# Preliminary

# Drainage Report

# For

# SWC of Ramona and Perris
# DPR 19-00012

# Perris, CA

November 2020
Revised July 2021

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Provided for:

Perris Industrial – Pacific Development Partners, LLC
c/o Lars Anderson
30220 Ranch Viejo Road, Suite B
San Juan Capistrano, CA 92675

Project # 20011

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


Christopher F. Lenz, PE 63001

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APPENDICES

# 1 INTRODUCTION

## 1.1. SITE DESCRIPTION

### 1.1.1. LOCATION

The project is located at the southwest corner of Ramona Expressway and Perris Boulevard in the City of Perris. Legally, it is parcel 303-060-020.

### 1.1.2. EXISTING FEATURES

The site consists of 20 gross acres of unsubdivided vacant land. The site drains gradually west to east with varying terrain with a flow slope of 0.3 percent. The site is infill and is bordered by developed properties. It is covered in seasonal grasses, and there is an existing flow path through the site, formed through passing the flows that enter the site from the stormdrain outlet along the western edge of the site. That stormdrain outlets the flows from Indian Avenue, and provides the overflow from the existing retention basin of the Lowes center, and is the only source of regional flows directly affecting the site. The site is within the Perris Valley MDP, with regional lines located north (Line E) and east (Line E-01) of the property.

### 1.1.3. PROPOSED CONDITION

It is proposed that the subject property be developed to permit development of a single 347,000 sf industrial building per the request of the client. Primary access to the site will be Indian Avenue, with secondary access points on Perris Boulevard. The building will be surrounded by parking on the west, south, and east side, with the south side of the building having the loading dock. The site will be primarily impervious surface, with the north and east sides having the required landscape areas (buffers and water quality features).

## 1.2. PURPOSE OF REPORT

The purpose of this report is to review the regional studies prepared for this area including; Perris Valley Master Drainage Plan, the surrounding projects drainage report, the existing plans for the existing storm drain system and ensure design compatibility with the proposed project. This report will analyze the hydrology of the landscape and assess the hydraulic conditions of the subject parcel to verify consistency with the previously listed reports. Where necessary, control measures will be recommended to alleviate existing flood problems and provide for water quality concerns as deemed necessary by the City of Perris.

## 1.3. FEMA INFORMATION

The Flood Insurance Rate Maps (Panel 06065C1430H) for this subject property shows that the site falls within Zone X. Zone X denotes areas determined to be outside of the 0.2% annual chance floodplain.

# 2. EXISTING DRAINAGE PATTERNS

## 2.1. OFFSITE

There is an existing outlet at Indian Avenue. The two 18" RCP's outlet into a small channel that traverse the site easterly before entering a lateral to Line E-01. The Indian Avenue outlet conveys the offsite flow from the Lowes center to the west, as well as the Indian Avenue street flow via a catch basin at the southeast corner of Indian and Ramona Expressway. The Lowes Drainage Report, indicates a peak runoff from the 18" pipes of 39 cfs (Appendix F). The property to the south blocks any potential offsite flow from the south. The regional area to the west of the site is identified to be collected and routed as part of the Line E system. That system is not yet in place and as such regional flows drain easterly along Ramona Expressway. The Perris Valley Commerce Center – Line E Update identifies a concentration point at the corner of Indian and Ramona (30-30) with a peak flow of 1,064 cfs, split both north and south of Ramona Expressway. At that flow rate, there is inundation of all intersections in the area, as confirmed by the City of Perris.

## 2.2. ONSITE

The site is un-subdivided vacant land. The site drains gradually west to east with varying terrain with a flow slope of 0.3 percent. The site is infill and is bordered by developed properties. It is covered in seasonal grasses, and there is an existing flow path through the site, formed through passing the flows that enter the site from the stormdrain outlet along the western edge of the site. The runoff from the site is primarily sheet flow with some localized ponding areas that flows northeasterly. The ultimate outfall is a storm drain inlet near the northeast corner of the site. The site is within the Perris Valley MDP, with regional lines located north (Line E) and east (Line E-01) of the property.

# 3. PROPOSED DRAINAGE PATTERNS

## 3.1. OFFSITE

As the project is within the areas of the ADP, it will participate in regional facilities. Line E is proposed to be constructed north of Ramona Expressway. The project proposes to construct a connection of the storm drain system in Indian Avenue to Line E. At time of this report that is assumed to be via 36” Pipe within Ramona Expressway to the existing Line E channel at the northeast corner of Perris Blvd and Ramona. If by the time of construction of the subject site Line E extends further west, then connection could be made as close as possible. The connection of this line to the Line E channel will help de-water the intersections of the area, including Perris and Ramona, with the combined capacity of the 36” and 54” lines. This will only de-water the intersections up to the combined capacity. However, that is an increased capacity to the existing conditions (+55 cfs), and will help the existing flooding of the area, until Line E is built. The existing onsite connection to Line E-01 will be maintained with the onsite inlet being replaced with another connection in conjunction with the onsite design.

## 3.2. ONSITE

The project has gone through review by the Airport Land Use Commission and determination was made, due to threat of bird strike, that no surface basins will be allowed. In order to still comply with Water Quality rules, an allowance was made for bio-swales or filtration trenches along the north and west sides of the building, with no long term ponding. As such the project has been designed with underground storage to offset the difference in runoff hydrograph volume between the developed and pre-developed condition for the 24 hour duration, 10 year return frequency design storm. The site soils have no infiltration potential (Appendix E), so a system of sump pumps will be used to dewater the three underground systems. The pumps will convey the water to the bio-swales, which will treat the water, before discharging to the existing line E-01 system in Perris Boulevard. In addition to the underground storage a system of storm drain is proposed to collect and route the site runoff (refer to section 5 and Figure 3 for detail).

# 4. HYDROLOGIC CONDITIONS

The Synthetic Unit Hydrograph and Rationale Methods have been employed to determine peak runoff amounts and volumes. The Riverside County Flood Control and Water Conservation District (RCFCD & WCD) Hydrology Manual (reference 1) was used to develop the hydrological parameters for the 1, 3, 6, and 24 hr 2, 5, and 10 year storm event. Refer to appendix A for detail.

In the existing condition, the proposed development envelope is relatively flat with an average flowline slope of 0.3 percent and is covered in native grasses. It is proposed to be developed into a single industrial building. The onsite runoff potential has been analyzed with the Synthetic Unit Hydrograph Method per the Riverside County Flood Control and Water Conservation District (RCFCD & WCD) Hydrology Manual (reference 1).
The Following Data is used in the calculations;

Soils Group – 60% B and 40% C
Pre-development Runoff Index – 73, with 17.8% impervious (existing street)
Post-development Runoff Index – 61 with 90% impervious

Rainfall Data – NOAA 14
2yr – 1hr = 0.466”
100yr – 1hr = 1.35”
2yr – 3hr = 0.819”
100yr – 3hr = 2.04”
2yr – 6hr = 1.14”
100yr – 6hr = 2.75”
2yr – 24hr = 1.97”
100yr – 24hr = 5.02”

