25	0.10	0.022	0.253	0.020	0.00
256	21.33	0.07	0.015	0.252	0.013	0.00
257	21.42	0.07	0.015	0.251	0.013	0.00
258	21.50	0.07	0.015	0.250	0.013	0.00
259	21.58	0.10	0.022	0.249	0.020	0.00
260	21.67	0.10	0.022	0.248	0.020	0.00
261	21.75	0.10	0.022	0.247	0.020	0.00
262	21.83	0.07	0.015	0.246	0.013	0.00
263	21.92	0.07	0.015	0.246	0.013	0.00

264	22.00	0.07	0.015	0.245	0.013	0.00
265	22.08	0.10	0.022	0.244	0.020	0.00
266	22.17	0.10	0.022	0.243	0.020	0.00
267	22.25	0.10	0.022	0.242	0.020	0.00
268	22.33	0.07	0.015	0.242	0.013	0.00
269	22.42	0.07	0.015	0.241	0.013	0.00
270	22.50	0.07	0.015	0.240	0.013	0.00
271	22.58	0.07	0.015	0.239	0.013	0.00
272	22.67	0.07	0.015	0.239	0.013	0.00
273	22.75	0.07	0.015	0.238	0.013	0.00
274	22.83	0.07	0.015	0.238	0.013	0.00
275	22.92	0.07	0.015	0.237	0.013	0.00
276	23.00	0.07	0.015	0.236	0.013	0.00
277	23.08	0.07	0.015	0.236	0.013	0.00
278	23.17	0.07	0.015	0.235	0.013	0.00
279	23.25	0.07	0.015	0.235	0.013	0.00
280	23.33	0.07	0.015	0.234	0.013	0.00
281	23.42	0.07	0.015	0.234	0.013	0.00
282	23.50	0.07	0.015	0.233	0.013	0.00
283	23.58	0.07	0.015	0.233	0.013	0.00
284	23.67	0.07	0.015	0.233	0.013	0.00
285	23.75	0.07	0.015	0.232	0.013	0.00
286	23.83	0.07	0.015	0.232	0.013	0.00
287	23.92	0.07	0.015	0.232	0.013	0.00
288	24.00	0.07	0.015	0.232	0.013	0.00
Sum =	100.0				Sum =	2.2

Flood volume = Effective rainfall 0.18 (In)  
times area 19.1 (Ac.) / [(In) / (Ft.)] = 0.3 (Ac.Ft)  
Total soil loss = 1.66 (In)  
Total soil loss = 2.650 (Ac.Ft)  
Total rainfall = 1.85 (In)  
Flood volume = 12826.1 Cubic Feet  
Total soil loss = 115435.1 Cubic Feet

Peak flow rate of this hydrograph = 0.460 (CFS)

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

Hydrograph in 5 Minute intervals ((CFS))

Time (h+m)	Volume Ac.Ft	Q (CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q				
0+10	0.0000	0.00	Q				
0+15	0.0001	0.01	Q				
0+20	0.0002	0.02	Q				
0+25	0.0004	0.02	Q				
0+30	0.0006	0.03	Q				
0+35	0.0008	0.03	Q				
0+40	0.0010	0.03	Q				
0+45	0.0013	0.04	Q				
0+50	0.0015	0.04	Q				
0+55	0.0018	0.04	Q				
1+ 0	0.0021	0.04	Q				
1+ 5	0.0024	0.05	Q				
1+10	0.0028	0.05	Q				
1+15	0.0031	0.05	Q				
1+20	0.0034	0.04	Q				
1+25	0.0037	0.04	Q				
1+30	0.0040	0.04	Q				

1+35	0.0043	0.04	Q
1+40	0.0046	0.04	Q
1+45	0.0049	0.04	Q
1+50	0.0052	0.04	Q
1+55	0.0055	0.05	Q
2+ 0	0.0058	0.05	Q
2+ 5	0.0062	0.05	Q
2+10	0.0065	0.05	Q
2+15	0.0069	0.05	Q
2+20	0.0073	0.05	Q
2+25	0.0077	0.05	QV
2+30	0.0080	0.06	QV
2+35	0.0084	0.06	QV
2+40	0.0088	0.06	QV
2+45	0.0092	0.06	QV
2+50	0.0097	0.06	QV
2+55	0.0101	0.07	QV
3+ 0	0.0106	0.07	QV
3+ 5	0.0111	0.07	QV
3+10	0.0115	0.07	QV
3+15	0.0120	0.07	QV
3+20	0.0125	0.07	QV
3+25	0.0130	0.07	QV
3+30	0.0135	0.07	QV
3+35	0.0139	0.07	QV
3+40	0.0144	0.07	QV
3+45	0.0149	0.07	Q V
3+50	0.0154	0.07	Q V
3+55	0.0159	0.07	Q V
4+ 0	0.0164	0.08	Q V
4+ 5	0.0170	0.08	Q V
4+10	0.0175	0.08	Q V
4+15	0.0181	0.08	Q V
4+20	0.0187	0.08	Q V
4+25	0.0193	0.09	Q V
4+30	0.0199	0.09	Q V
4+35	0.0205	0.09	Q V
4+40	0.0212	0.09	Q V
4+45	0.0218	0.10	Q V
4+50	0.0225	0.10	Q V
4+55	0.0232	0.10	Q V
5+ 0	0.0239	0.10	Q V
5+ 5	0.0246	0.11	Q V
5+10	0.0253	0.10	Q V
5+15	0.0260	0.10	Q V
5+20	0.0266	0.09	Q V
5+25	0.0273	0.09	Q V
5+30	0.0279	0.10	Q V
5+35	0.0286	0.10	Q V
5+40	0.0293	0.10	Q V
5+45	0.0300	0.10	Q V
5+50	0.0308	0.11	Q V
5+55	0.0315	0.11	Q V
6+ 0	0.0323	0.11	Q V
6+ 5	0.0330	0.11	Q V
6+10	0.0338	0.11	Q V
6+15	0.0346	0.12	Q V
6+20	0.0355	0.12	Q V
6+25	0.0363	0.12	Q V
6+30	0.0372	0.12	Q V
6+35	0.0380	0.12	Q V
6+40	0.0389	0.13	Q V
6+45	0.0398	0.13	Q V

6+50	0.0407	0.13	Q	V				
6+55	0.0417	0.14	Q	V				
7+ 0	0.0426	0.14	Q	V				
7+ 5	0.0436	0.14	Q	V				
7+10	0.0445	0.14	Q	V				
7+15	0.0455	0.14	Q	V				
7+20	0.0465	0.14	Q	V				
7+25	0.0474	0.14	Q	V				
7+30	0.0485	0.15	Q	V				
7+35	0.0495	0.15	Q	V				
7+40	0.0506	0.15	Q	V				
7+45	0.0516	0.16	Q	V				
7+50	0.0528	0.16	Q	V				
7+55	0.0539	0.17	Q	V				
8+ 0	0.0551	0.17	Q	V				
8+ 5	0.0563	0.18	Q	V				
8+10	0.0575	0.18	Q	V				
8+15	0.0589	0.19	Q	V				
8+20	0.0602	0.20	Q	V				
8+25	0.0616	0.20	Q	V				
8+30	0.0630	0.20	Q	V				
8+35	0.0644	0.21	Q	V				
8+40	0.0659	0.21	Q	V				
8+45	0.0673	0.21	Q	V				
8+50	0.0688	0.22	Q	V				
8+55	0.0704	0.22	Q	V				
9+ 0	0.0719	0.23	Q	V				
9+ 5	0.0735	0.23	Q	V				
9+10	0.0752	0.24	Q	V				
9+15	0.0768	0.25	Q	V				
9+20	0.0786	0.25	Q	V				
9+25	0.0804	0.26	Q	V				
9+30	0.0822	0.27	Q	V				
9+35	0.0841	0.27	Q	V				
9+40	0.0860	0.28	Q	V				
9+45	0.0879	0.28	Q	V				
9+50	0.0899	0.29	Q	V				
9+55	0.0919	0.29	Q	V				
10+ 0	0.0939	0.30	Q	V				
10+ 5	0.0960	0.30	Q	V				
10+10	0.0980	0.29	Q	V				
10+15	0.0998	0.27	Q	V				
10+20	0.1015	0.25	Q	V				
10+25	0.1031	0.24	Q	V				
10+30	0.1048	0.23	Q	V				
10+35	0.1064	0.23	Q	V				
10+40	0.1080	0.24	Q	V				
10+45	0.1097	0.25	Q	V				
10+50	0.1116	0.27	Q	V				
10+55	0.1134	0.27	Q	V				
11+ 0	0.1153	0.27	Q	V				
11+ 5	0.1172	0.28	Q	V				
11+10	0.1191	0.28	Q	V				
11+15	0.1210	0.27	Q	V				
11+20	0.1229	0.27	Q	V				
11+25	0.1248	0.27	Q	V				
11+30	0.1266	0.27	Q	V				
11+35	0.1285	0.27	Q	V				
11+40	0.1303	0.27	Q	V				
11+45	0.1321	0.26	Q	V				
11+50	0.1338	0.25	Q	V				
11+55	0.1356	0.25	Q	V				
12+ 0	0.1373	0.25	Q	V				

12+ 5	0.1391	0.26	Q	V		
12+10	0.1410	0.27	Q	V		
12+15	0.1430	0.30	Q	V		
12+20	0.1452	0.32	Q	V		
12+25	0.1475	0.33	Q	V		
12+30	0.1498	0.34	Q	V		
12+35	0.1522	0.35	Q	V		
12+40	0.1547	0.36	Q	V		
12+45	0.1572	0.37	Q	V		
12+50	0.1597	0.37	Q	V		
12+55	0.1624	0.38	Q	V		
13+ 0	0.1651	0.39	Q	V		
13+ 5	0.1678	0.40	Q	V		
13+10	0.1706	0.41	Q	V		
13+15	0.1736	0.43	Q	V		
13+20	0.1766	0.44	Q	V		
13+25	0.1797	0.45	Q	V		
13+30	0.1829	0.46	Q	V		
13+35	0.1861	0.46	Q	V		
13+40	0.1891	0.44	Q	V		
13+45	0.1919	0.41	Q	V		
13+50	0.1946	0.38	Q	V		
13+55	0.1971	0.37	Q	V		
14+ 0	0.1996	0.36	Q	V		
14+ 5	0.2020	0.35	Q	V		
14+10	0.2045	0.36	Q	V		
14+15	0.2070	0.37	Q	V		
14+20	0.2096	0.38	Q	V		
14+25	0.2122	0.38	Q	V		
14+30	0.2148	0.38	Q	V		
14+35	0.2173	0.37	Q	V		
14+40	0.2199	0.37	Q	V		
14+45	0.2225	0.37	Q	V		
14+50	0.2250	0.37	Q	V		
14+55	0.2276	0.37	Q	V		
15+ 0	0.2301	0.37	Q	V		
15+ 5	0.2326	0.36	Q	V		
15+10	0.2351	0.36	Q	V		
15+15	0.2375	0.35	Q	V		
15+20	0.2399	0.35	Q	V		
15+25	0.2423	0.35	Q	V		
15+30	0.2447	0.34	Q	V		
15+35	0.2470	0.34	Q	V		
15+40	0.2492	0.33	Q	V		
15+45	0.2514	0.31	Q	V		
15+50	0.2534	0.30	Q	V		
15+55	0.2554	0.29	Q	V		
16+ 0	0.2574	0.29	Q	V		
16+ 5	0.2593	0.28	Q	V		
16+10	0.2610	0.25	Q	V		
16+15	0.2624	0.20	Q	V		
16+20	0.2634	0.15	Q	V		
16+25	0.2643	0.13	Q	V		
16+30	0.2651	0.11	Q	V		
16+35	0.2658	0.10	Q	V		
16+40	0.2664	0.09	Q	V		
16+45	0.2670	0.08	Q	V		
16+50	0.2675	0.07	Q	V		
16+55	0.2680	0.07	Q	V		
17+ 0	0.2684	0.06	Q	V		
17+ 5	0.2689	0.06	Q	V		
17+10	0.2693	0.06	Q	V		
17+15	0.2697	0.07	Q	V		

17+20	0.2702	0.07	Q	V
17+25	0.2707	0.07	Q	V
17+30	0.2712	0.07	Q	V
17+35	0.2717	0.07	Q	V
17+40	0.2722	0.07	Q	V
17+45	0.2726	0.07	Q	V
17+50	0.2731	0.07	Q	V
17+55	0.2736	0.07	Q	V
18+ 0	0.2740	0.06	Q	V
18+ 5	0.2744	0.06	Q	V
18+10	0.2749	0.06	Q	V
18+15	0.2753	0.06	Q	V
18+20	0.2757	0.06	Q	V
18+25	0.2761	0.06	Q	V
18+30	0.2765	0.06	Q	V
18+35	0.2769	0.06	Q	V
18+40	0.2772	0.06	Q	V
18+45	0.2776	0.05	Q	V
18+50	0.2779	0.05	Q	V
18+55	0.2783	0.05	Q	V
19+ 0	0.2785	0.04	Q	V
19+ 5	0.2788	0.04	Q	V
19+10	0.2791	0.04	Q	V
19+15	0.2793	0.04	Q	V
19+20	0.2796	0.04	Q	V
19+25	0.2799	0.04	Q	V
19+30	0.2803	0.05	Q	V
19+35	0.2806	0.05	Q	V
19+40	0.2810	0.05	Q	V
19+45	0.2813	0.05	Q	V
19+50	0.2816	0.05	Q	V
19+55	0.2819	0.04	Q	V
20+ 0	0.2822	0.04	Q	V
20+ 5	0.2824	0.04	Q	V
20+10	0.2826	0.04	Q	V
20+15	0.2829	0.04	Q	V
20+20	0.2832	0.04	Q	V
20+25	0.2835	0.04	Q	V
20+30	0.2838	0.04	Q	V
20+35	0.2840	0.04	Q	V
20+40	0.2843	0.04	Q	V
20+45	0.2846	0.04	Q	V
20+50	0.2849	0.04	Q	V
20+55	0.2852	0.04	Q	V
21+ 0	0.2854	0.04	Q	V
21+ 5	0.2857	0.03	Q	V
21+10	0.2859	0.03	Q	V
21+15	0.2862	0.04	Q	V
21+20	0.2864	0.04	Q	V
21+25	0.2867	0.04	Q	V
21+30	0.2870	0.04	Q	V
21+35	0.2872	0.03	Q	V
21+40	0.2874	0.03	Q	V
21+45	0.2877	0.04	Q	V
21+50	0.2879	0.04	Q	V
21+55	0.2882	0.04	Q	V
22+ 0	0.2884	0.04	Q	V
22+ 5	0.2887	0.03	Q	V
22+10	0.2889	0.03	Q	V
22+15	0.2892	0.04	Q	V
22+20	0.2894	0.04	Q	V
22+25	0.2897	0.04	Q	V
22+30	0.2899	0.03	Q	V

22+35	0.2901	0.03	Q	V
22+40	0.2904	0.03	Q	V
22+45	0.2906	0.03	Q	V
22+50	0.2908	0.03	Q	V
22+55	0.2910	0.03	Q	V
23+ 0	0.2912	0.03	Q	V
23+ 5	0.2914	0.03	Q	V
23+10	0.2916	0.03	Q	V
23+15	0.2918	0.03	Q	V
23+20	0.2920	0.03	Q	V
23+25	0.2922	0.03	Q	V
23+30	0.2924	0.03	Q	V
23+35	0.2926	0.03	Q	V
23+40	0.2928	0.03	Q	V
23+45	0.2930	0.03	Q	V
23+50	0.2932	0.03	Q	V
23+55	0.2934	0.03	Q	V
24+ 0	0.2936	0.03	Q	V
24+ 5	0.2938	0.03	Q	V
24+10	0.2939	0.02	Q	V
24+15	0.2941	0.02	Q	V
24+20	0.2941	0.01	Q	V
24+25	0.2942	0.01	Q	V
24+30	0.2942	0.01	Q	V
24+35	0.2943	0.01	Q	V
24+40	0.2943	0.00	Q	V
24+45	0.2943	0.00	Q	V
24+50	0.2944	0.00	Q	V
24+55	0.2944	0.00	Q	V
25+ 0	0.2944	0.00	Q	V
25+ 5	0.2944	0.00	Q	V
25+10	0.2944	0.00	Q	V
25+15	0.2944	0.00	Q	V
25+20	0.2944	0.00	Q	V
25+25	0.2944	0.00	Q	V
25+30	0.2944	0.00	Q	V
25+35	0.2944	0.00	Q	V
25+40	0.2944	0.00	Q	V
25+45	0.2944	0.00	Q	V
25+50	0.2944	0.00	Q	V
25+55	0.2944	0.00	Q	V

V



Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHVDQ5E15.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrgraph for 5 Year 1 Hour Storm - Existing Condition  
3963UNIHVDQ5E  
CB

-----  
Drainage Area = 19.10(Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.10(Ac.) = 0.030 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.240 Hr.  
Lag time = 14.39 Min.  
25% of lag time = 3.60 Min.  
40% of lag time = 5.76 Min.  
Unit time = 5.00 Min.  
Duration of storm = 1 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	0.47	8.98

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	1.25	23.88

STORM EVENT (YEAR) = 5.00  
Area Averaged 2-Year Rainfall = 0.470 (In)  
Area Averaged 100-Year Rainfall = 1.250 (In)

Point rain (area averaged) = 0.653 (In)  
Areal adjustment factor = 99.98 %  
Adjusted average point rain = 0.653 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.100                    78.00                    0.000  
 Total Area Entered =        19.10(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
78.0	60.6	0.464	0.000	0.464	1.000	0.464
						Sum (F) = 0.464

Area averaged mean soil loss (F) (In/Hr) = 0.464

Minimum soil loss rate ((In/Hr)) = 0.232

(for 24 hour storm duration)

Soil low loss rate (decimal) = 0.900

-----  
 Slope of intensity-duration curve for a 1 hour storm =0.5000  
 -----

U n i t   H y d r o g r a p h  
 VALLEY S-Curve

-----  
 Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	34.742	3.549
2	0.167	69.483	13.889
3	0.250	104.225	23.056
4	0.333	138.966	19.663
5	0.417	173.708	10.501
6	0.500	208.449	5.992
7	0.583	243.191	4.353
8	0.667	277.932	3.416
9	0.750	312.674	2.715
10	0.833	347.415	2.169
11	0.917	382.157	1.846
12	1.000	416.898	1.481
13	1.083	451.640	1.167
14	1.167	486.381	1.074
15	1.250	521.123	0.991
16	1.333	555.864	0.784
17	1.417	590.606	0.673
18	1.500	625.347	0.588
19	1.583	660.089	0.486
20	1.667	694.830	0.382
21	1.750	729.572	0.347
22	1.833	764.314	0.347
23	1.917	799.055	0.347
24	2.000	833.797	0.183
		Sum = 100.000	Sum= 19.249

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	4.20	0.329	0.464	0.296	0.03
2	0.17	4.30	0.337	0.464	0.303	0.03
3	0.25	5.00	0.392	0.464	0.352	0.04
4	0.33	5.00	0.392	0.464	0.352	0.04
5	0.42	5.80	0.454	0.464	0.409	0.05
6	0.50	6.50	0.509	0.464	---	0.05
7	0.58	7.40	0.579	0.464	---	0.12
8	0.67	8.60	0.673	0.464	---	0.21
9	0.75	12.30	0.963	0.464	---	0.50

10	0.83	29.10	2.279	0.464	---	1.82
11	0.92	6.80	0.533	0.464	---	0.07
12	1.00	5.00	0.392	0.464	0.352	0.04
Sum =		100.0				Sum = 3.0

Flood volume = Effective rainfall 0.25(In)  
times area 19.1(Ac.)/[ (In)/(Ft.) ] = 0.4(Ac.Ft)  
Total soil loss = 0.40(In)  
Total soil loss = 0.643(Ac.Ft)  
Total rainfall = 0.65(In)  
Flood volume = 17245.6 Cubic Feet  
Total soil loss = 27999.8 Cubic Feet

-----  
**Peak flow rate of this hydrograph = 10.849(CFS)**  
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1 - H O U R S T O R M  
R u n o f f H y d r o g r a p h

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

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0002	0.02	Q				
0+10	0.0009	0.11	Q				
0+15	0.0027	0.26	Q				
0+20	0.0055	0.41	Q				
0+25	0.0090	0.50	VQ				
0+30	0.0130	0.58	Q				
0+35	0.0178	0.70	Q				
0+40	0.0247	1.00	Q				
0+45	0.0371	1.80	Q				
0+50	0.0659	4.18	V Q				
0+55	0.1232	8.31	V	Q			
1+ 0	0.1979	10.85	V	Q	V Q		
1+ 5	0.2580	8.74			Q	V	
1+10	0.2926	5.02		Q		V	
1+15	0.3137	3.07		Q		V	
1+20	0.3291	2.22		Q		V	
1+25	0.3410	1.74		Q		V	
1+30	0.3505	1.38		Q		V	
1+35	0.3583	1.12		Q		V	
1+40	0.3647	0.94	Q			V	
1+45	0.3700	0.76	Q			V	
1+50	0.3743	0.62	Q			V	
1+55	0.3781	0.56	Q			V	
2+ 0	0.3816	0.50	Q			V	
2+ 5	0.3844	0.41	Q			V	
2+10	0.3868	0.35	Q			V	
2+15	0.3889	0.30	Q			V	
2+20	0.3906	0.25	Q			V	
2+25	0.3919	0.20	Q			V	
2+30	0.3932	0.18	Q			V	
2+35	0.3944	0.17	Q			V	
2+40	0.3954	0.15	Q			V	
2+45	0.3959	0.07	Q			V	
2+50	0.3959	0.01	Q			V	
2+55	0.3959	0.00	Q			V	

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Unit Hydrograph Analysis

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrgraph for 5 Year 3 Hour Storm - Existing Condition  
3963UNIHVDQ5E  
CB

-----  
Drainage Area = 19.10(Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.10(Ac.) = 0.030 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.240 Hr.  
Lag time = 14.39 Min.  
25% of lag time = 3.60 Min.  
40% of lag time = 5.76 Min.  
Unit time = 5.00 Min.  
Duration of storm = 3 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	0.80	15.28

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	1.93	36.86

STORM EVENT (YEAR) = 5.00  
Area Averaged 2-Year Rainfall = 0.800 (In)  
Area Averaged 100-Year Rainfall = 1.930 (In)

Point rain (area averaged) = 1.065 (In)  
Areal adjustment factor = 99.99 %  
Adjusted average point rain = 1.065 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.100                    78.00                    0.000  
 Total Area Entered =        19.10(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
78.0	60.6	0.464	0.000	0.464	1.000	0.464
						Sum (F) = 0.464

Area averaged mean soil loss (F) (In/Hr) = 0.464  
 Minimum soil loss rate ((In/Hr)) = 0.232  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.900

-----  
 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	34.742	3.549
2	0.167	69.483	13.889
3	0.250	104.225	23.056
4	0.333	138.966	19.663
5	0.417	173.708	10.501
6	0.500	208.449	5.992
7	0.583	243.191	4.353
8	0.667	277.932	3.416
9	0.750	312.674	2.715
10	0.833	347.415	2.169
11	0.917	382.157	1.846
12	1.000	416.898	1.481
13	1.083	451.640	1.167
14	1.167	486.381	1.074
15	1.250	521.123	0.991
16	1.333	555.864	0.784
17	1.417	590.606	0.673
18	1.500	625.347	0.588
19	1.583	660.089	0.486
20	1.667	694.830	0.382
21	1.750	729.572	0.347
22	1.833	764.314	0.347
23	1.917	799.055	0.347
24	2.000	833.797	0.183
Sum = 100.000			Sum= 19.249

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
			Max	Low	
1	0.08	1.30	0.464	0.149	0.02
2	0.17	1.30	0.464	0.149	0.02
3	0.25	1.10	0.464	0.126	0.01
4	0.33	1.50	0.464	0.172	0.02
5	0.42	1.50	0.464	0.172	0.02
6	0.50	1.80	0.464	0.207	0.02
7	0.58	1.50	0.464	0.172	0.02
8	0.67	1.80	0.464	0.207	0.02
9	0.75	1.80	0.464	0.207	0.02
10	0.83	1.50	0.464	0.172	0.02
11	0.92	1.60	0.464	0.184	0.02

12	1.00	1.80	0.230	0.464	0.207	0.02
13	1.08	2.20	0.281	0.464	0.253	0.03
14	1.17	2.20	0.281	0.464	0.253	0.03
15	1.25	2.20	0.281	0.464	0.253	0.03
16	1.33	2.00	0.256	0.464	0.230	0.03
17	1.42	2.60	0.332	0.464	0.299	0.03
18	1.50	2.70	0.345	0.464	0.310	0.03
19	1.58	2.40	0.307	0.464	0.276	0.03
20	1.67	2.70	0.345	0.464	0.310	0.03
21	1.75	3.30	0.422	0.464	0.379	0.04
22	1.83	3.10	0.396	0.464	0.356	0.04
23	1.92	2.90	0.370	0.464	0.333	0.04
24	2.00	3.00	0.383	0.464	0.345	0.04
25	2.08	3.10	0.396	0.464	0.356	0.04
26	2.17	4.20	0.537	0.464	---	0.07
27	2.25	5.00	0.639	0.464	---	0.18
28	2.33	3.50	0.447	0.464	0.402	0.04
29	2.42	6.80	0.869	0.464	---	0.41
30	2.50	7.30	0.933	0.464	---	0.47
31	2.58	8.20	1.048	0.464	---	0.58
32	2.67	5.90	0.754	0.464	---	0.29
33	2.75	2.00	0.256	0.464	0.230	0.03
34	2.83	1.80	0.230	0.464	0.207	0.02
35	2.92	1.80	0.230	0.464	0.207	0.02
36	3.00	0.60	0.077	0.464	0.069	0.01
Sum =	100.0				Sum =	2.8

Flood volume = Effective rainfall 0.23 (In)  
times area 19.1 (Ac.) / [(In) / (Ft.)] = 0.4 (Ac.Ft)  
Total soil loss = 0.83 (In)  
Total soil loss = 1.324 (Ac.Ft)  
Total rainfall = 1.06 (In)  
Flood volume = 16157.2 Cubic Feet  
Total soil loss = 57653.6 Cubic Feet

Peak flow rate of this hydrograph = 6.336 (CFS)

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

Hydrograph in 5 Minute intervals ((CFS))

Time (h+m)	Volume Ac.Ft	Q (CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0001	0.01	Q				
0+10	0.0005	0.06	Q				
0+15	0.0013	0.13	Q				
0+20	0.0026	0.19	Q				
0+25	0.0042	0.22	Q				
0+30	0.0059	0.26	VQ				
0+35	0.0080	0.29	VQ				
0+40	0.0102	0.32	Q				
0+45	0.0125	0.34	Q				
0+50	0.0150	0.36	Q				
0+55	0.0175	0.37	Q				
1+ 0	0.0201	0.37	QV				
1+ 5	0.0227	0.38	QV				
1+10	0.0255	0.41	QV				
1+15	0.0286	0.45	Q V				
1+20	0.0318	0.47	Q V				
1+25	0.0352	0.49	Q V				
1+30	0.0387	0.51	Q V				

1+35	0.0424	0.54	Q	V					
1+40	0.0463	0.57	Q	V					
1+45	0.0504	0.59	Q	V					
1+50	0.0547	0.62	Q	V					
1+55	0.0593	0.67	Q	V					
2+ 0	0.0640	0.69	Q	V					
2+ 5	0.0688	0.69	Q	V					
2+10	0.0738	0.73	Q	V					
2+15	0.0800	0.90	Q	V					
2+20	0.0885	1.24	Q	V					
2+25	0.1004	1.73	Q	V					
2+30	0.1184	2.62	Q	V					
2+35	0.1475	4.22				VQ			
2+40	0.1879	5.86				V	Q		
2+45	0.2315	6.34					VQ		
2+50	0.2679	5.28				Q		V	
2+55	0.2925	3.58			Q			V	
3+ 0	0.3088	2.37			Q			V	
3+ 5	0.3209	1.76			Q			V	
3+10	0.3303	1.37		Q				V	
3+15	0.3377	1.06		Q				V	
3+20	0.3435	0.85		Q				V	
3+25	0.3482	0.69	Q					V	
3+30	0.3521	0.57	Q					V	
3+35	0.3554	0.48	Q					V	
3+40	0.3583	0.41	Q					V	
3+45	0.3607	0.35	Q					V	
3+50	0.3628	0.30	Q					V	
3+55	0.3645	0.25	Q					V	
4+ 0	0.3660	0.21	Q					V	
4+ 5	0.3672	0.18	Q					V	
4+10	0.3682	0.15	Q					V	
4+15	0.3691	0.13	Q					V	
4+20	0.3699	0.11	Q					V	
4+25	0.3704	0.08	Q					V	
4+30	0.3707	0.05	Q					V	
4+35	0.3709	0.02	Q					V	
4+40	0.3709	0.00	Q					V	
4+45	0.3709	0.00	Q					V	
4+50	0.3709	0.00	Q					V	
4+55	0.3709	0.00	Q					V	V

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHQ5E65.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrgraph for 5 Year 6 Hour Storm - Existing Condition  
3963UNIHQ5E  
CB

-----  
Drainage Area = 19.10 (Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.10 (Ac.) = 0.030 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.240 Hr.  
Lag time = 14.39 Min.  
25% of lag time = 3.60 Min.  
40% of lag time = 5.76 Min.  
Unit time = 5.00 Min.  
Duration of storm = 6 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	1.10	21.01

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	2.60	49.66

STORM EVENT (YEAR) = 5.00  
Area Averaged 2-Year Rainfall = 1.100 (In)  
Area Averaged 100-Year Rainfall = 2.600 (In)

Point rain (area averaged) = 1.451 (In)  
Areal adjustment factor = 99.99 %  
Adjusted average point rain = 1.451 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %



19.100                    78.00                    0.000  
 Total Area Entered =        19.10(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
78.0	60.6	0.464	0.000	0.464	1.000	0.464
						Sum (F) = 0.464

Area averaged mean soil loss (F) (In/Hr) = 0.464  
 Minimum soil loss rate ((In/Hr)) = 0.232  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.900

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 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	34.742	3.549
2	0.167	69.483	13.889
3	0.250	104.225	23.056
4	0.333	138.966	19.663
5	0.417	173.708	10.501
6	0.500	208.449	5.992
7	0.583	243.191	4.353
8	0.667	277.932	3.416
9	0.750	312.674	2.715
10	0.833	347.415	2.169
11	0.917	382.157	1.846
12	1.000	416.898	1.481
13	1.083	451.640	1.167
14	1.167	486.381	1.074
15	1.250	521.123	0.991
16	1.333	555.864	0.784
17	1.417	590.606	0.673
18	1.500	625.347	0.588
19	1.583	660.089	0.486
20	1.667	694.830	0.382
21	1.750	729.572	0.347
22	1.833	764.314	0.347
23	1.917	799.055	0.347
24	2.000	833.797	0.183
		Sum = 100.000	Sum= 19.249

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)	
			Max	Low		
1	0.08	0.50	0.087	0.464	0.078	0.01
2	0.17	0.60	0.104	0.464	0.094	0.01
3	0.25	0.60	0.104	0.464	0.094	0.01
4	0.33	0.60	0.104	0.464	0.094	0.01
5	0.42	0.60	0.104	0.464	0.094	0.01
6	0.50	0.70	0.122	0.464	0.110	0.01
7	0.58	0.70	0.122	0.464	0.110	0.01
8	0.67	0.70	0.122	0.464	0.110	0.01
9	0.75	0.70	0.122	0.464	0.110	0.01
10	0.83	0.70	0.122	0.464	0.110	0.01
11	0.92	0.70	0.122	0.464	0.110	0.01

12	1.00	0.80	0.139	0.464	0.125	0.01
13	1.08	0.80	0.139	0.464	0.125	0.01
14	1.17	0.80	0.139	0.464	0.125	0.01
15	1.25	0.80	0.139	0.464	0.125	0.01
16	1.33	0.80	0.139	0.464	0.125	0.01
17	1.42	0.80	0.139	0.464	0.125	0.01
18	1.50	0.80	0.139	0.464	0.125	0.01
19	1.58	0.80	0.139	0.464	0.125	0.01
20	1.67	0.80	0.139	0.464	0.125	0.01
21	1.75	0.80	0.139	0.464	0.125	0.01
22	1.83	0.80	0.139	0.464	0.125	0.01
23	1.92	0.80	0.139	0.464	0.125	0.01
24	2.00	0.90	0.157	0.464	0.141	0.02
25	2.08	0.80	0.139	0.464	0.125	0.01
26	2.17	0.90	0.157	0.464	0.141	0.02
27	2.25	0.90	0.157	0.464	0.141	0.02
28	2.33	0.90	0.157	0.464	0.141	0.02
29	2.42	0.90	0.157	0.464	0.141	0.02
30	2.50	0.90	0.157	0.464	0.141	0.02
31	2.58	0.90	0.157	0.464	0.141	0.02
32	2.67	0.90	0.157	0.464	0.141	0.02
33	2.75	1.00	0.174	0.464	0.157	0.02
34	2.83	1.00	0.174	0.464	0.157	0.02
35	2.92	1.00	0.174	0.464	0.157	0.02
36	3.00	1.00	0.174	0.464	0.157	0.02
37	3.08	1.00	0.174	0.464	0.157	0.02
38	3.17	1.10	0.192	0.464	0.172	0.02
39	3.25	1.10	0.192	0.464	0.172	0.02
40	3.33	1.10	0.192	0.464	0.172	0.02
41	3.42	1.20	0.209	0.464	0.188	0.02
42	3.50	1.30	0.226	0.464	0.204	0.02
43	3.58	1.40	0.244	0.464	0.219	0.02
44	3.67	1.40	0.244	0.464	0.219	0.02
45	3.75	1.50	0.261	0.464	0.235	0.03
46	3.83	1.50	0.261	0.464	0.235	0.03
47	3.92	1.60	0.279	0.464	0.251	0.03
48	4.00	1.60	0.279	0.464	0.251	0.03
49	4.08	1.70	0.296	0.464	0.266	0.03
50	4.17	1.80	0.313	0.464	0.282	0.03
51	4.25	1.90	0.331	0.464	0.298	0.03
52	4.33	2.00	0.348	0.464	0.313	0.03
53	4.42	2.10	0.366	0.464	0.329	0.04
54	4.50	2.10	0.366	0.464	0.329	0.04
55	4.58	2.20	0.383	0.464	0.345	0.04
56	4.67	2.30	0.401	0.464	0.360	0.04
57	4.75	2.40	0.418	0.464	0.376	0.04
58	4.83	2.40	0.418	0.464	0.376	0.04
59	4.92	2.50	0.435	0.464	0.392	0.04
60	5.00	2.60	0.453	0.464	0.408	0.05
61	5.08	3.10	0.540	0.464	---	0.08
62	5.17	3.60	0.627	0.464	---	0.16
63	5.25	3.90	0.679	0.464	---	0.22
64	5.33	4.20	0.731	0.464	---	0.27
65	5.42	4.70	0.818	0.464	---	0.35
66	5.50	5.60	0.975	0.464	---	0.51
67	5.58	1.90	0.331	0.464	0.298	0.03
68	5.67	0.90	0.157	0.464	0.141	0.02
69	5.75	0.60	0.104	0.464	0.094	0.01
70	5.83	0.50	0.087	0.464	0.078	0.01
71	5.92	0.30	0.052	0.464	0.047	0.01
72	6.00	0.20	0.035	0.464	0.031	0.00

Sum = 100.0 Sum = 2.9

Flood volume = Effective rainfall 0.24 (In)

times area        19.1(Ac.)/[ (In)/(Ft.) ] =        0.4(Ac.Ft)  
 Total soil loss =        1.21(In)  
 Total soil loss =        1.926(Ac.Ft)  
 Total rainfall =        1.45(In)  
 Flood volume =        16723.1 Cubic Feet  
 Total soil loss =        83895.8 Cubic Feet

Peak flow rate of this hydrograph = 4.815(CFS)

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

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.01	Q				
0+10	0.0003	0.03	Q				
0+15	0.0008	0.07	Q				
0+20	0.0015	0.11	Q				
0+25	0.0025	0.14	Q				
0+30	0.0036	0.15	Q				
0+35	0.0047	0.17	Q				
0+40	0.0060	0.18	Q				
0+45	0.0073	0.19	Q				
0+50	0.0087	0.20	Q				
0+55	0.0101	0.21	QV				
1+ 0	0.0116	0.21	QV				
1+ 5	0.0131	0.22	QV				
1+10	0.0148	0.23	QV				
1+15	0.0164	0.24	QV				
1+20	0.0181	0.25	QV				
1+25	0.0199	0.25	QV				
1+30	0.0216	0.26	QV				
1+35	0.0234	0.26	QV				
1+40	0.0252	0.26	QV				
1+45	0.0270	0.26	QV				
1+50	0.0288	0.26	Q V				
1+55	0.0306	0.26	Q V				
2+ 0	0.0325	0.27	Q V				
2+ 5	0.0343	0.27	Q V				
2+10	0.0362	0.28	Q V				
2+15	0.0382	0.28	Q V				
2+20	0.0401	0.28	Q V				
2+25	0.0421	0.29	Q V				
2+30	0.0441	0.29	Q V				
2+35	0.0462	0.29	Q V				
2+40	0.0482	0.30	Q V				
2+45	0.0503	0.30	Q V				
2+50	0.0524	0.30	Q V				
2+55	0.0545	0.31	Q V				
3+ 0	0.0567	0.32	Q V				
3+ 5	0.0589	0.32	Q V				
3+10	0.0612	0.33	Q V				
3+15	0.0635	0.33	Q V				
3+20	0.0658	0.34	Q V				
3+25	0.0683	0.35	Q V				
3+30	0.0708	0.36	Q V				
3+35	0.0734	0.38	Q V				
3+40	0.0761	0.40	Q V				
3+45	0.0790	0.42	Q V				

3+50	0.0820	0.44	Q	V				
3+55	0.0852	0.46	Q	V				
4+ 0	0.0884	0.47	Q	V				
4+ 5	0.0918	0.49	Q	V				
4+10	0.0953	0.51	Q	V				
4+15	0.0989	0.53	Q	V				
4+20	0.1027	0.55	Q	V				
4+25	0.1067	0.58	Q	V				
4+30	0.1109	0.61	Q	V				
4+35	0.1153	0.63	Q	V				
4+40	0.1198	0.66	Q	V				
4+45	0.1245	0.68	Q	V				
4+50	0.1294	0.71	Q	V				
4+55	0.1345	0.73	Q	V				
5+ 0	0.1397	0.76	Q	V				
5+ 5	0.1452	0.80	Q	V				
5+10	0.1519	0.97	Q	V				
5+15	0.1614	1.39	Q	Q	V			
5+20	0.1758	2.08		Q	V			
5+25	0.1958	2.91		Q	Q	V		
5+30	0.2227	3.90			Q	V		
5+35	0.2559	4.81			Q	V		
5+40	0.2890	4.81			Q	V		
5+45	0.3137	3.59			Q	V		
5+50	0.3291	2.24		Q		V		
5+55	0.3397	1.54		Q		V		
6+ 0	0.3479	1.19	Q	Q		V		
6+ 5	0.3545	0.96	Q	Q		V		
6+10	0.3598	0.77	Q	Q		V		
6+15	0.3640	0.62	Q	Q		V		
6+20	0.3675	0.51	Q	Q		V		
6+25	0.3704	0.42	Q			V		
6+30	0.3728	0.35	Q			V		
6+35	0.3749	0.31	Q			V		
6+40	0.3767	0.26	Q			V		
6+45	0.3782	0.22	Q			V		
6+50	0.3795	0.18	Q			V		
6+55	0.3805	0.16	Q			V		
7+ 0	0.3814	0.13	Q			V		
7+ 5	0.3822	0.11	Q			V		
7+10	0.3828	0.09	Q			V		
7+15	0.3833	0.07	Q			V		
7+20	0.3837	0.05	Q			V		
7+25	0.3838	0.02	Q			V		
7+30	0.3839	0.00	Q			V		
7+35	0.3839	0.00	Q			V		
7+40	0.3839	0.00	Q			V		
7+45	0.3839	0.00	Q			V		
7+50	0.3839	0.00	Q			V		
7+55	0.3839	0.00	Q			V		V

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHVDQ5E245.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

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English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

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Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 5 Year 24 Hour Storm - Existing Condition  
3963UNIHVDQ5E  
CB

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Drainage Area = 19.10 (Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.10 (Ac.) = 0.030 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.240 Hr.  
Lag time = 14.39 Min.  
25% of lag time = 3.60 Min.  
40% of lag time = 5.76 Min.  
Unit time = 5.00 Min.  
Duration of storm = 24 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	1.85	35.34

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	5.00	95.50

STORM EVENT (YEAR) = 5.00  
Area Averaged 2-Year Rainfall = 1.850 (In)  
Area Averaged 100-Year Rainfall = 5.000 (In)

Point rain (area averaged) = 2.588 (In)  
Areal adjustment factor = 100.00 %  
Adjusted average point rain = 2.588 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.100                    78.00                    0.000  
 Total Area Entered =        19.10(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
78.0	60.6	0.464	0.000	0.464	1.000	0.464
						Sum (F) = 0.464

Area averaged mean soil loss (F) (In/Hr) = 0.464  
 Minimum soil loss rate ((In/Hr)) = 0.232  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.900

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 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	34.742	3.549
2	0.167	69.483	13.889
3	0.250	104.225	23.056
4	0.333	138.966	19.663
5	0.417	173.708	10.501
6	0.500	208.449	5.992
7	0.583	243.191	4.353
8	0.667	277.932	3.416
9	0.750	312.674	2.715
10	0.833	347.415	2.169
11	0.917	382.157	1.846
12	1.000	416.898	1.481
13	1.083	451.640	1.167
14	1.167	486.381	1.074
15	1.250	521.123	0.991
16	1.333	555.864	0.784
17	1.417	590.606	0.673
18	1.500	625.347	0.588
19	1.583	660.089	0.486
20	1.667	694.830	0.382
21	1.750	729.572	0.347
22	1.833	764.314	0.347
23	1.917	799.055	0.347
24	2.000	833.797	0.183
		Sum = 100.000	Sum= 19.249

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
			Max	Low	
1	0.08	0.021	0.822	0.019	0.00
2	0.17	0.021	0.819	0.019	0.00
3	0.25	0.021	0.815	0.019	0.00
4	0.33	0.031	0.812	0.028	0.00
5	0.42	0.031	0.809	0.028	0.00
6	0.50	0.031	0.806	0.028	0.00
7	0.58	0.031	0.803	0.028	0.00
8	0.67	0.031	0.800	0.028	0.00
9	0.75	0.031	0.796	0.028	0.00
10	0.83	0.041	0.793	0.037	0.00
11	0.92	0.041	0.790	0.037	0.00

12	1.00	0.13	0.041	0.787	0.037	0.00
13	1.08	0.10	0.031	0.784	0.028	0.00
14	1.17	0.10	0.031	0.781	0.028	0.00
15	1.25	0.10	0.031	0.778	0.028	0.00
16	1.33	0.10	0.031	0.775	0.028	0.00
17	1.42	0.10	0.031	0.772	0.028	0.00
18	1.50	0.10	0.031	0.769	0.028	0.00
19	1.58	0.10	0.031	0.765	0.028	0.00
20	1.67	0.10	0.031	0.762	0.028	0.00
21	1.75	0.10	0.031	0.759	0.028	0.00
22	1.83	0.13	0.041	0.756	0.037	0.00
23	1.92	0.13	0.041	0.753	0.037	0.00
24	2.00	0.13	0.041	0.750	0.037	0.00
25	2.08	0.13	0.041	0.747	0.037	0.00
26	2.17	0.13	0.041	0.744	0.037	0.00
27	2.25	0.13	0.041	0.741	0.037	0.00
28	2.33	0.13	0.041	0.738	0.037	0.00
29	2.42	0.13	0.041	0.735	0.037	0.00
30	2.50	0.13	0.041	0.732	0.037	0.00
31	2.58	0.17	0.052	0.729	0.047	0.01
32	2.67	0.17	0.052	0.726	0.047	0.01
33	2.75	0.17	0.052	0.723	0.047	0.01
34	2.83	0.17	0.052	0.720	0.047	0.01
35	2.92	0.17	0.052	0.717	0.047	0.01
36	3.00	0.17	0.052	0.714	0.047	0.01
37	3.08	0.17	0.052	0.711	0.047	0.01
38	3.17	0.17	0.052	0.708	0.047	0.01
39	3.25	0.17	0.052	0.705	0.047	0.01
40	3.33	0.17	0.052	0.702	0.047	0.01
41	3.42	0.17	0.052	0.699	0.047	0.01
42	3.50	0.17	0.052	0.697	0.047	0.01
43	3.58	0.17	0.052	0.694	0.047	0.01
44	3.67	0.17	0.052	0.691	0.047	0.01
45	3.75	0.17	0.052	0.688	0.047	0.01
46	3.83	0.20	0.062	0.685	0.056	0.01
47	3.92	0.20	0.062	0.682	0.056	0.01
48	4.00	0.20	0.062	0.679	0.056	0.01
49	4.08	0.20	0.062	0.676	0.056	0.01
50	4.17	0.20	0.062	0.673	0.056	0.01
51	4.25	0.20	0.062	0.670	0.056	0.01
52	4.33	0.23	0.072	0.668	0.065	0.01
53	4.42	0.23	0.072	0.665	0.065	0.01
54	4.50	0.23	0.072	0.662	0.065	0.01
55	4.58	0.23	0.072	0.659	0.065	0.01
56	4.67	0.23	0.072	0.656	0.065	0.01
57	4.75	0.23	0.072	0.653	0.065	0.01
58	4.83	0.27	0.083	0.651	0.075	0.01
59	4.92	0.27	0.083	0.648	0.075	0.01
60	5.00	0.27	0.083	0.645	0.075	0.01
61	5.08	0.20	0.062	0.642	0.056	0.01
62	5.17	0.20	0.062	0.639	0.056	0.01
63	5.25	0.20	0.062	0.637	0.056	0.01
64	5.33	0.23	0.072	0.634	0.065	0.01
65	5.42	0.23	0.072	0.631	0.065	0.01
66	5.50	0.23	0.072	0.628	0.065	0.01
67	5.58	0.27	0.083	0.626	0.075	0.01
68	5.67	0.27	0.083	0.623	0.075	0.01
69	5.75	0.27	0.083	0.620	0.075	0.01
70	5.83	0.27	0.083	0.617	0.075	0.01
71	5.92	0.27	0.083	0.615	0.075	0.01
72	6.00	0.27	0.083	0.612	0.075	0.01
73	6.08	0.30	0.093	0.609	0.084	0.01
74	6.17	0.30	0.093	0.606	0.084	0.01

75	6.25	0.30	0.093	0.604	0.084	0.01
76	6.33	0.30	0.093	0.601	0.084	0.01
77	6.42	0.30	0.093	0.598	0.084	0.01
78	6.50	0.30	0.093	0.596	0.084	0.01
79	6.58	0.33	0.104	0.593	0.093	0.01
80	6.67	0.33	0.104	0.590	0.093	0.01
81	6.75	0.33	0.104	0.588	0.093	0.01
82	6.83	0.33	0.104	0.585	0.093	0.01
83	6.92	0.33	0.104	0.582	0.093	0.01
84	7.00	0.33	0.104	0.580	0.093	0.01
85	7.08	0.33	0.104	0.577	0.093	0.01
86	7.17	0.33	0.104	0.574	0.093	0.01
87	7.25	0.33	0.104	0.572	0.093	0.01
88	7.33	0.37	0.114	0.569	0.102	0.01
89	7.42	0.37	0.114	0.567	0.102	0.01
90	7.50	0.37	0.114	0.564	0.102	0.01
91	7.58	0.40	0.124	0.561	0.112	0.01
92	7.67	0.40	0.124	0.559	0.112	0.01
93	7.75	0.40	0.124	0.556	0.112	0.01
94	7.83	0.43	0.135	0.554	0.121	0.01
95	7.92	0.43	0.135	0.551	0.121	0.01
96	8.00	0.43	0.135	0.549	0.121	0.01
97	8.08	0.50	0.155	0.546	0.140	0.02
98	8.17	0.50	0.155	0.543	0.140	0.02
99	8.25	0.50	0.155	0.541	0.140	0.02
100	8.33	0.50	0.155	0.538	0.140	0.02
101	8.42	0.50	0.155	0.536	0.140	0.02
102	8.50	0.50	0.155	0.533	0.140	0.02
103	8.58	0.53	0.166	0.531	0.149	0.02
104	8.67	0.53	0.166	0.528	0.149	0.02
105	8.75	0.53	0.166	0.526	0.149	0.02
106	8.83	0.57	0.176	0.523	0.158	0.02
107	8.92	0.57	0.176	0.521	0.158	0.02
108	9.00	0.57	0.176	0.518	0.158	0.02
109	9.08	0.63	0.197	0.516	0.177	0.02
110	9.17	0.63	0.197	0.514	0.177	0.02
111	9.25	0.63	0.197	0.511	0.177	0.02
112	9.33	0.67	0.207	0.509	0.186	0.02
113	9.42	0.67	0.207	0.506	0.186	0.02
114	9.50	0.67	0.207	0.504	0.186	0.02
115	9.58	0.70	0.217	0.501	0.196	0.02
116	9.67	0.70	0.217	0.499	0.196	0.02
117	9.75	0.70	0.217	0.497	0.196	0.02
118	9.83	0.73	0.228	0.494	0.205	0.02
119	9.92	0.73	0.228	0.492	0.205	0.02
120	10.00	0.73	0.228	0.489	0.205	0.02
121	10.08	0.50	0.155	0.487	0.140	0.02
122	10.17	0.50	0.155	0.485	0.140	0.02
123	10.25	0.50	0.155	0.482	0.140	0.02
124	10.33	0.50	0.155	0.480	0.140	0.02
125	10.42	0.50	0.155	0.478	0.140	0.02
126	10.50	0.50	0.155	0.475	0.140	0.02
127	10.58	0.67	0.207	0.473	0.186	0.02
128	10.67	0.67	0.207	0.471	0.186	0.02
129	10.75	0.67	0.207	0.468	0.186	0.02
130	10.83	0.67	0.207	0.466	0.186	0.02
131	10.92	0.67	0.207	0.464	0.186	0.02
132	11.00	0.67	0.207	0.462	0.186	0.02
133	11.08	0.63	0.197	0.459	0.177	0.02
134	11.17	0.63	0.197	0.457	0.177	0.02
135	11.25	0.63	0.197	0.455	0.177	0.02
136	11.33	0.63	0.197	0.453	0.177	0.02
137	11.42	0.63	0.197	0.450	0.177	0.02



138	11.50	0.63	0.197	0.448	0.177	0.02
139	11.58	0.57	0.176	0.446	0.158	0.02
140	11.67	0.57	0.176	0.444	0.158	0.02
141	11.75	0.57	0.176	0.441	0.158	0.02
142	11.83	0.60	0.186	0.439	0.168	0.02
143	11.92	0.60	0.186	0.437	0.168	0.02
144	12.00	0.60	0.186	0.435	0.168	0.02
145	12.08	0.83	0.259	0.433	0.233	0.03
146	12.17	0.83	0.259	0.431	0.233	0.03
147	12.25	0.83	0.259	0.428	0.233	0.03
148	12.33	0.87	0.269	0.426	0.242	0.03
149	12.42	0.87	0.269	0.424	0.242	0.03
150	12.50	0.87	0.269	0.422	0.242	0.03
151	12.58	0.93	0.290	0.420	0.261	0.03
152	12.67	0.93	0.290	0.418	0.261	0.03
153	12.75	0.93	0.290	0.416	0.261	0.03
154	12.83	0.97	0.300	0.413	0.270	0.03
155	12.92	0.97	0.300	0.411	0.270	0.03
156	13.00	0.97	0.300	0.409	0.270	0.03
157	13.08	1.13	0.352	0.407	0.317	0.04
158	13.17	1.13	0.352	0.405	0.317	0.04
159	13.25	1.13	0.352	0.403	0.317	0.04
160	13.33	1.13	0.352	0.401	0.317	0.04
161	13.42	1.13	0.352	0.399	0.317	0.04
162	13.50	1.13	0.352	0.397	0.317	0.04
163	13.58	0.77	0.238	0.395	0.214	0.02
164	13.67	0.77	0.238	0.393	0.214	0.02
165	13.75	0.77	0.238	0.391	0.214	0.02
166	13.83	0.77	0.238	0.389	0.214	0.02
167	13.92	0.77	0.238	0.387	0.214	0.02
168	14.00	0.77	0.238	0.385	0.214	0.02
169	14.08	0.90	0.279	0.383	0.252	0.03
170	14.17	0.90	0.279	0.381	0.252	0.03
171	14.25	0.90	0.279	0.379	0.252	0.03
172	14.33	0.87	0.269	0.377	0.242	0.03
173	14.42	0.87	0.269	0.375	0.242	0.03
174	14.50	0.87	0.269	0.373	0.242	0.03
175	14.58	0.87	0.269	0.371	0.242	0.03
176	14.67	0.87	0.269	0.370	0.242	0.03
177	14.75	0.87	0.269	0.368	0.242	0.03
178	14.83	0.83	0.259	0.366	0.233	0.03
179	14.92	0.83	0.259	0.364	0.233	0.03
180	15.00	0.83	0.259	0.362	0.233	0.03
181	15.08	0.80	0.248	0.360	0.224	0.02
182	15.17	0.80	0.248	0.358	0.224	0.02
183	15.25	0.80	0.248	0.356	0.224	0.02
184	15.33	0.77	0.238	0.355	0.214	0.02
185	15.42	0.77	0.238	0.353	0.214	0.02
186	15.50	0.77	0.238	0.351	0.214	0.02
187	15.58	0.63	0.197	0.349	0.177	0.02
188	15.67	0.63	0.197	0.347	0.177	0.02
189	15.75	0.63	0.197	0.346	0.177	0.02
190	15.83	0.63	0.197	0.344	0.177	0.02
191	15.92	0.63	0.197	0.342	0.177	0.02
192	16.00	0.63	0.197	0.340	0.177	0.02
193	16.08	0.13	0.041	0.339	0.037	0.00
194	16.17	0.13	0.041	0.337	0.037	0.00
195	16.25	0.13	0.041	0.335	0.037	0.00
196	16.33	0.13	0.041	0.333	0.037	0.00
197	16.42	0.13	0.041	0.332	0.037	0.00
198	16.50	0.13	0.041	0.330	0.037	0.00
199	16.58	0.10	0.031	0.328	0.028	0.00
200	16.67	0.10	0.031	0.327	0.028	0.00

201	16.75	0.10	0.031	0.325	0.028	0.00
202	16.83	0.10	0.031	0.323	0.028	0.00
203	16.92	0.10	0.031	0.322	0.028	0.00
204	17.00	0.10	0.031	0.320	0.028	0.00
205	17.08	0.17	0.052	0.319	0.047	0.01
206	17.17	0.17	0.052	0.317	0.047	0.01
207	17.25	0.17	0.052	0.315	0.047	0.01
208	17.33	0.17	0.052	0.314	0.047	0.01
209	17.42	0.17	0.052	0.312	0.047	0.01
210	17.50	0.17	0.052	0.311	0.047	0.01
211	17.58	0.17	0.052	0.309	0.047	0.01
212	17.67	0.17	0.052	0.308	0.047	0.01
213	17.75	0.17	0.052	0.306	0.047	0.01
214	17.83	0.13	0.041	0.304	0.037	0.00
215	17.92	0.13	0.041	0.303	0.037	0.00
216	18.00	0.13	0.041	0.301	0.037	0.00
217	18.08	0.13	0.041	0.300	0.037	0.00
218	18.17	0.13	0.041	0.299	0.037	0.00
219	18.25	0.13	0.041	0.297	0.037	0.00
220	18.33	0.13	0.041	0.296	0.037	0.00
221	18.42	0.13	0.041	0.294	0.037	0.00
222	18.50	0.13	0.041	0.293	0.037	0.00
223	18.58	0.10	0.031	0.291	0.028	0.00
224	18.67	0.10	0.031	0.290	0.028	0.00
225	18.75	0.10	0.031	0.289	0.028	0.00
226	18.83	0.07	0.021	0.287	0.019	0.00
227	18.92	0.07	0.021	0.286	0.019	0.00
228	19.00	0.07	0.021	0.284	0.019	0.00
229	19.08	0.10	0.031	0.283	0.028	0.00
230	19.17	0.10	0.031	0.282	0.028	0.00
231	19.25	0.10	0.031	0.280	0.028	0.00
232	19.33	0.13	0.041	0.279	0.037	0.00
233	19.42	0.13	0.041	0.278	0.037	0.00
234	19.50	0.13	0.041	0.277	0.037	0.00
235	19.58	0.10	0.031	0.275	0.028	0.00
236	19.67	0.10	0.031	0.274	0.028	0.00
237	19.75	0.10	0.031	0.273	0.028	0.00
238	19.83	0.07	0.021	0.272	0.019	0.00
239	19.92	0.07	0.021	0.270	0.019	0.00
240	20.00	0.07	0.021	0.269	0.019	0.00
241	20.08	0.10	0.031	0.268	0.028	0.00
242	20.17	0.10	0.031	0.267	0.028	0.00
243	20.25	0.10	0.031	0.266	0.028	0.00
244	20.33	0.10	0.031	0.264	0.028	0.00
245	20.42	0.10	0.031	0.263	0.028	0.00
246	20.50	0.10	0.031	0.262	0.028	0.00
247	20.58	0.10	0.031	0.261	0.028	0.00
248	20.67	0.10	0.031	0.260	0.028	0.00
249	20.75	0.10	0.031	0.259	0.028	0.00
250	20.83	0.07	0.021	0.258	0.019	0.00
251	20.92	0.07	0.021	0.257	0.019	0.00
252	21.00	0.07	0.021	0.256	0.019	0.00
253	21.08	0.10	0.031	0.255	0.028	0.00
254	21.17	0.10	0.031	0.254	0.028	0.00
255	21.25	0.10	0.031	0.253	0.028	0.00
256	21.33	0.07	0.021	0.252	0.019	0.00
257	21.42	0.07	0.021	0.251	0.019	0.00
258	21.50	0.07	0.021	0.250	0.019	0.00
259	21.58	0.10	0.031	0.249	0.028	0.00
260	21.67	0.10	0.031	0.248	0.028	0.00
261	21.75	0.10	0.031	0.247	0.028	0.00
262	21.83	0.07	0.021	0.246	0.019	0.00
263	21.92	0.07	0.021	0.246	0.019	0.00

264	22.00	0.07	0.021	0.245	0.019	0.00
265	22.08	0.10	0.031	0.244	0.028	0.00
266	22.17	0.10	0.031	0.243	0.028	0.00
267	22.25	0.10	0.031	0.242	0.028	0.00
268	22.33	0.07	0.021	0.242	0.019	0.00
269	22.42	0.07	0.021	0.241	0.019	0.00
270	22.50	0.07	0.021	0.240	0.019	0.00
271	22.58	0.07	0.021	0.239	0.019	0.00
272	22.67	0.07	0.021	0.239	0.019	0.00
273	22.75	0.07	0.021	0.238	0.019	0.00
274	22.83	0.07	0.021	0.238	0.019	0.00
275	22.92	0.07	0.021	0.237	0.019	0.00
276	23.00	0.07	0.021	0.236	0.019	0.00
277	23.08	0.07	0.021	0.236	0.019	0.00
278	23.17	0.07	0.021	0.235	0.019	0.00
279	23.25	0.07	0.021	0.235	0.019	0.00
280	23.33	0.07	0.021	0.234	0.019	0.00
281	23.42	0.07	0.021	0.234	0.019	0.00
282	23.50	0.07	0.021	0.233	0.019	0.00
283	23.58	0.07	0.021	0.233	0.019	0.00
284	23.67	0.07	0.021	0.233	0.019	0.00
285	23.75	0.07	0.021	0.232	0.019	0.00
286	23.83	0.07	0.021	0.232	0.019	0.00
287	23.92	0.07	0.021	0.232	0.019	0.00
288	24.00	0.07	0.021	0.232	0.019	0.00
Sum =	100.0				Sum =	3.1

Flood volume = Effective rainfall 0.26 (In)  
 times area 19.1 (Ac.) / [(In) / (Ft.)] = 0.4 (Ac.Ft)  
 Total soil loss = 2.33 (In)  
 Total soil loss = 3.707 (Ac.Ft)  
 Total rainfall = 2.59 (In)  
 Flood volume = 17941.4 Cubic Feet  
 Total soil loss = 161472.3 Cubic Feet

Peak flow rate of this hydrograph = 0.645 (CFS)

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

Hydrograph in 5 Minute intervals ((CFS))

Time (h+m)	Volume Ac.Ft	Q (CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q				
0+10	0.0001	0.01	Q				
0+15	0.0002	0.02	Q				
0+20	0.0003	0.02	Q				
0+25	0.0006	0.03	Q				
0+30	0.0008	0.04	Q				
0+35	0.0011	0.04	Q				
0+40	0.0015	0.05	Q				
0+45	0.0018	0.05	Q				
0+50	0.0022	0.05	Q				
0+55	0.0026	0.06	Q				
1+ 0	0.0030	0.06	Q				
1+ 5	0.0034	0.07	Q				
1+10	0.0039	0.07	Q				
1+15	0.0043	0.06	Q				
1+20	0.0048	0.06	Q				
1+25	0.0052	0.06	Q				
1+30	0.0056	0.06	Q				

1+35	0.0060	0.06	Q
1+40	0.0064	0.06	Q
1+45	0.0068	0.06	Q
1+50	0.0073	0.06	Q
1+55	0.0077	0.06	Q
2+ 0	0.0082	0.07	Q
2+ 5	0.0087	0.07	Q
2+10	0.0092	0.07	Q
2+15	0.0097	0.08	Q
2+20	0.0102	0.08	Q
2+25	0.0107	0.08	QV
2+30	0.0113	0.08	QV
2+35	0.0118	0.08	QV
2+40	0.0124	0.08	QV
2+45	0.0130	0.09	QV
2+50	0.0136	0.09	QV
2+55	0.0142	0.09	QV
3+ 0	0.0149	0.09	QV
3+ 5	0.0155	0.10	QV
3+10	0.0162	0.10	QV
3+15	0.0169	0.10	QV
3+20	0.0175	0.10	QV
3+25	0.0182	0.10	QV
3+30	0.0189	0.10	QV
3+35	0.0196	0.10	QV
3+40	0.0202	0.10	QV
3+45	0.0209	0.10	Q V
3+50	0.0216	0.10	Q V
3+55	0.0223	0.10	Q V
4+ 0	0.0231	0.11	Q V
4+ 5	0.0238	0.11	Q V
4+10	0.0246	0.11	Q V
4+15	0.0254	0.11	Q V
4+20	0.0262	0.12	Q V
4+25	0.0270	0.12	Q V
4+30	0.0279	0.13	Q V
4+35	0.0288	0.13	Q V
4+40	0.0297	0.13	Q V
4+45	0.0306	0.13	Q V
4+50	0.0315	0.14	Q V
4+55	0.0325	0.14	Q V
5+ 0	0.0335	0.14	Q V
5+ 5	0.0345	0.15	Q V
5+10	0.0355	0.14	Q V
5+15	0.0364	0.14	Q V
5+20	0.0373	0.13	Q V
5+25	0.0382	0.13	Q V
5+30	0.0392	0.13	Q V
5+35	0.0401	0.14	Q V
5+40	0.0411	0.14	Q V
5+45	0.0421	0.15	Q V
5+50	0.0431	0.15	Q V
5+55	0.0442	0.15	Q V
6+ 0	0.0452	0.15	Q V
6+ 5	0.0463	0.16	Q V
6+10	0.0474	0.16	Q V
6+15	0.0485	0.16	Q V
6+20	0.0497	0.17	Q V
6+25	0.0509	0.17	Q V
6+30	0.0521	0.17	Q V
6+35	0.0533	0.17	Q V
6+40	0.0545	0.18	Q V
6+45	0.0558	0.18	Q V

6+50	0.0571	0.19	Q	V				
6+55	0.0584	0.19	Q	V				
7+ 0	0.0597	0.19	Q	V				
7+ 5	0.0611	0.19	Q	V				
7+10	0.0624	0.19	Q	V				
7+15	0.0638	0.20	Q	V				
7+20	0.0651	0.20	Q	V				
7+25	0.0665	0.20	Q	V				
7+30	0.0679	0.21	Q	V				
7+35	0.0694	0.21	Q	V				
7+40	0.0708	0.22	Q	V				
7+45	0.0724	0.22	Q	V				
7+50	0.0739	0.23	Q	V				
7+55	0.0755	0.23	Q	V				
8+ 0	0.0772	0.24	Q	V				
8+ 5	0.0789	0.25	Q	V				
8+10	0.0806	0.26	Q	V				
8+15	0.0825	0.27	Q	V				
8+20	0.0844	0.28	Q	V				
8+25	0.0863	0.28	Q	V				
8+30	0.0883	0.28	Q	V				
8+35	0.0903	0.29	Q	V				
8+40	0.0923	0.29	Q	V				
8+45	0.0943	0.30	Q	V				
8+50	0.0964	0.31	Q	V				
8+55	0.0986	0.31	Q	V				
9+ 0	0.1008	0.32	Q	V				
9+ 5	0.1030	0.33	Q	V				
9+10	0.1053	0.33	Q	V				
9+15	0.1077	0.35	Q	V				
9+20	0.1101	0.36	Q	V				
9+25	0.1127	0.36	Q	V				
9+30	0.1152	0.37	Q	V				
9+35	0.1178	0.38	Q	V				
9+40	0.1205	0.39	Q	V				
9+45	0.1232	0.39	Q	V				
9+50	0.1260	0.40	Q	V				
9+55	0.1288	0.41	Q	V				
10+ 0	0.1316	0.42	Q	V				
10+ 5	0.1345	0.42	Q	V				
10+10	0.1373	0.40	Q	V				
10+15	0.1398	0.37	Q	V				
10+20	0.1422	0.35	Q	V				
10+25	0.1445	0.33	Q	V				
10+30	0.1467	0.33	Q	V				
10+35	0.1490	0.32	Q	V				
10+40	0.1513	0.33	Q	V				
10+45	0.1537	0.35	Q	V				
10+50	0.1563	0.37	Q	V				
10+55	0.1589	0.38	Q	V				
11+ 0	0.1615	0.38	Q	V				
11+ 5	0.1642	0.39	Q	V				
11+10	0.1669	0.39	Q	V				
11+15	0.1695	0.38	Q	V				
11+20	0.1721	0.38	Q	V				
11+25	0.1747	0.38	Q	V				
11+30	0.1773	0.38	Q	V				
11+35	0.1799	0.38	Q	V				
11+40	0.1825	0.37	Q	V				
11+45	0.1850	0.36	Q	V				
11+50	0.1874	0.36	Q	V				
11+55	0.1899	0.35	Q	V				
12+ 0	0.1923	0.36	Q	V				

12+ 5	0.1948	0.36	Q	V		
12+10	0.1975	0.38	Q	V		
12+15	0.2003	0.42	Q	V		
12+20	0.2034	0.44	Q	V		
12+25	0.2066	0.46	Q	V		
12+30	0.2098	0.47	Q	V		
12+35	0.2132	0.49	Q	V		
12+40	0.2166	0.50	Q	V		
12+45	0.2201	0.51	Q	V		
12+50	0.2238	0.52	Q	V		
12+55	0.2274	0.53	Q	V		
13+ 0	0.2312	0.54	Q	V		
13+ 5	0.2350	0.56	Q	V		
13+10	0.2390	0.57	Q	V		
13+15	0.2431	0.60	Q	V		
13+20	0.2474	0.62	Q	V		
13+25	0.2518	0.64	Q	V		
13+30	0.2562	0.65	Q	V		
13+35	0.2607	0.64	Q	V		
13+40	0.2649	0.62	Q	V		
13+45	0.2689	0.57	Q	V		
13+50	0.2725	0.53	Q	V		
13+55	0.2760	0.51	Q	V		
14+ 0	0.2795	0.50	Q	V		
14+ 5	0.2829	0.50	Q	V		
14+10	0.2863	0.50	Q	V		
14+15	0.2899	0.51	Q	V		
14+20	0.2935	0.53	Q	V		
14+25	0.2971	0.53	Q	V		
14+30	0.3008	0.53	Q	V		
14+35	0.3044	0.52	Q	V		
14+40	0.3079	0.52	Q	V		
14+45	0.3115	0.52	Q	V		
14+50	0.3151	0.52	Q	V		
14+55	0.3187	0.52	Q	V		
15+ 0	0.3222	0.51	Q	V		
15+ 5	0.3257	0.51	Q	V		
15+10	0.3291	0.50	Q	V		
15+15	0.3325	0.50	Q	V		
15+20	0.3359	0.49	Q	V		
15+25	0.3392	0.48	Q	V		
15+30	0.3425	0.48	Q	V		
15+35	0.3458	0.47	Q	V		
15+40	0.3489	0.45	Q	V		
15+45	0.3519	0.43	Q	V		
15+50	0.3548	0.42	Q	V		
15+55	0.3576	0.41	Q	V		
16+ 0	0.3603	0.40	Q	V		
16+ 5	0.3630	0.39	Q	V		
16+10	0.3654	0.34	Q	V		
16+15	0.3672	0.27	Q	V		
16+20	0.3687	0.21	Q	V		
16+25	0.3699	0.18	Q	V		
16+30	0.3710	0.16	Q	V		
16+35	0.3719	0.14	Q	V		
16+40	0.3728	0.13	Q	V		
16+45	0.3736	0.11	Q	V		
16+50	0.3743	0.10	Q	V		
16+55	0.3750	0.09	Q	V		
17+ 0	0.3756	0.09	Q	V		
17+ 5	0.3762	0.08	Q	V		
17+10	0.3768	0.09	Q	V		
17+15	0.3774	0.09	Q	V		

17+20	0.3780	0.10	Q	V
17+25	0.3787	0.10	Q	V
17+30	0.3794	0.10	Q	V
17+35	0.3801	0.10	Q	V
17+40	0.3808	0.10	Q	V
17+45	0.3814	0.10	Q	V
17+50	0.3821	0.10	Q	V
17+55	0.3827	0.09	Q	V
18+ 0	0.3834	0.09	Q	V
18+ 5	0.3839	0.09	Q	V
18+10	0.3845	0.08	Q	V
18+15	0.3851	0.08	Q	V
18+20	0.3857	0.08	Q	V
18+25	0.3862	0.08	Q	V
18+30	0.3868	0.08	Q	V
18+35	0.3873	0.08	Q	V
18+40	0.3879	0.08	Q	V
18+45	0.3884	0.07	Q	V
18+50	0.3888	0.07	Q	V
18+55	0.3893	0.06	Q	V
19+ 0	0.3897	0.06	Q	V
19+ 5	0.3900	0.05	Q	V
19+10	0.3904	0.05	Q	V
19+15	0.3908	0.06	Q	V
19+20	0.3912	0.06	Q	V
19+25	0.3916	0.06	Q	V
19+30	0.3921	0.07	Q	V
19+35	0.3926	0.07	Q	V
19+40	0.3930	0.07	Q	V
19+45	0.3935	0.07	Q	V
19+50	0.3939	0.06	Q	V
19+55	0.3943	0.06	Q	V
20+ 0	0.3947	0.05	Q	V
20+ 5	0.3951	0.05	Q	V
20+10	0.3954	0.05	Q	V
20+15	0.3958	0.05	Q	V
20+20	0.3962	0.06	Q	V
20+25	0.3966	0.06	Q	V
20+30	0.3970	0.06	Q	V
20+35	0.3974	0.06	Q	V
20+40	0.3978	0.06	Q	V
20+45	0.3982	0.06	Q	V
20+50	0.3986	0.06	Q	V
20+55	0.3990	0.06	Q	V
21+ 0	0.3993	0.05	Q	V
21+ 5	0.3996	0.05	Q	V
21+10	0.4000	0.05	Q	V
21+15	0.4003	0.05	Q	V
21+20	0.4007	0.05	Q	V
21+25	0.4011	0.05	Q	V
21+30	0.4014	0.05	Q	V
21+35	0.4017	0.05	Q	V
21+40	0.4021	0.05	Q	V
21+45	0.4024	0.05	Q	V
21+50	0.4028	0.05	Q	V
21+55	0.4032	0.05	Q	V
22+ 0	0.4035	0.05	Q	V
22+ 5	0.4038	0.05	Q	V
22+10	0.4041	0.05	Q	V
22+15	0.4045	0.05	Q	V
22+20	0.4049	0.05	Q	V
22+25	0.4052	0.05	Q	V
22+30	0.4056	0.05	Q	V

22+35	0.4059	0.05	Q			V
22+40	0.4062	0.04	Q			V
22+45	0.4065	0.04	Q			V
22+50	0.4068	0.04	Q			V
22+55	0.4071	0.04	Q			V
23+ 0	0.4073	0.04	Q			V
23+ 5	0.4076	0.04	Q			V
23+10	0.4079	0.04	Q			V
23+15	0.4082	0.04	Q			V
23+20	0.4085	0.04	Q			V
23+25	0.4087	0.04	Q			V
23+30	0.4090	0.04	Q			V
23+35	0.4093	0.04	Q			V
23+40	0.4096	0.04	Q			V
23+45	0.4099	0.04	Q			V
23+50	0.4101	0.04	Q			V
23+55	0.4104	0.04	Q			V
24+ 0	0.4107	0.04	Q			V
24+ 5	0.4110	0.04	Q			V
24+10	0.4112	0.03	Q			V
24+15	0.4113	0.02	Q			V
24+20	0.4115	0.02	Q			V
24+25	0.4115	0.01	Q			V
24+30	0.4116	0.01	Q			V
24+35	0.4116	0.01	Q			V
24+40	0.4117	0.01	Q			V
24+45	0.4117	0.01	Q			V
24+50	0.4118	0.00	Q			V
24+55	0.4118	0.00	Q			V
25+ 0	0.4118	0.00	Q			V
25+ 5	0.4118	0.00	Q			V
25+10	0.4118	0.00	Q			V
25+15	0.4118	0.00	Q			V
25+20	0.4119	0.00	Q			V
25+25	0.4119	0.00	Q			V
25+30	0.4119	0.00	Q			V
25+35	0.4119	0.00	Q			V
25+40	0.4119	0.00	Q			V
25+45	0.4119	0.00	Q			V
25+50	0.4119	0.00	Q			V
25+55	0.4119	0.00	Q			V

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Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHYDQ10E110.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrgraph for 10 Year 1 Hour Storm - Existing Condition  
3963unihydql0e  
CB

-----  
Drainage Area = 19.10 (Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.10 (Ac.) = 0.030 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.230 Hr.  
Lag time = 13.80 Min.  
25% of lag time = 3.45 Min.  
40% of lag time = 5.52 Min.  
Unit time = 5.00 Min.  
Duration of storm = 1 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	0.47	8.98

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	1.25	23.88

STORM EVENT (YEAR) = 10.00  
Area Averaged 2-Year Rainfall = 0.470 (In)  
Area Averaged 100-Year Rainfall = 1.250 (In)

Point rain (area averaged) = 0.791 (In)  
Areal adjustment factor = 99.98 %  
Adjusted average point rain = 0.791 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.100                    78.00                    0.000  
 Total Area Entered =        19.10(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
78.0	78.0	0.268	0.000	0.268	1.000	0.268
						Sum (F) = 0.268

Area averaged mean soil loss (F) (In/Hr) = 0.268

Minimum soil loss rate ((In/Hr)) = 0.134

(for 24 hour storm duration)

Soil low loss rate (decimal) = 0.900

-----  
 Slope of intensity-duration curve for a 1 hour storm =0.5000  
 -----

U n i t   H y d r o g r a p h  
 VALLEY S-Curve

-----  
 Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	36.232	3.766
2	0.167	72.464	14.992
3	0.250	108.696	24.259
4	0.333	144.928	19.151
5	0.417	181.159	9.861
6	0.500	217.391	5.746
7	0.583	253.623	4.257
8	0.667	289.855	3.332
9	0.750	326.087	2.597
10	0.833	362.319	2.157
11	0.917	398.551	1.720
12	1.000	434.783	1.394
13	1.083	471.014	1.148
14	1.167	507.246	1.088
15	1.250	543.478	0.890
16	1.333	579.710	0.748
17	1.417	615.942	0.640
18	1.500	652.174	0.530
19	1.583	688.406	0.426
20	1.667	724.638	0.362
21	1.750	760.870	0.362
22	1.833	797.101	0.362
23	1.917	833.333	0.210
		Sum = 100.000	Sum= 19.249

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max   Low	Effective (In/Hr)
1	0.08	4.20	0.399   0.268	0.13
2	0.17	4.30	0.408   0.268	0.14
3	0.25	5.00	0.474   0.268	0.21
4	0.33	5.00	0.474   0.268	0.21
5	0.42	5.80	0.550   0.268	0.28
6	0.50	6.50	0.617   0.268	0.35
7	0.58	7.40	0.702   0.268	0.43
8	0.67	8.60	0.816   0.268	0.55
9	0.75	12.30	1.167   0.268	0.90
10	0.83	29.10	2.761   0.268	2.49

11	0.92	6.80	0.645	0.268	---	0.38
12	1.00	5.00	0.474	0.268	---	0.21
Sum =		100.0				Sum = 6.3

Flood volume = Effective rainfall 0.52 (In)  
times area 19.1(Ac.)/[ (In)/(Ft.) ] = 0.8 (Ac.Ft)  
Total soil loss = 0.27 (In)  
Total soil loss = 0.426 (Ac.Ft)  
Total rainfall = 0.79 (In)  
Flood volume = 36272.4 Cubic Feet  
Total soil loss = 18553.5 Cubic Feet

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**Peak flow rate of this hydrograph = 18.471 (CFS)**  
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1 - H O U R S T O R M  
R u n o f f H y d r o g r a p h

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

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0007	0.09	Q				
0+10	0.0040	0.48	Q				
0+15	0.0120	1.17	V Q				
0+20	0.0250	1.89	V Q				
0+25	0.0425	2.54	V Q				
0+30	0.0646	3.21	V Q				
0+35	0.0925	4.06	V Q				
0+40	0.1280	5.15	V Q				
0+45	0.1738	6.65	V Q				
0+50	0.2425	9.97	V Q				
0+55	0.3491	15.48	V Q				
1+ 0	0.4763	18.47	V Q				
1+ 5	0.5784	14.82	V Q				
1+10	0.6424	9.29	V Q				
1+15	0.6833	5.94	V Q				
1+20	0.7123	4.21	V Q				
1+25	0.7345	3.23	V Q				
1+30	0.7522	2.56	V Q				
1+35	0.7666	2.10	V Q				
1+40	0.7784	1.71	V Q				
1+45	0.7881	1.41	V Q				
1+50	0.7963	1.19	V Q				
1+55	0.8036	1.05	V Q				
2+ 0	0.8096	0.88	V Q				
2+ 5	0.8147	0.74	V Q				
2+10	0.8189	0.62	V Q				
2+15	0.8224	0.51	V Q				
2+20	0.8253	0.41	V Q				
2+25	0.8276	0.34	V Q				
2+30	0.8297	0.30	V Q				
2+35	0.8315	0.25	V Q				
2+40	0.8324	0.14	V Q				
2+45	0.8326	0.03	V Q				
2+50	0.8327	0.01	V Q				

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHQ10E310.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

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English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

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Black Creek - Harvill at Water Industrial  
Unit Hydrgraph for 10 Year 3 Hour Storm - Existing Condition  
3963unihydql0e  
CB

-----  
Drainage Area = 19.10(Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.10(Ac.) = 0.030 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.230 Hr.  
Lag time = 13.80 Min.  
25% of lag time = 3.45 Min.  
40% of lag time = 5.52 Min.  
Unit time = 5.00 Min.  
Duration of storm = 3 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	0.80	15.28

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	1.93	36.86

STORM EVENT (YEAR) = 10.00  
Area Averaged 2-Year Rainfall = 0.800 (In)  
Area Averaged 100-Year Rainfall = 1.930 (In)

Point rain (area averaged) = 1.265 (In)  
Areal adjustment factor = 99.99 %  
Adjusted average point rain = 1.265 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.100                    78.00                    0.000  
 Total Area Entered =        19.10(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
78.0	78.0	0.268	0.000	0.268	1.000	0.268
						Sum (F) = 0.268

Area averaged mean soil loss (F) (In/Hr) = 0.268  
 Minimum soil loss rate ((In/Hr)) = 0.134  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.900

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 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	36.232	3.766
2	0.167	72.464	14.992
3	0.250	108.696	24.259
4	0.333	144.928	19.151
5	0.417	181.159	9.861
6	0.500	217.391	5.746
7	0.583	253.623	4.257
8	0.667	289.855	3.332
9	0.750	326.087	2.597
10	0.833	362.319	2.157
11	0.917	398.551	1.720
12	1.000	434.783	1.394
13	1.083	471.014	1.148
14	1.167	507.246	1.088
15	1.250	543.478	0.890
16	1.333	579.710	0.748
17	1.417	615.942	0.640
18	1.500	652.174	0.530
19	1.583	688.406	0.426
20	1.667	724.638	0.362
21	1.750	760.870	0.362
22	1.833	797.101	0.362
23	1.917	833.333	0.210
		Sum = 100.000	Sum= 19.249

Unit Time	Pattern	Storm Rain	Loss rate(In./Hr)		Effective
(Hr.)	Percent	(In/Hr)	Max	Low	(In/Hr)
1	0.08	1.30	0.197	0.268   0.178	0.02
2	0.17	1.30	0.197	0.268   0.178	0.02
3	0.25	1.10	0.167	0.268   0.150	0.02
4	0.33	1.50	0.228	0.268   0.205	0.02
5	0.42	1.50	0.228	0.268   0.205	0.02
6	0.50	1.80	0.273	0.268   ---	0.01
7	0.58	1.50	0.228	0.268   0.205	0.02
8	0.67	1.80	0.273	0.268   ---	0.01
9	0.75	1.80	0.273	0.268   ---	0.01
10	0.83	1.50	0.228	0.268   0.205	0.02
11	0.92	1.60	0.243	0.268   0.219	0.02
12	1.00	1.80	0.273	0.268   ---	0.01

13	1.08	2.20	0.334	0.268	---	0.07
14	1.17	2.20	0.334	0.268	---	0.07
15	1.25	2.20	0.334	0.268	---	0.07
16	1.33	2.00	0.304	0.268	---	0.04
17	1.42	2.60	0.395	0.268	---	0.13
18	1.50	2.70	0.410	0.268	---	0.14
19	1.58	2.40	0.364	0.268	---	0.10
20	1.67	2.70	0.410	0.268	---	0.14
21	1.75	3.30	0.501	0.268	---	0.23
22	1.83	3.10	0.471	0.268	---	0.20
23	1.92	2.90	0.440	0.268	---	0.17
24	2.00	3.00	0.455	0.268	---	0.19
25	2.08	3.10	0.471	0.268	---	0.20
26	2.17	4.20	0.637	0.268	---	0.37
27	2.25	5.00	0.759	0.268	---	0.49
28	2.33	3.50	0.531	0.268	---	0.26
29	2.42	6.80	1.032	0.268	---	0.76
30	2.50	7.30	1.108	0.268	---	0.84
31	2.58	8.20	1.245	0.268	---	0.98
32	2.67	5.90	0.895	0.268	---	0.63
33	2.75	2.00	0.304	0.268	---	0.04
34	2.83	1.80	0.273	0.268	---	0.01
35	2.92	1.80	0.273	0.268	---	0.01
36	3.00	0.60	0.091	0.268	0.082	0.01
Sum =		100.0				Sum = 6.3

Flood volume = Effective rainfall 0.53 (In)  
times area 19.1 (Ac.) / [(In) / (Ft.)] = 0.8 (Ac.Ft)  
Total soil loss = 0.74 (In)  
Total soil loss = 1.174 (Ac.Ft)  
Total rainfall = 1.26 (In)  
Flood volume = 36554.2 Cubic Feet  
Total soil loss = 51137.1 Cubic Feet

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**Peak flow rate of this hydrograph = 12.331 (CFS)**  
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3 - H O U R S T O R M  
R u n o f f H y d r o g r a p h

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

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0001	0.01	Q				
0+10	0.0006	0.07	Q				
0+15	0.0017	0.16	Q				
0+20	0.0033	0.23	Q				
0+25	0.0051	0.27	Q				
0+30	0.0072	0.30	Q				
0+35	0.0092	0.29	Q				
0+40	0.0111	0.27	Q				
0+45	0.0128	0.25	Q				
0+50	0.0144	0.23	Q				
0+55	0.0160	0.24	Q				
1+ 0	0.0180	0.29	Q				
1+ 5	0.0203	0.34	Q				
1+10	0.0234	0.46	QV				
1+15	0.0282	0.69	Q				
1+20	0.0341	0.87	Q				
1+25	0.0407	0.95	Q				
1+30	0.0485	1.14	Q				
1+35	0.0589	1.51	VQ				

1+40	0.0713	1.79	Q				
1+45	0.0850	2.00	QV				
1+50	0.1016	2.41	Q				
1+55	0.1216	2.90	Q				
2+ 0	0.1431	3.12	Q				
2+ 5	0.1649	3.16	QV				
2+10	0.1882	3.38	Q V				
2+15	0.2165	4.11	Q V				
2+20	0.2523	5.19	Q V				
2+25	0.2947	6.16	Q V				
2+30	0.3457	7.42	Q V				
2+35	0.4125	9.70			Q		
2+40	0.4946	11.91			Q		
2+45	0.5795	12.33			Q	V	
2+50	0.6496	10.18			Q		V
2+55	0.6964	6.79		Q			V
3+ 0	0.7263	4.35		Q			V
3+ 5	0.7480	3.15		Q			V
3+10	0.7651	2.48	Q				V
3+15	0.7788	1.99	Q				V
3+20	0.7898	1.60	Q				V
3+25	0.7989	1.31	Q				V
3+30	0.8064	1.09	Q				V
3+35	0.8127	0.92	Q				V
3+40	0.8180	0.78	Q				V
3+45	0.8226	0.66	Q				V
3+50	0.8263	0.55	Q				V
3+55	0.8295	0.46	Q				V
4+ 0	0.8321	0.38	Q				V
4+ 5	0.8341	0.30	Q				V
4+10	0.8359	0.25	Q				V
4+15	0.8373	0.21	Q				V
4+20	0.8383	0.15	Q				V
4+25	0.8389	0.09	Q				V
4+30	0.8391	0.03	Q				V
4+35	0.8392	0.00	Q				V
4+40	0.8392	0.00	Q				V
4+45	0.8392	0.00	Q				V
4+50	0.8392	0.00	Q				V

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHQ10E610.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 10 Year 6 Hour Storm - Existing Condition  
3963unihydq10e  
CB

-----  
Drainage Area = 19.10 (Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.10 (Ac.) = 0.030 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.230 Hr.  
Lag time = 13.80 Min.  
25% of lag time = 3.45 Min.  
40% of lag time = 5.52 Min.  
Unit time = 5.00 Min.  
Duration of storm = 6 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	1.10	21.01

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	2.60	49.66

STORM EVENT (YEAR) = 10.00  
Area Averaged 2-Year Rainfall = 1.100 (In)  
Area Averaged 100-Year Rainfall = 2.600 (In)

Point rain (area averaged) = 1.717 (In)  
Areal adjustment factor = 99.99 %  
Adjusted average point rain = 1.717 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %



19.100                    78.00                    0.000  
 Total Area Entered =        19.10(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
78.0	78.0	0.268	0.000	0.268	1.000	0.268
						Sum (F) = 0.268

Area averaged mean soil loss (F) (In/Hr) = 0.268  
 Minimum soil loss rate ((In/Hr)) = 0.134  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.900

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 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	36.232	3.766
2	0.167	72.464	14.992
3	0.250	108.696	24.259
4	0.333	144.928	19.151
5	0.417	181.159	9.861
6	0.500	217.391	5.746
7	0.583	253.623	4.257
8	0.667	289.855	3.332
9	0.750	326.087	2.597
10	0.833	362.319	2.157
11	0.917	398.551	1.720
12	1.000	434.783	1.394
13	1.083	471.014	1.148
14	1.167	507.246	1.088
15	1.250	543.478	0.890
16	1.333	579.710	0.748
17	1.417	615.942	0.640
18	1.500	652.174	0.530
19	1.583	688.406	0.426
20	1.667	724.638	0.362
21	1.750	760.870	0.362
22	1.833	797.101	0.362
23	1.917	833.333	0.210
		Sum = 100.000	Sum= 19.249

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.50	0.103	0.268	0.093	0.01
2	0.17	0.60	0.124	0.268	0.111	0.01
3	0.25	0.60	0.124	0.268	0.111	0.01
4	0.33	0.60	0.124	0.268	0.111	0.01
5	0.42	0.60	0.124	0.268	0.111	0.01
6	0.50	0.70	0.144	0.268	0.130	0.01
7	0.58	0.70	0.144	0.268	0.130	0.01
8	0.67	0.70	0.144	0.268	0.130	0.01
9	0.75	0.70	0.144	0.268	0.130	0.01
10	0.83	0.70	0.144	0.268	0.130	0.01
11	0.92	0.70	0.144	0.268	0.130	0.01
12	1.00	0.80	0.165	0.268	0.148	0.02

13	1.08	0.80	0.165	0.268	0.148	0.02
14	1.17	0.80	0.165	0.268	0.148	0.02
15	1.25	0.80	0.165	0.268	0.148	0.02
16	1.33	0.80	0.165	0.268	0.148	0.02
17	1.42	0.80	0.165	0.268	0.148	0.02
18	1.50	0.80	0.165	0.268	0.148	0.02
19	1.58	0.80	0.165	0.268	0.148	0.02
20	1.67	0.80	0.165	0.268	0.148	0.02
21	1.75	0.80	0.165	0.268	0.148	0.02
22	1.83	0.80	0.165	0.268	0.148	0.02
23	1.92	0.80	0.165	0.268	0.148	0.02
24	2.00	0.90	0.185	0.268	0.167	0.02
25	2.08	0.80	0.165	0.268	0.148	0.02
26	2.17	0.90	0.185	0.268	0.167	0.02
27	2.25	0.90	0.185	0.268	0.167	0.02
28	2.33	0.90	0.185	0.268	0.167	0.02
29	2.42	0.90	0.185	0.268	0.167	0.02
30	2.50	0.90	0.185	0.268	0.167	0.02
31	2.58	0.90	0.185	0.268	0.167	0.02
32	2.67	0.90	0.185	0.268	0.167	0.02
33	2.75	1.00	0.206	0.268	0.185	0.02
34	2.83	1.00	0.206	0.268	0.185	0.02
35	2.92	1.00	0.206	0.268	0.185	0.02
36	3.00	1.00	0.206	0.268	0.185	0.02
37	3.08	1.00	0.206	0.268	0.185	0.02
38	3.17	1.10	0.227	0.268	0.204	0.02
39	3.25	1.10	0.227	0.268	0.204	0.02
40	3.33	1.10	0.227	0.268	0.204	0.02
41	3.42	1.20	0.247	0.268	0.223	0.02
42	3.50	1.30	0.268	0.268	---	0.00
43	3.58	1.40	0.288	0.268	---	0.02
44	3.67	1.40	0.288	0.268	---	0.02
45	3.75	1.50	0.309	0.268	---	0.04
46	3.83	1.50	0.309	0.268	---	0.04
47	3.92	1.60	0.330	0.268	---	0.06
48	4.00	1.60	0.330	0.268	---	0.06
49	4.08	1.70	0.350	0.268	---	0.08
50	4.17	1.80	0.371	0.268	---	0.10
51	4.25	1.90	0.391	0.268	---	0.12
52	4.33	2.00	0.412	0.268	---	0.14
53	4.42	2.10	0.433	0.268	---	0.17
54	4.50	2.10	0.433	0.268	---	0.17
55	4.58	2.20	0.453	0.268	---	0.19
56	4.67	2.30	0.474	0.268	---	0.21
57	4.75	2.40	0.494	0.268	---	0.23
58	4.83	2.40	0.494	0.268	---	0.23
59	4.92	2.50	0.515	0.268	---	0.25
60	5.00	2.60	0.536	0.268	---	0.27
61	5.08	3.10	0.639	0.268	---	0.37
62	5.17	3.60	0.742	0.268	---	0.47
63	5.25	3.90	0.804	0.268	---	0.54
64	5.33	4.20	0.865	0.268	---	0.60
65	5.42	4.70	0.968	0.268	---	0.70
66	5.50	5.60	1.154	0.268	---	0.89
67	5.58	1.90	0.391	0.268	---	0.12
68	5.67	0.90	0.185	0.268	0.167	0.02
69	5.75	0.60	0.124	0.268	0.111	0.01
70	5.83	0.50	0.103	0.268	0.093	0.01
71	5.92	0.30	0.062	0.268	0.056	0.01
72	6.00	0.20	0.041	0.268	0.037	0.00

Sum = 100.0 Sum = 6.8

Flood volume = Effective rainfall 0.57 (In)  
times area 19.1 (Ac.) / [(In) / (Ft.)] = 0.9 (Ac.Ft)

Total soil loss = 1.15(In)  
 Total soil loss = 1.826(Ac.Ft)  
 Total rainfall = 1.72(In)  
 Flood volume = 39525.0 Cubic Feet  
 Total soil loss = 79519.7 Cubic Feet

Peak flow rate of this hydrograph = 10.666(CFS)

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

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0001	0.01	Q				
0+10	0.0003	0.04	Q				
0+15	0.0010	0.09	Q				
0+20	0.0019	0.14	Q				
0+25	0.0031	0.17	Q				
0+30	0.0043	0.18	Q				
0+35	0.0057	0.20	Q				
0+40	0.0072	0.22	Q				
0+45	0.0088	0.23	Q				
0+50	0.0105	0.24	Q				
0+55	0.0122	0.25	Q				
1+ 0	0.0140	0.26	Q				
1+ 5	0.0158	0.27	Q				
1+10	0.0177	0.28	Q				
1+15	0.0197	0.29	Q				
1+20	0.0218	0.30	Q				
1+25	0.0238	0.30	QV				
1+30	0.0259	0.30	QV				
1+35	0.0280	0.31	QV				
1+40	0.0302	0.31	QV				
1+45	0.0323	0.31	QV				
1+50	0.0345	0.31	QV				
1+55	0.0366	0.31	QV				
2+ 0	0.0388	0.32	QV				
2+ 5	0.0410	0.32	QV				
2+10	0.0433	0.33	QV				
2+15	0.0455	0.33	Q V				
2+20	0.0479	0.34	Q V				
2+25	0.0502	0.34	Q V				
2+30	0.0526	0.35	Q V				
2+35	0.0550	0.35	Q V				
2+40	0.0575	0.35	Q V				
2+45	0.0599	0.35	Q V				
2+50	0.0624	0.36	Q V				
2+55	0.0649	0.37	Q V				
3+ 0	0.0675	0.38	Q V				
3+ 5	0.0702	0.38	Q V				
3+10	0.0728	0.39	Q V				
3+15	0.0756	0.40	Q V				
3+20	0.0784	0.41	Q V				
3+25	0.0812	0.42	Q V				
3+30	0.0841	0.41	Q V				
3+35	0.0866	0.37	Q V				
3+40	0.0888	0.32	Q V				
3+45	0.0912	0.35	Q V				
3+50	0.0943	0.44	Q V				

3+55	0.0982	0.57	Q	V				
4+ 0	0.1031	0.71	Q	V				
4+ 5	0.1090	0.86	Q	V				
4+10	0.1162	1.04	Q	V				
4+15	0.1249	1.27	Q	V				
4+20	0.1356	1.55	Q	V				
4+25	0.1484	1.86	Q	V				
4+30	0.1634	2.18	Q	V				
4+35	0.1804	2.46	Q	V				
4+40	0.1991	2.72	Q	V				
4+45	0.2199	3.01	Q	V				
4+50	0.2427	3.32	Q	V				
4+55	0.2676	3.61	Q	V				
5+ 0	0.2943	3.88	Q	V				
5+ 5	0.3234	4.23	Q	V				
5+10	0.3568	4.86	Q	V				
5+15	0.3972	5.87	Q	V				
5+20	0.4459	7.07	Q	V				
5+25	0.5029	8.27	Q	V				
5+30	0.5691	9.60	Q	V				
5+35	0.6425	10.67	Q	V				
5+40	0.7115	10.02	Q	V				
5+45	0.7618	7.30	Q	V				
5+50	0.7939	4.66	Q	V				
5+55	0.8162	3.25	Q	V				
6+ 0	0.8336	2.52	Q	V				
6+ 5	0.8474	2.01	Q	V				
6+10	0.8586	1.62	Q	V				
6+15	0.8677	1.32	Q	V				
6+20	0.8751	1.08	Q	V				
6+25	0.8813	0.90	Q	V				
6+30	0.8865	0.76	Q	V				
6+35	0.8909	0.64	Q	V				
6+40	0.8946	0.53	Q	V				
6+45	0.8976	0.44	Q	V				
6+50	0.9001	0.37	Q	V				
6+55	0.9022	0.30	Q	V				
7+ 0	0.9039	0.24	Q	V				
7+ 5	0.9052	0.19	Q	V				
7+10	0.9062	0.15	Q	V				
7+15	0.9069	0.10	Q	V				
7+20	0.9073	0.05	Q	V				
7+25	0.9073	0.01	Q	V				
7+30	0.9073	0.00	Q	V				
7+35	0.9074	0.00	Q	V				
7+40	0.9074	0.00	Q	V				
7+45	0.9074	0.00	Q	V				
7+50	0.9074	0.00	Q	V				V

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHYDQ10E2410.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 10 Year 24 Hour Storm - Existing Condition  
3963unihydql0e  
CB

-----  
Drainage Area = 19.10 (Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.10 (Ac.) = 0.030 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.230 Hr.  
Lag time = 13.80 Min.  
25% of lag time = 3.45 Min.  
40% of lag time = 5.52 Min.  
Unit time = 5.00 Min.  
Duration of storm = 24 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	1.85	35.34

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	5.00	95.50

STORM EVENT (YEAR) = 10.00  
Area Averaged 2-Year Rainfall = 1.850 (In)  
Area Averaged 100-Year Rainfall = 5.000 (In)

Point rain (area averaged) = 3.146 (In)  
Areal adjustment factor = 100.00 %  
Adjusted average point rain = 3.146 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.100                    78.00                    0.000  
 Total Area Entered =        19.10(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
78.0	78.0	0.268	0.000	0.268	1.000	0.268
						Sum (F) = 0.268

Area averaged mean soil loss (F) (In/Hr) = 0.268  
 Minimum soil loss rate ((In/Hr)) = 0.134  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.900

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 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	36.232	3.766
2	0.167	72.464	14.992
3	0.250	108.696	24.259
4	0.333	144.928	19.151
5	0.417	181.159	9.861
6	0.500	217.391	5.746
7	0.583	253.623	4.257
8	0.667	289.855	3.332
9	0.750	326.087	2.597
10	0.833	362.319	2.157
11	0.917	398.551	1.720
12	1.000	434.783	1.394
13	1.083	471.014	1.148
14	1.167	507.246	1.088
15	1.250	543.478	0.890
16	1.333	579.710	0.748
17	1.417	615.942	0.640
18	1.500	652.174	0.530
19	1.583	688.406	0.426
20	1.667	724.638	0.362
21	1.750	760.870	0.362
22	1.833	797.101	0.362
23	1.917	833.333	0.210
Sum = 100.000			Sum= 19.249

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
			Max	Low	
1	0.08	0.07	0.474	0.023	0.00
2	0.17	0.07	0.473	0.023	0.00
3	0.25	0.07	0.471	0.023	0.00
4	0.33	0.10	0.469	0.034	0.00
5	0.42	0.10	0.467	0.034	0.00
6	0.50	0.10	0.465	0.034	0.00
7	0.58	0.10	0.463	0.034	0.00
8	0.67	0.10	0.462	0.034	0.00
9	0.75	0.10	0.460	0.034	0.00
10	0.83	0.13	0.458	0.045	0.01
11	0.92	0.13	0.456	0.045	0.01
12	1.00	0.13	0.454	0.045	0.01

13	1.08	0.10	0.038	0.453	0.034	0.00
14	1.17	0.10	0.038	0.451	0.034	0.00
15	1.25	0.10	0.038	0.449	0.034	0.00
16	1.33	0.10	0.038	0.447	0.034	0.00
17	1.42	0.10	0.038	0.445	0.034	0.00
18	1.50	0.10	0.038	0.444	0.034	0.00
19	1.58	0.10	0.038	0.442	0.034	0.00
20	1.67	0.10	0.038	0.440	0.034	0.00
21	1.75	0.10	0.038	0.438	0.034	0.00
22	1.83	0.13	0.050	0.437	0.045	0.01
23	1.92	0.13	0.050	0.435	0.045	0.01
24	2.00	0.13	0.050	0.433	0.045	0.01
25	2.08	0.13	0.050	0.431	0.045	0.01
26	2.17	0.13	0.050	0.430	0.045	0.01
27	2.25	0.13	0.050	0.428	0.045	0.01
28	2.33	0.13	0.050	0.426	0.045	0.01
29	2.42	0.13	0.050	0.424	0.045	0.01
30	2.50	0.13	0.050	0.423	0.045	0.01
31	2.58	0.17	0.063	0.421	0.057	0.01
32	2.67	0.17	0.063	0.419	0.057	0.01
33	2.75	0.17	0.063	0.417	0.057	0.01
34	2.83	0.17	0.063	0.416	0.057	0.01
35	2.92	0.17	0.063	0.414	0.057	0.01
36	3.00	0.17	0.063	0.412	0.057	0.01
37	3.08	0.17	0.063	0.411	0.057	0.01
38	3.17	0.17	0.063	0.409	0.057	0.01
39	3.25	0.17	0.063	0.407	0.057	0.01
40	3.33	0.17	0.063	0.405	0.057	0.01
41	3.42	0.17	0.063	0.404	0.057	0.01
42	3.50	0.17	0.063	0.402	0.057	0.01
43	3.58	0.17	0.063	0.400	0.057	0.01
44	3.67	0.17	0.063	0.399	0.057	0.01
45	3.75	0.17	0.063	0.397	0.057	0.01
46	3.83	0.20	0.075	0.395	0.068	0.01
47	3.92	0.20	0.075	0.394	0.068	0.01
48	4.00	0.20	0.075	0.392	0.068	0.01
49	4.08	0.20	0.075	0.390	0.068	0.01
50	4.17	0.20	0.075	0.389	0.068	0.01
51	4.25	0.20	0.075	0.387	0.068	0.01
52	4.33	0.23	0.088	0.385	0.079	0.01
53	4.42	0.23	0.088	0.384	0.079	0.01
54	4.50	0.23	0.088	0.382	0.079	0.01
55	4.58	0.23	0.088	0.381	0.079	0.01
56	4.67	0.23	0.088	0.379	0.079	0.01
57	4.75	0.23	0.088	0.377	0.079	0.01
58	4.83	0.27	0.101	0.376	0.091	0.01
59	4.92	0.27	0.101	0.374	0.091	0.01
60	5.00	0.27	0.101	0.372	0.091	0.01
61	5.08	0.20	0.075	0.371	0.068	0.01
62	5.17	0.20	0.075	0.369	0.068	0.01
63	5.25	0.20	0.075	0.368	0.068	0.01
64	5.33	0.23	0.088	0.366	0.079	0.01
65	5.42	0.23	0.088	0.364	0.079	0.01
66	5.50	0.23	0.088	0.363	0.079	0.01
67	5.58	0.27	0.101	0.361	0.091	0.01
68	5.67	0.27	0.101	0.360	0.091	0.01
69	5.75	0.27	0.101	0.358	0.091	0.01
70	5.83	0.27	0.101	0.356	0.091	0.01
71	5.92	0.27	0.101	0.355	0.091	0.01
72	6.00	0.27	0.101	0.353	0.091	0.01
73	6.08	0.30	0.113	0.352	0.102	0.01
74	6.17	0.30	0.113	0.350	0.102	0.01
75	6.25	0.30	0.113	0.349	0.102	0.01

76	6.33	0.30	0.113	0.347	0.102	0.01
77	6.42	0.30	0.113	0.345	0.102	0.01
78	6.50	0.30	0.113	0.344	0.102	0.01
79	6.58	0.33	0.126	0.342	0.113	0.01
80	6.67	0.33	0.126	0.341	0.113	0.01
81	6.75	0.33	0.126	0.339	0.113	0.01
82	6.83	0.33	0.126	0.338	0.113	0.01
83	6.92	0.33	0.126	0.336	0.113	0.01
84	7.00	0.33	0.126	0.335	0.113	0.01
85	7.08	0.33	0.126	0.333	0.113	0.01
86	7.17	0.33	0.126	0.332	0.113	0.01
87	7.25	0.33	0.126	0.330	0.113	0.01
88	7.33	0.37	0.138	0.329	0.125	0.01
89	7.42	0.37	0.138	0.327	0.125	0.01
90	7.50	0.37	0.138	0.326	0.125	0.01
91	7.58	0.40	0.151	0.324	0.136	0.02
92	7.67	0.40	0.151	0.323	0.136	0.02
93	7.75	0.40	0.151	0.321	0.136	0.02
94	7.83	0.43	0.164	0.320	0.147	0.02
95	7.92	0.43	0.164	0.318	0.147	0.02
96	8.00	0.43	0.164	0.317	0.147	0.02
97	8.08	0.50	0.189	0.315	0.170	0.02
98	8.17	0.50	0.189	0.314	0.170	0.02
99	8.25	0.50	0.189	0.312	0.170	0.02
100	8.33	0.50	0.189	0.311	0.170	0.02
101	8.42	0.50	0.189	0.309	0.170	0.02
102	8.50	0.50	0.189	0.308	0.170	0.02
103	8.58	0.53	0.201	0.306	0.181	0.02
104	8.67	0.53	0.201	0.305	0.181	0.02
105	8.75	0.53	0.201	0.304	0.181	0.02
106	8.83	0.57	0.214	0.302	0.193	0.02
107	8.92	0.57	0.214	0.301	0.193	0.02
108	9.00	0.57	0.214	0.299	0.193	0.02
109	9.08	0.63	0.239	0.298	0.215	0.02
110	9.17	0.63	0.239	0.296	0.215	0.02
111	9.25	0.63	0.239	0.295	0.215	0.02
112	9.33	0.67	0.252	0.294	0.226	0.03
113	9.42	0.67	0.252	0.292	0.226	0.03
114	9.50	0.67	0.252	0.291	0.226	0.03
115	9.58	0.70	0.264	0.289	0.238	0.03
116	9.67	0.70	0.264	0.288	0.238	0.03
117	9.75	0.70	0.264	0.287	0.238	0.03
118	9.83	0.73	0.277	0.285	0.249	0.03
119	9.92	0.73	0.277	0.284	0.249	0.03
120	10.00	0.73	0.277	0.283	0.249	0.03
121	10.08	0.50	0.189	0.281	0.170	0.02
122	10.17	0.50	0.189	0.280	0.170	0.02
123	10.25	0.50	0.189	0.278	0.170	0.02
124	10.33	0.50	0.189	0.277	0.170	0.02
125	10.42	0.50	0.189	0.276	0.170	0.02
126	10.50	0.50	0.189	0.274	0.170	0.02
127	10.58	0.67	0.252	0.273	0.226	0.03
128	10.67	0.67	0.252	0.272	0.226	0.03
129	10.75	0.67	0.252	0.270	0.226	0.03
130	10.83	0.67	0.252	0.269	0.226	0.03
131	10.92	0.67	0.252	0.268	0.226	0.03
132	11.00	0.67	0.252	0.266	0.226	0.03
133	11.08	0.63	0.239	0.265	0.215	0.02
134	11.17	0.63	0.239	0.264	0.215	0.02
135	11.25	0.63	0.239	0.263	0.215	0.02
136	11.33	0.63	0.239	0.261	0.215	0.02
137	11.42	0.63	0.239	0.260	0.215	0.02
138	11.50	0.63	0.239	0.259	0.215	0.02



139	11.58	0.57	0.214	0.257	0.193	0.02
140	11.67	0.57	0.214	0.256	0.193	0.02
141	11.75	0.57	0.214	0.255	0.193	0.02
142	11.83	0.60	0.226	0.254	0.204	0.02
143	11.92	0.60	0.226	0.252	0.204	0.02
144	12.00	0.60	0.226	0.251	0.204	0.02
145	12.08	0.83	0.315	0.250	---	0.06
146	12.17	0.83	0.315	0.249	---	0.07
147	12.25	0.83	0.315	0.247	---	0.07
148	12.33	0.87	0.327	0.246	---	0.08
149	12.42	0.87	0.327	0.245	---	0.08
150	12.50	0.87	0.327	0.244	---	0.08
151	12.58	0.93	0.352	0.242	---	0.11
152	12.67	0.93	0.352	0.241	---	0.11
153	12.75	0.93	0.352	0.240	---	0.11
154	12.83	0.97	0.365	0.239	---	0.13
155	12.92	0.97	0.365	0.238	---	0.13
156	13.00	0.97	0.365	0.236	---	0.13
157	13.08	1.13	0.428	0.235	---	0.19
158	13.17	1.13	0.428	0.234	---	0.19
159	13.25	1.13	0.428	0.233	---	0.20
160	13.33	1.13	0.428	0.232	---	0.20
161	13.42	1.13	0.428	0.230	---	0.20
162	13.50	1.13	0.428	0.229	---	0.20
163	13.58	0.77	0.289	0.228	---	0.06
164	13.67	0.77	0.289	0.227	---	0.06
165	13.75	0.77	0.289	0.226	---	0.06
166	13.83	0.77	0.289	0.225	---	0.06
167	13.92	0.77	0.289	0.223	---	0.07
168	14.00	0.77	0.289	0.222	---	0.07
169	14.08	0.90	0.340	0.221	---	0.12
170	14.17	0.90	0.340	0.220	---	0.12
171	14.25	0.90	0.340	0.219	---	0.12
172	14.33	0.87	0.327	0.218	---	0.11
173	14.42	0.87	0.327	0.217	---	0.11
174	14.50	0.87	0.327	0.216	---	0.11
175	14.58	0.87	0.327	0.214	---	0.11
176	14.67	0.87	0.327	0.213	---	0.11
177	14.75	0.87	0.327	0.212	---	0.11
178	14.83	0.83	0.315	0.211	---	0.10
179	14.92	0.83	0.315	0.210	---	0.10
180	15.00	0.83	0.315	0.209	---	0.11
181	15.08	0.80	0.302	0.208	---	0.09
182	15.17	0.80	0.302	0.207	---	0.10
183	15.25	0.80	0.302	0.206	---	0.10
184	15.33	0.77	0.289	0.205	---	0.08
185	15.42	0.77	0.289	0.204	---	0.09
186	15.50	0.77	0.289	0.203	---	0.09
187	15.58	0.63	0.239	0.202	---	0.04
188	15.67	0.63	0.239	0.201	---	0.04
189	15.75	0.63	0.239	0.200	---	0.04
190	15.83	0.63	0.239	0.199	---	0.04
191	15.92	0.63	0.239	0.198	---	0.04
192	16.00	0.63	0.239	0.197	---	0.04
193	16.08	0.13	0.050	0.196	0.045	0.01
194	16.17	0.13	0.050	0.195	0.045	0.01
195	16.25	0.13	0.050	0.194	0.045	0.01
196	16.33	0.13	0.050	0.193	0.045	0.01
197	16.42	0.13	0.050	0.192	0.045	0.01
198	16.50	0.13	0.050	0.191	0.045	0.01
199	16.58	0.10	0.038	0.190	0.034	0.00
200	16.67	0.10	0.038	0.189	0.034	0.00
201	16.75	0.10	0.038	0.188	0.034	0.00

