



# Preliminary Hydrology Report

## Mapes & Trumble Industrial Project

APN: 329-020-033, 034, 044 & 046

**August 2022**

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KHA Project # 194428001

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# Certification by Engineer

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Jacob Glaze, P.E.

Date

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## References

*Hydrology Manual.* Riverside County Flood Control and Water Conservation District, April 1978.

## **100.0 Introduction**

Kimley-Horn and Associates has been retained to prepare a Preliminary Hydrology Report for the proposed Mapes and Trumble Industrial Project in Perris, California. The purpose of this report is to demonstrate preliminary analysis of the hydrologic and hydraulic conditions associated with the development of the project site. To do so, the following is the scope of this report:

- Discuss the pre-development discharge patterns and points
- Discuss the post-development discharge patterns and points
- Determine the pre-development flow rates for the 2-year, 10-year and 100-year events
- Determine the post-development unmitigated flow rates for the 2-year, 10-year and 100-year events
- Analyze the required post-development onsite mitigation for the 2-year and 100-year event

Even though this report discusses stormwater, this report is not a Stormwater Pollution Prevention Plan (SWPPP), a Groundwater Study, a Geotechnical Report, nor a Water Quality Management Plan (WQMP). Each of these separate reports discusses separate aspects of stormwater. Portions of the Geotechnical Report are utilized and referenced for the purpose of this report. Similarly, the stormwater mitigation requirements of the WQMP are considered for sizing the BMPs and outlet structures used for this project.

## **100.1 Project Description**

The existing vacant lot will be developed into the proposed Mapes and Trumble Industrial Project. The proposed development will include an industrial building with truck loading docks. Site improvements will include landscaping, concrete hardscape and asphalt paving. The associated improvements include, but are not limited to onsite grading, domestic water service, sanitary sewer service, storm drain infrastructure, concrete and asphalt pavement, landscaping and irrigation. The project will also include offsite improvements along Mapes Road, Trumble Road, and Exceed Road. However, this preliminary study will only focus on the onsite analysis, and the Final Hydrology Report will include both onsite and offsite analysis. The project site is approximately 19.0 acres, and the project will not be phased.

## **100.2 Location**

The site is located at the southwest intersection between Mapes Road and Trumble Road in the City of Perris, within Riverside County. The project site is bordered by Interstate 215 to the west, Mapes Road to the north, Trumble Road to the east, and an industrial building to the south. For reference, see the Location Map in Appendix A.

## **100.3 Methodology**

The hydrologic and hydraulic analyses were completed following the methods outlined in the RCFC & WCD Hydrology Manual. The rational method was used to estimate time of concentrations and peak flow rates generated from the existing and proposed 2-year, 10-year and 100-year storm events. The synthetic unit hydrograph method was used to determine the onsite existing and proposed hydrographs for the 24-hour duration of the 2-year and 100-year storm event. To determine the outflow from the proposed BMPs, a basin routing analysis was performed for the 2-year and 100-year storm event. The CivilDesign Engineering Software – 2018 Version 9.0 was used to complete the rational method, synthetic unit hydrograph, and basin routing analyses. The results of the rational method analyses are included in Appendix I, the results of the synthetic unit hydrograph analyses are included in Appendix J, and the basin analysis is included in Appendix K. As mentioned previously, this preliminary study is limited to onsite analyses, and the complete onsite and offsite drainage system analyses will be provided in the Final Hydrology Report.

For the rational method and unit hydrograph analysis, the slope of the intensity duration curve from the Riverside County Flood Control and Water Conservation District Hydrology Manual was used along with rainfall data from NOAA Atlas 14 for the project site. See Appendices D and E for rainfall data along with the slope of the intensity duration curve. For the basin routing analysis, the results of unit hydrograph analysis was used along with the stage-storage parameters of the detention system to obtain the peak outflows from the BMPs for both the 2-year and 100-year storm events.

The type of soil and soil conditions are major factors affecting infiltration/detention and resultant storm water runoff. The Natural Resources Conservation Service (NRCS) has classified soil into one general hydrologic soil group for comparing infiltration and runoff rates. The group is based on properties that influence runoff, such as water infiltration rate, texture, natural discharge, and moisture condition. The runoff potential is based on the amount of runoff at the end of a long duration storm that occurs after wetting and swelling of the soil not protected by vegetation. Using the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey online tool, it was determined the predominant hydrologic soil group classification onsite is D. Based on Plate C-1.42 of the Hydrology Manual, the site soils is type D as well. Soil type D is defined as soils having poor infiltration rates (high runoff potential). Based on the Geotechnical Investigation and Percolation Testing Report prepared by AES Soils, water did not percolate, and the proposed site is considered to be a poor candidate for onsite infiltration. See Appendix D and F for the soil information.

In addition, antecedent moisture condition (AMC) I, II, and III was used to calculate the peak flows and volumes for the 2-year, 10-year, and 100-year storm events respectively based on the hydrology manual. The land use selected for the proposed drainage subareas is “Commercial”. See Appendix D Plate D-5.6 for the impervious percentages that correspond to each land use.

## 100.4 Drainage Characteristics

The site is in Zone AE and Zone X per the Federal Emergency Management Administration (FEMA) Flood Insurance Rate Map (FIRM) panel 06065C1445H, dated August 18, 2014. For reference, see FIRM Map in Appendix B.

Flood Zone AE is defined by FEMA as areas with base flood elevations determined. Flood Zone AE is located within a special flood hazard area subject to inundation by the 100-year flood. The base flood elevation on the project site is 1420 ft. Flood Zone X is defined by FEMA as areas with 0.2% annual chance flood hazard and areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile.

### 100.4.1 Pre-development Condition

Under the existing conditions, the project site drains towards the northwest. The existing condition of the project site is undeveloped with poor land coverage. Under existing conditions, the project site was subdivided into three drainage areas (A1, A2, and A3). Both A1 and A2 confluence and sheet flow towards the northwest through an existing swale where it will sheet flow into an existing catch basin located along Mapes Road and enter the Perris Flood Control Channel where it will discharge into the overland. Under existing conditions, the project site also accepts offsite runoff from the south along Exceed Road. Offsite runoff sheet flows through the site and similarly enters the existing catch basin.

Table 1 shows a summary of the Onsite Pre-development Flows. See the Pre-Development Hydrology Exhibit in Appendix H for more information and Appendix I for the Rational Method Calculations.

*Table 1: 100-year Onsite Pre-development Flows*

Area Description	Area (acres)	Q <sub>2</sub> (cfs)	V <sub>2</sub> (cf)	Q <sub>10</sub> (cfs)	V <sub>10</sub> (cf)	Q <sub>100</sub> (cfs)	V <sub>100</sub> (cf)
<b>Total</b>	<b>19.01</b>	<b>8.30</b>	<b>14,323</b>	<b>21.84</b>	<b>97,291</b>	<b>39.91</b>	<b>277,142</b>

### 100.4.2 Post-development Condition

Similar to the existing conditions, the post-developed project site will predominantly drain northwest to maintain the existing flow pattern to the maximum extent possible. The project proposes to construct one (1) new industrial building with truck loading docks, landscaping, concrete hardscape, and asphalt paving. See Appendix C for the Construction Plans.

Per the Romoland Master Drainage Plan (MDP), originally prepared in April 1988 and revised in March 2006, the project site is intended to discharge into the overland via the Perris Flood Control Channel.

Under the proposed conditions, stormwater runoff will be collected by nearby catch basins and conveyed to an underground detention system. The detention system will mitigate stormwater runoff and route it into a nearby Modular Wetland System for treatment. When the required treatment volume is stored within the detention system, excess runoff will bypass the Modular Wetland System via orifice openings within the detention system. Since it is infeasible to retain runoff onsite via infiltration, all runoff is proposed to discharge into the existing catch basin located along Mapes Road towards the northwest of the project.

The developed project site includes eleven (11) drainage areas. Runoff within drainage areas A1 through A9 is proposed to be routed towards Detention System #1 and MWS #1 located towards the west of the project site, and runoff within drainage areas B1 and B2 is proposed to be routed towards Detention System #2 and MWS #2 located towards the northeast of the project site. The modular wetland system is intended to treat the required runoff prior to discharging offsite, and the detention system is intended to detain and control the flow rate of excess runoff leaving the site through the orifice openings.

To handle the offsite runoff along Exceed Road, a new catch basin and storm drain system is proposed to route the offsite runoff directly into the existing catch basin without treatment.

Table 2 shows a summary of the Onsite Post-development Flows (unmitigated). For more information, refer to the Post Development Hydrology Exhibit in Appendix H and the Rational Method Calculations in Appendix I.

**Table 2: Onsite Post-development Flows (unmitigated)**

Area Description	Area (acres)	Q <sub>2</sub> (cfs)	V <sub>2</sub> (cf)	Q <sub>10</sub> (cfs)	V <sub>10</sub> (cf)	Q <sub>100</sub> (cfs)	V <sub>100</sub> (cf)
A	18.09	19.96	103,019	37.48	174,985	62.05	305,203
B	0.92	1.00	4,726	1.94	8,098	3.28	14,780
<b>Total</b>	<b>19.01</b>	<b>20.96</b>	<b>107,746</b>	<b>39.42</b>	<b>183,083</b>	<b>65.34</b>	<b>319,983</b>

## 100.5 Stormwater Mitigation

Since infiltration is infeasible, the proposed development will be required to treat the design capture volume prior to discharging runoff offsite. In addition, since the project is within an HCOC Applicable Area, the project will be restricted to discharging up to 110% of the pre-development peak flow for a 2-year storm event. For the 100-year storm event, this project proposes to restrict the peak flow to be no greater 90% of the pre-development peak flow.

**Table 3: Mitigation Requirements**

Area Description	Area (acres)	DCV (CF)	Allowable Q <sub>2</sub> (cfs)	Allowable Q <sub>100</sub> (cfs)
A	18.09	26,297	-	-
B	0.92	1,106	-	-
<b>Total</b>	<b>19.01</b>	<b>27,403</b>	<b>9.13</b>	<b>35.92</b>

To mitigate and treat the required runoff generated onsite, the project proposes a combination of an underground detention system and modular wetland system. To ensure that the required volume is treated by the modular wetland system, the orifices used to control the peak flow rate are placed at an elevation above the DCV elevation. For Detention System #1, the bottom of the orifice is placed at 8' above the bottom of the detention system and for Detention System #2, the bottom of the orifice is placed at 4.5' above the bottom of the detention system.

Table 4 below shows a summary of the basins and Appendices J and K contain the basin analysis calculations.

**Table 4: Basin Routing Analysis**

<b>Area Description</b>	<b>Volume Treated (CF)</b>	<b>2-Year Peak Runoff (cfs)</b>	<b>100-Year Peak Runoff (cfs)</b>
<b>A</b>	26,993	3.55	12.56
<b>B</b>	1,257	0.18	0.63
<b>Total</b>	<b>28,249</b>	<b>3.73</b>	<b>13.19</b>

### **100.6 Hydraulic Analysis**

The calculated peak flows from the analyses discussed above will be used to size the onsite drainage devices such as the storm drain pipes and catch basin sizing. Sizing calculations will be performed and included in the Final Hydrology Report.

### **100.7 Conclusion**

In conclusion, the following was covered in this report:

- The pre-development discharge patterns and points were analyzed
- The post-development discharge patterns and points were analyzed
- The pre-development flow rates for the 2-year, 10-year, and 100-year events were determined
- The post-development unmitigated flows for the 2-year, 10-year, and 100-year events were determined
- The required stormwater mitigation for the 2-year and 100-year events was determined

As discussed in the contents of this report, the development is not expected to cause a significant impact to downstream systems for storms up to the 100-year condition.

**Appendix A**  
**Location Map**



# Location Map

Project Site

215

Mapes Rd & Trumble Rd

Mapes Rd

Big League Dreams Perris Blue Topaz Dr

Mapes Rd

Hooves N Hounds

David Tate Blown C

Camie Ln

Sherman Rd

Case Rd

Sunstate Equipment

Southern California Gas Company

Trumble Rd

UPS Customer Center

74

Jack in the Box

Baroni Rd

Google Earth

Image Landsat / Copernicus

Sun Leisure

1000 ft



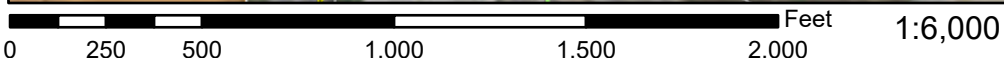
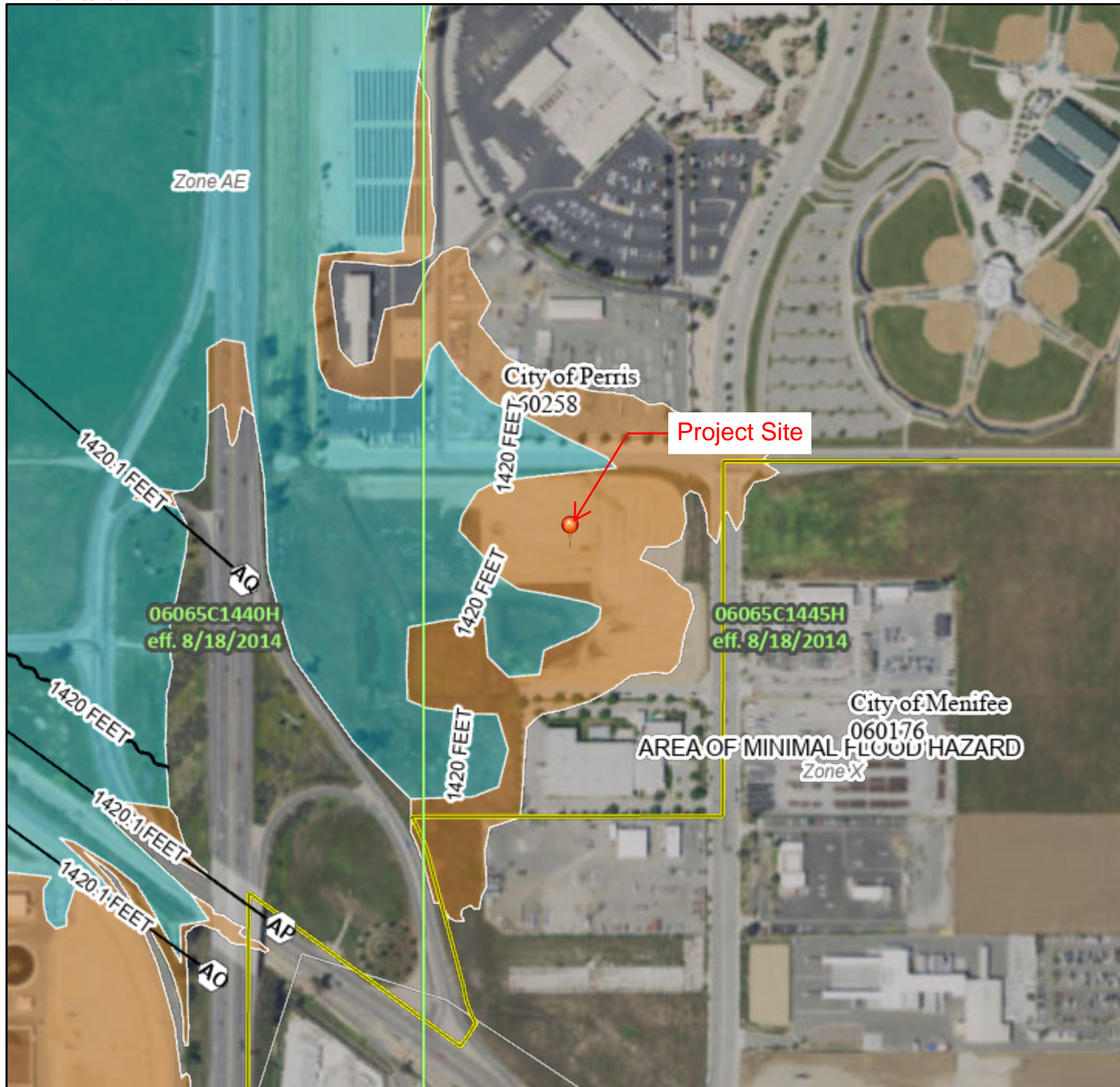
## **Appendix B**

### **FIRM Map**

# National Flood Hazard Layer FIRMette



117°11'29"W 33°45'40"N



117°10'51"W 33°45'10"N

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

## Legend

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

- |   |   |
|---|---|
| <p><b>SPECIAL FLOOD HAZARD AREAS</b></p>  | <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #e0ffff; border: 1px solid black; margin-right: 5px;"></span> Without Base Flood Elevation (BFE)<br/><i>Zone A, V, A99</i></li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #e0ffff; border: 1px solid black; margin-right: 5px;"></span> With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i></li> <li><span style="display: inline-block; width: 15px; height: 10px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, #ff0000 2px, #ff0000 4px); border: 1px solid black; margin-right: 5px;"></span> Regulatory Floodway</li> </ul>   |
| <p><b>OTHER AREAS OF FLOOD HAZARD</b></p> | <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #ffcc99; border: 1px solid black; margin-right: 5px;"></span> 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i></li> <li><span style="display: inline-block; width: 15px; height: 10px; background: repeating-linear-gradient(-45deg, transparent, transparent 2px, #cccccc 2px, #cccccc 4px); border: 1px solid black; margin-right: 5px;"></span> Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i></li> <li><span style="display: inline-block; width: 15px; height: 10px; background: repeating-linear-gradient(-45deg, transparent, transparent 2px, #ffcc99 2px, #ffcc99 4px); border: 1px solid black; margin-right: 5px;"></span> Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i></li> <li><span style="display: inline-block; width: 15px; height: 10px; background: repeating-linear-gradient(-45deg, transparent, transparent 2px, #ffcc99 2px, #ffcc99 4px); border: 1px solid black; margin-right: 5px;"></span> Area with Flood Risk due to Levee <i>Zone D</i></li> </ul> |
| <p><b>OTHER AREAS</b></p>                 | <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #ffffff; border: 1px solid black; margin-right: 5px;"></span> NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i></li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 2px solid blue; margin-right: 5px;"></span> Effective LOMRs</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #ffe4c4; border: 1px solid black; margin-right: 5px;"></span> Area of Undetermined Flood Hazard <i>Zone D</i></li> </ul>   |
| <p><b>GENERAL STRUCTURES</b></p>          | <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; border-bottom: 2px dashed black; margin-right: 5px;"></span> Channel, Culvert, or Storm Sewer</li> <li><span style="display: inline-block; width: 15px; border-bottom: 2px dashed gray; margin-right: 5px;"></span> Levee, Dike, or Floodwall</li> </ul>  |
| <p><b>OTHER FEATURES</b></p>              | <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; border-bottom: 2px solid black; margin-right: 5px;"></span> <b>20.2</b> Cross Sections with 1% Annual Chance Water Surface Elevation</li> <li><span style="display: inline-block; width: 15px; border-bottom: 2px solid black; margin-right: 5px;"></span> <b>17.5</b> Coastal Transect</li> <li><span style="display: inline-block; width: 15px; border-bottom: 2px dashed black; margin-right: 5px;"></span> Base Flood Elevation Line (BFE)</li> <li><span style="display: inline-block; width: 15px; border-bottom: 2px solid red; margin-right: 5px;"></span> Limit of Study</li> <li><span style="display: inline-block; width: 15px; border-bottom: 2px solid yellow; margin-right: 5px;"></span> Jurisdiction Boundary</li> <li><span style="display: inline-block; width: 15px; border-bottom: 2px dashed black; margin-right: 5px;"></span> Coastal Transect Baseline</li> <li><span style="display: inline-block; width: 15px; border-bottom: 2px solid blue; margin-right: 5px;"></span> Profile Baseline</li> <li><span style="display: inline-block; width: 15px; border-bottom: 2px solid blue; margin-right: 5px;"></span> Hydrographic Feature</li> </ul>      |
| <p><b>MAP PANELS</b></p>                  | <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #90ee90; border: 1px solid black; margin-right: 5px;"></span> Digital Data Available</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #cccccc; border: 1px solid black; margin-right: 5px;"></span> No Digital Data Available</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #ffffff; border: 1px solid black; margin-right: 5px;"></span> Unmapped</li> </ul>  |



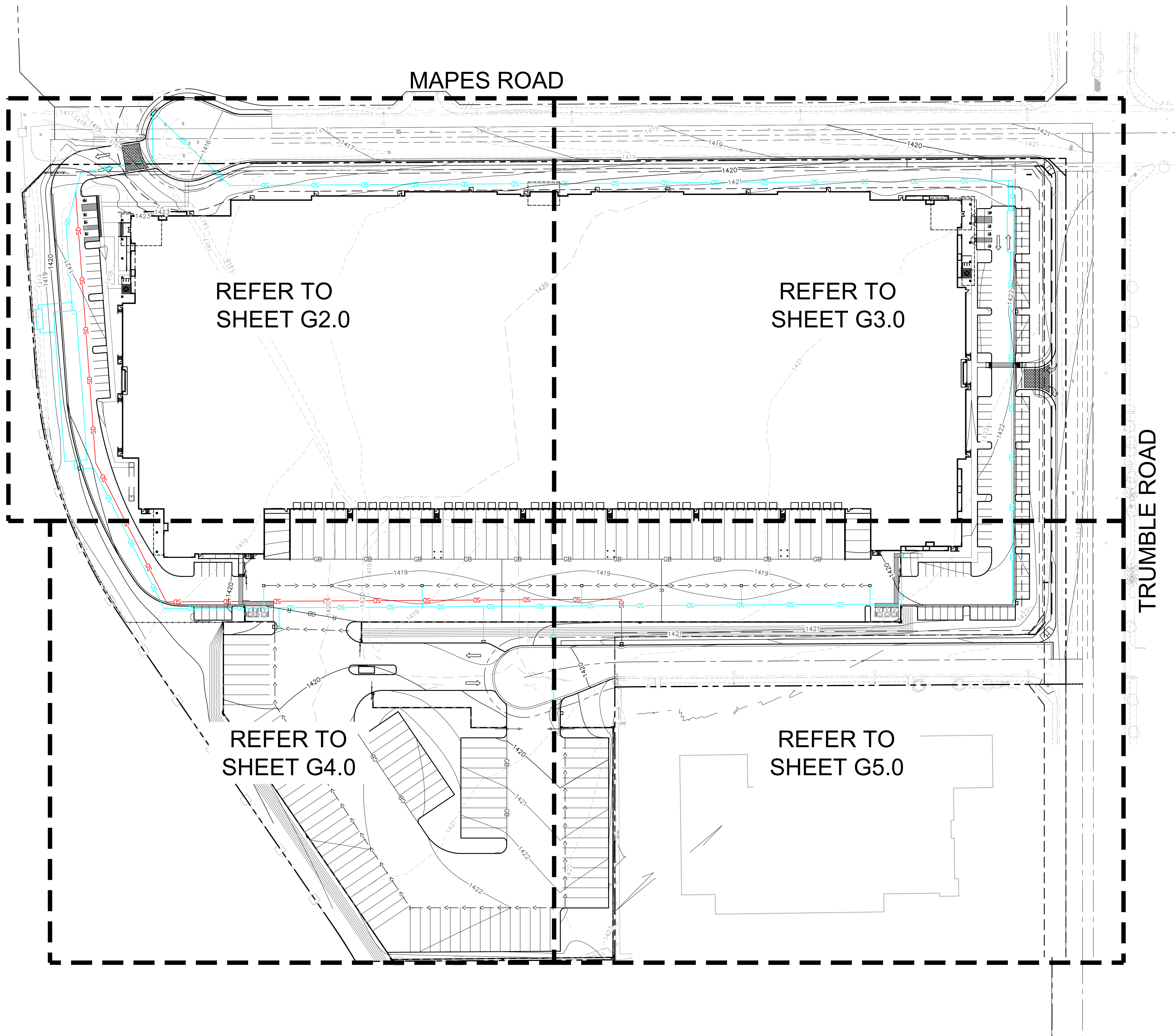
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **4/1/2022 at 2:42 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

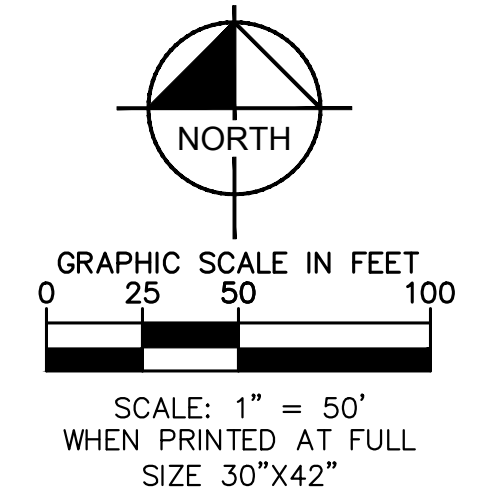
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory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

**Appendix C**  
**Construction Plans**



**LEGEND**

	EXISTING PROPERTY LINE
	PROPOSED DEDICATED PROPERTY LINE
	EXISTING EASEMENT LINE
	STREET CENTERLINE
	SETBACK LINE
	PROPOSED ONSITE STORM DRAIN LINE
	PROPOSED OFFSITE STORM DRAIN LINE
	PROPOSED CONTOURS
	EXISTING CONTOURS
	TOP OF RAMP
	TOP OF WALL
	TOP OF CURB
	FINISHED SURFACE
	TOP OF STAIRS
	BOTTOM OF STAIRS
	EXISTING GRADE
	PROPOSED GRADE
	FLOW LINE
	GRADE BREAK LINE
	RIDGE LINE



REFER TO SHEET G2.0

REFER TO SHEET G3.0

REFER TO SHEET G4.0

REFER TO SHEET G5.0

MAPES ROAD

TRUMBLE ROAD

No.	REVISIONS	DATE	BY

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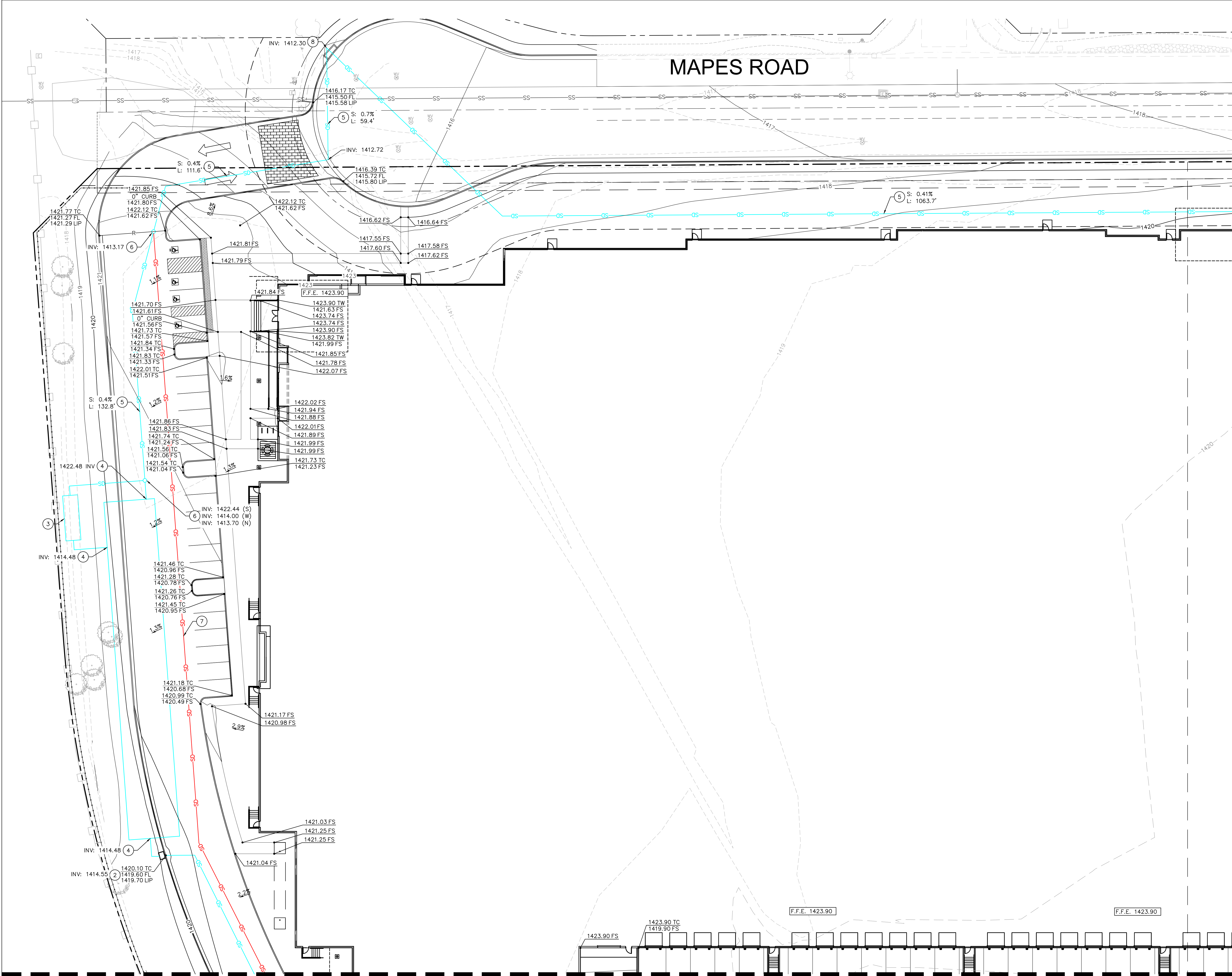
KHA PROJECT	MAPES & TRUMBLE INDUSTRIAL FACILITY
DATE	
SCALE	AS SHOWN
DESIGNED BY	JR
DRAWN BY	JR
CHECKED BY	JG

PREPARED FOR  
**BLUE ARCH INVESTMENTS**

LICENSED PROFESSIONAL  
 CA

**PRELIMINARY OVERALL  
 GRADING PLAN**

SHEET NUMBER  
**G1.0**



### LEGEND

	EXISTING PROPERTY LINE
	PROPOSED DEDICATED PROPERTY LINE
	EXISTING EASEMENT LINE
	STREET CENTERLINE
	SETBACK LINE
	PROPOSED ONSITE STORM DRAIN LINE
	PROPOSED OFFSITE STORM DRAIN LINE
	PROPOSED CONTOURS
	EXISTING CONTOURS
	TOP OF RAMP
	TOP OF WALL
	TOP OF CURB
	FINISHED SURFACE
	TOP OF STAIRS
	BOTTOM OF STAIRS
	EXISTING GRADE
	PROPOSED GRADE
	FLOW LINE
	GRADE BREAK LINE
	RIDGE LINE

### DATUM NOTES

DATUM HAS BEEN ADJUSTED BY ORIGINAL SURVEYOR TO OPUS NAVD88 DATUM. DATUM HAS BEEN ESTIMATED TO BE ACCURATE TO THE 0.18' OF THE COUNTRY BENCHMARK.

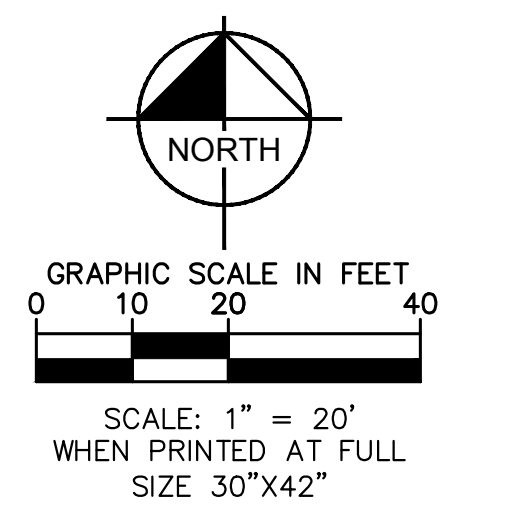
### DRAINAGE STATEMENT

STORMWATER RUNOFF GENERATED ONSITE WILL BE CAPTURED BY THE PROPOSED GRATE INLETS AND CATCH BASINS. FROM THERE WATER WILL BE ROUTED VIA PROPOSED STORM DRAIN PIPE INTO THE PROPOSED UNDERGROUND WATER TREATMENT/STORAGE TANKS. WATER AFTER LEAVING THE TANKS WILL DRAIN VIA PROPOSED STORM DRAIN PIPE INTO AN EXISTING OFFSITE CATCH BASIN THAT DRAINS OUT INTO AN EXISTING NATURALLY VEGETATED CHANNEL. THE FLOW TO THE EXISTING CATCH BASIN SHALL NOT EXCEED THE EXISTING HYDROLOGY CONDITIONS.

- ### DRAINAGE NOTES
- 1 PROPOSED STORM DRAIN INLET.
  - 2 PROPOSED CURB OPENING CATCH BASIN.
  - 3 PROPOSED MODULAR WETLAND SYSTEM.
  - 4 PROPOSED WATER STORAGE TANK.
  - 5 PROPOSED STORM DRAIN LINE.
  - 6 PROPOSED STORM DRAIN MANHOLE.
  - 7 PROPOSED OFFSITE STORM DRAIN LINE.
  - 8 PROPOSED CONNECTION TO EXISTING CATCH BASIN.
  - 9 PROPOSED TRAFFIC RATED TRENCH DRAIN.

REFER TO SHEET G3.0

REFER TO SHEET G4.0



No.	REVISIONS	DATE	BY

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KHA PROJECT
DATE
SCALE AS SHOWN
DESIGNED BY JR
DRAWN BY JR
CHECKED BY JG

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PRELIMINARY GRADING PLAN 1 **G2.0**

SHEET NUMBER

MAPES ROAD

LEGEND

- EXISTING PROPERTY LINE
- PROPOSED DEDICATED PROPERTY LINE
- EXISTING EASEMENT LINE
- STREET CENTERLINE
- SETBACK LINE
- PROPOSED ONSITE STORM DRAIN LINE
- PROPOSED OFFSITE STORM DRAIN LINE
- 1419 PROPOSED CONTOURS
- 1419 EXISTING CONTOURS
- TOP OF RAMP
- TOP OF WALL
- TOP OF CURB
- FINISHED SURFACE
- TOP OF STAIRS
- BOTTOM OF STAIRS
- EXISTING GRADE (1419.00 FS)
- PROPOSED GRADE (1419.00 FS)
- FLOW LINE
- GRADE BREAK LINE
- RIDGE LINE

DATUM NOTES

DATUM HAS BEEN ADJUSTED BY ORIGINAL SURVEYOR TO OPUS NAVD88 DATUM. DATUM HAS BEEN ESTIMATED TO BE ACCURATE TO THE 0.18' OF THE COUNTRY BENCHMARK.

DRAINAGE STATEMENT

STORMWATER RUNOFF GENERATED ONSITE WILL BE CAPTURED BY THE PROPOSED GRATE INLETS AND CATCH BASINS. FROM THERE WATER WILL BE ROUTED VIA PROPOSED STORM DRAIN PIPE INTO THE PROPOSED UNDERGROUND WATER TREATMENT/STORAGE TANKS. WATER AFTER LEAVING THE TANKS WILL DRAIN VIA PROPOSED STORM DRAIN PIPE INTO AN EXISTING OFFSITE CATCH BASIN THAT DRAINS OUT INTO AN EXISTING NATURALLY VEGETATED CHANNEL. THE FLOW TO THE EXISTING CATCH BASIN SHALL NOT EXCEED THE EXISTING HYDROLOGY CONDITIONS.

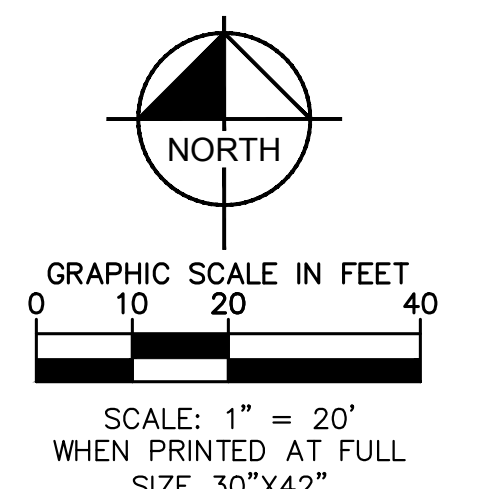
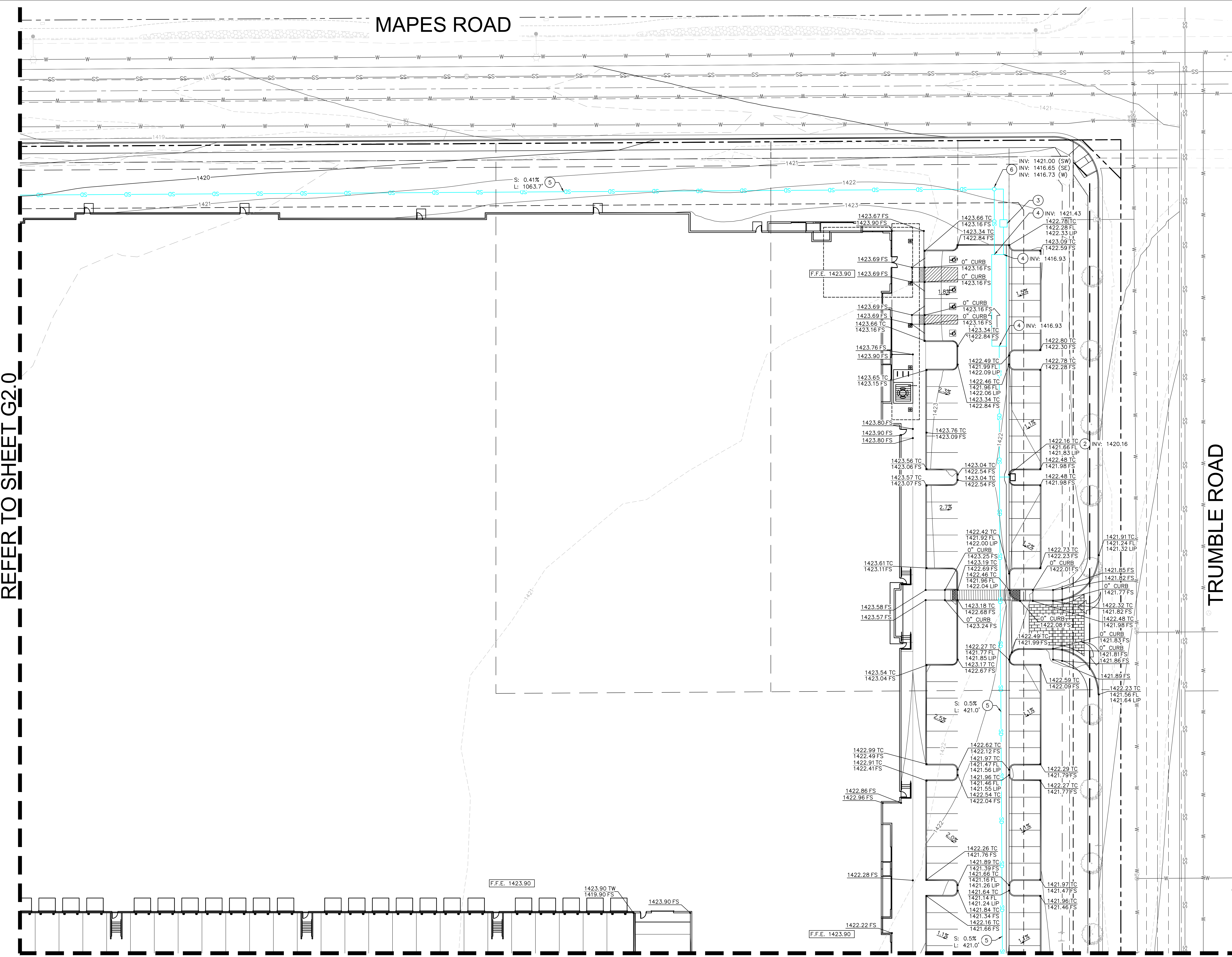
DRAINAGE NOTES

- 1 PROPOSED STORM DRAIN INLET.
- 2 PROPOSED CURB OPENING CATCH BASIN.
- 3 PROPOSED MODULAR WETLAND SYSTEM.
- 4 PROPOSED WATER STORAGE TANK.
- 5 PROPOSED STORM DRAIN LINE.
- 6 PROPOSED STORM DRAIN MANHOLE.
- 7 PROPOSED OFFSITE STORM DRAIN LINE.
- 8 PROPOSED CONNECTION TO EXISTING CATCH BASIN.
- 9 PROPOSED TRAFFIC RATED TRENCH DRAIN.

REFER TO SHEET G2.0

TRUMBULE ROAD

REFER TO SHEET G5.0



No.	REVISIONS	DATE	BY

**Kimley»Horn**

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KHA PROJECT  
DATE  
SCALE AS SHOWN  
DESIGNED BY JR  
DRAWN BY JR  
CHECKED BY JG PERIS

**MAPES & TRUMBULE INDUSTRIAL FACILITY**  
PREPARED FOR  
**BLUE ARCH INVESTMENTS**

LICENSED PROFESSIONAL  
CA

**PRELIMINARY GRADING PLAN 2**

SHEET NUMBER  
**G3.0**

REFER TO SHEET G3.0

LEGEND

- EXISTING PROPERTY LINE
- PROPOSED DEDICATED PROPERTY LINE
- EXISTING EASEMENT LINE
- STREET CENTERLINE
- SETBACK LINE
- PROPOSED ONSITE STORM DRAIN LINE
- PROPOSED OFFSITE STORM DRAIN LINE
- PROPOSED CONTOURS
- EXISTING CONTOURS
- TR TOP OF RAMP
- TW TOP OF WALL
- TC TOP OF CURB
- FS FINISHED SURFACE
- TS TOP OF STAIRS
- BS BOTTOM OF STAIRS
- (1419.50 TC) EXISTING GRADE
- (1419.00 FS) EXISTING GRADE
- 1419.50 TC PROPOSED GRADE
- 1419.00 FS PROPOSED GRADE
- FLOW LINE
- GB GRADE BREAK LINE
- R RIDGE LINE

DATUM NOTES

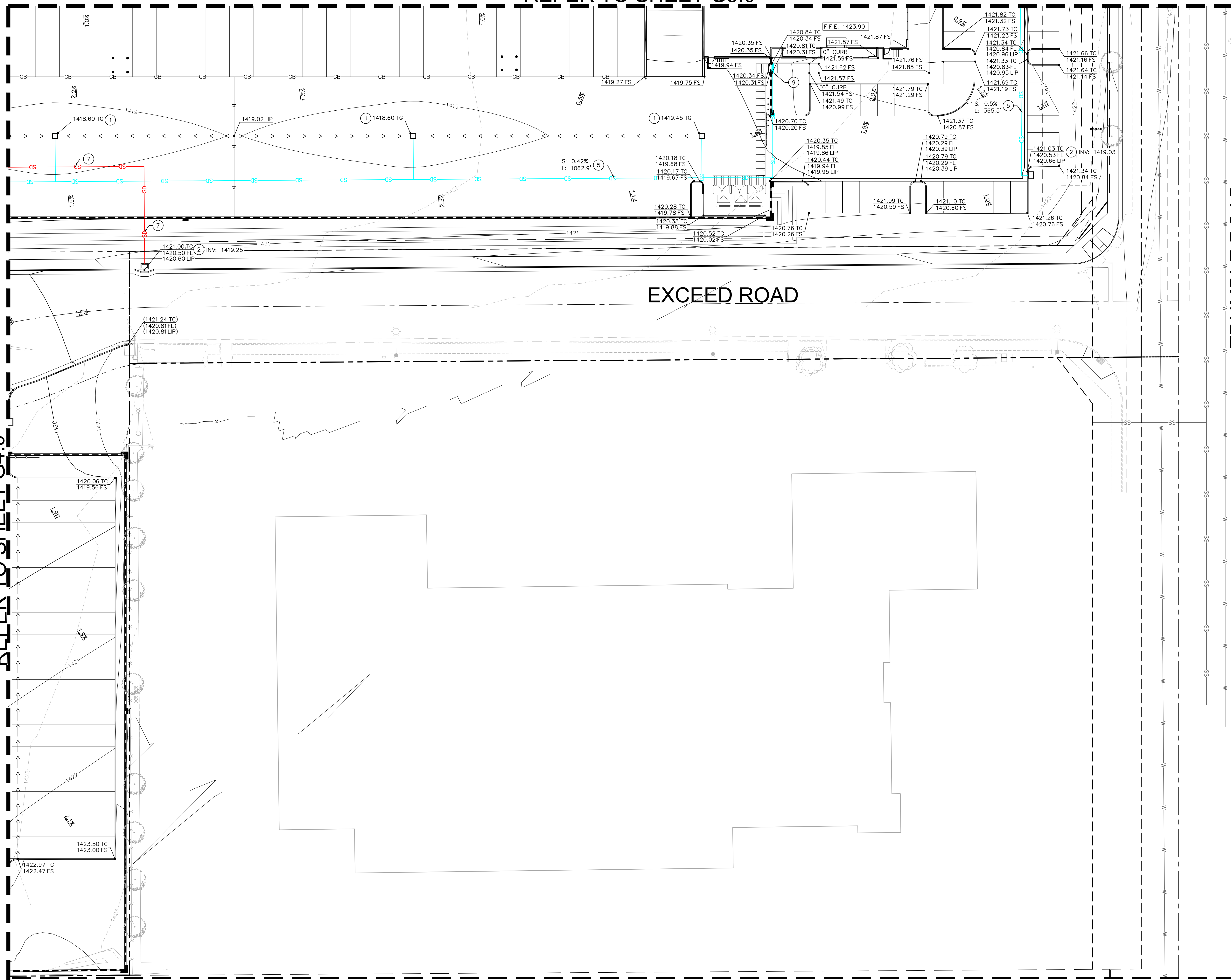
DATUM HAS BEEN ADJUSTED BY ORIGINAL SURVEYOR TO OPUS NAVD83 DATUM. DATUM HAS BEEN ESTIMATED TO BE ACCURATE TO THE 0.18' OF THE COUNTRY BENCHMARK.

DRAINAGE STATEMENT

STORMWATER RUNOFF GENERATED ONSITE WILL BE CAPTURED BY THE PROPOSED GRATE INLETS AND CATCH BASINS. FROM THERE WATER WILL BE ROUTED VIA PROPOSED STORM DRAIN PIPE INTO THE PROPOSED UNDERGROUND WATER TREATMENT/STORAGE TANKS. WATER AFTER LEAVING THE TANKS WILL DRAIN VIA PROPOSED STORM DRAIN PIPE INTO AN EXISTING OFFSITE CATCH BASIN THAT DRAINS OUT INTO AN EXISTING NATURALLY VEGETATED CHANNEL. THE FLOW TO THE EXISTING CATCH BASIN SHALL NOT EXCEED THE EXISTING HYDROLOGY CONDITIONS.

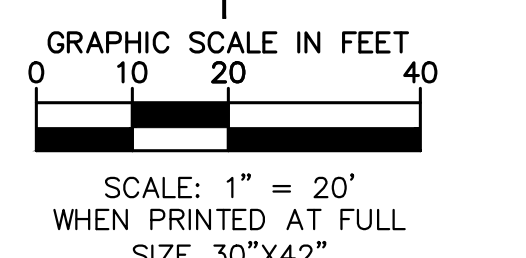
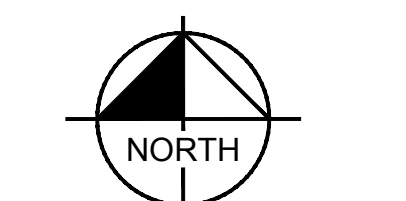
DRAINAGE NOTES

- 1 PROPOSED STORM DRAIN INLET.
- 2 PROPOSED CURB OPENING CATCH BASIN.
- 3 PROPOSED MODULAR WETLAND SYSTEM.
- 4 PROPOSED WATER STORAGE TANK.
- 5 PROPOSED STORM DRAIN LINE.
- 6 PROPOSED STORM DRAIN MANHOLE.
- 7 PROPOSED OFFSITE STORM DRAIN LINE.
- 8 PROPOSED CONNECTION TO EXISTING CATCH BASIN.
- 9 PROPOSED TRAFFIC RATED TRENCH DRAIN.



TRUMBLE ROAD

REFER TO SHEET G4.0



No.	REVISIONS	DATE	BY

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KHA PROJECT	
DATE	
SCALE AS SHOWN	
DESIGNED BY	JR
DRAWN BY	JR
CHECKED BY	JG

**MAPES & TRUMBLE INDUSTRIAL FACILITY**  
PREPARED FOR  
**BLUE ARCH INVESTMENTS**

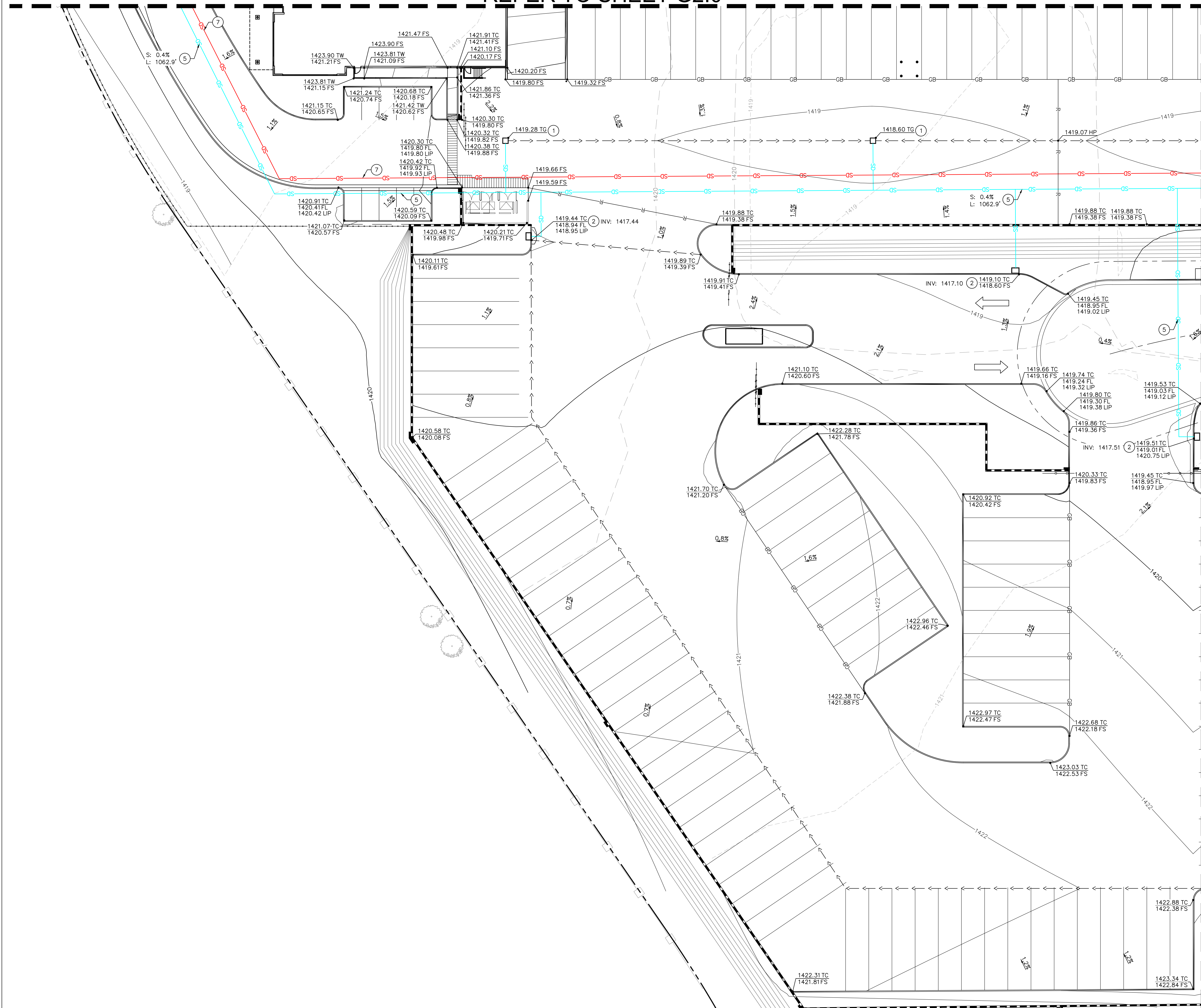
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CA

PRELIMINARY GRADING PLAN 4  
**G5.0**

SHEET NUMBER



REFER TO SHEET G2.0



REFER TO SHEET G5.0

**LEGEND**

- EXISTING PROPERTY LINE
- PROPOSED DEDICATED PROPERTY LINE
- EXISTING EASEMENT LINE
- STREET CENTERLINE
- SETBACK LINE
- SD PROPOSED ONSITE STORM DRAIN LINE
- OS PROPOSED OFFSITE STORM DRAIN LINE
- 1419 PROPOSED CONTOURS
- 1419 EXISTING CONTOURS
- TR TOP OF RAMP
- TW TOP OF WALL
- TC TOP OF CURB
- FS FINISHED SURFACE
- TS TOP OF STAIRS
- BS BOTTOM OF STAIRS
- (1419.50 TC) EXISTING GRADE (1419.00 FS)
- 1419.50 TC PROPOSED GRADE 1419.00 FS
- FLOW LINE
- GB GRADE BREAK LINE
- R RIDGE LINE

**DATUM NOTES**

DATUM HAS BEEN ADJUSTED BY ORIGINAL SURVEYOR TO OPUS NAVD88 DATUM. DATUM HAS BEEN ESTIMATED TO BE ACCURATE TO THE 0.18' OF THE COUNTRY BENCHMARK.

**DRAINAGE STATEMENT**

STORMWATER RUNOFF GENERATED ONSITE WILL BE CAPTURED BY THE PROPOSED GRATE INLETS AND CATCH BASINS. FROM THERE WATER WILL BE ROUTED VIA PROPOSED STORM DRAIN PIPE INTO THE PROPOSED UNDERGROUND WATER TREATMENT/STORAGE TANKS. WATER AFTER LEAVING THE TANKS WILL DRAIN VIA PROPOSED STORM DRAIN PIPE INTO AN EXISTING OFFSITE CATCH BASIN THAT DRAINS OUT INTO AN EXISTING NATURALLY VEGETATED CHANNEL. THE FLOW TO THE EXISTING CATCH BASIN SHALL NOT EXCEED THE EXISTING HYDROLOGY CONDITIONS.

**DRAINAGE NOTES**

- ① PROPOSED STORM DRAIN INLET.
- ② PROPOSED CURB OPENING CATCH BASIN.
- ③ PROPOSED MODULAR WETLAND SYSTEM.
- ④ PROPOSED WATER STORAGE TANK.
- ⑤ PROPOSED STORM DRAIN LINE.
- ⑥ PROPOSED STORM DRAIN MANHOLE.
- ⑦ PROPOSED OFFSITE STORM DRAIN LINE.
- ⑧ PROPOSED CONNECTION TO EXISTING CATCH BASIN.
- ⑨ PROPOSED TRAFFIC RATED TRENCH DRAIN.

No.	REVISIONS	DATE	BY

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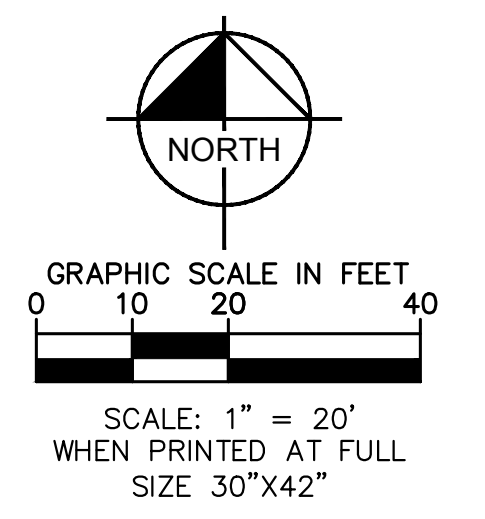
KHA PROJECT  
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 PREPARED FOR  
**BLUE ARCH INVESTMENTS**

LICENSED PROFESSIONAL  
 CA

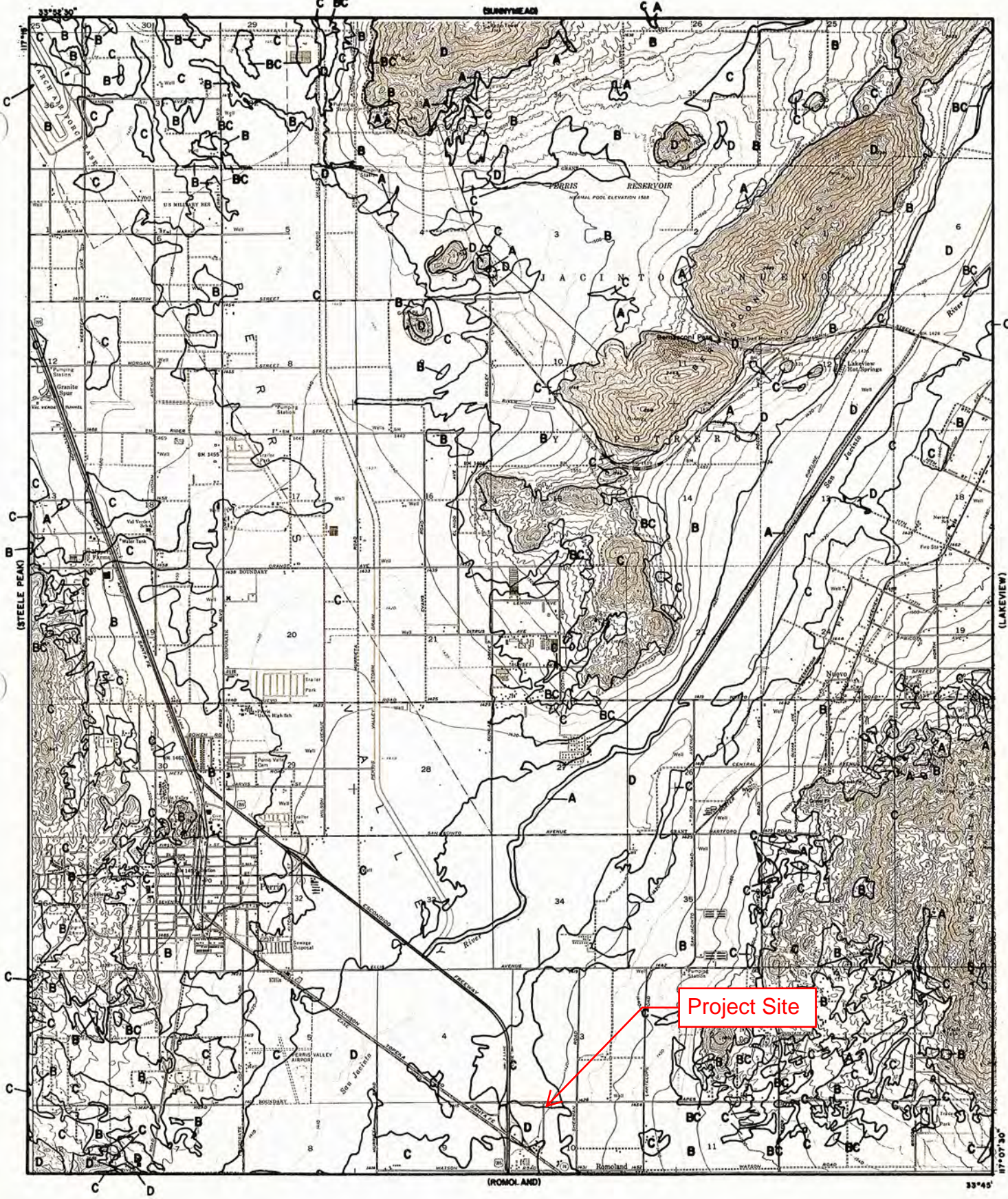
**PRELIMINARY GRADING PLAN 3**

SHEET NUMBER  
**G4.0**



## **Appendix D**



### **Hydrology Manual and Other Reference Material**



**LEGEND**

— SOILS GROUP BOUNDARY  
 A SOILS GROUP DESIGNATION

**RCFC & WCD**  
 HYDROLOGY MANUAL

  
  
 0 FEET 5000

**HYDROLOGIC SOILS GROUP MAP  
 FOR  
 PERRIS**

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group			
		A	B	C	D
<u>NATURAL COVERS -</u>					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	72	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	28	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
<u>URBAN COVERS -</u>					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
<u>AGRICULTURAL COVERS -</u>					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

**RCFC & WCD**  
HYDROLOGY MANUAL

RUNOFF INDEX NUMBERS  
FOR  
PERVIOUS AREA

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group			
		A	B	C	D
<u>AGRICULTURAL COVERS</u> (cont.) -					
Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Deciduous (Apples, apricots, pears, walnuts, etc.)		See Note 4			
Orchards, Evergreen (Citrus, avocados, etc.)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland (Annual grasses)	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Pasture, Irrigated (Legumes and perennial grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops (Field crops - tomatoes, sugar beets, etc.)	Poor	72	81	88	91
	Good	67	78	85	89
Small Grain (Wheat, oats, barley, etc.)	Poor	65	76	84	88
	Good	63	75	83	87
Vineyard		See Note 4			

Notes:

1. All runoff index (RI) numbers are for Antecedent Moisture Condition (AMC) II.
2. Quality of cover definitions:  
 Poor-Heavily grazed or regularly burned areas. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.  
 Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.  
 Good-Heavy or dense cover with more than 75 percent of the ground surface protected.
3. See Plate C-2 for a detailed description of cover types.
4. Use runoff index numbers based on ground cover type. See discussion under "Cover Type Descriptions" on Plate C-2.
5. Reference Bibliography item 17.

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HYDROLOGY MANUAL

**RUNOFF INDEX NUMBERS  
FOR  
PERVIOUS AREA**

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent (2)
Natural or Agriculture	0 - 10	0
Single Family Residential: (3)		
40,000 S. F. (1 Acre) Lots	10 - 25	20
20,000 S. F. (½ Acre) Lots	30 - 45	40
7,200 - 10,000 S. F. Lots	45 - 55	50
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 -100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.
2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area should always be made, and a review of aerial photos, where available may assist in estimating the percentage of impervious cover in developed areas.
3. For typical horse ranch subdivisions increase impervious area 5 percent over the values recommended in the table above.

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HYDROLOGY MANUAL

**IMPERVIOUS COVER  
FOR  
DEVELOPED AREAS**

## RUNOFF COEFFICIENT CURVE DATA

The data in the following tables may be used to develop runoff coefficient (C) curves for any combination of runoff index (RI) number and antecedent moisture condition (AMC). For an RI number with an AMC of II (from Plate D-5.5) enter the tables on the following pages and plot the "C" curve data directly on Plate D-5.8. "C" curve data is given for even RI numbers only, but values may easily be interpolated for odd RI numbers.

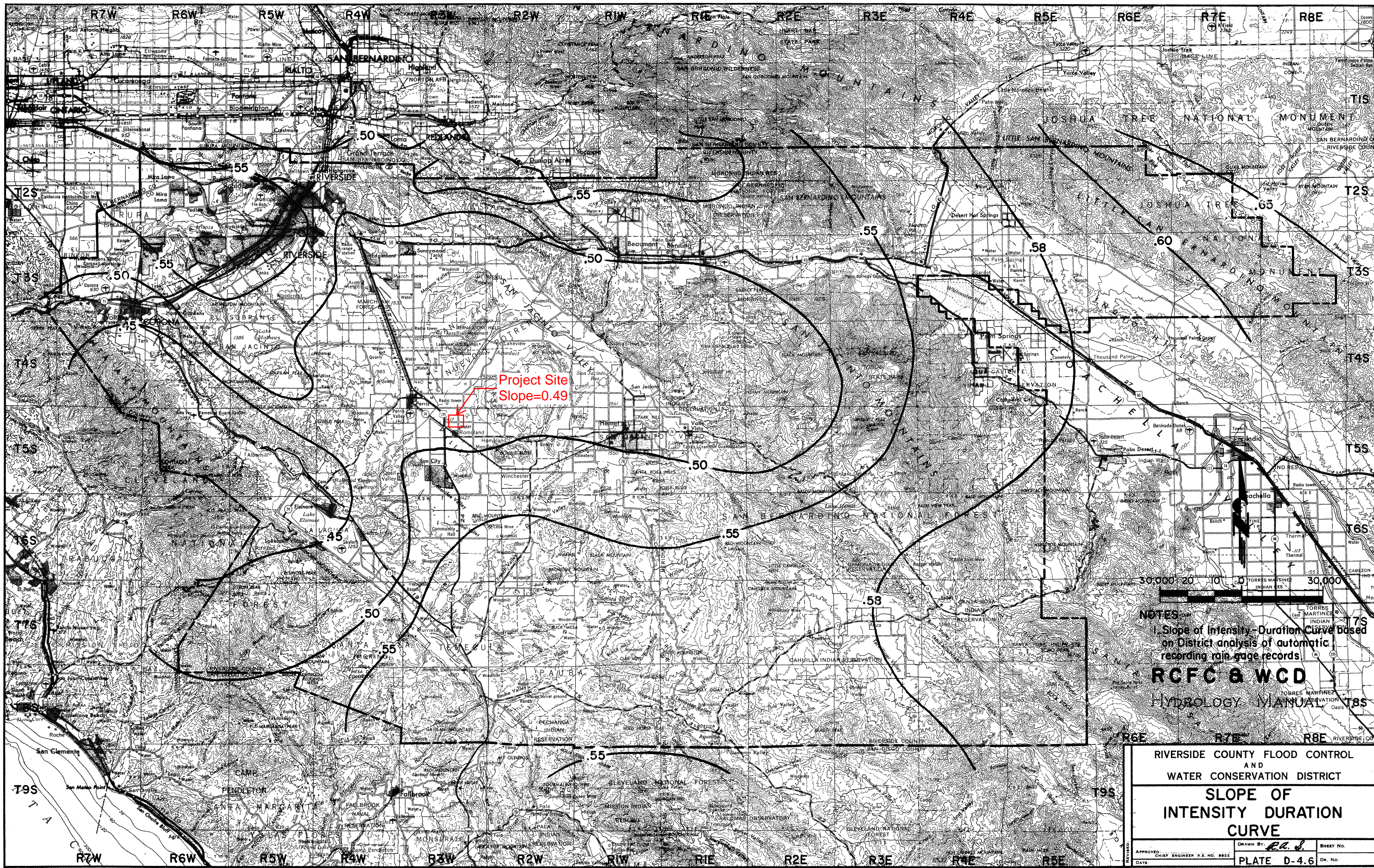
For an AMC of I or III enter the tabulation on this page with the RI for AMC II, and read the appropriate RI for AMC I or III. Use this revised RI to enter the tables on the following pages to determine "C". For example if RI = 40 for AMC II, then RI = 22 for AMC I and RI = 60 for AMC III.

### AMC ADJUSTMENT RELATIONSHIPS

RI FOR AMC II	RI FOR OTHER AMC CONDITIONS:		RI FOR AMC II	RI FOR OTHER AMC CONDITIONS:	
	AMC I	AMC III		AMC I	AMC III
10	--	22	55	35	74
11	--	24	56	36	75
12	--	25	57	37	75
13	--	27	58	38	76
14	--	28	59	39	77
15	--	30	60	40	78
16	--	31	61	41	78
17	--	33	62	42	79
18	--	34	63	43	80
19	--	36	64	44	81
20	--	37	65	45	82
21	10	38	66	46	82
22	10	39	67	47	83
23	11	41	68	48	84
24	11	42	69	50	84
25	12	43	70	51	85
26	12	44	71	52	86
27	13	46	72	53	86
28	14	47	73	54	87
29	14	49	74	55	88
30	15	50	75	57	88
31	16	51	76	58	89
32	16	52	77	59	89
33	17	53	78	60	90
34	18	54	79	62	91
35	18	55	80	63	91
36	19	56	81	64	92
37	20	57	82	66	92
38	21	58	83	67	93
39	21	59	84	68	93
40	22	60	85	70	94
41	23	61	86	72	94
42	24	62	87	73	95
43	25	63	88	75	95
44	25	64	89	76	96
45	26	65	90	78	96
46	27	66	91	80	97
47	28	67	92	81	97
48	29	68	93	83	98
49	30	69	94	85	98
50	31	70	95	87	98
51	31	70	96	89	99
52	32	71	97	91	99
53	33	72	98	94	99
54	34	73	99	97	--

**RCFC & WCD**  
HYDROLOGY MANUAL

RUNOFF COEFFICIENT  
CURVE DATA



Project Site  
Slope=0.49

NOTES:  
1. Slope of Intensity-Duration Curve Based on District analysis of automatic recording rain-gage records.

**RCFC & WCD**  
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
<b>SLOPE OF INTENSITY DURATION CURVE</b>		
APPROVED: _____ CHIEF ENGINEER P.E. NO. 8822	DRAWN BY: <i>R.C.S.</i>	SHEET NO. _____
DATE: _____	PLATE D-4.6	DR. NO. _____



**Appendix E**  
**NOAA Rainfall Data**



**NOAA Atlas 14, Volume 6, Version 2**  
**Location name: Perris, California, USA\***  
**Latitude: 33.7576°, Longitude: -117.1847°**  
**Elevation: 1421.99 ft\*\***



\* source: ESRI Maps  
 \*\* source: USGS

**POINT PRECIPITATION FREQUENCY ESTIMATES**

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Tryppaluk, 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**

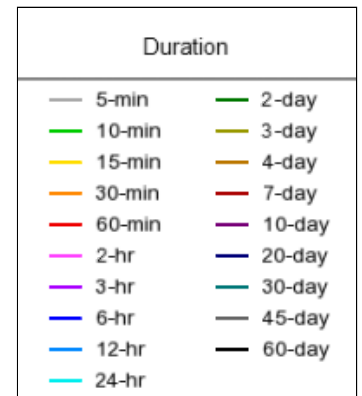
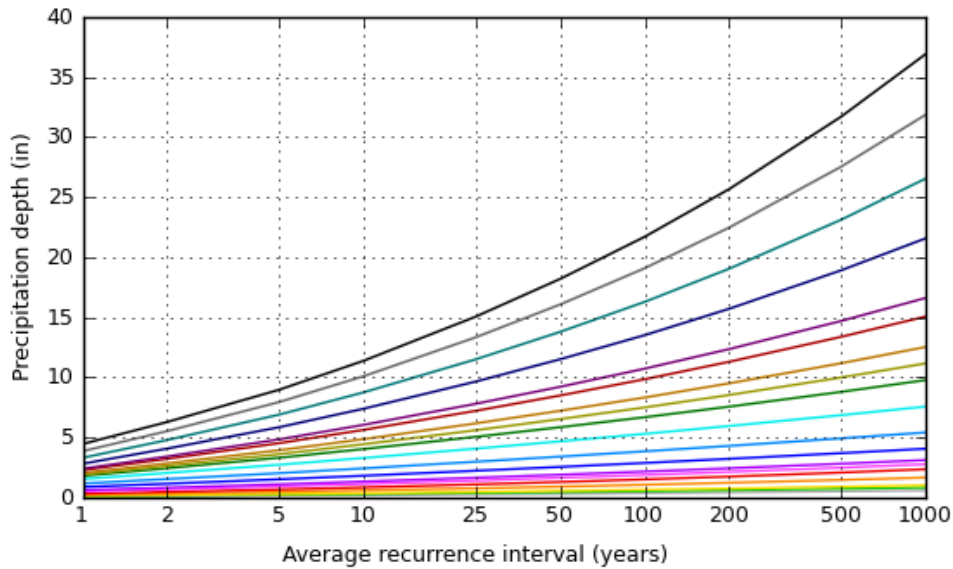
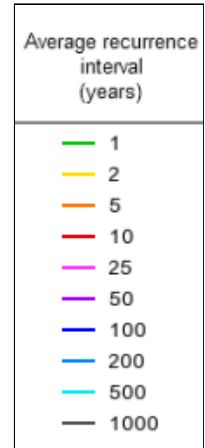
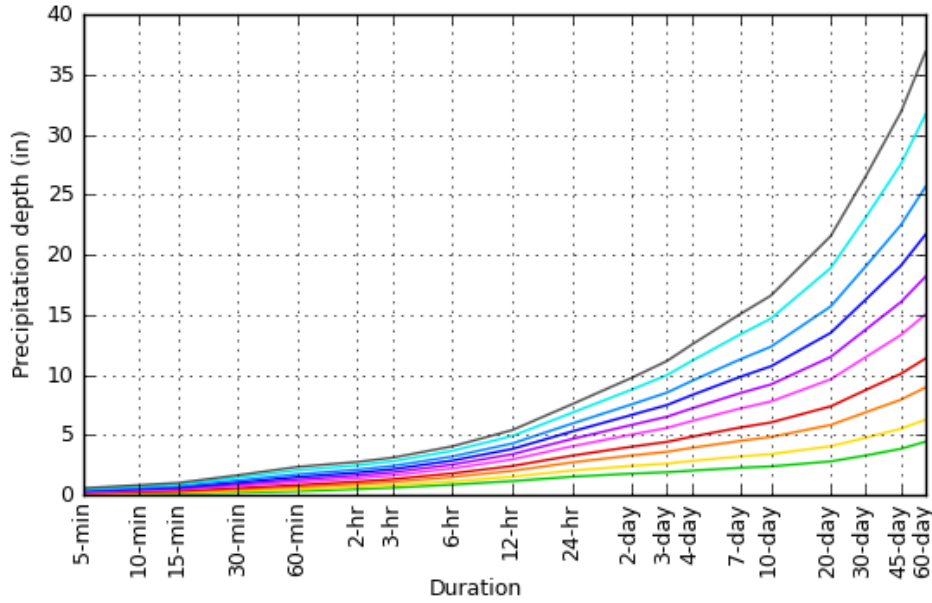
<b>PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)<sup>1</sup></b>										
<b>Duration</b>	<b>Average recurrence interval (years)</b>									
	<b>1</b>	<b>2</b>	<b>5</b>	<b>10</b>	<b>25</b>	<b>50</b>	<b>100</b>	<b>200</b>	<b>500</b>	<b>1000</b>
<b>5-min</b>	<b>0.086</b> (0.072-0.104)	<b>0.123</b> (0.103-0.148)	<b>0.173</b> (0.144-0.210)	<b>0.216</b> (0.179-0.265)	<b>0.279</b> (0.222-0.353)	<b>0.329</b> (0.257-0.426)	<b>0.384</b> (0.292-0.509)	<b>0.442</b> (0.327-0.605)	<b>0.527</b> (0.373-0.753)	<b>0.597</b> (0.407-0.883)
<b>10-min</b>	<b>0.124</b> (0.104-0.149)	<b>0.176</b> (0.147-0.213)	<b>0.248</b> (0.207-0.301)	<b>0.310</b> (0.256-0.379)	<b>0.399</b> (0.319-0.506)	<b>0.472</b> (0.368-0.611)	<b>0.550</b> (0.418-0.730)	<b>0.634</b> (0.468-0.867)	<b>0.755</b> (0.534-1.08)	<b>0.855</b> (0.583-1.27)
<b>15-min</b>	<b>0.150</b> (0.125-0.181)	<b>0.213</b> (0.178-0.257)	<b>0.300</b> (0.250-0.364)	<b>0.375</b> (0.310-0.459)	<b>0.483</b> (0.385-0.612)	<b>0.571</b> (0.446-0.739)	<b>0.665</b> (0.506-0.883)	<b>0.767</b> (0.566-1.05)	<b>0.913</b> (0.646-1.30)	<b>1.03</b> (0.705-1.53)
<b>30-min</b>	<b>0.242</b> (0.203-0.292)	<b>0.344</b> (0.288-0.416)	<b>0.486</b> (0.405-0.589)	<b>0.607</b> (0.501-0.742)	<b>0.782</b> (0.624-0.990)	<b>0.924</b> (0.721-1.20)	<b>1.08</b> (0.818-1.43)	<b>1.24</b> (0.916-1.70)	<b>1.48</b> (1.05-2.11)	<b>1.67</b> (1.14-2.48)
<b>60-min</b>	<b>0.343</b> (0.287-0.413)	<b>0.487</b> (0.407-0.589)	<b>0.687</b> (0.572-0.833)	<b>0.858</b> (0.709-1.05)	<b>1.11</b> (0.882-1.40)	<b>1.31</b> (1.02-1.69)	<b>1.52</b> (1.16-2.02)	<b>1.75</b> (1.30-2.40)	<b>2.09</b> (1.48-2.99)	<b>2.37</b> (1.61-3.50)
<b>2-hr</b>	<b>0.511</b> (0.428-0.617)	<b>0.691</b> (0.578-0.835)	<b>0.934</b> (0.779-1.13)	<b>1.14</b> (0.941-1.39)	<b>1.43</b> (1.14-1.81)	<b>1.65</b> (1.29-2.14)	<b>1.89</b> (1.44-2.51)	<b>2.14</b> (1.58-2.93)	<b>2.50</b> (1.77-3.57)	<b>2.78</b> (1.90-4.12)
<b>3-hr</b>	<b>0.628</b> (0.526-0.758)	<b>0.834</b> (0.697-1.01)	<b>1.11</b> (0.926-1.35)	<b>1.34</b> (1.11-1.64)	<b>1.66</b> (1.32-2.10)	<b>1.91</b> (1.49-2.47)	<b>2.17</b> (1.65-2.89)	<b>2.45</b> (1.81-3.35)	<b>2.83</b> (2.00-4.04)	<b>3.13</b> (2.13-4.63)
<b>6-hr</b>	<b>0.890</b> (0.745-1.08)	<b>1.17</b> (0.974-1.41)	<b>1.53</b> (1.27-1.85)	<b>1.83</b> (1.51-2.24)	<b>2.24</b> (1.79-2.84)	<b>2.56</b> (2.00-3.31)	<b>2.89</b> (2.20-3.84)	<b>3.23</b> (2.39-4.42)	<b>3.70</b> (2.62-5.29)	<b>4.07</b> (2.78-6.03)
<b>12-hr</b>	<b>1.18</b> (0.990-1.43)	<b>1.55</b> (1.30-1.88)	<b>2.04</b> (1.70-2.47)	<b>2.44</b> (2.02-2.98)	<b>2.99</b> (2.38-3.79)	<b>3.42</b> (2.67-4.42)	<b>3.85</b> (2.93-5.12)	<b>4.31</b> (3.18-5.89)	<b>4.93</b> (3.49-7.05)	<b>5.42</b> (3.70-8.03)
<b>24-hr</b>	<b>1.55</b> (1.37-1.79)	<b>2.06</b> (1.82-2.38)	<b>2.74</b> (2.41-3.17)	<b>3.30</b> (2.89-3.85)	<b>4.08</b> (3.45-4.91)	<b>4.68</b> (3.89-5.76)	<b>5.31</b> (4.30-6.69)	<b>5.96</b> (4.70-7.71)	<b>6.86</b> (5.20-9.24)	<b>7.58</b> (5.55-10.6)
<b>2-day</b>	<b>1.81</b> (1.60-2.09)	<b>2.45</b> (2.17-2.83)	<b>3.32</b> (2.93-3.85)	<b>4.05</b> (3.54-4.72)	<b>5.06</b> (4.28-6.10)	<b>5.86</b> (4.86-7.21)	<b>6.69</b> (5.42-8.43)	<b>7.57</b> (5.97-9.80)	<b>8.80</b> (6.66-11.9)	<b>9.78</b> (7.16-13.6)
<b>3-day</b>	<b>1.92</b> (1.70-2.22)	<b>2.64</b> (2.33-3.05)	<b>3.62</b> (3.19-4.19)	<b>4.45</b> (3.89-5.19)	<b>5.61</b> (4.75-6.76)	<b>6.53</b> (5.42-8.04)	<b>7.51</b> (6.08-9.45)	<b>8.54</b> (6.73-11.0)	<b>9.99</b> (7.57-13.5)	<b>11.2</b> (8.18-15.6)
<b>4-day</b>	<b>2.06</b> (1.82-2.37)	<b>2.86</b> (2.52-3.30)	<b>3.95</b> (3.48-4.57)	<b>4.87</b> (4.26-5.68)	<b>6.18</b> (5.23-7.45)	<b>7.23</b> (5.99-8.89)	<b>8.33</b> (6.75-10.5)	<b>9.51</b> (7.50-12.3)	<b>11.2</b> (8.47-15.1)	<b>12.5</b> (9.18-17.5)
<b>7-day</b>	<b>2.29</b> (2.03-2.64)	<b>3.23</b> (2.86-3.74)	<b>4.53</b> (3.99-5.25)	<b>5.64</b> (4.93-6.58)	<b>7.22</b> (6.11-8.70)	<b>8.49</b> (7.05-10.4)	<b>9.85</b> (7.98-12.4)	<b>11.3</b> (8.91-14.6)	<b>13.4</b> (10.1-18.0)	<b>15.1</b> (11.0-21.0)
<b>10-day</b>	<b>2.41</b> (2.13-2.78)	<b>3.43</b> (3.03-3.96)	<b>4.85</b> (4.27-5.61)	<b>6.06</b> (5.30-7.07)	<b>7.80</b> (6.61-9.41)	<b>9.22</b> (7.65-11.3)	<b>10.7</b> (8.69-13.5)	<b>12.4</b> (9.74-16.0)	<b>14.7</b> (11.1-19.8)	<b>16.6</b> (12.2-23.1)
<b>20-day</b>	<b>2.82</b> (2.50-3.26)	<b>4.08</b> (3.61-4.72)	<b>5.86</b> (5.16-6.78)	<b>7.40</b> (6.47-8.64)	<b>9.65</b> (8.17-11.6)	<b>11.5</b> (9.55-14.2)	<b>13.5</b> (10.9-17.0)	<b>15.7</b> (12.4-20.3)	<b>18.9</b> (14.3-25.5)	<b>21.6</b> (15.8-30.0)
<b>30-day</b>	<b>3.32</b> (2.93-3.83)	<b>4.80</b> (4.24-5.54)	<b>6.90</b> (6.08-8.00)	<b>8.76</b> (7.66-10.2)	<b>11.5</b> (9.73-13.9)	<b>13.8</b> (11.4-17.0)	<b>16.3</b> (13.2-20.5)	<b>19.0</b> (15.0-24.6)	<b>23.1</b> (17.5-31.1)	<b>26.5</b> (19.4-37.0)
<b>45-day</b>	<b>3.87</b> (3.42-4.46)	<b>5.54</b> (4.89-6.39)	<b>7.95</b> (7.00-9.21)	<b>10.1</b> (8.83-11.8)	<b>13.3</b> (11.3-16.1)	<b>16.1</b> (13.3-19.8)	<b>19.1</b> (15.5-24.0)	<b>22.5</b> (17.7-29.1)	<b>27.5</b> (20.8-37.1)	<b>31.8</b> (23.3-44.4)
<b>60-day</b>	<b>4.46</b> (3.95-5.15)	<b>6.30</b> (5.56-7.27)	<b>8.97</b> (7.91-10.4)	<b>11.4</b> (9.95-13.3)	<b>15.0</b> (12.7-18.1)	<b>18.2</b> (15.1-22.4)	<b>21.7</b> (17.6-27.3)	<b>25.7</b> (20.2-33.2)	<b>31.7</b> (24.0-42.7)	<b>36.9</b> (27.0-51.4)

<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**

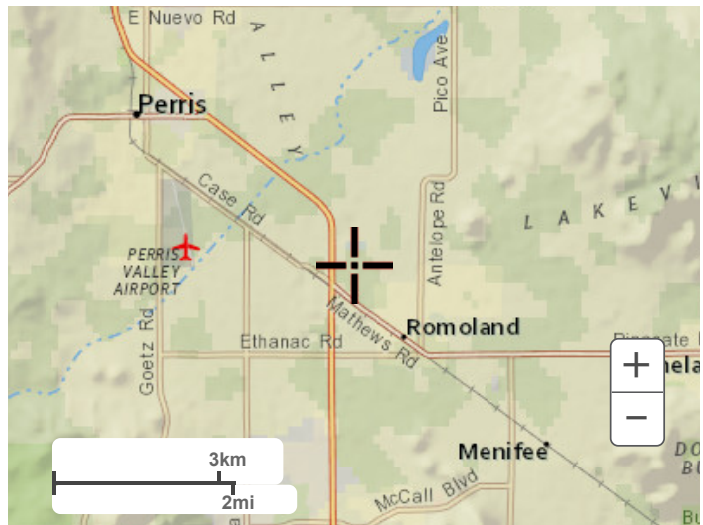
PDS-based depth-duration-frequency (DDF) curves  
 Latitude: 33.7576°, Longitude: -117.1847°



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**Maps & arials**

**Small scale terrain**



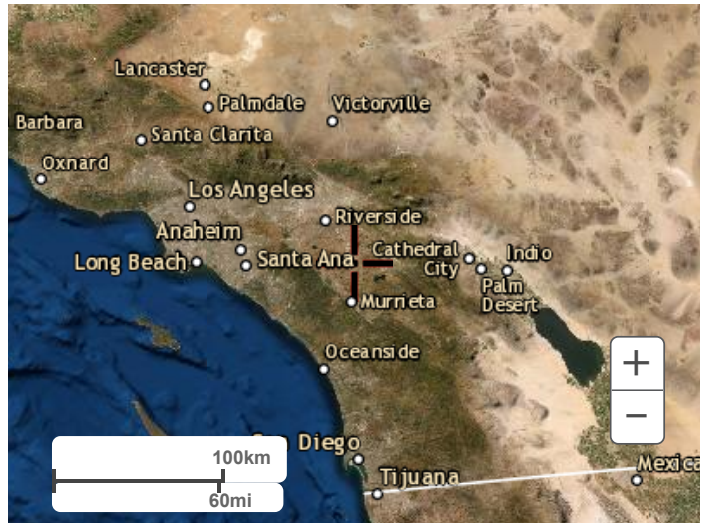
Large scale terrain



Large scale map



Large scale aerial



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1325 East West Highway  
Silver Spring, MD 20910  
Questions?: [HDSC.Questions@noaa.gov](mailto:HDSC.Questions@noaa.gov)

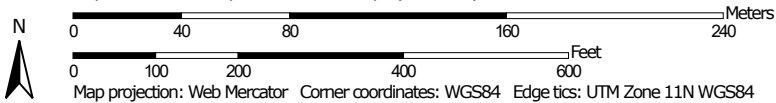
[Disclaimer](#)

**Appendix F**  
**Soils Reports**

Hydrologic Soil Group—Western Riverside Area, California



Map Scale: 1:2,790 if printed on A landscape (11" x 8.5") sheet.



## MAP LEGEND

### Area of Interest (AOI)









 Area of Interest (AOI)

### Soils

#### Soil Rating Polygons





 A  
 A/D  
 B  
 B/D  
 C  
 C/D  
 D  
 Not rated or not available

#### Soil Rating Lines


 A  
 A/D  
 B  
 B/D  
 C  
 C/D  
 D  
 Not rated or not available

#### Soil Rating Points

 A  
 A/D  
 B  
 B/D

 C  
 C/D  
 D  
 Not rated or not available


### Water Features

 Streams and Canals

### Transportation

 Rails  
 Interstate Highways  
 US Routes  
 Major Roads  
 Local Roads

### Background

 Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

**Warning:** Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL:  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Western Riverside Area, California  
 Survey Area Data: Version 14, Sep 13, 2021

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

Date(s) aerial images were photographed: May 25, 2019—Jun 25, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.



## Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
EnA	Exeter sandy loam, 0 to 2 percent slopes	C	0.0	0.0%
EwB	Exeter very fine sandy loam, 0 to 5 percent slopes	C	0.0	0.1%
MaA	Madera fine sandy loam, 0 to 2 percent slopes	D	37.9	99.9%
<b>Totals for Area of Interest</b>			<b>37.9</b>	<b>100.0%</b>

### Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

## Rating Options

*Aggregation Method: Dominant Condition*

*Component Percent Cutoff: None Specified*

*Tie-break Rule: Higher*

REPORT OF  
GEOTECHNICAL INVESTIGATION AND PERCOLATION TESTING  
PROPOSED COMMERCIAL/WAREHOUSE BUILDING PROJECT  
APN: 329-020-033, 034, 044, 046  
SOUTHWEST CORNER OF TRUMBLE ROAD AND MAPES ROAD  
PERRIS, CALIFORNIA 92571

FOR  
BLUE MARQUISE INVESTMENTS, LLC

PROJECT NO. 21-673-02

DECEMBER 10, 2021



December 10, 2021

21-673-02

Blue Marquise Investments, LLC  
6300 Wilshire Blvd, Suite 1420  
Los Angeles, California 90048

Attention: Mr. Kamran Benji

Subject: Geotechnical Investigation  
Proposed New Commercial/Warehouse Building Project  
APN: 329-020-033, 034, 044, 046  
Southwest Corner of Trumble Road and Mapes Road  
Perris, California 92571

Gentlemen:

## INTRODUCTION

This report presents the results of a geotechnical investigation and percolation testing for the subject project. During the course of this investigation, the engineering properties of the subsurface materials were evaluated in order to provide recommendations for design and construction of foundations and grading. The investigation included subsurface exploration, soil sampling, laboratory testing, engineering evaluation and analysis, consultation, and preparation of this report.

During the course of this investigation, the provided conceptual site plan was used as reference. The plan was prepared by the offices of HPA Architecture.

The enclosed Drawing No. 1, entitled Site Plan, shows the approximate locations of the exploratory borings in relation to the site boundaries and the proposed new building. This drawing also shows approximate location of test pits where percolation testing was performed.

