# APPENDIX I1

PRELIMINARY DRAINAGE STUDY

**FOR REVIEW ONLY**

# Capstone Menifee
# TPM 38139 (PLN21-0370)
# City of Menifee, Riverside County, California

# Preliminary Drainage Study

*Prepared for*:
Capstone Advisors
1545 Faraday Avenue
Carlsbad, CA 92008

*Prepared By:*

ALBERT A. WEBB ASSOCIATES
3788 McCray Street
Riverside, CA 92506

Original Date Prepared: October 2021
Revision Date(s): June 2022, October 2022

**DRAFT**

Sarah Kowalski, PE
Senior Civil Engineer

# TABLE OF CONTENTS

**SECTION 1 - SUMMARY ..... 1-1**

PURPOSE ..... 1-1
DESCRIPTION OF WATERSHED ..... 1-1
PROPOSED CONDITIONS ..... 1-1
METHODOLOGY ..... 1-2

FIG. 1 VICINITY MAP
FIG. 2 USGS TOPOGRAPHY MAP
FIG. 3 AERIAL PHOTOGRAPH
FIG. 4 RECEIVING WATERBODIES
FIG. 5 SOILS MAP

**SECTION 2 - HYDROLOGY ANALYSIS ..... 2-1**

HYDROLOGY PARAMETERS ..... 2-1
ON-SITE RATIONAL METHOD HYDROLOGY ..... 2-1
OFF-SITE RATIONAL METHOD HYDROLOGY ..... 2-2

**SECTION 3 - HYDRAULIC ANALYSIS ..... 3-1**

ON-SITE STORM DRAIN FACILITIES ..... 3-1
OFF-SITE STORM DRAIN FACILITIES ..... 3-1

**SECTION 4 - DETENTION SYSTEM ANALYSIS ..... 4-1**

ON-SITE UNIT HYDROGRAPH METHOD HYDROLOGY ..... 4-1
BASIN ROUTING ANALYSIS ..... 4-1

**SECTION 5 - CONCLUSION ..... 5-1**

**APPENDIX A – HYDROLOGY ANALYSIS ..... A**

HYDROLOGIC SOILS GROUP MAP (plate C-1.42 – ROMOLAND)
ISOHYETAL MAPS (PLATE D-4.1 – PERRIS VALLEY)
10-YEAR OFF-SITE HYDROLOGY (RATIONAL METHOD)
10-YEAR ON-SITE HYDROLOGY (RATIONAL METHOD)
100-YEAR OFF-SITE HYDROLOGY (RATIONAL METHOD)
100-YEAR ON-SITE HYDROLOGY (RATIONAL METHOD)
RATIONAL METHOD HYDROLOGY MAPS

**APPENDIX B – HYDRAULIC ANALYSIS ..... B**

**APPENDIX C – UNIT HYDROGRAPH ANALYSIS ..... C**

EXISTING CONDITION UNIT HYDROGRAPHS (2-YEAR, 24-HOUR STORM)
pROPOSED CONDITION UNIT HYDROGRAPHS (2-YEAR, 24-HOUR STORM)
STAGE-STORAGE-OUTFLOW
UNIT HYDROGRAPH HYDROLOGY MAPS

**APPENDIX D – REFERENCES ..... D**

MDP STORM DRAIN MAP
PLOT PLAN (PLN21-0370)

# SECTION 1 - SUMMARY

## PURPOSE

The purpose of this report is to document the hydrologic and hydraulic analyses performed in support of the CADO Menifee project located in the City of Menifee, County of Riverside, California. The project is bounded by Kuffel Road to the north, Wheat Street to the west, Byers Road to the east, and Corsica Lane to the south. The project proposes to build an industrial warehouse on approximately 36.8 acres. This report will summarize the hydrologic and hydraulic analyses that were conducted in order to determine the necessary drainage improvements required to provide flood protection for the proposed building and safely convey the runoff through the site.

The scope of this report will include the following:

- Determine the peak 100-year and 10-year flow rates for the existing and developed conditions using the Riverside County Flood Control and Water Conservation District (RCFC&WCD) Rational Method.
- Determine the required storm drain facilities, alignment, and sizes required to flood protect the project site.
- Preparation of a preliminary report summarizing the hydrology and hydraulic results.

## DESCRIPTION OF WATERSHED

As previously described, the project is proposing an industrial warehouse (approximately 700,037 square feet) on approximately 36.8 acres of vacant land. Existing elevations across the site vary from 1450.8' at the southwest corner to 1424.5' at the northeast corner (NAVD88 datum). The site currently slopes down at approximately 3.0% grade to the northeast corner. The existing drainage pattern for the site and the general area is characterized by sheet flow to the northeast towards Ethanac Road.

The project is located within the Romoland Master Drainage Plan (MDP), Romoland Area Drainage Plan (ADP), and the Santa Ana River watershed area. The proposed site will discharge to proposed MDP Line A-14a along Ethanac Road, which discharges to existing MDP Line A before reaching the San Jacinto River. Additionally, runoff from approximately 18.6 acres of off-site area will be collected along the southern project boundary before discharging to MDP Line A-14a.

Per the Romoland MDP, the site was initially zoned to drain partially to both Line A-15a and Line A-14a. However, the proposed site drainage pattern will direct the entirety of the project's stormwater runoff to Line A-14a. As such, only Line A-14a will be constructed as part of this project and will be sized to convey the additional flow. Since no part of the proposed development drains towards line A-15a, it is excluded from the project and this study.

## PROPOSED CONDITIONS

The planned site condition will propose an industrial warehouse (approximately 700,037 square feet) on approximately 36.8 acres of vacant land. The project proposes truck and auto parking as well as landscaped areas. All on-site flows generated from the project will be collected by proposed underground chambers located in the northernmost truck parking. The underground chambers will fully store the water quality volume, which will be pumped into a water quality facility for treatment. All high intensity flows will overflow into a high flow bypass and gravity flow north via Romoland MDP Line A-14a. Since the project drains to an MDP facility, the project qualifies for HCOC exemption, and proposed flow rates will not be required to match existing land use flow rates. Please see the preliminary WQMP report for more detail.

Off-site flows that originate south the property will be collected via a channel along the southern property boundary. Flows will be collected by inlets and conveyed via pipe to MDP Line A-14a in Byers

Road. Stormwater runoff from the street improvements along Wheat Street (centerline to the proposed eastern right of way) will enter a proposed catch basin located at the southeast corner of intersection of Wheat Street and Kuffel Road. Similarly, stormwater from the street improvements along Byers (centerline to the proposed western right of way) will enter a proposed catch basin located at the southeast corner of the intersection of Byers Road and Kuffel Road. Runoff from the south half of the street improvements along Kuffel Road (centerline to the proposed southern right of way) between Wheat Street and Byers Road will also be intercepted by proposed catch basins. Proposed water quality facilities will treat low flows prior to each catch basin, with high flows and treated low flows entering a proposed off-site storm drain lines that all gravity flow to Romoland MDP Line A-14a in Byers Road.

## METHODOLOGY

### HYDROLOGY

Hydrologic calculations were performed in accordance with the RCFC&WCD Hydrology Manual, dated April 1978. The Rational Method was utilized in determining peak flow rates.

The hydrological parameters, including rainfall values and soil types were derived from the RCFC&WCD Hydrology Manual. The isohyetal maps and soil map have been included in Section 2.

Rational Method calculations were performed using a computer program developed by CivilDesign Corporation and Joseph E. Bonadiman and Associates Inc. The computer program is commonly referred to as CivilD which incorporates the hydrological parameters outlined in the RCFC&WCD Hydrology Manual.

### HYDRAULICS

Water quality treatment calculations were performed using spreadsheets that were created by RCFC&WCD. Calculations and additional details can be found in the Preliminary-WQMP.

**FIG. 1 VICINITY MAP**

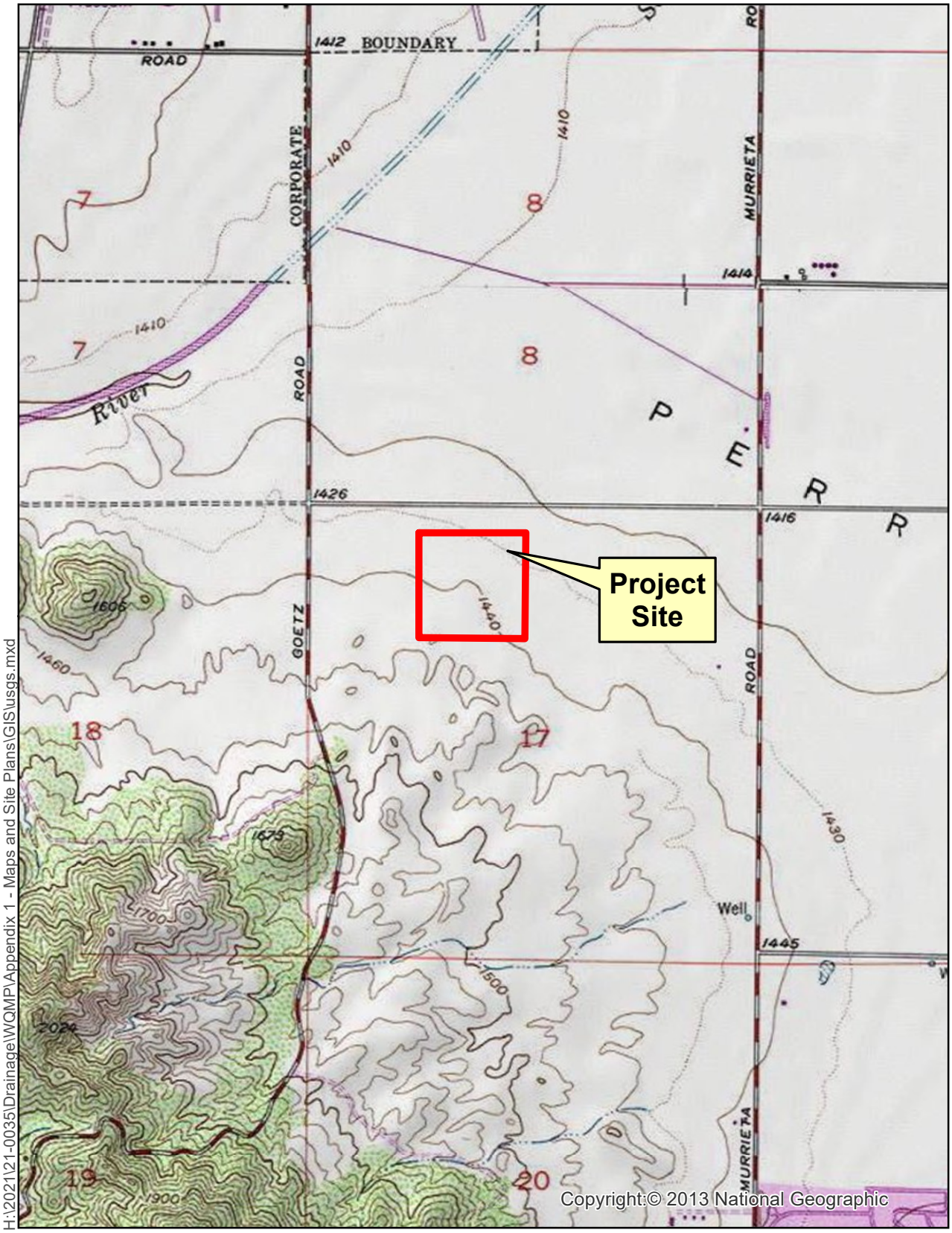
**FIG. 2 USGS TOPOGRAPHY MAP**

**FIG. 3 AERIAL PHOTOGRAPH**

**FIG. 4 RECEIVING WATERBODIES**

**FIG. 5 SOILS MAP**


**Figure 1. Vicinity Map**




H:\2021\21-0035\Drainage\WQMP\Appendix 1 - Maps and Site Plans\GIS\usgs.mxd

Sources: ESRI / USGS 7.5min Quad
DRGs: PERRIS / STEELE PEAK

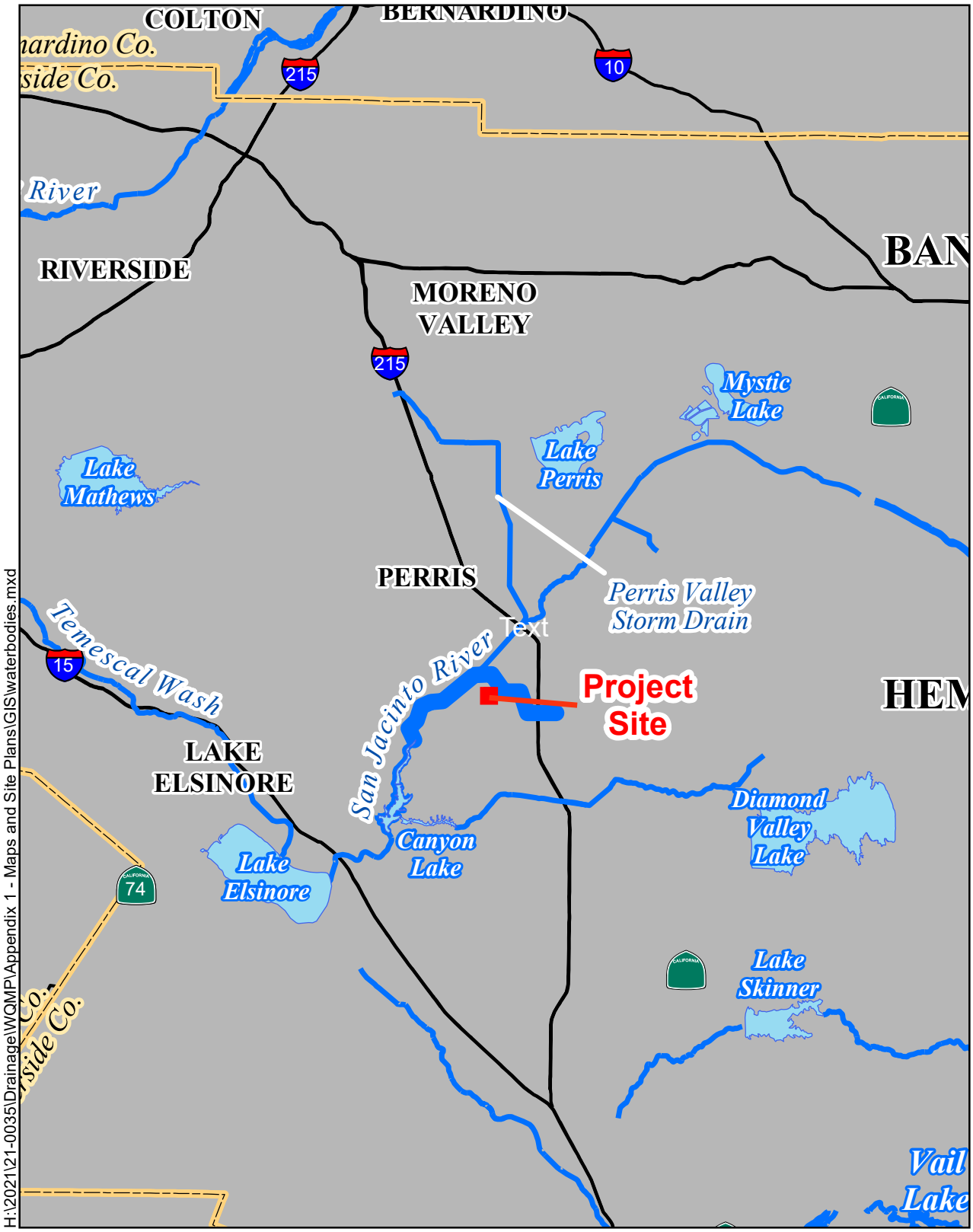
**Figure 2. USGS Topography Map**

0 1,000 2,000 Feet


Sources: County of Riverside GIS, 2013; Eagle Aerial, April 2012.

**Figure 3. Aerial Photograph**

0 400 800 Feet

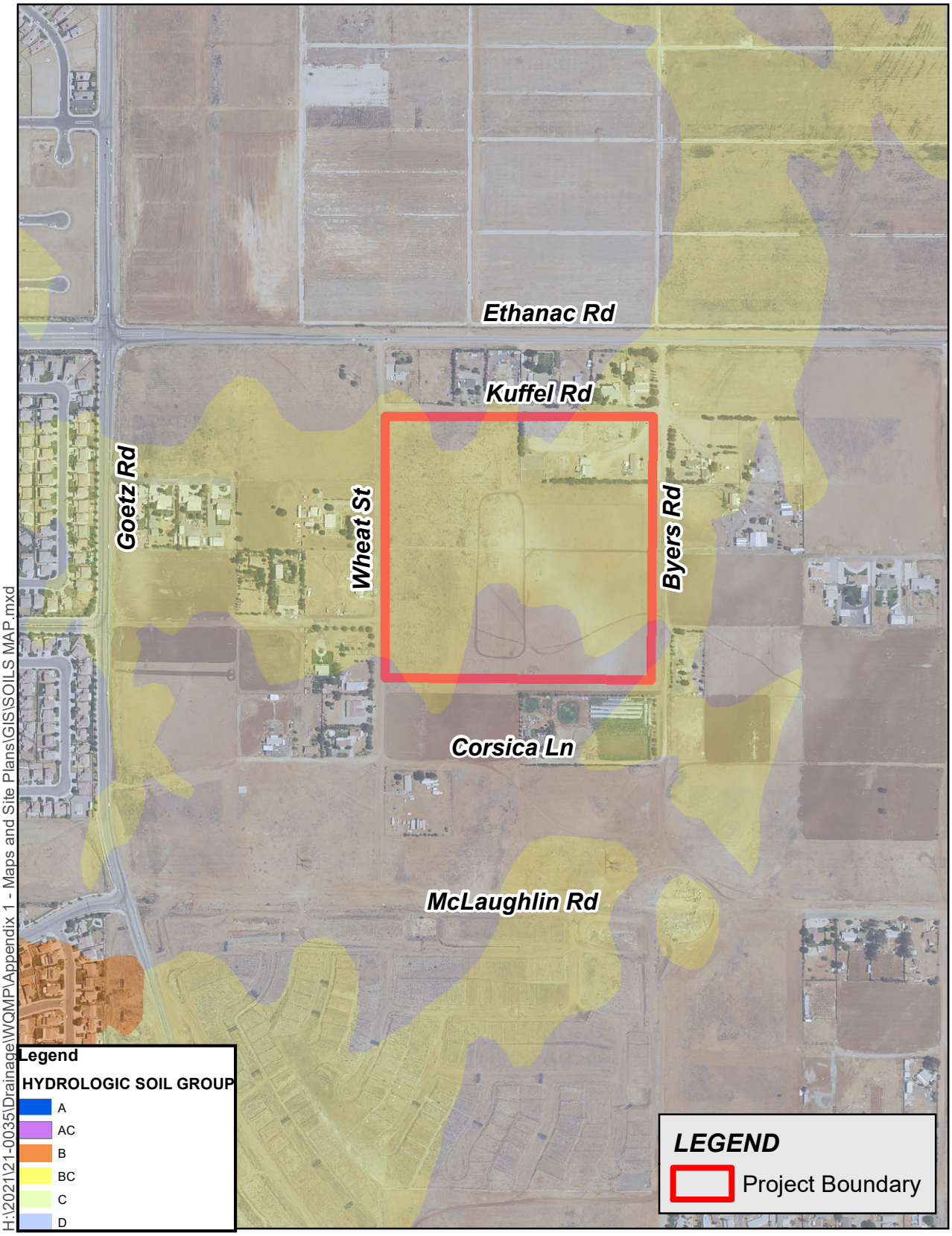



Sources: USGS 30 Meter DEM;
USGS Digital Line Graph

**Figure 4. Receiving Waterbodies**

0 2 4 6
Miles

Flowpath




H:\2021\21-0035\Drainage\WQMP\Appendix 1 - Maps and Site Plans\GIS\SOILS MAP.mxd

Eagle Aerial, April 2010;
Riverside County GIS, 2012
RCFC&WCD Hydology Manual Plate C-1.30

N
W E
S

0 500 1,000
Feet

**Soils Map**
Perris Valley Logisitc Center

Albert A. WEBB Associates

# SECTION 2 - HYDROLOGY ANALYSIS

## HYDROLOGY PARAMETERS

The RCFC&WCD Hydrology Manual was used to determine several of the hydrological parameters. The following rainfall depths were utilized in the hydrology analyses, which were obtained from Plate D-4.1 (Perris Valley) provided in the RCFC&WCD Hydrology Manual:

**Table 1 – Precipitation Values**

| | Duration |
|---|---|
| Storm Event | 1-Hour (inches) |
| 10-Year | 0.78 |
| 100-Year | 1.12 |

The value for slope of intensity was determined to be 0.49. The isohyetal maps have been included in Appendix A.

Based on the Plate C-1.42 (Romoland) in the RCFC&WCD Hydrology Manual, the project site is classified as soil types C and D. The soils map is included in Appendix A.

The cover type was determined based on the existing land cover and proposed land use of the site. Hydrological computations for the existing condition were done using 'Undeveloped-Poor Cover'. The commercial landscaping cover type was used to represent the developed condition for the on-site condition. The off-site condition was modeled as undeveloped for all calculations. The table below summarizes the runoff index values and the recommended values for percentage of impervious cover for each category:

**Table 2 – Cover Type**

| Cover Type | Soil Group A | Soil Group B | Soil Group C | Soil Group D | Percentage of Impervious Cover |
|---|---|---|---|---|---|
| Undeveloped Poor Cover | 67 | 78 | 86 | 89 | 0% |
| Commercial Landscaping | 32 | 56 | 69 | 75 | 90% |

## ON-SITE RATIONAL METHOD HYDROLOGY

The rational method was used to determine peak flows to adequately preliminarily size the proposed subsurface storm drains used to convey on-site flows through the site and into the proposed MDP Line A-14a. The design of the required subsurface storm drains and associated inlets used to convey on-site flows to the underground storage chambers will be provided in final engineering.

The on-site area (300 series) is broken up into three subareas: the western half of the site, which surface flows from the south to north; the eastern half of the site, which also surface flows from the south to north; and the northernmost truck parking area, which flows to the north. All on-site subareas will be collected by inlets that drain into the proposed underground storage chambers located within the northern truck parking area. An emergency outlet in the proposed underground storage chambers will be provided that is capable of bypassing the peak 100-year flow rate.

The following table summarizes the rational method results at key points:

**Table 3 – On-Site Rational Method Results**

| Point of Interest | 10-Year Peak Flow Rate (cfs) | 100-Year Peak Flow Rate (cfs) |
|---|---|---|
| Node 303 – Western Flows | 21.8 | 31.4 |
| Node 307 – Eastern Flows | 25.7 | 37.1 |
| Node 309 – Northern Flows | 14.0 | 20.3 |
| Node 304 – Cumulative On-Site Flows | 56.7 | 82.4 |

The rational method output files and hydrology map have been included in Appendix A.

## OFF-SITE RATIONAL METHOD HYDROLOGY

The off-site areas were broken into four subareas. Off-site tributary area to the south (100 series) will be intercepted by a channel and collected by inlets before being conveyed by pipe to MDP Line A-14a. Off-site runoff associated with the half-street improvements of Byers Road (200 series), Wheat Street (400 series) and Kuffel Road (400 series) will be collected by catch basin before being conveyed by pipe to MDP Line A-14a.

**Table 4 – Off-Site Rational Method Results**

| Point of Interest | 10-Year Peak Flow Rate (cfs) | 100-Year Peak Flow Rate (cfs) |
|---|---|---|
| Node 102 – Off-Site Southerly Run-On | 22.2 | 33.1 |
| Node 202 – Half-Street Improvements, Byers Road | 5.2 | 7.6 |
| Node 402 – Half-Street Improvements, Wheat Street | 2.2 | 3.2 |
| Node 404 – Half-Street Improvements, Kuffel Road | 1.4 | 2.0 |
| Node 106 – Cumulative On-Site and Off-Site Flows to MDP Line A-14a | 77.4 | 112.9 |

See Appendix A for the output files of the off-site rational method analysis.

# SECTION 3 - HYDRAULIC ANALYSIS

## ON-SITE STORM DRAIN FACILITIES

The design of the required on-site subsurface storm drains and associated inlets used to convey on-site flows to the proposed underground storage chambers will be provided during final engineering.

## OFF-SITE STORM DRAIN FACILITIES

The design of the required off-site subsurface storm drains and associated inlets used to convey off-site flows will be provided during final engineering.

### MDP Line A-14a

The Perris Valley MDP Line A-14a was preliminarily sized to be 54″ with a slope of 0.03% per 100-yr storm peak flow (113 cfs) and normal depth calculations. Refer to Appendix B for normal depth hydraulic calculations.

# SECTION 4 - DETENTION SYSTEM ANALYSIS

## ON-SITE UNIT HYDROGRAPH METHOD HYDROLOGY

The unit hydrograph method was used to determine the peak flow rates and volumes in order to adequately size the proposed underground chamber detention system to address Hydraulic Conditions of Concern (HCOC) mitigation. Unit hydrographs were performed for the 2-year, 24-hour storm event in both the existing condition and developed condition. The existing condition is used to establish a baseline for comparative purposes. The developed condition is used for design purposes, it was utilized in order to size and analyze the proposed chamber detention systems. The following table summarizes the results of the unit hydrograph analysis:

**Table 4 – Unit Hydrograph Results**

| | Existing Condition | | Proposed Condition | |
|---|---|---|---|---|
| Storm Event | Volume (Ac-ft) | Peak Flow (cfs) | Volume (Ac-ft) | Peak Flow (cfs) |
| 2-Year, 24-Hour | 1.030 | 4.2 | 4.778 | 7.9 |

The unit hydrograph output files and hydrology map have been included in Appendix C.

## BASIN ROUTING ANALYSIS

A routing analysis will be completed in final engineering to demonstrate that the underground CMP chambers systems contain substantial volume needed to mitigate flows down to existing condition peak flow rates. In this preliminary stage, the chambers were sized to contain the volume difference between the existing and proposed condition unit hydrographs.

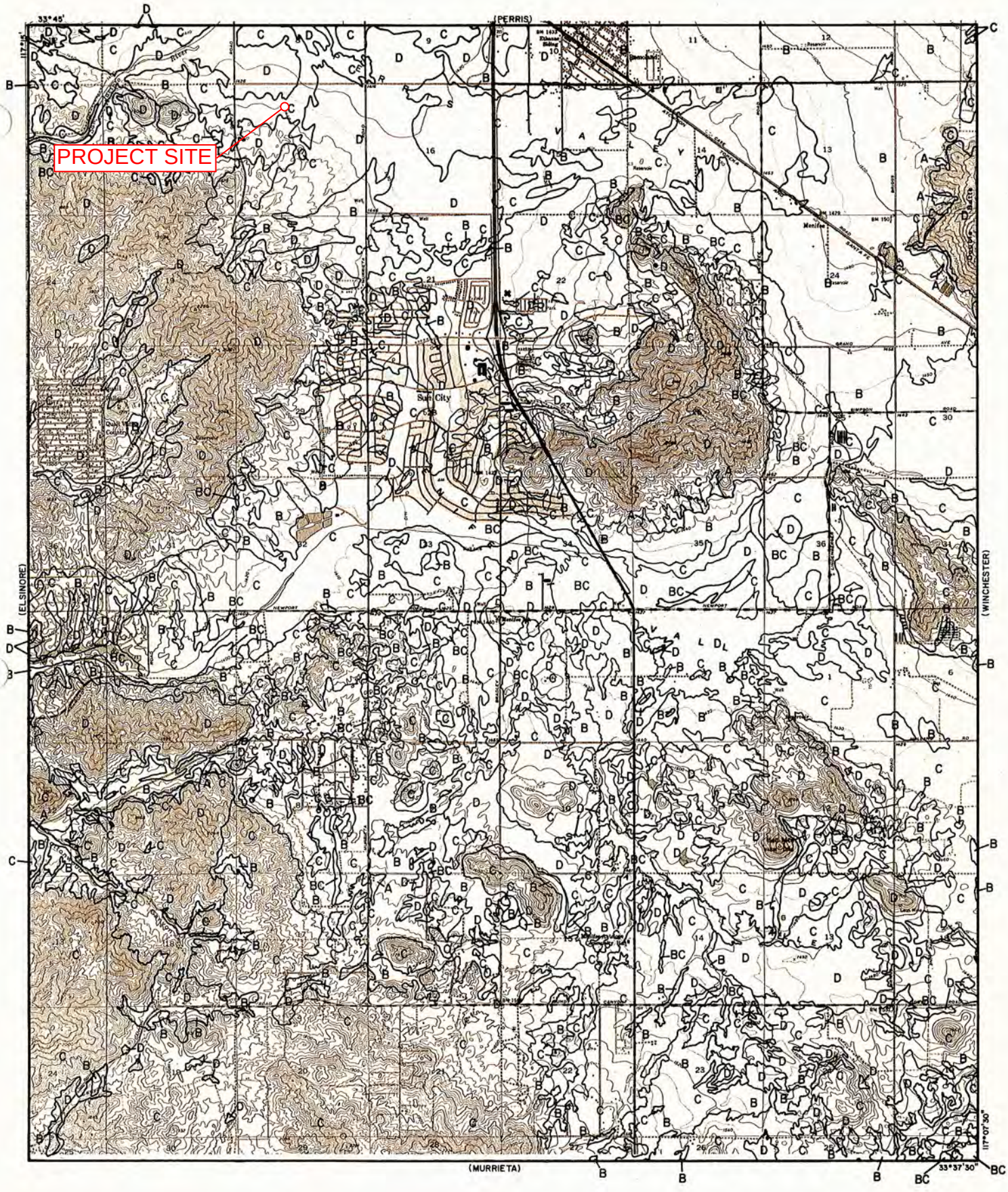
# SECTION 5 - CONCLUSION

Based on the analyses and results of this report, the following conclusions were derived from the hydrology and hydraulic results:

- The proposed drainage improvements will adequately convey flows to the underground storage chambers and provide flood protection for the 100-year storm event.
- The proposed CMP detention chambers will adequality mitigate for increases in runoff for the 24-hour duration storm event for the 2-year storm frequency.
- The proposed project will not impact flooding condition to upstream or downstream properties.