202	16.83	0.10	0.038	0.187	0.034	0.00
203	16.92	0.10	0.038	0.186	0.034	0.00
204	17.00	0.10	0.038	0.185	0.034	0.00
205	17.08	0.17	0.063	0.184	0.057	0.01
206	17.17	0.17	0.063	0.183	0.057	0.01
207	17.25	0.17	0.063	0.182	0.057	0.01
208	17.33	0.17	0.063	0.181	0.057	0.01
209	17.42	0.17	0.063	0.180	0.057	0.01
210	17.50	0.17	0.063	0.179	0.057	0.01
211	17.58	0.17	0.063	0.178	0.057	0.01
212	17.67	0.17	0.063	0.178	0.057	0.01
213	17.75	0.17	0.063	0.177	0.057	0.01
214	17.83	0.13	0.050	0.176	0.045	0.01
215	17.92	0.13	0.050	0.175	0.045	0.01
216	18.00	0.13	0.050	0.174	0.045	0.01
217	18.08	0.13	0.050	0.173	0.045	0.01
218	18.17	0.13	0.050	0.172	0.045	0.01
219	18.25	0.13	0.050	0.172	0.045	0.01
220	18.33	0.13	0.050	0.171	0.045	0.01
221	18.42	0.13	0.050	0.170	0.045	0.01
222	18.50	0.13	0.050	0.169	0.045	0.01
223	18.58	0.10	0.038	0.168	0.034	0.00
224	18.67	0.10	0.038	0.167	0.034	0.00
225	18.75	0.10	0.038	0.167	0.034	0.00
226	18.83	0.07	0.025	0.166	0.023	0.00
227	18.92	0.07	0.025	0.165	0.023	0.00
228	19.00	0.07	0.025	0.164	0.023	0.00
229	19.08	0.10	0.038	0.163	0.034	0.00
230	19.17	0.10	0.038	0.163	0.034	0.00
231	19.25	0.10	0.038	0.162	0.034	0.00
232	19.33	0.13	0.050	0.161	0.045	0.01
233	19.42	0.13	0.050	0.160	0.045	0.01
234	19.50	0.13	0.050	0.160	0.045	0.01
235	19.58	0.10	0.038	0.159	0.034	0.00
236	19.67	0.10	0.038	0.158	0.034	0.00
237	19.75	0.10	0.038	0.157	0.034	0.00
238	19.83	0.07	0.025	0.157	0.023	0.00
239	19.92	0.07	0.025	0.156	0.023	0.00
240	20.00	0.07	0.025	0.155	0.023	0.00
241	20.08	0.10	0.038	0.155	0.034	0.00
242	20.17	0.10	0.038	0.154	0.034	0.00
243	20.25	0.10	0.038	0.153	0.034	0.00
244	20.33	0.10	0.038	0.153	0.034	0.00
245	20.42	0.10	0.038	0.152	0.034	0.00
246	20.50	0.10	0.038	0.151	0.034	0.00
247	20.58	0.10	0.038	0.151	0.034	0.00
248	20.67	0.10	0.038	0.150	0.034	0.00
249	20.75	0.10	0.038	0.150	0.034	0.00
250	20.83	0.07	0.025	0.149	0.023	0.00
251	20.92	0.07	0.025	0.148	0.023	0.00
252	21.00	0.07	0.025	0.148	0.023	0.00
253	21.08	0.10	0.038	0.147	0.034	0.00
254	21.17	0.10	0.038	0.147	0.034	0.00
255	21.25	0.10	0.038	0.146	0.034	0.00
256	21.33	0.07	0.025	0.145	0.023	0.00
257	21.42	0.07	0.025	0.145	0.023	0.00
258	21.50	0.07	0.025	0.144	0.023	0.00
259	21.58	0.10	0.038	0.144	0.034	0.00
260	21.67	0.10	0.038	0.143	0.034	0.00
261	21.75	0.10	0.038	0.143	0.034	0.00
262	21.83	0.07	0.025	0.142	0.023	0.00
263	21.92	0.07	0.025	0.142	0.023	0.00
264	22.00	0.07	0.025	0.141	0.023	0.00

265	22.08	0.10	0.038	0.141	0.034	0.00
266	22.17	0.10	0.038	0.140	0.034	0.00
267	22.25	0.10	0.038	0.140	0.034	0.00
268	22.33	0.07	0.025	0.139	0.023	0.00
269	22.42	0.07	0.025	0.139	0.023	0.00
270	22.50	0.07	0.025	0.139	0.023	0.00
271	22.58	0.07	0.025	0.138	0.023	0.00
272	22.67	0.07	0.025	0.138	0.023	0.00
273	22.75	0.07	0.025	0.137	0.023	0.00
274	22.83	0.07	0.025	0.137	0.023	0.00
275	22.92	0.07	0.025	0.137	0.023	0.00
276	23.00	0.07	0.025	0.136	0.023	0.00
277	23.08	0.07	0.025	0.136	0.023	0.00
278	23.17	0.07	0.025	0.136	0.023	0.00
279	23.25	0.07	0.025	0.136	0.023	0.00
280	23.33	0.07	0.025	0.135	0.023	0.00
281	23.42	0.07	0.025	0.135	0.023	0.00
282	23.50	0.07	0.025	0.135	0.023	0.00
283	23.58	0.07	0.025	0.135	0.023	0.00
284	23.67	0.07	0.025	0.134	0.023	0.00
285	23.75	0.07	0.025	0.134	0.023	0.00
286	23.83	0.07	0.025	0.134	0.023	0.00
287	23.92	0.07	0.025	0.134	0.023	0.00
288	24.00	0.07	0.025	0.134	0.023	0.00
Sum =	100.0				Sum =	7.1

Flood volume = Effective rainfall 0.59 (In)  
times area 19.1 (Ac.) / [(In) / (Ft.)] = 0.9 (Ac.Ft)  
Total soil loss = 2.56 (In)  
Total soil loss = 4.069 (Ac.Ft)  
Total rainfall = 3.15 (In)  
Flood volume = 40862.1 Cubic Feet  
Total soil loss = 177246.9 Cubic Feet

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**Peak flow rate of this hydrograph = 3.377 (CFS)**  
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24 - H O U R S T O R M  
R u n o f f H y d r o g r a p h

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Hydrograph in 5 Minute intervals ((CFS))  
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Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q				
0+10	0.0001	0.01	Q				
0+15	0.0002	0.02	Q				
0+20	0.0004	0.03	Q				
0+25	0.0007	0.04	Q				
0+30	0.0010	0.05	Q				
0+35	0.0014	0.05	Q				
0+40	0.0018	0.06	Q				
0+45	0.0022	0.06	Q				
0+50	0.0027	0.06	Q				
0+55	0.0032	0.07	Q				
1+ 0	0.0037	0.08	Q				
1+ 5	0.0043	0.08	Q				
1+10	0.0048	0.08	Q				
1+15	0.0054	0.08	Q				
1+20	0.0059	0.07	Q				
1+25	0.0064	0.07	Q				
1+30	0.0069	0.07	Q				
1+35	0.0074	0.07	Q				

1+40	0.0079	0.07	Q
1+45	0.0084	0.07	Q
1+50	0.0089	0.07	Q
1+55	0.0094	0.08	Q
2+ 0	0.0100	0.08	Q
2+ 5	0.0106	0.09	Q
2+10	0.0113	0.09	Q
2+15	0.0119	0.09	Q
2+20	0.0125	0.09	Q
2+25	0.0132	0.09	Q
2+30	0.0138	0.09	Q
2+35	0.0145	0.10	Q
2+40	0.0152	0.10	Q
2+45	0.0159	0.11	Q
2+50	0.0167	0.11	Q
2+55	0.0174	0.11	Q
3+ 0	0.0182	0.11	Q
3+ 5	0.0190	0.12	Q
3+10	0.0198	0.12	Q
3+15	0.0207	0.12	Q
3+20	0.0215	0.12	Q
3+25	0.0223	0.12	Q
3+30	0.0231	0.12	Q
3+35	0.0239	0.12	QV
3+40	0.0248	0.12	QV
3+45	0.0256	0.12	QV
3+50	0.0264	0.12	QV
3+55	0.0273	0.13	QV
4+ 0	0.0282	0.13	QV
4+ 5	0.0291	0.14	QV
4+10	0.0301	0.14	QV
4+15	0.0310	0.14	QV
4+20	0.0320	0.14	QV
4+25	0.0330	0.15	QV
4+30	0.0341	0.15	QV
4+35	0.0352	0.16	QV
4+40	0.0363	0.16	QV
4+45	0.0374	0.16	QV
4+50	0.0385	0.16	QV
4+55	0.0397	0.17	QV
5+ 0	0.0409	0.18	QV
5+ 5	0.0422	0.18	QV
5+10	0.0434	0.18	QV
5+15	0.0445	0.17	QV
5+20	0.0456	0.16	QV
5+25	0.0467	0.16	QV
5+30	0.0478	0.16	Q V
5+35	0.0490	0.17	Q V
5+40	0.0501	0.17	Q V
5+45	0.0514	0.18	Q V
5+50	0.0526	0.18	Q V
5+55	0.0539	0.19	Q V
6+ 0	0.0552	0.19	Q V
6+ 5	0.0565	0.19	Q V
6+10	0.0579	0.19	Q V
6+15	0.0592	0.20	Q V
6+20	0.0607	0.21	Q V
6+25	0.0621	0.21	Q V
6+30	0.0636	0.21	Q V
6+35	0.0650	0.21	Q V
6+40	0.0665	0.22	Q V
6+45	0.0681	0.22	Q V
6+50	0.0697	0.23	Q V

6+55	0.0713	0.23	Q	V
7+ 0	0.0729	0.23	Q	V
7+ 5	0.0745	0.24	Q	V
7+10	0.0761	0.24	Q	V
7+15	0.0778	0.24	Q	V
7+20	0.0794	0.24	Q	V
7+25	0.0811	0.24	Q	V
7+30	0.0828	0.25	Q	V
7+35	0.0846	0.26	Q	V
7+40	0.0864	0.26	Q	V
7+45	0.0883	0.27	Q	V
7+50	0.0902	0.28	Q	V
7+55	0.0922	0.28	Q	V
8+ 0	0.0942	0.29	Q	V
8+ 5	0.0962	0.30	Q	V
8+10	0.0984	0.31	Q	V
8+15	0.1006	0.33	Q	V
8+20	0.1030	0.34	Q	V
8+25	0.1053	0.34	Q	V
8+30	0.1077	0.35	Q	V
8+35	0.1101	0.35	Q	V
8+40	0.1126	0.36	Q	V
8+45	0.1151	0.37	Q	V
8+50	0.1177	0.37	Q	V
8+55	0.1203	0.38	Q	V
9+ 0	0.1230	0.39	Q	V
9+ 5	0.1257	0.40	Q	V
9+10	0.1285	0.41	Q	V
9+15	0.1314	0.42	Q	V
9+20	0.1344	0.43	Q	V
9+25	0.1375	0.44	Q	V
9+30	0.1406	0.45	Q	V
9+35	0.1438	0.46	Q	V
9+40	0.1470	0.47	Q	V
9+45	0.1503	0.48	Q	V
9+50	0.1537	0.49	Q	V
9+55	0.1571	0.50	Q	V
10+ 0	0.1606	0.51	Q	V
10+ 5	0.1641	0.51	Q	V
10+10	0.1675	0.49	Q	V
10+15	0.1706	0.45	Q	V
10+20	0.1734	0.42	Q	V
10+25	0.1762	0.40	Q	V
10+30	0.1789	0.39	Q	V
10+35	0.1816	0.39	Q	V
10+40	0.1844	0.41	Q	V
10+45	0.1874	0.43	Q	V
10+50	0.1905	0.45	Q	V
10+55	0.1937	0.46	Q	V
11+ 0	0.1969	0.47	Q	V
11+ 5	0.2002	0.47	Q	V
11+10	0.2034	0.47	Q	V
11+15	0.2066	0.47	Q	V
11+20	0.2098	0.46	Q	V
11+25	0.2130	0.46	Q	V
11+30	0.2162	0.46	Q	V
11+35	0.2193	0.46	Q	V
11+40	0.2224	0.45	Q	V
11+45	0.2254	0.44	Q	V
11+50	0.2284	0.43	Q	V
11+55	0.2314	0.43	Q	V
12+ 0	0.2343	0.43	Q	V
12+ 5	0.2376	0.47	Q	V

12+10	0.2416	0.59	Q	V			
12+15	0.2471	0.79	Q	V			
12+20	0.2537	0.97	Q	V			
12+25	0.2613	1.10	Q	V			
12+30	0.2697	1.22	Q	V			
12+35	0.2789	1.34	Q	V			
12+40	0.2891	1.48	Q	V			
12+45	0.3005	1.65	Q	V			
12+50	0.3129	1.80	Q	V			
12+55	0.3262	1.93	Q	V			
13+ 0	0.3404	2.06	Q	V			
13+ 5	0.3556	2.21	Q	V			
13+10	0.3725	2.46	Q	V			
13+15	0.3919	2.82	Q	V			
13+20	0.4133	3.10	Q	V			
13+25	0.4357	3.27	Q	V			
13+30	0.4590	3.38	Q	V			
13+35	0.4822	3.37	Q	V			
13+40	0.5032	3.04	Q	V			
13+45	0.5201	2.46	Q	V			
13+50	0.5340	2.01	Q	V			
13+55	0.5464	1.80	Q	V			
14+ 0	0.5580	1.69	Q	V			
14+ 5	0.5694	1.66	Q	V			
14+10	0.5815	1.75	Q	V			
14+15	0.5950	1.95	Q	V			
14+20	0.6095	2.11	Q	V			
14+25	0.6243	2.15	Q	V			
14+30	0.6390	2.14	Q	V			
14+35	0.6537	2.13	Q	V			
14+40	0.6684	2.14	Q	V			
14+45	0.6832	2.15	Q	V			
14+50	0.6981	2.16	Q	V			
14+55	0.7128	2.14	Q	V			
15+ 0	0.7272	2.09	Q	V			
15+ 5	0.7414	2.05	Q	V			
15+10	0.7552	2.01	Q	V			
15+15	0.7687	1.95	Q	V			
15+20	0.7818	1.90	Q	V			
15+25	0.7946	1.85	Q	V			
15+30	0.8070	1.80	Q	V			
15+35	0.8188	1.72	Q	V			
15+40	0.8296	1.56	Q	V			
15+45	0.8388	1.33	Q	V			
15+50	0.8467	1.15	Q	V			
15+55	0.8539	1.06	Q	V			
16+ 0	0.8609	1.01	Q	V			
16+ 5	0.8674	0.95	Q	V			
16+10	0.8730	0.82	Q	V			
16+15	0.8773	0.62	Q	V			
16+20	0.8805	0.46	Q	V			
16+25	0.8831	0.37	Q	V			
16+30	0.8852	0.32	Q	V			
16+35	0.8872	0.28	Q	V			
16+40	0.8888	0.24	Q	V			
16+45	0.8902	0.20	Q	V			
16+50	0.8914	0.18	Q	V			
16+55	0.8925	0.16	Q	V			
17+ 0	0.8935	0.14	Q	V			
17+ 5	0.8944	0.13	Q	V			
17+10	0.8952	0.12	Q	V			
17+15	0.8961	0.13	Q	V			
17+20	0.8970	0.13	Q	V			

17+25	0.8978	0.12	Q	V
17+30	0.8987	0.12	Q	V
17+35	0.8995	0.12	Q	V
17+40	0.9004	0.12	Q	V
17+45	0.9012	0.12	Q	V
17+50	0.9020	0.12	Q	V
17+55	0.9028	0.11	Q	V
18+ 0	0.9035	0.11	Q	V
18+ 5	0.9042	0.10	Q	V
18+10	0.9049	0.10	Q	V
18+15	0.9056	0.10	Q	V
18+20	0.9063	0.10	Q	V
18+25	0.9070	0.10	Q	V
18+30	0.9077	0.10	Q	V
18+35	0.9084	0.10	Q	V
18+40	0.9090	0.09	Q	V
18+45	0.9096	0.09	Q	V
18+50	0.9102	0.08	Q	V
18+55	0.9107	0.08	Q	V
19+ 0	0.9112	0.07	Q	V
19+ 5	0.9116	0.06	Q	V
19+10	0.9120	0.06	Q	V
19+15	0.9125	0.07	Q	V
19+20	0.9130	0.07	Q	V
19+25	0.9135	0.08	Q	V
19+30	0.9141	0.08	Q	V
19+35	0.9147	0.09	Q	V
19+40	0.9153	0.09	Q	V
19+45	0.9158	0.08	Q	V
19+50	0.9164	0.08	Q	V
19+55	0.9168	0.07	Q	V
20+ 0	0.9173	0.06	Q	V
20+ 5	0.9177	0.06	Q	V
20+10	0.9181	0.06	Q	V
20+15	0.9186	0.07	Q	V
20+20	0.9190	0.07	Q	V
20+25	0.9195	0.07	Q	V
20+30	0.9200	0.07	Q	V
20+35	0.9205	0.07	Q	V
20+40	0.9210	0.07	Q	V
20+45	0.9215	0.07	Q	V
20+50	0.9220	0.07	Q	V
20+55	0.9224	0.07	Q	V
21+ 0	0.9229	0.06	Q	V
21+ 5	0.9233	0.06	Q	V
21+10	0.9237	0.06	Q	V
21+15	0.9241	0.06	Q	V
21+20	0.9246	0.07	Q	V
21+25	0.9250	0.06	Q	V
21+30	0.9254	0.06	Q	V
21+35	0.9258	0.06	Q	V
21+40	0.9262	0.06	Q	V
21+45	0.9267	0.06	Q	V
21+50	0.9271	0.07	Q	V
21+55	0.9276	0.06	Q	V
22+ 0	0.9280	0.06	Q	V
22+ 5	0.9283	0.06	Q	V
22+10	0.9287	0.06	Q	V
22+15	0.9292	0.06	Q	V
22+20	0.9296	0.07	Q	V
22+25	0.9301	0.06	Q	V
22+30	0.9305	0.06	Q	V
22+35	0.9308	0.05	Q	V

22+40	0.9312	0.05	Q			V
22+45	0.9316	0.05	Q			V
22+50	0.9319	0.05	Q			V
22+55	0.9323	0.05	Q			V
23+ 0	0.9326	0.05	Q			V
23+ 5	0.9330	0.05	Q			V
23+10	0.9333	0.05	Q			V
23+15	0.9336	0.05	Q			V
23+20	0.9340	0.05	Q			V
23+25	0.9343	0.05	Q			V
23+30	0.9347	0.05	Q			V
23+35	0.9350	0.05	Q			V
23+40	0.9353	0.05	Q			V
23+45	0.9357	0.05	Q			V
23+50	0.9360	0.05	Q			V
23+55	0.9363	0.05	Q			V
24+ 0	0.9367	0.05	Q			V
24+ 5	0.9370	0.05	Q			V
24+10	0.9373	0.04	Q			V
24+15	0.9375	0.03	Q			V
24+20	0.9376	0.02	Q			V
24+25	0.9377	0.01	Q			V
24+30	0.9378	0.01	Q			V
24+35	0.9378	0.01	Q			V
24+40	0.9379	0.01	Q			V
24+45	0.9379	0.01	Q			V
24+50	0.9379	0.00	Q			V
24+55	0.9380	0.00	Q			V
25+ 0	0.9380	0.00	Q			V
25+ 5	0.9380	0.00	Q			V
25+10	0.9380	0.00	Q			V
25+15	0.9380	0.00	Q			V
25+20	0.9380	0.00	Q			V
25+25	0.9380	0.00	Q			V
25+30	0.9381	0.00	Q			V
25+35	0.9381	0.00	Q			V
25+40	0.9381	0.00	Q			V
25+45	0.9381	0.00	Q			V
25+50	0.9381	0.00	Q			V



Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHQ100E1100.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 100 Year 1 Hour Storm - Existing Condition  
3963unihydql00e  
CB

-----  
Drainage Area = 19.10 (Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.10 (Ac.) = 0.030 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.220 Hr.  
Lag time = 13.20 Min.  
25% of lag time = 3.30 Min.  
40% of lag time = 5.28 Min.  
Unit time = 5.00 Min.  
Duration of storm = 1 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	0.47	8.98

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	1.25	23.88

STORM EVENT (YEAR) = 100.00  
Area Averaged 2-Year Rainfall = 0.470 (In)  
Area Averaged 100-Year Rainfall = 1.250 (In)

Point rain (area averaged) = 1.250 (In)  
Areal adjustment factor = 99.98 %  
Adjusted average point rain = 1.250 (In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
-----------	--------------	--------------

19.100                    78.00                    0.000  
 Total Area Entered =        19.10(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
78.0	78.0	0.268	0.000	0.268	1.000	0.268
						Sum (F) = 0.268

Area averaged mean soil loss (F) (In/Hr) = 0.268  
 Minimum soil loss rate ((In/Hr)) = 0.134  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.900

-----  
 Slope of intensity-duration curve for a 1 hour storm =0.5000  
 -----

U n i t   H y d r o g r a p h  
 VALLEY S-Curve

-----  
 Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	37.879	4.017
2	0.167	75.758	16.239
3	0.250	113.636	25.451
4	0.333	151.515	18.471
5	0.417	189.394	9.201
6	0.500	227.273	5.578
7	0.583	265.152	4.128
8	0.667	303.030	3.248
9	0.750	340.909	2.486
10	0.833	378.788	2.098
11	0.917	416.667	1.640
12	1.000	454.545	1.283
13	1.083	492.424	1.166
14	1.167	530.303	1.039
15	1.250	568.182	0.822
16	1.333	606.061	0.700
17	1.417	643.939	0.584
18	1.500	681.818	0.477
19	1.583	719.697	0.381
20	1.667	757.576	0.379
21	1.750	795.455	0.379
22	1.833	833.333	0.235
		Sum = 100.000	Sum= 19.249

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max   Low	Effective (In/Hr)
1	0.08	4.20	0.630   0.268	0.36
2	0.17	4.30	0.645   0.268	0.38
3	0.25	5.00	0.750   0.268	0.48
4	0.33	5.00	0.750   0.268	0.48
5	0.42	5.80	0.870   0.268	0.60
6	0.50	6.50	0.975   0.268	0.71
7	0.58	7.40	1.110   0.268	0.84
8	0.67	8.60	1.290   0.268	1.02
9	0.75	12.30	1.845   0.268	1.58
10	0.83	29.10	4.364   0.268	4.10
11	0.92	6.80	1.020   0.268	0.75

12 1.00 5.00 0.750 0.268 --- 0.48  
 Sum = 100.0 Sum = 11.8  
 Flood volume = Effective rainfall 0.98 (In)  
 times area 19.1(Ac.)/[ (In)/(Ft.) ] = 1.6(Ac.Ft)  
 Total soil loss = 0.27(In)  
 Total soil loss = 0.426(Ac.Ft)  
 Total rainfall = 1.25(In)  
 Flood volume = 68097.7 Cubic Feet  
 Total soil loss = 18553.5 Cubic Feet

-----  
 Peak flow rate of this hydrograph = 32.706(CFS)  
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 1 - H O U R S T O R M  
 R u n o f f H y d r o g r a p h  
 -----

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	10.0	20.0	30.0	40.0
0+ 5	0.0019	0.28	Q				
0+10	0.0117	1.42	VQ				
0+15	0.0347	3.33	V Q				
0+20	0.0692	5.02	V Q				
0+25	0.1128	6.32	V Q				
0+30	0.1649	7.57	V Q				
0+35	0.2274	9.08	V Q				
0+40	0.3027	10.93	V Q				
0+45	0.3953	13.44	V Q				
0+50	0.5263	19.02	V Q				
0+55	0.7211	28.29	V Q				
1+ 0	0.9464	32.71	V Q				
1+ 5	1.1226	25.58	Q				
1+10	1.2351	16.34	Q				
1+15	1.3080	10.58	Q				
1+20	1.3591	7.42	Q				
1+25	1.3983	5.69	Q				
1+30	1.4291	4.48	Q				
1+35	1.4544	3.67	Q				
1+40	1.4748	2.96	Q				
1+45	1.4916	2.43	Q				
1+50	1.5060	2.10	Q				
1+55	1.5183	1.79	Q				
2+ 0	1.5284	1.47	Q				
2+ 5	1.5368	1.22	Q				
2+10	1.5437	1.00	Q				
2+15	1.5493	0.81	Q				
2+20	1.5538	0.65	Q				
2+25	1.5576	0.56	Q				
2+30	1.5608	0.46	Q				
2+35	1.5627	0.28	Q				
2+40	1.5632	0.07	Q				
2+45	1.5633	0.02	Q				

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHYDQ100E3100.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 100 Year 3 Hour Storm - Existing Condition  
3963unihydql00e  
CB

-----  
Drainage Area = 19.10 (Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.10 (Ac.) = 0.030 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.220 Hr.  
Lag time = 13.20 Min.  
25% of lag time = 3.30 Min.  
40% of lag time = 5.28 Min.  
Unit time = 5.00 Min.  
Duration of storm = 3 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	0.80	15.28

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	1.93	36.86

STORM EVENT (YEAR) = 100.00  
Area Averaged 2-Year Rainfall = 0.800 (In)  
Area Averaged 100-Year Rainfall = 1.930 (In)

Point rain (area averaged) = 1.930 (In)  
Areal adjustment factor = 99.99 %  
Adjusted average point rain = 1.930 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.100                    78.00                    0.000  
 Total Area Entered =        19.10(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
78.0	78.0	0.268	0.000	0.268	1.000	0.268
						Sum (F) = 0.268

Area averaged mean soil loss (F) (In/Hr) = 0.268  
 Minimum soil loss rate ((In/Hr)) = 0.134  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.900

-----  
 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	37.879	4.017
2	0.167	75.758	16.239
3	0.250	113.636	25.451
4	0.333	151.515	18.471
5	0.417	189.394	9.201
6	0.500	227.273	5.578
7	0.583	265.152	4.128
8	0.667	303.030	3.248
9	0.750	340.909	2.486
10	0.833	378.788	2.098
11	0.917	416.667	1.640
12	1.000	454.545	1.283
13	1.083	492.424	1.166
14	1.167	530.303	1.039
15	1.250	568.182	0.822
16	1.333	606.061	0.700
17	1.417	643.939	0.584
18	1.500	681.818	0.477
19	1.583	719.697	0.381
20	1.667	757.576	0.379
21	1.750	795.455	0.379
22	1.833	833.333	0.235
Sum = 100.000			Sum= 19.249

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)	
			Max	Low		
1	0.08	1.30	0.301	0.268	---	0.03
2	0.17	1.30	0.301	0.268	---	0.03
3	0.25	1.10	0.255	0.268	0.229	0.03
4	0.33	1.50	0.347	0.268	---	0.08
5	0.42	1.50	0.347	0.268	---	0.08
6	0.50	1.80	0.417	0.268	---	0.15
7	0.58	1.50	0.347	0.268	---	0.08
8	0.67	1.80	0.417	0.268	---	0.15
9	0.75	1.80	0.417	0.268	---	0.15
10	0.83	1.50	0.347	0.268	---	0.08
11	0.92	1.60	0.371	0.268	---	0.10
12	1.00	1.80	0.417	0.268	---	0.15
13	1.08	2.20	0.509	0.268	---	0.24

14	1.17	2.20	0.509	0.268	---	0.24
15	1.25	2.20	0.509	0.268	---	0.24
16	1.33	2.00	0.463	0.268	---	0.20
17	1.42	2.60	0.602	0.268	---	0.33
18	1.50	2.70	0.625	0.268	---	0.36
19	1.58	2.40	0.556	0.268	---	0.29
20	1.67	2.70	0.625	0.268	---	0.36
21	1.75	3.30	0.764	0.268	---	0.50
22	1.83	3.10	0.718	0.268	---	0.45
23	1.92	2.90	0.672	0.268	---	0.40
24	2.00	3.00	0.695	0.268	---	0.43
25	2.08	3.10	0.718	0.268	---	0.45
26	2.17	4.20	0.973	0.268	---	0.71
27	2.25	5.00	1.158	0.268	---	0.89
28	2.33	3.50	0.811	0.268	---	0.54
29	2.42	6.80	1.575	0.268	---	1.31
30	2.50	7.30	1.691	0.268	---	1.42
31	2.58	8.20	1.899	0.268	---	1.63
32	2.67	5.90	1.366	0.268	---	1.10
33	2.75	2.00	0.463	0.268	---	0.20
34	2.83	1.80	0.417	0.268	---	0.15
35	2.92	1.80	0.417	0.268	---	0.15
36	3.00	0.60	0.139	0.268	0.125	0.01
Sum =		100.0				Sum = 13.7

Flood volume = Effective rainfall 1.14 (In)  
times area 19.1 (Ac.) / [(In) / (Ft.)] = 1.8 (Ac.Ft)  
Total soil loss = 0.79 (In)  
Total soil loss = 1.254 (Ac.Ft)  
Total rainfall = 1.93 (In)  
Flood volume = 79186.1 Cubic Feet  
Total soil loss = 54615.4 Cubic Feet

Peak flow rate of this hydrograph = 21.713 (CFS)

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

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	7.5	15.0	22.5	30.0
0+ 5	0.0002	0.03	Q				
0+10	0.0011	0.13	Q				
0+15	0.0031	0.29	Q				
0+20	0.0060	0.42	Q				
0+25	0.0102	0.61	Q				
0+30	0.0167	0.94	VQ				
0+35	0.0257	1.31	VQ				
0+40	0.0367	1.60	V Q				
0+45	0.0490	1.79	VQ				
0+50	0.0628	2.00	VQ				
0+55	0.0769	2.04	VQ				
1+ 0	0.0903	1.95	VQ				
1+ 5	0.1049	2.12	Q				
1+10	0.1232	2.66	VQ				
1+15	0.1460	3.30	VQ				
1+20	0.1714	3.69	VQ				
1+25	0.1981	3.88	VQ				
1+30	0.2273	4.25	Q				
1+35	0.2611	4.90	VQ				
1+40	0.2979	5.35	VQ				

1+45	0.3370	5.68		Q					
1+50	0.3810	6.38		Q					
1+55	0.4303	7.16		Q					
2+ 0	0.4817	7.47		QV					
2+ 5	0.5335	7.53		QV					
2+10	0.5880	7.90		Q	V				
2+15	0.6506	9.09		Q	V				
2+20	0.7251	10.83			QV				
2+25	0.8095	12.26			QV				
2+30	0.9076	14.23			QV				
2+35	1.0311	17.94				VQ			
2+40	1.1778	21.31				V	Q		
2+45	1.3274	21.71					QV		
2+50	1.4514	18.01				Q		V	
2+55	1.5385	12.65			Q			V	
3+ 0	1.6003	8.96			Q			V	
3+ 5	1.6471	6.80			Q			V	
3+10	1.6824	5.12			Q			V	
3+15	1.7091	3.88			Q			V	
3+20	1.7301	3.05			Q			V	
3+25	1.7471	2.47			Q			V	
3+30	1.7611	2.03		Q				V	
3+35	1.7727	1.68		Q				V	
3+40	1.7824	1.41		Q				V	
3+45	1.7905	1.17		Q				V	
3+50	1.7971	0.96		Q				V	
3+55	1.8026	0.79		Q				V	
4+ 0	1.8070	0.64	Q					V	
4+ 5	1.8105	0.51	Q					V	
4+10	1.8134	0.42	Q					V	
4+15	1.8155	0.31	Q					V	
4+20	1.8169	0.19	Q					V	
4+25	1.8175	0.09	Q					V	
4+30	1.8177	0.03	Q					V	
4+35	1.8178	0.02	Q					V	
4+40	1.8179	0.01	Q					V	
4+45	1.8179	0.00	Q					V	

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHQ100E6100.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 100 Year 6 Hour Storm - Existing Condition  
3963unihydql00e  
CB

-----  
Drainage Area = 19.10 (Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.10 (Ac.) = 0.030 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.220 Hr.  
Lag time = 13.20 Min.  
25% of lag time = 3.30 Min.  
40% of lag time = 5.28 Min.  
Unit time = 5.00 Min.  
Duration of storm = 6 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	1.10	21.01

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	2.60	49.66

STORM EVENT (YEAR) = 100.00  
Area Averaged 2-Year Rainfall = 1.100 (In)  
Area Averaged 100-Year Rainfall = 2.600 (In)

Point rain (area averaged) = 2.600 (In)  
Areal adjustment factor = 99.99 %  
Adjusted average point rain = 2.600 (In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
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19.100                    78.00                    0.000  
 Total Area Entered =        19.10(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
78.0	78.0	0.268	0.000	0.268	1.000	0.268
						Sum (F) = 0.268

Area averaged mean soil loss (F) (In/Hr) = 0.268  
 Minimum soil loss rate ((In/Hr)) = 0.134  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.900

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 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
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Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	37.879	4.017
2	0.167	75.758	16.239
3	0.250	113.636	25.451
4	0.333	151.515	18.471
5	0.417	189.394	9.201
6	0.500	227.273	5.578
7	0.583	265.152	4.128
8	0.667	303.030	3.248
9	0.750	340.909	2.486
10	0.833	378.788	2.098
11	0.917	416.667	1.640
12	1.000	454.545	1.283
13	1.083	492.424	1.166
14	1.167	530.303	1.039
15	1.250	568.182	0.822
16	1.333	606.061	0.700
17	1.417	643.939	0.584
18	1.500	681.818	0.477
19	1.583	719.697	0.381
20	1.667	757.576	0.379
21	1.750	795.455	0.379
22	1.833	833.333	0.235
Sum = 100.000			Sum= 19.249

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
			Max	Low	
1	0.08	0.50	0.268	0.140	0.02
2	0.17	0.60	0.268	0.168	0.02
3	0.25	0.60	0.268	0.168	0.02
4	0.33	0.60	0.268	0.168	0.02
5	0.42	0.60	0.268	0.168	0.02
6	0.50	0.70	0.268	0.197	0.02
7	0.58	0.70	0.268	0.197	0.02
8	0.67	0.70	0.268	0.197	0.02
9	0.75	0.70	0.268	0.197	0.02
10	0.83	0.70	0.268	0.197	0.02
11	0.92	0.70	0.268	0.197	0.02
12	1.00	0.80	0.268	0.225	0.02
13	1.08	0.80	0.268	0.225	0.02

14	1.17	0.80	0.250	0.268	0.225	0.02
15	1.25	0.80	0.250	0.268	0.225	0.02
16	1.33	0.80	0.250	0.268	0.225	0.02
17	1.42	0.80	0.250	0.268	0.225	0.02
18	1.50	0.80	0.250	0.268	0.225	0.02
19	1.58	0.80	0.250	0.268	0.225	0.02
20	1.67	0.80	0.250	0.268	0.225	0.02
21	1.75	0.80	0.250	0.268	0.225	0.02
22	1.83	0.80	0.250	0.268	0.225	0.02
23	1.92	0.80	0.250	0.268	0.225	0.02
24	2.00	0.90	0.281	0.268	---	0.01
25	2.08	0.80	0.250	0.268	0.225	0.02
26	2.17	0.90	0.281	0.268	---	0.01
27	2.25	0.90	0.281	0.268	---	0.01
28	2.33	0.90	0.281	0.268	---	0.01
29	2.42	0.90	0.281	0.268	---	0.01
30	2.50	0.90	0.281	0.268	---	0.01
31	2.58	0.90	0.281	0.268	---	0.01
32	2.67	0.90	0.281	0.268	---	0.01
33	2.75	1.00	0.312	0.268	---	0.04
34	2.83	1.00	0.312	0.268	---	0.04
35	2.92	1.00	0.312	0.268	---	0.04
36	3.00	1.00	0.312	0.268	---	0.04
37	3.08	1.00	0.312	0.268	---	0.04
38	3.17	1.10	0.343	0.268	---	0.08
39	3.25	1.10	0.343	0.268	---	0.08
40	3.33	1.10	0.343	0.268	---	0.08
41	3.42	1.20	0.374	0.268	---	0.11
42	3.50	1.30	0.406	0.268	---	0.14
43	3.58	1.40	0.437	0.268	---	0.17
44	3.67	1.40	0.437	0.268	---	0.17
45	3.75	1.50	0.468	0.268	---	0.20
46	3.83	1.50	0.468	0.268	---	0.20
47	3.92	1.60	0.499	0.268	---	0.23
48	4.00	1.60	0.499	0.268	---	0.23
49	4.08	1.70	0.530	0.268	---	0.26
50	4.17	1.80	0.562	0.268	---	0.29
51	4.25	1.90	0.593	0.268	---	0.33
52	4.33	2.00	0.624	0.268	---	0.36
53	4.42	2.10	0.655	0.268	---	0.39
54	4.50	2.10	0.655	0.268	---	0.39
55	4.58	2.20	0.686	0.268	---	0.42
56	4.67	2.30	0.718	0.268	---	0.45
57	4.75	2.40	0.749	0.268	---	0.48
58	4.83	2.40	0.749	0.268	---	0.48
59	4.92	2.50	0.780	0.268	---	0.51
60	5.00	2.60	0.811	0.268	---	0.54
61	5.08	3.10	0.967	0.268	---	0.70
62	5.17	3.60	1.123	0.268	---	0.86
63	5.25	3.90	1.217	0.268	---	0.95
64	5.33	4.20	1.310	0.268	---	1.04
65	5.42	4.70	1.466	0.268	---	1.20
66	5.50	5.60	1.747	0.268	---	1.48
67	5.58	1.90	0.593	0.268	---	0.33
68	5.67	0.90	0.281	0.268	---	0.01
69	5.75	0.60	0.187	0.268	0.168	0.02
70	5.83	0.50	0.156	0.268	0.140	0.02
71	5.92	0.30	0.094	0.268	0.084	0.01
72	6.00	0.20	0.062	0.268	0.056	0.01
Sum =	100.0				Sum =	14.1

Flood volume = Effective rainfall 1.17 (In)  
times area 19.1 (Ac.) / [(In) / (Ft.)] = 1.9 (Ac.Ft)  
Total soil loss = 1.43 (In)

Total soil loss = 2.273(Ac.Ft)  
 Total rainfall = 2.60(In)  
 Flood volume = 81238.8 Cubic Feet  
 Total soil loss = 99015.2 Cubic Feet

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 Peak flow rate of this hydrograph = 19.070(CFS)  
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6 - H O U R S T O R M  
 R u n o f f H y d r o g r a p h

-----  
 Hydrograph in 5 Minute intervals ((CFS))  
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Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0001	0.01	Q				
0+10	0.0005	0.06	Q				
0+15	0.0015	0.15	Q				
0+20	0.0031	0.22	Q				
0+25	0.0048	0.26	Q				
0+30	0.0068	0.28	Q				
0+35	0.0089	0.31	Q				
0+40	0.0113	0.34	Q				
0+45	0.0137	0.36	Q				
0+50	0.0163	0.37	Q				
0+55	0.0189	0.38	Q				
1+ 0	0.0216	0.39	Q				
1+ 5	0.0244	0.41	Q				
1+10	0.0273	0.43	Q				
1+15	0.0303	0.44	Q				
1+20	0.0334	0.45	Q				
1+25	0.0366	0.46	Q				
1+30	0.0398	0.46	Q				
1+35	0.0430	0.47	Q				
1+40	0.0462	0.47	Q				
1+45	0.0495	0.47	QV				
1+50	0.0528	0.47	QV				
1+55	0.0560	0.48	QV				
2+ 0	0.0593	0.47	QV				
2+ 5	0.0623	0.44	QV				
2+10	0.0651	0.41	QV				
2+15	0.0678	0.39	QV				
2+20	0.0703	0.36	QV				
2+25	0.0725	0.32	QV				
2+30	0.0746	0.30	QV				
2+35	0.0766	0.29	QV				
2+40	0.0786	0.29	QV				
2+45	0.0807	0.30	QV				
2+50	0.0834	0.40	QV				
2+55	0.0872	0.55	Q				
3+ 0	0.0917	0.65	Q				
3+ 5	0.0965	0.71	QV				
3+10	0.1018	0.76	QV				
3+15	0.1079	0.88	QV				
3+20	0.1151	1.05	Q				
3+25	0.1234	1.20	Q				
3+30	0.1330	1.39	Q				
3+35	0.1447	1.71	Q				
3+40	0.1592	2.10	VQ				
3+45	0.1762	2.47	VQ				
3+50	0.1954	2.79	VQ				
3+55	0.2167	3.10	V Q				

4+ 0	0.2401	3.40	VQ				
4+ 5	0.2656	3.70	V Q				
4+10	0.2933	4.02	V Q				
4+15	0.3237	4.42	V Q				
4+20	0.3575	4.90	V Q				
4+25	0.3947	5.41	V Q				
4+30	0.4355	5.92	V Q				
4+35	0.4793	6.37	V Q				
4+40	0.5260	6.77	V Q				
4+45	0.5757	7.22	V Q				
4+50	0.6289	7.72	V Q				
4+55	0.6851	8.16	V Q				
5+ 0	0.7441	8.57	V Q				
5+ 5	0.8069	9.12	VQ				
5+10	0.8767	10.13	V Q				
5+15	0.9574	11.72	V Q				
5+20	1.0509	13.58	V Q				
5+25	1.1571	15.41	V				
5+30	1.2773	17.45	V				
5+35	1.4086	19.07	V				
5+40	1.5305	17.70	V				
5+45	1.6183	12.75					
5+50	1.6742	8.11					
5+55	1.7130	5.64					
6+ 0	1.7430	4.35					
6+ 5	1.7669	3.47					
6+10	1.7860	2.78					
6+15	1.8016	2.25					
6+20	1.8142	1.83					
6+25	1.8245	1.51					
6+30	1.8333	1.27					
6+35	1.8406	1.06					
6+40	1.8465	0.86					
6+45	1.8514	0.71					
6+50	1.8553	0.57					
6+55	1.8585	0.46					
7+ 0	1.8609	0.35					
7+ 5	1.8628	0.27					
7+10	1.8641	0.19					
7+15	1.8648	0.10					
7+20	1.8649	0.02					
7+25	1.8649	0.00					
7+30	1.8650	0.00					
7+35	1.8650	0.00					
7+40	1.8650	0.00					
7+45	1.8650	0.00					

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHQ100E24100.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 100 Year 24 Hour Storm - Existing Condition  
3963unihydq100e  
CB

-----  
Drainage Area = 19.10(Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.10(Ac.) = 0.030 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.220 Hr.  
Lag time = 13.20 Min.  
25% of lag time = 3.30 Min.  
40% of lag time = 5.28 Min.  
Unit time = 5.00 Min.  
Duration of storm = 24 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	1.85	35.34

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.10	5.00	95.50

STORM EVENT (YEAR) = 100.00  
Area Averaged 2-Year Rainfall = 1.850 (In)  
Area Averaged 100-Year Rainfall = 5.000 (In)

Point rain (area averaged) = 5.000 (In)  
Areal adjustment factor = 100.00 %  
Adjusted average point rain = 5.000 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.100                    78.00                    0.000  
 Total Area Entered =        19.10(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
78.0	78.0	0.268	0.000	0.268	1.000	0.268
						Sum (F) = 0.268

Area averaged mean soil loss (F) (In/Hr) = 0.268  
 Minimum soil loss rate ((In/Hr)) = 0.134  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.900

-----  
 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	37.879	4.017
2	0.167	75.758	16.239
3	0.250	113.636	25.451
4	0.333	151.515	18.471
5	0.417	189.394	9.201
6	0.500	227.273	5.578
7	0.583	265.152	4.128
8	0.667	303.030	3.248
9	0.750	340.909	2.486
10	0.833	378.788	2.098
11	0.917	416.667	1.640
12	1.000	454.545	1.283
13	1.083	492.424	1.166
14	1.167	530.303	1.039
15	1.250	568.182	0.822
16	1.333	606.061	0.700
17	1.417	643.939	0.584
18	1.500	681.818	0.477
19	1.583	719.697	0.381
20	1.667	757.576	0.379
21	1.750	795.455	0.379
22	1.833	833.333	0.235
		Sum = 100.000	Sum= 19.249

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
			Max	Low	
1	0.08	0.07	0.474	0.036	0.00
2	0.17	0.07	0.473	0.036	0.00
3	0.25	0.07	0.471	0.036	0.00
4	0.33	0.10	0.469	0.054	0.01
5	0.42	0.10	0.467	0.054	0.01
6	0.50	0.10	0.465	0.054	0.01
7	0.58	0.10	0.463	0.054	0.01
8	0.67	0.10	0.462	0.054	0.01
9	0.75	0.10	0.460	0.054	0.01
10	0.83	0.13	0.458	0.072	0.01
11	0.92	0.13	0.456	0.072	0.01
12	1.00	0.13	0.454	0.072	0.01
13	1.08	0.10	0.453	0.054	0.01

14	1.17	0.10	0.060	0.451	0.054	0.01
15	1.25	0.10	0.060	0.449	0.054	0.01
16	1.33	0.10	0.060	0.447	0.054	0.01
17	1.42	0.10	0.060	0.445	0.054	0.01
18	1.50	0.10	0.060	0.444	0.054	0.01
19	1.58	0.10	0.060	0.442	0.054	0.01
20	1.67	0.10	0.060	0.440	0.054	0.01
21	1.75	0.10	0.060	0.438	0.054	0.01
22	1.83	0.13	0.080	0.437	0.072	0.01
23	1.92	0.13	0.080	0.435	0.072	0.01
24	2.00	0.13	0.080	0.433	0.072	0.01
25	2.08	0.13	0.080	0.431	0.072	0.01
26	2.17	0.13	0.080	0.430	0.072	0.01
27	2.25	0.13	0.080	0.428	0.072	0.01
28	2.33	0.13	0.080	0.426	0.072	0.01
29	2.42	0.13	0.080	0.424	0.072	0.01
30	2.50	0.13	0.080	0.423	0.072	0.01
31	2.58	0.17	0.100	0.421	0.090	0.01
32	2.67	0.17	0.100	0.419	0.090	0.01
33	2.75	0.17	0.100	0.417	0.090	0.01
34	2.83	0.17	0.100	0.416	0.090	0.01
35	2.92	0.17	0.100	0.414	0.090	0.01
36	3.00	0.17	0.100	0.412	0.090	0.01
37	3.08	0.17	0.100	0.411	0.090	0.01
38	3.17	0.17	0.100	0.409	0.090	0.01
39	3.25	0.17	0.100	0.407	0.090	0.01
40	3.33	0.17	0.100	0.405	0.090	0.01
41	3.42	0.17	0.100	0.404	0.090	0.01
42	3.50	0.17	0.100	0.402	0.090	0.01
43	3.58	0.17	0.100	0.400	0.090	0.01
44	3.67	0.17	0.100	0.399	0.090	0.01
45	3.75	0.17	0.100	0.397	0.090	0.01
46	3.83	0.20	0.120	0.395	0.108	0.01
47	3.92	0.20	0.120	0.394	0.108	0.01
48	4.00	0.20	0.120	0.392	0.108	0.01
49	4.08	0.20	0.120	0.390	0.108	0.01
50	4.17	0.20	0.120	0.389	0.108	0.01
51	4.25	0.20	0.120	0.387	0.108	0.01
52	4.33	0.23	0.140	0.385	0.126	0.01
53	4.42	0.23	0.140	0.384	0.126	0.01
54	4.50	0.23	0.140	0.382	0.126	0.01
55	4.58	0.23	0.140	0.381	0.126	0.01
56	4.67	0.23	0.140	0.379	0.126	0.01
57	4.75	0.23	0.140	0.377	0.126	0.01
58	4.83	0.27	0.160	0.376	0.144	0.02
59	4.92	0.27	0.160	0.374	0.144	0.02
60	5.00	0.27	0.160	0.372	0.144	0.02
61	5.08	0.20	0.120	0.371	0.108	0.01
62	5.17	0.20	0.120	0.369	0.108	0.01
63	5.25	0.20	0.120	0.368	0.108	0.01
64	5.33	0.23	0.140	0.366	0.126	0.01
65	5.42	0.23	0.140	0.364	0.126	0.01
66	5.50	0.23	0.140	0.363	0.126	0.01
67	5.58	0.27	0.160	0.361	0.144	0.02
68	5.67	0.27	0.160	0.360	0.144	0.02
69	5.75	0.27	0.160	0.358	0.144	0.02
70	5.83	0.27	0.160	0.356	0.144	0.02
71	5.92	0.27	0.160	0.355	0.144	0.02
72	6.00	0.27	0.160	0.353	0.144	0.02
73	6.08	0.30	0.180	0.352	0.162	0.02
74	6.17	0.30	0.180	0.350	0.162	0.02
75	6.25	0.30	0.180	0.349	0.162	0.02
76	6.33	0.30	0.180	0.347	0.162	0.02

77	6.42	0.30	0.180	0.345	0.162	0.02
78	6.50	0.30	0.180	0.344	0.162	0.02
79	6.58	0.33	0.200	0.342	0.180	0.02
80	6.67	0.33	0.200	0.341	0.180	0.02
81	6.75	0.33	0.200	0.339	0.180	0.02
82	6.83	0.33	0.200	0.338	0.180	0.02
83	6.92	0.33	0.200	0.336	0.180	0.02
84	7.00	0.33	0.200	0.335	0.180	0.02
85	7.08	0.33	0.200	0.333	0.180	0.02
86	7.17	0.33	0.200	0.332	0.180	0.02
87	7.25	0.33	0.200	0.330	0.180	0.02
88	7.33	0.37	0.220	0.329	0.198	0.02
89	7.42	0.37	0.220	0.327	0.198	0.02
90	7.50	0.37	0.220	0.326	0.198	0.02
91	7.58	0.40	0.240	0.324	0.216	0.02
92	7.67	0.40	0.240	0.323	0.216	0.02
93	7.75	0.40	0.240	0.321	0.216	0.02
94	7.83	0.43	0.260	0.320	0.234	0.03
95	7.92	0.43	0.260	0.318	0.234	0.03
96	8.00	0.43	0.260	0.317	0.234	0.03
97	8.08	0.50	0.300	0.315	0.270	0.03
98	8.17	0.50	0.300	0.314	0.270	0.03
99	8.25	0.50	0.300	0.312	0.270	0.03
100	8.33	0.50	0.300	0.311	0.270	0.03
101	8.42	0.50	0.300	0.309	0.270	0.03
102	8.50	0.50	0.300	0.308	0.270	0.03
103	8.58	0.53	0.320	0.306	---	0.01
104	8.67	0.53	0.320	0.305	---	0.01
105	8.75	0.53	0.320	0.304	---	0.02
106	8.83	0.57	0.340	0.302	---	0.04
107	8.92	0.57	0.340	0.301	---	0.04
108	9.00	0.57	0.340	0.299	---	0.04
109	9.08	0.63	0.380	0.298	---	0.08
110	9.17	0.63	0.380	0.296	---	0.08
111	9.25	0.63	0.380	0.295	---	0.08
112	9.33	0.67	0.400	0.294	---	0.11
113	9.42	0.67	0.400	0.292	---	0.11
114	9.50	0.67	0.400	0.291	---	0.11
115	9.58	0.70	0.420	0.289	---	0.13
116	9.67	0.70	0.420	0.288	---	0.13
117	9.75	0.70	0.420	0.287	---	0.13
118	9.83	0.73	0.440	0.285	---	0.15
119	9.92	0.73	0.440	0.284	---	0.16
120	10.00	0.73	0.440	0.283	---	0.16
121	10.08	0.50	0.300	0.281	---	0.02
122	10.17	0.50	0.300	0.280	---	0.02
123	10.25	0.50	0.300	0.278	---	0.02
124	10.33	0.50	0.300	0.277	---	0.02
125	10.42	0.50	0.300	0.276	---	0.02
126	10.50	0.50	0.300	0.274	---	0.03
127	10.58	0.67	0.400	0.273	---	0.13
128	10.67	0.67	0.400	0.272	---	0.13
129	10.75	0.67	0.400	0.270	---	0.13
130	10.83	0.67	0.400	0.269	---	0.13
131	10.92	0.67	0.400	0.268	---	0.13
132	11.00	0.67	0.400	0.266	---	0.13
133	11.08	0.63	0.380	0.265	---	0.11
134	11.17	0.63	0.380	0.264	---	0.12
135	11.25	0.63	0.380	0.263	---	0.12
136	11.33	0.63	0.380	0.261	---	0.12
137	11.42	0.63	0.380	0.260	---	0.12
138	11.50	0.63	0.380	0.259	---	0.12
139	11.58	0.57	0.340	0.257	---	0.08



140	11.67	0.57	0.340	0.256	---	0.08
141	11.75	0.57	0.340	0.255	---	0.09
142	11.83	0.60	0.360	0.254	---	0.11
143	11.92	0.60	0.360	0.252	---	0.11
144	12.00	0.60	0.360	0.251	---	0.11
145	12.08	0.83	0.500	0.250	---	0.25
146	12.17	0.83	0.500	0.249	---	0.25
147	12.25	0.83	0.500	0.247	---	0.25
148	12.33	0.87	0.520	0.246	---	0.27
149	12.42	0.87	0.520	0.245	---	0.28
150	12.50	0.87	0.520	0.244	---	0.28
151	12.58	0.93	0.560	0.242	---	0.32
152	12.67	0.93	0.560	0.241	---	0.32
153	12.75	0.93	0.560	0.240	---	0.32
154	12.83	0.97	0.580	0.239	---	0.34
155	12.92	0.97	0.580	0.238	---	0.34
156	13.00	0.97	0.580	0.236	---	0.34
157	13.08	1.13	0.680	0.235	---	0.44
158	13.17	1.13	0.680	0.234	---	0.45
159	13.25	1.13	0.680	0.233	---	0.45
160	13.33	1.13	0.680	0.232	---	0.45
161	13.42	1.13	0.680	0.230	---	0.45
162	13.50	1.13	0.680	0.229	---	0.45
163	13.58	0.77	0.460	0.228	---	0.23
164	13.67	0.77	0.460	0.227	---	0.23
165	13.75	0.77	0.460	0.226	---	0.23
166	13.83	0.77	0.460	0.225	---	0.24
167	13.92	0.77	0.460	0.223	---	0.24
168	14.00	0.77	0.460	0.222	---	0.24
169	14.08	0.90	0.540	0.221	---	0.32
170	14.17	0.90	0.540	0.220	---	0.32
171	14.25	0.90	0.540	0.219	---	0.32
172	14.33	0.87	0.520	0.218	---	0.30
173	14.42	0.87	0.520	0.217	---	0.30
174	14.50	0.87	0.520	0.216	---	0.30
175	14.58	0.87	0.520	0.214	---	0.31
176	14.67	0.87	0.520	0.213	---	0.31
177	14.75	0.87	0.520	0.212	---	0.31
178	14.83	0.83	0.500	0.211	---	0.29
179	14.92	0.83	0.500	0.210	---	0.29
180	15.00	0.83	0.500	0.209	---	0.29
181	15.08	0.80	0.480	0.208	---	0.27
182	15.17	0.80	0.480	0.207	---	0.27
183	15.25	0.80	0.480	0.206	---	0.27
184	15.33	0.77	0.460	0.205	---	0.26
185	15.42	0.77	0.460	0.204	---	0.26
186	15.50	0.77	0.460	0.203	---	0.26
187	15.58	0.63	0.380	0.202	---	0.18
188	15.67	0.63	0.380	0.201	---	0.18
189	15.75	0.63	0.380	0.200	---	0.18
190	15.83	0.63	0.380	0.199	---	0.18
191	15.92	0.63	0.380	0.198	---	0.18
192	16.00	0.63	0.380	0.197	---	0.18
193	16.08	0.13	0.080	0.196	0.072	0.01
194	16.17	0.13	0.080	0.195	0.072	0.01
195	16.25	0.13	0.080	0.194	0.072	0.01
196	16.33	0.13	0.080	0.193	0.072	0.01
197	16.42	0.13	0.080	0.192	0.072	0.01
198	16.50	0.13	0.080	0.191	0.072	0.01
199	16.58	0.10	0.060	0.190	0.054	0.01
200	16.67	0.10	0.060	0.189	0.054	0.01
201	16.75	0.10	0.060	0.188	0.054	0.01
202	16.83	0.10	0.060	0.187	0.054	0.01

203	16.92	0.10	0.060	0.186	0.054	0.01
204	17.00	0.10	0.060	0.185	0.054	0.01
205	17.08	0.17	0.100	0.184	0.090	0.01
206	17.17	0.17	0.100	0.183	0.090	0.01
207	17.25	0.17	0.100	0.182	0.090	0.01
208	17.33	0.17	0.100	0.181	0.090	0.01
209	17.42	0.17	0.100	0.180	0.090	0.01
210	17.50	0.17	0.100	0.179	0.090	0.01
211	17.58	0.17	0.100	0.178	0.090	0.01
212	17.67	0.17	0.100	0.178	0.090	0.01
213	17.75	0.17	0.100	0.177	0.090	0.01
214	17.83	0.13	0.080	0.176	0.072	0.01
215	17.92	0.13	0.080	0.175	0.072	0.01
216	18.00	0.13	0.080	0.174	0.072	0.01
217	18.08	0.13	0.080	0.173	0.072	0.01
218	18.17	0.13	0.080	0.172	0.072	0.01
219	18.25	0.13	0.080	0.172	0.072	0.01
220	18.33	0.13	0.080	0.171	0.072	0.01
221	18.42	0.13	0.080	0.170	0.072	0.01
222	18.50	0.13	0.080	0.169	0.072	0.01
223	18.58	0.10	0.060	0.168	0.054	0.01
224	18.67	0.10	0.060	0.167	0.054	0.01
225	18.75	0.10	0.060	0.167	0.054	0.01
226	18.83	0.07	0.040	0.166	0.036	0.00
227	18.92	0.07	0.040	0.165	0.036	0.00
228	19.00	0.07	0.040	0.164	0.036	0.00
229	19.08	0.10	0.060	0.163	0.054	0.01
230	19.17	0.10	0.060	0.163	0.054	0.01
231	19.25	0.10	0.060	0.162	0.054	0.01
232	19.33	0.13	0.080	0.161	0.072	0.01
233	19.42	0.13	0.080	0.160	0.072	0.01
234	19.50	0.13	0.080	0.160	0.072	0.01
235	19.58	0.10	0.060	0.159	0.054	0.01
236	19.67	0.10	0.060	0.158	0.054	0.01
237	19.75	0.10	0.060	0.157	0.054	0.01
238	19.83	0.07	0.040	0.157	0.036	0.00
239	19.92	0.07	0.040	0.156	0.036	0.00
240	20.00	0.07	0.040	0.155	0.036	0.00
241	20.08	0.10	0.060	0.155	0.054	0.01
242	20.17	0.10	0.060	0.154	0.054	0.01
243	20.25	0.10	0.060	0.153	0.054	0.01
244	20.33	0.10	0.060	0.153	0.054	0.01
245	20.42	0.10	0.060	0.152	0.054	0.01
246	20.50	0.10	0.060	0.151	0.054	0.01
247	20.58	0.10	0.060	0.151	0.054	0.01
248	20.67	0.10	0.060	0.150	0.054	0.01
249	20.75	0.10	0.060	0.150	0.054	0.01
250	20.83	0.07	0.040	0.149	0.036	0.00
251	20.92	0.07	0.040	0.148	0.036	0.00
252	21.00	0.07	0.040	0.148	0.036	0.00
253	21.08	0.10	0.060	0.147	0.054	0.01
254	21.17	0.10	0.060	0.147	0.054	0.01
255	21.25	0.10	0.060	0.146	0.054	0.01
256	21.33	0.07	0.040	0.145	0.036	0.00
257	21.42	0.07	0.040	0.145	0.036	0.00
258	21.50	0.07	0.040	0.144	0.036	0.00
259	21.58	0.10	0.060	0.144	0.054	0.01
260	21.67	0.10	0.060	0.143	0.054	0.01
261	21.75	0.10	0.060	0.143	0.054	0.01
262	21.83	0.07	0.040	0.142	0.036	0.00
263	21.92	0.07	0.040	0.142	0.036	0.00
264	22.00	0.07	0.040	0.141	0.036	0.00
265	22.08	0.10	0.060	0.141	0.054	0.01

266	22.17	0.10	0.060	0.140	0.054	0.01
267	22.25	0.10	0.060	0.140	0.054	0.01
268	22.33	0.07	0.040	0.139	0.036	0.00
269	22.42	0.07	0.040	0.139	0.036	0.00
270	22.50	0.07	0.040	0.139	0.036	0.00
271	22.58	0.07	0.040	0.138	0.036	0.00
272	22.67	0.07	0.040	0.138	0.036	0.00
273	22.75	0.07	0.040	0.137	0.036	0.00
274	22.83	0.07	0.040	0.137	0.036	0.00
275	22.92	0.07	0.040	0.137	0.036	0.00
276	23.00	0.07	0.040	0.136	0.036	0.00
277	23.08	0.07	0.040	0.136	0.036	0.00
278	23.17	0.07	0.040	0.136	0.036	0.00
279	23.25	0.07	0.040	0.136	0.036	0.00
280	23.33	0.07	0.040	0.135	0.036	0.00
281	23.42	0.07	0.040	0.135	0.036	0.00
282	23.50	0.07	0.040	0.135	0.036	0.00
283	23.58	0.07	0.040	0.135	0.036	0.00
284	23.67	0.07	0.040	0.134	0.036	0.00
285	23.75	0.07	0.040	0.134	0.036	0.00
286	23.83	0.07	0.040	0.134	0.036	0.00
287	23.92	0.07	0.040	0.134	0.036	0.00
288	24.00	0.07	0.040	0.134	0.036	0.00
Sum =	100.0					Sum = 19.8

Flood volume = Effective rainfall 1.65 (In)  
times area 19.1 (Ac.) / [(In) / (Ft.)] = 2.6 (Ac.Ft)  
Total soil loss = 3.35 (In)  
Total soil loss = 5.335 (Ac.Ft)  
Total rainfall = 5.00 (In)  
Flood volume = 114258.6 Cubic Feet  
Total soil loss = 232393.4 Cubic Feet

Peak flow rate of this hydrograph = 8.045 (CFS)

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

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q				
0+10	0.0001	0.02	Q				
0+15	0.0004	0.04	Q				
0+20	0.0007	0.05	Q				
0+25	0.0012	0.06	Q				
0+30	0.0017	0.08	Q				
0+35	0.0023	0.09	Q				
0+40	0.0030	0.09	Q				
0+45	0.0036	0.10	Q				
0+50	0.0044	0.10	Q				
0+55	0.0051	0.11	Q				
1+ 0	0.0060	0.12	Q				
1+ 5	0.0069	0.13	Q				
1+10	0.0078	0.13	Q				
1+15	0.0086	0.12	Q				
1+20	0.0095	0.12	Q				
1+25	0.0103	0.12	Q				
1+30	0.0111	0.12	Q				
1+35	0.0119	0.12	Q				
1+40	0.0127	0.12	Q				

1+45	0.0135	0.12	Q
1+50	0.0143	0.12	Q
1+55	0.0152	0.12	Q
2+ 0	0.0161	0.13	Q
2+ 5	0.0171	0.14	Q
2+10	0.0181	0.14	Q
2+15	0.0191	0.15	Q
2+20	0.0201	0.15	Q
2+25	0.0211	0.15	Q
2+30	0.0222	0.15	Q
2+35	0.0232	0.15	Q
2+40	0.0243	0.16	Q
2+45	0.0255	0.17	Q
2+50	0.0267	0.18	Q
2+55	0.0279	0.18	Q
3+ 0	0.0292	0.18	Q
3+ 5	0.0305	0.19	Q
3+10	0.0317	0.19	Q
3+15	0.0330	0.19	Q
3+20	0.0343	0.19	Q
3+25	0.0356	0.19	Q
3+30	0.0370	0.19	Q
3+35	0.0383	0.19	Q
3+40	0.0396	0.19	Q
3+45	0.0409	0.19	Q
3+50	0.0422	0.19	Q
3+55	0.0436	0.20	Q
4+ 0	0.0451	0.21	Q
4+ 5	0.0465	0.22	Q
4+10	0.0481	0.22	Q
4+15	0.0496	0.22	Q
4+20	0.0512	0.23	Q
4+25	0.0528	0.23	Q
4+30	0.0545	0.24	Q
4+35	0.0562	0.25	VQ
4+40	0.0580	0.26	VQ
4+45	0.0597	0.26	VQ
4+50	0.0615	0.26	VQ
4+55	0.0634	0.27	VQ
5+ 0	0.0654	0.28	VQ
5+ 5	0.0673	0.29	Q
5+10	0.0692	0.28	Q
5+15	0.0711	0.26	Q
5+20	0.0728	0.25	Q
5+25	0.0745	0.25	Q
5+30	0.0763	0.26	Q
5+35	0.0781	0.27	Q
5+40	0.0800	0.27	Q
5+45	0.0820	0.28	Q
5+50	0.0840	0.29	Q
5+55	0.0860	0.30	Q
6+ 0	0.0881	0.30	Q
6+ 5	0.0902	0.30	Q
6+10	0.0923	0.31	Q
6+15	0.0945	0.32	Q
6+20	0.0968	0.33	Q
6+25	0.0991	0.33	Q
6+30	0.1014	0.34	Q
6+35	0.1037	0.34	Q
6+40	0.1061	0.35	Q
6+45	0.1086	0.36	Q
6+50	0.1111	0.37	Q
6+55	0.1137	0.37	Q

7+ 0	0.1163	0.37	Q				
7+ 5	0.1189	0.38	Q				
7+10	0.1215	0.38	Q				
7+15	0.1241	0.38	Q				
7+20	0.1267	0.38	Q				
7+25	0.1294	0.39	Q				
7+30	0.1321	0.40	QV				
7+35	0.1350	0.41	QV				
7+40	0.1379	0.42	QV				
7+45	0.1408	0.43	QV				
7+50	0.1439	0.44	QV				
7+55	0.1470	0.45	QV				
8+ 0	0.1502	0.47	QV				
8+ 5	0.1535	0.48	QV				
8+10	0.1569	0.50	QV				
8+15	0.1605	0.52	Q				
8+20	0.1642	0.54	Q				
8+25	0.1680	0.55	Q				
8+30	0.1718	0.55	Q				
8+35	0.1756	0.55	Q				
8+40	0.1790	0.50	QV				
8+45	0.1820	0.43	QV				
8+50	0.1847	0.40	QV				
8+55	0.1878	0.45	QV				
9+ 0	0.1916	0.55	Q				
9+ 5	0.1962	0.67	Q				
9+10	0.2020	0.84	Q				
9+15	0.2094	1.07	VQ				
9+20	0.2181	1.27	V Q				
9+25	0.2280	1.43	V Q				
9+30	0.2390	1.60	V Q				
9+35	0.2511	1.75	V Q				
9+40	0.2642	1.91	V Q				
9+45	0.2785	2.07	V Q				
9+50	0.2938	2.22	V Q				
9+55	0.3101	2.37	V Q				
10+ 0	0.3276	2.54	V Q				
10+ 5	0.3452	2.56	V				
10+10	0.3605	2.21	V Q				
10+15	0.3715	1.60	VQ				
10+20	0.3794	1.16	QV				
10+25	0.3861	0.97	Q V				
10+30	0.3921	0.86	Q V				
10+35	0.3981	0.88	Q V				
10+40	0.4060	1.14	Q V				
10+45	0.4170	1.60	Q				
10+50	0.4304	1.94	VQ				
10+55	0.4449	2.11	V Q				
11+ 0	0.4601	2.21	VQ				
11+ 5	0.4758	2.28	V Q				
11+10	0.4915	2.28	V Q				
11+15	0.5068	2.23	VQ				
11+20	0.5221	2.21	VQ				
11+25	0.5373	2.22	Q				
11+30	0.5527	2.23	Q				
11+35	0.5681	2.23	Q				
11+40	0.5827	2.12	Q				
11+45	0.5961	1.95	Q V				
11+50	0.6088	1.85	Q V				
11+55	0.6217	1.87	Q V				
12+ 0	0.6351	1.95	Q V				
12+ 5	0.6497	2.13	QV				
12+10	0.6677	2.60	Q				

12+15	0.6905	3.32		V	Q				
12+20	0.7171	3.86		V		Q			
12+25	0.7459	4.19		V		Q			
12+30	0.7767	4.46		V		Q			
12+35	0.8090	4.70		V		Q			
12+40	0.8432	4.96		V		Q			
12+45	0.8795	5.27		V		Q			
12+50	0.9175	5.52		V		Q			
12+55	0.9570	5.74		V		Q			
13+ 0	0.9980	5.94		V		Q			
13+ 5	1.0406	6.19		V		Q			
13+10	1.0861	6.62		V		Q			
13+15	1.1357	7.20		V		Q			
13+20	1.1883	7.63		V		Q			
13+25	1.2425	7.88		V		Q			
13+30	1.2979	8.04		V		Q			
13+35	1.3531	8.01		V		Q			
13+40	1.4042	7.43		V		Q			
13+45	1.4486	6.45		V		Q			
13+50	1.4882	5.75		V		Q			
13+55	1.5255	5.42		V		Q			
14+ 0	1.5616	5.24		V		Q			
14+ 5	1.5973	5.18		V		Q			
14+10	1.6340	5.34		V		Q			
14+15	1.6731	5.67		V		Q			
14+20	1.7136	5.89		V		Q			
14+25	1.7544	5.93		V		Q			
14+30	1.7950	5.90		V		Q			
14+35	1.8354	5.87		V		Q			
14+40	1.8759	5.87		V		Q			
14+45	1.9163	5.88		V		Q			
14+50	1.9568	5.88		V		Q			
14+55	1.9969	5.82		V		Q			
15+ 0	2.0364	5.74		V		Q			
15+ 5	2.0754	5.66		V		Q			
15+10	2.1138	5.58		V		Q			
15+15	2.1515	5.47		V		Q			
15+20	2.1886	5.39		V		Q			
15+25	2.2252	5.30		V		Q			
15+30	2.2610	5.20		V		Q			
15+35	2.2959	5.07		V		Q			
15+40	2.3288	4.78		V		Q			
15+45	2.3590	4.38		V		Q			
15+50	2.3872	4.09		V		Q			
15+55	2.4143	3.94		V		Q			
16+ 0	2.4409	3.86		V		Q			
16+ 5	2.4661	3.66		V		Q			
16+10	2.4872	3.07		V		Q			
16+15	2.5022	2.17		V		Q			
16+20	2.5126	1.51		V		Q			
16+25	2.5206	1.17		V		Q			
16+30	2.5273	0.96		V		Q			
16+35	2.5328	0.80		V		Q			
16+40	2.5374	0.67		V		Q			
16+45	2.5412	0.56		V		Q			
16+50	2.5445	0.47	Q			Q			
16+55	2.5473	0.40	Q			Q			
17+ 0	2.5497	0.35	Q			Q			
17+ 5	2.5518	0.31	Q			Q			
17+10	2.5537	0.28	Q			Q			
17+15	2.5555	0.26	Q			Q			
17+20	2.5572	0.25	Q			Q			
17+25	2.5589	0.24	Q			Q			

17+30	2.5604	0.22	Q	V
17+35	2.5619	0.21	Q	V
17+40	2.5633	0.20	Q	V
17+45	2.5646	0.19	Q	V
17+50	2.5659	0.18	Q	V
17+55	2.5671	0.18	Q	V
18+ 0	2.5683	0.17	Q	V
18+ 5	2.5695	0.16	Q	V
18+10	2.5706	0.16	Q	V
18+15	2.5717	0.16	Q	V
18+20	2.5728	0.16	Q	V
18+25	2.5738	0.16	Q	V
18+30	2.5749	0.16	Q	V
18+35	2.5760	0.16	Q	V
18+40	2.5770	0.15	Q	V
18+45	2.5780	0.14	Q	V
18+50	2.5789	0.13	Q	V
18+55	2.5797	0.12	Q	V
19+ 0	2.5804	0.11	Q	V
19+ 5	2.5811	0.10	Q	V
19+10	2.5818	0.10	Q	V
19+15	2.5826	0.11	Q	V
19+20	2.5833	0.11	Q	V
19+25	2.5842	0.12	Q	V
19+30	2.5851	0.13	Q	V
19+35	2.5860	0.14	Q	V
19+40	2.5870	0.14	Q	V
19+45	2.5878	0.13	Q	V
19+50	2.5887	0.12	Q	V
19+55	2.5894	0.11	Q	V
20+ 0	2.5901	0.10	Q	V
20+ 5	2.5908	0.09	Q	V
20+10	2.5915	0.10	Q	V
20+15	2.5922	0.10	Q	V
20+20	2.5929	0.11	Q	V
20+25	2.5937	0.11	Q	V
20+30	2.5945	0.11	Q	V
20+35	2.5953	0.11	Q	V
20+40	2.5960	0.11	Q	V
20+45	2.5968	0.11	Q	V
20+50	2.5976	0.11	Q	V
20+55	2.5983	0.11	Q	V
21+ 0	2.5990	0.10	Q	V
21+ 5	2.5996	0.09	Q	V
21+10	2.6003	0.09	Q	V
21+15	2.6010	0.10	Q	V
21+20	2.6017	0.11	Q	V
21+25	2.6024	0.10	Q	V
21+30	2.6031	0.09	Q	V
21+35	2.6037	0.09	Q	V
21+40	2.6043	0.09	Q	V
21+45	2.6050	0.10	Q	V
21+50	2.6057	0.11	Q	V
21+55	2.6064	0.10	Q	V
22+ 0	2.6071	0.09	Q	V
22+ 5	2.6077	0.09	Q	V
22+10	2.6083	0.09	Q	V
22+15	2.6090	0.10	Q	V
22+20	2.6097	0.10	Q	V
22+25	2.6104	0.10	Q	V
22+30	2.6111	0.09	Q	V
22+35	2.6117	0.09	Q	V
22+40	2.6122	0.08	Q	V

22+45	2.6128	0.08	Q			V
22+50	2.6134	0.08	Q			V
22+55	2.6139	0.08	Q			V
23+ 0	2.6145	0.08	Q			V
23+ 5	2.6150	0.08	Q			V
23+10	2.6156	0.08	Q			V
23+15	2.6161	0.08	Q			V
23+20	2.6166	0.08	Q			V
23+25	2.6172	0.08	Q			V
23+30	2.6177	0.08	Q			V
23+35	2.6182	0.08	Q			V
23+40	2.6188	0.08	Q			V
23+45	2.6193	0.08	Q			V
23+50	2.6198	0.08	Q			V
23+55	2.6204	0.08	Q			V
24+ 0	2.6209	0.08	Q			V
24+ 5	2.6214	0.07	Q			V
24+10	2.6218	0.06	Q			V
24+15	2.6221	0.04	Q			V
24+20	2.6223	0.03	Q			V
24+25	2.6225	0.02	Q			V
24+30	2.6226	0.02	Q			V
24+35	2.6227	0.01	Q			V
24+40	2.6227	0.01	Q			V
24+45	2.6228	0.01	Q			V
24+50	2.6228	0.01	Q			V
24+55	2.6229	0.01	Q			V
25+ 0	2.6229	0.00	Q			V
25+ 5	2.6229	0.00	Q			V
25+10	2.6230	0.00	Q			V
25+15	2.6230	0.00	Q			V
25+20	2.6230	0.00	Q			V
25+25	2.6230	0.00	Q			V
25+30	2.6230	0.00	Q			V
25+35	2.6230	0.00	Q			V
25+40	2.6230	0.00	Q			V
25+45	2.6230	0.00	Q			V

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Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHVDQ2P12.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 2 Year 1 Hour Storm Event - Proposed Condition  
3963UNIHVDQ2P  
CB

-----  
Drainage Area = 19.63(Ac.) = 0.031 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.63(Ac.) = 0.031 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.215 Hr.  
Lag time = 12.90 Min.  
25% of lag time = 3.23 Min.  
40% of lag time = 5.16 Min.  
Unit time = 5.00 Min.  
Duration of storm = 1 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	0.47	9.23

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	1.25	24.54

STORM EVENT (YEAR) = 2.00  
Area Averaged 2-Year Rainfall = 0.470 (In)  
Area Averaged 100-Year Rainfall = 1.250 (In)

Point rain (area averaged) = 0.470 (In)  
Areal adjustment factor = 99.98 %  
Adjusted average point rain = 0.470 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.630                    56.00                    0.900  
 Total Area Entered =     19.63(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
56.0	36.0	0.706	0.900	0.134	1.000	0.134
						Sum (F) = 0.134

Area averaged mean soil loss (F) (In/Hr) = 0.134

Minimum soil loss rate ((In/Hr)) = 0.067

(for 24 hour storm duration)

Soil low loss rate (decimal) = 0.180

-----  
 Slope of intensity-duration curve for a 1 hour storm =0.5000  
 -----

U n i t   H y d r o g r a p h  
 VALLEY S-Curve

-----  
 Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	38.748	4.154
2	0.167	77.495	16.909
3	0.250	116.243	26.023
4	0.333	154.991	18.058
5	0.417	193.738	8.902
6	0.500	232.486	5.500
7	0.583	271.234	4.071
8	0.667	309.981	3.189
9	0.750	348.729	2.456
10	0.833	387.477	2.035
11	0.917	426.225	1.599
12	1.000	464.972	1.258
13	1.083	503.720	1.176
14	1.167	542.468	0.979
15	1.250	581.215	0.802
16	1.333	619.963	0.680
17	1.417	658.711	0.557
18	1.500	697.458	0.434
19	1.583	736.206	0.387
20	1.667	774.954	0.387
21	1.750	813.701	0.444
		Sum = 100.000	Sum= 19.783

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max   Low	Effective (In/Hr)
1	0.08	4.20	0.237	0.134   ---	0.10
2	0.17	4.30	0.242	0.134   ---	0.11
3	0.25	5.00	0.282	0.134   ---	0.15
4	0.33	5.00	0.282	0.134   ---	0.15
5	0.42	5.80	0.327	0.134   ---	0.19
6	0.50	6.50	0.367	0.134   ---	0.23
7	0.58	7.40	0.417	0.134   ---	0.28
8	0.67	8.60	0.485	0.134   ---	0.35
9	0.75	12.30	0.694	0.134   ---	0.56
10	0.83	29.10	1.641	0.134   ---	1.51
11	0.92	6.80	0.383	0.134   ---	0.25
12	1.00	5.00	0.282	0.134   ---	0.15

Sum = 100.0 Sum = 4.0  
 Flood volume = Effective rainfall 0.34 (In)  
 times area 19.6 (Ac.) / [(In) / (Ft.)] = 0.5 (Ac.Ft)  
 Total soil loss = 0.13 (In)  
 Total soil loss = 0.219 (Ac.Ft)  
 Total rainfall = 0.47 (In)  
 Flood volume = 23926.4 Cubic Feet  
 Total soil loss = 9558.4 Cubic Feet

Peak flow rate of this hydrograph = 12.144 (CFS)

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

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0006	0.08	Q				
0+10	0.0036	0.43	Q				
0+15	0.0105	1.01	V Q				
0+20	0.0212	1.54	V Q				
0+25	0.0348	1.98	V Q				
0+30	0.0515	2.43	V Q				
0+35	0.0722	2.99	Q				
0+40	0.0976	3.70	Q				
0+45	0.1297	4.66	Q				
0+50	0.1769	6.86	V Q				
0+55	0.2495	10.53	V Q				
1+ 0	0.3331	12.14	Q				
1+ 5	0.3962	9.16	Q			V	
1+10	0.4354	5.70	Q			V	
1+15	0.4608	3.68	Q			V	
1+20	0.4787	2.60	Q			V	
1+25	0.4924	2.00	Q			V	
1+30	0.5032	1.57	Q			V	
1+35	0.5121	1.28	Q			V	
1+40	0.5192	1.03	Q			V	
1+45	0.5250	0.85	Q			V	
1+50	0.5301	0.74	Q			V	
1+55	0.5343	0.61	Q			V	
2+ 0	0.5378	0.51	Q			V	
2+ 5	0.5407	0.42	Q			V	
2+10	0.5430	0.34	Q			V	
2+15	0.5449	0.27	Q			V	
2+20	0.5465	0.23	Q			V	
2+25	0.5478	0.20	Q			V	
2+30	0.5490	0.16	Q			V	
2+35	0.5492	0.03	Q			V	
2+40	0.5493	0.01	Q			V	

Unit Hydrograph Analysis

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

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-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 2 Year 3 Hour Storm Event - Proposed Condition  
3963UNIHVDQ2P  
CB

-----  
Drainage Area = 19.63(Ac.) = 0.031 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.63(Ac.) = 0.031 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.215 Hr.  
Lag time = 12.90 Min.  
25% of lag time = 3.23 Min.  
40% of lag time = 5.16 Min.  
Unit time = 5.00 Min.  
Duration of storm = 3 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	0.80	15.70

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	1.93	37.89

STORM EVENT (YEAR) = 2.00  
Area Averaged 2-Year Rainfall = 0.800 (In)  
Area Averaged 100-Year Rainfall = 1.930 (In)

Point rain (area averaged) = 0.800 (In)  
Areal adjustment factor = 99.99 %  
Adjusted average point rain = 0.800 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.630                    56.00                    0.900  
 Total Area Entered =    19.63(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
56.0	36.0	0.706	0.900	0.134	1.000	0.134
						Sum (F) = 0.134

Area averaged mean soil loss (F) (In/Hr) = 0.134  
 Minimum soil loss rate ((In/Hr)) = 0.067  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.180

-----  
 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	38.748	4.154
2	0.167	77.495	16.909
3	0.250	116.243	26.023
4	0.333	154.991	18.058
5	0.417	193.738	8.902
6	0.500	232.486	5.500
7	0.583	271.234	4.071
8	0.667	309.981	3.189
9	0.750	348.729	2.456
10	0.833	387.477	2.035
11	0.917	426.225	1.599
12	1.000	464.972	1.258
13	1.083	503.720	1.176
14	1.167	542.468	0.979
15	1.250	581.215	0.802
16	1.333	619.963	0.680
17	1.417	658.711	0.557
18	1.500	697.458	0.434
19	1.583	736.206	0.387
20	1.667	774.954	0.387
21	1.750	813.701	0.444
		Sum = 100.000	Sum= 19.783

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	1.30	0.125	0.134	0.022	0.10
2	0.17	1.30	0.125	0.134	0.022	0.10
3	0.25	1.10	0.106	0.134	0.019	0.09
4	0.33	1.50	0.144	0.134	---	0.01
5	0.42	1.50	0.144	0.134	---	0.01
6	0.50	1.80	0.173	0.134	---	0.04
7	0.58	1.50	0.144	0.134	---	0.01
8	0.67	1.80	0.173	0.134	---	0.04
9	0.75	1.80	0.173	0.134	---	0.04
10	0.83	1.50	0.144	0.134	---	0.01
11	0.92	1.60	0.154	0.134	---	0.02
12	1.00	1.80	0.173	0.134	---	0.04
13	1.08	2.20	0.211	0.134	---	0.08
14	1.17	2.20	0.211	0.134	---	0.08

15	1.25	2.20	0.211	0.134	---	0.08
16	1.33	2.00	0.192	0.134	---	0.06
17	1.42	2.60	0.250	0.134	---	0.12
18	1.50	2.70	0.259	0.134	---	0.13
19	1.58	2.40	0.230	0.134	---	0.10
20	1.67	2.70	0.259	0.134	---	0.13
21	1.75	3.30	0.317	0.134	---	0.18
22	1.83	3.10	0.298	0.134	---	0.16
23	1.92	2.90	0.278	0.134	---	0.14
24	2.00	3.00	0.288	0.134	---	0.15
25	2.08	3.10	0.298	0.134	---	0.16
26	2.17	4.20	0.403	0.134	---	0.27
27	2.25	5.00	0.480	0.134	---	0.35
28	2.33	3.50	0.336	0.134	---	0.20
29	2.42	6.80	0.653	0.134	---	0.52
30	2.50	7.30	0.701	0.134	---	0.57
31	2.58	8.20	0.787	0.134	---	0.65
32	2.67	5.90	0.566	0.134	---	0.43
33	2.75	2.00	0.192	0.134	---	0.06
34	2.83	1.80	0.173	0.134	---	0.04
35	2.92	1.80	0.173	0.134	---	0.04
36	3.00	0.60	0.058	0.134	0.010	0.05
Sum =		100.0				Sum = 5.2

Flood volume = Effective rainfall 0.44 (In)  
times area 19.6(Ac.) / [(In)/(Ft.)] = 0.7 (Ac.Ft)  
Total soil loss = 0.36 (In)  
Total soil loss = 0.595 (Ac.Ft)  
Total rainfall = 0.80 (In)  
Flood volume = 31070.4 Cubic Feet  
Total soil loss = 25930.3 Cubic Feet

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Peak flow rate of this hydrograph = 8.828 (CFS)  
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3 - H O U R S T O R M  
R u n o f f H y d r o g r a p h

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

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0006	0.08	Q				
0+10	0.0035	0.43	VQ				
0+15	0.0100	0.94	V Q				
0+20	0.0182	1.19	V Q				
0+25	0.0253	1.03	V Q				
0+30	0.0302	0.72	VQ				
0+35	0.0342	0.57	VQ				
0+40	0.0380	0.56	Q				
0+45	0.0419	0.56	Q				
0+50	0.0460	0.60	Q				
0+55	0.0500	0.58	Q				
1+ 0	0.0534	0.50	QV				
1+ 5	0.0573	0.56	QV				
1+10	0.0626	0.78	Q				
1+15	0.0698	1.04	VQ				
1+20	0.0780	1.19	Q				
1+25	0.0866	1.25	VQ				
1+30	0.0962	1.40	Q				
1+35	0.1078	1.68	Q				
1+40	0.1206	1.86	VQ				
1+45	0.1344	2.00	Q				

1+50	0.1502	2.30		vQ					
1+55	0.1683	2.62		vQ					
2+ 0	0.1871	2.73		Q					
2+ 5	0.2061	2.76		Q					
2+10	0.2262	2.92		QV					
2+15	0.2499	3.44		QV					
2+20	0.2788	4.20		vQ					
2+25	0.3119	4.80		v	Q				
2+30	0.3508	5.65		v	v	Q			
2+35	0.4010	7.28			v	Q			
2+40	0.4609	8.71			v	Q			
2+45	0.5217	8.83			v	v	Q		
2+50	0.5710	7.16			Q	v	v	Q	
2+55	0.6043	4.84			Q	v	v	v	
3+ 0	0.6274	3.35			Q		v	v	
3+ 5	0.6455	2.63			Q		v	v	
3+10	0.6600	2.11			Q		v	v	
3+15	0.6711	1.60			Q		v	v	
3+20	0.6795	1.22			Q		v	v	
3+25	0.6862	0.98			Q		v	v	
3+30	0.6917	0.80			Q		v	v	
3+35	0.6962	0.66			Q		v	v	
3+40	0.7000	0.55			Q		v	v	
3+45	0.7032	0.45			Q		v	v	
3+50	0.7057	0.37			Q		v	v	
3+55	0.7078	0.30			Q		v	v	
4+ 0	0.7094	0.24			Q		v	v	
4+ 5	0.7108	0.20			Q		v	v	
4+10	0.7119	0.15			Q		v	v	
4+15	0.7127	0.11			Q		v	v	
4+20	0.7130	0.05			Q		v	v	
4+25	0.7131	0.02			Q		v	v	
4+30	0.7132	0.01			Q		v	v	
4+35	0.7132	0.01			Q		v	v	
4+40	0.7133	0.00			Q		v	v	

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHVDQ2P62.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

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English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

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Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 2 Year 6 Hour Storm Event - Proposed Condition  
3963UNIHVDQ2P  
CB

-----  
Drainage Area = 19.63(Ac.) = 0.031 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.63(Ac.) = 0.031 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.215 Hr.  
Lag time = 12.90 Min.  
25% of lag time = 3.23 Min.  
40% of lag time = 5.16 Min.  
Unit time = 5.00 Min.  
Duration of storm = 6 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	1.10	21.59

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	2.60	51.04

STORM EVENT (YEAR) = 2.00  
Area Averaged 2-Year Rainfall = 1.100(In)  
Area Averaged 100-Year Rainfall = 2.600(In)

Point rain (area averaged) = 1.100(In)  
Areal adjustment factor = 99.99 %  
Adjusted average point rain = 1.100(In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %



19.630                    56.00                    0.900  
 Total Area Entered =     19.63(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
56.0	36.0	0.706	0.900	0.134	1.000	0.134
						Sum (F) = 0.134

Area averaged mean soil loss (F) (In/Hr) = 0.134  
 Minimum soil loss rate ((In/Hr)) = 0.067  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.180

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 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	38.748	4.154
2	0.167	77.495	16.909
3	0.250	116.243	26.023
4	0.333	154.991	18.058
5	0.417	193.738	8.902
6	0.500	232.486	5.500
7	0.583	271.234	4.071
8	0.667	309.981	3.189
9	0.750	348.729	2.456
10	0.833	387.477	2.035
11	0.917	426.225	1.599
12	1.000	464.972	1.258
13	1.083	503.720	1.176
14	1.167	542.468	0.979
15	1.250	581.215	0.802
16	1.333	619.963	0.680
17	1.417	658.711	0.557
18	1.500	697.458	0.434
19	1.583	736.206	0.387
20	1.667	774.954	0.387
21	1.750	813.701	0.444
		Sum = 100.000	Sum= 19.783

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.50	0.066	0.134	0.012	0.05
2	0.17	0.60	0.079	0.134	0.014	0.06
3	0.25	0.60	0.079	0.134	0.014	0.06
4	0.33	0.60	0.079	0.134	0.014	0.06
5	0.42	0.60	0.079	0.134	0.014	0.06
6	0.50	0.70	0.092	0.134	0.017	0.08
7	0.58	0.70	0.092	0.134	0.017	0.08
8	0.67	0.70	0.092	0.134	0.017	0.08
9	0.75	0.70	0.092	0.134	0.017	0.08
10	0.83	0.70	0.092	0.134	0.017	0.08
11	0.92	0.70	0.092	0.134	0.017	0.08
12	1.00	0.80	0.106	0.134	0.019	0.09
13	1.08	0.80	0.106	0.134	0.019	0.09
14	1.17	0.80	0.106	0.134	0.019	0.09

15	1.25	0.80	0.106	0.134	0.019	0.09
16	1.33	0.80	0.106	0.134	0.019	0.09
17	1.42	0.80	0.106	0.134	0.019	0.09
18	1.50	0.80	0.106	0.134	0.019	0.09
19	1.58	0.80	0.106	0.134	0.019	0.09
20	1.67	0.80	0.106	0.134	0.019	0.09
21	1.75	0.80	0.106	0.134	0.019	0.09
22	1.83	0.80	0.106	0.134	0.019	0.09
23	1.92	0.80	0.106	0.134	0.019	0.09
24	2.00	0.90	0.119	0.134	0.021	0.10
25	2.08	0.80	0.106	0.134	0.019	0.09
26	2.17	0.90	0.119	0.134	0.021	0.10
27	2.25	0.90	0.119	0.134	0.021	0.10
28	2.33	0.90	0.119	0.134	0.021	0.10
29	2.42	0.90	0.119	0.134	0.021	0.10
30	2.50	0.90	0.119	0.134	0.021	0.10
31	2.58	0.90	0.119	0.134	0.021	0.10
32	2.67	0.90	0.119	0.134	0.021	0.10
33	2.75	1.00	0.132	0.134	0.024	0.11
34	2.83	1.00	0.132	0.134	0.024	0.11
35	2.92	1.00	0.132	0.134	0.024	0.11
36	3.00	1.00	0.132	0.134	0.024	0.11
37	3.08	1.00	0.132	0.134	0.024	0.11
38	3.17	1.10	0.145	0.134	---	0.01
39	3.25	1.10	0.145	0.134	---	0.01
40	3.33	1.10	0.145	0.134	---	0.01
41	3.42	1.20	0.158	0.134	---	0.02
42	3.50	1.30	0.172	0.134	---	0.04
43	3.58	1.40	0.185	0.134	---	0.05
44	3.67	1.40	0.185	0.134	---	0.05
45	3.75	1.50	0.198	0.134	---	0.06
46	3.83	1.50	0.198	0.134	---	0.06
47	3.92	1.60	0.211	0.134	---	0.08
48	4.00	1.60	0.211	0.134	---	0.08
49	4.08	1.70	0.224	0.134	---	0.09
50	4.17	1.80	0.238	0.134	---	0.10
51	4.25	1.90	0.251	0.134	---	0.12
52	4.33	2.00	0.264	0.134	---	0.13
53	4.42	2.10	0.277	0.134	---	0.14
54	4.50	2.10	0.277	0.134	---	0.14
55	4.58	2.20	0.290	0.134	---	0.16
56	4.67	2.30	0.304	0.134	---	0.17
57	4.75	2.40	0.317	0.134	---	0.18
58	4.83	2.40	0.317	0.134	---	0.18
59	4.92	2.50	0.330	0.134	---	0.20
60	5.00	2.60	0.343	0.134	---	0.21
61	5.08	3.10	0.409	0.134	---	0.28
62	5.17	3.60	0.475	0.134	---	0.34
63	5.25	3.90	0.515	0.134	---	0.38
64	5.33	4.20	0.554	0.134	---	0.42
65	5.42	4.70	0.620	0.134	---	0.49
66	5.50	5.60	0.739	0.134	---	0.61
67	5.58	1.90	0.251	0.134	---	0.12
68	5.67	0.90	0.119	0.134	0.021	0.10
69	5.75	0.60	0.079	0.134	0.014	0.06
70	5.83	0.50	0.066	0.134	0.012	0.05
71	5.92	0.30	0.040	0.134	0.007	0.03
72	6.00	0.20	0.026	0.134	0.005	0.02
Sum =	100.0				Sum =	8.4

Flood volume = Effective rainfall 0.70 (In)  
 times area 19.6 (Ac.) / [(In) / (Ft.)] = 1.1 (Ac.Ft)  
 Total soil loss = 0.40 (In)  
 Total soil loss = 0.653 (Ac.Ft)

Total rainfall = 1.10(In)  
 Flood volume = 49938.6 Cubic Feet  
 Total soil loss = 28438.7 Cubic Feet

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 Peak flow rate of this hydrograph = 7.937(CFS)  
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6 - H O U R S T O R M  
 R u n o f f H y d r o g r a p h

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

Time(h+m)	Volume	Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0003		0.04	Q				
0+10	0.0019		0.23	Q				
0+15	0.0057		0.55	V Q				
0+20	0.0112		0.80	V Q				
0+25	0.0176		0.93	V Q				
0+30	0.0247		1.02	V Q				
0+35	0.0323		1.11	V Q				
0+40	0.0406		1.21	V Q				
0+45	0.0495		1.28	V Q				
0+50	0.0586		1.33	V Q				
0+55	0.0680		1.36	V Q				
1+ 0	0.0776		1.40	V Q				
1+ 5	0.0876		1.45	V Q				
1+10	0.0981		1.53	V Q				
1+15	0.1090		1.58	V Q				
1+20	0.1201		1.61	V Q				
1+25	0.1314		1.64	V Q				
1+30	0.1428		1.65	V Q				
1+35	0.1542		1.67	VQ				
1+40	0.1658		1.68	VQ				
1+45	0.1774		1.69	Q				
1+50	0.1891		1.70	Q				
1+55	0.2008		1.70	QV				
2+ 0	0.2126		1.71	QV				
2+ 5	0.2246		1.74	QV				
2+10	0.2368		1.77	QV				
2+15	0.2491		1.79	QV				
2+20	0.2617		1.83	Q V				
2+25	0.2746		1.86	Q V				
2+30	0.2875		1.88	Q V				
2+35	0.3005		1.89	Q V				
2+40	0.3136		1.90	Q V				
2+45	0.3268		1.91	Q V				
2+50	0.3402		1.95	Q V				
2+55	0.3541		2.01	Q V				
3+ 0	0.3683		2.05	Q V				
3+ 5	0.3826		2.08	Q V				
3+10	0.3964		2.01	Q V				
3+15	0.4081		1.70	Q V				
3+20	0.4164		1.20	Q V				
3+25	0.4224		0.87	Q V				
3+30	0.4276		0.76	Q V				
3+35	0.4330		0.78	Q V				
3+40	0.4390		0.87	Q V				
3+45	0.4456		0.96	Q V				
3+50	0.4528		1.04	Q V				
3+55	0.4606		1.13	Q V				
4+ 0	0.4691		1.23	Q V				

4+ 5	0.4783	1.33	Q	V		
4+10	0.4882	1.45	Q	V		
4+15	0.4993	1.60	Q	V		
4+20	0.5116	1.79	Q	V		
4+25	0.5254	2.00	Q	V		
4+30	0.5407	2.21	Q	V		
4+35	0.5572	2.40	Q	V		
4+40	0.5748	2.56	Q	V		
4+45	0.5938	2.75	Q	V		
4+50	0.6142	2.96	Q	V		
4+55	0.6359	3.15	Q	V		
5+ 0	0.6588	3.33	Q	V		
5+ 5	0.6834	3.57	Q	V		
5+10	0.7111	4.02	Q	V		
5+15	0.7436	4.73	Q	V		
5+20	0.7818	5.54	Q	V		
5+25	0.8254	6.34	Q	V		
5+30	0.8752	7.23	Q	V		
5+35	0.9299	7.94	Q	V		
5+40	0.9806	7.37	Q	V		
5+45	1.0183	5.48	Q	V		
5+50	1.0454	3.93	Q	V		
5+55	1.0665	3.07	Q	V		
6+ 0	1.0835	2.47	Q	V		
6+ 5	1.0971	1.97	Q	V		
6+10	1.1076	1.53	Q	V		
6+15	1.1157	1.17	Q	V		
6+20	1.1220	0.91	Q	V		
6+25	1.1270	0.74	Q	V		
6+30	1.1312	0.61	Q	V		
6+35	1.1347	0.50	Q	V		
6+40	1.1375	0.41	Q	V		
6+45	1.1398	0.34	Q	V		
6+50	1.1417	0.27	Q	V		
6+55	1.1432	0.21	Q	V		
7+ 0	1.1443	0.17	Q	V		
7+ 5	1.1452	0.13	Q	V		
7+10	1.1458	0.09	Q	V		
7+15	1.1461	0.03	Q	V		
7+20	1.1462	0.02	Q	V		
7+25	1.1463	0.01	Q	V		
7+30	1.1464	0.01	Q	V		
7+35	1.1464	0.00	Q	V		
7+40	1.1464	0.00	Q	V		

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHVDQ2P242.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

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English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

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Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 2 Year 24 Hour Storm Event - Proposed Condition  
3963UNIHVDQ2P  
CB

-----  
Drainage Area = 19.63(Ac.) = 0.031 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.63(Ac.) = 0.031 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.215 Hr.  
Lag time = 12.90 Min.  
25% of lag time = 3.23 Min.  
40% of lag time = 5.16 Min.  
Unit time = 5.00 Min.  
Duration of storm = 24 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	1.85	36.32

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	5.00	98.15

STORM EVENT (YEAR) = 2.00  
Area Averaged 2-Year Rainfall = 1.850 (In)  
Area Averaged 100-Year Rainfall = 5.000 (In)

Point rain (area averaged) = 1.850 (In)  
Areal adjustment factor = 100.00 %  
Adjusted average point rain = 1.850 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.630                    56.00                    0.900  
 Total Area Entered =     19.63(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
56.0	36.0	0.706	0.900	0.134	1.000	0.134
						Sum (F) = 0.134

Area averaged mean soil loss (F) (In/Hr) = 0.134  
 Minimum soil loss rate ((In/Hr)) = 0.067  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.180

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 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	38.748	4.154
2	0.167	77.495	16.909
3	0.250	116.243	26.023
4	0.333	154.991	18.058
5	0.417	193.738	8.902
6	0.500	232.486	5.500
7	0.583	271.234	4.071
8	0.667	309.981	3.189
9	0.750	348.729	2.456
10	0.833	387.477	2.035
11	0.917	426.225	1.599
12	1.000	464.972	1.258
13	1.083	503.720	1.176
14	1.167	542.468	0.979
15	1.250	581.215	0.802
16	1.333	619.963	0.680
17	1.417	658.711	0.557
18	1.500	697.458	0.434
19	1.583	736.206	0.387
20	1.667	774.954	0.387
21	1.750	813.701	0.444
		Sum = 100.000	Sum= 19.783

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.07	0.015	0.238	0.003	0.01
2	0.17	0.07	0.015	0.237	0.003	0.01
3	0.25	0.07	0.015	0.236	0.003	0.01
4	0.33	0.10	0.022	0.235	0.004	0.02
5	0.42	0.10	0.022	0.234	0.004	0.02
6	0.50	0.10	0.022	0.233	0.004	0.02
7	0.58	0.10	0.022	0.232	0.004	0.02
8	0.67	0.10	0.022	0.231	0.004	0.02
9	0.75	0.10	0.022	0.230	0.004	0.02
10	0.83	0.13	0.030	0.230	0.005	0.02
11	0.92	0.13	0.030	0.229	0.005	0.02
12	1.00	0.13	0.030	0.228	0.005	0.02
13	1.08	0.10	0.022	0.227	0.004	0.02
14	1.17	0.10	0.022	0.226	0.004	0.02

15	1.25	0.10	0.022	0.225	0.004	0.02
16	1.33	0.10	0.022	0.224	0.004	0.02
17	1.42	0.10	0.022	0.223	0.004	0.02
18	1.50	0.10	0.022	0.222	0.004	0.02
19	1.58	0.10	0.022	0.222	0.004	0.02
20	1.67	0.10	0.022	0.221	0.004	0.02
21	1.75	0.10	0.022	0.220	0.004	0.02
22	1.83	0.13	0.030	0.219	0.005	0.02
23	1.92	0.13	0.030	0.218	0.005	0.02
24	2.00	0.13	0.030	0.217	0.005	0.02
25	2.08	0.13	0.030	0.216	0.005	0.02
26	2.17	0.13	0.030	0.215	0.005	0.02
27	2.25	0.13	0.030	0.214	0.005	0.02
28	2.33	0.13	0.030	0.214	0.005	0.02
29	2.42	0.13	0.030	0.213	0.005	0.02
30	2.50	0.13	0.030	0.212	0.005	0.02
31	2.58	0.17	0.037	0.211	0.007	0.03
32	2.67	0.17	0.037	0.210	0.007	0.03
33	2.75	0.17	0.037	0.209	0.007	0.03
34	2.83	0.17	0.037	0.208	0.007	0.03
35	2.92	0.17	0.037	0.208	0.007	0.03
36	3.00	0.17	0.037	0.207	0.007	0.03
37	3.08	0.17	0.037	0.206	0.007	0.03
38	3.17	0.17	0.037	0.205	0.007	0.03
39	3.25	0.17	0.037	0.204	0.007	0.03
40	3.33	0.17	0.037	0.203	0.007	0.03
41	3.42	0.17	0.037	0.202	0.007	0.03
42	3.50	0.17	0.037	0.202	0.007	0.03
43	3.58	0.17	0.037	0.201	0.007	0.03
44	3.67	0.17	0.037	0.200	0.007	0.03
45	3.75	0.17	0.037	0.199	0.007	0.03
46	3.83	0.20	0.044	0.198	0.008	0.04
47	3.92	0.20	0.044	0.197	0.008	0.04
48	4.00	0.20	0.044	0.197	0.008	0.04
49	4.08	0.20	0.044	0.196	0.008	0.04
50	4.17	0.20	0.044	0.195	0.008	0.04
51	4.25	0.20	0.044	0.194	0.008	0.04
52	4.33	0.23	0.052	0.193	0.009	0.04
53	4.42	0.23	0.052	0.192	0.009	0.04
54	4.50	0.23	0.052	0.192	0.009	0.04
55	4.58	0.23	0.052	0.191	0.009	0.04
56	4.67	0.23	0.052	0.190	0.009	0.04
57	4.75	0.23	0.052	0.189	0.009	0.04
58	4.83	0.27	0.059	0.188	0.011	0.05
59	4.92	0.27	0.059	0.187	0.011	0.05
60	5.00	0.27	0.059	0.187	0.011	0.05
61	5.08	0.20	0.044	0.186	0.008	0.04
62	5.17	0.20	0.044	0.185	0.008	0.04
63	5.25	0.20	0.044	0.184	0.008	0.04
64	5.33	0.23	0.052	0.183	0.009	0.04
65	5.42	0.23	0.052	0.183	0.009	0.04
66	5.50	0.23	0.052	0.182	0.009	0.04
67	5.58	0.27	0.059	0.181	0.011	0.05
68	5.67	0.27	0.059	0.180	0.011	0.05
69	5.75	0.27	0.059	0.179	0.011	0.05
70	5.83	0.27	0.059	0.179	0.011	0.05
71	5.92	0.27	0.059	0.178	0.011	0.05
72	6.00	0.27	0.059	0.177	0.011	0.05
73	6.08	0.30	0.067	0.176	0.012	0.05
74	6.17	0.30	0.067	0.175	0.012	0.05
75	6.25	0.30	0.067	0.175	0.012	0.05
76	6.33	0.30	0.067	0.174	0.012	0.05
77	6.42	0.30	0.067	0.173	0.012	0.05

78	6.50	0.30	0.067	0.172	0.012	0.05
79	6.58	0.33	0.074	0.172	0.013	0.06
80	6.67	0.33	0.074	0.171	0.013	0.06
81	6.75	0.33	0.074	0.170	0.013	0.06
82	6.83	0.33	0.074	0.169	0.013	0.06
83	6.92	0.33	0.074	0.169	0.013	0.06
84	7.00	0.33	0.074	0.168	0.013	0.06
85	7.08	0.33	0.074	0.167	0.013	0.06
86	7.17	0.33	0.074	0.166	0.013	0.06
87	7.25	0.33	0.074	0.165	0.013	0.06
88	7.33	0.37	0.081	0.165	0.015	0.07
89	7.42	0.37	0.081	0.164	0.015	0.07
90	7.50	0.37	0.081	0.163	0.015	0.07
91	7.58	0.40	0.089	0.162	0.016	0.07
92	7.67	0.40	0.089	0.162	0.016	0.07
93	7.75	0.40	0.089	0.161	0.016	0.07
94	7.83	0.43	0.096	0.160	0.017	0.08
95	7.92	0.43	0.096	0.159	0.017	0.08
96	8.00	0.43	0.096	0.159	0.017	0.08
97	8.08	0.50	0.111	0.158	0.020	0.09
98	8.17	0.50	0.111	0.157	0.020	0.09
99	8.25	0.50	0.111	0.157	0.020	0.09
100	8.33	0.50	0.111	0.156	0.020	0.09
101	8.42	0.50	0.111	0.155	0.020	0.09
102	8.50	0.50	0.111	0.154	0.020	0.09
103	8.58	0.53	0.118	0.154	0.021	0.10
104	8.67	0.53	0.118	0.153	0.021	0.10
105	8.75	0.53	0.118	0.152	0.021	0.10
106	8.83	0.57	0.126	0.151	0.023	0.10
107	8.92	0.57	0.126	0.151	0.023	0.10
108	9.00	0.57	0.126	0.150	0.023	0.10
109	9.08	0.63	0.141	0.149	0.025	0.12
110	9.17	0.63	0.141	0.149	0.025	0.12
111	9.25	0.63	0.141	0.148	0.025	0.12
112	9.33	0.67	0.148	0.147	---	0.00
113	9.42	0.67	0.148	0.147	---	0.00
114	9.50	0.67	0.148	0.146	---	0.00
115	9.58	0.70	0.155	0.145	---	0.01
116	9.67	0.70	0.155	0.144	---	0.01
117	9.75	0.70	0.155	0.144	---	0.01
118	9.83	0.73	0.163	0.143	---	0.02
119	9.92	0.73	0.163	0.142	---	0.02
120	10.00	0.73	0.163	0.142	---	0.02
121	10.08	0.50	0.111	0.141	0.020	0.09
122	10.17	0.50	0.111	0.140	0.020	0.09
123	10.25	0.50	0.111	0.140	0.020	0.09
124	10.33	0.50	0.111	0.139	0.020	0.09
125	10.42	0.50	0.111	0.138	0.020	0.09
126	10.50	0.50	0.111	0.138	0.020	0.09
127	10.58	0.67	0.148	0.137	---	0.01
128	10.67	0.67	0.148	0.136	---	0.01
129	10.75	0.67	0.148	0.136	---	0.01
130	10.83	0.67	0.148	0.135	---	0.01
131	10.92	0.67	0.148	0.134	---	0.01
132	11.00	0.67	0.148	0.134	---	0.01
133	11.08	0.63	0.141	0.133	---	0.01
134	11.17	0.63	0.141	0.132	---	0.01
135	11.25	0.63	0.141	0.132	---	0.01
136	11.33	0.63	0.141	0.131	---	0.01
137	11.42	0.63	0.141	0.130	---	0.01
138	11.50	0.63	0.141	0.130	---	0.01
139	11.58	0.57	0.126	0.129	0.023	0.10
140	11.67	0.57	0.126	0.128	0.023	0.10



141	11.75	0.57	0.126	0.128	0.023	0.10
142	11.83	0.60	0.133	0.127	---	0.01
143	11.92	0.60	0.133	0.126	---	0.01
144	12.00	0.60	0.133	0.126	---	0.01
145	12.08	0.83	0.185	0.125	---	0.06
146	12.17	0.83	0.185	0.125	---	0.06
147	12.25	0.83	0.185	0.124	---	0.06
148	12.33	0.87	0.192	0.123	---	0.07
149	12.42	0.87	0.192	0.123	---	0.07
150	12.50	0.87	0.192	0.122	---	0.07
151	12.58	0.93	0.207	0.121	---	0.09
152	12.67	0.93	0.207	0.121	---	0.09
153	12.75	0.93	0.207	0.120	---	0.09
154	12.83	0.97	0.215	0.120	---	0.09
155	12.92	0.97	0.215	0.119	---	0.10
156	13.00	0.97	0.215	0.118	---	0.10
157	13.08	1.13	0.252	0.118	---	0.13
158	13.17	1.13	0.252	0.117	---	0.13
159	13.25	1.13	0.252	0.117	---	0.13
160	13.33	1.13	0.252	0.116	---	0.14
161	13.42	1.13	0.252	0.115	---	0.14
162	13.50	1.13	0.252	0.115	---	0.14
163	13.58	0.77	0.170	0.114	---	0.06
164	13.67	0.77	0.170	0.114	---	0.06
165	13.75	0.77	0.170	0.113	---	0.06
166	13.83	0.77	0.170	0.113	---	0.06
167	13.92	0.77	0.170	0.112	---	0.06
168	14.00	0.77	0.170	0.111	---	0.06
169	14.08	0.90	0.200	0.111	---	0.09
170	14.17	0.90	0.200	0.110	---	0.09
171	14.25	0.90	0.200	0.110	---	0.09
172	14.33	0.87	0.192	0.109	---	0.08
173	14.42	0.87	0.192	0.109	---	0.08
174	14.50	0.87	0.192	0.108	---	0.08
175	14.58	0.87	0.192	0.107	---	0.08
176	14.67	0.87	0.192	0.107	---	0.09
177	14.75	0.87	0.192	0.106	---	0.09
178	14.83	0.83	0.185	0.106	---	0.08
179	14.92	0.83	0.185	0.105	---	0.08
180	15.00	0.83	0.185	0.105	---	0.08
181	15.08	0.80	0.178	0.104	---	0.07
182	15.17	0.80	0.178	0.104	---	0.07
183	15.25	0.80	0.178	0.103	---	0.07
184	15.33	0.77	0.170	0.103	---	0.07
185	15.42	0.77	0.170	0.102	---	0.07
186	15.50	0.77	0.170	0.102	---	0.07
187	15.58	0.63	0.141	0.101	---	0.04
188	15.67	0.63	0.141	0.101	---	0.04
189	15.75	0.63	0.141	0.100	---	0.04
190	15.83	0.63	0.141	0.100	---	0.04
191	15.92	0.63	0.141	0.099	---	0.04
192	16.00	0.63	0.141	0.099	---	0.04
193	16.08	0.13	0.030	0.098	0.005	0.02
194	16.17	0.13	0.030	0.098	0.005	0.02
195	16.25	0.13	0.030	0.097	0.005	0.02
196	16.33	0.13	0.030	0.097	0.005	0.02
197	16.42	0.13	0.030	0.096	0.005	0.02
198	16.50	0.13	0.030	0.096	0.005	0.02
199	16.58	0.10	0.022	0.095	0.004	0.02
200	16.67	0.10	0.022	0.095	0.004	0.02
201	16.75	0.10	0.022	0.094	0.004	0.02
202	16.83	0.10	0.022	0.094	0.004	0.02
203	16.92	0.10	0.022	0.093	0.004	0.02

204	17.00	0.10	0.022	0.093	0.004	0.02
205	17.08	0.17	0.037	0.092	0.007	0.03
206	17.17	0.17	0.037	0.092	0.007	0.03
207	17.25	0.17	0.037	0.091	0.007	0.03
208	17.33	0.17	0.037	0.091	0.007	0.03
209	17.42	0.17	0.037	0.090	0.007	0.03
210	17.50	0.17	0.037	0.090	0.007	0.03
211	17.58	0.17	0.037	0.089	0.007	0.03
212	17.67	0.17	0.037	0.089	0.007	0.03
213	17.75	0.17	0.037	0.089	0.007	0.03
214	17.83	0.13	0.030	0.088	0.005	0.02
215	17.92	0.13	0.030	0.088	0.005	0.02
216	18.00	0.13	0.030	0.087	0.005	0.02
217	18.08	0.13	0.030	0.087	0.005	0.02
218	18.17	0.13	0.030	0.086	0.005	0.02
219	18.25	0.13	0.030	0.086	0.005	0.02
220	18.33	0.13	0.030	0.086	0.005	0.02
221	18.42	0.13	0.030	0.085	0.005	0.02
222	18.50	0.13	0.030	0.085	0.005	0.02
223	18.58	0.10	0.022	0.084	0.004	0.02
224	18.67	0.10	0.022	0.084	0.004	0.02
225	18.75	0.10	0.022	0.084	0.004	0.02
226	18.83	0.07	0.015	0.083	0.003	0.01
227	18.92	0.07	0.015	0.083	0.003	0.01
228	19.00	0.07	0.015	0.082	0.003	0.01
229	19.08	0.10	0.022	0.082	0.004	0.02
230	19.17	0.10	0.022	0.082	0.004	0.02
231	19.25	0.10	0.022	0.081	0.004	0.02
232	19.33	0.13	0.030	0.081	0.005	0.02
233	19.42	0.13	0.030	0.080	0.005	0.02
234	19.50	0.13	0.030	0.080	0.005	0.02
235	19.58	0.10	0.022	0.080	0.004	0.02
236	19.67	0.10	0.022	0.079	0.004	0.02
237	19.75	0.10	0.022	0.079	0.004	0.02
238	19.83	0.07	0.015	0.079	0.003	0.01
239	19.92	0.07	0.015	0.078	0.003	0.01
240	20.00	0.07	0.015	0.078	0.003	0.01
241	20.08	0.10	0.022	0.078	0.004	0.02
242	20.17	0.10	0.022	0.077	0.004	0.02
243	20.25	0.10	0.022	0.077	0.004	0.02
244	20.33	0.10	0.022	0.077	0.004	0.02
245	20.42	0.10	0.022	0.076	0.004	0.02
246	20.50	0.10	0.022	0.076	0.004	0.02
247	20.58	0.10	0.022	0.076	0.004	0.02
248	20.67	0.10	0.022	0.075	0.004	0.02
249	20.75	0.10	0.022	0.075	0.004	0.02
250	20.83	0.07	0.015	0.075	0.003	0.01
251	20.92	0.07	0.015	0.074	0.003	0.01
252	21.00	0.07	0.015	0.074	0.003	0.01
253	21.08	0.10	0.022	0.074	0.004	0.02
254	21.17	0.10	0.022	0.073	0.004	0.02
255	21.25	0.10	0.022	0.073	0.004	0.02
256	21.33	0.07	0.015	0.073	0.003	0.01
257	21.42	0.07	0.015	0.073	0.003	0.01
258	21.50	0.07	0.015	0.072	0.003	0.01
259	21.58	0.10	0.022	0.072	0.004	0.02
260	21.67	0.10	0.022	0.072	0.004	0.02
261	21.75	0.10	0.022	0.072	0.004	0.02
262	21.83	0.07	0.015	0.071	0.003	0.01
263	21.92	0.07	0.015	0.071	0.003	0.01
264	22.00	0.07	0.015	0.071	0.003	0.01
265	22.08	0.10	0.022	0.071	0.004	0.02
266	22.17	0.10	0.022	0.070	0.004	0.02