Figure No. 1 shows the Site Vicinity Map. Figure No. 2 shows the Regional Topographic Map. Figure No. 3 shows the Regional Geologic Maps.

The attached Appendix I, describes the method of field exploration. Figure Nos. I-1 and I-10 present summaries of the soils encountered at the location of our exploratory borings. Figure No. I-11 presents a key to the log of exploratory borings.

Appendix II describes the laboratory testing procedures. Figure Nos. II-1 and II-2 present the results of direct shear and consolidation tests performed on selected undisturbed samples.

### **PROJECT CONSIDERATIONS**

It is our understanding that the proposed project will consist of construction of a new commercial warehouse building at the subject site. The proposed development will consist of offices and warehouse totaling 427,320 square feet.

The proposed building is expected to be a one-story steel frame structure. The flooring system will be in a form of concrete grade slabs established at or near the present grade. No basement is planned.

Parking for the proposed facility will be provided in a form of open parking lot. Some 400 parking spaces will be provided. The setback from Mapes and Trumble roads is expected to be 10 feet. The approximate location of the proposed building and parking with respect to the site boundaries is shown on the enclosed Site Plan; Drawing No. 1.

Structural loading data was not available during the course of preparation of this report. For the purpose of this report, however, it is assumed that the magnitude of the collected load would be on the order of 100 kips, combined dead, plus frequently applied live loads. Wall loads are expected to be on the order of 10 kips per lineal foot.

### **ANTICIPATED SITE GRADING WORK**

Site grading for the proposed project will involve removal and recompaction of the existing fill. As part of the site grading work, some utility trenches will be backfilled.

In the building area, the zone of removal should be extended beyond the exterior walls of the proposed building a horizontal distance equal to the thickness of removal. The recompacted fill will be used for support of structural foundations and grade slabs. Debris and rocks larger than 4 inches in diameter should be excluded from the areas of new compacted fill.

The removal and recompaction of the fill in parking lot areas can be limited to 12 inches. The remaining 12 inches of the fill should be scarified and compacted in-place.

The excavated materials from the site may be reused in the areas of compacted fill. Note that some 10 percent shrinkage should be assumed when reusing the existing fill in the areas of new compacted fill. Therefore, import soils will be required to accomplish the site grading work. All imported soils should be non-expansive and granular in nature.

The existing fill were found to be fine grained in nature and potentially expansive. Such soils, where reused in the areas of new fill, should be placed back at some 3 percent higher than the optimum moisture content. The grade slabs also should be designed for expansive soil conditions.

## **SITE CONDITIONS**

### **SITE SURFACE CONDITIONS**

The site of the proposed development is located on Southwest corner of Trumble Road and Mapes Road in Perris, California. The site is irregular in shape and covers a plan area of 20.7 acres (902,107 square feet). See the enclosed Site Plan; Drawing No. 1 for the site location.

At the time of our investigation, the site was vacant. The site is slightly sloped down in the northwest direction. No slope occurs in the close vicinity of the subject site.

### **SUBSURFACE CONDITIONS**

Correlation of the subsoil between the test borings was considered to be good. Generally, the site, to the depths explored, was found to be covered with surficial fill consisting of silty sand underlain by predominantly sandy soils with little to no fines and variable amounts of gravel. Thickness of the surficial fill was found to be on the order of 2 to 3 feet in our borings. Deeper fill, however, may be present beneath the existing structures and in old utility lines.

The existing fill should not be used for support of new fill, structural foundations, and grade slabs at their present state. Such soils, however, can be excavated and reused in the areas of new compacted fill, provided that any debris and rocks larger than 4 inches in diameter are removed.

The underlying native soils were found to be medium dense to dense in-place and adequate to receive new fill for support of grade slabs and structural foundations. The results of our laboratory testing indicated that the site native soils within the zone of influence of foundation pressure were of relatively high strength and low compression.

The existing fill were found to be fine grained in nature and potentially expansive. The expansion index of the existing fill was found to be 42.

During the course of our field investigation, no water was found in our borings drilled to a maximum depth of 21 feet. The State Maps for Perris Quadrangle are not available to show the historically highest groundwater level in the vicinity of the subject site. It is estimated that it can be greater than 100 feet below ground surface.

Due to the method of drilling (use of continuous auger) caving was not detected during the course of our field exploration. Because the site upper soils have appreciable amounts of fines, forming is expected not to be necessary during foundation construction.

### SEISMIC DESIGN CONSIDERATIONS

In accordance with the ASCE7-16, corresponding to California Building Code (CBC 2019), the project site can be classified as site "D". The mapped spectral accelerations of  $S_s = 1.434$  (short period) and  $S_1 = 0.533$  (1-second period) can be used for this project. These parameters correspond to site Coefficients values of  $F_a = 1.0$  and  $F_v = \text{null}$  (see the Note below), respectively.

The seismic design parameters would be as follows:

$S_{MS} = F_a (S_s) = 1.0 (1.434) = 1.434$	$S_{M1} = F_v (S_1) = \text{null (see Note below)}$
$S_{DS} = 2/3 (S_{MS}) = 2/3 (1.434) = 0.956$	$S_{D1} = 2/3 (S_{M1}) = \text{null (see Note below)}$

Note: Since the seismic factor  $S_1$  is greater than 0.2 site-specific ground motion hazard analyses may be required. The project structural engineer shall determine if an exemption can be applied in accordance with ASCE7-16 Section 11.4.8. If an exemption applies, a long period coefficient ( $F_v$ ) of 1.7 may be utilized for calculation of the seismic parameters  $S_{M1}$  and  $S_{D1}$  in the above Table.

## **DISCUSSION OF LIQUEFACTION POTENTIAL**

During the course of our investigation, no groundwater was found in our borings to the maximum depth of 21 feet explored. The State Maps for Perris Quadrangle are not available to show the historically highest groundwater level in the vicinity of the subject site. It is estimated that it can be greater than 100 feet below ground surface. Additionally, Perris area is not a designated liquefaction zone. On this basis, it is our opinion that soil liquefaction will not occur at the subject site.

### **STATEMENT 111**

For the purpose of the subject project, it is our opinion that when the proposed grading and construction is made as planned, following the recommendations of this report, the site will be safe against the hazards of landsliding, settlement or slippage. The proposed construction and grading will not have adverse effect on the geologic stability of the existing properties outside the boundaries of the subject site.

## **SOIL CHEMICAL IMPURITIES AND CORROSION CONSIDERATIONS**

After the proposed finished grades are established, samples of the subgrade materials in contact with foundations and utility lines should be tested for chemical impurity (soil corrosivity). For the purpose of this report, however, it should be assumed that the site soils are corrosive. Subject to the results of chemical testing during construction, the design may be changed.

## **EVALUATION AND RECOMMENDATIONS**

### **GENERAL**

Based on the geotechnical engineering data derived from this investigation, the site can be developed as planned. The existing fill soils are considered to be inadequate for support of new fill, structural foundations, grade slabs at their present state. Such fill soils, however, can be excavated and reused in the areas of new fill. The zone of removal should be extended beyond the exterior walls of the proposed building a horizontal distance equal to the thickness of removal. The new fill will be used for support of grade slabs and foundations.

The existing fill were found to be fine grained in nature and potentially expansive. Such soils, where reused in the areas of new fill, should be placed back at



some 3 percent higher than the optimum moisture content. The grade slabs also should be designed for expansive soil conditions.

After proper site grading, conventional spread footing foundation system can be used for support of the proposed building. The foundation bearing materials should consist of medium dense to dense native and/or properly compacted fill soils.

Grade slabs can be supported on the finished grades which would be properly compacted granular fill soils. Due to potentially expansive character of the site upper soils, it is recommended that the concrete grade slabs for this project to have a minimum section of 5 inches and be reinforced with #4 bars placed at every 16 inches on center, each way. In the areas of pedestrian concrete walkways, the above recommendation can be changed to a minimum section of 4 inches.

The following sections present our specific recommendations for grading, site surface drainage, foundations, lateral design, grade slabs, temporary excavation, pavement design, and observations during construction.

## **GRADING RECOMMENDATIONS**

Site grading for the proposed project will involve removal and recompaction of the existing fill and utility trench backfilling. In the building area, the zone of removal should be extended beyond the exterior walls of the proposed building a horizontal distance equal to the thickness of removal. The recompacted fill will be used for support of structural foundations and grade slabs. Debris and rocks larger than 4 inches in diameter should be excluded from the areas of new compacted fill.

The removal and recompaction of the fill in the parking lot areas can be limited to 12 inches. The remaining 12 inches of the fill should be scarified and compacted in-place.

For utility trench backfill, place clean sand around and above the utility lines using jetting. The sand should be brought up to 12 inches above utility lines. Above the sand, normal soils from the site can be used. All utility backfills should be placed at a minimum relative compaction of 90% at optimum moisture content.

The excavated materials from the site may be reused in the areas of compacted fill. Note that some 10 percent shrinkage should be assumed when reusing the existing fill in the areas of new compacted fill. Therefore, import soils will be required to

accomplish the site grading work. All imported soils should be non-expansive and granular in nature.

The existing fill were found to be fine grained in nature and potentially expansive. Such soils, where reused in the areas of new fill, should be placed back at some 3 percent higher than the optimum moisture content. The grade slabs also should be designed for expansive soil conditions.

Prior to placement of any fill on the site, the Soil Engineer should observe the excavation bottoms. The areas to receive compacted fill should be scarified to a depth of about 8 inches and compacted to at least 90 percent of the maximum dry density as determined by the ASTM Designation D 1557 Compaction Method. The moisture content of the fine grained soils should be brought up to at least 3 percent higher than the optimum moisture content.

All import soils should be free of organic matter and rocks larger than 4 inches in diameter. Before import soils are brought to the site, a 40-pound sample of the proposed import soils should be submitted to the Soil Engineer (at least 48 hours in advance) so that the maximum density and expansion character of the import materials can be determined.

General guidelines regarding site grading are presented below in an itemized form which may be included in the earthwork specification. It is recommended that all fill be placed under engineering observation and in accordance with the following guidelines:

1. All vegetation and debris should be collected and hauled off-site. In the areas of new fill, the existing fill should be excavated until native soils are exposed.
2. The excavated areas should be observed and approved by the Soil Engineer prior to placing any fill.
3. The excavated sandy materials from the site are considered to be satisfactory for reuse in the compacted fill areas.
4. Fill material, approved by the Soil Engineer, should be placed in controlled layers. Each layer should be compacted to at least 90 percent of the maximum unit weight as determined by ASTM designation D 1557 for the material used.

5. The fill material shall be placed in layers which, when compacted, shall not exceed 8 inches per layer. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to insure uniformity of material in each layer.
6. When moisture content of the fill material is too low to obtain adequate compaction, water shall be added and thoroughly dispersed until the moisture content is near optimum.
7. When the moisture content of the fill material is too high to obtain adequate compaction, the fill material shall be aerated by blading or other satisfactory methods until near optimum moisture condition is achieved.
8. Inspection and field density tests should be conducted by the Soil Engineer during grading work to assure that adequate compaction is attained. Where compaction of less than 90 percent is indicated, additional compactive effort should be made with adjustment of the moisture content or layer thickness, as necessary, until at least 90 percent compaction is obtained.

## **SURFACE DRAINAGE**

Adequate site drainage should be provided to divert roof and surface waters away from the proposed building and from the property through non-erodible drainage devices. In no case should the surface waters be allowed to pond adjacent to the buildings or anywhere on the building pads. A minimum surface slope of one and two percent are recommended for paved and unpaved areas, respectively.

The site drainage recommendations should also include the following:

1. Having positive slope away from the buildings, as recommended above.
2. Installation of roof drains, area drains and catch basins with appropriate connecting lines.
3. Managing landscape watering.
4. Regular maintenance of the drainage devices.
5. Installing waterproofing or damp proofing, whichever appropriate, beneath concrete grade slabs.
6. The owners should be familiar with the general maintenance guidelines of the city requirements.

## **FOUNDATIONS**

Conventional spread footings can be used for support of the proposed building. The foundation bearing materials will be native and/or properly compacted fill soils.

New footings should be at least 18 inches wide and be placed at a minimum depth of 24 inches below the lowest adjacent final grades. Properly designed and constructed spread footings may be based on an allowable maximum bearing pressure of 2,200 pounds per square foot. This value can be increased at a rate of 100 and 200 pounds per square for each additional foot of footing width and depth, to a maximum value of 2,700 pounds per square foot.

The above given values are for the total of dead and frequently applied live loads. For short duration transient loading, such as wind or seismic forces, these values may be increased by one-third.

Under the allowable maximum soil pressure, footings with assumed collected loads of 100 kips is expected to settle about 5/8 of one inch. Wall footings, with loads of about 10 kips per lineal foot are expected to settle on the order of 1/2 of one inch. Maximum differential settlements are expected to be on the order of 1/4 of an inch. The major portions of the settlements are expected to occur during construction.

## **LATERAL DESIGN**

Lateral resistance at the base of footings in contact with native soils may be assumed to be the product of the dead load forces and a coefficient of friction of 0.35. Passive pressure on the face of footings may also be used to resist lateral forces. A passive pressure of zero at the finished grades and increasing at a rate of 250 pounds per square foot per foot of depth to a maximum value of 1,500 pounds per square foot may be used for footings poured against properly compacted fill soils.

## **GRADE SLABS**

New concrete grade slabs can be supported on the finished grades which would be properly compacted fill soils. Due to potentially expansive character of the site upper soils, it is recommended that new grade slabs for this project be at least 5 inches thick and be reinforced with # 4 bars placed at every 16 inches on center, each way.

For pedestrian concrete walkways, the above recommendation can be changed to a minimum section of 4 inches.

In the areas where moisture sensitive floor covering is used and slab dampness cannot be tolerated, a vapor-barrier should be used beneath the slabs. This normally consists of a 10-mil polyethylene film covered with 2 inches of clean sand.

## TEMPORARY EXCAVATION

**Unshored Excavations:** As part of the installation of underground utilities, temporary shoring will be made. Such cuts are expected to reach several feet. Based upon the engineering characteristics of the site upper soils, it is our opinion, as a minimum, that temporary excavation slopes in accordance with the following table should be used:

Maximum Depth of Cut (Ft)	Maximum Slope Ratio (Horizontal:Vertical)
0-3	Vertical
>3	1:1

Water should not be allowed to flow over the top of the excavation in an uncontrolled manner. No surcharge should be allowed within a 45-degree line drawn from the bottom of the excavation. Excavation surfaces should be kept moist but not saturated to retard raveling and sloughing during construction.

It would be advantageous, particularly during wet season construction, to place polyethylene plastic sheeting over the slopes. This will reduce the chances of moisture changes within the soil banks and material wash into the excavation.

**Shoring:** In lieu of shoring (1:1) the upper portion of the cuts exceeding 3 feet, cross bracing system can be used as shoring (underground utility trenches, etc.).

## PAVEMENT DESIGN

Using an assumed "R" value of 50, the minimum pavement section alternatives for Traffic Index (TI) values ranging from 4 to 7 were calculated. The results are shown on the enclosed Calculation Sheet.

The lower TI value of 4 is normally used for passenger cars, including pickup trucks. The higher TI value of 7 is normally used for heavier traffic (trucks, including garbage trucks).

The presumed R-value used for this project was for the upper soils which are sandy silt and silty sand. At the time of grading, a representative sample of soils should be tested to determine the actual "R" value and the recommended designed pavement section be modified as necessary.

Before pavement sections are placed, the surficial fill to a maximum depth of 12 inches should be removed and recompact. The remaining 12 inches of the fill should be scarified and compacted in-place. The new fill should be placed under engineering observation and testing, as presented in the preceding sections of this report.

This office should be notified if increased traffic loading condition is expected so that modification to the above given recommendations can be made. A Traffic Engineer should be consulted for design and use of proper pavement sections in the alley and roadway leading to parking entrances.

The base course should be compacted to a relative compaction of 95 percent per relative compaction. The soil engineer should verify the compaction degree of the pavement section subgrade and base course.

## **ON-SITE PERCOLATION TESTING**

### **Horizontal Drain System "Trench"**

The procedure for trench system design included performing the following tasks per the Administrative Manual County of Los Angeles Department of Public Works Geotechnical and Materials Engineering Division: Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration (GS200.2), at the subject site:

1. Excavate two test pits (TP-1 and TP-2) to a depth of about 4.5 feet.
2. Extending a one cubic foot (1' X 1' X 1') hole at the bases of the test pits.
3. Pre-saturating the one cubic foot hole prior to the percolation testing.
4. Determining time interval for recording water drop between readings by conducting standard water drop test over 10 minutes.

5. Once interval is determined, add water to 12 inches about bottom (starting water level must be this initial water depth);
6. Conduct percolation test by taking readings of water drop from initial water level per determined time interval.
7. Fill excavation back to initial water depth and record the time of filling.
8. Repeat percolation tests a minimum of eight times or until a stabilized rate of drop is obtained, whichever occurs first. (Stabilized rate in the highest and lowest readings within 10% of each other for three consecutive tests.);
9. Making engineering evaluation/analysis/calculations and report preparation.

Field percolation tests were conducted on November 18, 2021 using Excavation Percolation Test Procedure outlined on page 4 of the Administrative Manual, Guidelines for Design, Investigation and Reporting, Low Impact Development Stormwater Infiltration. The enclosed Site Plan; Drawing No. 1, shows the approximate location of the test pits within which the percolation test was conducted.

One cubic foot hole (1' X1' X 1') was excavated at the bottom of each test pit. The one cubic foot hole was then presoaked and standard test interval rate conducted prior to the actual in-situ percolation testing. The one cubic foot hole at the base of the test pit was completely filled, to the rim, with water. However, our test results indicated that a horizontal drain system is not feasible, and water did not percolate. The materials within the percolation zone consisted of very dense silty sand soils and appreciable amount of fines.

Based on the above, the subject site is considered to be a poor candidate for on-site infiltration. Therefore, the stormwater should be diverted to areas of planters and any excess water should be carried to the curb side, after going through the required on-site filtration process.

### **OBSERVATION DURING CONSTRUCTION**

The presented recommendations in this report assume that all foundations will be established in native soils. All footing excavations should be observed and accepted by a representative of this office before reinforcing is placed.

Site grading work should be conducted under observation and testing by a representative of this firm. For proper scheduling, please notify this office at least 24 hours before any observation work is required.

### **CLOSURE**

The findings and recommendations presented in this report were based on the results of our field and laboratory investigations combined with professional engineering experience and judgment. The report was prepared in accordance with generally accepted engineering principles and practice. We make no other warranty, either express or implied.

It is noted that the conclusions and recommendations presented are based on exploration "window" borings and excavations which is in conformance with accepted engineering practice. Some variations of subsurface conditions are common between "windows" and major variations are possible.

-oOo-



The following Figures and Appendices are attached and complete this report:

- Pavement Design Calculation Sheet
- Drawing No. 1 - Site Plan
- Figure No. 1 - Site Vicinity Map
- Figure No. 2 - Regional Topographic Map
- Figure No. 3 - Regional Geologic Map
- Appendix I-Method of Field Exploration
  - Log of Borings Figure Nos. I-1 through I-10
  - Unified Soil Classification System Figure No. I-11
- Appendix II- Methods of Laboratory Testing
  - Figure Nos. II-1 through II-2.2

Respectfully Submitted,  
**APPLIED EARTH SCIENCES**

Reviewed by:



Fereidoun "Fred" Jahani  
Project Engineer  
RE62875

FJ/CJM/lh/la



Caro J. Minas, President  
Geotechnical Engineer  
GE 601



Distribution: (4) Addressee

**R-Value (Assumed)**

**50**

Traffic Index (TI)	Gravel Equivalence Factor (Gf)	Gravel Equivalence (GE)
4	2.50	0.256
5	2.50	0.320
6	2.32	0.414
7	2.14	0.523

Pavement Section Thickness (inches)				
Traffic Index (TI)	Full Tac*		Alternative No. 1	
	Tac*(in)	Tbc** (in)	Tac*(in)	Tbc** (in)
4	4	0	3	3
5	5	0	4	3
6	6	0	5	4
7	7	0	6	4

\* Tac=Thickness of Asphalt Concrete (2.5" Minimum)

\*\*Tbc= Thickness of Base Course (Class III) with R-Value of 78 or Better (4" Minimum)

**Flexible Pavement Design Data**

**FOR:** Proposed Commercial Warehouse

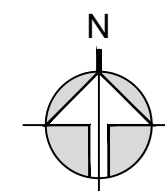
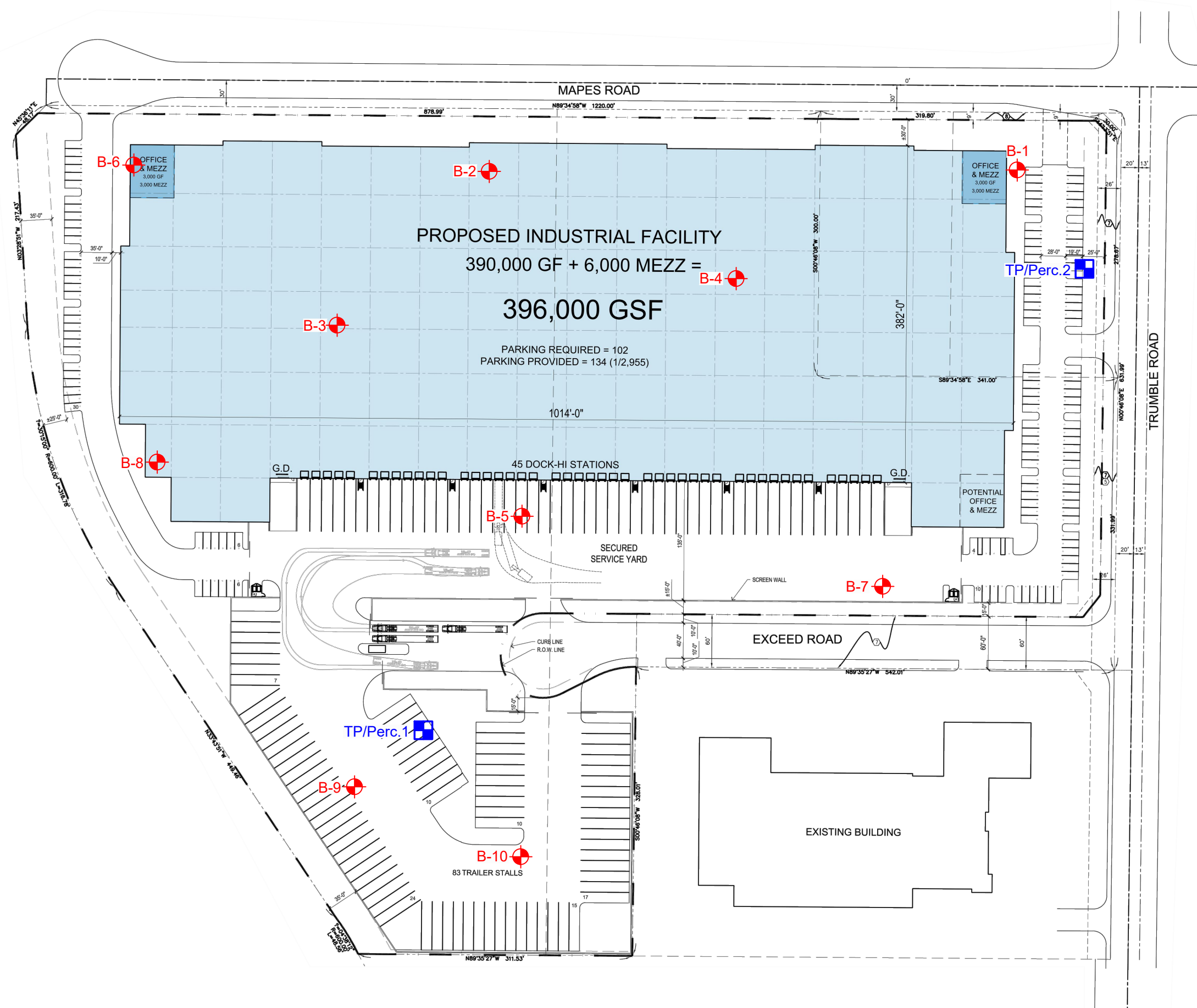
**DATE:** 12/10/21

**PROJECT NO.:** 21-673-02



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**CALC SHEET No. 1**



Scale: 1" = 120'

**LEGEND:**


B-10 = Location & Number of Boring

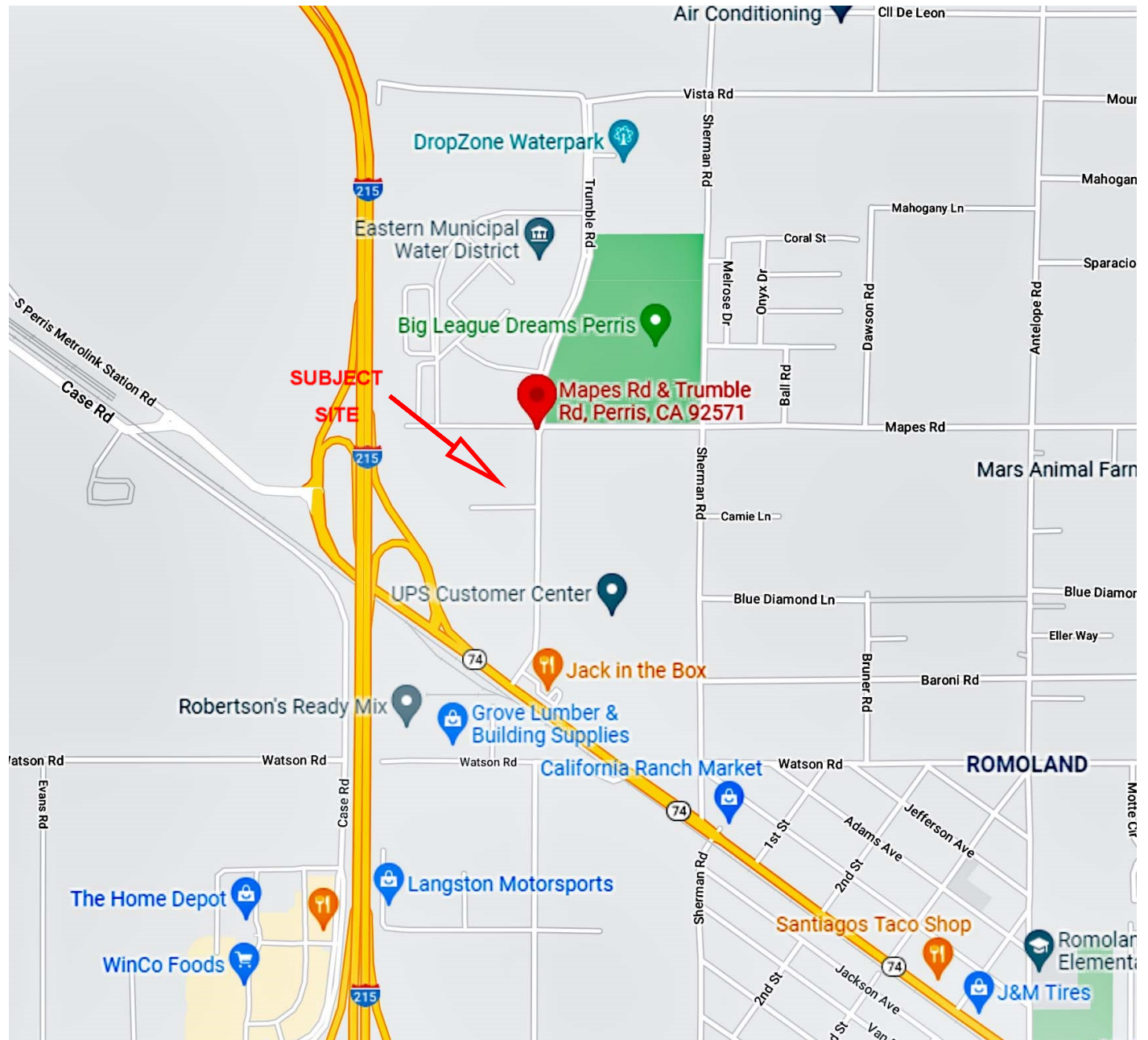
TP/Perc.2 = Percolation Test, Shallow Trench System

**Note:**

Site plan prepared by using plan provided by:  
-Architecture Design Relationships

**SITE PLAN**

PROJECT No:	21-673-02
	DATE: 11 / 18 / 2021
DESCRIPTION: Proposed Commercial/ Warehouse Building Project	DRAWN BY: TG
FOR: Blue Marquise Investments, LLC	CHECKED BY: CM
ADDRESS: SW Corner of Trumble Road & Mapes Road, Perris, CA 92571	DRAWING No: 1
 GEOTECHNICAL . GEOLOGY . ENVIRONMENTAL ENGINEERING CONSULTANTS www.aessoil.com (818) 552-6000	



Reference: Portion of Google Maps

## SITE VICINITY MAP

Proposed Commercial/ Warehouse Building Project

SW Corner of Trumble Road & Mapes Road, Perris, CA 92571

FOR

Blue Marquise Investments, LLC

DATE

11 / 18 / 2021

PROJECT No.

21-673-02

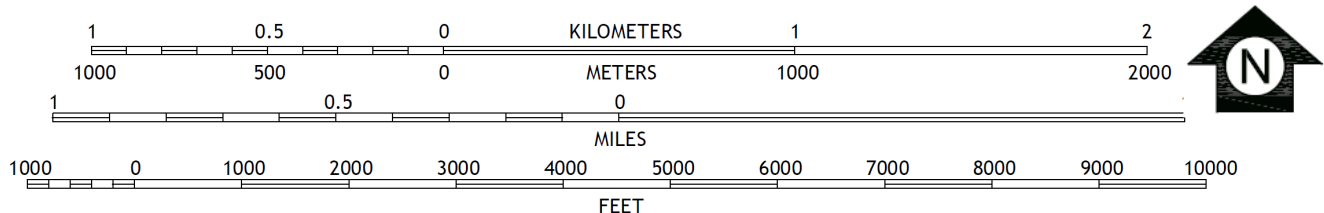
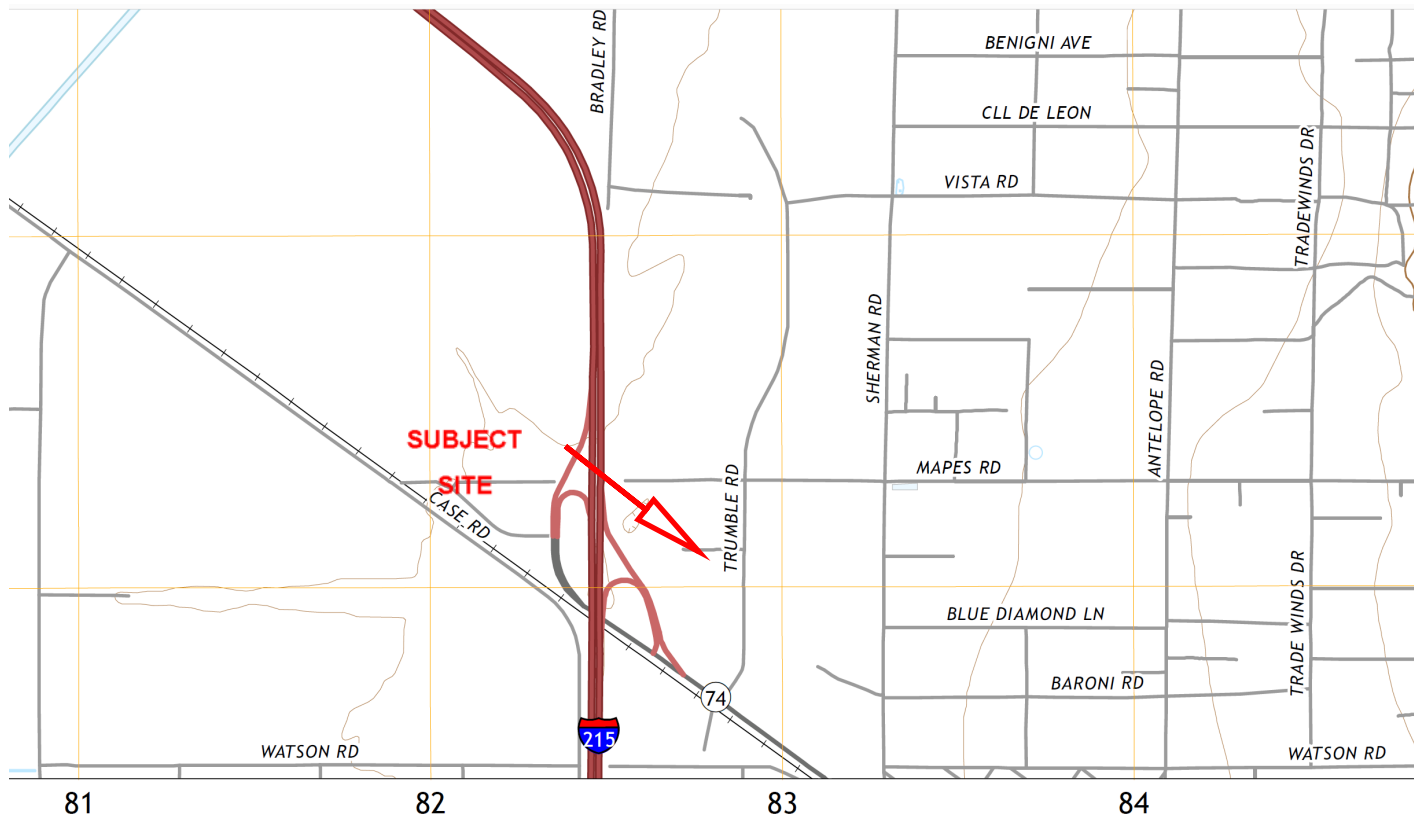


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FIGURE No.

1



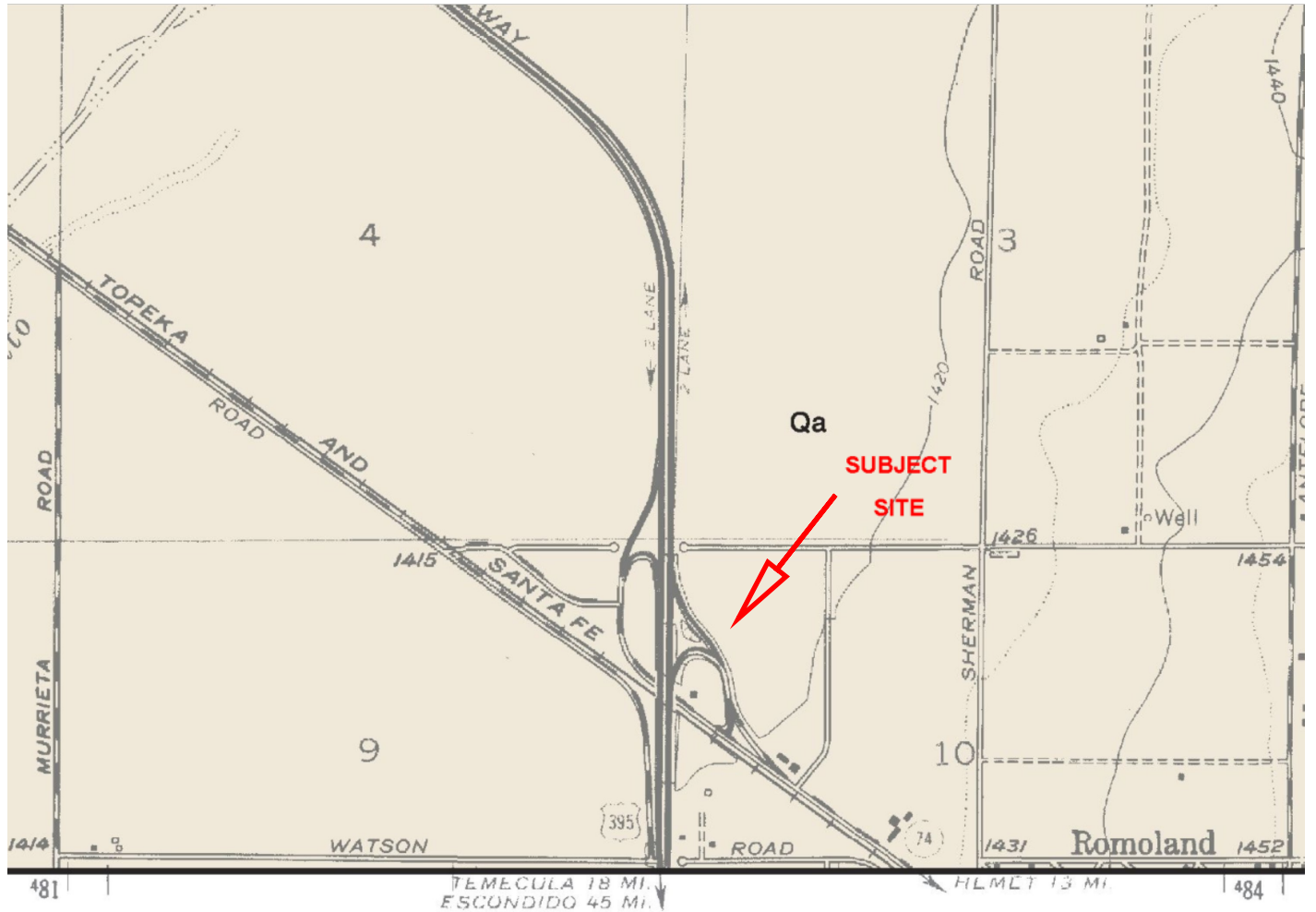
Reference: USGC Topo Map

# REGIONAL TOPOGRAPHIC MAP

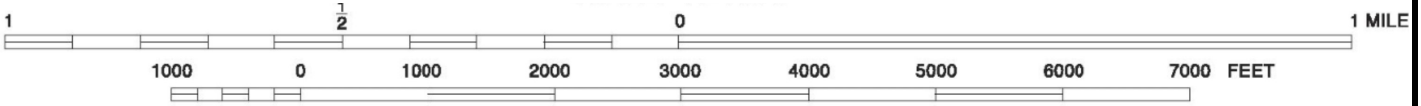
Proposed Commercial/ Warehouse Building Project SW Corner of Trumble Road & Mapes Road, Perris, CA 92571

<b>FOR</b> Blue Marquise Investments, LLC	<b>DATE</b> 11 / 18 / 2021	<b>PROJECT No.</b> 21-673-02
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<b>APPLIED EARTH SCIENCES</b> GEOTECHNICAL . GEOLOGY . ENVIRONMENTAL ENGINEERING CONSULTANTS	<b>FIGURE No.</b> 2
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*Alluvial sediments, unconsolidated, undissected*  
**Qa** Alluvial sand and clay of valley areas, covered by gray soil



Reference: Dibblee Geologic Map of the Perris Quadrangle

## REGIONAL GEOLOGIC MAP

Proposed Commercial Warehouse Building Project

SW Corner of Trumble Road & Mapes Road, Perris, CA 92571

FOR

Blue Marquise Investments, LLC

DATE

11 / 18 / 2021

PROJECT No.

21-673-02



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FIGURE No.

3

**APPENDIX I**  
**METHOD OF FIELD EXPLORATION**

In order to define subsurface conditions, ten borings were drilled on the site using hollow stem auger equipment to a maximum depth of 21 feet. The approximate locations of the exploratory borings are shown on the enclosed Site Plan.

Logs of the subsurface materials, as encountered in the borings, were recorded in the field and are presented Figure Nos. I-1 through I-10. These figures also show the number and approximate depths of each of the recovered soil samples.

Relatively undisturbed samples of the subsoils were obtained by driving a steel sampler with successive drops of a 140-pound standard sampling hammer free-falling a vertical distance of about 30 inches. The number of blows required for one foot of sampler penetration was recorded at the time of drilling and are shown on the log of exploratory borings. The relatively undisturbed soil samples were retained in brass liner rings 2.5 inches in diameter and 1.0 inch in height.

Field investigation for this project was performed on October 14 through 15, 2021. The material excavated from the borings was placed back and compacted upon completion of the field work. Such material may settle. The owner should periodically inspect these areas and notify this office if the settlement creates a hazard to persons or property.



# LOG OF BORING NO.1

21-673-02

SW Corner of Trumble Road & Mapes Road, Perris, CA 92571

Type: Hollow Stem Auger, With 140 Lb Hammer      Logged by: Daniel

Location: \*See Site Plan\*

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SPT BLOWS/FT	BLOWS PER FT	% Moisture	UNIT DRY WT LB/CU FT	% -200 - $\Delta$ % Moisture - $\bullet$ 20 40 60 80	% -200
0			(ML) FILL: Silt, moderately compact, slightly moist, medium brown, sandy silt.						
			(SM) SAND: Very dense, moist, brown, silty fine to medium grained sand.		50/3"	10	119		
5			(SM) Grades to lighter brown, more silty.		50/2"	11	118		
10			(SM) Grades to dark brown, slightly silty, fine to coarse grained sand with gravel.		58	7	125		
15			(SM) Grades to light yellowish brown, silty fine to medium grained sand, less gravelly.		65	9	123		
20			(ML) SILT: Very stiff, moist, yellowish brown, sandy silt.		63	13	113		
25			End of Boring @ 21' No Groundwater Encountered Hole Backfilled.						
30									
35									

COMPLETION DEPTH: 21  
DATE: October 20, 2021

DEPTH TO WATER > INITIAL: \_\_\_\_\_  
FINAL: \_\_\_\_\_





# LOG OF BORING NO.2

21-673-02

SW Corner of Trumble Road & Mapes Road, Perris, CA 92571

Type: Hollow Stem Auger, With 140 Lb Hammer      Logged by: Daniel

Location: \*See Site Plan\*

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SPT BLOWS/FT	BLOWS PER FT	% Moisture	UNIT DRY WT LB/CU FT	% -200 - $\Delta$ % Moisture - $\bullet$ 20 40 60 80	% -200
0			(ML) FILL: Silt, moderately compact, slightly moist, light brown, sandy silt.						
			(SM) SAND: Very dense, moist, brown, silty fine to medium grained sand with fine gravel.		50/5"	7	131	$\bullet$	
5			(SM) Grades to slightly more silty.		50/4"	11	127	$\bullet$	
10			(SM) Grades to yellowish brown, less silty, less gravelly.		61	13	117	$\bullet$	
15			(SM) Grades to orange brown, more silty.		71	15	114	$\bullet$	
20			(ML) SILT: Very stiff, moist, pale olive, slightly clayey, sandy silt.		40	20	113	$\bullet$	
25			End of Boring @ 21' No Groundwater Encountered Hole Backfilled.						
30									
35									

COMPLETION DEPTH: 21  
DATE: October 20, 2021

DEPTH TO WATER > INITIAL: \_\_\_\_\_  
FINAL: \_\_\_\_\_



# LOG OF BORING NO.3

21-673-02

SW Corner of Trumble Road & Mapes Road, Perris, CA 92571

Type: Hollow Stem Auger, With 140 Lb Hammer      Logged by: Daniel

Location: \*See Site Plan\*

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SPT BLOWS/FT	BLOWS PER FT	% Moisture	UNIT DRY WT LB/CU FT	% -200 - $\Delta$ % Moisture - $\bullet$ 20 40 60 80	% -200
0			(ML) FILL: Silt, moderately compact, slightly moist, medium brown, sandy silt.						
			(SM) SAND: Very dense, dry to slightly moist, light brown to brown, silty fine to medium grained sand.		50/3"	3	117		
5			(SM) Grades to moist, brown, gravelly.		70	7	134		
10			(SP/SM) Grades to brownish yellow, fine to coarse grained sand, some fines.		80	6	127		
15			(SM-ML) Grades to dense, pale yellow, silt-fine grained sand mixture.		32	18	115		
20			(SP/SM) Grades to very dense, slightly moist to moist, light yellowish brown, fine to medium grained sand, some fines, fine gravel.		52	7	119		
25			End of Boring @ 21' No Groundwater Encountered Hole Backfilled.						
30									
35									

COMPLETION DEPTH: 21  
DATE: October 20, 2021

DEPTH TO WATER > INITIAL: \_\_\_\_\_  
FINAL: \_\_\_\_\_



# LOG OF BORING NO.4

21-673-02

SW Corner of Trumble Road & Mapes Road, Perris, CA 92571

Type: Hollow Stem Auger, With 140 Lb Hammer      Logged by: Daniel

Location: \*See Site Plan\*

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SPT BLOWS/FT	BLOWS PER FT	% Moisture	UNIT DRY WT LB/CU FT	% -200 - $\Delta$ % Moisture - $\bullet$ 20 40 60 80	% -200
0			(ML) FILL: Silt, moderately compact, dry to slightly moist, medium brown, sandy silt, few gravel.						
			(SM) SAND: Very dense, moist, brown, silty fine to medium grained sand.		50/3"	11	117		
5			(SM) Grades to lighter brown, more silty, slightly gravelly.		65	9	122		
10			(SM) Grades to dark brown, slightly silty, fine to coarse grained sand.		68	9	125		
15			(SM) Grades to orange brown, more silty, more gravelly.		50/3"	9	134		
20			End of Boring @ 16' No Groundwater Encountered Hole Backfilled.						
25									
30									
35									

COMPLETION DEPTH: 16  
DATE: October 20, 2021

DEPTH TO WATER> INITIAL: \_\_\_\_\_  
FINAL: \_\_\_\_\_





# LOG OF BORING NO.6

21-673-02

SW Corner of Trumble Road & Mapes Road, Perris, CA 92571

Type: Hollow Stem Auger, With 140 Lb Hammer      Logged by: Daniel

Location: \*See Site Plan\*

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SPT BLOWS/FT	BLOWS PER FT	% Moisture	UNIT DRY WT LB/CU FT	% -200 - $\Delta$ % Moisture - $\bullet$ 20 40 60 80	% -200
0			(ML) FILL: Silt, moderately compact, dry to slightly moist, light brown, sandy silt.						
5			(SM) SAND: Very dense, moist, brown, silty fine to coarse grained sand with gravel. (SM) Grades to silty fine to medium grained sand, less gravelly.		50/3"	9	129	$\bullet$	
10			(SM) Grades to brownish yellow, less silty, slightly more gravelly.		49	10	121	$\bullet$	
15			(SM-ML) Grades to orange brown, silt-fine grained sand mixture.		71	9	128	$\bullet$	
16			(SM-ML) Grades to orange brown, silt-fine grained sand mixture.		76	19	109	$\bullet$	
20			End of Boring @ 16' No Groundwater Encountered Hole Backfilled.						
25									
30									
35									

COMPLETION DEPTH: 16  
DATE: October 20, 2021

DEPTH TO WATER > INITIAL: \_\_\_\_\_  
FINAL:



# LOG OF BORING NO.7

21-673-02

SW Corner of Trumble Road & Mapes Road, Perris, CA 92571

Type: Hollow Stem Auger, With 140 Lb Hammer      Logged by: Daniel

Location: \*See Site Plan\*

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SPT BLOWS/FT	BLOWS PER FT	% Moisture	UNIT DRY WT LB/CU FT	% -200 - $\Delta$ % Moisture - $\bullet$ 20 40 60 80	% -200
0			(ML) FILL: Silt, moderately compact, slightly moist, medium brown, sandy silt.						
			(SM) SAND: Very dense, dry to slightly moist, light brown, silty fine to medium grained sand with gravel.		82	2	131		
5			(SM) Grades to slightly moist to moist, brownish yellow, less silty, less gravelly.		50/5"	7	123		
10			(SM) Similar as above.		74	10	120		
15			End of Boring @ 11' No Groundwater Encountered Hole Backfilled.						
20									
25									
30									
35									

COMPLETION DEPTH: 11  
DATE: October 20, 2021

DEPTH TO WATER > INITIAL: \_\_\_\_\_  
FINAL: \_\_\_\_\_



# LOG OF BORING NO.8

21-673-02

SW Corner of Trumble Road & Mapes Road, Perris, CA 92571

Type: Hollow Stem Auger, With 140 Lb Hammer      Logged by: Daniel

Location: \*See Site Plan\*

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SPT BLOWS/FT	BLOWS PER FT	% Moisture	UNIT DRY WT LB/CU FT	% -200 - Δ				% -200
								% Moisture - ●				
								20	40	60	80	
0	[Cross-hatched symbol]		(ML) FILL: Silt, moderately compact, slightly moist, medium brown, sandy silt with lots of rootlets.		68	6	127					
5	[Vertical lines symbol]		(SM) SAND: Very dense, slightly moist to moist, brown, silty fine to medium grained sand with gravel. (SM) Grades to moist, dark brown, silty fine to coarse grained sand.		75	11	125					
10	[Vertical lines symbol]		(SM) Grades to yellowish brown, silty fine to medium grained sand.		50/3"	8	130					
15			End of Boring @ 11' No Groundwater Encountered Hole Backfilled.									
20												
25												
30												
35												

COMPLETION DEPTH: 11  
DATE: October 20, 2021

DEPTH TO WATER> INITIAL: \_\_\_\_\_  
FINAL: \_\_\_\_\_



# LOG OF BORING NO.9

21-673-02

SW Corner of Trumble Road & Mapes Road, Perris, CA 92571

Type: Hollow Stem Auger, With 140 Lb Hammer      Logged by: Daniel

Location: \*See Site Plan\*

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SPT BLOWS/FT	BLOWS PER FT	% Moisture	UNIT DRY WT LB/CU FT	% -200 - $\Delta$ % Moisture - $\bullet$ 20 40 60 80	% -200
0			(ML) FILL: Silt, moderately compact, slightly moist, medium brown, sandy silt.						
5			(SM) SAND: Very dense, moist, brown, silty fine to medium grained sand with gravel. (SM) Grades to more silty, less gravelly.		50/5" 50/6"	12 10	120 114		
10			(SM) Grades to dark brown, more gravelly.		55	13	130		
15			End of Boring @ 11' No Groundwater Encountered Hole Backfilled.						
20									
25									
30									
35									

COMPLETION DEPTH: 11  
DATE: October 20, 2021

DEPTH TO WATER > INITIAL: \_\_\_\_\_  
FINAL: \_\_\_\_\_





# LOG OF BORING NO.10

21-673-02

SW Corner of Trumble Road & Mapes Road, Perris, CA 92571

Type: Hollow Stem Auger, With 140 Lb Hammer      Logged by: Daniel

Location: \*See Site Plan\*

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SPT BLOWS/FT	BLOWS PER FT	% Moisture	UNIT DRY WT LB/CU FT	% -200 - $\Delta$ % Moisture - $\bullet$ 20 40 60 80	% -200
0			(SM) FILL: Sand, moderately compact, slightly moist, brown, silty sand with gravel, debri.		32	2	129		
5			(SM) Grades to compact, dark gray, fragments of asphalt. (SM) SAND: Very dense, moist, dark brown, silt fine to coarse grained sand with gravel.		50/3"	8	121		
10			(SM) Grades to more silty, more gravelly.		62	9	135		
15			End of Boring @ 11' No Groundwater Encountered Hole Backfilled.						
20									
25									
30									
35									

COMPLETION DEPTH: 11  
DATE: October 20, 2021

DEPTH TO WATER > INITIAL: \_\_\_\_\_  
FINAL: \_\_\_\_\_

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAME
<b>COARSE GRAINED SOILS</b> (More than 50% of material is LARGER than No. 200 sieve size)	<b>GRAVELS</b> (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	<b>CLEAN GRAVELS</b> (Little or no fines)	GW	Well graded gravels, gravel - sand mixtures, little or no fines.
		<b>GRAVELS WITH FINES</b> (Appreciable amt. of fines)	GP	Poorly graded gravels or gravel-sand mixtures, little or no fines.
			GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	<b>SANDS</b> (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size)	<b>CLEAN SANDS</b> (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines.
		<b>SANDS WITH FINES</b> (Appreciable amt. of fines)	SP	Poorly graded sands or gravelly sands, little or no fines.
			SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
<b>FINE GRAINED SOILS</b> (More than 50% of material is SMALLER than No. 200 sieve size)	<b>SILTS AND CLAYS</b> (Liquid limit LESS than 50)		ML	Organic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
	<b>SILTS AND CLAYS</b> (Liquid limit GREATER than 50)		CL	Organic clay of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
			MH	Organic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
	<b>SILTS AND CLAYS</b> (Liquid limit GREATER than 50)		CH	Organic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
<b>HIGHLY ORGANIC SOILS</b>			Pt	Peat and other highly organic soils.

**BOUNDARY CLASSIFICATIONS:** Soils possessing characteristics of two groups are designated by combinations of group symbols.

PARTICLE SIZE LIMITS

SILT OR CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		
	NO. 200	NO. 40	NO. 10	NO. 4	3/4 in.	3 in.	(12 in.)
U. S. STANDARD SIEVE SIZE							

**UNIFIED SOIL CLASSIFICATION SYSTEM**

Proposed New Commercial Warehouse Building  
**JOB NAME :** South West Corner of Trumble Road & Mapes Road,  
 Perris, CA 92571

**JOB No.**  
 21-673-02



**Applied  
 Earth  
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**FIGURE No.**

I-11

## **APPENDIX II**

### **LABORATORY TESTING PROCEDURES**

#### **Moisture Density**

The moisture-density information provides a summary of soil consistency for each stratum and can also provide a correlation between soils found on this site and other nearby sites. The tests were performed using ASTM D 2216-04 Laboratory Determination of water content Test Method. The dry unit weight and field moisture content were determined for each undisturbed sample, and the results are shown on log of exploratory borings.

#### **Shear Tests**

Shear tests were made with a direct shear machine at a constant rate of strain. The machine is designed to test the materials without completely removing the samples from the brass rings. The rate of shear was determined through determination of the rate of consolidation of the foundation bearing materials.

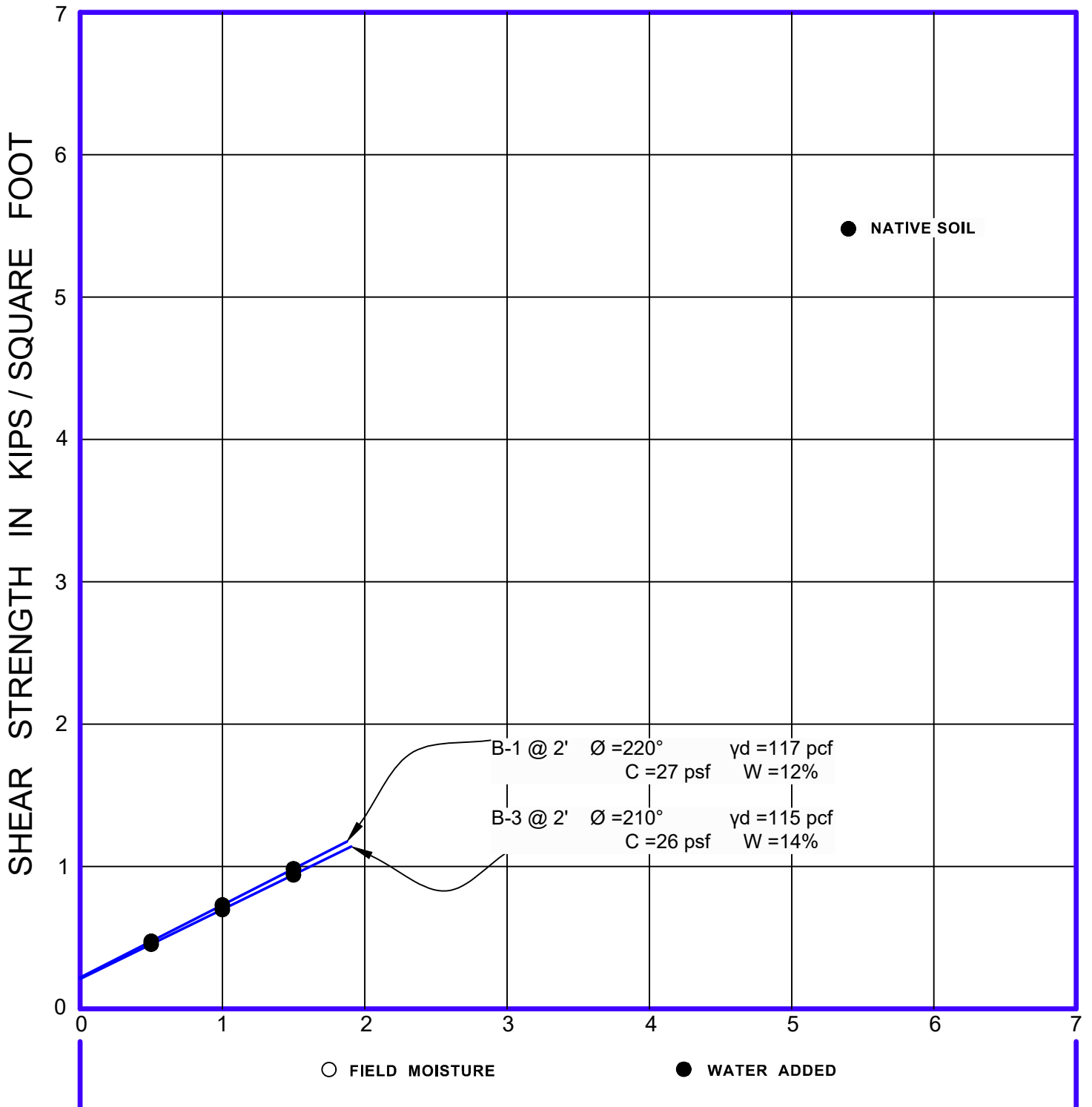
A range of normal stresses was applied vertically, and the shear strength was progressively determined at each load in order to determine the internal angle of friction and the cohesion. The tests were performed using ASTM D 3080-04 Laboratory Direct Shear Test Method. The Ultimate shear strength results of direct shear tests are presented on Figure No. II-1 within this Appendix.

#### **Consolidation**

The apparatus used for the consolidation tests is designed to receive the undisturbed brass ring of soil as it comes from the field. Loads were applied to the test specimen in several increments, and the resulting deformations were recorded at time intervals. Porous stones were placed in contact with the top and bottom of the specimen to permit the ready addition or release of water. ASTM D 2435-04 Laboratory Consolidation Test Method.

Undisturbed specimens were tested at the field and added water conditions. The test results are shown on Figure No. II-2 within this Appendix.

# NORMAL STRESS IN KIPS / SQUARE FOOT



## DIRECT SHEAR TESTS

Proposed New Commercial Warehouse Building  
 JOB NAME : South West Corner of Trumble Road & Mapes Road,  
 Perris, CA 92571

JOB No. 21-673-02

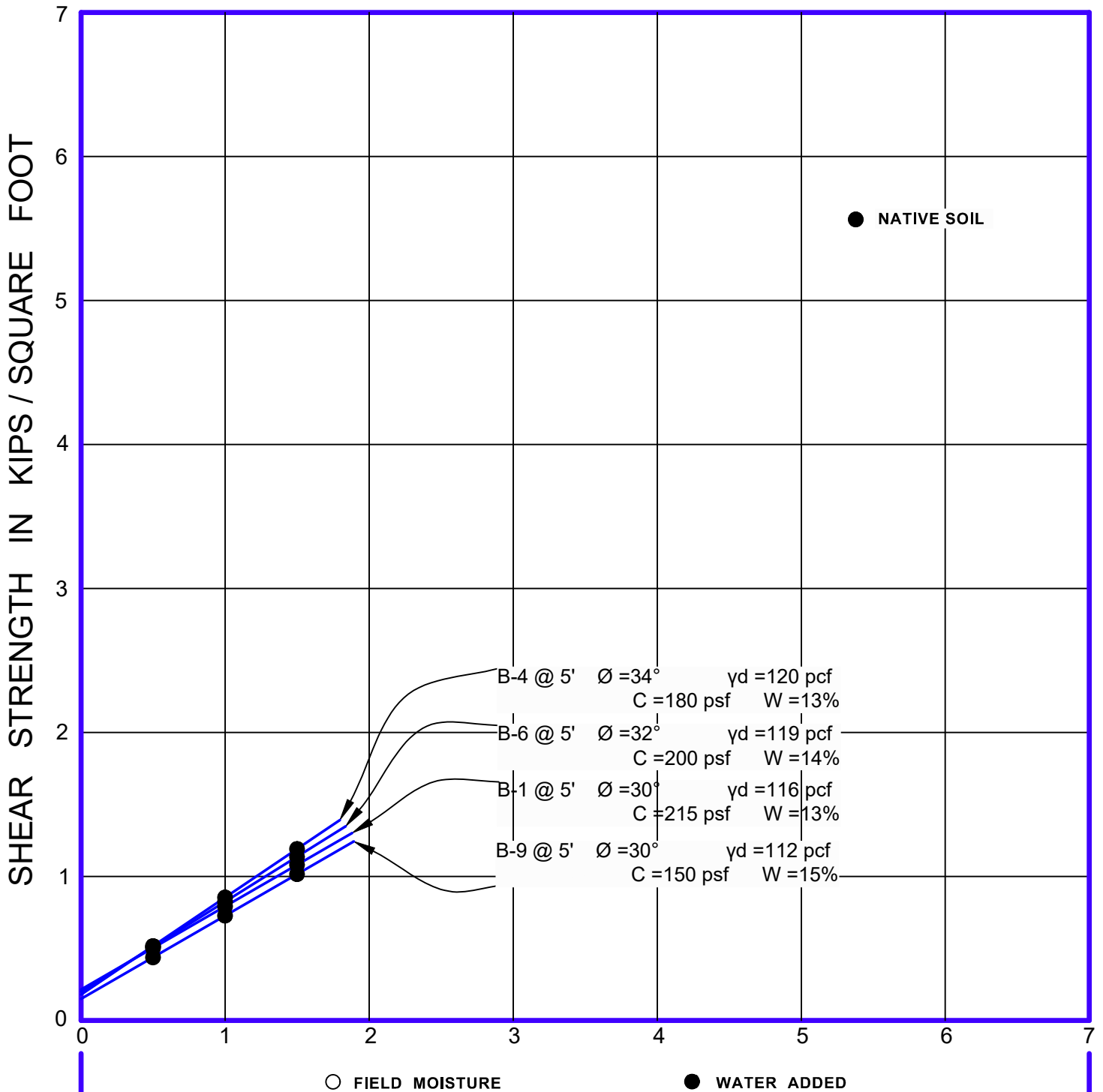


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FIGURE No. II - 1.1

# NORMAL STRESS IN KIPS / SQUARE FOOT



## DIRECT SHEAR TESTS

Proposed New Commercial Warehouse Building  
 JOB NAME : South West Corner of Trumble Road & Mapes Road,  
 Perris, CA 92571

JOB No. 21-673-02

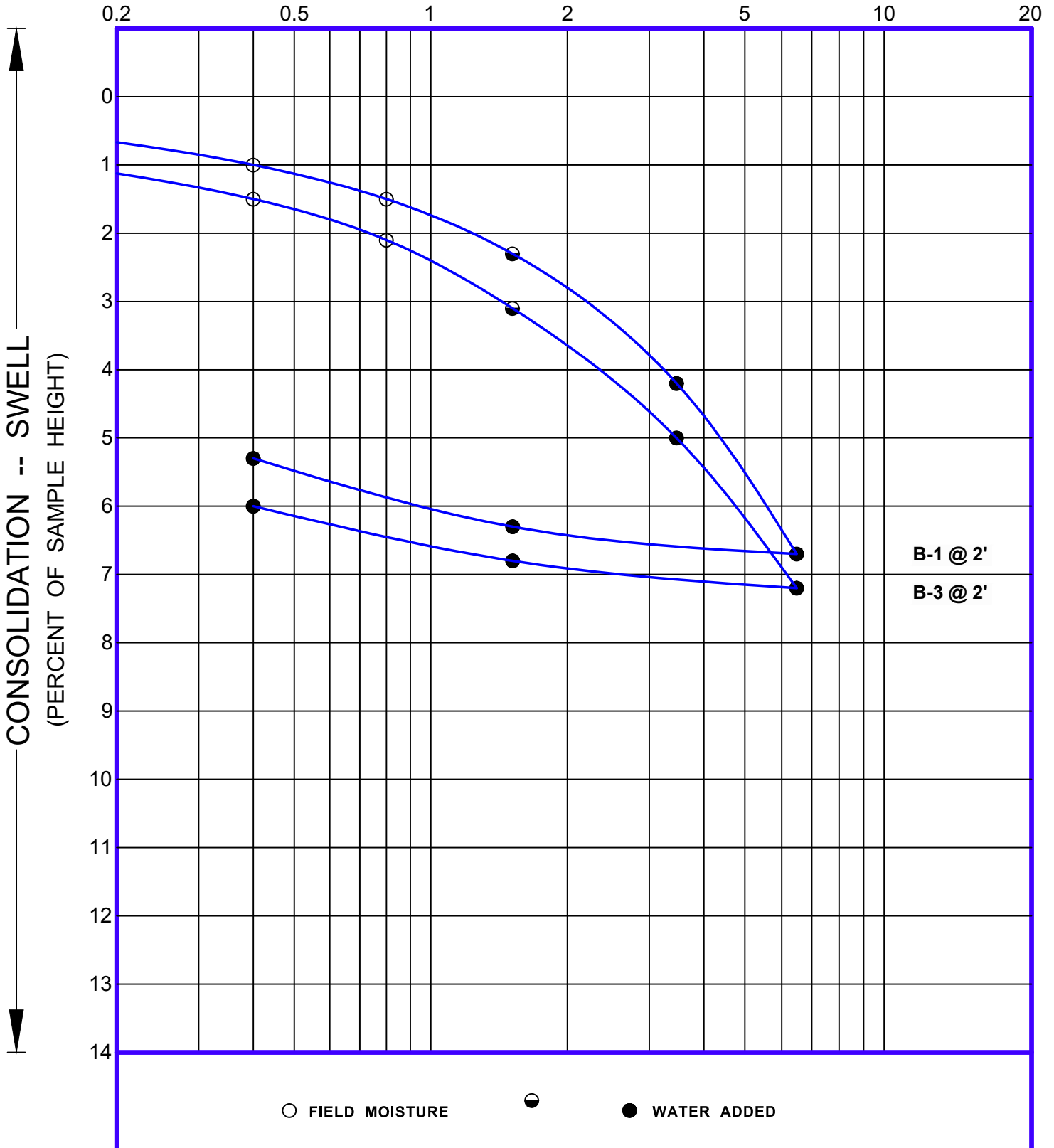


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FIGURE No. II - 1.2

# PRESSURE IN KIPS PER SQUARE FOOT



## SWELL - CONSOLIDATION TESTS

JOB NAME : Proposed New Commercial Warehouse Building  
 South West Corner of Trumble Road & Mapes Road,  
 Perris, CA 92571

JOB No.  
 21-673-02



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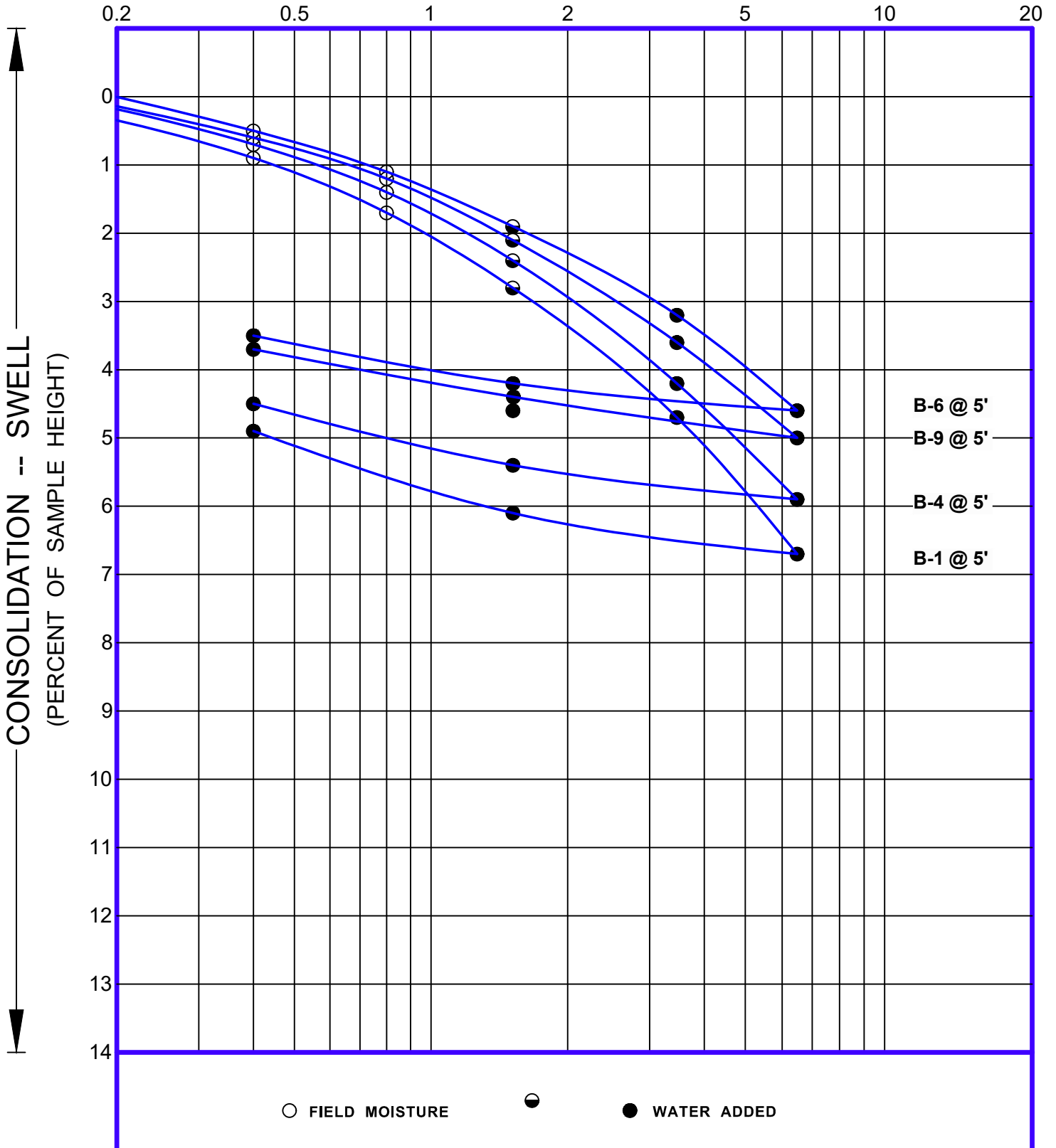
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FIGURE No.

II - 2.1

# PRESSURE IN KIPS PER SQUARE FOOT



○ FIELD MOISTURE      ● WATER ADDED

## SWELL - CONSOLIDATION TESTS

**JOB NAME :** Proposed New Commercial Warehouse Building  
 South West Corner of Trumble Road & Mapes Road,  
 Perris, CA 92571

**JOB No.**  
 21-673-02



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 Earth  
 Sciences**

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**FIGURE No.**  
 II - 2.2

**Appendix G**

**Romoland Master Drainage Plan**



RIVERSIDE COUNTY FLOOD CONTROL  
AND WATER CONSERVATION DISTRICT  
RIVERSIDE, CALIFORNIA

**ROMOLAND**  
**MASTER DRAINAGE PLAN**

**Zone 4**

Original Plan - April 1988  
Revision No.1 – March 2006

Warren D. Williams  
General Manager – Chief Engineer

## UNDERGROUND STORM DRAINS

The proposed underground storm drains generally consist of reinforced concrete pipe ranging in size from 27 inches to 96 inches in diameter. Reinforced concrete boxes are usually placed under dedicated road crossings or where the flow rates or hydraulic necessities exceed the capacity of standard pipe sizes. The underground storm drains proposed within this revision consist of pre-cast reinforced concrete pipe or reinforced concrete box.

## DETENTION BASINS

The purpose of the detention basin proposed in this plan is, by the use of temporary storage, to reduce fairly high inflow rates to substantially lesser outflow rates. This peak reduction allows the use of smaller and thus less costly downstream facilities. It should be pointed out that the detention basin proposed in this plan is designed for ultimate 100-year frequency storms. Flows exceeding the design capacity of the basin would pass through the emergency spillway in flow patterns approximating present condition.

## MAJOR REVISIONS

This section describes some of the major revisions to the previously adopted Romoland Master Drainage Plan. Revisions may include alignment changes, facility types and sizes and or flow-rate adjustments. Minor changes (such as the downstream extension of Line A-2, elimination of downstream portions of Line A-4, the deletion of Line A-14b and A-6) were the result of mainline realignments described below. **FIGURE 3** depicts the realignment, and modifications made by this master plan revision.

### Line A

This facility has been completely realigned and redesigned to account for basin additions in the Homeland area that have decreased the flow rate anticipated from that area. Line A will be proposed as an earthen open channel west of the freeway, where the alignment closely resembles the District's 1990 preliminary drawings titled "Romoland Channel Line A Stage 1" (project number: 4-0-310, drawing number: 4-552). The portion of Line A upstream of the 215 freeway is a combination of concrete-lined open channel, reinforced concrete box, and reinforced concrete pipe.

The existing topography on the east side of the Interstate 215 is steeper than the west side. As a result, the average slope is greater. The velocities on the east side of Interstate 215 range from 12 feet per second to over 20 feet per second. An earthen channel with that range of velocities would tend to scour and create deposition in the San Jacinto River. This deposition would constitute a hydrologic condition of concern for the San Jacinto River. In addition, this sediment could lead to further impairment of Lake Elsinore (which is listed on the federal Clean Water Act 303(d) list as impaired for sedimentation/siltation). In order to minimize scour potential and significantly reduce the right-of-way required, Line A is proposed as a concrete-lined channel between of Interstate 215 and Palomar Road.

### Line A-3

This facility consists of a concrete-lined open channel along Varela Lane and reinforced concrete box on Palomar Road. The alignment was altered to combine both Line A-3 and Line A-3e. This

eliminates a portion of the north-south alignment of Line A-3 and will simplify construction.

#### Line A-8 & A-12

The upstream portion of Line A-8 located on Murrieta road was extended northerly and incorporated as a part of Line A-12. Consequently, portions of Line A-8 from Murrieta to Hull Street have been deleted. Facility sizes and flow rates were revised accordingly.

#### Line A-15

This facility was revised to an underground storm drain and realigned downstream of Ethanac Road to travel north along Goetz Road to the San Jacinto River.

#### Line A-16, Line A-17, Line A-18

Lines A-16, A-17, and A-18 are new facilities that connect to the revised Line A alignment near the intersections of Sherman Road, Dawson Road and Antelope Road respectively. These lines are underground storm drains that extend south from Line A approximately 300 ft.

## **SECTION VI – ALTERNATIVES**

Several alternatives were developed and studied during the generation of this revision to the Romoland Master Drainage Plan. These alternatives considered different alignment schemes for the major storm drains and open channels; sizing of the proposed detention basins; and various hydraulic considerations. As the study progressed, alternatives considered for the main facilities proposed in this Plan were presented to the District management and staff. General concurrence with the Plan selected was obtained based on cost differentials, accessibility to collector drains, right-of-way restrictions and ease of construction.

## **SECTION VII – ESTIMATED COST**

A cost summary for the MDP facilities is shown in **TABLE 1 "Cost Summary"**. Cost were based on the 2005 Planning Unit Cost sheets and include construction, right of way and 34% for engineering, environmental mitigation, administration and contingencies.

The cost of the drains shown in **TABLE 1** includes manholes and catch basins in addition to the cost of the pipe installed. Manholes are located as necessary with a maximum spacing of 500 feet. Catch basins are not specifically located but the total number of lineal feet is computed and costed.

## **SECTION VIII – CONCLUSIONS**

Based on the studies and investigations made for this report it is concluded that:

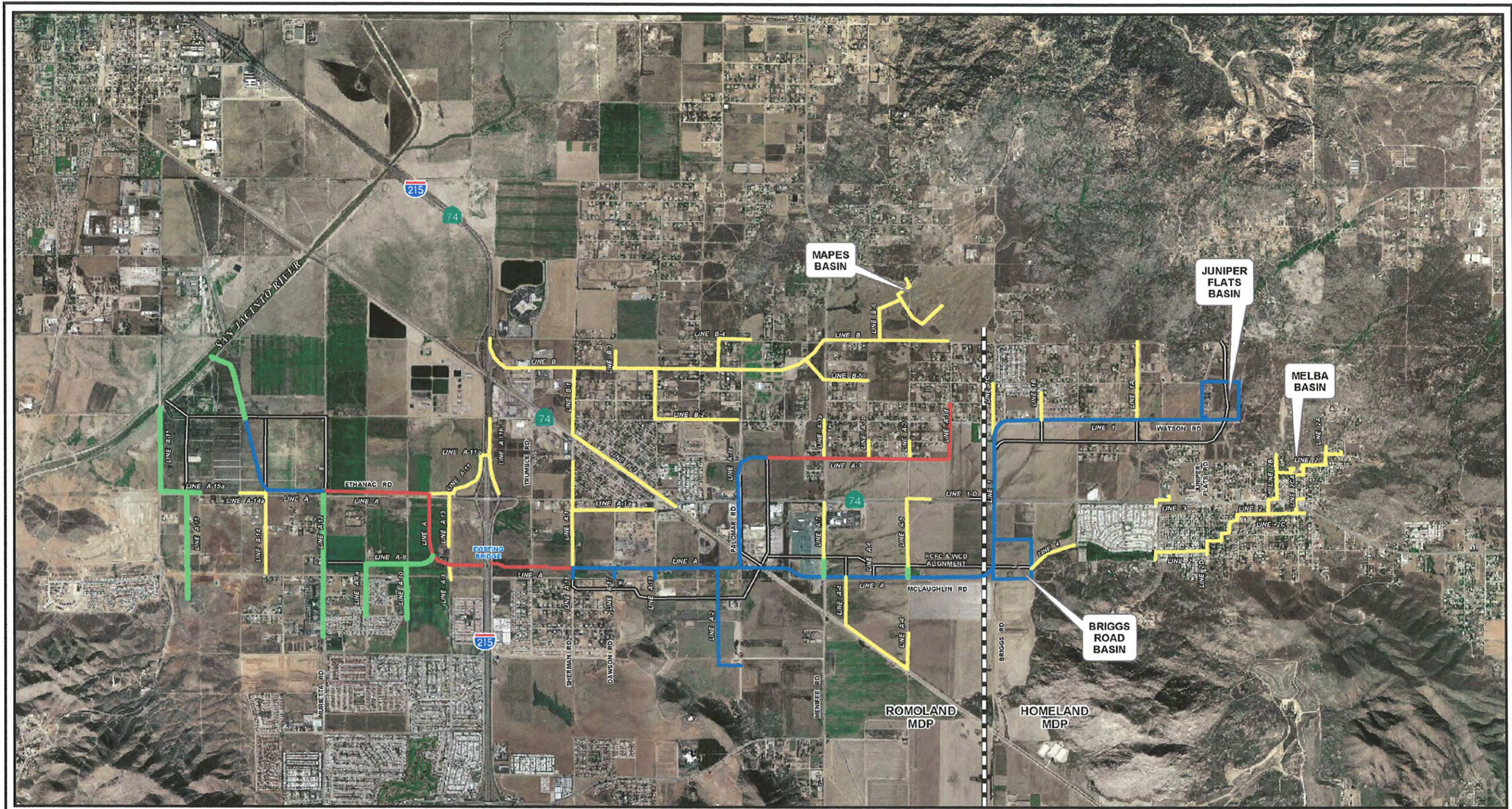
1. The Romoland area has experienced serious flooding problems in the past. As this area continues to urbanize these damages are expected to increase. A more orderly growth pattern can safely occur with the construction of these proposed facilities.
2. A drainage system is required to safely convey storm runoff through the area with the least interruption to public services. The Master Drainage Plan presented in this report is such a system and is the most feasible of the alternatives studied.

3. The proposed Plan lends itself to stage construction as funds become available.
4. The total cost of the recommended improvements, including construction, rights of way, engineering, administration and contingencies, is estimated to be **\$64,221,206.00**.

## **SECTION IX – RECOMMENDATIONS**

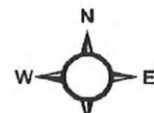
It is recommended that:

1. The Master Drainage Plan, as set forth herein, be adopted by the Riverside County Flood Control and Water Conservation District's Board of Supervisors as part of the overall master plan for the County of Riverside.
2. The Master Drainage Plan, as set forth herein, be used as a guide for all future developments in the study area and that such developments be required to conform to the Plan insofar as possible.
3. The rights of way required for the Plan be protected from encroachment.



Source: AirPhoto USA  
February 2004

ALBERT A  
**WEBB**  
ASSOCIATES  
ENGINEERING CONSULTANTS



0 3,000 6,000  
Feet

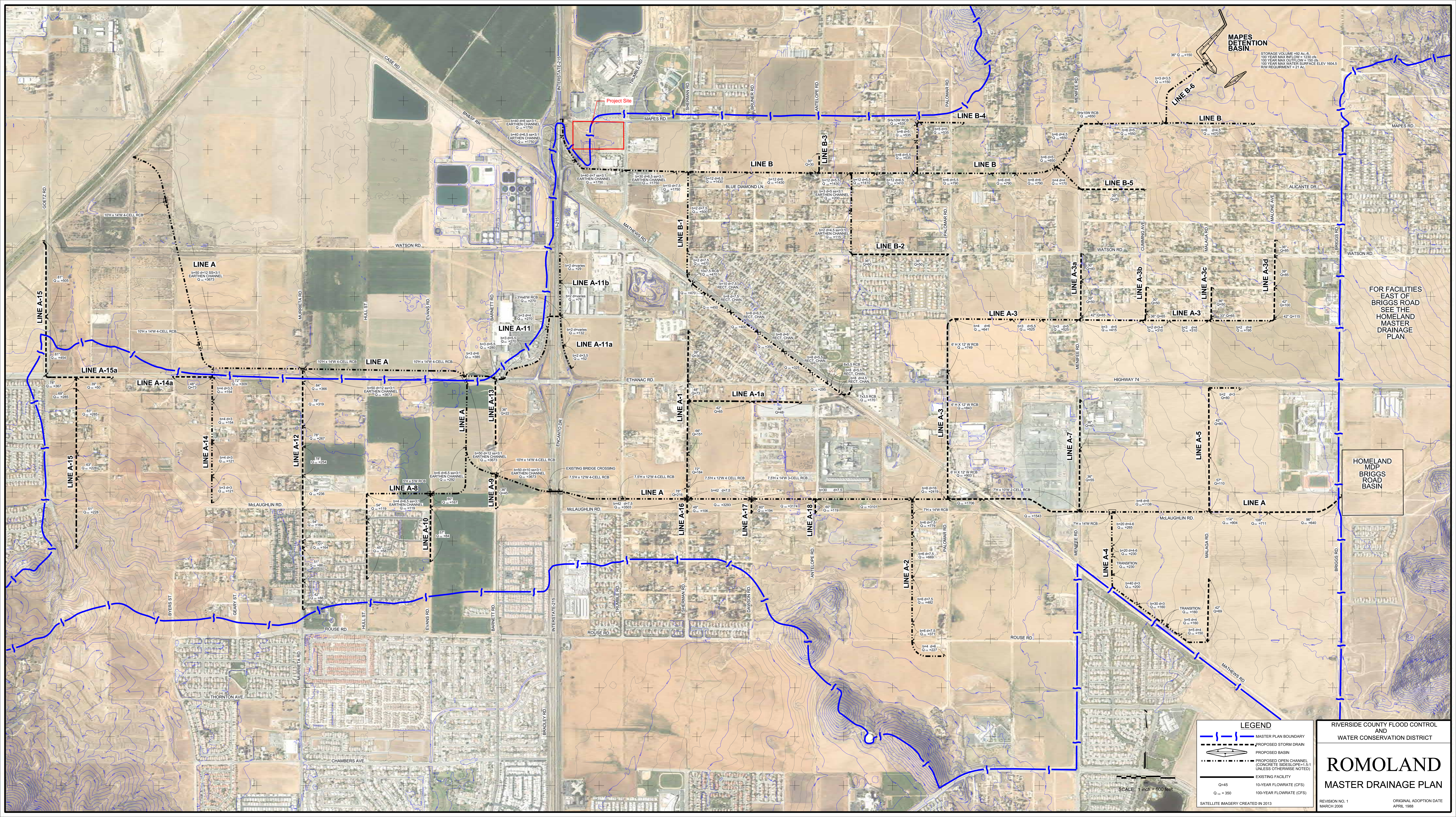
**LEGEND**

- PHASE I - PROPOSED REVISIONS
- PHASE I - PREVIOUSLY ADOPTED
- FUTURE FACILITIES - PROPOSED REVISIONS
- FUTURE FACILITIES - PREVIOUSLY ADOPTED
- PREVIOUSLY ADOPTED, TO BE ELIMINATED

Figure 3

MDP's - Adopted and Revised

Romoland / Homeland MDP/ADP



**MAPES DETENTION BASIN**  
 STORAGE VOLUME = 92 Ac.-ft.  
 100 YEAR MAX INFLOW = 1230 cfs  
 100 YEAR MAX OUTFLOW = 130 cfs  
 100 YEAR MAX WATER SURFACE ELEV 1604.5  
 RW REQUIREMENT = 21 ft

FOR FACILITIES EAST OF BRIGGS ROAD SEE THE HOMELAND MASTER DRAINAGE PLAN

HOMELAND MDP BRIGGS ROAD BASIN

**LEGEND**

- MASTER PLAN BOUNDARY
- PROPOSED STORM DRAIN
- PROPOSED BASIN
- PROPOSED OPEN CHANNEL (CONCRETE SIDESLOPE=1:5:1 UNLESS OTHERWISE NOTED)
- EXISTING FACILITY

Q=45 10-YEAR FLOWRATE (CFS)  
 Q=350 100-YEAR FLOWRATE (CFS)

SCALE: 1 inch = 600 feet

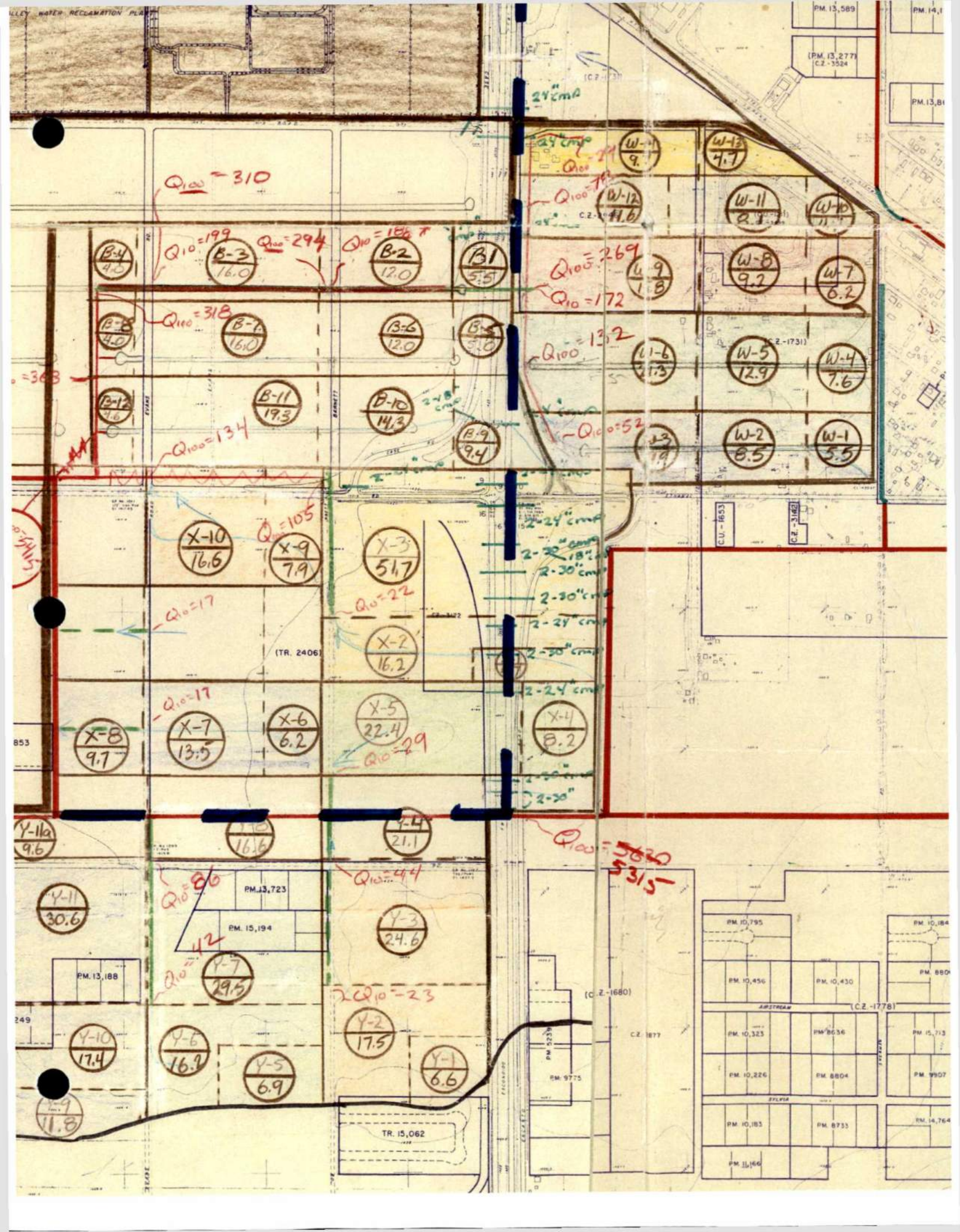
SATELLITE IMAGERY CREATED IN 2013

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

**ROMOLAND**  
**MASTER DRAINAGE PLAN**

REVISION NO. 1 MARCH 2006 ORIGINAL ADOPTION DATE APRIL 1988

# Hydrology



$Q_{10} = 310$

$Q_{10} = 199$     $Q_{10} = 294$     $Q_{10} = 186$

$Q_{10} = 318$

$Q_{10} = 269$

$Q_{10} = 172$

$Q_{10} = 132$

$Q_{10} = 52$

$Q_{10} = 134$

$Q_{10} = 105$

$Q_{10} = 17$

$Q_{10} = 22$

$Q_{10} = 17$

$Q_{10} = 29$

$Q_{10} = 5620$   
 $5315$

$Q_{10} = 86$

$Q_{10} = 44$

$Q_{10} = 42$

$2Q_{10} = 23$

$Q_{10} = 29.5$

VALLEY WATER RECLAMATION PLANT

PM 13,589  
[PM 13,277]  
C.Z. 3534

PM 13,81

C.U. 1603

C.Z. 3162

TR. 2406

PM 13,723

PM 15,194

PM 13,188

249

(C.Z. 1680)

C.Z. 1877

PM 10,795

PM 10,456

PM 10,323

PM 10,226

PM 10,183

PM 11,160

PM 10,430

PM 10,636

PM 8804

PM 8733

PM 10,184

PM 880

PM 15,713

PM 9907

PM 14,764

TR. 15,062



# RCFC & WCD HYDROLOGY MANUAL

## RATIONAL METHOD CALCULATION FORM

Sheet No. 3 of      Sheets

PROJECT ROMOLAND - WEST OF 395

FREQUENCY 100 yr.