# APPENDIX A – HYDROLOGY ANALYSIS

## HYDROLOGIC SOILS GROUP MAP (PLATE C-1.42 – ROMOLAND)




**LEGEND**

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

**RCFC & WCD**

HYDROLOGY MANUAL

0 FEET 5000

# HYDROLOGIC SOILS GROUP MAP FOR ROMOLAND

PLATE C-1.42

## ISOHYETAL MAPS (PLATE D-4.1 – PERRIS VALLEY)

# RAINFALL INTENSITY—INCHES PER HOUR

| MIRA LOMA | | | MURRIETA - TEMECULA & RANCHO CALIFORNIA | | | NORCO | | | PALM SPRINGS | | | PERRIS VALLEY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DURATION MINUTES | FREQUENCY | | DURATION MINUTES | FREQUENCY | | DURATION MINUTES | FREQUENCY | | DURATION MINUTES | FREQUENCY | | DURATION MINUTES | FREQUENCY | |
| | 10 YEAR | 100 YEAR | | 10 YEAR | 100 YEAR | | 10 YEAR | 100 YEAR | | 10 YEAR | 100 YEAR | | 10 YEAR | 100 YEAR |
| 5 | 2.84 | 4.48 | 5 | 3.45 | 5.10 | 5 | 2.77 | 4.16 | 5 | 4.23 | 6.76 | 5 | 2.64 | 3.78 |
| 6 | 2.58 | 4.07 | 6 | 3.12 | 4.61 | 6 | 2.53 | 3.79 | 6 | 3.80 | 6.08 | 6 | 2.41 | 3.46 |
| 7 | 2.37 | 3.75 | 7 | 2.87 | 4.24 | 7 | 2.34 | 3.51 | 7 | 3.48 | 5.56 | 7 | 2.24 | 3.21 |
| 8 | 2.21 | 3.49 | 8 | 2.67 | 3.94 | 8 | 2.19 | 3.29 | 8 | 3.22 | 5.15 | 8 | 2.09 | 3.01 |
| 9 | 2.08 | 3.28 | 9 | 2.50 | 3.69 | 9 | 2.07 | 3.10 | 9 | 3.01 | 4.81 | 9 | 1.98 | 2.84 |
| 10 | 1.96 | 3.10 | 10 | 2.36 | 3.48 | 10 | 1.96 | 2.94 | 10 | 2.83 | 4.52 | 10 | 1.88 | 2.69 |
| 11 | 1.87 | 2.95 | 11 | 2.24 | 3.30 | 11 | 1.87 | 2.80 | 11 | 2.67 | 4.28 | 11 | 1.79 | 2.57 |
| 12 | 1.78 | 2.82 | 12 | 2.13 | 3.15 | 12 | 1.79 | 2.68 | 12 | 2.54 | 4.07 | 12 | 1.72 | 2.46 |
| 13 | 1.71 | 2.70 | 13 | 2.04 | 3.01 | 13 | 1.72 | 2.58 | 13 | 2.43 | 3.88 | 13 | 1.65 | 2.37 |
| 14 | 1.64 | 2.60 | 14 | 1.96 | 2.89 | 14 | 1.66 | 2.48 | 14 | 2.33 | 3.72 | 14 | 1.59 | 2.29 |
| 15 | 1.58 | 2.50 | 15 | 1.89 | 2.79 | 15 | 1.60 | 2.40 | 15 | 2.23 | 3.58 | 15 | 1.54 | 2.21 |
| 16 | 1.53 | 2.42 | 16 | 1.82 | 2.69 | 16 | 1.55 | 2.32 | 16 | 2.15 | 3.44 | 16 | 1.49 | 2.14 |
| 17 | 1.48 | 2.34 | 17 | 1.76 | 2.60 | 17 | 1.50 | 2.25 | 17 | 2.08 | 3.32 | 17 | 1.45 | 2.08 |
| 18 | 1.44 | 2.27 | 18 | 1.71 | 2.52 | 18 | 1.46 | 2.19 | 18 | 2.01 | 3.22 | 18 | 1.41 | 2.02 |
| 19 | 1.40 | 2.21 | 19 | 1.66 | 2.45 | 19 | 1.42 | 2.13 | 19 | 1.95 | 3.12 | 19 | 1.37 | 1.97 |
| 20 | 1.36 | 2.15 | 20 | 1.61 | 2.38 | 20 | 1.39 | 2.08 | 20 | 1.89 | 3.03 | 20 | 1.34 | 1.92 |
| 22 | 1.29 | 2.04 | 22 | 1.53 | 2.26 | 22 | 1.32 | 1.98 | 22 | 1.79 | 2.86 | 22 | 1.28 | 1.83 |
| 24 | 1.24 | 1.95 | 24 | 1.46 | 2.15 | 24 | 1.26 | 1.90 | 24 | 1.70 | 2.72 | 24 | 1.22 | 1.75 |
| 26 | 1.18 | 1.87 | 26 | 1.39 | 2.06 | 26 | 1.22 | 1.82 | 26 | 1.62 | 2.60 | 26 | 1.18 | 1.69 |
| 28 | 1.14 | 1.80 | 28 | 1.34 | 1.98 | 28 | 1.17 | 1.76 | 28 | 1.56 | 2.49 | 28 | 1.13 | 1.63 |
| 30 | 1.10 | 1.73 | 30 | 1.29 | 1.90 | 30 | 1.13 | 1.70 | 30 | 1.49 | 2.39 | 30 | 1.10 | 1.57 |
| 32 | 1.06 | 1.67 | 32 | 1.24 | 1.84 | 32 | 1.10 | 1.64 | 32 | 1.44 | 2.30 | 32 | 1.06 | 1.52 |
| 34 | 1.03 | 1.62 | 34 | 1.20 | 1.78 | 34 | 1.06 | 1.59 | 34 | 1.39 | 2.22 | 34 | 1.03 | 1.48 |
| 36 | 1.00 | 1.57 | 36 | 1.17 | 1.72 | 36 | 1.03 | 1.55 | 36 | 1.34 | 2.15 | 36 | 1.00 | 1.44 |
| 38 | .97 | 1.53 | 38 | 1.13 | 1.67 | 38 | 1.01 | 1.51 | 38 | 1.30 | 2.09 | 38 | .98 | 1.40 |
| 40 | .94 | 1.49 | 40 | 1.10 | 1.62 | 40 | .98 | 1.47 | 40 | 1.27 | 2.02 | 40 | .95 | 1.37 |
| 45 | .89 | 1.40 | 45 | 1.03 | 1.52 | 45 | .92 | 1.39 | 45 | 1.18 | 1.89 | 45 | .90 | 1.29 |
| 50 | .84 | 1.32 | 50 | .97 | 1.44 | 50 | .88 | 1.31 | 50 | 1.11 | 1.78 | 50 | .85 | 1.22 |
| 55 | .80 | 1.26 | 55 | .92 | 1.36 | 55 | .84 | 1.25 | 55 | 1.05 | 1.68 | 55 | .81 | 1.17 |
| 60 | .76 | 1.20 | 60 | .88 | 1.30 | 60 | .80 | 1.20 | 60 | 1.00 | 1.60 | 60 | .78 | 1.12 |
| 65 | .73 | 1.15 | 65 | .84 | 1.24 | 65 | .77 | 1.15 | 65 | .95 | 1.53 | 65 | .75 | 1.08 |
| 70 | .70 | 1.11 | 70 | .81 | 1.19 | 70 | .74 | 1.11 | 70 | .91 | 1.46 | 70 | .72 | 1.04 |
| 75 | .68 | 1.07 | 75 | .78 | 1.15 | 75 | .72 | 1.07 | 75 | .88 | 1.41 | 75 | .70 | 1.00 |
| 80 | .65 | 1.03 | 80 | .75 | 1.11 | 80 | .69 | 1.04 | 80 | .85 | 1.35 | 80 | .68 | .97 |
| 85 | .63 | 1.00 | 85 | .73 | 1.07 | 85 | .67 | 1.01 | 85 | .82 | 1.31 | 85 | .66 | .94 |
| SLOPE = .530 | | | SLOPE = .550 | | | SLOPE = .500 | | | SLOPE = .580 | | | SLOPE = .490 | | |

STANDARD
INTENSITY-DURATION
CURVES DATA

## 10-YEAR OFF-SITE HYDROLOGY (RATIONAL METHOD)

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 06/16/22 File:OFF1PR.out

---

CAPSTONE MENIFEE RATIONAL ANALYSIS
10 YR STORM
OFFSITE AREA
2022-06-16 ABE

---

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

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

---

Program License Serial Number 4010

---

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

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

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

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

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

---

Initial area flow distance = 1000.000(Ft.)
Top (of initial area) elevation = 1480.000(Ft.)
Bottom (of initial area) elevation = 1459.700(Ft.)
Difference in elevation = 20.300(Ft.)
Slope = 0.02030 s(percent)= 2.03
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 18.314 min.
Rainfall intensity = 1.395(In/Hr) for a 10.0 year storm
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 = 0.050
Decimal fraction soil group D = 0.950
RI index for soil(AMC 2) = 88.85
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 5.942(CFS)
Total initial stream area = 5.300(Ac.)
Pervious area fraction = 1.000

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

Process from Point/Station 101.000 to Point/Station 102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

---

Upstream point/station elevation = 1440.000(Ft.)
Downstream point/station elevation = 1428.000(Ft.)
Pipe length = 800.00(Ft.) Manning's N = 0.013

```
No. of pipes = 1  Required pipe flow  =     5.942(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.942(CFS)
Normal flow depth in pipe =    9.70(In.)
Flow top width inside pipe =   14.34(In.)
Critical Depth =   11.82(In.)
Pipe flow velocity =      7.08(Ft/s)
Travel time through pipe =    1.88 min.
Time of concentration (TC) =    20.20 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.300(Ac.)
Runoff from this stream =      5.942(CFS)
Time of concentration =   20.20 min.
Rainfall intensity =     1.330(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   707.000(Ft.)
Top (of initial area) elevation =  1480.000(Ft.)
Bottom (of initial area) elevation =  1470.000(Ft.)
Difference in elevation =    10.000(Ft.)
Slope =    0.01414  s(percent)=       1.41
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   17.137 min.
Rainfall intensity =      1.441(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.801
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.250
Decimal fraction soil group D = 0.750
RI index for soil(AMC 2)  =  88.25
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      7.276(CFS)
Total initial stream area =        6.300(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.800
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.700
RI index for soil(AMC 2)  =  88.10
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    17.14 min.
Rainfall intensity =      1.441(In/Hr) for a    10.0 year storm
Subarea runoff =      9.917(CFS) for      8.600(Ac.)
Total runoff =     17.193(CFS)        Total area =      14.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1440.000(Ft.)
Downstream point/station elevation =  1428.000(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.193(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =    17.193(CFS)
```

```
Normal flow depth in pipe =    6.86(In.)
Flow top width inside pipe =   11.88(In.)
Critical depth could not be calculated.
Pipe flow velocity =     37.04(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    17.15 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      102.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     14.900(Ac.)
Runoff from this stream =     17.193(CFS)
Time of concentration =   17.15 min.
Rainfall intensity =     1.441(In/Hr)
Summary of stream data:

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


1        5.942     20.20                 1.330
2       17.193     17.15                 1.441
Largest stream flow has longer or shorter time of concentration
Qp =     17.193 + sum of
          Qa          Tb/Ta
           5.942 *    0.849 =      5.044
Qp =     22.237

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.942      17.193
Area of streams before confluence:
        5.300       14.900
Results of confluence:
Total flow rate =     22.237(CFS)
Time of concentration =    17.146 min.
Effective stream area after confluence =     20.200(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1428.000(Ft.)
Downstream point/station elevation =  1411.500(Ft.)
Pipe length  =  1485.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    22.237(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    22.237(CFS)
Normal flow depth in pipe =   18.35(In.)
Flow top width inside pipe =   20.36(In.)
Critical Depth =   20.19(In.)
Pipe flow velocity =      8.62(Ft/s)
Travel time through pipe =    2.87 min.
Time of concentration (TC) =    20.02 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      106.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     20.200(Ac.)
Runoff from this stream =     22.237(CFS)
Time of concentration =   20.02 min.
Rainfall intensity =     1.336(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
```

```
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   870.000(Ft.)
Top (of initial area) elevation =  1476.500(Ft.)
Bottom (of initial area) elevation =  1440.400(Ft.)
Difference in elevation =    36.100(Ft.)
Slope =    0.04149  s(percent)=       4.15
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.014 min.
Rainfall intensity =      1.538(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.806
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.700
RI index for soil(AMC 2)  =  88.10
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      3.841(CFS)
Total initial stream area =        3.100(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of street segment elevation =  1440.400(Ft.)
End of street segment elevation =  1425.000(Ft.)
Length of street segment  =  1290.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  28.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  11.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      4.540(CFS)
Depth of flow =   0.335(Ft.), Average velocity =   2.754(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.504(Ft.)
Flow velocity =   2.75(Ft/s)
Travel time =    7.81 min.     TC =   22.82  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.872
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.200
RI index for soil(AMC 2)  =  70.20
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.253(In/Hr) for a    10.0 year storm
Subarea runoff =      1.311(CFS) for      1.200(Ac.)
Total runoff =      5.151(CFS)       Total area =       4.300(Ac.)
Street flow at end of street =      5.151(CFS)
Half street flow at end of street =      5.151(CFS)
Depth of flow =   0.348(Ft.), Average velocity =   2.839(Ft/s)
Flow width (from curb towards crown)=  13.150(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1412.000(Ft.)
Downstream point/station elevation =  1411.500(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.151(CFS)
```

```
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.151(CFS)
Normal flow depth in pipe =    9.36(In.)
Flow top width inside pipe =   14.53(In.)
Critical Depth =   11.05(In.)
Pipe flow velocity =      6.39(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    22.92 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      106.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      4.300(Ac.)
Runoff from this stream =      5.151(CFS)
Time of concentration =   22.92 min.
Rainfall intensity =     1.250(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      400.000 to Point/Station      401.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   230.000(Ft.)
Top (of initial area) elevation =  1462.000(Ft.)
Bottom (of initial area) elevation =  1458.200(Ft.)
Difference in elevation =     3.800(Ft.)
Slope =    0.01652  s(percent)=       1.65
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.601 min.
Rainfall intensity =      1.824(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.824
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.050
Decimal fraction soil group D = 0.950
RI index for soil(AMC 2)  =  88.85
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.752(CFS)
Total initial stream area =        0.500(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1458.200(Ft.)
End of street segment elevation =  1434.500(Ft.)
Length of street segment  =  1290.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  28.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  11.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      1.515(CFS)
Depth of flow =   0.229(Ft.), Average velocity =   2.516(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   7.192(Ft.)
Flow velocity =   2.52(Ft/s)
Travel time =    8.55 min.     TC =   19.15  min.
 Adding area flow to street
```

```
COMMERCIAL subarea type
Runoff Coefficient = 0.873
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.850
Decimal fraction soil group D = 0.150
RI index for soil(AMC 2)  =  69.90
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.365(In/Hr) for a    10.0 year storm
Subarea runoff =      1.431(CFS) for      1.200(Ac.)
Total runoff =      2.182(CFS)       Total area =       1.700(Ac.)
Street flow at end of street =      2.182(CFS)
Half street flow at end of street =      2.182(CFS)
Depth of flow =   0.254(Ft.), Average velocity =   2.731(Ft/s)
Flow width (from curb towards crown)=   8.450(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1428.500(Ft.)
Downstream point/station elevation =  1412.000(Ft.)
Pipe length  =  1340.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.182(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.182(CFS)
Normal flow depth in pipe =    6.36(In.)
Flow top width inside pipe =   11.98(In.)
Critical Depth =    7.58(In.)
Pipe flow velocity =      5.16(Ft/s)
Travel time through pipe =    4.33 min.
Time of concentration (TC) =    23.48 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      404.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 3 in normal stream number 1
Stream flow area =      1.700(Ac.)
Runoff from this stream =      2.182(CFS)
Time of concentration =   23.48 min.
Rainfall intensity =     1.235(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   674.000(Ft.)
Top (of initial area) elevation =  1434.500(Ft.)
Bottom (of initial area) elevation =  1430.300(Ft.)
Difference in elevation =     4.200(Ft.)
Slope =    0.00623  s(percent)=       0.62
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.212 min.
Rainfall intensity =      1.774(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.879
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.700
Decimal fraction soil group D = 0.300
RI index for soil(AMC 2)  =  70.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      0.780(CFS)
Total initial stream area =        0.500(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
```

```
COMMERCIAL subarea type
Runoff Coefficient = 0.879
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.700
Decimal fraction soil group D = 0.300
RI index for soil(AMC 2)  =  70.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.21 min.
Rainfall intensity =      1.774(In/Hr) for a    10.0 year storm
Subarea runoff =      0.624(CFS) for      0.400(Ac.)
Total runoff =      1.403(CFS)       Total area =       0.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      403.000 to Point/Station      404.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 3 in normal stream number 2
Stream flow area =      0.900(Ac.)
Runoff from this stream =      1.403(CFS)
Time of concentration =   11.21 min.
Rainfall intensity =     1.774(In/Hr)
Summary of stream data:

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


1        2.182     23.48                 1.235
2        1.403     11.21                 1.774
Largest stream flow has longer time of concentration
Qp =      2.182 + sum of
          Qb         Ia/Ib
           1.403 *    0.696 =      0.977
Qp =      3.159

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.182       1.403
Area of streams before confluence:
        1.700        0.900
Results of confluence:
Total flow rate =      3.159(CFS)
Time of concentration =    23.477 min.
Effective stream area after confluence =      2.600(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1412.000(Ft.)
Downstream point/station elevation =  1411.500(Ft.)
Pipe length  =    70.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.159(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.159(CFS)
Normal flow depth in pipe =    8.19(In.)
Flow top width inside pipe =   14.94(In.)
Critical Depth =    8.59(In.)
Pipe flow velocity =      4.61(Ft/s)
Travel time through pipe =    0.25 min.
Time of concentration (TC) =    23.73 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      106.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      2.600(Ac.)
Runoff from this stream =      3.159(CFS)
Time of concentration =   23.73 min.
```

```
Rainfall intensity =     1.229(In/Hr)
Summary of stream data:

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


1       22.237     20.02               1.336
2        5.151     22.92               1.250
3        3.159     23.73               1.229
Largest stream flow has longer or shorter time of concentration
Qp =     22.237 + sum of
          Qa          Tb/Ta
           5.151 *    0.873 =      4.498
          Qa          Tb/Ta
           3.159 *    0.843 =      2.665
Qp =     29.400

Total of 3 main streams to confluence:
Flow rates before confluence point:
      22.237       5.151       3.159
Area of streams before confluence:
       20.200        4.300        2.600


Results of confluence:
Total flow rate =     29.400(CFS)
Time of concentration =    20.016 min.
Effective stream area after confluence  =     27.100(Ac.)
End of computations, total study area =           27.10 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.890
Area averaged RI index number =  86.1
```

## 10-YEAR ON-SITE HYDROLOGY (RATIONAL METHOD)

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 06/16/22 File:ON1PR.out

---

CAPSTONE MENIFEE RATIONAL ANALYSIS
10 YR STORM
ONSITE AREA
2022-06-16 ABE

---

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

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

---

Program License Serial Number 4010

---

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

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

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

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

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

Process from Point/Station 300.000 to Point/Station 301.000
**** INITIAL AREA EVALUATION ****

---

Initial area flow distance = 507.000(Ft.)
Top (of initial area) elevation = 1453.100(Ft.)
Bottom (of initial area) elevation = 1450.800(Ft.)
Difference in elevation = 2.300(Ft.)
Slope = 0.00454 s(percent)= 0.45
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.661 min.
Rainfall intensity = 1.819(In/Hr) for a 10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.880
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.400
RI index for soil(AMC 2) = 71.40
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 3.359(CFS)
Total initial stream area = 2.100(Ac.)
Pervious area fraction = 0.100

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

Process from Point/Station 301.000 to Point/Station 302.000
**** SUBAREA FLOW ADDITION ****

---

COMMERCIAL subarea type
Runoff Coefficient = 0.879
Decimal fraction soil group A = 0.000

```
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.650
Decimal fraction soil group D = 0.350
RI index for soil(AMC 2)  =  71.10
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.66 min.
Rainfall intensity =      1.819(In/Hr) for a    10.0 year storm
Subarea runoff =      9.276(CFS) for      5.800(Ac.)
Total runoff =     12.635(CFS)       Total area =       7.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      303.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.882
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.900
RI index for soil(AMC 2)  =  74.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.66 min.
Rainfall intensity =      1.819(In/Hr) for a    10.0 year storm
Subarea runoff =      9.142(CFS) for      5.700(Ac.)
Total runoff =     21.778(CFS)       Total area =      13.600(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      304.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1429.500(Ft.)
Downstream point/station elevation =  1424.600(Ft.)
Pipe length  =   730.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    21.778(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    21.778(CFS)
Normal flow depth in pipe =   19.27(In.)
Flow top width inside pipe =   24.41(In.)
Critical Depth =   19.60(In.)
Pipe flow velocity =      7.17(Ft/s)
Travel time through pipe =    1.70 min.
Time of concentration (TC) =    12.36 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      304.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     13.600(Ac.)
Runoff from this stream =     21.778(CFS)
Time of concentration =   12.36 min.
Rainfall intensity =     1.692(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      305.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   886.000(Ft.)
Top (of initial area) elevation =  1453.100(Ft.)
Bottom (of initial area) elevation =  1439.400(Ft.)
Difference in elevation =    13.700(Ft.)
Slope =    0.01546  s(percent)=       1.55
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.429 min.
Rainfall intensity =      1.838(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.880
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.600
```

```
Decimal fraction soil group D = 0.400
RI index for soil(AMC 2)  =  71.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      6.146(CFS)
Total initial stream area =        3.800(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      305.000 to Point/Station      306.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.878
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.43 min.
Rainfall intensity =      1.838(In/Hr) for a    10.0 year storm
Subarea runoff =      9.684(CFS) for      6.000(Ac.)
Total runoff =     15.830(CFS)        Total area =       9.800(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      307.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.878
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.950
Decimal fraction soil group D = 0.050
RI index for soil(AMC 2)  =  69.30
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.43 min.
Rainfall intensity =      1.838(In/Hr) for a    10.0 year storm
Subarea runoff =      9.848(CFS) for      6.100(Ac.)
Total runoff =     25.677(CFS)        Total area =      15.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      307.000 to Point/Station      304.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1426.500(Ft.)
Downstream point/station elevation =  1424.600(Ft.)
Pipe length  =   886.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    25.677(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    25.677(CFS)
Normal flow depth in pipe =   28.78(In.)
Flow top width inside pipe =   22.04(In.)
Critical Depth =   20.16(In.)
Pipe flow velocity =      4.67(Ft/s)
Travel time through pipe =    3.16 min.
Time of concentration (TC) =    13.59 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      307.000 to Point/Station      304.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     15.900(Ac.)
Runoff from this stream =     25.677(CFS)
Time of concentration =   13.59 min.
Rainfall intensity =     1.615(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      308.000 to Point/Station      309.000
```

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 360.000(Ft.)
Top (of initial area) elevation = 1442.700(Ft.)
Bottom (of initial area) elevation = 1433.400(Ft.)
Difference in elevation = 9.300(Ft.)
Slope = 0.02583 s(percent)= 2.58
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.068 min.
Rainfall intensity = 2.225(In/Hr) for a 10.0 year storm
APARTMENT 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 = 0.850
Decimal fraction soil group D = 0.150
RI index for soil(AMC 2) = 69.90
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 14.015(CFS)
Total initial stream area = 7.300(Ac.)
Pervious area fraction = 0.200

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station 309.000 to Point/Station 304.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1429.300(Ft.)
Downstream point/station elevation = 1424.600(Ft.)
Pipe length = 100.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 14.015(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 14.015(CFS)
Normal flow depth in pipe = 15.00(In.)
Flow top width inside pipe = 0.00(In.)
Critical depth could not be calculated.
Pipe flow velocity = 11.41(Ft/s)
Travel time through pipe = 0.15 min.
Time of concentration (TC) = 7.21 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station 309.000 to Point/Station 304.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 3
Stream flow area = 7.300(Ac.)
Runoff from this stream = 14.015(CFS)
Time of concentration = 7.21 min.
Rainfall intensity = 2.202(In/Hr)
Summary of stream data:

| Stream No. | Flow rate (CFS) | TC (min) | Rainfall Intensity (In/Hr) |
|---|---|---|---|
| 1 | 21.778 | 12.36 | 1.692 |
| 2 | 25.677 | 13.59 | 1.615 |
| 3 | 14.015 | 7.21 | 2.202 |

Largest stream flow has longer time of concentration
Qp = 25.677 + sum of
Qb Ia/Ib
21.778 * 0.954 = 20.786
Qb Ia/Ib
14.015 * 0.733 = 10.276
Qp = 56.740

Total of 3 streams to confluence:
Flow rates before confluence point:
21.778 25.677 14.015
Area of streams before confluence:
13.600 15.900 7.300
Results of confluence:
Total flow rate = 56.740(CFS)
Time of concentration = 13.589 min.

```
Effective stream area after confluence =     36.800(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1424.600(Ft.)
Downstream point/station elevation =  1411.500(Ft.)
Pipe length  =   470.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    56.740(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    56.740(CFS)
Normal flow depth in pipe =   20.84(In.)
Flow top width inside pipe =   27.64(In.)
Critical Depth =   28.43(In.)
Pipe flow velocity =     15.59(Ft/s)
Travel time through pipe =    0.50 min.
Time of concentration (TC) =    14.09 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     36.800(Ac.)
Runoff from this stream =     56.740(CFS)
Time of concentration =   14.09 min.
Rainfall intensity =     1.586(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      106.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________________
Rainfall intensity =      1.336(In/Hr) for a    10.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.789
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.700
RI index for soil(AMC 2)  =  86.10
Pervious area fraction =  0.890; Impervious fraction =  0.110
User specified values are as follows:
TC =  20.02 min.  Rain intensity =       1.34(In/Hr)
Total area =        27.10(Ac.)  Total runoff =     29.40(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     27.100(Ac.)
Runoff from this stream =     29.400(CFS)
Time of concentration =   20.02 min.
Rainfall intensity =     1.336(In/Hr)
Summary of stream data:

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


1       56.740     14.09                 1.586
2       29.400     20.02                 1.336
Largest stream flow has longer or shorter time of concentration
Qp =     56.740 + sum of
          Qa          Tb/Ta
          29.400 *    0.704 =     20.698
Qp =     77.438

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

```
      56.740      29.400
Area of streams before confluence:
       36.800       27.100
Results of confluence:
Total flow rate =     77.438(CFS)
Time of concentration =    14.092 min.
Effective stream area after confluence =     63.900(Ac.)
End of computations, total study area =           63.90 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.446
Area averaged RI index number =  77.3
```

## 100-YEAR OFF-SITE HYDROLOGY (RATIONAL METHOD)

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 06/14/22 File:OFF1PR.out

---

CAPSTONE MENIFEE RATIONAL ANALYSIS
100 YR STORM
OFFSITE AREA
2022-06-14 ABE

---

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

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

---

Program License Serial Number 4010

---

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

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

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

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

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

---

Initial area flow distance = 1000.000(Ft.)
Top (of initial area) elevation = 1480.000(Ft.)
Bottom (of initial area) elevation = 1459.700(Ft.)
Difference in elevation = 20.300(Ft.)
Slope = 0.02030 s(percent)= 2.03
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 18.314 min.
Rainfall intensity = 2.003(In/Hr) for a 100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.831
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.050
Decimal fraction soil group D = 0.950
RI index for soil(AMC 2) = 88.85
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 8.819(CFS)
Total initial stream area = 5.300(Ac.)
Pervious area fraction = 1.000

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

Process from Point/Station 101.000 to Point/Station 102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

---

Upstream point/station elevation = 1440.000(Ft.)
Downstream point/station elevation = 1428.000(Ft.)
Pipe length = 800.00(Ft.) Manning's N = 0.013

```
No. of pipes = 1  Required pipe flow  =     8.819(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     8.819(CFS)
Normal flow depth in pipe =   10.95(In.)
Flow top width inside pipe =   17.57(In.)
Critical Depth =   13.80(In.)
Pipe flow velocity =      7.84(Ft/s)
Travel time through pipe =    1.70 min.
Time of concentration (TC) =    20.01 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.300(Ac.)
Runoff from this stream =      8.819(CFS)
Time of concentration =   20.01 min.
Rainfall intensity =     1.918(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   707.000(Ft.)
Top (of initial area) elevation =  1480.000(Ft.)
Bottom (of initial area) elevation =  1470.000(Ft.)
Difference in elevation =    10.000(Ft.)
Slope =    0.01414  s(percent)=       1.41
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   17.137 min.
Rainfall intensity =      2.070(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.829
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.250
Decimal fraction soil group D = 0.750
RI index for soil(AMC 2)  =  88.25
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     10.808(CFS)
Total initial stream area =        6.300(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.828
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.700
RI index for soil(AMC 2)  =  88.10
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    17.14 min.
Rainfall intensity =      2.070(In/Hr) for a   100.0 year storm
Subarea runoff =     14.736(CFS) for      8.600(Ac.)
Total runoff =     25.544(CFS)        Total area =      14.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1440.000(Ft.)
Downstream point/station elevation =  1428.000(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    25.544(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =    25.544(CFS)
```

```
Normal flow depth in pipe =    9.12(In.)
Flow top width inside pipe =   10.25(In.)
Critical depth could not be calculated.
Pipe flow velocity =     39.89(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    17.15 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      102.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     14.900(Ac.)
Runoff from this stream =     25.544(CFS)
Time of concentration =   17.15 min.
Rainfall intensity =     2.069(In/Hr)
Summary of stream data:

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


1        8.819     20.01                 1.918
2       25.544     17.15                 2.069
Largest stream flow has longer or shorter time of concentration
Qp =     25.544 + sum of
          Qa          Tb/Ta
           8.819 *    0.857 =      7.555
Qp =     33.099

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.819      25.544
Area of streams before confluence:
       5.300       14.900
Results of confluence:
Total flow rate =     33.099(CFS)
Time of concentration =    17.145 min.
Effective stream area after confluence =     20.200(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1428.000(Ft.)
Downstream point/station elevation =  1411.500(Ft.)
Pipe length  =  1485.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    33.099(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    33.099(CFS)
Normal flow depth in pipe =   22.50(In.)
Flow top width inside pipe =   20.12(In.)
Critical Depth =   23.65(In.)
Pipe flow velocity =      9.35(Ft/s)
Travel time through pipe =    2.65 min.
Time of concentration (TC) =    19.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      106.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     20.200(Ac.)
Runoff from this stream =     33.099(CFS)
Time of concentration =   19.79 min.
Rainfall intensity =     1.929(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
```

```
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   870.000(Ft.)
Top (of initial area) elevation =  1476.500(Ft.)
Bottom (of initial area) elevation =  1440.400(Ft.)
Difference in elevation =    36.100(Ft.)
Slope =    0.04149  s(percent)=       4.15
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.014 min.
Rainfall intensity =      2.208(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.832
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.700
RI index for soil(AMC 2)  =  88.10
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      5.696(CFS)
Total initial stream area =        3.100(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of street segment elevation =  1440.400(Ft.)
End of street segment elevation =  1425.000(Ft.)
Length of street segment  =  1290.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  28.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  11.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      6.694(CFS)
Depth of flow =   0.377(Ft.), Average velocity =   3.026(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.586(Ft.)
Flow velocity =   3.03(Ft/s)
Travel time =    7.11 min.     TC =   22.12  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.879
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.200
RI index for soil(AMC 2)  =  70.20
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.826(In/Hr) for a   100.0 year storm
Subarea runoff =      1.926(CFS) for      1.200(Ac.)
Total runoff =      7.622(CFS)       Total area =       4.300(Ac.)
Street flow at end of street =      7.622(CFS)
Half street flow at end of street =      7.622(CFS)
Depth of flow =   0.392(Ft.), Average velocity =   3.123(Ft/s)
Flow width (from curb towards crown)=  15.348(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1412.000(Ft.)
Downstream point/station elevation =  1411.500(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.622(CFS)
```