267	22.25	0.10	0.022	0.070	0.004	0.02
268	22.33	0.07	0.015	0.070	0.003	0.01
269	22.42	0.07	0.015	0.070	0.003	0.01
270	22.50	0.07	0.015	0.069	0.003	0.01
271	22.58	0.07	0.015	0.069	0.003	0.01
272	22.67	0.07	0.015	0.069	0.003	0.01
273	22.75	0.07	0.015	0.069	0.003	0.01
274	22.83	0.07	0.015	0.069	0.003	0.01
275	22.92	0.07	0.015	0.069	0.003	0.01
276	23.00	0.07	0.015	0.068	0.003	0.01
277	23.08	0.07	0.015	0.068	0.003	0.01
278	23.17	0.07	0.015	0.068	0.003	0.01
279	23.25	0.07	0.015	0.068	0.003	0.01
280	23.33	0.07	0.015	0.068	0.003	0.01
281	23.42	0.07	0.015	0.068	0.003	0.01
282	23.50	0.07	0.015	0.068	0.003	0.01
283	23.58	0.07	0.015	0.067	0.003	0.01
284	23.67	0.07	0.015	0.067	0.003	0.01
285	23.75	0.07	0.015	0.067	0.003	0.01
286	23.83	0.07	0.015	0.067	0.003	0.01
287	23.92	0.07	0.015	0.067	0.003	0.01
288	24.00	0.07	0.015	0.067	0.003	0.01
Sum =	100.0				Sum =	11.9

Flood volume = Effective rainfall 0.99 (In)  
times area 19.6(Ac.) / [(In)/(Ft.)] = 1.6(Ac.Ft)  
Total soil loss = 0.86(In)  
Total soil loss = 1.410(Ac.Ft)  
Total rainfall = 1.85(In)  
Flood volume = 70400.6 Cubic Feet  
Total soil loss = 61419.6 Cubic Feet

-----  
Peak flow rate of this hydrograph = 2.461 (CFS)  
-----

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

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

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0001	0.01	Q				
0+10	0.0004	0.05	Q				
0+15	0.0012	0.11	Q				
0+20	0.0023	0.16	Q				
0+25	0.0037	0.20	Q				
0+30	0.0054	0.25	Q				
0+35	0.0073	0.28	VQ				
0+40	0.0094	0.30	VQ				
0+45	0.0115	0.31	VQ				
0+50	0.0138	0.32	VQ				
0+55	0.0162	0.35	VQ				
1+ 0	0.0189	0.39	VQ				
1+ 5	0.0217	0.41	VQ				
1+10	0.0245	0.41	VQ				
1+15	0.0272	0.39	VQ				
1+20	0.0297	0.37	VQ				
1+25	0.0322	0.37	VQ				
1+30	0.0348	0.37	VQ				
1+35	0.0373	0.36	VQ				
1+40	0.0398	0.36	VQ				
1+45	0.0423	0.36	Q				

1+50	0.0448	0.37	Q
1+55	0.0475	0.39	Q
2+ 0	0.0504	0.42	Q
2+ 5	0.0535	0.44	Q
2+10	0.0566	0.45	Q
2+15	0.0597	0.46	Q
2+20	0.0629	0.46	Q
2+25	0.0661	0.47	Q
2+30	0.0693	0.47	Q
2+35	0.0726	0.48	Q
2+40	0.0761	0.50	Q
2+45	0.0797	0.53	VQ
2+50	0.0835	0.55	Q
2+55	0.0874	0.56	Q
3+ 0	0.0913	0.57	Q
3+ 5	0.0953	0.58	Q
3+10	0.0993	0.58	Q
3+15	0.1034	0.59	Q
3+20	0.1074	0.59	Q
3+25	0.1115	0.59	Q
3+30	0.1156	0.59	Q
3+35	0.1197	0.59	Q
3+40	0.1238	0.60	QV
3+45	0.1279	0.60	QV
3+50	0.1321	0.60	QV
3+55	0.1364	0.62	QV
4+ 0	0.1409	0.66	QV
4+ 5	0.1455	0.68	QV
4+10	0.1503	0.69	QV
4+15	0.1551	0.70	QV
4+20	0.1599	0.71	QV
4+25	0.1650	0.73	Q V
4+30	0.1702	0.76	QV
4+35	0.1757	0.79	QV
4+40	0.1812	0.80	QV
4+45	0.1867	0.81	QV
4+50	0.1924	0.82	QV
4+55	0.1982	0.85	QV
5+ 0	0.2043	0.88	Q V
5+ 5	0.2105	0.90	Q V
5+10	0.2164	0.87	Q V
5+15	0.2221	0.81	Q V
5+20	0.2274	0.78	Q V
5+25	0.2329	0.79	Q V
5+30	0.2384	0.81	Q V
5+35	0.2442	0.83	Q V
5+40	0.2501	0.86	Q V
5+45	0.2562	0.89	Q V
5+50	0.2625	0.91	Q V
5+55	0.2689	0.93	Q V
6+ 0	0.2753	0.93	Q V
6+ 5	0.2818	0.94	Q V
6+10	0.2885	0.97	Q V
6+15	0.2954	1.00	Q V
6+20	0.3024	1.03	Q V
6+25	0.3096	1.04	Q V
6+30	0.3168	1.05	Q V
6+35	0.3241	1.06	Q V
6+40	0.3316	1.09	Q V
6+45	0.3393	1.12	Q V
6+50	0.3472	1.15	Q V
6+55	0.3552	1.16	Q V
7+ 0	0.3632	1.17	Q V

7+ 5	0.3713	1.17	Q	V				
7+10	0.3794	1.18	Q	V				
7+15	0.3876	1.18	Q	V				
7+20	0.3958	1.19	Q	V				
7+25	0.4042	1.22	Q	V				
7+30	0.4128	1.25	Q	V				
7+35	0.4216	1.28	Q	V				
7+40	0.4306	1.31	Q	V				
7+45	0.4399	1.35	Q	V				
7+50	0.4494	1.38	Q	V				
7+55	0.4592	1.42	Q	V				
8+ 0	0.4692	1.46	Q	V				
8+ 5	0.4796	1.50	Q	V				
8+10	0.4903	1.56	Q	V				
8+15	0.5015	1.63	Q	V				
8+20	0.5131	1.68	Q	V				
8+25	0.5249	1.71	Q	V				
8+30	0.5368	1.73	Q	V				
8+35	0.5488	1.75	Q	V				
8+40	0.5611	1.78	Q	V				
8+45	0.5736	1.82	Q	V				
8+50	0.5864	1.85	Q	V				
8+55	0.5994	1.89	Q	V				
9+ 0	0.6127	1.93	Q	V				
9+ 5	0.6263	1.98	Q	V				
9+10	0.6404	2.03	Q	V				
9+15	0.6549	2.11	Q	V				
9+20	0.6691	2.07	Q	V				
9+25	0.6809	1.71	Q	V				
9+30	0.6888	1.15	Q	V				
9+35	0.6941	0.76	Q	V				
9+40	0.6983	0.61	Q	V				
9+45	0.7020	0.54	Q	V				
9+50	0.7054	0.50	Q	V				
9+55	0.7088	0.48	Q	V				
10+ 0	0.7121	0.49	Q	V				
10+ 5	0.7159	0.55	Q	V				
10+10	0.7212	0.78	Q	V				
10+15	0.7290	1.13	Q	V				
10+20	0.7384	1.37	Q	V				
10+25	0.7486	1.48	Q	V				
10+30	0.7593	1.55	Q	V				
10+35	0.7698	1.53	Q	V				
10+40	0.7788	1.30	Q	V				
10+45	0.7851	0.92	Q	V				
10+50	0.7897	0.66	Q	V				
10+55	0.7935	0.55	Q	V				
11+ 0	0.7968	0.48	Q	V				
11+ 5	0.7998	0.44	Q	V				
11+10	0.8025	0.39	Q	V				
11+15	0.8049	0.34	Q	V				
11+20	0.8069	0.30	Q	V				
11+25	0.8089	0.28	Q	V				
11+30	0.8108	0.27	Q	V				
11+35	0.8132	0.34	Q	V				
11+40	0.8176	0.65	Q	V				
11+45	0.8253	1.12	Q	V				
11+50	0.8347	1.36	Q	V				
11+55	0.8428	1.19	Q	V				
12+ 0	0.8482	0.78	Q	V				
12+ 5	0.8521	0.55	Q	V				
12+10	0.8563	0.62	Q	V				
12+15	0.8620	0.83	Q	V				

12+20	0.8688	0.99	Q	V
12+25	0.8762	1.08	Q	V
12+30	0.8842	1.16	Q	V
12+35	0.8927	1.24	Q	V
12+40	0.9019	1.33	Q	V
12+45	0.9118	1.44	Q	V
12+50	0.9223	1.53	Q	V
12+55	0.9333	1.60	Q	V
13+ 0	0.9449	1.68	Q	V
13+ 5	0.9571	1.77	Q	V
13+10	0.9704	1.93	Q	V
13+15	0.9853	2.16	Q	V
13+20	1.0012	2.32	Q	V
13+25	1.0178	2.40	Q	V
13+30	1.0347	2.46	Q	V
13+35	1.0516	2.45	Q	V
13+40	1.0669	2.22	Q	V
13+45	1.0795	1.84	Q	V
13+50	1.0904	1.58	Q	V
13+55	1.1005	1.46	Q	V
14+ 0	1.1101	1.40	Q	V
14+ 5	1.1196	1.38	Q	V
14+10	1.1296	1.45	Q	V
14+15	1.1404	1.58	Q	V
14+20	1.1519	1.66	Q	V
14+25	1.1635	1.68	Q	V
14+30	1.1750	1.67	Q	V
14+35	1.1864	1.66	Q	V
14+40	1.1979	1.67	Q	V
14+45	1.2094	1.67	Q	V
14+50	1.2209	1.67	Q	V
14+55	1.2323	1.65	Q	V
15+ 0	1.2435	1.62	Q	V
15+ 5	1.2545	1.60	Q	V
15+10	1.2653	1.57	Q	V
15+15	1.2759	1.53	Q	V
15+20	1.2862	1.51	Q	V
15+25	1.2964	1.48	Q	V
15+30	1.3063	1.44	Q	V
15+35	1.3159	1.39	Q	V
15+40	1.3247	1.28	Q	V
15+45	1.3325	1.13	Q	V
15+50	1.3395	1.02	Q	V
15+55	1.3462	0.97	Q	V
16+ 0	1.3527	0.94	Q	V
16+ 5	1.3589	0.91	Q	V
16+10	1.3647	0.83	Q	V
16+15	1.3697	0.73	Q	V
16+20	1.3742	0.65	Q	V
16+25	1.3784	0.61	Q	V
16+30	1.3824	0.58	Q	V
16+35	1.3863	0.56	Q	V
16+40	1.3898	0.52	Q	V
16+45	1.3931	0.48	Q	V
16+50	1.3962	0.44	Q	V
16+55	1.3991	0.42	Q	V
17+ 0	1.4019	0.41	Q	V
17+ 5	1.4048	0.41	Q	V
17+10	1.4078	0.44	Q	V
17+15	1.4112	0.50	Q	V
17+20	1.4149	0.53	Q	V
17+25	1.4187	0.55	Q	V
17+30	1.4226	0.56	Q	V

17+35	1.4265	0.57	Q	V
17+40	1.4305	0.57	Q	V
17+45	1.4344	0.58	Q	V
17+50	1.4384	0.58	Q	V
17+55	1.4423	0.56	Q	V
18+ 0	1.4459	0.53	Q	V
18+ 5	1.4495	0.51	Q	V
18+10	1.4529	0.50	Q	V
18+15	1.4564	0.50	Q	V
18+20	1.4598	0.49	Q	V
18+25	1.4632	0.49	Q	V
18+30	1.4665	0.49	Q	V
18+35	1.4699	0.48	Q	V
18+40	1.4731	0.46	Q	V
18+45	1.4760	0.43	Q	V
18+50	1.4788	0.40	Q	V
18+55	1.4813	0.37	Q	V
19+ 0	1.4836	0.33	Q	V
19+ 5	1.4858	0.31	Q	V
19+10	1.4879	0.31	Q	V
19+15	1.4902	0.34	Q	V
19+20	1.4927	0.35	Q	V
19+25	1.4953	0.38	Q	V
19+30	1.4981	0.41	Q	V
19+35	1.5011	0.43	Q	V
19+40	1.5040	0.42	Q	V
19+45	1.5067	0.40	Q	V
19+50	1.5093	0.38	Q	V
19+55	1.5117	0.35	Q	V
20+ 0	1.5139	0.31	Q	V
20+ 5	1.5159	0.29	Q	V
20+10	1.5180	0.30	Q	V
20+15	1.5202	0.33	Q	V
20+20	1.5226	0.34	Q	V
20+25	1.5250	0.35	Q	V
20+30	1.5274	0.35	Q	V
20+35	1.5298	0.35	Q	V
20+40	1.5323	0.35	Q	V
20+45	1.5347	0.36	Q	V
20+50	1.5371	0.35	Q	V
20+55	1.5394	0.33	Q	V
21+ 0	1.5415	0.30	Q	V
21+ 5	1.5435	0.29	Q	V
21+10	1.5455	0.29	Q	V
21+15	1.5477	0.32	Q	V
21+20	1.5500	0.33	Q	V
21+25	1.5522	0.32	Q	V
21+30	1.5542	0.29	Q	V
21+35	1.5561	0.28	Q	V
21+40	1.5581	0.29	Q	V
21+45	1.5602	0.32	Q	V
21+50	1.5625	0.33	Q	V
21+55	1.5647	0.32	Q	V
22+ 0	1.5667	0.29	Q	V
22+ 5	1.5686	0.27	Q	V
22+10	1.5705	0.29	Q	V
22+15	1.5727	0.31	Q	V
22+20	1.5749	0.33	Q	V
22+25	1.5771	0.31	Q	V
22+30	1.5791	0.29	Q	V
22+35	1.5809	0.27	Q	V
22+40	1.5827	0.26	Q	V
22+45	1.5845	0.26	Q	V

22+50	1.5862	0.25	Q	V
22+55	1.5880	0.25	Q	V
23+ 0	1.5897	0.25	Q	V
23+ 5	1.5914	0.25	Q	V
23+10	1.5931	0.25	Q	V
23+15	1.5948	0.25	Q	V
23+20	1.5964	0.24	Q	V
23+25	1.5981	0.24	Q	V
23+30	1.5998	0.24	Q	V
23+35	1.6014	0.24	Q	V
23+40	1.6031	0.24	Q	V
23+45	1.6048	0.24	Q	V
23+50	1.6064	0.24	Q	V
23+55	1.6081	0.24	Q	V
24+ 0	1.6097	0.24	Q	V
24+ 5	1.6113	0.23	Q	V
24+10	1.6126	0.19	Q	V
24+15	1.6135	0.13	Q	V
24+20	1.6141	0.08	Q	V
24+25	1.6145	0.06	Q	V
24+30	1.6149	0.05	Q	V
24+35	1.6151	0.04	Q	V
24+40	1.6153	0.03	Q	V
24+45	1.6155	0.03	Q	V
24+50	1.6157	0.02	Q	V
24+55	1.6158	0.02	Q	V
25+ 0	1.6159	0.01	Q	V
25+ 5	1.6160	0.01	Q	V
25+10	1.6160	0.01	Q	V
25+15	1.6161	0.01	Q	V
25+20	1.6161	0.01	Q	V
25+25	1.6161	0.00	Q	V
25+30	1.6162	0.00	Q	V
25+35	1.6162	0.00	Q	V
25+40	1.6162	0.00	Q	V

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Unit Hydrograph Analysis

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0  
Study date 04/24/23 File: 3963UNIHVDQ5P15.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

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English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 5 Year 1 Hour Storm Event - Proposed Condition  
3963UNIHVDQ5P  
CB

-----  
Drainage Area = 19.63(Ac.) = 0.031 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.63(Ac.) = 0.031 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.212 Hr.  
Lag time = 12.70 Min.  
25% of lag time = 3.18 Min.  
40% of lag time = 5.08 Min.  
Unit time = 5.00 Min.  
Duration of storm = 1 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	0.47	9.23

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	1.25	24.54

STORM EVENT (YEAR) = 5.00  
Area Averaged 2-Year Rainfall = 0.470 (In)  
Area Averaged 100-Year Rainfall = 1.250 (In)

Point rain (area averaged) = 0.653 (In)  
Areal adjustment factor = 99.98 %  
Adjusted average point rain = 0.653 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.630                    56.00                    0.900  
 Total Area Entered =    19.63(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
56.0	36.0	0.706	0.900	0.134	1.000	0.134
						Sum (F) = 0.134

Area averaged mean soil loss (F) (In/Hr) = 0.134  
 Minimum soil loss rate ((In/Hr)) = 0.067  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.180

-----  
 Slope of intensity-duration curve for a 1 hour storm =0.5000  
 -----

U n i t   H y d r o g r a p h  
 VALLEY S-Curve

-----  
 Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	39.358	4.252
2	0.167	78.715	17.383
3	0.250	118.073	26.392
4	0.333	157.431	17.761
5	0.417	196.788	8.711
6	0.500	236.146	5.442
7	0.583	275.504	4.042
8	0.667	314.862	3.136
9	0.750	354.219	2.449
10	0.833	393.577	1.983
11	0.917	432.935	1.566
12	1.000	472.292	1.253
13	1.083	511.650	1.174
14	1.167	551.008	0.944
15	1.250	590.365	0.783
16	1.333	629.723	0.664
17	1.417	669.081	0.537
18	1.500	708.438	0.414
19	1.583	747.796	0.394
20	1.667	787.154	0.394
21	1.750	826.511	0.325
		Sum = 100.000	Sum= 19.783