The results of that analysis are as follows, with detailed output in Appendix A;

| SWC Ramone & Perris Pre-Development | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Storm Duration | | | | | | | |
| | 1 hour | | 3 hour | | 6 hour | | 24 hour | |
| Frequency | Q Peak | Volume | Q Peak | Volume | Q Peak | Volume | Q Peak | Volume |
| 2 year | 12.7 | 0.31 | 5.5 | 0.38 | 4.5 | 0.48 | 1.3 | 0.8 |
| 5 year | 21.1 | 0.52 | 10.1 | 0.60 | 10.5 | 0.88 | 1.8 | 1.08 |
| 10 year | 31.1 | 0.93 | 17.0 | 1.04 | 18.4 | 1.65 | 4.0 | 1.48 |

| SWC Ramone & Perris Post-Development | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Storm Duration | | | | | | | |
| | 1 hour | | 3 hour | | 6 hour | | 24 hour | |
| Frequency | Q Peak | Volume | Q Peak | Volume | Q Peak | Volume | Q Peak | Volume |
| 2 year | 19.4 | 0.71 | 12.9 | 1.25 | 11.7 | 1.74 | 4.9 | 3.00 |
| 5 year | 28.5 | 1.04 | 17.4 | 1.69 | 17.9 | 2.65 | 6.7 | 4.09 |
| 10 year | 35.9 | 1.29 | 21.2 | 2.02 | 23 | 3.35 | 8.1 | 4.92 |

To mitigate the increased runoff from the development, three underground storage facilities have been provided to offset the difference in runoff hydrograph volume between the developed and pre-developed condition for the 24 hour duration, 10 year return frequency design storm per the below table.

| | Volume | |
|---|---|---|
| SWC Ramona & Perris | [cf] | [ac-ft] |
| Pre Development 10yr 24hr | 64,538 | 1.48 |
| Post Development 10yr 24hr | 214,211 | 4.92 |
| Total Vol Required | 149,672 | 3.44 |
| Total Vol Provided | 151,320 | 3.47 |

The facility for the western area was preliminarily sized to be 20,894 cf. The facility for the central area, including the loading bay and majority of the south roof drainage, was preliminarily sized to be 104,423 cf. And the facility for the eastern area was preliminarily sized to be 26,003 cf. In total the 3 facilities mitigate the difference in 10 year 24 hour runoff volume from development. The footprint of the proposed systems is indicated on Figure 2 and Figure 3, with detail in Appendix C. At time of final design additional storage basin and outlet details will be required.

# 5. HYDRAULIC CONDITIONS

## 5.1. Existing Conditions

The two existing 18" pipes conveying the offsite flows from the west and outleting on the east side of Indian Avenue will be extended and routed within Ramona Expressway to the Existing Line E Channel. Preliminary sizing will combine the two 18" pipes (capacity 17.2 cfs) into a 36" pipe (Capacity 54.9 cfs). Another 36" line (capacity 54.9 cfs) near the northeast corner of the property will act as onsite overflow. The 36" pipe will be connected to the existing storm drain box at the edge of Perris Blvd, maintaining the existing connection to Line E-01. Refer to Figure 2 for locations.

The existing 54" line in Perris Blvd, Line E-01, is designed to collect flows from the subject site, and the site to the south. It is currently overburdened by the regional flows that enter the intersection of Perris and Ramona Expressway. However, when Line E is built, it will need to handle only the runoff from the property to the south (60.3 cfs) combined with the runoff from the subject site (maximum of 31 cfs). At a combined maximum runoff of 91 cfs, the 54" line has sufficient capacity (124 cfs). The likely maximum runoff from the subject site will be much lower, and will be designed at final plan stage with detailed design of pumping systems. Refer to Appendix H for details.

## 5.2. Proposed Conditions

The proposed condition for this site will be to construct a network of paved access within the site to convey storm runoff into a system of storm drain. Storm Drain will be used to collect and route the runoff from the paved areas and into the underground systems. The underground system will be pumped to the surface for treatment through Bio-swales, and will then be carried by storm drain into the Line E-01 system. Preliminary line sizing is provided below and as shown in Figure 3. For maintenance considerations a minimum 18" line size has been indicated. The City of Perris confirmed no treatment of offsite flows are required, thus the low point in Indian that accepts offsite flows will routed to Line E without treatment. The roads will remain in the existing condition, with the exception that sidewalks and driveways will be added.

| Control Point | Area [sf] | Area [ac] | Q10 [CFS]* | Q100 [CFS] | SD Sizing |
|---|---|---|---|---|---|
| | | | | | |
| 102 | 19,915 | 0.46 | 0.8 | 1.2 | 18" Pipe |
| 202 | 40,729 | 0.94 | 1.7 | 2.5 | 18" Pipe |
| Removed | | | | | |
| 402 | 39,288 | 0.90 | 1.5 | 2.1 | Curb Opening On-Grade |
| 502 | 156,975 | 3.60 | 5.6 | 8.0 | 24" Pipe |
| 602 | 28,129 | 0.65 | 1.1 | 1.5 | Curb Opening On-Grade |
| 702 | 119,779 | 2.75 | 4.3 | 6.2 | 36" Pipe |
| 802 | 69,327 | 1.59 | 2.9 | 4.1 | 18" Pipe |
| 902 | 35,250 | 0.81 | 1.6 | 2.2 | 18" Pipe |
| 1002 | 23,550 | 0.54 | 1.1 | 1.6 | 18" Pipe |
| 1102 | 35,250 | 0.81 | 1.6 | 2.2 | 18" Pipe |
| 1202 | 23,550 | 0.54 | 1.1 | 1.6 | 18" Pipe |
| 1302 | 35,250 | 0.81 | 1.6 | 2.2 | 18" Pipe |
| 1402 | 23,550 | 0.54 | 1.1 | 1.6 | 18" Pipe |
| 1502 | 35,250 | 0.81 | 1.6 | 2.2 | 18" Pipe |
| 1602 | 57,844 | 1.33 | 2.4 | 3.5 | 18" Pipe |
| 1702 | 11,654 | 0.27 | 0.6 | 0.8 | Curb Opening On-Grade |
| 1802 | 17,778 | 0.41 | 0.8 | 1.1 | Curb Opening On-Grade |
| 1902 | 11,831 | 0.27 | 0.6 | 0.9 | 18" Pipe |

The Bio-swales/water quality channels are planned at locations throughout the project to clean and discharge the flood water. These structures will be designed per Riverside County LID – Bio-swale standards in more detail at time of final design. Refer to Figure 4 for additional detail.

# 6. WATER QUALITY

The project has gone through review by the Airport Land Use Commission and determination was made, due to threat of bird strike, that no surface basins will be allowed. In order to still comply with Water Quality rules, an allowance was made for bio-swales or filtration trenches along the north and west sides of the building, with no long term ponding. The channels are designed to treat the 2yr 24hr flows, at a maximum depth of 6”, with additional capacity provided to carry larger storm flows safely. Detailed design of the channels, outlet structures, underdrains, and any landscaping will be prepared at final design, but must treat the flows indicated in the Project Preliminary WQMP. Final design of the channels, complete with landscaping and pipe plans will be provided with final construction plans and landscape plans.

# 7. MAINTENANCE

It is proposed that none of the features discussed above to handle offsite flows, will be required to be placed in flood control easements (Max line size 36”). Maintenance and ownership of the onsite facilities with be the responsibility of the property owner. At the Cities request, a storm drain easement can be provided.

Internal to the site, the underground systems will require pumps to raise the water to the water quality basins. It is assumed that these systems will be the responsibility of the tenant, a property association, or the Owner, with easements being placed to allow for city access and emergency maintenance.

The new 36” stormdrain connection from the intersection of Indian and Ramona to the Intersection of Perris and Ramona, will be within City right of way, and is assumed to be City maintenance responsibility once accepted.