```
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.622(CFS)
Normal flow depth in pipe =   10.56(In.)
Flow top width inside pipe =   17.73(In.)
Critical Depth =   12.84(In.)
Pipe flow velocity =      7.07(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    22.21 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      106.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      4.300(Ac.)
Runoff from this stream =      7.622(CFS)
Time of concentration =   22.21 min.
Rainfall intensity =     1.823(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      400.000 to Point/Station      401.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   230.000(Ft.)
Top (of initial area) elevation =  1462.000(Ft.)
Bottom (of initial area) elevation =  1458.200(Ft.)
Difference in elevation =     3.800(Ft.)
Slope =    0.01652  s(percent)=       1.65
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.601 min.
Rainfall intensity =      2.619(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.050
Decimal fraction soil group D = 0.950
RI index for soil(AMC 2)  =  88.85
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.108(CFS)
Total initial stream area =        0.500(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of street segment elevation =  1458.200(Ft.)
End of street segment elevation =  1434.500(Ft.)
Length of street segment  =  1290.000(Ft.)
Height of curb above gutter flowline  =    8.0(In.)
Width of half street (curb to crown)  =  28.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  11.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      2.197(CFS)
Depth of flow =   0.254(Ft.), Average velocity =   2.736(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   8.475(Ft.)
Flow velocity =   2.74(Ft/s)
Travel time =    7.86 min.     TC =   18.46  min.
 Adding area flow to street
```

```
COMMERCIAL subarea type
Runoff Coefficient = 0.880
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.850
Decimal fraction soil group D = 0.150
RI index for soil(AMC 2)  =  69.90
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.996(In/Hr) for a   100.0 year storm
Subarea runoff =      2.107(CFS) for      1.200(Ac.)
Total runoff =      3.215(CFS)       Total area =       1.700(Ac.)
Street flow at end of street =      3.215(CFS)
Half street flow at end of street =      3.215(CFS)
Depth of flow =   0.284(Ft.), Average velocity =   2.989(Ft/s)
Flow width (from curb towards crown)=   9.953(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1428.500(Ft.)
Downstream point/station elevation =  1412.000(Ft.)
Pipe length  =  1340.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.215(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.215(CFS)
Normal flow depth in pipe =    8.21(In.)
Flow top width inside pipe =   11.15(In.)
Critical Depth =    9.22(In.)
Pipe flow velocity =      5.61(Ft/s)
Travel time through pipe =    3.98 min.
Time of concentration (TC) =    22.44 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      404.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 3 in normal stream number 1
Stream flow area =      1.700(Ac.)
Runoff from this stream =      3.215(CFS)
Time of concentration =   22.44 min.
Rainfall intensity =     1.813(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   674.000(Ft.)
Top (of initial area) elevation =  1434.500(Ft.)
Bottom (of initial area) elevation =  1430.300(Ft.)
Difference in elevation =     4.200(Ft.)
Slope =    0.00623  s(percent)=       0.62
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.212 min.
Rainfall intensity =      2.548(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.884
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.700
Decimal fraction soil group D = 0.300
RI index for soil(AMC 2)  =  70.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.126(CFS)
Total initial stream area =        0.500(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
```

```
COMMERCIAL subarea type
Runoff Coefficient = 0.884
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.700
Decimal fraction soil group D = 0.300
RI index for soil(AMC 2)  =  70.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.21 min.
Rainfall intensity =      2.548(In/Hr) for a   100.0 year storm
Subarea runoff =      0.901(CFS) for      0.400(Ac.)
Total runoff =      2.027(CFS)       Total area =       0.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      403.000 to Point/Station      404.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 3 in normal stream number 2
Stream flow area =      0.900(Ac.)
Runoff from this stream =      2.027(CFS)
Time of concentration =   11.21 min.
Rainfall intensity =     2.548(In/Hr)
Summary of stream data:

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


1        3.215     22.44                 1.813
2        2.027     11.21                 2.548
Largest stream flow has longer time of concentration
Qp =      3.215 + sum of
          Qb         Ia/Ib
           2.027 *    0.712 =      1.443
Qp =      4.657

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.215       2.027
Area of streams before confluence:
        1.700        0.900
Results of confluence:
Total flow rate =      4.657(CFS)
Time of concentration =    22.442 min.
Effective stream area after confluence =      2.600(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1412.000(Ft.)
Downstream point/station elevation =  1411.500(Ft.)
Pipe length  =    70.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.657(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.657(CFS)
Normal flow depth in pipe =   10.65(In.)
Flow top width inside pipe =   13.61(In.)
Critical Depth =   10.50(In.)
Pipe flow velocity =      5.00(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    22.68 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      106.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      2.600(Ac.)
Runoff from this stream =      4.657(CFS)
Time of concentration =   22.68 min.
```

```
Rainfall intensity =     1.804(In/Hr)
Summary of stream data:

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


1       33.099     19.79               1.929
2        7.622     22.21               1.823
3        4.657     22.68               1.804
Largest stream flow has longer or shorter time of concentration
Qp =     33.099 + sum of
          Qa          Tb/Ta
           7.622 *    0.891 =      6.791
          Qa          Tb/Ta
           4.657 *    0.873 =      4.065
Qp =     43.955

Total of 3 main streams to confluence:
Flow rates before confluence point:
      33.099       7.622       4.657
Area of streams before confluence:
       20.200        4.300        2.600


Results of confluence:
Total flow rate =     43.955(CFS)
Time of concentration =    19.791 min.
Effective stream area after confluence  =     27.100(Ac.)
End of computations, total study area =           27.10 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.890
Area averaged RI index number =  86.1
```

## 100-YEAR ON-SITE HYDROLOGY (RATIONAL METHOD)

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 06/16/22 File:ON1PR.out

---

CAPSTONE MENIFEE RATIONAL ANALYSIS
100 YR STORM
ONSITE AREA
2022-06-16 ABE

---

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

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

---

Program License Serial Number 4010

---

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

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

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

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

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

Process from Point/Station 300.000 to Point/Station 301.000
**** INITIAL AREA EVALUATION ****

---

Initial area flow distance = 507.000(Ft.)
Top (of initial area) elevation = 1453.100(Ft.)
Bottom (of initial area) elevation = 1450.800(Ft.)
Difference in elevation = 2.300(Ft.)
Slope = 0.00454 s(percent)= 0.45
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.661 min.
Rainfall intensity = 2.612(In/Hr) for a 100.0 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 = 0.600
Decimal fraction soil group D = 0.400
RI index for soil(AMC 2) = 71.40
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 4.852(CFS)
Total initial stream area = 2.100(Ac.)
Pervious area fraction = 0.100

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

Process from Point/Station 301.000 to Point/Station 302.000
**** SUBAREA FLOW ADDITION ****

---

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 = 0.650
Decimal fraction soil group D = 0.350
RI index for soil(AMC 2)  =  71.10
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.66 min.
Rainfall intensity =      2.612(In/Hr) for a   100.0 year storm
Subarea runoff =     13.398(CFS) for      5.800(Ac.)
Total runoff =     18.250(CFS)       Total area =       7.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      303.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
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 = 0.100
Decimal fraction soil group D = 0.900
RI index for soil(AMC 2)  =  74.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.66 min.
Rainfall intensity =      2.612(In/Hr) for a   100.0 year storm
Subarea runoff =     13.197(CFS) for      5.700(Ac.)
Total runoff =     31.447(CFS)       Total area =      13.600(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      304.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1429.500(Ft.)
Downstream point/station elevation =  1424.600(Ft.)
Pipe length  =   730.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    31.447(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    31.447(CFS)
Normal flow depth in pipe =   23.02(In.)
Flow top width inside pipe =   25.36(In.)
Critical Depth =   22.92(In.)
Pipe flow velocity =      7.78(Ft/s)
Travel time through pipe =    1.56 min.
Time of concentration (TC) =    12.22 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      304.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     13.600(Ac.)
Runoff from this stream =     31.447(CFS)
Time of concentration =   12.22 min.
Rainfall intensity =     2.442(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      305.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   886.000(Ft.)
Top (of initial area) elevation =  1453.100(Ft.)
Bottom (of initial area) elevation =  1439.400(Ft.)
Difference in elevation =    13.700(Ft.)
Slope =    0.01546  s(percent)=       1.55
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.429 min.
Rainfall intensity =      2.640(In/Hr) for a   100.0 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 = 0.600
```

```
Decimal fraction soil group D = 0.400
RI index for soil(AMC 2)  =  71.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      8.876(CFS)
Total initial stream area =        3.800(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      305.000 to Point/Station      306.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.883
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.43 min.
Rainfall intensity =      2.640(In/Hr) for a   100.0 year storm
Subarea runoff =     13.991(CFS) for      6.000(Ac.)
Total runoff =     22.868(CFS)        Total area =       9.800(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      307.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.884
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.950
Decimal fraction soil group D = 0.050
RI index for soil(AMC 2)  =  69.30
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.43 min.
Rainfall intensity =      2.640(In/Hr) for a   100.0 year storm
Subarea runoff =     14.228(CFS) for      6.100(Ac.)
Total runoff =     37.095(CFS)        Total area =      15.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      307.000 to Point/Station      304.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1426.500(Ft.)
Downstream point/station elevation =  1424.600(Ft.)
Pipe length  =   886.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    37.095(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    37.095(CFS)
Normal flow depth in pipe =   30.94(In.)
Flow top width inside pipe =   31.59(In.)
Critical Depth =   23.22(In.)
Pipe flow velocity =      5.25(Ft/s)
Travel time through pipe =    2.81 min.
Time of concentration (TC) =    13.24 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      307.000 to Point/Station      304.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     15.900(Ac.)
Runoff from this stream =     37.095(CFS)
Time of concentration =   13.24 min.
Rainfall intensity =     2.348(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      308.000 to Point/Station      309.000
```

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 360.000(Ft.)
Top (of initial area) elevation = 1442.700(Ft.)
Bottom (of initial area) elevation = 1433.400(Ft.)
Difference in elevation = 9.300(Ft.)
Slope = 0.02583 s(percent)= 2.58
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.068 min.
Rainfall intensity = 3.194(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.873
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.850
Decimal fraction soil group D = 0.150
RI index for soil(AMC 2) = 69.90
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 20.346(CFS)
Total initial stream area = 7.300(Ac.)
Pervious area fraction = 0.200

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station 309.000 to Point/Station 304.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1429.300(Ft.)
Downstream point/station elevation = 1424.600(Ft.)
Pipe length = 100.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 20.346(CFS)
Nearest computed pipe diameter = 18.00(In.)
Calculated individual pipe flow = 20.346(CFS)
Normal flow depth in pipe = 13.27(In.)
Flow top width inside pipe = 15.85(In.)
Critical depth could not be calculated.
Pipe flow velocity = 14.57(Ft/s)
Travel time through pipe = 0.11 min.
Time of concentration (TC) = 7.18 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station 309.000 to Point/Station 304.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 3
Stream flow area = 7.300(Ac.)
Runoff from this stream = 20.346(CFS)
Time of concentration = 7.18 min.
Rainfall intensity = 3.169(In/Hr)
Summary of stream data:

| Stream No. | Flow rate (CFS) | TC (min) | Rainfall Intensity (In/Hr) |
|---|---|---|---|
| 1 | 31.447 | 12.22 | 2.442 |
| 2 | 37.095 | 13.24 | 2.348 |
| 3 | 20.346 | 7.18 | 3.169 |

Largest stream flow has longer time of concentration
Qp = 37.095 + sum of
Qb Ia/Ib
31.447 * 0.962 = 30.240
Qb Ia/Ib
20.346 * 0.741 = 15.077
Qp = 82.413

Total of 3 streams to confluence:
Flow rates before confluence point:
31.447 37.095 20.346
Area of streams before confluence:
13.600 15.900 7.300
Results of confluence:
Total flow rate = 82.413(CFS)
Time of concentration = 13.241 min.

```
Effective stream area after confluence =     36.800(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1424.600(Ft.)
Downstream point/station elevation =  1411.500(Ft.)
Pipe length  =   470.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    82.413(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    82.413(CFS)
Normal flow depth in pipe =   25.27(In.)
Flow top width inside pipe =   27.96(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.89(Ft/s)
Travel time through pipe =    0.46 min.
Time of concentration (TC) =    13.70 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     36.800(Ac.)
Runoff from this stream =     82.413(CFS)
Time of concentration =   13.70 min.
Rainfall intensity =     2.309(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      106.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________________
Rainfall intensity =      1.929(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.820
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.300
Decimal fraction soil group D = 0.700
RI index for soil(AMC 2)  =  86.10
Pervious area fraction =  0.890; Impervious fraction =  0.110
User specified values are as follows:
TC =  19.79 min.  Rain intensity =       1.93(In/Hr)
Total area =        27.10(Ac.)  Total runoff =     43.95(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      404.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     27.100(Ac.)
Runoff from this stream =     43.955(CFS)
Time of concentration =   19.79 min.
Rainfall intensity =     1.929(In/Hr)
Summary of stream data:

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


1       82.413     13.70                2.309
2       43.955     19.79                1.929
Largest stream flow has longer or shorter time of concentration
Qp =     82.413 + sum of
          Qa          Tb/Ta
          43.955 *    0.692 =     30.437
Qp =    112.850

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