Unit Time	Pattern	Storm Rain	Loss rate(In./Hr)		Effective
(Hr.)	Percent	(In/Hr)	Max	Low	(In/Hr)
1	0.08	4.20	0.134	---	0.19
2	0.17	4.30	0.134	---	0.20
3	0.25	5.00	0.134	---	0.26
4	0.33	5.00	0.134	---	0.26
5	0.42	5.80	0.134	---	0.32
6	0.50	6.50	0.134	---	0.37
7	0.58	7.40	0.134	---	0.45
8	0.67	8.60	0.134	---	0.54
9	0.75	12.30	0.134	---	0.83
10	0.83	29.10	0.134	---	2.14
11	0.92	6.80	0.134	---	0.40
12	1.00	5.00	0.134	---	0.26

```

Sum =      100.0
Flood volume = Effective rainfall      0.52 (In)
times area   19.6(Ac.)/[ (In)/(Ft.) ] = 0.8 (Ac.Ft)
Total soil loss =      0.13(In)
Total soil loss =      0.219(Ac.Ft)
Total rainfall =      0.65(In)
Flood volume =      36942.3 Cubic Feet
Total soil loss =      9558.4 Cubic Feet

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-----  
Peak flow rate of this hydrograph = 17.951 (CFS)  
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1 - H O U R     S T O R M  
R u n o f f     H y d r o g r a p h  
-----

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0011	0.16	Q				
0+10	0.0069	0.84	VQ				
0+15	0.0202	1.93	V Q				
0+20	0.0398	2.85	V Q Q				
0+25	0.0642	3.55	V V Q				
0+30	0.0933	4.23	V V Q				
0+35	0.1282	5.06	V V Q				
0+40	0.1700	6.07	V V Q				
0+45	0.2214	7.45	V V Q				
0+50	0.2942	10.57	V V Q				
0+55	0.4029	15.79	V V Q				
1+ 0	0.5266	17.95	V V Q				
1+ 5	0.6198	13.54	V V Q				
1+10	0.6789	8.58	V V Q				
1+15	0.7171	5.55	V V Q				
1+20	0.7440	3.90	V V Q				
1+25	0.7645	2.98	V V Q				
1+30	0.7807	2.35	V V Q				
1+35	0.7938	1.90	V V Q				
1+40	0.8044	1.54	V V Q				
1+45	0.8132	1.27	V V Q				
1+50	0.8207	1.09	V V Q				
1+55	0.8269	0.90	V V Q				
2+ 0	0.8320	0.74	V V Q				
2+ 5	0.8362	0.61	V V Q				
2+10	0.8396	0.49	V V Q				
2+15	0.8422	0.39	V V Q				
2+20	0.8445	0.33	V V Q				
2+25	0.8463	0.27	V V Q				
2+30	0.8477	0.19	V V Q				
2+35	0.8480	0.05	V V Q				
2+40	0.8481	0.02	V V Q				

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHVDQ5P35.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 5 Year 3 Hour Storm Event - Proposed Condition  
3963UNIHVDQ5P  
CB

-----  
Drainage Area = 19.63(Ac.) = 0.031 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.63(Ac.) = 0.031 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.212 Hr.  
Lag time = 12.70 Min.  
25% of lag time = 3.18 Min.  
40% of lag time = 5.08 Min.  
Unit time = 5.00 Min.  
Duration of storm = 3 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	0.80	15.70

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	1.93	37.89

STORM EVENT (YEAR) = 5.00  
Area Averaged 2-Year Rainfall = 0.800 (In)  
Area Averaged 100-Year Rainfall = 1.930 (In)

Point rain (area averaged) = 1.065 (In)  
Areal adjustment factor = 99.99 %  
Adjusted average point rain = 1.065 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.630                    56.00                    0.900  
 Total Area Entered =        19.63(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
56.0	36.0	0.706	0.900	0.134	1.000	0.134
						Sum (F) = 0.134

Area averaged mean soil loss (F) (In/Hr) = 0.134  
 Minimum soil loss rate ((In/Hr)) = 0.067  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.180

-----  
 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	39.358	4.252
2	0.167	78.715	17.383
3	0.250	118.073	26.392
4	0.333	157.431	17.761
5	0.417	196.788	8.711
6	0.500	236.146	5.442
7	0.583	275.504	4.042
8	0.667	314.862	3.136
9	0.750	354.219	2.449
10	0.833	393.577	1.983
11	0.917	432.935	1.566
12	1.000	472.292	1.253
13	1.083	511.650	1.174
14	1.167	551.008	0.944
15	1.250	590.365	0.783
16	1.333	629.723	0.664
17	1.417	669.081	0.537
18	1.500	708.438	0.414
19	1.583	747.796	0.394
20	1.667	787.154	0.394
21	1.750	826.511	0.325
		Sum = 100.000	Sum= 19.783

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	1.30	0.166	0.134	---	0.03
2	0.17	1.30	0.166	0.134	---	0.03
3	0.25	1.10	0.141	0.134	---	0.01
4	0.33	1.50	0.192	0.134	---	0.06
5	0.42	1.50	0.192	0.134	---	0.06
6	0.50	1.80	0.230	0.134	---	0.10
7	0.58	1.50	0.192	0.134	---	0.06
8	0.67	1.80	0.230	0.134	---	0.10
9	0.75	1.80	0.230	0.134	---	0.10
10	0.83	1.50	0.192	0.134	---	0.06
11	0.92	1.60	0.204	0.134	---	0.07
12	1.00	1.80	0.230	0.134	---	0.10
13	1.08	2.20	0.281	0.134	---	0.15
14	1.17	2.20	0.281	0.134	---	0.15

15	1.25	2.20	0.281	0.134	---	0.15
16	1.33	2.00	0.255	0.134	---	0.12
17	1.42	2.60	0.332	0.134	---	0.20
18	1.50	2.70	0.345	0.134	---	0.21
19	1.58	2.40	0.307	0.134	---	0.17
20	1.67	2.70	0.345	0.134	---	0.21
21	1.75	3.30	0.422	0.134	---	0.29
22	1.83	3.10	0.396	0.134	---	0.26
23	1.92	2.90	0.370	0.134	---	0.24
24	2.00	3.00	0.383	0.134	---	0.25
25	2.08	3.10	0.396	0.134	---	0.26
26	2.17	4.20	0.537	0.134	---	0.40
27	2.25	5.00	0.639	0.134	---	0.50
28	2.33	3.50	0.447	0.134	---	0.31
29	2.42	6.80	0.869	0.134	---	0.73
30	2.50	7.30	0.933	0.134	---	0.80
31	2.58	8.20	1.048	0.134	---	0.91
32	2.67	5.90	0.754	0.134	---	0.62
33	2.75	2.00	0.255	0.134	---	0.12
34	2.83	1.80	0.230	0.134	---	0.10
35	2.92	1.80	0.230	0.134	---	0.10
36	3.00	0.60	0.077	0.134	0.014	0.06
Sum =	100.0				Sum =	8.1

Flood volume = Effective rainfall 0.67 (In)  
times area 19.6(Ac.) / [(In)/(Ft.)] = 1.1(Ac.Ft)  
Total soil loss = 0.39(In)  
Total soil loss = 0.642(Ac.Ft)  
Total rainfall = 1.06(In)  
Flood volume = 47898.2 Cubic Feet  
Total soil loss = 27960.6 Cubic Feet

-----  
Peak flow rate of this hydrograph = 12.657 (CFS)  
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3 - H O U R S T O R M  
R u n o f f H y d r o g r a p h

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

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0002	0.03	Q				
0+10	0.0011	0.14	Q				
0+15	0.0031	0.28	Q				
0+20	0.0055	0.35	Q				
0+25	0.0086	0.45	Q				
0+30	0.0133	0.69	VQ				
0+35	0.0199	0.95	VQ				
0+40	0.0277	1.13	VQ				
0+45	0.0363	1.25	VQ				
0+50	0.0458	1.39	VQ				
0+55	0.0555	1.40	Q				
1+ 0	0.0648	1.35	Q				
1+ 5	0.0748	1.46	Q				
1+10	0.0872	1.79	Q				
1+15	0.1021	2.16	VQ				
1+20	0.1184	2.37	Q				
1+25	0.1355	2.47	Q				
1+30	0.1541	2.70	Q				
1+35	0.1753	3.08	Q				
1+40	0.1982	3.33	QV				
1+45	0.2224	3.51	QV				

1+50	0.2495	3.93	Q V				
1+55	0.2796	4.38	Q V				
2+ 0	0.3108	4.53	Q V				
2+ 5	0.3422	4.55	Q V				
2+10	0.3751	4.78	Q V				
2+15	0.4129	5.49	Q V				
2+20	0.4578	6.51	Q V				
2+25	0.5080	7.30	Q V				
2+30	0.5662	8.45	Q V				
2+35	0.6396	10.66	Q V				
2+40	0.7260	12.55	Q V				
2+45	0.8131	12.66	Q V				
2+50	0.8844	10.35	Q V				
2+55	0.9342	7.23	Q V				
3+ 0	0.9704	5.25	Q V				
3+ 5	0.9990	4.16	Q V				
3+10	1.0213	3.23	Q V				
3+15	1.0378	2.39	Q V				
3+20	1.0503	1.82	Q V				
3+25	1.0603	1.45	Q V				
3+30	1.0684	1.18	Q V				
3+35	1.0751	0.97	Q V				
3+40	1.0807	0.81	Q V				
3+45	1.0852	0.66	Q V				
3+50	1.0889	0.54	Q V				
3+55	1.0919	0.43	Q V				
4+ 0	1.0943	0.34	Q V				
4+ 5	1.0962	0.28	Q V				
4+10	1.0977	0.21	Q V				
4+15	1.0987	0.14	Q V				
4+20	1.0992	0.07	Q V				
4+25	1.0994	0.03	Q V				
4+30	1.0995	0.02	Q V				
4+35	1.0996	0.01	Q V				
4+40	1.0996	0.00	Q V				

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHVDQ5P65.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 5 Year 6 Hour Storm Event - Proposed Condition  
3963UNIHVDQ5P  
CB

-----  
Drainage Area = 19.63(Ac.) = 0.031 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.63(Ac.) = 0.031 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.212 Hr.  
Lag time = 12.70 Min.  
25% of lag time = 3.18 Min.  
40% of lag time = 5.08 Min.  
Unit time = 5.00 Min.  
Duration of storm = 6 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	1.10	21.59

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	2.60	51.04

STORM EVENT (YEAR) = 5.00  
Area Averaged 2-Year Rainfall = 1.100 (In)  
Area Averaged 100-Year Rainfall = 2.600 (In)

Point rain (area averaged) = 1.451 (In)  
Areal adjustment factor = 99.99 %  
Adjusted average point rain = 1.451 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %



19.630                    56.00                    0.900  
 Total Area Entered =    19.63(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
56.0	36.0	0.706	0.900	0.134	1.000	0.134
						Sum (F) = 0.134

Area averaged mean soil loss (F) (In/Hr) = 0.134  
 Minimum soil loss rate ((In/Hr)) = 0.067  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.180

-----  
 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	39.358	4.252
2	0.167	78.715	17.383
3	0.250	118.073	26.392
4	0.333	157.431	17.761
5	0.417	196.788	8.711
6	0.500	236.146	5.442
7	0.583	275.504	4.042
8	0.667	314.862	3.136
9	0.750	354.219	2.449
10	0.833	393.577	1.983
11	0.917	432.935	1.566
12	1.000	472.292	1.253
13	1.083	511.650	1.174
14	1.167	551.008	0.944
15	1.250	590.365	0.783
16	1.333	629.723	0.664
17	1.417	669.081	0.537
18	1.500	708.438	0.414
19	1.583	747.796	0.394
20	1.667	787.154	0.394
21	1.750	826.511	0.325
		Sum = 100.000	Sum= 19.783

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
			Max	Low	
1	0.08	0.50	0.134	0.016	0.07
2	0.17	0.60	0.134	0.019	0.09
3	0.25	0.60	0.134	0.019	0.09
4	0.33	0.60	0.134	0.019	0.09
5	0.42	0.60	0.134	0.019	0.09
6	0.50	0.70	0.134	0.022	0.10
7	0.58	0.70	0.134	0.022	0.10
8	0.67	0.70	0.134	0.022	0.10
9	0.75	0.70	0.134	0.022	0.10
10	0.83	0.70	0.134	0.022	0.10
11	0.92	0.70	0.134	0.022	0.10
12	1.00	0.80	0.134	---	0.01
13	1.08	0.80	0.134	---	0.01
14	1.17	0.80	0.134	---	0.01

15	1.25	0.80	0.139	0.134	---	0.01
16	1.33	0.80	0.139	0.134	---	0.01
17	1.42	0.80	0.139	0.134	---	0.01
18	1.50	0.80	0.139	0.134	---	0.01
19	1.58	0.80	0.139	0.134	---	0.01
20	1.67	0.80	0.139	0.134	---	0.01
21	1.75	0.80	0.139	0.134	---	0.01
22	1.83	0.80	0.139	0.134	---	0.01
23	1.92	0.80	0.139	0.134	---	0.01
24	2.00	0.90	0.157	0.134	---	0.02
25	2.08	0.80	0.139	0.134	---	0.01
26	2.17	0.90	0.157	0.134	---	0.02
27	2.25	0.90	0.157	0.134	---	0.02
28	2.33	0.90	0.157	0.134	---	0.02
29	2.42	0.90	0.157	0.134	---	0.02
30	2.50	0.90	0.157	0.134	---	0.02
31	2.58	0.90	0.157	0.134	---	0.02
32	2.67	0.90	0.157	0.134	---	0.02
33	2.75	1.00	0.174	0.134	---	0.04
34	2.83	1.00	0.174	0.134	---	0.04
35	2.92	1.00	0.174	0.134	---	0.04
36	3.00	1.00	0.174	0.134	---	0.04
37	3.08	1.00	0.174	0.134	---	0.04
38	3.17	1.10	0.192	0.134	---	0.06
39	3.25	1.10	0.192	0.134	---	0.06
40	3.33	1.10	0.192	0.134	---	0.06
41	3.42	1.20	0.209	0.134	---	0.07
42	3.50	1.30	0.226	0.134	---	0.09
43	3.58	1.40	0.244	0.134	---	0.11
44	3.67	1.40	0.244	0.134	---	0.11
45	3.75	1.50	0.261	0.134	---	0.13
46	3.83	1.50	0.261	0.134	---	0.13
47	3.92	1.60	0.279	0.134	---	0.14
48	4.00	1.60	0.279	0.134	---	0.14
49	4.08	1.70	0.296	0.134	---	0.16
50	4.17	1.80	0.313	0.134	---	0.18
51	4.25	1.90	0.331	0.134	---	0.20
52	4.33	2.00	0.348	0.134	---	0.21
53	4.42	2.10	0.366	0.134	---	0.23
54	4.50	2.10	0.366	0.134	---	0.23
55	4.58	2.20	0.383	0.134	---	0.25
56	4.67	2.30	0.401	0.134	---	0.27
57	4.75	2.40	0.418	0.134	---	0.28
58	4.83	2.40	0.418	0.134	---	0.28
59	4.92	2.50	0.435	0.134	---	0.30
60	5.00	2.60	0.453	0.134	---	0.32
61	5.08	3.10	0.540	0.134	---	0.41
62	5.17	3.60	0.627	0.134	---	0.49
63	5.25	3.90	0.679	0.134	---	0.55
64	5.33	4.20	0.731	0.134	---	0.60
65	5.42	4.70	0.818	0.134	---	0.68
66	5.50	5.60	0.975	0.134	---	0.84
67	5.58	1.90	0.331	0.134	---	0.20
68	5.67	0.90	0.157	0.134	---	0.02
69	5.75	0.60	0.104	0.134	0.019	0.09
70	5.83	0.50	0.087	0.134	0.016	0.07
71	5.92	0.30	0.052	0.134	0.009	0.04
72	6.00	0.20	0.035	0.134	0.006	0.03
Sum =	100.0					Sum = 9.5

Flood volume = Effective rainfall 0.79 (In)  
 times area 19.6(Ac.)/[ (In)/(Ft.) ] = 1.3(Ac.Ft)  
 Total soil loss = 0.66(In)  
 Total soil loss = 1.079(Ac.Ft)

Total rainfall = 1.45(In)  
 Flood volume = 56388.9 Cubic Feet  
 Total soil loss = 47021.8 Cubic Feet

-----  
 Peak flow rate of this hydrograph = 11.373(CFS)  
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6 - H O U R S T O R M  
 R u n o f f H y d r o g r a p h

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

Time(h+m)	Volume	Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0004		0.06	Q				
0+10	0.0026		0.32	Q				
0+15	0.0077		0.74	VQ				
0+20	0.0150		1.07	V Q				
0+25	0.0236		1.24	V Q				
0+30	0.0329		1.35	VQ				
0+35	0.0430		1.47	VQ				
0+40	0.0541		1.60	V Q				
0+45	0.0658		1.70	VQ				
0+50	0.0779		1.76	VQ				
0+55	0.0903		1.80	VQ				
1+ 0	0.1024		1.75	Q				
1+ 5	0.1124		1.46	QV				
1+10	0.1192		0.99	Q V				
1+15	0.1238		0.67	Q V				
1+20	0.1274		0.52	Q V				
1+25	0.1304		0.44	Q V				
1+30	0.1330		0.37	Q V				
1+35	0.1352		0.32	Q V				
1+40	0.1372		0.28	Q V				
1+45	0.1389		0.25	Q V				
1+50	0.1405		0.23	Q V				
1+55	0.1419		0.20	Q V				
2+ 0	0.1432		0.20	Q V				
2+ 5	0.1448		0.23	Q V				
2+10	0.1466		0.26	Q V				
2+15	0.1485		0.28	Q V				
2+20	0.1508		0.33	Q V				
2+25	0.1533		0.37	Q V				
2+30	0.1560		0.39	Q V				
2+35	0.1587		0.39	Q V				
2+40	0.1614		0.40	Q V				
2+45	0.1644		0.42	Q V				
2+50	0.1677		0.49	Q V				
2+55	0.1718		0.59	Q V				
3+ 0	0.1763		0.65	Q V				
3+ 5	0.1810		0.69	Q V				
3+10	0.1860		0.72	Q V				
3+15	0.1916		0.80	Q V				
3+20	0.1978		0.91	Q V				
3+25	0.2046		0.99	Q V				
3+30	0.2122		1.10	Q V				
3+35	0.2212		1.30	Q V				
3+40	0.2317		1.53	Q V				
3+45	0.2437		1.74	Q V				
3+50	0.2569		1.92	Q V				
3+55	0.2714		2.10	Q V				
4+ 0	0.2870		2.27	Q V				

4+ 5	0.3039	2.45	Q	V			
4+10	0.3220	2.63	Q	V			
4+15	0.3418	2.87	Q	V			
4+20	0.3634	3.15	Q	V			
4+25	0.3871	3.44	Q	V			
4+30	0.4128	3.73	Q	V			
4+35	0.4403	3.99	Q	V			
4+40	0.4694	4.22	Q	V			
4+45	0.5002	4.48	Q	V			
4+50	0.5331	4.77	Q	V			
4+55	0.5677	5.02	Q	V			
5+ 0	0.6039	5.25	Q	V			
5+ 5	0.6423	5.58	Q	V			
5+10	0.6848	6.18	Q	V			
5+15	0.7338	7.12	Q	V			
5+20	0.7903	8.20	Q	V			
5+25	0.8541	9.25	Q	V			
5+30	0.9260	10.44	Q	V			
5+35	1.0043	11.37	Q	V			
5+40	1.0762	10.44	Q	V			
5+45	1.1275	7.45	Q	V			
5+50	1.1621	5.02	Q	V			
5+55	1.1891	3.93	Q	V			
6+ 0	1.2116	3.26	Q	V			
6+ 5	1.2297	2.62	Q	V			
6+10	1.2437	2.04	Q	V			
6+15	1.2545	1.56	Q	V			
6+20	1.2628	1.21	Q	V			
6+25	1.2696	0.98	Q	V			
6+30	1.2752	0.81	Q	V			
6+35	1.2797	0.66	Q	V			
6+40	1.2834	0.54	Q	V			
6+45	1.2864	0.44	Q	V			
6+50	1.2888	0.35	Q	V			
6+55	1.2907	0.27	Q	V			
7+ 0	1.2922	0.21	Q	V			
7+ 5	1.2932	0.16	Q	V			
7+10	1.2939	0.10	Q	V			
7+15	1.2941	0.04	Q	V			
7+20	1.2943	0.02	Q	V			
7+25	1.2944	0.02	Q	V			
7+30	1.2945	0.01	Q	V			
7+35	1.2945	0.00	Q	V			
7+40	1.2945	0.00	Q	V			

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHVDQ5P245.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

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English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

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Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 5 Year 24 Hour Storm Event - Proposed Condition  
3963UNIHVDQ5P  
CB

-----  
Drainage Area = 19.63(Ac.) = 0.031 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.63(Ac.) = 0.031 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.212 Hr.  
Lag time = 12.70 Min.  
25% of lag time = 3.18 Min.  
40% of lag time = 5.08 Min.  
Unit time = 5.00 Min.  
Duration of storm = 24 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	1.85	36.32

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	5.00	98.15

STORM EVENT (YEAR) = 5.00  
Area Averaged 2-Year Rainfall = 1.850 (In)  
Area Averaged 100-Year Rainfall = 5.000 (In)

Point rain (area averaged) = 2.588 (In)  
Areal adjustment factor = 100.00 %  
Adjusted average point rain = 2.588 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.630                    56.00                    0.900  
 Total Area Entered =        19.63(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
56.0	36.0	0.706	0.900	0.134	1.000	0.134
						Sum (F) = 0.134

Area averaged mean soil loss (F) (In/Hr) = 0.134  
 Minimum soil loss rate ((In/Hr)) = 0.067  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.180

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 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	39.358	4.252
2	0.167	78.715	17.383
3	0.250	118.073	26.392
4	0.333	157.431	17.761
5	0.417	196.788	8.711
6	0.500	236.146	5.442
7	0.583	275.504	4.042
8	0.667	314.862	3.136
9	0.750	354.219	2.449
10	0.833	393.577	1.983
11	0.917	432.935	1.566
12	1.000	472.292	1.253
13	1.083	511.650	1.174
14	1.167	551.008	0.944
15	1.250	590.365	0.783
16	1.333	629.723	0.664
17	1.417	669.081	0.537
18	1.500	708.438	0.414
19	1.583	747.796	0.394
20	1.667	787.154	0.394
21	1.750	826.511	0.325
		Sum = 100.000	Sum= 19.783

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.07	0.021	0.238	0.004	0.02
2	0.17	0.07	0.021	0.237	0.004	0.02
3	0.25	0.07	0.021	0.236	0.004	0.02
4	0.33	0.10	0.031	0.235	0.006	0.03
5	0.42	0.10	0.031	0.234	0.006	0.03
6	0.50	0.10	0.031	0.233	0.006	0.03
7	0.58	0.10	0.031	0.232	0.006	0.03
8	0.67	0.10	0.031	0.231	0.006	0.03
9	0.75	0.10	0.031	0.230	0.006	0.03
10	0.83	0.13	0.041	0.230	0.007	0.03
11	0.92	0.13	0.041	0.229	0.007	0.03
12	1.00	0.13	0.041	0.228	0.007	0.03
13	1.08	0.10	0.031	0.227	0.006	0.03
14	1.17	0.10	0.031	0.226	0.006	0.03

15	1.25	0.10	0.031	0.225	0.006	0.03
16	1.33	0.10	0.031	0.224	0.006	0.03
17	1.42	0.10	0.031	0.223	0.006	0.03
18	1.50	0.10	0.031	0.222	0.006	0.03
19	1.58	0.10	0.031	0.222	0.006	0.03
20	1.67	0.10	0.031	0.221	0.006	0.03
21	1.75	0.10	0.031	0.220	0.006	0.03
22	1.83	0.13	0.041	0.219	0.007	0.03
23	1.92	0.13	0.041	0.218	0.007	0.03
24	2.00	0.13	0.041	0.217	0.007	0.03
25	2.08	0.13	0.041	0.216	0.007	0.03
26	2.17	0.13	0.041	0.215	0.007	0.03
27	2.25	0.13	0.041	0.214	0.007	0.03
28	2.33	0.13	0.041	0.214	0.007	0.03
29	2.42	0.13	0.041	0.213	0.007	0.03
30	2.50	0.13	0.041	0.212	0.007	0.03
31	2.58	0.17	0.052	0.211	0.009	0.04
32	2.67	0.17	0.052	0.210	0.009	0.04
33	2.75	0.17	0.052	0.209	0.009	0.04
34	2.83	0.17	0.052	0.208	0.009	0.04
35	2.92	0.17	0.052	0.208	0.009	0.04
36	3.00	0.17	0.052	0.207	0.009	0.04
37	3.08	0.17	0.052	0.206	0.009	0.04
38	3.17	0.17	0.052	0.205	0.009	0.04
39	3.25	0.17	0.052	0.204	0.009	0.04
40	3.33	0.17	0.052	0.203	0.009	0.04
41	3.42	0.17	0.052	0.202	0.009	0.04
42	3.50	0.17	0.052	0.202	0.009	0.04
43	3.58	0.17	0.052	0.201	0.009	0.04
44	3.67	0.17	0.052	0.200	0.009	0.04
45	3.75	0.17	0.052	0.199	0.009	0.04
46	3.83	0.20	0.062	0.198	0.011	0.05
47	3.92	0.20	0.062	0.197	0.011	0.05
48	4.00	0.20	0.062	0.197	0.011	0.05
49	4.08	0.20	0.062	0.196	0.011	0.05
50	4.17	0.20	0.062	0.195	0.011	0.05
51	4.25	0.20	0.062	0.194	0.011	0.05
52	4.33	0.23	0.072	0.193	0.013	0.06
53	4.42	0.23	0.072	0.192	0.013	0.06
54	4.50	0.23	0.072	0.192	0.013	0.06
55	4.58	0.23	0.072	0.191	0.013	0.06
56	4.67	0.23	0.072	0.190	0.013	0.06
57	4.75	0.23	0.072	0.189	0.013	0.06
58	4.83	0.27	0.083	0.188	0.015	0.07
59	4.92	0.27	0.083	0.187	0.015	0.07
60	5.00	0.27	0.083	0.187	0.015	0.07
61	5.08	0.20	0.062	0.186	0.011	0.05
62	5.17	0.20	0.062	0.185	0.011	0.05
63	5.25	0.20	0.062	0.184	0.011	0.05
64	5.33	0.23	0.072	0.183	0.013	0.06
65	5.42	0.23	0.072	0.183	0.013	0.06
66	5.50	0.23	0.072	0.182	0.013	0.06
67	5.58	0.27	0.083	0.181	0.015	0.07
68	5.67	0.27	0.083	0.180	0.015	0.07
69	5.75	0.27	0.083	0.179	0.015	0.07
70	5.83	0.27	0.083	0.179	0.015	0.07
71	5.92	0.27	0.083	0.178	0.015	0.07
72	6.00	0.27	0.083	0.177	0.015	0.07
73	6.08	0.30	0.093	0.176	0.017	0.08
74	6.17	0.30	0.093	0.175	0.017	0.08
75	6.25	0.30	0.093	0.175	0.017	0.08
76	6.33	0.30	0.093	0.174	0.017	0.08
77	6.42	0.30	0.093	0.173	0.017	0.08

78	6.50	0.30	0.093	0.172	0.017	0.08
79	6.58	0.33	0.104	0.172	0.019	0.08
80	6.67	0.33	0.104	0.171	0.019	0.08
81	6.75	0.33	0.104	0.170	0.019	0.08
82	6.83	0.33	0.104	0.169	0.019	0.08
83	6.92	0.33	0.104	0.169	0.019	0.08
84	7.00	0.33	0.104	0.168	0.019	0.08
85	7.08	0.33	0.104	0.167	0.019	0.08
86	7.17	0.33	0.104	0.166	0.019	0.08
87	7.25	0.33	0.104	0.165	0.019	0.08
88	7.33	0.37	0.114	0.165	0.020	0.09
89	7.42	0.37	0.114	0.164	0.020	0.09
90	7.50	0.37	0.114	0.163	0.020	0.09
91	7.58	0.40	0.124	0.162	0.022	0.10
92	7.67	0.40	0.124	0.162	0.022	0.10
93	7.75	0.40	0.124	0.161	0.022	0.10
94	7.83	0.43	0.135	0.160	0.024	0.11
95	7.92	0.43	0.135	0.159	0.024	0.11
96	8.00	0.43	0.135	0.159	0.024	0.11
97	8.08	0.50	0.155	0.158	0.028	0.13
98	8.17	0.50	0.155	0.157	0.028	0.13
99	8.25	0.50	0.155	0.157	0.028	0.13
100	8.33	0.50	0.155	0.156	0.028	0.13
101	8.42	0.50	0.155	0.155	---	0.00
102	8.50	0.50	0.155	0.154	---	0.00
103	8.58	0.53	0.166	0.154	---	0.01
104	8.67	0.53	0.166	0.153	---	0.01
105	8.75	0.53	0.166	0.152	---	0.01
106	8.83	0.57	0.176	0.151	---	0.02
107	8.92	0.57	0.176	0.151	---	0.03
108	9.00	0.57	0.176	0.150	---	0.03
109	9.08	0.63	0.197	0.149	---	0.05
110	9.17	0.63	0.197	0.149	---	0.05
111	9.25	0.63	0.197	0.148	---	0.05
112	9.33	0.67	0.207	0.147	---	0.06
113	9.42	0.67	0.207	0.147	---	0.06
114	9.50	0.67	0.207	0.146	---	0.06
115	9.58	0.70	0.217	0.145	---	0.07
116	9.67	0.70	0.217	0.144	---	0.07
117	9.75	0.70	0.217	0.144	---	0.07
118	9.83	0.73	0.228	0.143	---	0.08
119	9.92	0.73	0.228	0.142	---	0.09
120	10.00	0.73	0.228	0.142	---	0.09
121	10.08	0.50	0.155	0.141	---	0.01
122	10.17	0.50	0.155	0.140	---	0.01
123	10.25	0.50	0.155	0.140	---	0.02
124	10.33	0.50	0.155	0.139	---	0.02
125	10.42	0.50	0.155	0.138	---	0.02
126	10.50	0.50	0.155	0.138	---	0.02
127	10.58	0.67	0.207	0.137	---	0.07
128	10.67	0.67	0.207	0.136	---	0.07
129	10.75	0.67	0.207	0.136	---	0.07
130	10.83	0.67	0.207	0.135	---	0.07
131	10.92	0.67	0.207	0.134	---	0.07
132	11.00	0.67	0.207	0.134	---	0.07
133	11.08	0.63	0.197	0.133	---	0.06
134	11.17	0.63	0.197	0.132	---	0.06
135	11.25	0.63	0.197	0.132	---	0.07
136	11.33	0.63	0.197	0.131	---	0.07
137	11.42	0.63	0.197	0.130	---	0.07
138	11.50	0.63	0.197	0.130	---	0.07
139	11.58	0.57	0.176	0.129	---	0.05
140	11.67	0.57	0.176	0.128	---	0.05



141	11.75	0.57	0.176	0.128	---	0.05
142	11.83	0.60	0.186	0.127	---	0.06
143	11.92	0.60	0.186	0.126	---	0.06
144	12.00	0.60	0.186	0.126	---	0.06
145	12.08	0.83	0.259	0.125	---	0.13
146	12.17	0.83	0.259	0.125	---	0.13
147	12.25	0.83	0.259	0.124	---	0.13
148	12.33	0.87	0.269	0.123	---	0.15
149	12.42	0.87	0.269	0.123	---	0.15
150	12.50	0.87	0.269	0.122	---	0.15
151	12.58	0.93	0.290	0.121	---	0.17
152	12.67	0.93	0.290	0.121	---	0.17
153	12.75	0.93	0.290	0.120	---	0.17
154	12.83	0.97	0.300	0.120	---	0.18
155	12.92	0.97	0.300	0.119	---	0.18
156	13.00	0.97	0.300	0.118	---	0.18
157	13.08	1.13	0.352	0.118	---	0.23
158	13.17	1.13	0.352	0.117	---	0.23
159	13.25	1.13	0.352	0.117	---	0.24
160	13.33	1.13	0.352	0.116	---	0.24
161	13.42	1.13	0.352	0.115	---	0.24
162	13.50	1.13	0.352	0.115	---	0.24
163	13.58	0.77	0.238	0.114	---	0.12
164	13.67	0.77	0.238	0.114	---	0.12
165	13.75	0.77	0.238	0.113	---	0.12
166	13.83	0.77	0.238	0.113	---	0.13
167	13.92	0.77	0.238	0.112	---	0.13
168	14.00	0.77	0.238	0.111	---	0.13
169	14.08	0.90	0.279	0.111	---	0.17
170	14.17	0.90	0.279	0.110	---	0.17
171	14.25	0.90	0.279	0.110	---	0.17
172	14.33	0.87	0.269	0.109	---	0.16
173	14.42	0.87	0.269	0.109	---	0.16
174	14.50	0.87	0.269	0.108	---	0.16
175	14.58	0.87	0.269	0.107	---	0.16
176	14.67	0.87	0.269	0.107	---	0.16
177	14.75	0.87	0.269	0.106	---	0.16
178	14.83	0.83	0.259	0.106	---	0.15
179	14.92	0.83	0.259	0.105	---	0.15
180	15.00	0.83	0.259	0.105	---	0.15
181	15.08	0.80	0.248	0.104	---	0.14
182	15.17	0.80	0.248	0.104	---	0.14
183	15.25	0.80	0.248	0.103	---	0.15
184	15.33	0.77	0.238	0.103	---	0.14
185	15.42	0.77	0.238	0.102	---	0.14
186	15.50	0.77	0.238	0.102	---	0.14
187	15.58	0.63	0.197	0.101	---	0.10
188	15.67	0.63	0.197	0.101	---	0.10
189	15.75	0.63	0.197	0.100	---	0.10
190	15.83	0.63	0.197	0.100	---	0.10
191	15.92	0.63	0.197	0.099	---	0.10
192	16.00	0.63	0.197	0.099	---	0.10
193	16.08	0.13	0.041	0.098	0.007	0.03
194	16.17	0.13	0.041	0.098	0.007	0.03
195	16.25	0.13	0.041	0.097	0.007	0.03
196	16.33	0.13	0.041	0.097	0.007	0.03
197	16.42	0.13	0.041	0.096	0.007	0.03
198	16.50	0.13	0.041	0.096	0.007	0.03
199	16.58	0.10	0.031	0.095	0.006	0.03
200	16.67	0.10	0.031	0.095	0.006	0.03
201	16.75	0.10	0.031	0.094	0.006	0.03
202	16.83	0.10	0.031	0.094	0.006	0.03
203	16.92	0.10	0.031	0.093	0.006	0.03

204	17.00	0.10	0.031	0.093	0.006	0.03
205	17.08	0.17	0.052	0.092	0.009	0.04
206	17.17	0.17	0.052	0.092	0.009	0.04
207	17.25	0.17	0.052	0.091	0.009	0.04
208	17.33	0.17	0.052	0.091	0.009	0.04
209	17.42	0.17	0.052	0.090	0.009	0.04
210	17.50	0.17	0.052	0.090	0.009	0.04
211	17.58	0.17	0.052	0.089	0.009	0.04
212	17.67	0.17	0.052	0.089	0.009	0.04
213	17.75	0.17	0.052	0.089	0.009	0.04
214	17.83	0.13	0.041	0.088	0.007	0.03
215	17.92	0.13	0.041	0.088	0.007	0.03
216	18.00	0.13	0.041	0.087	0.007	0.03
217	18.08	0.13	0.041	0.087	0.007	0.03
218	18.17	0.13	0.041	0.086	0.007	0.03
219	18.25	0.13	0.041	0.086	0.007	0.03
220	18.33	0.13	0.041	0.086	0.007	0.03
221	18.42	0.13	0.041	0.085	0.007	0.03
222	18.50	0.13	0.041	0.085	0.007	0.03
223	18.58	0.10	0.031	0.084	0.006	0.03
224	18.67	0.10	0.031	0.084	0.006	0.03
225	18.75	0.10	0.031	0.084	0.006	0.03
226	18.83	0.07	0.021	0.083	0.004	0.02
227	18.92	0.07	0.021	0.083	0.004	0.02
228	19.00	0.07	0.021	0.082	0.004	0.02
229	19.08	0.10	0.031	0.082	0.006	0.03
230	19.17	0.10	0.031	0.082	0.006	0.03
231	19.25	0.10	0.031	0.081	0.006	0.03
232	19.33	0.13	0.041	0.081	0.007	0.03
233	19.42	0.13	0.041	0.080	0.007	0.03
234	19.50	0.13	0.041	0.080	0.007	0.03
235	19.58	0.10	0.031	0.080	0.006	0.03
236	19.67	0.10	0.031	0.079	0.006	0.03
237	19.75	0.10	0.031	0.079	0.006	0.03
238	19.83	0.07	0.021	0.079	0.004	0.02
239	19.92	0.07	0.021	0.078	0.004	0.02
240	20.00	0.07	0.021	0.078	0.004	0.02
241	20.08	0.10	0.031	0.078	0.006	0.03
242	20.17	0.10	0.031	0.077	0.006	0.03
243	20.25	0.10	0.031	0.077	0.006	0.03
244	20.33	0.10	0.031	0.077	0.006	0.03
245	20.42	0.10	0.031	0.076	0.006	0.03
246	20.50	0.10	0.031	0.076	0.006	0.03
247	20.58	0.10	0.031	0.076	0.006	0.03
248	20.67	0.10	0.031	0.075	0.006	0.03
249	20.75	0.10	0.031	0.075	0.006	0.03
250	20.83	0.07	0.021	0.075	0.004	0.02
251	20.92	0.07	0.021	0.074	0.004	0.02
252	21.00	0.07	0.021	0.074	0.004	0.02
253	21.08	0.10	0.031	0.074	0.006	0.03
254	21.17	0.10	0.031	0.073	0.006	0.03
255	21.25	0.10	0.031	0.073	0.006	0.03
256	21.33	0.07	0.021	0.073	0.004	0.02
257	21.42	0.07	0.021	0.073	0.004	0.02
258	21.50	0.07	0.021	0.072	0.004	0.02
259	21.58	0.10	0.031	0.072	0.006	0.03
260	21.67	0.10	0.031	0.072	0.006	0.03
261	21.75	0.10	0.031	0.072	0.006	0.03
262	21.83	0.07	0.021	0.071	0.004	0.02
263	21.92	0.07	0.021	0.071	0.004	0.02
264	22.00	0.07	0.021	0.071	0.004	0.02
265	22.08	0.10	0.031	0.071	0.006	0.03
266	22.17	0.10	0.031	0.070	0.006	0.03

267	22.25	0.10	0.031	0.070	0.006	0.03
268	22.33	0.07	0.021	0.070	0.004	0.02
269	22.42	0.07	0.021	0.070	0.004	0.02
270	22.50	0.07	0.021	0.069	0.004	0.02
271	22.58	0.07	0.021	0.069	0.004	0.02
272	22.67	0.07	0.021	0.069	0.004	0.02
273	22.75	0.07	0.021	0.069	0.004	0.02
274	22.83	0.07	0.021	0.069	0.004	0.02
275	22.92	0.07	0.021	0.069	0.004	0.02
276	23.00	0.07	0.021	0.068	0.004	0.02
277	23.08	0.07	0.021	0.068	0.004	0.02
278	23.17	0.07	0.021	0.068	0.004	0.02
279	23.25	0.07	0.021	0.068	0.004	0.02
280	23.33	0.07	0.021	0.068	0.004	0.02
281	23.42	0.07	0.021	0.068	0.004	0.02
282	23.50	0.07	0.021	0.068	0.004	0.02
283	23.58	0.07	0.021	0.067	0.004	0.02
284	23.67	0.07	0.021	0.067	0.004	0.02
285	23.75	0.07	0.021	0.067	0.004	0.02
286	23.83	0.07	0.021	0.067	0.004	0.02
287	23.92	0.07	0.021	0.067	0.004	0.02
288	24.00	0.07	0.021	0.067	0.004	0.02
Sum =	100.0				Sum =	17.7

Flood volume = Effective rainfall 1.48 (In)  
times area 19.6(Ac.)/[ (In)/(Ft.) ] = 2.4 (Ac.Ft)  
Total soil loss = 1.11 (In)  
Total soil loss = 1.814 (Ac.Ft)  
Total rainfall = 2.59 (In)  
Flood volume = 105377.3 Cubic Feet  
Total soil loss = 79014.7 Cubic Feet

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Peak flow rate of this hydrograph = 4.375 (CFS)  
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24 - H O U R S T O R M  
R u n o f f H y d r o g r a p h

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

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0001	0.01	Q				
0+10	0.0006	0.07	Q				
0+15	0.0017	0.16	Q				
0+20	0.0033	0.23	Q				
0+25	0.0053	0.29	VQ				
0+30	0.0077	0.35	VQ				
0+35	0.0104	0.39	VQ				
0+40	0.0132	0.42	VQ				
0+45	0.0162	0.44	VQ				
0+50	0.0194	0.46	VQ				
0+55	0.0228	0.50	VQ				
1+ 0	0.0266	0.55	V Q				
1+ 5	0.0306	0.58	V Q				
1+10	0.0345	0.57	V Q				
1+15	0.0382	0.54	V Q				
1+20	0.0418	0.52	V Q				
1+25	0.0453	0.51	V Q				
1+30	0.0488	0.51	V Q				
1+35	0.0524	0.51	V Q				
1+40	0.0559	0.51	V Q				
1+45	0.0594	0.51	V Q				

1+50	0.0629	0.52	VQ
1+55	0.0667	0.55	VQ
2+ 0	0.0708	0.59	VQ
2+ 5	0.0750	0.62	VQ
2+10	0.0794	0.63	VQ
2+15	0.0838	0.64	VQ
2+20	0.0882	0.65	VQ
2+25	0.0927	0.65	VQ
2+30	0.0973	0.66	VQ
2+35	0.1018	0.67	VQ
2+40	0.1067	0.70	VQ
2+45	0.1118	0.74	VQ
2+50	0.1171	0.78	V Q
2+55	0.1226	0.79	VQ
3+ 0	0.1281	0.80	VQ
3+ 5	0.1337	0.81	VQ
3+10	0.1393	0.82	VQ
3+15	0.1449	0.82	VQ
3+20	0.1506	0.82	VQ
3+25	0.1563	0.83	VQ
3+30	0.1620	0.83	VQ
3+35	0.1678	0.83	VQ
3+40	0.1735	0.83	VQ
3+45	0.1793	0.84	VQ
3+50	0.1851	0.84	Q
3+55	0.1911	0.87	Q
4+ 0	0.1974	0.92	Q
4+ 5	0.2040	0.95	Q
4+10	0.2106	0.96	Q
4+15	0.2173	0.97	Q
4+20	0.2241	0.99	Q
4+25	0.2312	1.02	VQ
4+30	0.2385	1.07	VQ
4+35	0.2461	1.10	Q
4+40	0.2539	1.12	Q
4+45	0.2617	1.13	Q
4+50	0.2696	1.15	Q
4+55	0.2777	1.18	Q
5+ 0	0.2862	1.23	Q
5+ 5	0.2949	1.25	VQ
5+10	0.3032	1.21	QV
5+15	0.3111	1.14	QV
5+20	0.3186	1.09	QV
5+25	0.3262	1.10	QV
5+30	0.3340	1.13	QV
5+35	0.3420	1.16	QV
5+40	0.3503	1.20	QV
5+45	0.3589	1.25	QV
5+50	0.3677	1.28	QV
5+55	0.3766	1.30	QV
6+ 0	0.3856	1.31	QV
6+ 5	0.3947	1.32	QV
6+10	0.4040	1.36	QV
6+15	0.4137	1.41	QV
6+20	0.4236	1.44	Q V
6+25	0.4337	1.46	Q V
6+30	0.4438	1.47	Q V
6+35	0.4540	1.48	Q V
6+40	0.4644	1.52	QV
6+45	0.4753	1.57	QV
6+50	0.4863	1.60	Q V
6+55	0.4975	1.62	Q V
7+ 0	0.5087	1.63	Q V

7+ 5	0.5201	1.64	Q	V			
7+10	0.5314	1.65	Q	V			
7+15	0.5428	1.66	Q	V			
7+20	0.5543	1.67	Q	V			
7+25	0.5661	1.70	Q	V			
7+30	0.5781	1.75	Q	V			
7+35	0.5904	1.79	Q	V			
7+40	0.6031	1.84	Q	V			
7+45	0.6161	1.89	Q	V			
7+50	0.6294	1.94	Q	V			
7+55	0.6431	1.99	Q	V			
8+ 0	0.6572	2.04	Q	V			
8+ 5	0.6716	2.10	Q	V			
8+10	0.6866	2.18	Q	V			
8+15	0.7024	2.28	Q	V			
8+20	0.7186	2.36	Q	V			
8+25	0.7344	2.29	Q	V			
8+30	0.7473	1.88	Q	V			
8+35	0.7559	1.24	Q	V			
8+40	0.7618	0.86	Q	V			
8+45	0.7667	0.71	Q	V			
8+50	0.7711	0.64	Q	V			
8+55	0.7753	0.61	Q	V			
9+ 0	0.7796	0.62	Q	V			
9+ 5	0.7840	0.64	Q	V			
9+10	0.7888	0.70	Q	V			
9+15	0.7943	0.80	Q	V			
9+20	0.8004	0.88	Q	V			
9+25	0.8069	0.95	Q	V			
9+30	0.8139	1.02	Q	V			
9+35	0.8214	1.09	Q	V			
9+40	0.8294	1.16	Q	V			
9+45	0.8379	1.24	Q	V			
9+50	0.8469	1.30	Q	V			
9+55	0.8564	1.38	Q	V			
10+ 0	0.8664	1.46	Q	V			
10+ 5	0.8765	1.46	Q	V			
10+10	0.8851	1.26	Q	V			
10+15	0.8914	0.92	Q	V			
10+20	0.8962	0.69	Q	V			
10+25	0.9003	0.60	Q	V			
10+30	0.9040	0.54	Q	V			
10+35	0.9078	0.55	Q	V			
10+40	0.9127	0.71	Q	V			
10+45	0.9193	0.96	Q	V			
10+50	0.9271	1.13	Q	V			
10+55	0.9355	1.22	Q	V			
11+ 0	0.9443	1.27	Q	V			
11+ 5	0.9532	1.30	Q	V			
11+10	0.9622	1.30	Q	V			
11+15	0.9709	1.27	Q	V			
11+20	0.9796	1.26	Q	V			
11+25	0.9884	1.27	Q	V			
11+30	0.9971	1.28	Q	V			
11+35	1.0059	1.27	Q	V			
11+40	1.0142	1.21	Q	V			
11+45	1.0219	1.11	Q	V			
11+50	1.0292	1.06	Q	V			
11+55	1.0366	1.08	Q	V			
12+ 0	1.0444	1.12	Q	V			
12+ 5	1.0528	1.22	Q	V			
12+10	1.0630	1.49	Q	V			
12+15	1.0760	1.88	Q	V			

12+20	1.0908	2.16	Q	V		
12+25	1.1069	2.33	Q	V		
12+30	1.1239	2.47	Q	V		
12+35	1.1418	2.60	Q	V		
12+40	1.1606	2.74	Q	V		
12+45	1.1807	2.91	Q	V		
12+50	1.2016	3.04	Q	V		
12+55	1.2232	3.15	Q	V		
13+ 0	1.2457	3.26	Q	V		
13+ 5	1.2690	3.39	Q	V		
13+10	1.2940	3.63	Q	V		
13+15	1.3211	3.94	Q	V		
13+20	1.3498	4.16	Q	V		
13+25	1.3794	4.29	Q	V		
13+30	1.4095	4.38	Q	V		
13+35	1.4394	4.35	Q	V		
13+40	1.4671	4.01	Q	V		
13+45	1.4910	3.47	Q	V		
13+50	1.5123	3.11	Q	V		
13+55	1.5326	2.94	Q	V		
14+ 0	1.5522	2.85	Q	V		
14+ 5	1.5716	2.82	Q	V		
14+10	1.5917	2.91	Q	V		
14+15	1.6130	3.10	Q	V		
14+20	1.6351	3.21	Q	V		
14+25	1.6573	3.22	Q	V		
14+30	1.6793	3.20	Q	V		
14+35	1.7013	3.19	Q	V		
14+40	1.7233	3.19	Q	V		
14+45	1.7453	3.20	Q	V		
14+50	1.7673	3.19	Q	V		
14+55	1.7890	3.16	Q	V		
15+ 0	1.8105	3.11	Q	V		
15+ 5	1.8317	3.08	Q	V		
15+10	1.8525	3.03	Q	V		
15+15	1.8730	2.97	Q	V		
15+20	1.8932	2.93	Q	V		
15+25	1.9130	2.88	Q	V		
15+30	1.9325	2.83	Q	V		
15+35	1.9515	2.76	Q	V		
15+40	1.9694	2.60	Q	V		
15+45	1.9857	2.38	Q	V		
15+50	2.0011	2.22	Q	V		
15+55	2.0159	2.15	Q	V		
16+ 0	2.0304	2.11	Q	V		
16+ 5	2.0443	2.02	Q	V		
16+10	2.0565	1.78	Q	V		
16+15	2.0663	1.42	Q	V		
16+20	2.0744	1.18	Q	V		
16+25	2.0817	1.05	Q	V		
16+30	2.0884	0.97	Q	V		
16+35	2.0946	0.90	Q	V		
16+40	2.1003	0.83	Q	V		
16+45	2.1055	0.74	Q	V		
16+50	2.1102	0.68	Q	V		
16+55	2.1146	0.65	Q	V		
17+ 0	2.1189	0.62	Q	V		
17+ 5	2.1230	0.61	Q	V		
17+10	2.1275	0.64	Q	V		
17+15	2.1324	0.72	Q	V		
17+20	2.1377	0.77	Q	V		
17+25	2.1431	0.79	Q	V		
17+30	2.1486	0.80	Q	V		

17+35	2.1541	0.80	Q	V
17+40	2.1597	0.81	Q	V
17+45	2.1652	0.81	Q	V
17+50	2.1708	0.81	Q	V
17+55	2.1762	0.78	Q	V
18+ 0	2.1813	0.74	Q	V
18+ 5	2.1862	0.72	Q	V
18+10	2.1911	0.70	Q	V
18+15	2.1959	0.70	Q	V
18+20	2.2006	0.69	Q	V
18+25	2.2054	0.69	Q	V
18+30	2.2101	0.69	Q	V
18+35	2.2148	0.68	Q	V
18+40	2.2192	0.65	Q	V
18+45	2.2234	0.60	Q	V
18+50	2.2272	0.56	Q	V
18+55	2.2308	0.52	Q	V
19+ 0	2.2340	0.46	Q	V
19+ 5	2.2369	0.43	Q	V
19+10	2.2400	0.44	Q	V
19+15	2.2432	0.47	Q	V
19+20	2.2466	0.50	Q	V
19+25	2.2503	0.53	Q	V
19+30	2.2542	0.58	Q	V
19+35	2.2584	0.60	Q	V
19+40	2.2624	0.59	Q	V
19+45	2.2663	0.55	Q	V
19+50	2.2699	0.52	Q	V
19+55	2.2732	0.49	Q	V
20+ 0	2.2762	0.44	Q	V
20+ 5	2.2790	0.41	Q	V
20+10	2.2820	0.42	Q	V
20+15	2.2851	0.46	Q	V
20+20	2.2884	0.48	Q	V
20+25	2.2917	0.49	Q	V
20+30	2.2951	0.49	Q	V
20+35	2.2985	0.49	Q	V
20+40	2.3019	0.50	Q	V
20+45	2.3054	0.50	Q	V
20+50	2.3088	0.49	Q	V
20+55	2.3120	0.46	Q	V
21+ 0	2.3149	0.42	Q	V
21+ 5	2.3176	0.40	Q	V
21+10	2.3204	0.41	Q	V
21+15	2.3235	0.45	Q	V
21+20	2.3267	0.46	Q	V
21+25	2.3298	0.44	Q	V
21+30	2.3326	0.41	Q	V
21+35	2.3352	0.39	Q	V
21+40	2.3380	0.40	Q	V
21+45	2.3411	0.44	Q	V
21+50	2.3442	0.46	Q	V
21+55	2.3473	0.44	Q	V
22+ 0	2.3500	0.40	Q	V
22+ 5	2.3527	0.38	Q	V
22+10	2.3554	0.40	Q	V
22+15	2.3585	0.44	Q	V
22+20	2.3616	0.46	Q	V
22+25	2.3646	0.44	Q	V
22+30	2.3674	0.40	Q	V
22+35	2.3700	0.38	Q	V
22+40	2.3725	0.36	Q	V
22+45	2.3750	0.36	Q	V

22+50	2.3774	0.35	Q			V
22+55	2.3798	0.35	Q			V
23+ 0	2.3822	0.35	Q			V
23+ 5	2.3846	0.34	Q			V
23+10	2.3870	0.34	Q			V
23+15	2.3893	0.34	Q			V
23+20	2.3917	0.34	Q			V
23+25	2.3940	0.34	Q			V
23+30	2.3963	0.34	Q			V
23+35	2.3987	0.34	Q			V
23+40	2.4010	0.34	Q			V
23+45	2.4033	0.34	Q			V
23+50	2.4056	0.34	Q			V
23+55	2.4080	0.34	Q			V
24+ 0	2.4103	0.34	Q			V
24+ 5	2.4125	0.32	Q			V
24+10	2.4143	0.26	Q			V
24+15	2.4155	0.17	Q			V
24+20	2.4163	0.11	Q			V
24+25	2.4169	0.09	Q			V
24+30	2.4174	0.07	Q			V
24+35	2.4177	0.05	Q			V
24+40	2.4180	0.04	Q			V
24+45	2.4183	0.04	Q			V
24+50	2.4185	0.03	Q			V
24+55	2.4186	0.02	Q			V
25+ 0	2.4187	0.02	Q			V
25+ 5	2.4189	0.01	Q			V
25+10	2.4189	0.01	Q			V
25+15	2.4190	0.01	Q			V
25+20	2.4190	0.01	Q			V
25+25	2.4191	0.01	Q			V
25+30	2.4191	0.00	Q			V
25+35	2.4191	0.00	Q			V
25+40	2.4191	0.00	Q			V

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Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHYDQ10P110.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

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English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

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Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 10 Year 1 Hour Storm Event - Proposed Condition  
3963unihydql0p  
CB

-----  
Drainage Area = 19.63(Ac.) = 0.031 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.63(Ac.) = 0.031 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.208 Hr.  
Lag time = 12.48 Min.  
25% of lag time = 3.12 Min.  
40% of lag time = 4.99 Min.  
Unit time = 5.00 Min.  
Duration of storm = 1 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	0.47	9.23

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	1.25	24.54

STORM EVENT (YEAR) = 10.00  
Area Averaged 2-Year Rainfall = 0.470 (In)  
Area Averaged 100-Year Rainfall = 1.250 (In)

Point rain (area averaged) = 0.791 (In)  
Areal adjustment factor = 99.98 %  
Adjusted average point rain = 0.791 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.630                    56.00                    0.900  
 Total Area Entered =        19.63(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
56.0	56.0	0.511	0.900	0.097	1.000	0.097
						Sum (F) = 0.097

Area averaged mean soil loss (F) (In/Hr) = 0.097

Minimum soil loss rate ((In/Hr)) = 0.049

(for 24 hour storm duration)

Soil low loss rate (decimal) = 0.180

-----  
 Slope of intensity-duration curve for a 1 hour storm =0.5000  
 -----

U n i t   H y d r o g r a p h  
 VALLEY S-Curve

-----  
 Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	40.064	4.367
2	0.167	80.128	17.938
3	0.250	120.192	26.788
4	0.333	160.256	17.414
5	0.417	200.321	8.506
6	0.500	240.385	5.371
7	0.583	280.449	4.014
8	0.667	320.513	3.075
9	0.750	360.577	2.439
10	0.833	400.641	1.936
11	0.917	440.705	1.515
12	1.000	480.769	1.258
13	1.083	520.833	1.161
14	1.167	560.897	0.912
15	1.250	600.962	0.764
16	1.333	641.026	0.637
17	1.417	681.090	0.513
18	1.500	721.154	0.405
19	1.583	761.218	0.401
20	1.667	801.282	0.588
		Sum = 100.000	Sum= 19.783

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
			Max	Low	
1	0.08	4.20	0.097	---	0.30
2	0.17	4.30	0.408	---	0.31
3	0.25	5.00	0.474	---	0.38
4	0.33	5.00	0.474	---	0.38
5	0.42	5.80	0.550	---	0.45
6	0.50	6.50	0.617	---	0.52
7	0.58	7.40	0.702	---	0.61
8	0.67	8.60	0.816	---	0.72
9	0.75	12.30	1.167	---	1.07
10	0.83	29.10	2.761	---	2.66
11	0.92	6.80	0.645	---	0.55
12	1.00	5.00	0.474	---	0.38
Sum =	100.0			Sum =	8.3

Flood volume = Effective rainfall 0.69(In)  
 times area 19.6(Ac.)/[ (In)/(Ft.) ] = 1.1(Ac.Ft)  
 Total soil loss = 0.10(In)  
 Total soil loss = 0.159(Ac.Ft)  
 Total rainfall = 0.79(In)  
 Flood volume = 49431.3 Cubic Feet  
 Total soil loss = 6915.6 Cubic Feet

Peak flow rate of this hydrograph = 23.126(CFS)

+++++

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

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	7.5	15.0	22.5	30.0
0+ 5	0.0018	0.26	Q				
0+10	0.0110	1.34	VQ				
0+15	0.0319	3.03	V Q				
0+20	0.0619	4.35	V Q				
0+25	0.0985	5.31	V Q				
0+30	0.1412	6.20	V Q				
0+35	0.1913	7.28	V Q				
0+40	0.2502	8.56	V Q				
0+45	0.3210	10.28	V Q				
0+50	0.4185	14.15	V Q				
0+55	0.5606	20.64	V Q				
1+ 0	0.7199	23.13	V Q				
1+ 5	0.8398	17.42	V Q				
1+10	0.9171	11.21	V Q				
1+15	0.9670	7.25	V Q				
1+20	1.0019	5.07	V Q				
1+25	1.0285	3.86	V Q				
1+30	1.0496	3.06	V Q				
1+35	1.0665	2.45	V Q				
1+40	1.0802	2.00	V Q				
1+45	1.0916	1.65	V Q				
1+50	1.1012	1.40	V Q				
1+55	1.1091	1.14	V Q				
2+ 0	1.1155	0.94	V Q				
2+ 5	1.1208	0.76	V Q				
2+10	1.1250	0.61	V Q				
2+15	1.1283	0.49	V Q				
2+20	1.1312	0.42	V Q				
2+25	1.1338	0.38	V Q				
2+30	1.1345	0.09	V Q				
2+35	1.1348	0.04	V Q				

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHYDQ10P310.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 10 Year 3 Hour Storm Event - Proposed Condition  
3963unihydql0p  
CB

-----  
Drainage Area = 19.63(Ac.) = 0.031 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.63(Ac.) = 0.031 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.208 Hr.  
Lag time = 12.48 Min.  
25% of lag time = 3.12 Min.  
40% of lag time = 4.99 Min.  
Unit time = 5.00 Min.  
Duration of storm = 3 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	0.80	15.70

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	1.93	37.89

STORM EVENT (YEAR) = 10.00  
Area Averaged 2-Year Rainfall = 0.800 (In)  
Area Averaged 100-Year Rainfall = 1.930 (In)

Point rain (area averaged) = 1.265 (In)  
Areal adjustment factor = 99.99 %  
Adjusted average point rain = 1.265 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.630                    56.00                    0.900  
 Total Area Entered =        19.63(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
56.0	56.0	0.511	0.900	0.097	1.000	0.097
						Sum (F) = 0.097

Area averaged mean soil loss (F) (In/Hr) = 0.097  
 Minimum soil loss rate ((In/Hr)) = 0.049  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.180

-----  
 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	40.064	4.367
2	0.167	80.128	17.938
3	0.250	120.192	26.788
4	0.333	160.256	17.414
5	0.417	200.321	8.506
6	0.500	240.385	5.371
7	0.583	280.449	4.014
8	0.667	320.513	3.075
9	0.750	360.577	2.439
10	0.833	400.641	1.936
11	0.917	440.705	1.515
12	1.000	480.769	1.258
13	1.083	520.833	1.161
14	1.167	560.897	0.912
15	1.250	600.962	0.764
16	1.333	641.026	0.637
17	1.417	681.090	0.513
18	1.500	721.154	0.405
19	1.583	761.218	0.401
20	1.667	801.282	0.588
		Sum = 100.000	Sum= 19.783

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	1.30	0.197	0.097	---	0.10
2	0.17	1.30	0.197	0.097	---	0.10
3	0.25	1.10	0.167	0.097	---	0.07
4	0.33	1.50	0.228	0.097	---	0.13
5	0.42	1.50	0.228	0.097	---	0.13
6	0.50	1.80	0.273	0.097	---	0.18
7	0.58	1.50	0.228	0.097	---	0.13
8	0.67	1.80	0.273	0.097	---	0.18
9	0.75	1.80	0.273	0.097	---	0.18
10	0.83	1.50	0.228	0.097	---	0.13
11	0.92	1.60	0.243	0.097	---	0.15
12	1.00	1.80	0.273	0.097	---	0.18
13	1.08	2.20	0.334	0.097	---	0.24
14	1.17	2.20	0.334	0.097	---	0.24
15	1.25	2.20	0.334	0.097	---	0.24

16	1.33	2.00	0.304	0.097	---	0.21
17	1.42	2.60	0.395	0.097	---	0.30
18	1.50	2.70	0.410	0.097	---	0.31
19	1.58	2.40	0.364	0.097	---	0.27
20	1.67	2.70	0.410	0.097	---	0.31
21	1.75	3.30	0.501	0.097	---	0.40
22	1.83	3.10	0.470	0.097	---	0.37
23	1.92	2.90	0.440	0.097	---	0.34
24	2.00	3.00	0.455	0.097	---	0.36
25	2.08	3.10	0.470	0.097	---	0.37
26	2.17	4.20	0.637	0.097	---	0.54
27	2.25	5.00	0.759	0.097	---	0.66
28	2.33	3.50	0.531	0.097	---	0.43
29	2.42	6.80	1.032	0.097	---	0.94
30	2.50	7.30	1.108	0.097	---	1.01
31	2.58	8.20	1.245	0.097	---	1.15
32	2.67	5.90	0.895	0.097	---	0.80
33	2.75	2.00	0.304	0.097	---	0.21
34	2.83	1.80	0.273	0.097	---	0.18
35	2.92	1.80	0.273	0.097	---	0.18
36	3.00	0.60	0.091	0.097	0.016	0.07
Sum =		100.0				Sum = 11.8

Flood volume = Effective rainfall 0.98 (In)  
times area 19.6(Ac.)/[ (In)/(Ft.) ] = 1.6 (Ac.Ft)  
Total soil loss = 0.28 (In)  
Total soil loss = 0.465 (Ac.Ft)  
Total rainfall = 1.26 (In)  
Flood volume = 69856.6 Cubic Feet  
Total soil loss = 20267.9 Cubic Feet

-----  
Peak flow rate of this hydrograph = 16.308 (CFS)  
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3 - H O U R S T O R M  
R u n o f f H y d r o g r a p h

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

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0006	0.09	Q				
0+10	0.0036	0.44	Q				
0+15	0.0102	0.95	VQ				
0+20	0.0187	1.24	V Q				
0+25	0.0288	1.46	V Q				
0+30	0.0413	1.82	V Q				
0+35	0.0564	2.18	V Q				
0+40	0.0732	2.43	V Q				
0+45	0.0911	2.60	V Q				
0+50	0.1103	2.79	V Q				
0+55	0.1297	2.82	V Q				
1+ 0	0.1488	2.77	V Q				
1+ 5	0.1690	2.93	VQ				
1+10	0.1920	3.34	V Q				
1+15	0.2181	3.79	V Q				
1+20	0.2460	4.05	V Q				
1+25	0.2747	4.17	V Q				
1+30	0.3053	4.44	VQ				
1+35	0.3391	4.91	VQ				
1+40	0.3750	5.20	VQ				
1+45	0.4123	5.42	Q				
1+50	0.4532	5.93	Q				



Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHQ10P610.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 10 Year 6 Hour Storm Event - Proposed Condition  
3963unihydql0p  
CB

-----  
Drainage Area = 19.63(Ac.) = 0.031 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.63(Ac.) = 0.031 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.208 Hr.  
Lag time = 12.48 Min.  
25% of lag time = 3.12 Min.  
40% of lag time = 4.99 Min.  
Unit time = 5.00 Min.  
Duration of storm = 6 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	1.10	21.59

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	2.60	51.04

STORM EVENT (YEAR) = 10.00  
Area Averaged 2-Year Rainfall = 1.100 (In)  
Area Averaged 100-Year Rainfall = 2.600 (In)

Point rain (area averaged) = 1.717 (In)  
Areal adjustment factor = 99.99 %  
Adjusted average point rain = 1.717 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %



19.630                    56.00                    0.900  
 Total Area Entered =        19.63(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
56.0	56.0	0.511	0.900	0.097	1.000	0.097
						Sum (F) = 0.097

Area averaged mean soil loss (F) (In/Hr) = 0.097  
 Minimum soil loss rate ((In/Hr)) = 0.049  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.180

-----  
 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	40.064	4.367
2	0.167	80.128	17.938
3	0.250	120.192	26.788
4	0.333	160.256	17.414
5	0.417	200.321	8.506
6	0.500	240.385	5.371
7	0.583	280.449	4.014
8	0.667	320.513	3.075
9	0.750	360.577	2.439
10	0.833	400.641	1.936
11	0.917	440.705	1.515
12	1.000	480.769	1.258
13	1.083	520.833	1.161
14	1.167	560.897	0.912
15	1.250	600.962	0.764
16	1.333	641.026	0.637
17	1.417	681.090	0.513
18	1.500	721.154	0.405
19	1.583	761.218	0.401
20	1.667	801.282	0.588
		Sum = 100.000	Sum= 19.783

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.50	0.103	0.097	---	0.01
2	0.17	0.60	0.124	0.097	---	0.03
3	0.25	0.60	0.124	0.097	---	0.03
4	0.33	0.60	0.124	0.097	---	0.03
5	0.42	0.60	0.124	0.097	---	0.03
6	0.50	0.70	0.144	0.097	---	0.05
7	0.58	0.70	0.144	0.097	---	0.05
8	0.67	0.70	0.144	0.097	---	0.05
9	0.75	0.70	0.144	0.097	---	0.05
10	0.83	0.70	0.144	0.097	---	0.05
11	0.92	0.70	0.144	0.097	---	0.05
12	1.00	0.80	0.165	0.097	---	0.07
13	1.08	0.80	0.165	0.097	---	0.07
14	1.17	0.80	0.165	0.097	---	0.07
15	1.25	0.80	0.165	0.097	---	0.07

16	1.33	0.80	0.165	0.097	---	0.07
17	1.42	0.80	0.165	0.097	---	0.07
18	1.50	0.80	0.165	0.097	---	0.07
19	1.58	0.80	0.165	0.097	---	0.07
20	1.67	0.80	0.165	0.097	---	0.07
21	1.75	0.80	0.165	0.097	---	0.07
22	1.83	0.80	0.165	0.097	---	0.07
23	1.92	0.80	0.165	0.097	---	0.07
24	2.00	0.90	0.185	0.097	---	0.09
25	2.08	0.80	0.165	0.097	---	0.07
26	2.17	0.90	0.185	0.097	---	0.09
27	2.25	0.90	0.185	0.097	---	0.09
28	2.33	0.90	0.185	0.097	---	0.09
29	2.42	0.90	0.185	0.097	---	0.09
30	2.50	0.90	0.185	0.097	---	0.09
31	2.58	0.90	0.185	0.097	---	0.09
32	2.67	0.90	0.185	0.097	---	0.09
33	2.75	1.00	0.206	0.097	---	0.11
34	2.83	1.00	0.206	0.097	---	0.11
35	2.92	1.00	0.206	0.097	---	0.11
36	3.00	1.00	0.206	0.097	---	0.11
37	3.08	1.00	0.206	0.097	---	0.11
38	3.17	1.10	0.227	0.097	---	0.13
39	3.25	1.10	0.227	0.097	---	0.13
40	3.33	1.10	0.227	0.097	---	0.13
41	3.42	1.20	0.247	0.097	---	0.15
42	3.50	1.30	0.268	0.097	---	0.17
43	3.58	1.40	0.288	0.097	---	0.19
44	3.67	1.40	0.288	0.097	---	0.19
45	3.75	1.50	0.309	0.097	---	0.21
46	3.83	1.50	0.309	0.097	---	0.21
47	3.92	1.60	0.330	0.097	---	0.23
48	4.00	1.60	0.330	0.097	---	0.23
49	4.08	1.70	0.350	0.097	---	0.25
50	4.17	1.80	0.371	0.097	---	0.27
51	4.25	1.90	0.391	0.097	---	0.29
52	4.33	2.00	0.412	0.097	---	0.32
53	4.42	2.10	0.433	0.097	---	0.34
54	4.50	2.10	0.433	0.097	---	0.34
55	4.58	2.20	0.453	0.097	---	0.36
56	4.67	2.30	0.474	0.097	---	0.38
57	4.75	2.40	0.494	0.097	---	0.40
58	4.83	2.40	0.494	0.097	---	0.40
59	4.92	2.50	0.515	0.097	---	0.42
60	5.00	2.60	0.536	0.097	---	0.44
61	5.08	3.10	0.639	0.097	---	0.54
62	5.17	3.60	0.742	0.097	---	0.64
63	5.25	3.90	0.804	0.097	---	0.71
64	5.33	4.20	0.865	0.097	---	0.77
65	5.42	4.70	0.968	0.097	---	0.87
66	5.50	5.60	1.154	0.097	---	1.06
67	5.58	1.90	0.391	0.097	---	0.29
68	5.67	0.90	0.185	0.097	---	0.09
69	5.75	0.60	0.124	0.097	---	0.03
70	5.83	0.50	0.103	0.097	---	0.01
71	5.92	0.30	0.062	0.097	0.011	0.05
72	6.00	0.20	0.041	0.097	0.007	0.03
Sum =	100.0					Sum = 13.8

Flood volume = Effective rainfall 1.15 (In)  
 times area 19.6 (Ac.) / [(In) / (Ft.)] = 1.9 (Ac.Ft)  
 Total soil loss = 0.57 (In)  
 Total soil loss = 0.929 (Ac.Ft)  
 Total rainfall = 1.72 (In)

Flood volume = 81896.6 Cubic Feet  
 Total soil loss = 40451.3 Cubic Feet

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 Peak flow rate of this hydrograph = 14.746(CFS)  
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6 - H O U R S T O R M  
 R u n o f f H y d r o g r a p h

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

Time(h+m)	Volume	Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0000		0.01	Q				
0+10	0.0003		0.04	Q				
0+15	0.0014		0.15	Q				
0+20	0.0033		0.28	Q				
0+25	0.0058		0.36	Q				
0+30	0.0086		0.42	Q				
0+35	0.0122		0.52	VQ				
0+40	0.0167		0.65	VQ				
0+45	0.0217		0.73	VQ				
0+50	0.0271		0.78	VQ				
0+55	0.0327		0.81	VQ				
1+ 0	0.0386		0.85	VQ				
1+ 5	0.0451		0.95	VQ				
1+10	0.0525		1.07	VQ				
1+15	0.0605		1.16	VQ				
1+20	0.0687		1.20	VQ				
1+25	0.0772		1.23	VQ				
1+30	0.0858		1.25	VQ				
1+35	0.0946		1.27	Q				
1+40	0.1035		1.29	Q				
1+45	0.1124		1.30	Q				
1+50	0.1214		1.31	Q				
1+55	0.1305		1.32	Q				
2+ 0	0.1397		1.34	Q				
2+ 5	0.1494		1.40	QV				
2+10	0.1594		1.46	QV				
2+15	0.1697		1.50	QV				
2+20	0.1805		1.57	Q				
2+25	0.1918		1.63	QV				
2+30	0.2032		1.66	QV				
2+35	0.2148		1.68	QV				
2+40	0.2265		1.70	QV				
2+45	0.2383		1.72	Q V				
2+50	0.2508		1.81	Q V				
2+55	0.2640		1.92	Q V				
3+ 0	0.2778		2.00	Q V				
3+ 5	0.2918		2.04	Q V				
3+10	0.3061		2.08	Q V				
3+15	0.3211		2.17	Q V				
3+20	0.3369		2.30	Q V				
3+25	0.3535		2.40	Q V				
3+30	0.3709		2.53	Q V				
3+35	0.3900		2.77	Q V				
3+40	0.4109		3.04	Q V				
3+45	0.4336		3.29	Q V				
3+50	0.4577		3.51	Q V				
3+55	0.4833		3.72	Q V				
4+ 0	0.5103		3.92	Q V				
4+ 5	0.5388		4.13	Q V				

4+10	0.5687	4.35	Q	V			
4+15	0.6006	4.63	Q	V			
4+20	0.6348	4.96	Q	V			
4+25	0.6713	5.31	Q	V			
4+30	0.7103	5.66	Q	V			
4+35	0.7513	5.96	Q	V			
4+40	0.7942	6.23	Q	V			
4+45	0.8393	6.55	Q	V			
4+50	0.8867	6.88	Q	V			
4+55	0.9362	7.18	Q	V			
5+ 0	0.9875	7.45	Q	V			
5+ 5	1.0416	7.84	Q	V			
5+10	1.1005	8.56	Q	V			
5+15	1.1673	9.70	Q	V			
5+20	1.2430	10.98	Q	V			
5+25	1.3272	12.23	Q	V			
5+30	1.4212	13.64	Q	V			
5+35	1.5227	14.75	Q	V			
5+40	1.6161	13.56	Q	V			
5+45	1.6836	9.80	Q	V			
5+50	1.7281	6.47	Q	V			
5+55	1.7595	4.55	Q	V			
6+ 0	1.7839	3.55	Q	V			
6+ 5	1.8044	2.97	Q	V			
6+10	1.8209	2.40	Q	V			
6+15	1.8336	1.85	Q	V			
6+20	1.8436	1.45	Q	V			
6+25	1.8517	1.17	Q	V			
6+30	1.8584	0.97	Q	V			
6+35	1.8637	0.78	Q	V			
6+40	1.8681	0.64	Q	V			
6+45	1.8716	0.51	Q	V			
6+50	1.8744	0.40	Q	V			
6+55	1.8765	0.31	Q	V			
7+ 0	1.8782	0.24	Q	V			
7+ 5	1.8793	0.17	Q	V			
7+10	1.8797	0.06	Q	V			
7+15	1.8799	0.02	Q	V			
7+20	1.8799	0.01	Q	V			
7+25	1.8800	0.01	Q	V			
7+30	1.8801	0.01	Q	V			
7+35	1.8801	0.00	Q	V			

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHYDQ10P2410.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

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English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

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Black Creek - Harvill at Water Industrial  
Unit Hydrograph for 10 Year 24 Hour Storm Event - Proposed Condition  
3963unihydql0p  
CB

-----  
Drainage Area = 19.63(Ac.) = 0.031 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.63(Ac.) = 0.031 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.208 Hr.  
Lag time = 12.48 Min.  
25% of lag time = 3.12 Min.  
40% of lag time = 4.99 Min.  
Unit time = 5.00 Min.  
Duration of storm = 24 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	1.85	36.32

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	5.00	98.15

STORM EVENT (YEAR) = 10.00  
Area Averaged 2-Year Rainfall = 1.850 (In)  
Area Averaged 100-Year Rainfall = 5.000 (In)

Point rain (area averaged) = 3.146(In)  
Areal adjustment factor = 100.00 %  
Adjusted average point rain = 3.146(In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.630                    56.00                    0.900  
 Total Area Entered =    19.63(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
56.0	56.0	0.511	0.900	0.097	1.000	0.097
						Sum (F) = 0.097

Area averaged mean soil loss (F) (In/Hr) = 0.097  
 Minimum soil loss rate ((In/Hr)) = 0.049  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.180

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 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	40.064	4.367
2	0.167	80.128	17.938
3	0.250	120.192	26.788
4	0.333	160.256	17.414
5	0.417	200.321	8.506
6	0.500	240.385	5.371
7	0.583	280.449	4.014
8	0.667	320.513	3.075
9	0.750	360.577	2.439
10	0.833	400.641	1.936
11	0.917	440.705	1.515
12	1.000	480.769	1.258
13	1.083	520.833	1.161
14	1.167	560.897	0.912
15	1.250	600.962	0.764
16	1.333	641.026	0.637
17	1.417	681.090	0.513
18	1.500	721.154	0.405
19	1.583	761.218	0.401
20	1.667	801.282	0.588
		Sum = 100.000	Sum= 19.783

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.07	0.025	0.172	0.005	0.02
2	0.17	0.07	0.025	0.171	0.005	0.02
3	0.25	0.07	0.025	0.171	0.005	0.02
4	0.33	0.10	0.038	0.170	0.007	0.03
5	0.42	0.10	0.038	0.169	0.007	0.03
6	0.50	0.10	0.038	0.169	0.007	0.03
7	0.58	0.10	0.038	0.168	0.007	0.03
8	0.67	0.10	0.038	0.167	0.007	0.03
9	0.75	0.10	0.038	0.167	0.007	0.03
10	0.83	0.13	0.050	0.166	0.009	0.04
11	0.92	0.13	0.050	0.165	0.009	0.04
12	1.00	0.13	0.050	0.165	0.009	0.04
13	1.08	0.10	0.038	0.164	0.007	0.03
14	1.17	0.10	0.038	0.163	0.007	0.03
15	1.25	0.10	0.038	0.163	0.007	0.03

16	1.33	0.10	0.038	0.162	0.007	0.03
17	1.42	0.10	0.038	0.162	0.007	0.03
18	1.50	0.10	0.038	0.161	0.007	0.03
19	1.58	0.10	0.038	0.160	0.007	0.03
20	1.67	0.10	0.038	0.160	0.007	0.03
21	1.75	0.10	0.038	0.159	0.007	0.03
22	1.83	0.13	0.050	0.158	0.009	0.04
23	1.92	0.13	0.050	0.158	0.009	0.04
24	2.00	0.13	0.050	0.157	0.009	0.04
25	2.08	0.13	0.050	0.156	0.009	0.04
26	2.17	0.13	0.050	0.156	0.009	0.04
27	2.25	0.13	0.050	0.155	0.009	0.04
28	2.33	0.13	0.050	0.155	0.009	0.04
29	2.42	0.13	0.050	0.154	0.009	0.04
30	2.50	0.13	0.050	0.153	0.009	0.04
31	2.58	0.17	0.063	0.153	0.011	0.05
32	2.67	0.17	0.063	0.152	0.011	0.05
33	2.75	0.17	0.063	0.151	0.011	0.05
34	2.83	0.17	0.063	0.151	0.011	0.05
35	2.92	0.17	0.063	0.150	0.011	0.05
36	3.00	0.17	0.063	0.150	0.011	0.05
37	3.08	0.17	0.063	0.149	0.011	0.05
38	3.17	0.17	0.063	0.148	0.011	0.05
39	3.25	0.17	0.063	0.148	0.011	0.05
40	3.33	0.17	0.063	0.147	0.011	0.05
41	3.42	0.17	0.063	0.146	0.011	0.05
42	3.50	0.17	0.063	0.146	0.011	0.05
43	3.58	0.17	0.063	0.145	0.011	0.05
44	3.67	0.17	0.063	0.145	0.011	0.05
45	3.75	0.17	0.063	0.144	0.011	0.05
46	3.83	0.20	0.075	0.143	0.014	0.06
47	3.92	0.20	0.075	0.143	0.014	0.06
48	4.00	0.20	0.075	0.142	0.014	0.06
49	4.08	0.20	0.075	0.142	0.014	0.06
50	4.17	0.20	0.075	0.141	0.014	0.06
51	4.25	0.20	0.075	0.140	0.014	0.06
52	4.33	0.23	0.088	0.140	0.016	0.07
53	4.42	0.23	0.088	0.139	0.016	0.07
54	4.50	0.23	0.088	0.139	0.016	0.07
55	4.58	0.23	0.088	0.138	0.016	0.07
56	4.67	0.23	0.088	0.137	0.016	0.07
57	4.75	0.23	0.088	0.137	0.016	0.07
58	4.83	0.27	0.101	0.136	0.018	0.08
59	4.92	0.27	0.101	0.136	0.018	0.08
60	5.00	0.27	0.101	0.135	0.018	0.08
61	5.08	0.20	0.075	0.134	0.014	0.06
62	5.17	0.20	0.075	0.134	0.014	0.06
63	5.25	0.20	0.075	0.133	0.014	0.06
64	5.33	0.23	0.088	0.133	0.016	0.07
65	5.42	0.23	0.088	0.132	0.016	0.07
66	5.50	0.23	0.088	0.132	0.016	0.07
67	5.58	0.27	0.101	0.131	0.018	0.08
68	5.67	0.27	0.101	0.130	0.018	0.08
69	5.75	0.27	0.101	0.130	0.018	0.08
70	5.83	0.27	0.101	0.129	0.018	0.08
71	5.92	0.27	0.101	0.129	0.018	0.08
72	6.00	0.27	0.101	0.128	0.018	0.08
73	6.08	0.30	0.113	0.128	0.020	0.09
74	6.17	0.30	0.113	0.127	0.020	0.09
75	6.25	0.30	0.113	0.126	0.020	0.09
76	6.33	0.30	0.113	0.126	0.020	0.09
77	6.42	0.30	0.113	0.125	0.020	0.09
78	6.50	0.30	0.113	0.125	0.020	0.09

79	6.58	0.33	0.126	0.124	---	0.00
80	6.67	0.33	0.126	0.124	---	0.00
81	6.75	0.33	0.126	0.123	---	0.00
82	6.83	0.33	0.126	0.122	---	0.00
83	6.92	0.33	0.126	0.122	---	0.00
84	7.00	0.33	0.126	0.121	---	0.00
85	7.08	0.33	0.126	0.121	---	0.01
86	7.17	0.33	0.126	0.120	---	0.01
87	7.25	0.33	0.126	0.120	---	0.01
88	7.33	0.37	0.138	0.119	---	0.02
89	7.42	0.37	0.138	0.119	---	0.02
90	7.50	0.37	0.138	0.118	---	0.02
91	7.58	0.40	0.151	0.118	---	0.03
92	7.67	0.40	0.151	0.117	---	0.03
93	7.75	0.40	0.151	0.116	---	0.03
94	7.83	0.43	0.164	0.116	---	0.05
95	7.92	0.43	0.164	0.115	---	0.05
96	8.00	0.43	0.164	0.115	---	0.05
97	8.08	0.50	0.189	0.114	---	0.07
98	8.17	0.50	0.189	0.114	---	0.07
99	8.25	0.50	0.189	0.113	---	0.08
100	8.33	0.50	0.189	0.113	---	0.08
101	8.42	0.50	0.189	0.112	---	0.08
102	8.50	0.50	0.189	0.112	---	0.08
103	8.58	0.53	0.201	0.111	---	0.09
104	8.67	0.53	0.201	0.111	---	0.09
105	8.75	0.53	0.201	0.110	---	0.09
106	8.83	0.57	0.214	0.110	---	0.10
107	8.92	0.57	0.214	0.109	---	0.10
108	9.00	0.57	0.214	0.109	---	0.11
109	9.08	0.63	0.239	0.108	---	0.13
110	9.17	0.63	0.239	0.108	---	0.13
111	9.25	0.63	0.239	0.107	---	0.13
112	9.33	0.67	0.252	0.107	---	0.15
113	9.42	0.67	0.252	0.106	---	0.15
114	9.50	0.67	0.252	0.105	---	0.15
115	9.58	0.70	0.264	0.105	---	0.16
116	9.67	0.70	0.264	0.104	---	0.16
117	9.75	0.70	0.264	0.104	---	0.16
118	9.83	0.73	0.277	0.103	---	0.17
119	9.92	0.73	0.277	0.103	---	0.17
120	10.00	0.73	0.277	0.102	---	0.17
121	10.08	0.50	0.189	0.102	---	0.09
122	10.17	0.50	0.189	0.101	---	0.09
123	10.25	0.50	0.189	0.101	---	0.09
124	10.33	0.50	0.189	0.101	---	0.09
125	10.42	0.50	0.189	0.100	---	0.09
126	10.50	0.50	0.189	0.100	---	0.09
127	10.58	0.67	0.252	0.099	---	0.15
128	10.67	0.67	0.252	0.099	---	0.15
129	10.75	0.67	0.252	0.098	---	0.15
130	10.83	0.67	0.252	0.098	---	0.15
131	10.92	0.67	0.252	0.097	---	0.15
132	11.00	0.67	0.252	0.097	---	0.16
133	11.08	0.63	0.239	0.096	---	0.14
134	11.17	0.63	0.239	0.096	---	0.14
135	11.25	0.63	0.239	0.095	---	0.14
136	11.33	0.63	0.239	0.095	---	0.14
137	11.42	0.63	0.239	0.094	---	0.14
138	11.50	0.63	0.239	0.094	---	0.15
139	11.58	0.57	0.214	0.093	---	0.12
140	11.67	0.57	0.214	0.093	---	0.12
141	11.75	0.57	0.214	0.092	---	0.12



142	11.83	0.60	0.226	0.092	---	0.13
143	11.92	0.60	0.226	0.092	---	0.13
144	12.00	0.60	0.226	0.091	---	0.14
145	12.08	0.83	0.315	0.091	---	0.22
146	12.17	0.83	0.315	0.090	---	0.22
147	12.25	0.83	0.315	0.090	---	0.22
148	12.33	0.87	0.327	0.089	---	0.24
149	12.42	0.87	0.327	0.089	---	0.24
150	12.50	0.87	0.327	0.088	---	0.24
151	12.58	0.93	0.352	0.088	---	0.26
152	12.67	0.93	0.352	0.087	---	0.26
153	12.75	0.93	0.352	0.087	---	0.27
154	12.83	0.97	0.365	0.087	---	0.28
155	12.92	0.97	0.365	0.086	---	0.28
156	13.00	0.97	0.365	0.086	---	0.28
157	13.08	1.13	0.428	0.085	---	0.34
158	13.17	1.13	0.428	0.085	---	0.34
159	13.25	1.13	0.428	0.084	---	0.34
160	13.33	1.13	0.428	0.084	---	0.34
161	13.42	1.13	0.428	0.084	---	0.34
162	13.50	1.13	0.428	0.083	---	0.34
163	13.58	0.77	0.289	0.083	---	0.21
164	13.67	0.77	0.289	0.082	---	0.21
165	13.75	0.77	0.289	0.082	---	0.21
166	13.83	0.77	0.289	0.081	---	0.21
167	13.92	0.77	0.289	0.081	---	0.21
168	14.00	0.77	0.289	0.081	---	0.21
169	14.08	0.90	0.340	0.080	---	0.26
170	14.17	0.90	0.340	0.080	---	0.26
171	14.25	0.90	0.340	0.079	---	0.26
172	14.33	0.87	0.327	0.079	---	0.25
173	14.42	0.87	0.327	0.079	---	0.25
174	14.50	0.87	0.327	0.078	---	0.25
175	14.58	0.87	0.327	0.078	---	0.25
176	14.67	0.87	0.327	0.077	---	0.25
177	14.75	0.87	0.327	0.077	---	0.25
178	14.83	0.83	0.315	0.077	---	0.24
179	14.92	0.83	0.315	0.076	---	0.24
180	15.00	0.83	0.315	0.076	---	0.24
181	15.08	0.80	0.302	0.075	---	0.23
182	15.17	0.80	0.302	0.075	---	0.23
183	15.25	0.80	0.302	0.075	---	0.23
184	15.33	0.77	0.289	0.074	---	0.22
185	15.42	0.77	0.289	0.074	---	0.22
186	15.50	0.77	0.289	0.073	---	0.22
187	15.58	0.63	0.239	0.073	---	0.17
188	15.67	0.63	0.239	0.073	---	0.17
189	15.75	0.63	0.239	0.072	---	0.17
190	15.83	0.63	0.239	0.072	---	0.17
191	15.92	0.63	0.239	0.072	---	0.17
192	16.00	0.63	0.239	0.071	---	0.17
193	16.08	0.13	0.050	0.071	0.009	0.04
194	16.17	0.13	0.050	0.071	0.009	0.04
195	16.25	0.13	0.050	0.070	0.009	0.04
196	16.33	0.13	0.050	0.070	0.009	0.04
197	16.42	0.13	0.050	0.069	0.009	0.04
198	16.50	0.13	0.050	0.069	0.009	0.04
199	16.58	0.10	0.038	0.069	0.007	0.03
200	16.67	0.10	0.038	0.068	0.007	0.03
201	16.75	0.10	0.038	0.068	0.007	0.03
202	16.83	0.10	0.038	0.068	0.007	0.03
203	16.92	0.10	0.038	0.067	0.007	0.03
204	17.00	0.10	0.038	0.067	0.007	0.03

205	17.08	0.17	0.063	0.067	0.011	0.05
206	17.17	0.17	0.063	0.066	0.011	0.05
207	17.25	0.17	0.063	0.066	0.011	0.05
208	17.33	0.17	0.063	0.066	0.011	0.05
209	17.42	0.17	0.063	0.065	0.011	0.05
210	17.50	0.17	0.063	0.065	0.011	0.05
211	17.58	0.17	0.063	0.065	0.011	0.05
212	17.67	0.17	0.063	0.064	0.011	0.05
213	17.75	0.17	0.063	0.064	0.011	0.05
214	17.83	0.13	0.050	0.064	0.009	0.04
215	17.92	0.13	0.050	0.063	0.009	0.04
216	18.00	0.13	0.050	0.063	0.009	0.04
217	18.08	0.13	0.050	0.063	0.009	0.04
218	18.17	0.13	0.050	0.063	0.009	0.04
219	18.25	0.13	0.050	0.062	0.009	0.04
220	18.33	0.13	0.050	0.062	0.009	0.04
221	18.42	0.13	0.050	0.062	0.009	0.04
222	18.50	0.13	0.050	0.061	0.009	0.04
223	18.58	0.10	0.038	0.061	0.007	0.03
224	18.67	0.10	0.038	0.061	0.007	0.03
225	18.75	0.10	0.038	0.060	0.007	0.03
226	18.83	0.07	0.025	0.060	0.005	0.02
227	18.92	0.07	0.025	0.060	0.005	0.02
228	19.00	0.07	0.025	0.060	0.005	0.02
229	19.08	0.10	0.038	0.059	0.007	0.03
230	19.17	0.10	0.038	0.059	0.007	0.03
231	19.25	0.10	0.038	0.059	0.007	0.03
232	19.33	0.13	0.050	0.058	0.009	0.04
233	19.42	0.13	0.050	0.058	0.009	0.04
234	19.50	0.13	0.050	0.058	0.009	0.04
235	19.58	0.10	0.038	0.058	0.007	0.03
236	19.67	0.10	0.038	0.057	0.007	0.03
237	19.75	0.10	0.038	0.057	0.007	0.03
238	19.83	0.07	0.025	0.057	0.005	0.02
239	19.92	0.07	0.025	0.057	0.005	0.02
240	20.00	0.07	0.025	0.056	0.005	0.02
241	20.08	0.10	0.038	0.056	0.007	0.03
242	20.17	0.10	0.038	0.056	0.007	0.03
243	20.25	0.10	0.038	0.056	0.007	0.03
244	20.33	0.10	0.038	0.055	0.007	0.03
245	20.42	0.10	0.038	0.055	0.007	0.03
246	20.50	0.10	0.038	0.055	0.007	0.03
247	20.58	0.10	0.038	0.055	0.007	0.03
248	20.67	0.10	0.038	0.054	0.007	0.03
249	20.75	0.10	0.038	0.054	0.007	0.03
250	20.83	0.07	0.025	0.054	0.005	0.02
251	20.92	0.07	0.025	0.054	0.005	0.02
252	21.00	0.07	0.025	0.054	0.005	0.02
253	21.08	0.10	0.038	0.053	0.007	0.03
254	21.17	0.10	0.038	0.053	0.007	0.03
255	21.25	0.10	0.038	0.053	0.007	0.03
256	21.33	0.07	0.025	0.053	0.005	0.02
257	21.42	0.07	0.025	0.053	0.005	0.02
258	21.50	0.07	0.025	0.052	0.005	0.02
259	21.58	0.10	0.038	0.052	0.007	0.03
260	21.67	0.10	0.038	0.052	0.007	0.03
261	21.75	0.10	0.038	0.052	0.007	0.03
262	21.83	0.07	0.025	0.052	0.005	0.02
263	21.92	0.07	0.025	0.051	0.005	0.02
264	22.00	0.07	0.025	0.051	0.005	0.02
265	22.08	0.10	0.038	0.051	0.007	0.03
266	22.17	0.10	0.038	0.051	0.007	0.03
267	22.25	0.10	0.038	0.051	0.007	0.03

268	22.33	0.07	0.025	0.051	0.005	0.02
269	22.42	0.07	0.025	0.050	0.005	0.02
270	22.50	0.07	0.025	0.050	0.005	0.02
271	22.58	0.07	0.025	0.050	0.005	0.02
272	22.67	0.07	0.025	0.050	0.005	0.02
273	22.75	0.07	0.025	0.050	0.005	0.02
274	22.83	0.07	0.025	0.050	0.005	0.02
275	22.92	0.07	0.025	0.050	0.005	0.02
276	23.00	0.07	0.025	0.049	0.005	0.02
277	23.08	0.07	0.025	0.049	0.005	0.02
278	23.17	0.07	0.025	0.049	0.005	0.02
279	23.25	0.07	0.025	0.049	0.005	0.02
280	23.33	0.07	0.025	0.049	0.005	0.02
281	23.42	0.07	0.025	0.049	0.005	0.02
282	23.50	0.07	0.025	0.049	0.005	0.02
283	23.58	0.07	0.025	0.049	0.005	0.02
284	23.67	0.07	0.025	0.049	0.005	0.02
285	23.75	0.07	0.025	0.049	0.005	0.02
286	23.83	0.07	0.025	0.049	0.005	0.02
287	23.92	0.07	0.025	0.049	0.005	0.02
288	24.00	0.07	0.025	0.049	0.005	0.02
Sum =	100.0				Sum =	25.2

Flood volume = Effective rainfall 2.10 (In)  
times area 19.6(Ac.)/[ (In)/(Ft.) ] = 3.4 (Ac.Ft)  
Total soil loss = 1.04 (In)  
Total soil loss = 1.708 (Ac.Ft)  
Total rainfall = 3.15 (In)  
Flood volume = 149753.0 Cubic Feet  
Total soil loss = 74408.1 Cubic Feet

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Peak flow rate of this hydrograph = 6.471 (CFS)  
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24 - H O U R S T O R M  
R u n o f f H y d r o g r a p h

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

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0001	0.02	Q				
0+10	0.0008	0.09	Q				
0+15	0.0021	0.20	Q				
0+20	0.0041	0.28	VQ				
0+25	0.0065	0.35	VQ				
0+30	0.0094	0.43	VQ				
0+35	0.0127	0.48	VQ				
0+40	0.0163	0.51	V Q				
0+45	0.0199	0.53	V Q				
0+50	0.0238	0.56	V Q				
0+55	0.0279	0.61	V Q				
1+ 0	0.0325	0.67	V Q				
1+ 5	0.0374	0.71	V Q				
1+10	0.0422	0.69	V Q				
1+15	0.0467	0.66	V Q				
1+20	0.0511	0.63	V Q				
1+25	0.0554	0.63	V Q				
1+30	0.0597	0.62	V Q				
1+35	0.0639	0.62	V Q				
1+40	0.0682	0.62	V Q				
1+45	0.0725	0.62	V Q				
1+50	0.0768	0.63	V Q				

1+55	0.0814	0.67	V Q
2+ 0	0.0863	0.72	VQ
2+ 5	0.0915	0.75	V Q
2+10	0.0968	0.77	V Q
2+15	0.1022	0.78	V Q
2+20	0.1076	0.79	V Q
2+25	0.1131	0.79	V Q
2+30	0.1186	0.80	V Q
2+35	0.1242	0.81	V Q
2+40	0.1300	0.85	V Q
2+45	0.1363	0.91	V Q
2+50	0.1428	0.94	V Q
2+55	0.1494	0.96	V Q
3+ 0	0.1561	0.98	V Q
3+ 5	0.1629	0.99	V Q
3+10	0.1698	0.99	V Q
3+15	0.1766	1.00	VQ
3+20	0.1835	1.00	V Q
3+25	0.1905	1.01	V Q
3+30	0.1974	1.01	V Q
3+35	0.2044	1.01	V Q
3+40	0.2114	1.01	V Q
3+45	0.2184	1.02	V Q
3+50	0.2255	1.03	V Q
3+55	0.2328	1.06	V Q
4+ 0	0.2405	1.12	V Q
4+ 5	0.2485	1.16	V Q
4+10	0.2565	1.17	V Q
4+15	0.2647	1.19	VQ
4+20	0.2730	1.20	VQ
4+25	0.2816	1.25	VQ
4+30	0.2906	1.31	V Q
4+35	0.2998	1.34	V Q
4+40	0.3092	1.37	V Q
4+45	0.3187	1.38	V Q
4+50	0.3283	1.40	V Q
4+55	0.3383	1.44	V Q
5+ 0	0.3486	1.50	V Q
5+ 5	0.3592	1.53	V Q
5+10	0.3693	1.48	VQ
5+15	0.3788	1.38	VQ
5+20	0.3880	1.33	VQ
5+25	0.3972	1.34	VQ
5+30	0.4067	1.38	VQ
5+35	0.4164	1.41	VQ
5+40	0.4265	1.46	VQ
5+45	0.4370	1.52	VQ
5+50	0.4477	1.56	VQ
5+55	0.4585	1.58	VQ
6+ 0	0.4695	1.59	VQ
6+ 5	0.4806	1.61	VQ
6+10	0.4919	1.65	VQ
6+15	0.5037	1.71	VQ
6+20	0.5158	1.75	VQ
6+25	0.5280	1.77	VQ
6+30	0.5403	1.79	VQ
6+35	0.5521	1.72	Q
6+40	0.5618	1.40	QV
6+45	0.5681	0.93	Q V
6+50	0.5724	0.62	Q V
6+55	0.5758	0.48	Q V
7+ 0	0.5785	0.40	Q V
7+ 5	0.5808	0.34	Q V

7+10	0.5829	0.29	Q	V
7+15	0.5847	0.26	Q	V
7+20	0.5864	0.25	Q	V
7+25	0.5883	0.28	Q	V
7+30	0.5906	0.33	Q	V
7+35	0.5932	0.38	Q	V
7+40	0.5962	0.44	Q	V
7+45	0.5997	0.51	Q	V
7+50	0.6037	0.58	Q	V
7+55	0.6082	0.65	Q	V
8+ 0	0.6133	0.74	Q	V
8+ 5	0.6190	0.82	Q	V
8+10	0.6255	0.95	Q	V
8+15	0.6332	1.11	Q	V
8+20	0.6416	1.23	Q	V
8+25	0.6506	1.30	Q	V
8+30	0.6598	1.34	Q	V
8+35	0.6694	1.39	Q	V
8+40	0.6795	1.47	Q	V
8+45	0.6903	1.57	Q	V
8+50	0.7017	1.65	Q	V
8+55	0.7136	1.74	Q	V
9+ 0	0.7263	1.84	QV	
9+ 5	0.7396	1.93	QV	
9+10	0.7538	2.06	Q	
9+15	0.7692	2.23	Q	
9+20	0.7854	2.36	Q	
9+25	0.8024	2.47	Q	
9+30	0.8203	2.59	VQ	
9+35	0.8387	2.68	VQ	
9+40	0.8579	2.78	V	Q
9+45	0.8778	2.89	VQ	
9+50	0.8983	2.98	VQ	
9+55	0.9194	3.07	V	Q
10+ 0	0.9413	3.18	V	Q
10+ 5	0.9632	3.18	VQ	
10+10	0.9833	2.91	Q	
10+15	1.0004	2.48	Q	V
10+20	1.0156	2.21	Q	V
10+25	1.0300	2.09	Q	V
10+30	1.0440	2.02	Q	V
10+35	1.0579	2.03	Q	V
10+40	1.0732	2.22	Q	V
10+45	1.0906	2.52	Q	V
10+50	1.1093	2.72	Q	V
10+55	1.1287	2.82	Q	V
11+ 0	1.1485	2.87	Q	V
11+ 5	1.1685	2.90	Q	V
11+10	1.1884	2.89	Q	V
11+15	1.2081	2.85	Q	V
11+20	1.2276	2.84	Q	V
11+25	1.2471	2.83	Q	V
11+30	1.2667	2.84	Q	V
11+35	1.2861	2.82	Q	V
11+40	1.3050	2.74	Q	V
11+45	1.3230	2.62	Q	V
11+50	1.3406	2.55	Q	V
11+55	1.3583	2.57	Q	V
12+ 0	1.3763	2.62	Q	V
12+ 5	1.3951	2.73	Q	V
12+10	1.4162	3.06	Q	V
12+15	1.4406	3.54	Q	V
12+20	1.4671	3.86	Q	V

12+25	1.4951	4.06			QV		
12+30	1.5242	4.23			QV		
12+35	1.5543	4.37			QV		
12+40	1.5856	4.54			Q		
12+45	1.6183	4.74			Q		
12+50	1.6519	4.89			Q		
12+55	1.6865	5.02			VQ		
13+ 0	1.7220	5.15			Q		
13+ 5	1.7585	5.30			VQ		
13+10	1.7969	5.59			V Q		
13+15	1.8381	5.97			V Q		
13+20	1.8810	6.23			V Q		
13+25	1.9249	6.37			V Q		
13+30	1.9695	6.47			V Q		
13+35	2.0137	6.43			V Q		
13+40	2.0551	6.00			VQ		
13+45	2.0917	5.32			Q V		
13+50	2.1253	4.88			Q V		
13+55	2.1575	4.68			Q V		
14+ 0	2.1889	4.56			Q V		
14+ 5	2.2201	4.52			Q V		
14+10	2.2520	4.64			Q V		
14+15	2.2855	4.86			Q V		
14+20	2.3198	4.98			Q V		
14+25	2.3542	5.00			Q V		
14+30	2.3884	4.96			Q V		
14+35	2.4225	4.94			Q V		
14+40	2.4565	4.94			Q V		
14+45	2.4905	4.94			Q V		
14+50	2.5245	4.93			Q V		
14+55	2.5581	4.89			Q V		
15+ 0	2.5913	4.82			Q V		
15+ 5	2.6242	4.77			Q V		
15+10	2.6566	4.70			Q V		
15+15	2.6885	4.63			Q V		
15+20	2.7201	4.58			Q V		
15+25	2.7512	4.52			Q V		
15+30	2.7818	4.44			Q V		
15+35	2.8117	4.35			Q V		
15+40	2.8403	4.15			Q V		
15+45	2.8670	3.87			Q V		
15+50	2.8924	3.68			Q V		
15+55	2.9171	3.59			Q V		
16+ 0	2.9414	3.53			Q V		
16+ 5	2.9647	3.38			Q V		
16+10	2.9847	2.90			Q V		
16+15	2.9999	2.20			Q V		
16+20	3.0119	1.75			Q V		
16+25	3.0223	1.51			Q V		
16+30	3.0317	1.37			Q V		
16+35	3.0403	1.24			Q V		
16+40	3.0480	1.12			Q V		
16+45	3.0548	0.99			Q V		
16+50	3.0611	0.90			Q V		
16+55	3.0669	0.84			Q V		
17+ 0	3.0723	0.80			Q V		
17+ 5	3.0777	0.77			Q V		
17+10	3.0833	0.81			Q V		
17+15	3.0894	0.90			Q V		
17+20	3.0960	0.95			Q V		
17+25	3.1026	0.97			Q V		
17+30	3.1094	0.98			Q V		
17+35	3.1161	0.98			Q V		

17+40	3.1228	0.98	Q	V
17+45	3.1296	0.99	Q	V
17+50	3.1364	0.98	Q	V
17+55	3.1430	0.95	Q	V
18+ 0	3.1492	0.90	Q	V
18+ 5	3.1551	0.87	Q	V
18+10	3.1610	0.85	Q	V
18+15	3.1669	0.85	Q	V
18+20	3.1727	0.84	Q	V
18+25	3.1784	0.84	Q	V
18+30	3.1842	0.83	Q	V
18+35	3.1898	0.82	Q	V
18+40	3.1952	0.78	Q	V
18+45	3.2002	0.73	Q	V
18+50	3.2049	0.68	Q	V
18+55	3.2092	0.62	Q	V
19+ 0	3.2131	0.56	Q	V
19+ 5	3.2167	0.52	Q	V
19+10	3.2203	0.53	Q	V
19+15	3.2243	0.57	Q	V
19+20	3.2284	0.60	Q	V
19+25	3.2329	0.65	Q	V
19+30	3.2377	0.70	Q	V
19+35	3.2428	0.73	Q	V
19+40	3.2477	0.72	Q	V
19+45	3.2523	0.67	Q	V
19+50	3.2567	0.64	Q	V
19+55	3.2608	0.59	Q	V
20+ 0	3.2644	0.53	Q	V
20+ 5	3.2678	0.50	Q	V
20+10	3.2714	0.51	Q	V
20+15	3.2752	0.56	Q	V
20+20	3.2792	0.58	Q	V
20+25	3.2833	0.59	Q	V
20+30	3.2874	0.60	Q	V
20+35	3.2915	0.60	Q	V
20+40	3.2957	0.60	Q	V
20+45	3.2999	0.61	Q	V
20+50	3.3040	0.60	Q	V
20+55	3.3079	0.56	Q	V
21+ 0	3.3114	0.51	Q	V
21+ 5	3.3147	0.48	Q	V
21+10	3.3181	0.50	Q	V
21+15	3.3219	0.55	Q	V
21+20	3.3258	0.56	Q	V
21+25	3.3295	0.54	Q	V
21+30	3.3329	0.49	Q	V
21+35	3.3361	0.47	Q	V
21+40	3.3395	0.49	Q	V
21+45	3.3432	0.54	Q	V
21+50	3.3471	0.56	Q	V
21+55	3.3507	0.53	Q	V
22+ 0	3.3541	0.49	Q	V
22+ 5	3.3573	0.47	Q	V
22+10	3.3607	0.49	Q	V
22+15	3.3644	0.54	Q	V
22+20	3.3682	0.56	Q	V
22+25	3.3719	0.53	Q	V
22+30	3.3752	0.49	Q	V
22+35	3.3783	0.46	Q	V
22+40	3.3814	0.44	Q	V
22+45	3.3844	0.44	Q	V
22+50	3.3874	0.43	Q	V

22+55	3.3903	0.42	Q			V
23+ 0	3.3932	0.42	Q			V
23+ 5	3.3961	0.42	Q			V
23+10	3.3990	0.42	Q			V
23+15	3.4018	0.42	Q			V
23+20	3.4047	0.41	Q			V
23+25	3.4075	0.41	Q			V
23+30	3.4103	0.41	Q			V
23+35	3.4132	0.41	Q			V
23+40	3.4160	0.41	Q			V
23+45	3.4188	0.41	Q			V
23+50	3.4217	0.41	Q			V
23+55	3.4245	0.41	Q			V
24+ 0	3.4273	0.41	Q			V
24+ 5	3.4300	0.39	Q			V
24+10	3.4322	0.32	Q			V
24+15	3.4336	0.21	Q			V
24+20	3.4345	0.14	Q			V
24+25	3.4352	0.10	Q			V
24+30	3.4358	0.08	Q			V
24+35	3.4362	0.06	Q			V
24+40	3.4366	0.05	Q			V
24+45	3.4369	0.04	Q			V
24+50	3.4371	0.03	Q			V
24+55	3.4373	0.03	Q			V
25+ 0	3.4374	0.02	Q			V
25+ 5	3.4376	0.02	Q			V
25+10	3.4376	0.01	Q			V
25+15	3.4377	0.01	Q			V
25+20	3.4378	0.01	Q			V
25+25	3.4378	0.01	Q			V
25+30	3.4378	0.00	Q			V
25+35	3.4379	0.00	Q			V



Unit Hydrograph Analysis

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0  
Study date 04/24/23 File: 3963UNIHVDQ100P1100.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

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English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

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Black Creek - Harvill at Water Industrial  
Unit hydrograph for 100 Year 1 Hour Storm Event - Proposed Condition  
3963UNIHVDQ100P  
CB

-----  
Drainage Area = 19.63(Ac.) = 0.031 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.63(Ac.) = 0.031 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.200 Hr.  
Lag time = 12.00 Min.  
25% of lag time = 3.00 Min.  
40% of lag time = 4.80 Min.  
Unit time = 5.00 Min.  
Duration of storm = 1 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	0.47	9.23

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	1.25	24.54

STORM EVENT (YEAR) = 100.00  
Area Averaged 2-Year Rainfall = 0.470 (In)  
Area Averaged 100-Year Rainfall = 1.250 (In)

Point rain (area averaged) = 1.250 (In)  
Areal adjustment factor = 99.98 %  
Adjusted average point rain = 1.250 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.630                    56.00                    0.900  
 Total Area Entered =        19.63(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
56.0	56.0	0.511	0.900	0.097	1.000	0.097
						Sum (F) = 0.097

Area averaged mean soil loss (F) (In/Hr) = 0.097

Minimum soil loss rate ((In/Hr)) = 0.049

(for 24 hour storm duration)

Soil low loss rate (decimal) = 0.180

-----  
 Slope of intensity-duration curve for a 1 hour storm =0.5000  
 -----

U n i t   H y d r o g r a p h  
 VALLEY S-Curve

-----  
 Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	41.667	4.633
2	0.167	83.333	19.213
3	0.250	125.000	27.563
4	0.333	166.667	16.618
5	0.417	208.333	8.081
6	0.500	250.000	5.242
7	0.583	291.667	3.930
8	0.667	333.333	2.960
9	0.750	375.000	2.390
10	0.833	416.667	1.847
11	0.917	458.333	1.422
12	1.000	500.000	1.277
13	1.083	541.667	1.083
14	1.167	583.333	0.863
15	1.250	625.000	0.723
16	1.333	666.667	0.583
17	1.417	708.333	0.447
18	1.500	750.000	0.417
19	1.583	791.667	0.417
20	1.667	833.333	0.292
		Sum = 100.000	Sum= 19.783

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)	
			Max	Low		
1	0.08	4.20	0.630	0.097	---	0.53
2	0.17	4.30	0.645	0.097	---	0.55
3	0.25	5.00	0.750	0.097	---	0.65
4	0.33	5.00	0.750	0.097	---	0.65
5	0.42	5.80	0.870	0.097	---	0.77
6	0.50	6.50	0.975	0.097	---	0.88
7	0.58	7.40	1.110	0.097	---	1.01
8	0.67	8.60	1.290	0.097	---	1.19
9	0.75	12.30	1.845	0.097	---	1.75
10	0.83	29.10	4.364	0.097	---	4.27
11	0.92	6.80	1.020	0.097	---	0.92
12	1.00	5.00	0.750	0.097	---	0.65
Sum =	100.0					Sum = 13.8

Flood volume = Effective rainfall 1.15 (In)  
 times area 19.6 (Ac.) / [(In) / (Ft.)] = 1.9 (Ac.Ft)  
 Total soil loss = 0.10 (In)  
 Total soil loss = 0.159 (Ac.Ft)  
 Total rainfall = 1.25 (In)  
 Flood volume = 82139.7 Cubic Feet  
 Total soil loss = 6915.6 Cubic Feet

Peak flow rate of this hydrograph = 38.067 (CFS)

+++++

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

Hydrograph in 5 Minute intervals ((CFS))

Time (h+m)	Volume Ac.Ft	Q (CFS)	0	10.0	20.0	30.0	40.0
0+ 5	0.0034	0.49	Q				
0+10	0.0208	2.53	V Q				
0+15	0.0593	5.59	V Q				
0+20	0.1132	7.82	V Q				
0+25	0.1779	9.41	V Q				
0+30	0.2529	10.88	V Q				
0+35	0.3401	12.66	V Q				
0+40	0.4415	14.74	V Q				
0+45	0.5624	17.55	V Q				
0+50	0.7273	23.95	V Q				
0+55	0.9663	34.71	V Q				
1+ 0	1.2285	38.07	V Q				
1+ 5	1.4208	27.93	V Q				
1+10	1.5449	18.01	V Q				
1+15	1.6248	11.60	V Q				
1+20	1.6807	8.11	V Q				
1+25	1.7230	6.15	V Q				
1+30	1.7566	4.88	V Q				
1+35	1.7832	3.87	V Q				
1+40	1.8047	3.12	V Q				
1+45	1.8227	2.61	V Q				
1+50	1.8375	2.15	V Q				
1+55	1.8495	1.74	V Q				
2+ 0	1.8593	1.42	V Q				
2+ 5	1.8670	1.12	V Q				
2+10	1.8731	0.88	V Q				
2+15	1.8780	0.72	V Q				
2+20	1.8821	0.59	V Q				
2+25	1.8847	0.38	V Q				
2+30	1.8854	0.11	V Q				
2+35	1.8857	0.04	V Q				

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHVDQ100P3100.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit hydrograph for 100 Year 3 Hour Storm Event - Proposed Condition  
3963UNIHVDQ100P  
CB

-----  
Drainage Area = 19.63(Ac.) = 0.031 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.63(Ac.) = 0.031 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.200 Hr.  
Lag time = 12.00 Min.  
25% of lag time = 3.00 Min.  
40% of lag time = 4.80 Min.  
Unit time = 5.00 Min.  
Duration of storm = 3 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	0.80	15.70

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	1.93	37.89

STORM EVENT (YEAR) = 100.00  
Area Averaged 2-Year Rainfall = 0.800 (In)  
Area Averaged 100-Year Rainfall = 1.930 (In)

Point rain (area averaged) = 1.930 (In)  
Areal adjustment factor = 99.99 %  
Adjusted average point rain = 1.930 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.630                    56.00                    0.900  
 Total Area Entered =        19.63(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
56.0	56.0	0.511	0.900	0.097	1.000	0.097
						Sum (F) = 0.097

Area averaged mean soil loss (F) (In/Hr) = 0.097  
 Minimum soil loss rate ((In/Hr)) = 0.049  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.180

-----  
 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	41.667	0.917
2	0.167	83.333	3.801
3	0.250	125.000	5.453
4	0.333	166.667	3.288
5	0.417	208.333	1.599
6	0.500	250.000	1.037
7	0.583	291.667	0.777
8	0.667	333.333	0.586
9	0.750	375.000	0.473
10	0.833	416.667	0.365
11	0.917	458.333	0.281
12	1.000	500.000	0.253
13	1.083	541.667	0.214
14	1.167	583.333	0.171
15	1.250	625.000	0.143
16	1.333	666.667	0.115
17	1.417	708.333	0.088
18	1.500	750.000	0.082
19	1.583	791.667	0.082
20	1.667	833.333	0.058
		Sum = 100.000	Sum= 19.783

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	1.30	0.301	0.097	---	0.20
2	0.17	1.30	0.301	0.097	---	0.20
3	0.25	1.10	0.255	0.097	---	0.16
4	0.33	1.50	0.347	0.097	---	0.25
5	0.42	1.50	0.347	0.097	---	0.25
6	0.50	1.80	0.417	0.097	---	0.32
7	0.58	1.50	0.347	0.097	---	0.25
8	0.67	1.80	0.417	0.097	---	0.32
9	0.75	1.80	0.417	0.097	---	0.32
10	0.83	1.50	0.347	0.097	---	0.25
11	0.92	1.60	0.371	0.097	---	0.27
12	1.00	1.80	0.417	0.097	---	0.32
13	1.08	2.20	0.509	0.097	---	0.41
14	1.17	2.20	0.509	0.097	---	0.41
15	1.25	2.20	0.509	0.097	---	0.41

16	1.33	2.00	0.463	0.097	---	0.37
17	1.42	2.60	0.602	0.097	---	0.51
18	1.50	2.70	0.625	0.097	---	0.53
19	1.58	2.40	0.556	0.097	---	0.46
20	1.67	2.70	0.625	0.097	---	0.53
21	1.75	3.30	0.764	0.097	---	0.67
22	1.83	3.10	0.718	0.097	---	0.62
23	1.92	2.90	0.672	0.097	---	0.57
24	2.00	3.00	0.695	0.097	---	0.60
25	2.08	3.10	0.718	0.097	---	0.62
26	2.17	4.20	0.973	0.097	---	0.88
27	2.25	5.00	1.158	0.097	---	1.06
28	2.33	3.50	0.811	0.097	---	0.71
29	2.42	6.80	1.575	0.097	---	1.48
30	2.50	7.30	1.691	0.097	---	1.59
31	2.58	8.20	1.899	0.097	---	1.80
32	2.67	5.90	1.366	0.097	---	1.27
33	2.75	2.00	0.463	0.097	---	0.37
34	2.83	1.80	0.417	0.097	---	0.32
35	2.92	1.80	0.417	0.097	---	0.32
36	3.00	0.60	0.139	0.097	---	0.04
Sum =	100.0					Sum = 19.7

Flood volume = Effective rainfall 1.64 (In)  
times area 19.6(Ac.)/[ (In)/(Ft.) ] = 2.7 (Ac.Ft)  
Total soil loss = 0.29 (In)  
Total soil loss = 0.476 (Ac.Ft)  
Total rainfall = 1.93 (In)  
Flood volume = 116767.1 Cubic Feet  
Total soil loss = 20746.9 Cubic Feet

-----  
Peak flow rate of this hydrograph = 26.143 (CFS)  
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3 - H O U R S T O R M  
R u n o f f H y d r o g r a p h

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

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	7.5	15.0	22.5	30.0
0+ 5	0.0013	0.19	Q				
0+10	0.0079	0.96	VQ				
0+15	0.0219	2.03	V Q				
0+20	0.0399	2.61	V Q				
0+25	0.0609	3.04	V Q				
0+30	0.0861	3.67	V Q				
0+35	0.1154	4.26	V Q				
0+40	0.1475	4.66	V Q				
0+45	0.1814	4.93	V Q				
0+50	0.2175	5.24	V Q				
0+55	0.2539	5.28	V Q				
1+ 0	0.2897	5.20	V Q				
1+ 5	0.3275	5.48	V Q				
1+10	0.3698	6.15	V Q				
1+15	0.4170	6.85	V Q				
1+20	0.4667	7.22	V Q				
1+25	0.5176	7.39	V Q				
1+30	0.5717	7.84	V Q				
1+35	0.6309	8.60	V Q				
1+40	0.6929	9.00	V Q				
1+45	0.7571	9.33	VQ				
1+50	0.8271	10.16	VQ				



Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHVDQ100P6100.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

-----  
Black Creek - Harvill at Water Industrial  
Unit hydrograph for 100 Year 6 Hour Storm Event - Proposed Condition  
3963UNIHVDQ100P  
CB

-----  
Drainage Area = 19.63(Ac.) = 0.031 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.63(Ac.) = 0.031 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.200 Hr.  
Lag time = 12.00 Min.  
25% of lag time = 3.00 Min.  
40% of lag time = 4.80 Min.  
Unit time = 5.00 Min.  
Duration of storm = 6 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	1.10	21.59

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	2.60	51.04

STORM EVENT (YEAR) = 100.00  
Area Averaged 2-Year Rainfall = 1.100 (In)  
Area Averaged 100-Year Rainfall = 2.600 (In)

Point rain (area averaged) = 2.600 (In)  
Areal adjustment factor = 99.99 %  
Adjusted average point rain = 2.600 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %



19.630                    56.00                    0.900  
 Total Area Entered =        19.63(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
56.0	56.0	0.511	0.900	0.097	1.000	0.097
						Sum (F) = 0.097

Area averaged mean soil loss (F) (In/Hr) = 0.097  
 Minimum soil loss rate ((In/Hr)) = 0.049  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.180

-----  
 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	41.667	0.917
2	0.167	83.333	3.801
3	0.250	125.000	5.453
4	0.333	166.667	3.288
5	0.417	208.333	1.599
6	0.500	250.000	1.037
7	0.583	291.667	0.777
8	0.667	333.333	0.586
9	0.750	375.000	0.473
10	0.833	416.667	0.365
11	0.917	458.333	0.281
12	1.000	500.000	0.253
13	1.083	541.667	0.214
14	1.167	583.333	0.171
15	1.250	625.000	0.143
16	1.333	666.667	0.115
17	1.417	708.333	0.088
18	1.500	750.000	0.082
19	1.583	791.667	0.082
20	1.667	833.333	0.058
		Sum = 100.000	Sum= 19.783

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.50	0.156	0.097	---	0.06
2	0.17	0.60	0.187	0.097	---	0.09
3	0.25	0.60	0.187	0.097	---	0.09
4	0.33	0.60	0.187	0.097	---	0.09
5	0.42	0.60	0.187	0.097	---	0.09
6	0.50	0.70	0.218	0.097	---	0.12
7	0.58	0.70	0.218	0.097	---	0.12
8	0.67	0.70	0.218	0.097	---	0.12
9	0.75	0.70	0.218	0.097	---	0.12
10	0.83	0.70	0.218	0.097	---	0.12
11	0.92	0.70	0.218	0.097	---	0.12
12	1.00	0.80	0.250	0.097	---	0.15
13	1.08	0.80	0.250	0.097	---	0.15
14	1.17	0.80	0.250	0.097	---	0.15
15	1.25	0.80	0.250	0.097	---	0.15

16	1.33	0.80	0.250	0.097	---	0.15
17	1.42	0.80	0.250	0.097	---	0.15
18	1.50	0.80	0.250	0.097	---	0.15
19	1.58	0.80	0.250	0.097	---	0.15
20	1.67	0.80	0.250	0.097	---	0.15
21	1.75	0.80	0.250	0.097	---	0.15
22	1.83	0.80	0.250	0.097	---	0.15
23	1.92	0.80	0.250	0.097	---	0.15
24	2.00	0.90	0.281	0.097	---	0.18
25	2.08	0.80	0.250	0.097	---	0.15
26	2.17	0.90	0.281	0.097	---	0.18
27	2.25	0.90	0.281	0.097	---	0.18
28	2.33	0.90	0.281	0.097	---	0.18
29	2.42	0.90	0.281	0.097	---	0.18
30	2.50	0.90	0.281	0.097	---	0.18
31	2.58	0.90	0.281	0.097	---	0.18
32	2.67	0.90	0.281	0.097	---	0.18
33	2.75	1.00	0.312	0.097	---	0.21
34	2.83	1.00	0.312	0.097	---	0.21
35	2.92	1.00	0.312	0.097	---	0.21
36	3.00	1.00	0.312	0.097	---	0.21
37	3.08	1.00	0.312	0.097	---	0.21
38	3.17	1.10	0.343	0.097	---	0.25
39	3.25	1.10	0.343	0.097	---	0.25
40	3.33	1.10	0.343	0.097	---	0.25
41	3.42	1.20	0.374	0.097	---	0.28
42	3.50	1.30	0.406	0.097	---	0.31
43	3.58	1.40	0.437	0.097	---	0.34
44	3.67	1.40	0.437	0.097	---	0.34
45	3.75	1.50	0.468	0.097	---	0.37
46	3.83	1.50	0.468	0.097	---	0.37
47	3.92	1.60	0.499	0.097	---	0.40
48	4.00	1.60	0.499	0.097	---	0.40
49	4.08	1.70	0.530	0.097	---	0.43
50	4.17	1.80	0.562	0.097	---	0.46
51	4.25	1.90	0.593	0.097	---	0.50
52	4.33	2.00	0.624	0.097	---	0.53
53	4.42	2.10	0.655	0.097	---	0.56
54	4.50	2.10	0.655	0.097	---	0.56
55	4.58	2.20	0.686	0.097	---	0.59
56	4.67	2.30	0.718	0.097	---	0.62
57	4.75	2.40	0.749	0.097	---	0.65
58	4.83	2.40	0.749	0.097	---	0.65
59	4.92	2.50	0.780	0.097	---	0.68
60	5.00	2.60	0.811	0.097	---	0.71
61	5.08	3.10	0.967	0.097	---	0.87
62	5.17	3.60	1.123	0.097	---	1.03
63	5.25	3.90	1.217	0.097	---	1.12
64	5.33	4.20	1.310	0.097	---	1.21
65	5.42	4.70	1.466	0.097	---	1.37
66	5.50	5.60	1.747	0.097	---	1.65
67	5.58	1.90	0.593	0.097	---	0.50
68	5.67	0.90	0.281	0.097	---	0.18
69	5.75	0.60	0.187	0.097	---	0.09
70	5.83	0.50	0.156	0.097	---	0.06
71	5.92	0.30	0.094	0.097	0.017	0.08
72	6.00	0.20	0.062	0.097	0.011	0.05
Sum =	100.0					Sum = 24.4

Flood volume = Effective rainfall 2.03 (In)  
 times area 19.6 (Ac.) / [(In) / (Ft.)] = 3.3 (Ac.Ft)  
 Total soil loss = 0.57 (In)  
 Total soil loss = 0.930 (Ac.Ft)  
 Total rainfall = 2.60 (In)

Flood volume = 144747.6 Cubic Feet  
 Total soil loss = 40507.9 Cubic Feet

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 Peak flow rate of this hydrograph = 23.546(CFS)  
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6 - H O U R S T O R M  
 R u n o f f H y d r o g r a p h

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

Time(h+m)	Volume	Ac.Ft	Q(CFS)	0	7.5	15.0	22.5	30.0
0+ 5	0.0004		0.05	Q				
0+10	0.0025		0.31	Q				
0+15	0.0076		0.75	Q				
0+20	0.0153		1.11	VQ				
0+25	0.0243		1.31	VQ				
0+30	0.0343		1.45	VQ				
0+35	0.0456		1.64	V Q				
0+40	0.0585		1.87	V Q				
0+45	0.0724		2.02	V Q				
0+50	0.0869		2.11	VQ				
0+55	0.1019		2.17	VQ				
1+ 0	0.1173		2.25	VQ				
1+ 5	0.1339		2.40	V Q				
1+10	0.1518		2.60	V Q				
1+15	0.1706		2.73	VQ				
1+20	0.1899		2.80	VQ				
1+25	0.2096		2.85	VQ				
1+30	0.2295		2.89	VQ				
1+35	0.2496		2.92	Q				
1+40	0.2699		2.95	Q				
1+45	0.2903		2.96	Q				
1+50	0.3108		2.97	Q				
1+55	0.3313		2.98	Q				
2+ 0	0.3522		3.02	Q				
2+ 5	0.3736		3.12	Q				
2+10	0.3957		3.20	Q				
2+15	0.4182		3.26	QV				
2+20	0.4414		3.38	QV				
2+25	0.4653		3.47	QV				
2+30	0.4895		3.51	QV				
2+35	0.5139		3.54	Q V				
2+40	0.5384		3.56	Q V				
2+45	0.5632		3.60	Q V				
2+50	0.5889		3.73	Q V				
2+55	0.6159		3.92	Q V				
3+ 0	0.6436		4.03	Q V				
3+ 5	0.6717		4.08	Q V				
3+10	0.7003		4.15	Q V				
3+15	0.7299		4.30	Q V				
3+20	0.7608		4.49	Q V				
3+25	0.7928		4.64	Q V				
3+30	0.8262		4.85	Q V				
3+35	0.8620		5.21	Q V				
3+40	0.9008		5.63	Q V				
3+45	0.9422		6.01	Q V				
3+50	0.9859		6.34	Q V				
3+55	1.0317		6.66	Q V				
4+ 0	1.0797		6.97	Q V				
4+ 5	1.1299		7.28	Q V				

4+10	1.1823	7.62		Q	V			
4+15	1.2378	8.05		Q	V			
4+20	1.2967	8.56		Q	V			
4+25	1.3593	9.09		Q	V			
4+30	1.4256	9.62		Q	V			
4+35	1.4950	10.07		Q	V			
4+40	1.5671	10.48		Q	V			
4+45	1.6426	10.97		Q	V			
4+50	1.7217	11.48		Q	V			
4+55	1.8039	11.93		Q	V			
5+ 0	1.8888	12.34		Q	V			
5+ 5	1.9779	12.94		Q	V			
5+10	2.0748	14.07		Q	V			
5+15	2.1840	15.85			Q	V		
5+20	2.3066	17.81			Q	V		
5+25	2.4423	19.70				Q	V	
5+30	2.5930	21.87					Q	V
5+35	2.7551	23.55						Q
5+40	2.9027	21.43					Q	V
5+45	3.0089	15.42			Q			V
5+50	3.0808	10.44			Q			V
5+55	3.1332	7.60		Q				V
6+ 0	3.1742	5.96						V
6+ 5	3.2075	4.83						V
6+10	3.2337	3.80						V
6+15	3.2536	2.89						V
6+20	3.2691	2.25						V
6+25	3.2816	1.82						V
6+30	3.2918	1.47		Q				V
6+35	3.2999	1.18		Q				V
6+40	3.3064	0.94		Q				V
6+45	3.3115	0.74		Q				V
6+50	3.3154	0.57		Q				V
6+55	3.3184	0.44		Q				V
7+ 0	3.3206	0.32		Q				V
7+ 5	3.3219	0.19		Q				V
7+10	3.3224	0.07		Q				V
7+15	3.3226	0.04		Q				V
7+20	3.3228	0.02		Q				V
7+25	3.3229	0.01		Q				V
7+30	3.3229	0.01		Q				V
7+35	3.3229	0.00		Q				V

Unit Hydrograph Analysis

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Study date 04/24/23 File: 3963UNIHVDQ100P24100.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6145

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English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used

English Units used in output format

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Black Creek - Harvill at Water Industrial  
Unit hydrograph for 100 Year 24 Hour Storm Event - Proposed Condition  
3963UNIHVDQ100P  
CB

-----  
Drainage Area = 19.63(Ac.) = 0.031 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.63(Ac.) = 0.031 Sq. Mi.  
USER Entry of lag time in hours  
Lag time = 0.200 Hr.  
Lag time = 12.00 Min.  
25% of lag time = 3.00 Min.  
40% of lag time = 4.80 Min.  
Unit time = 5.00 Min.  
Duration of storm = 24 Hour(s)  
User Entered Base Flow = 0.00 (CFS)

2 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	1.85	36.32

100 YEAR Area rainfall data:

Area(Ac.) [1]	Rainfall(In) [2]	Weighting[1*2]
19.63	5.00	98.15

STORM EVENT (YEAR) = 100.00  
Area Averaged 2-Year Rainfall = 1.850 (In)  
Area Averaged 100-Year Rainfall = 5.000 (In)

Point rain (area averaged) = 5.000 (In)  
Areal adjustment factor = 100.00 %  
Adjusted average point rain = 5.000 (In)

Sub-Area Data:  
Area(Ac.)            Runoff Index    Impervious %

19.630                    56.00                    0.900  
 Total Area Entered =        19.63(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
56.0	56.0	0.511	0.900	0.097	1.000	0.097
						Sum (F) = 0.097

Area averaged mean soil loss (F) (In/Hr) = 0.097  
 Minimum soil loss rate ((In/Hr)) = 0.049  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.180

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 U n i t   H y d r o g r a p h  
 VALLEY S-Curve  
 -----

Unit Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	41.667	4.633
2	0.167	83.333	19.213
3	0.250	125.000	27.563
4	0.333	166.667	16.618
5	0.417	208.333	8.081
6	0.500	250.000	5.242
7	0.583	291.667	3.930
8	0.667	333.333	2.960
9	0.750	375.000	2.390
10	0.833	416.667	1.847
11	0.917	458.333	1.422
12	1.000	500.000	1.277
13	1.083	541.667	1.083
14	1.167	583.333	0.863
15	1.250	625.000	0.723
16	1.333	666.667	0.583
17	1.417	708.333	0.447
18	1.500	750.000	0.417
19	1.583	791.667	0.417
20	1.667	833.333	0.292
		Sum = 100.000	Sum= 19.783

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.07	0.040	0.172	0.007	0.03
2	0.17	0.07	0.040	0.171	0.007	0.03
3	0.25	0.07	0.040	0.171	0.007	0.03
4	0.33	0.10	0.060	0.170	0.011	0.05
5	0.42	0.10	0.060	0.169	0.011	0.05
6	0.50	0.10	0.060	0.169	0.011	0.05
7	0.58	0.10	0.060	0.168	0.011	0.05
8	0.67	0.10	0.060	0.167	0.011	0.05
9	0.75	0.10	0.060	0.167	0.011	0.05
10	0.83	0.13	0.080	0.166	0.014	0.07
11	0.92	0.13	0.080	0.165	0.014	0.07
12	1.00	0.13	0.080	0.165	0.014	0.07
13	1.08	0.10	0.060	0.164	0.011	0.05
14	1.17	0.10	0.060	0.163	0.011	0.05
15	1.25	0.10	0.060	0.163	0.011	0.05

16	1.33	0.10	0.060	0.162	0.011	0.05
17	1.42	0.10	0.060	0.162	0.011	0.05
18	1.50	0.10	0.060	0.161	0.011	0.05
19	1.58	0.10	0.060	0.160	0.011	0.05
20	1.67	0.10	0.060	0.160	0.011	0.05
21	1.75	0.10	0.060	0.159	0.011	0.05
22	1.83	0.13	0.080	0.158	0.014	0.07
23	1.92	0.13	0.080	0.158	0.014	0.07
24	2.00	0.13	0.080	0.157	0.014	0.07
25	2.08	0.13	0.080	0.156	0.014	0.07
26	2.17	0.13	0.080	0.156	0.014	0.07
27	2.25	0.13	0.080	0.155	0.014	0.07
28	2.33	0.13	0.080	0.155	0.014	0.07
29	2.42	0.13	0.080	0.154	0.014	0.07
30	2.50	0.13	0.080	0.153	0.014	0.07
31	2.58	0.17	0.100	0.153	0.018	0.08
32	2.67	0.17	0.100	0.152	0.018	0.08
33	2.75	0.17	0.100	0.151	0.018	0.08
34	2.83	0.17	0.100	0.151	0.018	0.08
35	2.92	0.17	0.100	0.150	0.018	0.08
36	3.00	0.17	0.100	0.150	0.018	0.08
37	3.08	0.17	0.100	0.149	0.018	0.08
38	3.17	0.17	0.100	0.148	0.018	0.08
39	3.25	0.17	0.100	0.148	0.018	0.08
40	3.33	0.17	0.100	0.147	0.018	0.08
41	3.42	0.17	0.100	0.146	0.018	0.08
42	3.50	0.17	0.100	0.146	0.018	0.08
43	3.58	0.17	0.100	0.145	0.018	0.08
44	3.67	0.17	0.100	0.145	0.018	0.08
45	3.75	0.17	0.100	0.144	0.018	0.08
46	3.83	0.20	0.120	0.143	0.022	0.10
47	3.92	0.20	0.120	0.143	0.022	0.10
48	4.00	0.20	0.120	0.142	0.022	0.10
49	4.08	0.20	0.120	0.142	0.022	0.10
50	4.17	0.20	0.120	0.141	0.022	0.10
51	4.25	0.20	0.120	0.140	0.022	0.10
52	4.33	0.23	0.140	0.140	---	0.00
53	4.42	0.23	0.140	0.139	---	0.00
54	4.50	0.23	0.140	0.139	---	0.00
55	4.58	0.23	0.140	0.138	---	0.00
56	4.67	0.23	0.140	0.137	---	0.00
57	4.75	0.23	0.140	0.137	---	0.00
58	4.83	0.27	0.160	0.136	---	0.02
59	4.92	0.27	0.160	0.136	---	0.02
60	5.00	0.27	0.160	0.135	---	0.02
61	5.08	0.20	0.120	0.134	0.022	0.10
62	5.17	0.20	0.120	0.134	0.022	0.10
63	5.25	0.20	0.120	0.133	0.022	0.10
64	5.33	0.23	0.140	0.133	---	0.01
65	5.42	0.23	0.140	0.132	---	0.01
66	5.50	0.23	0.140	0.132	---	0.01
67	5.58	0.27	0.160	0.131	---	0.03
68	5.67	0.27	0.160	0.130	---	0.03
69	5.75	0.27	0.160	0.130	---	0.03
70	5.83	0.27	0.160	0.129	---	0.03
71	5.92	0.27	0.160	0.129	---	0.03
72	6.00	0.27	0.160	0.128	---	0.03
73	6.08	0.30	0.180	0.128	---	0.05
74	6.17	0.30	0.180	0.127	---	0.05
75	6.25	0.30	0.180	0.126	---	0.05
76	6.33	0.30	0.180	0.126	---	0.05
77	6.42	0.30	0.180	0.125	---	0.05
78	6.50	0.30	0.180	0.125	---	0.06

79	6.58	0.33	0.200	0.124	---	0.08
80	6.67	0.33	0.200	0.124	---	0.08
81	6.75	0.33	0.200	0.123	---	0.08
82	6.83	0.33	0.200	0.122	---	0.08
83	6.92	0.33	0.200	0.122	---	0.08
84	7.00	0.33	0.200	0.121	---	0.08
85	7.08	0.33	0.200	0.121	---	0.08
86	7.17	0.33	0.200	0.120	---	0.08
87	7.25	0.33	0.200	0.120	---	0.08
88	7.33	0.37	0.220	0.119	---	0.10
89	7.42	0.37	0.220	0.119	---	0.10
90	7.50	0.37	0.220	0.118	---	0.10
91	7.58	0.40	0.240	0.118	---	0.12
92	7.67	0.40	0.240	0.117	---	0.12
93	7.75	0.40	0.240	0.116	---	0.12
94	7.83	0.43	0.260	0.116	---	0.14
95	7.92	0.43	0.260	0.115	---	0.14
96	8.00	0.43	0.260	0.115	---	0.15
97	8.08	0.50	0.300	0.114	---	0.19
98	8.17	0.50	0.300	0.114	---	0.19
99	8.25	0.50	0.300	0.113	---	0.19
100	8.33	0.50	0.300	0.113	---	0.19
101	8.42	0.50	0.300	0.112	---	0.19
102	8.50	0.50	0.300	0.112	---	0.19
103	8.58	0.53	0.320	0.111	---	0.21
104	8.67	0.53	0.320	0.111	---	0.21
105	8.75	0.53	0.320	0.110	---	0.21
106	8.83	0.57	0.340	0.110	---	0.23
107	8.92	0.57	0.340	0.109	---	0.23
108	9.00	0.57	0.340	0.109	---	0.23
109	9.08	0.63	0.380	0.108	---	0.27
110	9.17	0.63	0.380	0.108	---	0.27
111	9.25	0.63	0.380	0.107	---	0.27
112	9.33	0.67	0.400	0.107	---	0.29
113	9.42	0.67	0.400	0.106	---	0.29
114	9.50	0.67	0.400	0.105	---	0.29
115	9.58	0.70	0.420	0.105	---	0.31
116	9.67	0.70	0.420	0.104	---	0.32
117	9.75	0.70	0.420	0.104	---	0.32
118	9.83	0.73	0.440	0.103	---	0.34
119	9.92	0.73	0.440	0.103	---	0.34
120	10.00	0.73	0.440	0.102	---	0.34
121	10.08	0.50	0.300	0.102	---	0.20
122	10.17	0.50	0.300	0.101	---	0.20
123	10.25	0.50	0.300	0.101	---	0.20
124	10.33	0.50	0.300	0.101	---	0.20
125	10.42	0.50	0.300	0.100	---	0.20
126	10.50	0.50	0.300	0.100	---	0.20
127	10.58	0.67	0.400	0.099	---	0.30
128	10.67	0.67	0.400	0.099	---	0.30
129	10.75	0.67	0.400	0.098	---	0.30
130	10.83	0.67	0.400	0.098	---	0.30
131	10.92	0.67	0.400	0.097	---	0.30
132	11.00	0.67	0.400	0.097	---	0.30
133	11.08	0.63	0.380	0.096	---	0.28
134	11.17	0.63	0.380	0.096	---	0.28
135	11.25	0.63	0.380	0.095	---	0.28
136	11.33	0.63	0.380	0.095	---	0.29
137	11.42	0.63	0.380	0.094	---	0.29
138	11.50	0.63	0.380	0.094	---	0.29
139	11.58	0.57	0.340	0.093	---	0.25
140	11.67	0.57	0.340	0.093	---	0.25
141	11.75	0.57	0.340	0.092	---	0.25



142	11.83	0.60	0.360	0.092	---	0.27
143	11.92	0.60	0.360	0.092	---	0.27
144	12.00	0.60	0.360	0.091	---	0.27
145	12.08	0.83	0.500	0.091	---	0.41
146	12.17	0.83	0.500	0.090	---	0.41
147	12.25	0.83	0.500	0.090	---	0.41
148	12.33	0.87	0.520	0.089	---	0.43
149	12.42	0.87	0.520	0.089	---	0.43
150	12.50	0.87	0.520	0.088	---	0.43
151	12.58	0.93	0.560	0.088	---	0.47
152	12.67	0.93	0.560	0.087	---	0.47
153	12.75	0.93	0.560	0.087	---	0.47
154	12.83	0.97	0.580	0.087	---	0.49
155	12.92	0.97	0.580	0.086	---	0.49
156	13.00	0.97	0.580	0.086	---	0.49
157	13.08	1.13	0.680	0.085	---	0.59
158	13.17	1.13	0.680	0.085	---	0.60
159	13.25	1.13	0.680	0.084	---	0.60
160	13.33	1.13	0.680	0.084	---	0.60
161	13.42	1.13	0.680	0.084	---	0.60
162	13.50	1.13	0.680	0.083	---	0.60
163	13.58	0.77	0.460	0.083	---	0.38
164	13.67	0.77	0.460	0.082	---	0.38
165	13.75	0.77	0.460	0.082	---	0.38
166	13.83	0.77	0.460	0.081	---	0.38
167	13.92	0.77	0.460	0.081	---	0.38
168	14.00	0.77	0.460	0.081	---	0.38
169	14.08	0.90	0.540	0.080	---	0.46
170	14.17	0.90	0.540	0.080	---	0.46
171	14.25	0.90	0.540	0.079	---	0.46
172	14.33	0.87	0.520	0.079	---	0.44
173	14.42	0.87	0.520	0.079	---	0.44
174	14.50	0.87	0.520	0.078	---	0.44
175	14.58	0.87	0.520	0.078	---	0.44
176	14.67	0.87	0.520	0.077	---	0.44
177	14.75	0.87	0.520	0.077	---	0.44
178	14.83	0.83	0.500	0.077	---	0.42
179	14.92	0.83	0.500	0.076	---	0.42
180	15.00	0.83	0.500	0.076	---	0.42
181	15.08	0.80	0.480	0.075	---	0.40
182	15.17	0.80	0.480	0.075	---	0.40
183	15.25	0.80	0.480	0.075	---	0.41
184	15.33	0.77	0.460	0.074	---	0.39
185	15.42	0.77	0.460	0.074	---	0.39
186	15.50	0.77	0.460	0.073	---	0.39
187	15.58	0.63	0.380	0.073	---	0.31
188	15.67	0.63	0.380	0.073	---	0.31
189	15.75	0.63	0.380	0.072	---	0.31
190	15.83	0.63	0.380	0.072	---	0.31
191	15.92	0.63	0.380	0.072	---	0.31
192	16.00	0.63	0.380	0.071	---	0.31
193	16.08	0.13	0.080	0.071	---	0.01
194	16.17	0.13	0.080	0.071	---	0.01
195	16.25	0.13	0.080	0.070	---	0.01
196	16.33	0.13	0.080	0.070	---	0.01
197	16.42	0.13	0.080	0.069	---	0.01
198	16.50	0.13	0.080	0.069	---	0.01
199	16.58	0.10	0.060	0.069	0.011	0.05
200	16.67	0.10	0.060	0.068	0.011	0.05
201	16.75	0.10	0.060	0.068	0.011	0.05
202	16.83	0.10	0.060	0.068	0.011	0.05
203	16.92	0.10	0.060	0.067	0.011	0.05
204	17.00	0.10	0.060	0.067	0.011	0.05

205	17.08	0.17	0.100	0.067	---	0.03
206	17.17	0.17	0.100	0.066	---	0.03
207	17.25	0.17	0.100	0.066	---	0.03
208	17.33	0.17	0.100	0.066	---	0.03
209	17.42	0.17	0.100	0.065	---	0.03
210	17.50	0.17	0.100	0.065	---	0.03
211	17.58	0.17	0.100	0.065	---	0.04
212	17.67	0.17	0.100	0.064	---	0.04
213	17.75	0.17	0.100	0.064	---	0.04
214	17.83	0.13	0.080	0.064	---	0.02
215	17.92	0.13	0.080	0.063	---	0.02
216	18.00	0.13	0.080	0.063	---	0.02
217	18.08	0.13	0.080	0.063	---	0.02
218	18.17	0.13	0.080	0.063	---	0.02
219	18.25	0.13	0.080	0.062	---	0.02
220	18.33	0.13	0.080	0.062	---	0.02
221	18.42	0.13	0.080	0.062	---	0.02
222	18.50	0.13	0.080	0.061	---	0.02
223	18.58	0.10	0.060	0.061	0.011	0.05
224	18.67	0.10	0.060	0.061	0.011	0.05
225	18.75	0.10	0.060	0.060	0.011	0.05
226	18.83	0.07	0.040	0.060	0.007	0.03
227	18.92	0.07	0.040	0.060	0.007	0.03
228	19.00	0.07	0.040	0.060	0.007	0.03
229	19.08	0.10	0.060	0.059	---	0.00
230	19.17	0.10	0.060	0.059	---	0.00
231	19.25	0.10	0.060	0.059	---	0.00
232	19.33	0.13	0.080	0.058	---	0.02
233	19.42	0.13	0.080	0.058	---	0.02
234	19.50	0.13	0.080	0.058	---	0.02
235	19.58	0.10	0.060	0.058	---	0.00
236	19.67	0.10	0.060	0.057	---	0.00
237	19.75	0.10	0.060	0.057	---	0.00
238	19.83	0.07	0.040	0.057	0.007	0.03
239	19.92	0.07	0.040	0.057	0.007	0.03
240	20.00	0.07	0.040	0.056	0.007	0.03
241	20.08	0.10	0.060	0.056	---	0.00
242	20.17	0.10	0.060	0.056	---	0.00
243	20.25	0.10	0.060	0.056	---	0.00
244	20.33	0.10	0.060	0.055	---	0.00
245	20.42	0.10	0.060	0.055	---	0.00
246	20.50	0.10	0.060	0.055	---	0.01
247	20.58	0.10	0.060	0.055	---	0.01
248	20.67	0.10	0.060	0.054	---	0.01
249	20.75	0.10	0.060	0.054	---	0.01
250	20.83	0.07	0.040	0.054	0.007	0.03
251	20.92	0.07	0.040	0.054	0.007	0.03
252	21.00	0.07	0.040	0.054	0.007	0.03
253	21.08	0.10	0.060	0.053	---	0.01
254	21.17	0.10	0.060	0.053	---	0.01
255	21.25	0.10	0.060	0.053	---	0.01
256	21.33	0.07	0.040	0.053	0.007	0.03
257	21.42	0.07	0.040	0.053	0.007	0.03
258	21.50	0.07	0.040	0.052	0.007	0.03
259	21.58	0.10	0.060	0.052	---	0.01
260	21.67	0.10	0.060	0.052	---	0.01
261	21.75	0.10	0.060	0.052	---	0.01
262	21.83	0.07	0.040	0.052	0.007	0.03
263	21.92	0.07	0.040	0.051	0.007	0.03
264	22.00	0.07	0.040	0.051	0.007	0.03
265	22.08	0.10	0.060	0.051	---	0.01
266	22.17	0.10	0.060	0.051	---	0.01
267	22.25	0.10	0.060	0.051	---	0.01

268	22.33	0.07	0.040	0.051	0.007	0.03
269	22.42	0.07	0.040	0.050	0.007	0.03
270	22.50	0.07	0.040	0.050	0.007	0.03
271	22.58	0.07	0.040	0.050	0.007	0.03
272	22.67	0.07	0.040	0.050	0.007	0.03
273	22.75	0.07	0.040	0.050	0.007	0.03
274	22.83	0.07	0.040	0.050	0.007	0.03
275	22.92	0.07	0.040	0.050	0.007	0.03
276	23.00	0.07	0.040	0.049	0.007	0.03
277	23.08	0.07	0.040	0.049	0.007	0.03
278	23.17	0.07	0.040	0.049	0.007	0.03
279	23.25	0.07	0.040	0.049	0.007	0.03
280	23.33	0.07	0.040	0.049	0.007	0.03
281	23.42	0.07	0.040	0.049	0.007	0.03
282	23.50	0.07	0.040	0.049	0.007	0.03
283	23.58	0.07	0.040	0.049	0.007	0.03
284	23.67	0.07	0.040	0.049	0.007	0.03
285	23.75	0.07	0.040	0.049	0.007	0.03
286	23.83	0.07	0.040	0.049	0.007	0.03
287	23.92	0.07	0.040	0.049	0.007	0.03
288	24.00	0.07	0.040	0.049	0.007	0.03
Sum =	100.0				Sum =	41.7

Flood volume = Effective rainfall 3.47 (In)  
times area 19.6(Ac.)/[ (In)/(Ft.) ] = 5.7(Ac.Ft)  
Total soil loss = 1.53(In)  
Total soil loss = 2.500(Ac.Ft)  
Total rainfall = 5.00(In)  
Flood volume = 247383.2 Cubic Feet  
Total soil loss = 108887.7 Cubic Feet

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Peak flow rate of this hydrograph = 11.310(CFS)  
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24 - H O U R S T O R M  
R u n o f f H y d r o g r a p h

-----  
Hydrograph in 5 Minute intervals ((CFS))  
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Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0002	0.03	Q				
0+10	0.0013	0.15	Q				
0+15	0.0036	0.33	Q				
0+20	0.0067	0.46	Q				
0+25	0.0107	0.57	VQ				
0+30	0.0154	0.70	VQ				
0+35	0.0208	0.77	VQ				
0+40	0.0264	0.82	VQ				
0+45	0.0323	0.85	VQ				
0+50	0.0384	0.89	VQ				
0+55	0.0451	0.97	VQ				
1+ 0	0.0526	1.08	V Q				
1+ 5	0.0604	1.13	V Q				
1+10	0.0680	1.10	V Q				
1+15	0.0751	1.04	V Q				
1+20	0.0821	1.01	V Q				
1+25	0.0889	1.00	VQ				
1+30	0.0958	0.99	VQ				
1+35	0.1026	0.99	VQ				
1+40	0.1094	0.99	VQ				
1+45	0.1162	0.99	VQ				
1+50	0.1231	1.00	V Q				

1+55	0.1304	1.06	V Q
2+ 0	0.1383	1.15	V Q
2+ 5	0.1466	1.20	VQ
2+10	0.1550	1.23	VQ
2+15	0.1636	1.24	VQ
2+20	0.1722	1.25	VQ
2+25	0.1809	1.26	VQ
2+30	0.1897	1.27	VQ
2+35	0.1986	1.29	VQ
2+40	0.2079	1.36	VQ
2+45	0.2179	1.45	VQ
2+50	0.2283	1.51	V Q
2+55	0.2389	1.54	V Q
3+ 0	0.2496	1.56	V Q
3+ 5	0.2604	1.57	V Q
3+10	0.2713	1.58	V Q
3+15	0.2822	1.59	V Q
3+20	0.2932	1.60	VQ
3+25	0.3043	1.60	VQ
3+30	0.3153	1.61	VQ
3+35	0.3264	1.61	VQ
3+40	0.3375	1.61	VQ
3+45	0.3487	1.62	VQ
3+50	0.3599	1.63	VQ
3+55	0.3716	1.70	VQ
4+ 0	0.3839	1.79	VQ
4+ 5	0.3966	1.84	VQ
4+10	0.4095	1.87	VQ
4+15	0.4225	1.89	VQ
4+20	0.4349	1.81	Q
4+25	0.4449	1.45	QV
4+30	0.4513	0.92	Q V
4+35	0.4555	0.61	Q V
4+40	0.4587	0.47	Q V
4+45	0.4613	0.38	Q V
4+50	0.4636	0.33	Q V
4+55	0.4661	0.36	Q V
5+ 0	0.4691	0.44	Q V
5+ 5	0.4729	0.55	Q V
5+10	0.4787	0.84	Q V
5+15	0.4872	1.24	QV
5+20	0.4969	1.40	QV
5+25	0.5049	1.17	QV
5+30	0.5101	0.75	Q V
5+35	0.5138	0.53	Q V
5+40	0.5173	0.51	Q V
5+45	0.5211	0.56	Q V
5+50	0.5252	0.59	Q V
5+55	0.5294	0.60	Q V
6+ 0	0.5336	0.61	Q V
6+ 5	0.5380	0.64	Q V
6+10	0.5430	0.73	Q V
6+15	0.5488	0.84	Q V
6+20	0.5551	0.92	Q V
6+25	0.5617	0.96	Q V
6+30	0.5685	0.99	Q V
6+35	0.5757	1.03	Q V
6+40	0.5835	1.13	Q V
6+45	0.5921	1.26	Q V
6+50	0.6013	1.34	Q V
6+55	0.6109	1.38	Q V
7+ 0	0.6206	1.42	Q V
7+ 5	0.6307	1.45	Q V

7+10	0.6409	1.48	Q V			
7+15	0.6512	1.50	QV			
7+20	0.6618	1.54	QV			
7+25	0.6731	1.64	QV			
7+30	0.6852	1.76	QV			
7+35	0.6981	1.86	QV			
7+40	0.7118	1.99	Q V			
7+45	0.7265	2.13	QV			
7+50	0.7419	2.24	QV			
7+55	0.7583	2.38	QV			
8+ 0	0.7757	2.53	Q			
8+ 5	0.7941	2.67	Q			
8+10	0.8139	2.88	Q			
8+15	0.8355	3.14	VQ			
8+20	0.8583	3.31	Q			
8+25	0.8818	3.41	Q			
8+30	0.9058	3.48	Q			
8+35	0.9302	3.55	VQ			
8+40	0.9555	3.67	VQ			
8+45	0.9818	3.82	VQ			
8+50	1.0089	3.94	Q			
8+55	1.0370	4.07	VQ			
9+ 0	1.0661	4.23	VQ			
9+ 5	1.0962	4.37	VQ			
9+10	1.1277	4.58	V Q			
9+15	1.1611	4.85	VQ			
9+20	1.1959	5.04	V Q			
9+25	1.2318	5.21	V Q			
9+30	1.2689	5.39	V Q			
9+35	1.3070	5.53	V Q			
9+40	1.3461	5.68	V Q			
9+45	1.3864	5.85	V Q			
9+50	1.4276	5.98	VQ			
9+55	1.4698	6.13	V Q			
10+ 0	1.5131	6.29	V Q			
10+ 5	1.5563	6.27	V Q			
10+10	1.5964	5.81	Q			
10+15	1.6315	5.10	QV			
10+20	1.6637	4.68	Q V			
10+25	1.6947	4.49	Q  V			
10+30	1.7248	4.38	Q  V			
10+35	1.7551	4.39	Q  V			
10+40	1.7875	4.71	Q  V			
10+45	1.8234	5.21	Q V			
10+50	1.8613	5.50	Q V			
10+55	1.9001	5.64	Q V			
11+ 0	1.9395	5.72	Q V			
11+ 5	1.9792	5.77	Q V			
11+10	2.0188	5.74	Q V			
11+15	2.0578	5.67	Q V			
11+20	2.0966	5.63	Q V			
11+25	2.1353	5.63	Q V			
11+30	2.1741	5.63	Q V			
11+35	2.2126	5.60	Q V			
11+40	2.2501	5.45	Q V			
11+45	2.2863	5.25	Q V			
11+50	2.3217	5.15	Q V			
11+55	2.3573	5.17	Q V			
12+ 0	2.3935	5.25	Q V			
12+ 5	2.4309	5.43	Q V			
12+10	2.4720	5.98	Q V			
12+15	2.5185	6.75	Q V			
12+20	2.5684	7.24	Q V			

12+25	2.6203	7.55			Q	V			
12+30	2.6741	7.81			Q	V			
12+35	2.7294	8.02			Q	V			
12+40	2.7865	8.30			Q	V			
12+45	2.8458	8.61			Q	V			
12+50	2.9066	8.83			Q	V			
12+55	2.9688	9.03			Q	V			
13+ 0	3.0325	9.24			Q	V			
13+ 5	3.0977	9.47			Q	V			
13+10	3.1662	9.95			Q	V			
13+15	3.2390	10.57			Q	V			
13+20	3.3144	10.96			Q	V			
13+25	3.3913	11.16			Q	V			
13+30	3.4692	11.31			Q	V			
13+35	3.5465	11.22			Q	V			
13+40	3.6187	10.48			Q	V			
13+45	3.6830	9.35			Q	V			
13+50	3.7428	8.68			Q	V			
13+55	3.8004	8.37			Q	V			
14+ 0	3.8568	8.18			Q	V			
14+ 5	3.9127	8.12			Q	V			
14+10	3.9700	8.32			Q	V			
14+15	4.0298	8.68			Q	V			
14+20	4.0909	8.87			Q	V			
14+25	4.1520	8.87			Q	V			
14+30	4.2126	8.81			Q	V			
14+35	4.2731	8.77			Q	V			
14+40	4.3334	8.77			Q	V			
14+45	4.3938	8.76			Q	V			
14+50	4.4539	8.74			Q	V			
14+55	4.5136	8.66			Q	V			
15+ 0	4.5725	8.55			Q	V			
15+ 5	4.6308	8.47			Q	V			
15+10	4.6884	8.36			Q	V			
15+15	4.7452	8.25			Q	V			
15+20	4.8014	8.16			Q	V			
15+25	4.8568	8.05			Q	V			
15+30	4.9114	7.92			Q	V			
15+35	4.9649	7.77			Q	V			
15+40	5.0161	7.43			Q	V			
15+45	5.0640	6.96			Q	V			
15+50	5.1100	6.68			Q	V			
15+55	5.1551	6.54			Q	V			
16+ 0	5.1994	6.44			Q	V			
16+ 5	5.2415	6.10			Q	V			
16+10	5.2753	4.91		Q					V
16+15	5.2975	3.23		Q					V
16+20	5.3128	2.22		Q					V
16+25	5.3246	1.71		Q					V
16+30	5.3341	1.38		Q					V
16+35	5.3422	1.17		Q					V
16+40	5.3500	1.13		Q					V
16+45	5.3582	1.19		Q					V
16+50	5.3664	1.20		Q					V
16+55	5.3744	1.17		Q					V
17+ 0	5.3822	1.13		Q					V
17+ 5	5.3896	1.07		Q					V
17+10	5.3963	0.98		Q					V
17+15	5.4023	0.87		Q					V
17+20	5.4078	0.80		Q					V
17+25	5.4130	0.76		Q					V
17+30	5.4181	0.74		Q					V
17+35	5.4230	0.71		Q					V

17+40	5.4279	0.70	Q	V
17+45	5.4327	0.70	Q	V
17+50	5.4374	0.69	Q	V
17+55	5.4417	0.62	Q	V
18+ 0	5.4452	0.51	Q	V
18+ 5	5.4484	0.45	Q	V
18+10	5.4513	0.43	Q	V
18+15	5.4542	0.41	Q	V
18+20	5.4569	0.40	Q	V
18+25	5.4596	0.39	Q	V
18+30	5.4623	0.39	Q	V
18+35	5.4651	0.41	Q	V
18+40	5.4687	0.53	Q	V
18+45	5.4735	0.69	Q	V
18+50	5.4788	0.77	Q	V
18+55	5.4841	0.76	Q	V
19+ 0	5.4889	0.70	Q	V
19+ 5	5.4933	0.64	Q	V
19+10	5.4968	0.51	Q	V
19+15	5.4990	0.33	Q	V
19+20	5.5007	0.24	Q	V
19+25	5.5025	0.27	Q	V
19+30	5.5049	0.35	Q	V
19+35	5.5075	0.38	Q	V
19+40	5.5097	0.32	Q	V
19+45	5.5113	0.22	Q	V
19+50	5.5126	0.19	Q	V
19+55	5.5145	0.28	Q	V
20+ 0	5.5174	0.42	Q	V
20+ 5	5.5207	0.48	Q	V
20+10	5.5236	0.41	Q	V
20+15	5.5255	0.28	Q	V
20+20	5.5269	0.20	Q	V
20+25	5.5280	0.17	Q	V
20+30	5.5291	0.15	Q	V
20+35	5.5300	0.14	Q	V
20+40	5.5310	0.13	Q	V
20+45	5.5319	0.13	Q	V
20+50	5.5329	0.15	Q	V
20+55	5.5347	0.26	Q	V
21+ 0	5.5374	0.40	Q	V
21+ 5	5.5406	0.46	Q	V
21+10	5.5434	0.40	Q	V
21+15	5.5454	0.29	Q	V
21+20	5.5471	0.25	Q	V
21+25	5.5494	0.32	Q	V
21+30	5.5524	0.45	Q	V
21+35	5.5559	0.50	Q	V
21+40	5.5589	0.44	Q	V
21+45	5.5611	0.32	Q	V
21+50	5.5630	0.28	Q	V
21+55	5.5654	0.35	Q	V
22+ 0	5.5687	0.47	Q	V
22+ 5	5.5722	0.51	Q	V
22+10	5.5753	0.45	Q	V
22+15	5.5777	0.34	Q	V
22+20	5.5798	0.30	Q	V
22+25	5.5823	0.37	Q	V
22+30	5.5856	0.48	Q	V
22+35	5.5894	0.54	Q	V
22+40	5.5933	0.57	Q	V
22+45	5.5974	0.59	Q	V
22+50	5.6015	0.60	Q	V

22+55	5.6058	0.61	Q			V
23+ 0	5.6100	0.62	Q			V
23+ 5	5.6143	0.63	Q			V
23+10	5.6187	0.63	Q			V
23+15	5.6230	0.63	Q			V
23+20	5.6274	0.64	Q			V
23+25	5.6318	0.64	Q			V
23+30	5.6363	0.64	Q			V
23+35	5.6407	0.64	Q			V
23+40	5.6451	0.64	Q			V
23+45	5.6496	0.65	Q			V
23+50	5.6540	0.65	Q			V
23+55	5.6585	0.65	Q			V
24+ 0	5.6630	0.65	Q			V
24+ 5	5.6672	0.62	Q			V
24+10	5.6706	0.49	Q			V
24+15	5.6728	0.32	Q			V
24+20	5.6742	0.21	Q			V
24+25	5.6753	0.16	Q			V
24+30	5.6762	0.12	Q			V
24+35	5.6768	0.10	Q			V
24+40	5.6773	0.08	Q			V
24+45	5.6778	0.06	Q			V
24+50	5.6781	0.05	Q			V
24+55	5.6784	0.04	Q			V
25+ 0	5.6786	0.03	Q			V
25+ 5	5.6787	0.02	Q			V
25+10	5.6789	0.02	Q			V
25+15	5.6790	0.01	Q			V
25+20	5.6790	0.01	Q			V
25+25	5.6791	0.01	Q			V
25+30	5.6791	0.00	Q			V
25+35	5.6791	0.00	Q			V

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# Appendix D

## Detention Routing Calculations

**Stage Storage Table**

								Harvill at Water Industrial	
#	Depth	Elevation	Area (sf)	Incremental Basin Volume (cf)	Total Volume (cf)	Storage Volume (acre-ft)	Outflow Q	Notes	
1	0.00	1,519.60	20,656	0	0.0	-	0.0	**Bottom of the rock	
2	0.25	1,519.85	20,656	2,066	2,066	0.05	0.0	Invert of 6" outlet pipe	
3	1.00	1,520.60	20,656	8,262	8,262	0.19	0.8		
4	2.00	1,521.60	20,656	6,197	14,459	0.33	1.3	**Top of the rock / Bottom of Eng. Media	
5	3.00	1,522.60	20,656	6,197	20,656	0.47	1.6		
6	3.40	1,523.00	20,656	2,479	23,135	0.53	1.7	**Top of Eng. Media / Bottom of Basin	
7	4.07	<b>1,523.67</b>	22,736	14,536	37,671	0.86	1.8	*Outlet TG @ 1523.67/ Basin WQMP Volume	
8	4.40	1,524.00	23,740	22,198	45,333	1.04	3.8		
9	5.40	1,525.00	26,990	25,365	70,698	1.62	5.4		
10	6.40	1,526.00	30,414	28,702	99,400	2.28	6.5		
11	7.40	1,527.00	34,144	32,279	131,679	3.02	7.4		
12	8.40	1,528.00	40,757	37,451	169,129	3.88	8.3	Top of the basin	

\*WQMP Design Capture Volume is **32,939 CF**

\*\*Rock = 40% voids, Eng. Media = 30% voids

System releases water after basin volume reaches to 37,671 CF

	Orifice Qout 6" pipe	Weir Qout 6" Pipe	Orifice Qout riser top 10" opening	Weir Qout riser top 10" opening	Total Qout from 6" Pipe and CMP 10" opening
<b>1519.60</b>	0.0	0.0	0.0	0.0	0.0
<b>1519.85</b>	0.0	0.0	0.0	0.0	0.0
<b>1520.60</b>	0.8	3.4	0.0	0.0	0.8
<b>1521.60</b>	1.3	12.0	0.0	0.0	1.3
<b>1522.60</b>	1.6	23.6	0.0	0.0	1.6
<b>1523.00</b>	1.7	29.0	0.0	0.0	1.7
<b>1523.50</b>	1.8	36.1	0.0	0.0	1.8
<b>1524.00</b>	1.9	43.8	1.9	4.3	3.8
<b>1525.00</b>	2.1	60.6	3.2	13.0	5.4
<b>1526.00</b>	2.3	79.0	4.2	21.6	6.5
<b>1527.00</b>	2.5	99.1	4.9	30.2	7.4
<b>1528.00</b>	2.7	120.5	5.6	38.9	8.3

Q out from bioretention basin

**Basin A Routing Summary Table**

2 YEAR STORM	1 Hour	3 Hour	6 Hour	24 Hour
Existing Q Out (CFS)	<b>6.3</b>	<b>3.1</b>	<b>2.2</b>	<b>0.5</b>
Max. Q Out (CFS) after Routing	<b>1.5</b>	<b>1.7</b>	<b>1.7</b>	<b>1.4</b>
WSE	<b>1522.3</b>	<b>1522.9</b>	<b>1523.3</b>	<b>1521.8</b>

5 YEAR STORM	1 Hour	3 Hour	6 Hour	24 Hour
Existing Q Out (CFS)	<b>10.8</b>	<b>6.3</b>	<b>4.8</b>	<b>0.6</b>
Max. Q Out (CFS) after	<b>1.7</b>	<b>1.8</b>	<b>2.0</b>	<b>1.8</b>
WSE	<b>1523.3</b>	<b>1523.6</b>	<b>1523.7</b>	<b>1523.5</b>

10 YEAR STORM	1 Hour	3 Hour	6 Hour	24 Hour
Existing Q Out (CFS) *	<b>18.5</b>	<b>12.3</b>	<b>10.7</b>	<b>3.4</b>
Max. Q Out (CFS) after	<b>2.4</b>	<b>4.1</b>	<b>4.3</b>	<b>4.0</b>
WSE	<b>1523.8</b>	<b>1524.2</b>	<b>1524.3</b>	<b>1524.2</b>

100 YEAR STORM	1 Hour	3 Hour	6 Hour	24 Hour
Existing Q Out (CFS) *	<b>32.7</b>	<b>21.7</b>	<b>19.1</b>	<b>8.0</b>
Max. Q Out (CFS) after	<b>5.0</b>	<b>5.9</b>	<b>6.2</b>	<b>6.3</b>
WSE	<b>1524.7</b>	<b>1525.5</b>	<b>1525.8</b>	<b>1525.8</b>

Note:

1. Peak discharge of 6.3 CFS occurs during the 100 year 24 hour event, which is less than the existing Q out 8.0 CFS.
2. WSE is 1525.8 for 100 year storm.
3. Some information may be rounded to the nearest tenth

\*From Unit Hydrograph Study for Existing Condition

\*\*From Routing Study

FLOOD HYDROGRAPH ROUTING PROGRAM  
 Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005  
 Study date: 04/24/23

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 Black Creek - Harvill at Water Industrial  
 Basin Routing Study - 1 Hour 2 Year Storm  
 3963ROUTING12  
 CB  
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Program License Serial Number 6145

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 \*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: 3963UNIHYDQ2P12.rte  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 32  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 12.144 (CFS)  
 Total volume = 0.549 (Ac.Ft)  
 Status of hydrographs being held in storage  
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5  
 Peak (CFS)          0.000    0.000    0.000    0.000    0.000  
 Vol (Ac.Ft)          0.000    0.000    0.000    0.000    0.000  
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 Process from Point/Station 1.000 to Point/Station 1.000  
 \*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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 User entry of depth-outflow-storage data

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 Total number of inflow hydrograph intervals = 32  
 Hydrograph time unit = 5.000 (Min.)  
 Initial depth in storage basin = 0.00 (Ft.)  
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 Initial basin depth = 0.00 (Ft.)  
 Initial basin storage = 0.00 (Ac.Ft)  
 Initial basin outflow = 0.00 (CFS)  
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 Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.250	0.050	0.001	0.050	0.050
1.000	0.190	0.800	0.187	0.193
2.000	0.330	1.300	0.326	0.334
3.000	0.470	1.600	0.464	0.476
3.400	0.530	1.700	0.524	0.536
4.070	0.860	1.800	0.854	0.866

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4.400	1.040	3.800	1.027	1.053
5.400	1.620	5.400	1.601	1.639
6.400	2.280	6.500	2.258	2.302
7.400	3.020	7.400	2.995	3.045
8.400	3.880	8.300	3.851	3.909

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

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)		3.0	6.07	9.11	12.14	Depth (Ft.)
0.083	0.08	0.00	0.000	O					0.00
0.167	0.43	0.00	0.002	O I					0.01
0.250	1.01	0.00	0.007	O I					0.04
0.333	1.54	0.00	0.016	O I					0.08
0.417	1.98	0.00	0.028	O I					0.14
0.500	2.43	0.00	0.043	O I					0.22
0.583	2.99	0.07	0.062	O I					0.31
0.667	3.70	0.19	0.084	O I					0.43
0.750	4.66	0.35	0.111	O I					0.57
0.833	6.86	0.56	0.147	O I					0.77
0.917	10.53	0.84	0.202	O I					1.09
1.000	12.14	1.10	0.274	O I					1.60
1.083	9.16	1.32	0.339	O I					2.06
1.167	5.70	1.41	0.380	O I					2.36
1.250	3.68	1.46	0.403	O I					2.52
1.333	2.60	1.48	0.414	O I					2.60
1.417	2.00	1.49	0.420	O I					2.64
1.500	1.57	1.50	0.422	O I					2.66
1.583	1.28	1.50	0.421	O I					2.65
1.667	1.03	1.49	0.419	O I					2.64
1.750	0.85	1.48	0.415	O I					2.61
1.833	0.74	1.47	0.411	O I					2.58
1.917	0.61	1.46	0.405	O I					2.54
2.000	0.51	1.45	0.399	O I					2.49
2.083	0.42	1.43	0.392	O I					2.45
2.167	0.34	1.42	0.385	O I					2.39
2.250	0.27	1.40	0.378	O I					2.34
2.333	0.23	1.38	0.370	O I					2.28
2.417	0.20	1.37	0.362	O I					2.23
2.500	0.16	1.35	0.354	O I					2.17
2.583	0.03	1.33	0.345	O I					2.11
2.667	0.01	1.31	0.336	O I					2.04
2.750	0.00	1.29	0.327	O I					1.98
2.833	0.00	1.26	0.318	O I					1.92
2.917	0.00	1.23	0.310	O I					1.86
3.000	0.00	1.20	0.301	O I					1.80
3.083	0.00	1.17	0.293	O I					1.74
3.167	0.00	1.14	0.285	O I					1.68
3.250	0.00	1.11	0.278	O I					1.63
3.333	0.00	1.09	0.270	O I					1.57
3.417	0.00	1.06	0.263	O I					1.52
3.500	0.00	1.03	0.255	O I					1.47
3.583	0.00	1.01	0.248	O I					1.42
3.667	0.00	0.98	0.241	O I					1.37
3.750	0.00	0.96	0.235	O I					1.32
3.833	0.00	0.94	0.228	O I					1.27
3.917	0.00	0.91	0.222	O I					1.23
4.000	0.00	0.89	0.216	O I					1.18
4.083	0.00	0.87	0.210	O I					1.14
4.167	0.00	0.85	0.204	O I					1.10

4.250	0.00	0.83	0.198	I O	1.06
4.333	0.00	0.81	0.192	I O	1.02
4.417	0.00	0.78	0.187	I O	0.98
4.500	0.00	0.75	0.182	IO	0.95
4.583	0.00	0.72	0.176	IO	0.93
4.667	0.00	0.69	0.172	IO	0.90
4.750	0.00	0.67	0.167	IO	0.88
4.833	0.00	0.64	0.162	IO	0.85
4.917	0.00	0.62	0.158	IO	0.83
5.000	0.00	0.59	0.154	IO	0.81
5.083	0.00	0.57	0.150	IO	0.78
5.167	0.00	0.55	0.146	IO	0.76
5.250	0.00	0.53	0.142	IO	0.74
5.333	0.00	0.51	0.139	IO	0.73
5.417	0.00	0.49	0.135	IO	0.71
5.500	0.00	0.47	0.132	IO	0.69
5.583	0.00	0.45	0.129	IO	0.67
5.667	0.00	0.43	0.126	IO	0.66
5.750	0.00	0.42	0.123	IO	0.64
5.833	0.00	0.40	0.120	IO	0.63
5.917	0.00	0.39	0.117	IO	0.61
6.000	0.00	0.37	0.115	O	0.60
6.083	0.00	0.36	0.112	O	0.58
6.167	0.00	0.34	0.110	O	0.57
6.250	0.00	0.33	0.108	O	0.56
6.333	0.00	0.32	0.105	O	0.55
6.417	0.00	0.30	0.103	O	0.53
6.500	0.00	0.29	0.101	O	0.52
6.583	0.00	0.28	0.099	O	0.51
6.667	0.00	0.27	0.097	O	0.50
6.750	0.00	0.26	0.095	O	0.49
6.833	0.00	0.25	0.094	O	0.48
6.917	0.00	0.24	0.092	O	0.47
7.000	0.00	0.23	0.090	O	0.47
7.083	0.00	0.22	0.089	O	0.46
7.167	0.00	0.21	0.087	O	0.45
7.250	0.00	0.21	0.086	O	0.44
7.333	0.00	0.20	0.084	O	0.43
7.417	0.00	0.19	0.083	O	0.43
7.500	0.00	0.18	0.082	O	0.42
7.583	0.00	0.18	0.081	O	0.41
7.667	0.00	0.17	0.079	O	0.41
7.750	0.00	0.16	0.078	O	0.40
7.833	0.00	0.16	0.077	O	0.40
7.917	0.00	0.15	0.076	O	0.39
8.000	0.00	0.14	0.075	O	0.38
8.083	0.00	0.14	0.074	O	0.38
8.167	0.00	0.13	0.073	O	0.37
8.250	0.00	0.13	0.072	O	0.37
8.333	0.00	0.12	0.071	O	0.36
8.417	0.00	0.12	0.071	O	0.36
8.500	0.00	0.11	0.070	O	0.36
8.583	0.00	0.11	0.069	O	0.35
8.667	0.00	0.11	0.068	O	0.35
8.750	0.00	0.10	0.068	O	0.34
8.833	0.00	0.10	0.067	O	0.34
8.917	0.00	0.09	0.066	O	0.34
9.000	0.00	0.09	0.066	O	0.33
9.083	0.00	0.09	0.065	O	0.33
9.167	0.00	0.08	0.064	O	0.33
9.250	0.00	0.08	0.064	O	0.32
9.333	0.00	0.08	0.063	O	0.32
9.417	0.00	0.07	0.063	O	0.32

9.500	0.00	0.07	0.062	0	0.32
9.583	0.00	0.07	0.062	0	0.31
9.667	0.00	0.07	0.061	0	0.31
9.750	0.00	0.06	0.061	0	0.31
9.833	0.00	0.06	0.060	0	0.31
9.917	0.00	0.06	0.060	0	0.30
10.000	0.00	0.06	0.060	0	0.30
10.083	0.00	0.05	0.059	0	0.30
10.167	0.00	0.05	0.059	0	0.30
10.250	0.00	0.05	0.059	0	0.30
10.333	0.00	0.05	0.058	0	0.29
10.417	0.00	0.05	0.058	0	0.29
10.500	0.00	0.04	0.058	0	0.29
10.583	0.00	0.04	0.057	0	0.29
10.667	0.00	0.04	0.057	0	0.29
10.750	0.00	0.04	0.057	0	0.29
10.833	0.00	0.04	0.056	0	0.28
10.917	0.00	0.04	0.056	0	0.28
11.000	0.00	0.04	0.056	0	0.28
11.083	0.00	0.03	0.056	0	0.28
11.167	0.00	0.03	0.055	0	0.28
11.250	0.00	0.03	0.055	0	0.28
11.333	0.00	0.03	0.055	0	0.28
11.417	0.00	0.03	0.055	0	0.28
11.500	0.00	0.03	0.055	0	0.28
11.583	0.00	0.03	0.054	0	0.27
11.667	0.00	0.03	0.054	0	0.27
11.750	0.00	0.02	0.054	0	0.27
11.833	0.00	0.02	0.054	0	0.27
11.917	0.00	0.02	0.054	0	0.27
12.000	0.00	0.02	0.054	0	0.27
12.083	0.00	0.02	0.054	0	0.27
12.167	0.00	0.02	0.053	0	0.27
12.250	0.00	0.02	0.053	0	0.27
12.333	0.00	0.02	0.053	0	0.27
12.417	0.00	0.02	0.053	0	0.27
12.500	0.00	0.02	0.053	0	0.27
12.583	0.00	0.02	0.053	0	0.26
12.667	0.00	0.02	0.053	0	0.26
12.750	0.00	0.02	0.053	0	0.26
12.833	0.00	0.01	0.052	0	0.26
12.917	0.00	0.01	0.052	0	0.26
13.000	0.00	0.01	0.052	0	0.26
13.083	0.00	0.01	0.052	0	0.26
13.167	0.00	0.01	0.052	0	0.26
13.250	0.00	0.01	0.052	0	0.26
13.333	0.00	0.01	0.052	0	0.26
13.417	0.00	0.01	0.052	0	0.26
13.500	0.00	0.01	0.052	0	0.26
13.583	0.00	0.01	0.052	0	0.26
13.667	0.00	0.01	0.052	0	0.26
13.750	0.00	0.01	0.052	0	0.26
13.833	0.00	0.01	0.051	0	0.26
13.917	0.00	0.01	0.051	0	0.26
14.000	0.00	0.01	0.051	0	0.26
14.083	0.00	0.01	0.051	0	0.26
14.167	0.00	0.01	0.051	0	0.26
14.250	0.00	0.01	0.051	0	0.26
14.333	0.00	0.01	0.051	0	0.26
14.417	0.00	0.01	0.051	0	0.26
14.500	0.00	0.01	0.051	0	0.26
14.583	0.00	0.01	0.051	0	0.26
14.667	0.00	0.01	0.051	0	0.25

14.750	0.00	0.01	0.051	0					0.25
14.833	0.00	0.01	0.051	0					0.25
14.917	0.00	0.01	0.051	0					0.25
15.000	0.00	0.01	0.051	0					0.25
15.083	0.00	0.01	0.051	0					0.25
15.167	0.00	0.00	0.051	0					0.25
15.250	0.00	0.00	0.051	0					0.25
15.333	0.00	0.00	0.051	0					0.25
15.417	0.00	0.00	0.051	0					0.25
15.500	0.00	0.00	0.051	0					0.25
15.583	0.00	0.00	0.051	0					0.25
15.667	0.00	0.00	0.051	0					0.25
15.750	0.00	0.00	0.050	0					0.25
15.833	0.00	0.00	0.050	0					0.25
15.917	0.00	0.00	0.050	0					0.25
16.000	0.00	0.00	0.050	0					0.25
16.083	0.00	0.00	0.050	0					0.25
16.167	0.00	0.00	0.050	0					0.25
16.250	0.00	0.00	0.050	0					0.25
16.333	0.00	0.00	0.050	0					0.25
16.417	0.00	0.00	0.050	0					0.25
16.500	0.00	0.00	0.050	0					0.25
16.583	0.00	0.00	0.050	0					0.25
16.667	0.00	0.00	0.050	0					0.25
16.750	0.00	0.00	0.050	0					0.25
16.833	0.00	0.00	0.050	0					0.25
16.917	0.00	0.00	0.050	0					0.25
17.000	0.00	0.00	0.050	0					0.25
17.083	0.00	0.00	0.050	0					0.25
17.167	0.00	0.00	0.050	0					0.25
17.250	0.00	0.00	0.050	0					0.25
17.333	0.00	0.00	0.050	0					0.25
17.417	0.00	0.00	0.050	0					0.25
17.500	0.00	0.00	0.050	0					0.25
17.583	0.00	0.00	0.050	0					0.25
17.667	0.00	0.00	0.050	0					0.25
17.750	0.00	0.00	0.050	0					0.25
17.833	0.00	0.00	0.050	0					0.25
17.917	0.00	0.00	0.050	0					0.25
18.000	0.00	0.00	0.050	0					0.25
18.083	0.00	0.00	0.050	0					0.25
18.167	0.00	0.00	0.050	0					0.25
18.250	0.00	0.00	0.050	0					0.25
18.333	0.00	0.00	0.050	0					0.25
18.417	0.00	0.00	0.050	0					0.25
18.500	0.00	0.00	0.050	0					0.25
18.583	0.00	0.00	0.050	0					0.25

Remaining water in basin = 0.05 (Ac.Ft)

\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
Number of intervals = 223  
Time interval = 5.0 (Min.)  
Maximum/Peak flow rate = 1.497 (CFS)  
Total volume = 0.499 (Ac.Ft)  
Status of hydrographs being held in storage  
Stream 1 Stream 2 Stream 3 Stream 4 Stream 5  
Peak (CFS) 0.000 0.000 0.000 0.000 0.000  
Vol (Ac.Ft) 0.000 0.000 0.000 0.000 0.000  
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FLOOD HYDROGRAPH ROUTING PROGRAM  
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 Study date: 04/24/23

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 BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
 BASIN ROUTING STUDY - 3 HOUR 2 YEAR STORM  
 3963ROUTING32  
 CB  
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Program License Serial Number 6145

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 \*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: 3963UNIHYDQ2P32.rte  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 56  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 8.828 (CFS)  
 Total volume = 0.713 (Ac.Ft)  
 Status of hydrographs being held in storage  
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5  
 Peak (CFS)          0.000    0.000    0.000    0.000    0.000  
 Vol (Ac.Ft)         0.000    0.000    0.000    0.000    0.000  
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 Process from Point/Station 1.000 to Point/Station 1.000  
 \*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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 User entry of depth-outflow-storage data

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 Total number of inflow hydrograph intervals = 56  
 Hydrograph time unit = 5.000 (Min.)  
 Initial depth in storage basin = 0.00 (Ft.)  
 -----

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

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 Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.250	0.050	0.001	0.050	0.050
1.000	0.190	0.800	0.187	0.193
2.000	0.330	1.300	0.326	0.334
3.000	0.470	1.600	0.464	0.476
3.400	0.530	1.700	0.524	0.536
4.070	0.860	1.800	0.854	0.866



4.400	1.040	3.800	1.027	1.053
5.400	1.620	5.400	1.601	1.639
6.400	2.280	6.500	2.258	2.302
7.400	3.020	7.400	2.995	3.045
8.400	3.880	8.300	3.851	3.909

-----  
Hydrograph Detention Basin Routing  
-----

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	2.2	4.41	6.62	8.83	Depth (Ft.)
0.083	0.08	0.00	0.000	O					0.00
0.167	0.43	0.00	0.002	O I					0.01
0.250	0.94	0.00	0.007	O I					0.03
0.333	1.19	0.00	0.014	O I					0.07
0.417	1.03	0.00	0.022	O I					0.11
0.500	0.72	0.00	0.028	O I					0.14
0.583	0.57	0.00	0.032	O I					0.16
0.667	0.56	0.00	0.036	O I					0.18
0.750	0.56	0.00	0.040	O I					0.20
0.833	0.60	0.00	0.044	O I					0.22
0.917	0.58	0.00	0.048	O I					0.24
1.000	0.50	0.01	0.052	O I					0.26
1.083	0.56	0.03	0.055	O I					0.28
1.167	0.78	0.05	0.059	O I					0.30
1.250	1.04	0.09	0.065	O I					0.33
1.333	1.19	0.13	0.072	O I					0.37
1.417	1.25	0.17	0.079	O I					0.41
1.500	1.40	0.21	0.087	O I					0.45
1.583	1.68	0.27	0.096	O I					0.50
1.667	1.86	0.32	0.106	O I					0.55
1.750	2.00	0.39	0.117	O I					0.61
1.833	2.30	0.45	0.129	O I					0.67
1.917	2.62	0.53	0.143	O I					0.75
2.000	2.73	0.61	0.157	O I					0.82
2.083	2.76	0.70	0.172	O I					0.90
2.167	2.92	0.78	0.186	O I					0.98
2.250	3.44	0.84	0.202	O I					1.09
2.333	4.20	0.92	0.223	O I					1.23
2.417	4.80	1.00	0.247	O I					1.41
2.500	5.65	1.11	0.276	O I					1.61
2.583	7.28	1.24	0.312	O I					1.87
2.667	8.71	1.36	0.358	O I					2.20
2.750	8.83	1.47	0.409	O I					2.56
2.833	7.16	1.56	0.454	O I					2.88
2.917	4.84	1.62	0.484	O I					3.09
3.000	3.35	1.65	0.501	O I					3.21
3.083	2.63	1.67	0.510	O I					3.27
3.167	2.11	1.67	0.515	O I					3.30
3.250	1.60	1.68	0.516	O I					3.31
3.333	1.22	1.67	0.514	O I					3.30
3.417	0.98	1.67	0.510	O I					3.27
3.500	0.80	1.66	0.505	O I					3.23
3.583	0.66	1.65	0.499	O I					3.19
3.667	0.55	1.64	0.491	O I					3.14
3.750	0.45	1.62	0.484	O I					3.09
3.833	0.37	1.61	0.475	O I					3.04
3.917	0.30	1.59	0.467	O I					2.98
4.000	0.24	1.57	0.458	O I					2.91
4.083	0.20	1.55	0.448	O I					2.85
4.167	0.15	1.53	0.439	O I					2.78

4.250	0.11	1.51	0.429	I	O	2.71
4.333	0.05	1.49	0.420	I	O	2.64
4.417	0.02	1.47	0.410	I	O	2.57
4.500	0.01	1.45	0.400	I	O	2.50
4.583	0.01	1.43	0.390	I	O	2.43
4.667	0.00	1.41	0.380	I	O	2.36
4.750	0.00	1.39	0.371	I	O	2.29
4.833	0.00	1.37	0.361	I	O	2.22
4.917	0.00	1.35	0.352	I	O	2.16
5.000	0.00	1.33	0.343	I	O	2.09
5.083	0.00	1.31	0.333	I	O	2.02
5.167	0.00	1.28	0.325	I	O	1.96
5.250	0.00	1.25	0.316	I	O	1.90
5.333	0.00	1.22	0.307	I	O	1.84
5.417	0.00	1.19	0.299	I	O	1.78
5.500	0.00	1.16	0.291	I	O	1.72
5.583	0.00	1.13	0.283	I	O	1.66
5.667	0.00	1.10	0.275	I	O	1.61
5.750	0.00	1.08	0.268	I	O	1.56
5.833	0.00	1.05	0.260	I	O	1.50
5.917	0.00	1.03	0.253	I	O	1.45
6.000	0.00	1.00	0.246	I	O	1.40
6.083	0.00	0.98	0.240	I	O	1.35
6.167	0.00	0.95	0.233	I	O	1.31
6.250	0.00	0.93	0.226	I	O	1.26
6.333	0.00	0.91	0.220	I	O	1.21
6.417	0.00	0.89	0.214	I	O	1.17
6.500	0.00	0.86	0.208	I	O	1.13
6.583	0.00	0.84	0.202	I	O	1.09
6.667	0.00	0.82	0.196	I	O	1.04
6.750	0.00	0.80	0.191	I	O	1.00
6.833	0.00	0.77	0.185	I	O	0.97
6.917	0.00	0.74	0.180	I	O	0.95
7.000	0.00	0.71	0.175	I	O	0.92
7.083	0.00	0.69	0.170	I	O	0.89
7.167	0.00	0.66	0.166	I	O	0.87
7.250	0.00	0.63	0.161	I	O	0.85
7.333	0.00	0.61	0.157	I	O	0.82
7.417	0.00	0.59	0.153	I	O	0.80
7.500	0.00	0.56	0.149	I	O	0.78
7.583	0.00	0.54	0.145	IO		0.76
7.667	0.00	0.52	0.141	IO		0.74
7.750	0.00	0.50	0.138	IO		0.72
7.833	0.00	0.48	0.134	IO		0.70
7.917	0.00	0.46	0.131	IO		0.68
8.000	0.00	0.45	0.128	IO		0.67
8.083	0.00	0.43	0.125	IO		0.65
8.167	0.00	0.41	0.122	IO		0.64
8.250	0.00	0.40	0.119	IO		0.62
8.333	0.00	0.38	0.117	IO		0.61
8.417	0.00	0.37	0.114	IO		0.59
8.500	0.00	0.35	0.112	IO		0.58
8.583	0.00	0.34	0.109	IO		0.57
8.667	0.00	0.33	0.107	IO		0.55
8.750	0.00	0.31	0.105	IO		0.54
8.833	0.00	0.30	0.103	IO		0.53
8.917	0.00	0.29	0.101	IO		0.52
9.000	0.00	0.28	0.099	IO		0.51
9.083	0.00	0.27	0.097	O		0.50
9.167	0.00	0.26	0.095	O		0.49
9.250	0.00	0.25	0.093	O		0.48
9.333	0.00	0.24	0.091	O		0.47
9.417	0.00	0.23	0.090	O		0.46

9.500	0.00	0.22	0.088	0	0.46
9.583	0.00	0.21	0.087	0	0.45
9.667	0.00	0.20	0.085	0	0.44
9.750	0.00	0.20	0.084	0	0.43
9.833	0.00	0.19	0.083	0	0.43
9.917	0.00	0.18	0.081	0	0.42
10.000	0.00	0.17	0.080	0	0.41
10.083	0.00	0.17	0.079	0	0.41
10.167	0.00	0.16	0.078	0	0.40
10.250	0.00	0.15	0.077	0	0.39
10.333	0.00	0.15	0.076	0	0.39
10.417	0.00	0.14	0.075	0	0.38
10.500	0.00	0.14	0.074	0	0.38
10.583	0.00	0.13	0.073	0	0.37
10.667	0.00	0.13	0.072	0	0.37
10.750	0.00	0.12	0.071	0	0.36
10.833	0.00	0.12	0.070	0	0.36
10.917	0.00	0.11	0.070	0	0.35
11.000	0.00	0.11	0.069	0	0.35
11.083	0.00	0.10	0.068	0	0.35
11.167	0.00	0.10	0.067	0	0.34
11.250	0.00	0.10	0.067	0	0.34
11.333	0.00	0.09	0.066	0	0.34
11.417	0.00	0.09	0.065	0	0.33
11.500	0.00	0.09	0.065	0	0.33
11.583	0.00	0.08	0.064	0	0.33
11.667	0.00	0.08	0.064	0	0.32
11.750	0.00	0.08	0.063	0	0.32
11.833	0.00	0.07	0.063	0	0.32
11.917	0.00	0.07	0.062	0	0.32
12.000	0.00	0.07	0.062	0	0.31
12.083	0.00	0.06	0.061	0	0.31
12.167	0.00	0.06	0.061	0	0.31
12.250	0.00	0.06	0.060	0	0.31
12.333	0.00	0.06	0.060	0	0.30
12.417	0.00	0.06	0.060	0	0.30
12.500	0.00	0.05	0.059	0	0.30
12.583	0.00	0.05	0.059	0	0.30
12.667	0.00	0.05	0.058	0	0.30
12.750	0.00	0.05	0.058	0	0.29
12.833	0.00	0.05	0.058	0	0.29
12.917	0.00	0.04	0.058	0	0.29
13.000	0.00	0.04	0.057	0	0.29
13.083	0.00	0.04	0.057	0	0.29
13.167	0.00	0.04	0.057	0	0.29
13.250	0.00	0.04	0.056	0	0.28
13.333	0.00	0.04	0.056	0	0.28
13.417	0.00	0.03	0.056	0	0.28
13.500	0.00	0.03	0.056	0	0.28
13.583	0.00	0.03	0.055	0	0.28
13.667	0.00	0.03	0.055	0	0.28
13.750	0.00	0.03	0.055	0	0.28
13.833	0.00	0.03	0.055	0	0.28
13.917	0.00	0.03	0.055	0	0.27
14.000	0.00	0.03	0.054	0	0.27
14.083	0.00	0.03	0.054	0	0.27
14.167	0.00	0.02	0.054	0	0.27
14.250	0.00	0.02	0.054	0	0.27
14.333	0.00	0.02	0.054	0	0.27
14.417	0.00	0.02	0.054	0	0.27
14.500	0.00	0.02	0.053	0	0.27
14.583	0.00	0.02	0.053	0	0.27
14.667	0.00	0.02	0.053	0	0.27

14.750	0.00	0.02	0.053	0	0.27
14.833	0.00	0.02	0.053	0	0.27
14.917	0.00	0.02	0.053	0	0.27
15.000	0.00	0.02	0.053	0	0.26
15.083	0.00	0.02	0.053	0	0.26
15.167	0.00	0.02	0.052	0	0.26
15.250	0.00	0.01	0.052	0	0.26
15.333	0.00	0.01	0.052	0	0.26
15.417	0.00	0.01	0.052	0	0.26
15.500	0.00	0.01	0.052	0	0.26
15.583	0.00	0.01	0.052	0	0.26
15.667	0.00	0.01	0.052	0	0.26
15.750	0.00	0.01	0.052	0	0.26
15.833	0.00	0.01	0.052	0	0.26
15.917	0.00	0.01	0.052	0	0.26
16.000	0.00	0.01	0.052	0	0.26
16.083	0.00	0.01	0.052	0	0.26
16.167	0.00	0.01	0.051	0	0.26
16.250	0.00	0.01	0.051	0	0.26
16.333	0.00	0.01	0.051	0	0.26
16.417	0.00	0.01	0.051	0	0.26
16.500	0.00	0.01	0.051	0	0.26
16.583	0.00	0.01	0.051	0	0.26
16.667	0.00	0.01	0.051	0	0.26
16.750	0.00	0.01	0.051	0	0.26
16.833	0.00	0.01	0.051	0	0.26
16.917	0.00	0.01	0.051	0	0.26
17.000	0.00	0.01	0.051	0	0.26
17.083	0.00	0.01	0.051	0	0.25
17.167	0.00	0.01	0.051	0	0.25
17.250	0.00	0.01	0.051	0	0.25
17.333	0.00	0.01	0.051	0	0.25
17.417	0.00	0.01	0.051	0	0.25
17.500	0.00	0.01	0.051	0	0.25
17.583	0.00	0.00	0.051	0	0.25
17.667	0.00	0.00	0.051	0	0.25
17.750	0.00	0.00	0.051	0	0.25
17.833	0.00	0.00	0.051	0	0.25
17.917	0.00	0.00	0.051	0	0.25
18.000	0.00	0.00	0.051	0	0.25
18.083	0.00	0.00	0.050	0	0.25
18.167	0.00	0.00	0.050	0	0.25
18.250	0.00	0.00	0.050	0	0.25
18.333	0.00	0.00	0.050	0	0.25
18.417	0.00	0.00	0.050	0	0.25
18.500	0.00	0.00	0.050	0	0.25
18.583	0.00	0.00	0.050	0	0.25
18.667	0.00	0.00	0.050	0	0.25
18.750	0.00	0.00	0.050	0	0.25
18.833	0.00	0.00	0.050	0	0.25
18.917	0.00	0.00	0.050	0	0.25
19.000	0.00	0.00	0.050	0	0.25
19.083	0.00	0.00	0.050	0	0.25
19.167	0.00	0.00	0.050	0	0.25
19.250	0.00	0.00	0.050	0	0.25
19.333	0.00	0.00	0.050	0	0.25
19.417	0.00	0.00	0.050	0	0.25
19.500	0.00	0.00	0.050	0	0.25
19.583	0.00	0.00	0.050	0	0.25
19.667	0.00	0.00	0.050	0	0.25
19.750	0.00	0.00	0.050	0	0.25
19.833	0.00	0.00	0.050	0	0.25
19.917	0.00	0.00	0.050	0	0.25

20.000	0.00	0.00	0.050	0					0.25
20.083	0.00	0.00	0.050	0					0.25
20.167	0.00	0.00	0.050	0					0.25
20.250	0.00	0.00	0.050	0					0.25
20.333	0.00	0.00	0.050	0					0.25
20.417	0.00	0.00	0.050	0					0.25
20.500	0.00	0.00	0.050	0					0.25
20.583	0.00	0.00	0.050	0					0.25
20.667	0.00	0.00	0.050	0					0.25
20.750	0.00	0.00	0.050	0					0.25
20.833	0.00	0.00	0.050	0					0.25
20.917	0.00	0.00	0.050	0					0.25
21.000	0.00	0.00	0.050	0					0.25

Remaining water in basin = 0.05 (Ac.Ft)

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*****HYDROGRAPH DATA*****
      Number of intervals = 252
      Time interval = 5.0 (Min.)
      Maximum/Peak flow rate = 1.677 (CFS)
      Total volume = 0.663 (Ac.Ft)
      Status of hydrographs being held in storage
      Stream 1 Stream 2 Stream 3 Stream 4 Stream 5
      Peak (CFS) 0.000 0.000 0.000 0.000 0.000
      Vol (Ac.Ft) 0.000 0.000 0.000 0.000 0.000
*****

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FLOOD HYDROGRAPH ROUTING PROGRAM  
 Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005  
 Study date: 04/24/23

-----  
 Black Creek - Harvill at Water Industrial  
 Basin Routing Study - 6 Hour 2 Year Study  
 3963Routing62  
 CB  
 -----

Program License Serial Number 6145

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 \*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: 3963UNIHYDQ2P62.rte  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 92  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 7.937 (CFS)  
 Total volume = 1.146 (Ac.Ft)  
 Status of hydrographs being held in storage  
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5  
 Peak (CFS)      0.000   0.000   0.000   0.000   0.000  
 Vol (Ac.Ft)     0.000   0.000   0.000   0.000   0.000  
 \*\*\*\*\*

+++++  
 Process from Point/Station 1.000 to Point/Station 1.000  
 \*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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 User entry of depth-outflow-storage data

-----  
 Total number of inflow hydrograph intervals = 92  
 Hydrograph time unit = 5.000 (Min.)  
 Initial depth in storage basin = 0.00 (Ft.)  
 -----

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

-----  
 Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.250	0.050	0.001	0.050	0.050
1.000	0.190	0.800	0.187	0.193
2.000	0.330	1.300	0.326	0.334
3.000	0.470	1.600	0.464	0.476
3.400	0.530	1.700	0.524	0.536
4.070	0.860	1.800	0.854	0.866

4.400	1.040	3.800	1.027	1.053
5.400	1.620	5.400	1.601	1.639
6.400	2.280	6.500	2.258	2.302
7.400	3.020	7.400	2.995	3.045
8.400	3.880	8.300	3.851	3.909

-----  
Hydrograph Detention Basin Routing  
-----

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)					Depth (Ft.)
			.0	2.0	3.97	5.95	7.94	
0.083	0.04	0.00	0.000	O				0.00
0.167	0.23	0.00	0.001	O				0.01
0.250	0.55	0.00	0.004	O	I			0.02
0.333	0.80	0.00	0.008	O	I			0.04
0.417	0.93	0.00	0.014	O	I			0.07
0.500	1.02	0.00	0.021	O	I			0.11
0.583	1.11	0.00	0.028	O	I			0.14
0.667	1.21	0.00	0.036	O	I			0.18
0.750	1.28	0.00	0.045	O	I			0.23
0.833	1.33	0.02	0.054	O	I			0.27
0.917	1.36	0.07	0.063	O	I			0.32
1.000	1.40	0.12	0.072	O	I			0.37
1.083	1.45	0.17	0.080	O	I			0.41
1.167	1.53	0.23	0.089	O	I			0.46
1.250	1.58	0.28	0.098	O	I			0.51
1.333	1.61	0.33	0.107	O	I			0.56
1.417	1.64	0.38	0.116	O	I			0.60
1.500	1.65	0.43	0.125	O	I			0.65
1.583	1.67	0.47	0.133	O	I			0.69
1.667	1.68	0.52	0.141	O	I			0.74
1.750	1.69	0.56	0.149	O	I			0.78
1.833	1.70	0.61	0.156	O	I			0.82
1.917	1.70	0.65	0.164	O	I			0.86
2.000	1.71	0.69	0.171	O	I			0.90
2.083	1.74	0.73	0.178	O	I			0.94
2.167	1.77	0.77	0.185	O	I			0.97
2.250	1.79	0.81	0.192	O	I			1.01
2.333	1.83	0.83	0.199	O	I			1.06
2.417	1.86	0.86	0.205	O	I			1.11
2.500	1.88	0.88	0.212	O	I			1.16
2.583	1.89	0.90	0.219	O	I			1.21
2.667	1.90	0.93	0.226	O	I			1.26
2.750	1.91	0.95	0.233	O	I			1.30
2.833	1.95	0.98	0.239	O	I			1.35
2.917	2.01	1.00	0.246	O	I			1.40
3.000	2.05	1.03	0.253	O	I			1.45
3.083	2.08	1.05	0.260	O	I			1.50
3.167	2.01	1.07	0.267	O	I			1.55
3.250	1.70	1.09	0.272	O	I			1.59
3.333	1.20	1.10	0.275	O				1.60
3.417	0.87	1.10	0.274	IO				1.60
3.500	0.76	1.09	0.272	IO				1.59
3.583	0.78	1.09	0.270	IO				1.57
3.667	0.87	1.08	0.268	IO				1.56
3.750	0.96	1.08	0.267	IO				1.55
3.833	1.04	1.07	0.267	O				1.55
3.917	1.13	1.07	0.267	O				1.55
4.000	1.23	1.08	0.268	O				1.55
4.083	1.33	1.08	0.269	OI				1.56
4.167	1.45	1.09	0.271	OI				1.58

4.250	1.60	1.10	0.274	O	I					1.60
4.333	1.79	1.11	0.278	O	I					1.63
4.417	2.00	1.13	0.283	O	I					1.67
4.500	2.21	1.16	0.290	O	I					1.71
4.583	2.40	1.19	0.298	O	I					1.77
4.667	2.56	1.22	0.307	O	I					1.83
4.750	2.75	1.25	0.316	O	I					1.90
4.833	2.96	1.29	0.327	O	I					1.98
4.917	3.15	1.32	0.339	O	I					2.07
5.000	3.33	1.35	0.353	O	I					2.16
5.083	3.57	1.38	0.367	O	I					2.26
5.167	4.02	1.41	0.383	O	I					2.38
5.250	4.73	1.46	0.404	O	I					2.53
5.333	5.54	1.51	0.429	O	I					2.71
5.417	6.34	1.58	0.459	O	I					2.92
5.500	7.23	1.64	0.495	O	I					3.16
5.583	7.94	1.70	0.535	O	I					3.41
5.667	7.37	1.71	0.576	O	I					3.49
5.750	5.48	1.72	0.609	O	I					3.56
5.833	3.93	1.73	0.629	O	I					3.60
5.917	3.07	1.73	0.641	O	I					3.63
6.000	2.47	1.74	0.649	O	I					3.64
6.083	1.97	1.74	0.652	O	I					3.65
6.167	1.53	1.74	0.652	O	IO					3.65
6.250	1.17	1.74	0.649	I	O					3.64
6.333	0.91	1.73	0.644	I	O					3.63
6.417	0.74	1.73	0.638	I	O					3.62
6.500	0.61	1.73	0.631	I	O					3.60
6.583	0.50	1.73	0.623	I	O					3.59
6.667	0.41	1.73	0.614	I	O					3.57
6.750	0.34	1.72	0.605	I	O					3.55
6.833	0.27	1.72	0.595	I	O					3.53
6.917	0.21	1.72	0.585	I	O					3.51
7.000	0.17	1.71	0.574	I	O					3.49
7.083	0.13	1.71	0.564	I	O					3.47
7.167	0.09	1.71	0.553	I	O					3.45
7.250	0.03	1.70	0.541	I	O					3.42
7.333	0.02	1.70	0.530	I	O					3.40
7.417	0.01	1.68	0.518	I	O					3.32
7.500	0.01	1.66	0.507	I	O					3.25
7.583	0.00	1.64	0.495	I	O					3.17
7.667	0.00	1.62	0.484	I	O					3.10
7.750	0.00	1.61	0.473	I	O					3.02
7.833	0.00	1.58	0.462	I	O					2.94
7.917	0.00	1.56	0.451	I	O					2.87
8.000	0.00	1.54	0.441	I	O					2.79
8.083	0.00	1.51	0.430	I	O					2.72
8.167	0.00	1.49	0.420	I	O					2.64
8.250	0.00	1.47	0.410	I	O					2.57
8.333	0.00	1.45	0.400	I	O					2.50
8.417	0.00	1.43	0.390	I	O					2.43
8.500	0.00	1.41	0.380	I	O					2.36
8.583	0.00	1.39	0.370	I	O					2.29
8.667	0.00	1.37	0.361	I	O					2.22
8.750	0.00	1.35	0.351	I	O					2.15
8.833	0.00	1.33	0.342	I	O					2.09
8.917	0.00	1.31	0.333	I	O					2.02
9.000	0.00	1.28	0.324	I	O					1.96
9.083	0.00	1.25	0.316	I	O					1.90
9.167	0.00	1.22	0.307	I	O					1.84
9.250	0.00	1.19	0.299	I	O					1.78
9.333	0.00	1.16	0.291	I	O					1.72
9.417	0.00	1.13	0.283	I	O					1.66



9.500	0.00	1.10	0.275	I	O	1.61
9.583	0.00	1.08	0.268	I	O	1.55
9.667	0.00	1.05	0.260	I	O	1.50
9.750	0.00	1.03	0.253	I	O	1.45
9.833	0.00	1.00	0.246	I	O	1.40
9.917	0.00	0.98	0.239	I	O	1.35
10.000	0.00	0.95	0.233	I	O	1.31
10.083	0.00	0.93	0.226	I	O	1.26
10.167	0.00	0.91	0.220	I	O	1.21
10.250	0.00	0.88	0.214	I	O	1.17
10.333	0.00	0.86	0.208	I	O	1.13
10.417	0.00	0.84	0.202	I	O	1.08
10.500	0.00	0.82	0.196	I	O	1.04
10.583	0.00	0.80	0.191	I	O	1.00
10.667	0.00	0.77	0.185	I	O	0.97
10.750	0.00	0.74	0.180	I	O	0.95
10.833	0.00	0.71	0.175	I	O	0.92
10.917	0.00	0.69	0.170	I	O	0.89
11.000	0.00	0.66	0.165	I	O	0.87
11.083	0.00	0.63	0.161	I	O	0.84
11.167	0.00	0.61	0.157	I	O	0.82
11.250	0.00	0.59	0.153	I	O	0.80
11.333	0.00	0.56	0.149	I	O	0.78
11.417	0.00	0.54	0.145	I	O	0.76
11.500	0.00	0.52	0.141	I	O	0.74
11.583	0.00	0.50	0.138	I	O	0.72
11.667	0.00	0.48	0.134	IO		0.70
11.750	0.00	0.46	0.131	IO		0.68
11.833	0.00	0.45	0.128	IO		0.67
11.917	0.00	0.43	0.125	IO		0.65
12.000	0.00	0.41	0.122	IO		0.64
12.083	0.00	0.40	0.119	IO		0.62
12.167	0.00	0.38	0.116	IO		0.61
12.250	0.00	0.37	0.114	IO		0.59
12.333	0.00	0.35	0.111	IO		0.58
12.417	0.00	0.34	0.109	IO		0.57
12.500	0.00	0.33	0.107	IO		0.55
12.583	0.00	0.31	0.105	IO		0.54
12.667	0.00	0.30	0.102	IO		0.53
12.750	0.00	0.29	0.100	IO		0.52
12.833	0.00	0.28	0.099	IO		0.51
12.917	0.00	0.27	0.097	IO		0.50
13.000	0.00	0.26	0.095	IO		0.49
13.083	0.00	0.25	0.093	O		0.48
13.167	0.00	0.24	0.091	O		0.47
13.250	0.00	0.23	0.090	O		0.46
13.333	0.00	0.22	0.088	O		0.46
13.417	0.00	0.21	0.087	O		0.45
13.500	0.00	0.20	0.085	O		0.44
13.583	0.00	0.20	0.084	O		0.43
13.667	0.00	0.19	0.083	O		0.43
13.750	0.00	0.18	0.081	O		0.42
13.833	0.00	0.17	0.080	O		0.41
13.917	0.00	0.17	0.079	O		0.41
14.000	0.00	0.16	0.078	O		0.40
14.083	0.00	0.15	0.077	O		0.39
14.167	0.00	0.15	0.076	O		0.39
14.250	0.00	0.14	0.075	O		0.38
14.333	0.00	0.14	0.074	O		0.38
14.417	0.00	0.13	0.073	O		0.37
14.500	0.00	0.13	0.072	O		0.37
14.583	0.00	0.12	0.071	O		0.36
14.667	0.00	0.12	0.070	O		0.36

14.750	0.00	0.11	0.070	0	0.35
14.833	0.00	0.11	0.069	0	0.35
14.917	0.00	0.10	0.068	0	0.35
15.000	0.00	0.10	0.067	0	0.34
15.083	0.00	0.10	0.067	0	0.34
15.167	0.00	0.09	0.066	0	0.34
15.250	0.00	0.09	0.065	0	0.33
15.333	0.00	0.09	0.065	0	0.33
15.417	0.00	0.08	0.064	0	0.33
15.500	0.00	0.08	0.064	0	0.32
15.583	0.00	0.08	0.063	0	0.32
15.667	0.00	0.07	0.063	0	0.32
15.750	0.00	0.07	0.062	0	0.31
15.833	0.00	0.07	0.062	0	0.31
15.917	0.00	0.06	0.061	0	0.31
16.000	0.00	0.06	0.061	0	0.31
16.083	0.00	0.06	0.060	0	0.31
16.167	0.00	0.06	0.060	0	0.30
16.250	0.00	0.06	0.060	0	0.30
16.333	0.00	0.05	0.059	0	0.30
16.417	0.00	0.05	0.059	0	0.30
16.500	0.00	0.05	0.058	0	0.30
16.583	0.00	0.05	0.058	0	0.29
16.667	0.00	0.05	0.058	0	0.29
16.750	0.00	0.04	0.057	0	0.29
16.833	0.00	0.04	0.057	0	0.29
16.917	0.00	0.04	0.057	0	0.29
17.000	0.00	0.04	0.057	0	0.29
17.083	0.00	0.04	0.056	0	0.28
17.167	0.00	0.04	0.056	0	0.28
17.250	0.00	0.03	0.056	0	0.28
17.333	0.00	0.03	0.056	0	0.28
17.417	0.00	0.03	0.055	0	0.28
17.500	0.00	0.03	0.055	0	0.28
17.583	0.00	0.03	0.055	0	0.28
17.667	0.00	0.03	0.055	0	0.28
17.750	0.00	0.03	0.055	0	0.27
17.833	0.00	0.03	0.054	0	0.27
17.917	0.00	0.03	0.054	0	0.27
18.000	0.00	0.02	0.054	0	0.27
18.083	0.00	0.02	0.054	0	0.27
18.167	0.00	0.02	0.054	0	0.27
18.250	0.00	0.02	0.054	0	0.27
18.333	0.00	0.02	0.053	0	0.27
18.417	0.00	0.02	0.053	0	0.27
18.500	0.00	0.02	0.053	0	0.27
18.583	0.00	0.02	0.053	0	0.27
18.667	0.00	0.02	0.053	0	0.27
18.750	0.00	0.02	0.053	0	0.27
18.833	0.00	0.02	0.053	0	0.26
18.917	0.00	0.02	0.053	0	0.26
19.000	0.00	0.02	0.052	0	0.26
19.083	0.00	0.01	0.052	0	0.26
19.167	0.00	0.01	0.052	0	0.26
19.250	0.00	0.01	0.052	0	0.26
19.333	0.00	0.01	0.052	0	0.26
19.417	0.00	0.01	0.052	0	0.26
19.500	0.00	0.01	0.052	0	0.26
19.583	0.00	0.01	0.052	0	0.26
19.667	0.00	0.01	0.052	0	0.26
19.750	0.00	0.01	0.052	0	0.26
19.833	0.00	0.01	0.052	0	0.26
19.917	0.00	0.01	0.052	0	0.26

20.000	0.00	0.01	0.051	0	0.26
20.083	0.00	0.01	0.051	0	0.26
20.167	0.00	0.01	0.051	0	0.26
20.250	0.00	0.01	0.051	0	0.26
20.333	0.00	0.01	0.051	0	0.26
20.417	0.00	0.01	0.051	0	0.26
20.500	0.00	0.01	0.051	0	0.26
20.583	0.00	0.01	0.051	0	0.26
20.667	0.00	0.01	0.051	0	0.26
20.750	0.00	0.01	0.051	0	0.26
20.833	0.00	0.01	0.051	0	0.26
20.917	0.00	0.01	0.051	0	0.25
21.000	0.00	0.01	0.051	0	0.25
21.083	0.00	0.01	0.051	0	0.25
21.167	0.00	0.01	0.051	0	0.25
21.250	0.00	0.01	0.051	0	0.25
21.333	0.00	0.01	0.051	0	0.25
21.417	0.00	0.00	0.051	0	0.25
21.500	0.00	0.00	0.051	0	0.25
21.583	0.00	0.00	0.051	0	0.25
21.667	0.00	0.00	0.051	0	0.25
21.750	0.00	0.00	0.051	0	0.25
21.833	0.00	0.00	0.051	0	0.25
21.917	0.00	0.00	0.050	0	0.25
22.000	0.00	0.00	0.050	0	0.25
22.083	0.00	0.00	0.050	0	0.25
22.167	0.00	0.00	0.050	0	0.25
22.250	0.00	0.00	0.050	0	0.25
22.333	0.00	0.00	0.050	0	0.25
22.417	0.00	0.00	0.050	0	0.25
22.500	0.00	0.00	0.050	0	0.25
22.583	0.00	0.00	0.050	0	0.25
22.667	0.00	0.00	0.050	0	0.25
22.750	0.00	0.00	0.050	0	0.25
22.833	0.00	0.00	0.050	0	0.25
22.917	0.00	0.00	0.050	0	0.25
23.000	0.00	0.00	0.050	0	0.25
23.083	0.00	0.00	0.050	0	0.25
23.167	0.00	0.00	0.050	0	0.25
23.250	0.00	0.00	0.050	0	0.25
23.333	0.00	0.00	0.050	0	0.25
23.417	0.00	0.00	0.050	0	0.25
23.500	0.00	0.00	0.050	0	0.25
23.583	0.00	0.00	0.050	0	0.25
23.667	0.00	0.00	0.050	0	0.25
23.750	0.00	0.00	0.050	0	0.25
23.833	0.00	0.00	0.050	0	0.25
23.917	0.00	0.00	0.050	0	0.25
24.000	0.00	0.00	0.050	0	0.25
24.083	0.00	0.00	0.050	0	0.25
24.167	0.00	0.00	0.050	0	0.25
24.250	0.00	0.00	0.050	0	0.25
24.333	0.00	0.00	0.050	0	0.25
24.417	0.00	0.00	0.050	0	0.25
24.500	0.00	0.00	0.050	0	0.25
24.583	0.00	0.00	0.050	0	0.25
24.667	0.00	0.00	0.050	0	0.25
24.750	0.00	0.00	0.050	0	0.25
24.833	0.00	0.00	0.050	0	0.25

Remaining water in basin = 0.05 (Ac.Ft)

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*****HYDROGRAPH DATA*****
Number of intervals = 298
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 1.737 (CFS)
Total volume = 1.096 (Ac.Ft)
Status of hydrographs being held in storage
      Stream 1 Stream 2 Stream 3 Stream 4 Stream 5
Peak (CFS)    0.000  0.000  0.000  0.000  0.000
Vol (Ac.Ft)   0.000  0.000  0.000  0.000  0.000
*****
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FLOOD HYDROGRAPH ROUTING PROGRAM  
 Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005  
 Study date: 04/24/23

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 Black Creek - harvill at Water Industrial  
 Basin Routing Study - 24 Hour 2 Year Storm  
 3963ROUTING242  
 CB  
 -----

Program License Serial Number 6145

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 \*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: 3963UNIHYDQ2P242.rte  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 308  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 2.461 (CFS)  
 Total volume = 1.616 (Ac.Ft)  
 Status of hydrographs being held in storage  
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5  
 Peak (CFS)          0.000    0.000    0.000    0.000    0.000  
 Vol (Ac.Ft)         0.000    0.000    0.000    0.000    0.000  
 \*\*\*\*\*

+++++  
 Process from Point/Station          1.000 to Point/Station          1.000  
 \*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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 User entry of depth-outflow-storage data

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 Total number of inflow hydrograph intervals = 308  
 Hydrograph time unit = 5.000 (Min.)  
 Initial depth in storage basin = 0.00 (Ft.)  
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-----  
 Initial basin depth = 0.00 (Ft.)  
 Initial basin storage = 0.00 (Ac.Ft)  
 Initial basin outflow = 0.00 (CFS)  
 -----

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 Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.250	0.050	0.001	0.050	0.050
1.000	0.190	0.800	0.187	0.193
2.000	0.330	1.300	0.326	0.334
3.000	0.470	1.600	0.464	0.476
3.400	0.530	1.700	0.524	0.536
4.070	0.860	1.800	0.854	0.866

4.400	1.040	3.800	1.027	1.053
5.400	1.620	5.400	1.601	1.639
6.400	2.280	6.500	2.258	2.302
7.400	3.020	7.400	2.995	3.045
8.400	3.880	8.300	3.851	3.909

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

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	0.6	1.23	1.85	2.46	Depth (Ft.)
0.083	0.01	0.00	0.000	O					0.00
0.167	0.05	0.00	0.000	O					0.00
0.250	0.11	0.00	0.001	O I					0.00
0.333	0.16	0.00	0.002	O I					0.01
0.417	0.20	0.00	0.003	O I					0.02
0.500	0.25	0.00	0.005	O I					0.02
0.583	0.28	0.00	0.006	O I					0.03
0.667	0.30	0.00	0.008	O I					0.04
0.750	0.31	0.00	0.010	O I					0.05
0.833	0.32	0.00	0.013	O I					0.06
0.917	0.35	0.00	0.015	O I					0.07
1.000	0.39	0.00	0.018	O I					0.09
1.083	0.41	0.00	0.020	O I					0.10
1.167	0.41	0.00	0.023	O I					0.12
1.250	0.39	0.00	0.026	O I					0.13
1.333	0.37	0.00	0.028	O I					0.14
1.417	0.37	0.00	0.031	O I					0.15
1.500	0.37	0.00	0.033	O I					0.17
1.583	0.36	0.00	0.036	O I					0.18
1.667	0.36	0.00	0.038	O I					0.19
1.750	0.36	0.00	0.041	O I					0.20
1.833	0.37	0.00	0.044	O I					0.22
1.917	0.39	0.00	0.046	O I					0.23
2.000	0.42	0.00	0.049	O I					0.24
2.083	0.44	0.01	0.052	O I					0.26
2.167	0.45	0.03	0.055	O I					0.28
2.250	0.46	0.04	0.058	O I					0.29
2.333	0.46	0.06	0.060	O I					0.31
2.417	0.47	0.08	0.063	O I					0.32
2.500	0.47	0.09	0.066	O I					0.33
2.583	0.48	0.11	0.068	O I					0.35
2.667	0.50	0.12	0.071	O I					0.36
2.750	0.53	0.14	0.074	O I					0.38
2.833	0.55	0.15	0.076	O I					0.39
2.917	0.56	0.17	0.079	O I					0.41
3.000	0.57	0.18	0.082	O I					0.42
3.083	0.58	0.20	0.084	O I					0.43
3.167	0.58	0.21	0.087	O I					0.45
3.250	0.59	0.23	0.090	O I					0.46
3.333	0.59	0.24	0.092	O I					0.48
3.417	0.59	0.25	0.094	O I					0.49
3.500	0.59	0.27	0.097	O I					0.50
3.583	0.59	0.28	0.099	O I					0.51
3.667	0.60	0.29	0.101	O I					0.52
3.750	0.60	0.30	0.103	O I					0.53
3.833	0.60	0.32	0.105	O I					0.54
3.917	0.62	0.33	0.107	O I					0.56
4.000	0.66	0.34	0.109	O I					0.57
4.083	0.68	0.35	0.111	O I					0.58
4.167	0.69	0.36	0.114	O I					0.59

4.250	0.70	0.38	0.116	O	I				0.60
4.333	0.71	0.39	0.118	O	I				0.61
4.417	0.73	0.40	0.120	O	I				0.63
4.500	0.76	0.42	0.123	O	I				0.64
4.583	0.79	0.43	0.125	O	I				0.65
4.667	0.80	0.44	0.128	O	I				0.67
4.750	0.81	0.46	0.130	O	I				0.68
4.833	0.82	0.47	0.132	O	I				0.69
4.917	0.85	0.49	0.135	O	I				0.70
5.000	0.88	0.50	0.137	O	I				0.72
5.083	0.90	0.51	0.140	O	I				0.73
5.167	0.87	0.53	0.142	O	I				0.75
5.250	0.81	0.54	0.145	O	I				0.76
5.333	0.78	0.55	0.146	O	I				0.77
5.417	0.79	0.56	0.148	O	I				0.77
5.500	0.81	0.57	0.150	O	I				0.78
5.583	0.83	0.58	0.151	O	I				0.79
5.667	0.86	0.59	0.153	O	I				0.80
5.750	0.89	0.60	0.155	O	I				0.81
5.833	0.91	0.61	0.157	O	I				0.82
5.917	0.93	0.62	0.159	O	I				0.83
6.000	0.93	0.64	0.161	O	I				0.85
6.083	0.94	0.65	0.163	O	I				0.86
6.167	0.97	0.66	0.165	O	I				0.87
6.250	1.00	0.67	0.167	O	I				0.88
6.333	1.03	0.68	0.170	O	I				0.89
6.417	1.04	0.70	0.172	O	I				0.90
6.500	1.05	0.71	0.174	O	I				0.92
6.583	1.06	0.72	0.177	O	I				0.93
6.667	1.09	0.74	0.179	O	I				0.94
6.750	1.12	0.75	0.182	O	I				0.96
6.833	1.15	0.77	0.184	O	I				0.97
6.917	1.16	0.78	0.187	O	I				0.98
7.000	1.17	0.80	0.189	O	I				1.00
7.083	1.17	0.81	0.192	O	I				1.01
7.167	1.18	0.82	0.194	O	I				1.03
7.250	1.18	0.82	0.197	O	I				1.05
7.333	1.19	0.83	0.199	O	I				1.07
7.417	1.22	0.84	0.202	O	I				1.09
7.500	1.25	0.85	0.205	O	I				1.10
7.583	1.28	0.86	0.207	O	I				1.12
7.667	1.31	0.87	0.210	O	I				1.15
7.750	1.35	0.88	0.213	O	I				1.17
7.833	1.38	0.90	0.217	O	I				1.19
7.917	1.42	0.91	0.220	O	I				1.22
8.000	1.46	0.92	0.224	O	I				1.24
8.083	1.50	0.93	0.228	O	I				1.27
8.167	1.56	0.95	0.232	O	I				1.30
8.250	1.63	0.96	0.236	O	I				1.33
8.333	1.68	0.98	0.241	O	I				1.36
8.417	1.71	1.00	0.246	O	I				1.40
8.500	1.73	1.02	0.250	O	I				1.43
8.583	1.75	1.03	0.255	O	I				1.47
8.667	1.78	1.05	0.260	O	I				1.50
8.750	1.82	1.07	0.265	O	I				1.54
8.833	1.85	1.09	0.271	O	I				1.58
8.917	1.89	1.11	0.276	O	I				1.61
9.000	1.93	1.13	0.281	O	I				1.65
9.083	1.98	1.15	0.287	O	I				1.69
9.167	2.03	1.17	0.293	O	I				1.74
9.250	2.11	1.19	0.299	O	I				1.78
9.333	2.07	1.21	0.305	O	I				1.82
9.417	1.71	1.23	0.310	O	I				1.86

9.500	1.15	1.23	0.311			I	O			1.87
9.583	0.76	1.23	0.309			I	O			1.85
9.667	0.61	1.21	0.306			I	O			1.83
9.750	0.54	1.20	0.301			I	O			1.80
9.833	0.50	1.18	0.297			I	O			1.76
9.917	0.48	1.16	0.292			I	O			1.73
10.000	0.49	1.15	0.287			I	O			1.70
10.083	0.55	1.13	0.283			I	O			1.67
10.167	0.78	1.12	0.280			I	O			1.64
10.250	1.13	1.12	0.279				O			1.63
10.333	1.37	1.12	0.280				O	I		1.64
10.417	1.48	1.13	0.282				O	I		1.66
10.500	1.55	1.14	0.284				O	I		1.67
10.583	1.53	1.15	0.287				O	I		1.69
10.667	1.30	1.15	0.289				O	I		1.71
10.750	0.92	1.15	0.289			I	O			1.70
10.833	0.66	1.14	0.286			I	O			1.69
10.917	0.55	1.13	0.283			I	O			1.66
11.000	0.48	1.12	0.278			I	O			1.63
11.083	0.44	1.10	0.274			I	O			1.60
11.167	0.39	1.08	0.269			I	O			1.57
11.250	0.34	1.07	0.264			I	O			1.53
11.333	0.30	1.05	0.259			I	O			1.49
11.417	0.28	1.03	0.254			I	O			1.46
11.500	0.27	1.01	0.249			I	O			1.42
11.583	0.34	0.99	0.244			I	O			1.39
11.667	0.65	0.98	0.241			I	O			1.36
11.750	1.12	0.98	0.240				O	I		1.36
11.833	1.36	0.99	0.242				O	I		1.37
11.917	1.19	0.99	0.244				O	I		1.39
12.000	0.78	0.99	0.244				O	I		1.38
12.083	0.55	0.98	0.242			I	O			1.37
12.167	0.62	0.97	0.239			I	O			1.35
12.250	0.83	0.97	0.237			I	O			1.34
12.333	0.99	0.97	0.237				O			1.33
12.417	1.08	0.97	0.237				O	I		1.34
12.500	1.16	0.97	0.238				O	I		1.34
12.583	1.24	0.98	0.240				O	I		1.36
12.667	1.33	0.99	0.242				O	I		1.37
12.750	1.44	1.00	0.245				O	I		1.39
12.833	1.53	1.01	0.248				O	I		1.41
12.917	1.60	1.02	0.252				O	I		1.44
13.000	1.68	1.04	0.256				O	I		1.47
13.083	1.77	1.05	0.261				O	I		1.50
13.167	1.93	1.07	0.266				O		I	1.54
13.250	2.16	1.10	0.273				O		I	1.59
13.333	2.32	1.12	0.280				O		I	1.65
13.417	2.40	1.15	0.289				O		I	1.71
13.500	2.46	1.18	0.298				O		I	1.77
13.583	2.45	1.22	0.306				O		I	1.83
13.667	2.22	1.24	0.314				O		I	1.88
13.750	1.84	1.26	0.319				O		I	1.92
13.833	1.58	1.27	0.322				O	I		1.94
13.917	1.46	1.28	0.324				O	I		1.96
14.000	1.40	1.28	0.325				O	I		1.96
14.083	1.38	1.28	0.326				O	I		1.97
14.167	1.45	1.29	0.327				O	I		1.98
14.250	1.58	1.29	0.328				O	I		1.99
14.333	1.66	1.30	0.330				O	I		2.00
14.417	1.68	1.31	0.333				O	I		2.02
14.500	1.67	1.31	0.335				O	I		2.04
14.583	1.66	1.32	0.338				O	I		2.06
14.667	1.67	1.32	0.340				O	I		2.07



14.750	1.67	1.33	0.343			O	I	2.09
14.833	1.67	1.33	0.345			O	I	2.11
14.917	1.65	1.34	0.347			O	I	2.12
15.000	1.62	1.34	0.349			O	I	2.14
15.083	1.60	1.35	0.351			O	I	2.15
15.167	1.57	1.35	0.353			O	I	2.16
15.250	1.53	1.35	0.354			O	I	2.17
15.333	1.51	1.35	0.355			O	I	2.18
15.417	1.48	1.36	0.356			O	I	2.19
15.500	1.44	1.36	0.357			O	I	2.19
15.583	1.39	1.36	0.357			O	I	2.19
15.667	1.28	1.36	0.357			O	I	2.19
15.750	1.13	1.36	0.356			O	I	2.19
15.833	1.02	1.35	0.354			O	I	2.17
15.917	0.97	1.35	0.352			O	I	2.15
16.000	0.94	1.34	0.349			O	I	2.14
16.083	0.91	1.33	0.346			O	I	2.12
16.167	0.83	1.33	0.343			O	I	2.09
16.250	0.73	1.32	0.339			O	I	2.07
16.333	0.65	1.31	0.335			O	I	2.04
16.417	0.61	1.30	0.330			O	I	2.00
16.500	0.58	1.28	0.326			O	I	1.97
16.583	0.56	1.27	0.321			O	I	1.93
16.667	0.52	1.25	0.316			O	I	1.90
16.750	0.48	1.23	0.311			O	I	1.86
16.833	0.44	1.21	0.305			O	I	1.82
16.917	0.42	1.19	0.300			O	I	1.79
17.000	0.41	1.17	0.295			O	I	1.75
17.083	0.41	1.16	0.290			O	I	1.71
17.167	0.44	1.14	0.285			O	I	1.68
17.250	0.50	1.12	0.280			O	I	1.64
17.333	0.53	1.11	0.276			O	I	1.61
17.417	0.55	1.09	0.272			O	I	1.59
17.500	0.56	1.08	0.269			O	I	1.56
17.583	0.57	1.07	0.265			O	I	1.54
17.667	0.57	1.06	0.262			O	I	1.51
17.750	0.58	1.04	0.258			O	I	1.49
17.833	0.58	1.03	0.255			O	I	1.47
17.917	0.56	1.02	0.252			O	I	1.44
18.000	0.53	1.01	0.249			O	I	1.42
18.083	0.51	1.00	0.245			O	I	1.40
18.167	0.50	0.99	0.242			O	I	1.37
18.250	0.50	0.97	0.239			O	I	1.35
18.333	0.49	0.96	0.236			O	I	1.33
18.417	0.49	0.95	0.232			O	I	1.30
18.500	0.49	0.94	0.229			O	I	1.28
18.583	0.48	0.93	0.226			O	I	1.26
18.667	0.46	0.92	0.223			O	I	1.24
18.750	0.43	0.91	0.220			O	I	1.21
18.833	0.40	0.89	0.217			O	I	1.19
18.917	0.37	0.88	0.213			O	I	1.16
19.000	0.33	0.87	0.209			O	I	1.14
19.083	0.31	0.86	0.206			O	I	1.11
19.167	0.31	0.84	0.202			O	I	1.09
19.250	0.34	0.83	0.199			O	I	1.06
19.333	0.35	0.82	0.195			O	I	1.04
19.417	0.38	0.81	0.192			O	I	1.02
19.500	0.41	0.80	0.189			O	I	1.00
19.583	0.43	0.78	0.187			O	I	0.98
19.667	0.42	0.77	0.184			O	I	0.97
19.750	0.40	0.75	0.182			O	I	0.96
19.833	0.38	0.74	0.179			O	I	0.94
19.917	0.35	0.73	0.177			O	I	0.93

20.000	0.31	0.71	0.174	I	O	0.92
20.083	0.29	0.69	0.172	I	O	0.90
20.167	0.30	0.68	0.169	I	O	0.89
20.250	0.33	0.67	0.166	I	O	0.87
20.333	0.34	0.65	0.164	I	O	0.86
20.417	0.35	0.64	0.162	I	O	0.85
20.500	0.35	0.63	0.160	I	O	0.84
20.583	0.35	0.62	0.158	I	O	0.83
20.667	0.35	0.61	0.156	I	O	0.82
20.750	0.36	0.60	0.155	I	O	0.81
20.833	0.35	0.59	0.153	I	O	0.80
20.917	0.33	0.58	0.151	I	O	0.79
21.000	0.30	0.57	0.150	I	O	0.78
21.083	0.29	0.56	0.148	I	O	0.77
21.167	0.29	0.55	0.146	I	O	0.76
21.250	0.32	0.54	0.144	I	O	0.76
21.333	0.33	0.53	0.143	I	O	0.75
21.417	0.32	0.52	0.141	I	O	0.74
21.500	0.29	0.51	0.140	I	O	0.73
21.583	0.28	0.51	0.138	I	O	0.72
21.667	0.29	0.50	0.137	I	O	0.72
21.750	0.32	0.49	0.136	I	O	0.71
21.833	0.33	0.48	0.134	I	O	0.70
21.917	0.32	0.48	0.133	I	O	0.70
22.000	0.29	0.47	0.132	I	O	0.69
22.083	0.27	0.46	0.131	I	O	0.68
22.167	0.29	0.46	0.130	I	O	0.68
22.250	0.31	0.45	0.129	IO		0.67
22.333	0.33	0.44	0.128	IO		0.67
22.417	0.31	0.44	0.127	IO		0.66
22.500	0.29	0.43	0.126	I O		0.66
22.583	0.27	0.43	0.125	I O		0.65
22.667	0.26	0.42	0.124	I O		0.65
22.750	0.26	0.42	0.123	I O		0.64
22.833	0.25	0.41	0.122	I O		0.63
22.917	0.25	0.40	0.121	I O		0.63
23.000	0.25	0.40	0.120	I O		0.62
23.083	0.25	0.39	0.119	I O		0.62
23.167	0.25	0.39	0.118	I O		0.61
23.250	0.25	0.38	0.117	IO		0.61
23.333	0.24	0.38	0.116	IO		0.60
23.417	0.24	0.37	0.115	IO		0.60
23.500	0.24	0.37	0.114	IO		0.59
23.583	0.24	0.36	0.113	IO		0.59
23.667	0.24	0.36	0.112	IO		0.58
23.750	0.24	0.35	0.111	IO		0.58
23.833	0.24	0.35	0.111	IO		0.58
23.917	0.24	0.34	0.110	IO		0.57
24.000	0.24	0.34	0.109	IO		0.57
24.083	0.23	0.34	0.109	I O		0.56
24.167	0.19	0.33	0.108	I O		0.56
24.250	0.13	0.32	0.107	I O		0.55
24.333	0.08	0.32	0.105	I O		0.55
24.417	0.06	0.31	0.103	I O		0.54
24.500	0.05	0.30	0.102	I O		0.53
24.583	0.04	0.29	0.100	I O		0.52
24.667	0.03	0.28	0.098	I O		0.51
24.750	0.03	0.27	0.097	I O		0.50
24.833	0.02	0.26	0.095	I O		0.49
24.917	0.02	0.25	0.093	I O		0.48
25.000	0.01	0.24	0.092	I O		0.47
25.083	0.01	0.23	0.090	I O		0.47
25.167	0.01	0.22	0.089	I O		0.46

25.250	0.01	0.21	0.087	I O	0.45
25.333	0.01	0.21	0.086	I O	0.44
25.417	0.00	0.20	0.085	I O	0.44
25.500	0.00	0.19	0.083	I O	0.43
25.583	0.00	0.18	0.082	I O	0.42
25.667	0.00	0.18	0.081	I O	0.42
25.750	0.00	0.17	0.080	I O	0.41
25.833	0.00	0.16	0.078	I O	0.40
25.917	0.00	0.16	0.077	I O	0.40
26.000	0.00	0.15	0.076	IO	0.39
26.083	0.00	0.15	0.075	IO	0.39
26.167	0.00	0.14	0.074	IO	0.38
26.250	0.00	0.13	0.073	IO	0.38
26.333	0.00	0.13	0.072	IO	0.37
26.417	0.00	0.12	0.072	IO	0.37
26.500	0.00	0.12	0.071	IO	0.36
26.583	0.00	0.11	0.070	IO	0.36
26.667	0.00	0.11	0.069	IO	0.35
26.750	0.00	0.11	0.068	IO	0.35
26.833	0.00	0.10	0.068	IO	0.34
26.917	0.00	0.10	0.067	IO	0.34
27.000	0.00	0.09	0.066	IO	0.34
27.083	0.00	0.09	0.066	IO	0.33
27.167	0.00	0.09	0.065	IO	0.33
27.250	0.00	0.08	0.065	IO	0.33
27.333	0.00	0.08	0.064	IO	0.32
27.417	0.00	0.08	0.063	IO	0.32
27.500	0.00	0.07	0.063	O	0.32
27.583	0.00	0.07	0.062	O	0.32
27.667	0.00	0.07	0.062	O	0.31
27.750	0.00	0.07	0.061	O	0.31
27.833	0.00	0.06	0.061	O	0.31
27.917	0.00	0.06	0.061	O	0.31
28.000	0.00	0.06	0.060	O	0.30
28.083	0.00	0.06	0.060	O	0.30
28.167	0.00	0.05	0.059	O	0.30
28.250	0.00	0.05	0.059	O	0.30
28.333	0.00	0.05	0.059	O	0.30
28.417	0.00	0.05	0.058	O	0.29
28.500	0.00	0.05	0.058	O	0.29
28.583	0.00	0.04	0.058	O	0.29
28.667	0.00	0.04	0.057	O	0.29
28.750	0.00	0.04	0.057	O	0.29
28.833	0.00	0.04	0.057	O	0.29
28.917	0.00	0.04	0.057	O	0.28
29.000	0.00	0.04	0.056	O	0.28
29.083	0.00	0.04	0.056	O	0.28
29.167	0.00	0.03	0.056	O	0.28
29.250	0.00	0.03	0.056	O	0.28
29.333	0.00	0.03	0.055	O	0.28
29.417	0.00	0.03	0.055	O	0.28
29.500	0.00	0.03	0.055	O	0.28
29.583	0.00	0.03	0.055	O	0.28
29.667	0.00	0.03	0.055	O	0.27
29.750	0.00	0.03	0.054	O	0.27
29.833	0.00	0.02	0.054	O	0.27
29.917	0.00	0.02	0.054	O	0.27
30.000	0.00	0.02	0.054	O	0.27
30.083	0.00	0.02	0.054	O	0.27
30.167	0.00	0.02	0.054	O	0.27
30.250	0.00	0.02	0.053	O	0.27
30.333	0.00	0.02	0.053	O	0.27
30.417	0.00	0.02	0.053	O	0.27

30.500	0.00	0.02	0.053	0	0.27
30.583	0.00	0.02	0.053	0	0.27
30.667	0.00	0.02	0.053	0	0.26
30.750	0.00	0.02	0.053	0	0.26
30.833	0.00	0.02	0.053	0	0.26
30.917	0.00	0.01	0.052	0	0.26
31.000	0.00	0.01	0.052	0	0.26
31.083	0.00	0.01	0.052	0	0.26
31.167	0.00	0.01	0.052	0	0.26
31.250	0.00	0.01	0.052	0	0.26
31.333	0.00	0.01	0.052	0	0.26
31.417	0.00	0.01	0.052	0	0.26
31.500	0.00	0.01	0.052	0	0.26
31.583	0.00	0.01	0.052	0	0.26
31.667	0.00	0.01	0.052	0	0.26
31.750	0.00	0.01	0.052	0	0.26
31.833	0.00	0.01	0.052	0	0.26
31.917	0.00	0.01	0.051	0	0.26
32.000	0.00	0.01	0.051	0	0.26
32.083	0.00	0.01	0.051	0	0.26
32.167	0.00	0.01	0.051	0	0.26
32.250	0.00	0.01	0.051	0	0.26
32.333	0.00	0.01	0.051	0	0.26
32.417	0.00	0.01	0.051	0	0.26
32.500	0.00	0.01	0.051	0	0.26
32.583	0.00	0.01	0.051	0	0.26
32.667	0.00	0.01	0.051	0	0.26
32.750	0.00	0.01	0.051	0	0.25
32.833	0.00	0.01	0.051	0	0.25
32.917	0.00	0.01	0.051	0	0.25
33.000	0.00	0.01	0.051	0	0.25
33.083	0.00	0.01	0.051	0	0.25
33.167	0.00	0.01	0.051	0	0.25
33.250	0.00	0.00	0.051	0	0.25
33.333	0.00	0.00	0.051	0	0.25
33.417	0.00	0.00	0.051	0	0.25
33.500	0.00	0.00	0.051	0	0.25
33.583	0.00	0.00	0.051	0	0.25
33.667	0.00	0.00	0.051	0	0.25
33.750	0.00	0.00	0.051	0	0.25
33.833	0.00	0.00	0.050	0	0.25
33.917	0.00	0.00	0.050	0	0.25
34.000	0.00	0.00	0.050	0	0.25
34.083	0.00	0.00	0.050	0	0.25
34.167	0.00	0.00	0.050	0	0.25
34.250	0.00	0.00	0.050	0	0.25
34.333	0.00	0.00	0.050	0	0.25
34.417	0.00	0.00	0.050	0	0.25
34.500	0.00	0.00	0.050	0	0.25
34.583	0.00	0.00	0.050	0	0.25
34.667	0.00	0.00	0.050	0	0.25
34.750	0.00	0.00	0.050	0	0.25
34.833	0.00	0.00	0.050	0	0.25
34.917	0.00	0.00	0.050	0	0.25
35.000	0.00	0.00	0.050	0	0.25
35.083	0.00	0.00	0.050	0	0.25
35.167	0.00	0.00	0.050	0	0.25
35.250	0.00	0.00	0.050	0	0.25
35.333	0.00	0.00	0.050	0	0.25
35.417	0.00	0.00	0.050	0	0.25
35.500	0.00	0.00	0.050	0	0.25
35.583	0.00	0.00	0.050	0	0.25
35.667	0.00	0.00	0.050	0	0.25

35.750	0.00	0.00	0.050	O					0.25
35.833	0.00	0.00	0.050	O					0.25
35.917	0.00	0.00	0.050	O					0.25
36.000	0.00	0.00	0.050	O					0.25
36.083	0.00	0.00	0.050	O					0.25
36.167	0.00	0.00	0.050	O					0.25
36.250	0.00	0.00	0.050	O					0.25
36.333	0.00	0.00	0.050	O					0.25
36.417	0.00	0.00	0.050	O					0.25
36.500	0.00	0.00	0.050	O					0.25
36.583	0.00	0.00	0.050	O					0.25
36.667	0.00	0.00	0.050	O					0.25

Remaining water in basin = 0.05 (Ac.Ft)