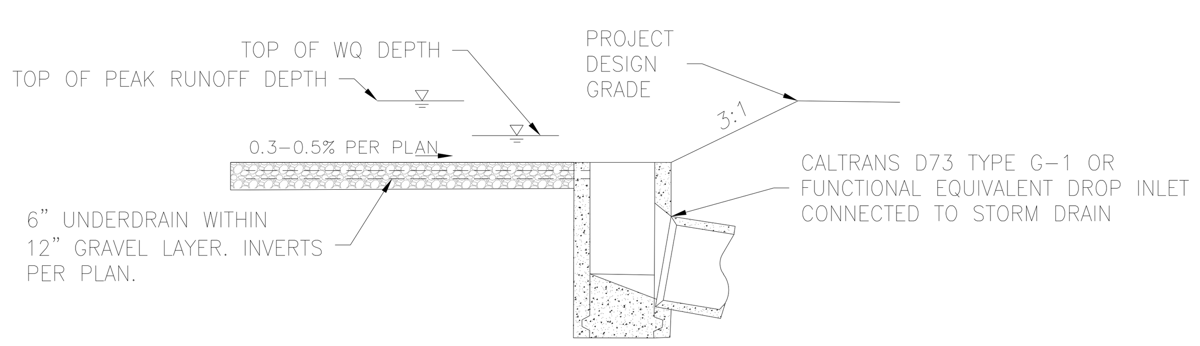
There are other smaller inlets, control structures, channels, and pipes where maintenance will be the responsibility of the tenant, a property association, or the Owner.

REFERENCES

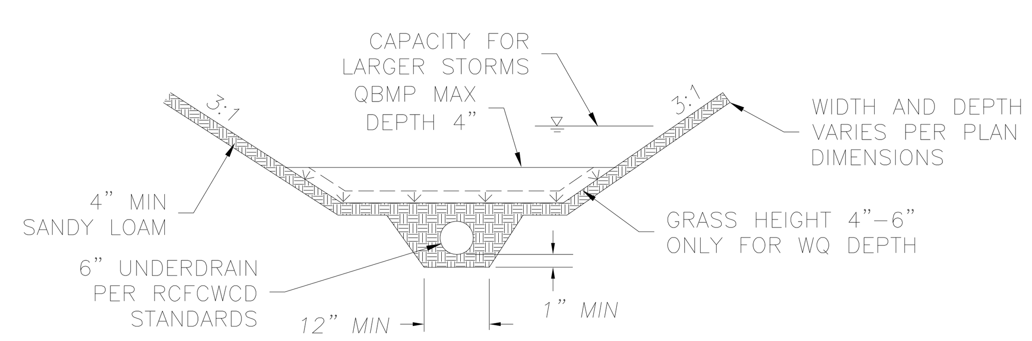
1. Riverside County Flood Control and Water Conservation District Hydrology Manual, April 1978.

# Figure 1

# Drainage Map Existing


BIO-SWALE END DRAIN DETAIL
N.T.S.




BIO-SWALE SECTION
N.T.S.

## LEGEND/ABBREVIATION

| | | | |
|---|---|---|---|
| CF | CURB FACE | TC | TOP OF CURB |
| FG | FINISH GRADE | TG | TOP OF GRATE |
| FF | FINISHED FLOOR | SD | STORM DRAIN |
| FL | FLOW LINE | PL | PROPERTY LINE |
| GB | GRADE BREAK | PED. | PEDESTRIAN |
| HP | HIGH POINT | TYP. | TYPICAL |
| INV | INVERT | | EXISTING FIRE HYDRANT |
| LP | LOW POINT | | WATER VALVE |
| R/W | RIGHT-OF-WAY | W | WATER METER |
| P=XX.X | PAD ELEVATION | | STREET LIGHT |
| FF=XX.X | FINISH FLOOR ELEVATION | | PROPOSED STORM DRAIN LINE |
| 2% | DIRECTION OF DRAINAGE/GRADE | 1425 | EXISTING CONTOUR |

50' 25' 0' 50'
GRAPHIC SCALE: 1"=50'

BGR NO. _______ WDID:

DIGALERT
DIAL BEFORE YOU DIG
TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 1-800-227-2600
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

NOTE:
WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL ENCROACHMENT PERMIT AND/OR GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY OF DESIGN AND ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY CITY.

| MARK | BY | DATE | REVISIONS | APPR. | DATE |
|---|---|---|---|---|---|
| ENGINEER | | | | CITY | |

DESIGN BY: DRAWN BY: CHECKED BY:

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE

SEAL-ENGINEER
REGISTERED PROFESSIONAL ENGINEER
CHRISTOPHER F. LENZ
NO. 63001
EXP. 6/30/22
CIVIL
STATE OF CALIFORNIA

ueg
united engineering group
8885 Haven Avenue - Suite 195
Rancho Cucamonga, CA 91730
Phone: 909.466.9240
www.unitedeng.com

PREPARED UNDER THE DIRECTION OF:
CHRISTOPHER F. LENZ 63001
DATE: ________ REGISTRATION EXPIRES 6-30-22

BENCH MARK:
BOLT AND WASHER, ILLEGIBLE, AT THE CENTERLINE INTERSECTION OF MARKHAM STREET AND PERRIS BOULEVARD, RIVERSIDE COUNTY BENCHMARK NUMBER BM-CSA4 AND RCM81.

ELEVATION = 1455.224'