```
      82.413      43.955
Area of streams before confluence:
       36.800       27.100
Results of confluence:
Total flow rate =    112.850(CFS)
Time of concentration =    13.705 min.
Effective stream area after confluence =     63.900(Ac.)
End of computations, total study area =           63.90 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.446
Area averaged RI index number =  77.3
```

## RATIONAL METHOD HYDROLOGY MAPS

## LEGEND

- WATERSHED BOUNDARY
- WATER COURSE
- FLOW DIRECTION
- ### / XXXX.X — NODE ELEVATION
- X–X / XXX.X — ACREAGE – ACRES, FLOW LENGTH – FEET

HEAT ST

ERS RD

WHEAT STREET

BYERS ROAD

KUFFEL ROAD

ETHANAC ROAD

100 / 1480

103 / 1480

104 / 1470

200 / 1476.5

1480

1460

401 / 1458.2
$Q_{10}$=0.8 CFS
$Q_{100}$=1.1 CFS

400 / 1462

101 / 1456.5
*1440.0 INV
$Q_{10}$=5.9 CFS
$Q_{100}$=8.8 CFS

0.5 / 230'

301 / 1450.8
$Q_{10}$=3.4 CFS
$Q_{100}$=4.9 CFS

302 / 1445.3
$Q_{10}$=12.6 CFS
$Q_{100}$=18.3 CFS

303 / 1433.9
*1429.5 INV
$Q_{10}$=21.8 CFS
$Q_{100}$=31.4 CFS

1.2 / 1290'

402 / 1434.5
*1428.5 INV
$Q_{10}$=2.2 CFS
$Q_{100}$=3.2 CFS

5.3 / 1000'

2.1 / 507'

5.8 / 414'

5.7 / 599'

300 / 1453.1

6.3 / 707'

8.6 / 701'

105 / 1450.9
*1440 INV
$Q_{10}$=17.2 CFS
$Q_{100}$=25.5 CFS

AREA 40.05 ACRES

308 / 1442.7

7.3 / 360

309 / 1433.4
*1429.3 INV
$Q_{10}$=14.0 CFS
$Q_{100}$=20.3 CFS

0.5 / 674

403 / 1430.3

304 / --
*1424.6 INV
$Q_{10}$=56.7 CFS
$Q_{100}$=82.4 CFS

0.4 / 520

3.8 / 886'

102 / --
*1428.0 INV
$Q_{10}$=22.2 CF
$Q_{100}$=33.1 CFS

6.0 / 414'

6.1 / 494'

305 / 1439.4
$Q_{10}$=6.1 CFS
$Q_{100}$=8.9 CFS

306 / 1435.0
$Q_{10}$=15.8 CFS
$Q_{100}$=22.9 CFS

307 / 1429.1
*1426.5 INV
$Q_{10}$=25.7 CFS
$Q_{100}$=37.1 CFS

404 / 1425.3
*1412.0 INV
$Q_{10}$=1.4 CFS
$Q_{100}$=2.0 CFS

PROPOSED 54" SD LINE (LINE A14–A) @ S=0.003

3.1 / 870

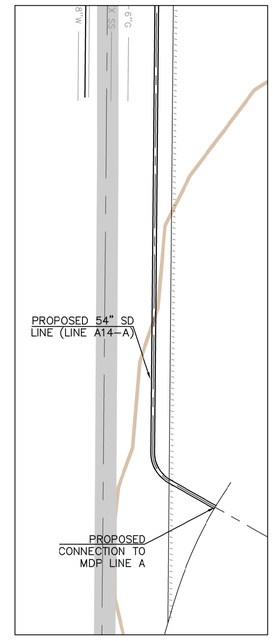
201 / 1440.4
$Q_{10}$=3.8 CFS
$Q_{100}$=5.7 CFS

1.2 / 1290'

202 / 1425.0
*1412.0 INV
$Q_{10}$=5.2 CFS
$Q_{100}$=7.6 CFS

106 / --
*1411.5 INV
$Q_{10}$=77.4 CFS
$Q_{100}$=112.9 CFS

SD
SS
W
X




**LINE A14–A CONNECTION TO LINE A**

1"=100"

PRELIMINARY

1" = 100'
100 50 0 100 200 300

CITY OF MENIFEE
CAPSTONE MENIFEE

RATIONAL METHOD HYDROLOGY
PROPOSED CONDITION HYDROLOGY MAP

| | | | |
|---|---|---|---|
| SCALE: 1"=100' | ALBERT A. WEBB ASSOCIATES | ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE, CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256 | W.O. 2021-0035 |
| DATE: 10/14/2021 | | | SHEET 1 |
| DESIGNED: ABE | | | OF 1 SHEETS |
| CHECKED: SKK | | | DWG. NO. |
| PLN CK REF: | | | |
| F.B. | | | |

H:\2021\21-0035\DRAINAGE\HYDROMG FOLDER\21-0035-C-HYD-PRE.DWG 7/11/2022 5:01:48 PM

# APPENDIX B – HYDRAULIC ANALYSIS

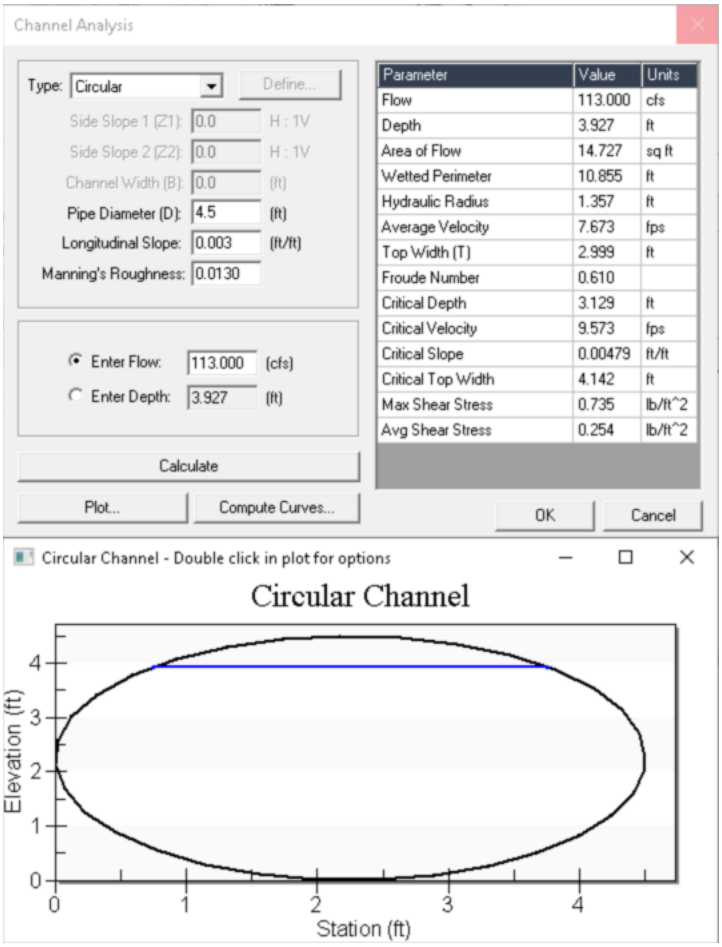



Figure 1. Normal depth hydraulic calculation for 54” pipe with a slope of 0.003.

# APPENDIX C – UNIT HYDROGRAPH ANALYSIS

## EXISTING CONDITION UNIT HYDROGRAPHS (2-YEAR, 24-HOUR STORM)

U n i t  H y d r o g r a p h  A n a l y s i s


Study date 10/18/22 File: EXUH242.out

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
---

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

---
English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

---
21-0035 - Capstone Ethanac
Onsite Unit Hydrograph Analysis
Existing Condition, 2-Year 24-Hour
FN: EXUH242.out - ABE
---
Drainage Area = 36.80(Ac.) = 0.057 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 36.80(Ac.) = 0.057 Sq. Mi.
Length along longest watercourse = 1320.00(Ft.)
Length along longest watercourse measured to centroid = 640.00(Ft.)
Length along longest watercourse = 0.250 Mi.
Length along longest watercourse measured to centroid = 0.121 Mi.
Difference in elevation = 25.00(Ft.)
Slope along watercourse = 100.0000 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.079 Hr.
Lag time = 4.77 Min.
25% of lag time = 1.19 Min.
40% of lag time = 1.91 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] |
|---|---|---|
| 36.80 | 1.90 | 69.92 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 36.80 | 4.75 | 174.80 |

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 1.900(In)
Area Averaged 100-Year Rainfall = 4.750(In)

Point rain (area averaged) = 1.900(In)
Areal adjustment factor = 99.99 %

Adjusted average point rain = 1.900(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 28.200 | 86.00 | 0.000 |
| 8.600 | 89.00 | 0.000 |

Total Area Entered = 36.80(Ac.)

| RI AMC2 | RI AMC-2 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 86.0 | 86.0 | 0.176 | 0.000 | 0.176 | 0.766 | 0.135 |
| 89.0 | 89.0 | 0.141 | 0.000 | 0.141 | 0.234 | 0.033 |

Sum (F) = 0.168

Area averaged mean soil loss (F) (In/Hr) = 0.168
Minimum soil loss rate ((In/Hr)) = 0.084
(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 | 104.839 | 20.680 | 7.670 |
| 2 | 0.167 | 209.677 | 48.689 | 18.058 |
| 3 | 0.250 | 314.516 | 14.948 | 5.544 |
| 4 | 0.333 | 419.355 | 6.810 | 2.526 |
| 5 | 0.417 | 524.193 | 3.794 | 1.407 |
| 6 | 0.500 | 629.032 | 2.428 | 0.901 |
| 7 | 0.583 | 733.871 | 1.456 | 0.540 |
| 8 | 0.667 | 838.709 | 1.194 | 0.443 |
| | | Sum = 100.000 | Sum= | 37.088 |

---

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) Max | Low | Effective (In/Hr) |
|---|---|---|---|---|---|
| 1 | 0.08 | 0.07 | 0.015 | ( 0.297) | 0.014 | 0.002 |
| 2 | 0.17 | 0.07 | 0.015 | ( 0.296) | 0.014 | 0.002 |
| 3 | 0.25 | 0.07 | 0.015 | ( 0.295) | 0.014 | 0.002 |
| 4 | 0.33 | 0.10 | 0.023 | ( 0.294) | 0.021 | 0.002 |
| 5 | 0.42 | 0.10 | 0.023 | ( 0.293) | 0.021 | 0.002 |
| 6 | 0.50 | 0.10 | 0.023 | ( 0.291) | 0.021 | 0.002 |
| 7 | 0.58 | 0.10 | 0.023 | ( 0.290) | 0.021 | 0.002 |
| 8 | 0.67 | 0.10 | 0.023 | ( 0.289) | 0.021 | 0.002 |
| 9 | 0.75 | 0.10 | 0.023 | ( 0.288) | 0.021 | 0.002 |
| 10 | 0.83 | 0.13 | 0.030 | ( 0.287) | 0.027 | 0.003 |
| 11 | 0.92 | 0.13 | 0.030 | ( 0.286) | 0.027 | 0.003 |
| 12 | 1.00 | 0.13 | 0.030 | ( 0.285) | 0.027 | 0.003 |
| 13 | 1.08 | 0.10 | 0.023 | ( 0.283) | 0.021 | 0.002 |
| 14 | 1.17 | 0.10 | 0.023 | ( 0.282) | 0.021 | 0.002 |
| 15 | 1.25 | 0.10 | 0.023 | ( 0.281) | 0.021 | 0.002 |
| 16 | 1.33 | 0.10 | 0.023 | ( 0.280) | 0.021 | 0.002 |
| 17 | 1.42 | 0.10 | 0.023 | ( 0.279) | 0.021 | 0.002 |
| 18 | 1.50 | 0.10 | 0.023 | ( 0.278) | 0.021 | 0.002 |
| 19 | 1.58 | 0.10 | 0.023 | ( 0.277) | 0.021 | 0.002 |
| 20 | 1.67 | 0.10 | 0.023 | ( 0.276) | 0.021 | 0.002 |
| 21 | 1.75 | 0.10 | 0.023 | ( 0.275) | 0.021 | 0.002 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 22 | 1.83 | 0.13 | 0.030 | ( 0.273) | 0.027 | 0.003 |
| 23 | 1.92 | 0.13 | 0.030 | ( 0.272) | 0.027 | 0.003 |
| 24 | 2.00 | 0.13 | 0.030 | ( 0.271) | 0.027 | 0.003 |
| 25 | 2.08 | 0.13 | 0.030 | ( 0.270) | 0.027 | 0.003 |
| 26 | 2.17 | 0.13 | 0.030 | ( 0.269) | 0.027 | 0.003 |
| 27 | 2.25 | 0.13 | 0.030 | ( 0.268) | 0.027 | 0.003 |
| 28 | 2.33 | 0.13 | 0.030 | ( 0.267) | 0.027 | 0.003 |
| 29 | 2.42 | 0.13 | 0.030 | ( 0.266) | 0.027 | 0.003 |
| 30 | 2.50 | 0.13 | 0.030 | ( 0.265) | 0.027 | 0.003 |
| 31 | 2.58 | 0.17 | 0.038 | ( 0.264) | 0.034 | 0.004 |
| 32 | 2.67 | 0.17 | 0.038 | ( 0.263) | 0.034 | 0.004 |
| 33 | 2.75 | 0.17 | 0.038 | ( 0.261) | 0.034 | 0.004 |
| 34 | 2.83 | 0.17 | 0.038 | ( 0.260) | 0.034 | 0.004 |
| 35 | 2.92 | 0.17 | 0.038 | ( 0.259) | 0.034 | 0.004 |
| 36 | 3.00 | 0.17 | 0.038 | ( 0.258) | 0.034 | 0.004 |
| 37 | 3.08 | 0.17 | 0.038 | ( 0.257) | 0.034 | 0.004 |
| 38 | 3.17 | 0.17 | 0.038 | ( 0.256) | 0.034 | 0.004 |
| 39 | 3.25 | 0.17 | 0.038 | ( 0.255) | 0.034 | 0.004 |
| 40 | 3.33 | 0.17 | 0.038 | ( 0.254) | 0.034 | 0.004 |
| 41 | 3.42 | 0.17 | 0.038 | ( 0.253) | 0.034 | 0.004 |
| 42 | 3.50 | 0.17 | 0.038 | ( 0.252) | 0.034 | 0.004 |
| 43 | 3.58 | 0.17 | 0.038 | ( 0.251) | 0.034 | 0.004 |
| 44 | 3.67 | 0.17 | 0.038 | ( 0.250) | 0.034 | 0.004 |
| 45 | 3.75 | 0.17 | 0.038 | ( 0.249) | 0.034 | 0.004 |
| 46 | 3.83 | 0.20 | 0.046 | ( 0.248) | 0.041 | 0.005 |
| 47 | 3.92 | 0.20 | 0.046 | ( 0.247) | 0.041 | 0.005 |
| 48 | 4.00 | 0.20 | 0.046 | ( 0.246) | 0.041 | 0.005 |
| 49 | 4.08 | 0.20 | 0.046 | ( 0.245) | 0.041 | 0.005 |
| 50 | 4.17 | 0.20 | 0.046 | ( 0.243) | 0.041 | 0.005 |
| 51 | 4.25 | 0.20 | 0.046 | ( 0.242) | 0.041 | 0.005 |
| 52 | 4.33 | 0.23 | 0.053 | ( 0.241) | 0.048 | 0.005 |
| 53 | 4.42 | 0.23 | 0.053 | ( 0.240) | 0.048 | 0.005 |
| 54 | 4.50 | 0.23 | 0.053 | ( 0.239) | 0.048 | 0.005 |
| 55 | 4.58 | 0.23 | 0.053 | ( 0.238) | 0.048 | 0.005 |
| 56 | 4.67 | 0.23 | 0.053 | ( 0.237) | 0.048 | 0.005 |
| 57 | 4.75 | 0.23 | 0.053 | ( 0.236) | 0.048 | 0.005 |
| 58 | 4.83 | 0.27 | 0.061 | ( 0.235) | 0.055 | 0.006 |
| 59 | 4.92 | 0.27 | 0.061 | ( 0.234) | 0.055 | 0.006 |
| 60 | 5.00 | 0.27 | 0.061 | ( 0.233) | 0.055 | 0.006 |
| 61 | 5.08 | 0.20 | 0.046 | ( 0.232) | 0.041 | 0.005 |
| 62 | 5.17 | 0.20 | 0.046 | ( 0.231) | 0.041 | 0.005 |
| 63 | 5.25 | 0.20 | 0.046 | ( 0.230) | 0.041 | 0.005 |
| 64 | 5.33 | 0.23 | 0.053 | ( 0.229) | 0.048 | 0.005 |
| 65 | 5.42 | 0.23 | 0.053 | ( 0.228) | 0.048 | 0.005 |
| 66 | 5.50 | 0.23 | 0.053 | ( 0.227) | 0.048 | 0.005 |
| 67 | 5.58 | 0.27 | 0.061 | ( 0.226) | 0.055 | 0.006 |
| 68 | 5.67 | 0.27 | 0.061 | ( 0.225) | 0.055 | 0.006 |
| 69 | 5.75 | 0.27 | 0.061 | ( 0.224) | 0.055 | 0.006 |
| 70 | 5.83 | 0.27 | 0.061 | ( 0.223) | 0.055 | 0.006 |
| 71 | 5.92 | 0.27 | 0.061 | ( 0.222) | 0.055 | 0.006 |
| 72 | 6.00 | 0.27 | 0.061 | ( 0.221) | 0.055 | 0.006 |
| 73 | 6.08 | 0.30 | 0.068 | ( 0.220) | 0.062 | 0.007 |
| 74 | 6.17 | 0.30 | 0.068 | ( 0.219) | 0.062 | 0.007 |
| 75 | 6.25 | 0.30 | 0.068 | ( 0.218) | 0.062 | 0.007 |
| 76 | 6.33 | 0.30 | 0.068 | ( 0.217) | 0.062 | 0.007 |
| 77 | 6.42 | 0.30 | 0.068 | ( 0.216) | 0.062 | 0.007 |
| 78 | 6.50 | 0.30 | 0.068 | ( 0.215) | 0.062 | 0.007 |
| 79 | 6.58 | 0.33 | 0.076 | ( 0.214) | 0.068 | 0.008 |
| 80 | 6.67 | 0.33 | 0.076 | ( 0.213) | 0.068 | 0.008 |
| 81 | 6.75 | 0.33 | 0.076 | ( 0.212) | 0.068 | 0.008 |
| 82 | 6.83 | 0.33 | 0.076 | ( 0.212) | 0.068 | 0.008 |
| 83 | 6.92 | 0.33 | 0.076 | ( 0.211) | 0.068 | 0.008 |
| 84 | 7.00 | 0.33 | 0.076 | ( 0.210) | 0.068 | 0.008 |
| 85 | 7.08 | 0.33 | 0.076 | ( 0.209) | 0.068 | 0.008 |
| 86 | 7.17 | 0.33 | 0.076 | ( 0.208) | 0.068 | 0.008 |
| 87 | 7.25 | 0.33 | 0.076 | ( 0.207) | 0.068 | 0.008 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 88 | 7.33 | 0.37 | 0.084 | ( 0.206) | 0.075 | 0.008 |
| 89 | 7.42 | 0.37 | 0.084 | ( 0.205) | 0.075 | 0.008 |
| 90 | 7.50 | 0.37 | 0.084 | ( 0.204) | 0.075 | 0.008 |
| 91 | 7.58 | 0.40 | 0.091 | ( 0.203) | 0.082 | 0.009 |
| 92 | 7.67 | 0.40 | 0.091 | ( 0.202) | 0.082 | 0.009 |
| 93 | 7.75 | 0.40 | 0.091 | ( 0.201) | 0.082 | 0.009 |
| 94 | 7.83 | 0.43 | 0.099 | ( 0.200) | 0.089 | 0.010 |
| 95 | 7.92 | 0.43 | 0.099 | ( 0.199) | 0.089 | 0.010 |
| 96 | 8.00 | 0.43 | 0.099 | ( 0.198) | 0.089 | 0.010 |
| 97 | 8.08 | 0.50 | 0.114 | ( 0.197) | 0.103 | 0.011 |
| 98 | 8.17 | 0.50 | 0.114 | ( 0.197) | 0.103 | 0.011 |
| 99 | 8.25 | 0.50 | 0.114 | ( 0.196) | 0.103 | 0.011 |
| 100 | 8.33 | 0.50 | 0.114 | ( 0.195) | 0.103 | 0.011 |
| 101 | 8.42 | 0.50 | 0.114 | ( 0.194) | 0.103 | 0.011 |
| 102 | 8.50 | 0.50 | 0.114 | ( 0.193) | 0.103 | 0.011 |
| 103 | 8.58 | 0.53 | 0.122 | ( 0.192) | 0.109 | 0.012 |
| 104 | 8.67 | 0.53 | 0.122 | ( 0.191) | 0.109 | 0.012 |
| 105 | 8.75 | 0.53 | 0.122 | ( 0.190) | 0.109 | 0.012 |
| 106 | 8.83 | 0.57 | 0.129 | ( 0.189) | 0.116 | 0.013 |
| 107 | 8.92 | 0.57 | 0.129 | ( 0.188) | 0.116 | 0.013 |
| 108 | 9.00 | 0.57 | 0.129 | ( 0.187) | 0.116 | 0.013 |
| 109 | 9.08 | 0.63 | 0.144 | ( 0.187) | 0.130 | 0.014 |
| 110 | 9.17 | 0.63 | 0.144 | ( 0.186) | 0.130 | 0.014 |
| 111 | 9.25 | 0.63 | 0.144 | ( 0.185) | 0.130 | 0.014 |
| 112 | 9.33 | 0.67 | 0.152 | ( 0.184) | 0.137 | 0.015 |
| 113 | 9.42 | 0.67 | 0.152 | ( 0.183) | 0.137 | 0.015 |
| 114 | 9.50 | 0.67 | 0.152 | ( 0.182) | 0.137 | 0.015 |
| 115 | 9.58 | 0.70 | 0.160 | ( 0.181) | 0.144 | 0.016 |
| 116 | 9.67 | 0.70 | 0.160 | ( 0.180) | 0.144 | 0.016 |
| 117 | 9.75 | 0.70 | 0.160 | ( 0.180) | 0.144 | 0.016 |
| 118 | 9.83 | 0.73 | 0.167 | ( 0.179) | 0.150 | 0.017 |
| 119 | 9.92 | 0.73 | 0.167 | ( 0.178) | 0.150 | 0.017 |
| 120 | 10.00 | 0.73 | 0.167 | ( 0.177) | 0.150 | 0.017 |
| 121 | 10.08 | 0.50 | 0.114 | ( 0.176) | 0.103 | 0.011 |
| 122 | 10.17 | 0.50 | 0.114 | ( 0.175) | 0.103 | 0.011 |
| 123 | 10.25 | 0.50 | 0.114 | ( 0.174) | 0.103 | 0.011 |
| 124 | 10.33 | 0.50 | 0.114 | ( 0.174) | 0.103 | 0.011 |
| 125 | 10.42 | 0.50 | 0.114 | ( 0.173) | 0.103 | 0.011 |
| 126 | 10.50 | 0.50 | 0.114 | ( 0.172) | 0.103 | 0.011 |
| 127 | 10.58 | 0.67 | 0.152 | ( 0.171) | 0.137 | 0.015 |
| 128 | 10.67 | 0.67 | 0.152 | ( 0.170) | 0.137 | 0.015 |
| 129 | 10.75 | 0.67 | 0.152 | ( 0.169) | 0.137 | 0.015 |
| 130 | 10.83 | 0.67 | 0.152 | ( 0.169) | 0.137 | 0.015 |
| 131 | 10.92 | 0.67 | 0.152 | ( 0.168) | 0.137 | 0.015 |
| 132 | 11.00 | 0.67 | 0.152 | ( 0.167) | 0.137 | 0.015 |
| 133 | 11.08 | 0.63 | 0.144 | ( 0.166) | 0.130 | 0.014 |
| 134 | 11.17 | 0.63 | 0.144 | ( 0.165) | 0.130 | 0.014 |
| 135 | 11.25 | 0.63 | 0.144 | ( 0.164) | 0.130 | 0.014 |
| 136 | 11.33 | 0.63 | 0.144 | ( 0.164) | 0.130 | 0.014 |
| 137 | 11.42 | 0.63 | 0.144 | ( 0.163) | 0.130 | 0.014 |
| 138 | 11.50 | 0.63 | 0.144 | ( 0.162) | 0.130 | 0.014 |
| 139 | 11.58 | 0.57 | 0.129 | ( 0.161) | 0.116 | 0.013 |
| 140 | 11.67 | 0.57 | 0.129 | ( 0.160) | 0.116 | 0.013 |
| 141 | 11.75 | 0.57 | 0.129 | ( 0.160) | 0.116 | 0.013 |
| 142 | 11.83 | 0.60 | 0.137 | ( 0.159) | 0.123 | 0.014 |
| 143 | 11.92 | 0.60 | 0.137 | ( 0.158) | 0.123 | 0.014 |
| 144 | 12.00 | 0.60 | 0.137 | ( 0.157) | 0.123 | 0.014 |
| 145 | 12.08 | 0.83 | 0.190 | 0.156 | ( 0.171) | 0.034 |
| 146 | 12.17 | 0.83 | 0.190 | 0.156 | ( 0.171) | 0.034 |
| 147 | 12.25 | 0.83 | 0.190 | 0.155 | ( 0.171) | 0.035 |
| 148 | 12.33 | 0.87 | 0.198 | 0.154 | ( 0.178) | 0.043 |
| 149 | 12.42 | 0.87 | 0.198 | 0.153 | ( 0.178) | 0.044 |
| 150 | 12.50 | 0.87 | 0.198 | 0.153 | ( 0.178) | 0.045 |
| 151 | 12.58 | 0.93 | 0.213 | 0.152 | ( 0.192) | 0.061 |
| 152 | 12.67 | 0.93 | 0.213 | 0.151 | ( 0.192) | 0.062 |
| 153 | 12.75 | 0.93 | 0.213 | 0.150 | ( 0.192) | 0.063 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 154 | 12.83 | 0.97 | 0.220 | 0.150 | ( 0.198) | 0.071 |
| 155 | 12.92 | 0.97 | 0.220 | 0.149 | ( 0.198) | 0.072 |
| 156 | 13.00 | 0.97 | 0.220 | 0.148 | ( 0.198) | 0.072 |
| 157 | 13.08 | 1.13 | 0.258 | 0.147 | ( 0.233) | 0.111 |
| 158 | 13.17 | 1.13 | 0.258 | 0.147 | ( 0.233) | 0.112 |
| 159 | 13.25 | 1.13 | 0.258 | 0.146 | ( 0.233) | 0.113 |
| 160 | 13.33 | 1.13 | 0.258 | 0.145 | ( 0.233) | 0.113 |
| 161 | 13.42 | 1.13 | 0.258 | 0.144 | ( 0.233) | 0.114 |
| 162 | 13.50 | 1.13 | 0.258 | 0.144 | ( 0.233) | 0.115 |
| 163 | 13.58 | 0.77 | 0.175 | 0.143 | ( 0.157) | 0.032 |
| 164 | 13.67 | 0.77 | 0.175 | 0.142 | ( 0.157) | 0.033 |
| 165 | 13.75 | 0.77 | 0.175 | 0.141 | ( 0.157) | 0.033 |
| 166 | 13.83 | 0.77 | 0.175 | 0.141 | ( 0.157) | 0.034 |
| 167 | 13.92 | 0.77 | 0.175 | 0.140 | ( 0.157) | 0.035 |
| 168 | 14.00 | 0.77 | 0.175 | 0.139 | ( 0.157) | 0.036 |
| 169 | 14.08 | 0.90 | 0.205 | 0.139 | ( 0.185) | 0.067 |
| 170 | 14.17 | 0.90 | 0.205 | 0.138 | ( 0.185) | 0.067 |
| 171 | 14.25 | 0.90 | 0.205 | 0.137 | ( 0.185) | 0.068 |
| 172 | 14.33 | 0.87 | 0.198 | 0.136 | ( 0.178) | 0.061 |
| 173 | 14.42 | 0.87 | 0.198 | 0.136 | ( 0.178) | 0.062 |
| 174 | 14.50 | 0.87 | 0.198 | 0.135 | ( 0.178) | 0.063 |
| 175 | 14.58 | 0.87 | 0.198 | 0.134 | ( 0.178) | 0.063 |
| 176 | 14.67 | 0.87 | 0.198 | 0.134 | ( 0.178) | 0.064 |
| 177 | 14.75 | 0.87 | 0.198 | 0.133 | ( 0.178) | 0.065 |
| 178 | 14.83 | 0.83 | 0.190 | 0.132 | ( 0.171) | 0.058 |
| 179 | 14.92 | 0.83 | 0.190 | 0.132 | ( 0.171) | 0.058 |
| 180 | 15.00 | 0.83 | 0.190 | 0.131 | ( 0.171) | 0.059 |
| 181 | 15.08 | 0.80 | 0.182 | 0.130 | ( 0.164) | 0.052 |
| 182 | 15.17 | 0.80 | 0.182 | 0.130 | ( 0.164) | 0.053 |
| 183 | 15.25 | 0.80 | 0.182 | 0.129 | ( 0.164) | 0.053 |
| 184 | 15.33 | 0.77 | 0.175 | 0.128 | ( 0.157) | 0.047 |
| 185 | 15.42 | 0.77 | 0.175 | 0.128 | ( 0.157) | 0.047 |
| 186 | 15.50 | 0.77 | 0.175 | 0.127 | ( 0.157) | 0.048 |
| 187 | 15.58 | 0.63 | 0.144 | 0.126 | ( 0.130) | 0.018 |
| 188 | 15.67 | 0.63 | 0.144 | 0.126 | ( 0.130) | 0.019 |
| 189 | 15.75 | 0.63 | 0.144 | 0.125 | ( 0.130) | 0.019 |
| 190 | 15.83 | 0.63 | 0.144 | 0.124 | ( 0.130) | 0.020 |
| 191 | 15.92 | 0.63 | 0.144 | 0.124 | ( 0.130) | 0.021 |
| 192 | 16.00 | 0.63 | 0.144 | 0.123 | ( 0.130) | 0.021 |
| 193 | 16.08 | 0.13 | 0.030 | ( 0.122) | 0.027 | 0.003 |
| 194 | 16.17 | 0.13 | 0.030 | ( 0.122) | 0.027 | 0.003 |
| 195 | 16.25 | 0.13 | 0.030 | ( 0.121) | 0.027 | 0.003 |
| 196 | 16.33 | 0.13 | 0.030 | ( 0.121) | 0.027 | 0.003 |
| 197 | 16.42 | 0.13 | 0.030 | ( 0.120) | 0.027 | 0.003 |
| 198 | 16.50 | 0.13 | 0.030 | ( 0.119) | 0.027 | 0.003 |
| 199 | 16.58 | 0.10 | 0.023 | ( 0.119) | 0.021 | 0.002 |
| 200 | 16.67 | 0.10 | 0.023 | ( 0.118) | 0.021 | 0.002 |
| 201 | 16.75 | 0.10 | 0.023 | ( 0.118) | 0.021 | 0.002 |
| 202 | 16.83 | 0.10 | 0.023 | ( 0.117) | 0.021 | 0.002 |
| 203 | 16.92 | 0.10 | 0.023 | ( 0.116) | 0.021 | 0.002 |
| 204 | 17.00 | 0.10 | 0.023 | ( 0.116) | 0.021 | 0.002 |
| 205 | 17.08 | 0.17 | 0.038 | ( 0.115) | 0.034 | 0.004 |
| 206 | 17.17 | 0.17 | 0.038 | ( 0.115) | 0.034 | 0.004 |
| 207 | 17.25 | 0.17 | 0.038 | ( 0.114) | 0.034 | 0.004 |
| 208 | 17.33 | 0.17 | 0.038 | ( 0.113) | 0.034 | 0.004 |
| 209 | 17.42 | 0.17 | 0.038 | ( 0.113) | 0.034 | 0.004 |
| 210 | 17.50 | 0.17 | 0.038 | ( 0.112) | 0.034 | 0.004 |
| 211 | 17.58 | 0.17 | 0.038 | ( 0.112) | 0.034 | 0.004 |
| 212 | 17.67 | 0.17 | 0.038 | ( 0.111) | 0.034 | 0.004 |
| 213 | 17.75 | 0.17 | 0.038 | ( 0.111) | 0.034 | 0.004 |
| 214 | 17.83 | 0.13 | 0.030 | ( 0.110) | 0.027 | 0.003 |
| 215 | 17.92 | 0.13 | 0.030 | ( 0.110) | 0.027 | 0.003 |
| 216 | 18.00 | 0.13 | 0.030 | ( 0.109) | 0.027 | 0.003 |
| 217 | 18.08 | 0.13 | 0.030 | ( 0.108) | 0.027 | 0.003 |
| 218 | 18.17 | 0.13 | 0.030 | ( 0.108) | 0.027 | 0.003 |
| 219 | 18.25 | 0.13 | 0.030 | ( 0.107) | 0.027 | 0.003 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 220 | 18.33 | 0.13 | 0.030 | ( 0.107) | 0.027 | 0.003 |
| 221 | 18.42 | 0.13 | 0.030 | ( 0.106) | 0.027 | 0.003 |
| 222 | 18.50 | 0.13 | 0.030 | ( 0.106) | 0.027 | 0.003 |
| 223 | 18.58 | 0.10 | 0.023 | ( 0.105) | 0.021 | 0.002 |
| 224 | 18.67 | 0.10 | 0.023 | ( 0.105) | 0.021 | 0.002 |
| 225 | 18.75 | 0.10 | 0.023 | ( 0.104) | 0.021 | 0.002 |
| 226 | 18.83 | 0.07 | 0.015 | ( 0.104) | 0.014 | 0.002 |
| 227 | 18.92 | 0.07 | 0.015 | ( 0.103) | 0.014 | 0.002 |
| 228 | 19.00 | 0.07 | 0.015 | ( 0.103) | 0.014 | 0.002 |
| 229 | 19.08 | 0.10 | 0.023 | ( 0.102) | 0.021 | 0.002 |
| 230 | 19.17 | 0.10 | 0.023 | ( 0.102) | 0.021 | 0.002 |
| 231 | 19.25 | 0.10 | 0.023 | ( 0.101) | 0.021 | 0.002 |
| 232 | 19.33 | 0.13 | 0.030 | ( 0.101) | 0.027 | 0.003 |
| 233 | 19.42 | 0.13 | 0.030 | ( 0.100) | 0.027 | 0.003 |
| 234 | 19.50 | 0.13 | 0.030 | ( 0.100) | 0.027 | 0.003 |
| 235 | 19.58 | 0.10 | 0.023 | ( 0.100) | 0.021 | 0.002 |
| 236 | 19.67 | 0.10 | 0.023 | ( 0.099) | 0.021 | 0.002 |
| 237 | 19.75 | 0.10 | 0.023 | ( 0.099) | 0.021 | 0.002 |
| 238 | 19.83 | 0.07 | 0.015 | ( 0.098) | 0.014 | 0.002 |
| 239 | 19.92 | 0.07 | 0.015 | ( 0.098) | 0.014 | 0.002 |
| 240 | 20.00 | 0.07 | 0.015 | ( 0.097) | 0.014 | 0.002 |
| 241 | 20.08 | 0.10 | 0.023 | ( 0.097) | 0.021 | 0.002 |
| 242 | 20.17 | 0.10 | 0.023 | ( 0.096) | 0.021 | 0.002 |
| 243 | 20.25 | 0.10 | 0.023 | ( 0.096) | 0.021 | 0.002 |
| 244 | 20.33 | 0.10 | 0.023 | ( 0.096) | 0.021 | 0.002 |
| 245 | 20.42 | 0.10 | 0.023 | ( 0.095) | 0.021 | 0.002 |
| 246 | 20.50 | 0.10 | 0.023 | ( 0.095) | 0.021 | 0.002 |
| 247 | 20.58 | 0.10 | 0.023 | ( 0.094) | 0.021 | 0.002 |
| 248 | 20.67 | 0.10 | 0.023 | ( 0.094) | 0.021 | 0.002 |
| 249 | 20.75 | 0.10 | 0.023 | ( 0.094) | 0.021 | 0.002 |
| 250 | 20.83 | 0.07 | 0.015 | ( 0.093) | 0.014 | 0.002 |
| 251 | 20.92 | 0.07 | 0.015 | ( 0.093) | 0.014 | 0.002 |
| 252 | 21.00 | 0.07 | 0.015 | ( 0.093) | 0.014 | 0.002 |
| 253 | 21.08 | 0.10 | 0.023 | ( 0.092) | 0.021 | 0.002 |
| 254 | 21.17 | 0.10 | 0.023 | ( 0.092) | 0.021 | 0.002 |
| 255 | 21.25 | 0.10 | 0.023 | ( 0.091) | 0.021 | 0.002 |
| 256 | 21.33 | 0.07 | 0.015 | ( 0.091) | 0.014 | 0.002 |
| 257 | 21.42 | 0.07 | 0.015 | ( 0.091) | 0.014 | 0.002 |
| 258 | 21.50 | 0.07 | 0.015 | ( 0.090) | 0.014 | 0.002 |
| 259 | 21.58 | 0.10 | 0.023 | ( 0.090) | 0.021 | 0.002 |
| 260 | 21.67 | 0.10 | 0.023 | ( 0.090) | 0.021 | 0.002 |
| 261 | 21.75 | 0.10 | 0.023 | ( 0.089) | 0.021 | 0.002 |
| 262 | 21.83 | 0.07 | 0.015 | ( 0.089) | 0.014 | 0.002 |
| 263 | 21.92 | 0.07 | 0.015 | ( 0.089) | 0.014 | 0.002 |
| 264 | 22.00 | 0.07 | 0.015 | ( 0.088) | 0.014 | 0.002 |
| 265 | 22.08 | 0.10 | 0.023 | ( 0.088) | 0.021 | 0.002 |
| 266 | 22.17 | 0.10 | 0.023 | ( 0.088) | 0.021 | 0.002 |
| 267 | 22.25 | 0.10 | 0.023 | ( 0.088) | 0.021 | 0.002 |
| 268 | 22.33 | 0.07 | 0.015 | ( 0.087) | 0.014 | 0.002 |
| 269 | 22.42 | 0.07 | 0.015 | ( 0.087) | 0.014 | 0.002 |
| 270 | 22.50 | 0.07 | 0.015 | ( 0.087) | 0.014 | 0.002 |
| 271 | 22.58 | 0.07 | 0.015 | ( 0.087) | 0.014 | 0.002 |
| 272 | 22.67 | 0.07 | 0.015 | ( 0.086) | 0.014 | 0.002 |
| 273 | 22.75 | 0.07 | 0.015 | ( 0.086) | 0.014 | 0.002 |
| 274 | 22.83 | 0.07 | 0.015 | ( 0.086) | 0.014 | 0.002 |
| 275 | 22.92 | 0.07 | 0.015 | ( 0.086) | 0.014 | 0.002 |
| 276 | 23.00 | 0.07 | 0.015 | ( 0.085) | 0.014 | 0.002 |
| 277 | 23.08 | 0.07 | 0.015 | ( 0.085) | 0.014 | 0.002 |
| 278 | 23.17 | 0.07 | 0.015 | ( 0.085) | 0.014 | 0.002 |
| 279 | 23.25 | 0.07 | 0.015 | ( 0.085) | 0.014 | 0.002 |
| 280 | 23.33 | 0.07 | 0.015 | ( 0.085) | 0.014 | 0.002 |
| 281 | 23.42 | 0.07 | 0.015 | ( 0.085) | 0.014 | 0.002 |
| 282 | 23.50 | 0.07 | 0.015 | ( 0.084) | 0.014 | 0.002 |
| 283 | 23.58 | 0.07 | 0.015 | ( 0.084) | 0.014 | 0.002 |
| 284 | 23.67 | 0.07 | 0.015 | ( 0.084) | 0.014 | 0.002 |
| 285 | 23.75 | 0.07 | 0.015 | ( 0.084) | 0.014 | 0.002 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 286 | 23.83 | 0.07 | 0.015 | ( 0.084) | 0.014 | 0.002 |
| 287 | 23.92 | 0.07 | 0.015 | ( 0.084) | 0.014 | 0.002 |
| 288 | 24.00 | 0.07 | 0.015 | ( 0.084) | 0.014 | 0.002 |

(Loss Rate Not Used)

Sum = 100.0 Sum = 4.0

Flood volume = Effective rainfall 0.34(In)
times area 36.8(Ac.)/[(In)/(Ft.)] = 1.0(Ac.Ft)
Total soil loss = 1.56(In)
Total soil loss = 4.796(Ac.Ft)
Total rainfall = 1.90(In)
Flood volume = 44887.0 Cubic Feet
Total soil loss = 208904.4 Cubic Feet

---

Peak flow rate of this hydrograph = 4.184(CFS)

---

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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 | 0.0003 | 0.04 | Q | | | | |
| 0+15 | 0.0007 | 0.05 | Q | | | | |
| 0+20 | 0.0011 | 0.06 | Q | | | | |
| 0+25 | 0.0016 | 0.07 | Q | | | | |
| 0+30 | 0.0021 | 0.08 | Q | | | | |
| 0+35 | 0.0027 | 0.08 | Q | | | | |
| 0+40 | 0.0033 | 0.08 | Q | | | | |
| 0+45 | 0.0038 | 0.08 | Q | | | | |
| 0+50 | 0.0044 | 0.09 | Q | | | | |
| 0+55 | 0.0052 | 0.10 | Q | | | | |
| 1+ 0 | 0.0059 | 0.11 | Q | | | | |
| 1+ 5 | 0.0066 | 0.10 | Q | | | | |
| 1+10 | 0.0073 | 0.09 | Q | | | | |
| 1+15 | 0.0079 | 0.09 | Q | | | | |
| 1+20 | 0.0085 | 0.09 | Q | | | | |
| 1+25 | 0.0091 | 0.09 | Q | | | | |
| 1+30 | 0.0096 | 0.09 | Q | | | | |
| 1+35 | 0.0102 | 0.08 | Q | | | | |
| 1+40 | 0.0108 | 0.08 | Q | | | | |
| 1+45 | 0.0114 | 0.08 | Q | | | | |
| 1+50 | 0.0120 | 0.09 | Q | | | | |
| 1+55 | 0.0127 | 0.10 | Q | | | | |
| 2+ 0 | 0.0135 | 0.11 | Q | | | | |
| 2+ 5 | 0.0142 | 0.11 | Q | | | | |
| 2+10 | 0.0150 | 0.11 | Q | | | | |
| 2+15 | 0.0158 | 0.11 | Q | | | | |
| 2+20 | 0.0166 | 0.11 | Q | | | | |
| 2+25 | 0.0173 | 0.11 | Q | | | | |
| 2+30 | 0.0181 | 0.11 | Q | | | | |
| 2+35 | 0.0189 | 0.12 | Q | | | | |
| 2+40 | 0.0198 | 0.13 | Q | | | | |
| 2+45 | 0.0208 | 0.14 | Q | | | | |
| 2+50 | 0.0217 | 0.14 | Q | | | | |
| 2+55 | 0.0227 | 0.14 | Q | | | | |
| 3+ 0 | 0.0237 | 0.14 | Q | | | | |
| 3+ 5 | 0.0246 | 0.14 | Q | | | | |
| 3+10 | 0.0256 | 0.14 | Q | | | | |
| 3+15 | 0.0266 | 0.14 | QV | | | | |
| 3+20 | 0.0275 | 0.14 | QV | | | | |
| 3+25 | 0.0285 | 0.14 | QV | | | | |
| 3+30 | 0.0295 | 0.14 | QV | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 3+35 | 0.0305 | 0.14 | QV | \| | \| | \| | \| |
| 3+40 | 0.0314 | 0.14 | QV | \| | \| | \| | \| |
| 3+45 | 0.0324 | 0.14 | QV | \| | \| | \| | \| |
| 3+50 | 0.0334 | 0.15 | QV | \| | \| | \| | \| |
| 3+55 | 0.0345 | 0.16 | QV | \| | \| | \| | \| |
| 4+ 0 | 0.0357 | 0.16 | QV | \| | \| | \| | \| |
| 4+ 5 | 0.0368 | 0.17 | QV | \| | \| | \| | \| |
| 4+10 | 0.0380 | 0.17 | QV | \| | \| | \| | \| |
| 4+15 | 0.0391 | 0.17 | QV | \| | \| | \| | \| |
| 4+20 | 0.0403 | 0.17 | QV | \| | \| | \| | \| |
| 4+25 | 0.0416 | 0.19 | QV | \| | \| | \| | \| |
| 4+30 | 0.0429 | 0.19 | QV | \| | \| | \| | \| |
| 4+35 | 0.0443 | 0.19 | QV | \| | \| | \| | \| |
| 4+40 | 0.0456 | 0.20 | QV | \| | \| | \| | \| |
| 4+45 | 0.0470 | 0.20 | QV | \| | \| | \| | \| |
| 4+50 | 0.0484 | 0.20 | QV | \| | \| | \| | \| |
| 4+55 | 0.0499 | 0.22 | QV | \| | \| | \| | \| |
| 5+ 0 | 0.0514 | 0.22 | QV | \| | \| | \| | \| |
| 5+ 5 | 0.0529 | 0.21 | Q V | \| | \| | \| | \| |
| 5+10 | 0.0541 | 0.19 | Q V | \| | \| | \| | \| |
| 5+15 | 0.0554 | 0.18 | Q V | \| | \| | \| | \| |
| 5+20 | 0.0566 | 0.18 | Q V | \| | \| | \| | \| |
| 5+25 | 0.0579 | 0.19 | Q V | \| | \| | \| | \| |
| 5+30 | 0.0593 | 0.19 | Q V | \| | \| | \| | \| |
| 5+35 | 0.0606 | 0.20 | Q V | \| | \| | \| | \| |
| 5+40 | 0.0621 | 0.22 | Q V | \| | \| | \| | \| |
| 5+45 | 0.0636 | 0.22 | Q V | \| | \| | \| | \| |
| 5+50 | 0.0652 | 0.22 | Q V | \| | \| | \| | \| |
| 5+55 | 0.0667 | 0.22 | Q V | \| | \| | \| | \| |
| 6+ 0 | 0.0683 | 0.22 | Q V | \| | \| | \| | \| |
| 6+ 5 | 0.0699 | 0.23 | Q V | \| | \| | \| | \| |
| 6+10 | 0.0716 | 0.25 | Q V | \| | \| | \| | \| |
| 6+15 | 0.0733 | 0.25 | Q V | \| | \| | \| | \| |
| 6+20 | 0.0750 | 0.25 | \|QV | \| | \| | \| | \| |
| 6+25 | 0.0767 | 0.25 | \|QV | \| | \| | \| | \| |
| 6+30 | 0.0785 | 0.25 | \|Q V | \| | \| | \| | \| |
| 6+35 | 0.0803 | 0.26 | \|Q V | \| | \| | \| | \| |
| 6+40 | 0.0821 | 0.27 | \|Q V | \| | \| | \| | \| |
| 6+45 | 0.0841 | 0.28 | \|Q V | \| | \| | \| | \| |
| 6+50 | 0.0860 | 0.28 | \|Q V | \| | \| | \| | \| |
| 6+55 | 0.0879 | 0.28 | \|Q V | \| | \| | \| | \| |
| 7+ 0 | 0.0899 | 0.28 | \|Q V | \| | \| | \| | \| |
| 7+ 5 | 0.0918 | 0.28 | \|Q V | \| | \| | \| | \| |
| 7+10 | 0.0937 | 0.28 | \|Q V | \| | \| | \| | \| |
| 7+15 | 0.0957 | 0.28 | \|Q V | \| | \| | \| | \| |
| 7+20 | 0.0977 | 0.29 | \|Q V | \| | \| | \| | \| |
| 7+25 | 0.0997 | 0.30 | \|Q V | \| | \| | \| | \| |
| 7+30 | 0.1018 | 0.31 | \|Q V | \| | \| | \| | \| |
| 7+35 | 0.1040 | 0.31 | \|Q V | \| | \| | \| | \| |
| 7+40 | 0.1063 | 0.33 | \|Q V | \| | \| | \| | \| |
| 7+45 | 0.1086 | 0.33 | \|Q V | \| | \| | \| | \| |
| 7+50 | 0.1109 | 0.34 | \|Q V | \| | \| | \| | \| |
| 7+55 | 0.1134 | 0.36 | \|Q V | \| | \| | \| | \| |
| 8+ 0 | 0.1159 | 0.36 | \|Q V | \| | \| | \| | \| |
| 8+ 5 | 0.1184 | 0.38 | \|Q V | \| | \| | \| | \| |
| 8+10 | 0.1212 | 0.40 | \|Q V | \| | \| | \| | \| |
| 8+15 | 0.1241 | 0.41 | \|Q V | \| | \| | \| | \| |
| 8+20 | 0.1269 | 0.42 | \|Q V | \| | \| | \| | \| |
| 8+25 | 0.1298 | 0.42 | \|Q V | \| | \| | \| | \| |
| 8+30 | 0.1327 | 0.42 | \|Q V | \| | \| | \| | \| |
| 8+35 | 0.1357 | 0.43 | \|Q V | \| | \| | \| | \| |
| 8+40 | 0.1387 | 0.44 | \|Q V | \| | \| | \| | \| |
| 8+45 | 0.1418 | 0.45 | \|Q V | \| | \| | \| | \| |
| 8+50 | 0.1449 | 0.45 | \|Q V | \| | \| | \| | \| |
| 8+55 | 0.1482 | 0.47 | \|Q V | \| | \| | \| | \| |
| 9+ 0 | 0.1514 | 0.47 | \|Q V | \| | \| | \| | \| |