Calculated by [Signature] 4-25-83  
DATE

Checked by                                            
DATE

DRAINAGE AREA	Soil & Development	A Acres	I in/hr	C	ΔQ CFS	ΣQ CFS	SLOPE	SECTION	V FPS	L FT.	T MIN.	ET	REMARKS					
W-1	D-Comm	5.5	2.85	.892	14.0	14.0	.004	66' AT	2.3	800	12.1	12.1						
W-2	"	8.5	2.34	.890	17.7						32	.003	66' AT	2.4	1250	8.7	17.9	
W-3	"	11.9	1.92	.888	20.3						52	.003	TR. CHAN.	6	350	1.0	26.6	
			1.89									27.6	(A)					
W-4	D-Comm	7.6	2.92	.892	19.8	19.8	.004	66' AT	2.3	800	11.5	11.5						
W-5	"	12.9	2.38	.890	27						47	.003	66' AT	2.8	1250	7.4	17.3	
W-6	"	21.3	2.00	.890	38						85						24.7	(B)
		$Q_p = 85 + 52$				$\left( \frac{24.7}{27.6} \right) = 1.32$		$T_c = 24.7$										
W-7	D-Comm	6.2	3.00	.893	16.6	16.6	.005	66' AT	2.6	750	10.9	10.9						
W-8	"	9.2	2.50	.889	20.5						37	.003	66' AT	2.5	1250	8.3	15.7	
W-9	"	15.8	2.02	.889	28						65						24.0	(B)
		$1.94$				$132$		$.003$		$TR. CHAN.$		$6$ 550 1.5		24.7	26.2 (A)			
		$Q_p = 132 + 65$				$\left( \frac{1.94}{2.02} \right) = 1.94$		$T_c = 26.2$										

RCFC & WCD HYDROLOGY MANUAL  
RATIONAL METHOD CALCULATION FORM

4  
Sheet No. 2 of      Sheets

PROJECT ROMANO - WEST OF 395  
FREQUENCY 100 yr.

Calculated by Dust 4-26-83  
Checked by      DATE     

DRAINAGE AREA	Soil & Development	A Acres	I in/hr.	C	$\Delta Q$ CFS	$\Sigma Q$ CFS	SLOPE	SECTION	V FPS	L FT.	T MIN.	ET	REMARKS
W-13	D-Comm	4.7	2.70	.891	11.3				H=4 2.0	900	13.2	13.5	
W-14	C-Comm	9.7	2.05	.886	17.6	11.3	.003	66" $\Delta$	2.0	1200	10.0	23.5	
			1.98			29	.003	TR. CHAN.	5	500	1.7	25.2	(B)
W-10	D-Comm	4.1	3.22	.894	11.8				H=4 2	500	9.5	9.5	
W-11	"	8.1	2.35	.89	16.9	11.8	.003	66" $\Delta$	2	1000	8.3	17.8	
W-12	"	11.6	1.97	.888	20.1	29	.003	66" $\Delta$	2.2	1000	7.6	25.4	(A)
						49							
						$(197 + 29) / 1.98$							
						78	.003	TR. CHAN.	5	600	2.0	25.4	
						1.89						27.4	(A)
						$(194 + 78) / (2.62 / 2.79)$							
						269							
	TRAVEL TO		d/s B-4										
			1.72			269	.002	84" $\Delta$	7.5	3100	6.9	26.2	
												33.1	(B)

# RCFC & WCD HYDROLOGY MANUAL

## RATIONAL METHOD CALCULATION FORM

Sheet No. 1 of      Sheets

PROJECT

Romorano - West of 395

Calculated by Just DATE 4-25-87

LINE A-II

FREQUENCY 10 yr. ←

Checked by ----- DATE -----

DRAINAGE AREA	Soil & Development	A Acres	I in/hr	C	ΔQ CFS	EQ CFS	SLOPE	SECTION	V FPS	L FT.	T MIN.	ΣT	REMARKS						
W-1	D-Comm	5.5	1.83	.885	8.9	8.9	.004	66' A	2.3	800	5.8	12.1							
W-2	D-Comm	8.5	1.50	.88	11.2	20	.003	66' A	2.1	1250	9.9	17.9							
W-3	D-Comm	11.9	1.21	.878	12.6	33	.003	TR. CAN	5.3	350	1.1	27.8	(A)						
												28.9							
W-4	D-Comm	7.6	1.87	.887	12.6	12.6	.004	66' A	2.3	800	5.8	11.5							
W-5	"	12.9	1.53	.881	17.4	30	.003	66' A	2.3	1250	9.1	17.3							
W-6	"	21.3	1.24	.877	23	53						26.4	(B)						
					$Q_P = 53 + 33$		$(\frac{26.4}{28.9}) = 83$		$T_C = 26.4$										
												26.4							
												83							
												1.21							
												83	.003	TR. CAN	6.8	550	1.3	27.7	(A)
W-7	D-Comm	6.2	1.92	.888	10.6	10.6	.005	66' A	2.5	750	5.0	10.9							
W-8	"	9.2	1.59	.883	12.9	23.5	.003	66' A	2.1	1250	9.9	15.9							
W-9	"	15.8	1.25	.878	17.3	41						25.8	(B)						
					$Q_P = 83 + 41$		$(\frac{1.21}{1.25}) = 123$		$T_C = 27.7$										
												1.21							
												1.25							

**RCFC & WCD HYDROLOGY MANUAL**  
**RATIONAL METHOD CALCULATION FORM**

Sheet No. 3 of \_\_\_ Sheets

PROJECT \_\_\_\_\_

Calculated by [Signature] 4-28-83  
 DATE

FREQUENCY 10yr.

Checked by [Signature] \_\_\_\_\_  
 DATE

DRAINAGE AREA	Soil & Development	A Acres	I in/hr	C	ΔQ CFS	Σ Q CFS	SLOPE	SECTION	v FPS	L FT.	T MIN.	ET	REMARKS
W-13	D-Comm	4.7	1.73	.885	7.2	7.2	.003	66" T.	1.95	1200	10.3	13.5	
W-14	C-Comm	9.7	1.30	.875	11.1	18.3	.003	TR. CH.	4.7	500	1.7	23.8	
			1.26									25.5	(B)
W-10	D-Comm	4.1	2.06	.888	7.5	7.5	.003	66" T.	1.95	1000	8.5	9.5	
W-11	"	8.1	1.50	.881	10.7	18.2	.003	66" T.	2.1	1000	7.9	18.0	
W-12	"	11.6	1.25	.878	12.7	31						25.9	(A)
		$Q_p = 31 + 18$		$(\frac{1.25}{1.26}) = 49$				$T_c = 25.9$					
			1.21			49	.003	TR. CH.	5.5	600	1.8	25.9	
												27.7	
$T_A = T_B =$		$Q_p = 123 +$		$49 = 172$				$T_c = 27.7$					
TRAVEL TO d/s B-2						172	.002	84" T.	4.5	1500	5.6	27.7	
			1.10									33.3	

DATE P. 3

# Hydraulics

PROJECT 4-6-954-00 000-0 RUN: LINE A - 1a

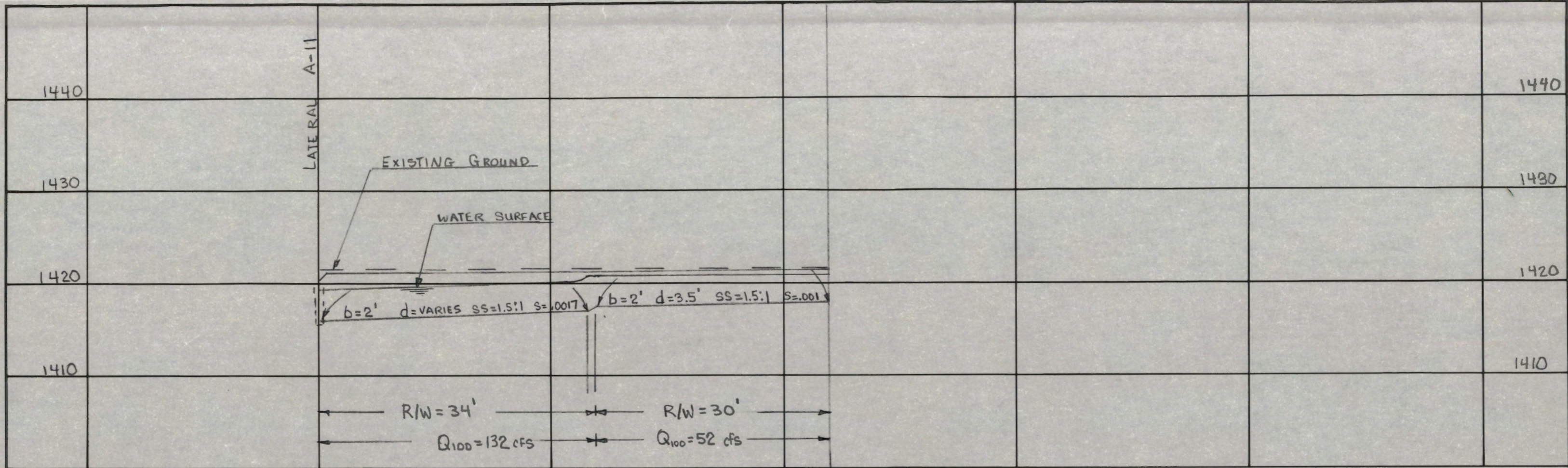
WATER SURFACE PROFILE INPUT DIRECTION = UP (SUBCRITICAL) STARTING DEPTH = 3.39

STATION	INVERT ELEV	Q	N	DIST INC	BOTTOM WIDTH	SIDE SLOPE	RADIUS (M+P)
0+00.00	1416.00	132	.015	100	2.00	1.500	-1
5+80.00	1417.00	52	.015	100	2.00	1.500	-1
6+00.00	1417.50	52	.015	100	2.00	1.500	-1
11+00.00	1418.00	52	.015	100	2.00	1.500	-1

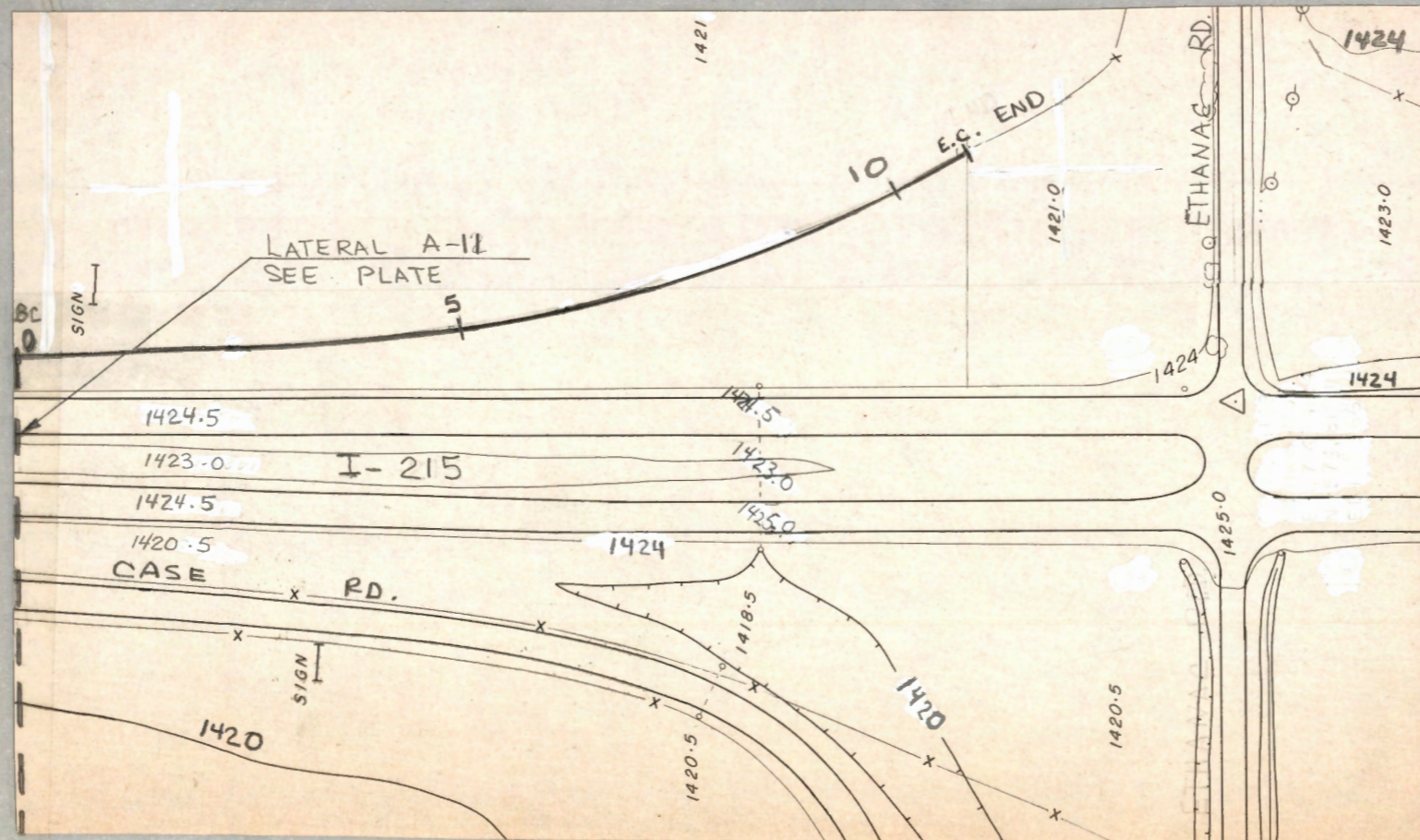
PROJECT 4-6-954-00 000-0 RUN: LINE A - 11a

## WATER SURFACE PROFILE FOR SUBCRITICAL FLOW

STATION	WATER ELEV	WATER DEPTH	INVERT ELEV	VELO	VH	CD	SUPER M+P	Q	N	BOTTOM WIDTH	SIDE SLOPE
0+00.00	1419.39	3.39	1416.00	5.5	.47	2.8	54	132	.015	2.00	1.500
1+00.00	1419.53	3.36	1416.17	5.6	.48	2.8	53				
2+00.00	1419.68	3.34	1416.34	5.6	.49	2.8	53				
3+00.00	1419.84	3.33	1416.52	5.7	.50	2.8	53				
4+00.00	1420.00	3.31	1416.69	5.7	.51	2.8	53				
5+00.00	1420.17	3.31	1416.86	5.7	.51	2.8	53				
5+80.00	1420.75	3.75	1417.00	1.8	.05	1.8	43	52	.015	2.00	1.500
6+00.00	1420.73	3.23	1417.50	2.4	.09	1.8	31	52	.015	2.00	1.500
7+00.00	1420.75	3.15	1417.60	2.5	.09	1.8	30				
8+00.00	1420.78	3.08	1417.70	2.6	.10	1.8	28				
9+00.00	1420.81	3.01	1417.80	2.7	.11	1.8	27				
10+00.00	1420.84	2.94	1417.90	2.8	.12	1.8	26				
11+00.00	1420.88	2.88	1418.00	2.9	.13	1.8	25	52	.015	2.00	1.500



HORIZ. 1"=200'  
VERT. 1"=10'



NOTE: Ground line in profile was taken from orthophoto map dated Aug. 8, 1977. Plan view is from topographic map dated Feb. 25, 1959.

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
M.O.P. - ROMOLAND AREA	
LATERAL A-11.A	
APPROVED: _____ CHIEF ENGINEER	DRAWN BY: D.B. 42
DATE: _____	CHECKED BY: _____ DATE DRAWN: 7/12/83



**Appendix H**  
**Drainage Maps**

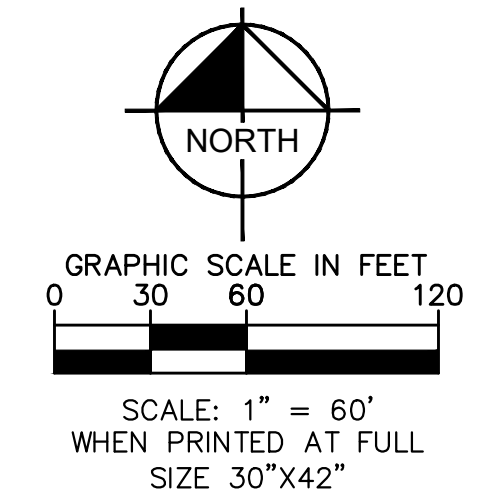
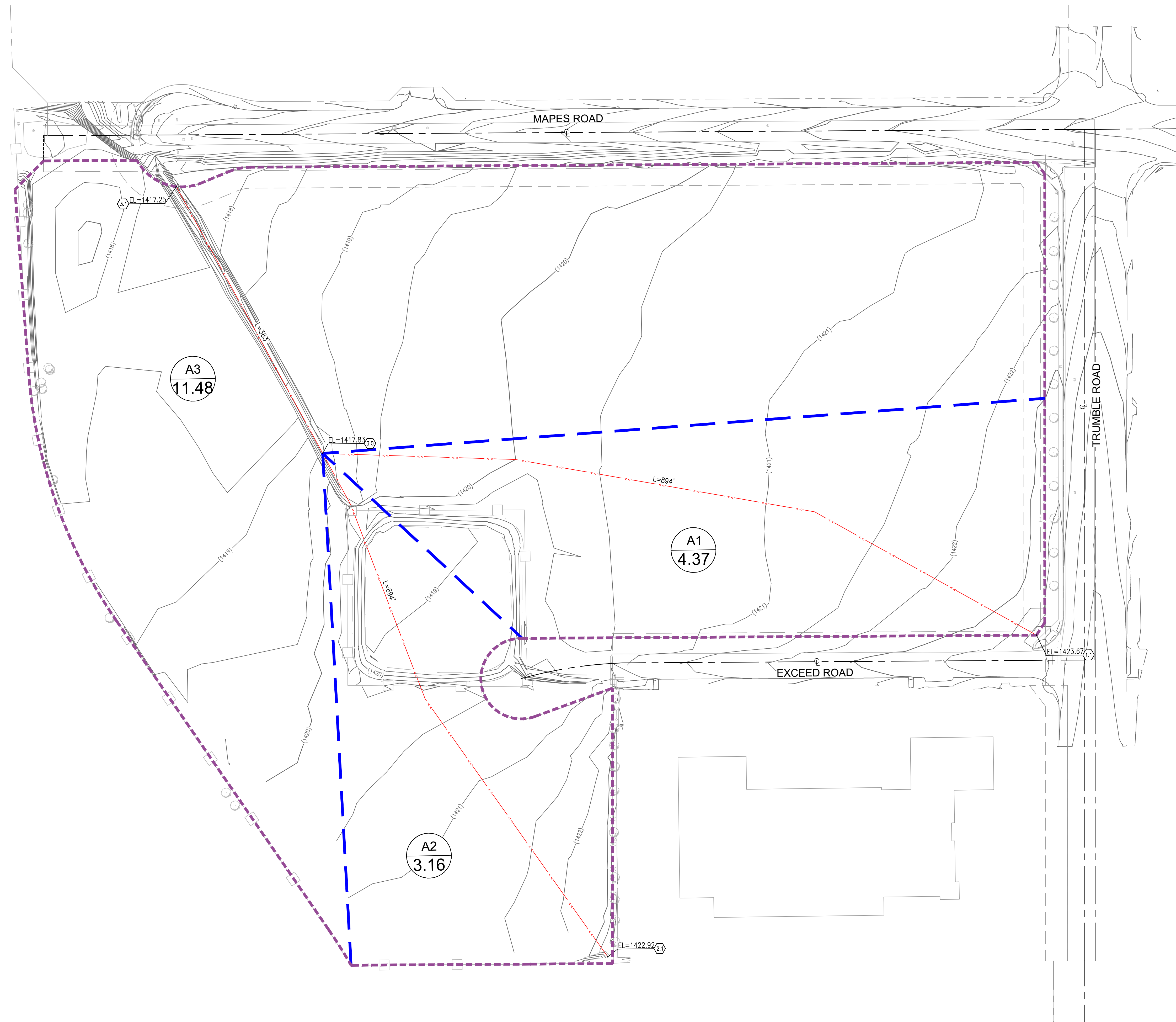
CITY OF PERRIS  
**PRE DEVELOPMENT HYDROLOGY EXHIBIT**  
 FOR  
 MAPES INDUSTRIAL FACILITY

**HYDROLOGY INFORMATION**

SITE AREA: 19.01 ACRES  
 SOIL TYPE: D (NRCS WEB SOIL SURVEY)  
 IMPERVIOUS: 0% (PER CALCULATIONS)  
 ISOHYETALS: 0.487 INCH (2 YEAR, 1 HOUR)  
 1.52 INCH (100 YEAR, 1 HOUR)  
 RUNOFF INDEX: 89 (SOIL GROUP D)  
 FREQUENCY: 2-YEAR (FOR STORMWATER QUALITY)  
 100-YEAR (FOR STORM DRAIN DESIGN)  
 METHOD: RIVERSIDE COUNTY HYDROLOGY MANUAL

**LEGEND:**

- DRAINAGE AREA BOUNDARY
- SUB-DRAINAGE AREA BOUNDARY
- FLOW PATH
- PROPOSED FLOW DIRECTION ARROW
- DRAINAGE AREA DESIGNATION  
AREA (AC)
- STREAM #
- NODE



HYDROLOGY SUMMARY							
DRAINAGE AREA NO.	TRIBUTARY AREA (SF)	TRIBUTARY AREA (AC)	IMPERVIOUS RATIO	Q <sub>2</sub> (CFS)	V <sub>2</sub> (CF)	Q <sub>100</sub> (CFS)	V <sub>100</sub> (CF)
A	828,248	19.01	0.00	8.30	14,323	39.91	277,142

Kimley»Horn

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 1100 W TOWN AND COUNTRY ROAD, SUITE 700,  
 ORANGE, CA 92668  
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 WWW.KIMLEY-HORN.COM

MAPES INDUSTRIAL FACILITY  
 PRE DEVELOPMENT HYDROLOGY EXHIBIT  
 MAPES AND TRUMBLE

CITY OF PERRIS

DATE: JUN 2022  
 SHEET

1

OF 1

© 2021 KIMLEY-HORN AND ASSOCIATES, INC. ALL RIGHTS RESERVED. EXHIBIT A-10 PRE DEVELOPMENT HYDROLOGY EXHIBIT FOR MAPES INDUSTRIAL FACILITY, PERRIS, CA. DRAWN BY: J. HORN

CITY OF PERRIS  
**POST DEVELOPMENT HYDROLOGY EXHIBIT**  
 FOR  
 MAPES INDUSTRIAL FACILITY

**HYDROLOGY INFORMATION**

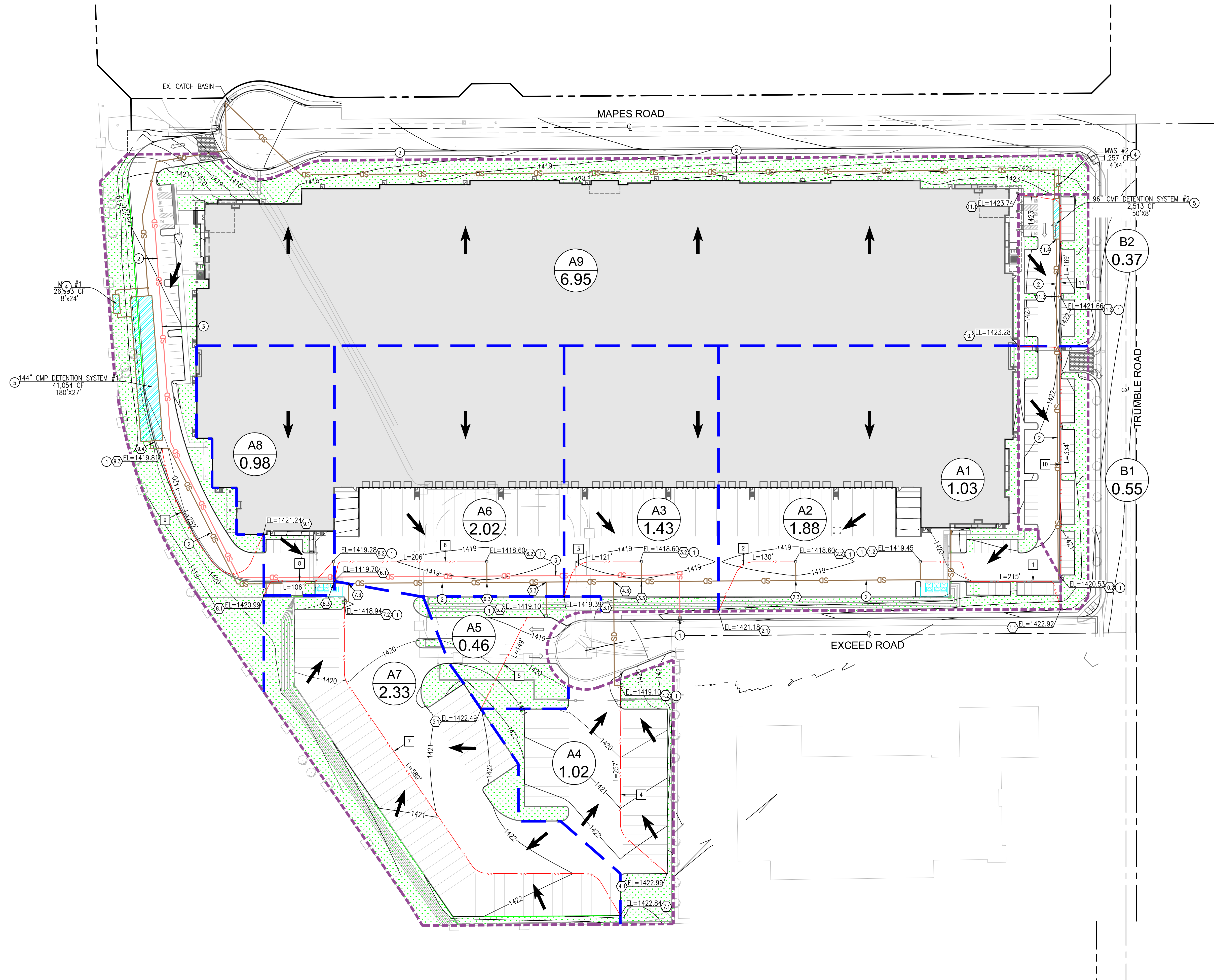
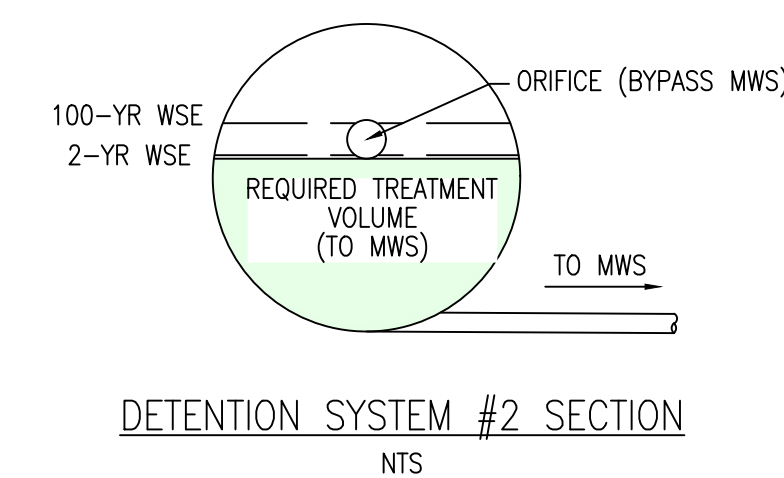
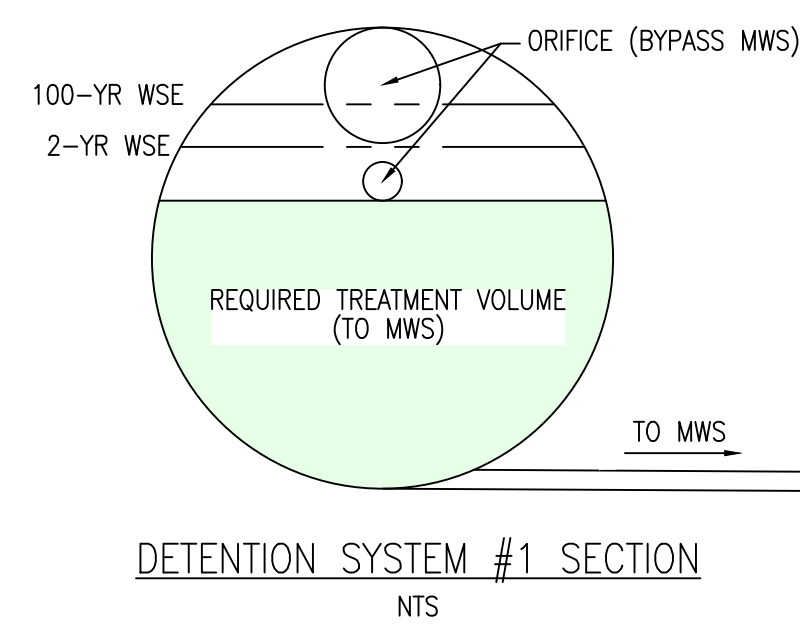
SITE AREA: 19.01 ACRES  
 SOIL TYPE: D (NRCS WEB SOIL SURVEY)  
 IMPERVIOUS: 82% (PER CALCULATIONS)  
 ISOHYETALS: 0.487 INCH (2 YEAR, 1 HOUR)  
 1.52 INCH (100 YEAR, 1 HOUR)  
 RUNOFF INDEX: 75 (SOIL GROUP D)  
 FREQUENCY: 2-YEAR (FOR STORMWATER QUALITY)  
 100-YEAR (FOR STORM DRAIN DESIGN)  
 METHOD: RIVERSIDE COUNTY HYDROLOGY MANUAL

**LEGEND:**

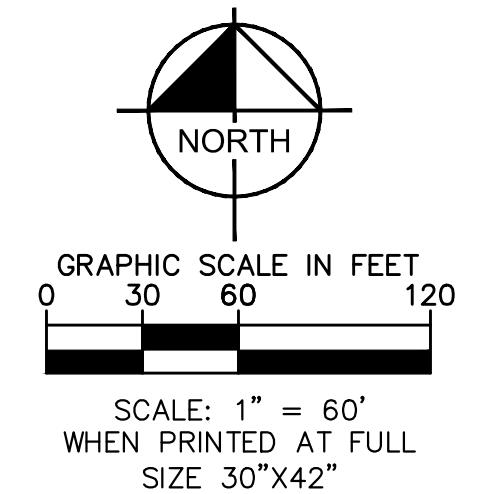
- DRAINAGE AREA BOUNDARY
- SUB-DRAINAGE AREA BOUNDARY
- FLOW PATH
- STORM DRAIN (ONSITE FLOWS)
- STORM DRAIN (OFFSITE FLOWS)
- PROPOSED FLOW DIRECTION ARROW
- X DRAINAGE AREA DESIGNATION
- XXX AREA (AC)
- 1 STREAM #
- 1 NODE

**DRAINAGE NOTES:**

- ① PROPOSED CATCH BASIN
- ② PROPOSED STORM DRAIN PIPE (ONSITE FLOWS)
- ③ PROPOSED STORM DRAIN PIPE (OFFSITE FLOWS)
- ④ PROPOSED BMP - MODULAR WETLAND SYSTEM
- ⑤ PROPOSED BMP - UNDERGROUND DETENTION BASIN



HYDROLOGY SUMMARY								
DRAINAGE AREA NO.	TRIBUTARY AREA (SF)	TRIBUTARY AREA (AC)	IMPERVIOUS RATIO	Q <sub>2</sub> (CFS)	V <sub>2</sub> (CF)	Q <sub>100</sub> (CFS)	V <sub>100</sub> (CF)	STORAGE PROVIDED (CF)
A	787,989	18.09	0.83	19.96	103,019	37.48	305,203	41,054 (UNDERGROUND DETENTION SYSTEM #1)
B	40,260	0.92	0.73	1.00	4,726	1.94	14,780	2,513 (UNDERGROUND DETENTION SYSTEM #2)
TOTAL	828,248	19.01	0.82	20.96	107,746	39.42	319,983	43,568



**Kimley»Horn**

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MAPES INDUSTRIAL FACILITY  
 POST DEVELOPMENT HYDROLOGY EXHIBIT  
 MAPES AND TRUMBLE

CITY OF PERRIS

DATE: AUG 2022

SHEET

1

OF 1

**Appendix I**  
**Rational Method Analysis**

**Appendix I.1**

**Rational Method Analysis  
Pre-Development Conditions  
2-Year Storm**

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0  
Rational Hydrology Study Date: 05/26/22

File:MapesPre2Rat.out

-----  
MAPES AND TRUMBLE INDUSTRIAL FACILITY  
RATIONAL METHOD  
PRE-DEVELOPMENT CONDITIONS  
2-YEAR STORM, DA A  
-----

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

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

Program License Serial Number 6443  
-----

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

2 year, 1 hour precipitation = 0.487(In.)  
100 year, 1 hour precipitation = 1.520(In.)

Storm event year = 2.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.487(In/Hr)  
Slope of intensity duration curve = 0.4900

++++  
Process from Point/Station 1.100 to Point/Station 3.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 893.980(Ft.)  
Top (of initial area) elevation = 1423.670(Ft.)  
Bottom (of initial area) elevation = 1417.830(Ft.)  
Difference in elevation = 5.840(Ft.)  
Slope = 0.00653 s(percent)= 0.65  
TC = k(0.530)\*[(length^3)/(elevation change)]^0.2

Initial area time of concentration = 21.968 min.  
Rainfall intensity = 0.797(In/Hr) for a 2.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.593  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 1) = 76.40  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Initial subarea runoff = 2.066(CFS)  
Total initial stream area = 4.370(Ac.)  
Pervious area fraction = 1.000

++++  
Process from Point/Station 3.000 to Point/Station 3.000  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 4.370(Ac.)  
Runoff from this stream = 2.066(CFS)  
Time of concentration = 21.97 min.  
Rainfall intensity = 0.797(In/Hr)

++++  
Process from Point/Station 2.100 to Point/Station 3.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 693.750(Ft.)  
Top (of initial area) elevation = 1422.920(Ft.)  
Bottom (of initial area) elevation = 1417.830(Ft.)  
Difference in elevation = 5.090(Ft.)  
Slope = 0.00734 s(percent)= 0.73  
TC =  $k(0.530)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Initial area time of concentration = 19.393 min.  
Rainfall intensity = 0.847(In/Hr) for a 2.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.606  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 1) = 76.40  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Initial subarea runoff = 1.621(CFS)  
Total initial stream area = 3.160(Ac.)  
Pervious area fraction = 1.000

+++++  
 Process from Point/Station 3.000 to Point/Station 3.000  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 3.160(Ac.)  
 Runoff from this stream = 1.621(CFS)  
 Time of concentration = 19.39 min.  
 Rainfall intensity = 0.847(In/Hr)  
 Summary of stream data:

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

1	2.066	21.97	0.797
2	1.621	19.39	0.847

Largest stream flow has longer time of concentration  
 $Q_p = 2.066 + \text{sum of } Q_b \cdot I_a/I_b$   
 $1.621 * 0.941 = 1.525$   
 $Q_p = 3.591$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 2.066 1.621  
 Area of streams before confluence:  
 4.370 3.160  
 Results of confluence:  
 Total flow rate = 3.591(CFS)  
 Time of concentration = 21.968 min.  
 Effective stream area after confluence = 7.530(Ac.)

+++++  
 Process from Point/Station 3.000 to Point/Station 3.100  
 \*\*\*\* IRREGULAR CHANNEL FLOW TRAVEL TIME \*\*\*\*

---

Estimated mean flow rate at midpoint of channel = 5.993(CFS)  
 Depth of flow = 0.614(Ft.), Average velocity = 1.148(Ft/s)  
 \*\*\*\*\* Irregular Channel Data \*\*\*\*\*

-----  
 Information entered for subchannel number 1 :  
 Point number 'X' coordinate 'Y' coordinate  
 1 0.00 0.77  
 2 4.23 0.00  
 3 9.79 0.02  
 4 14.96 1.12  
 Manning's 'N' friction factor = 0.030



-----  
Sub-Channel flow = 5.993(CFS)  
' ' flow top width = 11.724(Ft.)  
' ' velocity= 1.148(Ft/s)  
' ' area = 5.222(Sq.Ft)  
' ' Froude number = 0.303

Upstream point elevation = 1417.830(Ft.)  
Downstream point elevation = 1417.250(Ft.)  
Flow length = 362.580(Ft.)  
Travel time = 5.27 min.  
Time of concentration = 27.23 min.  
Depth of flow = 0.614(Ft.)  
Average velocity = 1.148(Ft/s)  
Total irregular channel flow = 5.993(CFS)  
Irregular channel normal depth above invert elev. = 0.614(Ft.)  
Average velocity of channel(s) = 1.148(Ft/s)  
Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.572  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 1) = 76.40  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 0.717(In/Hr) for a 2.0 year storm  
Subarea runoff = 4.707(CFS) for 11.480(Ac.)  
Total runoff = 8.297(CFS) Total area = 19.010(Ac.)  
Depth of flow = 0.725(Ft.), Average velocity = 1.259(Ft/s)  
End of computations, total study area = 19.01 (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 = 89.0

**Appendix I.11**

**Rational Method Analysis  
Pre-Development Conditions  
10-Year Storm**

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0

Rational Hydrology Study

Date: 05/26/22

File:MapesPre10Rat.out

-----  
MAPES AND TRUMBLE INDUSTRIAL FACILITY  
RATIONAL METHOD  
PRE-DEVELOPMENT CONDITIONS  
10-YEAR STORM, DA A  
-----

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

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

Program License Serial Number 6443  
-----

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

2 year, 1 hour precipitation = 0.487(In.)

100 year, 1 hour precipitation = 1.520(In.)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.912(In/Hr)

Slope of intensity duration curve = 0.4900

++++  
Process from Point/Station 1.100 to Point/Station 3.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 893.980(Ft.)

Top (of initial area) elevation = 1423.670(Ft.)

Bottom (of initial area) elevation = 1417.830(Ft.)

Difference in elevation = 5.840(Ft.)

Slope = 0.00653 s(percent)= 0.65

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

Initial area time of concentration = 21.968 min.  
Rainfall intensity = 1.492(In/Hr) for a 10.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.810  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 2) = 89.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Initial subarea runoff = 5.285(CFS)  
Total initial stream area = 4.370(Ac.)  
Pervious area fraction = 1.000

++++  
Process from Point/Station 3.000 to Point/Station 3.000  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 4.370(Ac.)  
Runoff from this stream = 5.285(CFS)  
Time of concentration = 21.97 min.  
Rainfall intensity = 1.492(In/Hr)

++++  
Process from Point/Station 2.100 to Point/Station 3.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 693.750(Ft.)  
Top (of initial area) elevation = 1422.920(Ft.)  
Bottom (of initial area) elevation = 1417.830(Ft.)  
Difference in elevation = 5.090(Ft.)  
Slope = 0.00734 s(percent)= 0.73  
TC =  $k(0.530)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Initial area time of concentration = 19.393 min.  
Rainfall intensity = 1.586(In/Hr) for a 10.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.815  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 2) = 89.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Initial subarea runoff = 4.086(CFS)  
Total initial stream area = 3.160(Ac.)  
Pervious area fraction = 1.000

+++++  
 Process from Point/Station 3.000 to Point/Station 3.000  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 3.160(Ac.)  
 Runoff from this stream = 4.086(CFS)  
 Time of concentration = 19.39 min.  
 Rainfall intensity = 1.586(In/Hr)  
 Summary of stream data:

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

1	5.285	21.97	1.492
2	4.086	19.39	1.586

Largest stream flow has longer time of concentration  
 $Q_p = 5.285 + \text{sum of } Q_b \cdot I_a/I_b$   
 $4.086 * 0.941 = 3.844$   
 $Q_p = 9.129$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 5.285 4.086  
 Area of streams before confluence:  
 4.370 3.160

Results of confluence:  
 Total flow rate = 9.129(CFS)  
 Time of concentration = 21.968 min.  
 Effective stream area after confluence = 7.530(Ac.)

+++++  
 Process from Point/Station 3.000 to Point/Station 3.100  
 \*\*\*\* IRREGULAR CHANNEL FLOW TRAVEL TIME \*\*\*\*

---

Estimated mean flow rate at midpoint of channel = 15.523(CFS)  
 Depth of flow = 0.975(Ft.), Average velocity = 1.551(Ft/s)  
 !!Warning: Water is above left or right bank elevations  
 \*\*\*\*\* Irregular Channel Data \*\*\*\*\*

-----  
 Information entered for subchannel number 1 :  

Point number	'X' coordinate	'Y' coordinate
1	0.00	0.77
2	4.23	0.00
3	9.79	0.02
4	14.96	1.12

Manning's 'N' friction factor = 0.030

-----  
Sub-Channel flow = 15.523(CFS)  
' ' flow top width = 14.280(Ft.)  
' ' velocity= 1.551(Ft/s)  
' ' area = 10.009(Sq.Ft)  
' ' Froude number = 0.326

Upstream point elevation = 1417.830(Ft.)  
Downstream point elevation = 1417.250(Ft.)  
Flow length = 362.580(Ft.)  
Travel time = 3.90 min.  
Time of concentration = 25.86 min.  
Depth of flow = 0.975(Ft.)  
Average velocity = 1.551(Ft/s)  
Total irregular channel flow = 15.523(CFS)  
Irregular channel normal depth above invert elev. = 0.975(Ft.)  
Average velocity of channel(s) = 1.551(Ft/s)  
!!Warning: Water is above left or right bank elevations  
Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.804  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 2) = 89.00  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 1.377(In/Hr) for a 10.0 year storm  
Subarea runoff = 12.711(CFS) for 11.480(Ac.)  
Total runoff = 21.840(CFS) Total area = 19.010(Ac.)  
Depth of flow = 1.146(Ft.), Average velocity = 1.745(Ft/s)  
!!Warning: Water is above left or right bank elevations  
End of computations, total study area = 19.01 (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 = 89.0

**Appendix I.III**

**Rational Method Analysis  
Pre-Development Conditions  
100-Year Storm**

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0  
Rational Hydrology Study Date: 05/26/22

File:MapesPre100Rat.out

-----  
MAPES AND TRUMBLE INDUSTRIAL FACILITY  
RATIONAL METHOD  
PRE-DEVELOPMENT CONDITIONS  
100-YEAR STORM, DA A  
-----

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

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

Program License Serial Number 6443  
-----

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

Storm event (year) = 100.00 Antecedent Moisture Condition = 3

2 year, 1 hour precipitation = 0.487(In.)  
100 year, 1 hour precipitation = 1.520(In.)

Storm event year = 100.0  
Calculated rainfall intensity data:  
1 hour intensity = 1.520(In/Hr)  
Slope of intensity duration curve = 0.4900

++++  
Process from Point/Station 1.100 to Point/Station 3.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 893.980(Ft.)  
Top (of initial area) elevation = 1423.670(Ft.)  
Bottom (of initial area) elevation = 1417.830(Ft.)  
Difference in elevation = 5.840(Ft.)  
Slope = 0.00653 s(percent)= 0.65  
TC = k(0.530)\*[(length^3)/(elevation change)]^0.2



Initial area time of concentration = 21.968 min.  
Rainfall intensity = 2.487(In/Hr) for a 100.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.878  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 3) = 95.60  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Initial subarea runoff = 9.545(CFS)  
Total initial stream area = 4.370(Ac.)  
Pervious area fraction = 1.000

++++  
Process from Point/Station 3.000 to Point/Station 3.000  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 4.370(Ac.)  
Runoff from this stream = 9.545(CFS)  
Time of concentration = 21.97 min.  
Rainfall intensity = 2.487(In/Hr)

++++  
Process from Point/Station 2.100 to Point/Station 3.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 693.750(Ft.)  
Top (of initial area) elevation = 1422.920(Ft.)  
Bottom (of initial area) elevation = 1417.830(Ft.)  
Difference in elevation = 5.090(Ft.)  
Slope = 0.00734 s(percent)= 0.73  
TC =  $k(0.530)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Initial area time of concentration = 19.393 min.  
Rainfall intensity = 2.644(In/Hr) for a 100.0 year storm  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.880  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 3) = 95.60  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Initial subarea runoff = 7.348(CFS)  
Total initial stream area = 3.160(Ac.)  
Pervious area fraction = 1.000

+++++  
 Process from Point/Station 3.000 to Point/Station 3.000  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 3.160(Ac.)  
 Runoff from this stream = 7.348(CFS)  
 Time of concentration = 19.39 min.  
 Rainfall intensity = 2.644(In/Hr)  
 Summary of stream data:

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

1	9.545	21.97	2.487
2	7.348	19.39	2.644

Largest stream flow has longer time of concentration  
 $Q_p = 9.545 + \text{sum of } Q_b \cdot I_a/I_b$   
 $7.348 * 0.941 = 6.912$   
 $Q_p = 16.458$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 9.545 7.348  
 Area of streams before confluence:  
 4.370 3.160

Results of confluence:  
 Total flow rate = 16.458(CFS)  
 Time of concentration = 21.968 min.  
 Effective stream area after confluence = 7.530(Ac.)

+++++  
 Process from Point/Station 3.000 to Point/Station 3.100  
 \*\*\*\* IRREGULAR CHANNEL FLOW TRAVEL TIME \*\*\*\*

---

Estimated mean flow rate at midpoint of channel = 28.212(CFS)  
 Depth of flow = 1.285(Ft.), Average velocity = 1.933(Ft/s)  
 !!Warning: Water is above left or right bank elevations  
 \*\*\*\*\* Irregular Channel Data \*\*\*\*\*

-----  
 Information entered for subchannel number 1 :  

Point number	'X' coordinate	'Y' coordinate
1	0.00	0.77
2	4.23	0.00
3	9.79	0.02
4	14.96	1.12

Manning's 'N' friction factor = 0.030

-----  
Sub-Channel flow = 28.212(CFS)  
' ' flow top width = 14.960(Ft.)  
' ' velocity= 1.933(Ft/s)  
' ' area = 14.596(Sq.Ft)  
' ' Froude number = 0.345

Upstream point elevation = 1417.830(Ft.)  
Downstream point elevation = 1417.250(Ft.)  
Flow length = 362.580(Ft.)  
Travel time = 3.13 min.  
Time of concentration = 25.09 min.  
Depth of flow = 1.285(Ft.)  
Average velocity = 1.933(Ft/s)  
Total irregular channel flow = 28.212(CFS)  
Irregular channel normal depth above invert elev. = 1.285(Ft.)  
Average velocity of channel(s) = 1.933(Ft/s)  
!!Warning: Water is above left or right bank elevations  
Adding area flow to channel  
UNDEVELOPED (poor cover) subarea  
Runoff Coefficient = 0.877  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 3) = 95.60  
Pervious area fraction = 1.000; Impervious fraction = 0.000  
Rainfall intensity = 2.330(In/Hr) for a 100.0 year storm  
Subarea runoff = 23.455(CFS) for 11.480(Ac.)  
Total runoff = 39.913(CFS) Total area = 19.010(Ac.)  
Depth of flow = 1.511(Ft.), Average velocity = 2.221(Ft/s)  
!!Warning: Water is above left or right bank elevations  
End of computations, total study area = 19.01 (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 = 89.0

**Appendix I.IV**

**Rational Method Analysis  
Post-Development Conditions  
2-Year Storm**

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0  
Rational Hydrology Study Date: 05/27/22

File:MapesPost2ARat.out

-----  
MAPES AND TRUMBLE INDUSTRIAL FACILITY  
RATIONAL METHOD  
POST-DEVELOPMENT CONDITIONS  
2-YEAR STORM, DA A  
-----

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

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

Program License Serial Number 6443  
-----

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

2 year, 1 hour precipitation = 0.487(In.)  
100 year, 1 hour precipitation = 1.520(In.)

Storm event year = 2.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.487(In/Hr)  
Slope of intensity duration curve = 0.4900

++++  
Process from Point/Station 1.100 to Point/Station 1.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 214.760(Ft.)  
Top (of initial area) elevation = 1422.920(Ft.)  
Bottom (of initial area) elevation = 1419.450(Ft.)  
Difference in elevation = 3.470(Ft.)  
Slope = 0.01616 s(percent)= 1.62  
TC = k(0.300)\*[(length^3)/(elevation change)]^0.2

Initial area time of concentration = 5.864 min.  
Rainfall intensity = 1.522(In/Hr) for a 2.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.864  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 1) = 57.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 1.355(CFS)  
Total initial stream area = 1.030(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 1.200 to Point/Station 2.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1415.450(Ft.)  
Downstream point/station elevation = 1414.490(Ft.)  
Pipe length = 175.42(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 1.355(CFS)  
Nearest computed pipe diameter = 12.00(In.)  
Calculated individual pipe flow = 1.355(CFS)  
Normal flow depth in pipe = 6.10(In.)  
Flow top width inside pipe = 12.00(In.)  
Critical Depth = 5.91(In.)  
Pipe flow velocity = 3.38(Ft/s)  
Travel time through pipe = 0.87 min.  
Time of concentration (TC) = 6.73 min.

++++  
Process from Point/Station 2.300 to Point/Station 2.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 1.030(Ac.)  
Runoff from this stream = 1.355(CFS)  
Time of concentration = 6.73 min.  
Rainfall intensity = 1.423(In/Hr)

++++  
Process from Point/Station 2.100 to Point/Station 2.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 130.430(Ft.)  
Top (of initial area) elevation = 1421.180(Ft.)

Bottom (of initial area) elevation = 1418.600(Ft.)  
 Difference in elevation = 2.580(Ft.)  
 Slope = 0.01978 s(percent)= 1.98  
 $TC = k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$   
 Warning: TC computed to be less than 5 min.; program is assuming the  
 time of concentration is 5 minutes.  
 Initial area time of concentration = 5.000 min.  
 Rainfall intensity = 1.646(In/Hr) for a 2.0 year storm  
 COMMERCIAL subarea type  
 Runoff Coefficient = 0.866  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 1.000  
 RI index for soil(AMC 1) = 57.00  
 Pervious area fraction = 0.100; Impervious fraction = 0.900  
 Initial subarea runoff = 2.679(CFS)  
 Total initial stream area = 1.880(Ac.)  
 Pervious area fraction = 0.100

++++++  
 Process from Point/Station 2.200 to Point/Station 2.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1414.600(Ft.)  
 Downstream point/station elevation = 1414.490(Ft.)  
 Pipe length = 21.80(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 2.679(CFS)  
 Nearest computed pipe diameter = 15.00(In.)  
 Calculated individual pipe flow = 2.679(CFS)  
 Normal flow depth in pipe = 8.23(In.)  
 Flow top width inside pipe = 14.93(In.)  
 Critical Depth = 7.88(In.)  
 Pipe flow velocity = 3.88(Ft/s)  
 Travel time through pipe = 0.09 min.  
 Time of concentration (TC) = 5.09 min.

++++++  
 Process from Point/Station 2.300 to Point/Station 2.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 1.880(Ac.)  
 Runoff from this stream = 2.679(CFS)  
 Time of concentration = 5.09 min.  
 Rainfall intensity = 1.631(In/Hr)  
 Summary of stream data:

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

1	1.355	6.73	1.423
2	2.679	5.09	1.631

Largest stream flow has longer or shorter time of concentration

Qp = 2.679 + sum of  
 Qa Tb/Ta  
 1.355 \* 0.757 = 1.025  
 Qp = 3.704

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 1.355 2.679

Area of streams before confluence:  
 1.030 1.880

Results of confluence:  
 Total flow rate = 3.704(CFS)  
 Time of concentration = 5.094 min.  
 Effective stream area after confluence = 2.910(Ac.)

\*\*\*\*\*  
 Process from Point/Station 2.300 to Point/Station 3.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1414.490(Ft.)  
 Downstream point/station elevation = 1413.530(Ft.)  
 Pipe length = 191.80(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 3.704(CFS)  
 Nearest computed pipe diameter = 15.00(In.)  
 Calculated individual pipe flow = 3.704(CFS)  
 Normal flow depth in pipe = 10.24(In.)  
 Flow top width inside pipe = 13.96(In.)  
 Critical Depth = 9.33(In.)  
 Pipe flow velocity = 4.15(Ft/s)  
 Travel time through pipe = 0.77 min.  
 Time of concentration (TC) = 5.86 min.

\*\*\*\*\*  
 Process from Point/Station 3.300 to Point/Station 3.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
 Stream flow area = 2.910(Ac.)  
 Runoff from this stream = 3.704(CFS)  
 Time of concentration = 5.86 min.  
 Rainfall intensity = 1.522(In/Hr)



++++  
Process from Point/Station 3.100 to Point/Station 3.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 120.880(Ft.)  
Top (of initial area) elevation = 1419.390(Ft.)  
Bottom (of initial area) elevation = 1418.600(Ft.)  
Difference in elevation = 0.790(Ft.)  
Slope = 0.00654 s(percent)= 0.65  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Initial area time of concentration = 5.585 min.  
Rainfall intensity = 1.559(In/Hr) for a 2.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.865  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 1) = 57.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 1.927(CFS)  
Total initial stream area = 1.430(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 3.200 to Point/Station 3.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1414.600(Ft.)  
Downstream point/station elevation = 1413.530(Ft.)  
Pipe length = 22.97(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 1.927(CFS)  
Nearest computed pipe diameter = 9.00(In.)  
Calculated individual pipe flow = 1.927(CFS)  
Normal flow depth in pipe = 4.71(In.)  
Flow top width inside pipe = 8.99(In.)  
Critical Depth = 7.59(In.)  
Pipe flow velocity = 8.24(Ft/s)  
Travel time through pipe = 0.05 min.  
Time of concentration (TC) = 5.63 min.

++++  
Process from Point/Station 3.300 to Point/Station 3.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2

Stream flow area = 1.430(Ac.)  
 Runoff from this stream = 1.927(CFS)  
 Time of concentration = 5.63 min.  
 Rainfall intensity = 1.552(In/Hr)  
 Summary of stream data:

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

1	3.704	5.86	1.522
2	1.927	5.63	1.552

Largest stream flow has longer time of concentration

Qp = 3.704 + sum of  
 Qb Ia/Ib  
 1.927 \* 0.980 = 1.890  
 Qp = 5.594

Total of 2 streams to confluence:  
 Flow rates before confluence point:

3.704 1.927

Area of streams before confluence:

2.910 1.430

Results of confluence:

Total flow rate = 5.594(CFS)  
 Time of concentration = 5.864 min.  
 Effective stream area after confluence = 4.340(Ac.)

++++  
 Process from Point/Station 3.300 to Point/Station 4.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1413.530(Ft.)  
 Downstream point/station elevation = 1413.360(Ft.)  
 Pipe length = 34.32(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 5.594(CFS)  
 Nearest computed pipe diameter = 18.00(In.)  
 Calculated individual pipe flow = 5.594(CFS)  
 Normal flow depth in pipe = 11.70(In.)  
 Flow top width inside pipe = 17.17(In.)  
 Critical Depth = 10.95(In.)  
 Pipe flow velocity = 4.60(Ft/s)  
 Travel time through pipe = 0.12 min.  
 Time of concentration (TC) = 5.99 min.

++++  
 Process from Point/Station 4.300 to Point/Station 4.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 4.340(Ac.)  
Runoff from this stream = 5.594(CFS)  
Time of concentration = 5.99 min.  
Rainfall intensity = 1.506(In/Hr)

++++  
Process from Point/Station 4.100 to Point/Station 4.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 256.970(Ft.)  
Top (of initial area) elevation = 1422.990(Ft.)  
Bottom (of initial area) elevation = 1419.100(Ft.)  
Difference in elevation = 3.890(Ft.)  
Slope = 0.01514 s(percent)= 1.51  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Initial area time of concentration = 6.384 min.  
Rainfall intensity = 1.460(In/Hr) for a 2.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.863  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 1) = 57.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 1.286(CFS)  
Total initial stream area = 1.020(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 4.200 to Point/Station 4.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1415.100(Ft.)  
Downstream point/station elevation = 1413.360(Ft.)  
Pipe length = 136.57(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 1.286(CFS)  
Nearest computed pipe diameter = 9.00(In.)  
Calculated individual pipe flow = 1.286(CFS)  
Normal flow depth in pipe = 5.48(In.)  
Flow top width inside pipe = 8.78(In.)  
Critical Depth = 6.26(In.)  
Pipe flow velocity = 4.56(Ft/s)  
Travel time through pipe = 0.50 min.  
Time of concentration (TC) = 6.88 min.

+++++  
 Process from Point/Station 4.300 to Point/Station 4.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 1.020(Ac.)  
 Runoff from this stream = 1.286(CFS)  
 Time of concentration = 6.88 min.  
 Rainfall intensity = 1.407(In/Hr)  
 Summary of stream data:

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

1	5.594	5.99	1.506
2	1.286	6.88	1.407

Largest stream flow has longer or shorter time of concentration  
 $Q_p = 5.594 + \text{sum of } Q_a \cdot T_b/T_a$   
 $Q_p = 1.286 * 0.870 = 1.119$   
 $Q_p = 6.712$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 5.594 1.286  
 Area of streams before confluence:  
 4.340 1.020

Results of confluence:  
 Total flow rate = 6.712(CFS)  
 Time of concentration = 5.989 min.  
 Effective stream area after confluence = 5.360(Ac.)

+++++  
 Process from Point/Station 4.300 to Point/Station 5.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1413.360(Ft.)  
 Downstream point/station elevation = 1412.940(Ft.)  
 Pipe length = 83.92(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 6.712(CFS)  
 Nearest computed pipe diameter = 18.00(In.)  
 Calculated individual pipe flow = 6.712(CFS)  
 Normal flow depth in pipe = 13.38(In.)  
 Flow top width inside pipe = 15.72(In.)  
 Critical Depth = 12.02(In.)  
 Pipe flow velocity = 4.76(Ft/s)  
 Travel time through pipe = 0.29 min.

Time of concentration (TC) = 6.28 min.

++++  
Process from Point/Station 5.300 to Point/Station 5.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 5.360(Ac.)  
Runoff from this stream = 6.712(CFS)  
Time of concentration = 6.28 min.  
Rainfall intensity = 1.471(In/Hr)

++++  
Process from Point/Station 5.100 to Point/Station 5.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 148.520(Ft.)  
Top (of initial area) elevation = 1422.490(Ft.)  
Bottom (of initial area) elevation = 1419.100(Ft.)  
Difference in elevation = 3.390(Ft.)  
Slope = 0.02283 s(percent)= 2.28  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Warning: TC computed to be less than 5 min.; program is assuming the  
time of concentration is 5 minutes.  
Initial area time of concentration = 5.000 min.  
Rainfall intensity = 1.646(In/Hr) for a 2.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.866  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 1) = 57.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 0.655(CFS)  
Total initial stream area = 0.460(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 5.200 to Point/Station 5.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1415.100(Ft.)  
Downstream point/station elevation = 1412.940(Ft.)  
Pipe length = 40.62(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 0.655(CFS)  
Nearest computed pipe diameter = 6.00(In.)

Calculated individual pipe flow = 0.655(CFS)  
 Normal flow depth in pipe = 3.02(In.)  
 Flow top width inside pipe = 6.00(In.)  
 Critical Depth = 4.92(In.)  
 Pipe flow velocity = 6.61(Ft/s)  
 Travel time through pipe = 0.10 min.  
 Time of concentration (TC) = 5.10 min.

++++++  
 Process from Point/Station 5.300 to Point/Station 5.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 0.460(Ac.)  
 Runoff from this stream = 0.655(CFS)  
 Time of concentration = 5.10 min.  
 Rainfall intensity = 1.629(In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	6.712	6.28	1.471
2	0.655	5.10	1.629

Largest stream flow has longer time of concentration  
 $Q_p = 6.712 + \text{sum of } Q_b \cdot I_a/I_b$   
 $Q_p = 6.712 + 0.655 * 0.903 = 7.304$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 6.712      0.655  
 Area of streams before confluence:  
 5.360      0.460  
 Results of confluence:  
 Total flow rate = 7.304(CFS)  
 Time of concentration = 6.283 min.  
 Effective stream area after confluence = 5.820(Ac.)

++++++  
 Process from Point/Station 5.300 to Point/Station 6.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1412.940(Ft.)  
 Downstream point/station elevation = 1412.570(Ft.)  
 Pipe length = 73.56(Ft.)      Manning's N = 0.013

No. of pipes = 1 Required pipe flow = 7.304(CFS)  
Nearest computed pipe diameter = 18.00(In.)  
Calculated individual pipe flow = 7.304(CFS)  
Normal flow depth in pipe = 14.44(In.)  
Flow top width inside pipe = 14.34(In.)  
Critical Depth = 12.56(In.)  
Pipe flow velocity = 4.81(Ft/s)  
Travel time through pipe = 0.26 min.  
Time of concentration (TC) = 6.54 min.

++++  
Process from Point/Station 6.300 to Point/Station 6.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 5.820(Ac.)  
Runoff from this stream = 7.304(CFS)  
Time of concentration = 6.54 min.  
Rainfall intensity = 1.443(In/Hr)

++++  
Process from Point/Station 6.100 to Point/Station 6.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 206.100(Ft.)  
Top (of initial area) elevation = 1419.690(Ft.)  
Bottom (of initial area) elevation = 1418.600(Ft.)  
Difference in elevation = 1.090(Ft.)  
Slope = 0.00529 s(percent)= 0.53  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Initial area time of concentration = 7.212 min.  
Rainfall intensity = 1.375(In/Hr) for a 2.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.862  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 1) = 57.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 2.394(CFS)  
Total initial stream area = 2.020(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 6.200 to Point/Station 6.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1414.600(Ft.)  
 Downstream point/station elevation = 1412.570(Ft.)  
 Pipe length = 24.15(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 2.394(CFS)  
 Nearest computed pipe diameter = 9.00(In.)  
 Calculated individual pipe flow = 2.394(CFS)  
 Normal flow depth in pipe = 4.49(In.)  
 Flow top width inside pipe = 9.00(In.)  
 Critical Depth = 8.21(In.)  
 Pipe flow velocity = 10.85(Ft/s)  
 Travel time through pipe = 0.04 min.  
 Time of concentration (TC) = 7.25 min.

++++++  
 Process from Point/Station 6.300 to Point/Station 6.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 2.020(Ac.)  
 Runoff from this stream = 2.394(CFS)  
 Time of concentration = 7.25 min.  
 Rainfall intensity = 1.372(In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	7.304	6.54	1.443
2	2.394	7.25	1.372

Largest stream flow has longer or shorter time of concentration  
 $Q_p = 7.304 + \text{sum of } Q_a \cdot \frac{T_b}{T_a}$   
 $2.394 * 0.902 = 2.159$   
 $Q_p = 9.463$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 7.304      2.394  
 Area of streams before confluence:  
 5.820      2.020  
 Results of confluence:  
 Total flow rate = 9.463(CFS)  
 Time of concentration = 6.538 min.  
 Effective stream area after confluence = 7.840(Ac.)

+++++



Process from Point/Station 6.300 to Point/Station 7.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1412.570(Ft.)  
Downstream point/station elevation = 1411.710(Ft.)  
Pipe length = 172.10(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 9.463(CFS)  
Nearest computed pipe diameter = 21.00(In.)  
Calculated individual pipe flow = 9.463(CFS)  
Normal flow depth in pipe = 14.81(In.)  
Flow top width inside pipe = 19.15(In.)  
Critical Depth = 13.73(In.)  
Pipe flow velocity = 5.22(Ft/s)  
Travel time through pipe = 0.55 min.  
Time of concentration (TC) = 7.09 min.

+++++  
Process from Point/Station 7.300 to Point/Station 7.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 7.840(Ac.)  
Runoff from this stream = 9.463(CFS)  
Time of concentration = 7.09 min.  
Rainfall intensity = 1.387(In/Hr)

+++++  
Process from Point/Station 7.100 to Point/Station 7.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 588.890(Ft.)  
Top (of initial area) elevation = 1422.840(Ft.)  
Bottom (of initial area) elevation = 1418.940(Ft.)  
Difference in elevation = 3.900(Ft.)  
Slope = 0.00662 s(percent)= 0.66  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Initial area time of concentration = 10.494 min.  
Rainfall intensity = 1.144(In/Hr) for a 2.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.858  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 1) = 57.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 2.287(CFS)  
Total initial stream area = 2.330(Ac.)

Pervious area fraction = 0.100

++++  
Process from Point/Station 7.200 to Point/Station 7.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1414.940(Ft.)  
Downstream point/station elevation = 1411.710(Ft.)  
Pipe length = 27.78(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 2.287(CFS)  
Nearest computed pipe diameter = 9.00(In.)  
Calculated individual pipe flow = 2.287(CFS)  
Normal flow depth in pipe = 3.99(In.)  
Flow top width inside pipe = 8.94(In.)  
Critical Depth = 8.09(In.)  
Pipe flow velocity = 12.10(Ft/s)  
Travel time through pipe = 0.04 min.  
Time of concentration (TC) = 10.53 min.

++++  
Process from Point/Station 7.300 to Point/Station 7.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
Stream flow area = 2.330(Ac.)  
Runoff from this stream = 2.287(CFS)  
Time of concentration = 10.53 min.  
Rainfall intensity = 1.142(In/Hr)  
Summary of stream data:

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

1	9.463	7.09	1.387
2	2.287	10.53	1.142

Largest stream flow has longer or shorter time of concentration

Qp = 9.463 + sum of  
Qa Tb/Ta  
2.287 \* 0.673 = 1.539  
Qp = 11.003

Total of 2 streams to confluence:  
Flow rates before confluence point:  
9.463 2.287  
Area of streams before confluence:  
7.840 2.330  
Results of confluence:

Total flow rate = 11.003(CFS)  
Time of concentration = 7.087 min.  
Effective stream area after confluence = 10.170(Ac.)

++++  
Process from Point/Station 7.300 to Point/Station 8.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1411.710(Ft.)  
Downstream point/station elevation = 1411.620(Ft.)  
Pipe length = 18.21(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 = 16.97(In.)  
Flow top width inside pipe = 16.54(In.)  
Critical Depth = 14.83(In.)  
Pipe flow velocity = 5.28(Ft/s)  
Travel time through pipe = 0.06 min.  
Time of concentration (TC) = 7.14 min.

++++  
Process from Point/Station 8.300 to Point/Station 8.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 10.170(Ac.)  
Runoff from this stream = 11.003(CFS)  
Time of concentration = 7.14 min.  
Rainfall intensity = 1.382(In/Hr)

++++  
Process from Point/Station 8.100 to Point/Station 8.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 106.130(Ft.)  
Top (of initial area) elevation = 1420.890(Ft.)  
Bottom (of initial area) elevation = 1419.280(Ft.)  
Difference in elevation = 1.610(Ft.)  
Slope = 0.01517 s(percent)= 1.52  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Warning: TC computed to be less than 5 min.; program is assuming the  
time of concentration is 5 minutes.  
Initial area time of concentration = 5.000 min.  
Rainfall intensity = 1.646(In/Hr) for a 2.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.866

Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 1.000  
 RI index for soil(AMC 1) = 57.00  
 Pervious area fraction = 0.100; Impervious fraction = 0.900  
 Initial subarea runoff = 1.396(CFS)  
 Total initial stream area = 0.980(Ac.)  
 Pervious area fraction = 0.100

++++++  
 Process from Point/Station 8.200 to Point/Station 8.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1415.280(Ft.)  
 Downstream point/station elevation = 1411.620(Ft.)  
 Pipe length = 25.32(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 1.396(CFS)  
 Nearest computed pipe diameter = 6.00(In.)  
 Calculated individual pipe flow = 1.396(CFS)  
 Normal flow depth in pipe = 3.54(In.)  
 Flow top width inside pipe = 5.90(In.)  
 Critical depth could not be calculated.  
 Pipe flow velocity = 11.58(Ft/s)  
 Travel time through pipe = 0.04 min.  
 Time of concentration (TC) = 5.04 min.

++++++  
 Process from Point/Station 8.300 to Point/Station 8.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 0.980(Ac.)  
 Runoff from this stream = 1.396(CFS)  
 Time of concentration = 5.04 min.  
 Rainfall intensity = 1.640(In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	11.003	7.14	1.382
2	1.396	5.04	1.640

Largest stream flow has longer time of concentration

$$Q_p = 11.003 + \text{sum of } \frac{Q_b \cdot I_a/I_b}{1.396 * 0.843} = 1.177$$

Qp = 12.179

Total of 2 streams to confluence:  
Flow rates before confluence point:

11.003 1.396

Area of streams before confluence:

10.170 0.980

Results of confluence:

Total flow rate = 12.179(CFS)

Time of concentration = 7.144 min.

Effective stream area after confluence = 11.150(Ac.)

++++  
Process from Point/Station 8.300 to Point/Station 9.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1411.620(Ft.)  
Downstream point/station elevation = 1410.040(Ft.)  
Pipe length = 317.20(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 12.179(CFS)  
Nearest computed pipe diameter = 24.00(In.)  
Calculated individual pipe flow = 12.179(CFS)  
Normal flow depth in pipe = 15.70(In.)  
Flow top width inside pipe = 22.83(In.)  
Critical Depth = 15.06(In.)  
Pipe flow velocity = 5.60(Ft/s)  
Travel time through pipe = 0.94 min.  
Time of concentration (TC) = 8.09 min.

++++  
Process from Point/Station 9.300 to Point/Station 9.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 11.150(Ac.)  
Runoff from this stream = 12.179(CFS)  
Time of concentration = 8.09 min.  
Rainfall intensity = 1.300(In/Hr)

++++  
Process from Point/Station 9.100 to Point/Station 9.300  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 252.240(Ft.)  
Top (of initial area) elevation = 1421.240(Ft.)  
Bottom (of initial area) elevation = 1420.100(Ft.)  
Difference in elevation = 1.140(Ft.)

Slope = 0.00452 s(percent)= 0.45  
 TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
 Initial area time of concentration = 8.069 min.  
 Rainfall intensity = 1.302(In/Hr) for a 2.0 year storm  
 COMMERCIAL subarea type  
 Runoff Coefficient = 0.861  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 1.000  
 RI index for soil(AMC 1) = 57.00  
 Pervious area fraction = 0.100; Impervious fraction = 0.900  
 Initial subarea runoff = 7.787(CFS)  
 Total initial stream area = 6.950(Ac.)  
 Pervious area fraction = 0.100

++++++  
 Process from Point/Station 9.300 to Point/Station 9.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 6.950(Ac.)  
 Runoff from this stream = 7.787(CFS)  
 Time of concentration = 8.07 min.  
 Rainfall intensity = 1.302(In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	12.179	8.09	1.300
2	7.787	8.07	1.302

Largest stream flow has longer time of concentration

$Q_p = 12.179 + \text{sum of}$   
 $\quad Q_b \quad I_a/I_b$   
 $\quad 7.787 * 0.999 = 7.777$   
 $Q_p = 19.956$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 12.179      7.787  
 Area of streams before confluence:  
 11.150      6.950

Results of confluence:  
 Total flow rate = 19.956(CFS)  
 Time of concentration = 8.089 min.  
 Effective stream area after confluence = 18.100(Ac.)

+++++  
Process from Point/Station 9.300 to Point/Station 9.400  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1410.040(Ft.)  
Downstream point/station elevation = 1409.990(Ft.)  
Pipe length = 9.57(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 19.956(CFS)  
Nearest computed pipe diameter = 27.00(In.)  
Calculated individual pipe flow = 19.956(CFS)  
Normal flow depth in pipe = 19.88(In.)  
Flow top width inside pipe = 23.80(In.)  
Critical Depth = 18.75(In.)  
Pipe flow velocity = 6.36(Ft/s)  
Travel time through pipe = 0.03 min.  
Time of concentration (TC) = 8.11 min.  
End of computations, total study area = 18.10 (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 = 75.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0  
Rational Hydrology Study Date: 05/27/22

File:MapesPost2BRat.out

-----  
MAPES AND TRUMBLE INDUSTRIAL FACILITY  
RATIONAL METHOD  
POST-DEVELOPMENT CONDITIONS  
2-YEAR STORM, DA B  
-----

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

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

Program License Serial Number 6443  
-----

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

2 year, 1 hour precipitation = 0.487(In.)  
100 year, 1 hour precipitation = 1.520(In.)

Storm event year = 2.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.487(In/Hr)  
Slope of intensity duration curve = 0.4900

++++  
Process from Point/Station 10.100 to Point/Station 10.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 333.910(Ft.)  
Top (of initial area) elevation = 1423.670(Ft.)  
Bottom (of initial area) elevation = 1420.530(Ft.)  
Difference in elevation = 3.140(Ft.)  
Slope = 0.00940 s(percent)= 0.94  
TC = k(0.300)\*[(length^3)/(elevation change)]^0.2



Initial area time of concentration = 7.797 min.  
Rainfall intensity = 1.324(In/Hr) for a 2.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.861  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 1) = 57.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 0.627(CFS)  
Total initial stream area = 0.550(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 10.200 to Point/Station 11.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1416.530(Ft.)  
Downstream point/station elevation = 1414.760(Ft.)  
Pipe length = 354.30(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 0.627(CFS)  
Nearest computed pipe diameter = 9.00(In.)  
Calculated individual pipe flow = 0.627(CFS)  
Normal flow depth in pipe = 4.69(In.)  
Flow top width inside pipe = 8.99(In.)  
Critical Depth = 4.31(In.)  
Pipe flow velocity = 2.69(Ft/s)  
Travel time through pipe = 2.19 min.  
Time of concentration (TC) = 9.99 min.

++++  
Process from Point/Station 11.300 to Point/Station 11.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 0.550(Ac.)  
Runoff from this stream = 0.627(CFS)  
Time of concentration = 9.99 min.  
Rainfall intensity = 1.172(In/Hr)

++++  
Process from Point/Station 11.100 to Point/Station 11.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 169.180(Ft.)  
Top (of initial area) elevation = 1423.740(Ft.)

Bottom (of initial area) elevation = 1421.670(Ft.)  
 Difference in elevation = 2.070(Ft.)  
 Slope = 0.01224 s(percent)= 1.22  
 $TC = k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$   
 Initial area time of concentration = 5.636 min.  
 Rainfall intensity = 1.552(In/Hr) for a 2.0 year storm  
 COMMERCIAL subarea type  
 Runoff Coefficient = 0.865  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 1.000  
 RI index for soil(AMC 1) = 57.00  
 Pervious area fraction = 0.100; Impervious fraction = 0.900  
 Initial subarea runoff = 0.496(CFS)  
 Total initial stream area = 0.370(Ac.)  
 Pervious area fraction = 0.100

++++++  
 Process from Point/Station 11.200 to Point/Station 11.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1417.670(Ft.)  
 Downstream point/station elevation = 1414.760(Ft.)  
 Pipe length = 5.72(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 0.496(CFS)  
 Nearest computed pipe diameter = 3.00(In.)  
 Calculated individual pipe flow = 0.496(CFS)  
 Normal flow depth in pipe = 2.01(In.)  
 Flow top width inside pipe = 2.82(In.)  
 Critical depth could not be calculated.  
 Pipe flow velocity = 14.23(Ft/s)  
 Travel time through pipe = 0.01 min.  
 Time of concentration (TC) = 5.64 min.

++++++  
 Process from Point/Station 11.300 to Point/Station 11.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 0.370(Ac.)  
 Runoff from this stream = 0.496(CFS)  
 Time of concentration = 5.64 min.  
 Rainfall intensity = 1.551(In/Hr)  
 Summary of stream data:

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

1            0.627            9.99                            1.172  
 2            0.496            5.64                            1.551  
 Largest stream flow has longer time of concentration  
 Qp =        0.627 + sum of  
           Qb            Ia/Ib  
           0.496 \*        0.756 =            0.375  
 Qp =        1.002

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
           0.627            0.496  
 Area of streams before confluence:  
           0.550            0.370  
 Results of confluence:  
 Total flow rate =        1.002(CFS)  
 Time of concentration =        9.990 min.  
 Effective stream area after confluence =        0.920(Ac.)

++++++  
 Process from Point/Station            11.300 to Point/Station            11.400  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1414.760(Ft.)  
 Downstream point/station elevation = 1414.030(Ft.)  
 Pipe length = 146.40(Ft.)    Manning's N = 0.013  
 No. of pipes = 1    Required pipe flow =        1.002(CFS)  
 Nearest computed pipe diameter =        9.00(In.)  
 Calculated individual pipe flow =        1.002(CFS)  
 Normal flow depth in pipe =        6.42(In.)  
 Flow top width inside pipe =        8.14(In.)  
 Critical Depth =        5.51(In.)  
 Pipe flow velocity =        2.97(Ft/s)  
 Travel time through pipe =        0.82 min.  
 Time of concentration (TC) =        10.81 min.  
 End of computations, total study area =                            0.92 (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 = 75.0

**Appendix I.V**

**Rational Method Analysis  
Post-Development Conditions  
10-Year Storm**

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0

Rational Hydrology Study

Date: 05/27/22

File:MapesPost10ARat.out

-----  
MAPES AND TRUMBLE INDUSTRIAL FACILITY  
RATIONAL METHOD  
POST-DEVELOPMENT CONDITIONS  
10-YEAR STORM, DA A  
-----

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

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

Program License Serial Number 6443  
-----

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

2 year, 1 hour precipitation = 0.487(In.)

100 year, 1 hour precipitation = 1.520(In.)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.912(In/Hr)

Slope of intensity duration curve = 0.4900

++++  
Process from Point/Station 1.100 to Point/Station 1.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 214.760(Ft.)

Top (of initial area) elevation = 1422.920(Ft.)

Bottom (of initial area) elevation = 1419.450(Ft.)

Difference in elevation = 3.470(Ft.)

Slope = 0.01616 s(percent)= 1.62

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

Initial area time of concentration = 5.864 min.  
Rainfall intensity = 2.850(In/Hr) for a 10.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.888  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 2) = 75.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 2.606(CFS)  
Total initial stream area = 1.030(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 1.200 to Point/Station 2.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1415.450(Ft.)  
Downstream point/station elevation = 1414.490(Ft.)  
Pipe length = 175.42(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 2.606(CFS)  
Nearest computed pipe diameter = 12.00(In.)  
Calculated individual pipe flow = 2.606(CFS)  
Normal flow depth in pipe = 9.73(In.)  
Flow top width inside pipe = 9.40(In.)  
Critical Depth = 8.30(In.)  
Pipe flow velocity = 3.83(Ft/s)  
Travel time through pipe = 0.76 min.  
Time of concentration (TC) = 6.63 min.

++++  
Process from Point/Station 2.300 to Point/Station 2.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 1.030(Ac.)  
Runoff from this stream = 2.606(CFS)  
Time of concentration = 6.63 min.  
Rainfall intensity = 2.684(In/Hr)

++++  
Process from Point/Station 2.100 to Point/Station 2.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 130.430(Ft.)  
Top (of initial area) elevation = 1421.180(Ft.)

Bottom (of initial area) elevation = 1418.600(Ft.)  
 Difference in elevation = 2.580(Ft.)  
 Slope = 0.01978 s(percent)= 1.98  
 $TC = k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$   
 Warning: TC computed to be less than 5 min.; program is assuming the  
 time of concentration is 5 minutes.  
 Initial area time of concentration = 5.000 min.  
 Rainfall intensity = 3.082(In/Hr) for a 10.0 year storm  
 COMMERCIAL subarea type  
 Runoff Coefficient = 0.889  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 1.000  
 RI index for soil(AMC 2) = 75.00  
 Pervious area fraction = 0.100; Impervious fraction = 0.900  
 Initial subarea runoff = 5.148(CFS)  
 Total initial stream area = 1.880(Ac.)  
 Pervious area fraction = 0.100

++++++  
 Process from Point/Station 2.200 to Point/Station 2.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1414.600(Ft.)  
 Downstream point/station elevation = 1414.490(Ft.)  
 Pipe length = 21.80(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 5.148(CFS)  
 Nearest computed pipe diameter = 18.00(In.)  
 Calculated individual pipe flow = 5.148(CFS)  
 Normal flow depth in pipe = 10.99(In.)  
 Flow top width inside pipe = 17.55(In.)  
 Critical Depth = 10.48(In.)  
 Pipe flow velocity = 4.55(Ft/s)  
 Travel time through pipe = 0.08 min.  
 Time of concentration (TC) = 5.08 min.

++++++  
 Process from Point/Station 2.300 to Point/Station 2.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 1.880(Ac.)  
 Runoff from this stream = 5.148(CFS)  
 Time of concentration = 5.08 min.  
 Rainfall intensity = 3.058(In/Hr)  
 Summary of stream data:

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

1	2.606	6.63	2.684
2	5.148	5.08	3.058

Largest stream flow has longer or shorter time of concentration

$Q_p = 5.148 + \text{sum of}$   
 $Q_a \quad T_b/T_a$   
 $2.606 * 0.766 = 1.997$   
 $Q_p = 7.146$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
     2.606      5.148

Area of streams before confluence:  
     1.030      1.880

Results of confluence:  
 Total flow rate = 7.146(CFS)  
 Time of concentration = 5.080 min.  
 Effective stream area after confluence = 2.910(Ac.)

++++++  
 Process from Point/Station 2.300 to Point/Station 3.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1414.490(Ft.)  
 Downstream point/station elevation = 1413.530(Ft.)  
 Pipe length = 191.80(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 7.146(CFS)  
 Nearest computed pipe diameter = 18.00(In.)  
 Calculated individual pipe flow = 7.146(CFS)  
 Normal flow depth in pipe = 14.16(In.)  
 Flow top width inside pipe = 14.75(In.)  
 Critical Depth = 12.42(In.)  
 Pipe flow velocity = 4.79(Ft/s)  
 Travel time through pipe = 0.67 min.  
 Time of concentration (TC) = 5.75 min.

++++++  
 Process from Point/Station 3.300 to Point/Station 3.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
 Stream flow area = 2.910(Ac.)  
 Runoff from this stream = 7.146(CFS)  
 Time of concentration = 5.75 min.  
 Rainfall intensity = 2.878(In/Hr)



++++  
Process from Point/Station 3.100 to Point/Station 3.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 120.880(Ft.)  
Top (of initial area) elevation = 1419.390(Ft.)  
Bottom (of initial area) elevation = 1418.600(Ft.)  
Difference in elevation = 0.790(Ft.)  
Slope = 0.00654 s(percent)= 0.65  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Initial area time of concentration = 5.585 min.  
Rainfall intensity = 2.919(In/Hr) for a 10.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.888  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 2) = 75.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 3.707(CFS)  
Total initial stream area = 1.430(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 3.200 to Point/Station 3.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1414.600(Ft.)  
Downstream point/station elevation = 1413.530(Ft.)  
Pipe length = 22.97(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 3.707(CFS)  
Nearest computed pipe diameter = 12.00(In.)  
Calculated individual pipe flow = 3.707(CFS)  
Normal flow depth in pipe = 5.87(In.)  
Flow top width inside pipe = 12.00(In.)  
Critical Depth = 9.84(In.)  
Pipe flow velocity = 9.70(Ft/s)  
Travel time through pipe = 0.04 min.  
Time of concentration (TC) = 5.62 min.

++++  
Process from Point/Station 3.300 to Point/Station 3.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2

Stream flow area = 1.430(Ac.)  
 Runoff from this stream = 3.707(CFS)  
 Time of concentration = 5.62 min.  
 Rainfall intensity = 2.909(In/Hr)  
 Summary of stream data:

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

1	7.146	5.75	2.878
2	3.707	5.62	2.909

Largest stream flow has longer time of concentration

Qp = 7.146 + sum of  
 $Q_b \cdot I_a/I_b$   
 $3.707 * 0.989 = 3.668$   
 Qp = 10.814

Total of 2 streams to confluence:  
 Flow rates before confluence point:

7.146      3.707

Area of streams before confluence:

2.910      1.430

Results of confluence:

Total flow rate = 10.814(CFS)  
 Time of concentration = 5.747 min.  
 Effective stream area after confluence = 4.340(Ac.)

++++  
 Process from Point/Station 3.300 to Point/Station 4.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1413.530(Ft.)  
 Downstream point/station elevation = 1413.360(Ft.)  
 Pipe length = 34.32(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 10.814(CFS)  
 Nearest computed pipe diameter = 21.00(In.)  
 Calculated individual pipe flow = 10.814(CFS)  
 Normal flow depth in pipe = 16.66(In.)  
 Flow top width inside pipe = 17.00(In.)  
 Critical Depth = 14.72(In.)  
 Pipe flow velocity = 5.28(Ft/s)  
 Travel time through pipe = 0.11 min.  
 Time of concentration (TC) = 5.86 min.

++++  
 Process from Point/Station 4.300 to Point/Station 4.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 4.340(Ac.)  
Runoff from this stream = 10.814(CFS)  
Time of concentration = 5.86 min.  
Rainfall intensity = 2.852(In/Hr)

++++  
Process from Point/Station 4.100 to Point/Station 4.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 256.970(Ft.)  
Top (of initial area) elevation = 1422.990(Ft.)  
Bottom (of initial area) elevation = 1419.100(Ft.)  
Difference in elevation = 3.890(Ft.)  
Slope = 0.01514 s(percent)= 1.51  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Initial area time of concentration = 6.384 min.  
Rainfall intensity = 2.734(In/Hr) for a 10.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.887  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 2) = 75.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 2.475(CFS)  
Total initial stream area = 1.020(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 4.200 to Point/Station 4.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1415.100(Ft.)  
Downstream point/station elevation = 1413.360(Ft.)  
Pipe length = 136.57(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 2.475(CFS)  
Nearest computed pipe diameter = 12.00(In.)  
Calculated individual pipe flow = 2.475(CFS)  
Normal flow depth in pipe = 6.81(In.)  
Flow top width inside pipe = 11.89(In.)  
Critical Depth = 8.09(In.)  
Pipe flow velocity = 5.38(Ft/s)  
Travel time through pipe = 0.42 min.  
Time of concentration (TC) = 6.81 min.

+++++  
 Process from Point/Station 4.300 to Point/Station 4.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 1.020(Ac.)  
 Runoff from this stream = 2.475(CFS)  
 Time of concentration = 6.81 min.  
 Rainfall intensity = 2.649(In/Hr)  
 Summary of stream data:

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

1	10.814	5.86	2.852
2	2.475	6.81	2.649

Largest stream flow has longer or shorter time of concentration  
 $Q_p = 10.814 + \text{sum of } Q_a \cdot \frac{T_b}{T_a}$   
 $2.475 * 0.860 = 2.129$   
 $Q_p = 12.943$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 10.814 2.475  
 Area of streams before confluence:  
 4.340 1.020

Results of confluence:  
 Total flow rate = 12.943(CFS)  
 Time of concentration = 5.856 min.  
 Effective stream area after confluence = 5.360(Ac.)

+++++  
 Process from Point/Station 4.300 to Point/Station 5.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1413.360(Ft.)  
 Downstream point/station elevation = 1412.940(Ft.)  
 Pipe length = 83.92(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 12.943(CFS)  
 Nearest computed pipe diameter = 24.00(In.)  
 Calculated individual pipe flow = 12.943(CFS)  
 Normal flow depth in pipe = 16.36(In.)  
 Flow top width inside pipe = 22.36(In.)  
 Critical Depth = 15.54(In.)  
 Pipe flow velocity = 5.67(Ft/s)  
 Travel time through pipe = 0.25 min.

Time of concentration (TC) = 6.10 min.