SCALE 1"=50'
FIELD BOOK
DESIGN
DRAWN
CHECKED

ZONING CASE # I.P. No. ______
PERRIS CA, 92571
COUNTY OF RIVERSIDE

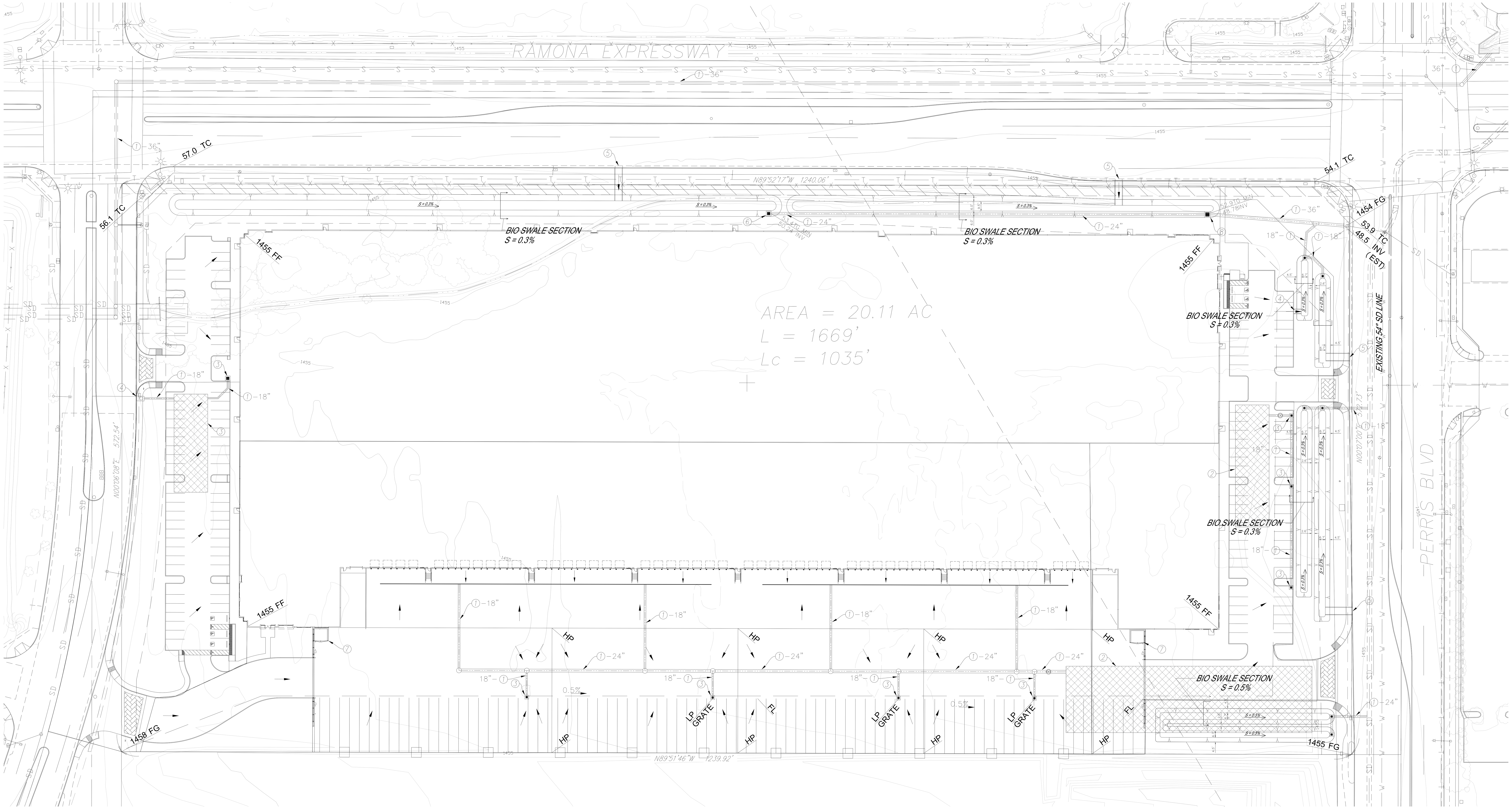
# PRELIMINARY GRADING & DRAINAGE PLAN SWC RAMONA & PERRIS DRAINAGE - EXISTING

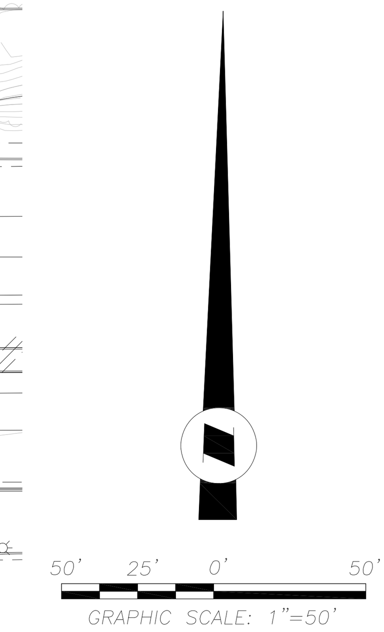
FOR: PACIFIC DEV. PARTNERS
W.O.
CITY FILE NO. XX-XXX

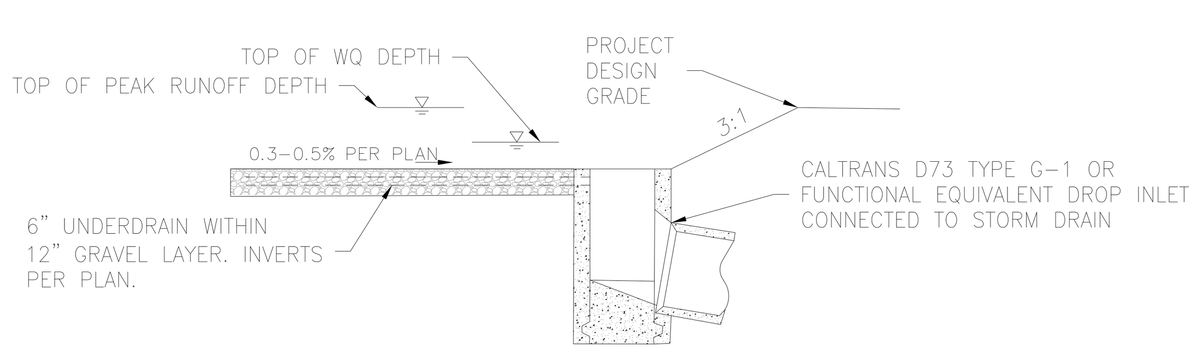
SHEET NO. 1 OF 3 SHEETS

# FIGURE 2

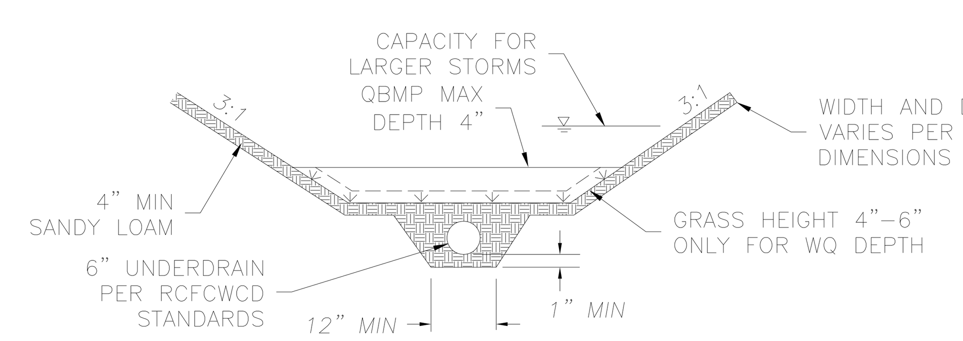
## Drainage Map Proposed






BIO-SWALE END DRAIN DETAIL
N.T.S.




BIO-SWALE SECTION
N.T.S.

## LEGEND/ABBREVIATION

| | | | |
|---|---|---|---|
| CF | CURB FACE | TC | TOP OF CURB |
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| HP | HIGH POINT | TYP. | TYPICAL |
| INV | INVERT | | EXISTING FIRE HYDRANT |
| LP | LOW POINT | | WATER VALVE |
| R/W | RIGHT-OF-WAY | W | WATER METER |
| P=XX.X | PAD ELEVATION | | STREET LIGHT |
| FF=XX.X | FINISH FLOOR ELEVATION | | PROPOSED STORM DRAIN LINE |
| 2% | DIRECTION OF DRAINAGE/GRADE | 1425 | EXISTING CONTOUR |

## CONSTRUCTION NOTES:

1. CONSTRUCT RCP STORM DRAIN AND FITTINGS PER G&D PLANS AT SIZES SHOWN.
2. CONSTRUCT CONTECH TYPE OR EQUIVALENT UNDERGROUND STORAGE SYSTEM PER PLAN.
3. CONSTRUCT GRATE INLET PER PLAN SIZING AND DETAIL PER GRADING PLAN
4. CONSTRUCT CATCH BASIN (WIDTH PER PLAN) PER COUNTY OF RIVERSIDE STD.
5. CONSTRUCT INVERTED UNDER SIDEWALK DRAIN CAST IN PLACE PER COUNTY OF RIVERSIDE STD. NO. 309.
6. INSTALL JENSEN PRECAST DROP INLET DI363636, WITH PEDESTRIAN GRATE.
7. INSTALL TRASH ENCLOSURE PER LANDSCAPE ARCHITECT PLAN.
8. INSTALL JENSEN PRECAST DROP INLET DI484848, WITH PEDESTRIAN GRATE.

BGR NO. _______ WDID:

DIGALERT
DIAL BEFORE YOU DIG — TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 1-800-227-2600
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

NOTE:
WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL ENCROACHMENT PERMIT AND/OR GRADING PERMIT HAS BEEN ISSUED.

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| MARK | BY | DATE | REVISIONS | APPR. | DATE |
|---|---|---|---|---|---|
| ENGINEER | | | | CITY | |

DESIGN BY: DRAWN BY: CHECKED BY:

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE

SEAL-ENGINEER
REGISTERED PROFESSIONAL ENGINEER
CHRISTOPHER F. LENZ
NO. 63001
EXP. 6/30/22
CIVIL
STATE OF CALIFORNIA

ueg
united engineering group
8885 Haven Avenue - Suite 195
Rancho Cucamonga, CA 91730
Phone: 909.466.9240
www.unitedeng.com

PREPARED UNDER THE DIRECTION OF:
CHRISTOPHER F. LENZ 63001
DATE: _______ REGISTRATION EXPIRES 6-30-22

BENCH MARK:
BOLT AND WASHER, ILLEGIBLE, AT THE CENTERLINE INTERSECTION OF MARKHAM STREET AND PERRIS BOULEVARD, RIVERSIDE COUNTY BENCHMARK NUMBER BM-CSA4 AND RCM81.