```
 9+ 5     0.1548     0.49  |Q    V   |        |        |        |
 9+10     0.1584     0.52  | Q   V   |        |        |        |
 9+15     0.1620     0.53  | Q   V   |        |        |        |
 9+20     0.1657     0.54  | Q   V   |        |        |        |
 9+25     0.1695     0.55  | Q   V   |        |        |        |
 9+30     0.1733     0.56  | Q   V   |        |        |        |
 9+35     0.1772     0.57  | Q   V   |        |        |        |
 9+40     0.1812     0.58  | Q    V  |        |        |        |
 9+45     0.1853     0.59  | Q    V  |        |        |        |
 9+50     0.1894     0.60  | Q    V  |        |        |        |
 9+55     0.1936     0.61  | Q    V  |        |        |        |
10+ 0     0.1978     0.62  | Q    V  |        |        |        |
10+ 5     0.2018     0.58  | Q    V  |        |        |        |
10+10     0.2051     0.48  |Q     V  |        |        |        |
10+15     0.2082     0.45  |Q     V |        |        |        |
10+20     0.2113     0.44  |Q     V |        |        |        |
10+25     0.2143     0.43  |Q     V |        |        |        |
10+30     0.2172     0.43  |Q     V |        |        |        |
10+35     0.2203     0.45  |Q     V |        |        |        |
10+40     0.2239     0.52  | Q    V |        |        |        |
10+45     0.2277     0.54  | Q    V |        |        |        |
10+50     0.2314     0.55  | Q    V |        |        |        |
10+55     0.2353     0.56  | Q     V|        |        |        |
11+ 0     0.2391     0.56  | Q     V|        |        |        |
11+ 5     0.2430     0.56  | Q     V|        |        |        |
11+10     0.2467     0.54  | Q     V|        |        |        |
11+15     0.2504     0.54  | Q     V|        |        |        |
11+20     0.2542     0.54  | Q     V|        |        |        |
11+25     0.2579     0.54  | Q      V        |        |        |
11+30     0.2615     0.54  | Q      V        |        |        |
11+35     0.2652     0.52  | Q      V        |        |        |
11+40     0.2686     0.50  |Q       V        |        |        |
11+45     0.2719     0.49  |Q       V        |        |        |
11+50     0.2753     0.49  |Q       V        |        |        |
11+55     0.2788     0.50  | Q      V        |        |        |
12+ 0     0.2823     0.50  | Q      V        |        |        |
12+ 5     0.2868     0.66  | Q      |V       |        |        |
12+10     0.2938     1.02  |   Q    |V       |        |        |
12+15     0.3018     1.15  |   Q    |V       |        |        |
12+20     0.3106     1.29  |    Q   | V      |        |        |
12+25     0.3208     1.48  |    Q   | V      |        |        |
12+30     0.3316     1.57  |     Q  | V      |        |        |
12+35     0.3436     1.74  |     Q  |  V     |        |        |
12+40     0.3578     2.06  |      Q |  V     |        |        |
12+45     0.3729     2.18  |      Q |   V    |        |        |
12+50     0.3888     2.31  |       Q|   V    |        |        |
12+55     0.4060     2.50  |        Q   V    |        |        |
13+ 0     0.4238     2.59  |        Q    V   |        |        |
13+ 5     0.4440     2.93  |        |Q    V  |        |        |
13+10     0.4693     3.66  |        |  Q   V |        |        |
13+15     0.4962     3.91  |        |   Q  V |        |        |
13+20     0.5240     4.04  |        |    Q  V        |        |
13+25     0.5524     4.12  |        |    Q  |V       |        |
13+30     0.5812     4.18  |        |    Q  | V      |        |
13+35     0.6059     3.59  |        |  Q    |  V     |        |
13+40     0.6206     2.12  |      Q |       |   V    |        |
13+45     0.6322     1.69  |    Q   |       |   V    |        |
13+50     0.6425     1.50  |    Q   |       |   V    |        |
13+55     0.6523     1.41  |    Q   |       |    V   |        |
14+ 0     0.6617     1.36  |   Q    |       |   V    |        |
14+ 5     0.6725     1.58  |    Q   |       |    V   |        |
14+10     0.6871     2.12  |      Q |       |    V   |        |
14+15     0.7030     2.31  |       Q|       |    V   |        |
14+20     0.7193     2.36  |       Q|       |    V   |        |
14+25     0.7350     2.29  |       Q|       |     V  |        |
14+30     0.7509     2.30  |       Q|       |      V |        |
```