++++  
Process from Point/Station 5.300 to Point/Station 5.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 5.360(Ac.)  
Runoff from this stream = 12.943(CFS)  
Time of concentration = 6.10 min.  
Rainfall intensity = 2.795(In/Hr)

++++  
Process from Point/Station 5.100 to Point/Station 5.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 148.520(Ft.)  
Top (of initial area) elevation = 1422.490(Ft.)  
Bottom (of initial area) elevation = 1419.100(Ft.)  
Difference in elevation = 3.390(Ft.)  
Slope = 0.02283 s(percent)= 2.28  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Warning: TC computed to be less than 5 min.; program is assuming the  
time of concentration is 5 minutes.  
Initial area time of concentration = 5.000 min.  
Rainfall intensity = 3.082(In/Hr) for a 10.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.889  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 2) = 75.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 1.260(CFS)  
Total initial stream area = 0.460(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 5.200 to Point/Station 5.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1415.100(Ft.)  
Downstream point/station elevation = 1412.940(Ft.)  
Pipe length = 40.62(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 1.260(CFS)  
Nearest computed pipe diameter = 6.00(In.)

Calculated individual pipe flow = 1.260(CFS)  
 Normal flow depth in pipe = 4.78(In.)  
 Flow top width inside pipe = 4.83(In.)  
 Critical depth could not be calculated.  
 Pipe flow velocity = 7.51(Ft/s)  
 Travel time through pipe = 0.09 min.  
 Time of concentration (TC) = 5.09 min.

++++++  
 Process from Point/Station 5.300 to Point/Station 5.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 0.460(Ac.)  
 Runoff from this stream = 1.260(CFS)  
 Time of concentration = 5.09 min.  
 Rainfall intensity = 3.055(In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	12.943	6.10	2.795
2	1.260	5.09	3.055

Largest stream flow has longer time of concentration  
 $Q_p = 12.943 + \text{sum of } \frac{Q_b \cdot I_a/I_b}{1.260 * 0.915} = 1.153$   
 $Q_p = 14.096$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 12.943      1.260  
 Area of streams before confluence:  
 5.360      0.460  
 Results of confluence:  
 Total flow rate = 14.096(CFS)  
 Time of concentration = 6.102 min.  
 Effective stream area after confluence = 5.820(Ac.)

++++++  
 Process from Point/Station 5.300 to Point/Station 6.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

Upstream point/station elevation = 1412.940(Ft.)  
 Downstream point/station elevation = 1412.570(Ft.)  
 Pipe length = 73.56(Ft.)      Manning's N = 0.013

No. of pipes = 1 Required pipe flow = 14.096(CFS)  
Nearest computed pipe diameter = 24.00(In.)  
Calculated individual pipe flow = 14.096(CFS)  
Normal flow depth in pipe = 17.44(In.)  
Flow top width inside pipe = 21.39(In.)  
Critical Depth = 16.22(In.)  
Pipe flow velocity = 5.76(Ft/s)  
Travel time through pipe = 0.21 min.  
Time of concentration (TC) = 6.32 min.

++++  
Process from Point/Station 6.300 to Point/Station 6.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 5.820(Ac.)  
Runoff from this stream = 14.096(CFS)  
Time of concentration = 6.32 min.  
Rainfall intensity = 2.749(In/Hr)

++++  
Process from Point/Station 6.100 to Point/Station 6.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 206.100(Ft.)  
Top (of initial area) elevation = 1419.690(Ft.)  
Bottom (of initial area) elevation = 1418.600(Ft.)  
Difference in elevation = 1.090(Ft.)  
Slope = 0.00529 s(percent)= 0.53  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Initial area time of concentration = 7.212 min.  
Rainfall intensity = 2.575(In/Hr) for a 10.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.887  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 2) = 75.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 4.613(CFS)  
Total initial stream area = 2.020(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 6.200 to Point/Station 6.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1414.600(Ft.)  
 Downstream point/station elevation = 1412.570(Ft.)  
 Pipe length = 24.15(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 4.613(CFS)  
 Nearest computed pipe diameter = 9.00(In.)  
 Calculated individual pipe flow = 4.613(CFS)  
 Normal flow depth in pipe = 7.09(In.)  
 Flow top width inside pipe = 7.36(In.)  
 Critical depth could not be calculated.  
 Pipe flow velocity = 12.37(Ft/s)  
 Travel time through pipe = 0.03 min.  
 Time of concentration (TC) = 7.24 min.

++++++  
 Process from Point/Station 6.300 to Point/Station 6.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 2.020(Ac.)  
 Runoff from this stream = 4.613(CFS)  
 Time of concentration = 7.24 min.  
 Rainfall intensity = 2.570(In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	14.096	6.32	2.749
2	4.613	7.24	2.570

Largest stream flow has longer or shorter time of concentration  
 $Q_p = 14.096 + \text{sum of } Q_a \cdot \frac{T_b}{T_a}$   
 $4.613 * 0.872 = 4.021$   
 $Q_p = 18.116$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 14.096      4.613  
 Area of streams before confluence:  
 5.820      2.020  
 Results of confluence:  
 Total flow rate = 18.116(CFS)  
 Time of concentration = 6.315 min.  
 Effective stream area after confluence = 7.840(Ac.)

+++++



Process from Point/Station 6.300 to Point/Station 7.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1412.570(Ft.)  
Downstream point/station elevation = 1411.710(Ft.)  
Pipe length = 172.10(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 18.116(CFS)  
Nearest computed pipe diameter = 27.00(In.)  
Calculated individual pipe flow = 18.116(CFS)  
Normal flow depth in pipe = 18.73(In.)  
Flow top width inside pipe = 24.89(In.)  
Critical Depth = 17.87(In.)  
Pipe flow velocity = 6.15(Ft/s)  
Travel time through pipe = 0.47 min.  
Time of concentration (TC) = 6.78 min.

+++++  
Process from Point/Station 7.300 to Point/Station 7.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 7.840(Ac.)  
Runoff from this stream = 18.116(CFS)  
Time of concentration = 6.78 min.  
Rainfall intensity = 2.654(In/Hr)

+++++  
Process from Point/Station 7.100 to Point/Station 7.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 588.890(Ft.)  
Top (of initial area) elevation = 1422.840(Ft.)  
Bottom (of initial area) elevation = 1418.940(Ft.)  
Difference in elevation = 3.900(Ft.)  
Slope = 0.00662 s(percent)= 0.66  
TC =  $k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$   
Initial area time of concentration = 10.494 min.  
Rainfall intensity = 2.143(In/Hr) for a 10.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.885  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 2) = 75.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 4.417(CFS)  
Total initial stream area = 2.330(Ac.)

Pervious area fraction = 0.100

++++  
Process from Point/Station 7.200 to Point/Station 7.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1414.940(Ft.)  
Downstream point/station elevation = 1411.710(Ft.)  
Pipe length = 27.78(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 4.417(CFS)  
Nearest computed pipe diameter = 9.00(In.)  
Calculated individual pipe flow = 4.417(CFS)  
Normal flow depth in pipe = 5.99(In.)  
Flow top width inside pipe = 8.49(In.)  
Critical depth could not be calculated.  
Pipe flow velocity = 14.13(Ft/s)  
Travel time through pipe = 0.03 min.  
Time of concentration (TC) = 10.53 min.

++++  
Process from Point/Station 7.300 to Point/Station 7.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
Stream flow area = 2.330(Ac.)  
Runoff from this stream = 4.417(CFS)  
Time of concentration = 10.53 min.  
Rainfall intensity = 2.140(In/Hr)  
Summary of stream data:

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

1	18.116	6.78	2.654
2	4.417	10.53	2.140

Largest stream flow has longer or shorter time of concentration

Qp = 18.116 + sum of  
Qa Tb/Ta  
4.417 \* 0.644 = 2.845  
Qp = 20.962

Total of 2 streams to confluence:  
Flow rates before confluence point:  
18.116 4.417  
Area of streams before confluence:  
7.840 2.330  
Results of confluence:

Total flow rate = 20.962(CFS)  
Time of concentration = 6.781 min.  
Effective stream area after confluence = 10.170(Ac.)

++++  
Process from Point/Station 7.300 to Point/Station 8.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1411.710(Ft.)  
Downstream point/station elevation = 1411.620(Ft.)  
Pipe length = 18.21(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 20.962(CFS)  
Nearest computed pipe diameter = 27.00(In.)  
Calculated individual pipe flow = 20.962(CFS)  
Normal flow depth in pipe = 21.28(In.)  
Flow top width inside pipe = 22.06(In.)  
Critical Depth = 19.22(In.)  
Pipe flow velocity = 6.24(Ft/s)  
Travel time through pipe = 0.05 min.  
Time of concentration (TC) = 6.83 min.

++++  
Process from Point/Station 8.300 to Point/Station 8.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 10.170(Ac.)  
Runoff from this stream = 20.962(CFS)  
Time of concentration = 6.83 min.  
Rainfall intensity = 2.645(In/Hr)

++++  
Process from Point/Station 8.100 to Point/Station 8.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 106.130(Ft.)  
Top (of initial area) elevation = 1420.890(Ft.)  
Bottom (of initial area) elevation = 1419.280(Ft.)  
Difference in elevation = 1.610(Ft.)  
Slope = 0.01517 s(percent)= 1.52  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Warning: TC computed to be less than 5 min.; program is assuming the  
time of concentration is 5 minutes.  
Initial area time of concentration = 5.000 min.  
Rainfall intensity = 3.082(In/Hr) for a 10.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.889

Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 1.000  
 RI index for soil(AMC 2) = 75.00  
 Pervious area fraction = 0.100; Impervious fraction = 0.900  
 Initial subarea runoff = 2.684(CFS)  
 Total initial stream area = 0.980(Ac.)  
 Pervious area fraction = 0.100

++++++  
 Process from Point/Station 8.200 to Point/Station 8.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1415.280(Ft.)  
 Downstream point/station elevation = 1411.620(Ft.)  
 Pipe length = 25.32(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 2.684(CFS)  
 Nearest computed pipe diameter = 9.00(In.)  
 Calculated individual pipe flow = 2.684(CFS)  
 Normal flow depth in pipe = 4.11(In.)  
 Flow top width inside pipe = 8.97(In.)  
 Critical Depth = 8.46(In.)  
 Pipe flow velocity = 13.68(Ft/s)  
 Travel time through pipe = 0.03 min.  
 Time of concentration (TC) = 5.03 min.

++++++  
 Process from Point/Station 8.300 to Point/Station 8.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 0.980(Ac.)  
 Runoff from this stream = 2.684(CFS)  
 Time of concentration = 5.03 min.  
 Rainfall intensity = 3.072(In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	20.962	6.83	2.645
2	2.684	5.03	3.072

Largest stream flow has longer time of concentration

$$Q_p = 20.962 + \text{sum of } \frac{Q_b \cdot I_a/I_b}{2.684 * 0.861} = 2.310$$

Qp = 23.272

Total of 2 streams to confluence:  
Flow rates before confluence point:

20.962 2.684

Area of streams before confluence:

10.170 0.980

Results of confluence:

Total flow rate = 23.272(CFS)

Time of concentration = 6.830 min.

Effective stream area after confluence = 11.150(Ac.)

++++  
Process from Point/Station 8.300 to Point/Station 9.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1411.620(Ft.)  
Downstream point/station elevation = 1410.040(Ft.)  
Pipe length = 317.20(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 23.272(CFS)  
Nearest computed pipe diameter = 30.00(In.)  
Calculated individual pipe flow = 23.272(CFS)  
Normal flow depth in pipe = 20.37(In.)  
Flow top width inside pipe = 28.01(In.)  
Critical Depth = 19.71(In.)  
Pipe flow velocity = 6.56(Ft/s)  
Travel time through pipe = 0.81 min.  
Time of concentration (TC) = 7.64 min.

++++  
Process from Point/Station 9.300 to Point/Station 9.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 11.150(Ac.)  
Runoff from this stream = 23.272(CFS)  
Time of concentration = 7.64 min.  
Rainfall intensity = 2.504(In/Hr)

++++  
Process from Point/Station 9.100 to Point/Station 9.300  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 252.240(Ft.)  
Top (of initial area) elevation = 1421.240(Ft.)  
Bottom (of initial area) elevation = 1420.100(Ft.)  
Difference in elevation = 1.140(Ft.)

Slope = 0.00452 s(percent)= 0.45  
 TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
 Initial area time of concentration = 8.069 min.  
 Rainfall intensity = 2.437(In/Hr) for a 10.0 year storm  
 COMMERCIAL subarea type  
 Runoff Coefficient = 0.886  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 1.000  
 RI index for soil(AMC 2) = 75.00  
 Pervious area fraction = 0.100; Impervious fraction = 0.900  
 Initial subarea runoff = 15.011(CFS)  
 Total initial stream area = 6.950(Ac.)  
 Pervious area fraction = 0.100

++++++  
 Process from Point/Station 9.300 to Point/Station 9.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 6.950(Ac.)  
 Runoff from this stream = 15.011(CFS)  
 Time of concentration = 8.07 min.  
 Rainfall intensity = 2.437(In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	23.272	7.64	2.504
2	15.011	8.07	2.437

Largest stream flow has longer or shorter time of concentration

$Q_p = 23.272 + \text{sum of}$   
 $\quad Q_a \quad T_b/T_a$   
 $\quad 15.011 * 0.946 = 14.205$   
 $Q_p = 37.477$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 23.272 15.011  
 Area of streams before confluence:  
 11.150 6.950

Results of confluence:  
 Total flow rate = 37.477(CFS)  
 Time of concentration = 7.636 min.  
 Effective stream area after confluence = 18.100(Ac.)

+++++  
Process from Point/Station 9.300 to Point/Station 9.400  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1410.040(Ft.)  
Downstream point/station elevation = 1409.990(Ft.)  
Pipe length = 9.57(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 37.477(CFS)  
Nearest computed pipe diameter = 33.00(In.)  
Calculated individual pipe flow = 37.477(CFS)  
Normal flow depth in pipe = 26.48(In.)  
Flow top width inside pipe = 26.27(In.)  
Critical Depth = 24.47(In.)  
Pipe flow velocity = 7.34(Ft/s)  
Travel time through pipe = 0.02 min.  
Time of concentration (TC) = 7.66 min.  
End of computations, total study area = 18.10 (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 = 75.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0  
Rational Hydrology Study Date: 05/27/22

File:MapesPost10BRat.out

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MAPES AND TRUMBLE INDUSTRIAL FACILITY  
RATIONAL METHOD  
POST-DEVELOPMENT CONDITIONS  
10-YEAR STORM, DA B  
-----

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

English (in-lb) Units used in input data file  
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Program License Serial Number 6443  
-----

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

2 year, 1 hour precipitation = 0.487(In.)  
100 year, 1 hour precipitation = 1.520(In.)

Storm event year = 10.0  
Calculated rainfall intensity data:  
1 hour intensity = 0.912(In/Hr)  
Slope of intensity duration curve = 0.4900

++++  
Process from Point/Station 10.100 to Point/Station 10.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 333.910(Ft.)  
Top (of initial area) elevation = 1423.670(Ft.)  
Bottom (of initial area) elevation = 1420.530(Ft.)  
Difference in elevation = 3.140(Ft.)  
Slope = 0.00940 s(percent)= 0.94  
TC = k(0.300)\*[(length^3)/(elevation change)]^0.2



Initial area time of concentration = 7.797 min.  
Rainfall intensity = 2.479(In/Hr) for a 10.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.886  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 2) = 75.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 1.208(CFS)  
Total initial stream area = 0.550(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 10.200 to Point/Station 11.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1416.530(Ft.)  
Downstream point/station elevation = 1414.760(Ft.)  
Pipe length = 354.30(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 1.208(CFS)  
Nearest computed pipe diameter = 12.00(In.)  
Calculated individual pipe flow = 1.208(CFS)  
Normal flow depth in pipe = 5.86(In.)  
Flow top width inside pipe = 12.00(In.)  
Critical Depth = 5.56(In.)  
Pipe flow velocity = 3.17(Ft/s)  
Travel time through pipe = 1.86 min.  
Time of concentration (TC) = 9.66 min.

++++  
Process from Point/Station 11.300 to Point/Station 11.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 0.550(Ac.)  
Runoff from this stream = 1.208(CFS)  
Time of concentration = 9.66 min.  
Rainfall intensity = 2.232(In/Hr)

++++  
Process from Point/Station 11.100 to Point/Station 11.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 169.180(Ft.)  
Top (of initial area) elevation = 1423.740(Ft.)

Bottom (of initial area) elevation = 1421.670(Ft.)  
 Difference in elevation = 2.070(Ft.)  
 Slope = 0.01224 s(percent)= 1.22  
 $TC = k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$   
 Initial area time of concentration = 5.636 min.  
 Rainfall intensity = 2.906(In/Hr) for a 10.0 year storm  
 COMMERCIAL subarea type  
 Runoff Coefficient = 0.888  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 1.000  
 RI index for soil(AMC 2) = 75.00  
 Pervious area fraction = 0.100; Impervious fraction = 0.900  
 Initial subarea runoff = 0.955(CFS)  
 Total initial stream area = 0.370(Ac.)  
 Pervious area fraction = 0.100

+-----+  
 Process from Point/Station 11.200 to Point/Station 11.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1417.670(Ft.)  
 Downstream point/station elevation = 1414.760(Ft.)  
 Pipe length = 5.72(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 0.955(CFS)  
 Nearest computed pipe diameter = 6.00(In.)  
 Calculated individual pipe flow = 0.955(CFS)  
 Normal flow depth in pipe = 1.99(In.)  
 Flow top width inside pipe = 5.65(In.)  
 Critical Depth = 5.61(In.)  
 Pipe flow velocity = 16.72(Ft/s)  
 Travel time through pipe = 0.01 min.  
 Time of concentration (TC) = 5.64 min.

+-----+  
 Process from Point/Station 11.300 to Point/Station 11.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 0.370(Ac.)  
 Runoff from this stream = 0.955(CFS)  
 Time of concentration = 5.64 min.  
 Rainfall intensity = 2.905(In/Hr)  
 Summary of stream data:

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

1            1.208            9.66                            2.232  
 2            0.955            5.64                            2.905  
 Largest stream flow has longer time of concentration  
 $Q_p = 1.208 + \text{sum of}$   
                    $Q_b \quad I_a/I_b$   
                    $0.955 * \quad 0.768 = \quad 0.734$   
 $Q_p = \quad 1.942$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
           1.208            0.955  
 Area of streams before confluence:  
           0.550            0.370  
 Results of confluence:  
 Total flow rate =            1.942(CFS)  
 Time of concentration =            9.657 min.  
 Effective stream area after confluence =            0.920(Ac.)

++++++  
 Process from Point/Station            11.300 to Point/Station            11.400  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1414.760(Ft.)  
 Downstream point/station elevation = 1414.030(Ft.)  
 Pipe length = 146.40(Ft.)    Manning's N = 0.013  
 No. of pipes = 1    Required pipe flow =            1.942(CFS)  
 Nearest computed pipe diameter =            12.00(In.)  
 Calculated individual pipe flow =            1.942(CFS)  
 Normal flow depth in pipe =            7.91(In.)  
 Flow top width inside pipe =            11.38(In.)  
 Critical Depth =            7.13(In.)  
 Pipe flow velocity =            3.53(Ft/s)  
 Travel time through pipe =            0.69 min.  
 Time of concentration (TC) =            10.35 min.  
 End of computations, total study area =            0.92 (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 = 75.0

**Appendix I.VI**

**Rational Method Analysis  
Post-Development Conditions  
100-Year Storm**

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0  
Rational Hydrology Study Date: 05/27/22

File:MapesPost100ARat.out

-----  
MAPES AND TRUMBLE INDUSTRIAL FACILITY  
RATIONAL METHOD  
POST-DEVELOPMENT CONDITIONS  
100-YEAR STORM, DA A  
-----

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

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

Program License Serial Number 6443  
-----

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

Storm event (year) = 100.00 Antecedent Moisture Condition = 3

2 year, 1 hour precipitation = 0.487(In.)  
100 year, 1 hour precipitation = 1.520(In.)

Storm event year = 100.0  
Calculated rainfall intensity data:  
1 hour intensity = 1.520(In/Hr)  
Slope of intensity duration curve = 0.4900

++++  
Process from Point/Station 1.100 to Point/Station 1.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 214.760(Ft.)  
Top (of initial area) elevation = 1422.920(Ft.)  
Bottom (of initial area) elevation = 1419.450(Ft.)  
Difference in elevation = 3.470(Ft.)  
Slope = 0.01616 s(percent)= 1.62  
TC = k(0.300)\*[(length^3)/(elevation change)]^0.2

Initial area time of concentration = 5.864 min.  
Rainfall intensity = 4.750(In/Hr) for a 100.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.897  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 3) = 88.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 4.387(CFS)  
Total initial stream area = 1.030(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 1.200 to Point/Station 2.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1415.450(Ft.)  
Downstream point/station elevation = 1414.490(Ft.)  
Pipe length = 175.42(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 4.387(CFS)  
Nearest computed pipe diameter = 15.00(In.)  
Calculated individual pipe flow = 4.387(CFS)  
Normal flow depth in pipe = 11.32(In.)  
Flow top width inside pipe = 12.91(In.)  
Critical Depth = 10.18(In.)  
Pipe flow velocity = 4.42(Ft/s)  
Travel time through pipe = 0.66 min.  
Time of concentration (TC) = 6.53 min.

++++  
Process from Point/Station 2.300 to Point/Station 2.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 1.030(Ac.)  
Runoff from this stream = 4.387(CFS)  
Time of concentration = 6.53 min.  
Rainfall intensity = 4.508(In/Hr)

++++  
Process from Point/Station 2.100 to Point/Station 2.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 130.430(Ft.)  
Top (of initial area) elevation = 1421.180(Ft.)

Bottom (of initial area) elevation = 1418.600(Ft.)  
Difference in elevation = 2.580(Ft.)  
Slope = 0.01978 s(percent)= 1.98  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Warning: TC computed to be less than 5 min.; program is assuming the  
time of concentration is 5 minutes.  
Initial area time of concentration = 5.000 min.  
Rainfall intensity = 5.136(In/Hr) for a 100.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.897  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 3) = 88.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 8.661(CFS)  
Total initial stream area = 1.880(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 2.200 to Point/Station 2.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1414.600(Ft.)  
Downstream point/station elevation = 1414.490(Ft.)  
Pipe length = 21.80(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 8.661(CFS)  
Nearest computed pipe diameter = 21.00(In.)  
Calculated individual pipe flow = 8.661(CFS)  
Normal flow depth in pipe = 13.82(In.)  
Flow top width inside pipe = 19.93(In.)  
Critical Depth = 13.11(In.)  
Pipe flow velocity = 5.16(Ft/s)  
Travel time through pipe = 0.07 min.  
Time of concentration (TC) = 5.07 min.

++++  
Process from Point/Station 2.300 to Point/Station 2.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
Stream flow area = 1.880(Ac.)  
Runoff from this stream = 8.661(CFS)  
Time of concentration = 5.07 min.  
Rainfall intensity = 5.101(In/Hr)  
Summary of stream data:

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

1	4.387	6.53	4.508
2	8.661	5.07	5.101

Largest stream flow has longer or shorter time of concentration

Qp = 8.661 + sum of  
 Qa Tb/Ta  
 4.387 \* 0.777 = 3.408

Qp = 12.069

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 4.387 8.661

Area of streams before confluence:  
 1.030 1.880

Results of confluence:  
 Total flow rate = 12.069(CFS)  
 Time of concentration = 5.070 min.  
 Effective stream area after confluence = 2.910(Ac.)

\*\*\*\*\*  
 Process from Point/Station 2.300 to Point/Station 3.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1414.490(Ft.)  
 Downstream point/station elevation = 1413.530(Ft.)  
 Pipe length = 191.80(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 12.069(CFS)  
 Nearest computed pipe diameter = 24.00(In.)  
 Calculated individual pipe flow = 12.069(CFS)  
 Normal flow depth in pipe = 15.56(In.)  
 Flow top width inside pipe = 22.92(In.)  
 Critical Depth = 14.98(In.)  
 Pipe flow velocity = 5.60(Ft/s)  
 Travel time through pipe = 0.57 min.  
 Time of concentration (TC) = 5.64 min.

\*\*\*\*\*  
 Process from Point/Station 3.300 to Point/Station 3.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
 Stream flow area = 2.910(Ac.)  
 Runoff from this stream = 12.069(CFS)  
 Time of concentration = 5.64 min.  
 Rainfall intensity = 4.841(In/Hr)



++++  
Process from Point/Station 3.100 to Point/Station 3.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 120.880(Ft.)  
Top (of initial area) elevation = 1419.390(Ft.)  
Bottom (of initial area) elevation = 1418.600(Ft.)  
Difference in elevation = 0.790(Ft.)  
Slope = 0.00654 s(percent)= 0.65  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Initial area time of concentration = 5.585 min.  
Rainfall intensity = 4.865(In/Hr) for a 100.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.897  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 3) = 88.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 6.239(CFS)  
Total initial stream area = 1.430(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 3.200 to Point/Station 3.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1414.600(Ft.)  
Downstream point/station elevation = 1413.530(Ft.)  
Pipe length = 22.97(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 6.239(CFS)  
Nearest computed pipe diameter = 12.00(In.)  
Calculated individual pipe flow = 6.239(CFS)  
Normal flow depth in pipe = 8.20(In.)  
Flow top width inside pipe = 11.16(In.)  
Critical depth could not be calculated.  
Pipe flow velocity = 10.90(Ft/s)  
Travel time through pipe = 0.04 min.  
Time of concentration (TC) = 5.62 min.

++++  
Process from Point/Station 3.300 to Point/Station 3.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2

Stream flow area = 1.430(Ac.)  
 Runoff from this stream = 6.239(CFS)  
 Time of concentration = 5.62 min.  
 Rainfall intensity = 4.850(In/Hr)  
 Summary of stream data:

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

1	12.069	5.64	4.841
2	6.239	5.62	4.850

Largest stream flow has longer time of concentration

Qp = 12.069 + sum of  

$$Q_b \cdot \frac{I_a}{I_b}$$

$$6.239 * 0.998 = 6.227$$
 Qp = 18.296

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 12.069      6.239  
 Area of streams before confluence:  
 2.910      1.430

Results of confluence:  
 Total flow rate = 18.296(CFS)  
 Time of concentration = 5.642 min.  
 Effective stream area after confluence = 4.340(Ac.)

++++  
 Process from Point/Station 3.300 to Point/Station 4.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1413.530(Ft.)  
 Downstream point/station elevation = 1413.360(Ft.)  
 Pipe length = 34.32(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 18.296(CFS)  
 Nearest computed pipe diameter = 27.00(In.)  
 Calculated individual pipe flow = 18.296(CFS)  
 Normal flow depth in pipe = 18.94(In.)  
 Flow top width inside pipe = 24.71(In.)  
 Critical Depth = 17.95(In.)  
 Pipe flow velocity = 6.14(Ft/s)  
 Travel time through pipe = 0.09 min.  
 Time of concentration (TC) = 5.73 min.

++++  
 Process from Point/Station 4.300 to Point/Station 4.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 4.340(Ac.)  
Runoff from this stream = 18.296(CFS)  
Time of concentration = 5.73 min.  
Rainfall intensity = 4.802(In/Hr)

++++  
Process from Point/Station 4.100 to Point/Station 4.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 256.970(Ft.)  
Top (of initial area) elevation = 1422.990(Ft.)  
Bottom (of initial area) elevation = 1419.100(Ft.)  
Difference in elevation = 3.890(Ft.)  
Slope = 0.01514 s(percent)= 1.51  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Initial area time of concentration = 6.384 min.  
Rainfall intensity = 4.557(In/Hr) for a 100.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.897  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 3) = 88.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 4.167(CFS)  
Total initial stream area = 1.020(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 4.200 to Point/Station 4.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1415.100(Ft.)  
Downstream point/station elevation = 1413.360(Ft.)  
Pipe length = 136.57(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 4.167(CFS)  
Nearest computed pipe diameter = 15.00(In.)  
Calculated individual pipe flow = 4.167(CFS)  
Normal flow depth in pipe = 8.13(In.)  
Flow top width inside pipe = 14.95(In.)  
Critical Depth = 9.93(In.)  
Pipe flow velocity = 6.14(Ft/s)  
Travel time through pipe = 0.37 min.  
Time of concentration (TC) = 6.75 min.

+++++  
 Process from Point/Station 4.300 to Point/Station 4.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 1.020(Ac.)  
 Runoff from this stream = 4.167(CFS)  
 Time of concentration = 6.75 min.  
 Rainfall intensity = 4.432(In/Hr)  
 Summary of stream data:

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

1	18.296	5.73	4.802
2	4.167	6.75	4.432

Largest stream flow has longer or shorter time of concentration  
 $Q_p = 18.296 + \text{sum of } Q_a \cdot \frac{T_b}{T_a}$   
 $4.167 * 0.849 = 3.538$   
 $Q_p = 21.834$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 18.296      4.167  
 Area of streams before confluence:  
 4.340      1.020

Results of confluence:  
 Total flow rate = 21.834(CFS)  
 Time of concentration = 5.735 min.  
 Effective stream area after confluence = 5.360(Ac.)

+++++  
 Process from Point/Station 4.300 to Point/Station 5.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1413.360(Ft.)  
 Downstream point/station elevation = 1412.940(Ft.)  
 Pipe length = 83.92(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 21.834(CFS)  
 Nearest computed pipe diameter = 27.00(In.)  
 Calculated individual pipe flow = 21.834(CFS)  
 Normal flow depth in pipe = 22.03(In.)  
 Flow top width inside pipe = 20.93(In.)  
 Critical Depth = 19.64(In.)  
 Pipe flow velocity = 6.28(Ft/s)  
 Travel time through pipe = 0.22 min.

Time of concentration (TC) = 5.96 min.

++++  
Process from Point/Station 5.300 to Point/Station 5.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 5.360(Ac.)  
Runoff from this stream = 21.834(CFS)  
Time of concentration = 5.96 min.  
Rainfall intensity = 4.714(In/Hr)

++++  
Process from Point/Station 5.100 to Point/Station 5.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 148.520(Ft.)  
Top (of initial area) elevation = 1422.490(Ft.)  
Bottom (of initial area) elevation = 1419.100(Ft.)  
Difference in elevation = 3.390(Ft.)  
Slope = 0.02283 s(percent)= 2.28  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Warning: TC computed to be less than 5 min.; program is assuming the  
time of concentration is 5 minutes.  
Initial area time of concentration = 5.000 min.  
Rainfall intensity = 5.136(In/Hr) for a 100.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.897  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 3) = 88.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 2.119(CFS)  
Total initial stream area = 0.460(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 5.200 to Point/Station 5.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1415.100(Ft.)  
Downstream point/station elevation = 1412.940(Ft.)  
Pipe length = 40.62(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 2.119(CFS)  
Nearest computed pipe diameter = 9.00(In.)

Calculated individual pipe flow = 2.119(CFS)  
 Normal flow depth in pipe = 4.79(In.)  
 Flow top width inside pipe = 8.98(In.)  
 Critical Depth = 7.88(In.)  
 Pipe flow velocity = 8.86(Ft/s)  
 Travel time through pipe = 0.08 min.  
 Time of concentration (TC) = 5.08 min.

++++++  
 Process from Point/Station 5.300 to Point/Station 5.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 0.460(Ac.)  
 Runoff from this stream = 2.119(CFS)  
 Time of concentration = 5.08 min.  
 Rainfall intensity = 5.098(In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	21.834	5.96	4.714
2	2.119	5.08	5.098

Largest stream flow has longer time of concentration  
 $Q_p = 21.834 + \text{sum of } Q_b \cdot I_a/I_b$   
 $2.119 * 0.925 = 1.959$   
 $Q_p = 23.794$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 21.834      2.119  
 Area of streams before confluence:  
 5.360      0.460  
 Results of confluence:  
 Total flow rate = 23.794(CFS)  
 Time of concentration = 5.957 min.  
 Effective stream area after confluence = 5.820(Ac.)

++++++  
 Process from Point/Station 5.300 to Point/Station 6.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1412.940(Ft.)  
 Downstream point/station elevation = 1412.570(Ft.)  
 Pipe length = 73.56(Ft.)      Manning's N = 0.013

No. of pipes = 1 Required pipe flow = 23.794(CFS)  
Nearest computed pipe diameter = 30.00(In.)  
Calculated individual pipe flow = 23.794(CFS)  
Normal flow depth in pipe = 20.63(In.)  
Flow top width inside pipe = 27.81(In.)  
Critical Depth = 19.95(In.)  
Pipe flow velocity = 6.61(Ft/s)  
Travel time through pipe = 0.19 min.  
Time of concentration (TC) = 6.14 min.

++++  
Process from Point/Station 6.300 to Point/Station 6.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 5.820(Ac.)  
Runoff from this stream = 23.794(CFS)  
Time of concentration = 6.14 min.  
Rainfall intensity = 4.643(In/Hr)

++++  
Process from Point/Station 6.100 to Point/Station 6.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 206.100(Ft.)  
Top (of initial area) elevation = 1419.690(Ft.)  
Bottom (of initial area) elevation = 1418.600(Ft.)  
Difference in elevation = 1.090(Ft.)  
Slope = 0.00529 s(percent)= 0.53  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Initial area time of concentration = 7.212 min.  
Rainfall intensity = 4.292(In/Hr) for a 100.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.896  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 3) = 88.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 7.771(CFS)  
Total initial stream area = 2.020(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 6.200 to Point/Station 6.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1414.600(Ft.)  
 Downstream point/station elevation = 1412.570(Ft.)  
 Pipe length = 24.15(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 7.771(CFS)  
 Nearest computed pipe diameter = 12.00(In.)  
 Calculated individual pipe flow = 7.771(CFS)  
 Normal flow depth in pipe = 7.77(In.)  
 Flow top width inside pipe = 11.47(In.)  
 Critical depth could not be calculated.  
 Pipe flow velocity = 14.44(Ft/s)  
 Travel time through pipe = 0.03 min.  
 Time of concentration (TC) = 7.24 min.

++++++  
 Process from Point/Station 6.300 to Point/Station 6.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 2.020(Ac.)  
 Runoff from this stream = 7.771(CFS)  
 Time of concentration = 7.24 min.  
 Rainfall intensity = 4.284(In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	23.794	6.14	4.643
2	7.771	7.24	4.284

Largest stream flow has longer or shorter time of concentration  
 $Q_p = 23.794 + \text{sum of } Q_a \cdot \frac{T_b}{T_a}$   
 $7.771 * 0.848 = 6.593$   
 $Q_p = 30.387$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 23.794      7.771  
 Area of streams before confluence:  
 5.820      2.020  
 Results of confluence:  
 Total flow rate = 30.387(CFS)  
 Time of concentration = 6.143 min.  
 Effective stream area after confluence = 7.840(Ac.)

+++++



Process from Point/Station 6.300 to Point/Station 7.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1412.570(Ft.)  
Downstream point/station elevation = 1411.710(Ft.)  
Pipe length = 172.10(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 30.387(CFS)  
Nearest computed pipe diameter = 30.00(In.)  
Calculated individual pipe flow = 30.387(CFS)  
Normal flow depth in pipe = 26.16(In.)  
Flow top width inside pipe = 20.05(In.)  
Critical Depth = 22.55(In.)  
Pipe flow velocity = 6.69(Ft/s)  
Travel time through pipe = 0.43 min.  
Time of concentration (TC) = 6.57 min.

+++++  
Process from Point/Station 7.300 to Point/Station 7.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 7.840(Ac.)  
Runoff from this stream = 30.387(CFS)  
Time of concentration = 6.57 min.  
Rainfall intensity = 4.492(In/Hr)

+++++  
Process from Point/Station 7.100 to Point/Station 7.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 588.890(Ft.)  
Top (of initial area) elevation = 1422.840(Ft.)  
Bottom (of initial area) elevation = 1418.940(Ft.)  
Difference in elevation = 3.900(Ft.)  
Slope = 0.00662 s(percent)= 0.66  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Initial area time of concentration = 10.494 min.  
Rainfall intensity = 3.572(In/Hr) for a 100.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.896  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 3) = 88.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 7.454(CFS)  
Total initial stream area = 2.330(Ac.)

Pervious area fraction = 0.100

++++  
Process from Point/Station 7.200 to Point/Station 7.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1414.940(Ft.)  
Downstream point/station elevation = 1411.710(Ft.)  
Pipe length = 27.78(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 7.454(CFS)  
Nearest computed pipe diameter = 12.00(In.)  
Calculated individual pipe flow = 7.454(CFS)  
Normal flow depth in pipe = 6.80(In.)  
Flow top width inside pipe = 11.89(In.)  
Critical depth could not be calculated.  
Pipe flow velocity = 16.25(Ft/s)  
Travel time through pipe = 0.03 min.  
Time of concentration (TC) = 10.52 min.

++++  
Process from Point/Station 7.300 to Point/Station 7.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
Stream flow area = 2.330(Ac.)  
Runoff from this stream = 7.454(CFS)  
Time of concentration = 10.52 min.  
Rainfall intensity = 3.567(In/Hr)  
Summary of stream data:

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

1	30.387	6.57	4.492
2	7.454	10.52	3.567

Largest stream flow has longer or shorter time of concentration

Qp = 30.387 + sum of  
Qa Tb/Ta  
7.454 \* 0.625 = 4.655  
Qp = 35.042

Total of 2 streams to confluence:  
Flow rates before confluence point:  
30.387 7.454  
Area of streams before confluence:  
7.840 2.330  
Results of confluence:

Total flow rate = 35.042(CFS)  
Time of concentration = 6.571 min.  
Effective stream area after confluence = 10.170(Ac.)

++++  
Process from Point/Station 7.300 to Point/Station 8.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1411.710(Ft.)  
Downstream point/station elevation = 1411.620(Ft.)  
Pipe length = 18.21(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 35.042(CFS)  
Nearest computed pipe diameter = 33.00(In.)  
Calculated individual pipe flow = 35.042(CFS)  
Normal flow depth in pipe = 25.50(In.)  
Flow top width inside pipe = 27.66(In.)  
Critical Depth = 23.64(In.)  
Pipe flow velocity = 7.12(Ft/s)  
Travel time through pipe = 0.04 min.  
Time of concentration (TC) = 6.61 min.

++++  
Process from Point/Station 8.300 to Point/Station 8.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 10.170(Ac.)  
Runoff from this stream = 35.042(CFS)  
Time of concentration = 6.61 min.  
Rainfall intensity = 4.478(In/Hr)

++++  
Process from Point/Station 8.100 to Point/Station 8.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 106.130(Ft.)  
Top (of initial area) elevation = 1420.890(Ft.)  
Bottom (of initial area) elevation = 1419.280(Ft.)  
Difference in elevation = 1.610(Ft.)  
Slope = 0.01517 s(percent)= 1.52  
TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
Warning: TC computed to be less than 5 min.; program is assuming the  
time of concentration is 5 minutes.  
Initial area time of concentration = 5.000 min.  
Rainfall intensity = 5.136(In/Hr) for a 100.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.897

Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 1.000  
 RI index for soil(AMC 3) = 88.00  
 Pervious area fraction = 0.100; Impervious fraction = 0.900  
 Initial subarea runoff = 4.515(CFS)  
 Total initial stream area = 0.980(Ac.)  
 Pervious area fraction = 0.100

++++++  
 Process from Point/Station 8.200 to Point/Station 8.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1415.280(Ft.)  
 Downstream point/station elevation = 1411.620(Ft.)  
 Pipe length = 25.32(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 4.515(CFS)  
 Nearest computed pipe diameter = 9.00(In.)  
 Calculated individual pipe flow = 4.515(CFS)  
 Normal flow depth in pipe = 5.64(In.)  
 Flow top width inside pipe = 8.71(In.)  
 Critical depth could not be calculated.  
 Pipe flow velocity = 15.49(Ft/s)  
 Travel time through pipe = 0.03 min.  
 Time of concentration (TC) = 5.03 min.

++++++  
 Process from Point/Station 8.300 to Point/Station 8.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 0.980(Ac.)  
 Runoff from this stream = 4.515(CFS)  
 Time of concentration = 5.03 min.  
 Rainfall intensity = 5.123(In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	35.042	6.61	4.478
2	4.515	5.03	5.123

Largest stream flow has longer time of concentration  
 $Q_p = 35.042 + \text{sum of } Q_b \cdot \frac{I_a}{I_b}$   
 $4.515 * 0.874 = 3.947$

Qp = 38.989

Total of 2 streams to confluence:  
Flow rates before confluence point:

35.042 4.515

Area of streams before confluence:

10.170 0.980

Results of confluence:

Total flow rate = 38.989(CFS)

Time of concentration = 6.614 min.

Effective stream area after confluence = 11.150(Ac.)

++++  
Process from Point/Station 8.300 to Point/Station 9.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1411.620(Ft.)  
Downstream point/station elevation = 1410.040(Ft.)  
Pipe length = 317.20(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 38.989(CFS)  
Nearest computed pipe diameter = 33.00(In.)  
Calculated individual pipe flow = 38.989(CFS)  
Normal flow depth in pipe = 28.59(In.)  
Flow top width inside pipe = 22.45(In.)  
Critical Depth = 24.93(In.)  
Pipe flow velocity = 7.13(Ft/s)  
Travel time through pipe = 0.74 min.  
Time of concentration (TC) = 7.36 min.

++++  
Process from Point/Station 9.300 to Point/Station 9.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 11.150(Ac.)  
Runoff from this stream = 38.989(CFS)  
Time of concentration = 7.36 min.  
Rainfall intensity = 4.251(In/Hr)

++++  
Process from Point/Station 9.100 to Point/Station 9.300  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 252.240(Ft.)  
Top (of initial area) elevation = 1421.240(Ft.)  
Bottom (of initial area) elevation = 1420.100(Ft.)  
Difference in elevation = 1.140(Ft.)

Slope = 0.00452 s(percent)= 0.45  
 TC =  $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$   
 Initial area time of concentration = 8.069 min.  
 Rainfall intensity = 4.062(In/Hr) for a 100.0 year storm  
 COMMERCIAL subarea type  
 Runoff Coefficient = 0.896  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 1.000  
 RI index for soil(AMC 3) = 88.00  
 Pervious area fraction = 0.100; Impervious fraction = 0.900  
 Initial subarea runoff = 25.302(CFS)  
 Total initial stream area = 6.950(Ac.)  
 Pervious area fraction = 0.100

++++++  
 Process from Point/Station 9.300 to Point/Station 9.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 6.950(Ac.)  
 Runoff from this stream = 25.302(CFS)  
 Time of concentration = 8.07 min.  
 Rainfall intensity = 4.062(In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	38.989	7.36	4.251
2	25.302	8.07	4.062

Largest stream flow has longer or shorter time of concentration  
 $Q_p = 38.989 + \text{sum of}$   
 $\frac{Q_a}{T_b/T_a}$   
 $25.302 * 0.912 = 23.064$   
 $Q_p = 62.054$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 38.989 25.302  
 Area of streams before confluence:  
 11.150 6.950

Results of confluence:  
 Total flow rate = 62.054(CFS)  
 Time of concentration = 7.356 min.  
 Effective stream area after confluence = 18.100(Ac.)

+++++  
Process from Point/Station 9.300 to Point/Station 9.400  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1410.040(Ft.)  
Downstream point/station elevation = 1409.990(Ft.)  
Pipe length = 9.57(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 62.054(CFS)  
Nearest computed pipe diameter = 39.00(In.)  
Calculated individual pipe flow = 62.054(CFS)  
Normal flow depth in pipe = 33.56(In.)  
Flow top width inside pipe = 27.02(In.)  
Critical Depth = 30.13(In.)  
Pipe flow velocity = 8.17(Ft/s)  
Travel time through pipe = 0.02 min.  
Time of concentration (TC) = 7.38 min.  
End of computations, total study area = 18.10 (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 = 75.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2018 Version 9.0  
Rational Hydrology Study Date: 05/27/22

File:MapesPost100BRat.out

-----  
MAPES AND TRUMBLE INDUSTRIAL FACILITY  
RATIONAL METHOD  
POST-DEVELOPMENT CONDITIONS  
100-YEAR STORM, DA B  
-----

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

English (in-lb) Units used in input data file  
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Program License Serial Number 6443  
-----

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

Storm event (year) = 100.00 Antecedent Moisture Condition = 3

2 year, 1 hour precipitation = 0.487(In.)  
100 year, 1 hour precipitation = 1.520(In.)

Storm event year = 100.0  
Calculated rainfall intensity data:  
1 hour intensity = 1.520(In/Hr)  
Slope of intensity duration curve = 0.4900

++++  
Process from Point/Station 10.100 to Point/Station 10.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

-----  
Initial area flow distance = 333.910(Ft.)  
Top (of initial area) elevation = 1423.670(Ft.)  
Bottom (of initial area) elevation = 1420.530(Ft.)  
Difference in elevation = 3.140(Ft.)  
Slope = 0.00940 s(percent)= 0.94  
TC = k(0.300)\*[(length^3)/(elevation change)]^0.2



Initial area time of concentration = 7.797 min.  
Rainfall intensity = 4.131(In/Hr) for a 100.0 year storm  
COMMERCIAL subarea type  
Runoff Coefficient = 0.896  
Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.000  
Decimal fraction soil group D = 1.000  
RI index for soil(AMC 3) = 88.00  
Pervious area fraction = 0.100; Impervious fraction = 0.900  
Initial subarea runoff = 2.036(CFS)  
Total initial stream area = 0.550(Ac.)  
Pervious area fraction = 0.100

++++  
Process from Point/Station 10.200 to Point/Station 11.300  
\*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1416.530(Ft.)  
Downstream point/station elevation = 1414.760(Ft.)  
Pipe length = 354.30(Ft.) Manning's N = 0.013  
No. of pipes = 1 Required pipe flow = 2.036(CFS)  
Nearest computed pipe diameter = 12.00(In.)  
Calculated individual pipe flow = 2.036(CFS)  
Normal flow depth in pipe = 8.18(In.)  
Flow top width inside pipe = 11.18(In.)  
Critical Depth = 7.30(In.)  
Pipe flow velocity = 3.57(Ft/s)  
Travel time through pipe = 1.65 min.  
Time of concentration (TC) = 9.45 min.

++++  
Process from Point/Station 11.300 to Point/Station 11.300  
\*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 1  
Stream flow area = 0.550(Ac.)  
Runoff from this stream = 2.036(CFS)  
Time of concentration = 9.45 min.  
Rainfall intensity = 3.760(In/Hr)

++++  
Process from Point/Station 11.100 to Point/Station 11.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Initial area flow distance = 169.180(Ft.)  
Top (of initial area) elevation = 1423.740(Ft.)

Bottom (of initial area) elevation = 1421.670(Ft.)  
 Difference in elevation = 2.070(Ft.)  
 Slope = 0.01224 s(percent)= 1.22  
 $TC = k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$   
 Initial area time of concentration = 5.636 min.  
 Rainfall intensity = 4.844(In/Hr) for a 100.0 year storm  
 COMMERCIAL subarea type  
 Runoff Coefficient = 0.897  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 1.000  
 RI index for soil(AMC 3) = 88.00  
 Pervious area fraction = 0.100; Impervious fraction = 0.900  
 Initial subarea runoff = 1.607(CFS)  
 Total initial stream area = 0.370(Ac.)  
 Pervious area fraction = 0.100

+-----+  
 Process from Point/Station 11.200 to Point/Station 11.300  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1417.670(Ft.)  
 Downstream point/station elevation = 1414.760(Ft.)  
 Pipe length = 5.72(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 1.607(CFS)  
 Nearest computed pipe diameter = 6.00(In.)  
 Calculated individual pipe flow = 1.607(CFS)  
 Normal flow depth in pipe = 2.64(In.)  
 Flow top width inside pipe = 5.96(In.)  
 Critical depth could not be calculated.  
 Pipe flow velocity = 19.27(Ft/s)  
 Travel time through pipe = 0.00 min.  
 Time of concentration (TC) = 5.64 min.

+-----+  
 Process from Point/Station 11.300 to Point/Station 11.300  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

---

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 0.370(Ac.)  
 Runoff from this stream = 1.607(CFS)  
 Time of concentration = 5.64 min.  
 Rainfall intensity = 4.842(In/Hr)  
 Summary of stream data:

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

1            2.036            9.45                            3.760  
 2            1.607            5.64                            4.842  
 Largest stream flow has longer time of concentration  
 $Q_p = 2.036 + \text{sum of}$   
                    $Q_b \quad I_a/I_b$   
                    $1.607 * \quad 0.777 = \quad 1.248$   
 $Q_p = \quad 3.284$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
                   2.036            1.607  
 Area of streams before confluence:  
                   0.550            0.370  
 Results of confluence:  
 Total flow rate =            3.284(CFS)  
 Time of concentration =            9.451 min.  
 Effective stream area after confluence =            0.920(Ac.)

++++++  
 Process from Point/Station            11.300 to Point/Station            11.400  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

---

Upstream point/station elevation = 1414.760(Ft.)  
 Downstream point/station elevation = 1414.030(Ft.)  
 Pipe length = 146.40(Ft.)    Manning's N = 0.013  
 No. of pipes = 1    Required pipe flow =            3.284(CFS)  
 Nearest computed pipe diameter =            15.00(In.)  
 Calculated individual pipe flow =            3.284(CFS)  
 Normal flow depth in pipe =            9.42(In.)  
 Flow top width inside pipe =            14.50(In.)  
 Critical Depth =            8.77(In.)  
 Pipe flow velocity =            4.05(Ft/s)  
 Travel time through pipe =            0.60 min.  
 Time of concentration (TC) =            10.05 min.  
 End of computations, total study area =            0.92 (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 = 75.0

## **Appendix J**

### **Synthetic Unit Hydrograph Method Analysis**

**Appendix J.1**

**Synthetic Unit Hydrograph Method Analysis  
Pre-Development Conditions  
2-Year Storm**

Unit Hydrograph Analysis

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0  
Study date 05/26/22 File: MapesPre2UH242.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6443

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used  
  
English Units used in output format

-----  
MAPES AND TRUMBLE INDUSTRIAL FACILITY  
UNIT HYDROGRAPH  
PRE-DEVELOPMENT CONDITIONS  
2-YEAR, 24HR STORM, DA A

-----  
Drainage Area = 19.01(Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.01(Ac.) =  
0.030 Sq. Mi.  
Length along longest watercourse = 1256.56(Ft.)  
Length along longest watercourse measured to centroid = 586.75(Ft.)  
Length along longest watercourse = 0.238 Mi.  
Length along longest watercourse measured to centroid = 0.111 Mi.  
Difference in elevation = 6.42(Ft.)  
Slope along watercourse = 26.9765 Ft./Mi.  
Average Manning's 'N' = 0.030  
Lag time = 0.097 Hr.  
Lag time = 5.81 Min.  
25% of lag time = 1.45 Min.  
40% of lag time = 2.32 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]
19.01	2.06	39.16

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
19.01	5.31	100.94

STORM EVENT (YEAR) = 2.00  
 Area Averaged 2-Year Rainfall = 2.060(In)  
 Area Averaged 100-Year Rainfall = 5.310(In)

Point rain (area averaged) = 2.060(In)  
 Areal adjustment factor = 100.00 %  
 Adjusted average point rain = 2.060(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
19.010	89.00	0.000
Total Area Entered = 19.01(Ac.)		

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
89.0	76.4	0.286	0.000	0.286	1.000	0.286
Sum (F) =						0.286

Area averaged mean soil loss (F) (In/Hr) = 0.286  
 Minimum soil loss rate ((In/Hr)) = 0.143  
 (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	86.074	15.028
2	0.167	172.149	46.219
3	0.250	258.223	18.315
4	0.333	344.297	7.866
5	0.417	430.372	4.648
6	0.500	516.446	2.910
7	0.583	602.520	2.059
8	0.667	688.594	1.359

9	0.750	774.669	0.913	0.175
10	0.833	860.743	0.684	0.131
			Sum = 100.000	Sum= 19.159

-----

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.07	0.016	( 0.508)	0.015	0.002
2	0.17	0.07	0.016	( 0.506)	0.015	0.002
3	0.25	0.07	0.016	( 0.504)	0.015	0.002
4	0.33	0.10	0.025	( 0.502)	0.022	0.002
5	0.42	0.10	0.025	( 0.500)	0.022	0.002
6	0.50	0.10	0.025	( 0.498)	0.022	0.002
7	0.58	0.10	0.025	( 0.496)	0.022	0.002
8	0.67	0.10	0.025	( 0.494)	0.022	0.002
9	0.75	0.10	0.025	( 0.492)	0.022	0.002
10	0.83	0.13	0.033	( 0.490)	0.030	0.003
11	0.92	0.13	0.033	( 0.488)	0.030	0.003
12	1.00	0.13	0.033	( 0.486)	0.030	0.003
13	1.08	0.10	0.025	( 0.485)	0.022	0.002
14	1.17	0.10	0.025	( 0.483)	0.022	0.002
15	1.25	0.10	0.025	( 0.481)	0.022	0.002
16	1.33	0.10	0.025	( 0.479)	0.022	0.002
17	1.42	0.10	0.025	( 0.477)	0.022	0.002
18	1.50	0.10	0.025	( 0.475)	0.022	0.002
19	1.58	0.10	0.025	( 0.473)	0.022	0.002
20	1.67	0.10	0.025	( 0.471)	0.022	0.002
21	1.75	0.10	0.025	( 0.469)	0.022	0.002
22	1.83	0.13	0.033	( 0.467)	0.030	0.003
23	1.92	0.13	0.033	( 0.466)	0.030	0.003
24	2.00	0.13	0.033	( 0.464)	0.030	0.003
25	2.08	0.13	0.033	( 0.462)	0.030	0.003
26	2.17	0.13	0.033	( 0.460)	0.030	0.003
27	2.25	0.13	0.033	( 0.458)	0.030	0.003
28	2.33	0.13	0.033	( 0.456)	0.030	0.003
29	2.42	0.13	0.033	( 0.454)	0.030	0.003
30	2.50	0.13	0.033	( 0.452)	0.030	0.003
31	2.58	0.17	0.041	( 0.451)	0.037	0.004
32	2.67	0.17	0.041	( 0.449)	0.037	0.004
33	2.75	0.17	0.041	( 0.447)	0.037	0.004
34	2.83	0.17	0.041	( 0.445)	0.037	0.004
35	2.92	0.17	0.041	( 0.443)	0.037	0.004
36	3.00	0.17	0.041	( 0.441)	0.037	0.004
37	3.08	0.17	0.041	( 0.440)	0.037	0.004
38	3.17	0.17	0.041	( 0.438)	0.037	0.004
39	3.25	0.17	0.041	( 0.436)	0.037	0.004



40	3.33	0.17	0.041	( 0.434)	0.037	0.004
41	3.42	0.17	0.041	( 0.432)	0.037	0.004
42	3.50	0.17	0.041	( 0.430)	0.037	0.004
43	3.58	0.17	0.041	( 0.429)	0.037	0.004
44	3.67	0.17	0.041	( 0.427)	0.037	0.004
45	3.75	0.17	0.041	( 0.425)	0.037	0.004
46	3.83	0.20	0.049	( 0.423)	0.044	0.005
47	3.92	0.20	0.049	( 0.422)	0.044	0.005
48	4.00	0.20	0.049	( 0.420)	0.044	0.005
49	4.08	0.20	0.049	( 0.418)	0.044	0.005
50	4.17	0.20	0.049	( 0.416)	0.044	0.005
51	4.25	0.20	0.049	( 0.414)	0.044	0.005
52	4.33	0.23	0.058	( 0.413)	0.052	0.006
53	4.42	0.23	0.058	( 0.411)	0.052	0.006
54	4.50	0.23	0.058	( 0.409)	0.052	0.006
55	4.58	0.23	0.058	( 0.407)	0.052	0.006
56	4.67	0.23	0.058	( 0.406)	0.052	0.006
57	4.75	0.23	0.058	( 0.404)	0.052	0.006
58	4.83	0.27	0.066	( 0.402)	0.059	0.007
59	4.92	0.27	0.066	( 0.400)	0.059	0.007
60	5.00	0.27	0.066	( 0.399)	0.059	0.007
61	5.08	0.20	0.049	( 0.397)	0.044	0.005
62	5.17	0.20	0.049	( 0.395)	0.044	0.005
63	5.25	0.20	0.049	( 0.393)	0.044	0.005
64	5.33	0.23	0.058	( 0.392)	0.052	0.006
65	5.42	0.23	0.058	( 0.390)	0.052	0.006
66	5.50	0.23	0.058	( 0.388)	0.052	0.006
67	5.58	0.27	0.066	( 0.387)	0.059	0.007
68	5.67	0.27	0.066	( 0.385)	0.059	0.007
69	5.75	0.27	0.066	( 0.383)	0.059	0.007
70	5.83	0.27	0.066	( 0.382)	0.059	0.007
71	5.92	0.27	0.066	( 0.380)	0.059	0.007
72	6.00	0.27	0.066	( 0.378)	0.059	0.007
73	6.08	0.30	0.074	( 0.376)	0.067	0.007
74	6.17	0.30	0.074	( 0.375)	0.067	0.007
75	6.25	0.30	0.074	( 0.373)	0.067	0.007
76	6.33	0.30	0.074	( 0.371)	0.067	0.007
77	6.42	0.30	0.074	( 0.370)	0.067	0.007
78	6.50	0.30	0.074	( 0.368)	0.067	0.007
79	6.58	0.33	0.082	( 0.366)	0.074	0.008
80	6.67	0.33	0.082	( 0.365)	0.074	0.008
81	6.75	0.33	0.082	( 0.363)	0.074	0.008
82	6.83	0.33	0.082	( 0.362)	0.074	0.008
83	6.92	0.33	0.082	( 0.360)	0.074	0.008
84	7.00	0.33	0.082	( 0.358)	0.074	0.008
85	7.08	0.33	0.082	( 0.357)	0.074	0.008
86	7.17	0.33	0.082	( 0.355)	0.074	0.008
87	7.25	0.33	0.082	( 0.353)	0.074	0.008
88	7.33	0.37	0.091	( 0.352)	0.082	0.009
89	7.42	0.37	0.091	( 0.350)	0.082	0.009

90	7.50	0.37	0.091	( 0.349)	0.082	0.009
91	7.58	0.40	0.099	( 0.347)	0.089	0.010
92	7.67	0.40	0.099	( 0.345)	0.089	0.010
93	7.75	0.40	0.099	( 0.344)	0.089	0.010
94	7.83	0.43	0.107	( 0.342)	0.096	0.011
95	7.92	0.43	0.107	( 0.341)	0.096	0.011
96	8.00	0.43	0.107	( 0.339)	0.096	0.011
97	8.08	0.50	0.124	( 0.337)	0.111	0.012
98	8.17	0.50	0.124	( 0.336)	0.111	0.012
99	8.25	0.50	0.124	( 0.334)	0.111	0.012
100	8.33	0.50	0.124	( 0.333)	0.111	0.012
101	8.42	0.50	0.124	( 0.331)	0.111	0.012
102	8.50	0.50	0.124	( 0.330)	0.111	0.012
103	8.58	0.53	0.132	( 0.328)	0.119	0.013
104	8.67	0.53	0.132	( 0.327)	0.119	0.013
105	8.75	0.53	0.132	( 0.325)	0.119	0.013
106	8.83	0.57	0.140	( 0.323)	0.126	0.014
107	8.92	0.57	0.140	( 0.322)	0.126	0.014
108	9.00	0.57	0.140	( 0.320)	0.126	0.014
109	9.08	0.63	0.157	( 0.319)	0.141	0.016
110	9.17	0.63	0.157	( 0.317)	0.141	0.016
111	9.25	0.63	0.157	( 0.316)	0.141	0.016
112	9.33	0.67	0.165	( 0.314)	0.148	0.016
113	9.42	0.67	0.165	( 0.313)	0.148	0.016
114	9.50	0.67	0.165	( 0.311)	0.148	0.016
115	9.58	0.70	0.173	( 0.310)	0.156	0.017
116	9.67	0.70	0.173	( 0.308)	0.156	0.017
117	9.75	0.70	0.173	( 0.307)	0.156	0.017
118	9.83	0.73	0.181	( 0.305)	0.163	0.018
119	9.92	0.73	0.181	( 0.304)	0.163	0.018
120	10.00	0.73	0.181	( 0.303)	0.163	0.018
121	10.08	0.50	0.124	( 0.301)	0.111	0.012
122	10.17	0.50	0.124	( 0.300)	0.111	0.012
123	10.25	0.50	0.124	( 0.298)	0.111	0.012
124	10.33	0.50	0.124	( 0.297)	0.111	0.012
125	10.42	0.50	0.124	( 0.295)	0.111	0.012
126	10.50	0.50	0.124	( 0.294)	0.111	0.012
127	10.58	0.67	0.165	( 0.292)	0.148	0.016
128	10.67	0.67	0.165	( 0.291)	0.148	0.016
129	10.75	0.67	0.165	( 0.290)	0.148	0.016
130	10.83	0.67	0.165	( 0.288)	0.148	0.016
131	10.92	0.67	0.165	( 0.287)	0.148	0.016
132	11.00	0.67	0.165	( 0.285)	0.148	0.016
133	11.08	0.63	0.157	( 0.284)	0.141	0.016
134	11.17	0.63	0.157	( 0.282)	0.141	0.016
135	11.25	0.63	0.157	( 0.281)	0.141	0.016
136	11.33	0.63	0.157	( 0.280)	0.141	0.016
137	11.42	0.63	0.157	( 0.278)	0.141	0.016
138	11.50	0.63	0.157	( 0.277)	0.141	0.016
139	11.58	0.57	0.140	( 0.276)	0.126	0.014

140	11.67	0.57	0.140	( 0.274)	0.126	0.014
141	11.75	0.57	0.140	( 0.273)	0.126	0.014
142	11.83	0.60	0.148	( 0.271)	0.133	0.015
143	11.92	0.60	0.148	( 0.270)	0.133	0.015
144	12.00	0.60	0.148	( 0.269)	0.133	0.015
145	12.08	0.83	0.206	( 0.267)	0.185	0.021
146	12.17	0.83	0.206	( 0.266)	0.185	0.021
147	12.25	0.83	0.206	( 0.265)	0.185	0.021
148	12.33	0.87	0.214	( 0.263)	0.193	0.021
149	12.42	0.87	0.214	( 0.262)	0.193	0.021
150	12.50	0.87	0.214	( 0.261)	0.193	0.021
151	12.58	0.93	0.231	( 0.259)	0.208	0.023
152	12.67	0.93	0.231	( 0.258)	0.208	0.023
153	12.75	0.93	0.231	( 0.257)	0.208	0.023
154	12.83	0.97	0.239	( 0.256)	0.215	0.024
155	12.92	0.97	0.239	( 0.254)	0.215	0.024
156	13.00	0.97	0.239	( 0.253)	0.215	0.024
157	13.08	1.13	0.280	0.252 ( 0.252)		0.028
158	13.17	1.13	0.280	0.250 ( 0.252)		0.030
159	13.25	1.13	0.280	0.249 ( 0.252)		0.031
160	13.33	1.13	0.280	0.248 ( 0.252)		0.032
161	13.42	1.13	0.280	0.247 ( 0.252)		0.034
162	13.50	1.13	0.280	0.245 ( 0.252)		0.035
163	13.58	0.77	0.190	( 0.244)	0.171	0.019
164	13.67	0.77	0.190	( 0.243)	0.171	0.019
165	13.75	0.77	0.190	( 0.242)	0.171	0.019
166	13.83	0.77	0.190	( 0.240)	0.171	0.019
167	13.92	0.77	0.190	( 0.239)	0.171	0.019
168	14.00	0.77	0.190	( 0.238)	0.171	0.019
169	14.08	0.90	0.222	( 0.237)	0.200	0.022
170	14.17	0.90	0.222	( 0.236)	0.200	0.022
171	14.25	0.90	0.222	( 0.234)	0.200	0.022
172	14.33	0.87	0.214	( 0.233)	0.193	0.021
173	14.42	0.87	0.214	( 0.232)	0.193	0.021
174	14.50	0.87	0.214	( 0.231)	0.193	0.021
175	14.58	0.87	0.214	( 0.230)	0.193	0.021
176	14.67	0.87	0.214	( 0.228)	0.193	0.021
177	14.75	0.87	0.214	( 0.227)	0.193	0.021
178	14.83	0.83	0.206	( 0.226)	0.185	0.021
179	14.92	0.83	0.206	( 0.225)	0.185	0.021
180	15.00	0.83	0.206	( 0.224)	0.185	0.021
181	15.08	0.80	0.198	( 0.223)	0.178	0.020
182	15.17	0.80	0.198	( 0.221)	0.178	0.020
183	15.25	0.80	0.198	( 0.220)	0.178	0.020
184	15.33	0.77	0.190	( 0.219)	0.171	0.019
185	15.42	0.77	0.190	( 0.218)	0.171	0.019
186	15.50	0.77	0.190	( 0.217)	0.171	0.019
187	15.58	0.63	0.157	( 0.216)	0.141	0.016
188	15.67	0.63	0.157	( 0.215)	0.141	0.016
189	15.75	0.63	0.157	( 0.214)	0.141	0.016

190	15.83	0.63	0.157	( 0.213)	0.141	0.016
191	15.92	0.63	0.157	( 0.211)	0.141	0.016
192	16.00	0.63	0.157	( 0.210)	0.141	0.016
193	16.08	0.13	0.033	( 0.209)	0.030	0.003
194	16.17	0.13	0.033	( 0.208)	0.030	0.003
195	16.25	0.13	0.033	( 0.207)	0.030	0.003
196	16.33	0.13	0.033	( 0.206)	0.030	0.003
197	16.42	0.13	0.033	( 0.205)	0.030	0.003
198	16.50	0.13	0.033	( 0.204)	0.030	0.003
199	16.58	0.10	0.025	( 0.203)	0.022	0.002
200	16.67	0.10	0.025	( 0.202)	0.022	0.002
201	16.75	0.10	0.025	( 0.201)	0.022	0.002
202	16.83	0.10	0.025	( 0.200)	0.022	0.002
203	16.92	0.10	0.025	( 0.199)	0.022	0.002
204	17.00	0.10	0.025	( 0.198)	0.022	0.002
205	17.08	0.17	0.041	( 0.197)	0.037	0.004
206	17.17	0.17	0.041	( 0.196)	0.037	0.004
207	17.25	0.17	0.041	( 0.195)	0.037	0.004
208	17.33	0.17	0.041	( 0.194)	0.037	0.004
209	17.42	0.17	0.041	( 0.193)	0.037	0.004
210	17.50	0.17	0.041	( 0.192)	0.037	0.004
211	17.58	0.17	0.041	( 0.191)	0.037	0.004
212	17.67	0.17	0.041	( 0.190)	0.037	0.004
213	17.75	0.17	0.041	( 0.189)	0.037	0.004
214	17.83	0.13	0.033	( 0.188)	0.030	0.003
215	17.92	0.13	0.033	( 0.187)	0.030	0.003
216	18.00	0.13	0.033	( 0.186)	0.030	0.003
217	18.08	0.13	0.033	( 0.185)	0.030	0.003
218	18.17	0.13	0.033	( 0.185)	0.030	0.003
219	18.25	0.13	0.033	( 0.184)	0.030	0.003
220	18.33	0.13	0.033	( 0.183)	0.030	0.003
221	18.42	0.13	0.033	( 0.182)	0.030	0.003
222	18.50	0.13	0.033	( 0.181)	0.030	0.003
223	18.58	0.10	0.025	( 0.180)	0.022	0.002
224	18.67	0.10	0.025	( 0.179)	0.022	0.002
225	18.75	0.10	0.025	( 0.178)	0.022	0.002
226	18.83	0.07	0.016	( 0.177)	0.015	0.002
227	18.92	0.07	0.016	( 0.177)	0.015	0.002
228	19.00	0.07	0.016	( 0.176)	0.015	0.002
229	19.08	0.10	0.025	( 0.175)	0.022	0.002
230	19.17	0.10	0.025	( 0.174)	0.022	0.002
231	19.25	0.10	0.025	( 0.173)	0.022	0.002
232	19.33	0.13	0.033	( 0.173)	0.030	0.003
233	19.42	0.13	0.033	( 0.172)	0.030	0.003
234	19.50	0.13	0.033	( 0.171)	0.030	0.003
235	19.58	0.10	0.025	( 0.170)	0.022	0.002
236	19.67	0.10	0.025	( 0.169)	0.022	0.002
237	19.75	0.10	0.025	( 0.169)	0.022	0.002
238	19.83	0.07	0.016	( 0.168)	0.015	0.002
239	19.92	0.07	0.016	( 0.167)	0.015	0.002

240	20.00	0.07	0.016	( 0.166)	0.015	0.002
241	20.08	0.10	0.025	( 0.166)	0.022	0.002
242	20.17	0.10	0.025	( 0.165)	0.022	0.002
243	20.25	0.10	0.025	( 0.164)	0.022	0.002
244	20.33	0.10	0.025	( 0.163)	0.022	0.002
245	20.42	0.10	0.025	( 0.163)	0.022	0.002
246	20.50	0.10	0.025	( 0.162)	0.022	0.002
247	20.58	0.10	0.025	( 0.161)	0.022	0.002
248	20.67	0.10	0.025	( 0.161)	0.022	0.002
249	20.75	0.10	0.025	( 0.160)	0.022	0.002
250	20.83	0.07	0.016	( 0.159)	0.015	0.002
251	20.92	0.07	0.016	( 0.159)	0.015	0.002
252	21.00	0.07	0.016	( 0.158)	0.015	0.002
253	21.08	0.10	0.025	( 0.157)	0.022	0.002
254	21.17	0.10	0.025	( 0.157)	0.022	0.002
255	21.25	0.10	0.025	( 0.156)	0.022	0.002
256	21.33	0.07	0.016	( 0.156)	0.015	0.002
257	21.42	0.07	0.016	( 0.155)	0.015	0.002
258	21.50	0.07	0.016	( 0.155)	0.015	0.002
259	21.58	0.10	0.025	( 0.154)	0.022	0.002
260	21.67	0.10	0.025	( 0.153)	0.022	0.002
261	21.75	0.10	0.025	( 0.153)	0.022	0.002
262	21.83	0.07	0.016	( 0.152)	0.015	0.002
263	21.92	0.07	0.016	( 0.152)	0.015	0.002
264	22.00	0.07	0.016	( 0.151)	0.015	0.002
265	22.08	0.10	0.025	( 0.151)	0.022	0.002
266	22.17	0.10	0.025	( 0.150)	0.022	0.002
267	22.25	0.10	0.025	( 0.150)	0.022	0.002
268	22.33	0.07	0.016	( 0.149)	0.015	0.002
269	22.42	0.07	0.016	( 0.149)	0.015	0.002
270	22.50	0.07	0.016	( 0.148)	0.015	0.002
271	22.58	0.07	0.016	( 0.148)	0.015	0.002
272	22.67	0.07	0.016	( 0.148)	0.015	0.002
273	22.75	0.07	0.016	( 0.147)	0.015	0.002
274	22.83	0.07	0.016	( 0.147)	0.015	0.002
275	22.92	0.07	0.016	( 0.146)	0.015	0.002
276	23.00	0.07	0.016	( 0.146)	0.015	0.002
277	23.08	0.07	0.016	( 0.146)	0.015	0.002
278	23.17	0.07	0.016	( 0.145)	0.015	0.002
279	23.25	0.07	0.016	( 0.145)	0.015	0.002
280	23.33	0.07	0.016	( 0.145)	0.015	0.002
281	23.42	0.07	0.016	( 0.145)	0.015	0.002
282	23.50	0.07	0.016	( 0.144)	0.015	0.002
283	23.58	0.07	0.016	( 0.144)	0.015	0.002
284	23.67	0.07	0.016	( 0.144)	0.015	0.002
285	23.75	0.07	0.016	( 0.144)	0.015	0.002
286	23.83	0.07	0.016	( 0.143)	0.015	0.002
287	23.92	0.07	0.016	( 0.143)	0.015	0.002
288	24.00	0.07	0.016	( 0.143)	0.015	0.002

(Loss Rate Not Used)

Sum = 100.0 Sum = 2.5  
Flood volume = Effective rainfall 0.21(In)  
times area 19.0(Ac.)/[(In)/(Ft.)] = 0.3(Ac.Ft)  
Total soil loss = 1.85(In)  
Total soil loss = 2.934(Ac.Ft)  
Total rainfall = 2.06(In)  
Flood volume = 14339.1 Cubic Feet  
Total soil loss = 127808.6 Cubic Feet

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Peak flow rate of this hydrograph = 0.622(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	0.0002	0.02	Q				
0+15	0.0003	0.03	Q				
0+20	0.0005	0.03	Q				
0+25	0.0008	0.04	Q				
0+30	0.0011	0.04	Q				
0+35	0.0014	0.04	Q				
0+40	0.0017	0.05	Q				
0+45	0.0020	0.05	Q				
0+50	0.0024	0.05	Q				
0+55	0.0028	0.06	Q				
1+ 0	0.0032	0.06	Q				
1+ 5	0.0036	0.06	Q				
1+10	0.0040	0.05	Q				
1+15	0.0043	0.05	Q				
1+20	0.0046	0.05	Q				
1+25	0.0050	0.05	Q				
1+30	0.0053	0.05	Q				
1+35	0.0056	0.05	Q				
1+40	0.0060	0.05	Q				
1+45	0.0063	0.05	Q				
1+50	0.0066	0.05	Q				
1+55	0.0070	0.06	Q				
2+ 0	0.0074	0.06	Q				
2+ 5	0.0079	0.06	Q				
2+10	0.0083	0.06	QV				
2+15	0.0087	0.06	QV				
2+20	0.0091	0.06	QV				
2+25	0.0096	0.06	QV				
2+30	0.0100	0.06	QV				

2+35	0.0105	0.07	QV
2+40	0.0110	0.07	QV
2+45	0.0115	0.08	QV
2+50	0.0120	0.08	QV
2+55	0.0125	0.08	QV
3+ 0	0.0131	0.08	QV
3+ 5	0.0136	0.08	QV
3+10	0.0142	0.08	QV
3+15	0.0147	0.08	QV
3+20	0.0153	0.08	QV
3+25	0.0158	0.08	QV
3+30	0.0163	0.08	QV
3+35	0.0169	0.08	Q V
3+40	0.0174	0.08	Q V
3+45	0.0180	0.08	Q V
3+50	0.0185	0.08	Q V
3+55	0.0191	0.09	Q V
4+ 0	0.0198	0.09	Q V
4+ 5	0.0204	0.09	Q V
4+10	0.0211	0.09	Q V
4+15	0.0217	0.09	Q V
4+20	0.0224	0.10	Q V
4+25	0.0231	0.10	Q V
4+30	0.0238	0.11	Q V
4+35	0.0246	0.11	Q V
4+40	0.0253	0.11	Q V
4+45	0.0261	0.11	Q V
4+50	0.0269	0.11	Q V
4+55	0.0277	0.12	Q V
5+ 0	0.0285	0.12	Q V
5+ 5	0.0294	0.12	Q V
5+10	0.0301	0.11	Q V
5+15	0.0308	0.10	Q V
5+20	0.0315	0.10	Q V
5+25	0.0322	0.11	Q V
5+30	0.0330	0.11	Q V
5+35	0.0337	0.11	Q V
5+40	0.0345	0.12	Q V
5+45	0.0354	0.12	Q V
5+50	0.0362	0.12	Q V
5+55	0.0371	0.12	Q V
6+ 0	0.0380	0.13	Q V
6+ 5	0.0389	0.13	Q V
6+10	0.0398	0.14	Q V
6+15	0.0407	0.14	Q V
6+20	0.0417	0.14	Q V
6+25	0.0427	0.14	Q V
6+30	0.0437	0.14	Q V
6+35	0.0446	0.14	Q V
6+40	0.0457	0.15	Q V

6+45	0.0468	0.15	Q	V				
6+50	0.0478	0.16	Q	V				
6+55	0.0489	0.16	Q	V				
7+ 0	0.0500	0.16	Q	V				
7+ 5	0.0511	0.16	Q	V				
7+10	0.0522	0.16	Q	V				
7+15	0.0532	0.16	Q	V				
7+20	0.0544	0.16	Q	V				
7+25	0.0555	0.17	Q	V				
7+30	0.0567	0.17	Q	V				
7+35	0.0579	0.17	Q	V				
7+40	0.0591	0.18	Q	V				
7+45	0.0604	0.19	Q	V				
7+50	0.0617	0.19	Q	V				
7+55	0.0631	0.20	Q	V				
8+ 0	0.0645	0.20	Q	V				
8+ 5	0.0659	0.21	Q	V				
8+10	0.0674	0.22	Q	V				
8+15	0.0690	0.23	Q	V				
8+20	0.0706	0.23	Q	V				
8+25	0.0722	0.23	Q	V				
8+30	0.0738	0.24	Q	V				
8+35	0.0755	0.24	Q	V				
8+40	0.0772	0.25	Q	V				
8+45	0.0789	0.25	Q	V				
8+50	0.0806	0.25	Q	V				
8+55	0.0824	0.26	Q	V				
9+ 0	0.0843	0.26	Q	V				
9+ 5	0.0861	0.27	Q	V				
9+10	0.0881	0.29	Q	V				
9+15	0.0901	0.29	Q	V				
9+20	0.0922	0.30	Q	V				
9+25	0.0943	0.31	Q	V				
9+30	0.0964	0.31	Q	V				
9+35	0.0986	0.32	Q	V				
9+40	0.1008	0.32	Q	V				
9+45	0.1031	0.33	Q	V				
9+50	0.1054	0.33	Q	V				
9+55	0.1077	0.34	Q	V				
10+ 0	0.1101	0.34	Q	V				
10+ 5	0.1123	0.33	Q	V				
10+10	0.1142	0.28	Q	V				
10+15	0.1160	0.26	Q	V				
10+20	0.1178	0.25	Q	V				
10+25	0.1194	0.25	Q	V				
10+30	0.1211	0.24	Q	V				
10+35	0.1228	0.25	Q	V				
10+40	0.1248	0.29	Q	V				
10+45	0.1269	0.30	Q	V				
10+50	0.1290	0.31	Q	V				



10+55	0.1311	0.31	Q	V			
11+ 0	0.1333	0.31	Q	V			
11+ 5	0.1354	0.31	Q	V			
11+10	0.1375	0.30	Q	V			
11+15	0.1396	0.30	Q	V			
11+20	0.1417	0.30	Q	V			
11+25	0.1438	0.30	Q	V			
11+30	0.1458	0.30	Q	V			
11+35	0.1479	0.30	Q	V			
11+40	0.1498	0.28	Q	V			
11+45	0.1517	0.28	Q	V			
11+50	0.1536	0.27	Q	V			
11+55	0.1555	0.28	Q	V			
12+ 0	0.1575	0.28	Q	V			
12+ 5	0.1595	0.30	Q	V			
12+10	0.1620	0.35	Q	V			
12+15	0.1645	0.37	Q	V			
12+20	0.1672	0.38	Q	V			
12+25	0.1699	0.40	Q	V			
12+30	0.1726	0.40	Q	V			
12+35	0.1755	0.41	Q	V			
12+40	0.1784	0.43	Q	V			
12+45	0.1814	0.43	Q	V			
12+50	0.1844	0.44	Q	V			
12+55	0.1875	0.45	Q	V			
13+ 0	0.1906	0.45	Q	V			
13+ 5	0.1939	0.47	Q	V			
13+10	0.1974	0.51	Q	V			
13+15	0.2012	0.55	Q	V			
13+20	0.2051	0.57	Q	V			
13+25	0.2092	0.60	Q	V			
13+30	0.2135	0.62	Q	V			
13+35	0.2176	0.60	Q	V			
13+40	0.2208	0.47	Q	V			
13+45	0.2237	0.42	Q	V			
13+50	0.2264	0.40	Q	V			
13+55	0.2291	0.38	Q	V			
14+ 0	0.2317	0.38	Q	V			
14+ 5	0.2343	0.38	Q	V			
14+10	0.2371	0.41	Q	V			
14+15	0.2400	0.42	Q	V			
14+20	0.2429	0.42	Q	V			
14+25	0.2457	0.41	Q	V			
14+30	0.2485	0.41	Q	V			
14+35	0.2513	0.41	Q	V			
14+40	0.2542	0.41	Q	V			
14+45	0.2570	0.41	Q	V			
14+50	0.2598	0.41	Q	V			
14+55	0.2626	0.40	Q	V			
15+ 0	0.2653	0.40	Q	V			

15+ 5	0.2680	0.39	Q			V	
15+10	0.2707	0.39	Q			V	
15+15	0.2733	0.38	Q			V	
15+20	0.2760	0.38	Q			V	
15+25	0.2785	0.37	Q			V	
15+30	0.2810	0.37	Q			V	
15+35	0.2835	0.36	Q			V	
15+40	0.2857	0.33	Q			V	
15+45	0.2879	0.31	Q			V	
15+50	0.2900	0.31	Q			V	
15+55	0.2921	0.31	Q			V	
16+ 0	0.2942	0.30	Q			V	
16+ 5	0.2961	0.27	Q			V	
16+10	0.2971	0.16	Q			V	
16+15	0.2979	0.11	Q			V	
16+20	0.2985	0.09	Q			V	
16+25	0.2991	0.08	Q			V	
16+30	0.2996	0.08	Q			V	
16+35	0.3001	0.07	Q			V	
16+40	0.3005	0.06	Q			V	
16+45	0.3008	0.05	Q			V	
16+50	0.3012	0.05	Q			V	
16+55	0.3015	0.05	Q			V	
17+ 0	0.3018	0.05	Q			V	
17+ 5	0.3022	0.05	Q			V	
17+10	0.3027	0.07	Q			V	
17+15	0.3032	0.07	Q			V	
17+20	0.3037	0.07	Q			V	
17+25	0.3042	0.08	Q			V	
17+30	0.3047	0.08	Q			V	
17+35	0.3053	0.08	Q			V	
17+40	0.3058	0.08	Q			V	
17+45	0.3064	0.08	Q			V	
17+50	0.3069	0.08	Q			V	
17+55	0.3074	0.07	Q			V	
18+ 0	0.3078	0.07	Q			V	
18+ 5	0.3083	0.07	Q			V	
18+10	0.3087	0.06	Q			V	
18+15	0.3092	0.06	Q			V	
18+20	0.3096	0.06	Q			V	
18+25	0.3100	0.06	Q			V	
18+30	0.3105	0.06	Q			V	
18+35	0.3109	0.06	Q			V	
18+40	0.3113	0.05	Q			V	
18+45	0.3116	0.05	Q			V	
18+50	0.3119	0.05	Q			V	
18+55	0.3122	0.04	Q			V	
19+ 0	0.3124	0.04	Q			V	
19+ 5	0.3127	0.04	Q			V	
19+10	0.3130	0.04	Q			V	

19+15	0.3133	0.05	Q				V
19+20	0.3136	0.05	Q				V
19+25	0.3140	0.06	Q				V
19+30	0.3144	0.06	Q				V
19+35	0.3148	0.06	Q				V
19+40	0.3152	0.05	Q				V
19+45	0.3155	0.05	Q				V
19+50	0.3159	0.05	Q				V
19+55	0.3161	0.04	Q				V
20+ 0	0.3164	0.04	Q				V
20+ 5	0.3166	0.04	Q				V
20+10	0.3169	0.04	Q				V
20+15	0.3172	0.05	Q				V
20+20	0.3175	0.05	Q				V
20+25	0.3179	0.05	Q				V
20+30	0.3182	0.05	Q				V
20+35	0.3185	0.05	Q				V
20+40	0.3188	0.05	Q				V
20+45	0.3191	0.05	Q				V
20+50	0.3195	0.05	Q				V
20+55	0.3197	0.04	Q				V
21+ 0	0.3200	0.03	Q				V
21+ 5	0.3202	0.04	Q				V
21+10	0.3205	0.04	Q				V
21+15	0.3208	0.04	Q				V
21+20	0.3211	0.04	Q				V
21+25	0.3214	0.04	Q				V
21+30	0.3216	0.03	Q				V
21+35	0.3218	0.04	Q				V
21+40	0.3221	0.04	Q				V
21+45	0.3224	0.04	Q				V
21+50	0.3227	0.04	Q				V
21+55	0.3230	0.04	Q				V
22+ 0	0.3232	0.03	Q				V
22+ 5	0.3235	0.04	Q				V
22+10	0.3238	0.04	Q				V
22+15	0.3241	0.04	Q				V
22+20	0.3244	0.04	Q				V
22+25	0.3246	0.04	Q				V
22+30	0.3249	0.03	Q				V
22+35	0.3251	0.03	Q				V
22+40	0.3253	0.03	Q				V
22+45	0.3255	0.03	Q				V
22+50	0.3258	0.03	Q				V
22+55	0.3260	0.03	Q				V
23+ 0	0.3262	0.03	Q				V
23+ 5	0.3264	0.03	Q				V
23+10	0.3266	0.03	Q				V
23+15	0.3268	0.03	Q				V
23+20	0.3271	0.03	Q				V

23+25	0.3273	0.03	Q				V
23+30	0.3275	0.03	Q				V
23+35	0.3277	0.03	Q				V
23+40	0.3279	0.03	Q				V
23+45	0.3281	0.03	Q				V
23+50	0.3284	0.03	Q				V
23+55	0.3286	0.03	Q				V
24+ 0	0.3288	0.03	Q				V
24+ 5	0.3290	0.03	Q				V
24+10	0.3291	0.01	Q				V
24+15	0.3291	0.01	Q				V
24+20	0.3291	0.00	Q				V
24+25	0.3292	0.00	Q				V
24+30	0.3292	0.00	Q				V
24+35	0.3292	0.00	Q				V
24+40	0.3292	0.00	Q				V
24+45	0.3292	0.00	Q				V

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**Appendix J.II**

**Synthetic Unit Hydrograph Method Analysis  
Pre-Development Conditions  
10-Year Storm**

U n i t   H y d r o g r a p h   A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0  
Study date 05/26/22 File: MapesPre10UH2410.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6443

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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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MAPES AND TRUMBLE INDUSTRIAL FACILITY  
UNIT HYDROGRAPH  
PRE-DEVELOPMENT CONDITIONS  
10-YEAR, 24HR STORM, DA A

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Drainage Area = 19.01(Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.01(Ac.) =  
0.030 Sq. Mi.  
Length along longest watercourse = 1256.56(Ft.)  
Length along longest watercourse measured to centroid = 586.75(Ft.)  
Length along longest watercourse = 0.238 Mi.  
Length along longest watercourse measured to centroid = 0.111 Mi.  
Difference in elevation = 6.42(Ft.)  
Slope along watercourse = 26.9765 Ft./Mi.  
Average Manning's 'N' = 0.030  
Lag time = 0.097 Hr.  
Lag time = 5.81 Min.  
25% of lag time = 1.45 Min.  
40% of lag time = 2.32 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]  
                   19.01                    2.06                    39.16

100 YEAR Area rainfall data:

Area(Ac.)[1]            Rainfall(In)[2]            Weighting[1\*2]  
                   19.01                    5.31                    100.94

STORM EVENT (YEAR) = 10.00  
 Area Averaged 2-Year Rainfall = 2.060(In)  
 Area Averaged 100-Year Rainfall = 5.310(In)

Point rain (area averaged) = 3.397(In)  
 Areal adjustment factor = 100.00 %  
 Adjusted average point rain = 3.397(In)

Sub-Area Data:

Area(Ac.)            Runoff Index    Impervious %  
                   19.010            89.00            0.000  
 Total Area Entered = 19.01(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
89.0	89.0	0.141	0.000	0.141	1.000	0.141
Sum (F) =						0.141

Area averaged mean soil loss (F) (In/Hr) = 0.141  
 Minimum soil loss rate ((In/Hr)) = 0.071  
 (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  
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Unit Hydrograph Data  
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Unit time period	Time % of lag	Distribution	Unit Hydrograph
(hrs)		Graph %	(CFS)
1	0.083	86.074	15.028
2	0.167	172.149	46.219
3	0.250	258.223	18.315
4	0.333	344.297	7.866
5	0.417	430.372	4.648
6	0.500	516.446	2.910
7	0.583	602.520	2.059
8	0.667	688.594	1.359

9	0.750	774.669	0.913	0.175
10	0.833	860.743	0.684	0.131
			Sum = 100.000	Sum= 19.159

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The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.07	0.027	( 0.251)	0.024	0.003
2	0.17	0.07	0.027	( 0.250)	0.024	0.003
3	0.25	0.07	0.027	( 0.249)	0.024	0.003
4	0.33	0.10	0.041	( 0.248)	0.037	0.004
5	0.42	0.10	0.041	( 0.247)	0.037	0.004
6	0.50	0.10	0.041	( 0.246)	0.037	0.004
7	0.58	0.10	0.041	( 0.245)	0.037	0.004
8	0.67	0.10	0.041	( 0.244)	0.037	0.004
9	0.75	0.10	0.041	( 0.243)	0.037	0.004
10	0.83	0.13	0.054	( 0.242)	0.049	0.005
11	0.92	0.13	0.054	( 0.241)	0.049	0.005
12	1.00	0.13	0.054	( 0.240)	0.049	0.005
13	1.08	0.10	0.041	( 0.239)	0.037	0.004
14	1.17	0.10	0.041	( 0.238)	0.037	0.004
15	1.25	0.10	0.041	( 0.237)	0.037	0.004
16	1.33	0.10	0.041	( 0.236)	0.037	0.004
17	1.42	0.10	0.041	( 0.235)	0.037	0.004
18	1.50	0.10	0.041	( 0.234)	0.037	0.004
19	1.58	0.10	0.041	( 0.234)	0.037	0.004
20	1.67	0.10	0.041	( 0.233)	0.037	0.004
21	1.75	0.10	0.041	( 0.232)	0.037	0.004
22	1.83	0.13	0.054	( 0.231)	0.049	0.005
23	1.92	0.13	0.054	( 0.230)	0.049	0.005
24	2.00	0.13	0.054	( 0.229)	0.049	0.005
25	2.08	0.13	0.054	( 0.228)	0.049	0.005
26	2.17	0.13	0.054	( 0.227)	0.049	0.005
27	2.25	0.13	0.054	( 0.226)	0.049	0.005
28	2.33	0.13	0.054	( 0.225)	0.049	0.005
29	2.42	0.13	0.054	( 0.224)	0.049	0.005
30	2.50	0.13	0.054	( 0.223)	0.049	0.005
31	2.58	0.17	0.068	( 0.222)	0.061	0.007
32	2.67	0.17	0.068	( 0.221)	0.061	0.007
33	2.75	0.17	0.068	( 0.221)	0.061	0.007
34	2.83	0.17	0.068	( 0.220)	0.061	0.007
35	2.92	0.17	0.068	( 0.219)	0.061	0.007
36	3.00	0.17	0.068	( 0.218)	0.061	0.007
37	3.08	0.17	0.068	( 0.217)	0.061	0.007
38	3.17	0.17	0.068	( 0.216)	0.061	0.007
39	3.25	0.17	0.068	( 0.215)	0.061	0.007