ELEVATION = 1455.224'

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DESIGN
DRAWN
CHECKED

ZONING CASE # I.P. No. ______
PERRIS CA, 92571
COUNTY OF RIVERSIDE

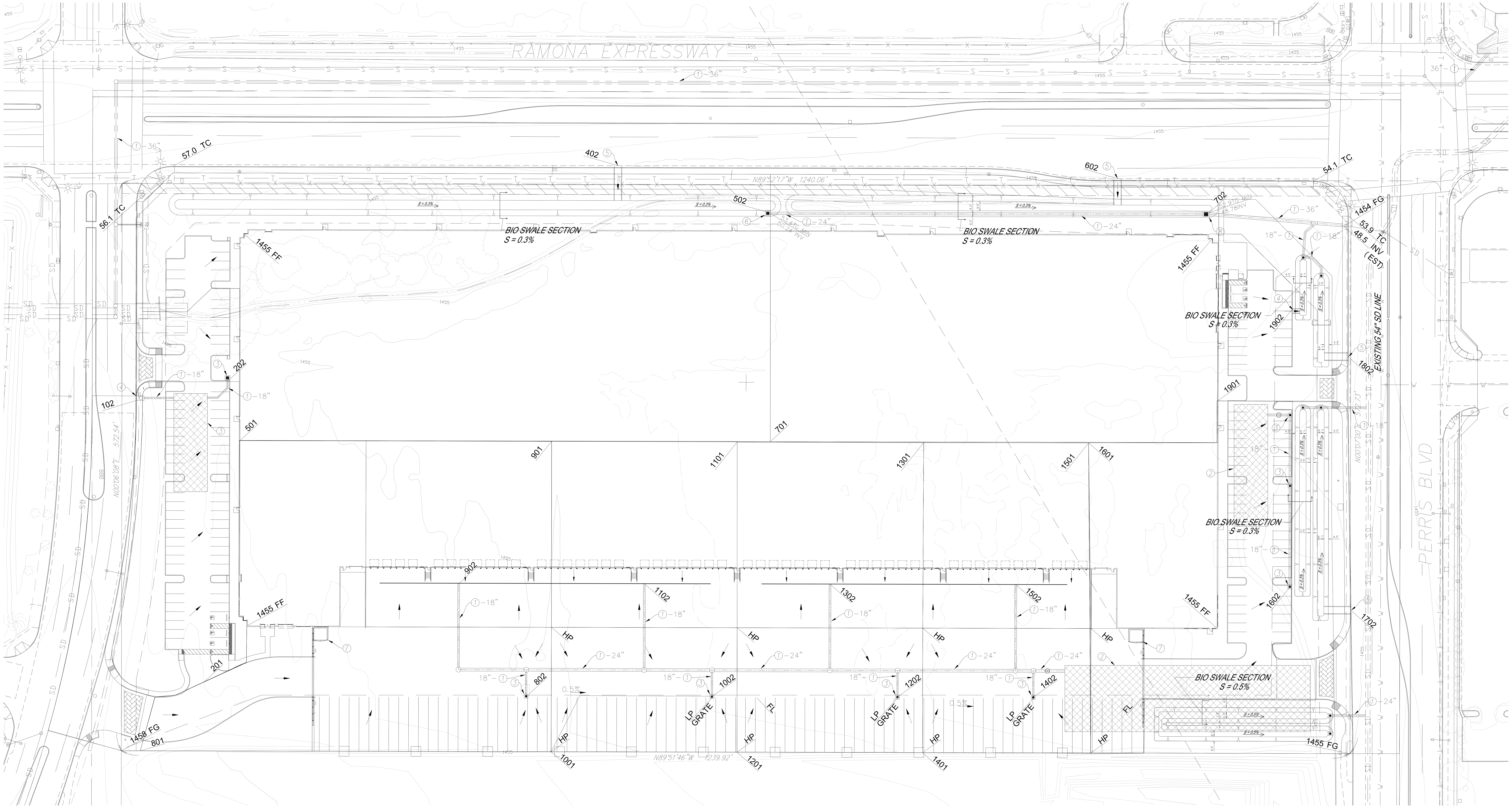
**PRELIMINARY GRADING & DRAINAGE PLAN SWC RAMONA & PERRIS DRAINAGE - PROPOSED**

FOR: PACIFIC DEV. PARTNERS
W.O.
CITY FILE NO. XX-XXX

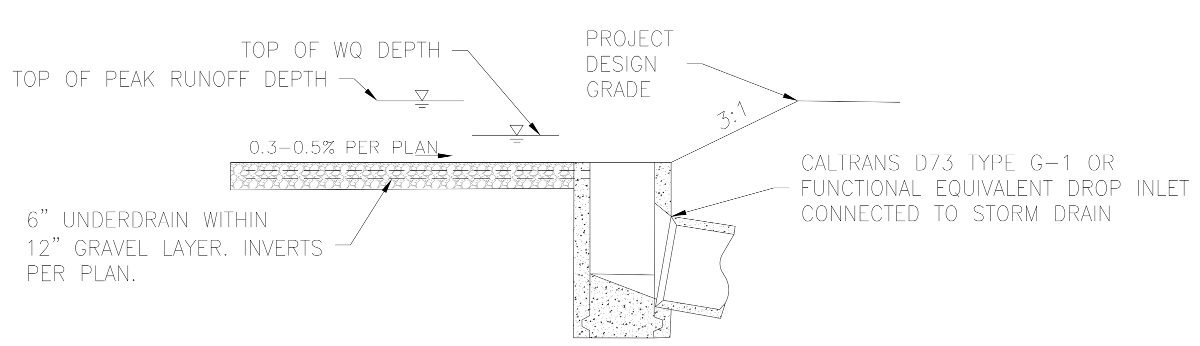
SHEET NO. 2 OF ____ SHEETS

# FIGURE 3

## Drainage Map Storm Drain

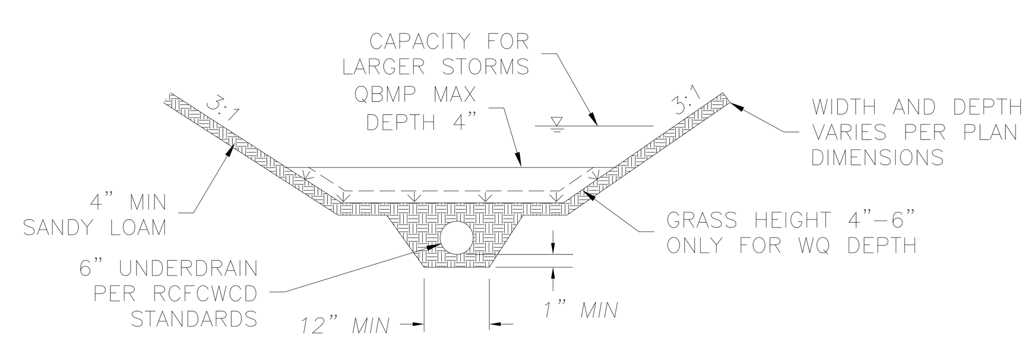



| CONTROL POINT | AREA [AC] | Q10 [CFS] | Q100 [CFS] |
|---|---|---|---|
| 102 | 0.46 | 0.8 | 1.2 |
| 202 | 0.94 | 1.7 | 2.5 |
| REMOVED | | | |
| 402 | 0.90 | 1.5 | 2.1 |
| 502 | 3.60 | 5.6 | 8.0 |
| 602 | 0.65 | 1.1 | 1.5 |
| 702 | 2.75 | 4.3 | 6.2 |
| 802 | 1.59 | 2.9 | 4.1 |
| 902 | 0.81 | 1.6 | 2.2 |
| 1002 | 0.54 | 1.1 | 1.6 |
| 1102 | 0.81 | 1.6 | 2.2 |
| 1202 | 0.54 | 1.1 | 1.6 |
| 1302 | 0.81 | 1.6 | 2.2 |
| 1402 | 0.54 | 1.1 | 1.6 |
| 1502 | 0.81 | 1.6 | 2.2 |
| 1602 | 1.33 | 2.4 | 3.5 |
| 1702 | 0.27 | 0.6 | 0.8 |
| 1802 | 0.41 | 0.8 | 1.1 |
| 1902 | 0.27 | 0.6 | 0.9 |




BIO-SWALE END DRAIN DETAIL

N.T.S.