```
14+35    0.7668    2.32 |      Q|       |      V|       |
14+40    0.7830    2.35 |      Q|       |       V       |
14+45    0.7994    2.37 |      Q|       |       |V      |
14+50    0.8154    2.33 |      Q|       |       |V      |
14+55    0.8307    2.22 |     Q |       |       | V     |
15+ 0    0.8458    2.20 |     Q |       |       | V     |
15+ 5    0.8606    2.15 |     Q |       |       |  V    |
15+10    0.8746    2.02 |     Q |       |       |  V    |
15+15    0.8884    2.00 |     Q |       |       |   V   |
15+20    0.9018    1.94 |    Q  |       |       |   V   |
15+25    0.9143    1.82 |    Q  |       |       |   V   |
15+30    0.9266    1.79 |    Q  |       |       |   V   |
15+35    0.9374    1.56 |   Q   |       |       |    V  |
15+40    0.9444    1.02 |  Q    |       |       |    V  |
15+45    0.9504    0.87 | Q     |       |       |    V  |
15+50    0.9560    0.81 | Q     |       |       |     V |
15+55    0.9614    0.79 | Q     |       |       |     V |
16+ 0    0.9668    0.79 | Q     |       |       |     V |
16+ 5    0.9713    0.65 |Q      |       |       |     V |
16+10    0.9735    0.31 |Q      |       |       |     V |
16+15    0.9749    0.21 Q        |       |       |     V |
16+20    0.9761    0.17 Q        |       |       |     V |
16+25    0.9771    0.15 Q        |       |       |     V |
16+30    0.9780    0.13 Q        |       |       |     V |
16+35    0.9788    0.12 Q        |       |       |     V |
16+40    0.9795    0.09 Q        |       |       |      V|
16+45    0.9801    0.09 Q        |       |       |      V|
16+50    0.9807    0.09 Q        |       |       |      V|
16+55    0.9813    0.09 Q        |       |       |      V|
17+ 0    0.9818    0.09 Q        |       |       |      V|
17+ 5    0.9825    0.10 Q        |       |       |      V|
17+10    0.9834    0.12 Q        |       |       |      V|
17+15    0.9843    0.13 Q        |       |       |      V|
17+20    0.9852    0.14 Q        |       |       |      V|
17+25    0.9862    0.14 Q        |       |       |      V|
17+30    0.9871    0.14 Q        |       |       |      V|
17+35    0.9881    0.14 Q        |       |       |      V|
17+40    0.9891    0.14 Q        |       |       |      V|
17+45    0.9900    0.14 Q        |       |       |      V|
17+50    0.9910    0.14 Q        |       |       |      V|
17+55    0.9918    0.12 Q        |       |       |      V|
18+ 0    0.9926    0.12 Q        |       |       |      V|
18+ 5    0.9934    0.12 Q        |       |       |      V|
18+10    0.9942    0.11 Q        |       |       |      V|
18+15    0.9950    0.11 Q        |       |       |      V|
18+20    0.9958    0.11 Q        |       |       |      V|
18+25    0.9965    0.11 Q        |       |       |      V|
18+30    0.9973    0.11 Q        |       |       |      V|
18+35    0.9980    0.11 Q        |       |       |      V|
18+40    0.9987    0.09 Q        |       |       |      V|
18+45    0.9993    0.09 Q        |       |       |      V|
18+50    0.9999    0.08 Q        |       |       |      V|
18+55    1.0003    0.07 Q        |       |       |      V|
19+ 0    1.0007    0.06 Q        |       |       |      V|
19+ 5    1.0012    0.07 Q        |       |       |      V|
19+10    1.0017    0.08 Q        |       |       |      V|
19+15    1.0023    0.08 Q        |       |       |      V|
19+20    1.0029    0.09 Q        |       |       |      V|
19+25    1.0036    0.10 Q        |       |       |      V|
19+30    1.0043    0.11 Q        |       |       |      V|
19+35    1.0051    0.10 Q        |       |       |       V|
19+40    1.0057    0.09 Q        |       |       |       V|
19+45    1.0063    0.09 Q        |       |       |       V|
19+50    1.0068    0.08 Q        |       |       |       V|
19+55    1.0073    0.07 Q        |       |       |       V|
20+ 0    1.0077    0.06 Q        |       |       |       V|
```

| | | | | | | |
|---|---|---|---|---|---|---|
| 20+ 5 | 1.0082 | 0.07 | Q | \| | \| | \| V\| |
| 20+10 | 1.0087 | 0.08 | Q | \| | \| | \| V\| |
| 20+15 | 1.0093 | 0.08 | Q | \| | \| | \| V\| |
| 20+20 | 1.0098 | 0.08 | Q | \| | \| | \| V\| |
| 20+25 | 1.0104 | 0.08 | Q | \| | \| | \| V\| |
| 20+30 | 1.0110 | 0.08 | Q | \| | \| | \| V\| |
| 20+35 | 1.0116 | 0.08 | Q | \| | \| | \| V\| |
| 20+40 | 1.0121 | 0.08 | Q | \| | \| | \| V\| |
| 20+45 | 1.0127 | 0.08 | Q | \| | \| | \| V\| |
| 20+50 | 1.0133 | 0.08 | Q | \| | \| | \| V\| |
| 20+55 | 1.0137 | 0.07 | Q | \| | \| | \| V\| |
| 21+ 0 | 1.0141 | 0.06 | Q | \| | \| | \| V\| |
| 21+ 5 | 1.0146 | 0.06 | Q | \| | \| | \| V\| |
| 21+10 | 1.0151 | 0.08 | Q | \| | \| | \| V\| |
| 21+15 | 1.0157 | 0.08 | Q | \| | \| | \| V\| |
| 21+20 | 1.0162 | 0.08 | Q | \| | \| | \| V\| |
| 21+25 | 1.0166 | 0.06 | Q | \| | \| | \| V\| |
| 21+30 | 1.0171 | 0.06 | Q | \| | \| | \| V\| |
| 21+35 | 1.0175 | 0.06 | Q | \| | \| | \| V\| |
| 21+40 | 1.0180 | 0.08 | Q | \| | \| | \| V\| |
| 21+45 | 1.0186 | 0.08 | Q | \| | \| | \| V\| |
| 21+50 | 1.0191 | 0.08 | Q | \| | \| | \| V\| |
| 21+55 | 1.0196 | 0.06 | Q | \| | \| | \| V\| |
| 22+ 0 | 1.0200 | 0.06 | Q | \| | \| | \| V\| |
| 22+ 5 | 1.0204 | 0.06 | Q | \| | \| | \| V\| |
| 22+10 | 1.0209 | 0.08 | Q | \| | \| | \| V\| |
| 22+15 | 1.0215 | 0.08 | Q | \| | \| | \| V\| |
| 22+20 | 1.0220 | 0.08 | Q | \| | \| | \| V\| |
| 22+25 | 1.0225 | 0.06 | Q | \| | \| | \| V\| |
| 22+30 | 1.0229 | 0.06 | Q | \| | \| | \| V\| |
| 22+35 | 1.0233 | 0.06 | Q | \| | \| | \| V\| |
| 22+40 | 1.0237 | 0.06 | Q | \| | \| | \| V\| |
| 22+45 | 1.0241 | 0.06 | Q | \| | \| | \| V\| |
| 22+50 | 1.0245 | 0.06 | Q | \| | \| | \| V\| |
| 22+55 | 1.0249 | 0.06 | Q | \| | \| | \| V\| |
| 23+ 0 | 1.0252 | 0.06 | Q | \| | \| | \| V\| |
| 23+ 5 | 1.0256 | 0.06 | Q | \| | \| | \| V\| |
| 23+10 | 1.0260 | 0.06 | Q | \| | \| | \| V\| |
| 23+15 | 1.0264 | 0.06 | Q | \| | \| | \| V\| |
| 23+20 | 1.0268 | 0.06 | Q | \| | \| | \| V\| |
| 23+25 | 1.0272 | 0.06 | Q | \| | \| | \| V\| |
| 23+30 | 1.0276 | 0.06 | Q | \| | \| | \| V\| |
| 23+35 | 1.0280 | 0.06 | Q | \| | \| | \| V\| |
| 23+40 | 1.0284 | 0.06 | Q | \| | \| | \| V\| |
| 23+45 | 1.0287 | 0.06 | Q | \| | \| | \| V\| |
| 23+50 | 1.0291 | 0.06 | Q | \| | \| | \| V\| |
| 23+55 | 1.0295 | 0.06 | Q | \| | \| | \| V\| |
| 24+ 0 | 1.0299 | 0.06 | Q | \| | \| | \| V\| |
| 24+ 5 | 1.0302 | 0.04 | Q | \| | \| | \| V\| |
| 24+10 | 1.0303 | 0.02 | Q | \| | \| | \| V\| |
| 24+15 | 1.0304 | 0.01 | Q | \| | \| | \| V\| |
| 24+20 | 1.0304 | 0.01 | Q | \| | \| | \| V\| |
| 24+25 | 1.0304 | 0.00 | Q | \| | \| | \| V\| |
| 24+30 | 1.0305 | 0.00 | Q | \| | \| | \| V\| |
| 24+35 | 1.0305 | 0.00 | Q | \| | \| | \| V\| |

---

## PROPOSED CONDITION UNIT HYDROGRAPHS (2-YEAR, 24-HOUR STORM)

U n i t  H y d r o g r a p h  A n a l y s i s


Study date 10/18/22 File: PRUH242.out

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
---

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

---
English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

---
21-0035 - Capstone Ethanac
Onsite Unit Hydrograph Analysis
Proposed Condition, 2-Year 24-Hour
FN: PRUH242.out - ABE
---
Drainage Area = 36.80(Ac.) = 0.057 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 36.80(Ac.) = 0.057 Sq. Mi.
Length along longest watercourse = 1795.00(Ft.)
Length along longest watercourse measured to centroid = 465.00(Ft.)
Length along longest watercourse = 0.340 Mi.
Length along longest watercourse measured to centroid = 0.088 Mi.
Difference in elevation = 24.00(Ft.)
Slope along watercourse = 70.5961 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.042 Hr.
Lag time = 2.54 Min.
25% of lag time = 0.63 Min.
40% of lag time = 1.01 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] |
|---|---|---|
| 36.80 | 1.90 | 69.92 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 36.80 | 4.75 | 174.80 |

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 1.900(In)
Area Averaged 100-Year Rainfall = 4.750(In)

Point rain (area averaged) = 1.900(In)
Areal adjustment factor = 99.99 %

Adjusted average point rain = 1.900(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 28.200 | 69.00 | 0.900 |
| 8.600 | 75.00 | 0.900 |

Total Area Entered = 36.80(Ac.)

| RI AMC2 | RI AMC-2 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 69.0 | 69.0 | 0.373 | 0.900 | 0.071 | 0.766 | 0.054 |
| 75.0 | 75.0 | 0.303 | 0.900 | 0.058 | 0.234 | 0.013 |

Sum (F) = 0.068

Area averaged mean soil loss (F) (In/Hr) = 0.068
Minimum soil loss rate ((In/Hr)) = 0.034
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

---

U n i t H y d r o g r a p h
VALLEY S-Curve

---

Unit Hydrograph Data

| Unit time period (hrs) | Time % of lag Graph % | Distribution (CFS) | Unit Hydrograph |
|---|---|---|---|
| 1 | 0.083 | 197.156 | 42.905 | 15.912 |
| 2 | 0.167 | 394.312 | 43.567 | 16.158 |
| 3 | 0.250 | 591.468 | 8.911 | 3.305 |
| 4 | 0.333 | 788.624 | 3.482 | 1.291 |
| 5 | 0.417 | 985.779 | 1.135 | 0.421 |
| | Sum = 100.000 | | Sum= | 37.087 |

---

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) Max | Low | Effective (In/Hr) |
|---|---|---|---|---|---|
| 1 | 0.08 | 0.07 | 0.015 | ( 0.120) | 0.003 | 0.012 |
| 2 | 0.17 | 0.07 | 0.015 | ( 0.120) | 0.003 | 0.012 |
| 3 | 0.25 | 0.07 | 0.015 | ( 0.119) | 0.003 | 0.012 |
| 4 | 0.33 | 0.10 | 0.023 | ( 0.119) | 0.004 | 0.019 |
| 5 | 0.42 | 0.10 | 0.023 | ( 0.118) | 0.004 | 0.019 |
| 6 | 0.50 | 0.10 | 0.023 | ( 0.118) | 0.004 | 0.019 |
| 7 | 0.58 | 0.10 | 0.023 | ( 0.117) | 0.004 | 0.019 |
| 8 | 0.67 | 0.10 | 0.023 | ( 0.117) | 0.004 | 0.019 |
| 9 | 0.75 | 0.10 | 0.023 | ( 0.116) | 0.004 | 0.019 |
| 10 | 0.83 | 0.13 | 0.030 | ( 0.116) | 0.005 | 0.025 |
| 11 | 0.92 | 0.13 | 0.030 | ( 0.115) | 0.005 | 0.025 |
| 12 | 1.00 | 0.13 | 0.030 | ( 0.115) | 0.005 | 0.025 |
| 13 | 1.08 | 0.10 | 0.023 | ( 0.115) | 0.004 | 0.019 |
| 14 | 1.17 | 0.10 | 0.023 | ( 0.114) | 0.004 | 0.019 |
| 15 | 1.25 | 0.10 | 0.023 | ( 0.114) | 0.004 | 0.019 |
| 16 | 1.33 | 0.10 | 0.023 | ( 0.113) | 0.004 | 0.019 |
| 17 | 1.42 | 0.10 | 0.023 | ( 0.113) | 0.004 | 0.019 |
| 18 | 1.50 | 0.10 | 0.023 | ( 0.112) | 0.004 | 0.019 |
| 19 | 1.58 | 0.10 | 0.023 | ( 0.112) | 0.004 | 0.019 |
| 20 | 1.67 | 0.10 | 0.023 | ( 0.111) | 0.004 | 0.019 |
| 21 | 1.75 | 0.10 | 0.023 | ( 0.111) | 0.004 | 0.019 |
| 22 | 1.83 | 0.13 | 0.030 | ( 0.111) | 0.005 | 0.025 |
| 23 | 1.92 | 0.13 | 0.030 | ( 0.110) | 0.005 | 0.025 |
| 24 | 2.00 | 0.13 | 0.030 | ( 0.110) | 0.005 | 0.025 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 25 | 2.08 | 0.13 | 0.030 | ( 0.109) | 0.005 | 0.025 |
| 26 | 2.17 | 0.13 | 0.030 | ( 0.109) | 0.005 | 0.025 |
| 27 | 2.25 | 0.13 | 0.030 | ( 0.108) | 0.005 | 0.025 |
| 28 | 2.33 | 0.13 | 0.030 | ( 0.108) | 0.005 | 0.025 |
| 29 | 2.42 | 0.13 | 0.030 | ( 0.107) | 0.005 | 0.025 |
| 30 | 2.50 | 0.13 | 0.030 | ( 0.107) | 0.005 | 0.025 |
| 31 | 2.58 | 0.17 | 0.038 | ( 0.107) | 0.007 | 0.031 |
| 32 | 2.67 | 0.17 | 0.038 | ( 0.106) | 0.007 | 0.031 |
| 33 | 2.75 | 0.17 | 0.038 | ( 0.106) | 0.007 | 0.031 |
| 34 | 2.83 | 0.17 | 0.038 | ( 0.105) | 0.007 | 0.031 |
| 35 | 2.92 | 0.17 | 0.038 | ( 0.105) | 0.007 | 0.031 |
| 36 | 3.00 | 0.17 | 0.038 | ( 0.104) | 0.007 | 0.031 |
| 37 | 3.08 | 0.17 | 0.038 | ( 0.104) | 0.007 | 0.031 |
| 38 | 3.17 | 0.17 | 0.038 | ( 0.103) | 0.007 | 0.031 |
| 39 | 3.25 | 0.17 | 0.038 | ( 0.103) | 0.007 | 0.031 |
| 40 | 3.33 | 0.17 | 0.038 | ( 0.103) | 0.007 | 0.031 |
| 41 | 3.42 | 0.17 | 0.038 | ( 0.102) | 0.007 | 0.031 |
| 42 | 3.50 | 0.17 | 0.038 | ( 0.102) | 0.007 | 0.031 |
| 43 | 3.58 | 0.17 | 0.038 | ( 0.101) | 0.007 | 0.031 |
| 44 | 3.67 | 0.17 | 0.038 | ( 0.101) | 0.007 | 0.031 |
| 45 | 3.75 | 0.17 | 0.038 | ( 0.101) | 0.007 | 0.031 |
| 46 | 3.83 | 0.20 | 0.046 | ( 0.100) | 0.008 | 0.037 |
| 47 | 3.92 | 0.20 | 0.046 | ( 0.100) | 0.008 | 0.037 |
| 48 | 4.00 | 0.20 | 0.046 | ( 0.099) | 0.008 | 0.037 |
| 49 | 4.08 | 0.20 | 0.046 | ( 0.099) | 0.008 | 0.037 |
| 50 | 4.17 | 0.20 | 0.046 | ( 0.098) | 0.008 | 0.037 |
| 51 | 4.25 | 0.20 | 0.046 | ( 0.098) | 0.008 | 0.037 |
| 52 | 4.33 | 0.23 | 0.053 | ( 0.098) | 0.010 | 0.044 |
| 53 | 4.42 | 0.23 | 0.053 | ( 0.097) | 0.010 | 0.044 |
| 54 | 4.50 | 0.23 | 0.053 | ( 0.097) | 0.010 | 0.044 |
| 55 | 4.58 | 0.23 | 0.053 | ( 0.096) | 0.010 | 0.044 |
| 56 | 4.67 | 0.23 | 0.053 | ( 0.096) | 0.010 | 0.044 |
| 57 | 4.75 | 0.23 | 0.053 | ( 0.095) | 0.010 | 0.044 |
| 58 | 4.83 | 0.27 | 0.061 | ( 0.095) | 0.011 | 0.050 |
| 59 | 4.92 | 0.27 | 0.061 | ( 0.095) | 0.011 | 0.050 |
| 60 | 5.00 | 0.27 | 0.061 | ( 0.094) | 0.011 | 0.050 |
| 61 | 5.08 | 0.20 | 0.046 | ( 0.094) | 0.008 | 0.037 |
| 62 | 5.17 | 0.20 | 0.046 | ( 0.093) | 0.008 | 0.037 |
| 63 | 5.25 | 0.20 | 0.046 | ( 0.093) | 0.008 | 0.037 |
| 64 | 5.33 | 0.23 | 0.053 | ( 0.093) | 0.010 | 0.044 |
| 65 | 5.42 | 0.23 | 0.053 | ( 0.092) | 0.010 | 0.044 |
| 66 | 5.50 | 0.23 | 0.053 | ( 0.092) | 0.010 | 0.044 |
| 67 | 5.58 | 0.27 | 0.061 | ( 0.091) | 0.011 | 0.050 |
| 68 | 5.67 | 0.27 | 0.061 | ( 0.091) | 0.011 | 0.050 |
| 69 | 5.75 | 0.27 | 0.061 | ( 0.091) | 0.011 | 0.050 |
| 70 | 5.83 | 0.27 | 0.061 | ( 0.090) | 0.011 | 0.050 |
| 71 | 5.92 | 0.27 | 0.061 | ( 0.090) | 0.011 | 0.050 |
| 72 | 6.00 | 0.27 | 0.061 | ( 0.089) | 0.011 | 0.050 |
| 73 | 6.08 | 0.30 | 0.068 | ( 0.089) | 0.012 | 0.056 |
| 74 | 6.17 | 0.30 | 0.068 | ( 0.089) | 0.012 | 0.056 |
| 75 | 6.25 | 0.30 | 0.068 | ( 0.088) | 0.012 | 0.056 |
| 76 | 6.33 | 0.30 | 0.068 | ( 0.088) | 0.012 | 0.056 |
| 77 | 6.42 | 0.30 | 0.068 | ( 0.087) | 0.012 | 0.056 |
| 78 | 6.50 | 0.30 | 0.068 | ( 0.087) | 0.012 | 0.056 |
| 79 | 6.58 | 0.33 | 0.076 | ( 0.087) | 0.014 | 0.062 |
| 80 | 6.67 | 0.33 | 0.076 | ( 0.086) | 0.014 | 0.062 |
| 81 | 6.75 | 0.33 | 0.076 | ( 0.086) | 0.014 | 0.062 |
| 82 | 6.83 | 0.33 | 0.076 | ( 0.085) | 0.014 | 0.062 |
| 83 | 6.92 | 0.33 | 0.076 | ( 0.085) | 0.014 | 0.062 |
| 84 | 7.00 | 0.33 | 0.076 | ( 0.085) | 0.014 | 0.062 |
| 85 | 7.08 | 0.33 | 0.076 | ( 0.084) | 0.014 | 0.062 |
| 86 | 7.17 | 0.33 | 0.076 | ( 0.084) | 0.014 | 0.062 |
| 87 | 7.25 | 0.33 | 0.076 | ( 0.084) | 0.014 | 0.062 |
| 88 | 7.33 | 0.37 | 0.084 | ( 0.083) | 0.015 | 0.069 |
| 89 | 7.42 | 0.37 | 0.084 | ( 0.083) | 0.015 | 0.069 |
| 90 | 7.50 | 0.37 | 0.084 | ( 0.082) | 0.015 | 0.069 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 91 | 7.58 | 0.40 | 0.091 | ( 0.082) | 0.016 | 0.075 |
| 92 | 7.67 | 0.40 | 0.091 | ( 0.082) | 0.016 | 0.075 |
| 93 | 7.75 | 0.40 | 0.091 | ( 0.081) | 0.016 | 0.075 |
| 94 | 7.83 | 0.43 | 0.099 | ( 0.081) | 0.018 | 0.081 |
| 95 | 7.92 | 0.43 | 0.099 | ( 0.081) | 0.018 | 0.081 |
| 96 | 8.00 | 0.43 | 0.099 | ( 0.080) | 0.018 | 0.081 |
| 97 | 8.08 | 0.50 | 0.114 | ( 0.080) | 0.021 | 0.093 |
| 98 | 8.17 | 0.50 | 0.114 | ( 0.079) | 0.021 | 0.093 |
| 99 | 8.25 | 0.50 | 0.114 | ( 0.079) | 0.021 | 0.093 |
| 100 | 8.33 | 0.50 | 0.114 | ( 0.079) | 0.021 | 0.093 |
| 101 | 8.42 | 0.50 | 0.114 | ( 0.078) | 0.021 | 0.093 |
| 102 | 8.50 | 0.50 | 0.114 | ( 0.078) | 0.021 | 0.093 |
| 103 | 8.58 | 0.53 | 0.122 | ( 0.078) | 0.022 | 0.100 |
| 104 | 8.67 | 0.53 | 0.122 | ( 0.077) | 0.022 | 0.100 |
| 105 | 8.75 | 0.53 | 0.122 | ( 0.077) | 0.022 | 0.100 |
| 106 | 8.83 | 0.57 | 0.129 | ( 0.076) | 0.023 | 0.106 |
| 107 | 8.92 | 0.57 | 0.129 | ( 0.076) | 0.023 | 0.106 |
| 108 | 9.00 | 0.57 | 0.129 | ( 0.076) | 0.023 | 0.106 |
| 109 | 9.08 | 0.63 | 0.144 | ( 0.075) | 0.026 | 0.118 |
| 110 | 9.17 | 0.63 | 0.144 | ( 0.075) | 0.026 | 0.118 |
| 111 | 9.25 | 0.63 | 0.144 | ( 0.075) | 0.026 | 0.118 |
| 112 | 9.33 | 0.67 | 0.152 | ( 0.074) | 0.027 | 0.125 |
| 113 | 9.42 | 0.67 | 0.152 | ( 0.074) | 0.027 | 0.125 |
| 114 | 9.50 | 0.67 | 0.152 | ( 0.074) | 0.027 | 0.125 |
| 115 | 9.58 | 0.70 | 0.160 | ( 0.073) | 0.029 | 0.131 |
| 116 | 9.67 | 0.70 | 0.160 | ( 0.073) | 0.029 | 0.131 |
| 117 | 9.75 | 0.70 | 0.160 | ( 0.073) | 0.029 | 0.131 |
| 118 | 9.83 | 0.73 | 0.167 | ( 0.072) | 0.030 | 0.137 |
| 119 | 9.92 | 0.73 | 0.167 | ( 0.072) | 0.030 | 0.137 |
| 120 | 10.00 | 0.73 | 0.167 | ( 0.072) | 0.030 | 0.137 |
| 121 | 10.08 | 0.50 | 0.114 | ( 0.071) | 0.021 | 0.093 |
| 122 | 10.17 | 0.50 | 0.114 | ( 0.071) | 0.021 | 0.093 |
| 123 | 10.25 | 0.50 | 0.114 | ( 0.070) | 0.021 | 0.093 |
| 124 | 10.33 | 0.50 | 0.114 | ( 0.070) | 0.021 | 0.093 |
| 125 | 10.42 | 0.50 | 0.114 | ( 0.070) | 0.021 | 0.093 |
| 126 | 10.50 | 0.50 | 0.114 | ( 0.069) | 0.021 | 0.093 |
| 127 | 10.58 | 0.67 | 0.152 | ( 0.069) | 0.027 | 0.125 |
| 128 | 10.67 | 0.67 | 0.152 | ( 0.069) | 0.027 | 0.125 |
| 129 | 10.75 | 0.67 | 0.152 | ( 0.068) | 0.027 | 0.125 |
| 130 | 10.83 | 0.67 | 0.152 | ( 0.068) | 0.027 | 0.125 |
| 131 | 10.92 | 0.67 | 0.152 | ( 0.068) | 0.027 | 0.125 |
| 132 | 11.00 | 0.67 | 0.152 | ( 0.067) | 0.027 | 0.125 |
| 133 | 11.08 | 0.63 | 0.144 | ( 0.067) | 0.026 | 0.118 |
| 134 | 11.17 | 0.63 | 0.144 | ( 0.067) | 0.026 | 0.118 |
| 135 | 11.25 | 0.63 | 0.144 | ( 0.066) | 0.026 | 0.118 |
| 136 | 11.33 | 0.63 | 0.144 | ( 0.066) | 0.026 | 0.118 |
| 137 | 11.42 | 0.63 | 0.144 | ( 0.066) | 0.026 | 0.118 |
| 138 | 11.50 | 0.63 | 0.144 | ( 0.065) | 0.026 | 0.118 |
| 139 | 11.58 | 0.57 | 0.129 | ( 0.065) | 0.023 | 0.106 |
| 140 | 11.67 | 0.57 | 0.129 | ( 0.065) | 0.023 | 0.106 |
| 141 | 11.75 | 0.57 | 0.129 | ( 0.065) | 0.023 | 0.106 |
| 142 | 11.83 | 0.60 | 0.137 | ( 0.064) | 0.025 | 0.112 |
| 143 | 11.92 | 0.60 | 0.137 | ( 0.064) | 0.025 | 0.112 |
| 144 | 12.00 | 0.60 | 0.137 | ( 0.064) | 0.025 | 0.112 |
| 145 | 12.08 | 0.83 | 0.190 | ( 0.063) | 0.034 | 0.156 |
| 146 | 12.17 | 0.83 | 0.190 | ( 0.063) | 0.034 | 0.156 |
| 147 | 12.25 | 0.83 | 0.190 | ( 0.063) | 0.034 | 0.156 |
| 148 | 12.33 | 0.87 | 0.198 | ( 0.062) | 0.036 | 0.162 |
| 149 | 12.42 | 0.87 | 0.198 | ( 0.062) | 0.036 | 0.162 |
| 150 | 12.50 | 0.87 | 0.198 | ( 0.062) | 0.036 | 0.162 |
| 151 | 12.58 | 0.93 | 0.213 | ( 0.061) | 0.038 | 0.174 |
| 152 | 12.67 | 0.93 | 0.213 | ( 0.061) | 0.038 | 0.174 |
| 153 | 12.75 | 0.93 | 0.213 | ( 0.061) | 0.038 | 0.174 |
| 154 | 12.83 | 0.97 | 0.220 | ( 0.060) | 0.040 | 0.181 |
| 155 | 12.92 | 0.97 | 0.220 | ( 0.060) | 0.040 | 0.181 |
| 156 | 13.00 | 0.97 | 0.220 | ( 0.060) | 0.040 | 0.181 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 157 | 13.08 | 1.13 | 0.258 | ( 0.060) | 0.047 | 0.212 |
| 158 | 13.17 | 1.13 | 0.258 | ( 0.059) | 0.047 | 0.212 |
| 159 | 13.25 | 1.13 | 0.258 | ( 0.059) | 0.047 | 0.212 |
| 160 | 13.33 | 1.13 | 0.258 | ( 0.059) | 0.047 | 0.212 |
| 161 | 13.42 | 1.13 | 0.258 | ( 0.058) | 0.047 | 0.212 |
| 162 | 13.50 | 1.13 | 0.258 | ( 0.058) | 0.047 | 0.212 |
| 163 | 13.58 | 0.77 | 0.175 | ( 0.058) | 0.031 | 0.143 |
| 164 | 13.67 | 0.77 | 0.175 | ( 0.057) | 0.031 | 0.143 |
| 165 | 13.75 | 0.77 | 0.175 | ( 0.057) | 0.031 | 0.143 |
| 166 | 13.83 | 0.77 | 0.175 | ( 0.057) | 0.031 | 0.143 |
| 167 | 13.92 | 0.77 | 0.175 | ( 0.057) | 0.031 | 0.143 |
| 168 | 14.00 | 0.77 | 0.175 | ( 0.056) | 0.031 | 0.143 |
| 169 | 14.08 | 0.90 | 0.205 | ( 0.056) | 0.037 | 0.168 |
| 170 | 14.17 | 0.90 | 0.205 | ( 0.056) | 0.037 | 0.168 |
| 171 | 14.25 | 0.90 | 0.205 | ( 0.055) | 0.037 | 0.168 |
| 172 | 14.33 | 0.87 | 0.198 | ( 0.055) | 0.036 | 0.162 |
| 173 | 14.42 | 0.87 | 0.198 | ( 0.055) | 0.036 | 0.162 |
| 174 | 14.50 | 0.87 | 0.198 | ( 0.055) | 0.036 | 0.162 |
| 175 | 14.58 | 0.87 | 0.198 | ( 0.054) | 0.036 | 0.162 |
| 176 | 14.67 | 0.87 | 0.198 | ( 0.054) | 0.036 | 0.162 |
| 177 | 14.75 | 0.87 | 0.198 | ( 0.054) | 0.036 | 0.162 |
| 178 | 14.83 | 0.83 | 0.190 | ( 0.053) | 0.034 | 0.156 |
| 179 | 14.92 | 0.83 | 0.190 | ( 0.053) | 0.034 | 0.156 |
| 180 | 15.00 | 0.83 | 0.190 | ( 0.053) | 0.034 | 0.156 |
| 181 | 15.08 | 0.80 | 0.182 | ( 0.053) | 0.033 | 0.150 |
| 182 | 15.17 | 0.80 | 0.182 | ( 0.052) | 0.033 | 0.150 |
| 183 | 15.25 | 0.80 | 0.182 | ( 0.052) | 0.033 | 0.150 |
| 184 | 15.33 | 0.77 | 0.175 | ( 0.052) | 0.031 | 0.143 |
| 185 | 15.42 | 0.77 | 0.175 | ( 0.052) | 0.031 | 0.143 |
| 186 | 15.50 | 0.77 | 0.175 | ( 0.051) | 0.031 | 0.143 |
| 187 | 15.58 | 0.63 | 0.144 | ( 0.051) | 0.026 | 0.118 |
| 188 | 15.67 | 0.63 | 0.144 | ( 0.051) | 0.026 | 0.118 |
| 189 | 15.75 | 0.63 | 0.144 | ( 0.051) | 0.026 | 0.118 |
| 190 | 15.83 | 0.63 | 0.144 | ( 0.050) | 0.026 | 0.118 |
| 191 | 15.92 | 0.63 | 0.144 | ( 0.050) | 0.026 | 0.118 |
| 192 | 16.00 | 0.63 | 0.144 | ( 0.050) | 0.026 | 0.118 |
| 193 | 16.08 | 0.13 | 0.030 | ( 0.049) | 0.005 | 0.025 |
| 194 | 16.17 | 0.13 | 0.030 | ( 0.049) | 0.005 | 0.025 |
| 195 | 16.25 | 0.13 | 0.030 | ( 0.049) | 0.005 | 0.025 |
| 196 | 16.33 | 0.13 | 0.030 | ( 0.049) | 0.005 | 0.025 |
| 197 | 16.42 | 0.13 | 0.030 | ( 0.048) | 0.005 | 0.025 |
| 198 | 16.50 | 0.13 | 0.030 | ( 0.048) | 0.005 | 0.025 |
| 199 | 16.58 | 0.10 | 0.023 | ( 0.048) | 0.004 | 0.019 |
| 200 | 16.67 | 0.10 | 0.023 | ( 0.048) | 0.004 | 0.019 |
| 201 | 16.75 | 0.10 | 0.023 | ( 0.048) | 0.004 | 0.019 |
| 202 | 16.83 | 0.10 | 0.023 | ( 0.047) | 0.004 | 0.019 |
| 203 | 16.92 | 0.10 | 0.023 | ( 0.047) | 0.004 | 0.019 |
| 204 | 17.00 | 0.10 | 0.023 | ( 0.047) | 0.004 | 0.019 |
| 205 | 17.08 | 0.17 | 0.038 | ( 0.047) | 0.007 | 0.031 |
| 206 | 17.17 | 0.17 | 0.038 | ( 0.046) | 0.007 | 0.031 |
| 207 | 17.25 | 0.17 | 0.038 | ( 0.046) | 0.007 | 0.031 |
| 208 | 17.33 | 0.17 | 0.038 | ( 0.046) | 0.007 | 0.031 |
| 209 | 17.42 | 0.17 | 0.038 | ( 0.046) | 0.007 | 0.031 |
| 210 | 17.50 | 0.17 | 0.038 | ( 0.045) | 0.007 | 0.031 |
| 211 | 17.58 | 0.17 | 0.038 | ( 0.045) | 0.007 | 0.031 |
| 212 | 17.67 | 0.17 | 0.038 | ( 0.045) | 0.007 | 0.031 |
| 213 | 17.75 | 0.17 | 0.038 | ( 0.045) | 0.007 | 0.031 |
| 214 | 17.83 | 0.13 | 0.030 | ( 0.044) | 0.005 | 0.025 |
| 215 | 17.92 | 0.13 | 0.030 | ( 0.044) | 0.005 | 0.025 |
| 216 | 18.00 | 0.13 | 0.030 | ( 0.044) | 0.005 | 0.025 |
| 217 | 18.08 | 0.13 | 0.030 | ( 0.044) | 0.005 | 0.025 |
| 218 | 18.17 | 0.13 | 0.030 | ( 0.044) | 0.005 | 0.025 |
| 219 | 18.25 | 0.13 | 0.030 | ( 0.043) | 0.005 | 0.025 |
| 220 | 18.33 | 0.13 | 0.030 | ( 0.043) | 0.005 | 0.025 |
| 221 | 18.42 | 0.13 | 0.030 | ( 0.043) | 0.005 | 0.025 |
| 222 | 18.50 | 0.13 | 0.030 | ( 0.043) | 0.005 | 0.025 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 223 | 18.58 | 0.10 | 0.023 | ( 0.043) | 0.004 | 0.019 |
| 224 | 18.67 | 0.10 | 0.023 | ( 0.042) | 0.004 | 0.019 |
| 225 | 18.75 | 0.10 | 0.023 | ( 0.042) | 0.004 | 0.019 |
| 226 | 18.83 | 0.07 | 0.015 | ( 0.042) | 0.003 | 0.012 |
| 227 | 18.92 | 0.07 | 0.015 | ( 0.042) | 0.003 | 0.012 |
| 228 | 19.00 | 0.07 | 0.015 | ( 0.042) | 0.003 | 0.012 |
| 229 | 19.08 | 0.10 | 0.023 | ( 0.041) | 0.004 | 0.019 |
| 230 | 19.17 | 0.10 | 0.023 | ( 0.041) | 0.004 | 0.019 |
| 231 | 19.25 | 0.10 | 0.023 | ( 0.041) | 0.004 | 0.019 |
| 232 | 19.33 | 0.13 | 0.030 | ( 0.041) | 0.005 | 0.025 |
| 233 | 19.42 | 0.13 | 0.030 | ( 0.041) | 0.005 | 0.025 |
| 234 | 19.50 | 0.13 | 0.030 | ( 0.040) | 0.005 | 0.025 |
| 235 | 19.58 | 0.10 | 0.023 | ( 0.040) | 0.004 | 0.019 |
| 236 | 19.67 | 0.10 | 0.023 | ( 0.040) | 0.004 | 0.019 |
| 237 | 19.75 | 0.10 | 0.023 | ( 0.040) | 0.004 | 0.019 |
| 238 | 19.83 | 0.07 | 0.015 | ( 0.040) | 0.003 | 0.012 |
| 239 | 19.92 | 0.07 | 0.015 | ( 0.040) | 0.003 | 0.012 |
| 240 | 20.00 | 0.07 | 0.015 | ( 0.039) | 0.003 | 0.012 |
| 241 | 20.08 | 0.10 | 0.023 | ( 0.039) | 0.004 | 0.019 |
| 242 | 20.17 | 0.10 | 0.023 | ( 0.039) | 0.004 | 0.019 |
| 243 | 20.25 | 0.10 | 0.023 | ( 0.039) | 0.004 | 0.019 |
| 244 | 20.33 | 0.10 | 0.023 | ( 0.039) | 0.004 | 0.019 |
| 245 | 20.42 | 0.10 | 0.023 | ( 0.038) | 0.004 | 0.019 |
| 246 | 20.50 | 0.10 | 0.023 | ( 0.038) | 0.004 | 0.019 |
| 247 | 20.58 | 0.10 | 0.023 | ( 0.038) | 0.004 | 0.019 |
| 248 | 20.67 | 0.10 | 0.023 | ( 0.038) | 0.004 | 0.019 |
| 249 | 20.75 | 0.10 | 0.023 | ( 0.038) | 0.004 | 0.019 |
| 250 | 20.83 | 0.07 | 0.015 | ( 0.038) | 0.003 | 0.012 |
| 251 | 20.92 | 0.07 | 0.015 | ( 0.038) | 0.003 | 0.012 |
| 252 | 21.00 | 0.07 | 0.015 | ( 0.037) | 0.003 | 0.012 |
| 253 | 21.08 | 0.10 | 0.023 | ( 0.037) | 0.004 | 0.019 |
| 254 | 21.17 | 0.10 | 0.023 | ( 0.037) | 0.004 | 0.019 |
| 255 | 21.25 | 0.10 | 0.023 | ( 0.037) | 0.004 | 0.019 |
| 256 | 21.33 | 0.07 | 0.015 | ( 0.037) | 0.003 | 0.012 |
| 257 | 21.42 | 0.07 | 0.015 | ( 0.037) | 0.003 | 0.012 |
| 258 | 21.50 | 0.07 | 0.015 | ( 0.037) | 0.003 | 0.012 |
| 259 | 21.58 | 0.10 | 0.023 | ( 0.036) | 0.004 | 0.019 |
| 260 | 21.67 | 0.10 | 0.023 | ( 0.036) | 0.004 | 0.019 |
| 261 | 21.75 | 0.10 | 0.023 | ( 0.036) | 0.004 | 0.019 |
| 262 | 21.83 | 0.07 | 0.015 | ( 0.036) | 0.003 | 0.012 |
| 263 | 21.92 | 0.07 | 0.015 | ( 0.036) | 0.003 | 0.012 |
| 264 | 22.00 | 0.07 | 0.015 | ( 0.036) | 0.003 | 0.012 |
| 265 | 22.08 | 0.10 | 0.023 | ( 0.036) | 0.004 | 0.019 |
| 266 | 22.17 | 0.10 | 0.023 | ( 0.036) | 0.004 | 0.019 |
| 267 | 22.25 | 0.10 | 0.023 | ( 0.035) | 0.004 | 0.019 |
| 268 | 22.33 | 0.07 | 0.015 | ( 0.035) | 0.003 | 0.012 |
| 269 | 22.42 | 0.07 | 0.015 | ( 0.035) | 0.003 | 0.012 |
| 270 | 22.50 | 0.07 | 0.015 | ( 0.035) | 0.003 | 0.012 |
| 271 | 22.58 | 0.07 | 0.015 | ( 0.035) | 0.003 | 0.012 |
| 272 | 22.67 | 0.07 | 0.015 | ( 0.035) | 0.003 | 0.012 |
| 273 | 22.75 | 0.07 | 0.015 | ( 0.035) | 0.003 | 0.012 |
| 274 | 22.83 | 0.07 | 0.015 | ( 0.035) | 0.003 | 0.012 |
| 275 | 22.92 | 0.07 | 0.015 | ( 0.035) | 0.003 | 0.012 |
| 276 | 23.00 | 0.07 | 0.015 | ( 0.035) | 0.003 | 0.012 |
| 277 | 23.08 | 0.07 | 0.015 | ( 0.034) | 0.003 | 0.012 |
| 278 | 23.17 | 0.07 | 0.015 | ( 0.034) | 0.003 | 0.012 |
| 279 | 23.25 | 0.07 | 0.015 | ( 0.034) | 0.003 | 0.012 |
| 280 | 23.33 | 0.07 | 0.015 | ( 0.034) | 0.003 | 0.012 |
| 281 | 23.42 | 0.07 | 0.015 | ( 0.034) | 0.003 | 0.012 |
| 282 | 23.50 | 0.07 | 0.015 | ( 0.034) | 0.003 | 0.012 |
| 283 | 23.58 | 0.07 | 0.015 | ( 0.034) | 0.003 | 0.012 |
| 284 | 23.67 | 0.07 | 0.015 | ( 0.034) | 0.003 | 0.012 |
| 285 | 23.75 | 0.07 | 0.015 | ( 0.034) | 0.003 | 0.012 |
| 286 | 23.83 | 0.07 | 0.015 | ( 0.034) | 0.003 | 0.012 |
| 287 | 23.92 | 0.07 | 0.015 | ( 0.034) | 0.003 | 0.012 |
| 288 | 24.00 | 0.07 | 0.015 | ( 0.034) | 0.003 | 0.012 |

(Loss Rate Not Used)
Sum = 100.0 Sum = 18.7
Flood volume = Effective rainfall 1.56(In)
times area 36.8(Ac.)/[(In)/(Ft.)] = 4.8(Ac.Ft)
Total soil loss = 0.34(In)
Total soil loss = 1.049(Ac.Ft)
Total rainfall = 1.90(In)
Flood volume = 208108.9 Cubic Feet
Total soil loss = 45682.4 Cubic Feet

---

Peak flow rate of this hydrograph = 7.862(CFS)

---

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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 | 0.0014 | 0.20 | Q | | | | |
| 0+10 | 0.0041 | 0.40 | VQ | | | | |
| 0+15 | 0.0072 | 0.44 | VQ | | | | |
| 0+20 | 0.0110 | 0.56 | V Q | | | | |
| 0+25 | 0.0156 | 0.66 | V Q | | | | |
| 0+30 | 0.0203 | 0.68 | V Q | | | | |
| 0+35 | 0.0250 | 0.69 | V Q | | | | |
| 0+40 | 0.0298 | 0.69 | V Q | | | | |
| 0+45 | 0.0346 | 0.69 | V Q | | | | |
| 0+50 | 0.0400 | 0.79 | V Q | | | | |
| 0+55 | 0.0462 | 0.89 | V Q | | | | |
| 1+ 0 | 0.0525 | 0.91 | V Q | | | | |
| 1+ 5 | 0.0582 | 0.82 | V Q | | | | |
| 1+10 | 0.0631 | 0.72 | V Q | | | | |
| 1+15 | 0.0680 | 0.70 | V Q | | | | |
| 1+20 | 0.0728 | 0.70 | V Q | | | | |
| 1+25 | 0.0776 | 0.69 | V Q | | | | |
| 1+30 | 0.0823 | 0.69 | V Q | | | | |
| 1+35 | 0.0871 | 0.69 | V Q | | | | |
| 1+40 | 0.0919 | 0.69 | V Q | | | | |
| 1+45 | 0.0967 | 0.69 | V Q | | | | |
| 1+50 | 0.1021 | 0.79 | V Q | | | | |
| 1+55 | 0.1083 | 0.89 | V Q | | | | |
| 2+ 0 | 0.1146 | 0.91 | V Q | | | | |
| 2+ 5 | 0.1209 | 0.92 | \|V Q | | | | |
| 2+10 | 0.1273 | 0.92 | \|V Q | | | | |
| 2+15 | 0.1337 | 0.92 | \|V Q | | | | |
| 2+20 | 0.1401 | 0.92 | \|V Q | | | | |
| 2+25 | 0.1464 | 0.92 | \|V Q | | | | |
| 2+30 | 0.1528 | 0.92 | \|V Q | | | | |
| 2+35 | 0.1598 | 1.02 | \|V Q | | | | |
| 2+40 | 0.1676 | 1.12 | \|V Q | | | | |
| 2+45 | 0.1755 | 1.15 | \|V Q | | | | |
| 2+50 | 0.1834 | 1.15 | \|V Q | | | | |
| 2+55 | 0.1914 | 1.16 | \|V Q | | | | |
| 3+ 0 | 0.1994 | 1.16 | \|V Q | | | | |
| 3+ 5 | 0.2073 | 1.16 | \|V Q | | | | |
| 3+10 | 0.2153 | 1.16 | \|V Q | | | | |
| 3+15 | 0.2232 | 1.16 | \|V Q | | | | |
| 3+20 | 0.2312 | 1.16 | \|V Q | | | | |
| 3+25 | 0.2392 | 1.16 | \| V Q | | | | |
| 3+30 | 0.2471 | 1.16 | \| V Q | | | | |
| 3+35 | 0.2551 | 1.16 | \| V Q | | | | |
| 3+40 | 0.2631 | 1.16 | \| V Q | | | | |
| 3+45 | 0.2710 | 1.16 | \| V Q | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3+50 | 0.2797 | 1.26 | V Q | | | |
| 3+55 | 0.2890 | 1.36 | V Q | | | |
| 4+ 0 | 0.2985 | 1.38 | V Q | | | |
| 4+ 5 | 0.3080 | 1.38 | V Q | | | |
| 4+10 | 0.3176 | 1.39 | V Q | | | |
| 4+15 | 0.3271 | 1.39 | V Q | | | |
| 4+20 | 0.3374 | 1.49 | V Q | | | |
| 4+25 | 0.3483 | 1.59 | V Q | | | |
| 4+30 | 0.3594 | 1.61 | V Q | | | |
| 4+35 | 0.3705 | 1.62 | V Q | | | |
| 4+40 | 0.3817 | 1.62 | V Q | | | |
| 4+45 | 0.3928 | 1.62 | V Q | | | |
| 4+50 | 0.4046 | 1.72 | V Q | | | |
| 4+55 | 0.4172 | 1.82 | V Q | | | |
| 5+ 0 | 0.4298 | 1.84 | V Q | | | |
| 5+ 5 | 0.4412 | 1.65 | V Q | | | |
| 5+10 | 0.4512 | 1.45 | V Q | | | |
| 5+15 | 0.4609 | 1.41 | V Q | | | |
| 5+20 | 0.4711 | 1.49 | V Q | | | |
| 5+25 | 0.4821 | 1.59 | V Q | | | |
| 5+30 | 0.4931 | 1.61 | V Q | | | |
| 5+35 | 0.5050 | 1.72 | V Q | | | |
| 5+40 | 0.5175 | 1.82 | V Q | | | |
| 5+45 | 0.5301 | 1.84 | V Q | | | |
| 5+50 | 0.5429 | 1.85 | V Q | | | |
| 5+55 | 0.5556 | 1.85 | V Q | | | |
| 6+ 0 | 0.5684 | 1.85 | V Q | | | |
| 6+ 5 | 0.5818 | 1.95 | V Q | | | |
| 6+10 | 0.5959 | 2.05 | V Q | | | |
| 6+15 | 0.6101 | 2.07 | V Q | | | |
| 6+20 | 0.6245 | 2.08 | V Q | | | |
| 6+25 | 0.6388 | 2.08 | V Q | | | |
| 6+30 | 0.6531 | 2.08 | V Q | | | |
| 6+35 | 0.6681 | 2.18 | V Q | | | |
| 6+40 | 0.6839 | 2.28 | V Q | | | |
| 6+45 | 0.6997 | 2.30 | V Q | | | |
| 6+50 | 0.7156 | 2.31 | V Q | | | |
| 6+55 | 0.7315 | 2.31 | V Q | | | |
| 7+ 0 | 0.7475 | 2.31 | V Q | | | |
| 7+ 5 | 0.7634 | 2.31 | V Q | | | |
| 7+10 | 0.7793 | 2.31 | V Q | | | |
| 7+15 | 0.7952 | 2.31 | V Q | | | |
| 7+20 | 0.8118 | 2.41 | V Q | | | |
| 7+25 | 0.8291 | 2.51 | V Q | | | |
| 7+30 | 0.8466 | 2.53 | V Q | | | |
| 7+35 | 0.8648 | 2.64 | V Q | | | |
| 7+40 | 0.8837 | 2.74 | V Q | | | |
| 7+45 | 0.9027 | 2.76 | V Q | | | |
| 7+50 | 0.9225 | 2.87 | V Q | | | |
| 7+55 | 0.9430 | 2.97 | V Q | | | |
| 8+ 0 | 0.9636 | 3.00 | V Q | | | |
| 8+ 5 | 0.9856 | 3.20 | V Q | | | |
| 8+10 | 1.0091 | 3.41 | V Q | | | |
| 8+15 | 1.0328 | 3.45 | V Q | | | |
| 8+20 | 1.0567 | 3.46 | V Q | | | |
| 8+25 | 1.0806 | 3.47 | V Q | | | |
| 8+30 | 1.1045 | 3.47 | V Q | | | |
| 8+35 | 1.1290 | 3.57 | V Q | | | |
| 8+40 | 1.1543 | 3.67 | V Q | | | |
| 8+45 | 1.1797 | 3.69 | V Q | | | |
| 8+50 | 1.2059 | 3.80 | V Q | | | |
| 8+55 | 1.2327 | 3.90 | V Q | | | |
| 9+ 0 | 1.2597 | 3.92 | V Q | | | |
| 9+ 5 | 1.2881 | 4.13 | V Q | | | |
| 9+10 | 1.3180 | 4.33 | V Q | | | |
| 9+15 | 1.3481 | 4.37 | V Q | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 9+20 | 1.3790 | 4.49 | \| | \|V Q \| | \| | \| |
| 9+25 | 1.4106 | 4.59 | \| | \|V Q \| | \| | \| |
| 9+30 | 1.4424 | 4.61 | \| | \| V Q \| | \| | \| |
| 9+35 | 1.4749 | 4.72 | \| | \| V Q \| | \| | \| |
| 9+40 | 1.5081 | 4.82 | \| | \| V Q\| | \| | \| |
| 9+45 | 1.5415 | 4.85 | \| | \| V Q\| | \| | \| |
| 9+50 | 1.5756 | 4.95 | \| | \| V Q\| | \| | \| |
| 9+55 | 1.6104 | 5.06 | \| | \| V Q | \| | \| |
| 10+ 0 | 1.6454 | 5.08 | \| | \| V Q | \| | \| |
| 10+ 5 | 1.6756 | 4.39 | \| | \| V Q \| | \| | \| |
| 10+10 | 1.7010 | 3.69 | \| | \| Q \| | \| | \| |
| 10+15 | 1.7254 | 3.54 | \| | \| Q \| | \| | \| |
| 10+20 | 1.7494 | 3.49 | \| | \| QV \| | \| | \| |
| 10+25 | 1.7733 | 3.47 | \| | \| QV \| | \| | \| |
| 10+30 | 1.7972 | 3.47 | \| | \| Q V \| | \| | \| |
| 10+35 | 1.8245 | 3.96 | \| | \| Q \| | \| | \| |
| 10+40 | 1.8553 | 4.47 | \| | \| V Q \| | \| | \| |
| 10+45 | 1.8868 | 4.57 | \| | \| V Q \| | \| | \| |
| 10+50 | 1.9185 | 4.61 | \| | \| V Q \| | \| | \| |
| 10+55 | 1.9504 | 4.62 | \| | \| V Q \| | \| | \| |
| 11+ 0 | 1.9822 | 4.62 | \| | \| V Q \| | \| | \| |
| 11+ 5 | 2.0134 | 4.53 | \| | \| V Q \| | \| | \| |
| 11+10 | 2.0439 | 4.42 | \| | \| Q \| | \| | \| |
| 11+15 | 2.0742 | 4.40 | \| | \| Q \| | \| | \| |
| 11+20 | 2.1045 | 4.40 | \| | \| Q \| | \| | \| |
| 11+25 | 2.1347 | 4.39 | \| | \| Q \| | \| | \| |
| 11+30 | 2.1650 | 4.39 | \| | \| QV \| | \| | \| |
| 11+35 | 2.1939 | 4.19 | \| | \| Q V \| | \| | \| |
| 11+40 | 2.2214 | 3.99 | \| | \| Q V \| | \| | \| |
| 11+45 | 2.2486 | 3.95 | \| | \| Q V \| | \| | \| |
| 11+50 | 2.2764 | 4.04 | \| | \| Q V\| | \| | \| |
| 11+55 | 2.3049 | 4.13 | \| | \| Q V\| | \| | \| |
| 12+ 0 | 2.3334 | 4.15 | \| | \| Q V\| | \| | \| |
| 12+ 5 | 2.3669 | 4.85 | \| | \| Q\| | \| | \| |
| 12+10 | 2.4052 | 5.56 | \| | \| V Q | \| | \| |
| 12+15 | 2.4445 | 5.71 | \| | \| V Q | \| | \| |
| 12+20 | 2.4848 | 5.86 | \| | \| V Q | \| | \| |
| 12+25 | 2.5260 | 5.98 | \| | \| \|V Q | \| | \| |
| 12+30 | 2.5674 | 6.00 | \| | \| \|V Q | \| | \| |
| 12+35 | 2.6101 | 6.21 | \| | \| \|V Q | \| | \| |
| 12+40 | 2.6543 | 6.41 | \| | \| \| V Q | \| | \| |
| 12+45 | 2.6987 | 6.45 | \| | \| \| V Q | \| | \| |
| 12+50 | 2.7440 | 6.57 | \| | \| \| V Q | \| | \| |
| 12+55 | 2.7899 | 6.67 | \| | \| \| V Q | \| | \| |
| 13+ 0 | 2.8360 | 6.70 | \| | \| \| V Q | \| | \| |
| 13+ 5 | 2.8856 | 7.20 | \| | \| \| V Q \| | \| | \| |
| 13+10 | 2.9387 | 7.71 | \| | \| \| V Q | \| | \| |
| 13+15 | 2.9925 | 7.81 | \| | \| \| V \|Q | \| | \| |
| 13+20 | 3.0465 | 7.85 | \| | \| \| V \|Q | \| | \| |
| 13+25 | 3.1007 | 7.86 | \| | \| \| V \|Q | \| | \| |
| 13+30 | 3.1548 | 7.86 | \| | \| \| V \|Q | \| | \| |
| 13+35 | 3.2014 | 6.77 | \| | \| \| VQ \| | \| | \| |
| 13+40 | 3.2404 | 5.66 | \| | \| \| Q V \| | \| | \| |
| 13+45 | 3.2779 | 5.44 | \| | \| \|Q V \| | \| | \| |
| 13+50 | 3.3147 | 5.35 | \| | \| \|Q V \| | \| | \| |
| 13+55 | 3.3513 | 5.32 | \| | \| \|Q V \| | \| | \| |
| 14+ 0 | 3.3880 | 5.32 | \| | \| \|Q V \| | \| | \| |
| 14+ 5 | 3.4273 | 5.72 | \| | \| \| Q V \| | \| | \| |
| 14+10 | 3.4695 | 6.12 | \| | \| \| Q V\| | \| | \| |
| 14+15 | 3.5122 | 6.20 | \| | \| \| Q V\| | \| | \| |
| 14+20 | 3.5544 | 6.13 | \| | \| \| Q V\| | \| | \| |
| 14+25 | 3.5960 | 6.04 | \| | \| \| Q V | \| | \| |
| 14+30 | 3.6375 | 6.02 | \| | \| \| Q V | \| | \| |
| 14+35 | 3.6789 | 6.01 | \| | \| \| Q V | \| | \| |
| 14+40 | 3.7203 | 6.01 | \| | \| \| Q \|V | \| | \| |
| 14+45 | 3.7617 | 6.01 | \| | \| \| Q \|V | \| | \| |