40	3.33	0.17	0.068	( 0.214)	0.061	0.007
41	3.42	0.17	0.068	( 0.213)	0.061	0.007
42	3.50	0.17	0.068	( 0.212)	0.061	0.007
43	3.58	0.17	0.068	( 0.212)	0.061	0.007
44	3.67	0.17	0.068	( 0.211)	0.061	0.007
45	3.75	0.17	0.068	( 0.210)	0.061	0.007
46	3.83	0.20	0.082	( 0.209)	0.073	0.008
47	3.92	0.20	0.082	( 0.208)	0.073	0.008
48	4.00	0.20	0.082	( 0.207)	0.073	0.008
49	4.08	0.20	0.082	( 0.206)	0.073	0.008
50	4.17	0.20	0.082	( 0.205)	0.073	0.008
51	4.25	0.20	0.082	( 0.205)	0.073	0.008
52	4.33	0.23	0.095	( 0.204)	0.086	0.010
53	4.42	0.23	0.095	( 0.203)	0.086	0.010
54	4.50	0.23	0.095	( 0.202)	0.086	0.010
55	4.58	0.23	0.095	( 0.201)	0.086	0.010
56	4.67	0.23	0.095	( 0.200)	0.086	0.010
57	4.75	0.23	0.095	( 0.199)	0.086	0.010
58	4.83	0.27	0.109	( 0.198)	0.098	0.011
59	4.92	0.27	0.109	( 0.198)	0.098	0.011
60	5.00	0.27	0.109	( 0.197)	0.098	0.011
61	5.08	0.20	0.082	( 0.196)	0.073	0.008
62	5.17	0.20	0.082	( 0.195)	0.073	0.008
63	5.25	0.20	0.082	( 0.194)	0.073	0.008
64	5.33	0.23	0.095	( 0.193)	0.086	0.010
65	5.42	0.23	0.095	( 0.193)	0.086	0.010
66	5.50	0.23	0.095	( 0.192)	0.086	0.010
67	5.58	0.27	0.109	( 0.191)	0.098	0.011
68	5.67	0.27	0.109	( 0.190)	0.098	0.011
69	5.75	0.27	0.109	( 0.189)	0.098	0.011
70	5.83	0.27	0.109	( 0.188)	0.098	0.011
71	5.92	0.27	0.109	( 0.187)	0.098	0.011
72	6.00	0.27	0.109	( 0.187)	0.098	0.011
73	6.08	0.30	0.122	( 0.186)	0.110	0.012
74	6.17	0.30	0.122	( 0.185)	0.110	0.012
75	6.25	0.30	0.122	( 0.184)	0.110	0.012
76	6.33	0.30	0.122	( 0.183)	0.110	0.012
77	6.42	0.30	0.122	( 0.183)	0.110	0.012
78	6.50	0.30	0.122	( 0.182)	0.110	0.012
79	6.58	0.33	0.136	( 0.181)	0.122	0.014
80	6.67	0.33	0.136	( 0.180)	0.122	0.014
81	6.75	0.33	0.136	( 0.179)	0.122	0.014
82	6.83	0.33	0.136	( 0.178)	0.122	0.014
83	6.92	0.33	0.136	( 0.178)	0.122	0.014
84	7.00	0.33	0.136	( 0.177)	0.122	0.014
85	7.08	0.33	0.136	( 0.176)	0.122	0.014
86	7.17	0.33	0.136	( 0.175)	0.122	0.014
87	7.25	0.33	0.136	( 0.174)	0.122	0.014
88	7.33	0.37	0.149	( 0.174)	0.135	0.015
89	7.42	0.37	0.149	( 0.173)	0.135	0.015

90	7.50	0.37	0.149	( 0.172)	0.135	0.015
91	7.58	0.40	0.163	( 0.171)	0.147	0.016
92	7.67	0.40	0.163	( 0.170)	0.147	0.016
93	7.75	0.40	0.163	( 0.170)	0.147	0.016
94	7.83	0.43	0.177	( 0.169)	0.159	0.018
95	7.92	0.43	0.177	( 0.168)	0.159	0.018
96	8.00	0.43	0.177	( 0.167)	0.159	0.018
97	8.08	0.50	0.204	0.167 ( 0.183)		0.037
98	8.17	0.50	0.204	0.166 ( 0.183)		0.038
99	8.25	0.50	0.204	0.165 ( 0.183)		0.039
100	8.33	0.50	0.204	0.164 ( 0.183)		0.040
101	8.42	0.50	0.204	0.163 ( 0.183)		0.040
102	8.50	0.50	0.204	0.163 ( 0.183)		0.041
103	8.58	0.53	0.217	0.162 ( 0.196)		0.055
104	8.67	0.53	0.217	0.161 ( 0.196)		0.056
105	8.75	0.53	0.217	0.160 ( 0.196)		0.057
106	8.83	0.57	0.231	0.160 ( 0.208)		0.071
107	8.92	0.57	0.231	0.159 ( 0.208)		0.072
108	9.00	0.57	0.231	0.158 ( 0.208)		0.073
109	9.08	0.63	0.258	0.157 ( 0.232)		0.101
110	9.17	0.63	0.258	0.157 ( 0.232)		0.102
111	9.25	0.63	0.258	0.156 ( 0.232)		0.102
112	9.33	0.67	0.272	0.155 ( 0.245)		0.117
113	9.42	0.67	0.272	0.154 ( 0.245)		0.117
114	9.50	0.67	0.272	0.154 ( 0.245)		0.118
115	9.58	0.70	0.285	0.153 ( 0.257)		0.132
116	9.67	0.70	0.285	0.152 ( 0.257)		0.133
117	9.75	0.70	0.285	0.151 ( 0.257)		0.134
118	9.83	0.73	0.299	0.151 ( 0.269)		0.148
119	9.92	0.73	0.299	0.150 ( 0.269)		0.149
120	10.00	0.73	0.299	0.149 ( 0.269)		0.150
121	10.08	0.50	0.204	0.149 ( 0.183)		0.055
122	10.17	0.50	0.204	0.148 ( 0.183)		0.056
123	10.25	0.50	0.204	0.147 ( 0.183)		0.057
124	10.33	0.50	0.204	0.146 ( 0.183)		0.057
125	10.42	0.50	0.204	0.146 ( 0.183)		0.058
126	10.50	0.50	0.204	0.145 ( 0.183)		0.059
127	10.58	0.67	0.272	0.144 ( 0.245)		0.127
128	10.67	0.67	0.272	0.144 ( 0.245)		0.128
129	10.75	0.67	0.272	0.143 ( 0.245)		0.129
130	10.83	0.67	0.272	0.142 ( 0.245)		0.130
131	10.92	0.67	0.272	0.142 ( 0.245)		0.130
132	11.00	0.67	0.272	0.141 ( 0.245)		0.131
133	11.08	0.63	0.258	0.140 ( 0.232)		0.118
134	11.17	0.63	0.258	0.139 ( 0.232)		0.119
135	11.25	0.63	0.258	0.139 ( 0.232)		0.119
136	11.33	0.63	0.258	0.138 ( 0.232)		0.120
137	11.42	0.63	0.258	0.137 ( 0.232)		0.121
138	11.50	0.63	0.258	0.137 ( 0.232)		0.121
139	11.58	0.57	0.231	0.136 ( 0.208)		0.095

140	11.67	0.57	0.231	0.135	( 0.208)	0.096
141	11.75	0.57	0.231	0.135	( 0.208)	0.096
142	11.83	0.60	0.245	0.134	( 0.220)	0.111
143	11.92	0.60	0.245	0.133	( 0.220)	0.111
144	12.00	0.60	0.245	0.133	( 0.220)	0.112
145	12.08	0.83	0.340	0.132	( 0.306)	0.208
146	12.17	0.83	0.340	0.131	( 0.306)	0.208
147	12.25	0.83	0.340	0.131	( 0.306)	0.209
148	12.33	0.87	0.353	0.130	( 0.318)	0.223
149	12.42	0.87	0.353	0.129	( 0.318)	0.224
150	12.50	0.87	0.353	0.129	( 0.318)	0.225
151	12.58	0.93	0.380	0.128	( 0.342)	0.252
152	12.67	0.93	0.380	0.127	( 0.342)	0.253
153	12.75	0.93	0.380	0.127	( 0.342)	0.254
154	12.83	0.97	0.394	0.126	( 0.355)	0.268
155	12.92	0.97	0.394	0.126	( 0.355)	0.269
156	13.00	0.97	0.394	0.125	( 0.355)	0.269
157	13.08	1.13	0.462	0.124	( 0.416)	0.338
158	13.17	1.13	0.462	0.124	( 0.416)	0.338
159	13.25	1.13	0.462	0.123	( 0.416)	0.339
160	13.33	1.13	0.462	0.122	( 0.416)	0.340
161	13.42	1.13	0.462	0.122	( 0.416)	0.340
162	13.50	1.13	0.462	0.121	( 0.416)	0.341
163	13.58	0.77	0.313	0.120	( 0.281)	0.192
164	13.67	0.77	0.313	0.120	( 0.281)	0.193
165	13.75	0.77	0.313	0.119	( 0.281)	0.193
166	13.83	0.77	0.313	0.119	( 0.281)	0.194
167	13.92	0.77	0.313	0.118	( 0.281)	0.194
168	14.00	0.77	0.313	0.117	( 0.281)	0.195
169	14.08	0.90	0.367	0.117	( 0.330)	0.250
170	14.17	0.90	0.367	0.116	( 0.330)	0.251
171	14.25	0.90	0.367	0.116	( 0.330)	0.251
172	14.33	0.87	0.353	0.115	( 0.318)	0.238
173	14.42	0.87	0.353	0.114	( 0.318)	0.239
174	14.50	0.87	0.353	0.114	( 0.318)	0.239
175	14.58	0.87	0.353	0.113	( 0.318)	0.240
176	14.67	0.87	0.353	0.113	( 0.318)	0.241
177	14.75	0.87	0.353	0.112	( 0.318)	0.241
178	14.83	0.83	0.340	0.112	( 0.306)	0.228
179	14.92	0.83	0.340	0.111	( 0.306)	0.229
180	15.00	0.83	0.340	0.110	( 0.306)	0.229
181	15.08	0.80	0.326	0.110	( 0.293)	0.216
182	15.17	0.80	0.326	0.109	( 0.293)	0.217
183	15.25	0.80	0.326	0.109	( 0.293)	0.217
184	15.33	0.77	0.313	0.108	( 0.281)	0.204
185	15.42	0.77	0.313	0.108	( 0.281)	0.205
186	15.50	0.77	0.313	0.107	( 0.281)	0.205
187	15.58	0.63	0.258	0.107	( 0.232)	0.152
188	15.67	0.63	0.258	0.106	( 0.232)	0.152
189	15.75	0.63	0.258	0.105	( 0.232)	0.153

190	15.83	0.63	0.258	0.105	( 0.232)	0.153
191	15.92	0.63	0.258	0.104	( 0.232)	0.154
192	16.00	0.63	0.258	0.104	( 0.232)	0.154
193	16.08	0.13	0.054	( 0.103)	0.049	0.005
194	16.17	0.13	0.054	( 0.103)	0.049	0.005
195	16.25	0.13	0.054	( 0.102)	0.049	0.005
196	16.33	0.13	0.054	( 0.102)	0.049	0.005
197	16.42	0.13	0.054	( 0.101)	0.049	0.005
198	16.50	0.13	0.054	( 0.101)	0.049	0.005
199	16.58	0.10	0.041	( 0.100)	0.037	0.004
200	16.67	0.10	0.041	( 0.100)	0.037	0.004
201	16.75	0.10	0.041	( 0.099)	0.037	0.004
202	16.83	0.10	0.041	( 0.099)	0.037	0.004
203	16.92	0.10	0.041	( 0.098)	0.037	0.004
204	17.00	0.10	0.041	( 0.098)	0.037	0.004
205	17.08	0.17	0.068	( 0.097)	0.061	0.007
206	17.17	0.17	0.068	( 0.097)	0.061	0.007
207	17.25	0.17	0.068	( 0.096)	0.061	0.007
208	17.33	0.17	0.068	( 0.096)	0.061	0.007
209	17.42	0.17	0.068	( 0.095)	0.061	0.007
210	17.50	0.17	0.068	( 0.095)	0.061	0.007
211	17.58	0.17	0.068	( 0.094)	0.061	0.007
212	17.67	0.17	0.068	( 0.094)	0.061	0.007
213	17.75	0.17	0.068	( 0.093)	0.061	0.007
214	17.83	0.13	0.054	( 0.093)	0.049	0.005
215	17.92	0.13	0.054	( 0.092)	0.049	0.005
216	18.00	0.13	0.054	( 0.092)	0.049	0.005
217	18.08	0.13	0.054	( 0.092)	0.049	0.005
218	18.17	0.13	0.054	( 0.091)	0.049	0.005
219	18.25	0.13	0.054	( 0.091)	0.049	0.005
220	18.33	0.13	0.054	( 0.090)	0.049	0.005
221	18.42	0.13	0.054	( 0.090)	0.049	0.005
222	18.50	0.13	0.054	( 0.089)	0.049	0.005
223	18.58	0.10	0.041	( 0.089)	0.037	0.004
224	18.67	0.10	0.041	( 0.088)	0.037	0.004
225	18.75	0.10	0.041	( 0.088)	0.037	0.004
226	18.83	0.07	0.027	( 0.088)	0.024	0.003
227	18.92	0.07	0.027	( 0.087)	0.024	0.003
228	19.00	0.07	0.027	( 0.087)	0.024	0.003
229	19.08	0.10	0.041	( 0.086)	0.037	0.004
230	19.17	0.10	0.041	( 0.086)	0.037	0.004
231	19.25	0.10	0.041	( 0.086)	0.037	0.004
232	19.33	0.13	0.054	( 0.085)	0.049	0.005
233	19.42	0.13	0.054	( 0.085)	0.049	0.005
234	19.50	0.13	0.054	( 0.084)	0.049	0.005
235	19.58	0.10	0.041	( 0.084)	0.037	0.004
236	19.67	0.10	0.041	( 0.084)	0.037	0.004
237	19.75	0.10	0.041	( 0.083)	0.037	0.004
238	19.83	0.07	0.027	( 0.083)	0.024	0.003
239	19.92	0.07	0.027	( 0.082)	0.024	0.003

240	20.00	0.07	0.027	( 0.082)	0.024	0.003
241	20.08	0.10	0.041	( 0.082)	0.037	0.004
242	20.17	0.10	0.041	( 0.081)	0.037	0.004
243	20.25	0.10	0.041	( 0.081)	0.037	0.004
244	20.33	0.10	0.041	( 0.081)	0.037	0.004
245	20.42	0.10	0.041	( 0.080)	0.037	0.004
246	20.50	0.10	0.041	( 0.080)	0.037	0.004
247	20.58	0.10	0.041	( 0.080)	0.037	0.004
248	20.67	0.10	0.041	( 0.079)	0.037	0.004
249	20.75	0.10	0.041	( 0.079)	0.037	0.004
250	20.83	0.07	0.027	( 0.079)	0.024	0.003
251	20.92	0.07	0.027	( 0.078)	0.024	0.003
252	21.00	0.07	0.027	( 0.078)	0.024	0.003
253	21.08	0.10	0.041	( 0.078)	0.037	0.004
254	21.17	0.10	0.041	( 0.077)	0.037	0.004
255	21.25	0.10	0.041	( 0.077)	0.037	0.004
256	21.33	0.07	0.027	( 0.077)	0.024	0.003
257	21.42	0.07	0.027	( 0.077)	0.024	0.003
258	21.50	0.07	0.027	( 0.076)	0.024	0.003
259	21.58	0.10	0.041	( 0.076)	0.037	0.004
260	21.67	0.10	0.041	( 0.076)	0.037	0.004
261	21.75	0.10	0.041	( 0.075)	0.037	0.004
262	21.83	0.07	0.027	( 0.075)	0.024	0.003
263	21.92	0.07	0.027	( 0.075)	0.024	0.003
264	22.00	0.07	0.027	( 0.075)	0.024	0.003
265	22.08	0.10	0.041	( 0.074)	0.037	0.004
266	22.17	0.10	0.041	( 0.074)	0.037	0.004
267	22.25	0.10	0.041	( 0.074)	0.037	0.004
268	22.33	0.07	0.027	( 0.074)	0.024	0.003
269	22.42	0.07	0.027	( 0.073)	0.024	0.003
270	22.50	0.07	0.027	( 0.073)	0.024	0.003
271	22.58	0.07	0.027	( 0.073)	0.024	0.003
272	22.67	0.07	0.027	( 0.073)	0.024	0.003
273	22.75	0.07	0.027	( 0.073)	0.024	0.003
274	22.83	0.07	0.027	( 0.072)	0.024	0.003
275	22.92	0.07	0.027	( 0.072)	0.024	0.003
276	23.00	0.07	0.027	( 0.072)	0.024	0.003
277	23.08	0.07	0.027	( 0.072)	0.024	0.003
278	23.17	0.07	0.027	( 0.072)	0.024	0.003
279	23.25	0.07	0.027	( 0.072)	0.024	0.003
280	23.33	0.07	0.027	( 0.071)	0.024	0.003
281	23.42	0.07	0.027	( 0.071)	0.024	0.003
282	23.50	0.07	0.027	( 0.071)	0.024	0.003
283	23.58	0.07	0.027	( 0.071)	0.024	0.003
284	23.67	0.07	0.027	( 0.071)	0.024	0.003
285	23.75	0.07	0.027	( 0.071)	0.024	0.003
286	23.83	0.07	0.027	( 0.071)	0.024	0.003
287	23.92	0.07	0.027	( 0.071)	0.024	0.003
288	24.00	0.07	0.027	( 0.071)	0.024	0.003

(Loss Rate Not Used)



2+35	0.0172	0.11	Q
2+40	0.0181	0.12	Q
2+45	0.0189	0.12	Q
2+50	0.0198	0.13	Q
2+55	0.0207	0.13	Q
3+ 0	0.0216	0.13	Q
3+ 5	0.0225	0.13	Q
3+10	0.0234	0.13	Q
3+15	0.0243	0.13	Q
3+20	0.0252	0.13	Q
3+25	0.0261	0.13	Q
3+30	0.0270	0.13	Q
3+35	0.0278	0.13	Q
3+40	0.0287	0.13	Q
3+45	0.0296	0.13	Q
3+50	0.0306	0.13	Q
3+55	0.0316	0.15	Q
4+ 0	0.0326	0.15	Q
4+ 5	0.0337	0.15	Q
4+10	0.0347	0.15	Q
4+15	0.0358	0.15	Q
4+20	0.0369	0.16	Q
4+25	0.0381	0.17	Q
4+30	0.0393	0.18	Q
4+35	0.0405	0.18	Q
4+40	0.0418	0.18	Q
4+45	0.0430	0.18	Q
4+50	0.0443	0.19	Q
4+55	0.0457	0.20	Q
5+ 0	0.0471	0.20	Q
5+ 5	0.0484	0.20	Q
5+10	0.0496	0.17	Q
5+15	0.0508	0.17	Q
5+20	0.0519	0.17	Q
5+25	0.0531	0.18	Q
5+30	0.0543	0.18	Q
5+35	0.0556	0.18	Q
5+40	0.0570	0.20	QV
5+45	0.0584	0.20	QV
5+50	0.0598	0.20	QV
5+55	0.0612	0.21	QV
6+ 0	0.0626	0.21	QV
6+ 5	0.0641	0.21	QV
6+10	0.0656	0.22	QV
6+15	0.0672	0.23	QV
6+20	0.0688	0.23	QV
6+25	0.0704	0.23	QV
6+30	0.0720	0.23	QV
6+35	0.0736	0.24	QV
6+40	0.0753	0.25	QV

6+45	0.0771	0.25	Q				
6+50	0.0789	0.26	Q				
6+55	0.0807	0.26	Q				
7+ 0	0.0824	0.26	Q				
7+ 5	0.0842	0.26	Q				
7+10	0.0860	0.26	Q				
7+15	0.0878	0.26	Q				
7+20	0.0896	0.26	Q				
7+25	0.0915	0.28	Q				
7+30	0.0935	0.28	Q				
7+35	0.0954	0.29	Q				
7+40	0.0975	0.30	Q				
7+45	0.0996	0.31	Q				
7+50	0.1018	0.31	Q				
7+55	0.1040	0.33	Q				
8+ 0	0.1063	0.33	Q				
8+ 5	0.1090	0.39	Q				
8+10	0.1129	0.57	Q				
8+15	0.1174	0.65	Q				
8+20	0.1221	0.69	Q				
8+25	0.1271	0.72	Q				
8+30	0.1322	0.74	Q				
8+35	0.1377	0.81	VQ				
8+40	0.1443	0.95	VQ				
8+45	0.1512	1.01	V Q				
8+50	0.1587	1.09	V Q				
8+55	0.1672	1.23	V Q				
9+ 0	0.1762	1.30	V Q				
9+ 5	0.1860	1.42	V Q				
9+10	0.1977	1.69	V Q				
9+15	0.2102	1.81	V Q				
9+20	0.2233	1.92	V Q				
9+25	0.2377	2.08	V Q				
9+30	0.2525	2.16	V Q				
9+35	0.2680	2.24	V Q				
9+40	0.2845	2.40	V Q				
9+45	0.3015	2.47	V Q				
9+50	0.3191	2.55	V Q				
9+55	0.3377	2.70	V Q				
10+ 0	0.3568	2.78	V Q				
10+ 5	0.3743	2.54	V Q				
10+10	0.3862	1.73	Q				
10+15	0.3960	1.42	Q V				
10+20	0.4049	1.30	Q V				
10+25	0.4134	1.23	Q V				
10+30	0.4216	1.19	Q V				
10+35	0.4310	1.37	Q V				
10+40	0.4445	1.96	Q				
10+45	0.4596	2.19	Q				
10+50	0.4754	2.30	VQ				



10+55	0.4917	2.37	VQ			
11+ 0	0.5084	2.42	Q			
11+ 5	0.5251	2.42	Q			
11+10	0.5412	2.33	Q			
11+15	0.5571	2.31	Q			
11+20	0.5730	2.31	QV			
11+25	0.5889	2.31	QV			
11+30	0.6049	2.32	QV			
11+35	0.6204	2.25	Q	V		
11+40	0.6343	2.02	Q	V		
11+45	0.6476	1.93	Q	V		
11+50	0.6610	1.94	Q	V		
11+55	0.6751	2.05	Q	V		
12+ 0	0.6895	2.10	Q	V		
12+ 5	0.7060	2.39	Q	V		
12+10	0.7284	3.25		Q		
12+15	0.7532	3.60		VQ		
12+20	0.7794	3.80		V	Q	
12+25	0.8071	4.02		V	Q	
12+30	0.8355	4.14		V	Q	
12+35	0.8651	4.29		V	Q	
12+40	0.8966	4.58		V	Q	
12+45	0.9290	4.71		V	Q	
12+50	0.9622	4.82		V	Q	
12+55	0.9965	4.98		V	Q	
13+ 0	1.0313	5.06		V	Q	
13+ 5	1.0678	5.30		V	Q	
13+10	1.1087	5.93		V	Q	
13+15	1.1513	6.19		V	Q	
13+20	1.1948	6.32		V	Q	
13+25	1.2389	6.39		V	Q	
13+30	1.2833	6.45		V	Q	
13+35	1.3250	6.06		VQ		
13+40	1.3578	4.76		Q	V	
13+45	1.3871	4.26		Q	V	
13+50	1.4150	4.06		Q	V	
13+55	1.4421	3.93		Q	V	
14+ 0	1.4687	3.86		Q	V	
14+ 5	1.4961	3.97		Q	V	
14+10	1.5266	4.43		Q	V	
14+15	1.5583	4.60		Q	V	
14+20	1.5902	4.64		Q	V	
14+25	1.6217	4.58		Q	V	
14+30	1.6532	4.57		Q	V	
14+35	1.6847	4.58		Q	V	
14+40	1.7164	4.60		Q	V	
14+45	1.7481	4.61		Q	V	
14+50	1.7797	4.58		Q	V	
14+55	1.8105	4.47		Q	V	V
15+ 0	1.8410	4.43		Q	V	V



19+15	2.2080	0.07	Q				V
19+20	2.2085	0.08	Q				V
19+25	2.2092	0.09	Q				V
19+30	2.2098	0.10	Q				V
19+35	2.2105	0.10	Q				V
19+40	2.2111	0.09	Q				V
19+45	2.2116	0.08	Q				V
19+50	2.2122	0.08	Q				V
19+55	2.2126	0.06	Q				V
20+ 0	2.2130	0.06	Q				V
20+ 5	2.2134	0.06	Q				V
20+10	2.2139	0.07	Q				V
20+15	2.2144	0.07	Q				V
20+20	2.2150	0.08	Q				V
20+25	2.2155	0.08	Q				V
20+30	2.2160	0.08	Q				V
20+35	2.2165	0.08	Q				V
20+40	2.2171	0.08	Q				V
20+45	2.2176	0.08	Q				V
20+50	2.2181	0.07	Q				V
20+55	2.2186	0.06	Q				V
21+ 0	2.2189	0.06	Q				V
21+ 5	2.2194	0.06	Q				V
21+10	2.2198	0.07	Q				V
21+15	2.2203	0.07	Q				V
21+20	2.2208	0.07	Q				V
21+25	2.2213	0.06	Q				V
21+30	2.2216	0.06	Q				V
21+35	2.2221	0.06	Q				V
21+40	2.2225	0.07	Q				V
21+45	2.2230	0.07	Q				V
21+50	2.2235	0.07	Q				V
21+55	2.2240	0.06	Q				V
22+ 0	2.2243	0.06	Q				V
22+ 5	2.2247	0.06	Q				V
22+10	2.2252	0.07	Q				V
22+15	2.2257	0.07	Q				V
22+20	2.2262	0.07	Q				V
22+25	2.2266	0.06	Q				V
22+30	2.2270	0.06	Q				V
22+35	2.2274	0.05	Q				V
22+40	2.2278	0.05	Q				V
22+45	2.2281	0.05	Q				V
22+50	2.2285	0.05	Q				V
22+55	2.2289	0.05	Q				V
23+ 0	2.2292	0.05	Q				V
23+ 5	2.2296	0.05	Q				V
23+10	2.2299	0.05	Q				V
23+15	2.2303	0.05	Q				V
23+20	2.2307	0.05	Q				V

23+25	2.2310	0.05	Q				V
23+30	2.2314	0.05	Q				V
23+35	2.2317	0.05	Q				V
23+40	2.2321	0.05	Q				V
23+45	2.2325	0.05	Q				V
23+50	2.2328	0.05	Q				V
23+55	2.2332	0.05	Q				V
24+ 0	2.2335	0.05	Q				V
24+ 5	2.2338	0.04	Q				V
24+10	2.2340	0.02	Q				V
24+15	2.2340	0.01	Q				V
24+20	2.2341	0.01	Q				V
24+25	2.2341	0.00	Q				V
24+30	2.2341	0.00	Q				V
24+35	2.2342	0.00	Q				V
24+40	2.2342	0.00	Q				V
24+45	2.2342	0.00	Q				V

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**Appendix J.II1**

**Synthetic Unit Hydrograph Method Analysis  
Pre-Development Conditions  
100-Year Storm**

Unit Hydrograph Analysis

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0  
Study date 05/26/22 File: MapesPre100UH24100.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6443

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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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MAPES AND TRUMBLE INDUSTRIAL FACILITY  
UNIT HYDROGRAPH  
PRE-DEVELOPMENT CONDITIONS  
100-YEAR, 24HR STORM, DA A

-----  
Drainage Area = 19.01(Ac.) = 0.030 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 19.01(Ac.) =  
0.030 Sq. Mi.  
Length along longest watercourse = 1256.56(Ft.)  
Length along longest watercourse measured to centroid = 586.75(Ft.)  
Length along longest watercourse = 0.238 Mi.  
Length along longest watercourse measured to centroid = 0.111 Mi.  
Difference in elevation = 6.42(Ft.)  
Slope along watercourse = 26.9765 Ft./Mi.  
Average Manning's 'N' = 0.030  
Lag time = 0.097 Hr.  
Lag time = 5.81 Min.  
25% of lag time = 1.45 Min.  
40% of lag time = 2.32 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]
19.01	2.06	39.16

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
19.01	5.31	100.94

STORM EVENT (YEAR) = 100.00  
 Area Averaged 2-Year Rainfall = 2.060(In)  
 Area Averaged 100-Year Rainfall = 5.310(In)

Point rain (area averaged) = 5.310(In)  
 Areal adjustment factor = 100.00 %  
 Adjusted average point rain = 5.310(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
19.010	89.00	0.000
Total Area Entered = 19.01(Ac.)		

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-3	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
89.0	95.6	0.057	0.000	0.057	1.000	0.057
Sum (F) =						0.057

Area averaged mean soil loss (F) (In/Hr) = 0.057  
 Minimum soil loss rate ((In/Hr)) = 0.029  
 (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	86.074	15.028
2	0.167	172.149	46.219
3	0.250	258.223	18.315
4	0.333	344.297	7.866
5	0.417	430.372	4.648
6	0.500	516.446	2.910
7	0.583	602.520	2.059
8	0.667	688.594	1.359

9	0.750	774.669	0.913	0.175
10	0.833	860.743	0.684	0.131
			Sum = 100.000	Sum= 19.159

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The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.07	0.042	( 0.101)	0.038	0.004
2	0.17	0.07	0.042	( 0.101)	0.038	0.004
3	0.25	0.07	0.042	( 0.101)	0.038	0.004
4	0.33	0.10	0.064	( 0.100)	0.057	0.006
5	0.42	0.10	0.064	( 0.100)	0.057	0.006
6	0.50	0.10	0.064	( 0.099)	0.057	0.006
7	0.58	0.10	0.064	( 0.099)	0.057	0.006
8	0.67	0.10	0.064	( 0.099)	0.057	0.006
9	0.75	0.10	0.064	( 0.098)	0.057	0.006
10	0.83	0.13	0.085	( 0.098)	0.076	0.008
11	0.92	0.13	0.085	( 0.098)	0.076	0.008
12	1.00	0.13	0.085	( 0.097)	0.076	0.008
13	1.08	0.10	0.064	( 0.097)	0.057	0.006
14	1.17	0.10	0.064	( 0.096)	0.057	0.006
15	1.25	0.10	0.064	( 0.096)	0.057	0.006
16	1.33	0.10	0.064	( 0.096)	0.057	0.006
17	1.42	0.10	0.064	( 0.095)	0.057	0.006
18	1.50	0.10	0.064	( 0.095)	0.057	0.006
19	1.58	0.10	0.064	( 0.094)	0.057	0.006
20	1.67	0.10	0.064	( 0.094)	0.057	0.006
21	1.75	0.10	0.064	( 0.094)	0.057	0.006
22	1.83	0.13	0.085	( 0.093)	0.076	0.008
23	1.92	0.13	0.085	( 0.093)	0.076	0.008
24	2.00	0.13	0.085	( 0.093)	0.076	0.008
25	2.08	0.13	0.085	( 0.092)	0.076	0.008
26	2.17	0.13	0.085	( 0.092)	0.076	0.008
27	2.25	0.13	0.085	( 0.091)	0.076	0.008
28	2.33	0.13	0.085	( 0.091)	0.076	0.008
29	2.42	0.13	0.085	( 0.091)	0.076	0.008
30	2.50	0.13	0.085	( 0.090)	0.076	0.008
31	2.58	0.17	0.106	0.090	( 0.096)	0.016
32	2.67	0.17	0.106	0.090	( 0.096)	0.017
33	2.75	0.17	0.106	0.089	( 0.096)	0.017
34	2.83	0.17	0.106	0.089	( 0.096)	0.017
35	2.92	0.17	0.106	0.088	( 0.096)	0.018
36	3.00	0.17	0.106	0.088	( 0.096)	0.018
37	3.08	0.17	0.106	0.088	( 0.096)	0.018
38	3.17	0.17	0.106	0.087	( 0.096)	0.019
39	3.25	0.17	0.106	0.087	( 0.096)	0.019



40	3.33	0.17	0.106	0.087	( 0.096)	0.020
41	3.42	0.17	0.106	0.086	( 0.096)	0.020
42	3.50	0.17	0.106	0.086	( 0.096)	0.020
43	3.58	0.17	0.106	0.086	( 0.096)	0.021
44	3.67	0.17	0.106	0.085	( 0.096)	0.021
45	3.75	0.17	0.106	0.085	( 0.096)	0.021
46	3.83	0.20	0.127	0.085	( 0.115)	0.043
47	3.92	0.20	0.127	0.084	( 0.115)	0.043
48	4.00	0.20	0.127	0.084	( 0.115)	0.044
49	4.08	0.20	0.127	0.083	( 0.115)	0.044
50	4.17	0.20	0.127	0.083	( 0.115)	0.044
51	4.25	0.20	0.127	0.083	( 0.115)	0.045
52	4.33	0.23	0.149	0.082	( 0.134)	0.066
53	4.42	0.23	0.149	0.082	( 0.134)	0.067
54	4.50	0.23	0.149	0.082	( 0.134)	0.067
55	4.58	0.23	0.149	0.081	( 0.134)	0.067
56	4.67	0.23	0.149	0.081	( 0.134)	0.068
57	4.75	0.23	0.149	0.081	( 0.134)	0.068
58	4.83	0.27	0.170	0.080	( 0.153)	0.090
59	4.92	0.27	0.170	0.080	( 0.153)	0.090
60	5.00	0.27	0.170	0.080	( 0.153)	0.090
61	5.08	0.20	0.127	0.079	( 0.115)	0.048
62	5.17	0.20	0.127	0.079	( 0.115)	0.049
63	5.25	0.20	0.127	0.079	( 0.115)	0.049
64	5.33	0.23	0.149	0.078	( 0.134)	0.070
65	5.42	0.23	0.149	0.078	( 0.134)	0.071
66	5.50	0.23	0.149	0.078	( 0.134)	0.071
67	5.58	0.27	0.170	0.077	( 0.153)	0.093
68	5.67	0.27	0.170	0.077	( 0.153)	0.093
69	5.75	0.27	0.170	0.077	( 0.153)	0.093
70	5.83	0.27	0.170	0.076	( 0.153)	0.094
71	5.92	0.27	0.170	0.076	( 0.153)	0.094
72	6.00	0.27	0.170	0.076	( 0.153)	0.094
73	6.08	0.30	0.191	0.075	( 0.172)	0.116
74	6.17	0.30	0.191	0.075	( 0.172)	0.116
75	6.25	0.30	0.191	0.074	( 0.172)	0.117
76	6.33	0.30	0.191	0.074	( 0.172)	0.117
77	6.42	0.30	0.191	0.074	( 0.172)	0.117
78	6.50	0.30	0.191	0.074	( 0.172)	0.118
79	6.58	0.33	0.212	0.073	( 0.191)	0.139
80	6.67	0.33	0.212	0.073	( 0.191)	0.140
81	6.75	0.33	0.212	0.073	( 0.191)	0.140
82	6.83	0.33	0.212	0.072	( 0.191)	0.140
83	6.92	0.33	0.212	0.072	( 0.191)	0.141
84	7.00	0.33	0.212	0.072	( 0.191)	0.141
85	7.08	0.33	0.212	0.071	( 0.191)	0.141
86	7.17	0.33	0.212	0.071	( 0.191)	0.142
87	7.25	0.33	0.212	0.071	( 0.191)	0.142
88	7.33	0.37	0.234	0.070	( 0.210)	0.163
89	7.42	0.37	0.234	0.070	( 0.210)	0.164

90	7.50	0.37	0.234	0.070	( 0.210)	0.164
91	7.58	0.40	0.255	0.069	( 0.229)	0.186
92	7.67	0.40	0.255	0.069	( 0.229)	0.186
93	7.75	0.40	0.255	0.069	( 0.229)	0.186
94	7.83	0.43	0.276	0.068	( 0.248)	0.208
95	7.92	0.43	0.276	0.068	( 0.248)	0.208
96	8.00	0.43	0.276	0.068	( 0.248)	0.208
97	8.08	0.50	0.319	0.067	( 0.287)	0.251
98	8.17	0.50	0.319	0.067	( 0.287)	0.252
99	8.25	0.50	0.319	0.067	( 0.287)	0.252
100	8.33	0.50	0.319	0.066	( 0.287)	0.252
101	8.42	0.50	0.319	0.066	( 0.287)	0.252
102	8.50	0.50	0.319	0.066	( 0.287)	0.253
103	8.58	0.53	0.340	0.066	( 0.306)	0.274
104	8.67	0.53	0.340	0.065	( 0.306)	0.275
105	8.75	0.53	0.340	0.065	( 0.306)	0.275
106	8.83	0.57	0.361	0.065	( 0.325)	0.296
107	8.92	0.57	0.361	0.064	( 0.325)	0.297
108	9.00	0.57	0.361	0.064	( 0.325)	0.297
109	9.08	0.63	0.404	0.064	( 0.363)	0.340
110	9.17	0.63	0.404	0.063	( 0.363)	0.340
111	9.25	0.63	0.404	0.063	( 0.363)	0.340
112	9.33	0.67	0.425	0.063	( 0.382)	0.362
113	9.42	0.67	0.425	0.062	( 0.382)	0.362
114	9.50	0.67	0.425	0.062	( 0.382)	0.363
115	9.58	0.70	0.446	0.062	( 0.401)	0.384
116	9.67	0.70	0.446	0.062	( 0.401)	0.384
117	9.75	0.70	0.446	0.061	( 0.401)	0.385
118	9.83	0.73	0.467	0.061	( 0.421)	0.406
119	9.92	0.73	0.467	0.061	( 0.421)	0.407
120	10.00	0.73	0.467	0.060	( 0.421)	0.407
121	10.08	0.50	0.319	0.060	( 0.287)	0.258
122	10.17	0.50	0.319	0.060	( 0.287)	0.259
123	10.25	0.50	0.319	0.060	( 0.287)	0.259
124	10.33	0.50	0.319	0.059	( 0.287)	0.259
125	10.42	0.50	0.319	0.059	( 0.287)	0.260
126	10.50	0.50	0.319	0.059	( 0.287)	0.260
127	10.58	0.67	0.425	0.058	( 0.382)	0.366
128	10.67	0.67	0.425	0.058	( 0.382)	0.367
129	10.75	0.67	0.425	0.058	( 0.382)	0.367
130	10.83	0.67	0.425	0.058	( 0.382)	0.367
131	10.92	0.67	0.425	0.057	( 0.382)	0.368
132	11.00	0.67	0.425	0.057	( 0.382)	0.368
133	11.08	0.63	0.404	0.057	( 0.363)	0.347
134	11.17	0.63	0.404	0.056	( 0.363)	0.347
135	11.25	0.63	0.404	0.056	( 0.363)	0.347
136	11.33	0.63	0.404	0.056	( 0.363)	0.348
137	11.42	0.63	0.404	0.056	( 0.363)	0.348
138	11.50	0.63	0.404	0.055	( 0.363)	0.348
139	11.58	0.57	0.361	0.055	( 0.325)	0.306

140	11.67	0.57	0.361	0.055	( 0.325)	0.306
141	11.75	0.57	0.361	0.054	( 0.325)	0.307
142	11.83	0.60	0.382	0.054	( 0.344)	0.328
143	11.92	0.60	0.382	0.054	( 0.344)	0.328
144	12.00	0.60	0.382	0.054	( 0.344)	0.329
145	12.08	0.83	0.531	0.053	( 0.478)	0.478
146	12.17	0.83	0.531	0.053	( 0.478)	0.478
147	12.25	0.83	0.531	0.053	( 0.478)	0.478
148	12.33	0.87	0.552	0.053	( 0.497)	0.500
149	12.42	0.87	0.552	0.052	( 0.497)	0.500
150	12.50	0.87	0.552	0.052	( 0.497)	0.500
151	12.58	0.93	0.595	0.052	( 0.535)	0.543
152	12.67	0.93	0.595	0.052	( 0.535)	0.543
153	12.75	0.93	0.595	0.051	( 0.535)	0.543
154	12.83	0.97	0.616	0.051	( 0.554)	0.565
155	12.92	0.97	0.616	0.051	( 0.554)	0.565
156	13.00	0.97	0.616	0.051	( 0.554)	0.565
157	13.08	1.13	0.722	0.050	( 0.650)	0.672
158	13.17	1.13	0.722	0.050	( 0.650)	0.672
159	13.25	1.13	0.722	0.050	( 0.650)	0.672
160	13.33	1.13	0.722	0.049	( 0.650)	0.673
161	13.42	1.13	0.722	0.049	( 0.650)	0.673
162	13.50	1.13	0.722	0.049	( 0.650)	0.673
163	13.58	0.77	0.489	0.049	( 0.440)	0.440
164	13.67	0.77	0.489	0.048	( 0.440)	0.440
165	13.75	0.77	0.489	0.048	( 0.440)	0.440
166	13.83	0.77	0.489	0.048	( 0.440)	0.440
167	13.92	0.77	0.489	0.048	( 0.440)	0.441
168	14.00	0.77	0.489	0.048	( 0.440)	0.441
169	14.08	0.90	0.573	0.047	( 0.516)	0.526
170	14.17	0.90	0.573	0.047	( 0.516)	0.526
171	14.25	0.90	0.573	0.047	( 0.516)	0.527
172	14.33	0.87	0.552	0.047	( 0.497)	0.506
173	14.42	0.87	0.552	0.046	( 0.497)	0.506
174	14.50	0.87	0.552	0.046	( 0.497)	0.506
175	14.58	0.87	0.552	0.046	( 0.497)	0.506
176	14.67	0.87	0.552	0.046	( 0.497)	0.507
177	14.75	0.87	0.552	0.045	( 0.497)	0.507
178	14.83	0.83	0.531	0.045	( 0.478)	0.486
179	14.92	0.83	0.531	0.045	( 0.478)	0.486
180	15.00	0.83	0.531	0.045	( 0.478)	0.486
181	15.08	0.80	0.510	0.044	( 0.459)	0.465
182	15.17	0.80	0.510	0.044	( 0.459)	0.466
183	15.25	0.80	0.510	0.044	( 0.459)	0.466
184	15.33	0.77	0.489	0.044	( 0.440)	0.445
185	15.42	0.77	0.489	0.044	( 0.440)	0.445
186	15.50	0.77	0.489	0.043	( 0.440)	0.445
187	15.58	0.63	0.404	0.043	( 0.363)	0.360
188	15.67	0.63	0.404	0.043	( 0.363)	0.361
189	15.75	0.63	0.404	0.043	( 0.363)	0.361

190	15.83	0.63	0.404	0.042	( 0.363)	0.361
191	15.92	0.63	0.404	0.042	( 0.363)	0.361
192	16.00	0.63	0.404	0.042	( 0.363)	0.362
193	16.08	0.13	0.085	0.042	( 0.076)	0.043
194	16.17	0.13	0.085	0.042	( 0.076)	0.043
195	16.25	0.13	0.085	0.041	( 0.076)	0.044
196	16.33	0.13	0.085	0.041	( 0.076)	0.044
197	16.42	0.13	0.085	0.041	( 0.076)	0.044
198	16.50	0.13	0.085	0.041	( 0.076)	0.044
199	16.58	0.10	0.064	0.041	( 0.057)	0.023
200	16.67	0.10	0.064	0.040	( 0.057)	0.023
201	16.75	0.10	0.064	0.040	( 0.057)	0.024
202	16.83	0.10	0.064	0.040	( 0.057)	0.024
203	16.92	0.10	0.064	0.040	( 0.057)	0.024
204	17.00	0.10	0.064	0.040	( 0.057)	0.024
205	17.08	0.17	0.106	0.039	( 0.096)	0.067
206	17.17	0.17	0.106	0.039	( 0.096)	0.067
207	17.25	0.17	0.106	0.039	( 0.096)	0.067
208	17.33	0.17	0.106	0.039	( 0.096)	0.067
209	17.42	0.17	0.106	0.039	( 0.096)	0.068
210	17.50	0.17	0.106	0.038	( 0.096)	0.068
211	17.58	0.17	0.106	0.038	( 0.096)	0.068
212	17.67	0.17	0.106	0.038	( 0.096)	0.068
213	17.75	0.17	0.106	0.038	( 0.096)	0.068
214	17.83	0.13	0.085	0.038	( 0.076)	0.047
215	17.92	0.13	0.085	0.037	( 0.076)	0.048
216	18.00	0.13	0.085	0.037	( 0.076)	0.048
217	18.08	0.13	0.085	0.037	( 0.076)	0.048
218	18.17	0.13	0.085	0.037	( 0.076)	0.048
219	18.25	0.13	0.085	0.037	( 0.076)	0.048
220	18.33	0.13	0.085	0.036	( 0.076)	0.048
221	18.42	0.13	0.085	0.036	( 0.076)	0.049
222	18.50	0.13	0.085	0.036	( 0.076)	0.049
223	18.58	0.10	0.064	0.036	( 0.057)	0.028
224	18.67	0.10	0.064	0.036	( 0.057)	0.028
225	18.75	0.10	0.064	0.036	( 0.057)	0.028
226	18.83	0.07	0.042	0.035	( 0.038)	0.007
227	18.92	0.07	0.042	0.035	( 0.038)	0.007
228	19.00	0.07	0.042	0.035	( 0.038)	0.007
229	19.08	0.10	0.064	0.035	( 0.057)	0.029
230	19.17	0.10	0.064	0.035	( 0.057)	0.029
231	19.25	0.10	0.064	0.035	( 0.057)	0.029
232	19.33	0.13	0.085	0.034	( 0.076)	0.051
233	19.42	0.13	0.085	0.034	( 0.076)	0.051
234	19.50	0.13	0.085	0.034	( 0.076)	0.051
235	19.58	0.10	0.064	0.034	( 0.057)	0.030
236	19.67	0.10	0.064	0.034	( 0.057)	0.030
237	19.75	0.10	0.064	0.034	( 0.057)	0.030
238	19.83	0.07	0.042	0.034	( 0.038)	0.009
239	19.92	0.07	0.042	0.033	( 0.038)	0.009

240	20.00	0.07	0.042	0.033	( 0.038)	0.009
241	20.08	0.10	0.064	0.033	( 0.057)	0.031
242	20.17	0.10	0.064	0.033	( 0.057)	0.031
243	20.25	0.10	0.064	0.033	( 0.057)	0.031
244	20.33	0.10	0.064	0.033	( 0.057)	0.031
245	20.42	0.10	0.064	0.032	( 0.057)	0.031
246	20.50	0.10	0.064	0.032	( 0.057)	0.031
247	20.58	0.10	0.064	0.032	( 0.057)	0.031
248	20.67	0.10	0.064	0.032	( 0.057)	0.032
249	20.75	0.10	0.064	0.032	( 0.057)	0.032
250	20.83	0.07	0.042	0.032	( 0.038)	0.011
251	20.92	0.07	0.042	0.032	( 0.038)	0.011
252	21.00	0.07	0.042	0.032	( 0.038)	0.011
253	21.08	0.10	0.064	0.031	( 0.057)	0.032
254	21.17	0.10	0.064	0.031	( 0.057)	0.032
255	21.25	0.10	0.064	0.031	( 0.057)	0.033
256	21.33	0.07	0.042	0.031	( 0.038)	0.011
257	21.42	0.07	0.042	0.031	( 0.038)	0.012
258	21.50	0.07	0.042	0.031	( 0.038)	0.012
259	21.58	0.10	0.064	0.031	( 0.057)	0.033
260	21.67	0.10	0.064	0.031	( 0.057)	0.033
261	21.75	0.10	0.064	0.031	( 0.057)	0.033
262	21.83	0.07	0.042	0.030	( 0.038)	0.012
263	21.92	0.07	0.042	0.030	( 0.038)	0.012
264	22.00	0.07	0.042	0.030	( 0.038)	0.012
265	22.08	0.10	0.064	0.030	( 0.057)	0.034
266	22.17	0.10	0.064	0.030	( 0.057)	0.034
267	22.25	0.10	0.064	0.030	( 0.057)	0.034
268	22.33	0.07	0.042	0.030	( 0.038)	0.013
269	22.42	0.07	0.042	0.030	( 0.038)	0.013
270	22.50	0.07	0.042	0.030	( 0.038)	0.013
271	22.58	0.07	0.042	0.030	( 0.038)	0.013
272	22.67	0.07	0.042	0.029	( 0.038)	0.013
273	22.75	0.07	0.042	0.029	( 0.038)	0.013
274	22.83	0.07	0.042	0.029	( 0.038)	0.013
275	22.92	0.07	0.042	0.029	( 0.038)	0.013
276	23.00	0.07	0.042	0.029	( 0.038)	0.013
277	23.08	0.07	0.042	0.029	( 0.038)	0.013
278	23.17	0.07	0.042	0.029	( 0.038)	0.013
279	23.25	0.07	0.042	0.029	( 0.038)	0.014
280	23.33	0.07	0.042	0.029	( 0.038)	0.014
281	23.42	0.07	0.042	0.029	( 0.038)	0.014
282	23.50	0.07	0.042	0.029	( 0.038)	0.014
283	23.58	0.07	0.042	0.029	( 0.038)	0.014
284	23.67	0.07	0.042	0.029	( 0.038)	0.014
285	23.75	0.07	0.042	0.029	( 0.038)	0.014
286	23.83	0.07	0.042	0.029	( 0.038)	0.014
287	23.92	0.07	0.042	0.029	( 0.038)	0.014
288	24.00	0.07	0.042	0.029	( 0.038)	0.014

(Loss Rate Not Used)

Sum = 100.0 Sum = 48.2  
 Flood volume = Effective rainfall 4.02(In)  
 times area 19.0(Ac.)/[ (In)/(Ft.) ] = 6.4(Ac.Ft)  
 Total soil loss = 1.29(In)  
 Total soil loss = 2.046(Ac.Ft)  
 Total rainfall = 5.31(In)  
 Flood volume = 277282.7 Cubic Feet  
 Total soil loss = 89127.1 Cubic Feet

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 Peak flow rate of this hydrograph = 12.790(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	5.0	10.0	15.0	20.0
0+ 5	0.0001	0.01	Q				
0+10	0.0004	0.05	Q				
0+15	0.0009	0.06	Q				
0+20	0.0014	0.08	Q				
0+25	0.0021	0.10	Q				
0+30	0.0029	0.11	Q				
0+35	0.0036	0.11	Q				
0+40	0.0044	0.12	Q				
0+45	0.0053	0.12	Q				
0+50	0.0061	0.13	Q				
0+55	0.0072	0.15	Q				
1+ 0	0.0082	0.15	Q				
1+ 5	0.0093	0.15	Q				
1+10	0.0102	0.13	Q				
1+15	0.0111	0.13	Q				
1+20	0.0119	0.13	Q				
1+25	0.0128	0.12	Q				
1+30	0.0137	0.12	Q				
1+35	0.0145	0.12	Q				
1+40	0.0154	0.12	Q				
1+45	0.0162	0.12	Q				
1+50	0.0171	0.13	Q				
1+55	0.0181	0.15	Q				
2+ 0	0.0192	0.15	Q				
2+ 5	0.0202	0.16	Q				
2+10	0.0213	0.16	Q				
2+15	0.0224	0.16	Q				
2+20	0.0236	0.16	Q				
2+25	0.0247	0.16	Q				
2+30	0.0258	0.16	Q				

2+35	0.0271	0.19	Q
2+40	0.0288	0.25	Q
2+45	0.0308	0.29	Q
2+50	0.0329	0.30	Q
2+55	0.0351	0.32	Q
3+ 0	0.0373	0.33	Q
3+ 5	0.0396	0.34	Q
3+10	0.0420	0.35	Q
3+15	0.0445	0.35	Q
3+20	0.0470	0.36	Q
3+25	0.0495	0.37	Q
3+30	0.0521	0.38	Q
3+35	0.0547	0.38	Q
3+40	0.0574	0.39	Q
3+45	0.0601	0.40	Q
3+50	0.0633	0.46	Q
3+55	0.0679	0.66	VQ
4+ 0	0.0730	0.74	VQ
4+ 5	0.0784	0.78	VQ
4+10	0.0839	0.81	VQ
4+15	0.0896	0.82	VQ
4+20	0.0958	0.90	VQ
4+25	0.1034	1.10	V Q
4+30	0.1115	1.19	V Q
4+35	0.1200	1.23	V Q
4+40	0.1286	1.25	V Q
4+45	0.1374	1.27	V Q
4+50	0.1467	1.35	V Q
4+55	0.1573	1.55	V Q
5+ 0	0.1686	1.63	V Q
5+ 5	0.1793	1.55	V Q
5+10	0.1876	1.20	VQ
5+15	0.1949	1.07	VQ
5+20	0.2024	1.08	VQ
5+25	0.2110	1.25	VQ
5+30	0.2200	1.31	VQ
5+35	0.2296	1.39	VQ
5+40	0.2406	1.60	V Q
5+45	0.2521	1.68	V Q
5+50	0.2640	1.72	V Q
5+55	0.2761	1.75	V Q
6+ 0	0.2883	1.78	V Q
6+ 5	0.3011	1.85	V Q
6+10	0.3152	2.05	V Q
6+15	0.3300	2.14	V Q
6+20	0.3450	2.18	V Q
6+25	0.3602	2.21	V Q
6+30	0.3755	2.22	V Q
6+35	0.3913	2.30	V Q
6+40	0.4085	2.50	V Q

6+45	0.4263	2.58	V Q				
6+50	0.4444	2.63	V Q				
6+55	0.4627	2.65	V Q				
7+ 0	0.4810	2.67	V Q				
7+ 5	0.4995	2.68	V Q				
7+10	0.5181	2.70	V Q				
7+15	0.5367	2.70	V Q				
7+20	0.5558	2.78	V Q				
7+25	0.5763	2.97	V Q				
7+30	0.5973	3.05	V Q				
7+35	0.6190	3.15	V Q				
7+40	0.6421	3.36	V Q				
7+45	0.6659	3.46	V Q				
7+50	0.6905	3.56	V Q				
7+55	0.7165	3.78	V Q				
8+ 0	0.7432	3.88	V Q				
8+ 5	0.7711	4.05	V Q				
8+10	0.8018	4.46	V Q				
8+15	0.8337	4.63	V Q				
8+20	0.8661	4.71	V Q				
8+25	0.8989	4.76	V Q				
8+30	0.9319	4.79	V Q				
8+35	0.9654	4.88	V Q				
8+40	1.0005	5.08	V Q				
8+45	1.0361	5.17	V Q				
8+50	1.0724	5.28	V Q				
8+55	1.1102	5.49	V Q				
9+ 0	1.1486	5.58	V Q				
9+ 5	1.1882	5.75	V Q				
9+10	1.2306	6.16	V Q				
9+15	1.2742	6.33	V Q				
9+20	1.3187	6.47	V Q				
9+25	1.3649	6.71	V Q				
9+30	1.4119	6.81	V Q				
9+35	1.4596	6.93	V Q				
9+40	1.5089	7.16	V Q				
9+45	1.5589	7.26	V Q				
9+50	1.6096	7.37	V Q				
9+55	1.6619	7.59	V Q				
10+ 0	1.7148	7.68	V Q				
10+ 5	1.7651	7.30	V Q				
10+10	1.8065	6.02	VQ				
10+15	1.8445	5.52	Q				
10+20	1.8810	5.31	QV				
10+25	1.9168	5.19	Q V				
10+30	1.9520	5.11	Q V				
10+35	1.9889	5.37	Q V				
10+40	2.0322	6.28	Q				
10+45	2.0778	6.63	Q				
10+50	2.1245	6.77	Q				



10+55	2.1718	6.87	Q		
11+ 0	2.2196	6.94	Q		
11+ 5	2.2673	6.93	QV		
11+10	2.3139	6.77	QV		
11+15	2.3602	6.72	QV		
11+20	2.4064	6.71	Q V		
11+25	2.4525	6.69	Q V		
11+30	2.4985	6.69	Q V		
11+35	2.5437	6.56	Q V		
11+40	2.5863	6.18	Q V		
11+45	2.6279	6.04	Q V		
11+50	2.6695	6.04	Q V		
11+55	2.7121	6.19	Q V		
12+ 0	2.7551	6.25	Q V		
12+ 5	2.8013	6.70	Q V		
12+10	2.8565	8.03	QV		
12+15	2.9155	8.56	QV		
12+20	2.9764	8.85	QV		
12+25	3.0397	9.18	QV		
12+30	3.1041	9.35	QV		
12+35	3.1700	9.57	Q		
12+40	3.2389	10.01	Q		
12+45	3.3092	10.20	Q		
12+50	3.3805	10.36	QV		
12+55	3.4535	10.60	Q		
13+ 0	3.5272	10.70	QV		
13+ 5	3.6034	11.07	Q		
13+10	3.6863	12.04	VQ		
13+15	3.7720	12.44	VQ		
13+20	3.8589	12.62	VQ		
13+25	3.9465	12.72	VQ		
13+30	4.0346	12.79	Q		
13+35	4.1184	12.17	QV		
13+40	4.1881	10.13	Q	V	
13+45	4.2524	9.33	Q	V	
13+50	4.3144	9.00	Q	V	
13+55	4.3750	8.80	Q	V	
14+ 0	4.4347	8.67	Q	V	
14+ 5	4.4955	8.83	Q	V	
14+10	4.5610	9.52	Q	V	
14+15	4.6284	9.79	Q	V	
14+20	4.6961	9.83	Q	V	
14+25	4.7630	9.72	Q	V	
14+30	4.8298	9.70	Q	V	
14+35	4.8966	9.70	Q	V	
14+40	4.9635	9.71	Q	V	
14+45	5.0304	9.72	Q	V	
14+50	5.0970	9.66	Q	V	
14+55	5.1622	9.47	Q	V	
15+ 0	5.2269	9.40	Q	V	

15+ 5	5.2911	9.31			Q	V
15+10	5.3538	9.11			Q	V
15+15	5.4159	9.02			Q	V
15+20	5.4774	8.93			Q	V
15+25	5.5374	8.72			Q	V
15+30	5.5969	8.63			Q	V
15+35	5.6544	8.35			Q	V
15+40	5.7066	7.58			Q	V
15+45	5.7566	7.27			Q	V
15+50	5.8057	7.13			Q	V
15+55	5.8543	7.05			Q	V
16+ 0	5.9026	7.01			Q	V
16+ 5	5.9443	6.06			Q	V
16+10	5.9664	3.22		Q		V
16+15	5.9808	2.09		Q		V
16+20	5.9918	1.60		Q		V
16+25	6.0009	1.32		Q		V
16+30	6.0088	1.15		Q		V
16+35	6.0155	0.96		Q		V
16+40	6.0203	0.70		Q		V
16+45	6.0242	0.57		Q		V
16+50	6.0276	0.50		Q		V
16+55	6.0310	0.49		Q		V
17+ 0	6.0343	0.48		Q		V
17+ 5	6.0384	0.60		Q		V
17+10	6.0450	0.97		Q		V
17+15	6.0528	1.12		Q		V
17+20	6.0609	1.18		Q		V
17+25	6.0694	1.23		Q		V
17+30	6.0780	1.25		Q		V
17+35	6.0868	1.27		Q		V
17+40	6.0956	1.29		Q		V
17+45	6.1046	1.30		Q		V
17+50	6.1132	1.25		Q		V
17+55	6.1205	1.06		Q		V
18+ 0	6.1273	0.99		Q		V
18+ 5	6.1340	0.96		Q		V
18+10	6.1405	0.95		Q		V
18+15	6.1470	0.94		Q		V
18+20	6.1534	0.94		Q		V
18+25	6.1599	0.93		Q		V
18+30	6.1663	0.93		Q		V
18+35	6.1723	0.87		Q		V
18+40	6.1770	0.69		Q		V
18+45	6.1813	0.62		Q		V
18+50	6.1849	0.53		Q		V
18+55	6.1871	0.32		Q		V
19+ 0	6.1888	0.24		Q		V
19+ 5	6.1906	0.26		Q		V
19+10	6.1935	0.43		Q		V

19+15	6.1969	0.49	Q				V
19+20	6.2009	0.58	Q				V
19+25	6.2063	0.78	Q				V
19+30	6.2123	0.87	Q				V
19+35	6.2181	0.85	Q				V
19+40	6.2228	0.69	Q				V
19+45	6.2272	0.63	Q				V
19+50	6.2310	0.55	Q				V
19+55	6.2334	0.35	Q				V
20+ 0	6.2353	0.27	Q				V
20+ 5	6.2374	0.30	Q				V
20+10	6.2406	0.47	Q				V
20+15	6.2442	0.53	Q				V
20+20	6.2480	0.55	Q				V
20+25	6.2519	0.57	Q				V
20+30	6.2559	0.58	Q				V
20+35	6.2600	0.59	Q				V
20+40	6.2641	0.60	Q				V
20+45	6.2682	0.60	Q				V
20+50	6.2720	0.55	Q				V
20+55	6.2744	0.36	Q				V
21+ 0	6.2764	0.29	Q				V
21+ 5	6.2786	0.32	Q				V
21+10	6.2820	0.49	Q				V
21+15	6.2858	0.56	Q				V
21+20	6.2894	0.52	Q				V
21+25	6.2918	0.35	Q				V
21+30	6.2938	0.28	Q				V
21+35	6.2960	0.32	Q				V
21+40	6.2994	0.50	Q				V
21+45	6.3033	0.57	Q				V
21+50	6.3070	0.53	Q				V
21+55	6.3095	0.36	Q				V
22+ 0	6.3116	0.30	Q				V
22+ 5	6.3139	0.33	Q				V
22+10	6.3174	0.51	Q				V
22+15	6.3214	0.58	Q				V
22+20	6.3251	0.55	Q				V
22+25	6.3277	0.37	Q				V
22+30	6.3298	0.31	Q				V
22+35	6.3318	0.28	Q				V
22+40	6.3337	0.27	Q				V
22+45	6.3355	0.27	Q				V
22+50	6.3373	0.26	Q				V
22+55	6.3391	0.26	Q				V
23+ 0	6.3408	0.26	Q				V
23+ 5	6.3426	0.25	Q				V
23+10	6.3443	0.26	Q				V
23+15	6.3461	0.26	Q				V
23+20	6.3479	0.26	Q				V

23+25	6.3497	0.26	Q				V
23+30	6.3515	0.26	Q				V
23+35	6.3533	0.26	Q				V
23+40	6.3551	0.26	Q				V
23+45	6.3569	0.26	Q				V
23+50	6.3587	0.26	Q				V
23+55	6.3605	0.26	Q				V
24+ 0	6.3623	0.27	Q				V
24+ 5	6.3639	0.23	Q				V
24+10	6.3646	0.10	Q				V
24+15	6.3650	0.05	Q				V
24+20	6.3652	0.03	Q				V
24+25	6.3653	0.02	Q				V
24+30	6.3654	0.01	Q				V
24+35	6.3655	0.01	Q				V
24+40	6.3655	0.00	Q				V
24+45	6.3655	0.00	Q				V

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**Appendix J.IV**

**Synthetic Unit Hydrograph Method Analysis  
Post-Development Conditions  
2-Year Storm**

Unit Hydrograph Analysis

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0  
Study date 05/27/22 File: MapesPost2AUH242.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6443

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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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MAPES AND TRUMBLE INDUSTRIAL FACILITY  
UNIT HYDROGRAPH  
POST-DEVELOPMENT CONDITIONS  
2-YEAR, 24HR STORM, DA A

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Drainage Area = 18.09(Ac.) = 0.028 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 18.09(Ac.) =  
0.028 Sq. Mi.  
Length along longest watercourse = 1290.86(Ft.)  
Length along longest watercourse measured to centroid = 632.74(Ft.)  
Length along longest watercourse = 0.244 Mi.  
Length along longest watercourse measured to centroid = 0.120 Mi.  
Difference in elevation = 12.93(Ft.)  
Slope along watercourse = 52.8875 Ft./Mi.  
Average Manning's 'N' = 0.015  
Lag time = 0.044 Hr.  
Lag time = 2.66 Min.  
25% of lag time = 0.66 Min.  
40% of lag time = 1.06 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]
18.09	2.06	37.27

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
18.09	5.31	96.06

STORM EVENT (YEAR) = 2.00  
 Area Averaged 2-Year Rainfall = 2.060(In)  
 Area Averaged 100-Year Rainfall = 5.310(In)

Point rain (area averaged) = 2.060(In)  
 Areal adjustment factor = 100.00 %  
 Adjusted average point rain = 2.060(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
18.090	75.00	0.830
Total Area Entered = 18.09(Ac.)		

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
75.0	57.0	0.501	0.830	0.127	1.000	0.127
Sum (F) =						0.127

Area averaged mean soil loss (F) (In/Hr) = 0.127  
 Minimum soil loss rate ((In/Hr)) = 0.063  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.238

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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	188.172	41.282
2	0.167	376.344	44.201
3	0.250	564.517	9.293
4	0.333	752.689	3.719
5	0.417	940.861	1.505
		Sum = 100.000	Sum= 18.231

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The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.07	0.016	( 0.225)	0.004	0.013
2	0.17	0.07	0.016	( 0.224)	0.004	0.013
3	0.25	0.07	0.016	( 0.223)	0.004	0.013
4	0.33	0.10	0.025	( 0.222)	0.006	0.019
5	0.42	0.10	0.025	( 0.221)	0.006	0.019
6	0.50	0.10	0.025	( 0.220)	0.006	0.019
7	0.58	0.10	0.025	( 0.219)	0.006	0.019
8	0.67	0.10	0.025	( 0.218)	0.006	0.019
9	0.75	0.10	0.025	( 0.218)	0.006	0.019
10	0.83	0.13	0.033	( 0.217)	0.008	0.025
11	0.92	0.13	0.033	( 0.216)	0.008	0.025
12	1.00	0.13	0.033	( 0.215)	0.008	0.025
13	1.08	0.10	0.025	( 0.214)	0.006	0.019
14	1.17	0.10	0.025	( 0.213)	0.006	0.019
15	1.25	0.10	0.025	( 0.213)	0.006	0.019
16	1.33	0.10	0.025	( 0.212)	0.006	0.019
17	1.42	0.10	0.025	( 0.211)	0.006	0.019
18	1.50	0.10	0.025	( 0.210)	0.006	0.019
19	1.58	0.10	0.025	( 0.209)	0.006	0.019
20	1.67	0.10	0.025	( 0.208)	0.006	0.019
21	1.75	0.10	0.025	( 0.207)	0.006	0.019
22	1.83	0.13	0.033	( 0.207)	0.008	0.025
23	1.92	0.13	0.033	( 0.206)	0.008	0.025
24	2.00	0.13	0.033	( 0.205)	0.008	0.025
25	2.08	0.13	0.033	( 0.204)	0.008	0.025
26	2.17	0.13	0.033	( 0.203)	0.008	0.025
27	2.25	0.13	0.033	( 0.202)	0.008	0.025
28	2.33	0.13	0.033	( 0.202)	0.008	0.025
29	2.42	0.13	0.033	( 0.201)	0.008	0.025
30	2.50	0.13	0.033	( 0.200)	0.008	0.025
31	2.58	0.17	0.041	( 0.199)	0.010	0.031
32	2.67	0.17	0.041	( 0.198)	0.010	0.031
33	2.75	0.17	0.041	( 0.198)	0.010	0.031
34	2.83	0.17	0.041	( 0.197)	0.010	0.031
35	2.92	0.17	0.041	( 0.196)	0.010	0.031
36	3.00	0.17	0.041	( 0.195)	0.010	0.031
37	3.08	0.17	0.041	( 0.194)	0.010	0.031
38	3.17	0.17	0.041	( 0.194)	0.010	0.031
39	3.25	0.17	0.041	( 0.193)	0.010	0.031
40	3.33	0.17	0.041	( 0.192)	0.010	0.031
41	3.42	0.17	0.041	( 0.191)	0.010	0.031
42	3.50	0.17	0.041	( 0.190)	0.010	0.031
43	3.58	0.17	0.041	( 0.190)	0.010	0.031
44	3.67	0.17	0.041	( 0.189)	0.010	0.031



45	3.75	0.17	0.041	( 0.188)	0.010	0.031
46	3.83	0.20	0.049	( 0.187)	0.012	0.038
47	3.92	0.20	0.049	( 0.186)	0.012	0.038
48	4.00	0.20	0.049	( 0.186)	0.012	0.038
49	4.08	0.20	0.049	( 0.185)	0.012	0.038
50	4.17	0.20	0.049	( 0.184)	0.012	0.038
51	4.25	0.20	0.049	( 0.183)	0.012	0.038
52	4.33	0.23	0.058	( 0.182)	0.014	0.044
53	4.42	0.23	0.058	( 0.182)	0.014	0.044
54	4.50	0.23	0.058	( 0.181)	0.014	0.044
55	4.58	0.23	0.058	( 0.180)	0.014	0.044
56	4.67	0.23	0.058	( 0.179)	0.014	0.044
57	4.75	0.23	0.058	( 0.179)	0.014	0.044
58	4.83	0.27	0.066	( 0.178)	0.016	0.050
59	4.92	0.27	0.066	( 0.177)	0.016	0.050
60	5.00	0.27	0.066	( 0.176)	0.016	0.050
61	5.08	0.20	0.049	( 0.175)	0.012	0.038
62	5.17	0.20	0.049	( 0.175)	0.012	0.038
63	5.25	0.20	0.049	( 0.174)	0.012	0.038
64	5.33	0.23	0.058	( 0.173)	0.014	0.044
65	5.42	0.23	0.058	( 0.172)	0.014	0.044
66	5.50	0.23	0.058	( 0.172)	0.014	0.044
67	5.58	0.27	0.066	( 0.171)	0.016	0.050
68	5.67	0.27	0.066	( 0.170)	0.016	0.050
69	5.75	0.27	0.066	( 0.169)	0.016	0.050
70	5.83	0.27	0.066	( 0.169)	0.016	0.050
71	5.92	0.27	0.066	( 0.168)	0.016	0.050
72	6.00	0.27	0.066	( 0.167)	0.016	0.050
73	6.08	0.30	0.074	( 0.166)	0.018	0.057
74	6.17	0.30	0.074	( 0.166)	0.018	0.057
75	6.25	0.30	0.074	( 0.165)	0.018	0.057
76	6.33	0.30	0.074	( 0.164)	0.018	0.057
77	6.42	0.30	0.074	( 0.163)	0.018	0.057
78	6.50	0.30	0.074	( 0.163)	0.018	0.057
79	6.58	0.33	0.082	( 0.162)	0.020	0.063
80	6.67	0.33	0.082	( 0.161)	0.020	0.063
81	6.75	0.33	0.082	( 0.161)	0.020	0.063
82	6.83	0.33	0.082	( 0.160)	0.020	0.063
83	6.92	0.33	0.082	( 0.159)	0.020	0.063
84	7.00	0.33	0.082	( 0.158)	0.020	0.063
85	7.08	0.33	0.082	( 0.158)	0.020	0.063
86	7.17	0.33	0.082	( 0.157)	0.020	0.063
87	7.25	0.33	0.082	( 0.156)	0.020	0.063
88	7.33	0.37	0.091	( 0.156)	0.022	0.069
89	7.42	0.37	0.091	( 0.155)	0.022	0.069
90	7.50	0.37	0.091	( 0.154)	0.022	0.069
91	7.58	0.40	0.099	( 0.153)	0.024	0.075
92	7.67	0.40	0.099	( 0.153)	0.024	0.075
93	7.75	0.40	0.099	( 0.152)	0.024	0.075
94	7.83	0.43	0.107	( 0.151)	0.025	0.082

95	7.92	0.43	0.107	( 0.151)	0.025	0.082
96	8.00	0.43	0.107	( 0.150)	0.025	0.082
97	8.08	0.50	0.124	( 0.149)	0.029	0.094
98	8.17	0.50	0.124	( 0.148)	0.029	0.094
99	8.25	0.50	0.124	( 0.148)	0.029	0.094
100	8.33	0.50	0.124	( 0.147)	0.029	0.094
101	8.42	0.50	0.124	( 0.146)	0.029	0.094
102	8.50	0.50	0.124	( 0.146)	0.029	0.094
103	8.58	0.53	0.132	( 0.145)	0.031	0.100
104	8.67	0.53	0.132	( 0.144)	0.031	0.100
105	8.75	0.53	0.132	( 0.144)	0.031	0.100
106	8.83	0.57	0.140	( 0.143)	0.033	0.107
107	8.92	0.57	0.140	( 0.142)	0.033	0.107
108	9.00	0.57	0.140	( 0.142)	0.033	0.107
109	9.08	0.63	0.157	( 0.141)	0.037	0.119
110	9.17	0.63	0.157	( 0.140)	0.037	0.119
111	9.25	0.63	0.157	( 0.140)	0.037	0.119
112	9.33	0.67	0.165	( 0.139)	0.039	0.126
113	9.42	0.67	0.165	( 0.138)	0.039	0.126
114	9.50	0.67	0.165	( 0.138)	0.039	0.126
115	9.58	0.70	0.173	( 0.137)	0.041	0.132
116	9.67	0.70	0.173	( 0.136)	0.041	0.132
117	9.75	0.70	0.173	( 0.136)	0.041	0.132
118	9.83	0.73	0.181	( 0.135)	0.043	0.138
119	9.92	0.73	0.181	( 0.134)	0.043	0.138
120	10.00	0.73	0.181	( 0.134)	0.043	0.138
121	10.08	0.50	0.124	( 0.133)	0.029	0.094
122	10.17	0.50	0.124	( 0.132)	0.029	0.094
123	10.25	0.50	0.124	( 0.132)	0.029	0.094
124	10.33	0.50	0.124	( 0.131)	0.029	0.094
125	10.42	0.50	0.124	( 0.131)	0.029	0.094
126	10.50	0.50	0.124	( 0.130)	0.029	0.094
127	10.58	0.67	0.165	( 0.129)	0.039	0.126
128	10.67	0.67	0.165	( 0.129)	0.039	0.126
129	10.75	0.67	0.165	( 0.128)	0.039	0.126
130	10.83	0.67	0.165	( 0.127)	0.039	0.126
131	10.92	0.67	0.165	( 0.127)	0.039	0.126
132	11.00	0.67	0.165	( 0.126)	0.039	0.126
133	11.08	0.63	0.157	( 0.126)	0.037	0.119
134	11.17	0.63	0.157	( 0.125)	0.037	0.119
135	11.25	0.63	0.157	( 0.124)	0.037	0.119
136	11.33	0.63	0.157	( 0.124)	0.037	0.119
137	11.42	0.63	0.157	( 0.123)	0.037	0.119
138	11.50	0.63	0.157	( 0.122)	0.037	0.119
139	11.58	0.57	0.140	( 0.122)	0.033	0.107
140	11.67	0.57	0.140	( 0.121)	0.033	0.107
141	11.75	0.57	0.140	( 0.121)	0.033	0.107
142	11.83	0.60	0.148	( 0.120)	0.035	0.113
143	11.92	0.60	0.148	( 0.119)	0.035	0.113
144	12.00	0.60	0.148	( 0.119)	0.035	0.113

145	12.08	0.83	0.206	( 0.118)	0.049	0.157
146	12.17	0.83	0.206	( 0.118)	0.049	0.157
147	12.25	0.83	0.206	( 0.117)	0.049	0.157
148	12.33	0.87	0.214	( 0.116)	0.051	0.163
149	12.42	0.87	0.214	( 0.116)	0.051	0.163
150	12.50	0.87	0.214	( 0.115)	0.051	0.163
151	12.58	0.93	0.231	( 0.115)	0.055	0.176
152	12.67	0.93	0.231	( 0.114)	0.055	0.176
153	12.75	0.93	0.231	( 0.114)	0.055	0.176
154	12.83	0.97	0.239	( 0.113)	0.057	0.182
155	12.92	0.97	0.239	( 0.112)	0.057	0.182
156	13.00	0.97	0.239	( 0.112)	0.057	0.182
157	13.08	1.13	0.280	( 0.111)	0.067	0.213
158	13.17	1.13	0.280	( 0.111)	0.067	0.213
159	13.25	1.13	0.280	( 0.110)	0.067	0.213
160	13.33	1.13	0.280	( 0.110)	0.067	0.213
161	13.42	1.13	0.280	( 0.109)	0.067	0.213
162	13.50	1.13	0.280	( 0.108)	0.067	0.213
163	13.58	0.77	0.190	( 0.108)	0.045	0.144
164	13.67	0.77	0.190	( 0.107)	0.045	0.144
165	13.75	0.77	0.190	( 0.107)	0.045	0.144
166	13.83	0.77	0.190	( 0.106)	0.045	0.144
167	13.92	0.77	0.190	( 0.106)	0.045	0.144
168	14.00	0.77	0.190	( 0.105)	0.045	0.144
169	14.08	0.90	0.222	( 0.105)	0.053	0.170
170	14.17	0.90	0.222	( 0.104)	0.053	0.170
171	14.25	0.90	0.222	( 0.104)	0.053	0.170
172	14.33	0.87	0.214	( 0.103)	0.051	0.163
173	14.42	0.87	0.214	( 0.103)	0.051	0.163
174	14.50	0.87	0.214	( 0.102)	0.051	0.163
175	14.58	0.87	0.214	( 0.101)	0.051	0.163
176	14.67	0.87	0.214	( 0.101)	0.051	0.163
177	14.75	0.87	0.214	( 0.100)	0.051	0.163
178	14.83	0.83	0.206	( 0.100)	0.049	0.157
179	14.92	0.83	0.206	( 0.099)	0.049	0.157
180	15.00	0.83	0.206	( 0.099)	0.049	0.157
181	15.08	0.80	0.198	( 0.098)	0.047	0.151
182	15.17	0.80	0.198	( 0.098)	0.047	0.151
183	15.25	0.80	0.198	( 0.097)	0.047	0.151
184	15.33	0.77	0.190	( 0.097)	0.045	0.144
185	15.42	0.77	0.190	( 0.096)	0.045	0.144
186	15.50	0.77	0.190	( 0.096)	0.045	0.144
187	15.58	0.63	0.157	( 0.095)	0.037	0.119
188	15.67	0.63	0.157	( 0.095)	0.037	0.119
189	15.75	0.63	0.157	( 0.094)	0.037	0.119
190	15.83	0.63	0.157	( 0.094)	0.037	0.119
191	15.92	0.63	0.157	( 0.093)	0.037	0.119
192	16.00	0.63	0.157	( 0.093)	0.037	0.119
193	16.08	0.13	0.033	( 0.093)	0.008	0.025
194	16.17	0.13	0.033	( 0.092)	0.008	0.025

195	16.25	0.13	0.033	( 0.092)	0.008	0.025
196	16.33	0.13	0.033	( 0.091)	0.008	0.025
197	16.42	0.13	0.033	( 0.091)	0.008	0.025
198	16.50	0.13	0.033	( 0.090)	0.008	0.025
199	16.58	0.10	0.025	( 0.090)	0.006	0.019
200	16.67	0.10	0.025	( 0.089)	0.006	0.019
201	16.75	0.10	0.025	( 0.089)	0.006	0.019
202	16.83	0.10	0.025	( 0.088)	0.006	0.019
203	16.92	0.10	0.025	( 0.088)	0.006	0.019
204	17.00	0.10	0.025	( 0.087)	0.006	0.019
205	17.08	0.17	0.041	( 0.087)	0.010	0.031
206	17.17	0.17	0.041	( 0.087)	0.010	0.031
207	17.25	0.17	0.041	( 0.086)	0.010	0.031
208	17.33	0.17	0.041	( 0.086)	0.010	0.031
209	17.42	0.17	0.041	( 0.085)	0.010	0.031
210	17.50	0.17	0.041	( 0.085)	0.010	0.031
211	17.58	0.17	0.041	( 0.084)	0.010	0.031
212	17.67	0.17	0.041	( 0.084)	0.010	0.031
213	17.75	0.17	0.041	( 0.084)	0.010	0.031
214	17.83	0.13	0.033	( 0.083)	0.008	0.025
215	17.92	0.13	0.033	( 0.083)	0.008	0.025
216	18.00	0.13	0.033	( 0.082)	0.008	0.025
217	18.08	0.13	0.033	( 0.082)	0.008	0.025
218	18.17	0.13	0.033	( 0.082)	0.008	0.025
219	18.25	0.13	0.033	( 0.081)	0.008	0.025
220	18.33	0.13	0.033	( 0.081)	0.008	0.025
221	18.42	0.13	0.033	( 0.080)	0.008	0.025
222	18.50	0.13	0.033	( 0.080)	0.008	0.025
223	18.58	0.10	0.025	( 0.080)	0.006	0.019
224	18.67	0.10	0.025	( 0.079)	0.006	0.019
225	18.75	0.10	0.025	( 0.079)	0.006	0.019
226	18.83	0.07	0.016	( 0.078)	0.004	0.013
227	18.92	0.07	0.016	( 0.078)	0.004	0.013
228	19.00	0.07	0.016	( 0.078)	0.004	0.013
229	19.08	0.10	0.025	( 0.077)	0.006	0.019
230	19.17	0.10	0.025	( 0.077)	0.006	0.019
231	19.25	0.10	0.025	( 0.077)	0.006	0.019
232	19.33	0.13	0.033	( 0.076)	0.008	0.025
233	19.42	0.13	0.033	( 0.076)	0.008	0.025
234	19.50	0.13	0.033	( 0.076)	0.008	0.025
235	19.58	0.10	0.025	( 0.075)	0.006	0.019
236	19.67	0.10	0.025	( 0.075)	0.006	0.019
237	19.75	0.10	0.025	( 0.075)	0.006	0.019
238	19.83	0.07	0.016	( 0.074)	0.004	0.013
239	19.92	0.07	0.016	( 0.074)	0.004	0.013
240	20.00	0.07	0.016	( 0.074)	0.004	0.013
241	20.08	0.10	0.025	( 0.073)	0.006	0.019
242	20.17	0.10	0.025	( 0.073)	0.006	0.019
243	20.25	0.10	0.025	( 0.073)	0.006	0.019
244	20.33	0.10	0.025	( 0.072)	0.006	0.019

245	20.42	0.10	0.025	( 0.072)	0.006	0.019
246	20.50	0.10	0.025	( 0.072)	0.006	0.019
247	20.58	0.10	0.025	( 0.071)	0.006	0.019
248	20.67	0.10	0.025	( 0.071)	0.006	0.019
249	20.75	0.10	0.025	( 0.071)	0.006	0.019
250	20.83	0.07	0.016	( 0.070)	0.004	0.013
251	20.92	0.07	0.016	( 0.070)	0.004	0.013
252	21.00	0.07	0.016	( 0.070)	0.004	0.013
253	21.08	0.10	0.025	( 0.070)	0.006	0.019
254	21.17	0.10	0.025	( 0.069)	0.006	0.019
255	21.25	0.10	0.025	( 0.069)	0.006	0.019
256	21.33	0.07	0.016	( 0.069)	0.004	0.013
257	21.42	0.07	0.016	( 0.069)	0.004	0.013
258	21.50	0.07	0.016	( 0.068)	0.004	0.013
259	21.58	0.10	0.025	( 0.068)	0.006	0.019
260	21.67	0.10	0.025	( 0.068)	0.006	0.019
261	21.75	0.10	0.025	( 0.068)	0.006	0.019
262	21.83	0.07	0.016	( 0.067)	0.004	0.013
263	21.92	0.07	0.016	( 0.067)	0.004	0.013
264	22.00	0.07	0.016	( 0.067)	0.004	0.013
265	22.08	0.10	0.025	( 0.067)	0.006	0.019
266	22.17	0.10	0.025	( 0.066)	0.006	0.019
267	22.25	0.10	0.025	( 0.066)	0.006	0.019
268	22.33	0.07	0.016	( 0.066)	0.004	0.013
269	22.42	0.07	0.016	( 0.066)	0.004	0.013
270	22.50	0.07	0.016	( 0.066)	0.004	0.013
271	22.58	0.07	0.016	( 0.065)	0.004	0.013
272	22.67	0.07	0.016	( 0.065)	0.004	0.013
273	22.75	0.07	0.016	( 0.065)	0.004	0.013
274	22.83	0.07	0.016	( 0.065)	0.004	0.013
275	22.92	0.07	0.016	( 0.065)	0.004	0.013
276	23.00	0.07	0.016	( 0.065)	0.004	0.013
277	23.08	0.07	0.016	( 0.064)	0.004	0.013
278	23.17	0.07	0.016	( 0.064)	0.004	0.013
279	23.25	0.07	0.016	( 0.064)	0.004	0.013
280	23.33	0.07	0.016	( 0.064)	0.004	0.013
281	23.42	0.07	0.016	( 0.064)	0.004	0.013
282	23.50	0.07	0.016	( 0.064)	0.004	0.013
283	23.58	0.07	0.016	( 0.064)	0.004	0.013
284	23.67	0.07	0.016	( 0.064)	0.004	0.013
285	23.75	0.07	0.016	( 0.063)	0.004	0.013
286	23.83	0.07	0.016	( 0.063)	0.004	0.013
287	23.92	0.07	0.016	( 0.063)	0.004	0.013
288	24.00	0.07	0.016	( 0.063)	0.004	0.013

(Loss Rate Not Used)

Sum = 100.0 Sum = 18.8

Flood volume = Effective rainfall 1.57(In)  
times area 18.1(Ac.)/[ (In)/(Ft.) ] = 2.4(Ac.Ft)

Total soil loss = 0.49(In)

Total soil loss = 0.739(Ac.Ft)

Total rainfall = 2.06(In)  
 Flood volume = 103074.7 Cubic Feet  
 Total soil loss = 32193.9 Cubic Feet

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 Peak flow rate of this hydrograph = 3.894(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	0.0007	0.09	Q				
0+10	0.0020	0.20	Q				
0+15	0.0035	0.22	Q				
0+20	0.0054	0.27	VQ				
0+25	0.0076	0.33	VQ				
0+30	0.0100	0.34	VQ				
0+35	0.0123	0.34	VQ				
0+40	0.0147	0.34	VQ				
0+45	0.0170	0.34	VQ				
0+50	0.0197	0.39	VQ				
0+55	0.0228	0.44	VQ				
1+ 0	0.0259	0.45	VQ				
1+ 5	0.0287	0.41	VQ				
1+10	0.0312	0.36	VQ				
1+15	0.0336	0.35	VQ				
1+20	0.0360	0.35	VQ				
1+25	0.0383	0.34	VQ				
1+30	0.0407	0.34	VQ				
1+35	0.0431	0.34	VQ				
1+40	0.0454	0.34	VQ				
1+45	0.0478	0.34	VQ				
1+50	0.0505	0.39	VQ				
1+55	0.0535	0.44	VQ				
2+ 0	0.0566	0.45	VQ				
2+ 5	0.0598	0.46	Q				
2+10	0.0629	0.46	Q				
2+15	0.0661	0.46	Q				
2+20	0.0693	0.46	Q				
2+25	0.0724	0.46	Q				
2+30	0.0756	0.46	Q				
2+35	0.0790	0.51	VQ				
2+40	0.0829	0.56	VQ				
2+45	0.0868	0.57	VQ				
2+50	0.0907	0.57	VQ				
2+55	0.0947	0.57	VQ				

3+ 0	0.0986	0.57	VQ				
3+ 5	0.1025	0.57	VQ				
3+10	0.1065	0.57	VQ				
3+15	0.1104	0.57	VQ				
3+20	0.1144	0.57	VQ				
3+25	0.1183	0.57	Q				
3+30	0.1223	0.57	Q				
3+35	0.1262	0.57	Q				
3+40	0.1301	0.57	Q				
3+45	0.1341	0.57	Q				
3+50	0.1384	0.62	Q				
3+55	0.1430	0.67	Q				
4+ 0	0.1477	0.68	Q				
4+ 5	0.1524	0.69	Q				
4+10	0.1571	0.69	Q				
4+15	0.1619	0.69	Q				
4+20	0.1669	0.73	Q				
4+25	0.1723	0.79	VQ				
4+30	0.1778	0.80	Q				
4+35	0.1833	0.80	Q				
4+40	0.1888	0.80	Q				
4+45	0.1944	0.80	Q				
4+50	0.2002	0.85	Q				
4+55	0.2064	0.90	Q				
5+ 0	0.2127	0.91	Q				
5+ 5	0.2183	0.82	Q				
5+10	0.2233	0.72	QV				
5+15	0.2281	0.70	QV				
5+20	0.2332	0.74	QV				
5+25	0.2386	0.79	QV				
5+30	0.2441	0.80	QV				
5+35	0.2499	0.85	QV				
5+40	0.2561	0.90	QV				
5+45	0.2624	0.91	QV				
5+50	0.2687	0.91	QV				
5+55	0.2750	0.92	QV				
6+ 0	0.2813	0.92	QV				
6+ 5	0.2879	0.96	QV				
6+10	0.2949	1.01	Q				
6+15	0.3020	1.02	QV				
6+20	0.3090	1.03	QV				
6+25	0.3161	1.03	QV				
6+30	0.3232	1.03	QV				
6+35	0.3307	1.08	QV				
6+40	0.3384	1.13	QV				
6+45	0.3463	1.14	QV				
6+50	0.3542	1.14	QV				
6+55	0.3620	1.15	Q V				
7+ 0	0.3699	1.15	Q V				
7+ 5	0.3778	1.15	Q V				