BIO-SWALE SECTION

N.T.S.

## LEGEND/ABBREVIATION

| | | | |
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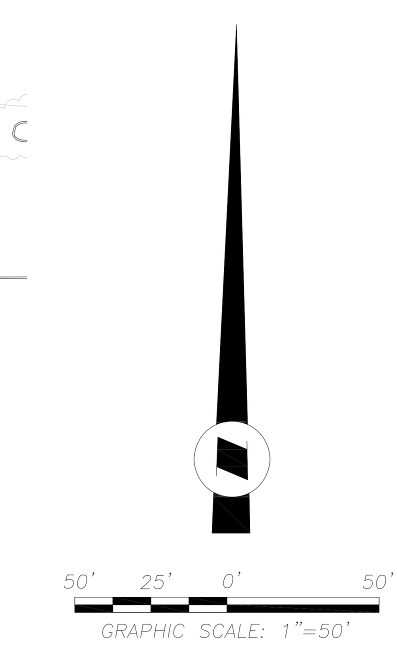
| HP | HIGH POINT | TYP. | TYPICAL |
| INV | INVERT | | EXISTING FIRE HYDRANT |
| LP | LOW POINT | | WATER VALVE |
| R/W | RIGHT-OF-WAY | W | WATER METER |
| P=XX.X | PAD ELEVATION | | STREET LIGHT |
| FF=XX.X | FINISH FLOOR ELEVATION | | PROPOSED STORM DRAIN LINE |
| 2% | DIRECTION OF DRAINAGE/GRADE | 1425 | EXISTING CONTOUR |




BGR NO. _______ WDID:

DIGALERT
DIAL BEFORE YOU DIG
TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 1-800-227-2600
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

NOTE:
WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL ENCROACHMENT PERMIT AND/OR GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY OF DESIGN AND ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY CITY.

| MARK | BY | DATE | REVISIONS | APPR. | DATE |
|---|---|---|---|---|---|
| ENGINEER | | | | CITY | |

DESIGN BY: DRAWN BY: CHECKED BY:

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE

SEAL-ENGINEER
REGISTERED PROFESSIONAL ENGINEER CHRISTOPHER F. LENZ NO. 63001 EXP. 6/30/22 CIVIL STATE OF CALIFORNIA

ueg united engineering group
8885 Haven Avenue - Suite 195
Rancho Cucamonga, CA 91730
Phone: 909.466.9240
www.unitedeng.com

PREPARED UNDER THE DIRECTION OF:
CHRISTOPHER F. LENZ 63001
DATE: ________ REGISTRATION EXPIRES 6-30-22

BENCH MARK:
BOLT AND WASHER, ILLEGIBLE, AT THE CENTERLINE INTERSECTION OF MARKHAM STREET AND PERRIS BOULEVARD, RIVERSIDE COUNTY BENCHMARK NUMBER BM-CSA4 AND RCM81.

ELEVATION = 1455.224'

SCALE 1"=50'
FIELD BOOK
DESIGN
DRAWN
CHECKED

ZONING CASE # I.P. No. ______
PERRIS CA, 92571
COUNTY OF RIVERSIDE

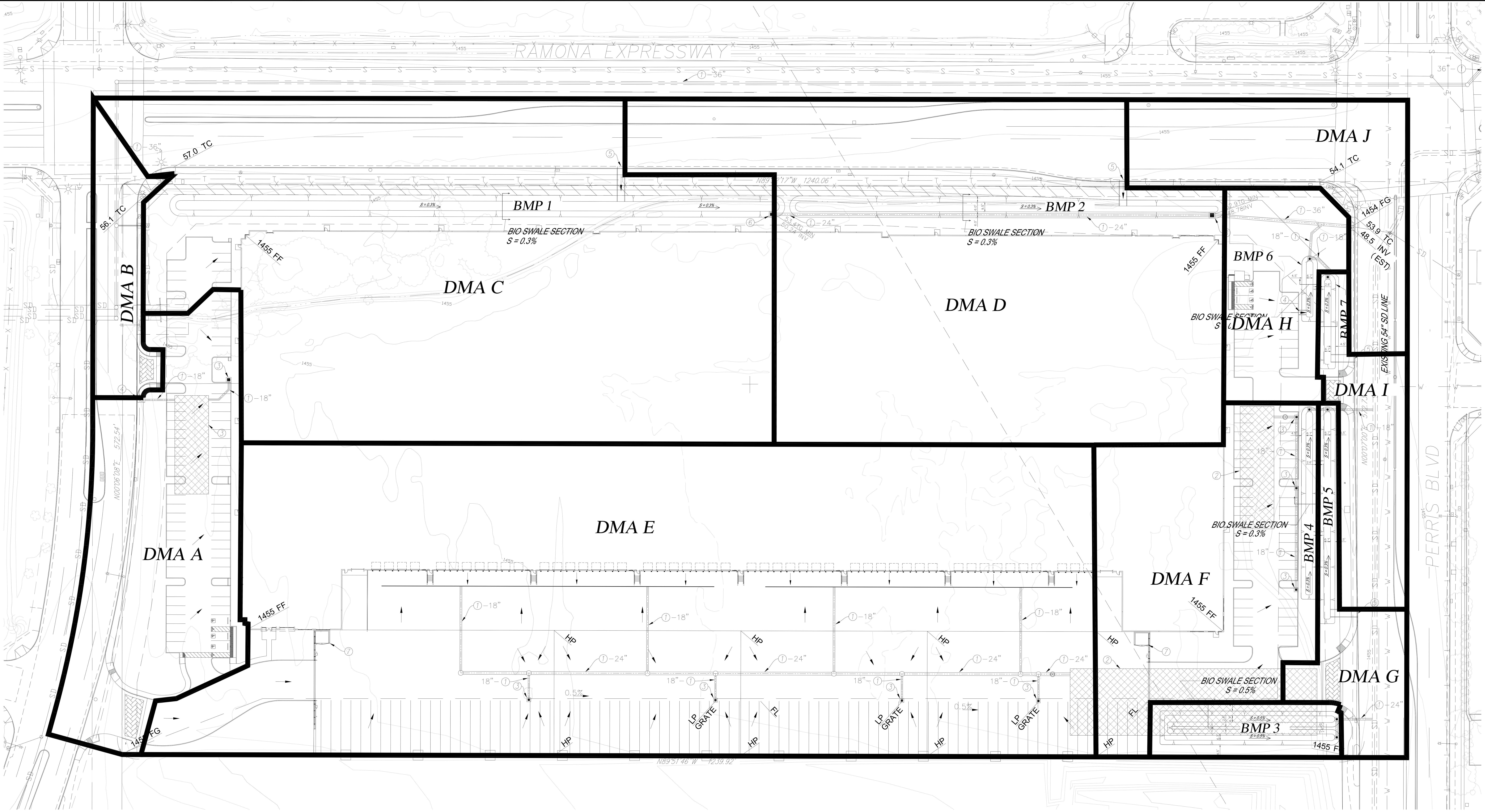
# PRELIMINARY GRADING & DRAINAGE PLAN SWC RAMONA & PERRIS STORM DRAIN PLAN-HYDRAULICS