```
14+50    3.8025    5.91 |      |      | Q    |V      |
14+55    3.8425    5.81 |      |      | Q    | V     |
15+ 0    3.8824    5.79 |      |      | Q    | V     |
15+ 5    3.9215    5.68 |      |      | Q    | V     |
15+10    3.9599    5.58 |      |      | Q    |  V    |
15+15    3.9982    5.56 |      |      | Q    |  V    |
15+20    4.0358    5.45 |      |      |Q     |  V    |
15+25    4.0726    5.35 |      |      |Q     |   V   |
15+30    4.1093    5.33 |      |      |Q     |   V   |
15+35    4.1433    4.92 |      |     Q|      |   V   |
15+40    4.1744    4.52 |      |    Q |      |   V   |
15+45    4.2049    4.44 |      |    Q |      |   V   |
15+50    4.2353    4.40 |      |    Q |      |   V   |
15+55    4.2655    4.39 |      |    Q |      |   V   |
16+ 0    4.2958    4.39 |      |    Q |      |   V   |
16+ 5    4.3158    2.91 |      |Q     |      |   V   |
16+10    4.3254    1.39 |   Q  |      |      |   V   |
16+15    4.3329    1.09 |   Q  |      |      |   V   |
16+20    4.3395    0.96 |  Q   |      |      |   V   |
16+25    4.3459    0.92 |  Q   |      |      |   V   |
16+30    4.3522    0.92 |  Q   |      |      |   V   |
16+35    4.3579    0.83 |  Q   |      |      |   V   |
16+40    4.3629    0.72 | Q    |      |      |   V   |
16+45    4.3678    0.70 | Q    |      |      |   V   |
16+50    4.3726    0.70 | Q    |      |      |   V   |
16+55    4.3773    0.69 | Q    |      |      |   V   |
17+ 0    4.3821    0.69 | Q    |      |      |   V   |
17+ 5    4.3883    0.89 |  Q   |      |      |   V   |
17+10    4.3958    1.09 |   Q  |      |      |   V   |
17+15    4.4036    1.13 |   Q  |      |      |   V   |
17+20    4.4115    1.15 |   Q  |      |      |   V   |
17+25    4.4195    1.16 |   Q  |      |      |    V  |
17+30    4.4275    1.16 |   Q  |      |      |    V  |
17+35    4.4354    1.16 |   Q  |      |      |    V  |
17+40    4.4434    1.16 |   Q  |      |      |    V  |
17+45    4.4513    1.16 |   Q  |      |      |    V  |
17+50    4.4586    1.06 |   Q  |      |      |    V  |
17+55    4.4652    0.96 |  Q   |      |      |    V  |
18+ 0    4.4717    0.94 |  Q   |      |      |    V  |
18+ 5    4.4780    0.93 |  Q   |      |      |    V  |
18+10    4.4844    0.92 |  Q   |      |      |    V  |
18+15    4.4908    0.92 |  Q   |      |      |    V  |
18+20    4.4972    0.92 |  Q   |      |      |    V  |
18+25    4.5035    0.92 |  Q   |      |      |    V  |
18+30    4.5099    0.92 |  Q   |      |      |    V  |
18+35    4.5156    0.83 |  Q   |      |      |    V  |
18+40    4.5206    0.72 | Q    |      |      |    V  |
18+45    4.5254    0.70 | Q    |      |      |    V  |
18+50    4.5295    0.60 | Q    |      |      |    V  |
18+55    4.5329    0.49 |Q     |      |      |    V  |
19+ 0    4.5362    0.47 |Q     |      |      |    V  |
19+ 5    4.5401    0.56 | Q    |      |      |    V  |
19+10    4.5446    0.66 | Q    |      |      |    V  |
19+15    4.5493    0.68 | Q    |      |      |    V  |
19+20    4.5548    0.79 |  Q   |      |      |    V  |
19+25    4.5609    0.89 |  Q   |      |      |    V  |
19+30    4.5672    0.91 |  Q   |      |      |    V  |
19+35    4.5729    0.82 |  Q   |      |      |    V  |
19+40    4.5779    0.72 | Q    |      |      |    V  |
19+45    4.5828    0.70 | Q    |      |      |    V  |
19+50    4.5869    0.60 | Q    |      |      |    V  |
19+55    4.5903    0.49 |Q     |      |      |    V  |
20+ 0    4.5935    0.47 |Q     |      |      |    V  |
20+ 5    4.5974    0.56 | Q    |      |      |    V  |
20+10    4.6020    0.66 | Q    |      |      |    V  |
20+15    4.6067    0.68 | Q    |      |      |    V  |
```

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 20+20 | 4.6114 | 0.69 | \| Q | \| | \| | \| | V \| |
| 20+25 | 4.6162 | 0.69 | \| Q | \| | \| | \| | V \| |
| 20+30 | 4.6210 | 0.69 | \| Q | \| | \| | \| | V \| |
| 20+35 | 4.6258 | 0.69 | \| Q | \| | \| | \| | V \| |
| 20+40 | 4.6305 | 0.69 | \| Q | \| | \| | \| | V \| |
| 20+45 | 4.6353 | 0.69 | \| Q | \| | \| | \| | V \| |
| 20+50 | 4.6394 | 0.59 | \| Q | \| | \| | \| | V \| |
| 20+55 | 4.6428 | 0.49 | \|Q | \| | \| | \| | V \| |
| 21+ 0 | 4.6461 | 0.47 | \|Q | \| | \| | \| | V \| |
| 21+ 5 | 4.6500 | 0.56 | \| Q | \| | \| | \| | V \| |
| 21+10 | 4.6545 | 0.66 | \| Q | \| | \| | \| | V \| |
| 21+15 | 4.6592 | 0.68 | \| Q | \| | \| | \| | V\| |
| 21+20 | 4.6633 | 0.59 | \| Q | \| | \| | \| | V\| |
| 21+25 | 4.6667 | 0.49 | \|Q | \| | \| | \| | V\| |
| 21+30 | 4.6700 | 0.47 | \|Q | \| | \| | \| | V\| |
| 21+35 | 4.6739 | 0.56 | \| Q | \| | \| | \| | V\| |
| 21+40 | 4.6784 | 0.66 | \| Q | \| | \| | \| | V\| |
| 21+45 | 4.6831 | 0.68 | \| Q | \| | \| | \| | V\| |
| 21+50 | 4.6872 | 0.59 | \| Q | \| | \| | \| | V\| |
| 21+55 | 4.6906 | 0.49 | \|Q | \| | \| | \| | V\| |
| 22+ 0 | 4.6939 | 0.47 | \|Q | \| | \| | \| | V\| |
| 22+ 5 | 4.6977 | 0.56 | \| Q | \| | \| | \| | V\| |
| 22+10 | 4.7023 | 0.66 | \| Q | \| | \| | \| | V\| |
| 22+15 | 4.7070 | 0.68 | \| Q | \| | \| | \| | V\| |
| 22+20 | 4.7111 | 0.59 | \| Q | \| | \| | \| | V\| |
| 22+25 | 4.7145 | 0.49 | \|Q | \| | \| | \| | V\| |
| 22+30 | 4.7177 | 0.47 | \|Q | \| | \| | \| | V\| |
| 22+35 | 4.7209 | 0.47 | \|Q | \| | \| | \| | V\| |
| 22+40 | 4.7241 | 0.46 | \|Q | \| | \| | \| | V\| |
| 22+45 | 4.7273 | 0.46 | \|Q | \| | \| | \| | V\| |
| 22+50 | 4.7305 | 0.46 | \|Q | \| | \| | \| | V\| |
| 22+55 | 4.7337 | 0.46 | \|Q | \| | \| | \| | V\| |
| 23+ 0 | 4.7369 | 0.46 | \|Q | \| | \| | \| | V\| |
| 23+ 5 | 4.7401 | 0.46 | \|Q | \| | \| | \| | V\| |
| 23+10 | 4.7432 | 0.46 | \|Q | \| | \| | \| | V\| |
| 23+15 | 4.7464 | 0.46 | \|Q | \| | \| | \| | V\| |
| 23+20 | 4.7496 | 0.46 | \|Q | \| | \| | \| | V\| |
| 23+25 | 4.7528 | 0.46 | \|Q | \| | \| | \| | V\| |
| 23+30 | 4.7560 | 0.46 | \|Q | \| | \| | \| | V\| |
| 23+35 | 4.7592 | 0.46 | \|Q | \| | \| | \| | V\| |
| 23+40 | 4.7624 | 0.46 | \|Q | \| | \| | \| | V\| |
| 23+45 | 4.7655 | 0.46 | \|Q | \| | \| | \| | V\| |
| 23+50 | 4.7687 | 0.46 | \|Q | \| | \| | \| | V\| |
| 23+55 | 4.7719 | 0.46 | \|Q | \| | \| | \| | V\| |
| 24+ 0 | 4.7751 | 0.46 | \|Q | \| | \| | \| | V\| |
| 24+ 5 | 4.7769 | 0.26 | \|Q | \| | \| | \| | V\| |
| 24+10 | 4.7773 | 0.06 | Q | \| | \| | \| | V\| |
| 24+15 | 4.7775 | 0.02 | Q | \| | \| | \| | V\| |
| 24+20 | 4.7775 | 0.01 | Q | \| | \| | \| | V |

---

## STAGE-STORAGE-OUTFLOW

EXCERPT FROM P-WQMP

*The project site does not meet the HCOC exemptions in SectionF.1, therefore CMP chamber systems with orifice outlets provided will mitigate flows to be within 10% of the pre-development flows for the 2-year, 24-hour storm event to meet the condition C in Section F.2. There are no offsite flows from the perimeter streets entering the project site. Therefore, the proposed CMP chamber and orifice systems will only mitigate onsite flows. The 2-year, 24-hour unit hydrograph was analyzed for the existing and proposed condition to determine the peak flow rates and volumes. For preliminary sizing during this entitlement phase, the difference in existing and proposed volumes was used to size onsite CMP chamber systems During final engineering, a routing analysis will need to be performed to determine the required orifice outlet sizing and to demonstrate that the proposed CMP chamber system has substantial volume needed to mitigate flows to existing condition flow rate.*

**Table** Hydrologic Conditions of Concern Mitigation Summary

| | **2 year – 24 hour storm event** | | |
|---|---|---|---|
| | **Existing** | **Proposed** | **Difference** |
| **Peak Flow Rate (cfs)** | *4.2* | *7.9* | * |
| **Volume (Cubic Feet)** | *44,887* | *208,109* | *163,222* |

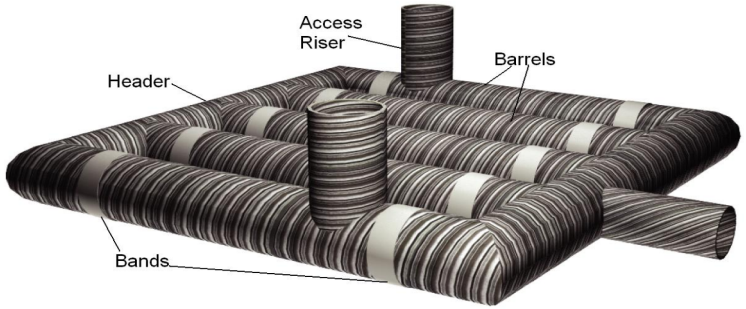
**More information will be provided in final engineering.*

# DYODS™
**Design Your Own Detention System**

CONTECH CMP DETENTION SYSTEMS

CONTECH CONSTRUCTION PRODUCTS INC.

For design assistance, drawings,
and pricing send completed worksheet to:
**dyods@contech-cpi.com**




## Project Summary

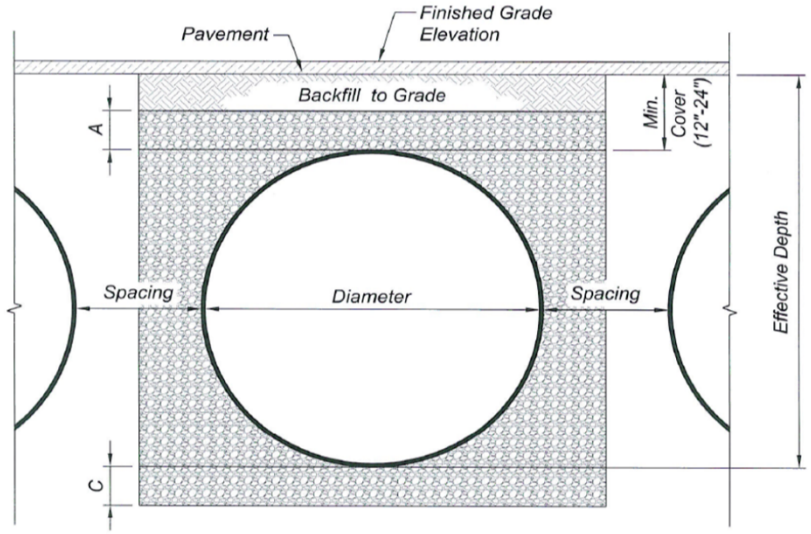
| | |
|---|---|
| Date: | 10/20/2022 |
| Project Name: | Capstone Menifee (Ethanac and Byers) |
| City / County: | Menifee |
| State: | CA |
| Designed By: | ABE |
| Company: | Albert A. Webb Associates |
| Telephone: | (951) 686-1070 |

**Enter Information in Blue Cells**

## Corrugated Metal Pipe Calculator

| | |
|---|---|
| Storage Volume Required (cf): | 225,985* |
| Limiting Width (ft): | 100.00 |
| Invert Depth Below Asphalt (ft): | 11.00 |
| Solid or Perforated Pipe: | Perforated |
| Shape Or Diameter (in): | 96 |
| Number Of Headers: | 2 |
| Spacing between Barrels (ft): | 3.00 |
| Stone Width Around Perimeter of System (ft): | 2 |
| Depth A: Porous Stone Above Pipe (in): | 6 |
| Depth C: Porous Stone Below Pipe (in): | 6 |
| Stone Porosity (0 to 40%): | 40 |

50.27 $ft^2$ Pipe Area




## System Sizing

| | | | |
|---|---|---|---|
| Pipe Storage: | 163,011 | cf | |
| Porous Stone Storage: | 64,036 | cf | |
| Total Storage Provided: | 227,047 | cf | 100.5% Of Required Storage |
| Number of Barrels: | 9 | barrels | |
| Length per Barrel: | 339.0 | ft | |
| Length Per Header: | 96.0 | ft | |
| Rectangular Footprint (W x L): | 100. ft x 359. ft | | |

## CONTECH Materials

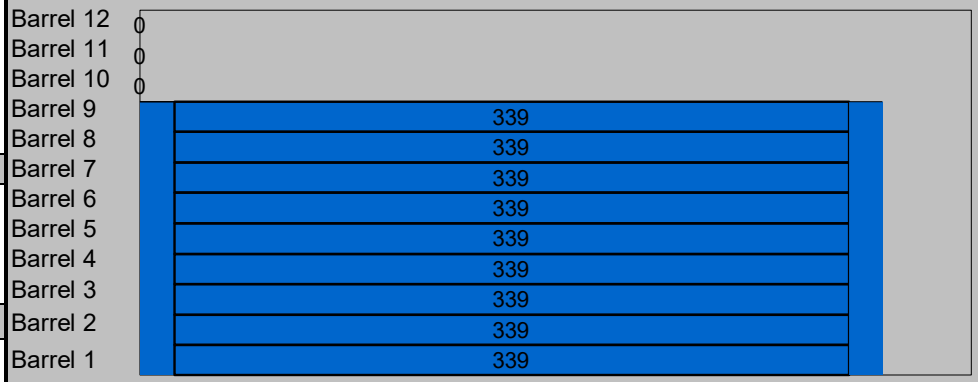
| | | |
|---|---|---|
| Total CMP Footage: | 3,243 | ft |
| Approximate Total Pieces: | 143 | pcs |
| Approximate Coupling Bands: | 150 | bands |
| Approximate Truckloads: | 72 | trucks |

## Construction Quantities**

| | | |
|---|---|---|
| Total Excavation: | 14626 | cy |
| Porous Stone Backfill For Storage: | 5929 | cy stone |
| Backfill to Grade Excluding Stone: | 2659 | cy fill |

***Construction quantities are approximate and should be verified upon final design*

## System Layout




**Barrel Footage (w/o headers)**

**Please note: STORAGE VOLUME = VBMP + [V(UH,proposed) - V(UH,existing)]*
*VOLUME = 62763 + 163,222 = 225,985*

## UNIT HYDROGRAPH HYDROLOGY MAPS

LEGEND

- WATERSHED BOUNDARY
- WATER COURSE
- FLOW DIRECTION
- ### / XXXX.X — NODE ELEVATION

WHEAT STREET

HEAT ST

100
1456.3

101
1431.3

KUFFEL ROAD

ETHANAC ROAD

BYERS ROAD

EXISTING AREA
TOTAL AREA= 36.8 AC
L= 1320 FT
LCA= 640 FT
ΔH= 25 FT

1480

1480

# ONSITE UNIT HYDROGRAPH
# UNDEVELOPED CONDITION HYDROLOGY MAP

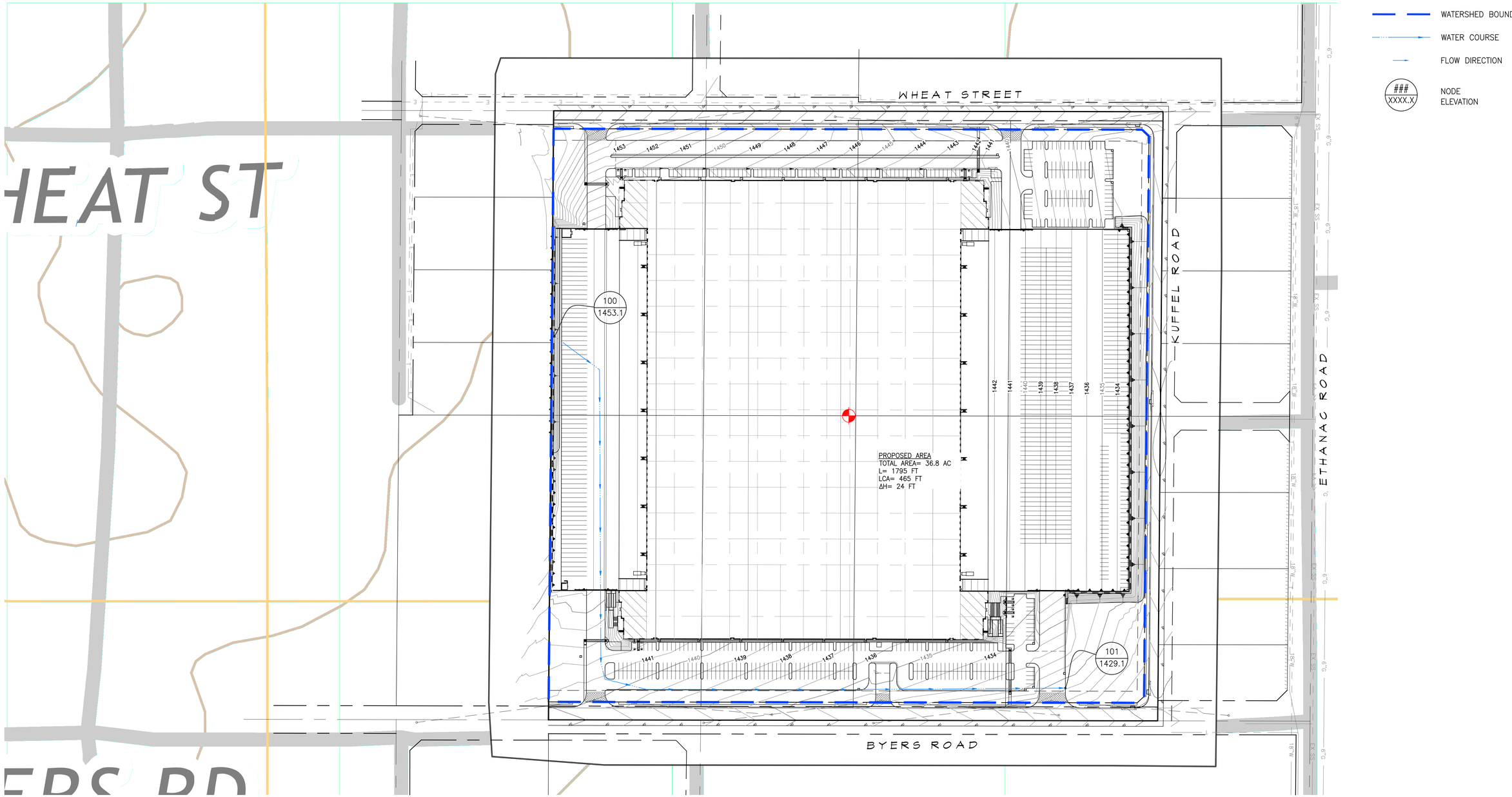
1" = 100'
100 50 0 100 200 300


ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256


W.O. 2021-0035
SHEET 1 OF 2 SHEETS

PRELIMINARY

H:\2021\21-0035\DRAINAGE\HYD\DWG FOLDER\21-0035-C-EX-UH.DWG 10/18/2022 6:15:16 PM




# ONSITE UNIT HYDROGRAPH
# DEVELOPED CONDITION HYDROLOGY MAP

PRELIMINARY

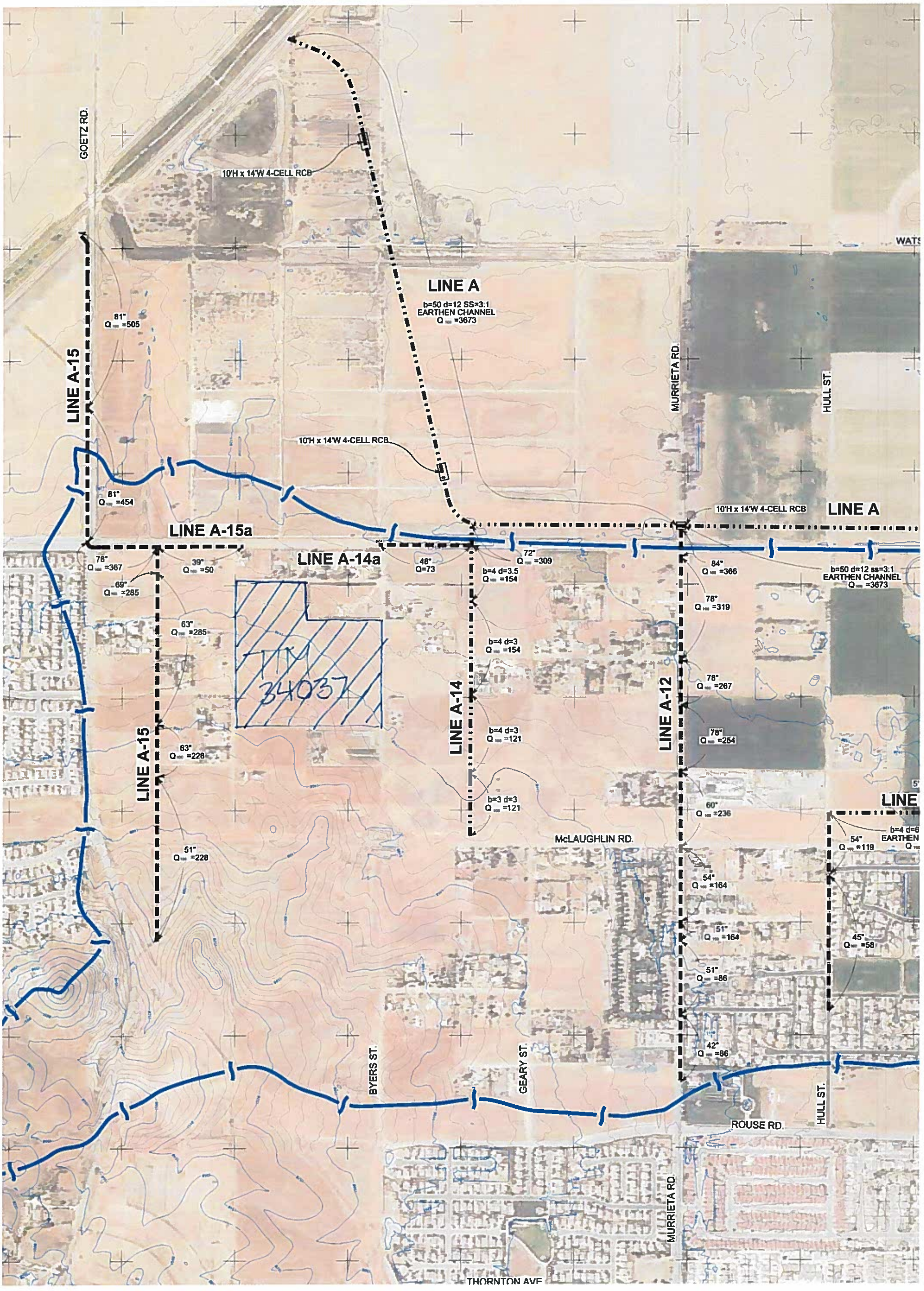
ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE, CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

W.O. 2021-0035
SHEET 2 OF 2 SHEETS

H:\2021\21-0035\DRAINAGE\HYD\DWG FOLDER\21-0035-C-PR-UH.DWG 10/18/2022 6:20:33 PM

# APPENDIX D – REFERENCES

## MDP STORM DRAIN MAP

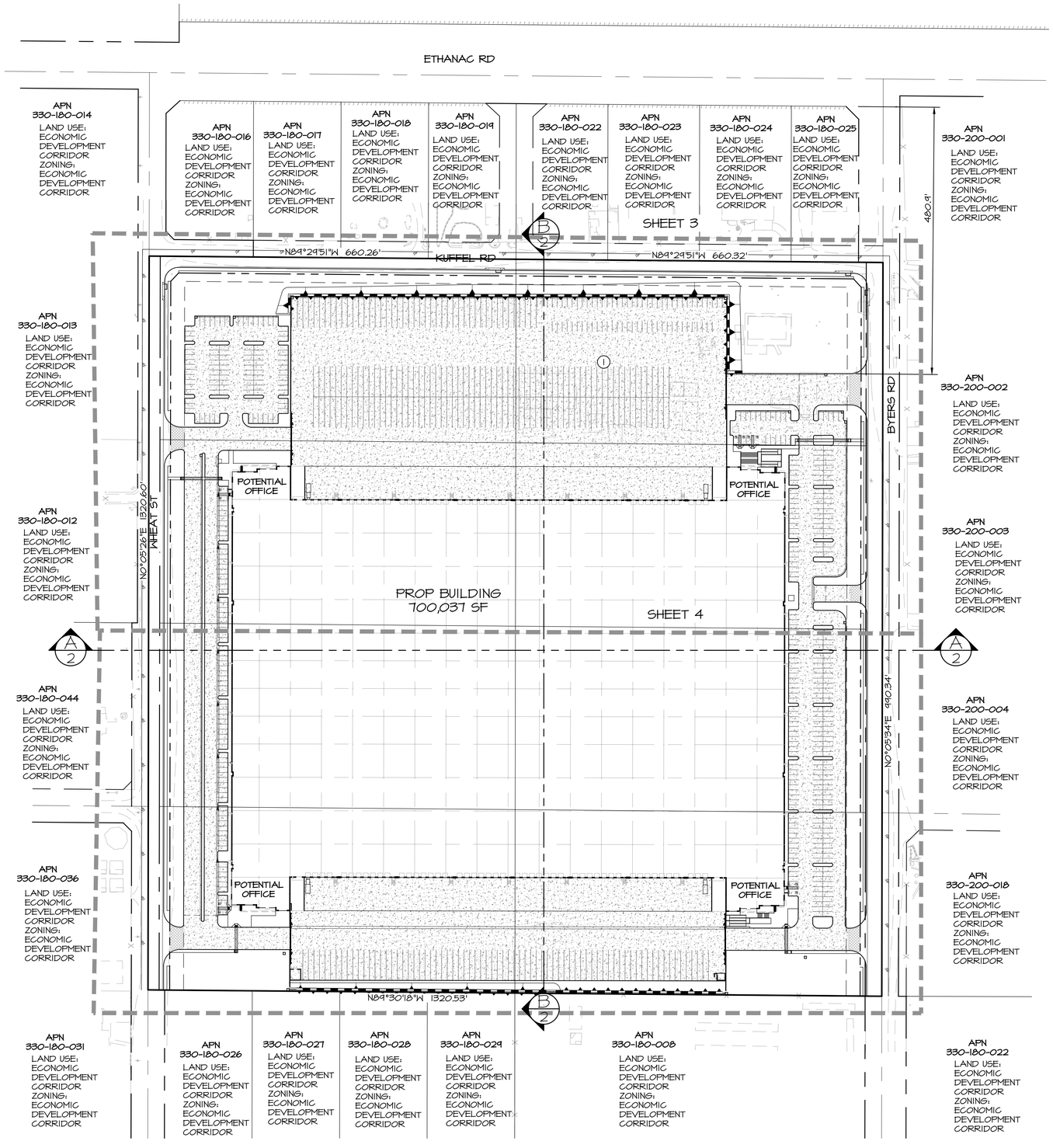

GOETZ RD.
10'H x 14'W 4-CELL RCB
LINE A
b=50 d=12 SS=3:1
EARTHEN CHANNEL
Q100 =3673
81"
Q100 =505
LINE A-15
10'H x 14'W 4-CELL RCB
81"
Q100 =454
LINE A-15a