7+10	0.3857	1.15	Q V			
7+15	0.3936	1.15	Q V			
7+20	0.4018	1.19	Q V			
7+25	0.4104	1.24	Q V			
7+30	0.4190	1.25	Q V			
7+35	0.4280	1.31	Q V			
7+40	0.4373	1.36	Q V			
7+45	0.4468	1.37	Q V			
7+50	0.4565	1.42	Q V			
7+55	0.4667	1.47	Q V			
8+ 0	0.4769	1.48	Q V			
8+ 5	0.4878	1.58	Q V			
8+10	0.4994	1.68	Q V			
8+15	0.5111	1.71	Q V			
8+20	0.5229	1.71	Q V			
8+25	0.5348	1.72	Q V			
8+30	0.5466	1.72	Q V			
8+35	0.5588	1.77	Q V			
8+40	0.5713	1.82	Q V			
8+45	0.5839	1.83	Q V			
8+50	0.5968	1.88	Q V			
8+55	0.6101	1.93	Q V			
9+ 0	0.6234	1.94	Q V			
9+ 5	0.6375	2.04	Q V			
9+10	0.6523	2.14	Q V			
9+15	0.6672	2.16	Q V			
9+20	0.6824	2.22	Q V			
9+25	0.6981	2.27	Q V			
9+30	0.7138	2.28	Q V			
9+35	0.7299	2.34	Q V			
9+40	0.7464	2.39	Q V			
9+45	0.7629	2.40	Q V			
9+50	0.7798	2.45	Q V			
9+55	0.7970	2.50	Q V			
10+ 0	0.8143	2.51	Q V			
10+ 5	0.8294	2.19	Q V			
10+10	0.8420	1.83	Q V			
10+15	0.8541	1.76	Q V			
10+20	0.8661	1.73	Q V			
10+25	0.8779	1.72	Q V			
10+30	0.8897	1.72	Q V			
10+35	0.9032	1.95	Q V			
10+40	0.9184	2.21	Q V			
10+45	0.9340	2.26	Q V			
10+50	0.9497	2.28	Q V			
10+55	0.9654	2.29	Q V			
11+ 0	0.9812	2.29	Q V			
11+ 5	0.9967	2.24	Q V			
11+10	1.0118	2.19	Q V			
11+15	1.0268	2.18	Q V			



11+20	1.0418	2.18	Q	V		
11+25	1.0568	2.18	Q	V		
11+30	1.0718	2.18	Q	V		
11+35	1.0861	2.08	Q	V		
11+40	1.0997	1.98	Q	V		
11+45	1.1132	1.96	Q	V		
11+50	1.1270	2.00	Q	V		
11+55	1.1411	2.04	Q	V		
12+ 0	1.1552	2.06	Q	V		
12+ 5	1.1717	2.39	Q	V		
12+10	1.1906	2.75	Q	V		
12+15	1.2100	2.82	Q	V		
12+20	1.2300	2.90	Q	V		
12+25	1.2504	2.96	Q	V		
12+30	1.2709	2.97	Q	V		
12+35	1.2920	3.07	Q	V		
12+40	1.3139	3.17	Q	V		
12+45	1.3359	3.19	Q	V		
12+50	1.3583	3.25	Q	V		
12+55	1.3810	3.30	Q	V		
13+ 0	1.4038	3.32	Q	V		
13+ 5	1.4283	3.56	Q	V		
13+10	1.4546	3.81	Q	V		
13+15	1.4812	3.86	Q	V		
13+20	1.5080	3.89	Q	V		
13+25	1.5348	3.89	Q	V		
13+30	1.5616	3.89	Q	V		
13+35	1.5848	3.37	Q	V		
13+40	1.6042	2.82	Q	V		
13+45	1.6228	2.70	Q	V		
13+50	1.6411	2.65	Q	V		
13+55	1.6592	2.63	Q	V		
14+ 0	1.6774	2.63	Q	V		
14+ 5	1.6968	2.82	Q	V		
14+10	1.7177	3.03	Q	V		
14+15	1.7388	3.07	Q	V		
14+20	1.7597	3.04	Q	V		
14+25	1.7803	2.99	Q	V		
14+30	1.8009	2.98	Q	V		
14+35	1.8214	2.98	Q	V		
14+40	1.8419	2.98	Q	V		
14+45	1.8624	2.98	Q	V		
14+50	1.8826	2.93	Q	V		
14+55	1.9024	2.88	Q	V		
15+ 0	1.9222	2.87	Q	V		
15+ 5	1.9416	2.82	Q	V		
15+10	1.9606	2.77	Q	V		
15+15	1.9796	2.75	Q	V		
15+20	1.9982	2.70	Q	V		
15+25	2.0165	2.65	Q	V		

15+30	2.0347	2.64						V
15+35	2.0515	2.45						V
15+40	2.0670	2.24						V
15+45	2.0821	2.20						V
15+50	2.0972	2.18						V
15+55	2.1121	2.18						V
16+ 0	2.1271	2.18						V
16+ 5	2.1372	1.47						V
16+10	2.1421	0.71						V
16+15	2.1459	0.55						V
16+20	2.1492	0.48						V
16+25	2.1524	0.46						V
16+30	2.1555	0.46						V
16+35	2.1583	0.41						V
16+40	2.1608	0.36						V
16+45	2.1632	0.35						V
16+50	2.1656	0.35						V
16+55	2.1680	0.34						V
17+ 0	2.1703	0.34						V
17+ 5	2.1734	0.44						V
17+10	2.1771	0.54						V
17+15	2.1809	0.56						V
17+20	2.1849	0.57						V
17+25	2.1888	0.57						V
17+30	2.1927	0.57						V
17+35	2.1967	0.57						V
17+40	2.2006	0.57						V
17+45	2.2046	0.57						V
17+50	2.2082	0.53						V
17+55	2.2115	0.47						V
18+ 0	2.2147	0.46						V
18+ 5	2.2178	0.46						V
18+10	2.2210	0.46						V
18+15	2.2241	0.46						V
18+20	2.2273	0.46						V
18+25	2.2304	0.46						V
18+30	2.2336	0.46						V
18+35	2.2364	0.41						V
18+40	2.2389	0.36						V
18+45	2.2413	0.35						V
18+50	2.2434	0.30						V
18+55	2.2451	0.25						V
19+ 0	2.2467	0.24						V
19+ 5	2.2486	0.28						V
19+10	2.2508	0.33						V
19+15	2.2532	0.34						V
19+20	2.2559	0.39						V
19+25	2.2589	0.44						V
19+30	2.2620	0.45						V
19+35	2.2648	0.41						V

19+40	2.2673	0.36	Q				V
19+45	2.2697	0.35	Q				V
19+50	2.2718	0.30	Q				V
19+55	2.2735	0.25	Q				V
20+ 0	2.2751	0.24	Q				V
20+ 5	2.2770	0.28	Q				V
20+10	2.2792	0.33	Q				V
20+15	2.2816	0.34	Q				V
20+20	2.2839	0.34	Q				V
20+25	2.2863	0.34	Q				V
20+30	2.2887	0.34	Q				V
20+35	2.2910	0.34	Q				V
20+40	2.2934	0.34	Q				V
20+45	2.2958	0.34	Q				V
20+50	2.2978	0.30	Q				V
20+55	2.2995	0.25	Q				V
21+ 0	2.3011	0.24	Q				V
21+ 5	2.3030	0.28	Q				V
21+10	2.3053	0.33	Q				V
21+15	2.3076	0.34	Q				V
21+20	2.3096	0.29	Q				V
21+25	2.3113	0.25	Q				V
21+30	2.3129	0.24	Q				V
21+35	2.3149	0.28	Q				V
21+40	2.3171	0.33	Q				V
21+45	2.3194	0.34	Q				V
21+50	2.3215	0.29	Q				V
21+55	2.3232	0.25	Q				V
22+ 0	2.3248	0.24	Q				V
22+ 5	2.3267	0.28	Q				V
22+10	2.3289	0.33	Q				V
22+15	2.3313	0.34	Q				V
22+20	2.3333	0.29	Q				V
22+25	2.3350	0.25	Q				V
22+30	2.3366	0.24	Q				V
22+35	2.3382	0.23	Q				V
22+40	2.3398	0.23	Q				V
22+45	2.3413	0.23	Q				V
22+50	2.3429	0.23	Q				V
22+55	2.3445	0.23	Q				V
23+ 0	2.3461	0.23	Q				V
23+ 5	2.3477	0.23	Q				V
23+10	2.3492	0.23	Q				V
23+15	2.3508	0.23	Q				V
23+20	2.3524	0.23	Q				V
23+25	2.3540	0.23	Q				V
23+30	2.3555	0.23	Q				V
23+35	2.3571	0.23	Q				V
23+40	2.3587	0.23	Q				V
23+45	2.3603	0.23	Q				V

23+50	2.3619	0.23	Q				V
23+55	2.3634	0.23	Q				V
24+ 0	2.3650	0.23	Q				V
24+ 5	2.3659	0.13	Q				V
24+10	2.3662	0.03	Q				V
24+15	2.3662	0.01	Q				V
24+20	2.3663	0.00	Q				V

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U n i t   H y d r o g r a p h   A n a l y s i s

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Study date 05/27/22 File: MapesPost2BUH242.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6443

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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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MAPES AND TRUMBLE INDUSTRIAL FACILITY  
UNIT HYDROGRAPH  
POST-DEVELOPMENT CONDITIONS  
2-YEAR, 6HR STORM, DA B

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Drainage Area =       0.92(Ac.) =       0.001 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment =       0.92(Ac.) =  
0.001 Sq. Mi.  
Length along longest watercourse =       834.61(Ft.)  
Length along longest watercourse measured to centroid =       558.41(Ft.)  
Length along longest watercourse =       0.158 Mi.  
Length along longest watercourse measured to centroid =       0.106 Mi.  
Difference in elevation =       9.65(Ft.)  
Slope along watercourse =       61.0489 Ft./Mi.  
Average Manning's 'N' = 0.015  
Lag time =       0.035 Hr.  
Lag time =       2.09 Min.  
25% of lag time =       0.52 Min.  
40% of lag time =       0.84 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]  
                   0.92                                  2.06                                  1.90

100 YEAR Area rainfall data:

Area(Ac.)[1]                  Rainfall(In)[2]                  Weighting[1\*2]  
                   0.92                                  5.31                                  4.89

STORM EVENT (YEAR) =    2.00  
 Area Averaged 2-Year Rainfall =    2.060(In)  
 Area Averaged 100-Year Rainfall =    5.310(In)

Point rain (area averaged) =    2.060(In)  
 Areal adjustment factor = 100.00 %  
 Adjusted average point rain =    2.060(In)

Sub-Area Data:

Area(Ac.)                  Runoff Index                  Impervious %  
                   0.920                                  75.00                                  0.730  
 Total Area Entered =                  0.92(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
75.0	57.0	0.501	0.730	0.172	1.000	0.172
Sum (F) =						0.172

Area averaged mean soil loss (F) (In/Hr) = 0.172  
 Minimum soil loss rate ((In/Hr)) = 0.086  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.313

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	239.327	49.466	0.459
2	0.167	478.653	40.724	0.378
3	0.250	717.980	7.375	0.068
4	0.333	957.306	2.435	0.023
		Sum = 100.000	Sum=	0.927

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.07	0.016	( 0.304)	0.005	0.011
2	0.17	0.07	0.016	( 0.303)	0.005	0.011
3	0.25	0.07	0.016	( 0.302)	0.005	0.011
4	0.33	0.10	0.025	( 0.301)	0.008	0.017
5	0.42	0.10	0.025	( 0.300)	0.008	0.017
6	0.50	0.10	0.025	( 0.299)	0.008	0.017
7	0.58	0.10	0.025	( 0.297)	0.008	0.017
8	0.67	0.10	0.025	( 0.296)	0.008	0.017
9	0.75	0.10	0.025	( 0.295)	0.008	0.017
10	0.83	0.13	0.033	( 0.294)	0.010	0.023
11	0.92	0.13	0.033	( 0.293)	0.010	0.023
12	1.00	0.13	0.033	( 0.292)	0.010	0.023
13	1.08	0.10	0.025	( 0.290)	0.008	0.017
14	1.17	0.10	0.025	( 0.289)	0.008	0.017
15	1.25	0.10	0.025	( 0.288)	0.008	0.017
16	1.33	0.10	0.025	( 0.287)	0.008	0.017
17	1.42	0.10	0.025	( 0.286)	0.008	0.017
18	1.50	0.10	0.025	( 0.285)	0.008	0.017
19	1.58	0.10	0.025	( 0.284)	0.008	0.017
20	1.67	0.10	0.025	( 0.282)	0.008	0.017
21	1.75	0.10	0.025	( 0.281)	0.008	0.017
22	1.83	0.13	0.033	( 0.280)	0.010	0.023
23	1.92	0.13	0.033	( 0.279)	0.010	0.023
24	2.00	0.13	0.033	( 0.278)	0.010	0.023
25	2.08	0.13	0.033	( 0.277)	0.010	0.023
26	2.17	0.13	0.033	( 0.276)	0.010	0.023
27	2.25	0.13	0.033	( 0.275)	0.010	0.023
28	2.33	0.13	0.033	( 0.273)	0.010	0.023
29	2.42	0.13	0.033	( 0.272)	0.010	0.023
30	2.50	0.13	0.033	( 0.271)	0.010	0.023
31	2.58	0.17	0.041	( 0.270)	0.013	0.028
32	2.67	0.17	0.041	( 0.269)	0.013	0.028
33	2.75	0.17	0.041	( 0.268)	0.013	0.028
34	2.83	0.17	0.041	( 0.267)	0.013	0.028
35	2.92	0.17	0.041	( 0.266)	0.013	0.028
36	3.00	0.17	0.041	( 0.265)	0.013	0.028
37	3.08	0.17	0.041	( 0.263)	0.013	0.028
38	3.17	0.17	0.041	( 0.262)	0.013	0.028
39	3.25	0.17	0.041	( 0.261)	0.013	0.028
40	3.33	0.17	0.041	( 0.260)	0.013	0.028
41	3.42	0.17	0.041	( 0.259)	0.013	0.028
42	3.50	0.17	0.041	( 0.258)	0.013	0.028
43	3.58	0.17	0.041	( 0.257)	0.013	0.028
44	3.67	0.17	0.041	( 0.256)	0.013	0.028
45	3.75	0.17	0.041	( 0.255)	0.013	0.028

46	3.83	0.20	0.049	( 0.254)	0.015	0.034
47	3.92	0.20	0.049	( 0.253)	0.015	0.034
48	4.00	0.20	0.049	( 0.252)	0.015	0.034
49	4.08	0.20	0.049	( 0.250)	0.015	0.034
50	4.17	0.20	0.049	( 0.249)	0.015	0.034
51	4.25	0.20	0.049	( 0.248)	0.015	0.034
52	4.33	0.23	0.058	( 0.247)	0.018	0.040
53	4.42	0.23	0.058	( 0.246)	0.018	0.040
54	4.50	0.23	0.058	( 0.245)	0.018	0.040
55	4.58	0.23	0.058	( 0.244)	0.018	0.040
56	4.67	0.23	0.058	( 0.243)	0.018	0.040
57	4.75	0.23	0.058	( 0.242)	0.018	0.040
58	4.83	0.27	0.066	( 0.241)	0.021	0.045
59	4.92	0.27	0.066	( 0.240)	0.021	0.045
60	5.00	0.27	0.066	( 0.239)	0.021	0.045
61	5.08	0.20	0.049	( 0.238)	0.015	0.034
62	5.17	0.20	0.049	( 0.237)	0.015	0.034
63	5.25	0.20	0.049	( 0.236)	0.015	0.034
64	5.33	0.23	0.058	( 0.235)	0.018	0.040
65	5.42	0.23	0.058	( 0.234)	0.018	0.040
66	5.50	0.23	0.058	( 0.233)	0.018	0.040
67	5.58	0.27	0.066	( 0.232)	0.021	0.045
68	5.67	0.27	0.066	( 0.231)	0.021	0.045
69	5.75	0.27	0.066	( 0.230)	0.021	0.045
70	5.83	0.27	0.066	( 0.229)	0.021	0.045
71	5.92	0.27	0.066	( 0.228)	0.021	0.045
72	6.00	0.27	0.066	( 0.227)	0.021	0.045
73	6.08	0.30	0.074	( 0.226)	0.023	0.051
74	6.17	0.30	0.074	( 0.225)	0.023	0.051
75	6.25	0.30	0.074	( 0.224)	0.023	0.051
76	6.33	0.30	0.074	( 0.223)	0.023	0.051
77	6.42	0.30	0.074	( 0.222)	0.023	0.051
78	6.50	0.30	0.074	( 0.221)	0.023	0.051
79	6.58	0.33	0.082	( 0.220)	0.026	0.057
80	6.67	0.33	0.082	( 0.219)	0.026	0.057
81	6.75	0.33	0.082	( 0.218)	0.026	0.057
82	6.83	0.33	0.082	( 0.217)	0.026	0.057
83	6.92	0.33	0.082	( 0.216)	0.026	0.057
84	7.00	0.33	0.082	( 0.215)	0.026	0.057
85	7.08	0.33	0.082	( 0.214)	0.026	0.057
86	7.17	0.33	0.082	( 0.213)	0.026	0.057
87	7.25	0.33	0.082	( 0.212)	0.026	0.057
88	7.33	0.37	0.091	( 0.211)	0.028	0.062
89	7.42	0.37	0.091	( 0.210)	0.028	0.062
90	7.50	0.37	0.091	( 0.209)	0.028	0.062
91	7.58	0.40	0.099	( 0.208)	0.031	0.068
92	7.67	0.40	0.099	( 0.207)	0.031	0.068
93	7.75	0.40	0.099	( 0.206)	0.031	0.068
94	7.83	0.43	0.107	( 0.205)	0.034	0.074
95	7.92	0.43	0.107	( 0.204)	0.034	0.074



96	8.00	0.43	0.107	( 0.203)	0.034	0.074
97	8.08	0.50	0.124	( 0.202)	0.039	0.085
98	8.17	0.50	0.124	( 0.201)	0.039	0.085
99	8.25	0.50	0.124	( 0.200)	0.039	0.085
100	8.33	0.50	0.124	( 0.199)	0.039	0.085
101	8.42	0.50	0.124	( 0.199)	0.039	0.085
102	8.50	0.50	0.124	( 0.198)	0.039	0.085
103	8.58	0.53	0.132	( 0.197)	0.041	0.091
104	8.67	0.53	0.132	( 0.196)	0.041	0.091
105	8.75	0.53	0.132	( 0.195)	0.041	0.091
106	8.83	0.57	0.140	( 0.194)	0.044	0.096
107	8.92	0.57	0.140	( 0.193)	0.044	0.096
108	9.00	0.57	0.140	( 0.192)	0.044	0.096
109	9.08	0.63	0.157	( 0.191)	0.049	0.108
110	9.17	0.63	0.157	( 0.190)	0.049	0.108
111	9.25	0.63	0.157	( 0.189)	0.049	0.108
112	9.33	0.67	0.165	( 0.188)	0.052	0.113
113	9.42	0.67	0.165	( 0.188)	0.052	0.113
114	9.50	0.67	0.165	( 0.187)	0.052	0.113
115	9.58	0.70	0.173	( 0.186)	0.054	0.119
116	9.67	0.70	0.173	( 0.185)	0.054	0.119
117	9.75	0.70	0.173	( 0.184)	0.054	0.119
118	9.83	0.73	0.181	( 0.183)	0.057	0.125
119	9.92	0.73	0.181	( 0.182)	0.057	0.125
120	10.00	0.73	0.181	( 0.181)	0.057	0.125
121	10.08	0.50	0.124	( 0.180)	0.039	0.085
122	10.17	0.50	0.124	( 0.180)	0.039	0.085
123	10.25	0.50	0.124	( 0.179)	0.039	0.085
124	10.33	0.50	0.124	( 0.178)	0.039	0.085
125	10.42	0.50	0.124	( 0.177)	0.039	0.085
126	10.50	0.50	0.124	( 0.176)	0.039	0.085
127	10.58	0.67	0.165	( 0.175)	0.052	0.113
128	10.67	0.67	0.165	( 0.174)	0.052	0.113
129	10.75	0.67	0.165	( 0.174)	0.052	0.113
130	10.83	0.67	0.165	( 0.173)	0.052	0.113
131	10.92	0.67	0.165	( 0.172)	0.052	0.113
132	11.00	0.67	0.165	( 0.171)	0.052	0.113
133	11.08	0.63	0.157	( 0.170)	0.049	0.108
134	11.17	0.63	0.157	( 0.169)	0.049	0.108
135	11.25	0.63	0.157	( 0.168)	0.049	0.108
136	11.33	0.63	0.157	( 0.168)	0.049	0.108
137	11.42	0.63	0.157	( 0.167)	0.049	0.108
138	11.50	0.63	0.157	( 0.166)	0.049	0.108
139	11.58	0.57	0.140	( 0.165)	0.044	0.096
140	11.67	0.57	0.140	( 0.164)	0.044	0.096
141	11.75	0.57	0.140	( 0.164)	0.044	0.096
142	11.83	0.60	0.148	( 0.163)	0.046	0.102
143	11.92	0.60	0.148	( 0.162)	0.046	0.102
144	12.00	0.60	0.148	( 0.161)	0.046	0.102
145	12.08	0.83	0.206	( 0.160)	0.064	0.142

146	12.17	0.83	0.206	( 0.159)	0.064	0.142
147	12.25	0.83	0.206	( 0.159)	0.064	0.142
148	12.33	0.87	0.214	( 0.158)	0.067	0.147
149	12.42	0.87	0.214	( 0.157)	0.067	0.147
150	12.50	0.87	0.214	( 0.156)	0.067	0.147
151	12.58	0.93	0.231	( 0.156)	0.072	0.159
152	12.67	0.93	0.231	( 0.155)	0.072	0.159
153	12.75	0.93	0.231	( 0.154)	0.072	0.159
154	12.83	0.97	0.239	( 0.153)	0.075	0.164
155	12.92	0.97	0.239	( 0.152)	0.075	0.164
156	13.00	0.97	0.239	( 0.152)	0.075	0.164
157	13.08	1.13	0.280	( 0.151)	0.088	0.192
158	13.17	1.13	0.280	( 0.150)	0.088	0.192
159	13.25	1.13	0.280	( 0.149)	0.088	0.192
160	13.33	1.13	0.280	( 0.149)	0.088	0.192
161	13.42	1.13	0.280	( 0.148)	0.088	0.192
162	13.50	1.13	0.280	( 0.147)	0.088	0.192
163	13.58	0.77	0.190	( 0.146)	0.059	0.130
164	13.67	0.77	0.190	( 0.146)	0.059	0.130
165	13.75	0.77	0.190	( 0.145)	0.059	0.130
166	13.83	0.77	0.190	( 0.144)	0.059	0.130
167	13.92	0.77	0.190	( 0.143)	0.059	0.130
168	14.00	0.77	0.190	( 0.143)	0.059	0.130
169	14.08	0.90	0.222	( 0.142)	0.070	0.153
170	14.17	0.90	0.222	( 0.141)	0.070	0.153
171	14.25	0.90	0.222	( 0.140)	0.070	0.153
172	14.33	0.87	0.214	( 0.140)	0.067	0.147
173	14.42	0.87	0.214	( 0.139)	0.067	0.147
174	14.50	0.87	0.214	( 0.138)	0.067	0.147
175	14.58	0.87	0.214	( 0.138)	0.067	0.147
176	14.67	0.87	0.214	( 0.137)	0.067	0.147
177	14.75	0.87	0.214	( 0.136)	0.067	0.147
178	14.83	0.83	0.206	( 0.135)	0.064	0.142
179	14.92	0.83	0.206	( 0.135)	0.064	0.142
180	15.00	0.83	0.206	( 0.134)	0.064	0.142
181	15.08	0.80	0.198	( 0.133)	0.062	0.136
182	15.17	0.80	0.198	( 0.133)	0.062	0.136
183	15.25	0.80	0.198	( 0.132)	0.062	0.136
184	15.33	0.77	0.190	( 0.131)	0.059	0.130
185	15.42	0.77	0.190	( 0.131)	0.059	0.130
186	15.50	0.77	0.190	( 0.130)	0.059	0.130
187	15.58	0.63	0.157	( 0.129)	0.049	0.108
188	15.67	0.63	0.157	( 0.129)	0.049	0.108
189	15.75	0.63	0.157	( 0.128)	0.049	0.108
190	15.83	0.63	0.157	( 0.127)	0.049	0.108
191	15.92	0.63	0.157	( 0.127)	0.049	0.108
192	16.00	0.63	0.157	( 0.126)	0.049	0.108
193	16.08	0.13	0.033	( 0.125)	0.010	0.023
194	16.17	0.13	0.033	( 0.125)	0.010	0.023
195	16.25	0.13	0.033	( 0.124)	0.010	0.023

196	16.33	0.13	0.033	( 0.124)	0.010	0.023
197	16.42	0.13	0.033	( 0.123)	0.010	0.023
198	16.50	0.13	0.033	( 0.122)	0.010	0.023
199	16.58	0.10	0.025	( 0.122)	0.008	0.017
200	16.67	0.10	0.025	( 0.121)	0.008	0.017
201	16.75	0.10	0.025	( 0.120)	0.008	0.017
202	16.83	0.10	0.025	( 0.120)	0.008	0.017
203	16.92	0.10	0.025	( 0.119)	0.008	0.017
204	17.00	0.10	0.025	( 0.119)	0.008	0.017
205	17.08	0.17	0.041	( 0.118)	0.013	0.028
206	17.17	0.17	0.041	( 0.117)	0.013	0.028
207	17.25	0.17	0.041	( 0.117)	0.013	0.028
208	17.33	0.17	0.041	( 0.116)	0.013	0.028
209	17.42	0.17	0.041	( 0.116)	0.013	0.028
210	17.50	0.17	0.041	( 0.115)	0.013	0.028
211	17.58	0.17	0.041	( 0.114)	0.013	0.028
212	17.67	0.17	0.041	( 0.114)	0.013	0.028
213	17.75	0.17	0.041	( 0.113)	0.013	0.028
214	17.83	0.13	0.033	( 0.113)	0.010	0.023
215	17.92	0.13	0.033	( 0.112)	0.010	0.023
216	18.00	0.13	0.033	( 0.112)	0.010	0.023
217	18.08	0.13	0.033	( 0.111)	0.010	0.023
218	18.17	0.13	0.033	( 0.111)	0.010	0.023
219	18.25	0.13	0.033	( 0.110)	0.010	0.023
220	18.33	0.13	0.033	( 0.110)	0.010	0.023
221	18.42	0.13	0.033	( 0.109)	0.010	0.023
222	18.50	0.13	0.033	( 0.108)	0.010	0.023
223	18.58	0.10	0.025	( 0.108)	0.008	0.017
224	18.67	0.10	0.025	( 0.107)	0.008	0.017
225	18.75	0.10	0.025	( 0.107)	0.008	0.017
226	18.83	0.07	0.016	( 0.106)	0.005	0.011
227	18.92	0.07	0.016	( 0.106)	0.005	0.011
228	19.00	0.07	0.016	( 0.105)	0.005	0.011
229	19.08	0.10	0.025	( 0.105)	0.008	0.017
230	19.17	0.10	0.025	( 0.104)	0.008	0.017
231	19.25	0.10	0.025	( 0.104)	0.008	0.017
232	19.33	0.13	0.033	( 0.103)	0.010	0.023
233	19.42	0.13	0.033	( 0.103)	0.010	0.023
234	19.50	0.13	0.033	( 0.102)	0.010	0.023
235	19.58	0.10	0.025	( 0.102)	0.008	0.017
236	19.67	0.10	0.025	( 0.102)	0.008	0.017
237	19.75	0.10	0.025	( 0.101)	0.008	0.017
238	19.83	0.07	0.016	( 0.101)	0.005	0.011
239	19.92	0.07	0.016	( 0.100)	0.005	0.011
240	20.00	0.07	0.016	( 0.100)	0.005	0.011
241	20.08	0.10	0.025	( 0.099)	0.008	0.017
242	20.17	0.10	0.025	( 0.099)	0.008	0.017
243	20.25	0.10	0.025	( 0.098)	0.008	0.017
244	20.33	0.10	0.025	( 0.098)	0.008	0.017
245	20.42	0.10	0.025	( 0.098)	0.008	0.017

246	20.50	0.10	0.025	( 0.097)	0.008	0.017
247	20.58	0.10	0.025	( 0.097)	0.008	0.017
248	20.67	0.10	0.025	( 0.096)	0.008	0.017
249	20.75	0.10	0.025	( 0.096)	0.008	0.017
250	20.83	0.07	0.016	( 0.096)	0.005	0.011
251	20.92	0.07	0.016	( 0.095)	0.005	0.011
252	21.00	0.07	0.016	( 0.095)	0.005	0.011
253	21.08	0.10	0.025	( 0.094)	0.008	0.017
254	21.17	0.10	0.025	( 0.094)	0.008	0.017
255	21.25	0.10	0.025	( 0.094)	0.008	0.017
256	21.33	0.07	0.016	( 0.093)	0.005	0.011
257	21.42	0.07	0.016	( 0.093)	0.005	0.011
258	21.50	0.07	0.016	( 0.093)	0.005	0.011
259	21.58	0.10	0.025	( 0.092)	0.008	0.017
260	21.67	0.10	0.025	( 0.092)	0.008	0.017
261	21.75	0.10	0.025	( 0.092)	0.008	0.017
262	21.83	0.07	0.016	( 0.091)	0.005	0.011
263	21.92	0.07	0.016	( 0.091)	0.005	0.011
264	22.00	0.07	0.016	( 0.091)	0.005	0.011
265	22.08	0.10	0.025	( 0.090)	0.008	0.017
266	22.17	0.10	0.025	( 0.090)	0.008	0.017
267	22.25	0.10	0.025	( 0.090)	0.008	0.017
268	22.33	0.07	0.016	( 0.089)	0.005	0.011
269	22.42	0.07	0.016	( 0.089)	0.005	0.011
270	22.50	0.07	0.016	( 0.089)	0.005	0.011
271	22.58	0.07	0.016	( 0.089)	0.005	0.011
272	22.67	0.07	0.016	( 0.088)	0.005	0.011
273	22.75	0.07	0.016	( 0.088)	0.005	0.011
274	22.83	0.07	0.016	( 0.088)	0.005	0.011
275	22.92	0.07	0.016	( 0.088)	0.005	0.011
276	23.00	0.07	0.016	( 0.088)	0.005	0.011
277	23.08	0.07	0.016	( 0.087)	0.005	0.011
278	23.17	0.07	0.016	( 0.087)	0.005	0.011
279	23.25	0.07	0.016	( 0.087)	0.005	0.011
280	23.33	0.07	0.016	( 0.087)	0.005	0.011
281	23.42	0.07	0.016	( 0.087)	0.005	0.011
282	23.50	0.07	0.016	( 0.086)	0.005	0.011
283	23.58	0.07	0.016	( 0.086)	0.005	0.011
284	23.67	0.07	0.016	( 0.086)	0.005	0.011
285	23.75	0.07	0.016	( 0.086)	0.005	0.011
286	23.83	0.07	0.016	( 0.086)	0.005	0.011
287	23.92	0.07	0.016	( 0.086)	0.005	0.011
288	24.00	0.07	0.016	( 0.086)	0.005	0.011

(Loss Rate Not Used)

Sum = 100.0

Sum = 17.0

Flood volume = Effective rainfall 1.42(In)

times area 0.9(Ac.)/[ (In)/(Ft.) ] = 0.1(Ac.Ft)

Total soil loss = 0.64(In)

Total soil loss = 0.049(Ac.Ft)

Total rainfall = 2.06(In)

Flood volume = 4726.3 Cubic Feet  
 Total soil loss = 2153.3 Cubic Feet

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 Peak flow rate of this hydrograph = 0.179(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	0.01	Q				
0+10	0.0001	0.01	Q				
0+15	0.0002	0.01	Q				
0+20	0.0003	0.01	Q				
0+25	0.0004	0.02	Q				
0+30	0.0005	0.02	Q				
0+35	0.0006	0.02	Q				
0+40	0.0007	0.02	Q				
0+45	0.0008	0.02	Q				
0+50	0.0009	0.02	Q				
0+55	0.0011	0.02	Q				
1+ 0	0.0012	0.02	Q				
1+ 5	0.0013	0.02	Q				
1+10	0.0015	0.02	Q				
1+15	0.0016	0.02	Q				
1+20	0.0017	0.02	Q				
1+25	0.0018	0.02	Q				
1+30	0.0019	0.02	Q				
1+35	0.0020	0.02	Q				
1+40	0.0021	0.02	Q				
1+45	0.0022	0.02	Q				
1+50	0.0023	0.02	Q				
1+55	0.0025	0.02	Q				
2+ 0	0.0026	0.02	Q				
2+ 5	0.0028	0.02	QV				
2+10	0.0029	0.02	QV				
2+15	0.0031	0.02	QV				
2+20	0.0032	0.02	QV				
2+25	0.0033	0.02	QV				
2+30	0.0035	0.02	QV				
2+35	0.0037	0.02	QV				
2+40	0.0038	0.03	QV				
2+45	0.0040	0.03	QV				
2+50	0.0042	0.03	QV				
2+55	0.0044	0.03	QV				
3+ 0	0.0046	0.03	QV				

3+ 5	0.0047	0.03	QV
3+10	0.0049	0.03	QV
3+15	0.0051	0.03	QV
3+20	0.0053	0.03	QV
3+25	0.0055	0.03	Q V
3+30	0.0056	0.03	Q V
3+35	0.0058	0.03	Q V
3+40	0.0060	0.03	Q V
3+45	0.0062	0.03	Q V
3+50	0.0064	0.03	Q V
3+55	0.0066	0.03	Q V
4+ 0	0.0068	0.03	Q V
4+ 5	0.0070	0.03	Q V
4+10	0.0072	0.03	Q V
4+15	0.0075	0.03	Q V
4+20	0.0077	0.03	Q V
4+25	0.0079	0.04	Q V
4+30	0.0082	0.04	Q V
4+35	0.0084	0.04	Q V
4+40	0.0087	0.04	Q V
4+45	0.0090	0.04	Q V
4+50	0.0092	0.04	Q V
4+55	0.0095	0.04	Q V
5+ 0	0.0098	0.04	Q V
5+ 5	0.0101	0.04	Q V
5+10	0.0103	0.03	Q V
5+15	0.0105	0.03	Q V
5+20	0.0107	0.03	Q V
5+25	0.0110	0.04	Q V
5+30	0.0112	0.04	Q V
5+35	0.0115	0.04	Q V
5+40	0.0118	0.04	Q V
5+45	0.0121	0.04	Q V
5+50	0.0124	0.04	Q V
5+55	0.0127	0.04	Q V
6+ 0	0.0129	0.04	Q V
6+ 5	0.0133	0.04	Q V
6+10	0.0136	0.05	Q V
6+15	0.0139	0.05	Q V
6+20	0.0142	0.05	Q V
6+25	0.0146	0.05	Q V
6+30	0.0149	0.05	Q V
6+35	0.0152	0.05	Q V
6+40	0.0156	0.05	Q V
6+45	0.0159	0.05	Q V
6+50	0.0163	0.05	Q V
6+55	0.0167	0.05	Q V
7+ 0	0.0170	0.05	Q V
7+ 5	0.0174	0.05	Q V
7+10	0.0177	0.05	Q V

7+15	0.0181	0.05	Q	V				
7+20	0.0185	0.06	Q	V				
7+25	0.0189	0.06	Q	V				
7+30	0.0193	0.06	Q	V				
7+35	0.0197	0.06	Q	V				
7+40	0.0201	0.06	Q	V				
7+45	0.0206	0.06	Q	V				
7+50	0.0210	0.07	Q	V				
7+55	0.0215	0.07	Q	V				
8+ 0	0.0219	0.07	Q	V				
8+ 5	0.0225	0.07	Q	V				
8+10	0.0230	0.08	Q	V				
8+15	0.0235	0.08	Q	V				
8+20	0.0241	0.08	Q	V				
8+25	0.0246	0.08	Q	V				
8+30	0.0252	0.08	Q	V				
8+35	0.0257	0.08	Q	V				
8+40	0.0263	0.08	Q	V				
8+45	0.0269	0.08	Q	V				
8+50	0.0275	0.09	Q	V				
8+55	0.0281	0.09	Q	V				
9+ 0	0.0287	0.09	Q	V				
9+ 5	0.0293	0.09	Q	V				
9+10	0.0300	0.10	Q	V				
9+15	0.0307	0.10	Q	V				
9+20	0.0314	0.10	Q	V				
9+25	0.0321	0.10	Q	V				
9+30	0.0329	0.10	Q	V				
9+35	0.0336	0.11	Q	V				
9+40	0.0344	0.11	Q	V				
9+45	0.0351	0.11	Q	V				
9+50	0.0359	0.11	Q	V				
9+55	0.0367	0.12	Q	V				
10+ 0	0.0375	0.12	Q	V				
10+ 5	0.0381	0.10	Q	V				
10+10	0.0387	0.08	Q	V				
10+15	0.0393	0.08	Q	V				
10+20	0.0398	0.08	Q	V				
10+25	0.0403	0.08	Q	V				
10+30	0.0409	0.08	Q	V				
10+35	0.0415	0.09	Q	V				
10+40	0.0422	0.10	Q	V				
10+45	0.0429	0.10	Q	V				
10+50	0.0437	0.11	Q	V				
10+55	0.0444	0.11	Q	V				
11+ 0	0.0451	0.11	Q	V				
11+ 5	0.0458	0.10	Q	V				
11+10	0.0465	0.10	Q	V				
11+15	0.0472	0.10	Q	V				
11+20	0.0479	0.10	Q	V				

11+25	0.0486	0.10	Q	V			
11+30	0.0493	0.10	Q	V			
11+35	0.0499	0.09	Q	V			
11+40	0.0505	0.09	Q	V			
11+45	0.0512	0.09	Q	V			
11+50	0.0518	0.09	Q	V			
11+55	0.0524	0.09	Q	V			
12+ 0	0.0531	0.09	Q	V			
12+ 5	0.0539	0.11	Q	V			
12+10	0.0547	0.13	Q	V			
12+15	0.0556	0.13	Q	V			
12+20	0.0566	0.13	Q	V			
12+25	0.0575	0.14	Q	V			
12+30	0.0584	0.14	Q	V			
12+35	0.0594	0.14	Q	V			
12+40	0.0604	0.15	Q	V			
12+45	0.0614	0.15	Q	V			
12+50	0.0625	0.15	Q	V			
12+55	0.0635	0.15	Q	V			
13+ 0	0.0646	0.15	Q	V			
13+ 5	0.0657	0.17	Q	V			
13+10	0.0669	0.18	Q	V			
13+15	0.0681	0.18	Q	V			
13+20	0.0694	0.18	Q	V			
13+25	0.0706	0.18	Q	V			
13+30	0.0718	0.18	Q	V			
13+35	0.0728	0.15	Q	V			
13+40	0.0737	0.13	Q	V			
13+45	0.0746	0.12	Q	V			
13+50	0.0754	0.12	Q	V			
13+55	0.0762	0.12	Q	V			
14+ 0	0.0771	0.12	Q	V			
14+ 5	0.0780	0.13	Q	V			
14+10	0.0789	0.14	Q	V			
14+15	0.0799	0.14	Q	V			
14+20	0.0809	0.14	Q	V			
14+25	0.0818	0.14	Q	V			
14+30	0.0827	0.14	Q	V			
14+35	0.0837	0.14	Q	V			
14+40	0.0846	0.14	Q	V			
14+45	0.0856	0.14	Q	V			
14+50	0.0865	0.13	Q	V			
14+55	0.0874	0.13	Q	V			
15+ 0	0.0883	0.13	Q	V			
15+ 5	0.0892	0.13	Q	V			
15+10	0.0901	0.13	Q	V			
15+15	0.0909	0.13	Q	V			
15+20	0.0918	0.12	Q	V			
15+25	0.0926	0.12	Q	V			
15+30	0.0934	0.12	Q	V			



15+35	0.0942	0.11	Q				V
15+40	0.0949	0.10	Q				V
15+45	0.0956	0.10	Q				V
15+50	0.0963	0.10	Q				V
15+55	0.0970	0.10	Q				V
16+ 0	0.0977	0.10	Q				V
16+ 5	0.0981	0.06	Q				V
16+10	0.0983	0.03	Q				V
16+15	0.0984	0.02	Q				V
16+20	0.0986	0.02	Q				V
16+25	0.0987	0.02	Q				V
16+30	0.0989	0.02	Q				V
16+35	0.0990	0.02	Q				V
16+40	0.0991	0.02	Q				V
16+45	0.0992	0.02	Q				V
16+50	0.0993	0.02	Q				V
16+55	0.0994	0.02	Q				V
17+ 0	0.0995	0.02	Q				V
17+ 5	0.0997	0.02	Q				V
17+10	0.0999	0.03	Q				V
17+15	0.1000	0.03	Q				V
17+20	0.1002	0.03	Q				V
17+25	0.1004	0.03	Q				V
17+30	0.1006	0.03	Q				V
17+35	0.1008	0.03	Q				V
17+40	0.1009	0.03	Q				V
17+45	0.1011	0.03	Q				V
17+50	0.1013	0.02	Q				V
17+55	0.1014	0.02	Q				V
18+ 0	0.1016	0.02	Q				V
18+ 5	0.1017	0.02	Q				V
18+10	0.1019	0.02	Q				V
18+15	0.1020	0.02	Q				V
18+20	0.1022	0.02	Q				V
18+25	0.1023	0.02	Q				V
18+30	0.1024	0.02	Q				V
18+35	0.1026	0.02	Q				V
18+40	0.1027	0.02	Q				V
18+45	0.1028	0.02	Q				V
18+50	0.1029	0.01	Q				V
18+55	0.1030	0.01	Q				V
19+ 0	0.1030	0.01	Q				V
19+ 5	0.1031	0.01	Q				V
19+10	0.1032	0.02	Q				V
19+15	0.1033	0.02	Q				V
19+20	0.1035	0.02	Q				V
19+25	0.1036	0.02	Q				V
19+30	0.1037	0.02	Q				V
19+35	0.1039	0.02	Q				V
19+40	0.1040	0.02	Q				V

19+45	0.1041	0.02	Q				V
19+50	0.1042	0.01	Q				V
19+55	0.1043	0.01	Q				V
20+ 0	0.1043	0.01	Q				V
20+ 5	0.1044	0.01	Q				V
20+10	0.1045	0.02	Q				V
20+15	0.1046	0.02	Q				V
20+20	0.1047	0.02	Q				V
20+25	0.1049	0.02	Q				V
20+30	0.1050	0.02	Q				V
20+35	0.1051	0.02	Q				V
20+40	0.1052	0.02	Q				V
20+45	0.1053	0.02	Q				V
20+50	0.1054	0.01	Q				V
20+55	0.1055	0.01	Q				V
21+ 0	0.1055	0.01	Q				V
21+ 5	0.1056	0.01	Q				V
21+10	0.1057	0.02	Q				V
21+15	0.1058	0.02	Q				V
21+20	0.1059	0.01	Q				V
21+25	0.1060	0.01	Q				V
21+30	0.1061	0.01	Q				V
21+35	0.1062	0.01	Q				V
21+40	0.1063	0.02	Q				V
21+45	0.1064	0.02	Q				V
21+50	0.1065	0.01	Q				V
21+55	0.1065	0.01	Q				V
22+ 0	0.1066	0.01	Q				V
22+ 5	0.1067	0.01	Q				V
22+10	0.1068	0.02	Q				V
22+15	0.1069	0.02	Q				V
22+20	0.1070	0.01	Q				V
22+25	0.1071	0.01	Q				V
22+30	0.1072	0.01	Q				V
22+35	0.1072	0.01	Q				V
22+40	0.1073	0.01	Q				V
22+45	0.1074	0.01	Q				V
22+50	0.1074	0.01	Q				V
22+55	0.1075	0.01	Q				V
23+ 0	0.1076	0.01	Q				V
23+ 5	0.1077	0.01	Q				V
23+10	0.1077	0.01	Q				V
23+15	0.1078	0.01	Q				V
23+20	0.1079	0.01	Q				V
23+25	0.1079	0.01	Q				V
23+30	0.1080	0.01	Q				V
23+35	0.1081	0.01	Q				V
23+40	0.1082	0.01	Q				V
23+45	0.1082	0.01	Q				V
23+50	0.1083	0.01	Q				V

23+55	0.1084	0.01	Q				V
24+ 0	0.1085	0.01	Q				V
24+ 5	0.1085	0.01	Q				V
24+10	0.1085	0.00	Q				V
24+15	0.1085	0.00	Q				V

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**Appendix J.V**

**Synthetic Unit Hydrograph Method Analysis  
Post-Development Conditions  
10-Year Storm**

U n i t   H y d r o g r a p h   A n a l y s i s

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Study date 05/27/22 File: MapesPost10AUH2410.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6443

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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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MAPES AND TRUMBLE INDUSTRIAL FACILITY  
UNIT HYDROGRAPH  
POST-DEVELOPMENT CONDITIONS  
10-YEAR, 24HR STORM, DA A

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Drainage Area = 18.09(Ac.) = 0.028 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 18.09(Ac.) =  
0.028 Sq. Mi.  
Length along longest watercourse = 1290.86(Ft.)  
Length along longest watercourse measured to centroid = 632.74(Ft.)  
Length along longest watercourse = 0.244 Mi.  
Length along longest watercourse measured to centroid = 0.120 Mi.  
Difference in elevation = 12.93(Ft.)  
Slope along watercourse = 52.8875 Ft./Mi.  
Average Manning's 'N' = 0.015  
Lag time = 0.044 Hr.  
Lag time = 2.66 Min.  
25% of lag time = 0.66 Min.  
40% of lag time = 1.06 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]
18.09	2.06	37.27

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
18.09	5.31	96.06

STORM EVENT (YEAR) = 10.00  
 Area Averaged 2-Year Rainfall = 2.060(In)  
 Area Averaged 100-Year Rainfall = 5.310(In)

Point rain (area averaged) = 3.397(In)  
 Areal adjustment factor = 100.00 %  
 Adjusted average point rain = 3.397(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
18.090	75.00	0.830
Total Area Entered = 18.09(Ac.)		

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
75.0	75.0	0.303	0.830	0.077	1.000	0.077
Sum (F) =						0.077

Area averaged mean soil loss (F) (In/Hr) = 0.077  
 Minimum soil loss rate ((In/Hr)) = 0.038  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.238

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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 Hydrograph Data  
 -----

Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)	
1	0.083	188.172	41.282	7.526
2	0.167	376.344	44.201	8.058
3	0.250	564.517	9.293	1.694
4	0.333	752.689	3.719	0.678
5	0.417	940.861	1.505	0.274
		Sum = 100.000	Sum=	18.231

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The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.07	0.027	( 0.136)	0.006	0.021
2	0.17	0.07	0.027	( 0.135)	0.006	0.021
3	0.25	0.07	0.027	( 0.135)	0.006	0.021
4	0.33	0.10	0.041	( 0.134)	0.010	0.031
5	0.42	0.10	0.041	( 0.134)	0.010	0.031
6	0.50	0.10	0.041	( 0.133)	0.010	0.031
7	0.58	0.10	0.041	( 0.133)	0.010	0.031
8	0.67	0.10	0.041	( 0.132)	0.010	0.031
9	0.75	0.10	0.041	( 0.132)	0.010	0.031
10	0.83	0.13	0.054	( 0.131)	0.013	0.041
11	0.92	0.13	0.054	( 0.131)	0.013	0.041
12	1.00	0.13	0.054	( 0.130)	0.013	0.041
13	1.08	0.10	0.041	( 0.130)	0.010	0.031
14	1.17	0.10	0.041	( 0.129)	0.010	0.031
15	1.25	0.10	0.041	( 0.129)	0.010	0.031
16	1.33	0.10	0.041	( 0.128)	0.010	0.031
17	1.42	0.10	0.041	( 0.128)	0.010	0.031
18	1.50	0.10	0.041	( 0.127)	0.010	0.031
19	1.58	0.10	0.041	( 0.127)	0.010	0.031
20	1.67	0.10	0.041	( 0.126)	0.010	0.031
21	1.75	0.10	0.041	( 0.126)	0.010	0.031
22	1.83	0.13	0.054	( 0.125)	0.013	0.041
23	1.92	0.13	0.054	( 0.125)	0.013	0.041
24	2.00	0.13	0.054	( 0.124)	0.013	0.041
25	2.08	0.13	0.054	( 0.124)	0.013	0.041
26	2.17	0.13	0.054	( 0.123)	0.013	0.041
27	2.25	0.13	0.054	( 0.123)	0.013	0.041
28	2.33	0.13	0.054	( 0.122)	0.013	0.041
29	2.42	0.13	0.054	( 0.122)	0.013	0.041
30	2.50	0.13	0.054	( 0.121)	0.013	0.041
31	2.58	0.17	0.068	( 0.121)	0.016	0.052
32	2.67	0.17	0.068	( 0.120)	0.016	0.052
33	2.75	0.17	0.068	( 0.120)	0.016	0.052
34	2.83	0.17	0.068	( 0.119)	0.016	0.052
35	2.92	0.17	0.068	( 0.119)	0.016	0.052
36	3.00	0.17	0.068	( 0.118)	0.016	0.052
37	3.08	0.17	0.068	( 0.118)	0.016	0.052
38	3.17	0.17	0.068	( 0.117)	0.016	0.052
39	3.25	0.17	0.068	( 0.117)	0.016	0.052
40	3.33	0.17	0.068	( 0.116)	0.016	0.052
41	3.42	0.17	0.068	( 0.116)	0.016	0.052
42	3.50	0.17	0.068	( 0.115)	0.016	0.052
43	3.58	0.17	0.068	( 0.115)	0.016	0.052
44	3.67	0.17	0.068	( 0.114)	0.016	0.052

45	3.75	0.17	0.068	( 0.114)	0.016	0.052
46	3.83	0.20	0.082	( 0.113)	0.019	0.062
47	3.92	0.20	0.082	( 0.113)	0.019	0.062
48	4.00	0.20	0.082	( 0.112)	0.019	0.062
49	4.08	0.20	0.082	( 0.112)	0.019	0.062
50	4.17	0.20	0.082	( 0.111)	0.019	0.062
51	4.25	0.20	0.082	( 0.111)	0.019	0.062
52	4.33	0.23	0.095	( 0.110)	0.023	0.072
53	4.42	0.23	0.095	( 0.110)	0.023	0.072
54	4.50	0.23	0.095	( 0.109)	0.023	0.072
55	4.58	0.23	0.095	( 0.109)	0.023	0.072
56	4.67	0.23	0.095	( 0.109)	0.023	0.072
57	4.75	0.23	0.095	( 0.108)	0.023	0.072
58	4.83	0.27	0.109	( 0.108)	0.026	0.083
59	4.92	0.27	0.109	( 0.107)	0.026	0.083
60	5.00	0.27	0.109	( 0.107)	0.026	0.083
61	5.08	0.20	0.082	( 0.106)	0.019	0.062
62	5.17	0.20	0.082	( 0.106)	0.019	0.062
63	5.25	0.20	0.082	( 0.105)	0.019	0.062
64	5.33	0.23	0.095	( 0.105)	0.023	0.072
65	5.42	0.23	0.095	( 0.104)	0.023	0.072
66	5.50	0.23	0.095	( 0.104)	0.023	0.072
67	5.58	0.27	0.109	( 0.103)	0.026	0.083
68	5.67	0.27	0.109	( 0.103)	0.026	0.083
69	5.75	0.27	0.109	( 0.103)	0.026	0.083
70	5.83	0.27	0.109	( 0.102)	0.026	0.083
71	5.92	0.27	0.109	( 0.102)	0.026	0.083
72	6.00	0.27	0.109	( 0.101)	0.026	0.083
73	6.08	0.30	0.122	( 0.101)	0.029	0.093
74	6.17	0.30	0.122	( 0.100)	0.029	0.093
75	6.25	0.30	0.122	( 0.100)	0.029	0.093
76	6.33	0.30	0.122	( 0.099)	0.029	0.093
77	6.42	0.30	0.122	( 0.099)	0.029	0.093
78	6.50	0.30	0.122	( 0.099)	0.029	0.093
79	6.58	0.33	0.136	( 0.098)	0.032	0.104
80	6.67	0.33	0.136	( 0.098)	0.032	0.104
81	6.75	0.33	0.136	( 0.097)	0.032	0.104
82	6.83	0.33	0.136	( 0.097)	0.032	0.104
83	6.92	0.33	0.136	( 0.096)	0.032	0.104
84	7.00	0.33	0.136	( 0.096)	0.032	0.104
85	7.08	0.33	0.136	( 0.095)	0.032	0.104
86	7.17	0.33	0.136	( 0.095)	0.032	0.104
87	7.25	0.33	0.136	( 0.095)	0.032	0.104
88	7.33	0.37	0.149	( 0.094)	0.036	0.114
89	7.42	0.37	0.149	( 0.094)	0.036	0.114
90	7.50	0.37	0.149	( 0.093)	0.036	0.114
91	7.58	0.40	0.163	( 0.093)	0.039	0.124
92	7.67	0.40	0.163	( 0.092)	0.039	0.124
93	7.75	0.40	0.163	( 0.092)	0.039	0.124
94	7.83	0.43	0.177	( 0.092)	0.042	0.135



95	7.92	0.43	0.177	( 0.091)	0.042	0.135
96	8.00	0.43	0.177	( 0.091)	0.042	0.135
97	8.08	0.50	0.204	( 0.090)	0.049	0.155
98	8.17	0.50	0.204	( 0.090)	0.049	0.155
99	8.25	0.50	0.204	( 0.089)	0.049	0.155
100	8.33	0.50	0.204	( 0.089)	0.049	0.155
101	8.42	0.50	0.204	( 0.089)	0.049	0.155
102	8.50	0.50	0.204	( 0.088)	0.049	0.155
103	8.58	0.53	0.217	( 0.088)	0.052	0.166
104	8.67	0.53	0.217	( 0.087)	0.052	0.166
105	8.75	0.53	0.217	( 0.087)	0.052	0.166
106	8.83	0.57	0.231	( 0.087)	0.055	0.176
107	8.92	0.57	0.231	( 0.086)	0.055	0.176
108	9.00	0.57	0.231	( 0.086)	0.055	0.176
109	9.08	0.63	0.258	( 0.085)	0.061	0.197
110	9.17	0.63	0.258	( 0.085)	0.061	0.197
111	9.25	0.63	0.258	( 0.085)	0.061	0.197
112	9.33	0.67	0.272	( 0.084)	0.065	0.207
113	9.42	0.67	0.272	( 0.084)	0.065	0.207
114	9.50	0.67	0.272	( 0.083)	0.065	0.207
115	9.58	0.70	0.285	( 0.083)	0.068	0.217
116	9.67	0.70	0.285	( 0.083)	0.068	0.217
117	9.75	0.70	0.285	( 0.082)	0.068	0.217
118	9.83	0.73	0.299	( 0.082)	0.071	0.228
119	9.92	0.73	0.299	( 0.081)	0.071	0.228
120	10.00	0.73	0.299	( 0.081)	0.071	0.228
121	10.08	0.50	0.204	( 0.081)	0.049	0.155
122	10.17	0.50	0.204	( 0.080)	0.049	0.155
123	10.25	0.50	0.204	( 0.080)	0.049	0.155
124	10.33	0.50	0.204	( 0.079)	0.049	0.155
125	10.42	0.50	0.204	( 0.079)	0.049	0.155
126	10.50	0.50	0.204	( 0.079)	0.049	0.155
127	10.58	0.67	0.272	( 0.078)	0.065	0.207
128	10.67	0.67	0.272	( 0.078)	0.065	0.207
129	10.75	0.67	0.272	( 0.077)	0.065	0.207
130	10.83	0.67	0.272	( 0.077)	0.065	0.207
131	10.92	0.67	0.272	( 0.077)	0.065	0.207
132	11.00	0.67	0.272	( 0.076)	0.065	0.207
133	11.08	0.63	0.258	( 0.076)	0.061	0.197
134	11.17	0.63	0.258	( 0.076)	0.061	0.197
135	11.25	0.63	0.258	( 0.075)	0.061	0.197
136	11.33	0.63	0.258	( 0.075)	0.061	0.197
137	11.42	0.63	0.258	( 0.074)	0.061	0.197
138	11.50	0.63	0.258	( 0.074)	0.061	0.197
139	11.58	0.57	0.231	( 0.074)	0.055	0.176
140	11.67	0.57	0.231	( 0.073)	0.055	0.176
141	11.75	0.57	0.231	( 0.073)	0.055	0.176
142	11.83	0.60	0.245	( 0.073)	0.058	0.186
143	11.92	0.60	0.245	( 0.072)	0.058	0.186
144	12.00	0.60	0.245	( 0.072)	0.058	0.186

145	12.08	0.83	0.340	0.072	( 0.081)	0.268
146	12.17	0.83	0.340	0.071	( 0.081)	0.268
147	12.25	0.83	0.340	0.071	( 0.081)	0.269
148	12.33	0.87	0.353	0.070	( 0.084)	0.283
149	12.42	0.87	0.353	0.070	( 0.084)	0.283
150	12.50	0.87	0.353	0.070	( 0.084)	0.284
151	12.58	0.93	0.380	0.069	( 0.091)	0.311
152	12.67	0.93	0.380	0.069	( 0.091)	0.311
153	12.75	0.93	0.380	0.069	( 0.091)	0.312
154	12.83	0.97	0.394	0.068	( 0.094)	0.326
155	12.92	0.97	0.394	0.068	( 0.094)	0.326
156	13.00	0.97	0.394	0.068	( 0.094)	0.326
157	13.08	1.13	0.462	0.067	( 0.110)	0.395
158	13.17	1.13	0.462	0.067	( 0.110)	0.395
159	13.25	1.13	0.462	0.067	( 0.110)	0.395
160	13.33	1.13	0.462	0.066	( 0.110)	0.396
161	13.42	1.13	0.462	0.066	( 0.110)	0.396
162	13.50	1.13	0.462	0.066	( 0.110)	0.396
163	13.58	0.77	0.313	0.065	( 0.074)	0.247
164	13.67	0.77	0.313	0.065	( 0.074)	0.248
165	13.75	0.77	0.313	0.065	( 0.074)	0.248
166	13.83	0.77	0.313	0.064	( 0.074)	0.248
167	13.92	0.77	0.313	0.064	( 0.074)	0.249
168	14.00	0.77	0.313	0.064	( 0.074)	0.249
169	14.08	0.90	0.367	0.063	( 0.087)	0.304
170	14.17	0.90	0.367	0.063	( 0.087)	0.304
171	14.25	0.90	0.367	0.063	( 0.087)	0.304
172	14.33	0.87	0.353	0.062	( 0.084)	0.291
173	14.42	0.87	0.353	0.062	( 0.084)	0.291
174	14.50	0.87	0.353	0.062	( 0.084)	0.292
175	14.58	0.87	0.353	0.061	( 0.084)	0.292
176	14.67	0.87	0.353	0.061	( 0.084)	0.292
177	14.75	0.87	0.353	0.061	( 0.084)	0.292
178	14.83	0.83	0.340	0.060	( 0.081)	0.279
179	14.92	0.83	0.340	0.060	( 0.081)	0.280
180	15.00	0.83	0.340	0.060	( 0.081)	0.280
181	15.08	0.80	0.326	0.060	( 0.078)	0.267
182	15.17	0.80	0.326	0.059	( 0.078)	0.267
183	15.25	0.80	0.326	0.059	( 0.078)	0.267
184	15.33	0.77	0.313	0.059	( 0.074)	0.254
185	15.42	0.77	0.313	0.058	( 0.074)	0.254
186	15.50	0.77	0.313	0.058	( 0.074)	0.254
187	15.58	0.63	0.258	0.058	( 0.061)	0.200
188	15.67	0.63	0.258	0.057	( 0.061)	0.201
189	15.75	0.63	0.258	0.057	( 0.061)	0.201
190	15.83	0.63	0.258	0.057	( 0.061)	0.201
191	15.92	0.63	0.258	0.057	( 0.061)	0.202
192	16.00	0.63	0.258	0.056	( 0.061)	0.202
193	16.08	0.13	0.054	( 0.056)	0.013	0.041
194	16.17	0.13	0.054	( 0.056)	0.013	0.041

195	16.25	0.13	0.054	( 0.055)	0.013	0.041
196	16.33	0.13	0.054	( 0.055)	0.013	0.041
197	16.42	0.13	0.054	( 0.055)	0.013	0.041
198	16.50	0.13	0.054	( 0.055)	0.013	0.041
199	16.58	0.10	0.041	( 0.054)	0.010	0.031
200	16.67	0.10	0.041	( 0.054)	0.010	0.031
201	16.75	0.10	0.041	( 0.054)	0.010	0.031
202	16.83	0.10	0.041	( 0.053)	0.010	0.031
203	16.92	0.10	0.041	( 0.053)	0.010	0.031
204	17.00	0.10	0.041	( 0.053)	0.010	0.031
205	17.08	0.17	0.068	( 0.053)	0.016	0.052
206	17.17	0.17	0.068	( 0.052)	0.016	0.052
207	17.25	0.17	0.068	( 0.052)	0.016	0.052
208	17.33	0.17	0.068	( 0.052)	0.016	0.052
209	17.42	0.17	0.068	( 0.052)	0.016	0.052
210	17.50	0.17	0.068	( 0.051)	0.016	0.052
211	17.58	0.17	0.068	( 0.051)	0.016	0.052
212	17.67	0.17	0.068	( 0.051)	0.016	0.052
213	17.75	0.17	0.068	( 0.051)	0.016	0.052
214	17.83	0.13	0.054	( 0.050)	0.013	0.041
215	17.92	0.13	0.054	( 0.050)	0.013	0.041
216	18.00	0.13	0.054	( 0.050)	0.013	0.041
217	18.08	0.13	0.054	( 0.050)	0.013	0.041
218	18.17	0.13	0.054	( 0.049)	0.013	0.041
219	18.25	0.13	0.054	( 0.049)	0.013	0.041
220	18.33	0.13	0.054	( 0.049)	0.013	0.041
221	18.42	0.13	0.054	( 0.049)	0.013	0.041
222	18.50	0.13	0.054	( 0.048)	0.013	0.041
223	18.58	0.10	0.041	( 0.048)	0.010	0.031
224	18.67	0.10	0.041	( 0.048)	0.010	0.031
225	18.75	0.10	0.041	( 0.048)	0.010	0.031
226	18.83	0.07	0.027	( 0.047)	0.006	0.021
227	18.92	0.07	0.027	( 0.047)	0.006	0.021
228	19.00	0.07	0.027	( 0.047)	0.006	0.021
229	19.08	0.10	0.041	( 0.047)	0.010	0.031
230	19.17	0.10	0.041	( 0.047)	0.010	0.031
231	19.25	0.10	0.041	( 0.046)	0.010	0.031
232	19.33	0.13	0.054	( 0.046)	0.013	0.041
233	19.42	0.13	0.054	( 0.046)	0.013	0.041
234	19.50	0.13	0.054	( 0.046)	0.013	0.041
235	19.58	0.10	0.041	( 0.046)	0.010	0.031
236	19.67	0.10	0.041	( 0.045)	0.010	0.031
237	19.75	0.10	0.041	( 0.045)	0.010	0.031
238	19.83	0.07	0.027	( 0.045)	0.006	0.021
239	19.92	0.07	0.027	( 0.045)	0.006	0.021
240	20.00	0.07	0.027	( 0.045)	0.006	0.021
241	20.08	0.10	0.041	( 0.044)	0.010	0.031
242	20.17	0.10	0.041	( 0.044)	0.010	0.031
243	20.25	0.10	0.041	( 0.044)	0.010	0.031
244	20.33	0.10	0.041	( 0.044)	0.010	0.031

245	20.42	0.10	0.041	( 0.044)	0.010	0.031
246	20.50	0.10	0.041	( 0.043)	0.010	0.031
247	20.58	0.10	0.041	( 0.043)	0.010	0.031
248	20.67	0.10	0.041	( 0.043)	0.010	0.031
249	20.75	0.10	0.041	( 0.043)	0.010	0.031
250	20.83	0.07	0.027	( 0.043)	0.006	0.021
251	20.92	0.07	0.027	( 0.042)	0.006	0.021
252	21.00	0.07	0.027	( 0.042)	0.006	0.021
253	21.08	0.10	0.041	( 0.042)	0.010	0.031
254	21.17	0.10	0.041	( 0.042)	0.010	0.031
255	21.25	0.10	0.041	( 0.042)	0.010	0.031
256	21.33	0.07	0.027	( 0.042)	0.006	0.021
257	21.42	0.07	0.027	( 0.041)	0.006	0.021
258	21.50	0.07	0.027	( 0.041)	0.006	0.021
259	21.58	0.10	0.041	( 0.041)	0.010	0.031
260	21.67	0.10	0.041	( 0.041)	0.010	0.031
261	21.75	0.10	0.041	( 0.041)	0.010	0.031
262	21.83	0.07	0.027	( 0.041)	0.006	0.021
263	21.92	0.07	0.027	( 0.041)	0.006	0.021
264	22.00	0.07	0.027	( 0.040)	0.006	0.021
265	22.08	0.10	0.041	( 0.040)	0.010	0.031
266	22.17	0.10	0.041	( 0.040)	0.010	0.031
267	22.25	0.10	0.041	( 0.040)	0.010	0.031
268	22.33	0.07	0.027	( 0.040)	0.006	0.021
269	22.42	0.07	0.027	( 0.040)	0.006	0.021
270	22.50	0.07	0.027	( 0.040)	0.006	0.021
271	22.58	0.07	0.027	( 0.040)	0.006	0.021
272	22.67	0.07	0.027	( 0.039)	0.006	0.021
273	22.75	0.07	0.027	( 0.039)	0.006	0.021
274	22.83	0.07	0.027	( 0.039)	0.006	0.021
275	22.92	0.07	0.027	( 0.039)	0.006	0.021
276	23.00	0.07	0.027	( 0.039)	0.006	0.021
277	23.08	0.07	0.027	( 0.039)	0.006	0.021
278	23.17	0.07	0.027	( 0.039)	0.006	0.021
279	23.25	0.07	0.027	( 0.039)	0.006	0.021
280	23.33	0.07	0.027	( 0.039)	0.006	0.021
281	23.42	0.07	0.027	( 0.039)	0.006	0.021
282	23.50	0.07	0.027	( 0.039)	0.006	0.021
283	23.58	0.07	0.027	( 0.039)	0.006	0.021
284	23.67	0.07	0.027	( 0.038)	0.006	0.021
285	23.75	0.07	0.027	( 0.038)	0.006	0.021
286	23.83	0.07	0.027	( 0.038)	0.006	0.021
287	23.92	0.07	0.027	( 0.038)	0.006	0.021
288	24.00	0.07	0.027	( 0.038)	0.006	0.021

(Loss Rate Not Used)

Sum = 100.0

Sum = 32.0

Flood volume = Effective rainfall 2.67(In)

times area 18.1(Ac.)/[ (In)/(Ft.) ] = 4.0(Ac.Ft)

Total soil loss = 0.73(In)

Total soil loss = 1.102(Ac.Ft)

Total rainfall = 3.40(In)  
 Flood volume = 175076.2 Cubic Feet  
 Total soil loss = 47990.7 Cubic Feet

-----  
 Peak flow rate of this hydrograph = 7.224(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	0.0011	0.16	Q				
0+10	0.0033	0.32	VQ				
0+15	0.0058	0.36	VQ				
0+20	0.0089	0.45	VQ				
0+25	0.0126	0.54	V Q				
0+30	0.0164	0.56	V Q				
0+35	0.0203	0.56	V Q				
0+40	0.0242	0.57	V Q				
0+45	0.0281	0.57	V Q				
0+50	0.0325	0.64	V Q				
0+55	0.0375	0.73	V Q				
1+ 0	0.0427	0.75	V Q				
1+ 5	0.0473	0.67	V Q				
1+10	0.0514	0.59	V Q				
1+15	0.0554	0.58	V Q				
1+20	0.0593	0.57	V Q				
1+25	0.0632	0.57	V Q				
1+30	0.0671	0.57	V Q				
1+35	0.0710	0.57	V Q				
1+40	0.0749	0.57	V Q				
1+45	0.0788	0.57	V Q				
1+50	0.0833	0.64	V Q				
1+55	0.0883	0.73	V Q				
2+ 0	0.0934	0.75	V Q				
2+ 5	0.0986	0.75	V Q				
2+10	0.1038	0.76	V Q				
2+15	0.1090	0.76	V Q				
2+20	0.1142	0.76	V Q				
2+25	0.1194	0.76	V Q				
2+30	0.1246	0.76	V Q				
2+35	0.1303	0.83	V Q				
2+40	0.1367	0.92	V Q				
2+45	0.1431	0.93	V Q				
2+50	0.1496	0.94	V Q				
2+55	0.1561	0.94	V Q				

3+ 0	0.1626	0.94	V Q				
3+ 5	0.1691	0.94	V Q				
3+10	0.1756	0.94	V Q				
3+15	0.1821	0.94	V Q				
3+20	0.1886	0.94	V Q				
3+25	0.1951	0.94	V Q				
3+30	0.2016	0.94	VQ				
3+35	0.2081	0.94	VQ				
3+40	0.2146	0.94	VQ				
3+45	0.2211	0.94	VQ				
3+50	0.2282	1.02	V Q				
3+55	0.2358	1.11	V Q				
4+ 0	0.2435	1.12	V Q				
4+ 5	0.2513	1.13	V Q				
4+10	0.2591	1.13	V Q				
4+15	0.2669	1.13	V Q				
4+20	0.2752	1.21	V Q				
4+25	0.2842	1.29	V Q				
4+30	0.2932	1.31	V Q				
4+35	0.3023	1.32	V Q				
4+40	0.3114	1.32	V Q				
4+45	0.3205	1.32	V Q				
4+50	0.3301	1.40	V Q				
4+55	0.3404	1.48	V Q				
5+ 0	0.3507	1.50	V Q				
5+ 5	0.3600	1.35	V Q				
5+10	0.3682	1.19	VQ				
5+15	0.3761	1.15	VQ				
5+20	0.3845	1.22	VQ				
5+25	0.3934	1.29	V Q				
5+30	0.4025	1.31	VQ				
5+35	0.4121	1.40	VQ				
5+40	0.4223	1.48	VQ				
5+45	0.4326	1.50	V Q				
5+50	0.4430	1.51	V Q				
5+55	0.4534	1.51	V Q				
6+ 0	0.4638	1.51	V Q				
6+ 5	0.4748	1.59	V Q				
6+10	0.4863	1.67	V Q				
6+15	0.4979	1.69	V Q				
6+20	0.5096	1.70	VQ				
6+25	0.5213	1.70	VQ				
6+30	0.5330	1.70	VQ				
6+35	0.5453	1.78	V Q				
6+40	0.5581	1.86	V Q				
6+45	0.5710	1.88	V Q				
6+50	0.5840	1.89	V Q				
6+55	0.5970	1.89	V Q				
7+ 0	0.6100	1.89	VQ				
7+ 5	0.6230	1.89	VQ				

7+10	0.6361	1.89	VQ			
7+15	0.6491	1.89	VQ			
7+20	0.6626	1.97	VQ			
7+25	0.6767	2.05	V Q			
7+30	0.6910	2.07	V Q			
7+35	0.7058	2.15	VQ			
7+40	0.7212	2.24	VQ			
7+45	0.7367	2.26	V Q			
7+50	0.7529	2.34	V Q			
7+55	0.7696	2.43	V Q			
8+ 0	0.7864	2.45	V Q			
8+ 5	0.8044	2.61	V Q			
8+10	0.8235	2.78	V  Q			
8+15	0.8429	2.81	V  Q			
8+20	0.8624	2.83	V  Q			
8+25	0.8819	2.83	V  Q			
8+30	0.9014	2.83	V  Q			
8+35	0.9214	2.91	V Q			
8+40	0.9421	2.99	V Q			
8+45	0.9628	3.01	V  Q			
8+50	0.9841	3.10	V  Q			
8+55	1.0061	3.18	V Q			
9+ 0	1.0281	3.20	V Q			
9+ 5	1.0513	3.36	V Q			
9+10	1.0756	3.53	V Q			
9+15	1.1002	3.57	V Q			
9+20	1.1254	3.66	V Q			
9+25	1.1512	3.75	V Q			
9+30	1.1772	3.77	V Q			
9+35	1.2037	3.85	V Q			
9+40	1.2308	3.94	V Q			
9+45	1.2581	3.96	V Q			
9+50	1.2859	4.04	V Q			
9+55	1.3143	4.13	V Q			
10+ 0	1.3429	4.15	V Q			
10+ 5	1.3677	3.61	VQ			
10+10	1.3886	3.02	QV			
10+15	1.4085	2.90	Q V			
10+20	1.4282	2.85	Q V			
10+25	1.4477	2.83	Q V			
10+30	1.4672	2.83	Q V			
10+35	1.4894	3.22	Q V			
10+40	1.5145	3.64	QV			
10+45	1.5401	3.73	QV			
10+50	1.5661	3.76	Q			
10+55	1.5921	3.78	Q			
11+ 0	1.6181	3.78	QV			
11+ 5	1.6436	3.70	Q V			
11+10	1.6685	3.62	Q V			
11+15	1.6933	3.60	Q V			





15+30	3.4674	4.65			Q	V
15+35	3.4966	4.24			Q	V
15+40	3.5228	3.80			Q	V
15+45	3.5483	3.71			Q	V
15+50	3.5737	3.68			Q	V
15+55	3.5990	3.67			Q	V
16+ 0	3.6243	3.68			Q	V
16+ 5	3.6414	2.47		Q		V
16+10	3.6495	1.18		Q		V
16+15	3.6557	0.91	Q			V
16+20	3.6612	0.80	Q			V
16+25	3.6664	0.76	Q			V
16+30	3.6716	0.76	Q			V
16+35	3.6763	0.68	Q			V
16+40	3.6804	0.59	Q			V
16+45	3.6844	0.58	Q			V
16+50	3.6883	0.57	Q			V
16+55	3.6922	0.57	Q			V
17+ 0	3.6961	0.57	Q			V
17+ 5	3.7011	0.72	Q			V
17+10	3.7072	0.89	Q			V
17+15	3.7136	0.92	Q			V
17+20	3.7200	0.94	Q			V
17+25	3.7265	0.94	Q			V
17+30	3.7330	0.94	Q			V
17+35	3.7395	0.94	Q			V
17+40	3.7460	0.94	Q			V
17+45	3.7526	0.94	Q			V
17+50	3.7585	0.87	Q			V
17+55	3.7639	0.78	Q			V
18+ 0	3.7692	0.77	Q			V
18+ 5	3.7744	0.76	Q			V
18+10	3.7796	0.76	Q			V
18+15	3.7848	0.76	Q			V
18+20	3.7900	0.76	Q			V
18+25	3.7952	0.76	Q			V
18+30	3.8004	0.76	Q			V
18+35	3.8051	0.68	Q			V
18+40	3.8092	0.59	Q			V
18+45	3.8131	0.58	Q			V
18+50	3.8165	0.49	Q			V
18+55	3.8193	0.41	Q			V
19+ 0	3.8220	0.39	Q			V
19+ 5	3.8251	0.46	Q			V
19+10	3.8289	0.54	Q			V
19+15	3.8327	0.56	Q			V
19+20	3.8371	0.64	Q			V
19+25	3.8421	0.73	Q			V
19+30	3.8473	0.75	Q			V
19+35	3.8519	0.67	Q			V

19+40	3.8560	0.59	Q				V
19+45	3.8600	0.58	Q				V
19+50	3.8634	0.49	Q				V
19+55	3.8661	0.41	Q				V
20+ 0	3.8688	0.39	Q				V
20+ 5	3.8720	0.46	Q				V
20+10	3.8757	0.54	Q				V
20+15	3.8795	0.56	Q				V
20+20	3.8834	0.56	Q				V
20+25	3.8873	0.57	Q				V
20+30	3.8912	0.57	Q				V
20+35	3.8951	0.57	Q				V
20+40	3.8990	0.57	Q				V
20+45	3.9029	0.57	Q				V
20+50	3.9063	0.49	Q				V
20+55	3.9091	0.41	Q				V
21+ 0	3.9117	0.39	Q				V
21+ 5	3.9149	0.46	Q				V
21+10	3.9186	0.54	Q				V
21+15	3.9224	0.56	Q				V
21+20	3.9258	0.49	Q				V
21+25	3.9286	0.41	Q				V
21+30	3.9312	0.39	Q				V
21+35	3.9344	0.46	Q				V
21+40	3.9381	0.54	Q				V
21+45	3.9420	0.56	Q				V
21+50	3.9453	0.49	Q				V
21+55	3.9481	0.41	Q				V
22+ 0	3.9508	0.39	Q				V
22+ 5	3.9539	0.46	Q				V
22+10	3.9576	0.54	Q				V
22+15	3.9615	0.56	Q				V
22+20	3.9648	0.49	Q				V
22+25	3.9676	0.41	Q				V
22+30	3.9703	0.39	Q				V
22+35	3.9729	0.38	Q				V
22+40	3.9755	0.38	Q				V
22+45	3.9781	0.38	Q				V
22+50	3.9807	0.38	Q				V
22+55	3.9833	0.38	Q				V
23+ 0	3.9859	0.38	Q				V
23+ 5	3.9885	0.38	Q				V
23+10	3.9911	0.38	Q				V
23+15	3.9937	0.38	Q				V
23+20	3.9963	0.38	Q				V
23+25	3.9989	0.38	Q				V
23+30	4.0015	0.38	Q				V
23+35	4.0041	0.38	Q				V
23+40	4.0067	0.38	Q				V
23+45	4.0093	0.38	Q				V

23+50	4.0119	0.38	Q				V
23+55	4.0145	0.38	Q				V
24+ 0	4.0171	0.38	Q				V
24+ 5	4.0186	0.22	Q				V
24+10	4.0190	0.05	Q				V
24+15	4.0192	0.02	Q				V
24+20	4.0192	0.01	Q				V

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Unit Hydrograph Analysis

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Study date 05/27/22 File: MapesPost10BUH2410.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6443

-----  
English (in-lb) Input Units Used  
English Rainfall Data (Inches) Input Values Used  
  
English Units used in output format

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MAPES AND TRUMBLE INDUSTRIAL FACILITY  
UNIT HYDROGRAPH  
POST-DEVELOPMENT CONDITIONS  
10-YEAR, 24HR STORM, DA B

-----  
Drainage Area = 0.92(Ac.) = 0.001 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 0.92(Ac.) =  
0.001 Sq. Mi.  
Length along longest watercourse = 834.61(Ft.)  
Length along longest watercourse measured to centroid = 558.41(Ft.)  
Length along longest watercourse = 0.158 Mi.  
Length along longest watercourse measured to centroid = 0.106 Mi.  
Difference in elevation = 9.65(Ft.)  
Slope along watercourse = 61.0489 Ft./Mi.  
Average Manning's 'N' = 0.015  
Lag time = 0.035 Hr.  
Lag time = 2.09 Min.  
25% of lag time = 0.52 Min.  
40% of lag time = 0.84 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]  
                   0.92                    2.06                    1.90

100 YEAR Area rainfall data:

Area(Ac.)[1]            Rainfall(In)[2]            Weighting[1\*2]  
                   0.92                    5.31                    4.89

STORM EVENT (YEAR) = 10.00  
 Area Averaged 2-Year Rainfall = 2.060(In)  
 Area Averaged 100-Year Rainfall = 5.310(In)

Point rain (area averaged) = 3.397(In)  
 Areal adjustment factor = 100.00 %  
 Adjusted average point rain = 3.397(In)

Sub-Area Data:

Area(Ac.)            Runoff Index    Impervious %  
                   0.920            75.00            0.730  
 Total Area Entered = 0.92(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-2	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
75.0	75.0	0.303	0.730	0.104	1.000	0.104
Sum (F) =						0.104

Area averaged mean soil loss (F) (In/Hr) = 0.104  
 Minimum soil loss rate ((In/Hr)) = 0.052  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.313

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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 Hydrograph Data  
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Unit time period	Time % of lag	Distribution	Unit Hydrograph
(hrs)		Graph %	(CFS)
1	0.083	239.327	49.466
2	0.167	478.653	40.724
3	0.250	717.980	7.375
4	0.333	957.306	2.435
		Sum = 100.000	Sum= 0.927

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The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.07	0.027	( 0.184)	0.009	0.019
2	0.17	0.07	0.027	( 0.184)	0.009	0.019
3	0.25	0.07	0.027	( 0.183)	0.009	0.019
4	0.33	0.10	0.041	( 0.182)	0.013	0.028
5	0.42	0.10	0.041	( 0.181)	0.013	0.028
6	0.50	0.10	0.041	( 0.181)	0.013	0.028
7	0.58	0.10	0.041	( 0.180)	0.013	0.028
8	0.67	0.10	0.041	( 0.179)	0.013	0.028
9	0.75	0.10	0.041	( 0.179)	0.013	0.028
10	0.83	0.13	0.054	( 0.178)	0.017	0.037
11	0.92	0.13	0.054	( 0.177)	0.017	0.037
12	1.00	0.13	0.054	( 0.176)	0.017	0.037
13	1.08	0.10	0.041	( 0.176)	0.013	0.028
14	1.17	0.10	0.041	( 0.175)	0.013	0.028
15	1.25	0.10	0.041	( 0.174)	0.013	0.028
16	1.33	0.10	0.041	( 0.174)	0.013	0.028
17	1.42	0.10	0.041	( 0.173)	0.013	0.028
18	1.50	0.10	0.041	( 0.172)	0.013	0.028
19	1.58	0.10	0.041	( 0.172)	0.013	0.028
20	1.67	0.10	0.041	( 0.171)	0.013	0.028
21	1.75	0.10	0.041	( 0.170)	0.013	0.028
22	1.83	0.13	0.054	( 0.170)	0.017	0.037
23	1.92	0.13	0.054	( 0.169)	0.017	0.037
24	2.00	0.13	0.054	( 0.168)	0.017	0.037
25	2.08	0.13	0.054	( 0.168)	0.017	0.037
26	2.17	0.13	0.054	( 0.167)	0.017	0.037
27	2.25	0.13	0.054	( 0.166)	0.017	0.037
28	2.33	0.13	0.054	( 0.165)	0.017	0.037
29	2.42	0.13	0.054	( 0.165)	0.017	0.037
30	2.50	0.13	0.054	( 0.164)	0.017	0.037
31	2.58	0.17	0.068	( 0.163)	0.021	0.047
32	2.67	0.17	0.068	( 0.163)	0.021	0.047
33	2.75	0.17	0.068	( 0.162)	0.021	0.047
34	2.83	0.17	0.068	( 0.161)	0.021	0.047
35	2.92	0.17	0.068	( 0.161)	0.021	0.047
36	3.00	0.17	0.068	( 0.160)	0.021	0.047
37	3.08	0.17	0.068	( 0.159)	0.021	0.047
38	3.17	0.17	0.068	( 0.159)	0.021	0.047
39	3.25	0.17	0.068	( 0.158)	0.021	0.047
40	3.33	0.17	0.068	( 0.157)	0.021	0.047
41	3.42	0.17	0.068	( 0.157)	0.021	0.047
42	3.50	0.17	0.068	( 0.156)	0.021	0.047
43	3.58	0.17	0.068	( 0.156)	0.021	0.047
44	3.67	0.17	0.068	( 0.155)	0.021	0.047
45	3.75	0.17	0.068	( 0.154)	0.021	0.047

46	3.83	0.20	0.082	( 0.154)	0.026	0.056
47	3.92	0.20	0.082	( 0.153)	0.026	0.056
48	4.00	0.20	0.082	( 0.152)	0.026	0.056
49	4.08	0.20	0.082	( 0.152)	0.026	0.056
50	4.17	0.20	0.082	( 0.151)	0.026	0.056
51	4.25	0.20	0.082	( 0.150)	0.026	0.056
52	4.33	0.23	0.095	( 0.150)	0.030	0.065
53	4.42	0.23	0.095	( 0.149)	0.030	0.065
54	4.50	0.23	0.095	( 0.148)	0.030	0.065
55	4.58	0.23	0.095	( 0.148)	0.030	0.065
56	4.67	0.23	0.095	( 0.147)	0.030	0.065
57	4.75	0.23	0.095	( 0.147)	0.030	0.065
58	4.83	0.27	0.109	( 0.146)	0.034	0.075
59	4.92	0.27	0.109	( 0.145)	0.034	0.075
60	5.00	0.27	0.109	( 0.145)	0.034	0.075
61	5.08	0.20	0.082	( 0.144)	0.026	0.056
62	5.17	0.20	0.082	( 0.143)	0.026	0.056
63	5.25	0.20	0.082	( 0.143)	0.026	0.056
64	5.33	0.23	0.095	( 0.142)	0.030	0.065
65	5.42	0.23	0.095	( 0.141)	0.030	0.065
66	5.50	0.23	0.095	( 0.141)	0.030	0.065
67	5.58	0.27	0.109	( 0.140)	0.034	0.075
68	5.67	0.27	0.109	( 0.140)	0.034	0.075
69	5.75	0.27	0.109	( 0.139)	0.034	0.075
70	5.83	0.27	0.109	( 0.138)	0.034	0.075
71	5.92	0.27	0.109	( 0.138)	0.034	0.075
72	6.00	0.27	0.109	( 0.137)	0.034	0.075
73	6.08	0.30	0.122	( 0.137)	0.038	0.084
74	6.17	0.30	0.122	( 0.136)	0.038	0.084
75	6.25	0.30	0.122	( 0.135)	0.038	0.084
76	6.33	0.30	0.122	( 0.135)	0.038	0.084
77	6.42	0.30	0.122	( 0.134)	0.038	0.084
78	6.50	0.30	0.122	( 0.134)	0.038	0.084
79	6.58	0.33	0.136	( 0.133)	0.043	0.093
80	6.67	0.33	0.136	( 0.132)	0.043	0.093
81	6.75	0.33	0.136	( 0.132)	0.043	0.093
82	6.83	0.33	0.136	( 0.131)	0.043	0.093
83	6.92	0.33	0.136	( 0.131)	0.043	0.093
84	7.00	0.33	0.136	( 0.130)	0.043	0.093
85	7.08	0.33	0.136	( 0.129)	0.043	0.093
86	7.17	0.33	0.136	( 0.129)	0.043	0.093
87	7.25	0.33	0.136	( 0.128)	0.043	0.093
88	7.33	0.37	0.149	( 0.128)	0.047	0.103
89	7.42	0.37	0.149	( 0.127)	0.047	0.103
90	7.50	0.37	0.149	( 0.126)	0.047	0.103
91	7.58	0.40	0.163	( 0.126)	0.051	0.112
92	7.67	0.40	0.163	( 0.125)	0.051	0.112
93	7.75	0.40	0.163	( 0.125)	0.051	0.112
94	7.83	0.43	0.177	( 0.124)	0.055	0.121
95	7.92	0.43	0.177	( 0.124)	0.055	0.121