```

*****HYDROGRAPH DATA*****
      Number of intervals = 440
      Time interval = 5.0 (Min.)
      Maximum/Peak flow rate = 1.358 (CFS)
      Total volume = 1.566 (Ac.Ft)
      Status of hydrographs being held in storage
            Stream 1 Stream 2 Stream 3 Stream 4 Stream 5
      Peak (CFS)      0.000  0.000  0.000  0.000  0.000
      Vol (Ac.Ft)     0.000  0.000  0.000  0.000  0.000
*****

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FLOOD HYDROGRAPH ROUTING PROGRAM  
 Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005  
 Study date: 04/24/23

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 Black Creek - Harvill at Water Industrial  
 Basin Routing Study - 1 Hour 5 Year Storm  
 3963ROUTING15  
 CB  
 -----

Program License Serial Number 6145

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 \*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: 3963UNIHYDQ5P15.rte  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 32  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 17.951 (CFS)  
 Total volume = 0.848 (Ac.Ft)  
 Status of hydrographs being held in storage  
 Stream 1 Stream 2 Stream 3 Stream 4 Stream 5  
 Peak (CFS) 0.000 0.000 0.000 0.000 0.000  
 Vol (Ac.Ft) 0.000 0.000 0.000 0.000 0.000  
 \*\*\*\*\*

+++++  
 Process from Point/Station 1.000 to Point/Station 1.000  
 \*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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

-----  
 Total number of inflow hydrograph intervals = 32  
 Hydrograph time unit = 5.000 (Min.)  
 Initial depth in storage basin = 0.00 (Ft.)  
 -----

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

-----  
 Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.250	0.050	0.001	0.050	0.050
1.000	0.190	0.800	0.187	0.193
2.000	0.330	1.300	0.326	0.334
3.000	0.470	1.600	0.464	0.476
3.400	0.530	1.700	0.524	0.536
4.070	0.860	1.800	0.854	0.866

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4.400	1.040	3.800	1.027	1.053
5.400	1.620	5.400	1.601	1.639
6.400	2.280	6.500	2.258	2.302
7.400	3.020	7.400	2.995	3.045
8.400	3.880	8.300	3.851	3.909

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

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)		.0	4.5	8.98	13.46	17.95	Depth (Ft.)
0.083	0.16	0.00	0.001	O						0.00
0.167	0.84	0.00	0.004	OI						0.02
0.250	1.93	0.00	0.014	O I						0.07
0.333	2.85	0.00	0.030	O I						0.15
0.417	3.55	0.01	0.052	O I						0.26
0.500	4.23	0.16	0.078	O I						0.40
0.583	5.06	0.33	0.108	O I						0.56
0.667	6.07	0.54	0.144	O I						0.75
0.750	7.45	0.78	0.186	O I						0.98
0.833	10.57	0.99	0.242	O I						1.37
0.917	15.79	1.28	0.325	O I						1.96
1.000	17.95	1.52	0.431	O I						2.72
1.083	13.54	1.70	0.529	O I						3.39
1.167	8.58	1.72	0.593	O I						3.53
1.250	5.55	1.73	0.630	O I						3.60
1.333	3.90	1.74	0.651	O I						3.64
1.417	2.98	1.74	0.662	O I						3.67
1.500	2.35	1.74	0.669	OI						3.68
1.583	1.90	1.74	0.671	O						3.69
1.667	1.54	1.74	0.671	IO						3.69
1.750	1.27	1.74	0.669	IO						3.68
1.833	1.09	1.74	0.665	I O						3.67
1.917	0.90	1.74	0.660	I O						3.66
2.000	0.74	1.74	0.653	I O						3.65
2.083	0.61	1.74	0.646	I O						3.64
2.167	0.49	1.73	0.638	I O						3.62
2.250	0.39	1.73	0.629	I O						3.60
2.333	0.33	1.73	0.620	I O						3.58
2.417	0.27	1.72	0.610	I O						3.56
2.500	0.19	1.72	0.600	I O						3.54
2.583	0.05	1.72	0.589	I O						3.52
2.667	0.02	1.71	0.577	I O						3.50
2.750	0.00	1.71	0.565	I O						3.47
2.833	0.00	1.71	0.553	I O						3.45
2.917	0.00	1.70	0.542	I O						3.42
3.000	0.00	1.70	0.530	I O						3.40
3.083	0.00	1.68	0.518	I O						3.32
3.167	0.00	1.66	0.507	I O						3.25
3.250	0.00	1.64	0.495	I O						3.17
3.333	0.00	1.62	0.484	I O						3.09
3.417	0.00	1.61	0.473	I O						3.02
3.500	0.00	1.58	0.462	I O						2.94
3.583	0.00	1.56	0.451	I O						2.87
3.667	0.00	1.54	0.441	I O						2.79
3.750	0.00	1.51	0.430	I O						2.72
3.833	0.00	1.49	0.420	I O						2.64
3.917	0.00	1.47	0.410	I O						2.57
4.000	0.00	1.45	0.399	I O						2.50
4.083	0.00	1.43	0.390	I O						2.43
4.167	0.00	1.41	0.380	I O						2.36

4.250	0.00	1.39	0.370	I O	2.29
4.333	0.00	1.37	0.361	I O	2.22
4.417	0.00	1.35	0.351	I O	2.15
4.500	0.00	1.33	0.342	I O	2.09
4.583	0.00	1.31	0.333	I O	2.02
4.667	0.00	1.28	0.324	I O	1.96
4.750	0.00	1.25	0.316	I O	1.90
4.833	0.00	1.22	0.307	I O	1.84
4.917	0.00	1.19	0.299	I O	1.78
5.000	0.00	1.16	0.291	I O	1.72
5.083	0.00	1.13	0.283	I O	1.66
5.167	0.00	1.10	0.275	IO	1.61
5.250	0.00	1.08	0.268	IO	1.55
5.333	0.00	1.05	0.260	IO	1.50
5.417	0.00	1.03	0.253	IO	1.45
5.500	0.00	1.00	0.246	IO	1.40
5.583	0.00	0.98	0.239	IO	1.35
5.667	0.00	0.95	0.233	IO	1.30
5.750	0.00	0.93	0.226	IO	1.26
5.833	0.00	0.91	0.220	IO	1.21
5.917	0.00	0.88	0.214	IO	1.17
6.000	0.00	0.86	0.208	IO	1.13
6.083	0.00	0.84	0.202	IO	1.08
6.167	0.00	0.82	0.196	IO	1.04
6.250	0.00	0.80	0.190	IO	1.00
6.333	0.00	0.77	0.185	IO	0.97
6.417	0.00	0.74	0.180	IO	0.95
6.500	0.00	0.71	0.175	IO	0.92
6.583	0.00	0.69	0.170	IO	0.89
6.667	0.00	0.66	0.165	IO	0.87
6.750	0.00	0.63	0.161	IO	0.84
6.833	0.00	0.61	0.157	IO	0.82
6.917	0.00	0.59	0.153	IO	0.80
7.000	0.00	0.56	0.149	IO	0.78
7.083	0.00	0.54	0.145	O	0.76
7.167	0.00	0.52	0.141	O	0.74
7.250	0.00	0.50	0.138	O	0.72
7.333	0.00	0.48	0.134	O	0.70
7.417	0.00	0.46	0.131	O	0.68
7.500	0.00	0.45	0.128	O	0.67
7.583	0.00	0.43	0.125	O	0.65
7.667	0.00	0.41	0.122	O	0.64
7.750	0.00	0.40	0.119	O	0.62
7.833	0.00	0.38	0.116	O	0.61
7.917	0.00	0.37	0.114	O	0.59
8.000	0.00	0.35	0.111	O	0.58
8.083	0.00	0.34	0.109	O	0.57
8.167	0.00	0.33	0.107	O	0.55
8.250	0.00	0.31	0.105	O	0.54
8.333	0.00	0.30	0.102	O	0.53
8.417	0.00	0.29	0.100	O	0.52
8.500	0.00	0.28	0.098	O	0.51
8.583	0.00	0.27	0.097	O	0.50
8.667	0.00	0.26	0.095	O	0.49
8.750	0.00	0.25	0.093	O	0.48
8.833	0.00	0.24	0.091	O	0.47
8.917	0.00	0.23	0.090	O	0.46
9.000	0.00	0.22	0.088	O	0.45
9.083	0.00	0.21	0.087	O	0.45
9.167	0.00	0.20	0.085	O	0.44
9.250	0.00	0.19	0.084	O	0.43
9.333	0.00	0.19	0.083	O	0.43
9.417	0.00	0.18	0.081	O	0.42



9.500	0.00	0.17	0.080	0	0.41
9.583	0.00	0.17	0.079	0	0.41
9.667	0.00	0.16	0.078	0	0.40
9.750	0.00	0.15	0.077	0	0.39
9.833	0.00	0.15	0.076	0	0.39
9.917	0.00	0.14	0.075	0	0.38
10.000	0.00	0.14	0.074	0	0.38
10.083	0.00	0.13	0.073	0	0.37
10.167	0.00	0.13	0.072	0	0.37
10.250	0.00	0.12	0.071	0	0.36
10.333	0.00	0.12	0.070	0	0.36
10.417	0.00	0.11	0.070	0	0.35
10.500	0.00	0.11	0.069	0	0.35
10.583	0.00	0.10	0.068	0	0.35
10.667	0.00	0.10	0.067	0	0.34
10.750	0.00	0.10	0.067	0	0.34
10.833	0.00	0.09	0.066	0	0.34
10.917	0.00	0.09	0.065	0	0.33
11.000	0.00	0.09	0.065	0	0.33
11.083	0.00	0.08	0.064	0	0.33
11.167	0.00	0.08	0.064	0	0.32
11.250	0.00	0.08	0.063	0	0.32
11.333	0.00	0.07	0.063	0	0.32
11.417	0.00	0.07	0.062	0	0.31
11.500	0.00	0.07	0.062	0	0.31
11.583	0.00	0.06	0.061	0	0.31
11.667	0.00	0.06	0.061	0	0.31
11.750	0.00	0.06	0.060	0	0.31
11.833	0.00	0.06	0.060	0	0.30
11.917	0.00	0.06	0.060	0	0.30
12.000	0.00	0.05	0.059	0	0.30
12.083	0.00	0.05	0.059	0	0.30
12.167	0.00	0.05	0.058	0	0.30
12.250	0.00	0.05	0.058	0	0.29
12.333	0.00	0.05	0.058	0	0.29
12.417	0.00	0.04	0.057	0	0.29
12.500	0.00	0.04	0.057	0	0.29
12.583	0.00	0.04	0.057	0	0.29
12.667	0.00	0.04	0.057	0	0.29
12.750	0.00	0.04	0.056	0	0.28
12.833	0.00	0.04	0.056	0	0.28
12.917	0.00	0.03	0.056	0	0.28
13.000	0.00	0.03	0.056	0	0.28
13.083	0.00	0.03	0.055	0	0.28
13.167	0.00	0.03	0.055	0	0.28
13.250	0.00	0.03	0.055	0	0.28
13.333	0.00	0.03	0.055	0	0.28
13.417	0.00	0.03	0.055	0	0.27
13.500	0.00	0.03	0.054	0	0.27
13.583	0.00	0.03	0.054	0	0.27
13.667	0.00	0.02	0.054	0	0.27
13.750	0.00	0.02	0.054	0	0.27
13.833	0.00	0.02	0.054	0	0.27
13.917	0.00	0.02	0.054	0	0.27
14.000	0.00	0.02	0.053	0	0.27
14.083	0.00	0.02	0.053	0	0.27
14.167	0.00	0.02	0.053	0	0.27
14.250	0.00	0.02	0.053	0	0.27
14.333	0.00	0.02	0.053	0	0.27
14.417	0.00	0.02	0.053	0	0.27
14.500	0.00	0.02	0.053	0	0.26
14.583	0.00	0.02	0.053	0	0.26
14.667	0.00	0.02	0.052	0	0.26

14.750	0.00	0.01	0.052	o					0.26
14.833	0.00	0.01	0.052	o					0.26
14.917	0.00	0.01	0.052	o					0.26
15.000	0.00	0.01	0.052	o					0.26
15.083	0.00	0.01	0.052	o					0.26
15.167	0.00	0.01	0.052	o					0.26
15.250	0.00	0.01	0.052	o					0.26
15.333	0.00	0.01	0.052	o					0.26
15.417	0.00	0.01	0.052	o					0.26
15.500	0.00	0.01	0.052	o					0.26
15.583	0.00	0.01	0.052	o					0.26
15.667	0.00	0.01	0.051	o					0.26
15.750	0.00	0.01	0.051	o					0.26
15.833	0.00	0.01	0.051	o					0.26
15.917	0.00	0.01	0.051	o					0.26
16.000	0.00	0.01	0.051	o					0.26
16.083	0.00	0.01	0.051	o					0.26
16.167	0.00	0.01	0.051	o					0.26
16.250	0.00	0.01	0.051	o					0.26
16.333	0.00	0.01	0.051	o					0.26
16.417	0.00	0.01	0.051	o					0.26
16.500	0.00	0.01	0.051	o					0.26
16.583	0.00	0.01	0.051	o					0.25
16.667	0.00	0.01	0.051	o					0.25
16.750	0.00	0.01	0.051	o					0.25
16.833	0.00	0.01	0.051	o					0.25
16.917	0.00	0.01	0.051	o					0.25
17.000	0.00	0.01	0.051	o					0.25
17.083	0.00	0.00	0.051	o					0.25
17.167	0.00	0.00	0.051	o					0.25
17.250	0.00	0.00	0.051	o					0.25
17.333	0.00	0.00	0.051	o					0.25
17.417	0.00	0.00	0.051	o					0.25
17.500	0.00	0.00	0.051	o					0.25
17.583	0.00	0.00	0.050	o					0.25
17.667	0.00	0.00	0.050	o					0.25
17.750	0.00	0.00	0.050	o					0.25
17.833	0.00	0.00	0.050	o					0.25
17.917	0.00	0.00	0.050	o					0.25
18.000	0.00	0.00	0.050	o					0.25
18.083	0.00	0.00	0.050	o					0.25
18.167	0.00	0.00	0.050	o					0.25
18.250	0.00	0.00	0.050	o					0.25
18.333	0.00	0.00	0.050	o					0.25
18.417	0.00	0.00	0.050	o					0.25
18.500	0.00	0.00	0.050	o					0.25
18.583	0.00	0.00	0.050	o					0.25
18.667	0.00	0.00	0.050	o					0.25
18.750	0.00	0.00	0.050	o					0.25
18.833	0.00	0.00	0.050	o					0.25
18.917	0.00	0.00	0.050	o					0.25
19.000	0.00	0.00	0.050	o					0.25
19.083	0.00	0.00	0.050	o					0.25
19.167	0.00	0.00	0.050	o					0.25
19.250	0.00	0.00	0.050	o					0.25
19.333	0.00	0.00	0.050	o					0.25
19.417	0.00	0.00	0.050	o					0.25
19.500	0.00	0.00	0.050	o					0.25
19.583	0.00	0.00	0.050	o					0.25
19.667	0.00	0.00	0.050	o					0.25
19.750	0.00	0.00	0.050	o					0.25
19.833	0.00	0.00	0.050	o					0.25
19.917	0.00	0.00	0.050	o					0.25

20.000	0.00	0.00	0.050	0					0.25
20.083	0.00	0.00	0.050	0					0.25
20.167	0.00	0.00	0.050	0					0.25
20.250	0.00	0.00	0.050	0					0.25
20.333	0.00	0.00	0.050	0					0.25
20.417	0.00	0.00	0.050	0					0.25
20.500	0.00	0.00	0.050	0					0.25

Remaining water in basin = 0.05 (Ac.Ft)

\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*

Number of intervals = 246

Time interval = 5.0 (Min.)

Maximum/Peak flow rate = 1.743 (CFS)

Total volume = 0.798 (Ac.Ft)

Status of hydrographs being held in storage

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

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FLOOD HYDROGRAPH ROUTING PROGRAM  
 Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005  
 Study date: 04/24/23

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 BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
 BASIN ROUTING STUFY - 3 HOUR 5 YEAR STORM  
 3963ROUTING35  
 CB  
 -----

Program License Serial Number 6145

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 \*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: 3963UNIHYDQ5P35.rte  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 56  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 12.657 (CFS)  
 Total volume = 1.100 (Ac.Ft)  
 Status of hydrographs being held in storage  
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5  
 Peak (CFS)          0.000    0.000    0.000    0.000    0.000  
 Vol (Ac.Ft)         0.000    0.000    0.000    0.000    0.000  
 \*\*\*\*\*

+++++  
 Process from Point/Station          1.000 to Point/Station          1.000  
 \*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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 User entry of depth-outflow-storage data

-----  
 Total number of inflow hydrograph intervals = 56  
 Hydrograph time unit = 5.000 (Min.)  
 Initial depth in storage basin = 0.00 (Ft.)  
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-----  
 Initial basin depth = 0.00 (Ft.)  
 Initial basin storage = 0.00 (Ac.Ft)  
 Initial basin outflow = 0.00 (CFS)  
 -----

-----  
 Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.250	0.050	0.001	0.050	0.050
1.000	0.190	0.800	0.187	0.193
2.000	0.330	1.300	0.326	0.334
3.000	0.470	1.600	0.464	0.476
3.400	0.530	1.700	0.524	0.536
4.070	0.860	1.800	0.854	0.866

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4.400	1.040	3.800	1.027	1.053
5.400	1.620	5.400	1.601	1.639
6.400	2.280	6.500	2.258	2.302
7.400	3.020	7.400	2.995	3.045
8.400	3.880	8.300	3.851	3.909

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

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	3.2	6.33	9.49	12.66	Depth (Ft.)
0.083	0.03	0.00	0.000	O					0.00
0.167	0.14	0.00	0.001	O					0.00
0.250	0.28	0.00	0.002	O					0.01
0.333	0.35	0.00	0.004	O					0.02
0.417	0.45	0.00	0.007	O I					0.04
0.500	0.69	0.00	0.011	O I					0.05
0.583	0.95	0.00	0.017	O I					0.08
0.667	1.13	0.00	0.024	O I					0.12
0.750	1.25	0.00	0.032	O I					0.16
0.833	1.39	0.00	0.041	O I					0.21
0.917	1.40	0.00	0.051	O I					0.25
1.000	1.35	0.06	0.060	O I					0.30
1.083	1.46	0.11	0.069	O I					0.35
1.167	1.79	0.17	0.079	O I					0.41
1.250	2.16	0.24	0.091	O I					0.47
1.333	2.37	0.32	0.105	O I					0.55
1.417	2.47	0.40	0.119	O I					0.62
1.500	2.70	0.48	0.134	O I					0.70
1.583	3.08	0.57	0.150	O I					0.79
1.667	3.33	0.68	0.168	O I					0.88
1.750	3.51	0.78	0.187	O I					0.98
1.833	3.93	0.86	0.207	O I					1.12
1.917	4.38	0.94	0.229	O I					1.28
2.000	4.53	1.03	0.253	O I					1.45
2.083	4.55	1.11	0.277	O I					1.62
2.167	4.78	1.20	0.301	O I					1.79
2.250	5.49	1.29	0.328	O I					1.99
2.333	6.51	1.36	0.360	O I					2.22
2.417	7.30	1.45	0.398	O I					2.49
2.500	8.45	1.54	0.442	O I					2.80
2.583	10.66	1.64	0.497	O I					3.18
2.667	12.55	1.71	0.565	O I					3.47
2.750	12.66	1.73	0.640	O I					3.62
2.833	10.35	1.75	0.707	O I					3.76
2.917	7.23	1.77	0.756	O I					3.86
3.000	5.25	1.78	0.786	O I					3.92
3.083	4.16	1.78	0.807	O I					3.96
3.167	3.23	1.79	0.820	O I					3.99
3.250	2.39	1.79	0.827	O I					4.00
3.333	1.82	1.79	0.829	O					4.01
3.417	1.45	1.79	0.828	O I					4.00
3.500	1.18	1.79	0.825	O I					4.00
3.583	0.97	1.79	0.820	O I					3.99
3.667	0.81	1.79	0.814	O I					3.98
3.750	0.66	1.78	0.806	O I					3.96
3.833	0.54	1.78	0.798	O I					3.94
3.917	0.43	1.78	0.789	O I					3.93
4.000	0.34	1.78	0.780	O I					3.91
4.083	0.28	1.77	0.770	O I					3.89
4.167	0.21	1.77	0.759	O I					3.87

4.250	0.14	1.77	0.748	I	O	3.84
4.333	0.07	1.76	0.737	I	O	3.82
4.417	0.03	1.76	0.725	I	O	3.80
4.500	0.02	1.76	0.713	I	O	3.77
4.583	0.01	1.75	0.701	I	O	3.75
4.667	0.00	1.75	0.689	I	O	3.72
4.750	0.00	1.74	0.677	I	O	3.70
4.833	0.00	1.74	0.665	I	O	3.67
4.917	0.00	1.74	0.653	I	O	3.65
5.000	0.00	1.73	0.641	I	O	3.63
5.083	0.00	1.73	0.629	I	O	3.60
5.167	0.00	1.73	0.617	I	O	3.58
5.250	0.00	1.72	0.605	I	O	3.55
5.333	0.00	1.72	0.594	I	O	3.53
5.417	0.00	1.72	0.582	I	O	3.51
5.500	0.00	1.71	0.570	I	O	3.48
5.583	0.00	1.71	0.558	I	O	3.46
5.667	0.00	1.70	0.546	I	O	3.43
5.750	0.00	1.70	0.535	I	O	3.41
5.833	0.00	1.69	0.523	I	O	3.35
5.917	0.00	1.67	0.511	I	O	3.28
6.000	0.00	1.65	0.500	I	O	3.20
6.083	0.00	1.63	0.489	I	O	3.12
6.167	0.00	1.61	0.478	I	O	3.05
6.250	0.00	1.59	0.466	I	O	2.97
6.333	0.00	1.57	0.456	I	O	2.90
6.417	0.00	1.55	0.445	I	O	2.82
6.500	0.00	1.52	0.434	I	O	2.75
6.583	0.00	1.50	0.424	I	O	2.67
6.667	0.00	1.48	0.414	I	O	2.60
6.750	0.00	1.46	0.404	I	O	2.53
6.833	0.00	1.44	0.394	I	O	2.45
6.917	0.00	1.42	0.384	I	O	2.38
7.000	0.00	1.39	0.374	I	O	2.31
7.083	0.00	1.37	0.365	I	O	2.25
7.167	0.00	1.35	0.355	I	O	2.18
7.250	0.00	1.33	0.346	I	O	2.11
7.333	0.00	1.31	0.337	I	O	2.05
7.417	0.00	1.29	0.328	I	O	1.98
7.500	0.00	1.26	0.319	I	O	1.92
7.583	0.00	1.23	0.310	I	O	1.86
7.667	0.00	1.20	0.302	I	O	1.80
7.750	0.00	1.17	0.294	I	O	1.74
7.833	0.00	1.14	0.286	I	O	1.69
7.917	0.00	1.11	0.278	I	O	1.63
8.000	0.00	1.09	0.271	I	O	1.58
8.083	0.00	1.06	0.263	I	O	1.52
8.167	0.00	1.04	0.256	I	O	1.47
8.250	0.00	1.01	0.249	I	O	1.42
8.333	0.00	0.99	0.242	I	O	1.37
8.417	0.00	0.96	0.235	I	O	1.32
8.500	0.00	0.94	0.229	I	O	1.28
8.583	0.00	0.92	0.222	I	O	1.23
8.667	0.00	0.89	0.216	I	O	1.19
8.750	0.00	0.87	0.210	I	O	1.14
8.833	0.00	0.85	0.204	I	O	1.10
8.917	0.00	0.83	0.198	I	O	1.06
9.000	0.00	0.81	0.193	I	O	1.02
9.083	0.00	0.78	0.187	IO		0.99
9.167	0.00	0.75	0.182	IO		0.96
9.250	0.00	0.72	0.177	IO		0.93
9.333	0.00	0.70	0.172	IO		0.90
9.417	0.00	0.67	0.167	IO		0.88

9.500	0.00	0.64	0.163	IO	0.85
9.583	0.00	0.62	0.158	IO	0.83
9.667	0.00	0.60	0.154	IO	0.81
9.750	0.00	0.57	0.150	IO	0.79
9.833	0.00	0.55	0.146	IO	0.77
9.917	0.00	0.53	0.143	IO	0.75
10.000	0.00	0.51	0.139	IO	0.73
10.083	0.00	0.49	0.136	IO	0.71
10.167	0.00	0.47	0.132	IO	0.69
10.250	0.00	0.45	0.129	IO	0.67
10.333	0.00	0.43	0.126	IO	0.66
10.417	0.00	0.42	0.123	IO	0.64
10.500	0.00	0.40	0.120	IO	0.63
10.583	0.00	0.39	0.118	O	0.61
10.667	0.00	0.37	0.115	O	0.60
10.750	0.00	0.36	0.112	O	0.58
10.833	0.00	0.34	0.110	O	0.57
10.917	0.00	0.33	0.108	O	0.56
11.000	0.00	0.32	0.105	O	0.55
11.083	0.00	0.31	0.103	O	0.54
11.167	0.00	0.29	0.101	O	0.52
11.250	0.00	0.28	0.099	O	0.51
11.333	0.00	0.27	0.097	O	0.50
11.417	0.00	0.26	0.096	O	0.49
11.500	0.00	0.25	0.094	O	0.48
11.583	0.00	0.24	0.092	O	0.48
11.667	0.00	0.23	0.090	O	0.47
11.750	0.00	0.22	0.089	O	0.46
11.833	0.00	0.21	0.087	O	0.45
11.917	0.00	0.21	0.086	O	0.44
12.000	0.00	0.20	0.085	O	0.44
12.083	0.00	0.19	0.083	O	0.43
12.167	0.00	0.18	0.082	O	0.42
12.250	0.00	0.18	0.081	O	0.41
12.333	0.00	0.17	0.079	O	0.41
12.417	0.00	0.16	0.078	O	0.40
12.500	0.00	0.16	0.077	O	0.40
12.583	0.00	0.15	0.076	O	0.39
12.667	0.00	0.14	0.075	O	0.38
12.750	0.00	0.14	0.074	O	0.38
12.833	0.00	0.13	0.073	O	0.37
12.917	0.00	0.13	0.072	O	0.37
13.000	0.00	0.12	0.071	O	0.37
13.083	0.00	0.12	0.071	O	0.36
13.167	0.00	0.11	0.070	O	0.36
13.250	0.00	0.11	0.069	O	0.35
13.333	0.00	0.11	0.068	O	0.35
13.417	0.00	0.10	0.068	O	0.34
13.500	0.00	0.10	0.067	O	0.34
13.583	0.00	0.09	0.066	O	0.34
13.667	0.00	0.09	0.066	O	0.33
13.750	0.00	0.09	0.065	O	0.33
13.833	0.00	0.08	0.064	O	0.33
13.917	0.00	0.08	0.064	O	0.32
14.000	0.00	0.08	0.063	O	0.32
14.083	0.00	0.07	0.063	O	0.32
14.167	0.00	0.07	0.062	O	0.32
14.250	0.00	0.07	0.062	O	0.31
14.333	0.00	0.07	0.061	O	0.31
14.417	0.00	0.06	0.061	O	0.31
14.500	0.00	0.06	0.060	O	0.31
14.583	0.00	0.06	0.060	O	0.30
14.667	0.00	0.06	0.060	O	0.30

14.750	0.00	0.05	0.059	0	0.30
14.833	0.00	0.05	0.059	0	0.30
14.917	0.00	0.05	0.059	0	0.30
15.000	0.00	0.05	0.058	0	0.29
15.083	0.00	0.05	0.058	0	0.29
15.167	0.00	0.04	0.058	0	0.29
15.250	0.00	0.04	0.057	0	0.29
15.333	0.00	0.04	0.057	0	0.29
15.417	0.00	0.04	0.057	0	0.29
15.500	0.00	0.04	0.056	0	0.28
15.583	0.00	0.04	0.056	0	0.28
15.667	0.00	0.04	0.056	0	0.28
15.750	0.00	0.03	0.056	0	0.28
15.833	0.00	0.03	0.056	0	0.28
15.917	0.00	0.03	0.055	0	0.28
16.000	0.00	0.03	0.055	0	0.28
16.083	0.00	0.03	0.055	0	0.28
16.167	0.00	0.03	0.055	0	0.28
16.250	0.00	0.03	0.054	0	0.27
16.333	0.00	0.03	0.054	0	0.27
16.417	0.00	0.02	0.054	0	0.27
16.500	0.00	0.02	0.054	0	0.27
16.583	0.00	0.02	0.054	0	0.27
16.667	0.00	0.02	0.054	0	0.27
16.750	0.00	0.02	0.054	0	0.27
16.833	0.00	0.02	0.053	0	0.27
16.917	0.00	0.02	0.053	0	0.27
17.000	0.00	0.02	0.053	0	0.27
17.083	0.00	0.02	0.053	0	0.27
17.167	0.00	0.02	0.053	0	0.27
17.250	0.00	0.02	0.053	0	0.26
17.333	0.00	0.02	0.053	0	0.26
17.417	0.00	0.02	0.053	0	0.26
17.500	0.00	0.01	0.052	0	0.26
17.583	0.00	0.01	0.052	0	0.26
17.667	0.00	0.01	0.052	0	0.26
17.750	0.00	0.01	0.052	0	0.26
17.833	0.00	0.01	0.052	0	0.26
17.917	0.00	0.01	0.052	0	0.26
18.000	0.00	0.01	0.052	0	0.26
18.083	0.00	0.01	0.052	0	0.26
18.167	0.00	0.01	0.052	0	0.26
18.250	0.00	0.01	0.052	0	0.26
18.333	0.00	0.01	0.052	0	0.26
18.417	0.00	0.01	0.052	0	0.26
18.500	0.00	0.01	0.051	0	0.26
18.583	0.00	0.01	0.051	0	0.26
18.667	0.00	0.01	0.051	0	0.26
18.750	0.00	0.01	0.051	0	0.26
18.833	0.00	0.01	0.051	0	0.26
18.917	0.00	0.01	0.051	0	0.26
19.000	0.00	0.01	0.051	0	0.26
19.083	0.00	0.01	0.051	0	0.26
19.167	0.00	0.01	0.051	0	0.26
19.250	0.00	0.01	0.051	0	0.26
19.333	0.00	0.01	0.051	0	0.25
19.417	0.00	0.01	0.051	0	0.25
19.500	0.00	0.01	0.051	0	0.25
19.583	0.00	0.01	0.051	0	0.25
19.667	0.00	0.01	0.051	0	0.25
19.750	0.00	0.01	0.051	0	0.25
19.833	0.00	0.00	0.051	0	0.25
19.917	0.00	0.00	0.051	0	0.25



20.000	0.00	0.00	0.051	O					0.25
20.083	0.00	0.00	0.051	O					0.25
20.167	0.00	0.00	0.051	O					0.25
20.250	0.00	0.00	0.051	O					0.25
20.333	0.00	0.00	0.051	O					0.25
20.417	0.00	0.00	0.050	O					0.25
20.500	0.00	0.00	0.050	O					0.25
20.583	0.00	0.00	0.050	O					0.25
20.667	0.00	0.00	0.050	O					0.25
20.750	0.00	0.00	0.050	O					0.25
20.833	0.00	0.00	0.050	O					0.25
20.917	0.00	0.00	0.050	O					0.25
21.000	0.00	0.00	0.050	O					0.25
21.083	0.00	0.00	0.050	O					0.25
21.167	0.00	0.00	0.050	O					0.25
21.250	0.00	0.00	0.050	O					0.25
21.333	0.00	0.00	0.050	O					0.25
21.417	0.00	0.00	0.050	O					0.25
21.500	0.00	0.00	0.050	O					0.25
21.583	0.00	0.00	0.050	O					0.25
21.667	0.00	0.00	0.050	O					0.25
21.750	0.00	0.00	0.050	O					0.25
21.833	0.00	0.00	0.050	O					0.25
21.917	0.00	0.00	0.050	O					0.25
22.000	0.00	0.00	0.050	O					0.25
22.083	0.00	0.00	0.050	O					0.25
22.167	0.00	0.00	0.050	O					0.25
22.250	0.00	0.00	0.050	O					0.25
22.333	0.00	0.00	0.050	O					0.25
22.417	0.00	0.00	0.050	O					0.25
22.500	0.00	0.00	0.050	O					0.25
22.583	0.00	0.00	0.050	O					0.25
22.667	0.00	0.00	0.050	O					0.25
22.750	0.00	0.00	0.050	O					0.25
22.833	0.00	0.00	0.050	O					0.25
22.917	0.00	0.00	0.050	O					0.25
23.000	0.00	0.00	0.050	O					0.25
23.083	0.00	0.00	0.050	O					0.25
23.167	0.00	0.00	0.050	O					0.25
23.250	0.00	0.00	0.050	O					0.25

Remaining water in basin = 0.05 (Ac.Ft)

\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*

Number of intervals = 279

Time interval = 5.0 (Min.)

Maximum/Peak flow rate = 1.791 (CFS)

Total volume = 1.050 (Ac.Ft)

Status of hydrographs being held in storage

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

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FLOOD HYDROGRAPH ROUTING PROGRAM  
 Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005  
 Study date: 04/24/23

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 Black Creek - Harvill at Water Industrial  
 Basin Routing Study - 6 Hour 5 Year Study  
 3963Routing65  
 CB  
 -----

Program License Serial Number 6145

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 \*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: 3963UNIHYDQ5P65.rte  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 92  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 11.373 (CFS)  
 Total volume = 1.295 (Ac.Ft)  
 Status of hydrographs being held in storage  
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5  
 Peak (CFS)      0.000   0.000   0.000   0.000   0.000  
 Vol (Ac.Ft)     0.000   0.000   0.000   0.000   0.000  
 \*\*\*\*\*

+++++  
 Process from Point/Station 1.000 to Point/Station 1.000  
 \*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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 User entry of depth-outflow-storage data

-----  
 Total number of inflow hydrograph intervals = 92  
 Hydrograph time unit = 5.000 (Min.)  
 Initial depth in storage basin = 0.00 (Ft.)  
 -----

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

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 Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.250	0.050	0.001	0.050	0.050
1.000	0.190	0.800	0.187	0.193
2.000	0.330	1.300	0.326	0.334
3.000	0.470	1.600	0.464	0.476
3.400	0.530	1.700	0.524	0.536
4.070	0.860	1.800	0.854	0.866

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4.400	1.040	3.800	1.027	1.053
5.400	1.620	5.400	1.601	1.639
6.400	2.280	6.500	2.258	2.302
7.400	3.020	7.400	2.995	3.045
8.400	3.880	8.300	3.851	3.909

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

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)						Depth (Ft.)
0.083	0.06	0.00	0.000	O					0.00
0.167	0.32	0.00	0.002	O					0.01
0.250	0.74	0.00	0.005	O I					0.03
0.333	1.07	0.00	0.011	O I					0.06
0.417	1.24	0.00	0.019	O I					0.10
0.500	1.35	0.00	0.028	O I					0.14
0.583	1.47	0.00	0.038	O I					0.19
0.667	1.60	0.00	0.049	O I					0.24
0.750	1.70	0.06	0.060	O I					0.30
0.833	1.76	0.12	0.071	O I					0.36
0.917	1.80	0.18	0.082	O I					0.42
1.000	1.75	0.25	0.093	O I					0.48
1.083	1.46	0.30	0.102	O I					0.53
1.167	0.99	0.33	0.108	O I					0.56
1.250	0.67	0.35	0.112	O I					0.58
1.333	0.52	0.36	0.113	O					0.59
1.417	0.44	0.37	0.114	O					0.59
1.500	0.37	0.37	0.114	O					0.60
1.583	0.32	0.37	0.114	O					0.59
1.667	0.28	0.37	0.114	O					0.59
1.750	0.25	0.36	0.113	O					0.59
1.833	0.23	0.36	0.112	O					0.58
1.917	0.20	0.35	0.111	O					0.58
2.000	0.20	0.35	0.110	O					0.57
2.083	0.23	0.34	0.109	O					0.57
2.167	0.26	0.34	0.109	O					0.57
2.250	0.28	0.33	0.108	O					0.56
2.333	0.33	0.33	0.108	O					0.56
2.417	0.37	0.33	0.108	O I					0.56
2.500	0.39	0.34	0.109	O I					0.56
2.583	0.39	0.34	0.109	O I					0.57
2.667	0.40	0.34	0.109	O I					0.57
2.750	0.42	0.34	0.110	O I					0.57
2.833	0.49	0.35	0.111	O I					0.57
2.917	0.59	0.35	0.112	O I					0.58
3.000	0.65	0.36	0.114	O					0.59
3.083	0.69	0.38	0.116	O					0.60
3.167	0.72	0.39	0.118	O I					0.61
3.250	0.80	0.40	0.121	O I					0.63
3.333	0.91	0.42	0.124	O I					0.64
3.417	0.99	0.44	0.127	O I					0.66
3.500	1.10	0.46	0.131	O I					0.69
3.583	1.30	0.49	0.136	O I					0.71
3.667	1.53	0.53	0.142	O I					0.75
3.750	1.74	0.57	0.150	O I					0.79
3.833	1.92	0.62	0.158	O I					0.83
3.917	2.10	0.67	0.168	O I					0.88
4.000	2.27	0.73	0.178	O I					0.94
4.083	2.45	0.79	0.189	O I					0.99
4.167	2.63	0.84	0.201	O I					1.08

4.250	2.87	0.89	0.214	O	I					1.17
4.333	3.15	0.94	0.228	O	I					1.27
4.417	3.44	0.99	0.244	O	I					1.39
4.500	3.73	1.06	0.262	O	I					1.51
4.583	3.99	1.13	0.281	O	I					1.65
4.667	4.22	1.20	0.301	O	I					1.80
4.750	4.48	1.27	0.323	O	I					1.95
4.833	4.77	1.33	0.346	O	I					2.11
4.917	5.02	1.39	0.370	O	I					2.29
5.000	5.25	1.44	0.396	O	I					2.47
5.083	5.58	1.50	0.423	O	I					2.66
5.167	6.18	1.56	0.453	O	I					2.88
5.250	7.12	1.63	0.488	O	I		I			3.12
5.333	8.20	1.70	0.529	O	I		I			3.39
5.417	9.25	1.71	0.577	O	I		I			3.50
5.500	10.44	1.73	0.633	O	I		I			3.61
5.583	11.37	1.75	0.696	O	I		I			3.74
5.667	10.44	1.77	0.759	O	I		I			3.87
5.750	7.45	1.78	0.809	O	I		I			3.97
5.833	5.02	1.79	0.839	O	I		I			4.03
5.917	3.93	1.80	0.858	O	I		I			4.07
6.000	3.26	1.91	0.870	O	I		I			4.09
6.083	2.62	1.98	0.877	O	I		I			4.10
6.167	2.04	2.01	0.879	O	I		I			4.10
6.250	1.56	1.99	0.878	O	I		I			4.10
6.333	1.21	1.95	0.873	I	O					4.09
6.417	0.98	1.89	0.868	I	O					4.08
6.500	0.81	1.81	0.861	I	O					4.07
6.583	0.66	1.80	0.854	I	O					4.06
6.667	0.54	1.80	0.846	I	O					4.04
6.750	0.44	1.79	0.837	I	O					4.02
6.833	0.35	1.79	0.827	I	O					4.00
6.917	0.27	1.79	0.817	I	O					3.98
7.000	0.21	1.78	0.806	I	O					3.96
7.083	0.16	1.78	0.795	I	O					3.94
7.167	0.10	1.78	0.784	I	O					3.92
7.250	0.04	1.77	0.772	I	O					3.89
7.333	0.02	1.77	0.760	I	O					3.87
7.417	0.02	1.77	0.748	I	O					3.84
7.500	0.01	1.76	0.736	I	O					3.82
7.583	0.00	1.76	0.724	I	O					3.79
7.667	0.00	1.76	0.712	I	O					3.77
7.750	0.00	1.75	0.700	I	O					3.74
7.833	0.00	1.75	0.688	I	O					3.72
7.917	0.00	1.74	0.676	I	O					3.70
8.000	0.00	1.74	0.664	I	O					3.67
8.083	0.00	1.74	0.652	I	O					3.65
8.167	0.00	1.73	0.640	I	O					3.62
8.250	0.00	1.73	0.628	I	O					3.60
8.333	0.00	1.73	0.616	I	O					3.57
8.417	0.00	1.72	0.604	I	O					3.55
8.500	0.00	1.72	0.592	I	O					3.53
8.583	0.00	1.72	0.580	I	O					3.50
8.667	0.00	1.71	0.569	I	O					3.48
8.750	0.00	1.71	0.557	I	O					3.45
8.833	0.00	1.70	0.545	I	O					3.43
8.917	0.00	1.70	0.533	I	O					3.41
9.000	0.00	1.69	0.522	I	O					3.34
9.083	0.00	1.67	0.510	I	O					3.27
9.167	0.00	1.65	0.499	I	O					3.19
9.250	0.00	1.63	0.487	I	O					3.12
9.333	0.00	1.61	0.476	I	O					3.04
9.417	0.00	1.59	0.465	I	O					2.97

9.500	0.00	1.57	0.454	I	O	2.89
9.583	0.00	1.54	0.444	I	O	2.81
9.667	0.00	1.52	0.433	I	O	2.74
9.750	0.00	1.50	0.423	I	O	2.66
9.833	0.00	1.48	0.412	I	O	2.59
9.917	0.00	1.45	0.402	I	O	2.52
10.000	0.00	1.43	0.392	I	O	2.45
10.083	0.00	1.41	0.383	I	O	2.38
10.167	0.00	1.39	0.373	I	O	2.31
10.250	0.00	1.37	0.363	I	O	2.24
10.333	0.00	1.35	0.354	I	O	2.17
10.417	0.00	1.33	0.345	I	O	2.11
10.500	0.00	1.31	0.336	I	O	2.04
10.583	0.00	1.29	0.327	I	O	1.98
10.667	0.00	1.26	0.318	I	O	1.91
10.750	0.00	1.23	0.309	I	O	1.85
10.833	0.00	1.20	0.301	I	O	1.79
10.917	0.00	1.17	0.293	I	O	1.74
11.000	0.00	1.14	0.285	I	O	1.68
11.083	0.00	1.11	0.277	I	O	1.62
11.167	0.00	1.08	0.270	I	O	1.57
11.250	0.00	1.06	0.262	I	O	1.52
11.333	0.00	1.03	0.255	I	O	1.46
11.417	0.00	1.01	0.248	I	O	1.41
11.500	0.00	0.98	0.241	I	O	1.37
11.583	0.00	0.96	0.235	I	O	1.32
11.667	0.00	0.94	0.228	I	O	1.27
11.750	0.00	0.91	0.222	I	O	1.23
11.833	0.00	0.89	0.215	I	O	1.18
11.917	0.00	0.87	0.209	I	O	1.14
12.000	0.00	0.85	0.203	I	O	1.10
12.083	0.00	0.83	0.198	I	O	1.05
12.167	0.00	0.81	0.192	I	O	1.01
12.250	0.00	0.78	0.187	I	O	0.98
12.333	0.00	0.75	0.181	I	O	0.95
12.417	0.00	0.72	0.176	I	O	0.93
12.500	0.00	0.69	0.171	IO		0.90
12.583	0.00	0.67	0.167	IO		0.88
12.667	0.00	0.64	0.162	IO		0.85
12.750	0.00	0.62	0.158	IO		0.83
12.833	0.00	0.59	0.154	IO		0.81
12.917	0.00	0.57	0.150	IO		0.78
13.000	0.00	0.55	0.146	IO		0.76
13.083	0.00	0.53	0.142	IO		0.74
13.167	0.00	0.51	0.139	IO		0.72
13.250	0.00	0.49	0.135	IO		0.71
13.333	0.00	0.47	0.132	IO		0.69
13.417	0.00	0.45	0.129	IO		0.67
13.500	0.00	0.43	0.126	IO		0.66
13.583	0.00	0.42	0.123	IO		0.64
13.667	0.00	0.40	0.120	IO		0.62
13.750	0.00	0.38	0.117	IO		0.61
13.833	0.00	0.37	0.115	IO		0.60
13.917	0.00	0.36	0.112	IO		0.58
14.000	0.00	0.34	0.110	O		0.57
14.083	0.00	0.33	0.107	O		0.56
14.167	0.00	0.32	0.105	O		0.55
14.250	0.00	0.30	0.103	O		0.53
14.333	0.00	0.29	0.101	O		0.52
14.417	0.00	0.28	0.099	O		0.51
14.500	0.00	0.27	0.097	O		0.50
14.583	0.00	0.26	0.095	O		0.49
14.667	0.00	0.25	0.094	O		0.48

14.750	0.00	0.24	0.092	0	0.47
14.833	0.00	0.23	0.090	0	0.47
14.917	0.00	0.22	0.089	0	0.46
15.000	0.00	0.21	0.087	0	0.45
15.083	0.00	0.21	0.086	0	0.44
15.167	0.00	0.20	0.084	0	0.43
15.250	0.00	0.19	0.083	0	0.43
15.333	0.00	0.18	0.082	0	0.42
15.417	0.00	0.18	0.081	0	0.41
15.500	0.00	0.17	0.079	0	0.41
15.583	0.00	0.16	0.078	0	0.40
15.667	0.00	0.16	0.077	0	0.40
15.750	0.00	0.15	0.076	0	0.39
15.833	0.00	0.14	0.075	0	0.38
15.917	0.00	0.14	0.074	0	0.38
16.000	0.00	0.13	0.073	0	0.37
16.083	0.00	0.13	0.072	0	0.37
16.167	0.00	0.12	0.071	0	0.36
16.250	0.00	0.12	0.071	0	0.36
16.333	0.00	0.11	0.070	0	0.36
16.417	0.00	0.11	0.069	0	0.35
16.500	0.00	0.11	0.068	0	0.35
16.583	0.00	0.10	0.068	0	0.34
16.667	0.00	0.10	0.067	0	0.34
16.750	0.00	0.09	0.066	0	0.34
16.833	0.00	0.09	0.066	0	0.33
16.917	0.00	0.09	0.065	0	0.33
17.000	0.00	0.08	0.064	0	0.33
17.083	0.00	0.08	0.064	0	0.32
17.167	0.00	0.08	0.063	0	0.32
17.250	0.00	0.07	0.063	0	0.32
17.333	0.00	0.07	0.062	0	0.32
17.417	0.00	0.07	0.062	0	0.31
17.500	0.00	0.07	0.061	0	0.31
17.583	0.00	0.06	0.061	0	0.31
17.667	0.00	0.06	0.060	0	0.31
17.750	0.00	0.06	0.060	0	0.30
17.833	0.00	0.06	0.060	0	0.30
17.917	0.00	0.05	0.059	0	0.30
18.000	0.00	0.05	0.059	0	0.30
18.083	0.00	0.05	0.059	0	0.30
18.167	0.00	0.05	0.058	0	0.29
18.250	0.00	0.05	0.058	0	0.29
18.333	0.00	0.04	0.058	0	0.29
18.417	0.00	0.04	0.057	0	0.29
18.500	0.00	0.04	0.057	0	0.29
18.583	0.00	0.04	0.057	0	0.29
18.667	0.00	0.04	0.056	0	0.28
18.750	0.00	0.04	0.056	0	0.28
18.833	0.00	0.03	0.056	0	0.28
18.917	0.00	0.03	0.056	0	0.28
19.000	0.00	0.03	0.055	0	0.28
19.083	0.00	0.03	0.055	0	0.28
19.167	0.00	0.03	0.055	0	0.28
19.250	0.00	0.03	0.055	0	0.28
19.333	0.00	0.03	0.055	0	0.27
19.417	0.00	0.03	0.054	0	0.27
19.500	0.00	0.03	0.054	0	0.27
19.583	0.00	0.02	0.054	0	0.27
19.667	0.00	0.02	0.054	0	0.27
19.750	0.00	0.02	0.054	0	0.27
19.833	0.00	0.02	0.054	0	0.27
19.917	0.00	0.02	0.054	0	0.27

20.000	0.00	0.02	0.053	0	0.27
20.083	0.00	0.02	0.053	0	0.27
20.167	0.00	0.02	0.053	0	0.27
20.250	0.00	0.02	0.053	0	0.27
20.333	0.00	0.02	0.053	0	0.27
20.417	0.00	0.02	0.053	0	0.26
20.500	0.00	0.02	0.053	0	0.26
20.583	0.00	0.02	0.053	0	0.26
20.667	0.00	0.01	0.052	0	0.26
20.750	0.00	0.01	0.052	0	0.26
20.833	0.00	0.01	0.052	0	0.26
20.917	0.00	0.01	0.052	0	0.26
21.000	0.00	0.01	0.052	0	0.26
21.083	0.00	0.01	0.052	0	0.26
21.167	0.00	0.01	0.052	0	0.26
21.250	0.00	0.01	0.052	0	0.26
21.333	0.00	0.01	0.052	0	0.26
21.417	0.00	0.01	0.052	0	0.26
21.500	0.00	0.01	0.052	0	0.26
21.583	0.00	0.01	0.051	0	0.26
21.667	0.00	0.01	0.051	0	0.26
21.750	0.00	0.01	0.051	0	0.26
21.833	0.00	0.01	0.051	0	0.26
21.917	0.00	0.01	0.051	0	0.26
22.000	0.00	0.01	0.051	0	0.26
22.083	0.00	0.01	0.051	0	0.26
22.167	0.00	0.01	0.051	0	0.26
22.250	0.00	0.01	0.051	0	0.26
22.333	0.00	0.01	0.051	0	0.26
22.417	0.00	0.01	0.051	0	0.26
22.500	0.00	0.01	0.051	0	0.25
22.583	0.00	0.01	0.051	0	0.25
22.667	0.00	0.01	0.051	0	0.25
22.750	0.00	0.01	0.051	0	0.25
22.833	0.00	0.01	0.051	0	0.25
22.917	0.00	0.01	0.051	0	0.25
23.000	0.00	0.00	0.051	0	0.25
23.083	0.00	0.00	0.051	0	0.25
23.167	0.00	0.00	0.051	0	0.25
23.250	0.00	0.00	0.051	0	0.25
23.333	0.00	0.00	0.051	0	0.25
23.417	0.00	0.00	0.051	0	0.25
23.500	0.00	0.00	0.051	0	0.25
23.583	0.00	0.00	0.050	0	0.25
23.667	0.00	0.00	0.050	0	0.25
23.750	0.00	0.00	0.050	0	0.25
23.833	0.00	0.00	0.050	0	0.25
23.917	0.00	0.00	0.050	0	0.25
24.000	0.00	0.00	0.050	0	0.25
24.083	0.00	0.00	0.050	0	0.25
24.167	0.00	0.00	0.050	0	0.25
24.250	0.00	0.00	0.050	0	0.25
24.333	0.00	0.00	0.050	0	0.25
24.417	0.00	0.00	0.050	0	0.25
24.500	0.00	0.00	0.050	0	0.25
24.583	0.00	0.00	0.050	0	0.25
24.667	0.00	0.00	0.050	0	0.25
24.750	0.00	0.00	0.050	0	0.25
24.833	0.00	0.00	0.050	0	0.25
24.917	0.00	0.00	0.050	0	0.25
25.000	0.00	0.00	0.050	0	0.25
25.083	0.00	0.00	0.050	0	0.25
25.167	0.00	0.00	0.050	0	0.25

25.250	0.00	0.00	0.050	0					0.25
25.333	0.00	0.00	0.050	0					0.25
25.417	0.00	0.00	0.050	0					0.25
25.500	0.00	0.00	0.050	0					0.25
25.583	0.00	0.00	0.050	0					0.25
25.667	0.00	0.00	0.050	0					0.25
25.750	0.00	0.00	0.050	0					0.25
25.833	0.00	0.00	0.050	0					0.25
25.917	0.00	0.00	0.050	0					0.25
26.000	0.00	0.00	0.050	0					0.25
26.083	0.00	0.00	0.050	0					0.25
26.167	0.00	0.00	0.050	0					0.25
26.250	0.00	0.00	0.050	0					0.25
26.333	0.00	0.00	0.050	0					0.25
26.417	0.00	0.00	0.050	0					0.25

Remaining water in basin = 0.05 (Ac.Ft)

\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*

Number of intervals = 317

Time interval = 5.0 (Min.)

Maximum/Peak flow rate = 2.010 (CFS)

Total volume = 1.245 (Ac.Ft)

Status of hydrographs being held in storage

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

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FLOOD HYDROGRAPH ROUTING PROGRAM  
 Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005  
 Study date: 04/24/23

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 Black Creek - harvill at Water Industrial  
 Basin Routing Study - 24 Hour 5 Year Storm  
 3963ROUTING245  
 CB  
 -----

Program License Serial Number 6145

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 \*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: 3963UNIHYDQ5P245.rte  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 308  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 4.375 (CFS)  
 Total volume = 2.419 (Ac.Ft)  
 Status of hydrographs being held in storage  
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5  
 Peak (CFS)          0.000    0.000    0.000    0.000    0.000  
 Vol (Ac.Ft)          0.000    0.000    0.000    0.000    0.000  
 \*\*\*\*\*

+++++  
 Process from Point/Station 1.000 to Point/Station 1.000  
 \*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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 User entry of depth-outflow-storage data

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 Total number of inflow hydrograph intervals = 308  
 Hydrograph time unit = 5.000 (Min.)  
 Initial depth in storage basin = 0.00 (Ft.)  
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-----  
 Initial basin depth = 0.00 (Ft.)  
 Initial basin storage = 0.00 (Ac.Ft)  
 Initial basin outflow = 0.00 (CFS)  
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 Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.250	0.050	0.001	0.050	0.050
1.000	0.190	0.800	0.187	0.193
2.000	0.330	1.300	0.326	0.334
3.000	0.470	1.600	0.464	0.476
3.400	0.530	1.700	0.524	0.536
4.070	0.860	1.800	0.854	0.866

4.400	1.040	3.800	1.027	1.053
5.400	1.620	5.400	1.601	1.639
6.400	2.280	6.500	2.258	2.302
7.400	3.020	7.400	2.995	3.045
8.400	3.880	8.300	3.851	3.909

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

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	1.1	2.19	3.28	4.38	Depth (Ft.)
0.083	0.01	0.00	0.000	O					0.00
0.167	0.07	0.00	0.000	O					0.00
0.250	0.16	0.00	0.001	O I					0.01
0.333	0.23	0.00	0.002	O I					0.01
0.417	0.29	0.00	0.004	O I					0.02
0.500	0.35	0.00	0.006	O I					0.03
0.583	0.39	0.00	0.009	O I					0.05
0.667	0.42	0.00	0.012	O I					0.06
0.750	0.44	0.00	0.015	O I					0.07
0.833	0.46	0.00	0.018	O I					0.09
0.917	0.50	0.00	0.021	O I					0.11
1.000	0.55	0.00	0.025	O I					0.12
1.083	0.58	0.00	0.029	O I					0.14
1.167	0.57	0.00	0.032	O I					0.16
1.250	0.54	0.00	0.036	O I					0.18
1.333	0.52	0.00	0.040	O I					0.20
1.417	0.51	0.00	0.044	O I					0.22
1.500	0.51	0.00	0.047	O I					0.24
1.583	0.51	0.00	0.051	O I					0.25
1.667	0.51	0.02	0.054	O I					0.27
1.750	0.51	0.04	0.057	O I					0.29
1.833	0.52	0.06	0.060	O I					0.31
1.917	0.55	0.08	0.064	O I					0.32
2.000	0.59	0.10	0.067	O I					0.34
2.083	0.62	0.12	0.070	O I					0.36
2.167	0.63	0.14	0.074	O I					0.38
2.250	0.64	0.16	0.077	O I					0.40
2.333	0.65	0.17	0.080	O I					0.41
2.417	0.65	0.19	0.084	O I					0.43
2.500	0.66	0.21	0.087	O I					0.45
2.583	0.67	0.23	0.090	O I					0.46
2.667	0.70	0.25	0.093	O I					0.48
2.750	0.74	0.26	0.096	O I					0.50
2.833	0.78	0.28	0.099	O I					0.51
2.917	0.79	0.30	0.103	O I					0.53
3.000	0.80	0.32	0.106	O I					0.55
3.083	0.81	0.34	0.109	O I					0.57
3.167	0.82	0.36	0.113	O I					0.59
3.250	0.82	0.38	0.116	O I					0.60
3.333	0.82	0.39	0.119	O I					0.62
3.417	0.83	0.41	0.122	O I					0.63
3.500	0.83	0.43	0.124	O I					0.65
3.583	0.83	0.44	0.127	O I					0.66
3.667	0.83	0.46	0.130	O I					0.68
3.750	0.84	0.47	0.132	O I					0.69
3.833	0.84	0.49	0.135	O I					0.70
3.917	0.87	0.50	0.137	O I					0.72
4.000	0.92	0.52	0.140	O I					0.73
4.083	0.95	0.53	0.143	O I					0.75
4.167	0.96	0.55	0.146	O I					0.76

4.250	0.97	0.56	0.149	O	I				0.78
4.333	0.99	0.58	0.151	O	I				0.79
4.417	1.02	0.60	0.154	O	I				0.81
4.500	1.07	0.61	0.157	O	I				0.83
4.583	1.10	0.63	0.161	O	I				0.84
4.667	1.12	0.65	0.164	O	I				0.86
4.750	1.13	0.67	0.167	O	I				0.88
4.833	1.15	0.69	0.170	O	I				0.89
4.917	1.18	0.71	0.173	O	I				0.91
5.000	1.23	0.73	0.177	O	I				0.93
5.083	1.25	0.75	0.180	O	I				0.95
5.167	1.21	0.76	0.184	O	I				0.97
5.250	1.14	0.78	0.186	O	I				0.98
5.333	1.09	0.79	0.189	O	I				0.99
5.417	1.10	0.80	0.191	O	I				1.01
5.500	1.13	0.81	0.193	O	I				1.02
5.583	1.16	0.82	0.195	O	I				1.04
5.667	1.20	0.83	0.198	O	I				1.06
5.750	1.25	0.84	0.200	O	I				1.07
5.833	1.28	0.85	0.203	O	I				1.10
5.917	1.30	0.86	0.206	O	I				1.12
6.000	1.31	0.87	0.209	O	I				1.14
6.083	1.32	0.88	0.212	O	I				1.16
6.167	1.36	0.89	0.215	O	I				1.18
6.250	1.41	0.90	0.219	O	I				1.21
6.333	1.44	0.92	0.222	O	I				1.23
6.417	1.46	0.93	0.226	O	I				1.26
6.500	1.47	0.94	0.230	O	I				1.28
6.583	1.48	0.95	0.233	O	I				1.31
6.667	1.52	0.97	0.237	O	I				1.34
6.750	1.57	0.98	0.241	O	I				1.36
6.833	1.60	1.00	0.245	O	I				1.39
6.917	1.62	1.01	0.249	O	I				1.42
7.000	1.63	1.03	0.253	O	I				1.45
7.083	1.64	1.04	0.258	O	I				1.48
7.167	1.65	1.06	0.262	O	I				1.51
7.250	1.66	1.07	0.266	O	I				1.54
7.333	1.67	1.08	0.270	O	I				1.57
7.417	1.70	1.10	0.274	O	I				1.60
7.500	1.75	1.11	0.278	O	I				1.63
7.583	1.79	1.13	0.283	O	I				1.66
7.667	1.84	1.15	0.287	O	I				1.69
7.750	1.89	1.16	0.292	O	I				1.73
7.833	1.94	1.18	0.297	O	I				1.77
7.917	1.99	1.20	0.302	O	I				1.80
8.000	2.04	1.22	0.308	O	I				1.84
8.083	2.10	1.24	0.314	O	I				1.88
8.167	2.18	1.26	0.320	O	I				1.93
8.250	2.28	1.29	0.326	O	I				1.97
8.333	2.36	1.31	0.334	O	I				2.03
8.417	2.29	1.32	0.340	O	I				2.07
8.500	1.88	1.33	0.346	O	I				2.11
8.583	1.24	1.34	0.347	O	I				2.12
8.667	0.86	1.33	0.345	I	O				2.11
8.750	0.71	1.32	0.342	I	O				2.08
8.833	0.64	1.32	0.337	I	O				2.05
8.917	0.61	1.31	0.332	I	O				2.02
9.000	0.62	1.29	0.328	I	O				1.98
9.083	0.64	1.28	0.323	I	O				1.95
9.167	0.70	1.26	0.319	I	O				1.92
9.250	0.80	1.25	0.316	I	O				1.90
9.333	0.88	1.24	0.313	I	O				1.88
9.417	0.95	1.23	0.311	I	O				1.86

9.500	1.02	1.22	0.309	IO					1.85
9.583	1.09	1.22	0.308	IO					1.84
9.667	1.16	1.22	0.307	O					1.84
9.750	1.24	1.22	0.307	OI					1.84
9.833	1.30	1.22	0.307	OI					1.84
9.917	1.38	1.22	0.308	O I					1.84
10.000	1.46	1.23	0.309	O I					1.85
10.083	1.46	1.23	0.311	OI					1.86
10.167	1.26	1.24	0.312	O					1.87
10.250	0.92	1.23	0.311	I O					1.86
10.333	0.69	1.22	0.308	I O					1.84
10.417	0.60	1.21	0.304	I O					1.81
10.500	0.54	1.19	0.300	I O					1.78
10.583	0.55	1.18	0.295	I O					1.75
10.667	0.71	1.16	0.292	I O					1.73
10.750	0.96	1.15	0.289	IO					1.71
10.833	1.13	1.15	0.289	O					1.70
10.917	1.22	1.15	0.289	O					1.71
11.000	1.27	1.15	0.289	OI					1.71
11.083	1.30	1.16	0.290	OI					1.72
11.167	1.30	1.16	0.291	OI					1.72
11.250	1.27	1.16	0.292	OI					1.73
11.333	1.26	1.17	0.293	OI					1.73
11.417	1.27	1.17	0.293	OI					1.74
11.500	1.28	1.17	0.294	OI					1.74
11.583	1.27	1.17	0.295	OI					1.75
11.667	1.21	1.18	0.295	O					1.75
11.750	1.11	1.18	0.295	O					1.75
11.833	1.06	1.17	0.295	IO					1.75
11.917	1.08	1.17	0.294	IO					1.74
12.000	1.12	1.17	0.293	O					1.74
12.083	1.22	1.17	0.293	O					1.74
12.167	1.49	1.17	0.295	O I					1.75
12.250	1.88	1.19	0.298	O I					1.77
12.333	2.16	1.21	0.304	O I					1.81
12.417	2.33	1.23	0.311	O I					1.86
12.500	2.47	1.26	0.319	O I					1.92
12.583	2.60	1.29	0.328	O I					1.98
12.667	2.74	1.31	0.337	O I					2.05
12.750	2.91	1.34	0.347	O I					2.12
12.833	3.04	1.36	0.358	O I					2.20
12.917	3.15	1.39	0.370	O I					2.29
13.000	3.26	1.41	0.383	O I					2.38
13.083	3.39	1.44	0.396	O I					2.47
13.167	3.63	1.47	0.410	O I					2.57
13.250	3.94	1.50	0.426	O I					2.68
13.333	4.16	1.54	0.443	O I					2.81
13.417	4.29	1.58	0.461	O I					2.94
13.500	4.38	1.62	0.480	O I					3.07
13.583	4.35	1.65	0.499	O I					3.19
13.667	4.01	1.68	0.516	O I					3.31
13.750	3.47	1.70	0.531	O I					3.40
13.833	3.11	1.70	0.541	O I					3.42
13.917	2.94	1.71	0.550	O I					3.44
14.000	2.85	1.71	0.559	O I					3.46
14.083	2.82	1.71	0.566	O I					3.47
14.167	2.91	1.71	0.574	O I					3.49
14.250	3.10	1.72	0.583	O I					3.51
14.333	3.21	1.72	0.593	O I					3.53
14.417	3.22	1.72	0.603	O I					3.55
14.500	3.20	1.73	0.614	O I					3.57
14.583	3.19	1.73	0.624	O I					3.59
14.667	3.19	1.73	0.634	O I					3.61

14.750	3.20	1.73	0.644			O		I		3.63
14.833	3.19	1.74	0.654			O		I		3.65
14.917	3.16	1.74	0.664			O		I		3.67
15.000	3.11	1.74	0.673			O		I		3.69
15.083	3.08	1.75	0.683			O		I		3.71
15.167	3.03	1.75	0.692			O		I		3.73
15.250	2.97	1.75	0.700			O		I		3.75
15.333	2.93	1.75	0.709			O		I		3.76
15.417	2.88	1.76	0.716			O		I		3.78
15.500	2.83	1.76	0.724			O		I		3.79
15.583	2.76	1.76	0.731			O		I		3.81
15.667	2.60	1.76	0.737			O		I		3.82
15.750	2.38	1.76	0.742			O		I		3.83
15.833	2.22	1.77	0.746			O		I		3.84
15.917	2.15	1.77	0.749			O		I		3.84
16.000	2.11	1.77	0.752			O		I		3.85
16.083	2.02	1.77	0.754			O		I		3.85
16.167	1.78	1.77	0.754			O				3.86
16.250	1.42	1.77	0.753			I	O			3.85
16.333	1.18	1.77	0.750			I	O			3.85
16.417	1.05	1.77	0.746			I	O			3.84
16.500	0.97	1.76	0.740			I	O			3.83
16.583	0.90	1.76	0.735			I	O			3.82
16.667	0.83	1.76	0.729			I	O			3.80
16.750	0.74	1.76	0.722			I	O			3.79
16.833	0.68	1.76	0.715			I	O			3.78
16.917	0.65	1.75	0.707			I	O			3.76
17.000	0.62	1.75	0.699			I	O			3.74
17.083	0.61	1.75	0.692			I	O			3.73
17.167	0.64	1.75	0.684			I	O			3.71
17.250	0.72	1.74	0.677			I	O			3.70
17.333	0.77	1.74	0.670			I	O			3.68
17.417	0.79	1.74	0.663			I	O			3.67
17.500	0.80	1.74	0.656			I	O			3.66
17.583	0.80	1.74	0.650			I	O			3.64
17.667	0.81	1.73	0.644			I	O			3.63
17.750	0.81	1.73	0.637			I	O			3.62
17.833	0.81	1.73	0.631			I	O			3.60
17.917	0.78	1.73	0.624			I	O			3.59
18.000	0.74	1.73	0.618			I	O			3.58
18.083	0.72	1.72	0.611			I	O			3.56
18.167	0.70	1.72	0.604			I	O			3.55
18.250	0.70	1.72	0.597			I	O			3.54
18.333	0.69	1.72	0.590			I	O			3.52
18.417	0.69	1.72	0.583			I	O			3.51
18.500	0.69	1.71	0.576			I	O			3.49
18.583	0.68	1.71	0.569			I	O			3.48
18.667	0.65	1.71	0.561			I	O			3.46
18.750	0.60	1.71	0.554			I	O			3.45
18.833	0.56	1.70	0.546			I	O			3.43
18.917	0.52	1.70	0.538			I	O			3.42
19.000	0.46	1.70	0.530			I	O			3.40
19.083	0.43	1.69	0.521			I	O			3.34
19.167	0.44	1.67	0.513			I	O			3.28
19.250	0.47	1.66	0.504			I	O			3.23
19.333	0.50	1.64	0.496			I	O			3.18
19.417	0.53	1.63	0.489			I	O			3.12
19.500	0.58	1.62	0.481			I	O			3.07
19.583	0.60	1.61	0.474			I	O			3.03
19.667	0.59	1.59	0.467			I	O			2.98
19.750	0.55	1.58	0.460			I	O			2.93
19.833	0.52	1.56	0.453			I	O			2.88
19.917	0.49	1.55	0.446			I	O			2.83

20.000	0.44	1.53	0.438	I	O	2.77
20.083	0.41	1.52	0.431	I	O	2.72
20.167	0.42	1.50	0.423	I	O	2.67
20.250	0.46	1.48	0.416	I	O	2.61
20.333	0.48	1.47	0.409	I	O	2.57
20.417	0.49	1.46	0.402	I	O	2.52
20.500	0.49	1.44	0.396	I	O	2.47
20.583	0.49	1.43	0.389	I	O	2.42
20.667	0.50	1.41	0.383	I	O	2.38
20.750	0.50	1.40	0.377	I	O	2.33
20.833	0.49	1.39	0.370	I	O	2.29
20.917	0.46	1.37	0.364	I	O	2.24
21.000	0.42	1.36	0.358	I	O	2.20
21.083	0.40	1.35	0.351	I	O	2.15
21.167	0.41	1.33	0.345	I	O	2.11
21.250	0.45	1.32	0.339	I	O	2.06
21.333	0.46	1.31	0.333	I	O	2.02
21.417	0.44	1.29	0.327	I	O	1.98
21.500	0.41	1.27	0.321	I	O	1.94
21.583	0.39	1.25	0.315	I	O	1.89
21.667	0.40	1.23	0.309	I	O	1.85
21.750	0.44	1.21	0.304	I	O	1.81
21.833	0.46	1.19	0.299	I	O	1.78
21.917	0.44	1.17	0.294	I	O	1.74
22.000	0.40	1.15	0.289	I	O	1.71
22.083	0.38	1.13	0.284	I	O	1.67
22.167	0.40	1.12	0.279	I	O	1.63
22.250	0.44	1.10	0.274	I	O	1.60
22.333	0.46	1.08	0.269	I	O	1.57
22.417	0.44	1.07	0.265	I	O	1.54
22.500	0.40	1.05	0.261	I	O	1.50
22.583	0.38	1.04	0.256	I	O	1.47
22.667	0.36	1.02	0.252	I	O	1.44
22.750	0.36	1.00	0.247	I	O	1.41
22.833	0.35	0.99	0.243	I	O	1.38
22.917	0.35	0.97	0.238	I	O	1.35
23.000	0.35	0.96	0.234	I	O	1.32
23.083	0.34	0.94	0.230	I	O	1.29
23.167	0.34	0.93	0.226	I	O	1.26
23.250	0.34	0.91	0.222	I	O	1.23
23.333	0.34	0.90	0.218	I	O	1.20
23.417	0.34	0.89	0.214	I	O	1.17
23.500	0.34	0.87	0.210	I	O	1.15
23.583	0.34	0.86	0.207	I	O	1.12
23.667	0.34	0.85	0.203	I	O	1.10
23.750	0.34	0.84	0.200	I	O	1.07
23.833	0.34	0.82	0.196	I	O	1.05
23.917	0.34	0.81	0.193	I	O	1.02
24.000	0.34	0.80	0.190	I	O	1.00
24.083	0.32	0.78	0.187	I	O	0.98
24.167	0.26	0.76	0.183	I	O	0.96
24.250	0.17	0.74	0.180	I	O	0.95
24.333	0.11	0.72	0.176	I	O	0.92
24.417	0.09	0.69	0.172	I	O	0.90
24.500	0.07	0.67	0.167	I	O	0.88
24.583	0.05	0.65	0.163	I	O	0.86
24.667	0.04	0.62	0.159	I	O	0.84
24.750	0.04	0.60	0.155	I	O	0.81
24.833	0.03	0.58	0.151	I	O	0.79
24.917	0.02	0.56	0.148	I	O	0.77
25.000	0.02	0.54	0.144	I	O	0.75
25.083	0.01	0.52	0.141	I	O	0.73
25.167	0.01	0.50	0.137	I	O	0.72

25.250	0.01	0.48	0.134	I	O	0.70
25.333	0.01	0.46	0.131	I	O	0.68
25.417	0.01	0.44	0.128	I	O	0.67
25.500	0.00	0.43	0.125	I	O	0.65
25.583	0.00	0.41	0.122	I	O	0.63
25.667	0.00	0.39	0.119	I	O	0.62
25.750	0.00	0.38	0.116	I	O	0.61
25.833	0.00	0.36	0.114	I	O	0.59
25.917	0.00	0.35	0.111	I	O	0.58
26.000	0.00	0.34	0.109	I	O	0.57
26.083	0.00	0.32	0.107	I	O	0.55
26.167	0.00	0.31	0.104	I	O	0.54
26.250	0.00	0.30	0.102	I	O	0.53
26.333	0.00	0.29	0.100	I	O	0.52
26.417	0.00	0.28	0.098	I	O	0.51
26.500	0.00	0.27	0.097	IO		0.50
26.583	0.00	0.26	0.095	IO		0.49
26.667	0.00	0.25	0.093	IO		0.48
26.750	0.00	0.24	0.091	IO		0.47
26.833	0.00	0.23	0.090	IO		0.46
26.917	0.00	0.22	0.088	IO		0.45
27.000	0.00	0.21	0.087	IO		0.45
27.083	0.00	0.20	0.085	IO		0.44
27.167	0.00	0.19	0.084	IO		0.43
27.250	0.00	0.19	0.083	IO		0.42
27.333	0.00	0.18	0.081	IO		0.42
27.417	0.00	0.17	0.080	IO		0.41
27.500	0.00	0.17	0.079	IO		0.41
27.583	0.00	0.16	0.078	IO		0.40
27.667	0.00	0.15	0.077	IO		0.39
27.750	0.00	0.15	0.076	IO		0.39
27.833	0.00	0.14	0.075	IO		0.38
27.917	0.00	0.14	0.074	O		0.38
28.000	0.00	0.13	0.073	O		0.37
28.083	0.00	0.13	0.072	O		0.37
28.167	0.00	0.12	0.071	O		0.36
28.250	0.00	0.12	0.070	O		0.36
28.333	0.00	0.11	0.069	O		0.35
28.417	0.00	0.11	0.069	O		0.35
28.500	0.00	0.10	0.068	O		0.35
28.583	0.00	0.10	0.067	O		0.34
28.667	0.00	0.10	0.067	O		0.34
28.750	0.00	0.09	0.066	O		0.34
28.833	0.00	0.09	0.065	O		0.33
28.917	0.00	0.09	0.065	O		0.33
29.000	0.00	0.08	0.064	O		0.33
29.083	0.00	0.08	0.064	O		0.32
29.167	0.00	0.08	0.063	O		0.32
29.250	0.00	0.07	0.063	O		0.32
29.333	0.00	0.07	0.062	O		0.31
29.417	0.00	0.07	0.062	O		0.31
29.500	0.00	0.06	0.061	O		0.31
29.583	0.00	0.06	0.061	O		0.31
29.667	0.00	0.06	0.060	O		0.31
29.750	0.00	0.06	0.060	O		0.30
29.833	0.00	0.06	0.060	O		0.30
29.917	0.00	0.05	0.059	O		0.30
30.000	0.00	0.05	0.059	O		0.30
30.083	0.00	0.05	0.058	O		0.30
30.167	0.00	0.05	0.058	O		0.29
30.250	0.00	0.05	0.058	O		0.29
30.333	0.00	0.04	0.057	O		0.29
30.417	0.00	0.04	0.057	O		0.29

30.500	0.00	0.04	0.057	0	0.29
30.583	0.00	0.04	0.057	0	0.29
30.667	0.00	0.04	0.056	0	0.28
30.750	0.00	0.04	0.056	0	0.28
30.833	0.00	0.03	0.056	0	0.28
30.917	0.00	0.03	0.056	0	0.28
31.000	0.00	0.03	0.055	0	0.28
31.083	0.00	0.03	0.055	0	0.28
31.167	0.00	0.03	0.055	0	0.28
31.250	0.00	0.03	0.055	0	0.28
31.333	0.00	0.03	0.055	0	0.27
31.417	0.00	0.03	0.054	0	0.27
31.500	0.00	0.03	0.054	0	0.27
31.583	0.00	0.02	0.054	0	0.27
31.667	0.00	0.02	0.054	0	0.27
31.750	0.00	0.02	0.054	0	0.27
31.833	0.00	0.02	0.054	0	0.27
31.917	0.00	0.02	0.053	0	0.27
32.000	0.00	0.02	0.053	0	0.27
32.083	0.00	0.02	0.053	0	0.27
32.167	0.00	0.02	0.053	0	0.27
32.250	0.00	0.02	0.053	0	0.27
32.333	0.00	0.02	0.053	0	0.27
32.417	0.00	0.02	0.053	0	0.26
32.500	0.00	0.02	0.053	0	0.26
32.583	0.00	0.02	0.052	0	0.26
32.667	0.00	0.01	0.052	0	0.26
32.750	0.00	0.01	0.052	0	0.26
32.833	0.00	0.01	0.052	0	0.26
32.917	0.00	0.01	0.052	0	0.26
33.000	0.00	0.01	0.052	0	0.26
33.083	0.00	0.01	0.052	0	0.26
33.167	0.00	0.01	0.052	0	0.26
33.250	0.00	0.01	0.052	0	0.26
33.333	0.00	0.01	0.052	0	0.26
33.417	0.00	0.01	0.052	0	0.26
33.500	0.00	0.01	0.052	0	0.26
33.583	0.00	0.01	0.051	0	0.26
33.667	0.00	0.01	0.051	0	0.26
33.750	0.00	0.01	0.051	0	0.26
33.833	0.00	0.01	0.051	0	0.26
33.917	0.00	0.01	0.051	0	0.26
34.000	0.00	0.01	0.051	0	0.26
34.083	0.00	0.01	0.051	0	0.26
34.167	0.00	0.01	0.051	0	0.26
34.250	0.00	0.01	0.051	0	0.26
34.333	0.00	0.01	0.051	0	0.26
34.417	0.00	0.01	0.051	0	0.26
34.500	0.00	0.01	0.051	0	0.25
34.583	0.00	0.01	0.051	0	0.25
34.667	0.00	0.01	0.051	0	0.25
34.750	0.00	0.01	0.051	0	0.25
34.833	0.00	0.01	0.051	0	0.25
34.917	0.00	0.01	0.051	0	0.25
35.000	0.00	0.00	0.051	0	0.25
35.083	0.00	0.00	0.051	0	0.25
35.167	0.00	0.00	0.051	0	0.25
35.250	0.00	0.00	0.051	0	0.25
35.333	0.00	0.00	0.051	0	0.25
35.417	0.00	0.00	0.051	0	0.25
35.500	0.00	0.00	0.050	0	0.25
35.583	0.00	0.00	0.050	0	0.25
35.667	0.00	0.00	0.050	0	0.25



35.750	0.00	0.00	0.050	0					0.25
35.833	0.00	0.00	0.050	0					0.25
35.917	0.00	0.00	0.050	0					0.25
36.000	0.00	0.00	0.050	0					0.25
36.083	0.00	0.00	0.050	0					0.25
36.167	0.00	0.00	0.050	0					0.25
36.250	0.00	0.00	0.050	0					0.25
36.333	0.00	0.00	0.050	0					0.25
36.417	0.00	0.00	0.050	0					0.25
36.500	0.00	0.00	0.050	0					0.25
36.583	0.00	0.00	0.050	0					0.25
36.667	0.00	0.00	0.050	0					0.25
36.750	0.00	0.00	0.050	0					0.25
36.833	0.00	0.00	0.050	0					0.25
36.917	0.00	0.00	0.050	0					0.25
37.000	0.00	0.00	0.050	0					0.25
37.083	0.00	0.00	0.050	0					0.25
37.167	0.00	0.00	0.050	0					0.25
37.250	0.00	0.00	0.050	0					0.25
37.333	0.00	0.00	0.050	0					0.25
37.417	0.00	0.00	0.050	0					0.25
37.500	0.00	0.00	0.050	0					0.25
37.583	0.00	0.00	0.050	0					0.25
37.667	0.00	0.00	0.050	0					0.25
37.750	0.00	0.00	0.050	0					0.25
37.833	0.00	0.00	0.050	0					0.25
37.917	0.00	0.00	0.050	0					0.25
38.000	0.00	0.00	0.050	0					0.25
38.083	0.00	0.00	0.050	0					0.25
38.167	0.00	0.00	0.050	0					0.25
38.250	0.00	0.00	0.050	0					0.25
38.333	0.00	0.00	0.050	0					0.25
38.417	0.00	0.00	0.050	0					0.25

Remaining water in basin = 0.05 (Ac.Ft)

\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*

Number of intervals = 461

Time interval = 5.0 (Min.)