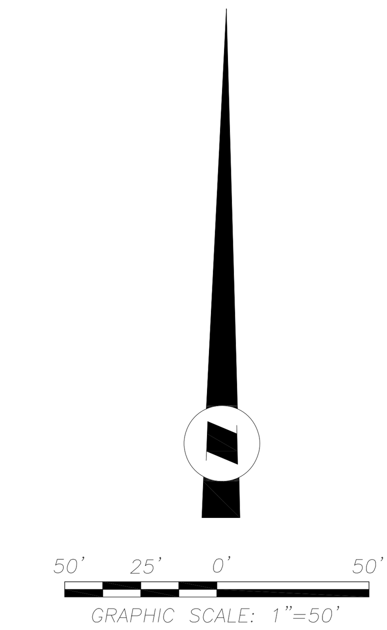
SHEET NO. 3 OF ____ SHEETS

FOR: PACIFIC DEV. PARTNERS
W.O.
CITY FILE NO. XX-XXX

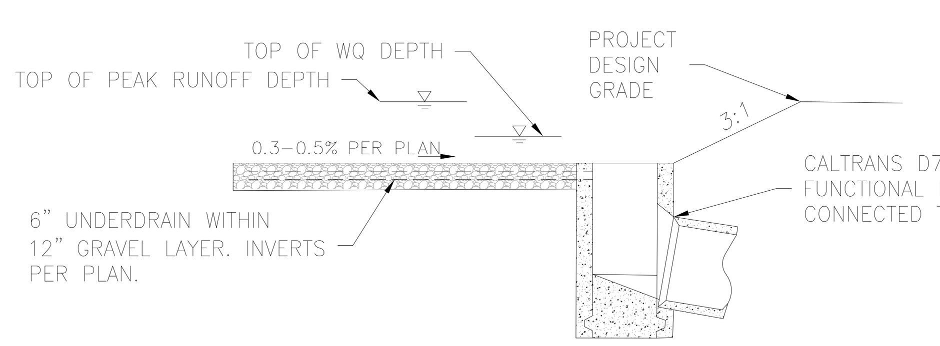
# FIGURE 4

## Drainage Map WQMP

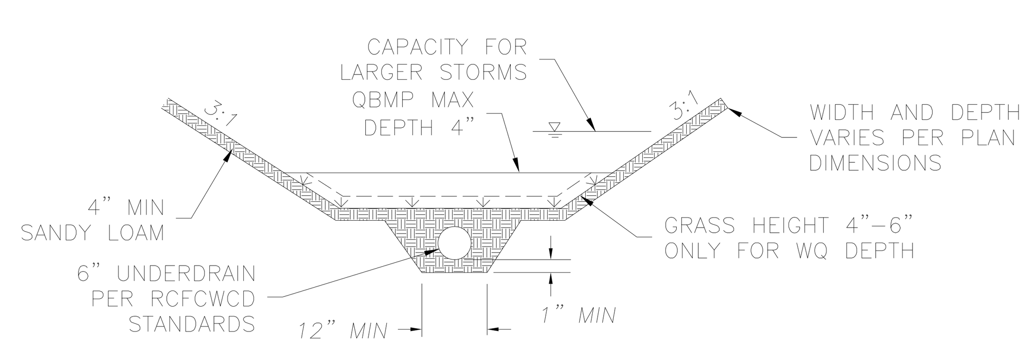



| DMA | AREA [AC] | 2YR 24HR FLOW [CFS] | BMP |
|---|---|---|---|
| A | 1.39 | 0.34 | 1 |
| B | 0.34 | 0.08 | NONE |
| C | 4.50 | 1.10 | 1 |
| D | 3.66 | 0.90 | 2 |
| E | 6.55 | 1.60 | 3 |
| F | 1.50 | 0.37 | 4 |
| G | 0.41 | 0.10 | 5 |
| H | 0.52 | 0.13 | 6 |
| I | 0.48 | 0.12 | 7 |
| J | 0.81 | 0.20 | NONE |




BIO–SWALE END DRAIN DETAIL
N.T.S.




BIO–SWALE SECTION
N.T.S.

## LEGEND/ABBREVIATION

| | | | |
|---|---|---|---|
| CF | CURB FACE | TC | TOP OF CURB |
| FG | FINISH GRADE | TG | TOP OF GRATE |
| FF | FINISHED FLOOR | SD | STORM DRAIN |
| FL | FLOW LINE | PL | PROPERTY LINE |
| GB | GRADE BREAK | PED. | PEDESTRIAN |
| HP | HIGH POINT | TYP. | TYPICAL |
| INV | INVERT | | EXISTING FIRE HYDRANT |
| LP | LOW POINT | | WATER VALVE |
| R/W | RIGHT–OF–WAY | W | WATER METER |
| P=XX.X | PAD ELEVATION | | STREET LIGHT |
| FF=XX.X | FINISH FLOOR ELEVATION | | PROPOSED STORM DRAIN LINE |
| 2% | DIRECTION OF DRAINAGE/GRADE | 1425 | EXISTING CONTOUR |

## CONSTRUCTION NOTES:

1. CONSTRUCT RCP STORM DRAIN AND FITTINGS PER G&D PLANS AT SIZES SHOWN.
2. CONSTRUCT CONTECH TYPE OR EQUIVALENT UNDERGROUND STORAGE SYSTEM PER PLAN.
3. CONSTRUCT GRATE INLET PER PLAN SIZING AND DETAIL PER GRADING PLAN
4. CONSTRUCT CATCH BASIN (WIDTH PER PLAN) PER COUNTY OF RIVERSIDE STD.
5. CONSTRUCT INVERTED UNDER SIDEWALK DRAIN CAST IN PLACE PER COUNTY OF RIVERSIDE STD. NO. 309.
6. INSTALL JENSEN PRECAST DROP INLET DI363636, WITH PEDESTRIAN GRATE.
7. INSTALL TRASH ENCLOSURE PER LANDSCAPE ARCHITECT PLAN.
8. INSTALL JENSEN PRECAST DROP INLET DI484848, WITH PEDESTRIAN GRATE.

BGR NO. XXXXXX WDID: XXXXXX

SEAL–ENGINEER
REGISTERED PROFESSIONAL ENGINEER
CHRISTOPHER F. LENZ
NO. 63001
EXP. 6/30/22
CIVIL
STATE OF CALIFORNIA

united engineering group
8885 Haven Avenue - Suite 195
Rancho Cucamonga, CA 91730
Phone: 909.466.9240
www.unitedeng.com

PREPARED UNDER THE DIRECTION OF:

CHRISTOPHER F. LENZ 63001

DATE: ________ REGISTRATION EXPIRES 6–30–22

BENCH MARK: 1"=50'
BOLT AND WASHER ILLEGIBLE, AT THE CENTERLINE INTERSECTION OF MARKHAM STREET AND PERRIS BOULEVARD. RIVERSIDE COUNTY BENCHMARK NUMBER BM–CSA4 AND RCM81.