96	8.00	0.43	0.177	( 0.123)	0.055	0.121
97	8.08	0.50	0.204	( 0.122)	0.064	0.140
98	8.17	0.50	0.204	( 0.122)	0.064	0.140
99	8.25	0.50	0.204	( 0.121)	0.064	0.140
100	8.33	0.50	0.204	( 0.121)	0.064	0.140
101	8.42	0.50	0.204	( 0.120)	0.064	0.140
102	8.50	0.50	0.204	( 0.120)	0.064	0.140
103	8.58	0.53	0.217	( 0.119)	0.068	0.149
104	8.67	0.53	0.217	( 0.118)	0.068	0.149
105	8.75	0.53	0.217	( 0.118)	0.068	0.149
106	8.83	0.57	0.231	( 0.117)	0.072	0.159
107	8.92	0.57	0.231	( 0.117)	0.072	0.159
108	9.00	0.57	0.231	( 0.116)	0.072	0.159
109	9.08	0.63	0.258	( 0.116)	0.081	0.177
110	9.17	0.63	0.258	( 0.115)	0.081	0.177
111	9.25	0.63	0.258	( 0.115)	0.081	0.177
112	9.33	0.67	0.272	( 0.114)	0.085	0.187
113	9.42	0.67	0.272	( 0.114)	0.085	0.187
114	9.50	0.67	0.272	( 0.113)	0.085	0.187
115	9.58	0.70	0.285	( 0.112)	0.089	0.196
116	9.67	0.70	0.285	( 0.112)	0.089	0.196
117	9.75	0.70	0.285	( 0.111)	0.089	0.196
118	9.83	0.73	0.299	( 0.111)	0.094	0.205
119	9.92	0.73	0.299	( 0.110)	0.094	0.205
120	10.00	0.73	0.299	( 0.110)	0.094	0.205
121	10.08	0.50	0.204	( 0.109)	0.064	0.140
122	10.17	0.50	0.204	( 0.109)	0.064	0.140
123	10.25	0.50	0.204	( 0.108)	0.064	0.140
124	10.33	0.50	0.204	( 0.108)	0.064	0.140
125	10.42	0.50	0.204	( 0.107)	0.064	0.140
126	10.50	0.50	0.204	( 0.107)	0.064	0.140
127	10.58	0.67	0.272	( 0.106)	0.085	0.187
128	10.67	0.67	0.272	( 0.106)	0.085	0.187
129	10.75	0.67	0.272	( 0.105)	0.085	0.187
130	10.83	0.67	0.272	( 0.105)	0.085	0.187
131	10.92	0.67	0.272	( 0.104)	0.085	0.187
132	11.00	0.67	0.272	( 0.103)	0.085	0.187
133	11.08	0.63	0.258	( 0.103)	0.081	0.177
134	11.17	0.63	0.258	( 0.102)	0.081	0.177
135	11.25	0.63	0.258	( 0.102)	0.081	0.177
136	11.33	0.63	0.258	( 0.101)	0.081	0.177
137	11.42	0.63	0.258	( 0.101)	0.081	0.177
138	11.50	0.63	0.258	( 0.100)	0.081	0.177
139	11.58	0.57	0.231	( 0.100)	0.072	0.159
140	11.67	0.57	0.231	( 0.099)	0.072	0.159
141	11.75	0.57	0.231	( 0.099)	0.072	0.159
142	11.83	0.60	0.245	( 0.098)	0.077	0.168
143	11.92	0.60	0.245	( 0.098)	0.077	0.168
144	12.00	0.60	0.245	( 0.098)	0.077	0.168
145	12.08	0.83	0.340	0.097 ( 0.106)		0.243



146	12.17	0.83	0.340	0.097	( 0.106)	0.243
147	12.25	0.83	0.340	0.096	( 0.106)	0.244
148	12.33	0.87	0.353	0.096	( 0.111)	0.258
149	12.42	0.87	0.353	0.095	( 0.111)	0.258
150	12.50	0.87	0.353	0.095	( 0.111)	0.259
151	12.58	0.93	0.380	0.094	( 0.119)	0.286
152	12.67	0.93	0.380	0.094	( 0.119)	0.287
153	12.75	0.93	0.380	0.093	( 0.119)	0.287
154	12.83	0.97	0.394	0.093	( 0.123)	0.301
155	12.92	0.97	0.394	0.092	( 0.123)	0.302
156	13.00	0.97	0.394	0.092	( 0.123)	0.302
157	13.08	1.13	0.462	0.091	( 0.145)	0.371
158	13.17	1.13	0.462	0.091	( 0.145)	0.371
159	13.25	1.13	0.462	0.090	( 0.145)	0.372
160	13.33	1.13	0.462	0.090	( 0.145)	0.372
161	13.42	1.13	0.462	0.089	( 0.145)	0.373
162	13.50	1.13	0.462	0.089	( 0.145)	0.373
163	13.58	0.77	0.313	0.089	( 0.098)	0.224
164	13.67	0.77	0.313	0.088	( 0.098)	0.224
165	13.75	0.77	0.313	0.088	( 0.098)	0.225
166	13.83	0.77	0.313	0.087	( 0.098)	0.225
167	13.92	0.77	0.313	0.087	( 0.098)	0.226
168	14.00	0.77	0.313	0.086	( 0.098)	0.226
169	14.08	0.90	0.367	0.086	( 0.115)	0.281
170	14.17	0.90	0.367	0.085	( 0.115)	0.281
171	14.25	0.90	0.367	0.085	( 0.115)	0.282
172	14.33	0.87	0.353	0.085	( 0.111)	0.269
173	14.42	0.87	0.353	0.084	( 0.111)	0.269
174	14.50	0.87	0.353	0.084	( 0.111)	0.270
175	14.58	0.87	0.353	0.083	( 0.111)	0.270
176	14.67	0.87	0.353	0.083	( 0.111)	0.270
177	14.75	0.87	0.353	0.082	( 0.111)	0.271
178	14.83	0.83	0.340	0.082	( 0.106)	0.258
179	14.92	0.83	0.340	0.082	( 0.106)	0.258
180	15.00	0.83	0.340	0.081	( 0.106)	0.259
181	15.08	0.80	0.326	0.081	( 0.102)	0.245
182	15.17	0.80	0.326	0.080	( 0.102)	0.246
183	15.25	0.80	0.326	0.080	( 0.102)	0.246
184	15.33	0.77	0.313	0.080	( 0.098)	0.233
185	15.42	0.77	0.313	0.079	( 0.098)	0.233
186	15.50	0.77	0.313	0.079	( 0.098)	0.234
187	15.58	0.63	0.258	0.078	( 0.081)	0.180
188	15.67	0.63	0.258	0.078	( 0.081)	0.180
189	15.75	0.63	0.258	0.078	( 0.081)	0.181
190	15.83	0.63	0.258	0.077	( 0.081)	0.181
191	15.92	0.63	0.258	0.077	( 0.081)	0.181
192	16.00	0.63	0.258	0.076	( 0.081)	0.182
193	16.08	0.13	0.054	( 0.076)	0.017	0.037
194	16.17	0.13	0.054	( 0.076)	0.017	0.037
195	16.25	0.13	0.054	( 0.075)	0.017	0.037

196	16.33	0.13	0.054	( 0.075)	0.017	0.037
197	16.42	0.13	0.054	( 0.074)	0.017	0.037
198	16.50	0.13	0.054	( 0.074)	0.017	0.037
199	16.58	0.10	0.041	( 0.074)	0.013	0.028
200	16.67	0.10	0.041	( 0.073)	0.013	0.028
201	16.75	0.10	0.041	( 0.073)	0.013	0.028
202	16.83	0.10	0.041	( 0.073)	0.013	0.028
203	16.92	0.10	0.041	( 0.072)	0.013	0.028
204	17.00	0.10	0.041	( 0.072)	0.013	0.028
205	17.08	0.17	0.068	( 0.071)	0.021	0.047
206	17.17	0.17	0.068	( 0.071)	0.021	0.047
207	17.25	0.17	0.068	( 0.071)	0.021	0.047
208	17.33	0.17	0.068	( 0.070)	0.021	0.047
209	17.42	0.17	0.068	( 0.070)	0.021	0.047
210	17.50	0.17	0.068	( 0.070)	0.021	0.047
211	17.58	0.17	0.068	( 0.069)	0.021	0.047
212	17.67	0.17	0.068	( 0.069)	0.021	0.047
213	17.75	0.17	0.068	( 0.069)	0.021	0.047
214	17.83	0.13	0.054	( 0.068)	0.017	0.037
215	17.92	0.13	0.054	( 0.068)	0.017	0.037
216	18.00	0.13	0.054	( 0.068)	0.017	0.037
217	18.08	0.13	0.054	( 0.067)	0.017	0.037
218	18.17	0.13	0.054	( 0.067)	0.017	0.037
219	18.25	0.13	0.054	( 0.067)	0.017	0.037
220	18.33	0.13	0.054	( 0.066)	0.017	0.037
221	18.42	0.13	0.054	( 0.066)	0.017	0.037
222	18.50	0.13	0.054	( 0.066)	0.017	0.037
223	18.58	0.10	0.041	( 0.065)	0.013	0.028
224	18.67	0.10	0.041	( 0.065)	0.013	0.028
225	18.75	0.10	0.041	( 0.065)	0.013	0.028
226	18.83	0.07	0.027	( 0.064)	0.009	0.019
227	18.92	0.07	0.027	( 0.064)	0.009	0.019
228	19.00	0.07	0.027	( 0.064)	0.009	0.019
229	19.08	0.10	0.041	( 0.063)	0.013	0.028
230	19.17	0.10	0.041	( 0.063)	0.013	0.028
231	19.25	0.10	0.041	( 0.063)	0.013	0.028
232	19.33	0.13	0.054	( 0.063)	0.017	0.037
233	19.42	0.13	0.054	( 0.062)	0.017	0.037
234	19.50	0.13	0.054	( 0.062)	0.017	0.037
235	19.58	0.10	0.041	( 0.062)	0.013	0.028
236	19.67	0.10	0.041	( 0.061)	0.013	0.028
237	19.75	0.10	0.041	( 0.061)	0.013	0.028
238	19.83	0.07	0.027	( 0.061)	0.009	0.019
239	19.92	0.07	0.027	( 0.061)	0.009	0.019
240	20.00	0.07	0.027	( 0.060)	0.009	0.019
241	20.08	0.10	0.041	( 0.060)	0.013	0.028
242	20.17	0.10	0.041	( 0.060)	0.013	0.028
243	20.25	0.10	0.041	( 0.060)	0.013	0.028
244	20.33	0.10	0.041	( 0.059)	0.013	0.028
245	20.42	0.10	0.041	( 0.059)	0.013	0.028

246	20.50	0.10	0.041	( 0.059)	0.013	0.028
247	20.58	0.10	0.041	( 0.059)	0.013	0.028
248	20.67	0.10	0.041	( 0.058)	0.013	0.028
249	20.75	0.10	0.041	( 0.058)	0.013	0.028
250	20.83	0.07	0.027	( 0.058)	0.009	0.019
251	20.92	0.07	0.027	( 0.058)	0.009	0.019
252	21.00	0.07	0.027	( 0.057)	0.009	0.019
253	21.08	0.10	0.041	( 0.057)	0.013	0.028
254	21.17	0.10	0.041	( 0.057)	0.013	0.028
255	21.25	0.10	0.041	( 0.057)	0.013	0.028
256	21.33	0.07	0.027	( 0.056)	0.009	0.019
257	21.42	0.07	0.027	( 0.056)	0.009	0.019
258	21.50	0.07	0.027	( 0.056)	0.009	0.019
259	21.58	0.10	0.041	( 0.056)	0.013	0.028
260	21.67	0.10	0.041	( 0.056)	0.013	0.028
261	21.75	0.10	0.041	( 0.055)	0.013	0.028
262	21.83	0.07	0.027	( 0.055)	0.009	0.019
263	21.92	0.07	0.027	( 0.055)	0.009	0.019
264	22.00	0.07	0.027	( 0.055)	0.009	0.019
265	22.08	0.10	0.041	( 0.055)	0.013	0.028
266	22.17	0.10	0.041	( 0.055)	0.013	0.028
267	22.25	0.10	0.041	( 0.054)	0.013	0.028
268	22.33	0.07	0.027	( 0.054)	0.009	0.019
269	22.42	0.07	0.027	( 0.054)	0.009	0.019
270	22.50	0.07	0.027	( 0.054)	0.009	0.019
271	22.58	0.07	0.027	( 0.054)	0.009	0.019
272	22.67	0.07	0.027	( 0.054)	0.009	0.019
273	22.75	0.07	0.027	( 0.053)	0.009	0.019
274	22.83	0.07	0.027	( 0.053)	0.009	0.019
275	22.92	0.07	0.027	( 0.053)	0.009	0.019
276	23.00	0.07	0.027	( 0.053)	0.009	0.019
277	23.08	0.07	0.027	( 0.053)	0.009	0.019
278	23.17	0.07	0.027	( 0.053)	0.009	0.019
279	23.25	0.07	0.027	( 0.053)	0.009	0.019
280	23.33	0.07	0.027	( 0.053)	0.009	0.019
281	23.42	0.07	0.027	( 0.052)	0.009	0.019
282	23.50	0.07	0.027	( 0.052)	0.009	0.019
283	23.58	0.07	0.027	( 0.052)	0.009	0.019
284	23.67	0.07	0.027	( 0.052)	0.009	0.019
285	23.75	0.07	0.027	( 0.052)	0.009	0.019
286	23.83	0.07	0.027	( 0.052)	0.009	0.019
287	23.92	0.07	0.027	( 0.052)	0.009	0.019
288	24.00	0.07	0.027	( 0.052)	0.009	0.019

(Loss Rate Not Used)

Sum = 100.0

Sum = 29.1

Flood volume = Effective rainfall 2.43(In)  
times area 0.9(Ac.)/[((In)/(Ft.))] = 0.2(Ac.Ft)

Total soil loss = 0.97(In)

Total soil loss = 0.074(Ac.Ft)

Total rainfall = 3.40(In)

Flood volume = 8100.5 Cubic Feet  
 Total soil loss = 3244.4 Cubic Feet

-----  
 Peak flow rate of this hydrograph = 0.346(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	0.0002	0.02	Q				
0+15	0.0003	0.02	Q				
0+20	0.0004	0.02	Q				
0+25	0.0006	0.03	Q				
0+30	0.0008	0.03	Q				
0+35	0.0010	0.03	Q				
0+40	0.0011	0.03	Q				
0+45	0.0013	0.03	Q				
0+50	0.0015	0.03	Q				
0+55	0.0018	0.03	Q				
1+ 0	0.0020	0.03	Q				
1+ 5	0.0022	0.03	Q				
1+10	0.0024	0.03	Q				
1+15	0.0026	0.03	Q				
1+20	0.0028	0.03	Q				
1+25	0.0029	0.03	Q				
1+30	0.0031	0.03	Q				
1+35	0.0033	0.03	Q				
1+40	0.0035	0.03	Q				
1+45	0.0036	0.03	Q				
1+50	0.0039	0.03	Q				
1+55	0.0041	0.03	Q				
2+ 0	0.0043	0.03	Q				
2+ 5	0.0046	0.03	Q				
2+10	0.0048	0.03	QV				
2+15	0.0050	0.03	QV				
2+20	0.0053	0.03	QV				
2+25	0.0055	0.03	QV				
2+30	0.0058	0.03	QV				
2+35	0.0060	0.04	QV				
2+40	0.0063	0.04	QV				
2+45	0.0066	0.04	QV				
2+50	0.0069	0.04	QV				
2+55	0.0072	0.04	QV				
3+ 0	0.0075	0.04	QV				

3+ 5	0.0078	0.04	QV
3+10	0.0081	0.04	QV
3+15	0.0084	0.04	QV
3+20	0.0087	0.04	QV
3+25	0.0090	0.04	QV
3+30	0.0093	0.04	QV
3+35	0.0096	0.04	Q V
3+40	0.0099	0.04	Q V
3+45	0.0102	0.04	Q V
3+50	0.0105	0.05	Q V
3+55	0.0109	0.05	Q V
4+ 0	0.0112	0.05	Q V
4+ 5	0.0116	0.05	Q V
4+10	0.0119	0.05	Q V
4+15	0.0123	0.05	Q V
4+20	0.0127	0.06	Q V
4+25	0.0131	0.06	Q V
4+30	0.0135	0.06	Q V
4+35	0.0139	0.06	Q V
4+40	0.0144	0.06	Q V
4+45	0.0148	0.06	Q V
4+50	0.0152	0.06	Q V
4+55	0.0157	0.07	Q V
5+ 0	0.0162	0.07	Q V
5+ 5	0.0166	0.06	Q V
5+10	0.0169	0.05	Q V
5+15	0.0173	0.05	Q V
5+20	0.0177	0.06	Q V
5+25	0.0181	0.06	Q V
5+30	0.0185	0.06	Q V
5+35	0.0190	0.06	Q V
5+40	0.0194	0.07	Q V
5+45	0.0199	0.07	Q V
5+50	0.0204	0.07	Q V
5+55	0.0209	0.07	Q V
6+ 0	0.0214	0.07	Q V
6+ 5	0.0219	0.07	Q V
6+10	0.0224	0.08	Q V
6+15	0.0229	0.08	Q V
6+20	0.0235	0.08	Q V
6+25	0.0240	0.08	Q V
6+30	0.0245	0.08	Q V
6+35	0.0251	0.08	Q V
6+40	0.0257	0.09	Q V
6+45	0.0263	0.09	Q V
6+50	0.0269	0.09	Q V
6+55	0.0275	0.09	Q V
7+ 0	0.0281	0.09	Q V
7+ 5	0.0287	0.09	Q V
7+10	0.0293	0.09	Q V

7+15	0.0299	0.09	Q	V				
7+20	0.0305	0.09	Q	V				
7+25	0.0311	0.09	Q	V				
7+30	0.0318	0.10	Q	V				
7+35	0.0325	0.10	Q	V				
7+40	0.0332	0.10	Q	V				
7+45	0.0339	0.10	Q	V				
7+50	0.0346	0.11	Q	V				
7+55	0.0354	0.11	Q	V				
8+ 0	0.0362	0.11	Q	V				
8+ 5	0.0370	0.12	Q	V				
8+10	0.0379	0.13	Q	V				
8+15	0.0388	0.13	Q	V				
8+20	0.0397	0.13	Q	V				
8+25	0.0406	0.13	Q	V				
8+30	0.0415	0.13	Q	V				
8+35	0.0424	0.13	Q	V				
8+40	0.0434	0.14	Q	V				
8+45	0.0443	0.14	Q	V				
8+50	0.0453	0.14	Q	V				
8+55	0.0463	0.15	Q	V				
9+ 0	0.0473	0.15	Q	V				
9+ 5	0.0484	0.16	Q	V				
9+10	0.0495	0.16	Q	V				
9+15	0.0506	0.16	Q	V				
9+20	0.0518	0.17	Q	V				
9+25	0.0530	0.17	Q	V				
9+30	0.0542	0.17	Q	V				
9+35	0.0554	0.18	Q	V				
9+40	0.0566	0.18	Q	V				
9+45	0.0579	0.18	Q	V				
9+50	0.0592	0.19	Q	V				
9+55	0.0605	0.19	Q	V				
10+ 0	0.0618	0.19	Q	V				
10+ 5	0.0629	0.16	Q	V				
10+10	0.0638	0.14	Q	V				
10+15	0.0647	0.13	Q	V				
10+20	0.0656	0.13	Q	V				
10+25	0.0665	0.13	Q	V				
10+30	0.0674	0.13	Q	V				
10+35	0.0685	0.15	Q	V				
10+40	0.0696	0.17	Q	V				
10+45	0.0708	0.17	Q	V				
10+50	0.0720	0.17	Q	V				
10+55	0.0732	0.17	Q	V				
11+ 0	0.0744	0.17	Q	V				
11+ 5	0.0756	0.17	Q	V				
11+10	0.0767	0.17	Q	V				
11+15	0.0778	0.16	Q	V				
11+20	0.0790	0.16	Q	V				

11+25	0.0801	0.16	Q	V			
11+30	0.0812	0.16	Q	V			
11+35	0.0823	0.16	Q	V			
11+40	0.0833	0.15	Q	V			
11+45	0.0844	0.15	Q	V			
11+50	0.0854	0.15	Q	V			
11+55	0.0865	0.16	Q	V			
12+ 0	0.0875	0.16	Q	V			
12+ 5	0.0888	0.19	Q	V			
12+10	0.0904	0.22	Q	V			
12+15	0.0919	0.22	Q	V			
12+20	0.0935	0.23	Q	V			
12+25	0.0951	0.24	Q	V			
12+30	0.0968	0.24	Q	V			
12+35	0.0985	0.25	Q	V			
12+40	0.1003	0.26	Q	V			
12+45	0.1022	0.27	Q	V			
12+50	0.1040	0.27	Q	V			
12+55	0.1060	0.28	Q	V			
13+ 0	0.1079	0.28	Q	V			
13+ 5	0.1100	0.31	Q	V			
13+10	0.1124	0.34	Q	V			
13+15	0.1147	0.34	Q	V			
13+20	0.1171	0.34	Q	V			
13+25	0.1195	0.35	Q	V			
13+30	0.1219	0.35	Q	V			
13+35	0.1238	0.28	Q	V			
13+40	0.1253	0.22	Q	V			
13+45	0.1268	0.21	Q	V			
13+50	0.1282	0.21	Q	V			
13+55	0.1296	0.21	Q	V			
14+ 0	0.1311	0.21	Q	V			
14+ 5	0.1327	0.23	Q	V			
14+10	0.1345	0.26	Q	V			
14+15	0.1362	0.26	Q	V			
14+20	0.1380	0.26	Q	V			
14+25	0.1397	0.25	Q	V			
14+30	0.1415	0.25	Q	V			
14+35	0.1432	0.25	Q	V			
14+40	0.1449	0.25	Q	V			
14+45	0.1466	0.25	Q	V			
14+50	0.1483	0.25	Q	V			
14+55	0.1500	0.24	Q	V			
15+ 0	0.1516	0.24	Q	V			
15+ 5	0.1532	0.23	Q	V			
15+10	0.1548	0.23	Q	V			
15+15	0.1564	0.23	Q	V			
15+20	0.1579	0.22	Q	V			
15+25	0.1594	0.22	Q	V			
15+30	0.1609	0.22	Q	V			

15+35	0.1622	0.19	Q				V
15+40	0.1634	0.17	Q				V
15+45	0.1646	0.17	Q				V
15+50	0.1657	0.17	Q				V
15+55	0.1669	0.17	Q				V
16+ 0	0.1681	0.17	Q				V
16+ 5	0.1688	0.10	Q				V
16+10	0.1691	0.05	Q				V
16+15	0.1694	0.04	Q				V
16+20	0.1696	0.03	Q				V
16+25	0.1698	0.03	Q				V
16+30	0.1701	0.03	Q				V
16+35	0.1703	0.03	Q				V
16+40	0.1705	0.03	Q				V
16+45	0.1706	0.03	Q				V
16+50	0.1708	0.03	Q				V
16+55	0.1710	0.03	Q				V
17+ 0	0.1712	0.03	Q				V
17+ 5	0.1714	0.03	Q				V
17+10	0.1717	0.04	Q				V
17+15	0.1720	0.04	Q				V
17+20	0.1723	0.04	Q				V
17+25	0.1726	0.04	Q				V
17+30	0.1729	0.04	Q				V
17+35	0.1732	0.04	Q				V
17+40	0.1735	0.04	Q				V
17+45	0.1738	0.04	Q				V
17+50	0.1741	0.04	Q				V
17+55	0.1743	0.04	Q				V
18+ 0	0.1745	0.03	Q				V
18+ 5	0.1748	0.03	Q				V
18+10	0.1750	0.03	Q				V
18+15	0.1753	0.03	Q				V
18+20	0.1755	0.03	Q				V
18+25	0.1757	0.03	Q				V
18+30	0.1760	0.03	Q				V
18+35	0.1762	0.03	Q				V
18+40	0.1764	0.03	Q				V
18+45	0.1765	0.03	Q				V
18+50	0.1767	0.02	Q				V
18+55	0.1768	0.02	Q				V
19+ 0	0.1769	0.02	Q				V
19+ 5	0.1771	0.02	Q				V
19+10	0.1773	0.03	Q				V
19+15	0.1774	0.03	Q				V
19+20	0.1776	0.03	Q				V
19+25	0.1779	0.03	Q				V
19+30	0.1781	0.03	Q				V
19+35	0.1783	0.03	Q				V
19+40	0.1785	0.03	Q				V



19+45	0.1787	0.03	Q				V
19+50	0.1788	0.02	Q				V
19+55	0.1790	0.02	Q				V
20+ 0	0.1791	0.02	Q				V
20+ 5	0.1792	0.02	Q				V
20+10	0.1794	0.03	Q				V
20+15	0.1796	0.03	Q				V
20+20	0.1798	0.03	Q				V
20+25	0.1799	0.03	Q				V
20+30	0.1801	0.03	Q				V
20+35	0.1803	0.03	Q				V
20+40	0.1805	0.03	Q				V
20+45	0.1807	0.03	Q				V
20+50	0.1808	0.02	Q				V
20+55	0.1809	0.02	Q				V
21+ 0	0.1811	0.02	Q				V
21+ 5	0.1812	0.02	Q				V
21+10	0.1814	0.03	Q				V
21+15	0.1816	0.03	Q				V
21+20	0.1817	0.02	Q				V
21+25	0.1818	0.02	Q				V
21+30	0.1820	0.02	Q				V
21+35	0.1821	0.02	Q				V
21+40	0.1823	0.03	Q				V
21+45	0.1824	0.03	Q				V
21+50	0.1826	0.02	Q				V
21+55	0.1827	0.02	Q				V
22+ 0	0.1828	0.02	Q				V
22+ 5	0.1830	0.02	Q				V
22+10	0.1832	0.03	Q				V
22+15	0.1833	0.03	Q				V
22+20	0.1835	0.02	Q				V
22+25	0.1836	0.02	Q				V
22+30	0.1837	0.02	Q				V
22+35	0.1839	0.02	Q				V
22+40	0.1840	0.02	Q				V
22+45	0.1841	0.02	Q				V
22+50	0.1842	0.02	Q				V
22+55	0.1843	0.02	Q				V
23+ 0	0.1845	0.02	Q				V
23+ 5	0.1846	0.02	Q				V
23+10	0.1847	0.02	Q				V
23+15	0.1848	0.02	Q				V
23+20	0.1849	0.02	Q				V
23+25	0.1851	0.02	Q				V
23+30	0.1852	0.02	Q				V
23+35	0.1853	0.02	Q				V
23+40	0.1854	0.02	Q				V
23+45	0.1855	0.02	Q				V
23+50	0.1856	0.02	Q				V

23+55	0.1858	0.02	Q				V
24+ 0	0.1859	0.02	Q				V
24+ 5	0.1859	0.01	Q				V
24+10	0.1860	0.00	Q				V
24+15	0.1860	0.00	Q				V

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**Appendix J.VI**

**Synthetic Unit Hydrograph Method Analysis  
Post-Development Conditions  
100-Year Storm**

U n i t   H y d r o g r a p h   A n a l y s i s

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Study date 05/27/22 File: MapesPost100AUH24100.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6443

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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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MAPES AND TRUMBLE INDUSTRIAL FACILITY  
UNIT HYDROGRAPH  
POST-DEVELOPMENT CONDITIONS  
100-YEAR, 24HR STORM, DA A

-----  
Drainage Area = 18.09(Ac.) = 0.028 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 18.09(Ac.) =  
0.028 Sq. Mi.  
Length along longest watercourse = 1290.86(Ft.)  
Length along longest watercourse measured to centroid = 632.74(Ft.)  
Length along longest watercourse = 0.244 Mi.  
Length along longest watercourse measured to centroid = 0.120 Mi.  
Difference in elevation = 12.93(Ft.)  
Slope along watercourse = 52.8875 Ft./Mi.  
Average Manning's 'N' = 0.015  
Lag time = 0.044 Hr.  
Lag time = 2.66 Min.  
25% of lag time = 0.66 Min.  
40% of lag time = 1.06 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]
18.09	2.06	37.27

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
18.09	5.31	96.06

STORM EVENT (YEAR) = 100.00  
 Area Averaged 2-Year Rainfall = 2.060(In)  
 Area Averaged 100-Year Rainfall = 5.310(In)

Point rain (area averaged) = 5.310(In)  
 Areal adjustment factor = 100.00 %  
 Adjusted average point rain = 5.310(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
18.090	75.00	0.830
Total Area Entered = 18.09(Ac.)		

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-3	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
75.0	88.0	0.153	0.830	0.039	1.000	0.039
Sum (F) =						0.039

Area averaged mean soil loss (F) (In/Hr) = 0.039  
 Minimum soil loss rate ((In/Hr)) = 0.019  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.238

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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	188.172	41.282	7.526
2	0.167	376.344	44.201	8.058
3	0.250	564.517	9.293	1.694
4	0.333	752.689	3.719	0.678
5	0.417	940.861	1.505	0.274
		Sum = 100.000	Sum=	18.231

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The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.07	0.042	( 0.069)	0.010	0.032
2	0.17	0.07	0.042	( 0.068)	0.010	0.032
3	0.25	0.07	0.042	( 0.068)	0.010	0.032
4	0.33	0.10	0.064	( 0.068)	0.015	0.049
5	0.42	0.10	0.064	( 0.067)	0.015	0.049
6	0.50	0.10	0.064	( 0.067)	0.015	0.049
7	0.58	0.10	0.064	( 0.067)	0.015	0.049
8	0.67	0.10	0.064	( 0.067)	0.015	0.049
9	0.75	0.10	0.064	( 0.066)	0.015	0.049
10	0.83	0.13	0.085	( 0.066)	0.020	0.065
11	0.92	0.13	0.085	( 0.066)	0.020	0.065
12	1.00	0.13	0.085	( 0.066)	0.020	0.065
13	1.08	0.10	0.064	( 0.065)	0.015	0.049
14	1.17	0.10	0.064	( 0.065)	0.015	0.049
15	1.25	0.10	0.064	( 0.065)	0.015	0.049
16	1.33	0.10	0.064	( 0.065)	0.015	0.049
17	1.42	0.10	0.064	( 0.064)	0.015	0.049
18	1.50	0.10	0.064	( 0.064)	0.015	0.049
19	1.58	0.10	0.064	( 0.064)	0.015	0.049
20	1.67	0.10	0.064	( 0.064)	0.015	0.049
21	1.75	0.10	0.064	( 0.063)	0.015	0.049
22	1.83	0.13	0.085	( 0.063)	0.020	0.065
23	1.92	0.13	0.085	( 0.063)	0.020	0.065
24	2.00	0.13	0.085	( 0.063)	0.020	0.065
25	2.08	0.13	0.085	( 0.062)	0.020	0.065
26	2.17	0.13	0.085	( 0.062)	0.020	0.065
27	2.25	0.13	0.085	( 0.062)	0.020	0.065
28	2.33	0.13	0.085	( 0.062)	0.020	0.065
29	2.42	0.13	0.085	( 0.061)	0.020	0.065
30	2.50	0.13	0.085	( 0.061)	0.020	0.065
31	2.58	0.17	0.106	( 0.061)	0.025	0.081
32	2.67	0.17	0.106	( 0.061)	0.025	0.081
33	2.75	0.17	0.106	( 0.060)	0.025	0.081
34	2.83	0.17	0.106	( 0.060)	0.025	0.081
35	2.92	0.17	0.106	( 0.060)	0.025	0.081
36	3.00	0.17	0.106	( 0.060)	0.025	0.081
37	3.08	0.17	0.106	( 0.059)	0.025	0.081
38	3.17	0.17	0.106	( 0.059)	0.025	0.081
39	3.25	0.17	0.106	( 0.059)	0.025	0.081
40	3.33	0.17	0.106	( 0.059)	0.025	0.081
41	3.42	0.17	0.106	( 0.058)	0.025	0.081
42	3.50	0.17	0.106	( 0.058)	0.025	0.081
43	3.58	0.17	0.106	( 0.058)	0.025	0.081
44	3.67	0.17	0.106	( 0.058)	0.025	0.081

45	3.75	0.17	0.106	( 0.057)	0.025	0.081
46	3.83	0.20	0.127	( 0.057)	0.030	0.097
47	3.92	0.20	0.127	( 0.057)	0.030	0.097
48	4.00	0.20	0.127	( 0.057)	0.030	0.097
49	4.08	0.20	0.127	( 0.056)	0.030	0.097
50	4.17	0.20	0.127	( 0.056)	0.030	0.097
51	4.25	0.20	0.127	( 0.056)	0.030	0.097
52	4.33	0.23	0.149	( 0.056)	0.035	0.113
53	4.42	0.23	0.149	( 0.055)	0.035	0.113
54	4.50	0.23	0.149	( 0.055)	0.035	0.113
55	4.58	0.23	0.149	( 0.055)	0.035	0.113
56	4.67	0.23	0.149	( 0.055)	0.035	0.113
57	4.75	0.23	0.149	( 0.054)	0.035	0.113
58	4.83	0.27	0.170	( 0.054)	0.040	0.129
59	4.92	0.27	0.170	( 0.054)	0.040	0.129
60	5.00	0.27	0.170	( 0.054)	0.040	0.129
61	5.08	0.20	0.127	( 0.054)	0.030	0.097
62	5.17	0.20	0.127	( 0.053)	0.030	0.097
63	5.25	0.20	0.127	( 0.053)	0.030	0.097
64	5.33	0.23	0.149	( 0.053)	0.035	0.113
65	5.42	0.23	0.149	( 0.053)	0.035	0.113
66	5.50	0.23	0.149	( 0.052)	0.035	0.113
67	5.58	0.27	0.170	( 0.052)	0.040	0.129
68	5.67	0.27	0.170	( 0.052)	0.040	0.129
69	5.75	0.27	0.170	( 0.052)	0.040	0.129
70	5.83	0.27	0.170	( 0.051)	0.040	0.129
71	5.92	0.27	0.170	( 0.051)	0.040	0.129
72	6.00	0.27	0.170	( 0.051)	0.040	0.129
73	6.08	0.30	0.191	( 0.051)	0.045	0.146
74	6.17	0.30	0.191	( 0.051)	0.045	0.146
75	6.25	0.30	0.191	( 0.050)	0.045	0.146
76	6.33	0.30	0.191	( 0.050)	0.045	0.146
77	6.42	0.30	0.191	( 0.050)	0.045	0.146
78	6.50	0.30	0.191	( 0.050)	0.045	0.146
79	6.58	0.33	0.212	0.049 ( 0.051)		0.163
80	6.67	0.33	0.212	0.049 ( 0.051)		0.163
81	6.75	0.33	0.212	0.049 ( 0.051)		0.163
82	6.83	0.33	0.212	0.049 ( 0.051)		0.164
83	6.92	0.33	0.212	0.049 ( 0.051)		0.164
84	7.00	0.33	0.212	0.048 ( 0.051)		0.164
85	7.08	0.33	0.212	0.048 ( 0.051)		0.164
86	7.17	0.33	0.212	0.048 ( 0.051)		0.164
87	7.25	0.33	0.212	0.048 ( 0.051)		0.165
88	7.33	0.37	0.234	0.047 ( 0.056)		0.186
89	7.42	0.37	0.234	0.047 ( 0.056)		0.186
90	7.50	0.37	0.234	0.047 ( 0.056)		0.187
91	7.58	0.40	0.255	0.047 ( 0.061)		0.208
92	7.67	0.40	0.255	0.047 ( 0.061)		0.208
93	7.75	0.40	0.255	0.046 ( 0.061)		0.208
94	7.83	0.43	0.276	0.046 ( 0.066)		0.230

95	7.92	0.43	0.276	0.046	( 0.066)	0.230
96	8.00	0.43	0.276	0.046	( 0.066)	0.230
97	8.08	0.50	0.319	0.046	( 0.076)	0.273
98	8.17	0.50	0.319	0.045	( 0.076)	0.273
99	8.25	0.50	0.319	0.045	( 0.076)	0.273
100	8.33	0.50	0.319	0.045	( 0.076)	0.274
101	8.42	0.50	0.319	0.045	( 0.076)	0.274
102	8.50	0.50	0.319	0.044	( 0.076)	0.274
103	8.58	0.53	0.340	0.044	( 0.081)	0.296
104	8.67	0.53	0.340	0.044	( 0.081)	0.296
105	8.75	0.53	0.340	0.044	( 0.081)	0.296
106	8.83	0.57	0.361	0.044	( 0.086)	0.317
107	8.92	0.57	0.361	0.043	( 0.086)	0.318
108	9.00	0.57	0.361	0.043	( 0.086)	0.318
109	9.08	0.63	0.404	0.043	( 0.096)	0.361
110	9.17	0.63	0.404	0.043	( 0.096)	0.361
111	9.25	0.63	0.404	0.043	( 0.096)	0.361
112	9.33	0.67	0.425	0.042	( 0.101)	0.382
113	9.42	0.67	0.425	0.042	( 0.101)	0.383
114	9.50	0.67	0.425	0.042	( 0.101)	0.383
115	9.58	0.70	0.446	0.042	( 0.106)	0.404
116	9.67	0.70	0.446	0.042	( 0.106)	0.404
117	9.75	0.70	0.446	0.041	( 0.106)	0.405
118	9.83	0.73	0.467	0.041	( 0.111)	0.426
119	9.92	0.73	0.467	0.041	( 0.111)	0.426
120	10.00	0.73	0.467	0.041	( 0.111)	0.426
121	10.08	0.50	0.319	0.041	( 0.076)	0.278
122	10.17	0.50	0.319	0.040	( 0.076)	0.278
123	10.25	0.50	0.319	0.040	( 0.076)	0.278
124	10.33	0.50	0.319	0.040	( 0.076)	0.279
125	10.42	0.50	0.319	0.040	( 0.076)	0.279
126	10.50	0.50	0.319	0.040	( 0.076)	0.279
127	10.58	0.67	0.425	0.039	( 0.101)	0.385
128	10.67	0.67	0.425	0.039	( 0.101)	0.386
129	10.75	0.67	0.425	0.039	( 0.101)	0.386
130	10.83	0.67	0.425	0.039	( 0.101)	0.386
131	10.92	0.67	0.425	0.039	( 0.101)	0.386
132	11.00	0.67	0.425	0.038	( 0.101)	0.386
133	11.08	0.63	0.404	0.038	( 0.096)	0.365
134	11.17	0.63	0.404	0.038	( 0.096)	0.365
135	11.25	0.63	0.404	0.038	( 0.096)	0.366
136	11.33	0.63	0.404	0.038	( 0.096)	0.366
137	11.42	0.63	0.404	0.038	( 0.096)	0.366
138	11.50	0.63	0.404	0.037	( 0.096)	0.366
139	11.58	0.57	0.361	0.037	( 0.086)	0.324
140	11.67	0.57	0.361	0.037	( 0.086)	0.324
141	11.75	0.57	0.361	0.037	( 0.086)	0.324
142	11.83	0.60	0.382	0.037	( 0.091)	0.346
143	11.92	0.60	0.382	0.036	( 0.091)	0.346
144	12.00	0.60	0.382	0.036	( 0.091)	0.346



145	12.08	0.83	0.531	0.036	( 0.126)	0.495
146	12.17	0.83	0.531	0.036	( 0.126)	0.495
147	12.25	0.83	0.531	0.036	( 0.126)	0.495
148	12.33	0.87	0.552	0.036	( 0.131)	0.517
149	12.42	0.87	0.552	0.035	( 0.131)	0.517
150	12.50	0.87	0.552	0.035	( 0.131)	0.517
151	12.58	0.93	0.595	0.035	( 0.142)	0.560
152	12.67	0.93	0.595	0.035	( 0.142)	0.560
153	12.75	0.93	0.595	0.035	( 0.142)	0.560
154	12.83	0.97	0.616	0.034	( 0.147)	0.581
155	12.92	0.97	0.616	0.034	( 0.147)	0.582
156	13.00	0.97	0.616	0.034	( 0.147)	0.582
157	13.08	1.13	0.722	0.034	( 0.172)	0.688
158	13.17	1.13	0.722	0.034	( 0.172)	0.688
159	13.25	1.13	0.722	0.034	( 0.172)	0.689
160	13.33	1.13	0.722	0.033	( 0.172)	0.689
161	13.42	1.13	0.722	0.033	( 0.172)	0.689
162	13.50	1.13	0.722	0.033	( 0.172)	0.689
163	13.58	0.77	0.489	0.033	( 0.116)	0.456
164	13.67	0.77	0.489	0.033	( 0.116)	0.456
165	13.75	0.77	0.489	0.033	( 0.116)	0.456
166	13.83	0.77	0.489	0.032	( 0.116)	0.456
167	13.92	0.77	0.489	0.032	( 0.116)	0.456
168	14.00	0.77	0.489	0.032	( 0.116)	0.456
169	14.08	0.90	0.573	0.032	( 0.136)	0.542
170	14.17	0.90	0.573	0.032	( 0.136)	0.542
171	14.25	0.90	0.573	0.032	( 0.136)	0.542
172	14.33	0.87	0.552	0.031	( 0.131)	0.521
173	14.42	0.87	0.552	0.031	( 0.131)	0.521
174	14.50	0.87	0.552	0.031	( 0.131)	0.521
175	14.58	0.87	0.552	0.031	( 0.131)	0.521
176	14.67	0.87	0.552	0.031	( 0.131)	0.521
177	14.75	0.87	0.552	0.031	( 0.131)	0.522
178	14.83	0.83	0.531	0.031	( 0.126)	0.500
179	14.92	0.83	0.531	0.030	( 0.126)	0.501
180	15.00	0.83	0.531	0.030	( 0.126)	0.501
181	15.08	0.80	0.510	0.030	( 0.121)	0.480
182	15.17	0.80	0.510	0.030	( 0.121)	0.480
183	15.25	0.80	0.510	0.030	( 0.121)	0.480
184	15.33	0.77	0.489	0.030	( 0.116)	0.459
185	15.42	0.77	0.489	0.029	( 0.116)	0.459
186	15.50	0.77	0.489	0.029	( 0.116)	0.459
187	15.58	0.63	0.404	0.029	( 0.096)	0.374
188	15.67	0.63	0.404	0.029	( 0.096)	0.375
189	15.75	0.63	0.404	0.029	( 0.096)	0.375
190	15.83	0.63	0.404	0.029	( 0.096)	0.375
191	15.92	0.63	0.404	0.029	( 0.096)	0.375
192	16.00	0.63	0.404	0.028	( 0.096)	0.375
193	16.08	0.13	0.085	( 0.028)	0.020	0.065
194	16.17	0.13	0.085	( 0.028)	0.020	0.065

195	16.25	0.13	0.085	( 0.028)	0.020	0.065
196	16.33	0.13	0.085	( 0.028)	0.020	0.065
197	16.42	0.13	0.085	( 0.028)	0.020	0.065
198	16.50	0.13	0.085	( 0.028)	0.020	0.065
199	16.58	0.10	0.064	( 0.027)	0.015	0.049
200	16.67	0.10	0.064	( 0.027)	0.015	0.049
201	16.75	0.10	0.064	( 0.027)	0.015	0.049
202	16.83	0.10	0.064	( 0.027)	0.015	0.049
203	16.92	0.10	0.064	( 0.027)	0.015	0.049
204	17.00	0.10	0.064	( 0.027)	0.015	0.049
205	17.08	0.17	0.106	( 0.027)	0.025	0.081
206	17.17	0.17	0.106	( 0.026)	0.025	0.081
207	17.25	0.17	0.106	( 0.026)	0.025	0.081
208	17.33	0.17	0.106	( 0.026)	0.025	0.081
209	17.42	0.17	0.106	( 0.026)	0.025	0.081
210	17.50	0.17	0.106	( 0.026)	0.025	0.081
211	17.58	0.17	0.106	( 0.026)	0.025	0.081
212	17.67	0.17	0.106	( 0.026)	0.025	0.081
213	17.75	0.17	0.106	( 0.026)	0.025	0.081
214	17.83	0.13	0.085	( 0.025)	0.020	0.065
215	17.92	0.13	0.085	( 0.025)	0.020	0.065
216	18.00	0.13	0.085	( 0.025)	0.020	0.065
217	18.08	0.13	0.085	( 0.025)	0.020	0.065
218	18.17	0.13	0.085	( 0.025)	0.020	0.065
219	18.25	0.13	0.085	( 0.025)	0.020	0.065
220	18.33	0.13	0.085	( 0.025)	0.020	0.065
221	18.42	0.13	0.085	( 0.025)	0.020	0.065
222	18.50	0.13	0.085	( 0.024)	0.020	0.065
223	18.58	0.10	0.064	( 0.024)	0.015	0.049
224	18.67	0.10	0.064	( 0.024)	0.015	0.049
225	18.75	0.10	0.064	( 0.024)	0.015	0.049
226	18.83	0.07	0.042	( 0.024)	0.010	0.032
227	18.92	0.07	0.042	( 0.024)	0.010	0.032
228	19.00	0.07	0.042	( 0.024)	0.010	0.032
229	19.08	0.10	0.064	( 0.024)	0.015	0.049
230	19.17	0.10	0.064	( 0.023)	0.015	0.049
231	19.25	0.10	0.064	( 0.023)	0.015	0.049
232	19.33	0.13	0.085	( 0.023)	0.020	0.065
233	19.42	0.13	0.085	( 0.023)	0.020	0.065
234	19.50	0.13	0.085	( 0.023)	0.020	0.065
235	19.58	0.10	0.064	( 0.023)	0.015	0.049
236	19.67	0.10	0.064	( 0.023)	0.015	0.049
237	19.75	0.10	0.064	( 0.023)	0.015	0.049
238	19.83	0.07	0.042	( 0.023)	0.010	0.032
239	19.92	0.07	0.042	( 0.023)	0.010	0.032
240	20.00	0.07	0.042	( 0.022)	0.010	0.032
241	20.08	0.10	0.064	( 0.022)	0.015	0.049
242	20.17	0.10	0.064	( 0.022)	0.015	0.049
243	20.25	0.10	0.064	( 0.022)	0.015	0.049
244	20.33	0.10	0.064	( 0.022)	0.015	0.049



Total rainfall = 5.31(In)  
 Flood volume = 305343.4 Cubic Feet  
 Total soil loss = 43334.4 Cubic Feet

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 Peak flow rate of this hydrograph = 12.566(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	5.0	10.0	15.0	20.0
0+ 5	0.0017	0.24	Q				
0+10	0.0052	0.50	VQ				
0+15	0.0090	0.56	VQ				
0+20	0.0139	0.70	VQ				
0+25	0.0197	0.84	VQ				
0+30	0.0257	0.87	VQ				
0+35	0.0317	0.88	VQ				
0+40	0.0378	0.89	VQ				
0+45	0.0439	0.89	VQ				
0+50	0.0509	1.01	V Q				
0+55	0.0587	1.14	V Q				
1+ 0	0.0667	1.17	V Q				
1+ 5	0.0740	1.05	V Q				
1+10	0.0804	0.93	VQ				
1+15	0.0866	0.90	VQ				
1+20	0.0927	0.89	VQ				
1+25	0.0988	0.89	VQ				
1+30	0.1049	0.89	VQ				
1+35	0.1110	0.89	VQ				
1+40	0.1171	0.89	VQ				
1+45	0.1232	0.89	VQ				
1+50	0.1301	1.01	V Q				
1+55	0.1380	1.14	V Q				
2+ 0	0.1460	1.17	V Q				
2+ 5	0.1541	1.18	V Q				
2+10	0.1622	1.18	V Q				
2+15	0.1704	1.18	V Q				
2+20	0.1785	1.18	VQ				
2+25	0.1866	1.18	VQ				
2+30	0.1948	1.18	VQ				
2+35	0.2038	1.30	VQ				
2+40	0.2136	1.43	VQ				
2+45	0.2237	1.46	VQ				
2+50	0.2338	1.47	VQ				
2+55	0.2440	1.48	VQ				

3+ 0	0.2541	1.48	VQ				
3+ 5	0.2643	1.48	VQ				
3+10	0.2745	1.48	VQ				
3+15	0.2846	1.48	VQ				
3+20	0.2948	1.48	VQ				
3+25	0.3050	1.48	VQ				
3+30	0.3151	1.48	VQ				
3+35	0.3253	1.48	VQ				
3+40	0.3355	1.48	VQ				
3+45	0.3456	1.48	VQ				
3+50	0.3566	1.60	VQ				
3+55	0.3685	1.73	VQ				
4+ 0	0.3806	1.76	VQ				
4+ 5	0.3928	1.77	VQ				
4+10	0.4050	1.77	VQ				
4+15	0.4172	1.77	VQ				
4+20	0.4302	1.89	VQ				
4+25	0.4442	2.02	V Q				
4+30	0.4583	2.05	V Q				
4+35	0.4725	2.06	V Q				
4+40	0.4867	2.07	V Q				
4+45	0.5010	2.07	V Q				
4+50	0.5160	2.19	V Q				
4+55	0.5320	2.32	VQ				
5+ 0	0.5482	2.35	VQ				
5+ 5	0.5627	2.11	VQ				
5+10	0.5755	1.86	Q				
5+15	0.5879	1.80	Q				
5+20	0.6010	1.90	Q				
5+25	0.6150	2.02	VQ				
5+30	0.6291	2.05	VQ				
5+35	0.6441	2.18	VQ				
5+40	0.6601	2.32	VQ				
5+45	0.6763	2.35	VQ				
5+50	0.6925	2.36	VQ				
5+55	0.7088	2.36	Q				
6+ 0	0.7250	2.36	Q				
6+ 5	0.7421	2.48	Q				
6+10	0.7601	2.61	VQ				
6+15	0.7783	2.64	VQ				
6+20	0.7966	2.65	VQ				
6+25	0.8149	2.66	VQ				
6+30	0.8332	2.66	VQ				
6+35	0.8524	2.79	VQ				
6+40	0.8726	2.93	VQ				
6+45	0.8929	2.96	Q				
6+50	0.9134	2.98	Q				
6+55	0.9340	2.99	Q				
7+ 0	0.9546	2.99	Q				
7+ 5	0.9752	2.99	Q				

7+10	0.9958	3.00	Q				
7+15	1.0165	3.00	VQ				
7+20	1.0383	3.17	VQ				
7+25	1.0613	3.34	Q				
7+30	1.0846	3.38	Q				
7+35	1.1091	3.56	VQ				
7+40	1.1349	3.74	VQ				
7+45	1.1609	3.78	VQ				
7+50	1.1881	3.96	VQ				
7+55	1.2166	4.14	V Q				
8+ 0	1.2454	4.18	VQ				
8+ 5	1.2765	4.52	V Q				
8+10	1.3101	4.87	V Q				
8+15	1.3441	4.94	V Q				
8+20	1.3784	4.98	V Q				
8+25	1.4128	4.99	VQ				
8+30	1.4472	5.00	VQ				
8+35	1.4827	5.16	V Q				
8+40	1.5195	5.34	V Q				
8+45	1.5565	5.38	V Q				
8+50	1.5948	5.55	V Q				
8+55	1.6342	5.73	V Q				
9+ 0	1.6740	5.77	V Q				
9+ 5	1.7161	6.11	V  Q				
9+10	1.7606	6.46	V Q				
9+15	1.8057	6.54	V Q				
9+20	1.8520	6.73	V Q				
9+25	1.8997	6.92	V Q				
9+30	1.9476	6.96	V Q				
9+35	1.9968	7.14	V Q				
9+40	2.0472	7.32	V Q				
9+45	2.0978	7.36	V Q				
9+50	2.1497	7.54	V Q				
9+55	2.2029	7.72	V Q				
10+ 0	2.2563	7.76	V Q				
10+ 5	2.3021	6.65	Q				
10+10	2.3397	5.46	Q V				
10+15	2.3757	5.22	Q V				
10+20	2.4109	5.12	Q V				
10+25	2.4459	5.08	Q V				
10+30	2.4809	5.09	Q V				
10+35	2.5215	5.89	Q V				
10+40	2.5680	6.75	QV				
10+45	2.6157	6.93	QV				
10+50	2.6640	7.01	QV				
10+55	2.7124	7.04	QV				
11+ 0	2.7610	7.04	QV				
11+ 5	2.8084	6.89	Q V				
11+10	2.8547	6.72	Q V				
11+15	2.9007	6.69	Q V				

11+20	2.9467	6.68	Q	V			
11+25	2.9926	6.67	Q	V			
11+30	3.0386	6.68	Q	V			
11+35	3.0824	6.36	Q	V			
11+40	3.1239	6.02	Q	V			
11+45	3.1649	5.95	Q	V			
11+50	3.2068	6.09	Q	V			
11+55	3.2499	6.25	Q	V			
12+ 0	3.2932	6.29	Q	V			
12+ 5	3.3443	7.43	Q	V			
12+10	3.4038	8.63	Q	V			
12+15	3.4650	8.89	Q	V			
12+20	3.5280	9.15	Q	V			
12+25	3.5926	9.37	Q	V			
12+30	3.6574	9.41	Q	V			
12+35	3.7245	9.75	Q	V			
12+40	3.7940	10.10	Q	V			
12+45	3.8641	10.17	Q	V			
12+50	3.9355	10.36	Q	V			
12+55	4.0081	10.55	Q	V			
13+ 0	4.0810	10.59	Q	V			
13+ 5	4.1596	11.41	Q	V			
13+10	4.2441	12.27	Q	V			
13+15	4.3299	12.46	Q	V			
13+20	4.4162	12.53	Q	V			
13+25	4.5027	12.56	Q	V			
13+30	4.5893	12.57	Q	V			
13+35	4.6637	10.81	Q	V			
13+40	4.7252	8.93	Q	V			
13+45	4.7840	8.54	Q	V			
13+50	4.8417	8.38	Q	V			
13+55	4.8990	8.32	Q	V			
14+ 0	4.9563	8.32	Q	V			
14+ 5	5.0181	8.97	Q	V			
14+10	5.0846	9.65	Q	V			
14+15	5.1520	9.80	Q	V			
14+20	5.2189	9.70	Q	V			
14+25	5.2847	9.56	Q	V			
14+30	5.3503	9.52	Q	V			
14+35	5.4158	9.51	Q	V			
14+40	5.4812	9.51	Q	V			
14+45	5.5468	9.51	Q	V			
14+50	5.6112	9.35	Q	V			
14+55	5.6744	9.19	Q	V			
15+ 0	5.7375	9.15	Q	V			
15+ 5	5.7993	8.98	Q	V			
15+10	5.8600	8.81	Q	V			
15+15	5.9204	8.77	Q	V			
15+20	5.9796	8.60	Q	V			
15+25	6.0377	8.43	Q	V			

15+30	6.0955	8.39					V
15+35	6.1488	7.74					V
15+40	6.1974	7.06					V
15+45	6.2450	6.91					V
15+50	6.2923	6.86					V
15+55	6.3394	6.84					V
16+ 0	6.3865	6.84					V
16+ 5	6.4175	4.51					V
16+10	6.4313	2.00		Q			V
16+15	6.4415	1.48	Q				V
16+20	6.4502	1.27	Q				V
16+25	6.4583	1.18	Q				V
16+30	6.4665	1.18	Q				V
16+35	6.4738	1.06	Q				V
16+40	6.4802	0.93	Q				V
16+45	6.4864	0.90	Q				V
16+50	6.4925	0.89	Q				V
16+55	6.4986	0.89	Q				V
17+ 0	6.5047	0.89	Q				V
17+ 5	6.5125	1.13	Q				V
17+10	6.5220	1.39	Q				V
17+15	6.5320	1.45	Q				V
17+20	6.5421	1.47	Q				V
17+25	6.5523	1.48	Q				V
17+30	6.5624	1.48	Q				V
17+35	6.5726	1.48	Q				V
17+40	6.5828	1.48	Q				V
17+45	6.5929	1.48	Q				V
17+50	6.6023	1.35	Q				V
17+55	6.6107	1.22	Q				V
18+ 0	6.6189	1.20	Q				V
18+ 5	6.6271	1.19	Q				V
18+10	6.6352	1.18	Q				V
18+15	6.6433	1.18	Q				V
18+20	6.6515	1.18	Q				V
18+25	6.6596	1.18	Q				V
18+30	6.6677	1.18	Q				V
18+35	6.6750	1.06	Q				V
18+40	6.6814	0.93	Q				V
18+45	6.6876	0.90	Q				V
18+50	6.6929	0.77	Q				V
18+55	6.6973	0.63	Q				V
19+ 0	6.7015	0.61	Q				V
19+ 5	6.7064	0.72	Q				V
19+10	6.7122	0.84	Q				V
19+15	6.7182	0.87	Q				V
19+20	6.7251	1.00	Q				V
19+25	6.7329	1.14	Q				V
19+30	6.7410	1.17	Q				V
19+35	6.7482	1.05	Q				V



19+40	6.7546	0.93	Q				V
19+45	6.7608	0.90	Q				V
19+50	6.7661	0.77	Q				V
19+55	6.7705	0.63	Q				V
20+ 0	6.7747	0.61	Q				V
20+ 5	6.7796	0.72	Q				V
20+10	6.7854	0.84	Q				V
20+15	6.7914	0.87	Q				V
20+20	6.7975	0.88	Q				V
20+25	6.8036	0.89	Q				V
20+30	6.8097	0.89	Q				V
20+35	6.8158	0.89	Q				V
20+40	6.8219	0.89	Q				V
20+45	6.8280	0.89	Q				V
20+50	6.8332	0.76	Q				V
20+55	6.8376	0.63	Q				V
21+ 0	6.8418	0.61	Q				V
21+ 5	6.8467	0.72	Q				V
21+10	6.8525	0.84	Q				V
21+15	6.8585	0.87	Q				V
21+20	6.8637	0.76	Q				V
21+25	6.8681	0.63	Q				V
21+30	6.8722	0.61	Q				V
21+35	6.8772	0.72	Q				V
21+40	6.8830	0.84	Q				V
21+45	6.8890	0.87	Q				V
21+50	6.8942	0.76	Q				V
21+55	6.8986	0.63	Q				V
22+ 0	6.9027	0.61	Q				V
22+ 5	6.9077	0.72	Q				V
22+10	6.9135	0.84	Q				V
22+15	6.9195	0.87	Q				V
22+20	6.9247	0.76	Q				V
22+25	6.9291	0.63	Q				V
22+30	6.9332	0.61	Q				V
22+35	6.9373	0.59	Q				V
22+40	6.9414	0.59	Q				V
22+45	6.9455	0.59	Q				V
22+50	6.9495	0.59	Q				V
22+55	6.9536	0.59	Q				V
23+ 0	6.9577	0.59	Q				V
23+ 5	6.9617	0.59	Q				V
23+10	6.9658	0.59	Q				V
23+15	6.9699	0.59	Q				V
23+20	6.9739	0.59	Q				V
23+25	6.9780	0.59	Q				V
23+30	6.9821	0.59	Q				V
23+35	6.9861	0.59	Q				V
23+40	6.9902	0.59	Q				V
23+45	6.9943	0.59	Q				V

23+50	6.9983	0.59	Q				V
23+55	7.0024	0.59	Q				V
24+ 0	7.0065	0.59	Q				V
24+ 5	7.0089	0.35	Q				V
24+10	7.0094	0.09	Q				V
24+15	7.0097	0.03	Q				V
24+20	7.0097	0.01	Q				V

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Unit Hydrograph Analysis

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Study date 05/27/22 File: MapesPost100BUH24100.out

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Riverside County Synthetic Unit Hydrology Method  
RCFC & WCD Manual date - April 1978

Program License Serial Number 6443

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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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MAPES AND TRUMBLE INDUSTRIAL FACILITY  
UNIT HYDROGRAPH  
POST-DEVELOPMENT CONDITIONS  
100-YEAR, 24HR STORM, DA B

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Drainage Area = 0.92(Ac.) = 0.001 Sq. Mi.  
Drainage Area for Depth-Area Areal Adjustment = 0.92(Ac.) =  
0.001 Sq. Mi.  
Length along longest watercourse = 834.61(Ft.)  
Length along longest watercourse measured to centroid = 558.41(Ft.)  
Length along longest watercourse = 0.158 Mi.  
Length along longest watercourse measured to centroid = 0.106 Mi.  
Difference in elevation = 9.65(Ft.)  
Slope along watercourse = 61.0489 Ft./Mi.  
Average Manning's 'N' = 0.015  
Lag time = 0.035 Hr.  
Lag time = 2.09 Min.  
25% of lag time = 0.52 Min.  
40% of lag time = 0.84 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]
0.92	2.06	1.90

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
0.92	5.31	4.89

STORM EVENT (YEAR) = 100.00  
 Area Averaged 2-Year Rainfall = 2.060(In)  
 Area Averaged 100-Year Rainfall = 5.310(In)

Point rain (area averaged) = 5.310(In)  
 Areal adjustment factor = 100.00 %  
 Adjusted average point rain = 5.310(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
0.920	75.00	0.730
Total Area Entered = 0.92(Ac.)		

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-3	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
75.0	88.0	0.153	0.730	0.052	1.000	0.052
Sum (F) =						0.052

Area averaged mean soil loss (F) (In/Hr) = 0.052  
 Minimum soil loss rate ((In/Hr)) = 0.026  
 (for 24 hour storm duration)  
 Soil low loss rate (decimal) = 0.313

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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 Hydrograph Data  
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Unit time period (hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)	
1	0.083	239.327	49.466	0.459
2	0.167	478.653	40.724	0.378
3	0.250	717.980	7.375	0.068
4	0.333	957.306	2.435	0.023
		Sum = 100.000	Sum=	0.927

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The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.07	0.042	( 0.093)	0.013	0.029
2	0.17	0.07	0.042	( 0.093)	0.013	0.029
3	0.25	0.07	0.042	( 0.092)	0.013	0.029
4	0.33	0.10	0.064	( 0.092)	0.020	0.044
5	0.42	0.10	0.064	( 0.091)	0.020	0.044
6	0.50	0.10	0.064	( 0.091)	0.020	0.044
7	0.58	0.10	0.064	( 0.091)	0.020	0.044
8	0.67	0.10	0.064	( 0.090)	0.020	0.044
9	0.75	0.10	0.064	( 0.090)	0.020	0.044
10	0.83	0.13	0.085	( 0.090)	0.027	0.058
11	0.92	0.13	0.085	( 0.089)	0.027	0.058
12	1.00	0.13	0.085	( 0.089)	0.027	0.058
13	1.08	0.10	0.064	( 0.089)	0.020	0.044
14	1.17	0.10	0.064	( 0.088)	0.020	0.044
15	1.25	0.10	0.064	( 0.088)	0.020	0.044
16	1.33	0.10	0.064	( 0.088)	0.020	0.044
17	1.42	0.10	0.064	( 0.087)	0.020	0.044
18	1.50	0.10	0.064	( 0.087)	0.020	0.044
19	1.58	0.10	0.064	( 0.087)	0.020	0.044
20	1.67	0.10	0.064	( 0.086)	0.020	0.044
21	1.75	0.10	0.064	( 0.086)	0.020	0.044
22	1.83	0.13	0.085	( 0.086)	0.027	0.058
23	1.92	0.13	0.085	( 0.085)	0.027	0.058
24	2.00	0.13	0.085	( 0.085)	0.027	0.058
25	2.08	0.13	0.085	( 0.084)	0.027	0.058
26	2.17	0.13	0.085	( 0.084)	0.027	0.058
27	2.25	0.13	0.085	( 0.084)	0.027	0.058
28	2.33	0.13	0.085	( 0.083)	0.027	0.058
29	2.42	0.13	0.085	( 0.083)	0.027	0.058
30	2.50	0.13	0.085	( 0.083)	0.027	0.058
31	2.58	0.17	0.106	( 0.082)	0.033	0.073
32	2.67	0.17	0.106	( 0.082)	0.033	0.073
33	2.75	0.17	0.106	( 0.082)	0.033	0.073
34	2.83	0.17	0.106	( 0.081)	0.033	0.073
35	2.92	0.17	0.106	( 0.081)	0.033	0.073
36	3.00	0.17	0.106	( 0.081)	0.033	0.073
37	3.08	0.17	0.106	( 0.080)	0.033	0.073
38	3.17	0.17	0.106	( 0.080)	0.033	0.073
39	3.25	0.17	0.106	( 0.080)	0.033	0.073
40	3.33	0.17	0.106	( 0.079)	0.033	0.073
41	3.42	0.17	0.106	( 0.079)	0.033	0.073
42	3.50	0.17	0.106	( 0.079)	0.033	0.073
43	3.58	0.17	0.106	( 0.078)	0.033	0.073
44	3.67	0.17	0.106	( 0.078)	0.033	0.073
45	3.75	0.17	0.106	( 0.078)	0.033	0.073

46	3.83	0.20	0.127	( 0.077)	0.040	0.088
47	3.92	0.20	0.127	( 0.077)	0.040	0.088
48	4.00	0.20	0.127	( 0.077)	0.040	0.088
49	4.08	0.20	0.127	( 0.076)	0.040	0.088
50	4.17	0.20	0.127	( 0.076)	0.040	0.088
51	4.25	0.20	0.127	( 0.076)	0.040	0.088
52	4.33	0.23	0.149	( 0.075)	0.047	0.102
53	4.42	0.23	0.149	( 0.075)	0.047	0.102
54	4.50	0.23	0.149	( 0.075)	0.047	0.102
55	4.58	0.23	0.149	( 0.075)	0.047	0.102
56	4.67	0.23	0.149	( 0.074)	0.047	0.102
57	4.75	0.23	0.149	( 0.074)	0.047	0.102
58	4.83	0.27	0.170	( 0.074)	0.053	0.117
59	4.92	0.27	0.170	( 0.073)	0.053	0.117
60	5.00	0.27	0.170	( 0.073)	0.053	0.117
61	5.08	0.20	0.127	( 0.073)	0.040	0.088
62	5.17	0.20	0.127	( 0.072)	0.040	0.088
63	5.25	0.20	0.127	( 0.072)	0.040	0.088
64	5.33	0.23	0.149	( 0.072)	0.047	0.102
65	5.42	0.23	0.149	( 0.071)	0.047	0.102
66	5.50	0.23	0.149	( 0.071)	0.047	0.102
67	5.58	0.27	0.170	( 0.071)	0.053	0.117
68	5.67	0.27	0.170	( 0.070)	0.053	0.117
69	5.75	0.27	0.170	( 0.070)	0.053	0.117
70	5.83	0.27	0.170	( 0.070)	0.053	0.117
71	5.92	0.27	0.170	( 0.069)	0.053	0.117
72	6.00	0.27	0.170	( 0.069)	0.053	0.117
73	6.08	0.30	0.191	( 0.069)	0.060	0.131
74	6.17	0.30	0.191	( 0.069)	0.060	0.131
75	6.25	0.30	0.191	( 0.068)	0.060	0.131
76	6.33	0.30	0.191	( 0.068)	0.060	0.131
77	6.42	0.30	0.191	( 0.068)	0.060	0.131
78	6.50	0.30	0.191	( 0.067)	0.060	0.131
79	6.58	0.33	0.212	( 0.067)	0.066	0.146
80	6.67	0.33	0.212	( 0.067)	0.066	0.146
81	6.75	0.33	0.212	0.066 ( 0.066)		0.146
82	6.83	0.33	0.212	0.066 ( 0.066)		0.146
83	6.92	0.33	0.212	0.066 ( 0.066)		0.147
84	7.00	0.33	0.212	0.066 ( 0.066)		0.147
85	7.08	0.33	0.212	0.065 ( 0.066)		0.147
86	7.17	0.33	0.212	0.065 ( 0.066)		0.147
87	7.25	0.33	0.212	0.065 ( 0.066)		0.148
88	7.33	0.37	0.234	0.064 ( 0.073)		0.169
89	7.42	0.37	0.234	0.064 ( 0.073)		0.170
90	7.50	0.37	0.234	0.064 ( 0.073)		0.170
91	7.58	0.40	0.255	0.063 ( 0.080)		0.191
92	7.67	0.40	0.255	0.063 ( 0.080)		0.192
93	7.75	0.40	0.255	0.063 ( 0.080)		0.192
94	7.83	0.43	0.276	0.063 ( 0.086)		0.214
95	7.92	0.43	0.276	0.062 ( 0.086)		0.214

96	8.00	0.43	0.276	0.062	( 0.086)	0.214
97	8.08	0.50	0.319	0.062	( 0.100)	0.257
98	8.17	0.50	0.319	0.061	( 0.100)	0.257
99	8.25	0.50	0.319	0.061	( 0.100)	0.257
100	8.33	0.50	0.319	0.061	( 0.100)	0.258
101	8.42	0.50	0.319	0.061	( 0.100)	0.258
102	8.50	0.50	0.319	0.060	( 0.100)	0.258
103	8.58	0.53	0.340	0.060	( 0.106)	0.280
104	8.67	0.53	0.340	0.060	( 0.106)	0.280
105	8.75	0.53	0.340	0.059	( 0.106)	0.280
106	8.83	0.57	0.361	0.059	( 0.113)	0.302
107	8.92	0.57	0.361	0.059	( 0.113)	0.302
108	9.00	0.57	0.361	0.059	( 0.113)	0.302
109	9.08	0.63	0.404	0.058	( 0.126)	0.345
110	9.17	0.63	0.404	0.058	( 0.126)	0.345
111	9.25	0.63	0.404	0.058	( 0.126)	0.346
112	9.33	0.67	0.425	0.058	( 0.133)	0.367
113	9.42	0.67	0.425	0.057	( 0.133)	0.368
114	9.50	0.67	0.425	0.057	( 0.133)	0.368
115	9.58	0.70	0.446	0.057	( 0.140)	0.389
116	9.67	0.70	0.446	0.056	( 0.140)	0.390
117	9.75	0.70	0.446	0.056	( 0.140)	0.390
118	9.83	0.73	0.467	0.056	( 0.146)	0.411
119	9.92	0.73	0.467	0.056	( 0.146)	0.412
120	10.00	0.73	0.467	0.055	( 0.146)	0.412
121	10.08	0.50	0.319	0.055	( 0.100)	0.264
122	10.17	0.50	0.319	0.055	( 0.100)	0.264
123	10.25	0.50	0.319	0.055	( 0.100)	0.264
124	10.33	0.50	0.319	0.054	( 0.100)	0.264
125	10.42	0.50	0.319	0.054	( 0.100)	0.265
126	10.50	0.50	0.319	0.054	( 0.100)	0.265
127	10.58	0.67	0.425	0.053	( 0.133)	0.371
128	10.67	0.67	0.425	0.053	( 0.133)	0.372
129	10.75	0.67	0.425	0.053	( 0.133)	0.372
130	10.83	0.67	0.425	0.053	( 0.133)	0.372
131	10.92	0.67	0.425	0.052	( 0.133)	0.372
132	11.00	0.67	0.425	0.052	( 0.133)	0.373
133	11.08	0.63	0.404	0.052	( 0.126)	0.352
134	11.17	0.63	0.404	0.052	( 0.126)	0.352
135	11.25	0.63	0.404	0.051	( 0.126)	0.352
136	11.33	0.63	0.404	0.051	( 0.126)	0.352
137	11.42	0.63	0.404	0.051	( 0.126)	0.353
138	11.50	0.63	0.404	0.051	( 0.126)	0.353
139	11.58	0.57	0.361	0.050	( 0.113)	0.311
140	11.67	0.57	0.361	0.050	( 0.113)	0.311
141	11.75	0.57	0.361	0.050	( 0.113)	0.311
142	11.83	0.60	0.382	0.050	( 0.120)	0.333
143	11.92	0.60	0.382	0.049	( 0.120)	0.333
144	12.00	0.60	0.382	0.049	( 0.120)	0.333
145	12.08	0.83	0.531	0.049	( 0.166)	0.482

146	12.17	0.83	0.531	0.049	( 0.166)	0.482
147	12.25	0.83	0.531	0.048	( 0.166)	0.483
148	12.33	0.87	0.552	0.048	( 0.173)	0.504
149	12.42	0.87	0.552	0.048	( 0.173)	0.504
150	12.50	0.87	0.552	0.048	( 0.173)	0.505
151	12.58	0.93	0.595	0.047	( 0.186)	0.547
152	12.67	0.93	0.595	0.047	( 0.186)	0.547
153	12.75	0.93	0.595	0.047	( 0.186)	0.548
154	12.83	0.97	0.616	0.047	( 0.193)	0.569
155	12.92	0.97	0.616	0.047	( 0.193)	0.569
156	13.00	0.97	0.616	0.046	( 0.193)	0.570
157	13.08	1.13	0.722	0.046	( 0.226)	0.676
158	13.17	1.13	0.722	0.046	( 0.226)	0.676
159	13.25	1.13	0.722	0.046	( 0.226)	0.677
160	13.33	1.13	0.722	0.045	( 0.226)	0.677
161	13.42	1.13	0.722	0.045	( 0.226)	0.677
162	13.50	1.13	0.722	0.045	( 0.226)	0.677
163	13.58	0.77	0.489	0.045	( 0.153)	0.444
164	13.67	0.77	0.489	0.044	( 0.153)	0.444
165	13.75	0.77	0.489	0.044	( 0.153)	0.444
166	13.83	0.77	0.489	0.044	( 0.153)	0.445
167	13.92	0.77	0.489	0.044	( 0.153)	0.445
168	14.00	0.77	0.489	0.044	( 0.153)	0.445
169	14.08	0.90	0.573	0.043	( 0.179)	0.530
170	14.17	0.90	0.573	0.043	( 0.179)	0.530
171	14.25	0.90	0.573	0.043	( 0.179)	0.531
172	14.33	0.87	0.552	0.043	( 0.173)	0.510
173	14.42	0.87	0.552	0.042	( 0.173)	0.510
174	14.50	0.87	0.552	0.042	( 0.173)	0.510
175	14.58	0.87	0.552	0.042	( 0.173)	0.510
176	14.67	0.87	0.552	0.042	( 0.173)	0.510
177	14.75	0.87	0.552	0.042	( 0.173)	0.511
178	14.83	0.83	0.531	0.041	( 0.166)	0.490
179	14.92	0.83	0.531	0.041	( 0.166)	0.490
180	15.00	0.83	0.531	0.041	( 0.166)	0.490
181	15.08	0.80	0.510	0.041	( 0.160)	0.469
182	15.17	0.80	0.510	0.041	( 0.160)	0.469
183	15.25	0.80	0.510	0.040	( 0.160)	0.469
184	15.33	0.77	0.489	0.040	( 0.153)	0.448
185	15.42	0.77	0.489	0.040	( 0.153)	0.449
186	15.50	0.77	0.489	0.040	( 0.153)	0.449
187	15.58	0.63	0.404	0.039	( 0.126)	0.364
188	15.67	0.63	0.404	0.039	( 0.126)	0.364
189	15.75	0.63	0.404	0.039	( 0.126)	0.364
190	15.83	0.63	0.404	0.039	( 0.126)	0.365
191	15.92	0.63	0.404	0.039	( 0.126)	0.365
192	16.00	0.63	0.404	0.038	( 0.126)	0.365
193	16.08	0.13	0.085	( 0.038)	0.027	0.058
194	16.17	0.13	0.085	( 0.038)	0.027	0.058
195	16.25	0.13	0.085	( 0.038)	0.027	0.058



196	16.33	0.13	0.085	( 0.038)	0.027	0.058
197	16.42	0.13	0.085	( 0.038)	0.027	0.058
198	16.50	0.13	0.085	( 0.037)	0.027	0.058
199	16.58	0.10	0.064	( 0.037)	0.020	0.044
200	16.67	0.10	0.064	( 0.037)	0.020	0.044
201	16.75	0.10	0.064	( 0.037)	0.020	0.044
202	16.83	0.10	0.064	( 0.037)	0.020	0.044
203	16.92	0.10	0.064	( 0.036)	0.020	0.044
204	17.00	0.10	0.064	( 0.036)	0.020	0.044
205	17.08	0.17	0.106	( 0.036)	0.033	0.073
206	17.17	0.17	0.106	( 0.036)	0.033	0.073
207	17.25	0.17	0.106	( 0.036)	0.033	0.073
208	17.33	0.17	0.106	( 0.035)	0.033	0.073
209	17.42	0.17	0.106	( 0.035)	0.033	0.073
210	17.50	0.17	0.106	( 0.035)	0.033	0.073
211	17.58	0.17	0.106	( 0.035)	0.033	0.073
212	17.67	0.17	0.106	( 0.035)	0.033	0.073
213	17.75	0.17	0.106	( 0.035)	0.033	0.073
214	17.83	0.13	0.085	( 0.034)	0.027	0.058
215	17.92	0.13	0.085	( 0.034)	0.027	0.058
216	18.00	0.13	0.085	( 0.034)	0.027	0.058
217	18.08	0.13	0.085	( 0.034)	0.027	0.058
218	18.17	0.13	0.085	( 0.034)	0.027	0.058
219	18.25	0.13	0.085	( 0.034)	0.027	0.058
220	18.33	0.13	0.085	( 0.033)	0.027	0.058
221	18.42	0.13	0.085	( 0.033)	0.027	0.058
222	18.50	0.13	0.085	( 0.033)	0.027	0.058
223	18.58	0.10	0.064	( 0.033)	0.020	0.044
224	18.67	0.10	0.064	( 0.033)	0.020	0.044
225	18.75	0.10	0.064	( 0.033)	0.020	0.044
226	18.83	0.07	0.042	( 0.032)	0.013	0.029
227	18.92	0.07	0.042	( 0.032)	0.013	0.029
228	19.00	0.07	0.042	( 0.032)	0.013	0.029
229	19.08	0.10	0.064	( 0.032)	0.020	0.044
230	19.17	0.10	0.064	( 0.032)	0.020	0.044
231	19.25	0.10	0.064	( 0.032)	0.020	0.044
232	19.33	0.13	0.085	( 0.032)	0.027	0.058
233	19.42	0.13	0.085	( 0.031)	0.027	0.058
234	19.50	0.13	0.085	( 0.031)	0.027	0.058
235	19.58	0.10	0.064	( 0.031)	0.020	0.044
236	19.67	0.10	0.064	( 0.031)	0.020	0.044
237	19.75	0.10	0.064	( 0.031)	0.020	0.044
238	19.83	0.07	0.042	( 0.031)	0.013	0.029
239	19.92	0.07	0.042	( 0.031)	0.013	0.029
240	20.00	0.07	0.042	( 0.030)	0.013	0.029
241	20.08	0.10	0.064	( 0.030)	0.020	0.044
242	20.17	0.10	0.064	( 0.030)	0.020	0.044
243	20.25	0.10	0.064	( 0.030)	0.020	0.044
244	20.33	0.10	0.064	( 0.030)	0.020	0.044
245	20.42	0.10	0.064	( 0.030)	0.020	0.044

246	20.50	0.10	0.064	( 0.030)	0.020	0.044
247	20.58	0.10	0.064	( 0.030)	0.020	0.044
248	20.67	0.10	0.064	( 0.029)	0.020	0.044
249	20.75	0.10	0.064	( 0.029)	0.020	0.044
250	20.83	0.07	0.042	( 0.029)	0.013	0.029
251	20.92	0.07	0.042	( 0.029)	0.013	0.029
252	21.00	0.07	0.042	( 0.029)	0.013	0.029
253	21.08	0.10	0.064	( 0.029)	0.020	0.044
254	21.17	0.10	0.064	( 0.029)	0.020	0.044
255	21.25	0.10	0.064	( 0.029)	0.020	0.044
256	21.33	0.07	0.042	( 0.028)	0.013	0.029
257	21.42	0.07	0.042	( 0.028)	0.013	0.029
258	21.50	0.07	0.042	( 0.028)	0.013	0.029
259	21.58	0.10	0.064	( 0.028)	0.020	0.044
260	21.67	0.10	0.064	( 0.028)	0.020	0.044
261	21.75	0.10	0.064	( 0.028)	0.020	0.044
262	21.83	0.07	0.042	( 0.028)	0.013	0.029
263	21.92	0.07	0.042	( 0.028)	0.013	0.029
264	22.00	0.07	0.042	( 0.028)	0.013	0.029
265	22.08	0.10	0.064	( 0.028)	0.020	0.044
266	22.17	0.10	0.064	( 0.027)	0.020	0.044
267	22.25	0.10	0.064	( 0.027)	0.020	0.044
268	22.33	0.07	0.042	( 0.027)	0.013	0.029
269	22.42	0.07	0.042	( 0.027)	0.013	0.029
270	22.50	0.07	0.042	( 0.027)	0.013	0.029
271	22.58	0.07	0.042	( 0.027)	0.013	0.029
272	22.67	0.07	0.042	( 0.027)	0.013	0.029
273	22.75	0.07	0.042	( 0.027)	0.013	0.029
274	22.83	0.07	0.042	( 0.027)	0.013	0.029
275	22.92	0.07	0.042	( 0.027)	0.013	0.029
276	23.00	0.07	0.042	( 0.027)	0.013	0.029
277	23.08	0.07	0.042	( 0.027)	0.013	0.029
278	23.17	0.07	0.042	( 0.027)	0.013	0.029
279	23.25	0.07	0.042	( 0.027)	0.013	0.029
280	23.33	0.07	0.042	( 0.026)	0.013	0.029
281	23.42	0.07	0.042	( 0.026)	0.013	0.029
282	23.50	0.07	0.042	( 0.026)	0.013	0.029
283	23.58	0.07	0.042	( 0.026)	0.013	0.029
284	23.67	0.07	0.042	( 0.026)	0.013	0.029
285	23.75	0.07	0.042	( 0.026)	0.013	0.029
286	23.83	0.07	0.042	( 0.026)	0.013	0.029
287	23.92	0.07	0.042	( 0.026)	0.013	0.029
288	24.00	0.07	0.042	( 0.026)	0.013	0.029

(Loss Rate Not Used)

Sum = 100.0

Sum = 53.1

Flood volume = Effective rainfall 4.43(In)

times area 0.9(Ac.)/[((In)/(Ft.))] = 0.3(Ac.Ft)

Total soil loss = 0.88(In)

Total soil loss = 0.068(Ac.Ft)

Total rainfall = 5.31(In)

Flood volume = 14785.9 Cubic Feet  
 Total soil loss = 2947.4 Cubic Feet

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 Peak flow rate of this hydrograph = 0.628(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	0.0003	0.02	Q				
0+15	0.0004	0.03	Q				
0+20	0.0007	0.03	Q				
0+25	0.0009	0.04	Q				
0+30	0.0012	0.04	Q				
0+35	0.0015	0.04	Q				
0+40	0.0018	0.04	Q				
0+45	0.0021	0.04	Q				
0+50	0.0024	0.05	Q				
0+55	0.0028	0.05	Q				
1+ 0	0.0031	0.05	Q				
1+ 5	0.0034	0.05	Q				
1+10	0.0037	0.04	Q				
1+15	0.0040	0.04	Q				
1+20	0.0043	0.04	Q				
1+25	0.0046	0.04	Q				
1+30	0.0049	0.04	Q				
1+35	0.0051	0.04	Q				
1+40	0.0054	0.04	Q				
1+45	0.0057	0.04	Q				
1+50	0.0060	0.05	Q				
1+55	0.0064	0.05	Q				
2+ 0	0.0068	0.05	Q				
2+ 5	0.0071	0.05	Q				
2+10	0.0075	0.05	Q				
2+15	0.0079	0.05	Q				
2+20	0.0082	0.05	Q				
2+25	0.0086	0.05	QV				
2+30	0.0090	0.05	QV				
2+35	0.0094	0.06	QV				
2+40	0.0099	0.07	QV				
2+45	0.0103	0.07	QV				
2+50	0.0108	0.07	QV				
2+55	0.0113	0.07	QV				
3+ 0	0.0117	0.07	QV				

3+ 5	0.0122	0.07	QV
3+10	0.0127	0.07	QV
3+15	0.0131	0.07	QV
3+20	0.0136	0.07	QV
3+25	0.0141	0.07	QV
3+30	0.0145	0.07	QV
3+35	0.0150	0.07	QV
3+40	0.0155	0.07	QV
3+45	0.0159	0.07	QV
3+50	0.0164	0.07	QV
3+55	0.0170	0.08	Q V
4+ 0	0.0175	0.08	Q V
4+ 5	0.0181	0.08	Q V
4+10	0.0187	0.08	Q V
4+15	0.0192	0.08	Q V
4+20	0.0198	0.09	Q V
4+25	0.0205	0.09	Q V
4+30	0.0211	0.09	Q V
4+35	0.0218	0.09	Q V
4+40	0.0224	0.09	Q V
4+45	0.0231	0.09	Q V
4+50	0.0238	0.10	Q V
4+55	0.0245	0.11	Q V
5+ 0	0.0253	0.11	Q V
5+ 5	0.0259	0.09	Q V
5+10	0.0265	0.08	Q V
5+15	0.0271	0.08	Q V
5+20	0.0277	0.09	Q V
5+25	0.0283	0.09	Q V
5+30	0.0290	0.09	Q V
5+35	0.0297	0.10	Q V
5+40	0.0304	0.11	Q V
5+45	0.0311	0.11	Q V
5+50	0.0319	0.11	Q V
5+55	0.0326	0.11	Q V
6+ 0	0.0334	0.11	Q V
6+ 5	0.0342	0.11	Q V
6+10	0.0350	0.12	Q V
6+15	0.0358	0.12	Q V
6+20	0.0367	0.12	Q V
6+25	0.0375	0.12	Q V
6+30	0.0383	0.12	Q V
6+35	0.0392	0.13	Q V
6+40	0.0402	0.13	Q V
6+45	0.0411	0.14	Q V
6+50	0.0420	0.14	Q V
6+55	0.0430	0.14	Q V
7+ 0	0.0439	0.14	Q V
7+ 5	0.0448	0.14	Q V
7+10	0.0458	0.14	Q V

7+15	0.0467	0.14	Q	V				
7+20	0.0477	0.15	Q	V				
7+25	0.0488	0.16	Q	V				
7+30	0.0499	0.16	Q	V				
7+35	0.0510	0.17	Q	V				
7+40	0.0522	0.18	Q	V				
7+45	0.0535	0.18	Q	V				
7+50	0.0548	0.19	Q	V				
7+55	0.0561	0.20	Q	V				
8+ 0	0.0575	0.20	Q	V				
8+ 5	0.0590	0.22	Q	V				
8+10	0.0606	0.23	Q	V				
8+15	0.0622	0.24	Q	V				
8+20	0.0639	0.24	Q	V				
8+25	0.0655	0.24	Q	V				
8+30	0.0672	0.24	Q	V				
8+35	0.0689	0.25	Q	V				
8+40	0.0707	0.26	Q	V				
8+45	0.0724	0.26	Q	V				
8+50	0.0743	0.27	Q	V				
8+55	0.0762	0.28	Q	V				
9+ 0	0.0782	0.28	Q	V				
9+ 5	0.0802	0.30	Q	V				
9+10	0.0824	0.32	Q	V				
9+15	0.0846	0.32	Q	V				
9+20	0.0869	0.33	Q	V				
9+25	0.0892	0.34	Q	V				
9+30	0.0916	0.34	Q	V				
9+35	0.0940	0.35	Q	V				
9+40	0.0964	0.36	Q	V				
9+45	0.0989	0.36	Q	V				
9+50	0.1015	0.37	Q	V				
9+55	0.1041	0.38	Q	V				
10+ 0	0.1067	0.38	Q	V				
10+ 5	0.1089	0.31	Q	V				
10+10	0.1107	0.26	Q	V				
10+15	0.1124	0.25	Q	V				
10+20	0.1141	0.25	Q	V				
10+25	0.1158	0.25	Q	V				
10+30	0.1175	0.25	Q	V				
10+35	0.1195	0.29	Q	V				
10+40	0.1218	0.33	Q	V				
10+45	0.1241	0.34	Q	V				
10+50	0.1265	0.35	Q	V				
10+55	0.1289	0.35	Q	V				
11+ 0	0.1313	0.35	Q	V				
11+ 5	0.1336	0.34	Q	V				
11+10	0.1359	0.33	Q	V				
11+15	0.1381	0.33	Q	V				
11+20	0.1404	0.33	Q	V				

11+25	0.1426	0.33	Q	V			
11+30	0.1449	0.33	Q	V			
11+35	0.1470	0.31	Q	V			
11+40	0.1490	0.29	Q	V			
11+45	0.1510	0.29	Q	V			
11+50	0.1530	0.30	Q	V			
11+55	0.1552	0.31	Q	V			
12+ 0	0.1573	0.31	Q	V			
12+ 5	0.1599	0.38	Q	V			
12+10	0.1629	0.43	Q	V			
12+15	0.1659	0.44	Q	V			
12+20	0.1691	0.46	Q	V			
12+25	0.1723	0.47	Q	V			
12+30	0.1755	0.47	Q	V			
12+35	0.1789	0.49	Q	V			
12+40	0.1823	0.50	Q	V			
12+45	0.1858	0.51	Q	V			
12+50	0.1894	0.52	Q	V			
12+55	0.1930	0.53	Q	V			
13+ 0	0.1966	0.53	Q	V			
13+ 5	0.2006	0.58	Q	V			
13+10	0.2049	0.62	Q	V			
13+15	0.2092	0.63	Q	V			
13+20	0.2135	0.63	Q	V			
13+25	0.2178	0.63	Q	V			
13+30	0.2222	0.63	Q	V			
13+35	0.2257	0.52	Q	V			
13+40	0.2287	0.43	Q	V			
13+45	0.2316	0.42	Q	V			
13+50	0.2344	0.41	Q	V			
13+55	0.2373	0.41	Q	V			
14+ 0	0.2401	0.41	Q	V			
14+ 5	0.2432	0.45	Q	V			
14+10	0.2466	0.48	Q	V			
14+15	0.2499	0.49	Q	V			
14+20	0.2533	0.48	Q	V			
14+25	0.2565	0.47	Q	V			
14+30	0.2598	0.47	Q	V			
14+35	0.2631	0.47	Q	V			
14+40	0.2663	0.47	Q	V			
14+45	0.2696	0.47	Q	V			
14+50	0.2728	0.46	Q	V			
14+55	0.2759	0.46	Q	V			
15+ 0	0.2791	0.45	Q	V			
15+ 5	0.2821	0.44	Q	V			
15+10	0.2851	0.44	Q	V			
15+15	0.2881	0.44	Q	V			
15+20	0.2911	0.43	Q	V			
15+25	0.2939	0.42	Q	V			
15+30	0.2968	0.42	Q	V			

15+35	0.2994	0.38	Q				V
15+40	0.3018	0.35	Q				V
15+45	0.3041	0.34	Q				V
15+50	0.3065	0.34	Q				V
15+55	0.3088	0.34	Q				V
16+ 0	0.3111	0.34	Q				V
16+ 5	0.3125	0.20	Q				V
16+10	0.3131	0.08	Q				V
16+15	0.3135	0.06	Q				V
16+20	0.3138	0.05	Q				V
16+25	0.3142	0.05	Q				V
16+30	0.3146	0.05	Q				V
16+35	0.3149	0.05	Q				V
16+40	0.3152	0.04	Q				V
16+45	0.3155	0.04	Q				V
16+50	0.3158	0.04	Q				V
16+55	0.3160	0.04	Q				V
17+ 0	0.3163	0.04	Q				V
17+ 5	0.3167	0.05	Q				V
17+10	0.3171	0.07	Q				V
17+15	0.3176	0.07	Q				V
17+20	0.3181	0.07	Q				V
17+25	0.3185	0.07	Q				V
17+30	0.3190	0.07	Q				V
17+35	0.3195	0.07	Q				V
17+40	0.3199	0.07	Q				V
17+45	0.3204	0.07	Q				V
17+50	0.3208	0.06	Q				V
17+55	0.3212	0.06	Q				V
18+ 0	0.3216	0.05	Q				V
18+ 5	0.3220	0.05	Q				V
18+10	0.3223	0.05	Q				V
18+15	0.3227	0.05	Q				V
18+20	0.3231	0.05	Q				V
18+25	0.3234	0.05	Q				V
18+30	0.3238	0.05	Q				V
18+35	0.3241	0.05	Q				V
18+40	0.3244	0.04	Q				V
18+45	0.3247	0.04	Q				V
18+50	0.3250	0.03	Q				V
18+55	0.3251	0.03	Q				V
19+ 0	0.3253	0.03	Q				V
19+ 5	0.3256	0.03	Q				V
19+10	0.3258	0.04	Q				V
19+15	0.3261	0.04	Q				V
19+20	0.3264	0.05	Q				V
19+25	0.3268	0.05	Q				V
19+30	0.3272	0.05	Q				V
19+35	0.3275	0.05	Q				V
19+40	0.3278	0.04	Q				V

19+45	0.3281	0.04	Q				V
19+50	0.3283	0.03	Q				V
19+55	0.3285	0.03	Q				V
20+ 0	0.3287	0.03	Q				V
20+ 5	0.3289	0.03	Q				V
20+10	0.3292	0.04	Q				V
20+15	0.3295	0.04	Q				V
20+20	0.3298	0.04	Q				V
20+25	0.3300	0.04	Q				V
20+30	0.3303	0.04	Q				V
20+35	0.3306	0.04	Q				V
20+40	0.3309	0.04	Q				V
20+45	0.3312	0.04	Q				V
20+50	0.3314	0.03	Q				V
20+55	0.3316	0.03	Q				V
21+ 0	0.3318	0.03	Q				V
21+ 5	0.3320	0.03	Q				V
21+10	0.3323	0.04	Q				V
21+15	0.3325	0.04	Q				V
21+20	0.3328	0.03	Q				V
21+25	0.3330	0.03	Q				V
21+30	0.3332	0.03	Q				V
21+35	0.3334	0.03	Q				V
21+40	0.3337	0.04	Q				V
21+45	0.3339	0.04	Q				V
21+50	0.3342	0.03	Q				V
21+55	0.3344	0.03	Q				V
22+ 0	0.3346	0.03	Q				V
22+ 5	0.3348	0.03	Q				V
22+10	0.3351	0.04	Q				V
22+15	0.3353	0.04	Q				V
22+20	0.3356	0.03	Q				V
22+25	0.3358	0.03	Q				V
22+30	0.3360	0.03	Q				V
22+35	0.3362	0.03	Q				V
22+40	0.3363	0.03	Q				V
22+45	0.3365	0.03	Q				V
22+50	0.3367	0.03	Q				V
22+55	0.3369	0.03	Q				V
23+ 0	0.3371	0.03	Q				V
23+ 5	0.3373	0.03	Q				V
23+10	0.3375	0.03	Q				V
23+15	0.3376	0.03	Q				V
23+20	0.3378	0.03	Q				V
23+25	0.3380	0.03	Q				V
23+30	0.3382	0.03	Q				V
23+35	0.3384	0.03	Q				V
23+40	0.3386	0.03	Q				V
23+45	0.3388	0.03	Q				V
23+50	0.3389	0.03	Q				V



23+55	0.3391	0.03	Q				V
24+ 0	0.3393	0.03	Q				V
24+ 5	0.3394	0.01	Q				V
24+10	0.3394	0.00	Q				V
24+15	0.3394	0.00	Q				V

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**Appendix K**  
**Basin Analysis**

# Pond Report

## Pond No. 1 - Mapes Industrial - DA A

### Pond Data

Pond storage is based on user-defined values.