Maximum/Peak flow rate = 1.768 (CFS)

Total volume = 2.369 (Ac.Ft)

Status of hydrographs being held in storage

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

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FLOOD HYDROGRAPH ROUTING PROGRAM  
 Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005  
 Study date: 04/24/23

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 Black Creek - Harvill at Water Industrial  
 Basin Routing Study - 1 Hour 10 Year Storm  
 3963ROUTING110  
 CB  
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Program License Serial Number 6145

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 \*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: 3963UNIHYDQ10P110.rte  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 31  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 23.126 (CFS)  
 Total volume = 1.135 (Ac.Ft)  
 Status of hydrographs being held in storage  
 Stream 1 Stream 2 Stream 3 Stream 4 Stream 5  
 Peak (CFS) 0.000 0.000 0.000 0.000 0.000  
 Vol (Ac.Ft) 0.000 0.000 0.000 0.000 0.000  
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 Process from Point/Station 1.000 to Point/Station 1.000  
 \*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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 User entry of depth-outflow-storage data

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 Total number of inflow hydrograph intervals = 31  
 Hydrograph time unit = 5.000 (Min.)  
 Initial depth in storage basin = 0.00 (Ft.)  
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 Initial basin depth = 0.00 (Ft.)  
 Initial basin storage = 0.00 (Ac.Ft)  
 Initial basin outflow = 0.00 (CFS)  
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 Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.250	0.050	0.001	0.050	0.050
1.000	0.190	0.800	0.187	0.193
2.000	0.330	1.300	0.326	0.334
3.000	0.470	1.600	0.464	0.476
3.400	0.530	1.700	0.524	0.536
4.070	0.860	1.800	0.854	0.866

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4.400	1.040	3.800	1.027	1.053
5.400	1.620	5.400	1.601	1.639
6.400	2.280	6.500	2.258	2.302
7.400	3.020	7.400	2.995	3.045
8.400	3.880	8.300	3.851	3.909

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

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	5.8	11.56	17.34	23.13	Depth (Ft.)
0.083	0.26	0.00	0.001	O					0.00
0.167	1.34	0.00	0.006	OI					0.03
0.250	3.03	0.00	0.021	O	I				0.11
0.333	4.35	0.00	0.047	O	I				0.23
0.417	5.31	0.17	0.080	O	I				0.41
0.500	6.20	0.39	0.117	O	I				0.61
0.583	7.28	0.63	0.160	O	I				0.84
0.667	8.56	0.87	0.210	O	I				1.14
0.750	10.28	1.08	0.268	O		I			1.56
0.833	14.15	1.33	0.344	O		I			2.10
0.917	20.64	1.56	0.453	O			I		2.88
1.000	23.13	1.72	0.593	O				I	3.53
1.083	17.42	1.76	0.720	O			I		3.79
1.167	11.21	1.78	0.807	O		I			3.96
1.250	7.25	1.80	0.858	O	I				4.07
1.333	5.07	2.10	0.887	O	I				4.12
1.417	3.86	2.28	0.903	O	I				4.15
1.500	3.06	2.36	0.911	O	I				4.16
1.583	2.45	2.39	0.913	O					4.17
1.667	2.00	2.38	0.912	IO					4.17
1.750	1.65	2.34	0.908	IO					4.16
1.833	1.40	2.28	0.903	IO					4.15
1.917	1.14	2.20	0.896	IO					4.14
2.000	0.94	2.12	0.889	IO					4.12
2.083	0.76	2.02	0.880	IO					4.11
2.167	0.61	1.93	0.871	IO					4.09
2.250	0.49	1.82	0.862	IO					4.07
2.333	0.42	1.80	0.853	IO					4.06
2.417	0.38	1.79	0.843	IO					4.04
2.500	0.09	1.79	0.833	IO					4.01
2.583	0.04	1.79	0.821	IO					3.99
2.667	0.00	1.78	0.809	IO					3.97
2.750	0.00	1.78	0.796	IO					3.94
2.833	0.00	1.78	0.784	IO					3.92
2.917	0.00	1.77	0.772	IO					3.89
3.000	0.00	1.77	0.760	IO					3.87
3.083	0.00	1.77	0.747	IO					3.84
3.167	0.00	1.76	0.735	IO					3.82
3.250	0.00	1.76	0.723	IO					3.79
3.333	0.00	1.75	0.711	IO					3.77
3.417	0.00	1.75	0.699	IO					3.74
3.500	0.00	1.75	0.687	IO					3.72
3.583	0.00	1.74	0.675	IO					3.69
3.667	0.00	1.74	0.663	IO					3.67
3.750	0.00	1.74	0.651	IO					3.65
3.833	0.00	1.73	0.639	IO					3.62
3.917	0.00	1.73	0.627	IO					3.60
4.000	0.00	1.73	0.615	IO					3.57
4.083	0.00	1.72	0.603	IO					3.55
4.167	0.00	1.72	0.591	IO					3.52

4.250	0.00	1.72	0.580	I O	3.50
4.333	0.00	1.71	0.568	I O	3.48
4.417	0.00	1.71	0.556	I O	3.45
4.500	0.00	1.70	0.544	I O	3.43
4.583	0.00	1.70	0.533	I O	3.41
4.667	0.00	1.68	0.521	I O	3.34
4.750	0.00	1.67	0.509	I O	3.26
4.833	0.00	1.65	0.498	I O	3.19
4.917	0.00	1.63	0.487	I O	3.11
5.000	0.00	1.61	0.476	I O	3.04
5.083	0.00	1.59	0.464	I O	2.96
5.167	0.00	1.56	0.454	I O	2.88
5.250	0.00	1.54	0.443	I O	2.81
5.333	0.00	1.52	0.432	I O	2.73
5.417	0.00	1.50	0.422	I O	2.66
5.500	0.00	1.48	0.412	I O	2.58
5.583	0.00	1.45	0.402	I O	2.51
5.667	0.00	1.43	0.392	IO	2.44
5.750	0.00	1.41	0.382	IO	2.37
5.833	0.00	1.39	0.372	IO	2.30
5.917	0.00	1.37	0.363	IO	2.23
6.000	0.00	1.35	0.353	IO	2.17
6.083	0.00	1.33	0.344	IO	2.10
6.167	0.00	1.31	0.335	IO	2.04
6.250	0.00	1.29	0.326	IO	1.97
6.333	0.00	1.26	0.317	IO	1.91
6.417	0.00	1.22	0.309	IO	1.85
6.500	0.00	1.19	0.301	IO	1.79
6.583	0.00	1.17	0.292	IO	1.73
6.667	0.00	1.14	0.284	IO	1.67
6.750	0.00	1.11	0.277	IO	1.62
6.833	0.00	1.08	0.269	IO	1.57
6.917	0.00	1.06	0.262	IO	1.51
7.000	0.00	1.03	0.255	IO	1.46
7.083	0.00	1.01	0.248	IO	1.41
7.167	0.00	0.98	0.241	IO	1.36
7.250	0.00	0.96	0.234	IO	1.32
7.333	0.00	0.93	0.228	IO	1.27
7.417	0.00	0.91	0.221	IO	1.22
7.500	0.00	0.89	0.215	IO	1.18
7.583	0.00	0.87	0.209	IO	1.14
7.667	0.00	0.85	0.203	IO	1.09
7.750	0.00	0.83	0.197	IO	1.05
7.833	0.00	0.81	0.192	IO	1.01
7.917	0.00	0.78	0.186	IO	0.98
8.000	0.00	0.75	0.181	IO	0.95
8.083	0.00	0.72	0.176	O	0.92
8.167	0.00	0.69	0.171	O	0.90
8.250	0.00	0.67	0.166	O	0.87
8.333	0.00	0.64	0.162	O	0.85
8.417	0.00	0.61	0.158	O	0.83
8.500	0.00	0.59	0.153	O	0.80
8.583	0.00	0.57	0.149	O	0.78
8.667	0.00	0.55	0.146	O	0.76
8.750	0.00	0.53	0.142	O	0.74
8.833	0.00	0.51	0.138	O	0.72
8.917	0.00	0.49	0.135	O	0.71
9.000	0.00	0.47	0.132	O	0.69
9.083	0.00	0.45	0.129	O	0.67
9.167	0.00	0.43	0.125	O	0.65
9.250	0.00	0.42	0.123	O	0.64
9.333	0.00	0.40	0.120	O	0.62
9.417	0.00	0.38	0.117	O	0.61

9.500	0.00	0.37	0.114	0	0.60
9.583	0.00	0.35	0.112	0	0.58
9.667	0.00	0.34	0.110	0	0.57
9.750	0.00	0.33	0.107	0	0.56
9.833	0.00	0.32	0.105	0	0.54
9.917	0.00	0.30	0.103	0	0.53
10.000	0.00	0.29	0.101	0	0.52
10.083	0.00	0.28	0.099	0	0.51
10.167	0.00	0.27	0.097	0	0.50
10.250	0.00	0.26	0.095	0	0.49
10.333	0.00	0.25	0.093	0	0.48
10.417	0.00	0.24	0.092	0	0.47
10.500	0.00	0.23	0.090	0	0.47
10.583	0.00	0.22	0.089	0	0.46
10.667	0.00	0.21	0.087	0	0.45
10.750	0.00	0.20	0.086	0	0.44
10.833	0.00	0.20	0.084	0	0.43
10.917	0.00	0.19	0.083	0	0.43
11.000	0.00	0.18	0.082	0	0.42
11.083	0.00	0.17	0.080	0	0.41
11.167	0.00	0.17	0.079	0	0.41
11.250	0.00	0.16	0.078	0	0.40
11.333	0.00	0.16	0.077	0	0.39
11.417	0.00	0.15	0.076	0	0.39
11.500	0.00	0.14	0.075	0	0.38
11.583	0.00	0.14	0.074	0	0.38
11.667	0.00	0.13	0.073	0	0.37
11.750	0.00	0.13	0.072	0	0.37
11.833	0.00	0.12	0.071	0	0.36
11.917	0.00	0.12	0.070	0	0.36
12.000	0.00	0.11	0.070	0	0.36
12.083	0.00	0.11	0.069	0	0.35
12.167	0.00	0.10	0.068	0	0.35
12.250	0.00	0.10	0.067	0	0.34
12.333	0.00	0.10	0.067	0	0.34
12.417	0.00	0.09	0.066	0	0.34
12.500	0.00	0.09	0.066	0	0.33
12.583	0.00	0.09	0.065	0	0.33
12.667	0.00	0.08	0.064	0	0.33
12.750	0.00	0.08	0.064	0	0.32
12.833	0.00	0.08	0.063	0	0.32
12.917	0.00	0.07	0.063	0	0.32
13.000	0.00	0.07	0.062	0	0.32
13.083	0.00	0.07	0.062	0	0.31
13.167	0.00	0.07	0.061	0	0.31
13.250	0.00	0.06	0.061	0	0.31
13.333	0.00	0.06	0.060	0	0.31
13.417	0.00	0.06	0.060	0	0.30
13.500	0.00	0.06	0.060	0	0.30
13.583	0.00	0.05	0.059	0	0.30
13.667	0.00	0.05	0.059	0	0.30
13.750	0.00	0.05	0.059	0	0.30
13.833	0.00	0.05	0.058	0	0.29
13.917	0.00	0.05	0.058	0	0.29
14.000	0.00	0.04	0.058	0	0.29
14.083	0.00	0.04	0.057	0	0.29
14.167	0.00	0.04	0.057	0	0.29
14.250	0.00	0.04	0.057	0	0.29
14.333	0.00	0.04	0.056	0	0.28
14.417	0.00	0.04	0.056	0	0.28
14.500	0.00	0.03	0.056	0	0.28
14.583	0.00	0.03	0.056	0	0.28
14.667	0.00	0.03	0.055	0	0.28

14.750	0.00	0.03	0.055	0	0.28
14.833	0.00	0.03	0.055	0	0.28
14.917	0.00	0.03	0.055	0	0.28
15.000	0.00	0.03	0.055	0	0.27
15.083	0.00	0.03	0.054	0	0.27
15.167	0.00	0.03	0.054	0	0.27
15.250	0.00	0.02	0.054	0	0.27
15.333	0.00	0.02	0.054	0	0.27
15.417	0.00	0.02	0.054	0	0.27
15.500	0.00	0.02	0.054	0	0.27
15.583	0.00	0.02	0.053	0	0.27
15.667	0.00	0.02	0.053	0	0.27
15.750	0.00	0.02	0.053	0	0.27
15.833	0.00	0.02	0.053	0	0.27
15.917	0.00	0.02	0.053	0	0.27
16.000	0.00	0.02	0.053	0	0.27
16.083	0.00	0.02	0.053	0	0.26
16.167	0.00	0.02	0.053	0	0.26
16.250	0.00	0.02	0.053	0	0.26
16.333	0.00	0.01	0.052	0	0.26
16.417	0.00	0.01	0.052	0	0.26
16.500	0.00	0.01	0.052	0	0.26
16.583	0.00	0.01	0.052	0	0.26
16.667	0.00	0.01	0.052	0	0.26
16.750	0.00	0.01	0.052	0	0.26
16.833	0.00	0.01	0.052	0	0.26
16.917	0.00	0.01	0.052	0	0.26
17.000	0.00	0.01	0.052	0	0.26
17.083	0.00	0.01	0.052	0	0.26
17.167	0.00	0.01	0.052	0	0.26
17.250	0.00	0.01	0.051	0	0.26
17.333	0.00	0.01	0.051	0	0.26
17.417	0.00	0.01	0.051	0	0.26
17.500	0.00	0.01	0.051	0	0.26
17.583	0.00	0.01	0.051	0	0.26
17.667	0.00	0.01	0.051	0	0.26
17.750	0.00	0.01	0.051	0	0.26
17.833	0.00	0.01	0.051	0	0.26
17.917	0.00	0.01	0.051	0	0.26
18.000	0.00	0.01	0.051	0	0.26
18.083	0.00	0.01	0.051	0	0.26
18.167	0.00	0.01	0.051	0	0.25
18.250	0.00	0.01	0.051	0	0.25
18.333	0.00	0.01	0.051	0	0.25
18.417	0.00	0.01	0.051	0	0.25
18.500	0.00	0.01	0.051	0	0.25
18.583	0.00	0.01	0.051	0	0.25
18.667	0.00	0.00	0.051	0	0.25
18.750	0.00	0.00	0.051	0	0.25
18.833	0.00	0.00	0.051	0	0.25
18.917	0.00	0.00	0.051	0	0.25
19.000	0.00	0.00	0.051	0	0.25
19.083	0.00	0.00	0.051	0	0.25
19.167	0.00	0.00	0.051	0	0.25
19.250	0.00	0.00	0.050	0	0.25
19.333	0.00	0.00	0.050	0	0.25
19.417	0.00	0.00	0.050	0	0.25
19.500	0.00	0.00	0.050	0	0.25
19.583	0.00	0.00	0.050	0	0.25
19.667	0.00	0.00	0.050	0	0.25
19.750	0.00	0.00	0.050	0	0.25
19.833	0.00	0.00	0.050	0	0.25
19.917	0.00	0.00	0.050	0	0.25

20.000	0.00	0.00	0.050	0					0.25
20.083	0.00	0.00	0.050	0					0.25
20.167	0.00	0.00	0.050	0					0.25
20.250	0.00	0.00	0.050	0					0.25
20.333	0.00	0.00	0.050	0					0.25
20.417	0.00	0.00	0.050	0					0.25
20.500	0.00	0.00	0.050	0					0.25
20.583	0.00	0.00	0.050	0					0.25
20.667	0.00	0.00	0.050	0					0.25
20.750	0.00	0.00	0.050	0					0.25
20.833	0.00	0.00	0.050	0					0.25
20.917	0.00	0.00	0.050	0					0.25
21.000	0.00	0.00	0.050	0					0.25
21.083	0.00	0.00	0.050	0					0.25
21.167	0.00	0.00	0.050	0					0.25
21.250	0.00	0.00	0.050	0					0.25
21.333	0.00	0.00	0.050	0					0.25
21.417	0.00	0.00	0.050	0					0.25
21.500	0.00	0.00	0.050	0					0.25
21.583	0.00	0.00	0.050	0					0.25
21.667	0.00	0.00	0.050	0					0.25
21.750	0.00	0.00	0.050	0					0.25
21.833	0.00	0.00	0.050	0					0.25
21.917	0.00	0.00	0.050	0					0.25
22.000	0.00	0.00	0.050	0					0.25
22.083	0.00	0.00	0.050	0					0.25

Remaining water in basin = 0.05 (Ac.Ft)

\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 265  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 2.392 (CFS)  
 Total volume = 1.085 (Ac.Ft)  
 Status of hydrographs being held in storage  
 Stream 1 Stream 2 Stream 3 Stream 4 Stream 5  
 Peak (CFS) 0.000 0.000 0.000 0.000 0.000  
 Vol (Ac.Ft) 0.000 0.000 0.000 0.000 0.000  
 \*\*\*\*\*

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FLOOD HYDROGRAPH ROUTING PROGRAM  
 Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005  
 Study date: 04/24/23

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 BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
 BASIN ROUTING STUFY - 3 HOUR 10 YEAR STORM  
 3963ROUTING310  
 CB  
 -----

Program License Serial Number 6145

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 \*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: 3963UNIHYDQ10P310.rte  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 55  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 16.308 (CFS)  
 Total volume = 1.604 (Ac.Ft)  
 Status of hydrographs being held in storage  
 Stream 1 Stream 2 Stream 3 Stream 4 Stream 5  
 Peak (CFS) 0.000 0.000 0.000 0.000 0.000  
 Vol (Ac.Ft) 0.000 0.000 0.000 0.000 0.000  
 \*\*\*\*\*

+++++  
 Process from Point/Station 1.000 to Point/Station 1.000  
 \*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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 User entry of depth-outflow-storage data

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 Total number of inflow hydrograph intervals = 55  
 Hydrograph time unit = 5.000 (Min.)  
 Initial depth in storage basin = 0.00 (Ft.)  
 -----

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

-----  
 Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.250	0.050	0.001	0.050	0.050
1.000	0.190	0.800	0.187	0.193
2.000	0.330	1.300	0.326	0.334
3.000	0.470	1.600	0.464	0.476
3.400	0.530	1.700	0.524	0.536
4.070	0.860	1.800	0.854	0.866



4.400	1.040	3.800	1.027	1.053
5.400	1.620	5.400	1.601	1.639
6.400	2.280	6.500	2.258	2.302
7.400	3.020	7.400	2.995	3.045
8.400	3.880	8.300	3.851	3.909

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

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	4.1	8.15	12.23	16.31	Depth (Ft.)
0.083	0.09	0.00	0.000	O					0.00
0.167	0.44	0.00	0.002	O					0.01
0.250	0.95	0.00	0.007	O I					0.03
0.333	1.24	0.00	0.014	O I					0.07
0.417	1.46	0.00	0.024	O I					0.12
0.500	1.82	0.00	0.035	O I					0.18
0.583	2.18	0.00	0.049	O I					0.24
0.667	2.43	0.08	0.064	O I					0.33
0.750	2.60	0.18	0.081	O I					0.42
0.833	2.79	0.27	0.098	O I					0.51
0.917	2.82	0.37	0.115	O I					0.60
1.000	2.77	0.47	0.131	O I					0.69
1.083	2.93	0.56	0.148	O I					0.77
1.167	3.34	0.66	0.165	O I					0.87
1.250	3.79	0.77	0.185	O I					0.97
1.333	4.05	0.86	0.206	O I					1.11
1.417	4.17	0.94	0.228	O I					1.27
1.500	4.44	1.02	0.251	O I					1.44
1.583	4.91	1.11	0.276	O I					1.61
1.667	5.20	1.20	0.303	O I					1.81
1.750	5.42	1.30	0.331	O I					2.01
1.833	5.93	1.37	0.361	O I					2.22
1.917	6.46	1.44	0.394	O I					2.45
2.000	6.63	1.51	0.429	O I					2.70
2.083	6.66	1.59	0.464	O I					2.96
2.167	6.93	1.65	0.499	O I					3.20
2.250	7.80	1.70	0.539	O I					3.42
2.333	9.03	1.72	0.585	O I					3.51
2.417	9.94	1.73	0.638	O I					3.62
2.500	11.33	1.75	0.699	O I					3.74
2.583	14.02	1.77	0.775	O I					3.90
2.667	16.25	1.87	0.866	O I					4.08
2.750	16.31	2.93	0.962	O I					4.26
2.833	13.45	3.80	1.041	O I					4.40
2.917	9.71	3.95	1.094	O I					4.49
3.000	7.35	4.04	1.125	O I					4.55
3.083	5.85	4.08	1.143	O I					4.58
3.167	4.41	4.10	1.150	O I					4.59
3.250	3.21	4.10	1.148	O I					4.59
3.333	2.43	4.07	1.139	O I					4.57
3.417	1.93	4.04	1.126	O I					4.55
3.500	1.56	4.00	1.111	O I					4.52
3.583	1.28	3.95	1.093	O I					4.49
3.667	1.05	3.89	1.074	O I					4.46
3.750	0.86	3.84	1.054	O I					4.42
3.833	0.70	3.73	1.033	O I					4.39
3.917	0.54	3.50	1.013	O I					4.35
4.000	0.46	3.28	0.993	O I					4.31
4.083	0.36	3.07	0.974	O I					4.28
4.167	0.26	2.86	0.956	O I					4.25

4.250	0.15	2.67	0.938	I	O	4.21
4.333	0.06	2.48	0.921	I	O	4.18
4.417	0.04	2.30	0.905	I	O	4.15
4.500	0.03	2.13	0.890	I	O	4.12
4.583	0.01	1.98	0.876	I	O	4.10
4.667	0.00	1.83	0.863	I	O	4.08
4.750	0.00	1.80	0.850	I	O	4.05
4.833	0.00	1.79	0.838	I	O	4.03
4.917	0.00	1.79	0.826	I	O	4.00
5.000	0.00	1.79	0.813	I	O	3.98
5.083	0.00	1.78	0.801	I	O	3.95
5.167	0.00	1.78	0.789	I	O	3.93
5.250	0.00	1.77	0.777	I	O	3.90
5.333	0.00	1.77	0.764	I	O	3.88
5.417	0.00	1.77	0.752	I	O	3.85
5.500	0.00	1.76	0.740	I	O	3.83
5.583	0.00	1.76	0.728	I	O	3.80
5.667	0.00	1.76	0.716	I	O	3.78
5.750	0.00	1.75	0.704	I	O	3.75
5.833	0.00	1.75	0.692	I	O	3.73
5.917	0.00	1.75	0.680	I	O	3.70
6.000	0.00	1.74	0.668	I	O	3.68
6.083	0.00	1.74	0.656	I	O	3.65
6.167	0.00	1.73	0.644	I	O	3.63
6.250	0.00	1.73	0.632	I	O	3.61
6.333	0.00	1.73	0.620	I	O	3.58
6.417	0.00	1.72	0.608	I	O	3.56
6.500	0.00	1.72	0.596	I	O	3.53
6.583	0.00	1.72	0.584	I	O	3.51
6.667	0.00	1.71	0.572	I	O	3.49
6.750	0.00	1.71	0.561	I	O	3.46
6.833	0.00	1.71	0.549	I	O	3.44
6.917	0.00	1.70	0.537	I	O	3.41
7.000	0.00	1.69	0.525	I	O	3.37
7.083	0.00	1.67	0.514	I	O	3.29
7.167	0.00	1.65	0.502	I	O	3.22
7.250	0.00	1.64	0.491	I	O	3.14
7.333	0.00	1.62	0.480	I	O	3.07
7.417	0.00	1.60	0.469	I	O	2.99
7.500	0.00	1.57	0.458	I	O	2.91
7.583	0.00	1.55	0.447	I	O	2.84
7.667	0.00	1.53	0.437	I	O	2.76
7.750	0.00	1.51	0.426	I	O	2.69
7.833	0.00	1.48	0.416	I	O	2.61
7.917	0.00	1.46	0.406	I	O	2.54
8.000	0.00	1.44	0.396	I	O	2.47
8.083	0.00	1.42	0.386	I	O	2.40
8.167	0.00	1.40	0.376	I	O	2.33
8.250	0.00	1.38	0.367	I	O	2.26
8.333	0.00	1.36	0.357	I	O	2.19
8.417	0.00	1.34	0.348	I	O	2.13
8.500	0.00	1.32	0.339	I	O	2.06
8.583	0.00	1.30	0.330	I	O	2.00
8.667	0.00	1.27	0.321	I	O	1.93
8.750	0.00	1.24	0.312	I	O	1.87
8.833	0.00	1.21	0.304	I	O	1.81
8.917	0.00	1.18	0.296	I	O	1.75
9.000	0.00	1.15	0.288	I	O	1.70
9.083	0.00	1.12	0.280	I	O	1.64
9.167	0.00	1.09	0.272	I	O	1.59
9.250	0.00	1.07	0.265	I	O	1.53
9.333	0.00	1.04	0.257	I	O	1.48
9.417	0.00	1.02	0.250	IO		1.43

9.500	0.00	0.99	0.243	IO	1.38
9.583	0.00	0.97	0.237	IO	1.33
9.667	0.00	0.94	0.230	IO	1.29
9.750	0.00	0.92	0.224	IO	1.24
9.833	0.00	0.90	0.217	IO	1.20
9.917	0.00	0.88	0.211	IO	1.15
10.000	0.00	0.85	0.205	IO	1.11
10.083	0.00	0.83	0.200	IO	1.07
10.167	0.00	0.81	0.194	IO	1.03
10.250	0.00	0.79	0.188	IO	0.99
10.333	0.00	0.76	0.183	IO	0.96
10.417	0.00	0.73	0.178	IO	0.94
10.500	0.00	0.70	0.173	IO	0.91
10.583	0.00	0.68	0.168	IO	0.88
10.667	0.00	0.65	0.164	IO	0.86
10.750	0.00	0.62	0.159	IO	0.84
10.833	0.00	0.60	0.155	IO	0.81
10.917	0.00	0.58	0.151	IO	0.79
11.000	0.00	0.56	0.147	IO	0.77
11.083	0.00	0.53	0.143	IO	0.75
11.167	0.00	0.51	0.140	IO	0.73
11.250	0.00	0.49	0.136	O	0.71
11.333	0.00	0.47	0.133	O	0.69
11.417	0.00	0.46	0.130	O	0.68
11.500	0.00	0.44	0.127	O	0.66
11.583	0.00	0.42	0.124	O	0.64
11.667	0.00	0.41	0.121	O	0.63
11.750	0.00	0.39	0.118	O	0.61
11.833	0.00	0.37	0.115	O	0.60
11.917	0.00	0.36	0.113	O	0.59
12.000	0.00	0.35	0.111	O	0.57
12.083	0.00	0.33	0.108	O	0.56
12.167	0.00	0.32	0.106	O	0.55
12.250	0.00	0.31	0.104	O	0.54
12.333	0.00	0.30	0.102	O	0.53
12.417	0.00	0.28	0.100	O	0.52
12.500	0.00	0.27	0.098	O	0.51
12.583	0.00	0.26	0.096	O	0.50
12.667	0.00	0.25	0.094	O	0.49
12.750	0.00	0.24	0.092	O	0.48
12.833	0.00	0.23	0.091	O	0.47
12.917	0.00	0.22	0.089	O	0.46
13.000	0.00	0.22	0.088	O	0.45
13.083	0.00	0.21	0.086	O	0.44
13.167	0.00	0.20	0.085	O	0.44
13.250	0.00	0.19	0.083	O	0.43
13.333	0.00	0.18	0.082	O	0.42
13.417	0.00	0.18	0.081	O	0.42
13.500	0.00	0.17	0.080	O	0.41
13.583	0.00	0.16	0.079	O	0.40
13.667	0.00	0.16	0.077	O	0.40
13.750	0.00	0.15	0.076	O	0.39
13.833	0.00	0.15	0.075	O	0.39
13.917	0.00	0.14	0.074	O	0.38
14.000	0.00	0.13	0.073	O	0.38
14.083	0.00	0.13	0.073	O	0.37
14.167	0.00	0.12	0.072	O	0.37
14.250	0.00	0.12	0.071	O	0.36
14.333	0.00	0.12	0.070	O	0.36
14.417	0.00	0.11	0.069	O	0.35
14.500	0.00	0.11	0.068	O	0.35
14.583	0.00	0.10	0.068	O	0.35
14.667	0.00	0.10	0.067	O	0.34

14.750	0.00	0.09	0.066	0	0.34
14.833	0.00	0.09	0.066	0	0.33
14.917	0.00	0.09	0.065	0	0.33
15.000	0.00	0.08	0.065	0	0.33
15.083	0.00	0.08	0.064	0	0.32
15.167	0.00	0.08	0.063	0	0.32
15.250	0.00	0.07	0.063	0	0.32
15.333	0.00	0.07	0.062	0	0.32
15.417	0.00	0.07	0.062	0	0.31
15.500	0.00	0.07	0.061	0	0.31
15.583	0.00	0.06	0.061	0	0.31
15.667	0.00	0.06	0.061	0	0.31
15.750	0.00	0.06	0.060	0	0.30
15.833	0.00	0.06	0.060	0	0.30
15.917	0.00	0.05	0.059	0	0.30
16.000	0.00	0.05	0.059	0	0.30
16.083	0.00	0.05	0.059	0	0.30
16.167	0.00	0.05	0.058	0	0.29
16.250	0.00	0.05	0.058	0	0.29
16.333	0.00	0.04	0.058	0	0.29
16.417	0.00	0.04	0.057	0	0.29
16.500	0.00	0.04	0.057	0	0.29
16.583	0.00	0.04	0.057	0	0.29
16.667	0.00	0.04	0.057	0	0.29
16.750	0.00	0.04	0.056	0	0.28
16.833	0.00	0.04	0.056	0	0.28
16.917	0.00	0.03	0.056	0	0.28
17.000	0.00	0.03	0.056	0	0.28
17.083	0.00	0.03	0.055	0	0.28
17.167	0.00	0.03	0.055	0	0.28
17.250	0.00	0.03	0.055	0	0.28
17.333	0.00	0.03	0.055	0	0.28
17.417	0.00	0.03	0.055	0	0.27
17.500	0.00	0.03	0.054	0	0.27
17.583	0.00	0.02	0.054	0	0.27
17.667	0.00	0.02	0.054	0	0.27
17.750	0.00	0.02	0.054	0	0.27
17.833	0.00	0.02	0.054	0	0.27
17.917	0.00	0.02	0.054	0	0.27
18.000	0.00	0.02	0.053	0	0.27
18.083	0.00	0.02	0.053	0	0.27
18.167	0.00	0.02	0.053	0	0.27
18.250	0.00	0.02	0.053	0	0.27
18.333	0.00	0.02	0.053	0	0.27
18.417	0.00	0.02	0.053	0	0.26
18.500	0.00	0.02	0.053	0	0.26
18.583	0.00	0.02	0.053	0	0.26
18.667	0.00	0.01	0.052	0	0.26
18.750	0.00	0.01	0.052	0	0.26
18.833	0.00	0.01	0.052	0	0.26
18.917	0.00	0.01	0.052	0	0.26
19.000	0.00	0.01	0.052	0	0.26
19.083	0.00	0.01	0.052	0	0.26
19.167	0.00	0.01	0.052	0	0.26
19.250	0.00	0.01	0.052	0	0.26
19.333	0.00	0.01	0.052	0	0.26
19.417	0.00	0.01	0.052	0	0.26
19.500	0.00	0.01	0.052	0	0.26
19.583	0.00	0.01	0.052	0	0.26
19.667	0.00	0.01	0.051	0	0.26
19.750	0.00	0.01	0.051	0	0.26
19.833	0.00	0.01	0.051	0	0.26
19.917	0.00	0.01	0.051	0	0.26

20.000	0.00	0.01	0.051	0	0.26
20.083	0.00	0.01	0.051	0	0.26
20.167	0.00	0.01	0.051	0	0.26
20.250	0.00	0.01	0.051	0	0.26
20.333	0.00	0.01	0.051	0	0.26
20.417	0.00	0.01	0.051	0	0.26
20.500	0.00	0.01	0.051	0	0.25
20.583	0.00	0.01	0.051	0	0.25
20.667	0.00	0.01	0.051	0	0.25
20.750	0.00	0.01	0.051	0	0.25
20.833	0.00	0.01	0.051	0	0.25
20.917	0.00	0.01	0.051	0	0.25
21.000	0.00	0.00	0.051	0	0.25
21.083	0.00	0.00	0.051	0	0.25
21.167	0.00	0.00	0.051	0	0.25
21.250	0.00	0.00	0.051	0	0.25
21.333	0.00	0.00	0.051	0	0.25
21.417	0.00	0.00	0.051	0	0.25
21.500	0.00	0.00	0.051	0	0.25
21.583	0.00	0.00	0.050	0	0.25
21.667	0.00	0.00	0.050	0	0.25
21.750	0.00	0.00	0.050	0	0.25
21.833	0.00	0.00	0.050	0	0.25
21.917	0.00	0.00	0.050	0	0.25
22.000	0.00	0.00	0.050	0	0.25
22.083	0.00	0.00	0.050	0	0.25
22.167	0.00	0.00	0.050	0	0.25
22.250	0.00	0.00	0.050	0	0.25
22.333	0.00	0.00	0.050	0	0.25
22.417	0.00	0.00	0.050	0	0.25
22.500	0.00	0.00	0.050	0	0.25
22.583	0.00	0.00	0.050	0	0.25
22.667	0.00	0.00	0.050	0	0.25
22.750	0.00	0.00	0.050	0	0.25
22.833	0.00	0.00	0.050	0	0.25
22.917	0.00	0.00	0.050	0	0.25
23.000	0.00	0.00	0.050	0	0.25
23.083	0.00	0.00	0.050	0	0.25
23.167	0.00	0.00	0.050	0	0.25
23.250	0.00	0.00	0.050	0	0.25
23.333	0.00	0.00	0.050	0	0.25
23.417	0.00	0.00	0.050	0	0.25
23.500	0.00	0.00	0.050	0	0.25
23.583	0.00	0.00	0.050	0	0.25
23.667	0.00	0.00	0.050	0	0.25
23.750	0.00	0.00	0.050	0	0.25
23.833	0.00	0.00	0.050	0	0.25
23.917	0.00	0.00	0.050	0	0.25
24.000	0.00	0.00	0.050	0	0.25
24.083	0.00	0.00	0.050	0	0.25
24.167	0.00	0.00	0.050	0	0.25
24.250	0.00	0.00	0.050	0	0.25
24.333	0.00	0.00	0.050	0	0.25
24.417	0.00	0.00	0.050	0	0.25

Remaining water in basin = 0.05 (Ac.Ft)

\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*

Number of intervals = 293

Time interval = 5.0 (Min.)

Maximum/Peak flow rate = 4.104 (CFS)

Total volume = 1.554 (Ac.Ft)  
Status of hydrographs being held in storage

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

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FLOOD HYDROGRAPH ROUTING PROGRAM  
 Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005  
 Study date: 04/24/23

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 Black Creek - Harvill at Water Industrial  
 Basin Routing Study - 6 Hour 10 Year Study  
 3963Routing610  
 CB  
 -----

Program License Serial Number 6145

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 \*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: 3963UNIHYDQ10P610.rte  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 91  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 14.746 (CFS)  
 Total volume = 1.880 (Ac.Ft)  
 Status of hydrographs being held in storage  
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5  
 Peak (CFS)          0.000    0.000    0.000    0.000    0.000  
 Vol (Ac.Ft)         0.000    0.000    0.000    0.000    0.000  
 \*\*\*\*\*

+++++  
 Process from Point/Station 1.000 to Point/Station 1.000  
 \*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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 User entry of depth-outflow-storage data

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 Total number of inflow hydrograph intervals = 91  
 Hydrograph time unit = 5.000 (Min.)  
 Initial depth in storage basin = 0.00 (Ft.)  
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-----  
 Initial basin depth = 0.00 (Ft.)  
 Initial basin storage = 0.00 (Ac.Ft)  
 Initial basin outflow = 0.00 (CFS)  
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 Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.250	0.050	0.001	0.050	0.050
1.000	0.190	0.800	0.187	0.193
2.000	0.330	1.300	0.326	0.334
3.000	0.470	1.600	0.464	0.476
3.400	0.530	1.700	0.524	0.536
4.070	0.860	1.800	0.854	0.866

4.400	1.040	3.800	1.027	1.053
5.400	1.620	5.400	1.601	1.639
6.400	2.280	6.500	2.258	2.302
7.400	3.020	7.400	2.995	3.045
8.400	3.880	8.300	3.851	3.909

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

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	3.7	7.37	11.06	14.75	Depth (Ft.)
0.083	0.01	0.00	0.000	O					0.00
0.167	0.04	0.00	0.000	O					0.00
0.250	0.15	0.00	0.001	O					0.00
0.333	0.28	0.00	0.002	O					0.01
0.417	0.36	0.00	0.005	O					0.02
0.500	0.42	0.00	0.007	O					0.04
0.583	0.52	0.00	0.010	O I					0.05
0.667	0.65	0.00	0.014	O I					0.07
0.750	0.73	0.00	0.019	O I					0.10
0.833	0.78	0.00	0.024	O I					0.12
0.917	0.81	0.00	0.030	O I					0.15
1.000	0.85	0.00	0.036	O I					0.18
1.083	0.95	0.00	0.042	O I					0.21
1.167	1.07	0.00	0.049	O I					0.24
1.250	1.16	0.04	0.056	O I					0.28
1.333	1.20	0.08	0.064	O I					0.33
1.417	1.23	0.12	0.072	O I					0.37
1.500	1.25	0.17	0.079	O I					0.41
1.583	1.27	0.21	0.087	O I					0.45
1.667	1.29	0.25	0.094	O I					0.48
1.750	1.30	0.29	0.101	O I					0.52
1.833	1.31	0.33	0.108	O I					0.56
1.917	1.32	0.37	0.114	O I					0.59
2.000	1.34	0.41	0.121	O I					0.63
2.083	1.40	0.44	0.127	O I					0.66
2.167	1.46	0.48	0.134	O I					0.70
2.250	1.50	0.52	0.141	O I					0.74
2.333	1.57	0.56	0.148	O I					0.77
2.417	1.63	0.60	0.155	O I					0.81
2.500	1.66	0.64	0.162	O I					0.85
2.583	1.68	0.68	0.169	O I					0.89
2.667	1.70	0.72	0.176	O I					0.92
2.750	1.72	0.76	0.182	O I					0.96
2.833	1.81	0.79	0.189	O I					0.99
2.917	1.92	0.82	0.196	O I					1.05
3.000	2.00	0.85	0.204	O I					1.10
3.083	2.04	0.88	0.212	O I					1.16
3.167	2.08	0.91	0.220	O I					1.21
3.250	2.17	0.94	0.228	O I					1.27
3.333	2.30	0.97	0.237	O I					1.34
3.417	2.40	1.00	0.247	O I					1.40
3.500	2.53	1.04	0.257	O I					1.48
3.583	2.77	1.08	0.267	O I					1.55
3.667	3.04	1.12	0.280	O I					1.64
3.750	3.29	1.17	0.294	O I					1.74
3.833	3.51	1.22	0.309	O I					1.85
3.917	3.72	1.28	0.325	O I					1.97
4.000	3.92	1.33	0.343	O I					2.09
4.083	4.13	1.37	0.361	O I					2.22
4.167	4.35	1.41	0.381	O I					2.36



4.250	4.63	1.45	0.402	O	I				2.51
4.333	4.96	1.50	0.425	O	I				2.68
4.417	5.31	1.56	0.449	O	I				2.85
4.500	5.66	1.61	0.476	O	I				3.04
4.583	5.96	1.66	0.505	O	I				3.23
4.667	6.23	1.70	0.535	O	I				3.41
4.750	6.55	1.71	0.568	O	I				3.48
4.833	6.88	1.72	0.602	O	I				3.55
4.917	7.18	1.73	0.639	O	I				3.62
5.000	7.45	1.74	0.677	O	I				3.70
5.083	7.84	1.76	0.718	O	I				3.78
5.167	8.56	1.77	0.762	O	I				3.87
5.250	9.70	1.79	0.813	O		I			3.97
5.333	10.98	1.92	0.871	O		I			4.09
5.417	12.23	2.64	0.935	O			I		4.21
5.500	13.64	3.40	1.004	O			I		4.33
5.583	14.75	3.90	1.076	O				I	4.46
5.667	13.56	4.09	1.146	O				I	4.58
5.750	9.80	4.24	1.198	O		I			4.67
5.833	6.47	4.31	1.225	O	I				4.72
5.917	4.55	4.33	1.233	O					4.73
6.000	3.55	4.33	1.231	I	O				4.73
6.083	2.97	4.31	1.224	I	O				4.72
6.167	2.40	4.28	1.212	I	O				4.70
6.250	1.85	4.24	1.198	I	O				4.67
6.333	1.45	4.19	1.180	I	O				4.64
6.417	1.17	4.13	1.161	I	O				4.61
6.500	0.97	4.07	1.140	I	O				4.57
6.583	0.78	4.01	1.118	I	O				4.53
6.667	0.64	3.95	1.095	I	O				4.50
6.750	0.51	3.89	1.072	I	O				4.46
6.833	0.40	3.82	1.049	I	O				4.42
6.917	0.31	3.64	1.026	I	O				4.37
7.000	0.24	3.39	1.003	I	O				4.33
7.083	0.17	3.16	0.982	I	O				4.29
7.167	0.06	2.93	0.962	I	O				4.26
7.250	0.02	2.72	0.943	I	O				4.22
7.333	0.01	2.52	0.925	I	O				4.19
7.417	0.01	2.33	0.908	I	O				4.16
7.500	0.01	2.16	0.893	I	O				4.13
7.583	0.00	2.00	0.878	I	O				4.10
7.667	0.00	1.86	0.865	I	O				4.08
7.750	0.00	1.80	0.853	I	O				4.05
7.833	0.00	1.79	0.840	I	O				4.03
7.917	0.00	1.79	0.828	I	O				4.00
8.000	0.00	1.79	0.815	I	O				3.98
8.083	0.00	1.78	0.803	I	O				3.95
8.167	0.00	1.78	0.791	I	O				3.93
8.250	0.00	1.78	0.779	I	O				3.90
8.333	0.00	1.77	0.766	I	O				3.88
8.417	0.00	1.77	0.754	I	O				3.86
8.500	0.00	1.76	0.742	I	O				3.83
8.583	0.00	1.76	0.730	I	O				3.81
8.667	0.00	1.76	0.718	I	O				3.78
8.750	0.00	1.75	0.706	I	O				3.76
8.833	0.00	1.75	0.694	I	O				3.73
8.917	0.00	1.75	0.682	I	O				3.71
9.000	0.00	1.74	0.670	I	O				3.68
9.083	0.00	1.74	0.658	I	O				3.66
9.167	0.00	1.74	0.646	I	O				3.63
9.250	0.00	1.73	0.634	I	O				3.61
9.333	0.00	1.73	0.622	I	O				3.59
9.417	0.00	1.72	0.610	I	O				3.56

9.500	0.00	1.72	0.598	I	O	3.54
9.583	0.00	1.72	0.586	I	O	3.51
9.667	0.00	1.71	0.574	I	O	3.49
9.750	0.00	1.71	0.563	I	O	3.47
9.833	0.00	1.71	0.551	I	O	3.44
9.917	0.00	1.70	0.539	I	O	3.42
10.000	0.00	1.70	0.527	I	O	3.38
10.083	0.00	1.68	0.516	I	O	3.31
10.167	0.00	1.66	0.504	I	O	3.23
10.250	0.00	1.64	0.493	I	O	3.15
10.333	0.00	1.62	0.482	I	O	3.08
10.417	0.00	1.60	0.471	I	O	3.00
10.500	0.00	1.58	0.460	I	O	2.93
10.583	0.00	1.55	0.449	I	O	2.85
10.667	0.00	1.53	0.438	I	O	2.77
10.750	0.00	1.51	0.428	I	O	2.70
10.833	0.00	1.49	0.418	I	O	2.63
10.917	0.00	1.47	0.407	I	O	2.55
11.000	0.00	1.44	0.397	I	O	2.48
11.083	0.00	1.42	0.387	I	O	2.41
11.167	0.00	1.40	0.378	I	O	2.34
11.250	0.00	1.38	0.368	I	O	2.27
11.333	0.00	1.36	0.359	I	O	2.21
11.417	0.00	1.34	0.349	I	O	2.14
11.500	0.00	1.32	0.340	I	O	2.07
11.583	0.00	1.30	0.331	I	O	2.01
11.667	0.00	1.27	0.322	I	O	1.95
11.750	0.00	1.24	0.314	I	O	1.88
11.833	0.00	1.21	0.305	I	O	1.82
11.917	0.00	1.18	0.297	I	O	1.76
12.000	0.00	1.15	0.289	I	O	1.71
12.083	0.00	1.13	0.281	I	O	1.65
12.167	0.00	1.10	0.273	I	O	1.60
12.250	0.00	1.07	0.266	I	O	1.54
12.333	0.00	1.05	0.259	I	O	1.49
12.417	0.00	1.02	0.252	I	O	1.44
12.500	0.00	1.00	0.245	I	O	1.39
12.583	0.00	0.97	0.238	I	O	1.34
12.667	0.00	0.95	0.231	I	O	1.29
12.750	0.00	0.92	0.225	I	O	1.25
12.833	0.00	0.90	0.219	IO		1.20
12.917	0.00	0.88	0.212	IO		1.16
13.000	0.00	0.86	0.206	IO		1.12
13.083	0.00	0.84	0.201	IO		1.08
13.167	0.00	0.82	0.195	IO		1.03
13.250	0.00	0.80	0.189	IO		1.00
13.333	0.00	0.77	0.184	IO		0.97
13.417	0.00	0.74	0.179	IO		0.94
13.500	0.00	0.71	0.174	IO		0.91
13.583	0.00	0.68	0.169	IO		0.89
13.667	0.00	0.65	0.164	IO		0.86
13.750	0.00	0.63	0.160	IO		0.84
13.833	0.00	0.60	0.156	IO		0.82
13.917	0.00	0.58	0.152	IO		0.79
14.000	0.00	0.56	0.148	IO		0.77
14.083	0.00	0.54	0.144	IO		0.75
14.167	0.00	0.52	0.140	IO		0.73
14.250	0.00	0.50	0.137	IO		0.72
14.333	0.00	0.48	0.133	IO		0.70
14.417	0.00	0.46	0.130	O		0.68
14.500	0.00	0.44	0.127	O		0.66
14.583	0.00	0.42	0.124	O		0.65
14.667	0.00	0.41	0.121	O		0.63

14.750	0.00	0.39	0.119	0	0.62
14.833	0.00	0.38	0.116	0	0.60
14.917	0.00	0.36	0.113	0	0.59
15.000	0.00	0.35	0.111	0	0.58
15.083	0.00	0.34	0.109	0	0.56
15.167	0.00	0.32	0.106	0	0.55
15.250	0.00	0.31	0.104	0	0.54
15.333	0.00	0.30	0.102	0	0.53
15.417	0.00	0.29	0.100	0	0.52
15.500	0.00	0.28	0.098	0	0.51
15.583	0.00	0.26	0.096	0	0.50
15.667	0.00	0.25	0.094	0	0.49
15.750	0.00	0.24	0.093	0	0.48
15.833	0.00	0.24	0.091	0	0.47
15.917	0.00	0.23	0.089	0	0.46
16.000	0.00	0.22	0.088	0	0.45
16.083	0.00	0.21	0.086	0	0.45
16.167	0.00	0.20	0.085	0	0.44
16.250	0.00	0.19	0.084	0	0.43
16.333	0.00	0.19	0.082	0	0.42
16.417	0.00	0.18	0.081	0	0.42
16.500	0.00	0.17	0.080	0	0.41
16.583	0.00	0.17	0.079	0	0.40
16.667	0.00	0.16	0.078	0	0.40
16.750	0.00	0.15	0.077	0	0.39
16.833	0.00	0.15	0.076	0	0.39
16.917	0.00	0.14	0.075	0	0.38
17.000	0.00	0.14	0.074	0	0.38
17.083	0.00	0.13	0.073	0	0.37
17.167	0.00	0.13	0.072	0	0.37
17.250	0.00	0.12	0.071	0	0.36
17.333	0.00	0.12	0.070	0	0.36
17.417	0.00	0.11	0.069	0	0.35
17.500	0.00	0.11	0.069	0	0.35
17.583	0.00	0.10	0.068	0	0.35
17.667	0.00	0.10	0.067	0	0.34
17.750	0.00	0.10	0.067	0	0.34
17.833	0.00	0.09	0.066	0	0.34
17.917	0.00	0.09	0.065	0	0.33
18.000	0.00	0.08	0.065	0	0.33
18.083	0.00	0.08	0.064	0	0.33
18.167	0.00	0.08	0.064	0	0.32
18.250	0.00	0.08	0.063	0	0.32
18.333	0.00	0.07	0.063	0	0.32
18.417	0.00	0.07	0.062	0	0.31
18.500	0.00	0.07	0.062	0	0.31
18.583	0.00	0.06	0.061	0	0.31
18.667	0.00	0.06	0.061	0	0.31
18.750	0.00	0.06	0.060	0	0.30
18.833	0.00	0.06	0.060	0	0.30
18.917	0.00	0.05	0.059	0	0.30
19.000	0.00	0.05	0.059	0	0.30
19.083	0.00	0.05	0.059	0	0.30
19.167	0.00	0.05	0.058	0	0.29
19.250	0.00	0.05	0.058	0	0.29
19.333	0.00	0.05	0.058	0	0.29
19.417	0.00	0.04	0.057	0	0.29
19.500	0.00	0.04	0.057	0	0.29
19.583	0.00	0.04	0.057	0	0.29
19.667	0.00	0.04	0.057	0	0.29
19.750	0.00	0.04	0.056	0	0.28
19.833	0.00	0.04	0.056	0	0.28
19.917	0.00	0.03	0.056	0	0.28

20.000	0.00	0.03	0.056	0	0.28
20.083	0.00	0.03	0.055	0	0.28
20.167	0.00	0.03	0.055	0	0.28
20.250	0.00	0.03	0.055	0	0.28
20.333	0.00	0.03	0.055	0	0.28
20.417	0.00	0.03	0.055	0	0.27
20.500	0.00	0.03	0.054	0	0.27
20.583	0.00	0.03	0.054	0	0.27
20.667	0.00	0.02	0.054	0	0.27
20.750	0.00	0.02	0.054	0	0.27
20.833	0.00	0.02	0.054	0	0.27
20.917	0.00	0.02	0.054	0	0.27
21.000	0.00	0.02	0.053	0	0.27
21.083	0.00	0.02	0.053	0	0.27
21.167	0.00	0.02	0.053	0	0.27
21.250	0.00	0.02	0.053	0	0.27
21.333	0.00	0.02	0.053	0	0.27
21.417	0.00	0.02	0.053	0	0.26
21.500	0.00	0.02	0.053	0	0.26
21.583	0.00	0.02	0.053	0	0.26
21.667	0.00	0.02	0.052	0	0.26
21.750	0.00	0.01	0.052	0	0.26
21.833	0.00	0.01	0.052	0	0.26
21.917	0.00	0.01	0.052	0	0.26
22.000	0.00	0.01	0.052	0	0.26
22.083	0.00	0.01	0.052	0	0.26
22.167	0.00	0.01	0.052	0	0.26
22.250	0.00	0.01	0.052	0	0.26
22.333	0.00	0.01	0.052	0	0.26
22.417	0.00	0.01	0.052	0	0.26
22.500	0.00	0.01	0.052	0	0.26
22.583	0.00	0.01	0.052	0	0.26
22.667	0.00	0.01	0.051	0	0.26
22.750	0.00	0.01	0.051	0	0.26
22.833	0.00	0.01	0.051	0	0.26
22.917	0.00	0.01	0.051	0	0.26
23.000	0.00	0.01	0.051	0	0.26
23.083	0.00	0.01	0.051	0	0.26
23.167	0.00	0.01	0.051	0	0.26
23.250	0.00	0.01	0.051	0	0.26
23.333	0.00	0.01	0.051	0	0.26
23.417	0.00	0.01	0.051	0	0.26
23.500	0.00	0.01	0.051	0	0.25
23.583	0.00	0.01	0.051	0	0.25
23.667	0.00	0.01	0.051	0	0.25
23.750	0.00	0.01	0.051	0	0.25
23.833	0.00	0.01	0.051	0	0.25
23.917	0.00	0.01	0.051	0	0.25
24.000	0.00	0.00	0.051	0	0.25
24.083	0.00	0.00	0.051	0	0.25
24.167	0.00	0.00	0.051	0	0.25
24.250	0.00	0.00	0.051	0	0.25
24.333	0.00	0.00	0.051	0	0.25
24.417	0.00	0.00	0.051	0	0.25
24.500	0.00	0.00	0.051	0	0.25
24.583	0.00	0.00	0.050	0	0.25
24.667	0.00	0.00	0.050	0	0.25
24.750	0.00	0.00	0.050	0	0.25
24.833	0.00	0.00	0.050	0	0.25
24.917	0.00	0.00	0.050	0	0.25
25.000	0.00	0.00	0.050	0	0.25
25.083	0.00	0.00	0.050	0	0.25
25.167	0.00	0.00	0.050	0	0.25

25.250	0.00	0.00	0.050	0					0.25
25.333	0.00	0.00	0.050	0					0.25
25.417	0.00	0.00	0.050	0					0.25
25.500	0.00	0.00	0.050	0					0.25
25.583	0.00	0.00	0.050	0					0.25
25.667	0.00	0.00	0.050	0					0.25
25.750	0.00	0.00	0.050	0					0.25
25.833	0.00	0.00	0.050	0					0.25
25.917	0.00	0.00	0.050	0					0.25
26.000	0.00	0.00	0.050	0					0.25
26.083	0.00	0.00	0.050	0					0.25
26.167	0.00	0.00	0.050	0					0.25
26.250	0.00	0.00	0.050	0					0.25
26.333	0.00	0.00	0.050	0					0.25
26.417	0.00	0.00	0.050	0					0.25
26.500	0.00	0.00	0.050	0					0.25
26.583	0.00	0.00	0.050	0					0.25
26.667	0.00	0.00	0.050	0					0.25
26.750	0.00	0.00	0.050	0					0.25
26.833	0.00	0.00	0.050	0					0.25
26.917	0.00	0.00	0.050	0					0.25
27.000	0.00	0.00	0.050	0					0.25
27.083	0.00	0.00	0.050	0					0.25
27.167	0.00	0.00	0.050	0					0.25
27.250	0.00	0.00	0.050	0					0.25
27.333	0.00	0.00	0.050	0					0.25
27.417	0.00	0.00	0.050	0					0.25

Remaining water in basin = 0.05 (Ac.Ft)

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*****HYDROGRAPH DATA*****
      Number of intervals = 329
      Time interval = 5.0 (Min.)
      Maximum/Peak flow rate = 4.332 (CFS)
      Total volume = 1.830 (Ac.Ft)
      Status of hydrographs being held in storage
      Stream 1 Stream 2 Stream 3 Stream 4 Stream 5
      Peak (CFS) 0.000 0.000 0.000 0.000 0.000
      Vol (Ac.Ft) 0.000 0.000 0.000 0.000 0.000
*****

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FLOOD HYDROGRAPH ROUTING PROGRAM  
 Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005  
 Study date: 04/24/23

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 Black Creek - harvill at Water Industrial  
 Basin Routing Study - 24 Hour 10 Year Storm  
 3963ROUTING2410  
 CB  
 -----

Program License Serial Number 6145

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 \*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: 3963unihydql0p2410.rte  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 307  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 6.471 (CFS)  
 Total volume = 3.438 (Ac.Ft)  
 Status of hydrographs being held in storage  
 Stream 1 Stream 2 Stream 3 Stream 4 Stream 5  
 Peak (CFS) 0.000 0.000 0.000 0.000 0.000  
 Vol (Ac.Ft) 0.000 0.000 0.000 0.000 0.000  
 \*\*\*\*\*

+++++  
 Process from Point/Station 1.000 to Point/Station 1.000  
 \*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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

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

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

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 Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.250	0.050	0.001	0.050	0.050
1.000	0.190	0.800	0.187	0.193
2.000	0.330	1.300	0.326	0.334
3.000	0.470	1.600	0.464	0.476
3.400	0.530	1.700	0.524	0.536
4.070	0.860	1.800	0.854	0.866
4.400	1.040	3.800	1.027	1.053
5.400	1.620	5.400	1.601	1.639
6.400	2.280	6.500	2.258	2.302
7.400	3.020	7.400	2.995	3.045

8.400      3.880      8.300      3.851      3.909

-----  
 Hydrograph Detention Basin Routing  
 -----

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)		1.6	3.24	4.85	6.47	Depth (Ft.)
0.083	0.02	0.00	0.000	O					0.00
0.167	0.09	0.00	0.000	O					0.00
0.250	0.20	0.00	0.001	O					0.01
0.333	0.28	0.00	0.003	O I					0.02
0.417	0.35	0.00	0.005	O I					0.03
0.500	0.43	0.00	0.008	O I					0.04
0.583	0.48	0.00	0.011	O I					0.06
0.667	0.51	0.00	0.015	O I					0.07
0.750	0.53	0.00	0.018	O I					0.09
0.833	0.56	0.00	0.022	O I					0.11
0.917	0.61	0.00	0.026	O I					0.13
1.000	0.67	0.00	0.030	O I					0.15
1.083	0.71	0.00	0.035	O I					0.17
1.167	0.69	0.00	0.040	O I					0.20
1.250	0.66	0.00	0.044	O I					0.22
1.333	0.63	0.00	0.049	O I					0.24
1.417	0.63	0.02	0.053	O I					0.27
1.500	0.62	0.04	0.057	O I					0.29
1.583	0.62	0.06	0.061	O I					0.31
1.667	0.62	0.09	0.065	O I					0.33
1.750	0.62	0.11	0.068	O I					0.35
1.833	0.63	0.13	0.072	O I					0.37
1.917	0.67	0.15	0.076	O I					0.39
2.000	0.72	0.17	0.079	O I					0.41
2.083	0.75	0.19	0.083	O I					0.43
2.167	0.77	0.21	0.087	O I					0.45
2.250	0.78	0.23	0.091	O I					0.47
2.333	0.79	0.25	0.094	O I					0.49
2.417	0.79	0.28	0.098	O I					0.51
2.500	0.80	0.30	0.102	O I					0.53
2.583	0.81	0.31	0.105	O I					0.54
2.667	0.85	0.33	0.108	O I					0.56
2.750	0.91	0.36	0.112	O I					0.58
2.833	0.94	0.38	0.116	O I					0.60
2.917	0.96	0.40	0.120	O I					0.62
3.000	0.98	0.42	0.124	O I					0.64
3.083	0.99	0.44	0.128	O I					0.67
3.167	0.99	0.46	0.131	O I					0.68
3.250	1.00	0.48	0.135	O I					0.70
3.333	1.00	0.50	0.138	O I					0.72
3.417	1.01	0.52	0.142	O I					0.74
3.500	1.01	0.54	0.145	O I					0.76
3.583	1.01	0.56	0.148	O I					0.78
3.667	1.01	0.58	0.151	O I					0.79
3.750	1.02	0.60	0.154	O I					0.81
3.833	1.03	0.61	0.157	O I					0.82
3.917	1.06	0.63	0.160	O I					0.84
4.000	1.12	0.65	0.163	O I					0.86
4.083	1.16	0.67	0.166	O I					0.87
4.167	1.17	0.68	0.170	O I					0.89
4.250	1.19	0.70	0.173	O I					0.91
4.333	1.20	0.72	0.176	O I					0.93
4.417	1.25	0.74	0.180	O I					0.95
4.500	1.31	0.76	0.183	O I					0.96

4.583	1.34	0.78	0.187	O	I				0.98
4.667	1.37	0.80	0.191	O	I				1.01
4.750	1.38	0.82	0.195	O	I				1.04
4.833	1.40	0.83	0.199	O	I				1.06
4.917	1.44	0.85	0.203	O	I				1.09
5.000	1.50	0.86	0.207	O	I				1.12
5.083	1.53	0.88	0.212	O	I				1.15
5.167	1.48	0.89	0.216	O	I				1.18
5.250	1.38	0.91	0.219	O	I				1.21
5.333	1.33	0.92	0.222	O	I				1.23
5.417	1.34	0.93	0.225	O	I				1.25
5.500	1.38	0.94	0.228	O	I				1.27
5.583	1.41	0.95	0.231	O	I				1.30
5.667	1.46	0.96	0.235	O	I				1.32
5.750	1.52	0.97	0.238	O	I				1.35
5.833	1.56	0.99	0.242	O	I				1.37
5.917	1.58	1.00	0.246	O	I				1.40
6.000	1.59	1.01	0.250	O	I				1.43
6.083	1.61	1.03	0.254	O	I				1.46
6.167	1.65	1.04	0.258	O	I				1.49
6.250	1.71	1.06	0.262	O	I				1.52
6.333	1.75	1.08	0.267	O	I				1.55
6.417	1.77	1.09	0.272	O	I				1.58
6.500	1.79	1.11	0.276	O	I				1.62
6.583	1.72	1.12	0.281	O	I				1.65
6.667	1.40	1.13	0.284	O	I				1.67
6.750	0.93	1.14	0.284	I	O				1.67
6.833	0.62	1.13	0.281	I	O				1.65
6.917	0.48	1.11	0.278	I	O				1.63
7.000	0.40	1.10	0.273	I	O				1.59
7.083	0.34	1.08	0.268	I	O				1.56
7.167	0.29	1.06	0.263	I	O				1.52
7.250	0.26	1.04	0.258	I	O				1.48
7.333	0.25	1.02	0.252	I	O				1.44
7.417	0.28	1.00	0.247	I	O				1.41
7.500	0.33	0.99	0.242	I	O				1.37
7.583	0.38	0.97	0.238	I	O				1.34
7.667	0.44	0.96	0.234	I	O				1.32
7.750	0.51	0.95	0.231	I	O				1.29
7.833	0.58	0.94	0.228	I	O				1.27
7.917	0.65	0.93	0.226	I	O				1.26
8.000	0.74	0.92	0.224	I	O				1.25
8.083	0.82	0.92	0.223	O					1.24
8.167	0.95	0.92	0.223	O					1.24
8.250	1.11	0.92	0.224	O	I				1.24
8.333	1.23	0.93	0.226	O	I				1.25
8.417	1.30	0.94	0.228	O	I				1.27
8.500	1.34	0.94	0.231	O	I				1.29
8.583	1.39	0.96	0.233	O	I				1.31
8.667	1.47	0.97	0.237	O	I				1.33
8.750	1.57	0.98	0.240	O	I				1.36
8.833	1.65	1.00	0.245	O	I				1.39
8.917	1.74	1.01	0.249	O	I				1.42
9.000	1.84	1.03	0.255	O	I				1.46
9.083	1.93	1.05	0.260	O	I				1.50
9.167	2.06	1.07	0.267	O	I				1.55
9.250	2.23	1.10	0.274	O	I				1.60
9.333	2.36	1.13	0.282	O	I				1.66
9.417	2.47	1.16	0.291	O	I				1.72
9.500	2.59	1.19	0.300	O	I				1.79
9.583	2.68	1.23	0.310	O	I				1.86
9.667	2.78	1.27	0.320	O	I				1.93
9.750	2.89	1.30	0.331	O	I				2.01



9.833	2.98	1.33	0.342	O		I				2.09
9.917	3.07	1.35	0.354	O		I				2.17
10.000	3.18	1.38	0.366	O		I				2.26
10.083	3.18	1.40	0.378	O		I				2.35
10.167	2.91	1.43	0.390	O		I				2.43
10.250	2.48	1.45	0.398	O		I				2.49
10.333	2.21	1.46	0.404	O	I					2.53
10.417	2.09	1.47	0.409	O	I					2.57
10.500	2.02	1.48	0.413	O	I					2.59
10.583	2.03	1.49	0.417	O	I					2.62
10.667	2.22	1.50	0.421	O	I					2.65
10.750	2.52	1.51	0.427	O		I				2.69
10.833	2.72	1.52	0.435	O		I				2.75
10.917	2.82	1.54	0.443	O		I				2.81
11.000	2.87	1.56	0.452	O		I				2.87
11.083	2.90	1.58	0.461	O		I				2.94
11.167	2.89	1.60	0.470	O		I				3.00
11.250	2.85	1.62	0.479	O		I				3.06
11.333	2.84	1.63	0.487	O		I				3.12
11.417	2.83	1.64	0.496	O		I				3.17
11.500	2.84	1.66	0.504	O		I				3.23
11.583	2.82	1.67	0.512	O		I				3.28
11.667	2.74	1.68	0.520	O		I				3.33
11.750	2.62	1.69	0.526	O	I					3.38
11.833	2.55	1.70	0.532	O	I					3.41
11.917	2.57	1.70	0.538	O	I					3.42
12.000	2.62	1.70	0.545	O	I					3.43
12.083	2.73	1.71	0.551	O	I					3.44
12.167	3.06	1.71	0.559	O		I				3.46
12.250	3.54	1.71	0.570	O		I				3.48
12.333	3.86	1.72	0.584	O			I			3.51
12.417	4.06	1.72	0.599	O			I			3.54
12.500	4.23	1.73	0.616	O			I			3.57
12.583	4.37	1.73	0.634	O			I			3.61
12.667	4.54	1.74	0.653	O			I			3.65
12.750	4.74	1.74	0.673	O			I			3.69
12.833	4.89	1.75	0.694	O			I			3.73
12.917	5.02	1.76	0.716	O			I			3.78
13.000	5.15	1.76	0.739	O			I			3.82
13.083	5.30	1.77	0.762	O			I			3.87
13.167	5.59	1.78	0.788	O			I			3.92
13.250	5.97	1.79	0.815	O			I			3.98
13.333	6.23	1.80	0.845	O			I			4.04
13.417	6.37	1.97	0.875	O	O		I			4.10
13.500	6.47	2.30	0.905		O		I			4.15
13.583	6.43	2.60	0.932		O		I			4.20
13.667	6.00	2.87	0.956		O		I			4.25
13.750	5.32	3.08	0.975		O		I			4.28
13.833	4.88	3.23	0.988		O		I			4.31
13.917	4.68	3.34	0.999		O		I			4.32
14.000	4.56	3.43	1.007		O		I			4.34
14.083	4.52	3.52	1.014		O		I			4.35
14.167	4.64	3.59	1.021		O		I			4.37
14.250	4.86	3.68	1.029		O		I			4.38
14.333	4.98	3.77	1.037		O		I			4.40
14.417	5.00	3.82	1.046		O		I			4.41
14.500	4.96	3.84	1.054		O		I			4.42
14.583	4.94	3.86	1.061		O		I			4.44
14.667	4.94	3.88	1.069		O		I			4.45
14.750	4.94	3.90	1.076		O		I			4.46
14.833	4.93	3.92	1.083		O		I			4.47
14.917	4.89	3.94	1.090		O		I			4.49
15.000	4.82	3.95	1.096		O		I			4.50

15.083	4.77	3.97	1.102					O	I		4.51
15.167	4.70	3.98	1.107					O	I		4.52
15.250	4.63	4.00	1.112					O	I		4.52
15.333	4.58	4.01	1.116					O	I		4.53
15.417	4.52	4.02	1.119					O	I		4.54
15.500	4.44	4.03	1.123					O	I		4.54
15.583	4.35	4.03	1.125					O	I		4.55
15.667	4.15	4.04	1.127					O	I		4.55
15.750	3.87	4.04	1.126					O			4.55
15.833	3.68	4.03	1.125					O	I		4.55
15.917	3.59	4.03	1.122					I	O		4.54
16.000	3.53	4.02	1.119					I	O		4.54
16.083	3.38	4.01	1.115					I	O		4.53
16.167	2.90	3.99	1.109					I	O		4.52
16.250	2.20	3.96	1.099				I	O			4.50
16.333	1.75	3.93	1.086				I	O			4.48
16.417	1.51	3.88	1.070				I	O			4.45
16.500	1.37	3.84	1.053				I	O			4.42
16.583	1.24	3.76	1.036				I	O			4.39
16.667	1.12	3.57	1.019				I	O			4.36
16.750	0.99	3.38	1.002				I	O			4.33
16.833	0.90	3.20	0.986				I	O			4.30
16.917	0.84	3.03	0.971				I	O			4.27
17.000	0.80	2.87	0.956				I	O			4.25
17.083	0.77	2.71	0.942				I	O			4.22
17.167	0.81	2.57	0.930				I	O			4.20
17.250	0.90	2.45	0.918				I	O			4.18
17.333	0.95	2.33	0.908				I	O			4.16
17.417	0.97	2.23	0.899				I	O			4.14
17.500	0.98	2.14	0.891				I	O			4.13
17.583	0.98	2.05	0.883				I	O			4.11
17.667	0.98	1.97	0.876				I	O			4.10
17.750	0.99	1.90	0.869				I	O			4.09
17.833	0.98	1.83	0.863				I	O			4.08
17.917	0.95	1.80	0.857				I	O			4.06
18.000	0.90	1.80	0.851				I	O			4.05
18.083	0.87	1.80	0.845				I	O			4.04
18.167	0.85	1.79	0.838				I	O			4.03
18.250	0.85	1.79	0.832				I	O			4.01
18.333	0.84	1.79	0.825				I	O			4.00
18.417	0.84	1.79	0.819				I	O			3.99
18.500	0.83	1.79	0.812				I	O			3.97
18.583	0.82	1.78	0.806				I	O			3.96
18.667	0.78	1.78	0.799				I	O			3.95
18.750	0.73	1.78	0.792				I	O			3.93
18.833	0.68	1.78	0.785				I	O			3.92
18.917	0.62	1.77	0.777				I	O			3.90
19.000	0.56	1.77	0.769				I	O			3.88
19.083	0.52	1.77	0.760				I	O			3.87
19.167	0.53	1.77	0.752				I	O			3.85
19.250	0.57	1.76	0.743				I	O			3.83
19.333	0.60	1.76	0.735				I	O			3.82
19.417	0.65	1.76	0.727				I	O			3.80
19.500	0.70	1.76	0.720				I	O			3.79
19.583	0.73	1.76	0.713				I	O			3.77
19.667	0.72	1.75	0.706				I	O			3.76
19.750	0.67	1.75	0.698				I	O			3.74
19.833	0.64	1.75	0.691				I	O			3.73
19.917	0.59	1.75	0.683				I	O			3.71
20.000	0.53	1.74	0.675				I	O			3.69
20.083	0.50	1.74	0.666				I	O			3.68
20.167	0.51	1.74	0.658				I	O			3.66
20.250	0.56	1.74	0.650				I	O			3.64

20.333	0.58	1.73	0.642	I	O	3.63
20.417	0.59	1.73	0.634	I	O	3.61
20.500	0.60	1.73	0.626	I	O	3.59
20.583	0.60	1.73	0.618	I	O	3.58
20.667	0.60	1.72	0.610	I	O	3.56
20.750	0.61	1.72	0.603	I	O	3.55
20.833	0.60	1.72	0.595	I	O	3.53
20.917	0.56	1.72	0.587	I	O	3.52
21.000	0.51	1.71	0.579	I	O	3.50
21.083	0.48	1.71	0.571	I	O	3.48
21.167	0.50	1.71	0.562	I	O	3.47
21.250	0.55	1.71	0.554	I	O	3.45
21.333	0.56	1.70	0.546	I	O	3.43
21.417	0.54	1.70	0.538	I	O	3.42
21.500	0.49	1.70	0.530	I	O	3.40
21.583	0.47	1.69	0.522	I	O	3.34
21.667	0.49	1.67	0.513	I	O	3.29
21.750	0.54	1.66	0.506	I	O	3.24
21.833	0.56	1.65	0.498	I	O	3.19
21.917	0.53	1.63	0.490	I	O	3.14
22.000	0.49	1.62	0.483	I	O	3.08
22.083	0.47	1.61	0.475	I	O	3.03
22.167	0.49	1.59	0.467	I	O	2.98
22.250	0.54	1.58	0.460	I	O	2.93
22.333	0.56	1.56	0.453	I	O	2.88
22.417	0.53	1.55	0.446	I	O	2.83
22.500	0.49	1.53	0.439	I	O	2.78
22.583	0.46	1.52	0.431	I	O	2.72
22.667	0.44	1.50	0.424	I	O	2.67
22.750	0.44	1.49	0.417	I	O	2.62
22.833	0.43	1.47	0.410	I	O	2.57
22.917	0.42	1.46	0.402	I	O	2.52
23.000	0.42	1.44	0.395	I	O	2.47
23.083	0.42	1.43	0.388	I	O	2.42
23.167	0.42	1.41	0.382	I	O	2.37
23.250	0.42	1.40	0.375	I	O	2.32
23.333	0.41	1.38	0.368	I	O	2.27
23.417	0.41	1.37	0.361	I	O	2.22
23.500	0.41	1.35	0.355	I	O	2.18
23.583	0.41	1.34	0.348	I	O	2.13
23.667	0.41	1.33	0.342	I	O	2.09
23.750	0.41	1.31	0.336	I	O	2.04
23.833	0.41	1.30	0.330	I	O	2.00
23.917	0.41	1.28	0.324	I	O	1.95
24.000	0.41	1.26	0.318	I	O	1.91
24.083	0.39	1.24	0.312	I	O	1.87
24.167	0.32	1.21	0.306	I	O	1.83
24.250	0.21	1.19	0.299	I	O	1.78
24.333	0.14	1.17	0.292	I	O	1.73
24.417	0.10	1.14	0.285	I	O	1.68
24.500	0.08	1.12	0.278	I	O	1.63
24.583	0.06	1.09	0.271	I	O	1.58
24.667	0.05	1.06	0.264	I	O	1.53
24.750	0.04	1.04	0.257	I	O	1.48
24.833	0.03	1.02	0.250	I	O	1.43
24.917	0.03	0.99	0.244	I	O	1.38
25.000	0.02	0.97	0.237	I	O	1.34
25.083	0.02	0.95	0.231	I	O	1.29
25.167	0.01	0.92	0.224	I	O	1.24
25.250	0.01	0.90	0.218	I	O	1.20
25.333	0.01	0.88	0.212	I	O	1.16
25.417	0.01	0.86	0.206	I	O	1.12
25.500	0.00	0.84	0.200	I	O	1.07

25.583	0.00	0.82	0.195	I	O	1.03
25.667	0.00	0.79	0.189	I	O	1.00
25.750	0.00	0.76	0.184	I	O	0.97
25.833	0.00	0.73	0.179	I	O	0.94
25.917	0.00	0.71	0.174	I	O	0.91
26.000	0.00	0.68	0.169	I	O	0.89
26.083	0.00	0.65	0.164	I	O	0.86
26.167	0.00	0.63	0.160	I	O	0.84
26.250	0.00	0.60	0.156	I	O	0.82
26.333	0.00	0.58	0.152	I	O	0.79
26.417	0.00	0.56	0.148	I	O	0.77
26.500	0.00	0.54	0.144	I	O	0.75
26.583	0.00	0.52	0.140	I	O	0.73
26.667	0.00	0.50	0.137	I	O	0.71
26.750	0.00	0.48	0.133	I	O	0.70
26.833	0.00	0.46	0.130	I	O	0.68
26.917	0.00	0.44	0.127	I	O	0.66
27.000	0.00	0.42	0.124	I	O	0.65
27.083	0.00	0.41	0.121	I	O	0.63
27.167	0.00	0.39	0.118	IO		0.62
27.250	0.00	0.38	0.116	IO		0.60
27.333	0.00	0.36	0.113	IO		0.59
27.417	0.00	0.35	0.111	IO		0.58
27.500	0.00	0.33	0.108	IO		0.56
27.583	0.00	0.32	0.106	IO		0.55
27.667	0.00	0.31	0.104	IO		0.54
27.750	0.00	0.30	0.102	IO		0.53
27.833	0.00	0.29	0.100	IO		0.52
27.917	0.00	0.27	0.098	IO		0.51
28.000	0.00	0.26	0.096	IO		0.50
28.083	0.00	0.25	0.094	IO		0.49
28.167	0.00	0.24	0.093	IO		0.48
28.250	0.00	0.23	0.091	IO		0.47
28.333	0.00	0.23	0.089	IO		0.46
28.417	0.00	0.22	0.088	IO		0.45
28.500	0.00	0.21	0.086	IO		0.45
28.583	0.00	0.20	0.085	O		0.44
28.667	0.00	0.19	0.084	O		0.43
28.750	0.00	0.19	0.082	O		0.42
28.833	0.00	0.18	0.081	O		0.42
28.917	0.00	0.17	0.080	O		0.41
29.000	0.00	0.16	0.079	O		0.40
29.083	0.00	0.16	0.078	O		0.40
29.167	0.00	0.15	0.077	O		0.39
29.250	0.00	0.15	0.076	O		0.39
29.333	0.00	0.14	0.075	O		0.38
29.417	0.00	0.14	0.074	O		0.38
29.500	0.00	0.13	0.073	O		0.37
29.583	0.00	0.13	0.072	O		0.37
29.667	0.00	0.12	0.071	O		0.36
29.750	0.00	0.12	0.070	O		0.36
29.833	0.00	0.11	0.069	O		0.35
29.917	0.00	0.11	0.069	O		0.35
30.000	0.00	0.10	0.068	O		0.35
30.083	0.00	0.10	0.067	O		0.34
30.167	0.00	0.10	0.066	O		0.34
30.250	0.00	0.09	0.066	O		0.33
30.333	0.00	0.09	0.065	O		0.33
30.417	0.00	0.08	0.065	O		0.33
30.500	0.00	0.08	0.064	O		0.33
30.583	0.00	0.08	0.064	O		0.32
30.667	0.00	0.08	0.063	O		0.32
30.750	0.00	0.07	0.062	O		0.32

30.833	0.00	0.07	0.062	0	0.31
30.917	0.00	0.07	0.062	0	0.31
31.000	0.00	0.06	0.061	0	0.31
31.083	0.00	0.06	0.061	0	0.31
31.167	0.00	0.06	0.060	0	0.30
31.250	0.00	0.06	0.060	0	0.30
31.333	0.00	0.05	0.059	0	0.30
31.417	0.00	0.05	0.059	0	0.30
31.500	0.00	0.05	0.059	0	0.30
31.583	0.00	0.05	0.058	0	0.29
31.667	0.00	0.05	0.058	0	0.29
31.750	0.00	0.05	0.058	0	0.29
31.833	0.00	0.04	0.057	0	0.29
31.917	0.00	0.04	0.057	0	0.29
32.000	0.00	0.04	0.057	0	0.29
32.083	0.00	0.04	0.057	0	0.29
32.167	0.00	0.04	0.056	0	0.28
32.250	0.00	0.04	0.056	0	0.28
32.333	0.00	0.03	0.056	0	0.28
32.417	0.00	0.03	0.056	0	0.28
32.500	0.00	0.03	0.055	0	0.28
32.583	0.00	0.03	0.055	0	0.28
32.667	0.00	0.03	0.055	0	0.28
32.750	0.00	0.03	0.055	0	0.28
32.833	0.00	0.03	0.055	0	0.27
32.917	0.00	0.03	0.054	0	0.27
33.000	0.00	0.02	0.054	0	0.27
33.083	0.00	0.02	0.054	0	0.27
33.167	0.00	0.02	0.054	0	0.27
33.250	0.00	0.02	0.054	0	0.27
33.333	0.00	0.02	0.054	0	0.27
33.417	0.00	0.02	0.053	0	0.27
33.500	0.00	0.02	0.053	0	0.27
33.583	0.00	0.02	0.053	0	0.27
33.667	0.00	0.02	0.053	0	0.27
33.750	0.00	0.02	0.053	0	0.27
33.833	0.00	0.02	0.053	0	0.26
33.917	0.00	0.02	0.053	0	0.26
34.000	0.00	0.02	0.053	0	0.26
34.083	0.00	0.01	0.052	0	0.26
34.167	0.00	0.01	0.052	0	0.26
34.250	0.00	0.01	0.052	0	0.26
34.333	0.00	0.01	0.052	0	0.26
34.417	0.00	0.01	0.052	0	0.26
34.500	0.00	0.01	0.052	0	0.26
34.583	0.00	0.01	0.052	0	0.26
34.667	0.00	0.01	0.052	0	0.26
34.750	0.00	0.01	0.052	0	0.26
34.833	0.00	0.01	0.052	0	0.26
34.917	0.00	0.01	0.052	0	0.26
35.000	0.00	0.01	0.052	0	0.26
35.083	0.00	0.01	0.051	0	0.26
35.167	0.00	0.01	0.051	0	0.26
35.250	0.00	0.01	0.051	0	0.26
35.333	0.00	0.01	0.051	0	0.26
35.417	0.00	0.01	0.051	0	0.26
35.500	0.00	0.01	0.051	0	0.26
35.583	0.00	0.01	0.051	0	0.26
35.667	0.00	0.01	0.051	0	0.26
35.750	0.00	0.01	0.051	0	0.26
35.833	0.00	0.01	0.051	0	0.26
35.917	0.00	0.01	0.051	0	0.25
36.000	0.00	0.01	0.051	0	0.25

36.083	0.00	0.01	0.051	0					0.25
36.167	0.00	0.01	0.051	0					0.25
36.250	0.00	0.01	0.051	0					0.25
36.333	0.00	0.01	0.051	0					0.25
36.417	0.00	0.00	0.051	0					0.25
36.500	0.00	0.00	0.051	0					0.25
36.583	0.00	0.00	0.051	0					0.25
36.667	0.00	0.00	0.051	0					0.25
36.750	0.00	0.00	0.051	0					0.25
36.833	0.00	0.00	0.051	0					0.25
36.917	0.00	0.00	0.051	0					0.25
37.000	0.00	0.00	0.050	0					0.25
37.083	0.00	0.00	0.050	0					0.25
37.167	0.00	0.00	0.050	0					0.25
37.250	0.00	0.00	0.050	0					0.25
37.333	0.00	0.00	0.050	0					0.25
37.417	0.00	0.00	0.050	0					0.25
37.500	0.00	0.00	0.050	0					0.25
37.583	0.00	0.00	0.050	0					0.25
37.667	0.00	0.00	0.050	0					0.25
37.750	0.00	0.00	0.050	0					0.25
37.833	0.00	0.00	0.050	0					0.25
37.917	0.00	0.00	0.050	0					0.25
38.000	0.00	0.00	0.050	0					0.25
38.083	0.00	0.00	0.050	0					0.25
38.167	0.00	0.00	0.050	0					0.25
38.250	0.00	0.00	0.050	0					0.25
38.333	0.00	0.00	0.050	0					0.25
38.417	0.00	0.00	0.050	0					0.25
38.500	0.00	0.00	0.050	0					0.25
38.583	0.00	0.00	0.050	0					0.25
38.667	0.00	0.00	0.050	0					0.25
38.750	0.00	0.00	0.050	0					0.25
38.833	0.00	0.00	0.050	0					0.25
38.917	0.00	0.00	0.050	0					0.25
39.000	0.00	0.00	0.050	0					0.25
39.083	0.00	0.00	0.050	0					0.25
39.167	0.00	0.00	0.050	0					0.25
39.250	0.00	0.00	0.050	0					0.25
39.333	0.00	0.00	0.050	0					0.25
39.417	0.00	0.00	0.050	0					0.25
39.500	0.00	0.00	0.050	0					0.25
39.583	0.00	0.00	0.050	0					0.25
39.667	0.00	0.00	0.050	0					0.25
39.750	0.00	0.00	0.050	0					0.25
39.833	0.00	0.00	0.050	0					0.25

Remaining water in basin = 0.05 (Ac.Ft)

\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 478  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 4.039 (CFS)  
 Total volume = 3.388 (Ac.Ft)  
 Status of hydrographs being held in storage  
 Stream 1 Stream 2 Stream 3 Stream 4 Stream 5  
 Peak (CFS) 0.000 0.000 0.000 0.000 0.000  
 Vol (Ac.Ft) 0.000 0.000 0.000 0.000 0.000  
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FLOOD HYDROGRAPH ROUTING PROGRAM  
 Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005  
 Study date: 04/24/23

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 Black Creek - Harvill at Water Industrial  
 Basin Routing Study - 1 Hour 100 Year Storm Event  
 3963ROUTING1100  
 CB  
 -----

Program License Serial Number 6145

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 \*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: 3963unihydql00p1100.rte  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 31  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 38.067 (CFS)  
 Total volume = 1.886 (Ac.Ft)  
 Status of hydrographs being held in storage  
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5  
 Peak (CFS)      0.000   0.000   0.000   0.000   0.000  
 Vol (Ac.Ft)     0.000   0.000   0.000   0.000   0.000  
 \*\*\*\*\*

+++++  
 Process from Point/Station 1.000 to Point/Station 1.000  
 \*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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 User entry of depth-outflow-storage data

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 Total number of inflow hydrograph intervals = 31  
 Hydrograph time unit = 5.000 (Min.)  
 Initial depth in storage basin = 0.00 (Ft.)  
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-----  
 Initial basin depth = 0.00 (Ft.)  
 Initial basin storage = 0.00 (Ac.Ft)  
 Initial basin outflow = 0.00 (CFS)  
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 Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.250	0.050	0.001	0.050	0.050
1.000	0.190	0.800	0.187	0.193
2.000	0.330	1.300	0.326	0.334
3.000	0.470	1.600	0.464	0.476
3.400	0.530	1.700	0.524	0.536
4.070	0.860	1.800	0.854	0.866

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4.400	1.040	3.800	1.027	1.053
5.400	1.620	5.400	1.601	1.639
6.400	2.280	6.500	2.258	2.302
7.400	3.020	7.400	2.995	3.045
8.400	3.880	8.300	3.851	3.909

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

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	9.5	19.03	28.55	38.07	Depth (Ft.)
0.083	0.49	0.00	0.002	O					0.01
0.167	2.53	0.00	0.012	O I					0.06
0.250	5.59	0.00	0.040	O I					0.20
0.333	7.82	0.20	0.086	O I					0.44
0.417	9.41	0.53	0.142	O I					0.74
0.500	10.88	0.86	0.207	O I					1.12
0.583	12.66	1.13	0.282	O I					1.65
0.667	14.74	1.38	0.367	O I					2.27
0.750	17.55	1.60	0.468	O I					2.99
0.833	23.95	1.72	0.600	O I					3.54
0.917	34.71	1.78	0.790	O I					3.93
1.000	38.07	3.60	1.022	O I					4.37
1.083	27.93	4.30	1.222	O I					4.71
1.167	18.01	4.65	1.349	O I					4.93
1.250	11.60	4.84	1.418	O I					5.05
1.333	8.11	4.94	1.453	O I					5.11
1.417	6.15	4.98	1.468	O I					5.14
1.500	4.88	4.99	1.471	O					5.14
1.583	3.87	4.98	1.467	O I					5.14
1.667	3.12	4.95	1.457	O I					5.12
1.750	2.61	4.91	1.443	O I					5.09
1.833	2.15	4.86	1.425	O I					5.06
1.917	1.74	4.81	1.405	O I					5.03
2.000	1.42	4.75	1.383	O I					4.99
2.083	1.12	4.68	1.360	O I					4.95
2.167	0.88	4.61	1.335	O I					4.91
2.250	0.72	4.54	1.309	O I					4.86
2.333	0.59	4.47	1.282	O I					4.82
2.417	0.38	4.39	1.255	O I					4.77
2.500	0.11	4.31	1.227	O I					4.72
2.583	0.04	4.23	1.198	O I					4.67
2.667	0.00	4.16	1.169	O I					4.62
2.750	0.00	4.08	1.141	O I					4.57
2.833	0.00	4.00	1.113	O I					4.53
2.917	0.00	3.93	1.085	O I					4.48
3.000	0.00	3.85	1.059	O I					4.43
3.083	0.00	3.72	1.033	O I					4.39
3.167	0.00	3.44	1.008	O I					4.34
3.250	0.00	3.19	0.985	O I					4.30
3.333	0.00	2.95	0.964	O I					4.26
3.417	0.00	2.74	0.944	O I					4.22
3.500	0.00	2.54	0.926	O I					4.19
3.583	0.00	2.35	0.909	O I					4.16
3.667	0.00	2.18	0.894	O I					4.13
3.750	0.00	2.01	0.879	O I					4.11
3.833	0.00	1.87	0.866	O I					4.08
3.917	0.00	1.80	0.853	O I					4.06
4.000	0.00	1.79	0.841	O I					4.03
4.083	0.00	1.79	0.829	O I					4.01
4.167	0.00	1.79	0.816	O I					3.98



4.250	0.00	1.78	0.804	IO	3.96
4.333	0.00	1.78	0.792	IO	3.93
4.417	0.00	1.78	0.780	IO	3.91
4.500	0.00	1.77	0.767	IO	3.88
4.583	0.00	1.77	0.755	IO	3.86
4.667	0.00	1.76	0.743	IO	3.83
4.750	0.00	1.76	0.731	IO	3.81
4.833	0.00	1.76	0.719	IO	3.78
4.917	0.00	1.75	0.707	IO	3.76
5.000	0.00	1.75	0.695	IO	3.73
5.083	0.00	1.75	0.683	IO	3.71
5.167	0.00	1.74	0.670	IO	3.69
5.250	0.00	1.74	0.658	IO	3.66
5.333	0.00	1.74	0.647	IO	3.64
5.417	0.00	1.73	0.635	IO	3.61
5.500	0.00	1.73	0.623	IO	3.59
5.583	0.00	1.72	0.611	IO	3.56
5.667	0.00	1.72	0.599	IO	3.54
5.750	0.00	1.72	0.587	IO	3.52
5.833	0.00	1.71	0.575	IO	3.49
5.917	0.00	1.71	0.563	IO	3.47
6.000	0.00	1.71	0.552	IO	3.44
6.083	0.00	1.70	0.540	IO	3.42
6.167	0.00	1.70	0.528	IO	3.39
6.250	0.00	1.68	0.517	IO	3.31
6.333	0.00	1.66	0.505	IO	3.23
6.417	0.00	1.64	0.494	IO	3.16
6.500	0.00	1.62	0.483	IO	3.08
6.583	0.00	1.60	0.471	IO	3.01
6.667	0.00	1.58	0.461	IO	2.93
6.750	0.00	1.56	0.450	IO	2.86
6.833	0.00	1.53	0.439	IO	2.78
6.917	0.00	1.51	0.429	IO	2.70
7.000	0.00	1.49	0.418	IO	2.63
7.083	0.00	1.47	0.408	IO	2.56
7.167	0.00	1.45	0.398	IO	2.49
7.250	0.00	1.42	0.388	IO	2.42
7.333	0.00	1.40	0.378	IO	2.35
7.417	0.00	1.38	0.369	IO	2.28
7.500	0.00	1.36	0.359	IO	2.21
7.583	0.00	1.34	0.350	IO	2.14
7.667	0.00	1.32	0.341	IO	2.08
7.750	0.00	1.30	0.332	IO	2.01
7.833	0.00	1.27	0.323	IO	1.95
7.917	0.00	1.24	0.314	IO	1.89
8.000	0.00	1.21	0.306	IO	1.83
8.083	0.00	1.18	0.298	O	1.77
8.167	0.00	1.16	0.289	O	1.71
8.250	0.00	1.13	0.282	O	1.65
8.333	0.00	1.10	0.274	O	1.60
8.417	0.00	1.07	0.266	O	1.55
8.500	0.00	1.05	0.259	O	1.49
8.583	0.00	1.02	0.252	O	1.44
8.667	0.00	1.00	0.245	O	1.39
8.750	0.00	0.97	0.238	O	1.35
8.833	0.00	0.95	0.232	O	1.30
8.917	0.00	0.93	0.225	O	1.25
9.000	0.00	0.90	0.219	O	1.21
9.083	0.00	0.88	0.213	O	1.16
9.167	0.00	0.86	0.207	O	1.12
9.250	0.00	0.84	0.201	O	1.08
9.333	0.00	0.82	0.195	O	1.04
9.417	0.00	0.80	0.190	O	1.00

9.500	0.00	0.77	0.184	0	0.97
9.583	0.00	0.74	0.179	0	0.94
9.667	0.00	0.71	0.174	0	0.91
9.750	0.00	0.68	0.169	0	0.89
9.833	0.00	0.66	0.165	0	0.86
9.917	0.00	0.63	0.160	0	0.84
10.000	0.00	0.61	0.156	0	0.82
10.083	0.00	0.58	0.152	0	0.80
10.167	0.00	0.56	0.148	0	0.78
10.250	0.00	0.54	0.144	0	0.75
10.333	0.00	0.52	0.141	0	0.74
10.417	0.00	0.50	0.137	0	0.72
10.500	0.00	0.48	0.134	0	0.70
10.583	0.00	0.46	0.130	0	0.68
10.667	0.00	0.44	0.127	0	0.66
10.750	0.00	0.43	0.124	0	0.65
10.833	0.00	0.41	0.122	0	0.63
10.917	0.00	0.39	0.119	0	0.62
11.000	0.00	0.38	0.116	0	0.60
11.083	0.00	0.36	0.114	0	0.59
11.167	0.00	0.35	0.111	0	0.58
11.250	0.00	0.34	0.109	0	0.56
11.333	0.00	0.32	0.106	0	0.55
11.417	0.00	0.31	0.104	0	0.54
11.500	0.00	0.30	0.102	0	0.53
11.583	0.00	0.29	0.100	0	0.52
11.667	0.00	0.28	0.098	0	0.51
11.750	0.00	0.27	0.096	0	0.50
11.833	0.00	0.26	0.095	0	0.49
11.917	0.00	0.25	0.093	0	0.48
12.000	0.00	0.24	0.091	0	0.47
12.083	0.00	0.23	0.090	0	0.46
12.167	0.00	0.22	0.088	0	0.45
12.250	0.00	0.21	0.087	0	0.45
12.333	0.00	0.20	0.085	0	0.44
12.417	0.00	0.19	0.084	0	0.43
12.500	0.00	0.19	0.082	0	0.42
12.583	0.00	0.18	0.081	0	0.42
12.667	0.00	0.17	0.080	0	0.41
12.750	0.00	0.17	0.079	0	0.40
12.833	0.00	0.16	0.078	0	0.40
12.917	0.00	0.15	0.077	0	0.39
13.000	0.00	0.15	0.076	0	0.39
13.083	0.00	0.14	0.075	0	0.38
13.167	0.00	0.14	0.074	0	0.38
13.250	0.00	0.13	0.073	0	0.37
13.333	0.00	0.13	0.072	0	0.37
13.417	0.00	0.12	0.071	0	0.36
13.500	0.00	0.12	0.070	0	0.36
13.583	0.00	0.11	0.069	0	0.35
13.667	0.00	0.11	0.069	0	0.35
13.750	0.00	0.10	0.068	0	0.35
13.833	0.00	0.10	0.067	0	0.34
13.917	0.00	0.10	0.067	0	0.34
14.000	0.00	0.09	0.066	0	0.34
14.083	0.00	0.09	0.065	0	0.33
14.167	0.00	0.08	0.065	0	0.33
14.250	0.00	0.08	0.064	0	0.33
14.333	0.00	0.08	0.064	0	0.32
14.417	0.00	0.08	0.063	0	0.32
14.500	0.00	0.07	0.063	0	0.32
14.583	0.00	0.07	0.062	0	0.31
14.667	0.00	0.07	0.062	0	0.31

14.750	0.00	0.06	0.061	0	0.31
14.833	0.00	0.06	0.061	0	0.31
14.917	0.00	0.06	0.060	0	0.31
15.000	0.00	0.06	0.060	0	0.30
15.083	0.00	0.06	0.059	0	0.30
15.167	0.00	0.05	0.059	0	0.30
15.250	0.00	0.05	0.059	0	0.30
15.333	0.00	0.05	0.058	0	0.30
15.417	0.00	0.05	0.058	0	0.29
15.500	0.00	0.05	0.058	0	0.29
15.583	0.00	0.04	0.057	0	0.29
15.667	0.00	0.04	0.057	0	0.29
15.750	0.00	0.04	0.057	0	0.29
15.833	0.00	0.04	0.057	0	0.29
15.917	0.00	0.04	0.056	0	0.28
16.000	0.00	0.04	0.056	0	0.28
16.083	0.00	0.03	0.056	0	0.28
16.167	0.00	0.03	0.056	0	0.28
16.250	0.00	0.03	0.055	0	0.28
16.333	0.00	0.03	0.055	0	0.28
16.417	0.00	0.03	0.055	0	0.28
16.500	0.00	0.03	0.055	0	0.28
16.583	0.00	0.03	0.055	0	0.27
16.667	0.00	0.03	0.054	0	0.27
16.750	0.00	0.03	0.054	0	0.27
16.833	0.00	0.02	0.054	0	0.27
16.917	0.00	0.02	0.054	0	0.27
17.000	0.00	0.02	0.054	0	0.27
17.083	0.00	0.02	0.054	0	0.27
17.167	0.00	0.02	0.053	0	0.27
17.250	0.00	0.02	0.053	0	0.27
17.333	0.00	0.02	0.053	0	0.27
17.417	0.00	0.02	0.053	0	0.27
17.500	0.00	0.02	0.053	0	0.27
17.583	0.00	0.02	0.053	0	0.26
17.667	0.00	0.02	0.053	0	0.26
17.750	0.00	0.02	0.053	0	0.26
17.833	0.00	0.02	0.052	0	0.26
17.917	0.00	0.01	0.052	0	0.26
18.000	0.00	0.01	0.052	0	0.26
18.083	0.00	0.01	0.052	0	0.26
18.167	0.00	0.01	0.052	0	0.26
18.250	0.00	0.01	0.052	0	0.26
18.333	0.00	0.01	0.052	0	0.26
18.417	0.00	0.01	0.052	0	0.26
18.500	0.00	0.01	0.052	0	0.26
18.583	0.00	0.01	0.052	0	0.26
18.667	0.00	0.01	0.052	0	0.26
18.750	0.00	0.01	0.052	0	0.26
18.833	0.00	0.01	0.051	0	0.26
18.917	0.00	0.01	0.051	0	0.26
19.000	0.00	0.01	0.051	0	0.26
19.083	0.00	0.01	0.051	0	0.26
19.167	0.00	0.01	0.051	0	0.26
19.250	0.00	0.01	0.051	0	0.26
19.333	0.00	0.01	0.051	0	0.26
19.417	0.00	0.01	0.051	0	0.26
19.500	0.00	0.01	0.051	0	0.26
19.583	0.00	0.01	0.051	0	0.26
19.667	0.00	0.01	0.051	0	0.26
19.750	0.00	0.01	0.051	0	0.25
19.833	0.00	0.01	0.051	0	0.25
19.917	0.00	0.01	0.051	0	0.25

20.000	0.00	0.01	0.051	O					0.25
20.083	0.00	0.01	0.051	O					0.25
20.167	0.00	0.01	0.051	O					0.25
20.250	0.00	0.00	0.051	O					0.25
20.333	0.00	0.00	0.051	O					0.25
20.417	0.00	0.00	0.051	O					0.25
20.500	0.00	0.00	0.051	O					0.25
20.583	0.00	0.00	0.051	O					0.25
20.667	0.00	0.00	0.051	O					0.25
20.750	0.00	0.00	0.050	O					0.25
20.833	0.00	0.00	0.050	O					0.25
20.917	0.00	0.00	0.050	O					0.25
21.000	0.00	0.00	0.050	O					0.25
21.083	0.00	0.00	0.050	O					0.25
21.167	0.00	0.00	0.050	O					0.25
21.250	0.00	0.00	0.050	O					0.25
21.333	0.00	0.00	0.050	O					0.25
21.417	0.00	0.00	0.050	O					0.25
21.500	0.00	0.00	0.050	O					0.25
21.583	0.00	0.00	0.050	O					0.25
21.667	0.00	0.00	0.050	O					0.25
21.750	0.00	0.00	0.050	O					0.25
21.833	0.00	0.00	0.050	O					0.25
21.917	0.00	0.00	0.050	O					0.25
22.000	0.00	0.00	0.050	O					0.25
22.083	0.00	0.00	0.050	O					0.25
22.167	0.00	0.00	0.050	O					0.25
22.250	0.00	0.00	0.050	O					0.25
22.333	0.00	0.00	0.050	O					0.25
22.417	0.00	0.00	0.050	O					0.25
22.500	0.00	0.00	0.050	O					0.25
22.583	0.00	0.00	0.050	O					0.25
22.667	0.00	0.00	0.050	O					0.25
22.750	0.00	0.00	0.050	O					0.25
22.833	0.00	0.00	0.050	O					0.25
22.917	0.00	0.00	0.050	O					0.25
23.000	0.00	0.00	0.050	O					0.25
23.083	0.00	0.00	0.050	O					0.25
23.167	0.00	0.00	0.050	O					0.25
23.250	0.00	0.00	0.050	O					0.25
23.333	0.00	0.00	0.050	O					0.25
23.417	0.00	0.00	0.050	O					0.25
23.500	0.00	0.00	0.050	O					0.25
23.583	0.00	0.00	0.050	O					0.25

Remaining water in basin = 0.05 (Ac.Ft)

\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
Number of intervals = 283  
Time interval = 5.0 (Min.)  
Maximum/Peak flow rate = 4.989 (CFS)  
Total volume = 1.836 (Ac.Ft)  
Status of hydrographs being held in storage  
Stream 1 Stream 2 Stream 3 Stream 4 Stream 5  
Peak (CFS) 0.000 0.000 0.000 0.000 0.000  
Vol (Ac.Ft) 0.000 0.000 0.000 0.000 0.000  
\*\*\*\*\*

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FLOOD HYDROGRAPH ROUTING PROGRAM  
 Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005  
 Study date: 04/24/23

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 Black Creek - Harvill at Water Industrial  
 Basin Routing Study - 3 Hour 100 Year Storm Event  
 3963ROUTING3100  
 CB  
 -----

Program License Serial Number 6145

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 \*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: 3963unihydql00p3100.rte  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 55  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 26.143 (CFS)  
 Total volume = 2.681 (Ac.Ft)  
 Status of hydrographs being held in storage  
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5  
 Peak (CFS)          0.000    0.000    0.000    0.000    0.000  
 Vol (Ac.Ft)         0.000    0.000    0.000    0.000    0.000  
 \*\*\*\*\*

+++++  
 Process from Point/Station 1.000 to Point/Station 1.000  
 \*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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 User entry of depth-outflow-storage data

-----  
 Total number of inflow hydrograph intervals = 55  
 Hydrograph time unit = 5.000 (Min.)  
 Initial depth in storage basin = 0.00 (Ft.)  
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-----  
 Initial basin depth = 0.00 (Ft.)  
 Initial basin storage = 0.00 (Ac.Ft)  
 Initial basin outflow = 0.00 (CFS)  
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 Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.250	0.050	0.001	0.050	0.050
1.000	0.190	0.800	0.187	0.193
2.000	0.330	1.300	0.326	0.334
3.000	0.470	1.600	0.464	0.476
3.400	0.530	1.700	0.524	0.536
4.070	0.860	1.800	0.854	0.866

4.400	1.040	3.800	1.027	1.053
5.400	1.620	5.400	1.601	1.639
6.400	2.280	6.500	2.258	2.302
7.400	3.020	7.400	2.995	3.045
8.400	3.880	8.300	3.851	3.909

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

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	6.5	13.07	19.61	26.14	Depth (Ft.)
0.083	0.19	0.00	0.001	O					0.00
0.167	0.96	0.00	0.005	O I					0.02
0.250	2.03	0.00	0.015	O I					0.07
0.333	2.61	0.00	0.031	O I					0.15
0.417	3.04	0.00	0.050	O I					0.25
0.500	3.67	0.13	0.073	O I					0.37
0.583	4.26	0.28	0.099	O I					0.51
0.667	4.66	0.44	0.127	O I					0.66
0.750	4.93	0.61	0.156	O I					0.82
0.833	5.24	0.78	0.187	O I					0.98
0.917	5.28	0.90	0.217	O I					1.19
1.000	5.20	1.00	0.247	O I					1.40
1.083	5.48	1.11	0.276	O I					1.62
1.167	6.15	1.22	0.308	O I					1.84
1.250	6.85	1.33	0.344	O I					2.10
1.333	7.22	1.41	0.383	O I					2.38
1.417	7.39	1.50	0.424	O I					2.67
1.500	7.84	1.59	0.465	O I					2.97
1.583	8.60	1.67	0.511	O I					3.27
1.667	9.00	1.71	0.560	O I					3.46
1.750	9.33	1.72	0.611	O I					3.56
1.833	10.16	1.74	0.666	O I					3.68
1.917	10.96	1.76	0.727	O I					3.80
2.000	11.16	1.78	0.791	O I					3.93
2.083	11.20	1.80	0.856	O I					4.06
2.167	11.65	2.46	0.920	O I					4.18
2.250	13.04	3.19	0.985	O I					4.30
2.333	14.97	3.85	1.057	O I					4.43
2.417	16.31	4.07	1.138	O I					4.57
2.500	18.52	4.32	1.229	O I					4.73
2.583	22.81	4.63	1.340	O I					4.92
2.667	26.14	5.00	1.476	O I					5.15
2.750	26.00	5.40	1.619	O I					5.40
2.833	21.27	5.61	1.744	O I					5.59
2.917	15.46	5.75	1.832	O I					5.72
3.000	11.89	5.84	1.886	O I					5.80
3.083	9.23	5.90	1.918	O I					5.85
3.167	6.60	5.92	1.932	O I					5.87
3.250	4.76	5.92	1.930	I O					5.87
3.333	3.66	5.90	1.919	I O					5.85
3.417	2.91	5.87	1.901	I O					5.83
3.500	2.35	5.83	1.879	I O					5.79
3.583	1.92	5.79	1.853	I O					5.75
3.667	1.56	5.74	1.826	I O					5.71
3.750	1.25	5.69	1.796	I O					5.67
3.833	1.00	5.64	1.765	I O					5.62
3.917	0.79	5.59	1.732	I O					5.57
4.000	0.63	5.53	1.699	I O					5.52
4.083	0.47	5.47	1.665	I O					5.47
4.167	0.31	5.42	1.630	I O					5.41

4.250	0.16	5.33	1.594	I	O	5.36
4.333	0.08	5.23	1.559	I	O	5.29
4.417	0.05	5.13	1.524	I	O	5.23
4.500	0.02	5.04	1.489	I	O	5.17
4.583	0.00	4.94	1.455	I	O	5.11
4.667	0.00	4.85	1.421	I	O	5.06
4.750	0.00	4.76	1.388	I	O	5.00
4.833	0.00	4.67	1.355	I	O	4.94
4.917	0.00	4.58	1.323	I	O	4.89
5.000	0.00	4.50	1.292	I	O	4.83
5.083	0.00	4.41	1.261	I	O	4.78
5.167	0.00	4.33	1.231	I	O	4.73
5.250	0.00	4.25	1.202	I	O	4.68
5.333	0.00	4.17	1.173	I	O	4.63
5.417	0.00	4.09	1.144	I	O	4.58
5.500	0.00	4.01	1.117	I	O	4.53
5.583	0.00	3.94	1.089	I	O	4.48
5.667	0.00	3.86	1.062	I	O	4.44
5.750	0.00	3.76	1.036	I	O	4.39
5.833	0.00	3.48	1.011	I	O	4.35
5.917	0.00	3.22	0.988	I	O	4.30
6.000	0.00	2.99	0.967	I	O	4.27
6.083	0.00	2.77	0.947	I	O	4.23
6.167	0.00	2.56	0.929	I	O	4.20
6.250	0.00	2.37	0.912	I	O	4.16
6.333	0.00	2.20	0.896	I	O	4.14
6.417	0.00	2.04	0.881	I	O	4.11
6.500	0.00	1.89	0.868	I	O	4.08
6.583	0.00	1.80	0.855	I	O	4.06
6.667	0.00	1.79	0.843	I	O	4.03
6.750	0.00	1.79	0.830	I	O	4.01
6.833	0.00	1.79	0.818	I	O	3.98
6.917	0.00	1.78	0.806	I	O	3.96
7.000	0.00	1.78	0.793	I	O	3.93
7.083	0.00	1.78	0.781	I	O	3.91
7.167	0.00	1.77	0.769	I	O	3.89
7.250	0.00	1.77	0.757	I	O	3.86
7.333	0.00	1.77	0.745	I	O	3.84
7.417	0.00	1.76	0.732	I	O	3.81
7.500	0.00	1.76	0.720	I	O	3.79
7.583	0.00	1.75	0.708	I	O	3.76
7.667	0.00	1.75	0.696	I	O	3.74
7.750	0.00	1.75	0.684	I	O	3.71
7.833	0.00	1.74	0.672	I	O	3.69
7.917	0.00	1.74	0.660	I	O	3.66
8.000	0.00	1.74	0.648	I	O	3.64
8.083	0.00	1.73	0.636	I	O	3.62
8.167	0.00	1.73	0.624	I	O	3.59
8.250	0.00	1.72	0.612	I	O	3.57
8.333	0.00	1.72	0.601	I	O	3.54
8.417	0.00	1.72	0.589	I	O	3.52
8.500	0.00	1.71	0.577	I	O	3.50
8.583	0.00	1.71	0.565	I	O	3.47
8.667	0.00	1.71	0.553	I	O	3.45
8.750	0.00	1.70	0.542	I	O	3.42
8.833	0.00	1.70	0.530	I	O	3.40
8.917	0.00	1.68	0.518	I	O	3.32
9.000	0.00	1.66	0.507	I	O	3.24
9.083	0.00	1.64	0.495	I	O	3.17
9.167	0.00	1.62	0.484	IO		3.09
9.250	0.00	1.60	0.473	IO		3.02
9.333	0.00	1.58	0.462	IO		2.94
9.417	0.00	1.56	0.451	IO		2.87

9.500	0.00	1.54	0.441	IO	2.79
9.583	0.00	1.51	0.430	IO	2.71
9.667	0.00	1.49	0.420	IO	2.64
9.750	0.00	1.47	0.409	IO	2.57
9.833	0.00	1.45	0.399	IO	2.50
9.917	0.00	1.43	0.390	IO	2.43
10.000	0.00	1.41	0.380	IO	2.36
10.083	0.00	1.39	0.370	IO	2.29
10.167	0.00	1.37	0.361	IO	2.22
10.250	0.00	1.35	0.351	IO	2.15
10.333	0.00	1.33	0.342	IO	2.09
10.417	0.00	1.31	0.333	IO	2.02
10.500	0.00	1.28	0.324	IO	1.96
10.583	0.00	1.25	0.315	IO	1.90
10.667	0.00	1.22	0.307	IO	1.84
10.750	0.00	1.19	0.299	IO	1.78
10.833	0.00	1.16	0.291	IO	1.72
10.917	0.00	1.13	0.283	IO	1.66
11.000	0.00	1.10	0.275	IO	1.61
11.083	0.00	1.08	0.268	IO	1.55
11.167	0.00	1.05	0.260	IO	1.50
11.250	0.00	1.03	0.253	IO	1.45
11.333	0.00	1.00	0.246	IO	1.40
11.417	0.00	0.98	0.239	IO	1.35
11.500	0.00	0.95	0.233	IO	1.30
11.583	0.00	0.93	0.226	IO	1.26
11.667	0.00	0.91	0.220	IO	1.21
11.750	0.00	0.88	0.214	IO	1.17
11.833	0.00	0.86	0.208	IO	1.13
11.917	0.00	0.84	0.202	IO	1.08
12.000	0.00	0.82	0.196	IO	1.04
12.083	0.00	0.80	0.190	O	1.00
12.167	0.00	0.77	0.185	O	0.97
12.250	0.00	0.74	0.180	O	0.95
12.333	0.00	0.71	0.175	O	0.92
12.417	0.00	0.69	0.170	O	0.89
12.500	0.00	0.66	0.165	O	0.87
12.583	0.00	0.63	0.161	O	0.84
12.667	0.00	0.61	0.157	O	0.82
12.750	0.00	0.59	0.152	O	0.80
12.833	0.00	0.56	0.149	O	0.78
12.917	0.00	0.54	0.145	O	0.76
13.000	0.00	0.52	0.141	O	0.74
13.083	0.00	0.50	0.138	O	0.72
13.167	0.00	0.48	0.134	O	0.70
13.250	0.00	0.46	0.131	O	0.68
13.333	0.00	0.45	0.128	O	0.67
13.417	0.00	0.43	0.125	O	0.65
13.500	0.00	0.41	0.122	O	0.64
13.583	0.00	0.40	0.119	O	0.62
13.667	0.00	0.38	0.116	O	0.61
13.750	0.00	0.37	0.114	O	0.59
13.833	0.00	0.35	0.111	O	0.58
13.917	0.00	0.34	0.109	O	0.57
14.000	0.00	0.32	0.107	O	0.55
14.083	0.00	0.31	0.105	O	0.54
14.167	0.00	0.30	0.102	O	0.53
14.250	0.00	0.29	0.100	O	0.52
14.333	0.00	0.28	0.098	O	0.51
14.417	0.00	0.27	0.097	O	0.50
14.500	0.00	0.26	0.095	O	0.49
14.583	0.00	0.25	0.093	O	0.48
14.667	0.00	0.24	0.091	O	0.47



14.750	0.00	0.23	0.090	0	0.46
14.833	0.00	0.22	0.088	0	0.45
14.917	0.00	0.21	0.087	0	0.45
15.000	0.00	0.20	0.085	0	0.44
15.083	0.00	0.19	0.084	0	0.43
15.167	0.00	0.19	0.083	0	0.42
15.250	0.00	0.18	0.081	0	0.42
15.333	0.00	0.17	0.080	0	0.41
15.417	0.00	0.17	0.079	0	0.41
15.500	0.00	0.16	0.078	0	0.40
15.583	0.00	0.15	0.077	0	0.39
15.667	0.00	0.15	0.076	0	0.39
15.750	0.00	0.14	0.075	0	0.38
15.833	0.00	0.14	0.074	0	0.38
15.917	0.00	0.13	0.073	0	0.37
16.000	0.00	0.13	0.072	0	0.37
16.083	0.00	0.12	0.071	0	0.36
16.167	0.00	0.12	0.070	0	0.36
16.250	0.00	0.11	0.070	0	0.35
16.333	0.00	0.11	0.069	0	0.35
16.417	0.00	0.10	0.068	0	0.35
16.500	0.00	0.10	0.067	0	0.34
16.583	0.00	0.10	0.067	0	0.34
16.667	0.00	0.09	0.066	0	0.34
16.750	0.00	0.09	0.065	0	0.33
16.833	0.00	0.09	0.065	0	0.33
16.917	0.00	0.08	0.064	0	0.33
17.000	0.00	0.08	0.064	0	0.32
17.083	0.00	0.08	0.063	0	0.32
17.167	0.00	0.07	0.063	0	0.32
17.250	0.00	0.07	0.062	0	0.31
17.333	0.00	0.07	0.062	0	0.31
17.417	0.00	0.06	0.061	0	0.31
17.500	0.00	0.06	0.061	0	0.31
17.583	0.00	0.06	0.060	0	0.31
17.667	0.00	0.06	0.060	0	0.30
17.750	0.00	0.06	0.060	0	0.30
17.833	0.00	0.05	0.059	0	0.30
17.917	0.00	0.05	0.059	0	0.30
18.000	0.00	0.05	0.058	0	0.30
18.083	0.00	0.05	0.058	0	0.29
18.167	0.00	0.05	0.058	0	0.29
18.250	0.00	0.04	0.057	0	0.29
18.333	0.00	0.04	0.057	0	0.29
18.417	0.00	0.04	0.057	0	0.29
18.500	0.00	0.04	0.057	0	0.29
18.583	0.00	0.04	0.056	0	0.28
18.667	0.00	0.04	0.056	0	0.28
18.750	0.00	0.03	0.056	0	0.28
18.833	0.00	0.03	0.056	0	0.28
18.917	0.00	0.03	0.055	0	0.28
19.000	0.00	0.03	0.055	0	0.28
19.083	0.00	0.03	0.055	0	0.28
19.167	0.00	0.03	0.055	0	0.28
19.250	0.00	0.03	0.055	0	0.27
19.333	0.00	0.03	0.054	0	0.27
19.417	0.00	0.03	0.054	0	0.27
19.500	0.00	0.02	0.054	0	0.27
19.583	0.00	0.02	0.054	0	0.27
19.667	0.00	0.02	0.054	0	0.27
19.750	0.00	0.02	0.054	0	0.27
19.833	0.00	0.02	0.053	0	0.27
19.917	0.00	0.02	0.053	0	0.27

20.000	0.00	0.02	0.053	0	0.27
20.083	0.00	0.02	0.053	0	0.27
20.167	0.00	0.02	0.053	0	0.27
20.250	0.00	0.02	0.053	0	0.27
20.333	0.00	0.02	0.053	0	0.26
20.417	0.00	0.02	0.053	0	0.26
20.500	0.00	0.02	0.052	0	0.26
20.583	0.00	0.01	0.052	0	0.26
20.667	0.00	0.01	0.052	0	0.26
20.750	0.00	0.01	0.052	0	0.26
20.833	0.00	0.01	0.052	0	0.26
20.917	0.00	0.01	0.052	0	0.26
21.000	0.00	0.01	0.052	0	0.26
21.083	0.00	0.01	0.052	0	0.26
21.167	0.00	0.01	0.052	0	0.26
21.250	0.00	0.01	0.052	0	0.26
21.333	0.00	0.01	0.052	0	0.26
21.417	0.00	0.01	0.052	0	0.26
21.500	0.00	0.01	0.051	0	0.26
21.583	0.00	0.01	0.051	0	0.26
21.667	0.00	0.01	0.051	0	0.26
21.750	0.00	0.01	0.051	0	0.26
21.833	0.00	0.01	0.051	0	0.26
21.917	0.00	0.01	0.051	0	0.26
22.000	0.00	0.01	0.051	0	0.26
22.083	0.00	0.01	0.051	0	0.26
22.167	0.00	0.01	0.051	0	0.26
22.250	0.00	0.01	0.051	0	0.26
22.333	0.00	0.01	0.051	0	0.26
22.417	0.00	0.01	0.051	0	0.25
22.500	0.00	0.01	0.051	0	0.25
22.583	0.00	0.01	0.051	0	0.25
22.667	0.00	0.01	0.051	0	0.25
22.750	0.00	0.01	0.051	0	0.25
22.833	0.00	0.01	0.051	0	0.25
22.917	0.00	0.00	0.051	0	0.25
23.000	0.00	0.00	0.051	0	0.25
23.083	0.00	0.00	0.051	0	0.25
23.167	0.00	0.00	0.051	0	0.25
23.250	0.00	0.00	0.051	0	0.25
23.333	0.00	0.00	0.051	0	0.25
23.417	0.00	0.00	0.050	0	0.25
23.500	0.00	0.00	0.050	0	0.25
23.583	0.00	0.00	0.050	0	0.25
23.667	0.00	0.00	0.050	0	0.25
23.750	0.00	0.00	0.050	0	0.25
23.833	0.00	0.00	0.050	0	0.25
23.917	0.00	0.00	0.050	0	0.25
24.000	0.00	0.00	0.050	0	0.25
24.083	0.00	0.00	0.050	0	0.25
24.167	0.00	0.00	0.050	0	0.25
24.250	0.00	0.00	0.050	0	0.25
24.333	0.00	0.00	0.050	0	0.25
24.417	0.00	0.00	0.050	0	0.25
24.500	0.00	0.00	0.050	0	0.25
24.583	0.00	0.00	0.050	0	0.25
24.667	0.00	0.00	0.050	0	0.25
24.750	0.00	0.00	0.050	0	0.25
24.833	0.00	0.00	0.050	0	0.25
24.917	0.00	0.00	0.050	0	0.25
25.000	0.00	0.00	0.050	0	0.25
25.083	0.00	0.00	0.050	0	0.25
25.167	0.00	0.00	0.050	0	0.25

25.250	0.00	0.00	0.050	0					0.25
25.333	0.00	0.00	0.050	0					0.25
25.417	0.00	0.00	0.050	0					0.25
25.500	0.00	0.00	0.050	0					0.25
25.583	0.00	0.00	0.050	0					0.25
25.667	0.00	0.00	0.050	0					0.25
25.750	0.00	0.00	0.050	0					0.25
25.833	0.00	0.00	0.050	0					0.25
25.917	0.00	0.00	0.050	0					0.25
26.000	0.00	0.00	0.050	0					0.25
26.083	0.00	0.00	0.050	0					0.25
26.167	0.00	0.00	0.050	0					0.25
26.250	0.00	0.00	0.050	0					0.25
26.333	0.00	0.00	0.050	0					0.25

Remaining water in basin = 0.05 (Ac.Ft)

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*****HYDROGRAPH DATA*****
      Number of intervals = 316
      Time interval = 5.0 (Min.)
      Maximum/Peak flow rate = 5.920 (CFS)
      Total volume = 2.631 (Ac.Ft)
      Status of hydrographs being held in storage
            Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000    0.000    0.000    0.000    0.000
      Vol (Ac.Ft)     0.000    0.000    0.000    0.000    0.000
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FLOOD HYDROGRAPH ROUTING PROGRAM  
 Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005  
 Study date: 04/24/23

Black Creek - Harvill at Water Industrial  
 Basin Routing Study - 6 Hour 100 Year Storm  
 3963ROUTING6100  
 CB

Program License Serial Number 6145

\*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: 3963unihydq100p6100.rte  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 91  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 23.546 (CFS)  
 Total volume = 3.323 (Ac.Ft)  
 Status of hydrographs being held in storage  
 Stream 1 Stream 2 Stream 3 Stream 4 Stream 5  
 Peak (CFS) 0.000 0.000 0.000 0.000 0.000  
 Vol (Ac.Ft) 0.000 0.000 0.000 0.000 0.000  
 \*\*\*\*\*

+++++  
 Process from Point/Station 1.000 to Point/Station 1.000  
 \*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 91  
 Hydrograph time unit = 5.000 (Min.)  
 Initial depth in storage basin = 0.00 (Ft.)