LINE A-14a
78"
Q100 =367
39"
Q100 =50
69"
Q100 =285
48"
Q=73
72"
Q100 =309
b=4 d=3.5
Q100 =154
10'H x 14'W 4-CELL RCB
LINE A
84"
Q100 =366
b=50 d=12 ss=3:1
EARTHEN CHANNEL
Q100 =3673
78"
Q100 =319
63"
Q100 =285
b=4 d=3
Q100 =154
APN
340371
LINE A-14
LINE A-12
78"
Q100 =267
78"
Q100 =254
LINE A-15
63"
Q100 =228
b=4 d=3
Q100 =121
b=3 d=3
Q100 =121
60"
Q100 =236
McLAUGHLIN RD.
54"
Q100 =119
b=4 d=6
EARTHEN
51"
Q100 =228
54"
Q100 =164
51"
Q100 =86
45"
Q100 =58
42"
Q100 =86
BYERS ST.
GEARY ST.
HULL ST.
ROUSE RD.
MURRIETA RD.
THORNTON AVE
MURRIETA RD.
HULL ST.

## PLOT PLAN (PLN21-0370)

IN THE CITY OF MENIFEE, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

# PLOT PLAN NO. PLN 21-0370

LOCATED IN SECTION 17, T. 5 S., R. 3 W., S.B.M.




## GENERAL INFORMATION

1. ALL IMPROVEMENTS SHALL BE PER SCHEDULE "B" SUBDIVISION, ORDINANCE 460.
2. THOMAS BROS. MAP BOOK PAGE 837 GRID: H2 & J2.
3. THIS MAP INCLUDES THE ENTIRE CONTIGUOUS OWNERSHIP OF THE LAND DIVIDER.
4. PROJECT IS NOT WITHIN A SPECIFIC PLAN.
5. EASEMENTS OF RECORD ARE PLOTTED HEREON.
6. PROJECT IS NOT WITHIN COMMUNITY SERVICES DISTRICT.
7. THERE IS AN EXISTING WELL ON THE PROPERTY THAT IS PROPOSED TO BE ABANDONED AND CAPPED.
8. TOPOGRAPHY FLOWN BY INLAND AERIAL SURVEYS, INC.
9. SETBACKS OF SLOPES TO PROPERTY LINES SHALL CONFORM TO ORDINANCE 457 REQUIREMENTS.
10. ALL SLOPES ARE 2:1 RATIO, UNLESS OTHERWISE NOTED.
11. LAND IS NOT WITHIN A SPECIAL STUDIES ZONE.
12. LAND IS SUBJECT TO VERY LOW LIQUEFACTION.
13. NO SUBSURFACE SEPTIC SEWAGE DISPOSAL IS INTENDED.
14. EXISTING SUBSURFACE SEPTIC SEWER IS PROPOSED TO BE REMOVED.
15. THERE ARE EXISTING STRUCTURES ON THE SITE TO BE REMOVED
16. THERE IS AN EXISTING DWELLING ON THE SITE THAT WILL BE REMOVED.
17. THE PROJECT WILL COMPLY WITH NPDES REQUIREMENTS AS REQUIRED BY NPDES SUPPLEMENT "A".
18. FLOOD ZONE X, AREA OF LOW FLOODING PER FEMA PANEL 06065C2055H

## UTILITY PROVIDERS

| | |
|---|---|
| WATER | EASTERN MUNICIPAL WATER DISTRICT |
| SEWER | EASTERN MUNICIPAL WATER DISTRICT |
| ELECTRICAL | SOUTHERN CALIFORNIA EDISON |
| GAS | SOUTHERN CALIFORNIA GAS COMPANY |
| TELEPHONE | FRONTIER COMMUNICATIONS |
| CABLE T.V. | TIME WARNER CABLE |

## EASEMENT NOTES

(1) AN EASEMENT FOR THE CONSTRUCTION AND MAINTENANCE OF ELECTRIC POLE LINES AND UNDERGROUND CONDUITS AND INCIDENTAL PURPOSES, RECORDED MAY 11, 1928 AS BOOK 765, PAGE 185 OF OFFICIAL RECORDS, IN FAVOR OF SOUTHERN SIERRA POWER COMPANY

## PROJECT DATA

BUILDING AREA

| | |
|---|---|
| OFFICE | 10,000 SF |
| WAREHOUSE | 690,037 SF |
| TOTAL AREA | 700,037 SF |

AUTO PARKING REQUIREMENTS

| | |
|---|---|
| OFFICE: 1/250 SF | 40 STALLS |
| BUILDING: 1/2,000 SF | 346 STALLS |
| TOTAL | 386 STALLS |

PARKING PROVIDED

| | |
|---|---|
| STANDARD AUTO (9'X18') | 499 STALLS |
| TRAILER (10'X55') | 245 STALLS |
| TOTAL | 744 STALLS |

## EARTHWORK ESTIMATE:

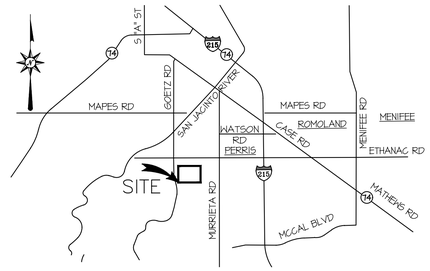
| | |
|---|---|
| RAW CUT: | 52,000 C.Y. |
| RAW FILL: | 197,00 C.Y. |
| RAW NET: | 145,000 C.Y. (IMPORT) |

## LEGEND

| | |
|---|---|
| | PROJECT BOUNDARY |
| X | EX FENCE |
| | PROP GRADE BREAK |
| | RIGHT OF WAY |
| | ROAD CENTERLINE |
| | PROP EDGE OF PAVEMENT |
| C&G | CURB AND GUTTER |
| EX | EXISTING |
| FF | FINISHED FLOOR |
| FS | FINISHED SURFACE |
| PROP | PROPOSED |
| R/W | RIGHT OF WAY |
| TC | TOP OF CURB |
| | PROP CONCRETE PAVEMENT |
| | PROP DECORATIVE PAVEMENT |

## SHEET INDEX


| | |
|---|---|
| SHEET 1 | INDEX MAP |
| SHEET 2 | SECTIONS |
| SHEET 3-4 | CONCEPTUAL GRADING |
| SHEET 5 | CONCEPTUAL UTILITY PLAN |


VICINITY MAP
NTS

## OWNER/APPLICANT

CADO MENIFEE LLC
1545 FARADAY AVENUE
CARLSBAD, CA 92008
CONTACT: MARK HAYDEN
PHONE: (760) 827-6025
FAX: (760) 804-6901

## ENGINEER

ALBERT A. WEBB ASSOCIATES
3788 MCGRAY STREET
RIVERSIDE, CA 92506
CONTACT: SARAH KOWALSKI
PHONE: 951-686-1070
FAX: 951-788-1256

## ARCHITECT

HPA
1883 BARDEEN AVE, SUITE 100
IRVINE, CA 92612
CONTACT: STEVE HONG
PHONE: (944) 863-1770

## ARCHITECT FILE RECEIVED

ARCHITECT SITE PLAN PROVIDED BY HPA ON 06/21/2022

## SOILS ENGINEER

GEO-ENVIRONMENTAL, INC.
2691 RICHTER AVENUE, SUITE 127
IRVINE, CA 92606
CONTACT: ROBERTO FLORES
PHONE: (944) 263-8334
FAX: (944) 263-8338

## TOPOGRAPHY SOURCE

TOPOGRAPHY FLOWN BY INLAND AERIAL SURVEYS, INC. ON 03/2021

## A.P.N.

330-190-002 THRU 005
330-190-010 THRU 013

## LAND USE

EXISTING LAND USE: VACANT LOT
EXISTING ZONING: ECONOMIC DEVELOPMENT CORRIDOR-NORTHERN GATEWAY (EDC-NG)

PROPOSED LAND USE: ECONOMIC DEVELOPMENT CORRIDOR (EDC)
PROPOSED ZONING: ECONOMIC DEVELOPMENT CORRIDOR-NORTHERN GATEWAY (EDC-NG)

## ACREAGE

40.03 ACRES (GROSS)
36.81 ACRES (NET)

## SCHOOL DISTRICT

MENIFEE UNION SCHOOL DISTRICT

## LEGAL DESCRIPTION

PARCEL 1 (APN 330-190-002)
LOT 793 AND LETTERED LOT J, OF ROMOLA FARMS NO. 9 AS SHOWN BY MAP ON FILE IN BOOK 14, PAGE(S) 91 OF MAPS, IN THE OFFICE OF THE RIVERSIDE COUNTY RECORDER.

PARCEL 2 (APN 330-190-003)
LOT 794 AND LETTERED LOT J, OF ROMOLA FARMS NO. 9, AS SHOWN BY MAP ON FILE IN BOOK 14, PAGE(S) 91, IN THE OFFICE OF THE COUNTY RECORDER OF RIVERSIDE COUNTY.

PARCEL 3 (APN 330-190-004)
LOT 795 AND LETTERED LOT J, OF ROMOLA FARMS NO. 9, AS SHOWN BY MAP ON FILE IN BOOK 14 PAGE(S) 91 OF MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

PARCEL 4 (APN 330-190-005)
LOT 796 AND LETTERED LOT J, OF ROMOLA FARMS NO. 9 AS SHOWN BY MAP ON FILE IN BOOK 14, PAGE 91 OF MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

PARCEL 5 (330-190-010)
LOT 801 AND LETTERED LOT H OF ROMOLA FARMS NO. 9, AS SHOWN BY MAP ON FILE IN BOOK 14 PAGE (S) 91 OF MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

PARCEL 6 (APN 330-190-011)
LOT 802 AND LETTERED LOT H OF ROMOLA FARMS NO. 9 AS SHOWN BY MAP ON FILE IN BOOK 14, PAGE(S) 91 OF MAPS, IN THE OFFICE OF THE RIVERSIDE COUNTY RECORDER.

PARCEL 7 (APN 330-190-012)
LOT 803 AND LETTERED LOT H OF ROMOLA FARMS NO. 9, IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN BY MAP ON FILE IN BOOK 14 PAGE 91 OF MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

PARCEL 8 (APN 330-190-013)
LOT 804 AND LETTERED LOT H OF ROMOLA FARMS NO. 9, IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN BY MAP ON FILE IN BOOK 14 PAGE 91 OF MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

| REVISIONS | DATE | BY |
|---|---|---|
| | | |

CITY OF MENIFEE
COUNTY OF RIVERSIDE

PLOT PLAN NO. PLN 21-0370
INDEX MAP

| | |
|---|---|
| SCALE: | 1"=100' |
| DATE: | 7/11/22 |
| DESIGNED: | AM |
| CHECKED: | SKK |
| PLN CK REF: | |
| F.B. | |

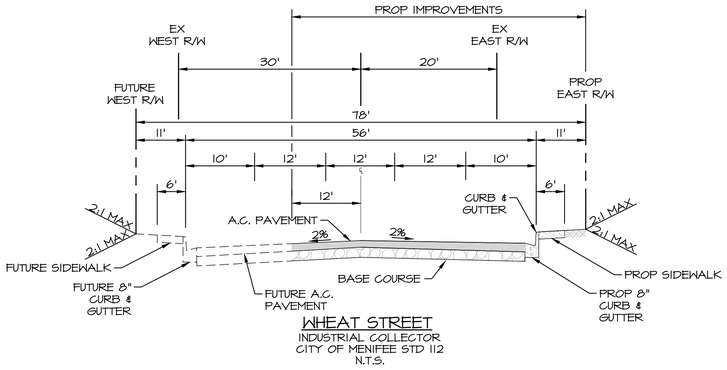
ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McGRAY STREET
RIVERSIDE, CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

W.O. 21-0035
SHEET
OF 5 SHEETS
DWG. NO.

1" = 100'
100 0 100 200 300

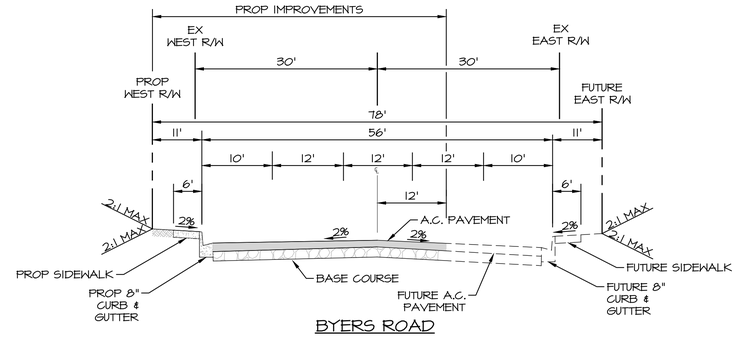
PRELIMINARY

H:\2021\21-0035\DRAWINGS\ENTITLEMENTS\21-0035-C-PP.DWG 7/11/2022 5:10:15 PM



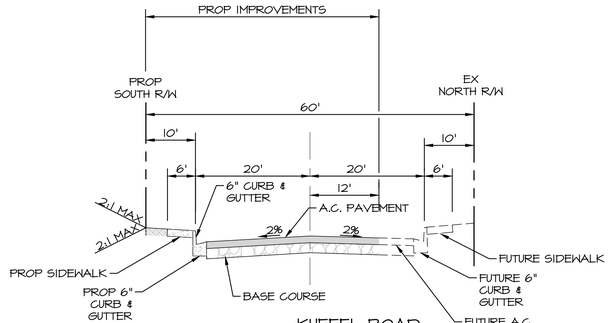

## WHEAT STREET

INDUSTRIAL COLLECTOR
CITY OF MENIFEE STD 112
N.T.S.



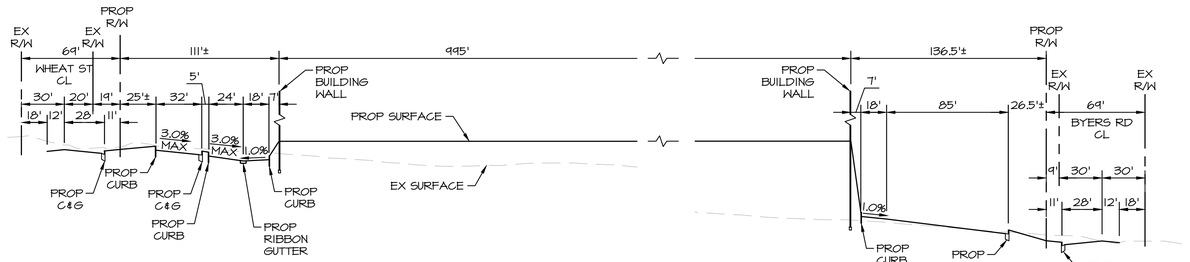

## BYERS ROAD

INDUSTRIAL COLLECTOR
CITY OF MENIFEE STD 112
N.T.S.

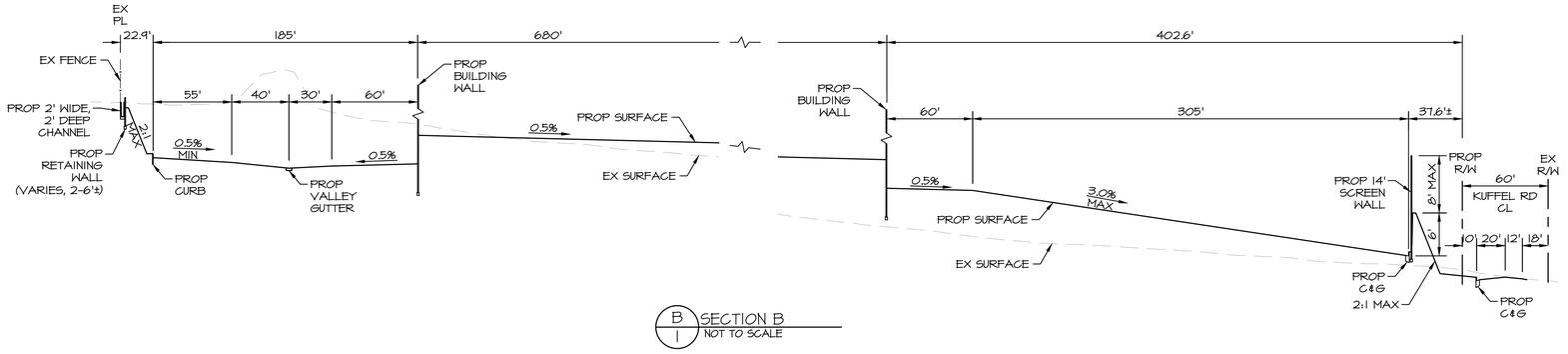



## KUFFEL ROAD

GENERAL LOCAL
CITY OF MENIFEE STD 115
N.T.S.




A/1 SECTION A
NOT TO SCALE




B/1 SECTION B
NOT TO SCALE

PRELIMINARY

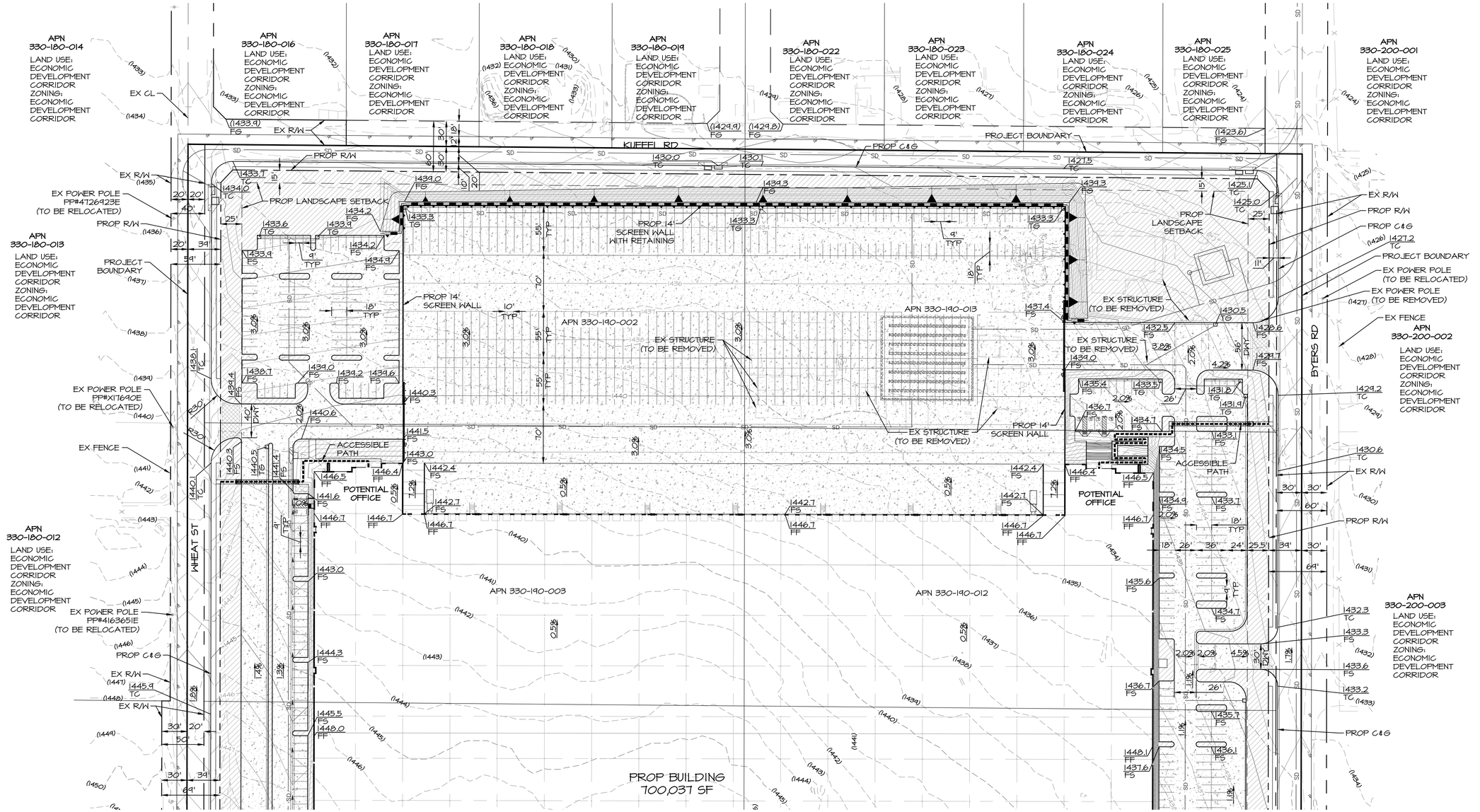
| REVISIONS | DATE | BY |
|---|---|---|
| | | |

CITY OF MENIFEE
COUNTY OF RIVERSIDE

PLOT PLAN NO. PLN 21-0370
SECTIONS

| | | | |
|---|---|---|---|
| SCALE: | 1"=100' | ALBERT A. WEBB ASSOCIATES | W.O. 21-0035 |
| DATE: | 7/11/22 | ENGINEERING CONSULTANTS<br>3788 McGRAY STREET<br>RIVERSIDE CA. 92506<br>PH. (951) 686-1070<br>FAX (951) 788-1256 | SHEET 2 |
| DESIGNED: | AM | | OF 5 SHEETS |
| CHECKED: | SKK | | |
| PLN CK REF: | | | DWG. NO. |
| F.B. | | | |

H:\2021\21-0035\DRAWINGS\ENTITLEMENT\21-0035-C-PP.DWG 7/11/2022 5:10:15 PM




## LEGEND

| | |
|---|---|
| PROPERTY LINE | PROP AUTO PARKING PAVEMENT |
| SD — PROP STORM DRAIN | PROP LANDSCAPE AREA |
| ACCESSIBLE PATH OF TRAVEL | PROP DECORATIVE PAVEMENT |
| PROP EDGE OF PAVEMENT | |
| X — EX FENCE | |
| PROP GRADE BREAK | |
| RIGHT OF WAY | |
| ROAD CENTER LINE | |
| FLOW LINE | |
| C&G — CURB AND GUTTER | |
| EX — EXISTING | |
| FF — FINISHED FLOOR | |
| FS — FINISHED SURFACE | |
| PROP — PROPOSED | |
| R/W — RIGHT OF WAY | |
| TC — TOP OF CURB | |

PRELIMINARY

| REVISIONS | DATE | BY |
|---|---|---|
| | | |

N W E S — WEBB

1" = 60'

60 0 60 120 180

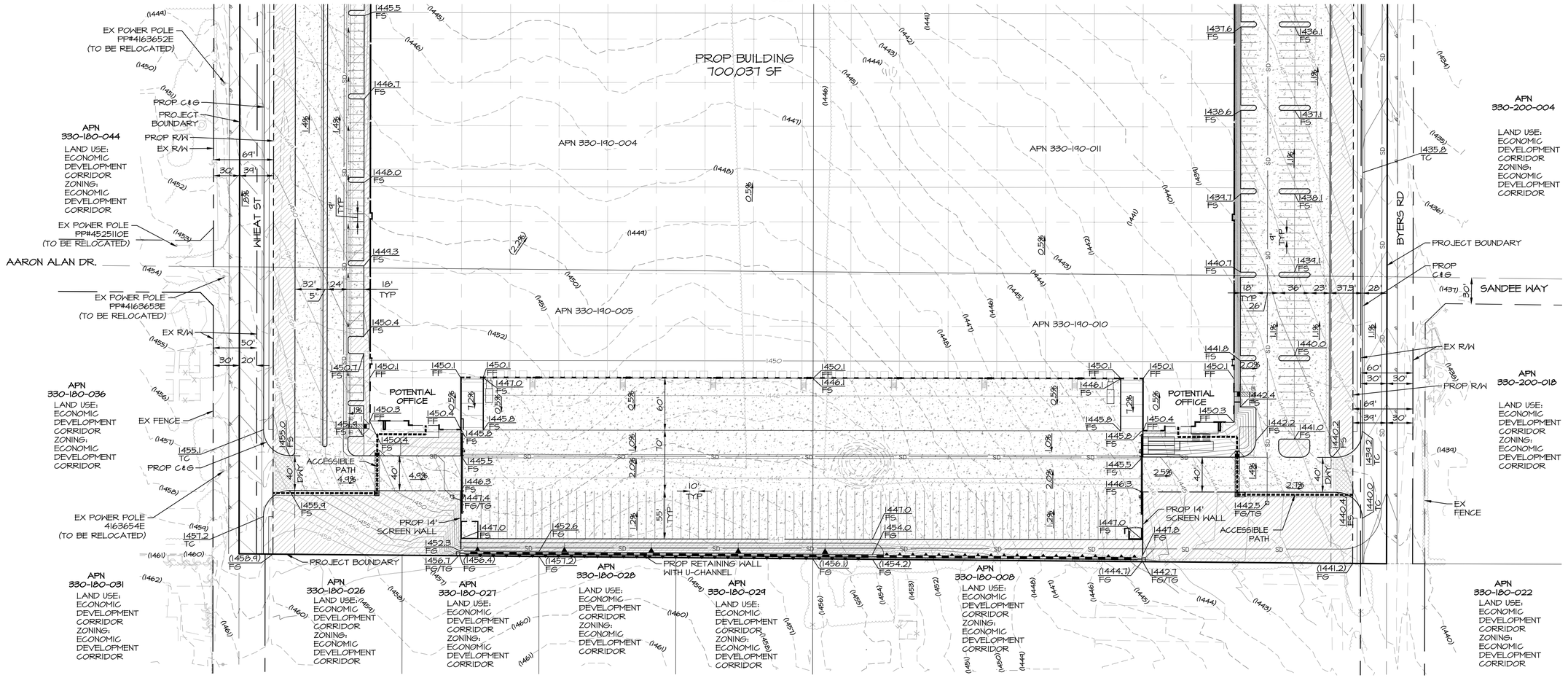
CITY OF MENIFEE
COUNTY OF RIVERSIDE

PLOT PLAN NO. PLN 21-0370
CONCEPTUAL GRADING

| | | | |
|---|---|---|---|
| SCALE: 1"=60' | ALBERT A. WEBB ASSOCIATES | ENGINEERING CONSULTANTS<br>3788 McCRAY STREET<br>RIVERSIDE CA, 92506<br>PH. (951) 686-1070<br>FAX (951) 788-1256 | W.O. 21-0035 |
| DATE: 7/11/22 | | | SHEET 3 |
| DESIGNED: AM | | | OF 5 SHEETS |
| CHECKED: SKK | | | |
| PLN CK REF: | | | DWG. NO. |
| F.B. | | | |

H:\2021\21-0035\DRAWINGS\ENTITLEMENT\21-0035-C-PP.DWG 7/11/2022 5:10:15 PM

SEE SHEET 3




## LEGEND

- PROPERTY LINE
- SD — PROP STORM DRAIN
- ACCESSIBLE PATH OF TRAVEL
- PROP EDGE OF PAVEMENT
- X — EX FENCE
- PROP GRADE BREAK
- RIGHT OF WAY
- ROAD CENTER LINE
- FLOW LINE
- PROP AUTO PARKING PAVEMENT
- PROP LANDSCAPE AREA
- PROP DECORATIVE PAVEMENT

| | |
|---|---|
| C&G | CURB AND GUTTER |
| EX | EXISTING |
| FF | FINISHED FLOOR |
| FS | FINISHED SURFACE |
| PROP | PROPOSED |
| R/W | RIGHT OF WAY |
| TC | TOP OF CURB |

N W E S WEBB

1" = 60'

60 0 60 120 180

PRELIMINARY

| REVISIONS | DATE | BY |
|---|---|---|
| | | |

CITY OF MENIFEE
COUNTY OF RIVERSIDE

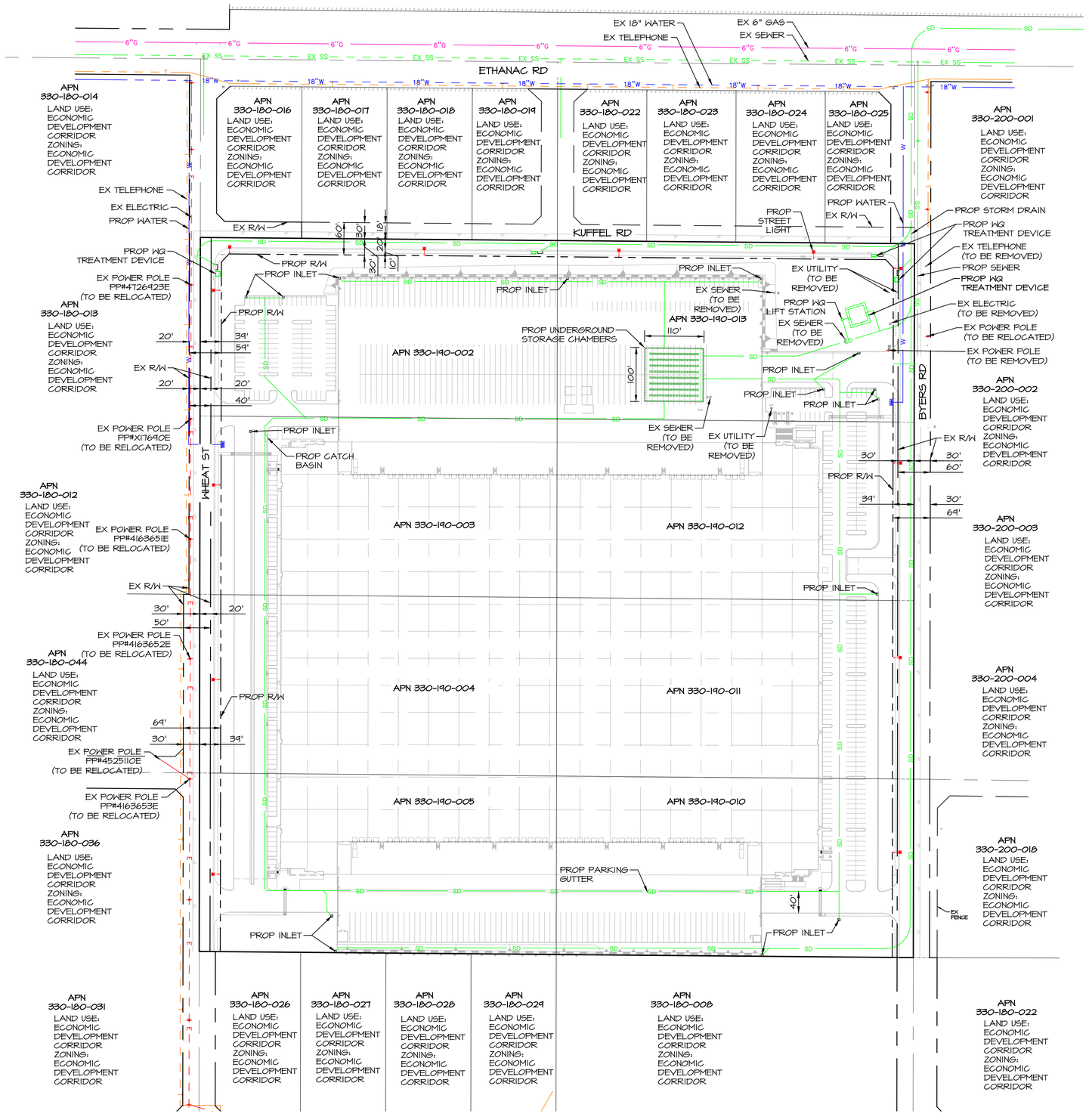
PLOT PLAN NO. PLN 21-0370
CONCEPTUAL GRADING

| | |
|---|---|
| SCALE: | 1"=60' |
| DATE: | 7/11/22 |
| DESIGNED: | AM |
| CHECKED: | SKK |
| PLN CK REF: | |
| F.B. | |

ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McGRAY STREET
RIVERSIDE CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

| | |
|---|---|
| W.O. | 21-0035 |
| SHEET | 4 |
| OF 5 | SHEETS |
| DWG. NO. | |

H:\2021\21-0035\DRAWINGS\ENTITLEMENT\21-0035-C-PP1.DWG 7/11/2022 5:10:15 PM




## LEGEND

- PROJECT BOUNDARY
- PROP WATER
- EX 18" WATER
- EX 6" GAS
- PROP STORM DRAIN
- EX SEWER
- PROP SEWER
- EX ELECTRICAL
- EX TELEPHONE
- EX FENCE
- PROP STREET LIGHT
- GRADE BREAK
- RIGHT OF WAY
- EX ROAD CENTERLINE
- FLOW LINE
- PROP SEWER CLEANOUT
- PROP INLET
- EX EDGE OF PAVEMENT

| | |
|---|---|
| C&G | CURB AND GUTTER |
| EX | EXISTING |
| FF | FINISHED FLOOR |
| FS | FINISHED SURFACE |
| PROP | PROPOSED |
| R/W | RIGHT OF WAY |
| TC | TOP OF CURB |

1" = 100'

100 0 100 200 300

PRELIMINARY

| REVISIONS | DATE | BY |
|---|---|---|
| | | |

CITY OF MENIFEE
COUNTY OF RIVERSIDE

PLOT PLAN NO. PLN 21-0370
CONCEPTUAL UTILITY PLAN

| | |
|---|---|
| SCALE: | 1"=100' |
| DATE: | 7/11/22 |
| DESIGNED: | AM |
| CHECKED: | SKK |
| PLN CK REF: | |
| F.B. | |

ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE, CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

| | |
|---|---|
| W.O. | 21-0035 |
| SHEET | 5 |
| OF | 5 SHEETS |
| DWG. NO. | |

H:\2021\21-0035\DRAWINGS\ENTITLEMENT\21-0035-C-PP-CONCEPTUAL UTILITY.DWG 7/7/2022 5:21:17 PM