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	n/a	0	0
8.00	108.00	n/a	26,993	26,993
8.50	108.50	n/a	2,083	29,075
9.00	109.00	n/a	2,018	31,093
9.50	109.50	n/a	1,935	33,028
10.00	110.00	n/a	1,830	34,858
10.50	110.50	n/a	1,699	36,557
11.00	111.00	n/a	1,536	38,092
11.50	111.50	n/a	1,328	39,420
12.00	112.00	n/a	1,049	40,469
12.50	112.50	n/a	585	41,054

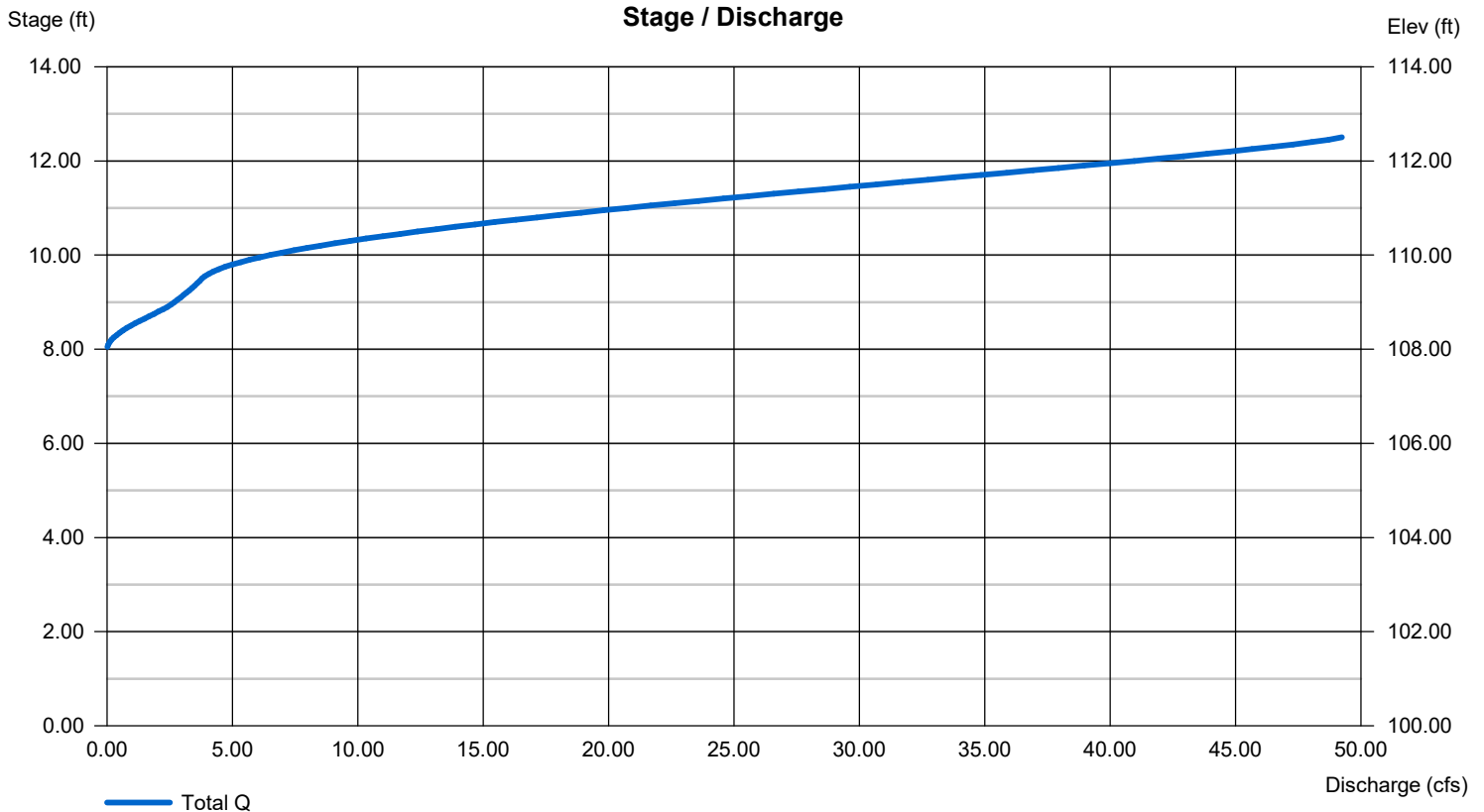
### Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	36.00	0.00	0.00
Span (in)	= 12.00	36.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 108.00	109.50	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000	(by Wet area)		
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).





# Pond Report

## Pond No. 2 - Mapes Industrial - DA B

### Pond Data

Pond storage is based on user-defined values.

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	n/a	0	0
4.50	104.50	n/a	1,257	1,257
5.00	105.00	n/a	200	1,456
5.50	105.50	n/a	196	1,652
6.00	106.00	n/a	190	1,842
6.50	106.50	n/a	180	2,022
7.00	107.00	n/a	165	2,187
7.50	107.50	n/a	145	2,332
8.00	108.00	n/a	116	2,448
8.50	108.50	n/a	65	2,513

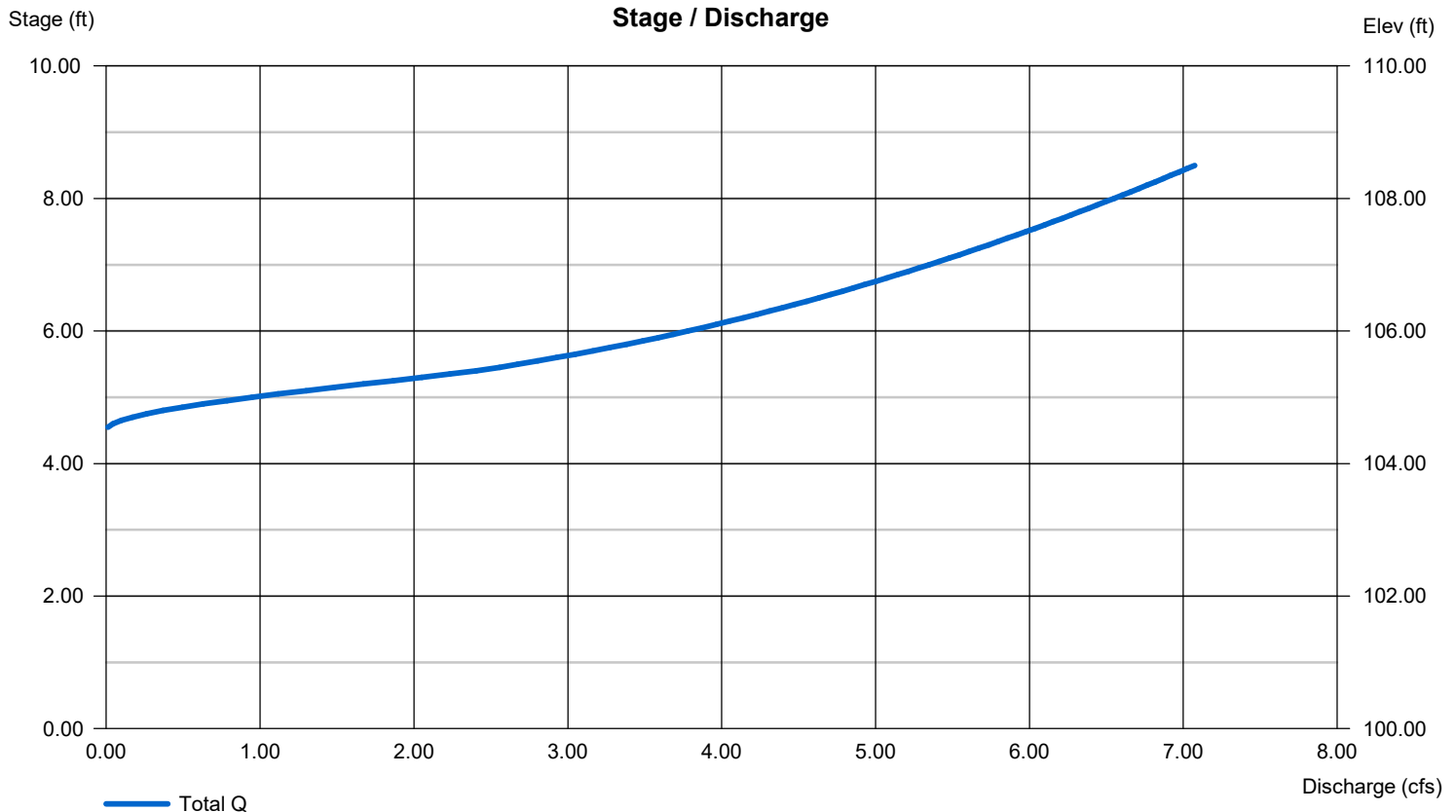
### Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 104.50	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000	(by Wet area)		
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).





## **Appendix K.1**

### **Basin Analysis 2-Year Storm**

FLOOD HYDROGRAPH ROUTING PROGRAM  
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018  
Study date: 05/30/22

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MAPES AND TRUMBLE INDUSTRIAL FACILITY  
BASIN ROUTING  
POST-DEVELOPMENT CONDITIONS  
2-YEAR STORM, DA A  
-----

Program License Serial Number 6443

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\*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: MapesPost2AUH24.rte  
\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
Number of intervals = 292  
Time interval = 5.0 (Min.)  
Maximum/Peak flow rate = 3.894 (CFS)  
Total volume = 2.366 (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 0.000 to Point/Station 0.000  
\*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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

Total number of inflow hydrograph intervals = 292  
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-0*dt/2) (Ac.Ft)	(S+0*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
8.000	0.620	0.001	0.620	0.620
8.500	0.667	0.950	0.664	0.670
9.000	0.714	2.670	0.705	0.723
9.500	0.758	3.780	0.745	0.771
10.000	0.800	6.500	0.778	0.822
10.500	0.839	12.380	0.796	0.882
11.000	0.874	20.750	0.803	0.945
11.500	0.905	30.670	0.799	1.011
12.000	0.929	40.970	0.788	1.070
12.500	0.942	49.240	0.772	1.112

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Hydrograph Detention Basin Routing

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Graph values: 'I'= unit inflow; 'O'=outflow at time shown

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Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	1.0	1.95	2.92	3.89	Depth (Ft.)
0.083	0.09	0.00	0.000	O					0.00
0.167	0.20	0.00	0.001	O I					0.02
0.250	0.22	0.00	0.003	O I					0.04
0.333	0.27	0.00	0.004	O I					0.06
0.417	0.33	0.00	0.006	O I					0.08
0.500	0.34	0.00	0.009	O I					0.11
0.583	0.34	0.00	0.011	O I					0.14
0.667	0.34	0.00	0.013	O I					0.17
0.750	0.34	0.00	0.016	O I					0.20
0.833	0.39	0.00	0.018	O I					0.24
0.917	0.44	0.00	0.021	O I					0.27
1.000	0.45	0.00	0.024	O I					0.31
1.083	0.41	0.00	0.027	O I					0.35
1.167	0.36	0.00	0.030	O I					0.39
1.250	0.35	0.00	0.032	O I					0.42
1.333	0.35	0.00	0.035	O I					0.45
1.417	0.34	0.00	0.037	O I					0.48
1.500	0.34	0.00	0.040	O I					0.51
1.583	0.34	0.00	0.042	O I					0.54
1.667	0.34	0.00	0.044	O I					0.57
1.750	0.34	0.00	0.047	O I					0.60
1.833	0.39	0.00	0.049	O I					0.63
1.917	0.44	0.00	0.052	O I					0.67
2.000	0.45	0.00	0.055	O I					0.71
2.083	0.46	0.00	0.058	O I					0.75

2.167	0.46	0.00	0.061	0	I					0.79
2.250	0.46	0.00	0.065	0	I					0.83
2.333	0.46	0.00	0.068	0	I					0.87
2.417	0.46	0.00	0.071	0	I					0.91
2.500	0.46	0.00	0.074	0	I					0.95
2.583	0.51	0.00	0.077	0	I					1.00
2.667	0.56	0.00	0.081	0	I					1.04
2.750	0.57	0.00	0.085	0	I					1.09
2.833	0.57	0.00	0.089	0	I					1.14
2.917	0.57	0.00	0.093	0	I					1.20
3.000	0.57	0.00	0.097	0	I					1.25
3.083	0.57	0.00	0.101	0	I					1.30
3.167	0.57	0.00	0.104	0	I					1.35
3.250	0.57	0.00	0.108	0	I					1.40
3.333	0.57	0.00	0.112	0	I					1.45
3.417	0.57	0.00	0.116	0	I					1.50
3.500	0.57	0.00	0.120	0	I					1.55
3.583	0.57	0.00	0.124	0	I					1.60
3.667	0.57	0.00	0.128	0	I					1.65
3.750	0.57	0.00	0.132	0	I					1.70
3.833	0.62	0.00	0.136	0	I					1.76
3.917	0.67	0.00	0.141	0	I					1.81
4.000	0.68	0.00	0.145	0	I					1.87
4.083	0.69	0.00	0.150	0	I					1.94
4.167	0.69	0.00	0.155	0	I					2.00
4.250	0.69	0.00	0.159	0	I					2.06
4.333	0.73	0.00	0.164	0	I					2.12
4.417	0.79	0.00	0.170	0	I					2.19
4.500	0.80	0.00	0.175	0	I					2.26
4.583	0.80	0.00	0.181	0	I					2.33
4.667	0.80	0.00	0.186	0	I					2.40
4.750	0.80	0.00	0.192	0	I					2.47
4.833	0.85	0.00	0.197	0	I					2.54
4.917	0.90	0.00	0.203	0	I					2.62
5.000	0.91	0.00	0.209	0	I					2.70
5.083	0.82	0.00	0.215	0	I					2.78
5.167	0.72	0.00	0.221	0	I					2.85
5.250	0.70	0.00	0.226	0	I					2.91
5.333	0.74	0.00	0.231	0	I					2.97
5.417	0.79	0.00	0.236	0	I					3.04
5.500	0.80	0.00	0.241	0	I					3.11
5.583	0.85	0.00	0.247	0	I					3.19
5.667	0.90	0.00	0.253	0	I					3.26
5.750	0.91	0.00	0.259	0	I					3.34
5.833	0.91	0.00	0.265	0	I					3.42
5.917	0.92	0.00	0.272	0	I					3.51
6.000	0.92	0.00	0.278	0	I					3.59
6.083	0.96	0.00	0.284	0	I					3.67
6.167	1.01	0.00	0.291	0	I					3.76
6.250	1.02	0.00	0.298	0	I					3.85

6.333	1.03	0.00	0.305	0	I				3.94
6.417	1.03	0.00	0.312	0	I				4.03
6.500	1.03	0.00	0.320	0	I				4.12
6.583	1.08	0.00	0.327	0	I				4.22
6.667	1.13	0.00	0.334	0	I				4.32
6.750	1.14	0.00	0.342	0	I				4.42
6.833	1.14	0.00	0.350	0	I				4.52
6.917	1.15	0.00	0.358	0	I				4.62
7.000	1.15	0.00	0.366	0	I				4.72
7.083	1.15	0.00	0.374	0	I				4.82
7.167	1.15	0.00	0.382	0	I				4.92
7.250	1.15	0.00	0.390	0	I				5.03
7.333	1.19	0.00	0.398	0	I				5.13
7.417	1.24	0.00	0.406	0	I				5.24
7.500	1.25	0.00	0.415	0	I				5.35
7.583	1.31	0.00	0.423	0	I				5.46
7.667	1.36	0.00	0.433	0	I				5.58
7.750	1.37	0.00	0.442	0	I				5.70
7.833	1.42	0.00	0.451	0	I				5.83
7.917	1.47	0.00	0.461	0	I				5.95
8.000	1.48	0.00	0.472	0	I				6.09
8.083	1.58	0.00	0.482	0	I				6.22
8.167	1.68	0.00	0.493	0	I				6.37
8.250	1.71	0.00	0.505	0	I				6.52
8.333	1.71	0.00	0.517	0	I				6.67
8.417	1.72	0.00	0.529	0	I				6.82
8.500	1.72	0.00	0.540	0	I				6.97
8.583	1.77	0.00	0.552	0	I				7.13
8.667	1.82	0.00	0.565	0	I				7.29
8.750	1.83	0.00	0.577	0	I				7.45
8.833	1.88	0.00	0.590	0	I				7.61
8.917	1.93	0.00	0.603	0	I				7.78
9.000	1.94	0.00	0.617	0	I				7.95
9.083	2.04	0.19	0.630	0	I				8.10
9.167	2.14	0.44	0.642	0	I				8.23
9.250	2.16	0.66	0.653	0	I				8.35
9.333	2.22	0.86	0.663	0	I				8.45
9.417	2.27	1.11	0.671	0	I				8.55
9.500	2.28	1.37	0.678	0	I				8.62
9.583	2.34	1.58	0.684	0	I				8.68
9.667	2.39	1.76	0.689	0	I				8.73
9.750	2.40	1.90	0.693	0	I				8.78
9.833	2.45	2.02	0.696	0	I				8.81
9.917	2.50	2.12	0.699	0	I				8.84
10.000	2.51	2.21	0.701	0	I				8.87
10.083	2.19	2.24	0.702	0	I				8.87
10.167	1.83	2.19	0.701	0	I				8.86
10.250	1.76	2.10	0.698	0	I				8.83
10.333	1.73	2.02	0.696	0	I				8.81
10.417	1.72	1.95	0.694	0	I				8.79

10.500	1.72	1.90	0.693			IO			8.78	
10.583	1.95	1.89	0.693			OI			8.77	
10.667	2.21	1.93	0.694			O	I		8.78	
10.750	2.26	2.00	0.696			O	I		8.80	
10.833	2.28	2.06	0.697			O	I		8.82	
10.917	2.29	2.11	0.699				OI		8.84	
11.000	2.29	2.15	0.700				OI		8.85	
11.083	2.24	2.18	0.701				OI		8.86	
11.167	2.19	2.19	0.701				OI		8.86	
11.250	2.18	2.19	0.701				O		8.86	
11.333	2.18	2.18	0.701				O		8.86	
11.417	2.18	2.18	0.701				O		8.86	
11.500	2.18	2.18	0.701				O		8.86	
11.583	2.08	2.17	0.700				O		8.85	
11.667	1.98	2.14	0.699			IO			8.85	
11.750	1.96	2.10	0.698			IO			8.83	
11.833	2.00	2.07	0.698			IO			8.83	
11.917	2.04	2.06	0.697			O			8.82	
12.000	2.06	2.06	0.697			O			8.82	
12.083	2.39	2.10	0.698				O	I	8.83	
12.167	2.75	2.20	0.701					O	I	8.86
12.250	2.82	2.33	0.705					O	I	8.90
12.333	2.90	2.45	0.708					O	I	8.94
12.417	2.96	2.56	0.711					O	I	8.97
12.500	2.97	2.65	0.713					O	I	8.99
12.583	3.07	2.71	0.716					O	I	9.02
12.667	3.17	2.78	0.718					O	I	9.05
12.750	3.19	2.84	0.721					O	I	9.08
12.833	3.25	2.90	0.723					O	I	9.11
12.917	3.30	2.96	0.726					O	I	9.13
13.000	3.32	3.02	0.728					O	I	9.16
13.083	3.56	3.09	0.730					O	I	9.19
13.167	3.81	3.18	0.734					O	I	9.23
13.250	3.86	3.29	0.738					O	I	9.28
13.333	3.89	3.38	0.742					O	I	9.32
13.417	3.89	3.46	0.745					O	I	9.36
13.500	3.89	3.53	0.748					O	I	9.39
13.583	3.37	3.55	0.749					I	O	9.40
13.667	2.82	3.48	0.746					I	O	9.36
13.750	2.70	3.36	0.741					I	O	9.31
13.833	2.65	3.25	0.737					I	O	9.26
13.917	2.63	3.15	0.733					I	O	9.22
14.000	2.63	3.07	0.730					I	O	9.18
14.083	2.82	3.02	0.728					IO		9.16
14.167	3.03	3.00	0.727					O		9.15
14.250	3.07	3.01	0.727					OI		9.15
14.333	3.04	3.02	0.728					O		9.16
14.417	2.99	3.02	0.728					O		9.16
14.500	2.98	3.01	0.728					O		9.15
14.583	2.98	3.01	0.727					O		9.15

14.667	2.98	3.00	0.727				0	9.15
14.750	2.98	3.00	0.727				0	9.15
14.833	2.93	2.99	0.727				0	9.14
14.917	2.88	2.98	0.726				IO	9.14
15.000	2.87	2.96	0.726				IO	9.13
15.083	2.82	2.94	0.725				IO	9.12
15.167	2.77	2.92	0.724				IO	9.11
15.250	2.75	2.89	0.723				IO	9.10
15.333	2.70	2.87	0.722				IO	9.09
15.417	2.65	2.84	0.721				I 0	9.07
15.500	2.64	2.81	0.719				I 0	9.06
15.583	2.45	2.76	0.718				I 0	9.04
15.667	2.24	2.70	0.715				I 0	9.01
15.750	2.20	2.60	0.712				I 0	8.98
15.833	2.18	2.51	0.710				I 0	8.95
15.917	2.18	2.44	0.708				I 0	8.93
16.000	2.18	2.38	0.706				I 0	8.91
16.083	1.47	2.25	0.703			I	0	8.88
16.167	0.71	1.99	0.695	I			0	8.80
16.250	0.55	1.69	0.687	I		0		8.71
16.333	0.48	1.42	0.680	I		0		8.64
16.417	0.46	1.21	0.674	I		0		8.58
16.500	0.46	1.04	0.670	I		0		8.53
16.583	0.41	0.92	0.666	I		0		8.49
16.667	0.36	0.85	0.662	I		0		8.45
16.750	0.35	0.79	0.659	I		0		8.42
16.833	0.35	0.73	0.656	I		0		8.39
16.917	0.34	0.68	0.654	I		0		8.36
17.000	0.34	0.64	0.652	I		0		8.34
17.083	0.44	0.61	0.650	IO				8.32
17.167	0.54	0.59	0.649	0				8.31
17.250	0.56	0.59	0.649	0				8.31
17.333	0.57	0.58	0.649	0				8.31
17.417	0.57	0.58	0.649	0				8.31
17.500	0.57	0.58	0.649	0				8.31
17.583	0.57	0.58	0.649	0				8.30
17.667	0.57	0.58	0.649	0				8.30
17.750	0.57	0.58	0.649	0				8.30
17.833	0.53	0.57	0.648	0				8.30
17.917	0.47	0.56	0.648	IO				8.30
18.000	0.46	0.55	0.647	IO				8.29
18.083	0.46	0.54	0.647	IO				8.28
18.167	0.46	0.53	0.646	IO				8.28
18.250	0.46	0.52	0.646	IO				8.27
18.333	0.46	0.51	0.645	IO				8.27
18.417	0.46	0.51	0.645	IO				8.27
18.500	0.46	0.50	0.645	IO				8.26
18.583	0.41	0.49	0.644	IO				8.26
18.667	0.36	0.48	0.644	IO				8.25
18.750	0.35	0.46	0.643	IO				8.24

18.833	0.30	0.44	0.642	IO					8.23
18.917	0.25	0.42	0.641	IO					8.22
19.000	0.24	0.40	0.640	I 0					8.21
19.083	0.28	0.38	0.639	IO					8.20
19.167	0.33	0.37	0.638	IO					8.19
19.250	0.34	0.36	0.638	0					8.19
19.333	0.39	0.36	0.638	OI					8.19
19.417	0.44	0.37	0.638	0					8.19
19.500	0.45	0.38	0.639	0					8.20
19.583	0.41	0.39	0.639	0					8.20
19.667	0.36	0.39	0.639	IO					8.20
19.750	0.35	0.38	0.639	IO					8.20
19.833	0.30	0.38	0.639	IO					8.20
19.917	0.25	0.36	0.638	0					8.19
20.000	0.24	0.35	0.637	IO					8.18
20.083	0.28	0.33	0.637	0					8.18
20.167	0.33	0.33	0.636	0					8.17
20.250	0.34	0.33	0.636	0					8.17
20.333	0.34	0.33	0.636	0					8.17
20.417	0.34	0.33	0.636	0					8.17
20.500	0.34	0.33	0.637	0					8.18
20.583	0.34	0.34	0.637	0					8.18
20.667	0.34	0.34	0.637	0					8.18
20.750	0.34	0.34	0.637	0					8.18
20.833	0.30	0.34	0.637	0					8.18
20.917	0.25	0.33	0.636	0					8.17
21.000	0.24	0.32	0.636	IO					8.17
21.083	0.28	0.31	0.635	0					8.16
21.167	0.33	0.31	0.635	0					8.16
21.250	0.34	0.31	0.635	0					8.16
21.333	0.29	0.31	0.635	0					8.16
21.417	0.25	0.31	0.635	0					8.16
21.500	0.24	0.30	0.635	IO					8.16
21.583	0.28	0.29	0.634	0					8.15
21.667	0.33	0.29	0.634	0					8.15
21.750	0.34	0.30	0.635	0					8.16
21.833	0.29	0.30	0.635	0					8.16
21.917	0.25	0.30	0.635	0					8.16
22.000	0.24	0.29	0.634	IO					8.15
22.083	0.28	0.29	0.634	0					8.15
22.167	0.33	0.29	0.634	0					8.15
22.250	0.34	0.29	0.634	0					8.15
22.333	0.29	0.30	0.635	0					8.16
22.417	0.25	0.29	0.634	0					8.15
22.500	0.24	0.29	0.634	IO					8.15
22.583	0.23	0.28	0.634	IO					8.15
22.667	0.23	0.27	0.633	IO					8.14
22.750	0.23	0.27	0.633	IO					8.14
22.833	0.23	0.26	0.633	IO					8.14
22.917	0.23	0.26	0.633	IO					8.14

23.000	0.23	0.25	0.633	IO					8.13
23.083	0.23	0.25	0.632	IO					8.13
23.167	0.23	0.25	0.632	IO					8.13
23.250	0.23	0.25	0.632	IO					8.13
23.333	0.23	0.24	0.632	IO					8.13
23.417	0.23	0.24	0.632	0					8.13
23.500	0.23	0.24	0.632	0					8.13
23.583	0.23	0.24	0.632	0					8.13
23.667	0.23	0.24	0.632	0					8.12
23.750	0.23	0.24	0.632	0					8.12
23.833	0.23	0.24	0.632	0					8.12
23.917	0.23	0.23	0.632	0					8.12
24.000	0.23	0.23	0.632	0					8.12
24.083	0.13	0.23	0.631	0					8.12
24.167	0.03	0.21	0.630	IO					8.11
24.250	0.01	0.18	0.629	IO					8.10
24.333	0.00	0.16	0.628	IO					8.08
24.417	0.00	0.14	0.627	IO					8.07
24.500	0.00	0.12	0.626	IO					8.06
24.583	0.00	0.11	0.625	0					8.06
24.667	0.00	0.09	0.625	0					8.05
24.750	0.00	0.08	0.624	0					8.04
24.833	0.00	0.07	0.623	0					8.04
24.917	0.00	0.06	0.623	0					8.03
25.000	0.00	0.05	0.623	0					8.03
25.083	0.00	0.05	0.622	0					8.02
25.167	0.00	0.04	0.622	0					8.02
25.250	0.00	0.03	0.622	0					8.02
25.333	0.00	0.03	0.621	0					8.02
25.417	0.00	0.03	0.621	0					8.01
25.500	0.00	0.02	0.621	0					8.01
25.583	0.00	0.02	0.621	0					8.01
25.667	0.00	0.02	0.621	0					8.01
25.750	0.00	0.02	0.621	0					8.01
25.833	0.00	0.01	0.621	0					8.01
25.917	0.00	0.01	0.621	0					8.01
26.000	0.00	0.01	0.620	0					8.00
26.083	0.00	0.01	0.620	0					8.00
26.167	0.00	0.01	0.620	0					8.00
26.250	0.00	0.01	0.620	0					8.00
26.333	0.00	0.01	0.620	0					8.00
26.417	0.00	0.00	0.620	0					8.00
26.500	0.00	0.00	0.620	0					8.00
26.583	0.00	0.00	0.620	0					8.00
26.667	0.00	0.00	0.620	0					8.00
26.750	0.00	0.00	0.620	0					8.00
26.833	0.00	0.00	0.620	0					8.00
26.917	0.00	0.00	0.620	0					8.00
27.000	0.00	0.00	0.620	0					8.00
27.083	0.00	0.00	0.620	0					8.00

27.167	0.00	0.00	0.620	0					8.00
27.250	0.00	0.00	0.620	0					8.00
27.333	0.00	0.00	0.620	0					8.00
27.417	0.00	0.00	0.620	0					8.00

Remaining water in basin = 0.62 (Ac.Ft)

\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*

Number of intervals = 329

Time interval = 5.0 (Min.)

Maximum/Peak flow rate = 3.547 (CFS)

Total volume = 1.746 (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 - 2018  
Study date: 05/30/22

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MAPES AND TRUMBLE INDUSTRIAL FACILITY  
BASIN ROUTING  
POST-DEVELOPMENT CONDITIONS  
2-YEAR STORM, DA B  
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Program License Serial Number 6443

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\*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: MapesPost2BUH24.rte  
\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
Number of intervals = 291  
Time interval = 5.0 (Min.)  
Maximum/Peak flow rate = 0.179 (CFS)  
Total volume = 0.109 (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 0.000 to Point/Station 0.000  
\*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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User entry of depth-outflow-storage data  
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Total number of inflow hydrograph intervals = 291  
Hydrograph time unit = 5.000 (Min.)  
Initial depth in storage basin = 0.00(Ft.)  
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Initial basin depth = 0.00 (Ft.)  
Initial basin storage = 0.00 (Ac.Ft)  
Initial basin outflow = 0.00 (CFS)

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 -----  
 Depth vs. Storage and Depth vs. Discharge data:  
 Basin Depth    Storage    Outflow    (S-0\*dt/2)    (S+0\*dt/2)  
           (Ft.)    (Ac.Ft)    (CFS)    (Ac.Ft)    (Ac.Ft)

-----

0.000	0.000	0.000	0.000	0.000
4.500	0.029	0.001	0.029	0.029
5.000	0.033	0.950	0.030	0.036
5.500	0.038	2.670	0.029	0.047
6.000	0.042	3.780	0.029	0.055
6.500	0.046	4.630	0.030	0.062
7.000	0.050	5.350	0.032	0.068
7.500	0.054	5.980	0.033	0.075
8.000	0.056	6.550	0.033	0.079
8.500	0.058	7.070	0.034	0.082

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

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Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	Depth (Ft.)					
				0	0.0	0.09	0.13	0.18	
0.083	0.01	0.00	0.000	0					0.00
0.167	0.01	0.00	0.000	OI					0.01
0.250	0.01	0.00	0.000	OI					0.02
0.333	0.01	0.00	0.000	O I					0.03
0.417	0.02	0.00	0.000	O I					0.05
0.500	0.02	0.00	0.000	O I					0.07
0.583	0.02	0.00	0.001	O I					0.08
0.667	0.02	0.00	0.001	O I					0.10
0.750	0.02	0.00	0.001	O I					0.12
0.833	0.02	0.00	0.001	O I					0.13
0.917	0.02	0.00	0.001	O I					0.15
1.000	0.02	0.00	0.001	O I					0.18
1.083	0.02	0.00	0.001	O I					0.20
1.167	0.02	0.00	0.001	O I					0.22
1.250	0.02	0.00	0.002	O I					0.23
1.333	0.02	0.00	0.002	O I					0.25
1.417	0.02	0.00	0.002	O I					0.27
1.500	0.02	0.00	0.002	O I					0.28
1.583	0.02	0.00	0.002	O I					0.30
1.667	0.02	0.00	0.002	O I					0.32
1.750	0.02	0.00	0.002	O I					0.33
1.833	0.02	0.00	0.002	O I					0.35
1.917	0.02	0.00	0.002	O I					0.37
2.000	0.02	0.00	0.003	O I					0.39
2.083	0.02	0.00	0.003	O I					0.42
2.167	0.02	0.00	0.003	O I					0.44

2.250	0.02	0.00	0.003	0	I					0.46
2.333	0.02	0.00	0.003	0	I					0.48
2.417	0.02	0.00	0.003	0	I					0.51
2.500	0.02	0.00	0.003	0	I					0.53
2.583	0.02	0.00	0.004	0	I					0.55
2.667	0.03	0.00	0.004	0	I					0.58
2.750	0.03	0.00	0.004	0	I					0.61
2.833	0.03	0.00	0.004	0	I					0.63
2.917	0.03	0.00	0.004	0	I					0.66
3.000	0.03	0.00	0.004	0	I					0.69
3.083	0.03	0.00	0.005	0	I					0.72
3.167	0.03	0.00	0.005	0	I					0.75
3.250	0.03	0.00	0.005	0	I					0.77
3.333	0.03	0.00	0.005	0	I					0.80
3.417	0.03	0.00	0.005	0	I					0.83
3.500	0.03	0.00	0.006	0	I					0.86
3.583	0.03	0.00	0.006	0	I					0.88
3.667	0.03	0.00	0.006	0	I					0.91
3.750	0.03	0.00	0.006	0	I					0.94
3.833	0.03	0.00	0.006	0	I					0.97
3.917	0.03	0.00	0.006	0	I					1.00
4.000	0.03	0.00	0.007	0	I					1.03
4.083	0.03	0.00	0.007	0	I					1.07
4.167	0.03	0.00	0.007	0	I					1.10
4.250	0.03	0.00	0.007	0	I					1.13
4.333	0.03	0.00	0.008	0	I					1.17
4.417	0.04	0.00	0.008	0	I					1.21
4.500	0.04	0.00	0.008	0	I					1.25
4.583	0.04	0.00	0.008	0	I					1.28
4.667	0.04	0.00	0.009	0	I					1.32
4.750	0.04	0.00	0.009	0	I					1.36
4.833	0.04	0.00	0.009	0	I					1.40
4.917	0.04	0.00	0.009	0	I					1.45
5.000	0.04	0.00	0.010	0	I					1.49
5.083	0.04	0.00	0.010	0	I					1.53
5.167	0.03	0.00	0.010	0	I					1.57
5.250	0.03	0.00	0.010	0	I					1.60
5.333	0.03	0.00	0.011	0	I					1.64
5.417	0.04	0.00	0.011	0	I					1.67
5.500	0.04	0.00	0.011	0	I					1.71
5.583	0.04	0.00	0.011	0	I					1.75
5.667	0.04	0.00	0.012	0	I					1.80
5.750	0.04	0.00	0.012	0	I					1.84
5.833	0.04	0.00	0.012	0	I					1.88
5.917	0.04	0.00	0.012	0	I					1.93
6.000	0.04	0.00	0.013	0	I					1.97
6.083	0.04	0.00	0.013	0	I					2.02
6.167	0.05	0.00	0.013	0	I					2.07
6.250	0.05	0.00	0.014	0	I					2.12
6.333	0.05	0.00	0.014	0	I					2.17

6.417	0.05	0.00	0.014	0	I				2.22
6.500	0.05	0.00	0.015	0	I				2.27
6.583	0.05	0.00	0.015	0	I				2.32
6.667	0.05	0.00	0.015	0	I				2.37
6.750	0.05	0.00	0.016	0	I				2.43
6.833	0.05	0.00	0.016	0	I				2.48
6.917	0.05	0.00	0.016	0	I				2.54
7.000	0.05	0.00	0.017	0	I				2.59
7.083	0.05	0.00	0.017	0	I				2.65
7.167	0.05	0.00	0.017	0	I				2.70
7.250	0.05	0.00	0.018	0	I				2.76
7.333	0.06	0.00	0.018	0	I				2.82
7.417	0.06	0.00	0.019	0	I				2.88
7.500	0.06	0.00	0.019	0	I				2.94
7.583	0.06	0.00	0.019	0	I				3.00
7.667	0.06	0.00	0.020	0	I				3.06
7.750	0.06	0.00	0.020	0	I				3.13
7.833	0.07	0.00	0.021	0	I				3.20
7.917	0.07	0.00	0.021	0	I				3.27
8.000	0.07	0.00	0.022	0	I				3.34
8.083	0.07	0.00	0.022	0	I				3.42
8.167	0.08	0.00	0.023	0	I				3.50
8.250	0.08	0.00	0.023	0	I				3.58
8.333	0.08	0.00	0.024	0	I				3.66
8.417	0.08	0.00	0.024	0	I				3.74
8.500	0.08	0.00	0.025	0	I				3.83
8.583	0.08	0.00	0.025	0	I				3.91
8.667	0.08	0.00	0.026	0	I				4.00
8.750	0.08	0.00	0.026	0	I				4.09
8.833	0.09	0.00	0.027	0	I				4.18
8.917	0.09	0.00	0.028	0	I				4.27
9.000	0.09	0.00	0.028	0	I				4.37
9.083	0.09	0.00	0.029	0	I				4.46
9.167	0.10	0.06	0.029		0	I			4.53
9.250	0.10	0.09	0.029			OI			4.55
9.333	0.10	0.10	0.029			OI			4.55
9.417	0.10	0.10	0.029			0			4.55
9.500	0.10	0.10	0.029			0			4.55
9.583	0.11	0.11	0.029			0			4.56
9.667	0.11	0.11	0.029			0			4.56
9.750	0.11	0.11	0.029			0			4.56
9.833	0.11	0.11	0.029			OI			4.56
9.917	0.12	0.11	0.029			0			4.56
10.000	0.12	0.12	0.029			0			4.56
10.083	0.10	0.11	0.029			I 0			4.56
10.167	0.08	0.09	0.029			I 0			4.55
10.250	0.08	0.08	0.029			0			4.54
10.333	0.08	0.08	0.029			0			4.54
10.417	0.08	0.08	0.029			0			4.54
10.500	0.08	0.08	0.029			0			4.54

10.583	0.09	0.08	0.029		OI		4.54
10.667	0.10	0.10	0.029		OI		4.55
10.750	0.10	0.10	0.029		0		4.55
10.833	0.11	0.10	0.029		0		4.55
10.917	0.11	0.10	0.029		0		4.55
11.000	0.11	0.11	0.029		0		4.55
11.083	0.10	0.10	0.029		0		4.55
11.167	0.10	0.10	0.029		IO		4.55
11.250	0.10	0.10	0.029		0		4.55
11.333	0.10	0.10	0.029		0		4.55
11.417	0.10	0.10	0.029		0		4.55
11.500	0.10	0.10	0.029		0		4.55
11.583	0.09	0.10	0.029		IO		4.55
11.667	0.09	0.09	0.029		0		4.55
11.750	0.09	0.09	0.029		0		4.55
11.833	0.09	0.09	0.029		0		4.55
11.917	0.09	0.09	0.029		0		4.55
12.000	0.09	0.09	0.029		0		4.55
12.083	0.11	0.10	0.029		0 I		4.55
12.167	0.13	0.12	0.029		OI		4.56
12.250	0.13	0.13	0.030		OI		4.57
12.333	0.13	0.13	0.030		0		4.57
12.417	0.14	0.13	0.030		0		4.57
12.500	0.14	0.14	0.030		0		4.57
12.583	0.14	0.14	0.030		OI		4.57
12.667	0.15	0.14	0.030		OI		4.58
12.750	0.15	0.15	0.030		0		4.58
12.833	0.15	0.15	0.030		0		4.58
12.917	0.15	0.15	0.030		OI		4.58
13.000	0.15	0.15	0.030		0		4.58
13.083	0.17	0.16	0.030		OI		4.58
13.167	0.18	0.17	0.030		OI		4.59
13.250	0.18	0.18	0.030		0		4.59
13.333	0.18	0.18	0.030		OI		4.59
13.417	0.18	0.18	0.030		OI		4.59
13.500	0.18	0.18	0.030		OI		4.59
13.583	0.15	0.17	0.030		I 0		4.59
13.667	0.13	0.14	0.030		I 0		4.57
13.750	0.12	0.13	0.030		IO		4.57
13.833	0.12	0.12	0.030		0		4.56
13.917	0.12	0.12	0.030		0		4.56
14.000	0.12	0.12	0.030		0		4.56
14.083	0.13	0.13	0.030		OI		4.57
14.167	0.14	0.13	0.030		OI		4.57
14.250	0.14	0.14	0.030		0		4.57
14.333	0.14	0.14	0.030		IO		4.57
14.417	0.14	0.14	0.030		0		4.57
14.500	0.14	0.14	0.030		0		4.57
14.583	0.14	0.14	0.030		0		4.57
14.667	0.14	0.14	0.030		0		4.57

14.750	0.14	0.14	0.030				0	4.57
14.833	0.13	0.14	0.030				0	4.57
14.917	0.13	0.13	0.030				0	4.57
15.000	0.13	0.13	0.030				0	4.57
15.083	0.13	0.13	0.030				0	4.57
15.167	0.13	0.13	0.030				0	4.57
15.250	0.13	0.13	0.030				0	4.57
15.333	0.12	0.12	0.030				0	4.57
15.417	0.12	0.12	0.030				0	4.56
15.500	0.12	0.12	0.030				0	4.56
15.583	0.11	0.12	0.029				IO	4.56
15.667	0.10	0.11	0.029				IO	4.56
15.750	0.10	0.10	0.029				IO	4.55
15.833	0.10	0.10	0.029				0	4.55
15.917	0.10	0.10	0.029				0	4.55
16.000	0.10	0.10	0.029				0	4.55
16.083	0.06	0.08	0.029		I	0		4.54
16.167	0.03	0.05	0.029	I	0			4.53
16.250	0.02	0.03	0.029	IO				4.51
16.333	0.02	0.02	0.029	IO				4.51
16.417	0.02	0.02	0.029	0				4.51
16.500	0.02	0.02	0.029	0				4.51
16.583	0.02	0.02	0.029	0				4.51
16.667	0.02	0.02	0.029	IO				4.51
16.750	0.02	0.02	0.029	0				4.51
16.833	0.02	0.02	0.029	0				4.51
16.917	0.02	0.02	0.029	0				4.51
17.000	0.02	0.02	0.029	0				4.51
17.083	0.02	0.02	0.029	0				4.51
17.167	0.03	0.02	0.029	0				4.51
17.250	0.03	0.03	0.029	0				4.51
17.333	0.03	0.03	0.029	0				4.51
17.417	0.03	0.03	0.029	0				4.51
17.500	0.03	0.03	0.029	0				4.51
17.583	0.03	0.03	0.029	0				4.51
17.667	0.03	0.03	0.029	0				4.51
17.750	0.03	0.03	0.029	0				4.51
17.833	0.02	0.03	0.029	0				4.51
17.917	0.02	0.02	0.029	IO				4.51
18.000	0.02	0.02	0.029	0				4.51
18.083	0.02	0.02	0.029	0				4.51
18.167	0.02	0.02	0.029	0				4.51
18.250	0.02	0.02	0.029	0				4.51
18.333	0.02	0.02	0.029	0				4.51
18.417	0.02	0.02	0.029	0				4.51
18.500	0.02	0.02	0.029	0				4.51
18.583	0.02	0.02	0.029	0				4.51
18.667	0.02	0.02	0.029	IO				4.51
18.750	0.02	0.02	0.029	0				4.51
18.833	0.01	0.01	0.029	0				4.51

18.917	0.01	0.01	0.029	IO					4.51
19.000	0.01	0.01	0.029	0					4.51
19.083	0.01	0.01	0.029	0					4.51
19.167	0.02	0.01	0.029	0					4.51
19.250	0.02	0.02	0.029	0					4.51
19.333	0.02	0.02	0.029	0					4.51
19.417	0.02	0.02	0.029	0					4.51
19.500	0.02	0.02	0.029	0					4.51
19.583	0.02	0.02	0.029	0					4.51
19.667	0.02	0.02	0.029	IO					4.51
19.750	0.02	0.02	0.029	0					4.51
19.833	0.01	0.01	0.029	0					4.51
19.917	0.01	0.01	0.029	IO					4.51
20.000	0.01	0.01	0.029	0					4.51
20.083	0.01	0.01	0.029	0					4.51
20.167	0.02	0.01	0.029	0					4.51
20.250	0.02	0.02	0.029	0					4.51
20.333	0.02	0.02	0.029	0					4.51
20.417	0.02	0.02	0.029	0					4.51
20.500	0.02	0.02	0.029	0					4.51
20.583	0.02	0.02	0.029	0					4.51
20.667	0.02	0.02	0.029	0					4.51
20.750	0.02	0.02	0.029	0					4.51
20.833	0.01	0.01	0.029	0					4.51
20.917	0.01	0.01	0.029	IO					4.51
21.000	0.01	0.01	0.029	0					4.51
21.083	0.01	0.01	0.029	0					4.51
21.167	0.02	0.01	0.029	0					4.51
21.250	0.02	0.02	0.029	0					4.51
21.333	0.01	0.01	0.029	0					4.51
21.417	0.01	0.01	0.029	IO					4.51
21.500	0.01	0.01	0.029	0					4.51
21.583	0.01	0.01	0.029	0					4.51
21.667	0.02	0.01	0.029	0					4.51
21.750	0.02	0.02	0.029	0					4.51
21.833	0.01	0.01	0.029	0					4.51
21.917	0.01	0.01	0.029	IO					4.51
22.000	0.01	0.01	0.029	0					4.51
22.083	0.01	0.01	0.029	0					4.51
22.167	0.02	0.01	0.029	0					4.51
22.250	0.02	0.02	0.029	0					4.51
22.333	0.01	0.01	0.029	0					4.51
22.417	0.01	0.01	0.029	IO					4.51
22.500	0.01	0.01	0.029	0					4.51
22.583	0.01	0.01	0.029	0					4.51
22.667	0.01	0.01	0.029	0					4.51
22.750	0.01	0.01	0.029	0					4.51
22.833	0.01	0.01	0.029	0					4.51
22.917	0.01	0.01	0.029	0					4.51
23.000	0.01	0.01	0.029	0					4.51

23.083	0.01	0.01	0.029	0					4.51
23.167	0.01	0.01	0.029	0					4.51
23.250	0.01	0.01	0.029	0					4.51
23.333	0.01	0.01	0.029	0					4.51
23.417	0.01	0.01	0.029	0					4.51
23.500	0.01	0.01	0.029	0					4.51
23.583	0.01	0.01	0.029	0					4.51
23.667	0.01	0.01	0.029	0					4.51
23.750	0.01	0.01	0.029	0					4.51
23.833	0.01	0.01	0.029	0					4.51
23.917	0.01	0.01	0.029	0					4.51
24.000	0.01	0.01	0.029	0					4.51
24.083	0.01	0.01	0.029	IO					4.50
24.167	0.00	0.00	0.029	0					4.50
24.250	0.00	0.00	0.029	0					4.50
24.333	0.00	0.00	0.029	0					4.50

Remaining water in basin = 0.03 (Ac.Ft)

\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 292  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 0.179 (CFS)  
 Total volume = 0.080 (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 K.1I**

### **Basin Analysis 100-Year Storm**

FLOOD HYDROGRAPH ROUTING PROGRAM  
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018  
Study date: 05/30/22

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MAPES AND TRUMBLE INDUSTRIAL FACILITY  
BASIN ROUTING  
POST-DEVELOPMENT CONDITIONS  
100-YEAR STORM, DA A  
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Program License Serial Number 6443

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\*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: MapesPost100AUH24.rte  
\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
Number of intervals = 292  
Time interval = 5.0 (Min.)  
Maximum/Peak flow rate = 12.566 (CFS)  
Total volume = 7.010 (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 0.000 to Point/Station 0.000  
\*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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

Total number of inflow hydrograph intervals = 292  
Hydrograph time unit = 5.000 (Min.)  
Initial depth in storage basin = 0.00(Ft.)  
-----

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

-----  
 -----  
 Depth vs. Storage and Depth vs. Discharge data:  
 Basin Depth    Storage    Outflow    (S-0\*dt/2)    (S+0\*dt/2)  
                   (Ft.)            (Ac.Ft)    (CFS)        (Ac.Ft)        (Ac.Ft)

-----

0.000	0.000	0.000	0.000	0.000
8.000	0.620	0.001	0.620	0.620
8.500	0.667	0.950	0.664	0.670
9.000	0.714	2.670	0.705	0.723
9.500	0.758	3.780	0.745	0.771
10.000	0.800	6.500	0.778	0.822
10.500	0.839	12.380	0.796	0.882
11.000	0.874	20.750	0.803	0.945
11.500	0.905	30.670	0.799	1.011
12.000	0.929	40.970	0.788	1.070
12.500	0.942	49.240	0.772	1.112

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

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Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	3.1	6.28	9.42	12.57	Depth (Ft.)
0.083	0.24	0.00	0.001	O					0.01
0.167	0.50	0.00	0.003	OI					0.04
0.250	0.56	0.00	0.007	OI					0.09
0.333	0.70	0.00	0.011	OI					0.15
0.417	0.84	0.00	0.017	O I					0.22
0.500	0.87	0.00	0.023	O I					0.29
0.583	0.88	0.00	0.029	O I					0.37
0.667	0.89	0.00	0.035	O I					0.45
0.750	0.89	0.00	0.041	O I					0.53
0.833	1.01	0.00	0.047	O I					0.61
0.917	1.14	0.00	0.055	O I					0.71
1.000	1.17	0.00	0.063	O I					0.81
1.083	1.05	0.00	0.070	O I					0.91
1.167	0.93	0.00	0.077	O I					1.00
1.250	0.90	0.00	0.083	O I					1.08
1.333	0.89	0.00	0.090	O I					1.16
1.417	0.89	0.00	0.096	O I					1.24
1.500	0.89	0.00	0.102	O I					1.31
1.583	0.89	0.00	0.108	O I					1.39
1.667	0.89	0.00	0.114	O I					1.47
1.750	0.89	0.00	0.120	O I					1.55
1.833	1.01	0.00	0.127	O I					1.63
1.917	1.14	0.00	0.134	O I					1.73
2.000	1.17	0.00	0.142	O I					1.83
2.083	1.18	0.00	0.150	O I					1.94

2.167	1.18	0.00	0.158	0	I					2.04
2.250	1.18	0.00	0.166	0	I					2.15
2.333	1.18	0.00	0.174	0	I					2.25
2.417	1.18	0.00	0.183	0	I					2.36
2.500	1.18	0.00	0.191	0	I					2.46
2.583	1.30	0.00	0.199	0	I					2.57
2.667	1.43	0.00	0.209	0	I					2.69
2.750	1.46	0.00	0.219	0	I					2.82
2.833	1.47	0.00	0.229	0	I					2.95
2.917	1.48	0.00	0.239	0	I					3.08
3.000	1.48	0.00	0.249	0	I					3.21
3.083	1.48	0.00	0.259	0	I					3.34
3.167	1.48	0.00	0.269	0	I					3.48
3.250	1.48	0.00	0.280	0	I					3.61
3.333	1.48	0.00	0.290	0	I					3.74
3.417	1.48	0.00	0.300	0	I					3.87
3.500	1.48	0.00	0.310	0	I					4.00
3.583	1.48	0.00	0.320	0	I					4.13
3.667	1.48	0.00	0.330	0	I					4.26
3.750	1.48	0.00	0.340	0	I					4.39
3.833	1.60	0.00	0.351	0	I					4.53
3.917	1.73	0.00	0.363	0	I					4.68
4.000	1.76	0.00	0.375	0	I					4.83
4.083	1.77	0.00	0.387	0	I					4.99
4.167	1.77	0.00	0.399	0	I					5.15
4.250	1.77	0.00	0.411	0	I					5.30
4.333	1.89	0.00	0.424	0	I					5.47
4.417	2.02	0.00	0.437	0	I					5.64
4.500	2.05	0.00	0.451	0	I					5.82
4.583	2.06	0.00	0.465	0	I					6.00
4.667	2.07	0.00	0.480	0	I					6.19
4.750	2.07	0.00	0.494	0	I					6.37
4.833	2.19	0.00	0.508	0	I					6.56
4.917	2.32	0.00	0.524	0	I					6.76
5.000	2.35	0.00	0.540	0	I					6.97
5.083	2.11	0.00	0.555	0	I					7.17
5.167	1.86	0.00	0.569	0	I					7.34
5.250	1.80	0.00	0.582	0	I					7.50
5.333	1.90	0.00	0.594	0	I					7.67
5.417	2.02	0.00	0.608	0	I					7.84
5.500	2.05	0.04	0.622	0	I					8.02
5.583	2.18	0.31	0.635	0	I					8.16
5.667	2.32	0.56	0.648	0	I					8.29
5.750	2.35	0.79	0.659	0	I					8.42
5.833	2.36	1.02	0.669	0	I					8.52
5.917	2.36	1.32	0.677	0	I					8.61
6.000	2.36	1.56	0.684	0	I					8.68
6.083	2.48	1.75	0.689	0	I					8.73
6.167	2.61	1.93	0.694	0	I					8.78
6.250	2.64	2.08	0.698	0	I					8.83

6.333	2.65	2.21	0.701	OI				8.87
6.417	2.66	2.31	0.704	OI				8.90
6.500	2.66	2.39	0.706	0				8.92
6.583	2.79	2.46	0.708	OI				8.94
6.667	2.93	2.55	0.711	OI				8.97
6.750	2.96	2.64	0.713	OI				8.99
6.833	2.98	2.70	0.715	OI				9.01
6.917	2.99	2.75	0.717	OI				9.03
7.000	2.99	2.78	0.719	0				9.05
7.083	2.99	2.82	0.720	0				9.07
7.167	3.00	2.85	0.721	0				9.08
7.250	3.00	2.87	0.722	0				9.09
7.333	3.17	2.90	0.723	OI				9.11
7.417	3.34	2.96	0.725	OI				9.13
7.500	3.38	3.02	0.728	OI				9.16
7.583	3.56	3.10	0.731	0 I				9.19
7.667	3.74	3.18	0.734	OI				9.23
7.750	3.78	3.28	0.738	OI				9.27
7.833	3.96	3.37	0.742	0 I				9.32
7.917	4.14	3.48	0.746	0 I				9.36
8.000	4.18	3.59	0.750	OI				9.41
8.083	4.52	3.71	0.755	0 I				9.47
8.167	4.87	3.98	0.761	0 I				9.54
8.250	4.94	4.32	0.766	0 I				9.60
8.333	4.98	4.55	0.770	OI				9.64
8.417	4.99	4.71	0.772	OI				9.67
8.500	5.00	4.81	0.774	0				9.69
8.583	5.16	4.91	0.775	OI				9.71
8.667	5.34	5.03	0.777	OI				9.73
8.750	5.38	5.15	0.779	0				9.75
8.833	5.55	5.27	0.781	OI				9.77
8.917	5.73	5.40	0.783	OI				9.80
9.000	5.77	5.53	0.785	0				9.82
9.083	6.11	5.68	0.787	OI				9.85
9.167	6.46	5.90	0.791	OI				9.89
9.250	6.54	6.12	0.794	OI				9.93
9.333	6.73	6.31	0.797	OI				9.96
9.417	6.92	6.50	0.800	OI				10.00
9.500	6.96	6.80	0.802	0				10.03
9.583	7.14	6.97	0.803	OI				10.04
9.667	7.32	7.15	0.804	0				10.05
9.750	7.36	7.28	0.805	0				10.07
9.833	7.54	7.39	0.806	OI				10.08
9.917	7.72	7.55	0.807	0				10.09
10.000	7.76	7.68	0.808	0				10.10
10.083	6.65	7.35	0.806	I 0				10.07
10.167	5.46	6.48	0.800	I 0				10.00
10.250	5.22	6.07	0.793	I 0				9.92
10.333	5.12	5.74	0.788	IO				9.86
10.417	5.08	5.51	0.785	I 0				9.82

10.500	5.09	5.35	0.782			IO			9.79	
10.583	5.89	5.40	0.783			OI			9.80	
10.667	6.75	5.74	0.788			0	I		9.86	
10.750	6.93	6.14	0.794			0	I		9.93	
10.833	7.01	6.44	0.799				OI		9.99	
10.917	7.04	6.79	0.802				0		10.02	
11.000	7.04	6.96	0.803				0		10.04	
11.083	6.89	6.96	0.803				0		10.04	
11.167	6.72	6.85	0.802				0		10.03	
11.250	6.69	6.75	0.802				0		10.02	
11.333	6.68	6.70	0.801				0		10.02	
11.417	6.67	6.68	0.801			IO			10.02	
11.500	6.68	6.68	0.801				0		10.02	
11.583	6.36	6.57	0.800				0		10.01	
11.667	6.02	6.40	0.798			IO			9.98	
11.750	5.95	6.25	0.796				0		9.95	
11.833	6.09	6.17	0.795				0		9.94	
11.917	6.25	6.17	0.795				0		9.94	
12.000	6.29	6.20	0.795			OI			9.95	
12.083	7.43	6.44	0.799				0	I	9.99	
12.167	8.63	7.48	0.806					0	I	10.08
12.250	8.89	8.36	0.812					OI		10.16
12.333	9.15	8.81	0.815					OI		10.20
12.417	9.37	9.12	0.817					0		10.22
12.500	9.41	9.30	0.819					0		10.24
12.583	9.75	9.49	0.820					0		10.25
12.667	10.10	9.78	0.822					OI		10.28
12.750	10.17	10.02	0.823					0		10.30
12.833	10.36	10.19	0.824					OI		10.31
12.917	10.55	10.37	0.826					0		10.33
13.000	10.59	10.51	0.827					0		10.34
13.083	11.41	10.84	0.829					0	I	10.37
13.167	12.27	11.52	0.833					0	I	10.43
13.250	12.46	12.10	0.837						OI	10.48
13.333	12.53	12.37	0.839						0	10.50
13.417	12.56	12.53	0.840						0	10.51
13.500	12.57	12.56	0.840						OI	10.51
13.583	10.81	11.92	0.836					I	0	10.46
13.667	8.93	10.52	0.827					I	0	10.34
13.750	8.54	9.30	0.819					I	0	10.24
13.833	8.38	8.72	0.815					IO		10.19
13.917	8.32	8.47	0.813					0		10.17
14.000	8.32	8.37	0.812					0		10.16
14.083	8.97	8.56	0.814					OI		10.17
14.167	9.65	9.07	0.817					OI		10.22
14.250	9.80	9.52	0.820					0		10.26
14.333	9.70	9.68	0.821					0		10.27
14.417	9.56	9.64	0.821					0		10.27
14.500	9.52	9.57	0.820					0		10.26
14.583	9.51	9.53	0.820					0		10.26

14.667	9.51	9.52	0.820				0	10.26
14.750	9.51	9.51	0.820				0	10.26
14.833	9.35	9.46	0.820				IO	10.25
14.917	9.19	9.33	0.819				0	10.24
15.000	9.15	9.22	0.818				0	10.23
15.083	8.98	9.12	0.817				IO	10.22
15.167	8.81	8.96	0.816				0	10.21
15.250	8.77	8.85	0.816				0	10.20
15.333	8.60	8.74	0.815				IO	10.19
15.417	8.43	8.59	0.814				0	10.18
15.500	8.39	8.47	0.813				0	10.17
15.583	7.74	8.19	0.811				IO	10.14
15.667	7.06	7.65	0.808				I 0	10.10
15.750	6.91	7.20	0.805				IO	10.06
15.833	6.86	6.98	0.803				0	10.04
15.917	6.84	6.89	0.803				0	10.03
16.000	6.84	6.86	0.802				0	10.03
16.083	4.51	6.26	0.796			I 0		9.96
16.167	2.00	5.16	0.779		I	0		9.75
16.250	1.48	3.91	0.760		I	0		9.52
16.333	1.27	3.43	0.744		I	0		9.34
16.417	1.18	3.08	0.730		I	0		9.18
16.500	1.18	2.78	0.718		I	0		9.05
16.583	1.06	2.45	0.708		I	0		8.94
16.667	0.93	2.12	0.699		I	0		8.84
16.750	0.90	1.85	0.692		I	0		8.76
16.833	0.89	1.64	0.686		I	0		8.70
16.917	0.89	1.47	0.681		IO			8.65
17.000	0.89	1.34	0.678		IO			8.61
17.083	1.13	1.26	0.676		IO			8.59
17.167	1.39	1.26	0.676		0			8.59
17.250	1.45	1.30	0.677		0			8.60
17.333	1.47	1.33	0.677		0			8.61
17.417	1.48	1.36	0.678		0			8.62
17.500	1.48	1.39	0.679		0			8.63
17.583	1.48	1.41	0.680		0			8.63
17.667	1.48	1.42	0.680		0			8.64
17.750	1.48	1.44	0.680		0			8.64
17.833	1.35	1.43	0.680		0			8.64
17.917	1.22	1.40	0.679		0			8.63
18.000	1.20	1.36	0.678		0			8.62
18.083	1.19	1.32	0.677		0			8.61
18.167	1.18	1.29	0.676		0			8.60
18.250	1.18	1.26	0.676		0			8.59
18.333	1.18	1.25	0.675		0			8.59
18.417	1.18	1.23	0.675		0			8.58
18.500	1.18	1.22	0.674		0			8.58
18.583	1.06	1.20	0.674		IO			8.57
18.667	0.93	1.15	0.673		0			8.56
18.750	0.90	1.10	0.671		0			8.54

18.833	0.77	1.04	0.669	IO					8.53
18.917	0.63	0.96	0.667	IO					8.50
19.000	0.61	0.91	0.665	IO					8.48
19.083	0.72	0.88	0.664	IO					8.46
19.167	0.84	0.87	0.663	0					8.46
19.250	0.87	0.87	0.663	0					8.46
19.333	1.00	0.88	0.663	0					8.46
19.417	1.14	0.90	0.665	0					8.47
19.500	1.17	0.93	0.666	0					8.49
19.583	1.05	0.96	0.667	0					8.50
19.667	0.93	0.97	0.667	0					8.51
19.750	0.90	0.96	0.667	0					8.50
19.833	0.77	0.94	0.666	IO					8.49
19.917	0.63	0.91	0.665	IO					8.48
20.000	0.61	0.87	0.663	IO					8.46
20.083	0.72	0.84	0.662	IO					8.44
20.167	0.84	0.83	0.661	0					8.44
20.250	0.87	0.84	0.661	0					8.44
20.333	0.88	0.84	0.662	0					8.44
20.417	0.89	0.85	0.662	0					8.45
20.500	0.89	0.85	0.662	0					8.45
20.583	0.89	0.86	0.662	0					8.45
20.667	0.89	0.86	0.663	0					8.45
20.750	0.89	0.86	0.663	0					8.45
20.833	0.76	0.86	0.662	IO					8.45
20.917	0.63	0.84	0.661	IO					8.44
21.000	0.61	0.81	0.660	IO					8.43
21.083	0.72	0.79	0.659	IO					8.42
21.167	0.84	0.79	0.659	0					8.42
21.250	0.87	0.80	0.659	0					8.42
21.333	0.76	0.80	0.660	IO					8.42
21.417	0.63	0.79	0.659	IO					8.41
21.500	0.61	0.76	0.658	0					8.40
21.583	0.72	0.75	0.657	0					8.40
21.667	0.84	0.75	0.657	OI					8.40
21.750	0.87	0.77	0.658	OI					8.40
21.833	0.76	0.77	0.658	0					8.41
21.917	0.63	0.76	0.658	0					8.40
22.000	0.61	0.75	0.657	0					8.39
22.083	0.72	0.73	0.656	0					8.39
22.167	0.84	0.74	0.657	OI					8.39
22.250	0.87	0.76	0.657	OI					8.40
22.333	0.76	0.76	0.658	0					8.40
22.417	0.63	0.75	0.657	0					8.40
22.500	0.61	0.74	0.656	0					8.39
22.583	0.59	0.72	0.656	0					8.38
22.667	0.59	0.70	0.655	0					8.37
22.750	0.59	0.69	0.654	0					8.36
22.833	0.59	0.68	0.653	0					8.36
22.917	0.59	0.66	0.653	0					8.35



23.000	0.59	0.65	0.652	0					8.34
23.083	0.59	0.65	0.652	0					8.34
23.167	0.59	0.64	0.652	0					8.34
23.250	0.59	0.63	0.651	0					8.33
23.333	0.59	0.63	0.651	0					8.33
23.417	0.59	0.62	0.651	0					8.33
23.500	0.59	0.62	0.651	0					8.33
23.583	0.59	0.61	0.650	0					8.32
23.667	0.59	0.61	0.650	0					8.32
23.750	0.59	0.61	0.650	0					8.32
23.833	0.59	0.61	0.650	0					8.32
23.917	0.59	0.60	0.650	0					8.32
24.000	0.59	0.60	0.650	0					8.32
24.083	0.35	0.59	0.649	IO					8.31
24.167	0.09	0.54	0.647	IO					8.28
24.250	0.03	0.47	0.643	IO					8.25
24.333	0.01	0.42	0.641	IO					8.22
24.417	0.00	0.36	0.638	0					8.19
24.500	0.00	0.32	0.636	0					8.17
24.583	0.00	0.27	0.634	0					8.14
24.667	0.00	0.24	0.632	0					8.13
24.750	0.00	0.21	0.630	0					8.11
24.833	0.00	0.18	0.629	0					8.09
24.917	0.00	0.16	0.628	0					8.08
25.000	0.00	0.14	0.627	0					8.07
25.083	0.00	0.12	0.626	0					8.06
25.167	0.00	0.10	0.625	0					8.05
25.250	0.00	0.09	0.624	0					8.05
25.333	0.00	0.08	0.624	0					8.04
25.417	0.00	0.07	0.623	0					8.04
25.500	0.00	0.06	0.623	0					8.03
25.583	0.00	0.05	0.623	0					8.03
25.667	0.00	0.04	0.622	0					8.02
25.750	0.00	0.04	0.622	0					8.02
25.833	0.00	0.03	0.622	0					8.02
25.917	0.00	0.03	0.621	0					8.02
26.000	0.00	0.03	0.621	0					8.01
26.083	0.00	0.02	0.621	0					8.01
26.167	0.00	0.02	0.621	0					8.01
26.250	0.00	0.02	0.621	0					8.01
26.333	0.00	0.01	0.621	0					8.01
26.417	0.00	0.01	0.621	0					8.01
26.500	0.00	0.01	0.621	0					8.01
26.583	0.00	0.01	0.620	0					8.00
26.667	0.00	0.01	0.620	0					8.00
26.750	0.00	0.01	0.620	0					8.00
26.833	0.00	0.01	0.620	0					8.00
26.917	0.00	0.01	0.620	0					8.00
27.000	0.00	0.00	0.620	0					8.00
27.083	0.00	0.00	0.620	0					8.00

27.167	0.00	0.00	0.620	0					8.00
27.250	0.00	0.00	0.620	0					8.00
27.333	0.00	0.00	0.620	0					8.00
27.417	0.00	0.00	0.620	0					8.00
27.500	0.00	0.00	0.620	0					8.00
27.583	0.00	0.00	0.620	0					8.00
27.667	0.00	0.00	0.620	0					8.00
27.750	0.00	0.00	0.620	0					8.00
27.833	0.00	0.00	0.620	0					8.00
27.917	0.00	0.00	0.620	0					8.00
28.000	0.00	0.00	0.620	0					8.00

Remaining water in basin = 0.62 (Ac.Ft)

\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 336  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 12.561 (CFS)  
 Total volume = 6.390 (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 - 2018  
Study date: 05/30/22

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MAPES AND TRUMBLE INDUSTRIAL FACILITY  
BASIN ROUTING  
POST-DEVELOPMENT CONDITIONS  
100-YEAR STORM, DA B  
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Program License Serial Number 6443

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\*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*

From study/file name: MapesPost100BUH24.rte  
\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
Number of intervals = 291  
Time interval = 5.0 (Min.)  
Maximum/Peak flow rate = 0.628 (CFS)  
Total volume = 0.339 (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 0.000 to Point/Station 0.000  
\*\*\*\* RETARDING BASIN ROUTING \*\*\*\*

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User entry of depth-outflow-storage data  
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Total number of inflow hydrograph intervals = 291  
Hydrograph time unit = 5.000 (Min.)  
Initial depth in storage basin = 0.00(Ft.)  
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Initial basin depth = 0.00 (Ft.)  
Initial basin storage = 0.00 (Ac.Ft)  
Initial basin outflow = 0.00 (CFS)

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 Depth vs. Storage and Depth vs. Discharge data:  
 Basin Depth    Storage    Outflow    (S-0\*dt/2)    (S+0\*dt/2)  
           (Ft.)        (Ac.Ft)    (CFS)        (Ac.Ft)        (Ac.Ft)

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0.000	0.000	0.000	0.000	0.000
4.500	0.029	0.001	0.029	0.029
5.000	0.033	0.950	0.030	0.036
5.500	0.038	2.670	0.029	0.047
6.000	0.042	3.780	0.029	0.055
6.500	0.046	4.630	0.030	0.062
7.000	0.050	5.350	0.032	0.068
7.500	0.054	5.980	0.033	0.075
8.000	0.056	6.550	0.033	0.079
8.500	0.058	7.070	0.034	0.082

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

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Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	Depth (Ft.)					
				0	0.2	0.31	0.47	0.63	
0.083	0.01	0.00	0.000	O					0.01
0.167	0.02	0.00	0.000	O I					0.03
0.250	0.03	0.00	0.000	O I					0.05
0.333	0.03	0.00	0.001	O I					0.09
0.417	0.04	0.00	0.001	O I					0.13
0.500	0.04	0.00	0.001	O I					0.17
0.583	0.04	0.00	0.001	O I					0.21
0.667	0.04	0.00	0.002	O I					0.25
0.750	0.04	0.00	0.002	O I					0.30
0.833	0.05	0.00	0.002	O I					0.34
0.917	0.05	0.00	0.003	O I					0.40
1.000	0.05	0.00	0.003	O I					0.46
1.083	0.05	0.00	0.003	O I					0.51
1.167	0.04	0.00	0.004	O I					0.56
1.250	0.04	0.00	0.004	O I					0.60
1.333	0.04	0.00	0.004	O I					0.64
1.417	0.04	0.00	0.004	O I					0.69
1.500	0.04	0.00	0.005	O I					0.73
1.583	0.04	0.00	0.005	O I					0.77
1.667	0.04	0.00	0.005	O I					0.82
1.750	0.04	0.00	0.006	O I					0.86
1.833	0.05	0.00	0.006	O I					0.91
1.917	0.05	0.00	0.006	O I					0.96
2.000	0.05	0.00	0.007	O I					1.02
2.083	0.05	0.00	0.007	O I					1.07
2.167	0.05	0.00	0.007	O I					1.13

2.250	0.05	0.00	0.008	0	I					1.19
2.333	0.05	0.00	0.008	0	I					1.25
2.417	0.05	0.00	0.008	0	I					1.31
2.500	0.05	0.00	0.009	0	I					1.36
2.583	0.06	0.00	0.009	0	I					1.42
2.667	0.07	0.00	0.010	0	I					1.49
2.750	0.07	0.00	0.010	0	I					1.56
2.833	0.07	0.00	0.011	0	I					1.63
2.917	0.07	0.00	0.011	0	I					1.71
3.000	0.07	0.00	0.011	0	I					1.78
3.083	0.07	0.00	0.012	0	I					1.85
3.167	0.07	0.00	0.012	0	I					1.92
3.250	0.07	0.00	0.013	0	I					1.99
3.333	0.07	0.00	0.013	0	I					2.07
3.417	0.07	0.00	0.014	0	I					2.14
3.500	0.07	0.00	0.014	0	I					2.21
3.583	0.07	0.00	0.015	0	I					2.28
3.667	0.07	0.00	0.015	0	I					2.35
3.750	0.07	0.00	0.016	0	I					2.42
3.833	0.07	0.00	0.016	0	I					2.50
3.917	0.08	0.00	0.017	0	I					2.58
4.000	0.08	0.00	0.017	0	I					2.67
4.083	0.08	0.00	0.018	0	I					2.75
4.167	0.08	0.00	0.018	0	I					2.84
4.250	0.08	0.00	0.019	0	I					2.93
4.333	0.09	0.00	0.019	0	I					3.01
4.417	0.09	0.00	0.020	0	I					3.11
4.500	0.09	0.00	0.021	0	I					3.21
4.583	0.09	0.00	0.021	0	I					3.31
4.667	0.09	0.00	0.022	0	I					3.41
4.750	0.09	0.00	0.023	0	I					3.51
4.833	0.10	0.00	0.023	0	I					3.62
4.917	0.11	0.00	0.024	0	I					3.73
5.000	0.11	0.00	0.025	0	I					3.84
5.083	0.09	0.00	0.025	0	I					3.95
5.167	0.08	0.00	0.026	0	I					4.04
5.250	0.08	0.00	0.027	0	I					4.13
5.333	0.09	0.00	0.027	0	I					4.22
5.417	0.09	0.00	0.028	0	I					4.32
5.500	0.09	0.00	0.028	0	I					4.41
5.583	0.10	0.02	0.029	0	I					4.51
5.667	0.11	0.10	0.029		OI					4.55
5.750	0.11	0.11	0.029		0					4.56
5.833	0.11	0.11	0.029		0					4.56
5.917	0.11	0.11	0.029		0					4.56
6.000	0.11	0.11	0.029		0					4.56
6.083	0.11	0.11	0.029		0					4.56
6.167	0.12	0.12	0.029		OI					4.56
6.250	0.12	0.12	0.030		0					4.56
6.333	0.12	0.12	0.030		0					4.56

6.417	0.12	0.12	0.030	0				4.56
6.500	0.12	0.12	0.030	0				4.56
6.583	0.13	0.12	0.030	0				4.57
6.667	0.13	0.13	0.030	0				4.57
6.750	0.14	0.13	0.030	0				4.57
6.833	0.14	0.14	0.030	0				4.57
6.917	0.14	0.14	0.030	0				4.57
7.000	0.14	0.14	0.030	0				4.57
7.083	0.14	0.14	0.030	0				4.57
7.167	0.14	0.14	0.030	0				4.57
7.250	0.14	0.14	0.030	0				4.57
7.333	0.15	0.14	0.030	0				4.57
7.417	0.16	0.15	0.030	0				4.58
7.500	0.16	0.16	0.030	0				4.58
7.583	0.17	0.16	0.030	0				4.58
7.667	0.18	0.17	0.030	0				4.59
7.750	0.18	0.18	0.030	0I				4.59
7.833	0.19	0.18	0.030	0				4.60
7.917	0.20	0.19	0.030	0				4.60
8.000	0.20	0.20	0.030	0				4.60
8.083	0.22	0.21	0.030	0I				4.61
8.167	0.23	0.22	0.030	0				4.62
8.250	0.24	0.23	0.030	0I				4.62
8.333	0.24	0.24	0.030	0				4.62
8.417	0.24	0.24	0.030	0				4.63
8.500	0.24	0.24	0.030	0				4.63
8.583	0.25	0.24	0.030	0				4.63
8.667	0.26	0.25	0.030	0I				4.63
8.750	0.26	0.26	0.030	0				4.64
8.833	0.27	0.26	0.030	0				4.64
8.917	0.28	0.27	0.030	0I				4.64
9.000	0.28	0.28	0.030	0				4.65
9.083	0.30	0.29	0.030	0I				4.65
9.167	0.32	0.31	0.030	0I				4.66
9.250	0.32	0.32	0.030	0				4.67
9.333	0.33	0.32	0.030	0				4.67
9.417	0.34	0.33	0.030	0I				4.68
9.500	0.34	0.34	0.030	0				4.68
9.583	0.35	0.35	0.030	0				4.68
9.667	0.36	0.35	0.030	0				4.69
9.750	0.36	0.36	0.031	0				4.69
9.833	0.37	0.37	0.031	0				4.69
9.917	0.38	0.37	0.031	0				4.70
10.000	0.38	0.38	0.031	0				4.70
10.083	0.31	0.35	0.030	I 0				4.68
10.167	0.26	0.29	0.030	IO				4.65
10.250	0.25	0.26	0.030	IO				4.63
10.333	0.25	0.25	0.030	0				4.63
10.417	0.25	0.25	0.030	0				4.63
10.500	0.25	0.25	0.030	0				4.63

10.583	0.29	0.27	0.030		0 I			4.64
10.667	0.33	0.31	0.030		0 I			4.66
10.750	0.34	0.34	0.030		0			4.68
10.833	0.35	0.34	0.030		0			4.68
10.917	0.35	0.34	0.030		0			4.68
11.000	0.35	0.35	0.030		0			4.68
11.083	0.34	0.34	0.030		0			4.68
11.167	0.33	0.33	0.030		0			4.67
11.250	0.33	0.33	0.030		0			4.67
11.333	0.33	0.33	0.030		0			4.67
11.417	0.33	0.33	0.030		0			4.67
11.500	0.33	0.33	0.030		0			4.67
11.583	0.31	0.32	0.030		IO			4.67
11.667	0.29	0.30	0.030		IO			4.66
11.750	0.29	0.29	0.030		0			4.65
11.833	0.30	0.29	0.030		OI			4.65
11.917	0.31	0.30	0.030		0			4.66
12.000	0.31	0.31	0.030		0			4.66
12.083	0.38	0.34	0.030		0 I			4.68
12.167	0.43	0.40	0.031			0 I		4.71
12.250	0.44	0.43	0.031			0		4.73
12.333	0.46	0.45	0.031			OI		4.74
12.417	0.47	0.46	0.031			0		4.74
12.500	0.47	0.47	0.031			0		4.74
12.583	0.49	0.48	0.031			0		4.75
12.667	0.50	0.49	0.031			0		4.76
12.750	0.51	0.50	0.031			0		4.77
12.833	0.52	0.51	0.031			0		4.77
12.917	0.53	0.52	0.031			0		4.77
13.000	0.53	0.53	0.031			0		4.78
13.083	0.58	0.55	0.031				OI	4.79
13.167	0.62	0.59	0.031				OI	4.81
13.250	0.63	0.62	0.032				0	4.83
13.333	0.63	0.63	0.032				0	4.83
13.417	0.63	0.63	0.032				0	4.83
13.500	0.63	0.63	0.032				OI	4.83
13.583	0.52	0.58	0.031				I 0	4.81
13.667	0.43	0.49	0.031			I 0		4.76
13.750	0.42	0.43	0.031			0		4.73
13.833	0.41	0.42	0.031			0		4.72
13.917	0.41	0.41	0.031			0		4.72
14.000	0.41	0.41	0.031			0		4.72
14.083	0.45	0.43	0.031			0 I		4.73
14.167	0.48	0.46	0.031			OI		4.74
14.250	0.49	0.48	0.031			0		4.75
14.333	0.48	0.49	0.031			0		4.76
14.417	0.47	0.48	0.031			0		4.75
14.500	0.47	0.47	0.031			0		4.75
14.583	0.47	0.47	0.031			0		4.75
14.667	0.47	0.47	0.031			0		4.75

14.750	0.47	0.47	0.031				0	4.75
14.833	0.46	0.47	0.031				0	4.75
14.917	0.46	0.46	0.031				0	4.74
15.000	0.45	0.46	0.031				0	4.74
15.083	0.44	0.45	0.031				0	4.74
15.167	0.44	0.44	0.031				0	4.73
15.250	0.44	0.44	0.031				0	4.73
15.333	0.43	0.43	0.031				0	4.73
15.417	0.42	0.42	0.031				0	4.72
15.500	0.42	0.42	0.031				0	4.72
15.583	0.38	0.40	0.031				IO	4.71
15.667	0.35	0.37	0.031				IO	4.69
15.750	0.34	0.34	0.030				0	4.68
15.833	0.34	0.34	0.030				0	4.68
15.917	0.34	0.34	0.030				0	4.68
16.000	0.34	0.34	0.030				0	4.68
16.083	0.20	0.28	0.030		I	0		4.64
16.167	0.08	0.15	0.030	I	0			4.58
16.250	0.06	0.08	0.029	IO				4.54
16.333	0.05	0.06	0.029	IO				4.53
16.417	0.05	0.05	0.029	0				4.53
16.500	0.05	0.05	0.029	0				4.53
16.583	0.05	0.05	0.029	0				4.53
16.667	0.04	0.05	0.029	0				4.52
16.750	0.04	0.04	0.029	0				4.52
16.833	0.04	0.04	0.029	0				4.52
16.917	0.04	0.04	0.029	0				4.52
17.000	0.04	0.04	0.029	0				4.52
17.083	0.05	0.05	0.029	0				4.52
17.167	0.07	0.06	0.029	OI				4.53
17.250	0.07	0.07	0.029	0				4.53
17.333	0.07	0.07	0.029	0				4.53
17.417	0.07	0.07	0.029	0				4.54
17.500	0.07	0.07	0.029	0				4.54
17.583	0.07	0.07	0.029	0				4.54
17.667	0.07	0.07	0.029	0				4.54
17.750	0.07	0.07	0.029	0				4.54
17.833	0.06	0.06	0.029	0				4.53
17.917	0.06	0.06	0.029	0				4.53
18.000	0.05	0.06	0.029	0				4.53
18.083	0.05	0.05	0.029	0				4.53
18.167	0.05	0.05	0.029	0				4.53
18.250	0.05	0.05	0.029	0				4.53
18.333	0.05	0.05	0.029	0				4.53
18.417	0.05	0.05	0.029	0				4.53
18.500	0.05	0.05	0.029	0				4.53
18.583	0.05	0.05	0.029	0				4.53
18.667	0.04	0.05	0.029	0				4.52
18.750	0.04	0.04	0.029	0				4.52
18.833	0.03	0.04	0.029	0				4.52



18.917	0.03	0.03	0.029	0					4.52
19.000	0.03	0.03	0.029	0					4.51
19.083	0.03	0.03	0.029	0					4.52
19.167	0.04	0.04	0.029	0I					4.52
19.250	0.04	0.04	0.029	0					4.52
19.333	0.05	0.04	0.029	0					4.52
19.417	0.05	0.05	0.029	0					4.53
19.500	0.05	0.05	0.029	0					4.53
19.583	0.05	0.05	0.029	0					4.53
19.667	0.04	0.05	0.029	0					4.52
19.750	0.04	0.04	0.029	0					4.52
19.833	0.03	0.04	0.029	0					4.52
19.917	0.03	0.03	0.029	0					4.52
20.000	0.03	0.03	0.029	0					4.51
20.083	0.03	0.03	0.029	0					4.52
20.167	0.04	0.04	0.029	0I					4.52
20.250	0.04	0.04	0.029	0					4.52
20.333	0.04	0.04	0.029	0					4.52
20.417	0.04	0.04	0.029	0					4.52
20.500	0.04	0.04	0.029	0					4.52
20.583	0.04	0.04	0.029	0					4.52
20.667	0.04	0.04	0.029	0					4.52
20.750	0.04	0.04	0.029	0					4.52
20.833	0.03	0.04	0.029	0					4.52
20.917	0.03	0.03	0.029	0					4.52
21.000	0.03	0.03	0.029	0					4.51
21.083	0.03	0.03	0.029	0					4.52
21.167	0.04	0.04	0.029	0I					4.52
21.250	0.04	0.04	0.029	0					4.52
21.333	0.03	0.04	0.029	0					4.52
21.417	0.03	0.03	0.029	0					4.52
21.500	0.03	0.03	0.029	0					4.51
21.583	0.03	0.03	0.029	0					4.52
21.667	0.04	0.04	0.029	0I					4.52
21.750	0.04	0.04	0.029	0					4.52
21.833	0.03	0.04	0.029	0					4.52
21.917	0.03	0.03	0.029	0					4.52
22.000	0.03	0.03	0.029	0					4.51
22.083	0.03	0.03	0.029	0					4.52
22.167	0.04	0.04	0.029	0I					4.52
22.250	0.04	0.04	0.029	0					4.52
22.333	0.03	0.04	0.029	0					4.52
22.417	0.03	0.03	0.029	0					4.52
22.500	0.03	0.03	0.029	0					4.51
22.583	0.03	0.03	0.029	0					4.51
22.667	0.03	0.03	0.029	0					4.51
22.750	0.03	0.03	0.029	0					4.51
22.833	0.03	0.03	0.029	0					4.51
22.917	0.03	0.03	0.029	0					4.51
23.000	0.03	0.03	0.029	0					4.51

23.083	0.03	0.03	0.029	0					4.51
23.167	0.03	0.03	0.029	0					4.51
23.250	0.03	0.03	0.029	0					4.51
23.333	0.03	0.03	0.029	0					4.51
23.417	0.03	0.03	0.029	0					4.51
23.500	0.03	0.03	0.029	0					4.51
23.583	0.03	0.03	0.029	0					4.51
23.667	0.03	0.03	0.029	0					4.51
23.750	0.03	0.03	0.029	0					4.51
23.833	0.03	0.03	0.029	0					4.51
23.917	0.03	0.03	0.029	0					4.51
24.000	0.03	0.03	0.029	0					4.51
24.083	0.01	0.02	0.029	IO					4.51
24.167	0.00	0.01	0.029	0					4.50
24.250	0.00	0.00	0.029	0					4.50
24.333	0.00	0.00	0.029	0					4.50

Remaining water in basin = 0.03 (Ac.Ft)

\*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 292  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 0.628 (CFS)  
 Total volume = 0.310 (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 L**

### **Sizing Calculations (To be prepared in Final Engineering)**