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

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.250	0.050	0.001	0.050	0.050
1.000	0.190	0.800	0.187	0.193
2.000	0.330	1.300	0.326	0.334
3.000	0.470	1.600	0.464	0.476
3.400	0.530	1.700	0.524	0.536
4.070	0.860	1.800	0.854	0.866
4.400	1.040	3.800	1.027	1.053
5.400	1.620	5.400	1.601	1.639
6.400	2.280	6.500	2.258	2.302
7.400	3.020	7.400	2.995	3.045
8.400	3.880	8.300	3.851	3.909

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

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	5.9	11.77	17.66	23.55	Depth (Ft.)
0.083	0.05	0.00	0.000	O					0.00
0.167	0.31	0.00	0.001	O					0.01
0.250	0.75	0.00	0.005	OI					0.03
0.333	1.11	0.00	0.011	OI					0.06
0.417	1.31	0.00	0.020	OI					0.10
0.500	1.45	0.00	0.029	OI					0.15
0.583	1.64	0.00	0.040	O I					0.20
0.667	1.87	0.01	0.052	O I					0.26
0.750	2.02	0.09	0.065	O I					0.33
0.833	2.11	0.16	0.078	O I					0.40
0.917	2.17	0.24	0.092	O I					0.47
1.000	2.25	0.32	0.105	O I					0.54
1.083	2.40	0.39	0.119	O I					0.62
1.167	2.60	0.47	0.133	O I					0.69
1.250	2.73	0.56	0.148	O I					0.77
1.333	2.80	0.64	0.163	O I					0.85
1.417	2.85	0.73	0.177	O I					0.93
1.500	2.89	0.81	0.192	O I					1.01
1.583	2.92	0.86	0.206	O I					1.12
1.667	2.95	0.91	0.220	O I					1.22
1.750	2.96	0.96	0.234	O I					1.32
1.833	2.97	1.01	0.248	O I					1.41
1.917	2.98	1.05	0.261	O I					1.51
2.000	3.02	1.10	0.275	O I					1.60
2.083	3.12	1.15	0.288	O I					1.70
2.167	3.20	1.20	0.302	O I					1.80
2.250	3.26	1.25	0.315	O I					1.90
2.333	3.38	1.30	0.330	O I					2.00
2.417	3.47	1.33	0.344	O I					2.10
2.500	3.51	1.36	0.359	O I					2.21
2.583	3.54	1.39	0.374	O I					2.31
2.667	3.56	1.43	0.388	O I					2.42
2.750	3.60	1.46	0.403	O I					2.52
2.833	3.73	1.49	0.418	O I					2.63
2.917	3.92	1.52	0.434	O I					2.74
3.000	4.03	1.56	0.451	O I					2.86
3.083	4.08	1.60	0.468	O I					2.99
3.167	4.15	1.63	0.485	O I					3.10
3.250	4.30	1.66	0.503	O I					3.22
3.333	4.49	1.69	0.522	O I					3.35
3.417	4.64	1.70	0.542	O I					3.42
3.500	4.85	1.71	0.562	O I					3.47
3.583	5.21	1.72	0.585	O I					3.51
3.667	5.63	1.72	0.611	O I					3.56
3.750	6.01	1.73	0.639	O I					3.62
3.833	6.34	1.74	0.670	O I					3.68
3.917	6.66	1.75	0.702	O I					3.75
4.000	6.97	1.76	0.737	O I					3.82
4.083	7.28	1.77	0.774	O I					3.90
4.167	7.62	1.79	0.813	O I					3.97
4.250	8.05	1.80	0.855	O I					4.06
4.333	8.56	2.22	0.898	O I					4.14
4.417	9.09	2.71	0.942	O I					4.22
4.500	9.62	3.20	0.986	O I					4.30
4.583	10.07	3.69	1.030	O I					4.38

4.667	10.48	3.90	1.075	O	I			4.46
4.750	10.97	4.02	1.121	O	I			4.54
4.833	11.48	4.16	1.170	O	I			4.62
4.917	11.93	4.30	1.222	O	I			4.71
5.000	12.34	4.45	1.275	O	I			4.81
5.083	12.94	4.60	1.331	O	I			4.90
5.167	14.07	4.77	1.392	O	I	I		5.01
5.250	15.85	4.96	1.461	O	I	I		5.13
5.333	17.81	5.19	1.542	O	I	I		5.27
5.417	19.70	5.42	1.635	O	I	I		5.42
5.500	21.87	5.60	1.740	O	I	I	I	5.58
5.583	23.55	5.80	1.857	O	I	I	I	5.76
5.667	21.43	5.99	1.972	O	I	I		5.93
5.750	15.42	6.13	2.057	O	I	I		6.06
5.833	10.44	6.21	2.103	O	I	I		6.13
5.917	7.60	6.24	2.123	O	I	I		6.16
6.000	5.96	6.24	2.126	O	I	I		6.17
6.083	4.83	6.23	2.121	I	O			6.16
6.167	3.80	6.21	2.107	I	O			6.14
6.250	2.89	6.18	2.088	I	O			6.11
6.333	2.25	6.14	2.063	I	O			6.07
6.417	1.82	6.09	2.035	I	O			6.03
6.500	1.47	6.04	2.005	I	O			5.98
6.583	1.18	5.99	1.972	I	O			5.93
6.667	0.94	5.93	1.939	I	O			5.88
6.750	0.74	5.87	1.904	I	O			5.83
6.833	0.57	5.81	1.868	I	O			5.78
6.917	0.44	5.75	1.832	I	O			5.72
7.000	0.32	5.69	1.795	I	O			5.66
7.083	0.19	5.63	1.757	I	O			5.61
7.167	0.07	5.57	1.720	I	O			5.55
7.250	0.04	5.50	1.682	I	O			5.49
7.333	0.02	5.44	1.645	I	O			5.44
7.417	0.01	5.37	1.607	I	O			5.38
7.500	0.01	5.26	1.571	I	O			5.32
7.583	0.00	5.17	1.535	I	O			5.25
7.667	0.00	5.07	1.500	I	O			5.19
7.750	0.00	4.97	1.465	I	O			5.13
7.833	0.00	4.88	1.431	I	O			5.07
7.917	0.00	4.79	1.398	I	O			5.02
8.000	0.00	4.70	1.365	I	O			4.96
8.083	0.00	4.61	1.333	I	O			4.91
8.167	0.00	4.52	1.302	I	O			4.85
8.250	0.00	4.44	1.271	I	O			4.80
8.333	0.00	4.35	1.241	I	O			4.75
8.417	0.00	4.27	1.211	I	O			4.69
8.500	0.00	4.19	1.182	I	O			4.64
8.583	0.00	4.11	1.153	I	O			4.60
8.667	0.00	4.04	1.125	I	O			4.55
8.750	0.00	3.96	1.098	I	O			4.50
8.833	0.00	3.88	1.071	I	O			4.45
8.917	0.00	3.81	1.044	I	O			4.41
9.000	0.00	3.56	1.019	I	O			4.36
9.083	0.00	3.30	0.995	I	O			4.32
9.167	0.00	3.06	0.973	I	O			4.28
9.250	0.00	2.83	0.953	I	O			4.24
9.333	0.00	2.62	0.934	I	O			4.21
9.417	0.00	2.43	0.917	I	O			4.17
9.500	0.00	2.25	0.901	I	O			4.14
9.583	0.00	2.09	0.886	I	O			4.12
9.667	0.00	1.93	0.872	I	O			4.09
9.750	0.00	1.80	0.859	I	O			4.07
9.833	0.00	1.80	0.847	I	O			4.04

9.917	0.00	1.79	0.834	I O	4.02
10.000	0.00	1.79	0.822	I O	3.99
10.083	0.00	1.78	0.810	I O	3.97
10.167	0.00	1.78	0.797	I O	3.94
10.250	0.00	1.78	0.785	I O	3.92
10.333	0.00	1.77	0.773	I O	3.89
10.417	0.00	1.77	0.761	I O	3.87
10.500	0.00	1.77	0.749	I O	3.84
10.583	0.00	1.76	0.736	I O	3.82
10.667	0.00	1.76	0.724	I O	3.79
10.750	0.00	1.76	0.712	I O	3.77
10.833	0.00	1.75	0.700	I O	3.75
10.917	0.00	1.75	0.688	I O	3.72
11.000	0.00	1.74	0.676	I O	3.70
11.083	0.00	1.74	0.664	I O	3.67
11.167	0.00	1.74	0.652	I O	3.65
11.250	0.00	1.73	0.640	I O	3.62
11.333	0.00	1.73	0.628	I O	3.60
11.417	0.00	1.73	0.616	I O	3.58
11.500	0.00	1.72	0.604	I O	3.55
11.583	0.00	1.72	0.593	I O	3.53
11.667	0.00	1.72	0.581	I O	3.50
11.750	0.00	1.71	0.569	I O	3.48
11.833	0.00	1.71	0.557	I O	3.46
11.917	0.00	1.70	0.545	I O	3.43
12.000	0.00	1.70	0.534	I O	3.41
12.083	0.00	1.69	0.522	I O	3.35
12.167	0.00	1.67	0.510	I O	3.27
12.250	0.00	1.65	0.499	I O	3.19
12.333	0.00	1.63	0.488	I O	3.12
12.417	0.00	1.61	0.477	I O	3.04
12.500	0.00	1.59	0.466	I O	2.97
12.583	0.00	1.57	0.455	I O	2.89
12.667	0.00	1.54	0.444	I O	2.81
12.750	0.00	1.52	0.433	I O	2.74
12.833	0.00	1.50	0.423	I O	2.66
12.917	0.00	1.48	0.413	I O	2.59
13.000	0.00	1.46	0.403	IO	2.52
13.083	0.00	1.43	0.393	IO	2.45
13.167	0.00	1.41	0.383	IO	2.38
13.250	0.00	1.39	0.373	IO	2.31
13.333	0.00	1.37	0.364	IO	2.24
13.417	0.00	1.35	0.354	IO	2.17
13.500	0.00	1.33	0.345	IO	2.11
13.583	0.00	1.31	0.336	IO	2.04
13.667	0.00	1.29	0.327	IO	1.98
13.750	0.00	1.26	0.318	IO	1.92
13.833	0.00	1.23	0.310	IO	1.85
13.917	0.00	1.20	0.301	IO	1.80
14.000	0.00	1.17	0.293	IO	1.74
14.083	0.00	1.14	0.285	IO	1.68
14.167	0.00	1.11	0.277	IO	1.62
14.250	0.00	1.09	0.270	IO	1.57
14.333	0.00	1.06	0.263	IO	1.52
14.417	0.00	1.03	0.255	IO	1.47
14.500	0.00	1.01	0.248	IO	1.42
14.583	0.00	0.98	0.241	IO	1.37
14.667	0.00	0.96	0.235	IO	1.32
14.750	0.00	0.94	0.228	IO	1.27
14.833	0.00	0.91	0.222	IO	1.23
14.917	0.00	0.89	0.216	IO	1.18
15.000	0.00	0.87	0.210	IO	1.14
15.083	0.00	0.85	0.204	IO	1.10

15.167	0.00	0.83	0.198	IO	1.06
15.250	0.00	0.81	0.192	IO	1.02
15.333	0.00	0.78	0.187	IO	0.98
15.417	0.00	0.75	0.181	IO	0.95
15.500	0.00	0.72	0.176	O	0.93
15.583	0.00	0.69	0.172	O	0.90
15.667	0.00	0.67	0.167	O	0.88
15.750	0.00	0.64	0.162	O	0.85
15.833	0.00	0.62	0.158	O	0.83
15.917	0.00	0.59	0.154	O	0.81
16.000	0.00	0.57	0.150	O	0.78
16.083	0.00	0.55	0.146	O	0.76
16.167	0.00	0.53	0.142	O	0.74
16.250	0.00	0.51	0.139	O	0.73
16.333	0.00	0.49	0.135	O	0.71
16.417	0.00	0.47	0.132	O	0.69
16.500	0.00	0.45	0.129	O	0.67
16.583	0.00	0.43	0.126	O	0.66
16.667	0.00	0.42	0.123	O	0.64
16.750	0.00	0.40	0.120	O	0.63
16.833	0.00	0.39	0.117	O	0.61
16.917	0.00	0.37	0.115	O	0.60
17.000	0.00	0.36	0.112	O	0.58
17.083	0.00	0.34	0.110	O	0.57
17.167	0.00	0.33	0.107	O	0.56
17.250	0.00	0.32	0.105	O	0.55
17.333	0.00	0.30	0.103	O	0.53
17.417	0.00	0.29	0.101	O	0.52
17.500	0.00	0.28	0.099	O	0.51
17.583	0.00	0.27	0.097	O	0.50
17.667	0.00	0.26	0.095	O	0.49
17.750	0.00	0.25	0.094	O	0.48
17.833	0.00	0.24	0.092	O	0.47
17.917	0.00	0.23	0.090	O	0.47
18.000	0.00	0.22	0.089	O	0.46
18.083	0.00	0.21	0.087	O	0.45
18.167	0.00	0.21	0.086	O	0.44
18.250	0.00	0.20	0.084	O	0.43
18.333	0.00	0.19	0.083	O	0.43
18.417	0.00	0.18	0.082	O	0.42
18.500	0.00	0.18	0.081	O	0.41
18.583	0.00	0.17	0.079	O	0.41
18.667	0.00	0.16	0.078	O	0.40
18.750	0.00	0.16	0.077	O	0.40
18.833	0.00	0.15	0.076	O	0.39
18.917	0.00	0.14	0.075	O	0.38
19.000	0.00	0.14	0.074	O	0.38
19.083	0.00	0.13	0.073	O	0.37
19.167	0.00	0.13	0.072	O	0.37
19.250	0.00	0.12	0.071	O	0.36
19.333	0.00	0.12	0.071	O	0.36
19.417	0.00	0.11	0.070	O	0.36
19.500	0.00	0.11	0.069	O	0.35
19.583	0.00	0.11	0.068	O	0.35
19.667	0.00	0.10	0.068	O	0.34
19.750	0.00	0.10	0.067	O	0.34
19.833	0.00	0.09	0.066	O	0.34
19.917	0.00	0.09	0.066	O	0.33
20.000	0.00	0.09	0.065	O	0.33
20.083	0.00	0.08	0.064	O	0.33
20.167	0.00	0.08	0.064	O	0.32
20.250	0.00	0.08	0.063	O	0.32
20.333	0.00	0.07	0.063	O	0.32



20.417	0.00	0.07	0.062	0	0.32
20.500	0.00	0.07	0.062	0	0.31
20.583	0.00	0.07	0.061	0	0.31
20.667	0.00	0.06	0.061	0	0.31
20.750	0.00	0.06	0.060	0	0.31
20.833	0.00	0.06	0.060	0	0.30
20.917	0.00	0.06	0.060	0	0.30
21.000	0.00	0.05	0.059	0	0.30
21.083	0.00	0.05	0.059	0	0.30
21.167	0.00	0.05	0.059	0	0.30
21.250	0.00	0.05	0.058	0	0.29
21.333	0.00	0.05	0.058	0	0.29
21.417	0.00	0.04	0.058	0	0.29
21.500	0.00	0.04	0.057	0	0.29
21.583	0.00	0.04	0.057	0	0.29
21.667	0.00	0.04	0.057	0	0.29
21.750	0.00	0.04	0.056	0	0.28
21.833	0.00	0.04	0.056	0	0.28
21.917	0.00	0.04	0.056	0	0.28
22.000	0.00	0.03	0.056	0	0.28
22.083	0.00	0.03	0.055	0	0.28
22.167	0.00	0.03	0.055	0	0.28
22.250	0.00	0.03	0.055	0	0.28
22.333	0.00	0.03	0.055	0	0.28
22.417	0.00	0.03	0.055	0	0.28
22.500	0.00	0.03	0.054	0	0.27
22.583	0.00	0.03	0.054	0	0.27
22.667	0.00	0.02	0.054	0	0.27
22.750	0.00	0.02	0.054	0	0.27
22.833	0.00	0.02	0.054	0	0.27
22.917	0.00	0.02	0.054	0	0.27
23.000	0.00	0.02	0.054	0	0.27
23.083	0.00	0.02	0.053	0	0.27
23.167	0.00	0.02	0.053	0	0.27
23.250	0.00	0.02	0.053	0	0.27
23.333	0.00	0.02	0.053	0	0.27
23.417	0.00	0.02	0.053	0	0.27
23.500	0.00	0.02	0.053	0	0.26
23.583	0.00	0.02	0.053	0	0.26
23.667	0.00	0.02	0.053	0	0.26
23.750	0.00	0.01	0.052	0	0.26
23.833	0.00	0.01	0.052	0	0.26
23.917	0.00	0.01	0.052	0	0.26
24.000	0.00	0.01	0.052	0	0.26
24.083	0.00	0.01	0.052	0	0.26
24.167	0.00	0.01	0.052	0	0.26
24.250	0.00	0.01	0.052	0	0.26
24.333	0.00	0.01	0.052	0	0.26
24.417	0.00	0.01	0.052	0	0.26
24.500	0.00	0.01	0.052	0	0.26
24.583	0.00	0.01	0.052	0	0.26
24.667	0.00	0.01	0.052	0	0.26
24.750	0.00	0.01	0.051	0	0.26
24.833	0.00	0.01	0.051	0	0.26
24.917	0.00	0.01	0.051	0	0.26
25.000	0.00	0.01	0.051	0	0.26
25.083	0.00	0.01	0.051	0	0.26
25.167	0.00	0.01	0.051	0	0.26
25.250	0.00	0.01	0.051	0	0.26
25.333	0.00	0.01	0.051	0	0.26
25.417	0.00	0.01	0.051	0	0.26
25.500	0.00	0.01	0.051	0	0.26
25.583	0.00	0.01	0.051	0	0.25

25.667	0.00	0.01	0.051	O					0.25
25.750	0.00	0.01	0.051	O					0.25
25.833	0.00	0.01	0.051	O					0.25
25.917	0.00	0.01	0.051	O					0.25
26.000	0.00	0.01	0.051	O					0.25
26.083	0.00	0.00	0.051	O					0.25
26.167	0.00	0.00	0.051	O					0.25
26.250	0.00	0.00	0.051	O					0.25
26.333	0.00	0.00	0.051	O					0.25
26.417	0.00	0.00	0.051	O					0.25
26.500	0.00	0.00	0.051	O					0.25
26.583	0.00	0.00	0.051	O					0.25
26.667	0.00	0.00	0.050	O					0.25
26.750	0.00	0.00	0.050	O					0.25
26.833	0.00	0.00	0.050	O					0.25
26.917	0.00	0.00	0.050	O					0.25
27.000	0.00	0.00	0.050	O					0.25
27.083	0.00	0.00	0.050	O					0.25
27.167	0.00	0.00	0.050	O					0.25
27.250	0.00	0.00	0.050	O					0.25
27.333	0.00	0.00	0.050	O					0.25
27.417	0.00	0.00	0.050	O					0.25
27.500	0.00	0.00	0.050	O					0.25
27.583	0.00	0.00	0.050	O					0.25
27.667	0.00	0.00	0.050	O					0.25
27.750	0.00	0.00	0.050	O					0.25
27.833	0.00	0.00	0.050	O					0.25
27.917	0.00	0.00	0.050	O					0.25
28.000	0.00	0.00	0.050	O					0.25
28.083	0.00	0.00	0.050	O					0.25
28.167	0.00	0.00	0.050	O					0.25
28.250	0.00	0.00	0.050	O					0.25
28.333	0.00	0.00	0.050	O					0.25
28.417	0.00	0.00	0.050	O					0.25
28.500	0.00	0.00	0.050	O					0.25
28.583	0.00	0.00	0.050	O					0.25
28.667	0.00	0.00	0.050	O					0.25
28.750	0.00	0.00	0.050	O					0.25
28.833	0.00	0.00	0.050	O					0.25
28.917	0.00	0.00	0.050	O					0.25
29.000	0.00	0.00	0.050	O					0.25
29.083	0.00	0.00	0.050	O					0.25
29.167	0.00	0.00	0.050	O					0.25
29.250	0.00	0.00	0.050	O					0.25
29.333	0.00	0.00	0.050	O					0.25
29.417	0.00	0.00	0.050	O					0.25
29.500	0.00	0.00	0.050	O					0.25

Remaining water in basin = 0.05 (Ac.Ft)

\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*

Number of intervals = 354

Time interval = 5.0 (Min.)

Maximum/Peak flow rate = 6.244 (CFS)

Total volume = 3.273 (Ac.Ft)

Status of hydrographs being held in storage

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

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FLOOD HYDROGRAPH ROUTING PROGRAM  
 Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005  
 Study date: 04/24/23

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 Black Creek - Harvill at Water Industrial  
 Basin Routing Study - 24 Hour 100 Year Storm Event  
 3963ROUTING24100  
 CB  
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Program License Serial Number 6145

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 \*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: 3963unihydql00p24100.rte  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 307  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 11.310 (CFS)  
 Total volume = 5.679 (Ac.Ft)  
 Status of hydrographs being held in storage  
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5  
 Peak (CFS)          0.000    0.000    0.000    0.000    0.000  
 Vol (Ac.Ft)         0.000    0.000    0.000    0.000    0.000  
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 Process from Point/Station 1.000 to Point/Station 1.000  
 \*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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 User entry of depth-outflow-storage data

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 Total number of inflow hydrograph intervals = 307  
 Hydrograph time unit = 5.000 (Min.)  
 Initial depth in storage basin = 0.00 (Ft.)  
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-----  
 Initial basin depth = 0.00 (Ft.)  
 Initial basin storage = 0.00 (Ac.Ft)  
 Initial basin outflow = 0.00 (CFS)  
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 Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.250	0.050	0.001	0.050	0.050
1.000	0.190	0.800	0.187	0.193
2.000	0.330	1.300	0.326	0.334
3.000	0.470	1.600	0.464	0.476
3.400	0.530	1.700	0.524	0.536
4.070	0.860	1.800	0.854	0.866

4.400	1.040	3.800	1.027	1.053
5.400	1.620	5.400	1.601	1.639
6.400	2.280	6.500	2.258	2.302
7.400	3.020	7.400	2.995	3.045
8.400	3.880	8.300	3.851	3.909

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

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)						Depth (Ft.)
0.083	0.03	0.00	0.000	O					0.00
0.167	0.15	0.00	0.001	O					0.00
0.250	0.33	0.00	0.002	O					0.01
0.333	0.46	0.00	0.005	O I					0.03
0.417	0.57	0.00	0.009	O I					0.04
0.500	0.70	0.00	0.013	O I					0.07
0.583	0.77	0.00	0.018	O I					0.09
0.667	0.82	0.00	0.024	O I					0.12
0.750	0.85	0.00	0.029	O I					0.15
0.833	0.89	0.00	0.035	O I					0.18
0.917	0.97	0.00	0.042	O I					0.21
1.000	1.08	0.00	0.049	O I					0.24
1.083	1.13	0.04	0.056	O I					0.28
1.167	1.10	0.08	0.064	O I					0.32
1.250	1.04	0.12	0.070	O I					0.36
1.333	1.01	0.15	0.076	O I					0.39
1.417	1.00	0.18	0.082	O I					0.42
1.500	0.99	0.22	0.088	O I					0.45
1.583	0.99	0.25	0.093	O I					0.48
1.667	0.99	0.27	0.098	O I					0.51
1.750	0.99	0.30	0.103	O I					0.53
1.833	1.00	0.33	0.107	O I					0.56
1.917	1.06	0.36	0.112	O I					0.58
2.000	1.15	0.38	0.117	O I					0.61
2.083	1.20	0.42	0.123	O I					0.64
2.167	1.23	0.45	0.128	O I					0.67
2.250	1.24	0.48	0.133	O I					0.70
2.333	1.25	0.51	0.138	O I					0.72
2.417	1.26	0.54	0.144	O I					0.75
2.500	1.27	0.56	0.149	O I					0.78
2.583	1.29	0.59	0.153	O I					0.80
2.667	1.36	0.62	0.158	O I					0.83
2.750	1.45	0.65	0.164	O I					0.86
2.833	1.51	0.68	0.169	O I					0.89
2.917	1.54	0.71	0.175	O I					0.92
3.000	1.56	0.75	0.181	O I					0.95
3.083	1.57	0.78	0.186	O I					0.98
3.167	1.58	0.81	0.191	O I					1.01
3.250	1.59	0.82	0.197	O I					1.05
3.333	1.60	0.84	0.202	O I					1.09
3.417	1.60	0.86	0.207	O I					1.12
3.500	1.61	0.88	0.212	O I					1.16
3.583	1.61	0.90	0.217	O I					1.19
3.667	1.61	0.91	0.222	O I					1.23
3.750	1.62	0.93	0.227	O I					1.26
3.833	1.63	0.95	0.232	O I					1.30
3.917	1.70	0.97	0.236	O I					1.33
4.000	1.79	0.98	0.242	O I					1.37
4.083	1.84	1.00	0.247	O I					1.41
4.167	1.87	1.03	0.253	O I					1.45

4.250	1.89	1.05	0.259	O I				1.49
4.333	1.81	1.07	0.264	O I				1.53
4.417	1.45	1.08	0.268	O I				1.56
4.500	0.92	1.08	0.269	IO				1.56
4.583	0.61	1.07	0.267	I O				1.55
4.667	0.47	1.06	0.263	I O				1.52
4.750	0.38	1.05	0.259	IO				1.49
4.833	0.33	1.03	0.254	I O				1.46
4.917	0.36	1.01	0.249	IO				1.42
5.000	0.44	1.00	0.245	IO				1.39
5.083	0.55	0.99	0.242	IO				1.37
5.167	0.84	0.98	0.240	O				1.36
5.250	1.24	0.98	0.240	O I				1.36
5.333	1.40	0.99	0.243	O I				1.38
5.417	1.17	1.00	0.245	O I				1.39
5.500	0.75	0.99	0.244	O				1.39
5.583	0.53	0.99	0.242	IO				1.37
5.667	0.51	0.97	0.239	IO				1.35
5.750	0.56	0.96	0.236	IO				1.33
5.833	0.59	0.95	0.233	IO				1.31
5.917	0.60	0.95	0.231	IO				1.29
6.000	0.61	0.94	0.229	IO				1.28
6.083	0.64	0.93	0.226	IO				1.26
6.167	0.73	0.92	0.225	O				1.25
6.250	0.84	0.92	0.224	O				1.24
6.333	0.92	0.92	0.223	O				1.24
6.417	0.96	0.92	0.224	O				1.24
6.500	0.99	0.92	0.224	O				1.24
6.583	1.03	0.92	0.225	O				1.25
6.667	1.13	0.93	0.226	O I				1.26
6.750	1.26	0.93	0.228	O I				1.27
6.833	1.34	0.94	0.230	O I				1.29
6.917	1.38	0.95	0.233	O I				1.31
7.000	1.42	0.96	0.236	O I				1.33
7.083	1.45	0.98	0.239	O I				1.35
7.167	1.48	0.99	0.242	O I				1.37
7.250	1.50	1.00	0.246	O I				1.40
7.333	1.54	1.01	0.249	O I				1.42
7.417	1.64	1.03	0.253	O I				1.45
7.500	1.76	1.04	0.258	O I				1.49
7.583	1.86	1.06	0.263	O I				1.52
7.667	1.99	1.08	0.269	O I				1.56
7.750	2.13	1.11	0.276	O I				1.61
7.833	2.24	1.13	0.283	O I				1.66
7.917	2.38	1.16	0.291	O I				1.72
8.000	2.53	1.19	0.300	O I				1.78
8.083	2.67	1.23	0.309	O I				1.85
8.167	2.88	1.26	0.320	O I				1.93
8.250	3.14	1.30	0.332	O I				2.01
8.333	3.31	1.33	0.345	O I				2.11
8.417	3.41	1.36	0.359	O I				2.21
8.500	3.48	1.39	0.373	O I				2.31
8.583	3.55	1.42	0.388	O I				2.41
8.667	3.67	1.46	0.403	O I				2.52
8.750	3.82	1.49	0.418	O I				2.63
8.833	3.94	1.52	0.435	O I				2.75
8.917	4.07	1.56	0.452	O I				2.87
9.000	4.23	1.60	0.469	O I				2.99
9.083	4.37	1.63	0.488	O I				3.12
9.167	4.58	1.66	0.507	O I				3.25
9.250	4.85	1.70	0.528	O I				3.39
9.333	5.04	1.71	0.550	O I				3.44
9.417	5.21	1.71	0.574	O I				3.49

9.500	5.39	1.72	0.599	O		I				3.54
9.583	5.53	1.73	0.624	O		I				3.59
9.667	5.68	1.74	0.651	O		I				3.65
9.750	5.85	1.75	0.679	O		I				3.70
9.833	5.98	1.75	0.708	O		I				3.76
9.917	6.13	1.76	0.737	O		I				3.82
10.000	6.29	1.77	0.768	O		I				3.88
10.083	6.27	1.78	0.799	O		I				3.95
10.167	5.81	1.79	0.828	O		I				4.01
10.250	5.10	1.80	0.853	O		I				4.06
10.333	4.68	1.96	0.874	O		I				4.10
10.417	4.49	2.15	0.891	O		I				4.13
10.500	4.38	2.32	0.907	O		I				4.16
10.583	4.39	2.47	0.920	O		I				4.18
10.667	4.71	2.62	0.934	O		I				4.21
10.750	5.21	2.80	0.950	O		I				4.23
10.833	5.50	2.98	0.967	O		I				4.27
10.917	5.64	3.18	0.984	O		I				4.30
11.000	5.72	3.36	1.000	O		I				4.33
11.083	5.77	3.54	1.016	O		I				4.36
11.167	5.74	3.70	1.031	O		I				4.38
11.250	5.67	3.81	1.044	O		I				4.41
11.333	5.63	3.85	1.057	O		I				4.43
11.417	5.63	3.88	1.069	O		I				4.45
11.500	5.63	3.91	1.081	O		I				4.47
11.583	5.60	3.94	1.093	O		I				4.49
11.667	5.45	3.97	1.103	O		I				4.51
11.750	5.25	4.00	1.113	O		I				4.53
11.833	5.15	4.02	1.121	O		I				4.54
11.917	5.17	4.04	1.129	O		I				4.55
12.000	5.25	4.07	1.137	O		I				4.57
12.083	5.43	4.09	1.145	O		I				4.58
12.167	5.98	4.12	1.156	O		I				4.60
12.250	6.75	4.16	1.172	O		I				4.63
12.333	7.24	4.22	1.191	O		I				4.66
12.417	7.55	4.28	1.212	O		I				4.70
12.500	7.81	4.34	1.236	O		I				4.74
12.583	8.02	4.41	1.260	O		I				4.78
12.667	8.30	4.48	1.286	O		I				4.82
12.750	8.61	4.55	1.313	O		I				4.87
12.833	8.83	4.63	1.341	O		I				4.92
12.917	9.03	4.71	1.371	O		I				4.97
13.000	9.24	4.80	1.401	O		I				5.02
13.083	9.47	4.88	1.432	O		I				5.08
13.167	9.95	4.97	1.465	O		I				5.13
13.250	10.57	5.07	1.501	O		I				5.19
13.333	10.96	5.18	1.540	O		I				5.26
13.417	11.16	5.29	1.580	O		I				5.33
13.500	11.31	5.40	1.620	O		I				5.40
13.583	11.22	5.47	1.661	O		I				5.46
13.667	10.48	5.53	1.697	O		I				5.52
13.750	9.35	5.58	1.727	O		I				5.56
13.833	8.68	5.62	1.751	O		I				5.60
13.917	8.37	5.65	1.771	O		I				5.63
14.000	8.18	5.68	1.789	O		I				5.66
14.083	8.12	5.71	1.806	O		I				5.68
14.167	8.32	5.74	1.823	O		I				5.71
14.250	8.68	5.77	1.842	O		I				5.74
14.333	8.87	5.80	1.862	O		I				5.77
14.417	8.87	5.84	1.883	O		I				5.80
14.500	8.81	5.87	1.904	O		I				5.83
14.583	8.77	5.91	1.924	O		I				5.86
14.667	8.77	5.94	1.944	O		I				5.89

14.750	8.76	5.97	1.963				O	I	5.92
14.833	8.74	6.00	1.982				O	I	5.95
14.917	8.66	6.03	2.000				O	I	5.98
15.000	8.55	6.06	2.018				O	I	6.00
15.083	8.47	6.09	2.035				O	I	6.03
15.167	8.36	6.12	2.051				O	I	6.05
15.250	8.25	6.14	2.066				O	I	6.08
15.333	8.16	6.17	2.080				O	I	6.10
15.417	8.05	6.19	2.093				O	I	6.12
15.500	7.92	6.21	2.105				O	I	6.14
15.583	7.77	6.23	2.117				O	I	6.15
15.667	7.43	6.24	2.126				O	I	6.17
15.750	6.96	6.25	2.132				O	I	6.18
15.833	6.68	6.26	2.136				O	I	6.18
15.917	6.54	6.26	2.139				O	I	6.19
16.000	6.44	6.27	2.140				O	I	6.19
16.083	6.10	6.27	2.140				O		6.19
16.167	4.91	6.26	2.135				I	O	6.18
16.250	3.23	6.23	2.120			I		O	6.16
16.333	2.22	6.19	2.096			I		O	6.12
16.417	1.71	6.15	2.067			I		O	6.08
16.500	1.38	6.09	2.036			I		O	6.03
16.583	1.17	6.04	2.003			I		O	5.98
16.667	1.13	5.98	1.969			I		O	5.93
16.750	1.19	5.93	1.936			I		O	5.88
16.833	1.20	5.87	1.904			I		O	5.83
16.917	1.17	5.82	1.872			I		O	5.78
17.000	1.13	5.77	1.840			I		O	5.73
17.083	1.07	5.71	1.808			I		O	5.68
17.167	0.98	5.66	1.776			I		O	5.64
17.250	0.87	5.61	1.743			I		O	5.59
17.333	0.80	5.55	1.710			I		O	5.54
17.417	0.76	5.50	1.678			I		O	5.49
17.500	0.74	5.44	1.645			I		O	5.44
17.583	0.71	5.38	1.613			I		O	5.39
17.667	0.70	5.29	1.581			I		O	5.33
17.750	0.70	5.21	1.550			I		O	5.28
17.833	0.69	5.12	1.519			I		O	5.23
17.917	0.62	5.04	1.489			I		O	5.17
18.000	0.51	4.95	1.458			I		O	5.12
18.083	0.45	4.87	1.428			I		O	5.07
18.167	0.43	4.79	1.397			I		O	5.02
18.250	0.41	4.70	1.368			I		O	4.96
18.333	0.40	4.62	1.338			I		O	4.91
18.417	0.39	4.54	1.309			I		O	4.86
18.500	0.39	4.47	1.281			I		O	4.82
18.583	0.41	4.39	1.253			I		O	4.77
18.667	0.53	4.31	1.227			I		O	4.72
18.750	0.69	4.25	1.201			I		O	4.68
18.833	0.77	4.18	1.177			I		O	4.64
18.917	0.76	4.11	1.154			I		O	4.60
19.000	0.70	4.05	1.131			I		O	4.56
19.083	0.64	3.99	1.108			I		O	4.52
19.167	0.51	3.92	1.085			I		O	4.48
19.250	0.33	3.86	1.061			I		O	4.44
19.333	0.24	3.76	1.036			I		O	4.39
19.417	0.27	3.50	1.013			I		O	4.35
19.500	0.35	3.27	0.992			I		O	4.31
19.583	0.38	3.05	0.973			I		O	4.28
19.667	0.32	2.85	0.955			I		O	4.24
19.750	0.22	2.66	0.938			I		O	4.21
19.833	0.19	2.48	0.921			I		O	4.18
19.917	0.28	2.32	0.906			I		O	4.16

20.000	0.42	2.17	0.893	I	O	4.13
20.083	0.48	2.04	0.882	I	O	4.11
20.167	0.41	1.93	0.871	I	O	4.09
20.250	0.28	1.81	0.861	I	O	4.07
20.333	0.20	1.80	0.850	I	O	4.05
20.417	0.17	1.79	0.839	I	O	4.03
20.500	0.15	1.79	0.828	I	O	4.00
20.583	0.14	1.79	0.817	I	O	3.98
20.667	0.13	1.78	0.805	I	O	3.96
20.750	0.13	1.78	0.794	I	O	3.94
20.833	0.15	1.78	0.783	I	O	3.91
20.917	0.26	1.77	0.772	I	O	3.89
21.000	0.40	1.77	0.762	I	O	3.87
21.083	0.46	1.77	0.753	I	O	3.85
21.167	0.40	1.76	0.743	I	O	3.83
21.250	0.29	1.76	0.734	I	O	3.81
21.333	0.25	1.76	0.723	I	O	3.79
21.417	0.32	1.76	0.713	I	O	3.77
21.500	0.45	1.75	0.704	I	O	3.75
21.583	0.50	1.75	0.695	I	O	3.74
21.667	0.44	1.75	0.686	I	O	3.72
21.750	0.32	1.74	0.677	I	O	3.70
21.833	0.28	1.74	0.667	I	O	3.68
21.917	0.35	1.74	0.657	I	O	3.66
22.000	0.47	1.74	0.648	I	O	3.64
22.083	0.51	1.73	0.639	I	O	3.62
22.167	0.45	1.73	0.631	I	O	3.60
22.250	0.34	1.73	0.622	I	O	3.59
22.333	0.30	1.72	0.612	I	O	3.57
22.417	0.37	1.72	0.602	I	O	3.55
22.500	0.48	1.72	0.593	I	O	3.53
22.583	0.54	1.72	0.585	I	O	3.51
22.667	0.57	1.71	0.577	I	O	3.50
22.750	0.59	1.71	0.569	I	O	3.48
22.833	0.60	1.71	0.562	I	O	3.46
22.917	0.61	1.71	0.554	I	O	3.45
23.000	0.62	1.71	0.547	I	O	3.43
23.083	0.63	1.70	0.539	I	O	3.42
23.167	0.63	1.70	0.532	I	O	3.40
23.250	0.63	1.69	0.524	I	O	3.36
23.333	0.64	1.68	0.517	I	O	3.31
23.417	0.64	1.67	0.510	I	O	3.27
23.500	0.64	1.66	0.503	I	O	3.22
23.583	0.64	1.64	0.496	I	O	3.17
23.667	0.64	1.63	0.489	I	O	3.13
23.750	0.65	1.62	0.483	I	O	3.08
23.833	0.65	1.61	0.476	I	O	3.04
23.917	0.65	1.60	0.469	I	O	2.99
24.000	0.65	1.58	0.463	I	O	2.95
24.083	0.62	1.57	0.456	I	O	2.90
24.167	0.49	1.56	0.449	I	O	2.85
24.250	0.32	1.54	0.441	I	O	2.80
24.333	0.21	1.52	0.433	I	O	2.73
24.417	0.16	1.50	0.424	I	O	2.67
24.500	0.12	1.48	0.414	I	O	2.60
24.583	0.10	1.46	0.405	I	O	2.54
24.667	0.08	1.44	0.396	I	O	2.47
24.750	0.06	1.42	0.386	I	O	2.40
24.833	0.05	1.40	0.377	I	O	2.33
24.917	0.04	1.38	0.368	I	O	2.27
25.000	0.03	1.36	0.358	I	O	2.20
25.083	0.02	1.34	0.349	I	O	2.14
25.167	0.02	1.32	0.340	I	O	2.07



25.250	0.01	1.30	0.331	I	O	2.01
25.333	0.01	1.27	0.322	I	O	1.95
25.417	0.01	1.24	0.314	I	O	1.88
25.500	0.00	1.21	0.305	I	O	1.82
25.583	0.00	1.18	0.297	I	O	1.77
25.667	0.00	1.15	0.289	I	O	1.71
25.750	0.00	1.13	0.281	I	O	1.65
25.833	0.00	1.10	0.274	I	O	1.60
25.917	0.00	1.07	0.266	I	O	1.54
26.000	0.00	1.05	0.259	I	O	1.49
26.083	0.00	1.02	0.252	I	O	1.44
26.167	0.00	1.00	0.245	I	O	1.39
26.250	0.00	0.97	0.238	I	O	1.34
26.333	0.00	0.95	0.231	I	O	1.30
26.417	0.00	0.93	0.225	I	O	1.25
26.500	0.00	0.90	0.219	I	O	1.21
26.583	0.00	0.88	0.213	I	O	1.16
26.667	0.00	0.86	0.207	I	O	1.12
26.750	0.00	0.84	0.201	I	O	1.08
26.833	0.00	0.82	0.195	I	O	1.04
26.917	0.00	0.80	0.189	I	O	1.00
27.000	0.00	0.77	0.184	I	O	0.97
27.083	0.00	0.74	0.179	I	O	0.94
27.167	0.00	0.71	0.174	I	O	0.91
27.250	0.00	0.68	0.169	IO		0.89
27.333	0.00	0.65	0.165	IO		0.86
27.417	0.00	0.63	0.160	IO		0.84
27.500	0.00	0.61	0.156	IO		0.82
27.583	0.00	0.58	0.152	IO		0.80
27.667	0.00	0.56	0.148	IO		0.77
27.750	0.00	0.54	0.144	IO		0.75
27.833	0.00	0.52	0.140	IO		0.73
27.917	0.00	0.50	0.137	IO		0.72
28.000	0.00	0.48	0.134	IO		0.70
28.083	0.00	0.46	0.130	IO		0.68
28.167	0.00	0.44	0.127	IO		0.66
28.250	0.00	0.42	0.124	IO		0.65
28.333	0.00	0.41	0.121	IO		0.63
28.417	0.00	0.39	0.119	IO		0.62
28.500	0.00	0.38	0.116	IO		0.60
28.583	0.00	0.36	0.113	IO		0.59
28.667	0.00	0.35	0.111	O		0.58
28.750	0.00	0.34	0.109	O		0.56
28.833	0.00	0.32	0.106	O		0.55
28.917	0.00	0.31	0.104	O		0.54
29.000	0.00	0.30	0.102	O		0.53
29.083	0.00	0.29	0.100	O		0.52
29.167	0.00	0.28	0.098	O		0.51
29.250	0.00	0.27	0.096	O		0.50
29.333	0.00	0.25	0.094	O		0.49
29.417	0.00	0.25	0.093	O		0.48
29.500	0.00	0.24	0.091	O		0.47
29.583	0.00	0.23	0.090	O		0.46
29.667	0.00	0.22	0.088	O		0.45
29.750	0.00	0.21	0.087	O		0.45
29.833	0.00	0.20	0.085	O		0.44
29.917	0.00	0.19	0.084	O		0.43
30.000	0.00	0.19	0.082	O		0.42
30.083	0.00	0.18	0.081	O		0.42
30.167	0.00	0.17	0.080	O		0.41
30.250	0.00	0.17	0.079	O		0.40
30.333	0.00	0.16	0.078	O		0.40
30.417	0.00	0.15	0.077	O		0.39

30.500	0.00	0.15	0.076	0	0.39
30.583	0.00	0.14	0.075	0	0.38
30.667	0.00	0.14	0.074	0	0.38
30.750	0.00	0.13	0.073	0	0.37
30.833	0.00	0.13	0.072	0	0.37
30.917	0.00	0.12	0.071	0	0.36
31.000	0.00	0.12	0.070	0	0.36
31.083	0.00	0.11	0.069	0	0.35
31.167	0.00	0.11	0.069	0	0.35
31.250	0.00	0.10	0.068	0	0.35
31.333	0.00	0.10	0.067	0	0.34
31.417	0.00	0.10	0.067	0	0.34
31.500	0.00	0.09	0.066	0	0.34
31.583	0.00	0.09	0.065	0	0.33
31.667	0.00	0.08	0.065	0	0.33
31.750	0.00	0.08	0.064	0	0.33
31.833	0.00	0.08	0.064	0	0.32
31.917	0.00	0.08	0.063	0	0.32
32.000	0.00	0.07	0.063	0	0.32
32.083	0.00	0.07	0.062	0	0.31
32.167	0.00	0.07	0.062	0	0.31
32.250	0.00	0.06	0.061	0	0.31
32.333	0.00	0.06	0.061	0	0.31
32.417	0.00	0.06	0.060	0	0.30
32.500	0.00	0.06	0.060	0	0.30
32.583	0.00	0.06	0.059	0	0.30
32.667	0.00	0.05	0.059	0	0.30
32.750	0.00	0.05	0.059	0	0.30
32.833	0.00	0.05	0.058	0	0.29
32.917	0.00	0.05	0.058	0	0.29
33.000	0.00	0.05	0.058	0	0.29
33.083	0.00	0.04	0.057	0	0.29
33.167	0.00	0.04	0.057	0	0.29
33.250	0.00	0.04	0.057	0	0.29
33.333	0.00	0.04	0.057	0	0.29
33.417	0.00	0.04	0.056	0	0.28
33.500	0.00	0.04	0.056	0	0.28
33.583	0.00	0.03	0.056	0	0.28
33.667	0.00	0.03	0.056	0	0.28
33.750	0.00	0.03	0.055	0	0.28
33.833	0.00	0.03	0.055	0	0.28
33.917	0.00	0.03	0.055	0	0.28
34.000	0.00	0.03	0.055	0	0.28
34.083	0.00	0.03	0.055	0	0.27
34.167	0.00	0.03	0.054	0	0.27
34.250	0.00	0.03	0.054	0	0.27
34.333	0.00	0.02	0.054	0	0.27
34.417	0.00	0.02	0.054	0	0.27
34.500	0.00	0.02	0.054	0	0.27
34.583	0.00	0.02	0.054	0	0.27
34.667	0.00	0.02	0.053	0	0.27
34.750	0.00	0.02	0.053	0	0.27
34.833	0.00	0.02	0.053	0	0.27
34.917	0.00	0.02	0.053	0	0.27
35.000	0.00	0.02	0.053	0	0.27
35.083	0.00	0.02	0.053	0	0.26
35.167	0.00	0.02	0.053	0	0.26
35.250	0.00	0.02	0.053	0	0.26
35.333	0.00	0.02	0.052	0	0.26
35.417	0.00	0.01	0.052	0	0.26
35.500	0.00	0.01	0.052	0	0.26
35.583	0.00	0.01	0.052	0	0.26
35.667	0.00	0.01	0.052	0	0.26

35.750	0.00	0.01	0.052	0					0.26
35.833	0.00	0.01	0.052	0					0.26
35.917	0.00	0.01	0.052	0					0.26
36.000	0.00	0.01	0.052	0					0.26
36.083	0.00	0.01	0.052	0					0.26
36.167	0.00	0.01	0.052	0					0.26
36.250	0.00	0.01	0.052	0					0.26
36.333	0.00	0.01	0.051	0					0.26
36.417	0.00	0.01	0.051	0					0.26
36.500	0.00	0.01	0.051	0					0.26
36.583	0.00	0.01	0.051	0					0.26
36.667	0.00	0.01	0.051	0					0.26
36.750	0.00	0.01	0.051	0					0.26
36.833	0.00	0.01	0.051	0					0.26
36.917	0.00	0.01	0.051	0					0.26
37.000	0.00	0.01	0.051	0					0.26
37.083	0.00	0.01	0.051	0					0.26
37.167	0.00	0.01	0.051	0					0.26
37.250	0.00	0.01	0.051	0					0.25
37.333	0.00	0.01	0.051	0					0.25
37.417	0.00	0.01	0.051	0					0.25
37.500	0.00	0.01	0.051	0					0.25
37.583	0.00	0.01	0.051	0					0.25
37.667	0.00	0.01	0.051	0					0.25
37.750	0.00	0.00	0.051	0					0.25
37.833	0.00	0.00	0.051	0					0.25
37.917	0.00	0.00	0.051	0					0.25
38.000	0.00	0.00	0.051	0					0.25
38.083	0.00	0.00	0.051	0					0.25
38.167	0.00	0.00	0.051	0					0.25
38.250	0.00	0.00	0.050	0					0.25
38.333	0.00	0.00	0.050	0					0.25
38.417	0.00	0.00	0.050	0					0.25
38.500	0.00	0.00	0.050	0					0.25
38.583	0.00	0.00	0.050	0					0.25
38.667	0.00	0.00	0.050	0					0.25
38.750	0.00	0.00	0.050	0					0.25
38.833	0.00	0.00	0.050	0					0.25
38.917	0.00	0.00	0.050	0					0.25
39.000	0.00	0.00	0.050	0					0.25
39.083	0.00	0.00	0.050	0					0.25
39.167	0.00	0.00	0.050	0					0.25
39.250	0.00	0.00	0.050	0					0.25
39.333	0.00	0.00	0.050	0					0.25
39.417	0.00	0.00	0.050	0					0.25
39.500	0.00	0.00	0.050	0					0.25
39.583	0.00	0.00	0.050	0					0.25
39.667	0.00	0.00	0.050	0					0.25
39.750	0.00	0.00	0.050	0					0.25
39.833	0.00	0.00	0.050	0					0.25
39.917	0.00	0.00	0.050	0					0.25
40.000	0.00	0.00	0.050	0					0.25
40.083	0.00	0.00	0.050	0					0.25
40.167	0.00	0.00	0.050	0					0.25
40.250	0.00	0.00	0.050	0					0.25
40.333	0.00	0.00	0.050	0					0.25
40.417	0.00	0.00	0.050	0					0.25
40.500	0.00	0.00	0.050	0					0.25
40.583	0.00	0.00	0.050	0					0.25
40.667	0.00	0.00	0.050	0					0.25
40.750	0.00	0.00	0.050	0					0.25
40.833	0.00	0.00	0.050	0					0.25
40.917	0.00	0.00	0.050	0					0.25

41.000	0.00	0.00	0.050	o					0.25
41.083	0.00	0.00	0.050	o					0.25

Remaining water in basin = 0.05 (Ac.Ft)

\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*

Number of intervals = 493

Time interval = 5.0 (Min.)

Maximum/Peak flow rate = 6.267 (CFS)

Total volume = 5.629 (Ac.Ft)

Status of hydrographs being held in storage

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

\*\*\*\*\*

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# Appendix E

## Hydraulic Calculations

# ONSITE HYDRAULICS

T1 BLACK CREEK - HARVILL AT WATER INDUSTRIAL

0

T2 100 YEAR STORM EVENT - LINE A HYDRAULICS

T3 3963LINEA

SO	1000.000	1523.170	1					1526.160			
R	1217.820	1524.090	1		.013				.000	.000	0
JX	1222.490	1524.113	1	2	.013	3.500		1524.580	-45.0		.000
R	1416.640	1525.080	1		.013				.000	.000	0
R	1422.370	1525.108	1		.013				.000	45.000	0
JX	1424.370	1525.120	1	2	.013	6.300		1525.750	-90.0		.000
R	1504.320	1525.520	1		.013				.000	.000	0
R	1528.010	1525.640	1		.013				.000	-45.000	0
JX	1532.680	1525.664	1	2	.013	.500		1525.980	-90.0		.000
R	1597.060	1525.994	1		.013				.000	.000	0
R	1656.350	1526.280	1		.013				.000	45.000	0
R	2134.980	1528.680	1		.013				.000	45.000	1
R	2155.400	1528.782	1		.013				.000	45.000	0
R	2286.960	1529.440	1		.013				.000	45.000	0
JX	2291.630	1529.960	1	2	.013	4.200		1530.210	-45.0		.000
R	2550.460	1531.250	3		.013				.000	.000	0
JX	2555.130	1532.000	3	2	.013	4.000		1531.830	-45.0		.000
R	2814.790	1533.300	4		.013				.000	.000	0
R	2827.080	1533.362	4		.013				.000	-45.000	0
SH	2827.080	1533.362	4					1533.362			
CD	1	4	1		.000	2.500	.000	.000	.000	.000	.00
CD	2	4	1		.000	1.000	.000	.000	.000	.000	.00
CD	3	4	1		.000	2.000	.000	.000	.000	.000	.00
CD	4	4	1		.000	1.250	.000	.000	.000	.000	.00
Q					4.300	.0					

WATER SURFACE PROFILE LISTING

Date: 9-30-2022 Time:11: 8:53

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
 100 YEAR STORM EVENT - LINE A HYDRAULICS  
 3963LINEA

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	1523.000	3.160	1526.160	22.80	4.64	.33	1526.49	.00	1.62	.00	2.500	.000	.00	1 .0
217.820	.0050					.0031	.67	3.16	.00	1.67	.013	.00	.00	PIPE
1217.820	1524.090	2.743	1526.833	22.80	4.64	.33	1527.17	.00	1.62	.00	2.500	.000	.00	1 .0
JUNCT STR	.0049					.0027	.01	2.74	.00		.013	.00	.00	PIPE
1222.490	1524.113	2.853	1526.966	19.30	3.93	.24	1527.21	.00	1.49	.00	2.500	.000	.00	1 .0
127.448	.0050					.0022	.28	2.85	.00	1.49	.013	.00	.00	PIPE
1349.938	1524.748	2.500	1527.248	19.30	3.93	.24	1527.49	.00	1.49	.00	2.500	.000	.00	1 .0
66.702	.0050					.0021	.14	2.50	.00	1.49	.013	.00	.00	PIPE
1416.640	1525.080	2.282	1527.362	19.30	4.11	.26	1527.62	.00	1.49	1.41	2.500	.000	.00	1 .0
5.630	.0050					.0019	.01	2.28	.40	1.49	.013	.00	.00	PIPE
1422.370	1525.108	2.262	1527.370	19.30	4.13	.27	1527.64	.00	1.49	1.47	2.500	.000	.00	1 .0
JUNCT STR	.0060					.0015	.00	2.26	.41		.013	.00	.00	PIPE
1424.370	1525.120	2.547	1527.667	13.00	2.65	.11	1527.78	.00	1.21	.00	2.500	.000	.00	1 .0
11.769	.0050					.0010	.01	2.55	.00	1.17	.013	.00	.00	PIPE
1436.039	1525.179	2.500	1527.679	13.00	2.65	.11	1527.79	.00	1.21	.00	2.500	.000	.00	1 .0
54.136	.0050					.0009	.05	2.50	.00	1.17	.013	.00	.00	PIPE
1490.175	1525.449	2.268	1527.717	13.00	2.78	.12	1527.84	.00	1.21	1.45	2.500	.000	.00	1 .0
14.145	.0050					.0009	.01	2.27	.27	1.17	.013	.00	.00	PIPE





WATER SURFACE PROFILE LISTING  
BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - LINE A HYDRAULICS  
3963LINEA

Date: 9-30-2022 Time:11: 8:53

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*****
Station      Invert      Depth      Water      Q      Vel      Vel      Energy      Super      Critical      Flow Top      Height/      Base Wt      ZL      No Wth
      Elev      (FT)      Elev      (CFS)      (FPS)      Head      Grd.El.      Elev      Depth      Width      Dia.-FT      or I.D.      ZL      Prs/Pip
L/Elem      Ch Slope
*****      *****
1644.131    1526.221    1.575    1527.796    12.50    3.84    .23    1528.02    .00    1.19    2.41    2.500    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
12.219      .0048
      .0019    .02    1.58    .58    1.16    .013    .00    .00    PIPE
1656.350    1526.280    1.519    1527.799    12.50    4.00    .25    1528.05    .00    1.19    2.44    2.500    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
11.987      .0050
      .0021    .03    1.52    .62    1.15    .013    .00    .00    PIPE
1668.337    1526.340    1.459    1527.799    12.50    4.20    .27    1528.07    .00    1.19    2.46    2.500    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
10.880      .0050
      .0024    .03    1.46    .67    1.15    .013    .00    .00    PIPE
1679.217    1526.395    1.403    1527.798    12.50    4.41    .30    1528.10    .00    1.19    2.48    2.500    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
9.884      .0050
      .0027    .03    1.40    .73    1.15    .013    .00    .00    PIPE
1689.101    1526.444    1.350    1527.794    12.50    4.62    .33    1528.13    .00    1.19    2.49    2.500    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
8.632      .0050
      .0031    .03    1.35    .78    1.15    .013    .00    .00    PIPE
1697.733    1526.488    1.300    1527.788    12.50    4.85    .36    1528.15    .00    1.19    2.50    2.500    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
7.493      .0050
      .0035    .03    1.30    .84    1.15    .013    .00    .00    PIPE
1705.226    1526.525    1.252    1527.777    12.50    5.08    .40    1528.18    .00    1.19    2.50    2.500    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
3.501      .0050
      .0039    .01    1.25    .90    1.15    .013    .00    .00    PIPE
1708.727    1526.543    1.206    1527.749    12.50    5.33    .44    1528.19    .00    1.19    2.50    2.500    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
HYDRAULIC JUMP
1708.727    1526.543    1.146    1527.689    12.50    5.70    .50    1528.19    .00    1.19    2.49    2.500    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
407.003      .0050
      .0050    2.04    1.15    1.07    1.15    .013    .00    .00    PIPE

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WATER SURFACE PROFILE LISTING  
BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - LINE A HYDRAULICS  
3963LINEA

Date: 9-30-2022 Time:11: 8:53

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*****
Station   Invert   Depth   Water   Q       Vel     Vel     Energy   Super   Critical   Flow Top   Height/   Base Wt   No Wth
- - - - - Elev   (FT)   Elev   (CFS)   (FPS)   Head   Grd.El.   Elev   Depth   Width   Dia.-FT   or I.D.   ZL   Prs/Pip
L/Elem   Ch Slope
*****   *****
2277.508  1529.393  .967  1530.360  12.50  7.12  .79  1531.15  .00  1.19  2.44  2.500  .000  .00  1 .0
- - - - -
9.452  .0050
2286.960  1529.440  .934  1530.374  12.50  7.47  .87  1531.24  .00  1.19  2.42  2.500  .000  .00  1 .0
- - - - -
JUNCT STR .1114
2291.630  1529.960  .959  1530.919  8.30  4.80  .36  1531.28  .00  .96  2.43  2.500  .000  .00  1 .0
- - - - -
2291.630  1529.960  1.023  1530.983  8.30  5.13  .41  1531.39  .00  1.03  2.00  2.000  .000  .00  1 .0
- - - - -
192.676  .0050
2484.306  1530.920  1.023  1531.943  8.30  5.13  .41  1532.35  .00  1.03  2.00  2.000  .000  .00  1 .0
- - - - -
7.981  .0050
2492.287  1530.960  .988  1531.948  8.30  5.36  .45  1532.39  .00  1.03  2.00  2.000  .000  .00  1 .0
- - - - -
8.683  .0050
2500.970  1531.003  .952  1531.955  8.30  5.62  .49  1532.45  .00  1.03  2.00  2.000  .000  .00  1 .0
- - - - -
8.331  .0050
2509.301  1531.045  .918  1531.963  8.30  5.90  .54  1532.50  .00  1.03  1.99  2.000  .000  .00  1 .0
- - - - -
7.650  .0050
2516.951  1531.083  .885  1531.968  8.30  6.19  .59  1532.56  .00  1.03  1.99  2.000  .000  .00  1 .0
- - - - -
7.195  .0050
2524.146  1531.119  .853  1531.972  8.30  6.49  .65  1532.63  .00  1.03  1.98  2.000  .000  .00  1 .0
- - - - -

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7.034 .0050 .0100 .07 .85 1.42 1.02 .013 .00 .00 PIPE



30.779 .0050

.0049 .15 .96 .76 .96 .013 .00 .00 PIPE

WATER SURFACE PROFILE LISTING  
 BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
 100 YEAR STORM EVENT - LINE A HYDRAULICS  
 3963LINEA

Date: 9-30-2022 Time:11: 8:53

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*****
Station  | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt |   | No Wth
          | Elev   | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev  | Depth   | Width   | Dia.-FT | or I.D. | ZL | Prs/Pip
          |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|-----
L/Elem   | Ch Slope |          |          |          |          | SF Ave | HF   | SE Dpth | Froude N | Norm Dp | "N"   | X-Fall | ZR | Type Ch
*****   |*****   |*****   |*****   |*****   |*****   |*****   |*****   |*****   |*****   |*****   |*****   |*****   |****|*****
2814.790 | 1533.300 | .964 | 1534.264 | 4.30 | 4.24 | .28 | 1534.54 | .00 | .84 | 1.05 | 1.250 | .000 | .00 | 1 .0
          | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
          | 12.290 | .0050 |          |          |          | .0050 | .06 | .96 | .76 | .96 | .013 | .00 | .00 | PIPE
2827.080 | 1533.362 | .963 | 1534.325 | 4.30 | 4.24 | .28 | 1534.60 | .00 | .84 | 1.05 | 1.250 | .000 | .00 | 1 .0
          | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
    
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T1 BLACK CREEK - HARVILL AT WATER INDUSTRIAL

0

T2 100 YEAR STORM EVENT - LINE B HYDRAULICS

T3 3963LINEB

SO	3400.000	1523.170	3					1526.160			
R	3439.330	1523.510	3		.013				.000	.000	0
JX	3443.670	1523.550	3	2	.013	3.700		1523.690	-90.0		90.000
R	3485.340	1523.910	3		.013				.000	.000	0
JX	3490.010	1524.410	5	4	.013	7.300		1524.280	45.0		.000
R	3536.260	1524.750	5		.013				.000	.000	0
R	3606.970	1525.280	5		.013				.000	-45.000	0
R	3821.780	1526.890	5		.013				.000	45.000	0
R	3847.790	1527.090	5		.013				.000	-45.000	0
R	4059.710	1528.680	5		.013				.000	-45.000	1
JX	4064.380	1528.930	2	4	.013	2.000		1528.870	45.0		.000
R	4167.420	1529.760	2		.013				.000	.000	0
R	4238.320	1530.160	2		.013				.000	11.250	0
JX	4239.320	1530.180	2	6	.013	.400		1530.550	90.0		.000
R	4364.310	1531.330	2		.013				.000	.000	0
R	4383.740	1531.490	2		.013				.000	-45.000	0
R	4524.180	1532.610	2		.013				.000	-45.000	0
R	4536.470	1532.720	2		.013				.000	45.000	0
SH	4536.470	1532.720	2					1532.720			
CD	1	4	1		.000	2.500	.000	.000	.000	.000	.00
CD	2	4	1		.000	1.250	.000	.000	.000	.000	.00
CD	3	4	1		.000	2.000	.000	.000	.000	.000	.00
CD	4	4	1		.000	1.000	.000	.000	.000	.000	.00
CD	5	4	1		.000	1.500	.000	.000	.000	.000	.00
CD	6	4	1		.000	.500	.000	.000	.000	.000	.00
Q					4.300	.0					

WATER SURFACE PROFILE LISTING

Date:10- 4-2022 Time: 4: 8: 9

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - LINE B HYDRAULICS  
3963LINEB

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3400.000	1523.170	2.990	1526.160	17.70	5.63	.49	1526.65	.00	1.52	.00	2.000	.000	.00	1 .0
39.330	.0086					.0061	.24	2.99	.00	1.41	.013	.00	.00	PIPE
3439.330	1523.510	2.891	1526.401	17.70	5.63	.49	1526.89	.00	1.52	.00	2.000	.000	.00	1 .0
JUNCT STR	.0092					.0050	.02	.00	.00		.013	.00	.00	PIPE
3443.670	1523.550	3.241	1526.792	14.00	4.46	.31	1527.10	.00	1.35	.00	2.000	.000	.00	1 .0
41.670	.0086					.0038	.16	3.24	.00	1.19	.013	.00	.00	PIPE
3485.340	1523.910	3.041	1526.951	14.00	4.46	.31	1527.26	.00	1.35	.00	2.000	.000	.00	1 .0
JUNCT STR	.1071					.0039	.02	3.04	.00		.013	.00	.00	PIPE
3490.010	1524.410	2.645	1527.055	6.70	3.79	.22	1527.28	.00	1.00	.00	1.500	.000	.00	1 .0
46.250	.0074					.0041	.19	2.64	.00	.96	.013	.00	.00	PIPE
3536.260	1524.750	2.493	1527.243	6.70	3.79	.22	1527.47	.00	1.00	.00	1.500	.000	.00	1 .0
70.710	.0075					.0041	.29	2.49	.00	.96	.013	.00	.00	PIPE
3606.970	1525.280	2.284	1527.564	6.70	3.79	.22	1527.79	.00	1.00	.00	1.500	.000	.00	1 .0
214.810	.0075					.0041	.87	2.28	.00	.96	.013	.00	.00	PIPE
3821.780	1526.890	1.581	1528.471	6.70	3.79	.22	1528.69	.00	1.00	.00	1.500	.000	.00	1 .0
26.010	.0077					.0041	.11	1.58	.00	.95	.013	.00	.00	PIPE
3847.790	1527.090	1.520	1528.610	6.70	3.79	.22	1528.83	.00	1.00	.00	1.500	.000	.00	1 .0
15.625	.0075					.0040	.06	1.52	.00	.96	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING  
BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - LINE B HYDRAULICS  
3963LINEB

Date: 9-30-2022 Time: 2:28:34

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3735.071	1526.240	1.280	1527.520	6.70	4.17	.27	1527.79	.00	1.00	1.06	1.500	.000	.00	1 .0
11.398	.0075					.0040	.05	1.28	.60	.96	.013	.00	.00	PIPE
3746.469	1526.326	1.213	1527.539	6.70	4.37	.30	1527.84	.00	1.00	1.18	1.500	.000	.00	1 .0
9.100	.0075					.0044	.04	1.21	.68	.96	.013	.00	.00	PIPE
3755.569	1526.394	1.155	1527.549	6.70	4.59	.33	1527.88	.00	1.00	1.26	1.500	.000	.00	1 .0
7.732	.0075					.0049	.04	1.16	.75	.96	.013	.00	.00	PIPE
3763.302	1526.452	1.102	1527.554	6.70	4.81	.36	1527.91	.00	1.00	1.32	1.500	.000	.00	1 .0
5.837	.0075					.0054	.03	1.10	.83	.96	.013	.00	.00	PIPE
3769.139	1526.496	1.054	1527.550	6.70	5.05	.40	1527.95	.00	1.00	1.37	1.500	.000	.00	1 .0
.778	.0075					.0061	.00	1.05	.90	.96	.013	.00	.00	PIPE
3769.916	1526.501	1.010	1527.512	6.70	5.29	.44	1527.95	.00	1.00	1.41	1.500	.000	.00	1 .0
HYDRAULIC JUMP														
3769.916	1526.501	.957	1527.459	6.70	5.63	.49	1527.95	.00	1.00	1.44	1.500	.000	.00	1 .0
33.770	.0075					.0075	.25	.96	1.09	.96	.013	.00	.00	PIPE
3803.687	1526.754	.957	1527.712	6.70	5.63	.49	1528.20	.00	1.00	1.44	1.500	.000	.00	1 .0
18.094	.0075					.0076	.14	.96	1.09	.96	.013	.00	.00	PIPE
3821.780	1526.890	.949	1527.839	6.70	5.68	.50	1528.34	.00	1.00	1.45	1.500	.000	.00	1 .0
7.633	.0077					.0077	.06	.95	1.11	.95	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING  
BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - LINE B HYDRAULICS  
3963LINEB

Date: 9-30-2022 Time: 2:28:34

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3829.413	1526.949	.949	1527.898	6.70	5.68	.50	1528.40	.00	1.00	1.45	1.500	.000	.00	1 .0
18.377	.0077					.0076	.14	.95	1.11	.95	.013	.00	.00	PIPE
3847.790	1527.090	.957	1528.047	6.70	5.63	.49	1528.54	.00	1.00	1.44	1.500	.000	.00	1 .0
171.999	.0075					.0075	1.29	.96	1.09	.96	.013	.00	.00	PIPE
4019.789	1528.381	.957	1529.338	6.70	5.63	.49	1529.83	.00	1.00	1.44	1.500	.000	.00	1 .0
33.488	.0075					.0075	.25	.96	1.09	.96	.013	.00	.00	PIPE
4053.276	1528.632	.959	1529.591	6.70	5.61	.49	1530.08	.00	1.00	1.44	1.500	.000	.00	1 .0
6.434	.0075					.0070	.05	.96	1.09	.96	.013	.00	.00	PIPE
4059.710	1528.680	1.001	1529.682	6.70	5.34	.44	1530.13	.00	1.00	1.41	1.500	.000	.00	1 .0
JUNCT STR	.0535					.0056	.03	1.00	1.00		.013	.00	.00	PIPE
4064.380	1528.930	1.115	1530.045	4.70	4.07	.26	1530.30	.00	.88	.78	1.250	.000	.00	1 .0
12.127	.0081					.0049	.06	1.12	.59	.85	.013	.00	.00	PIPE
4076.507	1529.028	1.051	1530.079	4.70	4.26	.28	1530.36	.00	.88	.91	1.250	.000	.00	1 .0
9.014	.0081					.0053	.05	1.05	.68	.85	.013	.00	.00	PIPE
4085.521	1529.100	.998	1530.098	4.70	4.47	.31	1530.41	.00	.88	1.00	1.250	.000	.00	1 .0
7.254	.0081					.0059	.04	1.00	.77	.85	.013	.00	.00	PIPE
4092.775	1529.159	.951	1530.110	4.70	4.69	.34	1530.45	.00	.88	1.07	1.250	.000	.00	1 .0
5.721	.0081					.0065	.04	.95	.85	.85	.013	.00	.00	PIPE







T1 BLACK CREEK - HARVILL AT WATER INDUSTRIAL

0

T2 100 YEAR STORM EVENT - LINE C HYDRAULICS

T3 3963LINEC

SO	5600.0001528.800	1						1530.380			
R	5688.5001529.250	1	.013						.000	.000	1
R	5698.5001529.301	1	.013						.000	-45.000	0
R	6012.2601530.860	1	.013						.000	-45.000	0
R	6042.1301531.010	1	.013						.000	45.000	0
JX	6046.8001531.040	1	2	.013	4.000			1531.780	-45.0		.000
R	6434.8301532.980	1	.013						.000	.000	1
JX	6439.5001533.003	1	3	.013	6.900			1533.700	-45.0		.000
R	6562.1801533.610	1	.013						.000	.000	0
R	6576.2101533.690	1	.013						.000	-45.000	0
R	6591.2901545.270	1	.013						.000	.000	0
SH	6591.2901545.270	1						1545.270			
CD	1	4	1	.000	2.000	.000	.000	.000	.00		
CD	2	4	1	.000	1.000	.000	.000	.000	.00		
CD	3	4	1	.000	1.250	.000	.000	.000	.00		
Q				6.900	.0						



WATER SURFACE PROFILE LISTING

Date:10-13-2022 Time:11:43:29

BLACK CREEK - HARVILL AT WATER INDUSTRIAL

100 YEAR STORM EVENT - LINE C HYDRAULICS

3963LINEC

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
5600.000	1528.800	1.580	1530.380	17.80	6.69	.69	1531.07	.00	1.52	1.63	2.000	.000	.00	1 .0
15.148	.0051					.0063	.10	1.58	.92	2.00	.013	.00	.00	PIPE
5615.148	1528.877	1.662	1530.539	17.80	6.38	.63	1531.17	.00	1.52	1.50	2.000	.000	.00	1 .0
56.530	.0051					.0058	.33	1.66	.82	2.00	.013	.00	.00	PIPE
5671.678	1529.164	1.760	1530.925	17.80	6.08	.57	1531.50	.00	1.52	1.30	2.000	.000	.00	1 .0
16.822	.0051					.0055	.09	1.76	.71	2.00	.013	.00	.00	PIPE
5688.500	1529.250	1.776	1531.026	17.80	6.04	.57	1531.59	.00	1.52	1.26	2.000	.000	.00	1 .0
10.000	.0051					.0055	.06	1.78	.70	2.00	.013	.00	.00	PIPE
5698.500	1529.301	1.784	1531.085	17.80	6.02	.56	1531.65	.00	1.52	1.24	2.000	.000	.00	1 .0
185.222	.0050					.0054	1.01	1.78	.69	2.00	.013	.00	.00	PIPE
5883.722	1530.221	1.923	1532.144	17.80	5.74	.51	1532.66	.00	1.52	.77	2.000	.000	.00	1 .0
100.157	.0050					.0056	.56	1.92	.50	2.00	.013	.00	.00	PIPE
5983.879	1530.719	2.000	1532.719	17.80	5.67	.50	1533.22	.00	1.52	.00	2.000	.000	.00	1 .0
28.381	.0050					.0060	.17	2.00	.00	2.00	.013	.00	.00	PIPE
6012.260	1530.860	2.035	1532.895	17.80	5.67	.50	1533.39	.00	1.52	.00	2.000	.000	.00	1 .0
29.870	.0050					.0062	.18	2.03	.00	2.00	.013	.00	.00	PIPE
6042.130	1531.010	2.144	1533.154	17.80	5.67	.50	1533.65	.00	1.52	.00	2.000	.000	.00	1 .0
JUNCT STR	.0064					.0050	.02	2.14	.00		.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING

Date:10-13-2022 Time:11:43:29

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - LINE C HYDRAULICS  
3963LINEC

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
6046.800	1531.040	2.392	1533.432	13.80	4.39	.30	1533.73	.00	1.34	.00	2.000	.000	.00	1 .0
316.248	.0050					.0037	1.17	2.39	.00	1.43	.013	.00	.00	PIPE
6363.047	1532.621	2.000	1534.621	13.80	4.39	.30	1534.92	.00	1.34	.00	2.000	.000	.00	1 .0
71.783	.0050					.0034	.25	2.00	.00	1.43	.013	.00	.00	PIPE
6434.830	1532.980	1.869	1534.849	13.80	4.52	.32	1535.17	.00	1.34	.99	2.000	.000	.00	1 .0
JUNCT STR	.0049					.0021	.01	1.87	.45		.013	.00	.00	PIPE
6439.500	1533.003	2.054	1535.057	6.90	2.20	.07	1535.13	.00	.93	.00	2.000	.000	.00	1 .0
13.472	.0049					.0009	.01	2.05	.00	.92	.013	.00	.00	PIPE
6452.972	1533.070	2.000	1535.070	6.90	2.20	.07	1535.14	.00	.93	.00	2.000	.000	.00	1 .0
43.439	.0049					.0009	.04	2.00	.00	.92	.013	.00	.00	PIPE
6496.411	1533.285	1.814	1535.099	6.90	2.30	.08	1535.18	.00	.93	1.16	2.000	.000	.00	1 .0
24.300	.0049					.0008	.02	1.81	.25	.92	.013	.00	.00	PIPE
6520.711	1533.405	1.706	1535.111	6.90	2.42	.09	1535.20	.00	.93	1.42	2.000	.000	.00	1 .0
13.295	.0049					.0009	.01	1.71	.30	.92	.013	.00	.00	PIPE
6534.006	1533.471	1.645	1535.116	6.90	2.50	.10	1535.21	.00	.93	1.53	2.000	.000	.00	1 .0
HYDRAULIC JUMP														
6534.006	1533.471	.484	1533.955	6.90	11.76	2.15	1536.10	.00	.93	1.71	2.000	.000	.00	1 .0
.530	.0049					.0563	.03	.48	3.54	.92	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING  
BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - LINE C HYDRAULICS  
3963LINEC

Date:10-13-2022 Time:11:43:29

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
6534.536	1533.473	.484	1533.957	6.90	11.74	2.14	1536.10	.00	.93	1.71	2.000	.000	.00	1 .0
3.588	.0049					.0602	.22	.48	3.53	.92	.013	.00	.00	PIPE
6538.124	1533.491	.468	1533.959	6.90	12.32	2.36	1536.31	.00	.93	1.69	2.000	.000	.00	1 .0
3.439	.0049					.0688	.24	.47	3.77	.92	.013	.00	.00	PIPE
6541.563	1533.508	.452	1533.960	6.90	12.92	2.59	1536.55	.00	.93	1.67	2.000	.000	.00	1 .0
3.323	.0049					.0787	.26	.45	4.03	.92	.013	.00	.00	PIPE
6544.886	1533.524	.438	1533.962	6.90	13.55	2.85	1536.81	.00	.93	1.65	2.000	.000	.00	1 .0
3.172	.0049					.0901	.29	.44	4.30	.92	.013	.00	.00	PIPE
6548.059	1533.540	.423	1533.963	6.90	14.21	3.14	1537.10	.00	.93	1.63	2.000	.000	.00	1 .0
3.055	.0049					.1030	.31	.42	4.59	.92	.013	.00	.00	PIPE
6551.114	1533.555	.409	1533.964	6.90	14.90	3.45	1537.41	.00	.93	1.61	2.000	.000	.00	1 .0
2.938	.0049					.1179	.35	.41	4.90	.92	.013	.00	.00	PIPE
6554.052	1533.570	.396	1533.966	6.90	15.63	3.79	1537.76	.00	.93	1.59	2.000	.000	.00	1 .0
2.818	.0049					.1350	.38	.40	5.24	.92	.013	.00	.00	PIPE
6556.870	1533.584	.383	1533.967	6.90	16.39	4.17	1538.14	.00	.93	1.57	2.000	.000	.00	1 .0
2.705	.0049					.1544	.42	.38	5.59	.92	.013	.00	.00	PIPE
6559.575	1533.597	.370	1533.967	6.90	17.19	4.59	1538.56	.00	.93	1.55	2.000	.000	.00	1 .0
2.605	.0049					.1768	.46	.37	5.96	.92	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING  
 BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
 100 YEAR STORM EVENT - LINE C HYDRAULICS  
 3963LINEC

Date:10-13-2022 Time:11:43:29

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
6562.180	1533.610	.359	1533.969	6.90	18.03	5.05	1539.02	.00	.93	1.53	2.000	.000	.00	1 .0
	.520	.0057				.1914	.10	.36	6.36	.88	.013	.00	.00	PIPE
6562.699	1533.613	.356	1533.969	6.90	18.21	5.15	1539.12	.00	.93	1.53	2.000	.000	.00	1 .0
	2.486	.0057				.2080	.52	.36	6.45	.88	.013	.00	.00	PIPE
6565.185	1533.627	.344	1533.971	6.90	19.10	5.66	1539.63	.00	.93	1.51	2.000	.000	.00	1 .0
	2.390	.0057				.2381	.57	.34	6.88	.88	.013	.00	.00	PIPE
6567.575	1533.641	.333	1533.974	6.90	20.03	6.23	1540.20	.00	.93	1.49	2.000	.000	.00	1 .0
	2.293	.0057				.2726	.63	.33	7.34	.88	.013	.00	.00	PIPE
6569.868	1533.654	.322	1533.976	6.90	21.01	6.85	1540.83	.00	.93	1.47	2.000	.000	.00	1 .0
	2.203	.0057				.3123	.69	.32	7.83	.88	.013	.00	.00	PIPE
6572.070	1533.666	.312	1533.978	6.90	22.03	7.54	1541.52	.00	.93	1.45	2.000	.000	.00	1 .0
	2.112	.0057				.3578	.76	.31	8.36	.88	.013	.00	.00	PIPE
6574.183	1533.678	.302	1533.980	6.90	23.11	8.29	1542.27	.00	.93	1.43	2.000	.000	.00	1 .0
	2.027	.0057				.4099	.83	.30	8.92	.88	.013	.00	.00	PIPE
6576.210	1533.690	.292	1533.982	6.90	24.24	9.12	1543.10	.00	.93	1.41	2.000	.000	.00	1 .0
	2.106	.7679				.4126	.87	.29	9.52	.26	.013	.00	.00	PIPE
6578.317	1535.307	.301	1535.609	6.90	23.22	8.37	1543.98	.00	.93	1.43	2.000	.000	.00	1 .0
	1.855	.7679				.3630	.67	.30	8.98	.26	.013	.00	.00	PIPE

Program Package Serial Number: 1404

WATER SURFACE PROFILE LISTING

Date:10-13-2022 Time:11:43:29

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - LINE C HYDRAULICS  
3963LINEC

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
6580.172	1536.732	.311	1537.043	6.90	22.14	7.61	1544.66	.00	.93	1.45	2.000	.000	.00	1 .0
1.512	.7679					.3168	.48	.31	8.42	.26	.013	.00	.00	PIPE
6581.684	1537.893	.321	1538.214	6.90	21.11	6.92	1545.13	.00	.93	1.47	2.000	.000	.00	1 .0
1.258	.7679					.2765	.35	.32	7.89	.26	.013	.00	.00	PIPE
6582.941	1538.859	.332	1539.191	6.90	20.13	6.29	1545.48	.00	.93	1.49	2.000	.000	.00	1 .0
1.066	.7679					.2415	.26	.33	7.39	.26	.013	.00	.00	PIPE
6584.007	1539.678	.343	1540.021	6.90	19.19	5.72	1545.74	.00	.93	1.51	2.000	.000	.00	1 .0
.912	.7679					.2110	.19	.34	6.93	.26	.013	.00	.00	PIPE
6584.919	1540.378	.355	1540.733	6.90	18.30	5.20	1545.93	.00	.93	1.53	2.000	.000	.00	1 .0
.790	.7679					.1844	.15	.36	6.49	.26	.013	.00	.00	PIPE
6585.709	1540.984	.367	1541.351	6.90	17.45	4.73	1546.08	.00	.93	1.55	2.000	.000	.00	1 .0
.688	.7679					.1610	.11	.37	6.08	.26	.013	.00	.00	PIPE
6586.397	1541.513	.379	1541.892	6.90	16.64	4.30	1546.19	.00	.93	1.57	2.000	.000	.00	1 .0
.602	.7679					.1407	.08	.38	5.70	.26	.013	.00	.00	PIPE
6587.000	1541.975	.392	1542.367	6.90	15.86	3.91	1546.27	.00	.93	1.59	2.000	.000	.00	1 .0
.530	.7679					.1229	.07	.39	5.34	.26	.013	.00	.00	PIPE
6587.530	1542.383	.405	1542.788	6.90	15.12	3.55	1546.34	.00	.93	1.61	2.000	.000	.00	1 .0
.468	.7679					.1074	.05	.41	5.00	.26	.013	.00	.00	PIPE

Program Package Serial Number: 1404

WATER SURFACE PROFILE LISTING

Date:10-13-2022 Time:11:43:29

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - LINE C HYDRAULICS  
3963LINEC

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
6587.998	1542.742	.419	1543.161	6.90	14.42	3.23	1546.39	.00	.93	1.63	2.000	.000	.00	1 .0
	.415	.7679				.0939	.04	.42	4.69	.26	.013	.00	.00	PIPE
6588.412	1543.060	.433	1543.493	6.90	13.75	2.94	1546.43	.00	.93	1.65	2.000	.000	.00	1 .0
	.367	.7679				.0820	.03	.43	4.39	.26	.013	.00	.00	PIPE
6588.779	1543.342	.448	1543.790	6.90	13.11	2.67	1546.46	.00	.93	1.67	2.000	.000	.00	1 .0
	.327	.7679				.0717	.02	.45	4.11	.26	.013	.00	.00	PIPE
6589.106	1543.593	.463	1544.056	6.90	12.50	2.43	1546.48	.00	.93	1.69	2.000	.000	.00	1 .0
	.290	.7679				.0627	.02	.46	3.85	.26	.013	.00	.00	PIPE
6589.396	1543.816	.479	1544.295	6.90	11.92	2.21	1546.50	.00	.93	1.71	2.000	.000	.00	1 .0
	.257	.7679				.0548	.01	.48	3.61	.26	.013	.00	.00	PIPE
6589.653	1544.013	.496	1544.509	6.90	11.36	2.00	1546.51	.00	.93	1.73	2.000	.000	.00	1 .0
	.229	.7679				.0480	.01	.50	3.38	.26	.013	.00	.00	PIPE
6589.883	1544.189	.513	1544.703	6.90	10.83	1.82	1546.52	.00	.93	1.75	2.000	.000	.00	1 .0
	.205	.7679				.0419	.01	.51	3.16	.26	.013	.00	.00	PIPE
6590.087	1544.347	.530	1544.877	6.90	10.33	1.66	1546.53	.00	.93	1.77	2.000	.000	.00	1 .0
	.180	.7679				.0367	.01	.53	2.96	.26	.013	.00	.00	PIPE
6590.268	1544.485	.549	1545.034	6.90	9.85	1.51	1546.54	.00	.93	1.79	2.000	.000	.00	1 .0
	.160	.7679				.0321	.01	.55	2.77	.26	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING  
 BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
 100 YEAR STORM EVENT - LINE C HYDRAULICS  
 3963LINEC

Date:10-13-2022 Time:11:43:29

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
6590.428	1544.608	.568	1545.176	6.90	9.39	1.37	1546.55	.00	.93	1.80	2.000	.000	.00	1 .0
.143	.7679					.0281	.00	.57	2.59	.26	.013	.00	.00	PIPE
6590.570	1544.717	.587	1545.305	6.90	8.95	1.24	1546.55	.00	.93	1.82	2.000	.000	.00	1 .0
.124	.7679					.0246	.00	.59	2.43	.26	.013	.00	.00	PIPE
6590.694	1544.813	.608	1545.421	6.90	8.54	1.13	1546.55	.00	.93	1.84	2.000	.000	.00	1 .0
.110	.7679					.0215	.00	.61	2.27	.26	.013	.00	.00	PIPE
6590.804	1544.897	.629	1545.526	6.90	8.14	1.03	1546.55	.00	.93	1.86	2.000	.000	.00	1 .0
.094	.7679					.0189	.00	.63	2.12	.26	.013	.00	.00	PIPE
6590.898	1544.969	.652	1545.621	6.90	7.76	.94	1546.56	.00	.93	1.88	2.000	.000	.00	1 .0
.083	.7679					.0165	.00	.65	1.99	.26	.013	.00	.00	PIPE
6590.981	1545.032	.675	1545.708	6.90	7.40	.85	1546.56	.00	.93	1.89	2.000	.000	.00	1 .0
.071	.7679					.0145	.00	.68	1.86	.26	.013	.00	.00	PIPE
6591.052	1545.087	.699	1545.786	6.90	7.06	.77	1546.56	.00	.93	1.91	2.000	.000	.00	1 .0
.061	.7679					.0127	.00	.70	1.74	.26	.013	.00	.00	PIPE
6591.113	1545.134	.723	1545.857	6.90	6.73	.70	1546.56	.00	.93	1.92	2.000	.000	.00	1 .0
.050	.7679					.0111	.00	.72	1.62	.26	.013	.00	.00	PIPE
6591.163	1545.172	.749	1545.921	6.90	6.41	.64	1546.56	.00	.93	1.94	2.000	.000	.00	1 .0
.041	.7679					.0098	.00	.75	1.52	.26	.013	.00	.00	PIPE





T1 BLACK CREEK - HARVILL AT WATER INDUSTRIAL

0

T2 100 YEAR STORM EVENT - LINE D HYDRAULICS

T3 3963LINED

SO	5100.00	1532.590	1					1534.200			
R	5139.16	1532.780	1		.013				.000	.000	0
JX	5143.82	1532.800	1	2	.013	.001		1533.100	90.0		.000
R	5507.02	1534.620	1		.013				.000	.000	0
R	5521.12	1534.690	1		.013				.000	45.000	0
R	5536.02	1541.120	1		.013				.000	.000	0
SH	5536.02	1541.120	1					1541.120			
CD	1	4	1		.000	1.500	.000	.000	.000	.00	
CD	2	4	1		.000	1.000	.000	.000	.000	.00	
Q		9.600	.0								

WATER SURFACE PROFILE LISTING

Date: 3-21-2023 Time: 6: 0:40

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
 100 YEAR STORM EVENT - LINE D HYDRAULICS  
 3963LINED

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
5100.000	1532.590	1.610	1534.200	9.60	5.43	.46	1534.66	.00	1.20	.00	1.500	.000	.00	1 .0
39.160	.0049					.0084	.33	1.61	.00	1.50	.013	.00	.00	PIPE
5139.160	1532.780	1.747	1534.527	9.60	5.43	.46	1534.99	.00	1.20	.00	1.500	.000	.00	1 .0
JUNCT STR	.0043					.0084	.04	1.75	.00		.013	.00	.00	PIPE
5143.820	1532.800	1.766	1534.566	9.60	5.43	.46	1535.02	.00	1.20	.00	1.500	.000	.00	1 .0
363.200	.0050					.0084	3.03	1.77	.00	1.50	.013	.00	.00	PIPE
5507.020	1534.620	2.980	1537.600	9.60	5.43	.46	1538.06	.00	1.20	.00	1.500	.000	.00	1 .0
8.750	.0050					.0084	.07	2.98	.00	1.50	.013	.00	.00	PIPE
5515.770	1534.663	3.052	1537.715	9.60	5.43	.46	1538.17	.00	1.20	.00	1.500	.000	.00	1 .0
HYDRAULIC JUMP														
5515.770	1534.663	.497	1535.161	9.60	18.76	5.46	1540.62	.00	1.20	1.41	1.500	.000	.00	1 .0
1.967	.0050					.1533	.30	.50	5.49	1.50	.013	.00	.00	PIPE
5517.737	1534.673	.488	1535.161	9.60	19.21	5.73	1540.89	.00	1.20	1.41	1.500	.000	.00	1 .0
3.383	.0050					.1696	.57	.49	5.68	1.50	.013	.00	.00	PIPE
5521.121	1534.690	.472	1535.162	9.60	20.14	6.30	1541.46	.00	1.20	1.39	1.500	.000	.00	1 .0
.525	.4316					.1785	.09	.47	6.07	.38	.013	.00	.00	PIPE
5521.646	1534.916	.475	1535.391	9.60	19.96	6.18	1541.57	.00	1.20	1.40	1.500	.000	.00	1 .0
2.047	.4316					.1653	.34	.48	5.99	.38	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING  
 BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
 100 YEAR STORM EVENT - LINE D HYDRAULICS  
 3963LINED

Date: 3-21-2023 Time: 6: 0:40

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
5523.693	1535.800	.492	1536.292	9.60	19.03	5.62	1541.91	.00	1.20	1.41	1.500	.000	.00	1 .0
1.723	.4316					.1448	.25	.49	5.60	.38	.013	.00	.00	PIPE
5525.416	1536.543	.509	1537.052	9.60	18.14	5.11	1542.16	.00	1.20	1.42	1.500	.000	.00	1 .0
1.465	.4316					.1268	.19	.51	5.24	.38	.013	.00	.00	PIPE
5526.881	1537.176	.527	1537.703	9.60	17.30	4.65	1542.35	.00	1.20	1.43	1.500	.000	.00	1 .0
1.259	.4316					.1111	.14	.53	4.90	.38	.013	.00	.00	PIPE
5528.140	1537.719	.546	1538.265	9.60	16.49	4.22	1542.49	.00	1.20	1.44	1.500	.000	.00	1 .0
1.089	.4316					.0975	.11	.55	4.58	.38	.013	.00	.00	PIPE
5529.229	1538.189	.566	1538.755	9.60	15.72	3.84	1542.59	.00	1.20	1.45	1.500	.000	.00	1 .0
.951	.4316					.0855	.08	.57	4.28	.38	.013	.00	.00	PIPE
5530.180	1538.599	.586	1539.185	9.60	14.99	3.49	1542.68	.00	1.20	1.46	1.500	.000	.00	1 .0
.831	.4316					.0750	.06	.59	3.99	.38	.013	.00	.00	PIPE
5531.011	1538.958	.607	1539.565	9.60	14.30	3.17	1542.74	.00	1.20	1.47	1.500	.000	.00	1 .0
.729	.4316					.0658	.05	.61	3.73	.38	.013	.00	.00	PIPE
5531.740	1539.272	.629	1539.902	9.60	13.63	2.88	1542.79	.00	1.20	1.48	1.500	.000	.00	1 .0
.638	.4316					.0578	.04	.63	3.48	.38	.013	.00	.00	PIPE
5532.377	1539.548	.653	1540.201	9.60	13.00	2.62	1542.82	.00	1.20	1.49	1.500	.000	.00	1 .0
.563	.4316					.0508	.03	.65	3.25	.38	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING  
BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - LINE D HYDRAULICS  
3963LINED

Date: 3-21-2023 Time: 6: 0:40

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
5532.940	1539.791	.677	1540.468	9.60	12.39	2.38	1542.85	.00	1.20	1.49	1.500	.000	.00	1 .0
	.496	.4316				.0447	.02	.68	3.03	.38	.013	.00	.00	PIPE
5533.436	1540.005	.702	1540.707	9.60	11.81	2.17	1542.87	.00	1.20	1.50	1.500	.000	.00	1 .0
	.434	.4316				.0393	.02	.70	2.83	.38	.013	.00	.00	PIPE
5533.870	1540.192	.729	1540.921	9.60	11.26	1.97	1542.89	.00	1.20	1.50	1.500	.000	.00	1 .0
	.383	.4316				.0346	.01	.73	2.63	.38	.013	.00	.00	PIPE
5534.253	1540.357	.756	1541.113	9.60	10.74	1.79	1542.90	.00	1.20	1.50	1.500	.000	.00	1 .0
	.333	.4316				.0304	.01	.76	2.45	.38	.013	.00	.00	PIPE
5534.586	1540.501	.785	1541.286	9.60	10.24	1.63	1542.91	.00	1.20	1.50	1.500	.000	.00	1 .0
	.289	.4316				.0268	.01	.79	2.28	.38	.013	.00	.00	PIPE
5534.875	1540.626	.816	1541.442	9.60	9.76	1.48	1542.92	.00	1.20	1.49	1.500	.000	.00	1 .0
	.251	.4316				.0237	.01	.82	2.12	.38	.013	.00	.00	PIPE
5535.127	1540.734	.848	1541.582	9.60	9.31	1.35	1542.93	.00	1.20	1.49	1.500	.000	.00	1 .0
	.215	.4316				.0209	.00	.85	1.97	.38	.013	.00	.00	PIPE
5535.342	1540.827	.882	1541.709	9.60	8.88	1.22	1542.93	.00	1.20	1.48	1.500	.000	.00	1 .0
	.182	.4316				.0185	.00	.88	1.83	.38	.013	.00	.00	PIPE
5535.524	1540.906	.918	1541.824	9.60	8.46	1.11	1542.94	.00	1.20	1.46	1.500	.000	.00	1 .0
	.152	.4316				.0164	.00	.92	1.69	.38	.013	.00	.00	PIPE



# OFFSITE HYDRAULICS

T1 BLACK CREEK - HARVILL AT WATER INDUSTRIAL

0

T2 100 YEAR STORM EVENT - ORANGE AVENUE SD HYDRAULICS LINE J-9

T3 3963ORANGELINE

SO	1009.4201503.080	1							1507.560			
R	1059.2301503.580	1		.013						.000	.000	0
R	1076.4401503.780	1		.013						-31.927	.000	1
R	1476.4401509.820	1		.013						.000	.000	1
R	1876.4401519.850	1		.013						.000	.000	1
R	2165.6501528.420	1		.013						.000	.000	0
JX	2172.1501528.790	1	2	.013	17.800				1528.800	45.0		.000
R	2585.9201552.610	1		.013						.000	.000	0
JX	2592.9201553.010	1	2	.013	28.400				1553.010	45.0		.000
R	2597.3401553.260	1		.013						.000	.000	0
SH	2597.3401553.260	1							1553.260			
CD	1	4	1	.000	2.500	.000	.000	.000	.00			
CD	2	4	1	.000	2.000	.000	.000	.000	.00			
Q				.001	.0							

WATER SURFACE PROFILE LISTING

Date:10- 5-2022 Time: 4:15:57

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
 100 YEAR STORM EVENT - ORANGE AVENUE SD HYDRAULICS  
 3963ORANGELINE

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1009.420	1503.080	4.480	1507.560	46.20	9.41	1.38	1508.94	.00	2.25	.00	2.500	.000	.00	1 .0
49.810	.0100					.0127	.63	4.48	.00	2.50	.013	.00	.00	PIPE
1059.230	1503.580	4.612	1508.192	46.20	9.41	1.38	1509.57	.00	2.25	.00	2.500	.000	.00	1 .0
17.210	.0116					.0127	.22	.00	.00	2.17	.013	.00	.00	PIPE
1076.440	1503.780	4.863	1508.643	46.20	9.41	1.38	1510.02	.00	2.25	.00	2.500	.000	.00	1 .0
400.000	.0151					.0127	5.07	4.86	.00	1.88	.013	.00	.00	PIPE
1476.440	1509.820	3.967	1513.787	46.20	9.41	1.38	1515.16	.00	2.25	.00	2.500	.000	.00	1 .0
67.587	.0251					.0127	.86	3.97	.00	1.56	.013	.00	.00	PIPE
1544.027	1511.515	3.141	1514.656	46.20	9.41	1.38	1516.03	.00	2.25	.00	2.500	.000	.00	1 .0
HYDRAULIC JUMP														
1544.027	1511.515	1.558	1513.073	46.20	14.37	3.20	1516.28	.00	2.25	2.42	2.500	.000	.00	1 .0
71.399	.0251					.0251	1.79	1.56	2.20	1.56	.013	.00	.00	PIPE
1615.426	1513.305	1.558	1514.863	46.20	14.37	3.20	1518.07	.00	2.25	2.42	2.500	.000	.00	1 .0
159.430	.0251					.0256	4.08	1.56	2.20	1.56	.013	.00	.00	PIPE
1774.855	1517.303	1.538	1518.841	46.20	14.58	3.30	1522.14	.00	2.25	2.43	2.500	.000	.00	1 .0
101.584	.0251					.0277	2.82	1.54	2.25	1.56	.013	.00	.00	PIPE
1876.440	1519.850	1.478	1521.328	46.20	15.29	3.63	1524.96	.00	2.25	2.46	2.500	.000	.00	1 .0
128.688	.0296					.0286	3.68	1.48	2.43	1.47	.013	.00	.00	PIPE



WATER SURFACE PROFILE LISTING  
BLACK CREEK - HARVILL AT WATER INDUSTRIAL LINE J-9  
100 YEAR STORM EVENT - ORANGE AVENUE SD HYDRAULICS  
3963ORANGELINE

Date:10- 5-2022 Time: 4:15:57

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*****
Station      Invert      Depth      Water      Q      Vel      Vel      Energy      Super      Critical      Flow Top      Height/      Base Wt      ZL      No Wth
      Elev      (FT)      Elev      (CFS)      (FPS)      Head      Grd.El.      Elev      Depth      Width      Dia.-FT      or I.D.      ZR      Prs/Pip
L/Elem      Ch Slope
*****      *****
2005.128      1523.663      1.506      1525.170      46.20      14.95      3.47      1528.64      .00      2.25      2.45      2.500      .000      .00      1      .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
      73.456      .0296      .0262      1.92      1.51      2.34      1.47      .013      .00      .00      PIPE
2078.584      1525.840      1.568      1527.408      46.20      14.26      3.16      1530.56      .00      2.25      2.42      2.500      .000      .00      1      .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
      34.531      .0296      .0232      .80      1.57      2.17      1.47      .013      .00      .00      PIPE
2113.115      1526.863      1.633      1528.496      46.20      13.59      2.87      1531.37      .00      2.25      2.38      2.500      .000      .00      1      .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
      21.047      .0296      .0206      .43      1.63      2.00      1.47      .013      .00      .00      PIPE
2134.162      1527.487      1.704      1529.191      46.20      12.96      2.61      1531.80      .00      2.25      2.33      2.500      .000      .00      1      .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
      14.297      .0296      .0184      .26      1.70      1.85      1.47      .013      .00      .00      PIPE
2148.459      1527.911      1.780      1529.691      46.20      12.36      2.37      1532.06      .00      2.25      2.26      2.500      .000      .00      1      .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
      10.099      .0296      .0164      .17      1.78      1.69      1.47      .013      .00      .00      PIPE
2158.558      1528.210      1.862      1530.072      46.20      11.78      2.16      1532.23      .00      2.25      2.18      2.500      .000      .00      1      .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
      7.092      .0296      .0147      .10      1.86      1.55      1.47      .013      .00      .00      PIPE
2165.650      1528.420      1.952      1530.372      46.20      11.23      1.96      1532.33      .00      2.25      2.07      2.500      .000      .00      1      .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
JUNCT STR      .0569      .0358      .23      1.95      1.40      .013      .00      .00      PIPE
2172.150      1528.790      .920      1529.710      28.40      17.34      4.67      1534.38      .00      1.82      2.41      2.500      .000      .00      1      .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
      178.213      .0576      .0576      10.26      .92      3.71      .92      .013      .00      .00      PIPE
2350.363      1539.049      .920      1539.969      28.40      17.34      4.67      1544.64      .00      1.82      2.41      2.500      .000      .00      1      .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
      109.900      .0576      .0548      6.02      .92      3.71      .92      .013      .00      .00      PIPE

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WATER SURFACE PROFILE LISTING  
BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - ORANGE AVENUE SD HYDRAULICS  
3963ORANGELINE

Date:10- 5-2022 Time: 4:15:57

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*****
Station      Invert      Depth      Water      Q      Vel      Vel      Energy      Super      Critical      Flow Top      Height/      Base Wt      ZL      No Wth
      Elev      (FT)      Elev      (CFS)      (FPS)      Head      Grd.El.      Elev      Depth      Width      Dia.-FT      or I.D.      ZL      Prs/Pip
L/Elem      Ch Slope
*****      *****
2460.263    1545.376    .944    1546.320    28.40    16.72    4.34    1550.66    .00    1.82    2.42    2.500    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
41.264      .0576
      .0488    2.01    .94    3.52    .92    .013    .00    .00    PIPE
2501.527    1547.752    .978    1548.730    28.40    15.94    3.95    1552.67    .00    1.82    2.44    2.500    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
21.927      .0576
      .0429    .94    .98    3.29    .92    .013    .00    .00    PIPE
2523.454    1549.014    1.014    1550.028    28.40    15.20    3.59    1553.61    .00    1.82    2.46    2.500    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
14.493      .0576
      .0376    .55    1.01    3.07    .92    .013    .00    .00    PIPE
2537.947    1549.848    1.051    1550.900    28.40    14.49    3.26    1554.16    .00    1.82    2.47    2.500    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
10.496      .0576
      .0330    .35    1.05    2.87    .92    .013    .00    .00    PIPE
2548.443    1550.453    1.090    1551.543    28.40    13.82    2.96    1554.51    .00    1.82    2.48    2.500    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
8.041      .0576
      .0290    .23    1.09    2.67    .92    .013    .00    .00    PIPE
2556.484    1550.916    1.130    1552.046    28.40    13.17    2.69    1554.74    .00    1.82    2.49    2.500    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
6.333      .0576
      .0255    .16    1.13    2.49    .92    .013    .00    .00    PIPE
2562.816    1551.280    1.172    1552.452    28.40    12.56    2.45    1554.90    .00    1.82    2.50    2.500    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
5.087      .0576
      .0224    .11    1.17    2.33    .92    .013    .00    .00    PIPE
2567.904    1551.573    1.216    1552.789    28.40    11.98    2.23    1555.02    .00    1.82    2.50    2.500    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
4.111      .0576
      .0198    .08    1.22    2.17    .92    .013    .00    .00    PIPE
2572.015    1551.810    1.263    1553.073    28.40    11.42    2.02    1555.10    .00    1.82    2.50    2.500    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
3.387      .0576
      .0174    .06    1.26    2.02    .92    .013    .00    .00    PIPE
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WATER SURFACE PROFILE LISTING  
BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - ORANGE AVENUE SD HYDRAULICS  
3963ORANGELINE

Date:10- 5-2022 Time: 4:15:57

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2575.402	1552.005	1.311	1553.316	28.40	10.89	1.84	1555.16	.00	1.82	2.50	2.500	.000	.00	1 .0
2.754	.0576					.0153	.04	1.31	1.88	.92	.013	.00	.00	PIPE
2578.156	1552.163	1.362	1553.525	28.40	10.38	1.67	1555.20	.00	1.82	2.49	2.500	.000	.00	1 .0
2.228	.0576					.0135	.03	1.36	1.75	.92	.013	.00	.00	PIPE
2580.384	1552.291	1.416	1553.708	28.40	9.90	1.52	1555.23	.00	1.82	2.48	2.500	.000	.00	1 .0
1.782	.0576					.0120	.02	1.42	1.62	.92	.013	.00	.00	PIPE
2582.166	1552.394	1.473	1553.867	28.40	9.44	1.38	1555.25	.00	1.82	2.46	2.500	.000	.00	1 .0
1.398	.0576					.0106	.01	1.47	1.50	.92	.013	.00	.00	PIPE
2583.564	1552.474	1.533	1554.007	28.40	9.00	1.26	1555.26	.00	1.82	2.44	2.500	.000	.00	1 .0
1.043	.0576					.0094	.01	1.53	1.39	.92	.013	.00	.00	PIPE
2584.608	1552.534	1.597	1554.131	28.40	8.58	1.14	1555.27	.00	1.82	2.40	2.500	.000	.00	1 .0
.749	.0576					.0083	.01	1.60	1.29	.92	.013	.00	.00	PIPE
2585.357	1552.578	1.664	1554.242	28.40	8.18	1.04	1555.28	.00	1.82	2.36	2.500	.000	.00	1 .0
.427	.0576					.0074	.00	1.66	1.19	.92	.013	.00	.00	PIPE
2585.784	1552.602	1.737	1554.339	28.40	7.80	.94	1555.28	.00	1.82	2.30	2.500	.000	.00	1 .0
.136	.0576					.0066	.00	1.74	1.09	.92	.013	.00	.00	PIPE
2585.920	1552.610	1.817	1554.427	28.40	7.43	.86	1555.28	.00	1.82	2.23	2.500	.000	.00	1 .0
JUNCT STR	.0571							1.82	1.00		.013	.00	.00	PIPE



Program Package Serial Number: 1404

WATER SURFACE PROFILE LISTING

Date:10- 5-2022 Time: 4:15:57

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
 100 YEAR STORM EVENT - ORANGE AVENUE SD HYDRAULICS  
 3963ORANGELINE

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*****
Station  | Invert | Depth | Water | Q   | Vel  | Vel  | Energy | Super | Critical | Flow Top | Height/ | Base Wt |   | No Wth
          | Elev   | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev  | Depth   | Width   | Dia.-FT | or I.D. | ZL | Prs/Pip
          | - - - | - - - | - - - | - - - | - - - | - - - | - - -   | - - - | - - -   | - - -   | - - -   | - - -   | -  | -
L/Elem   | Ch Slope |         |         |         |         |         |         |         |         |         |         |         | ZR | Type Ch
*****   |         |         |         |         |         |         |         |         |         |         |         |         |    |        
          |         |         |         |         |         |         |         |         |         |         |         |         |    |        
2597.340 | 1553.260 | .010 | 1553.270 | .00 | .47 | .00 | 1553.27 | .00 | .01 | .32 | 2.500 | .000 | .00 | 1 .0
          | - - - | - - - | - - - | - - - | - - - | - - - | - - -   | - - - | - - -   | - - -   | - - -   | - - -   | -  | -
    
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WATER SURFACE PROFILE LISTING  
 BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
 100 YEAR STORM EVENT - LATERAL J-9-2 HYDRAULICS  
 3963LINEJ-9-2

Date:10- 5-2022 Time: 5:46:24

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*****
Station   Invert   Depth   Water   Q       Vel     Vel     Energy   Super   Critical   Flow Top   Height/   Base Wt   ZL   No Wth
          Elev    (FT)    Elev    (CFS)   (FPS)   Head   Grd.El.   Elev    Depth     Width     Dia.-FT  or I.D.  ZR   Prs/Pip
L/Elem   Ch Slope
*****   *****
101.750  1553.200  1.036  1554.236  28.40  17.29  4.64  1558.88  .00  1.84  2.00  2.000  .000  .00  1 .0
          -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
          5.300  .1087
          .0534  .28  1.04  3.36  .86  .013  .00  .00  PIPE
107.050  1553.776  1.066  1554.842  28.40  16.67  4.31  1559.16  .00  1.84  2.00  2.000  .000  .00  1 .0
          -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
          5.752  .1087
          .0478  .28  1.07  3.18  .86  .013  .00  .00  PIPE
112.802  1554.401  1.108  1555.510  28.40  15.89  3.92  1559.43  .00  1.84  1.99  2.000  .000  .00  1 .0
          -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
          4.701  .1087
          .0422  .20  1.11  2.95  .86  .013  .00  .00  PIPE
117.503  1554.913  1.152  1556.065  28.40  15.15  3.57  1559.63  .00  1.84  1.98  2.000  .000  .00  1 .0
          -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
          3.896  .1087
          .0373  .15  1.15  2.74  .86  .013  .00  .00  PIPE
121.399  1555.336  1.198  1556.534  28.40  14.45  3.24  1559.78  .00  1.84  1.96  2.000  .000  .00  1 .0
          -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
          3.246  .1087
          .0330  .11  1.20  2.54  .86  .013  .00  .00  PIPE
124.645  1555.689  1.247  1556.936  28.40  13.78  2.95  1559.88  .00  1.84  1.94  2.000  .000  .00  1 .0
          -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
          2.705  .1087
          .0293  .08  1.25  2.35  .86  .013  .00  .00  PIPE
127.350  1555.983  1.300  1557.283  28.40  13.14  2.68  1559.96  .00  1.84  1.91  2.000  .000  .00  1 .0
          -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
          2.268  .1087
          .0260  .06  1.30  2.17  .86  .013  .00  .00  PIPE
129.618  1556.230  1.356  1557.586  28.40  12.52  2.44  1560.02  .00  1.84  1.87  2.000  .000  .00  1 .0
          -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
          1.887  .1087
          .0232  .04  1.36  2.00  .86  .013  .00  .00  PIPE
131.504  1556.435  1.416  1557.851  28.40  11.94  2.21  1560.07  .00  1.84  1.82  2.000  .000  .00  1 .0
          -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|- -|-
          1.548  .1087
          .0207  .03  1.42  1.84  .86  .013  .00  .00  PIPE
    
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**BLACK CREEK - HARVILL AT WATER INDUSTRIAL**  
**100 YEAR STORM EVENT - HARVILL AVENUE SD HYDRAULICS**  
**3963HARVILLLINE**

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1001.440	1512.150	2.270	1514.420	6.60	3.73	.22	1514.64	.00	.99	.00	1.500	.000	.00	1 .0
142.840	.0050					.0039	.56	2.27	.00	1.10	.013	.00	.00	PIPE
1144.280	1512.860	2.124	1514.984	6.60	3.73	.22	1515.20	.00	.99	.00	1.500	.000	.00	1 .0
140.190	.0051					.0039	.55	.00	.00	1.09	.013	.00	.00	PIPE
1284.470	1513.570	1.981	1515.551	6.60	3.73	.22	1515.77	.00	.99	.00	1.500	.000	.00	1 .0
35.360	.0051					.0039	.14	.00	.00	1.09	.013	.00	.00	PIPE
1319.830	1513.749	1.972	1515.722	6.60	3.73	.22	1515.94	.00	.99	.00	1.500	.000	.00	1 .0
50.614	.0050					.0039	.20	1.97	.00	1.10	.013	.00	.00	PIPE
1370.444	1514.000	1.919	1515.919	6.60	3.73	.22	1516.14	.00	.99	.00	1.500	.000	.00	1 .0
HYDRAULIC JUMP														
1370.444	1514.000	.484	1514.484	6.60	13.38	2.78	1517.26	.00	.99	1.40	1.500	.000	.00	1 .0
1.966	.0050					.0804	.16	.48	3.98	1.10	.013	.00	.00	PIPE
1372.410	1514.010	.476	1514.486	6.60	13.71	2.92	1517.40	.00	.99	1.40	1.500	.000	.00	1 .0
10.153	.1001					.0786	.80	.48	4.11	.45	.013	.00	.00	PIPE
1382.563	1515.026	.490	1515.516	6.60	13.15	2.69	1518.20	.00	.99	1.41	1.500	.000	.00	1 .0
7.401	.1001					.0694	.51	.49	3.88	.45	.013	.00	.00	PIPE
1389.964	1515.767	.507	1516.274	6.60	12.54	2.44	1518.72	.00	.99	1.42	1.500	.000	.00	1 .0
5.189	.1001					.0608	.32	.51	3.63	.45	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING  
 BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
 100 YEAR STORM EVENT - HARVILL AVENUE SD HYDRAULICS  
 3963HARVILLLINE

Date:10-13-2022 Time:11:45: 9

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Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1395.153	1516.287	.525	1516.812	6.60	11.95	2.22	1519.03	.00	.99	1.43	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.905	.1001					.0533	.21	.53	3.39	.45	.013	.00	.00	PIPE
1399.058	1516.678	.544	1517.222	6.60	11.40	2.02	1519.24	.00	.99	1.44	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.080	.1001					.0467	.14	.54	3.17	.45	.013	.00	.00	PIPE
1402.139	1516.986	.563	1517.549	6.60	10.87	1.83	1519.38	.00	.99	1.45	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.465	.1001					.0410	.10	.56	2.96	.45	.013	.00	.00	PIPE
1404.604	1517.233	.584	1517.817	6.60	10.36	1.67	1519.48	.00	.99	1.46	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.036	.1001					.0360	.07	.58	2.77	.45	.013	.00	.00	PIPE
1406.640	1517.437	.605	1518.042	6.60	9.88	1.52	1519.56	.00	.99	1.47	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.690	.1001					.0316	.05	.61	2.58	.45	.013	.00	.00	PIPE
1408.329	1517.606	.627	1518.233	6.60	9.42	1.38	1519.61	.00	.99	1.48	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.413	.1001					.0277	.04	.63	2.41	.45	.013	.00	.00	PIPE
1409.742	1517.748	.650	1518.398	6.60	8.98	1.25	1519.65	.00	.99	1.49	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.187	.1001					.0244	.03	.65	2.25	.45	.013	.00	.00	PIPE
1410.929	1517.866	.674	1518.540	6.60	8.56	1.14	1519.68	.00	.99	1.49	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
.998	.1001					.0214	.02	.67	2.10	.45	.013	.00	.00	PIPE
1411.927	1517.966	.699	1518.665	6.60	8.17	1.04	1519.70	.00	.99	1.50	1.500	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
.826	.1001					.0188	.02	.70	1.96	.45	.013	.00	.00	PIPE

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T1 BLACK CREEK - HARVILL AT WATER INDUSTRIAL

0

T2 100 YEAR STORM EVENT - WATER STREET SD HYDRAULICS LINE H-10 along project frontage

T3 3963WATERLINE

SO	1466.3301511.900	1						1522.270			
R	1600.0001520.320	1		.013					.000	.000	0
R	2069.8901532.060	1		.013					.000	.000	1
JX	2074.5501532.180	1	2	.013	9.600			1532.580	-45.0		.000
R	2149.8801534.060	1		.013					.000	.000	0
JX	2154.5401534.180	1	3	.013	34.900			1534.720	-45.0		.000
R	2160.1501534.320	1		.013					.000	.000	0
SH	2160.1501534.320	1						1534.320			
CD	1	4	1	.000	3.000	.000	.000	.000	.00		
CD	2	4	1	.000	1.500	.000	.000	.000	.00		
CD	3	4	1	.000	2.500	.000	.000	.000	.00		
Q				0.001	.0						

**BLACK CREEK - HARVILL AT WATER INDUSTRIAL**  
**100 YEAR STORM EVENT - WATER STREET SD HYDRAULICS**  
**3963WATERLINE LINE H-10 along project frontage**

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1466.330	1511.900	10.370	1522.270	44.50	6.30	.62	1522.89	.00	2.17	.00	3.000	.000	.00	1 .0
116.250	.0630					.0045	.52	10.37	.00	1.06	.013	.00	.00	PIPE
1582.580	1519.223	3.561	1522.784	44.50	6.30	.62	1523.40	.00	2.17	.00	3.000	.000	.00	1 .0
HYDRAULIC JUMP														
1582.580	1519.223	1.260	1520.483	44.50	15.79	3.87	1524.36	.00	2.17	2.96	3.000	.000	.00	1 .0
.789	.0630					.0326	.03	1.26	2.85	1.06	.013	.00	.00	PIPE
1583.370	1519.272	1.264	1520.536	44.50	15.71	3.83	1524.37	.00	2.17	2.96	3.000	.000	.00	1 .0
9.249	.0630					.0304	.28	1.26	2.83	1.06	.013	.00	.00	PIPE
1592.618	1519.855	1.311	1521.166	44.50	14.98	3.49	1524.65	.00	2.17	2.98	3.000	.000	.00	1 .0
7.382	.0630					.0267	.20	1.31	2.64	1.06	.013	.00	.00	PIPE
1600.000	1520.320	1.360	1521.680	44.50	14.28	3.17	1524.85	.00	2.17	2.99	3.000	.000	.00	1 .0
167.767	.0250					.0250	4.19	1.36	2.46	1.36	.013	.00	.00	PIPE
1767.767	1524.512	1.360	1525.872	44.50	14.28	3.17	1529.04	.00	2.17	2.99	3.000	.000	.00	1 .0
157.897	.0250					.0237	3.74	1.36	2.46	1.36	.013	.00	.00	PIPE
1925.664	1528.457	1.403	1529.860	44.50	13.71	2.92	1532.78	.00	2.17	2.99	3.000	.000	.00	1 .0
53.915	.0250					.0210	1.13	1.40	2.32	1.36	.013	.00	.00	PIPE
1979.579	1529.804	1.456	1531.260	44.50	13.08	2.66	1533.92	.00	2.17	3.00	3.000	.000	.00	1 .0
28.831	.0250					.0185	.53	1.46	2.16	1.36	.013	.00	.00	PIPE





WATER SURFACE PROFILE LISTING  
BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - WATER STREET SD HYDRAULICS  
3963WATERLINE

Date: 1-30-2023 Time: 6: 7:25

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2069.890	1532.060	2.173	1534.233	44.50	8.12	1.02	1535.26	.00	2.17	2.68	3.000	.000	.00	1 .0
JUNCT STR	.0257					.0041	.02	2.17	1.00		.013	.00	.00	PIPE
2074.550	1532.180	2.812	1534.992	34.90	5.07	.40	1535.39	.00	1.92	1.45	3.000	.000	.00	1 .0
	.641 .0250					.0024	.00	2.81	.41	1.19	.013	.00	.00	PIPE
2075.191	1532.196	2.794	1534.990	34.90	5.09	.40	1535.39	.00	1.92	1.52	3.000	.000	.00	1 .0
HYDRAULIC JUMP														
2075.191	1532.196	1.280	1533.476	34.90	12.14	2.29	1535.76	.00	1.92	2.97	3.000	.000	.00	1 .0
	15.066 .0250					.0183	.28	1.28	2.17	1.19	.013	.00	.00	PIPE
2090.257	1532.572	1.309	1533.881	34.90	11.77	2.15	1536.03	.00	1.92	2.98	3.000	.000	.00	1 .0
	17.374 .0250					.0165	.29	1.31	2.08	1.19	.013	.00	.00	PIPE
2107.631	1533.006	1.358	1534.364	34.90	11.23	1.96	1536.32	.00	1.92	2.99	3.000	.000	.00	1 .0
	12.250 .0250					.0145	.18	1.36	1.94	1.19	.013	.00	.00	PIPE
2119.881	1533.312	1.408	1534.720	34.90	10.70	1.78	1536.50	.00	1.92	2.99	3.000	.000	.00	1 .0
	8.918 .0250					.0128	.11	1.41	1.81	1.19	.013	.00	.00	PIPE
2128.799	1533.534	1.461	1534.995	34.90	10.20	1.62	1536.61	.00	1.92	3.00	3.000	.000	.00	1 .0
	6.634 .0250					.0112	.07	1.46	1.68	1.19	.013	.00	.00	PIPE
2135.432	1533.700	1.517	1535.217	34.90	9.73	1.47	1536.69	.00	1.92	3.00	3.000	.000	.00	1 .0
	5.024 .0250					.0099	.05	1.52	1.57	1.19	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING  
BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - WATER STREET SD HYDRAULICS  
3963WATERLINE

Date: 1-30-2023 Time: 6: 7:25

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*****
Station      Invert      Depth      Water      Q      Vel      Vel      Energy      Super      Critical      Flow Top      Height/      Base Wt      ZL      No Wth
      Elev      (FT)      Elev      (CFS)      (FPS)      Head      Grd.El.      Elev      Depth      Width      Dia.-FT      or I.D.      ZR      Prs/Pip
L/Elem      Ch Slope
*****      *****
2140.456    1533.825    1.575    1535.400    34.90    9.28    1.34    1536.74    .00    1.92    3.00    3.000    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
      3.666    .0250
2144.122    1533.916    1.637    1535.553    34.90    8.85    1.21    1536.77    .00    1.92    2.99    3.000    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
      2.692    .0250
2146.814    1533.984    1.701    1535.685    34.90    8.43    1.10    1536.79    .00    1.92    2.97    3.000    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
      1.730    .0250
2148.544    1534.027    1.770    1535.797    34.90    8.04    1.00    1536.80    .00    1.92    2.95    3.000    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
      1.018    .0250
2149.562    1534.052    1.842    1535.894    34.90    7.67    .91    1536.81    .00    1.92    2.92    3.000    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
      .318    .0250
2149.880    1534.060    1.920    1535.980    34.90    7.31    .83    1536.81    .00    1.92    2.88    3.000    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
JUNCT STR    .0257
2154.540    1534.180    .008    1534.188    .00    .57    .01    1534.19    .00    .01    .32    3.000    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
      4.521    .0249
2159.062    1534.293    .008    1534.301    .00    .57    .01    1534.31    .00    .01    .32    3.000    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
      1.036    .0249
2160.098    1534.319    .008    1534.327    .00    .56    .00    1534.33    .00    .01    .31    3.000    .000    .00    1    .0
      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -
      .052    .0249
      .0186    .00    .01    1.31    .01    .013    .00    .00    PIPE

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Program Package Serial Number: 1404

WATER SURFACE PROFILE LISTING

Date: 1-30-2023 Time: 6: 7:25

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
 100 YEAR STORM EVENT - WATER STREET SD HYDRAULICS  
 3963WATERLINE

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*****
Station  | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt |   | No Wth
          | Elev   | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev  | Depth   | Width   | Dia.-FT | or I.D. | ZL | Prs/Pip
          | - - - | - - - | - - - | - - - | - - - | - - - | - - -  | - - - | - - -  | - - -  | - - -  | - - -  | -  | -
L/Elem   | Ch Slope |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
*****   |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
2160.150 | 1534.320 | .010 | 1534.330 | .00 | .46 | .00 | 1534.33 | .00 | .01 | .34 | 3.000 | .000 | .00 | 1 | .0
          | - - - | - - - | - - - | - - - | - - - | - - - | - - -  | - - - | - - -  | - - -  | - - -  | - - -  | -  | -
    
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**BLACK CREEK - HARVILL AT WATER INDUSTRIAL**  
**100 YEAR STORM EVENT - LATERAL H-10.4 HYDRAULICS**  
**3963LATH-10.4**

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*****
Station | Invert | Depth | Water | Q | Vel | Vel | Energy | Super | Critical | Flow Top | Height/ | Base Wt | | No Wth
      | Elev   | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev  | Depth   | Width   | Dia.-FT | or I.D. | ZL | Prs/Pip
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-----
L/Elem | Ch Slope | | | | | | | | | | | | | | |
***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | ***** | *****
106.000 | 1512.140 | 10.430 | 1522.570 | .00 | .00 | .00 | 1522.57 | .00 | .01 | .00 | 1.500 | .000 | .00 | 1 .0
      | | | | | | | | | | | | | | | |
33.500 | .2478 | | | | | | | | | | | | | | | |
      | | | | | | | | | | | | | | | |
139.500 | 1520.440 | 2.130 | 1522.570 | .00 | .00 | .00 | 1522.57 | .00 | .01 | .00 | 1.500 | .000 | .00 | 1 .0
      | | | | | | | | | | | | | | | |
    
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T1 BLACK CREEK - HARVILL AT WATER INDUSTRIAL

0

T2 100 YEAR STORM EVENT - LATERAL H-10.5 HYDRAULICS

T3 3963LATH-10.5

SO 106.0001512.140 1 1522.570

R 136.7601518.720 1 .013 .000 .000 0

SH 136.7601518.720 1 1518.720

CD 1 4 1 .000 1.500 .000 .000 .000 .00

Q 2.800 .0

WATER SURFACE PROFILE LISTING

Date: 1-30-2023 Time: 3:36: 7

**BLACK CREEK - HARVILL AT WATER INDUSTRIAL**  
**100 YEAR STORM EVENT - LATERAL H-10.5 HYDRAULICS**  
**3963LATH-10.5**

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*****
Station  | Invert | Depth | Water | Q   | Vel  | Vel  | Energy | Super | Critical | Flow Top | Height/ | Base Wt |   | No Wth
          | Elev   | (FT)  | Elev  | (CFS) | (FPS) | Head | Grd.El. | Elev  | Depth   | Width   | Dia.-FT | or I.D. | ZL | Prs/Pip
-----  |-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-----
L/Elem   | Ch Slope |          |          |          |          |          |          |          |          |          |          |          | ZR | Type Ch
*****   |*****   |*****   |*****   |*****   |*****   |*****   |*****   |*****   |*****   |*****   |*****   |*****   |****|*****
106.000  | 1512.140 | 10.430 | 1522.570 | 2.80 | 1.58 | .04 | 1522.61 | .00 | .64 | .00 | 1.500 | .000 | .00 | 1 .0
          | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
30.760   | .2139 |          |          |          |          | .0007 | .02 | 10.43 | .00 | .24 | .013 | .00 | .00 | PIPE
          | | | | | | | | | | | | | | | |
136.760  | 1518.720 | 3.872 | 1522.592 | 2.80 | 1.58 | .04 | 1522.63 | .00 | .64 | .00 | 1.500 | .000 | .00 | 1 .0
          | - | - | - | - | - | - | - | - | - | - | - | - | - | - | -
    
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WATER SURFACE PROFILE LISTING

Date: 1-30-2023 Time: 4:23: 2

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - LATERAL H-10.7 HYDRAULICS  
3963LINEH-10.7

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
101.730	1534.720	1.243	1535.963	34.90	14.33	3.19	1539.15	.00	2.01	2.50	2.500	.000	.00	1 .0
3.019	.0718					.0286	.09	1.24	2.56	.97	.013	.00	.00	PIPE
104.749	1534.937	1.267	1536.204	34.90	13.97	3.03	1539.23	.00	2.01	2.50	2.500	.000	.00	1 .0
4.942	.0718					.0260	.13	1.27	2.46	.97	.013	.00	.00	PIPE
109.690	1535.291	1.316	1536.607	34.90	13.32	2.75	1539.36	.00	2.01	2.50	2.500	.000	.00	1 .0
4.078	.0718					.0229	.09	1.32	2.29	.97	.013	.00	.00	PIPE
113.768	1535.584	1.367	1536.951	34.90	12.70	2.50	1539.45	.00	2.01	2.49	2.500	.000	.00	1 .0
3.347	.0718					.0202	.07	1.37	2.13	.97	.013	.00	.00	PIPE
117.115	1535.824	1.422	1537.246	34.90	12.11	2.28	1539.52	.00	2.01	2.48	2.500	.000	.00	1 .0
2.780	.0718					.0178	.05	1.42	1.98	.97	.013	.00	.00	PIPE
119.895	1536.023	1.479	1537.503	34.90	11.54	2.07	1539.57	.00	2.01	2.46	2.500	.000	.00	1 .0
2.288	.0718					.0158	.04	1.48	1.83	.97	.013	.00	.00	PIPE
122.183	1536.188	1.539	1537.727	34.90	11.00	1.88	1539.61	.00	2.01	2.43	2.500	.000	.00	1 .0
1.851	.0718					.0140	.03	1.54	1.70	.97	.013	.00	.00	PIPE
124.034	1536.320	1.603	1537.924	34.90	10.49	1.71	1539.63	.00	2.01	2.40	2.500	.000	.00	1 .0
1.473	.0718					.0124	.02	1.60	1.57	.97	.013	.00	.00	PIPE
125.507	1536.426	1.671	1538.097	34.90	10.00	1.55	1539.65	.00	2.01	2.35	2.500	.000	.00	1 .0
1.108	.0718					.0110	.01	1.67	1.45	.97	.013	.00	.00	PIPE



**FLOOD CONTROL MDP LINE H-10 IN  
HARVILL AVE  
FROM WATER ST TO  
PLACENTIA AVE**

T1 BLACK CREEK - HARVILL AT WATER INDUSTRIAL

0

T2 100 YEAR STORM EVENT - HARVILL AVENUE SD HYDRAULICS

T3 LINE H-10 RATIONAL Q

SO	106.380	1491.720	1					1493.000			
R	109.970	1491.770	1		.013				.000	.000	0
JX	113.390	1491.798	1	2	.013	28.300		1492.480	45.0		.000
R	322.660	1494.700	1		.013				.000	.000	0
JX	327.330	1495.260	1	2	.013	44.700		1496.610	90.0		.000
R	1384.460	1509.870	1		.013				.000	.000	2
R	1454.370	1510.860	1		.013				90.000	.000	0
R	1457.670	1510.880	1		.013				.000	.000	0
SH	1457.670	1510.880	1					1510.880			
CD	1	4	1		.000	4.000	.000	.000	.000	.00	
CD	2	4	1		.000	3.000	.000	.000	.000	.00	
Q		167.100			.0						









T1 BLACK CREEK - HARVILL AT WATER INDUSTRIAL

0

T2 100 YEAR STORM EVENT - HARVILL AVENUE SD HYDRAULICS

T3 LINE H-10 MDP Q

SO	106.3801491.720	1						1493.000			
R	109.9701491.770	1		.013					.000	.000	0
JX	113.3901491.798	1	2	.013	17.700			1492.480	45.0		.000
R	322.6601494.700	1		.013					.000	.000	0
JX	327.3301495.260	1	2	.013	26.300			1496.610	90.0		.000
R	1384.4601509.870	1		.013					.000	.000	2
R	1454.3701510.860	1		.013					90.000	.000	0
R	1457.6701510.880	1		.013					.000	.000	0
SH	1457.6701510.880	1						1510.880			
CD	1	4	1	.000	4.000	.000	.000	.000	.00		
CD	2	4	1	.000	3.000	.000	.000	.000	.00		
Q	146.000			.0							

WATER SURFACE PROFILE LISTING  
 BLACK CREEK - HARVILL AT WATER INDUSTRIAL **LINE H-10 MDP Q**  
 100 YEAR STORM EVENT - HARVILL AVENUE SD HYDRAULICS  
 FOR RIVERSIDE COUNTY FLOOD CONTROL

Date: 1-16-2023 Time: 6: 5:24

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
106.380	1491.720	3.814	1495.534	190.00	15.38	3.67	1499.21	.00	3.81	1.68	4.000	.000	.00	1 .0
	3.590	.0139				.0153	.05	3.81	1.00	4.00	.013	.00	.00	PIPE
109.970	1491.770	3.870	1495.640	190.00	15.27	3.62	1499.26	.00	3.81	1.42	4.000	.000	.00	1 .0
JUNCT STR	.0140					.0149	.03	3.87	.91		.013	.00	.00	PIPE
111.970	1491.798	5.132	1496.930	172.30	13.71	2.92	1499.85	.00	3.74	.00	4.000	.000	.00	1 .0
210.690	.0138					.0144	3.03	5.13	.00	3.36	.013	.00	.00	PIPE
322.660	1494.700	5.262	1499.962	172.30	13.71	2.92	1502.88	.00	3.74	.00	4.000	.000	.00	1 .0
JUNCT STR	.1199					.0124	.06	5.26	.00		.013	.00	.00	PIPE
327.330	1495.260	6.406	1501.666	146.00	11.62	2.10	1503.76	.00	3.56	.00	4.000	.000	.00	1 .0
656.912	.0138					.0103	6.79	6.41	.00	2.87	.013	.00	.00	PIPE
984.242	1504.339	4.243	1508.582	146.00	11.62	2.10	1510.68	.00	3.56	.00	4.000	.000	.00	1 .0
HYDRAULIC JUMP														
984.242	1504.339	2.871	1507.210	146.00	15.12	3.55	1510.76	.00	3.56	3.60	4.000	.000	.00	1 .0
	.533	.0138				.0138	.01	2.87	1.63	2.87	.013	.00	.00	PIPE
984.774	1504.346	2.871	1507.217	146.00	15.12	3.55	1510.77	.00	3.56	3.60	4.000	.000	.00	1 .0
270.149	.0138					.0135	3.65	2.87	1.63	2.87	.013	.00	.00	PIPE
1254.923	1508.080	2.926	1511.006	146.00	14.82	3.41	1514.42	.00	3.56	3.55	4.000	.000	.00	1 .0
129.537	.0138					.0125	1.62	2.93	1.57	2.87	.013	.00	.00	PIPE



T1 BLACK CREEK - HARVILL AT WATER INDUSTRIAL LAT. H-10.2

0

T2 100 YEAR STORM EVENT - HARVILL AVENUE SD HYDRAULICS

T3 FOR RIVERSIDE COUNTY FLOOD CONTROL

SO	4.8101493.300	1							1498.150			
R	13.3901495.570	1		.013						10.937	.000	0
R	60.0001501.430	1		.013						.000	.000	0
SH	60.0001501.430	1							1501.430			
CD	1	4	1	.000	3.000	.000	.000	.000	.00			
Q				28.300	.0							

WATER SURFACE PROFILE LISTING

Date: 3-20-2023 Time: 1:20:39

BLACK CREEK - HARVILL AT WATER INDUSTRIAL LAT. H-10.2  
 100 YEAR STORM EVENT - HARVILL AVENUE SD HYDRAULICS  
 FOR RIVERSIDE COUNTY FLOOD CONTROL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
4.810	1493.300	4.850	1498.150	28.30	4.00	.25	1498.40	.00	1.72	.00	3.000	.000	.00	1 .0
5.042	.2646					.0018	.01	.00	.00	.58	.013	.00	.00	PIPE
9.852	1494.634	3.535	1498.169	28.30	4.00	.25	1498.42	.00	1.72	.00	3.000	.000	.00	1 .0
HYDRAULIC JUMP														
9.852	1494.634	.765	1495.398	28.30	19.93	6.17	1501.57	.72	1.72	2.61	3.000	.000	.00	1 .0
.731	.2646					.0871	.06	1.48	4.77	.58	.013	.00	.00	PIPE
10.583	1494.827	.772	1495.599	28.30	19.65	5.99	1501.59	.70	1.72	2.62	3.000	.000	.00	1 .0
2.807	.2646					.0800	.22	1.47	4.67	.58	.013	.00	.00	PIPE
13.390	1495.570	.799	1496.369	28.30	18.73	5.45	1501.82	.00	1.72	2.65	3.000	.000	.00	1 .0
3.681	.1257					.0727	.27	.80	4.37	.70	.013	.00	.00	PIPE
17.071	1496.033	.810	1496.843	28.30	18.37	5.24	1502.08	.00	1.72	2.66	3.000	.000	.00	1 .0
7.531	.1257					.0662	.50	.81	4.26	.70	.013	.00	.00	PIPE
24.602	1496.979	.838	1497.818	28.30	17.51	4.76	1502.58	.00	1.72	2.69	3.000	.000	.00	1 .0
5.958	.1257					.0579	.35	.84	3.98	.70	.013	.00	.00	PIPE
30.560	1497.729	.867	1498.596	28.30	16.70	4.33	1502.92	.00	1.72	2.72	3.000	.000	.00	1 .0
4.845	.1257					.0507	.25	.87	3.73	.70	.013	.00	.00	PIPE
35.405	1498.338	.897	1499.235	28.30	15.92	3.93	1503.17	.00	1.72	2.75	3.000	.000	.00	1 .0
4.005	.1257					.0444	.18	.90	3.49	.70	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING  
BLACK CREEK - HARVILL AT WATER INDUSTRIAL LAT. H-10.2  
100 YEAR STORM EVENT - HARVILL AVENUE SD HYDRAULICS  
FOR RIVERSIDE COUNTY FLOOD CONTROL

Date: 3-20-2023 Time: 1:20:39

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Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
39.410	1498.841	.929	1499.770	28.30	15.18	3.58	1503.35	.00	1.72	2.77	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.376	.1257					.0389	.13	.93	3.26	.70	.013	.00	.00	PIPE
42.786	1499.266	.961	1500.227	28.30	14.47	3.25	1503.48	.00	1.72	2.80	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.854	.1257					.0340	.10	.96	3.05	.70	.013	.00	.00	PIPE
45.640	1499.624	.995	1500.620	28.30	13.80	2.96	1503.58	.00	1.72	2.82	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.427	.1257					.0298	.07	1.00	2.85	.70	.013	.00	.00	PIPE
48.067	1499.930	1.031	1500.961	28.30	13.16	2.69	1503.65	.00	1.72	2.85	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.092	.1257					.0261	.05	1.03	2.67	.70	.013	.00	.00	PIPE
50.159	1500.193	1.067	1501.260	28.30	12.54	2.44	1503.70	.00	1.72	2.87	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.781	.1257					.0229	.04	1.07	2.49	.70	.013	.00	.00	PIPE
51.940	1500.417	1.106	1501.523	28.30	11.96	2.22	1503.74	.00	1.72	2.89	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.542	.1257					.0201	.03	1.11	2.33	.70	.013	.00	.00	PIPE
53.482	1500.611	1.145	1501.756	28.30	11.40	2.02	1503.77	.00	1.72	2.91	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.310	.1257					.0176	.02	1.15	2.18	.70	.013	.00	.00	PIPE
54.792	1500.775	1.187	1501.962	28.30	10.87	1.84	1503.80	.00	1.72	2.93	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.124	.1257					.0155	.02	1.19	2.03	.70	.013	.00	.00	PIPE
55.916	1500.917	1.230	1502.147	28.30	10.37	1.67	1503.82	.00	1.72	2.95	3.000	.000	.00	1 .0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
.952	.1257					.0136	.01	1.23	1.90	.70	.013	.00	.00	PIPE









Program Package Serial Number: 1404

WATER SURFACE PROFILE LISTING

Date: 3-20-2023 Time: 1:21:46

BLACK CREEK - HARVILL AT WATER INDUSTRIAL LAT. H-10.2 MDP Q

100 YEAR STORM EVENT - HARVILL AVENUE SD HYDRAULICS

FOR RIVERSIDE COUNTY FLOOD CONTROL

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*****
Station  Invert  Depth  Water  Q      Vel    Vel    Energy  Super  Critical  Flow Top  Height/  Base Wt  ZL  No Wth
          Elev    (FT)   Elev   (CFS)  (FPS)  Head   Grd.El. Elev   Depth  Width  Dia.-FT  or I.D.  ZR  Prs/Pip
L/Elem   Ch Slope
*****   *****
35.219  1498.314  .672  1498.986  17.70  14.95  3.47  1502.46  .00  1.35  2.50  3.000  .000  .00  1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
          4.099  .1257          .0544  .22  .67  3.83  .56  .013  .00  .00  PIPE
39.318  1498.830  .695  1499.525  17.70  14.25  3.16  1502.68  .00  1.35  2.53  3.000  .000  .00  1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
          3.361  .1257          .0475  .16  .70  3.59  .56  .013  .00  .00  PIPE
42.679  1499.252  .719  1499.971  17.70  13.59  2.87  1502.84  .00  1.35  2.56  3.000  .000  .00  1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
          2.813  .1257          .0416  .12  .72  3.36  .56  .013  .00  .00  PIPE
45.492  1499.606  .743  1500.349  17.70  12.96  2.61  1502.96  .00  1.35  2.59  3.000  .000  .00  1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
          2.361  .1257          .0363  .09  .74  3.14  .56  .013  .00  .00  PIPE
47.853  1499.903  .769  1500.672  17.70  12.36  2.37  1503.04  .00  1.35  2.62  3.000  .000  .00  1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
          2.017  .1257          .0318  .06  .77  2.94  .56  .013  .00  .00  PIPE
49.870  1500.156  .795  1500.951  17.70  11.78  2.16  1503.11  .00  1.35  2.65  3.000  .000  .00  1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
          1.715  .1257          .0278  .05  .80  2.76  .56  .013  .00  .00  PIPE
51.585  1500.372  .823  1501.195  17.70  11.23  1.96  1503.15  .00  1.35  2.68  3.000  .000  .00  1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
          1.471  .1257          .0243  .04  .82  2.58  .56  .013  .00  .00  PIPE
53.055  1500.557  .852  1501.409  17.70  10.71  1.78  1503.19  .00  1.35  2.71  3.000  .000  .00  1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
          1.273  .1257          .0213  .03  .85  2.41  .56  .013  .00  .00  PIPE
54.328  1500.717  .881  1501.598  17.70  10.21  1.62  1503.22  .00  1.35  2.73  3.000  .000  .00  1 .0
          -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-    -|-
          1.085  .1257          .0186  .02  .88  2.26  .56  .013  .00  .00  PIPE
*****

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Program Package Serial Number: 1404

WATER SURFACE PROFILE LISTING

Date: 3-20-2023 Time: 1:21:46

BLACK CREEK - HARVILL AT WATER INDUSTRIAL LAT. H-10.2 MDP Q

100 YEAR STORM EVENT - HARVILL AVENUE SD HYDRAULICS

FOR RIVERSIDE COUNTY FLOOD CONTROL

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*****
Station  Invert  Depth  Water  Q      Vel    Vel    Energy  Super  Critical  Flow Top  Height/  Base Wt  ZL  No Wth
          Elev   (FT)   Elev   (CFS)  (FPS)  Head   Grd.El.  Elev   Depth  Froude N  Width  Dia.-FT  or I.D.  ZR  Prs/Pip
L/Elem  Ch Slope
*****  *****
55.413  1500.853  .912  1501.766  17.70  9.74  1.47  1503.24  .00  1.35  2.76  3.000  .000  .00  1 .0
          .931  .1257
          .0163  .02  .91  2.11  .56  .013  .00  .00  PIPE
56.344  1500.970  .944  1501.914  17.70  9.28  1.34  1503.25  .00  1.35  2.79  3.000  .000  .00  1 .0
          .796  .1257
          .0143  .01  .94  1.98  .56  .013  .00  .00  PIPE
57.139  1501.070  .977  1502.047  17.70  8.85  1.22  1503.26  .00  1.35  2.81  3.000  .000  .00  1 .0
          .668  .1257
          .0125  .01  .98  1.85  .56  .013  .00  .00  PIPE
57.807  1501.154  1.012  1502.166  17.70  8.44  1.11  1503.27  .00  1.35  2.84  3.000  .000  .00  1 .0
          .562  .1257
          .0110  .01  1.01  1.73  .56  .013  .00  .00  PIPE
58.369  1501.225  1.048  1502.273  17.70  8.05  1.01  1503.28  .00  1.35  2.86  3.000  .000  .00  1 .0
          .468  .1257
          .0096  .00  1.05  1.62  .56  .013  .00  .00  PIPE
58.838  1501.284  1.085  1502.369  17.70  7.67  .91  1503.28  .00  1.35  2.88  3.000  .000  .00  1 .0
          .376  .1257
          .0084  .00  1.09  1.51  .56  .013  .00  .00  PIPE
59.213  1501.331  1.124  1502.455  17.70  7.31  .83  1503.29  .00  1.35  2.90  3.000  .000  .00  1 .0
          .292  .1257
          .0074  .00  1.12  1.41  .56  .013  .00  .00  PIPE
59.505  1501.368  1.165  1502.533  17.70  6.97  .76  1503.29  .00  1.35  2.92  3.000  .000  .00  1 .0
          .224  .1257
          .0065  .00  1.17  1.32  .56  .013  .00  .00  PIPE
59.729  1501.396  1.207  1502.603  17.70  6.65  .69  1503.29  .00  1.35  2.94  3.000  .000  .00  1 .0
          .153  .1257
          .0057  .00  1.21  1.23  .56  .013  .00  .00  PIPE
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Program Package Serial Number: 1404

WATER SURFACE PROFILE LISTING

Date: 3-20-2023 Time: 1:21:46

BLACK CREEK - HARVILL AT WATER INDUSTRIAL LAT. H-10.2 MDP Q

100 YEAR STORM EVENT - HARVILL AVENUE SD HYDRAULICS

FOR RIVERSIDE COUNTY FLOOD CONTROL

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*****
Station  Invert  Depth  Water  Q      Vel   Vel   Energy  Super  Critical  Flow Top  Height/  Base Wt  ZL  No Wth
          Elev   (FT)   Elev   (CFS) (FPS) Head  Grd.El. Elev  Depth  Width  Dia.-FT or I.D.  ZL  Prs/Pip
L/Elem  Ch Slope
*****  *****
59.882  1501.415  1.251  1502.666  17.70  6.34  .62  1503.29  .00  1.35  2.96  3.000  .000  .00  1  .0
          -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-
          .089  .1257
          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
59.971  1501.427  1.297  1502.724  17.70  6.05  .57  1503.29  .00  1.35  2.97  3.000  .000  .00  1  .0
          -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-
          .029  .1257
          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
60.000  1501.430  1.346  1502.776  17.70  5.76  .51  1503.29  .00  1.35  2.98  3.000  .000  .00  1  .0
          -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-  -|-
          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
*****
    
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T1 BLACK CREEK - HARVILL AT WATER INDUSTRIAL **LAT. H-10.3 MDP Q** 0  
 T2 100 YEAR STORM EVENT - HARVILL AVENUE SD HYDRAULICS  
 T3 FOR RIVERSIDE COUNTY FLOOD CONTROL  
 SO 3.2201495.760 1 1501.650  
 R 13.3901497.140 1 .013 .000 .000 0  
 R 34.1801503.500 1 .013 .000 .000 0  
 SH 34.1801503.500 1 1503.500  
 CD 1 4 1 .000 3.000 .000 .000 .000 .00  
 Q 26.300 .0



Program Package Serial Number: 1404

WATER SURFACE PROFILE LISTING

Date: 1-16-2023 Time: 6:22:28

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - HARVILL AVENUE SD HYDRAULICS  
FOR RIVERSIDE COUNTY FLOOD CONTROL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
27.209	1501.368	.898	1502.266	26.30	14.79	3.40	1505.66	.00	1.66	2.75	3.000	.000	.00	1 .0
1.038	.3059					.0383	.04	.90	3.24	.54	.013	.00	.00	PIPE
28.246	1501.685	.929	1502.614	26.30	14.10	3.09	1505.70	.00	1.66	2.77	3.000	.000	.00	1 .0
.909	.3059					.0335	.03	.93	3.03	.54	.013	.00	.00	PIPE
29.156	1501.963	.962	1502.925	26.30	13.44	2.81	1505.73	.00	1.66	2.80	3.000	.000	.00	1 .0
.800	.3059					.0294	.02	.96	2.83	.54	.013	.00	.00	PIPE
29.955	1502.208	.996	1503.204	26.30	12.82	2.55	1505.75	.00	1.66	2.83	3.000	.000	.00	1 .0
.703	.3059					.0257	.02	1.00	2.65	.54	.013	.00	.00	PIPE
30.658	1502.423	1.031	1503.454	26.30	12.22	2.32	1505.77	.00	1.66	2.85	3.000	.000	.00	1 .0
.613	.3059					.0226	.01	1.03	2.48	.54	.013	.00	.00	PIPE
31.271	1502.610	1.068	1503.678	26.30	11.65	2.11	1505.79	.00	1.66	2.87	3.000	.000	.00	1 .0
.537	.3059					.0198	.01	1.07	2.32	.54	.013	.00	.00	PIPE
31.809	1502.775	1.106	1503.881	26.30	11.11	1.92	1505.80	.00	1.66	2.89	3.000	.000	.00	1 .0
.465	.3059					.0173	.01	1.11	2.17	.54	.013	.00	.00	PIPE
32.274	1502.917	1.146	1504.063	26.30	10.59	1.74	1505.81	.00	1.66	2.92	3.000	.000	.00	1 .0
.404	.3059					.0152	.01	1.15	2.02	.54	.013	.00	.00	PIPE
32.678	1503.040	1.187	1504.228	26.30	10.10	1.58	1505.81	.00	1.66	2.93	3.000	.000	.00	1 .0
.345	.3059					.0133	.00	1.19	1.89	.54	.013	.00	.00	PIPE



Program Package Serial Number: 1404

WATER SURFACE PROFILE LISTING

Date: 1-16-2023 Time: 6:22:28

BLACK CREEK - HARVILL AT WATER INDUSTRIAL  
100 YEAR STORM EVENT - HARVILL AVENUE SD HYDRAULICS  
FOR RIVERSIDE COUNTY FLOOD CONTROL

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
33.023	1503.146	1.230	1504.376	26.30	9.63	1.44	1505.82	.00	1.66	2.95	3.000	.000	.00	1 .0
	.292	.3059				.0117	.00	1.23	1.76	.54	.013	.00	.00	PIPE
33.315	1503.235	1.275	1504.510	26.30	9.18	1.31	1505.82	.00	1.66	2.97	3.000	.000	.00	1 .0
	.244	.3059				.0103	.00	1.28	1.65	.54	.013	.00	.00	PIPE
33.558	1503.310	1.322	1504.632	26.30	8.75	1.19	1505.82	.00	1.66	2.98	3.000	.000	.00	1 .0
	.199	.3059				.0090	.00	1.32	1.54	.54	.013	.00	.00	PIPE
33.758	1503.371	1.371	1504.742	26.30	8.35	1.08	1505.82	.00	1.66	2.99	3.000	.000	.00	1 .0
	.156	.3059				.0080	.00	1.37	1.43	.54	.013	.00	.00	PIPE
33.913	1503.418	1.423	1504.842	26.30	7.96	.98	1505.83	.00	1.66	3.00	3.000	.000	.00	1 .0
	.118	.3059				.0070	.00	1.42	1.34	.54	.013	.00	.00	PIPE
34.032	1503.455	1.477	1504.932	26.30	7.59	.89	1505.83	.00	1.66	3.00	3.000	.000	.00	1 .0
	.084	.3059				.0062	.00	1.48	1.24	.54	.013	.00	.00	PIPE
34.116	1503.480	1.533	1505.014	26.30	7.24	.81	1505.83	.00	1.66	3.00	3.000	.000	.00	1 .0
	.050	.3059				.0054	.00	1.53	1.16	.54	.013	.00	.00	PIPE
34.166	1503.496	1.592	1505.088	26.30	6.90	.74	1505.83	.00	1.66	2.99	3.000	.000	.00	1 .0
	.014	.3059				.0048	.00	1.59	1.08	.54	.013	.00	.00	PIPE
34.180	1503.500	1.656	1505.156	26.30	6.57	.67	1505.83	.00	1.66	2.98	3.000	.000	.00	1 .0

Appendix F  
Catch Basin Sizing and Street Capacity Calculations

## CATCH BASIN SIZING

Orifice Not Used	
h= 0.5 C= 3.3	h= 2 C= 0.8
Weir Control Equation, $Q = CP h^{1.5}$ $L=Q/(C*h^{1.5})$	Orifice Control Equation = $CA*(2gh)^{1/2}$ $L=((Q^2)/(C2*h^3*2*g))^{0.5}$
g= 32.2	

		Weir		Not Used Orifice	
Catch Basin	Area (ac)	Approx Flow Q	Length of opening P=L	Outlet Box, L	USE <sup>2</sup>
CB#1		3.50	3.0		1 - 3'X2' Grate
CB#2		6.30	5.4		2 - 3'X2' Grate
CB#3					
CB#4		4.20	3.6		1 - 3'X2' Grate
CB#5		4.00	3.4		1 - 3'X2' Grate
CB#6		4.30	3.7		1 - 3'X2' Grate
CB#7		7.30	6.3		2 - 3'X2' Grate
CB#8					
CB#9		4.30	3.7		1 - 3'X2' Grate

1. SEE SEPARATE CB CALCS ON NEXT PAGES.
2. CATCH BASINS ARE LARGER THAN REQUIRED TO ACCOUNT FOR CLOGGING.

Catch Basin 3

\*\*\*\*\*

>>>>SUMP TYPE BASIN INPUT INFORMATION<<<<

-----

Curb Inlet Capacities are approximated based on the Bureau of Public Roads nomograph plots for flowby basins and sump basins.

BASIN INFLOW(CFS) = 0.50

BASIN OPENING(FEET) = 0.33

DEPTH OF WATER(FEET) = 0.50

>>>>CALCULATED ESTIMATED SUMP BASIN WIDTH(FEET) = 0.54

>>>>PROPOSED SUMP BASIN WIDTH(FEET) = 3.5 (USE 5' MIN CB)

=====

Catch Basin 8

\*\*\*\*\*

>>>>SUMP TYPE BASIN INPUT INFORMATION<<<<

-----

Curb Inlet Capacities are approximated based on the Bureau of Public Roads nomograph plots for flowby basins and sump basins.

BASIN INFLOW(CFS) = 2.40

BASIN OPENING(FEET) = 0.33

DEPTH OF WATER(FEET) = 0.50

>>>>CALCULATED ESTIMATED SUMP BASIN WIDTH(FEET) = 2.60

>>>>PROPOSED SUMP BASIN WIDTH(FEET) = 3.5 (USE 5' MIN CB)

=====

## WATER STREET CATCH BASIN

\*\*\*\*\*

>>>>SUMP TYPE BASIN INPUT INFORMATION<<<<

-----

Curb Inlet Capacities are approximated based on the Bureau of  
Public Roads nomograph plots for flowby basins and sump basins.

BASIN INFLOW(CFS) = 30.00 REPRESENTS CAPACITY OF CB, BUT ACTUAL  
FLOW IS 2.8 CFS IN THE INTERIM

BASIN OPENING(FEET) = 0.67

DEPTH OF WATER(FEET) = 0.83 10" =6" TC + 4" Local Depression

>>>>CALCULATED ESTIMATED SUMP BASIN WIDTH(FEET) = 13.98

=====

# Concrete Spillway for Overflow Emergency Escape

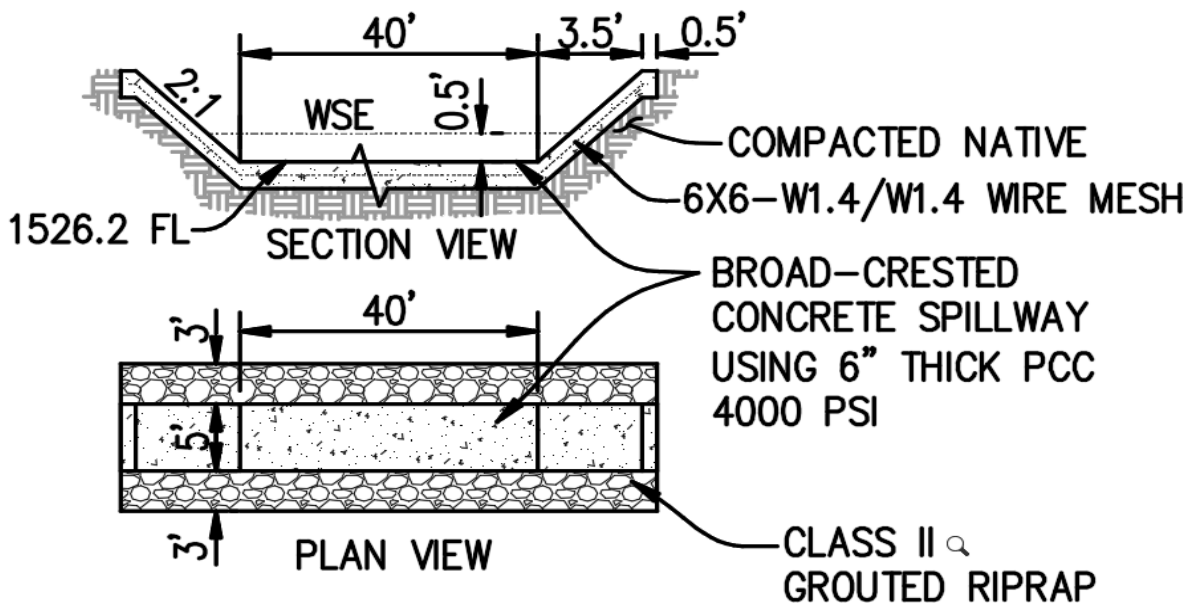
Weir Calculations

$$Q = CLH^{3/2}$$

$$L = Q / C H^{3/2} \quad L = 38.56 \quad \text{Use } L = 40'$$

where:

$Q$	=	40.9	100yr - Flow discharge (cfs)
$C$	=	3	Broad-crested weir coefficient
$L$	=	-	Length of spillway (ft)
$H$	=	0.5	Head over spillway flowline for spillway discharge (ft)



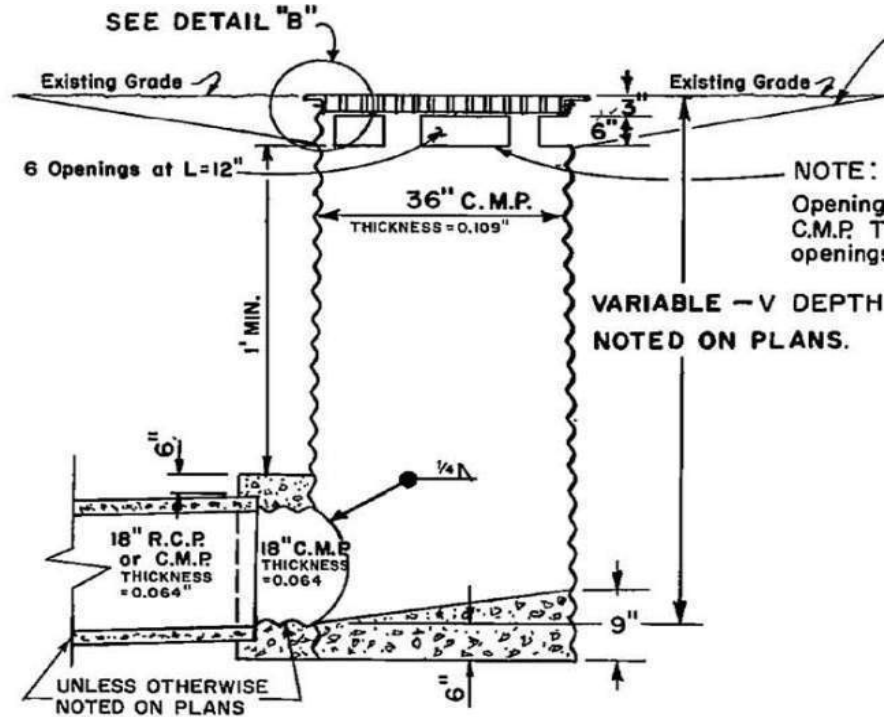
# Riser Inlet Capacity

Orifice Size (inches) = 36  
 Orifice Area, A (SF) = 7.07  
 Orifice Perimeter (ft) = 9.42  
 C (Sharp Crested Weir) = 3.3  
 Cd (Sharp Edge Orifice) = 0.62

Depth over Riser Rim (feet)	Orifice Prop. 36" Orifice (cfs)	Weir Qout Prop. 36" Opening (cfs)	
0	0.0	0.0	
0.25	17.6	3.9	
0.5	24.9	11.0	
0.75	30.5	20.2	
0.9	34.1	<b>28.4</b>	Max Cap @ Orange Ave
1.1	36.5	<b>34.9</b>	Max Cap. @ Water St
1.3	40.1	<b>46.1</b>	Max Cap. @ Harvill Ave

Orifice Control Equation =  $CA^*(2gh)^{1/2}$

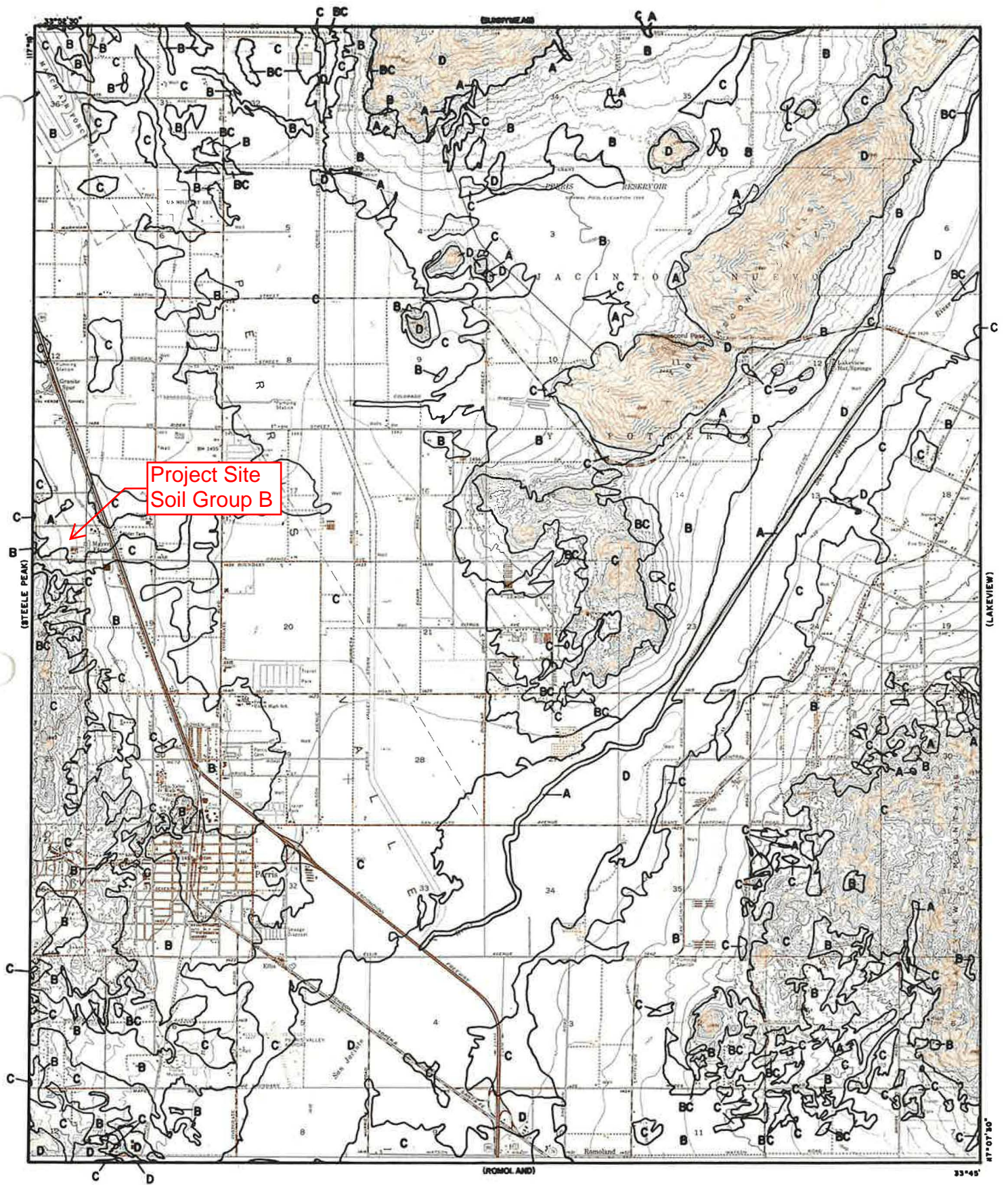
Weir Control Equation =  $CP h^{1.5}$



# Appendix G

## Soil Group Map and Isohyetal Map





Project Site  
Soil Group B

**LEGEND**

- SOILS GROUP BOUNDARY
- A SOILS GROUP DESIGNATION

**RCFC & WCD**

HYDROLOGY MANUAL



**HYDROLOGIC SOILS GROUP MAP  
FOR  
PERRIS**



\* source: ESRI Maps  
 \*\* source: USGS

**POINT PRECIPITATION FREQUENCY ESTIMATES**

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

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerials](#)

**PF tabular**

<b>PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)<sup>1</sup></b>										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
<b>5-min</b>	<b>0.087</b> (0.073-0.105)	<b>0.122</b> (0.102-0.148)	<b>0.171</b> (0.143-0.208)	<b>0.214</b> (0.177-0.262)	<b>0.276</b> (0.220-0.349)	<b>0.326</b> (0.255-0.423)	<b>0.381</b> (0.290-0.507)	<b>0.441</b> (0.326-0.604)	<b>0.528</b> (0.373-0.755)	<b>0.601</b> (0.410-0.890)
<b>10-min</b>	<b>0.125</b> (0.104-0.151)	<b>0.175</b> (0.146-0.212)	<b>0.245</b> (0.204-0.298)	<b>0.306</b> (0.253-0.375)	<b>0.395</b> (0.315-0.500)	<b>0.468</b> (0.365-0.606)	<b>0.546</b> (0.415-0.726)	<b>0.632</b> (0.467-0.865)	<b>0.757</b> (0.535-1.08)	<b>0.861</b> (0.587-1.28)
<b>15-min</b>	<b>0.151</b> (0.126-0.182)	<b>0.212</b> (0.177-0.256)	<b>0.297</b> (0.247-0.360)	<b>0.371</b> (0.306-0.453)	<b>0.478</b> (0.381-0.605)	<b>0.566</b> (0.441-0.733)	<b>0.661</b> (0.502-0.878)	<b>0.765</b> (0.565-1.05)	<b>0.916</b> (0.647-1.31)	<b>1.04</b> (0.710-1.54)
<b>30-min</b>	<b>0.241</b> (0.201-0.291)	<b>0.338</b> (0.282-0.409)	<b>0.474</b> (0.395-0.575)	<b>0.592</b> (0.489-0.724)	<b>0.763</b> (0.608-0.967)	<b>0.904</b> (0.705-1.17)	<b>1.06</b> (0.802-1.40)	<b>1.22</b> (0.902-1.67)	<b>1.46</b> (1.03-2.09)	<b>1.66</b> (1.14-2.47)
<b>60-min</b>	<b>0.322</b> (0.270-0.389)	<b>0.452</b> (0.378-0.547)	<b>0.634</b> (0.528-0.769)	<b>0.792</b> (0.654-0.969)	<b>1.02</b> (0.814-1.29)	<b>1.21</b> (0.943-1.57)	<b>1.41</b> (1.07-1.88)	<b>1.63</b> (1.21-2.24)	<b>1.96</b> (1.38-2.80)	<b>2.23</b> (1.52-3.30)
<b>2-hr</b>	<b>0.488</b> (0.408-0.589)	<b>0.656</b> (0.548-0.793)	<b>0.884</b> (0.736-1.07)	<b>1.08</b> (0.889-1.32)	<b>1.35</b> (1.08-1.71)	<b>1.57</b> (1.22-2.03)	<b>1.79</b> (1.36-2.38)	<b>2.04</b> (1.50-2.79)	<b>2.38</b> (1.68-3.40)	<b>2.65</b> (1.81-3.93)
<b>3-hr</b>	<b>0.602</b> (0.503-0.727)	<b>0.797</b> (0.666-0.964)	<b>1.06</b> (0.882-1.29)	<b>1.28</b> (1.06-1.56)	<b>1.58</b> (1.26-2.01)	<b>1.82</b> (1.42-2.36)	<b>2.07</b> (1.58-2.75)	<b>2.33</b> (1.72-3.19)	<b>2.70</b> (1.91-3.86)	<b>2.99</b> (2.04-4.43)
<b>6-hr</b>	<b>0.857</b> (0.716-1.03)	<b>1.12</b> (0.936-1.36)	<b>1.47</b> (1.22-1.78)	<b>1.76</b> (1.45-2.15)	<b>2.15</b> (1.71-2.72)	<b>2.45</b> (1.91-3.18)	<b>2.77</b> (2.10-3.68)	<b>3.09</b> (2.28-4.23)	<b>3.54</b> (2.50-5.06)	<b>3.89</b> (2.65-5.76)
<b>12-hr</b>	<b>1.15</b> (0.963-1.39)	<b>1.51</b> (1.26-1.83)	<b>1.98</b> (1.65-2.41)	<b>2.37</b> (1.96-2.90)	<b>2.89</b> (2.31-3.67)	<b>3.30</b> (2.57-4.27)	<b>3.71</b> (2.82-4.93)	<b>4.13</b> (3.05-5.66)	<b>4.71</b> (3.33-6.73)	<b>5.16</b> (3.52-7.64)
<b>24-hr</b>	<b>1.53</b> (1.35-1.76)	<b>2.03</b> (1.80-2.35)	<b>2.70</b> (2.38-3.12)	<b>3.24</b> (2.83-3.78)	<b>3.98</b> (3.37-4.80)	<b>4.55</b> (3.77-5.59)	<b>5.13</b> (4.15-6.46)	<b>5.72</b> (4.51-7.41)	<b>6.53</b> (4.95-8.80)	<b>7.16</b> (5.25-9.98)
<b>2-day</b>	<b>1.75</b> (1.55-2.02)	<b>2.38</b> (2.10-2.75)	<b>3.22</b> (2.84-3.73)	<b>3.91</b> (3.42-4.56)	<b>4.86</b> (4.12-5.86)	<b>5.61</b> (4.65-6.90)	<b>6.38</b> (5.17-8.03)	<b>7.18</b> (5.66-9.29)	<b>8.28</b> (6.27-11.2)	<b>9.16</b> (6.71-12.8)
<b>3-day</b>	<b>1.86</b> (1.64-2.14)	<b>2.56</b> (2.26-2.95)	<b>3.50</b> (3.08-4.05)	<b>4.28</b> (3.74-5.00)	<b>5.38</b> (4.55-6.48)	<b>6.25</b> (5.18-7.68)	<b>7.15</b> (5.79-9.01)	<b>8.11</b> (6.39-10.5)	<b>9.44</b> (7.15-12.7)	<b>10.5</b> (7.69-14.6)
<b>4-day</b>	<b>1.98</b> (1.75-2.28)	<b>2.75</b> (2.43-3.17)	<b>3.79</b> (3.34-4.38)	<b>4.66</b> (4.07-5.44)	<b>5.88</b> (4.98-7.09)	<b>6.86</b> (5.69-8.44)	<b>7.88</b> (6.39-9.93)	<b>8.97</b> (7.07-11.6)	<b>10.5</b> (7.94-14.1)	<b>11.7</b> (8.58-16.3)
<b>7-day</b>	<b>2.16</b> (1.91-2.50)	<b>3.03</b> (2.68-3.51)	<b>4.22</b> (3.72-4.89)	<b>5.22</b> (4.56-6.09)	<b>6.63</b> (5.61-7.99)	<b>7.76</b> (6.43-9.54)	<b>8.94</b> (7.24-11.3)	<b>10.2</b> (8.04-13.2)	<b>12.0</b> (9.06-16.1)	<b>13.4</b> (9.81-18.7)
<b>10-day</b>	<b>2.26</b> (1.99-2.60)	<b>3.18</b> (2.81-3.68)	<b>4.45</b> (3.92-5.15)	<b>5.52</b> (4.83-6.45)	<b>7.04</b> (5.96-8.49)	<b>8.26</b> (6.85-10.2)	<b>9.55</b> (7.73-12.0)	<b>10.9</b> (8.61-14.1)	<b>12.8</b> (9.73-17.3)	<b>14.4</b> (10.6-20.1)
<b>20-day</b>	<b>2.63</b> (2.33-3.04)	<b>3.76</b> (3.33-4.35)	<b>5.34</b> (4.71-6.18)	<b>6.70</b> (5.85-7.82)	<b>8.65</b> (7.33-10.4)	<b>10.2</b> (8.50-12.6)	<b>12.0</b> (9.69-15.1)	<b>13.8</b> (10.9-17.9)	<b>16.5</b> (12.5-22.2)	<b>18.6</b> (13.6-26.0)
<b>30-day</b>	<b>3.00</b> (2.66-3.47)	<b>4.30</b> (3.80-4.97)	<b>6.14</b> (5.41-7.12)	<b>7.75</b> (6.78-9.05)	<b>10.1</b> (8.56-12.2)	<b>12.1</b> (10.0-14.8)	<b>14.2</b> (11.5-17.9)	<b>16.5</b> (13.0-21.4)	<b>19.9</b> (15.1-26.8)	<b>22.7</b> (16.6-31.7)
<b>45-day</b>	<b>3.48</b> (3.08-4.02)	<b>4.96</b> (4.38-5.72)	<b>7.08</b> (6.24-8.20)	<b>8.98</b> (7.85-10.5)	<b>11.8</b> (10.0-14.2)	<b>14.2</b> (11.8-17.5)	<b>16.9</b> (13.7-21.2)	<b>19.8</b> (15.6-25.7)	<b>24.3</b> (18.4-32.7)	<b>28.0</b> (20.5-39.1)
<b>60-day</b>	<b>3.94</b> (3.48-4.54)	<b>5.54</b> (4.89-6.40)	<b>7.89</b> (6.95-9.13)	<b>10.0</b> (8.75-11.7)	<b>13.3</b> (11.2-16.0)	<b>16.1</b> (13.3-19.7)	<b>19.2</b> (15.5-24.2)	<b>22.7</b> (17.9-29.4)	<b>28.2</b> (21.3-37.9)	<b>32.9</b> (24.1-45.8)

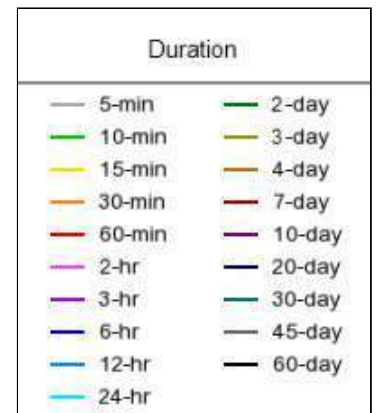
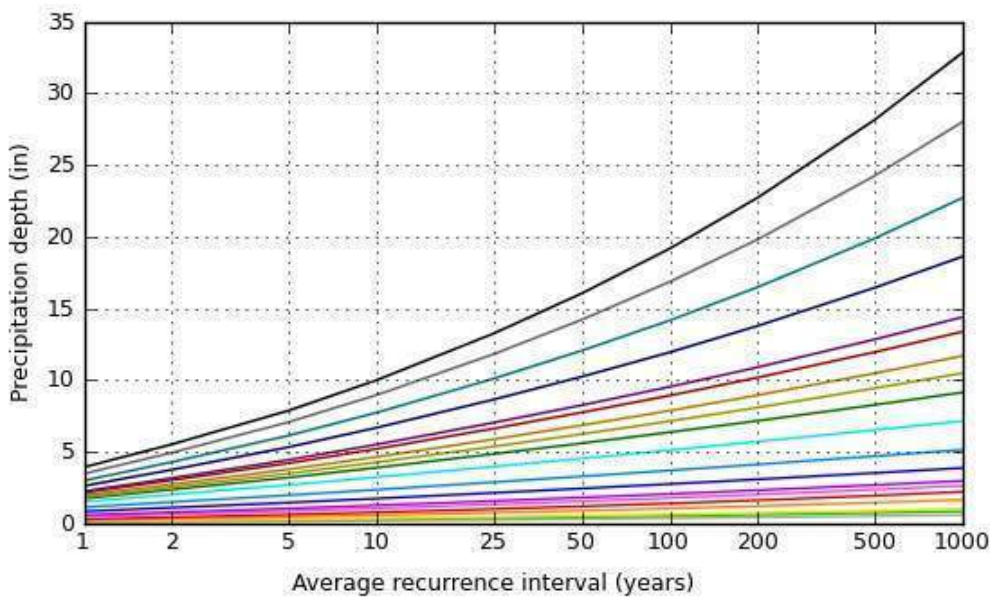
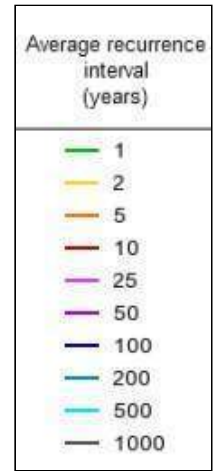
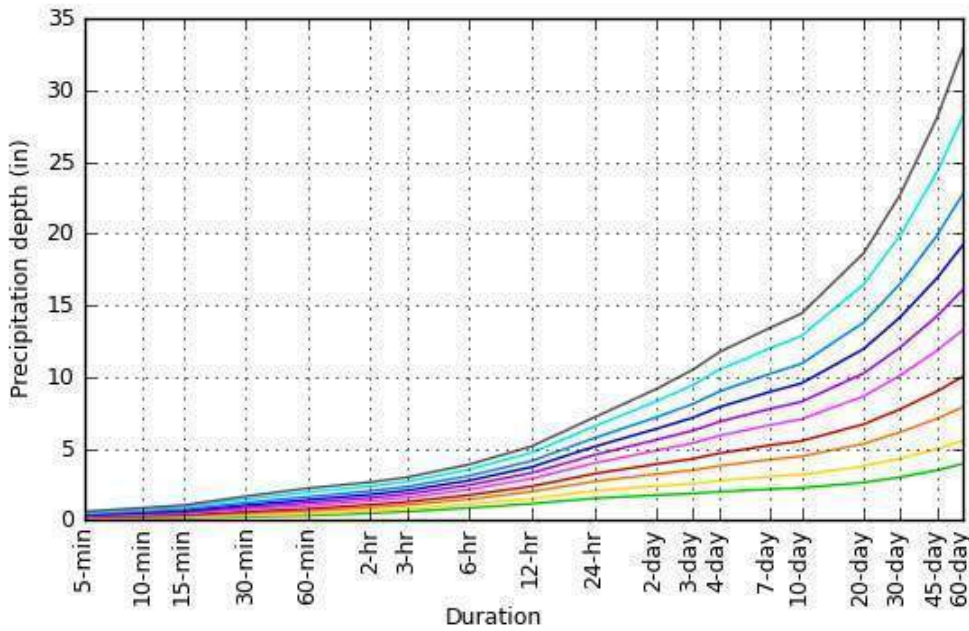
<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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**PF graphical**

PDS-based depth-duration-frequency (DDF) curves

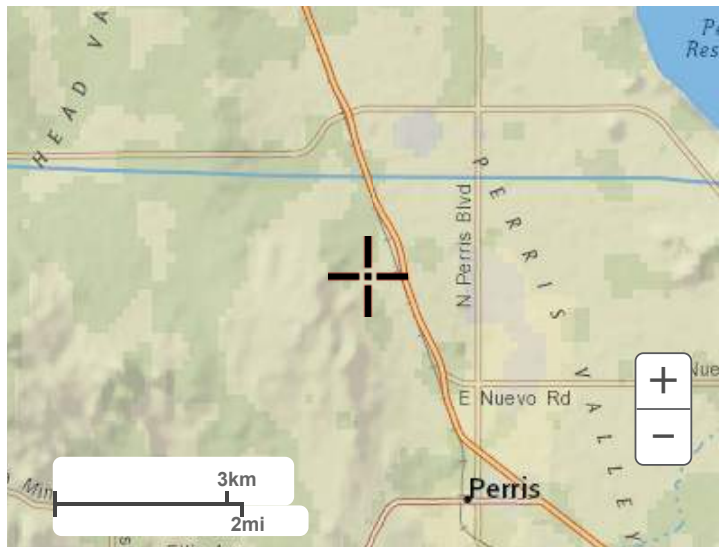
Latitude: 33.8179°, Longitude: -117.2469°



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**Maps & aerials**

Small scale terrain



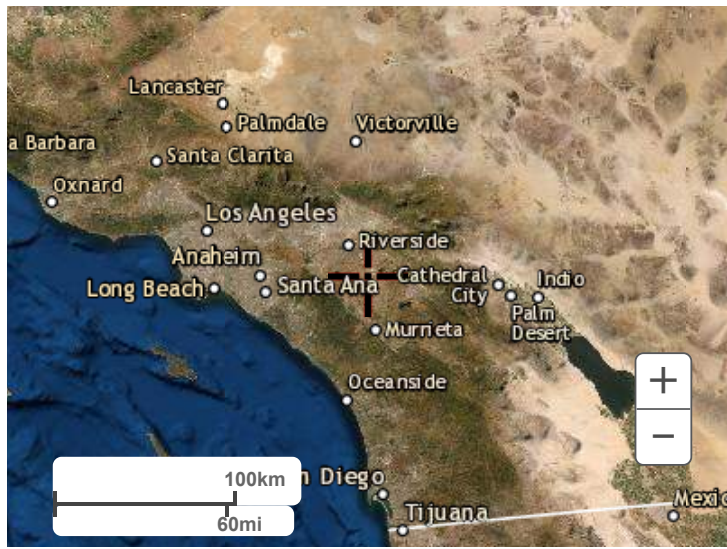
Large scale terrain



Large scale map



Large scale aerial



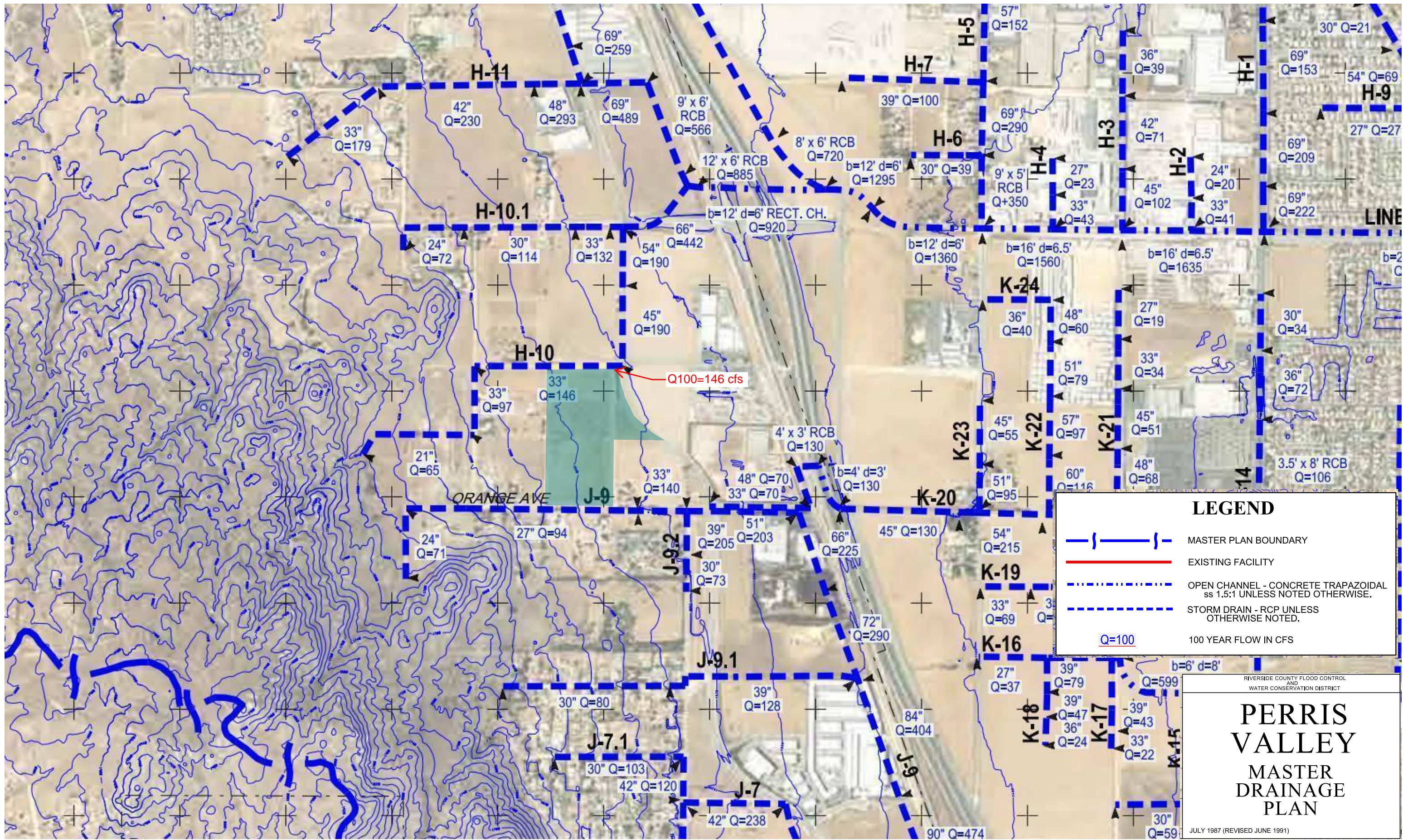
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[US Department of Commerce](#)  
[National Oceanic and Atmospheric Administration](#)  
[National Weather Service](#)  
[National Water Center](#)  
1325 East West Highway  
Silver Spring, MD 20910  
Questions?: [HDSC.Questions@noaa.gov](mailto:HDSC.Questions@noaa.gov)

[Disclaimer](#)

# Appendix H

## Reference Plans



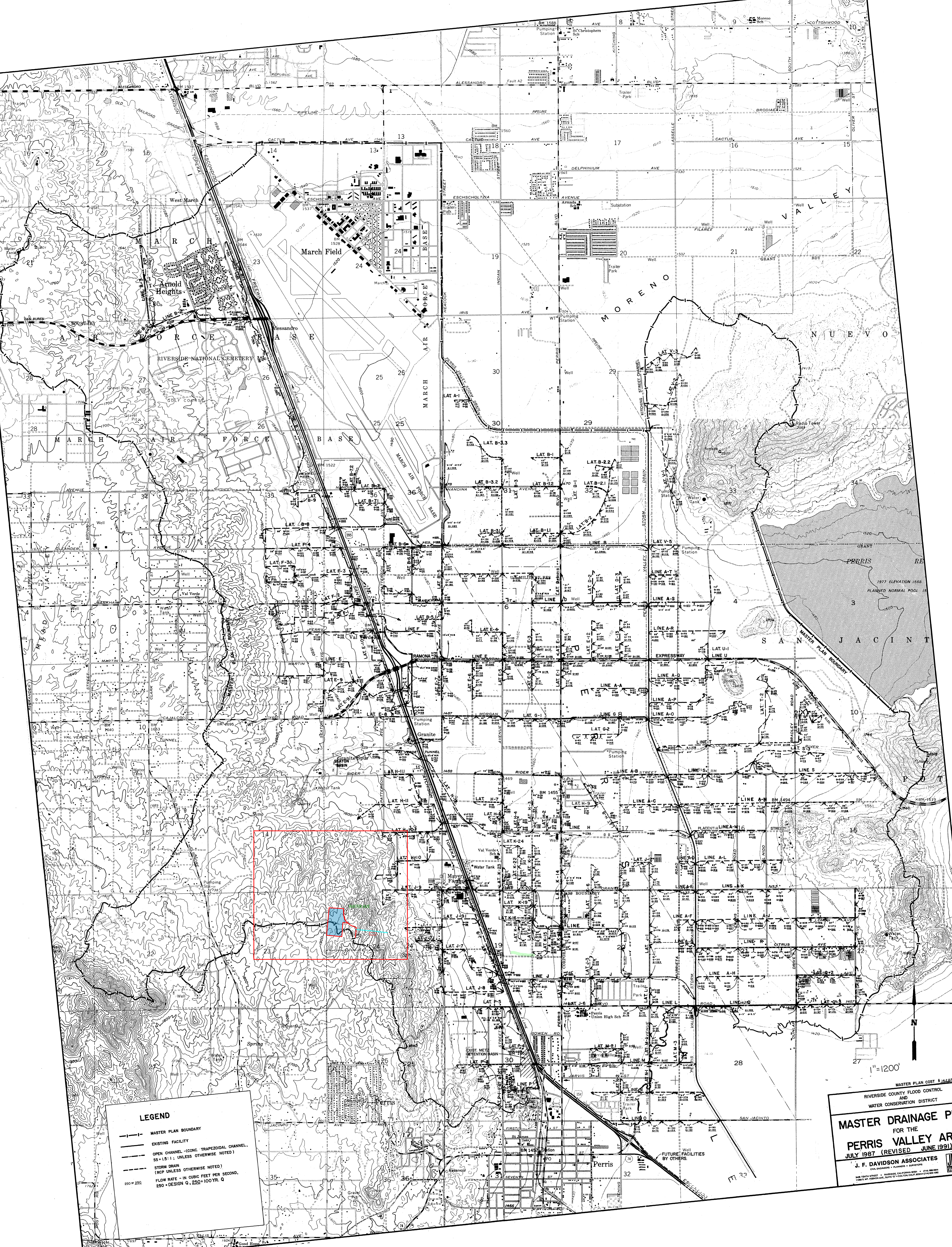
**LEGEND**

- MASTER PLAN BOUNDARY
- EXISTING FACILITY
- OPEN CHANNEL - CONCRETE TRAPAZOIDAL ss 1.5:1 UNLESS NOTED OTHERWISE.
- STORM DRAIN - RCP UNLESS OTHERWISE NOTED.
- 100 YEAR FLOW IN CFS

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

# PERRIS VALLEY MASTER DRAINAGE PLAN

JULY 1987 (REVISED JUNE 1991)



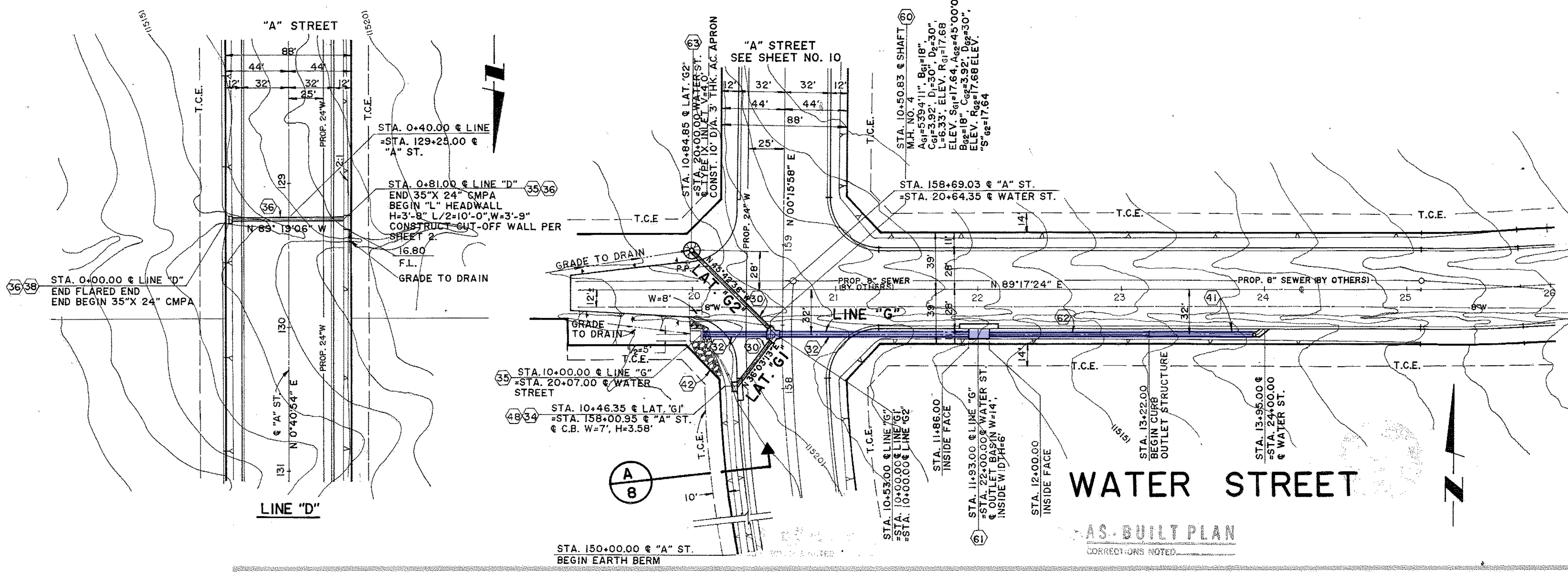
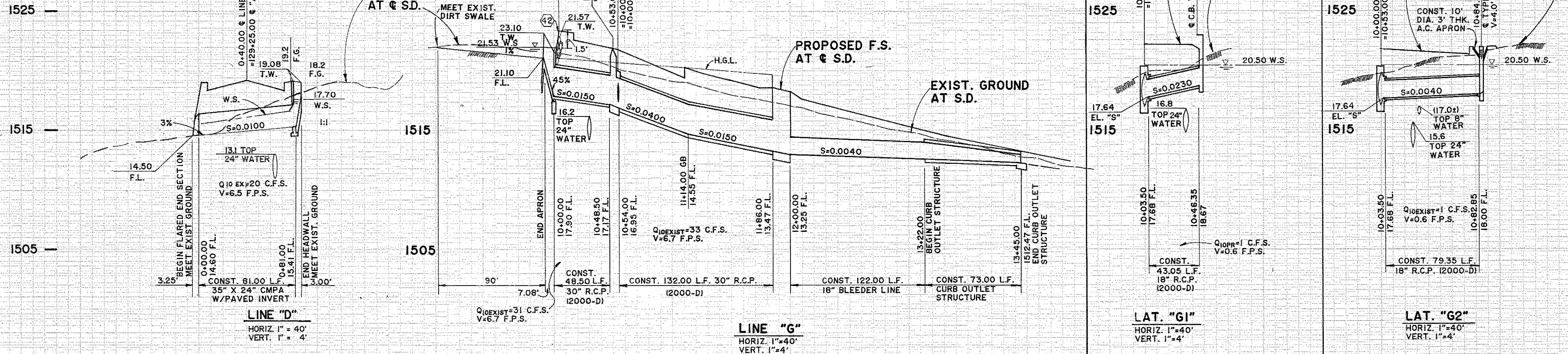
**LEGEND**

- MASTER PLAN BOUNDARY
- EXISTING FACILITY
- OPEN CHANNEL - (CONC. TRAPEZOIDAL CHANNEL, 55:1.5:1; UNLESS OTHERWISE NOTED)
- STORM DRAIN (RCP UNLESS OTHERWISE NOTED)
- FLOW RATE - IN CUBIC FEET PER SECOND, 250 \* DESIGN Q, 250 \* 100 YR. Q

MASTER PLAN COST \$142,280  
 RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT  
**MASTER DRAINAGE PLAN**  
 FOR THE  
**PERRIS VALLEY AREA**  
 JULY 1987 (REVISED JUNE 1991)  
 J. F. DAVIDSON ASSOCIATES  
 CIVIL ENGINEERS • PLANNERS • SURVEYORS  
 1801 VENTURA STREET • RIVERSIDE, CALIFORNIA 92501 • (951) 948-1800  
 1301 E. VENTURA AVE., SUITE 107 • COSTA MESA, CALIF. 92626 • (714) 995-1100







- CONSTRUCTION NOTES:**
- 30 CONSTRUCT 18" R.C.P. (2000-D).
  - 32 CONSTRUCT 30" R.C.P. (2000-D).
  - 34 CONSTRUCT CATCH BASIN (WIDTH & HEIGHT PER PLAN & PROFILE) PER COUNTY OF RIVERSIDE STD. NO. 300 & 300A.
  - 35 CONSTRUCT HEADWALL PER CALTRANS STD. PLAN D89.
  - 41 CONSTRUCT CURB OUTLET STRUCTURE PER COUNTY OF RIVERSIDE STD. NO. 308.
  - 42 PLACE LIGHT CLASS ROCK SLOPE PROTECTION METHOD "A".
  - 43 PLACE 1/4 TON ROCK SLOPE PROTECTION WITH FILTER BLANKET, METHOD "B".
  - 48 CONSTRUCT CONC. APRON PER DETAIL ON SHEET 2 AND PER PLAN.
  - 60 CONSTRUCT MANHOLE NO. 4 PER R.C.F.C.D. STD. MH254.
  - 61 CONSTRUCT CURB OUTLET PER MODIFIED COUNTY OF RIVERSIDE STD. NO. 300 & 301. (NO DEPRESSION).
  - 62 CONSTRUCT 18" BLEEDER PIPE (CORRUGATED POLY-ETHYLENE PIPE).
  - 36 CONSTRUCT 35"x24" C.M.P.A. W/PAVED INVERT.
  - 38 CONSTRUCT FLARED END SECTION FOR 35"x24" C.M.P.A.
  - 63 CONSTRUCT TYPE IX INLET PER R.C.F.C.D. STD. CB 108.

**Underground Service Alert**  
 Call TOLL FREE  
 1-800-492-4333

**PRIVATE ENGINEERING NOTE**

NOTHING ON THIS PLAN OR ANY OTHER DOCUMENT SHALL BE CONSIDERED AS A GUARANTEE OF ACCURACY OR A WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE. THE USER OF THIS PLAN OR ANY OTHER DOCUMENT SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND FOR VERIFYING THE ACCURACY OF ALL INFORMATION PROVIDED HEREON. THE ENGINEER'S LIABILITY IS LIMITED TO THE PROFESSIONAL SERVICES PROVIDED HEREON AND DOES NOT EXTEND TO ANY OTHER MATTER.

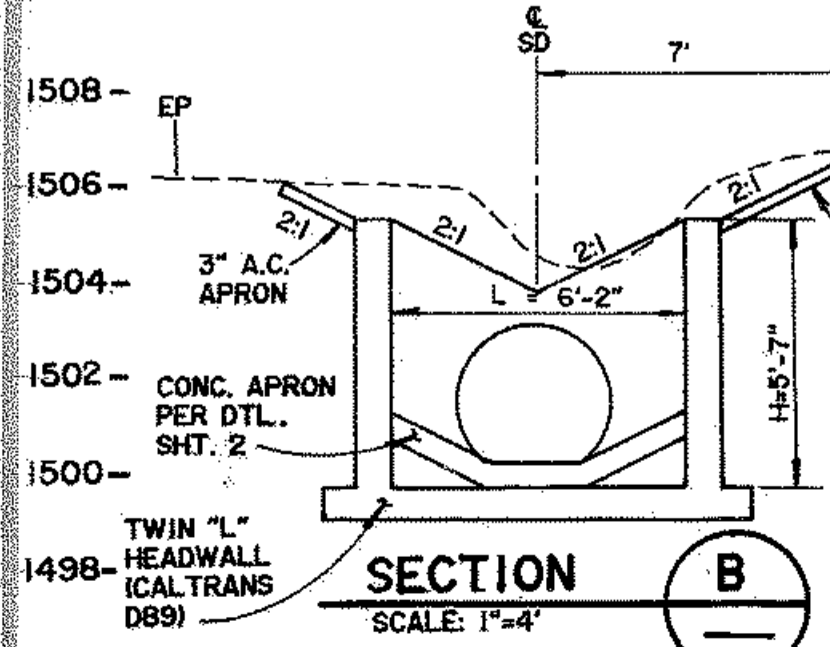
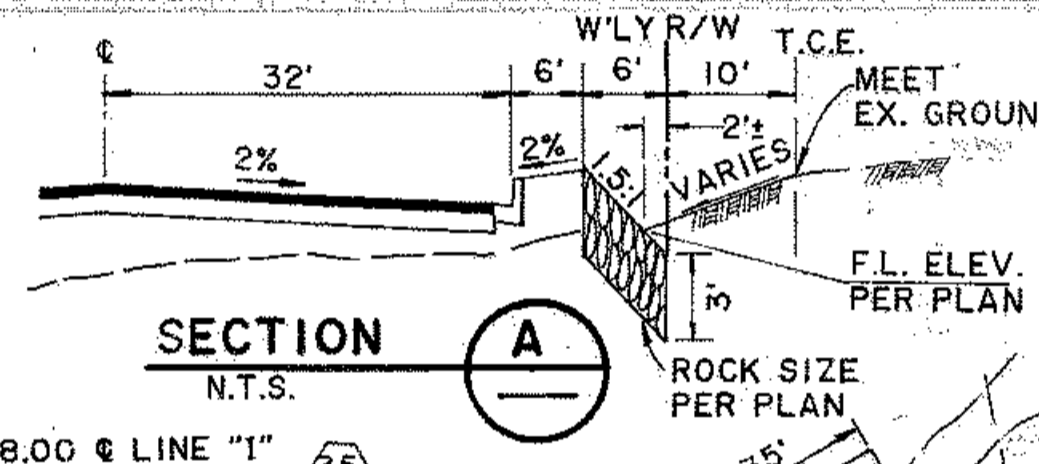
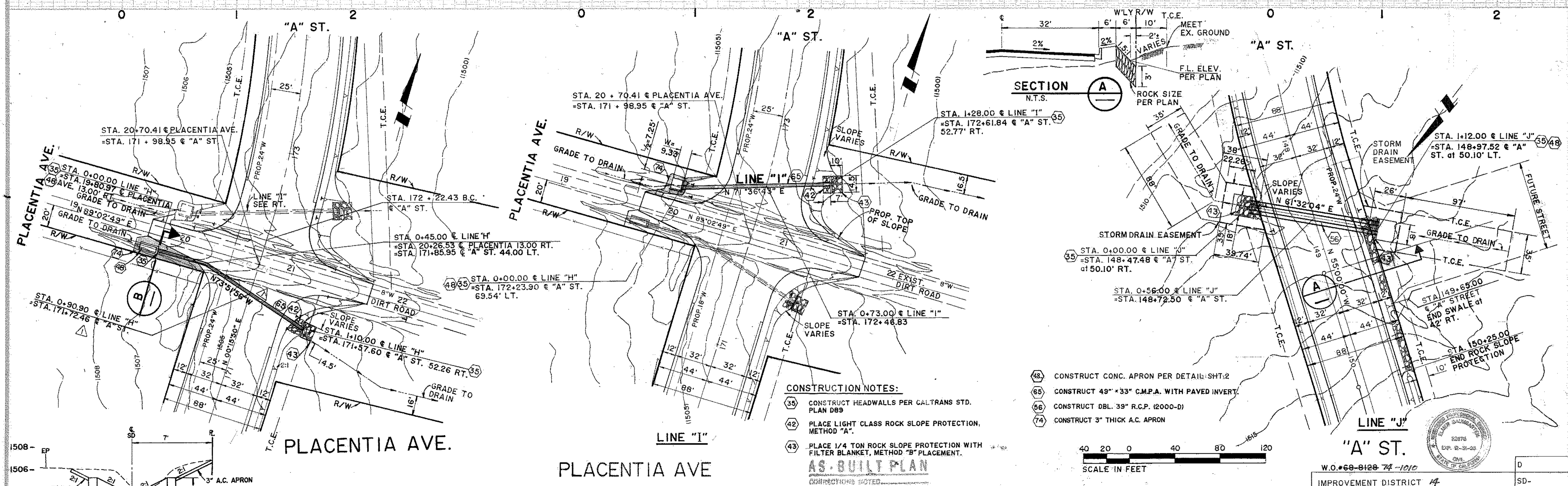
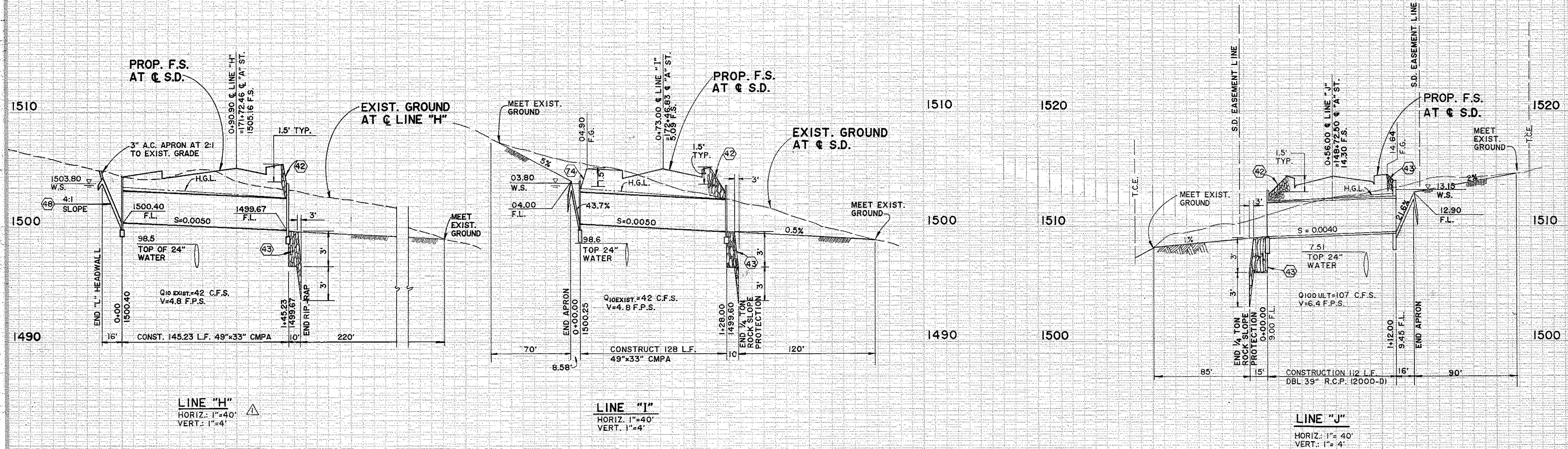
DATE: 6-3-92  
 REGISTERED CIVIL ENGINEER No. 35458  
 EXP. 9/30/91

**J.F. Davidson Associates, Inc.**  
 11500 S. Main Street, Suite 100  
 San Diego, CA 92108  
 (619) 594-5500  
 FAX: (619) 594-5501

W.O. #68-8128 74-1010  
 IMPROVEMENT DISTRICT 14  
 IN THE COUNTY OF RIVERSIDE CALIFORNIA  
**STORM DRAIN IMPROVEMENT PLANS**  
 LINES "D" & "G"  
 SCHEDULE I IMPROVEMENTS  
 COUNTY OF RIVERSIDE

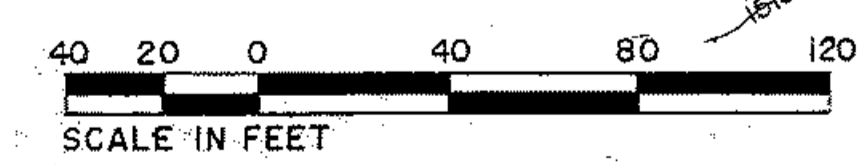
22  
 OF 38 SHEETS  
 SEE SHEET No. 1  
 W.O. FILE NO. 8710383

907-H



- CONSTRUCTION NOTES:**
- (35) CONSTRUCT HEADWALLS PER GALTRANS STD. PLAN DB9
  - (42) PLACE LIGHT CLASS ROCK SLOPE PROTECTION, METHOD "A".
  - (43) PLACE 1/4 TON ROCK SLOPE PROTECTION WITH FILTER BLANKET, METHOD "B" PLACEMENT.

- (48) CONSTRUCT CONC. APRON PER DETAIL: SHT. 2
- (65) CONSTRUCT 49" x 33" C.M.P.A. WITH PAVED INVERT.
- (66) CONSTRUCT DBL. 39" R.C.P. (12000-D)
- (74) CONSTRUCT 3" THICK A.C. APRON



**Underground Service Alert**  
Call TOLL FREE 1-800-402-4133

**PRIVATE ENGINEERING NOTE**  
CONSULTING CONTRACTOR ADVISES THAT IN ACCORDANCE WITH... (text partially obscured)

**AS-BUILT PLAN**  
CORRECTIONS NOTED

REVISOR: M.M. DATE: 2/24/95

PREPARED UNDER THE DIRECTION OF: *William W. Smith* DATE: 1-5-91

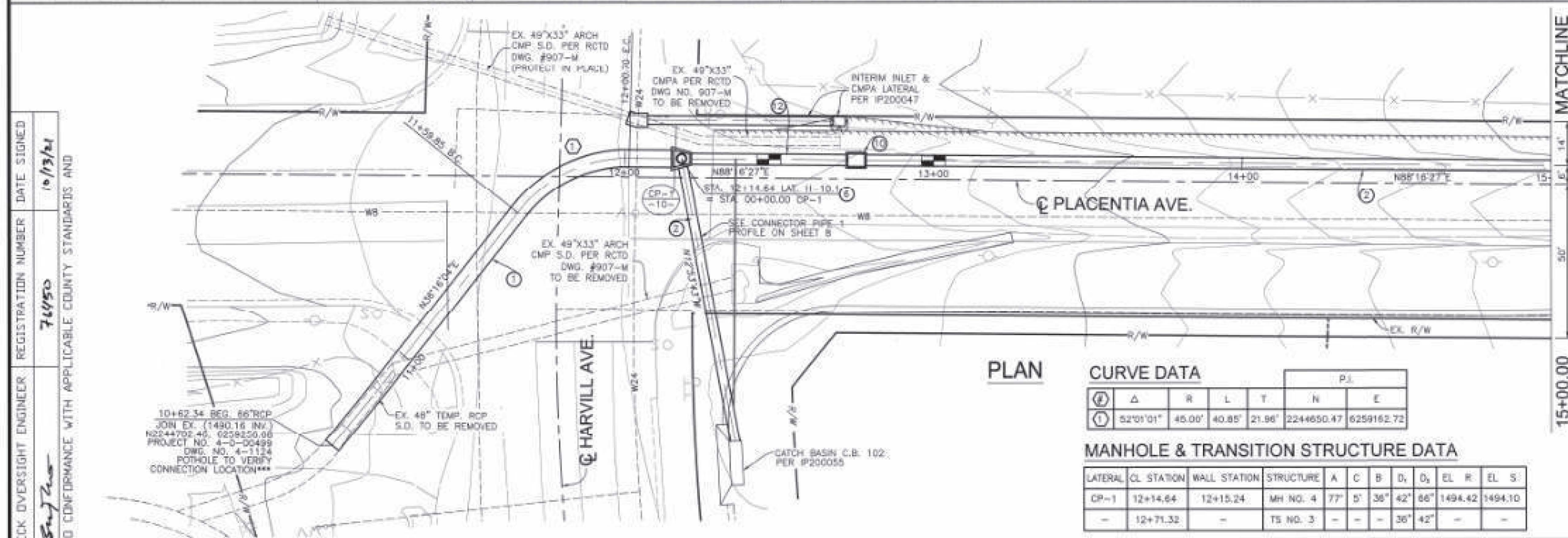
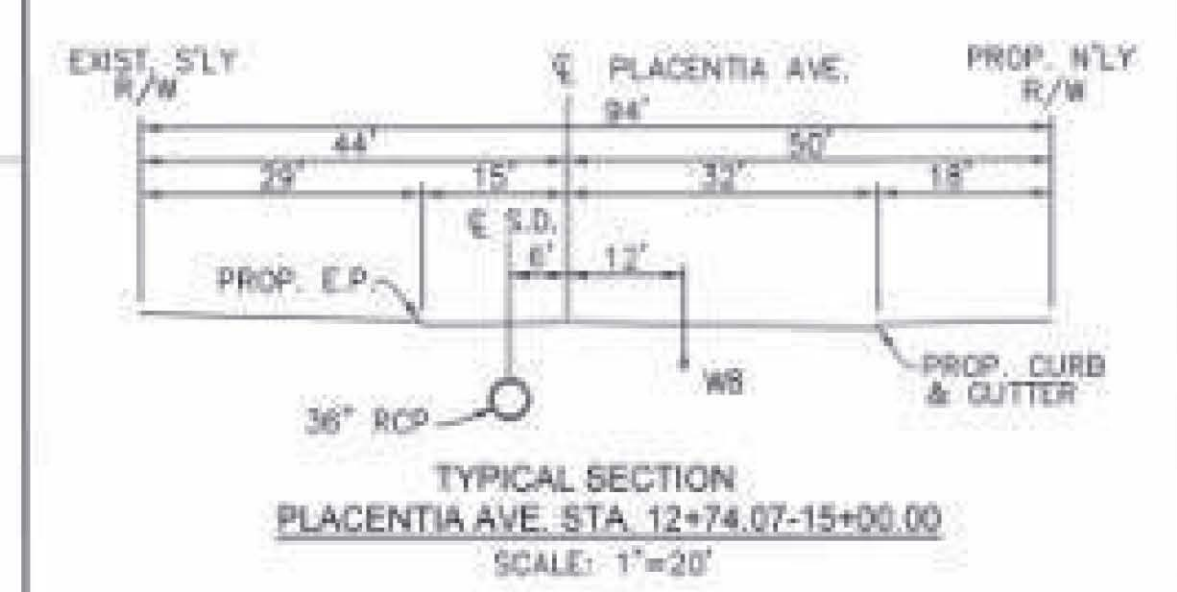
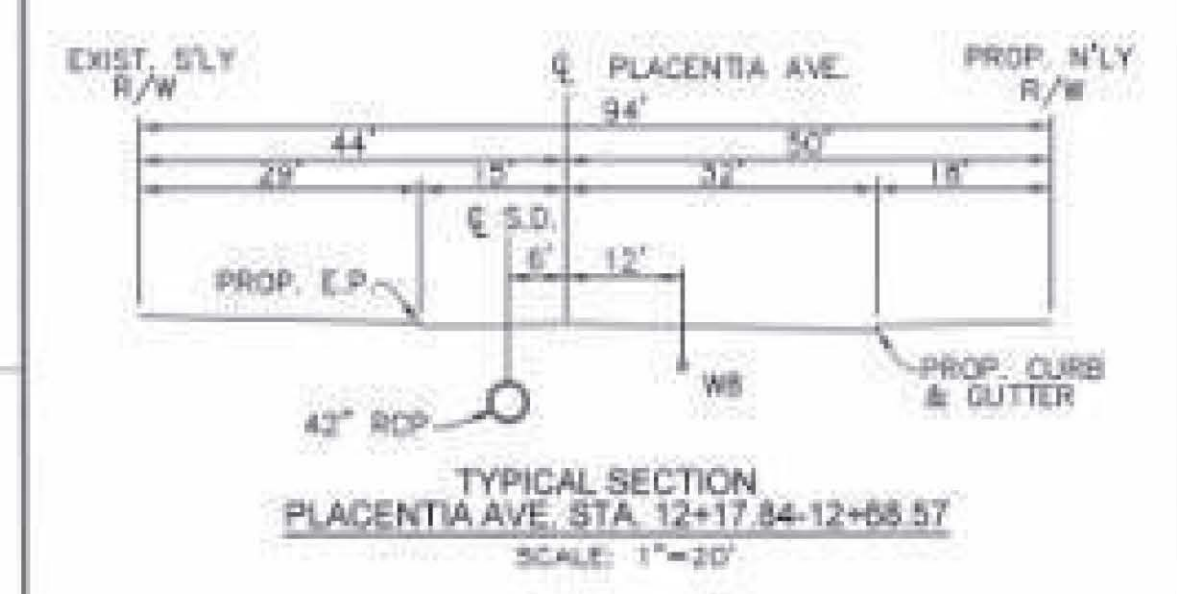
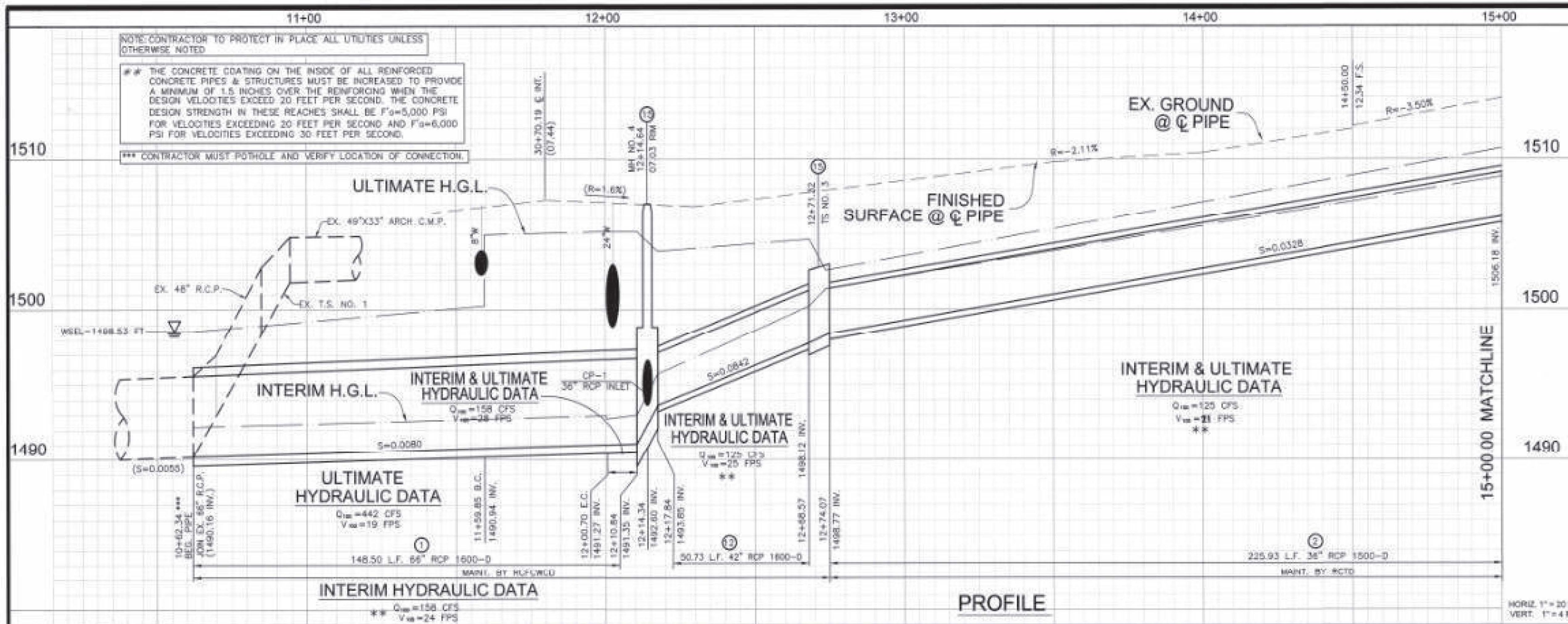
REGISTERED CIVIL ENGINEER No. 35458 EXP. DATE: 9/30/95

FOR TRANSPORTATION DEPT. RIVERSIDE, CA DATE: 2-2-92

**J.F. Davidson Associates, Inc.**  
REGISTERED PROFESSIONAL ARCHITECTURE, LANDSCAPE ARCHITECTURE  
3800 Lamon Street, Fontana, CA 92335  
70800 E. Palm Street, Suite 100, Fontana, CA 92335  
(913) 340-4641 FAX: 913-340-3529

W.O.# 68-8128 74-1010  
IMPROVEMENT DISTRICT 14  
IN THE COUNTY OF RIVERSIDE  
STORM DRAIN IMPROVEMENT PLANS  
**LINE "H", "I", & "J"**  
SCHEDULE I IMPROVEMENTS  
FOR COUNTY OF RIVERSIDE W.O.F.B. FILE NO. 8710383

23 OF 38 SHEETS



RECORD PLAN CHECK OVERSIGHT ENGINEER: *[Signature]* DATE SIGNED: 10/13/21  
 REGISTRATION NUMBER: 76950

APPROVED AS TO CONFORMANCE WITH APPLICABLE COUNTY STANDARDS AND PRACTICES:



PREPARED BY:  
**SDH**  
 SOH and ASSOCIATES INC.  
 2780 VIA INDUSTRIAL  
 TEMECULA, CA 92590  
 TEL: (951) 863-2691 FAX: (951) 786-2314

DESIGNED BY: DANF SOMMERS  
 DRAWN BY: DANF SOMMERS  
 CONST. SET: 09/2021  
 CHECKED BY: DANF SOMMERS  
 PB NUMBER: P6/235541



BENCH MARK  
 CITY OF RIVERSIDE BENCHMARK  
 #4-33 PK N&L AND CITY  
 ENGINEER TAG IN THE TOP OF  
 CURB OF THE MOST  
 SOUTHERLY CURB RETURNS AT  
 THE INTERSECTION OF LINCOLN  
 AVE. AND VAN BUREN BLVD.  
 ELEV. = 860.662 (1988)

REVISIONS	ENGINEER	RCFC & WCD

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT  
 RECOMMENDED FOR APPROVAL BY: *[Signature]*  
 APPROVED BY: *[Signature]*  
 DATE: 10/13/2021 DATE: 10/13/2021

# 969-WW PPT190008 IP200047  
 PROJECT NO. 4-0-00499  
 DRAWING NO. 4-1173  
 SHEET NO. 3 OF 10  
 PERRIS VALLEY MDP LATERAL H-10.1 STAGE 2  
 STA. 10+62.34 TO 16+00.00

# 969-WW