ELEVATION 1455.224

DPR 19–00012 I.P. No. XXXXXX
PERRIS CA, 92571

**POST CONSTRUCTION BMP SITE PLAN**
**SWC RAMONA & PERRIS**
**DPR 19-00012**
**WQMP - DMA MAP**

SHEET NO. 4 OF 5 SHEETS

FOR: PACIFIC DEVELOPMENT PARTNERS, LLC
W.O.
CITY FILE NO. DPR 19–00012

# Appendix A

**NOAA Atlas 14, Volume 6, Version 2**
**Location name: Perris, California, USA***
**Latitude: 33.8435°, Longitude: -117.2284°**
**Elevation: 1459.54 ft****
* source: ESRI Maps
** source: USGS

## POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

# PF tabular

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

| Duration | Average recurrence interval (years) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 5 | 10 | 25 | 50 | 100 | 200 | 500 | 1000 |
| 5-min | 0.089 (0.074-0.108) | 0.124 (0.103-0.150) | 0.171 (0.142-0.207) | 0.211 (0.174-0.258) | 0.267 (0.213-0.338) | 0.312 (0.243-0.404) | 0.359 (0.273-0.477) | 0.410 (0.302-0.561) | 0.482 (0.340-0.688) | 0.540 (0.368-0.800) |
| 10-min | 0.128 (0.107-0.154) | 0.177 (0.148-0.215) | 0.245 (0.204-0.297) | 0.302 (0.249-0.369) | 0.382 (0.305-0.485) | 0.447 (0.348-0.579) | 0.515 (0.391-0.684) | 0.587 (0.434-0.804) | 0.690 (0.488-0.987) | 0.774 (0.528-1.15) |
| 15-min | 0.154 (0.129-0.187) | 0.214 (0.179-0.260) | 0.296 (0.246-0.359) | 0.365 (0.301-0.447) | 0.462 (0.369-0.586) | 0.540 (0.421-0.700) | 0.623 (0.473-0.828) | 0.710 (0.524-0.972) | 0.835 (0.590-1.19) | 0.936 (0.638-1.39) |
| 30-min | 0.252 (0.210-0.304) | 0.350 (0.292-0.423) | 0.483 (0.402-0.586) | 0.595 (0.491-0.729) | 0.754 (0.601-0.956) | 0.882 (0.687-1.14) | 1.02 (0.772-1.35) | 1.16 (0.855-1.59) | 1.36 (0.962-1.95) | 1.53 (1.04-2.26) |
| 60-min | 0.336 (0.281-0.406) | 0.466 (0.389-0.564) | 0.644 (0.536-0.781) | 0.794 (0.655-0.971) | 1.00 (0.801-1.27) | 1.18 (0.916-1.52) | 1.35 (1.03-1.80) | 1.55 (1.14-2.11) | 1.82 (1.28-2.59) | 2.04 (1.39-3.01) |
| 2-hr | 0.504 (0.421-0.609) | 0.670 (0.560-0.811) | 0.892 (0.743-1.08) | 1.08 (0.889-1.32) | 1.33 (1.06-1.69) | 1.53 (1.20-1.99) | 1.74 (1.32-2.31) | 1.96 (1.45-2.68) | 2.26 (1.60-3.23) | 2.50 (1.70-3.70) |
| 3-hr | 0.624 (0.522-0.754) | 0.819 (0.684-0.991) | 1.08 (0.896-1.31) | 1.29 (1.06-1.58) | 1.58 (1.26-2.00) | 1.81 (1.41-2.34) | 2.04 (1.55-2.71) | 2.28 (1.69-3.13) | 2.62 (1.85-3.74) | 2.88 (1.96-4.26) |
| 6-hr | 0.879 (0.735-1.06) | 1.14 (0.955-1.39) | 1.49 (1.24-1.81) | 1.77 (1.46-2.17) | 2.16 (1.72-2.74) | 2.45 (1.91-3.18) | 2.75 (2.09-3.66) | 3.06 (2.26-4.19) | 3.48 (2.46-4.98) | 3.81 (2.60-5.64) |
| 12-hr | 1.14 (0.954-1.38) | 1.51 (1.26-1.82) | 1.98 (1.65-2.41) | 2.37 (1.95-2.90) | 2.89 (2.30-3.66) | 3.29 (2.56-4.26) | 3.69 (2.80-4.90) | 4.10 (3.02-5.61) | 4.65 (3.29-6.64) | 5.08 (3.46-7.52) |
| 24-hr | 1.45 (1.28-1.67) | 1.97 (1.74-2.27) | 2.64 (2.32-3.05) | 3.18 (2.78-3.71) | 3.91 (3.31-4.71) | 4.46 (3.70-5.49) | 5.02 (4.07-6.32) | 5.59 (4.41-7.24) | 6.36 (4.82-8.57) | 6.96 (5.10-9.69) |
| 2-day | 1.67 (1.48-1.92) | 2.30 (2.03-2.66) | 3.13 (2.76-3.62) | 3.80 (3.32-4.43) | 4.71 (3.99-5.68) | 5.41 (4.49-6.66) | 6.12 (4.96-7.71) | 6.86 (5.41-8.87) | 7.85 (5.94-10.6) | 8.62 (6.31-12.0) |
| 3-day | 1.77 (1.57-2.04) | 2.46 (2.18-2.85) | 3.38 (2.98-3.91) | 4.13 (3.61-4.82) | 5.15 (4.36-6.21) | 5.94 (4.93-7.31) | 6.75 (5.47-8.50) | 7.59 (5.98-9.82) | 8.73 (6.61-11.8) | 9.63 (7.05-13.4) |
| 4-day | 1.90 (1.68-2.19) | 2.67 (2.36-3.08) | 3.69 (3.25-4.27) | 4.52 (3.95-5.28) | 5.67 (4.80-6.83) | 6.56 (5.44-8.07) | 7.47 (6.05-9.41) | 8.42 (6.64-10.9) | 9.72 (7.36-13.1) | 10.7 (7.87-15.0) |
| 7-day | 2.04 (1.80-2.35) | 2.90 (2.56-3.35) | 4.06 (3.58-4.70) | 5.02 (4.39-5.86) | 6.34 (5.37-7.64) | 7.37 (6.11-9.07) | 8.43 (6.83-10.6) | 9.54 (7.52-12.3) | 11.1 (8.38-14.9) | 12.3 (8.99-17.1) |
| 10-day | 2.07 (1.83-2.38) | 2.98 (2.63-3.44) | 4.20 (3.70-4.86) | 5.22 (4.56-6.09) | 6.63 (5.62-8.00) | 7.74 (6.42-9.53) | 8.89 (7.21-11.2) | 10.1 (7.96-13.1) | 11.8 (8.91-15.9) | 13.1 (9.58-18.2) |
| 20-day | 2.34 (2.07-2.69) | 3.41 (3.02-3.94) | 4.89 (4.31-5.66) | 6.15 (5.37-7.17) | 7.93 (6.71-9.55) | 9.35 (7.76-11.5) | 10.8 (8.79-13.7) | 12.4 (9.81-16.1) | 14.7 (11.1-19.8) | 16.5 (12.1-23.0) |
| 30-day | 2.61 (2.31-3.01) | 3.81 (3.36-4.39) | 5.48 (4.83-6.35) | 6.93 (6.06-8.09) | 9.02 (7.63-10.9) | 10.7 (8.89-13.2) | 12.5 (10.1-15.8) | 14.4 (11.4-18.7) | 17.2 (13.0-23.2) | 19.4 (14.2-27.1) |
| 45-day | 3.02 (2.67-3.49) | 4.36 (3.85-5.04) | 6.27 (5.53-7.26) | 7.95 (6.95-9.28) | 10.4 (8.82-12.6) | 12.5 (10.3-15.3) | 14.7 (11.9-18.5) | 17.1 (13.5-22.1) | 20.6 (15.6-27.7) | 23.5 (17.2-32.7) |
| 60-day | 3.40 (3.00-3.92) | 4.82 (4.26-5.57) | 6.89 (6.08-7.98) | 8.74 (7.64-10.2) | 11.5 (9.74-13.9) | 13.8 (11.5-17.0) | 16.4 (13.3-20.6) | 19.2 (15.1-24.8) | 23.3 (17.7-31.4) | 26.8 (19.6-37.3) |

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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

Please refer to NOAA Atlas 14 document for more information.

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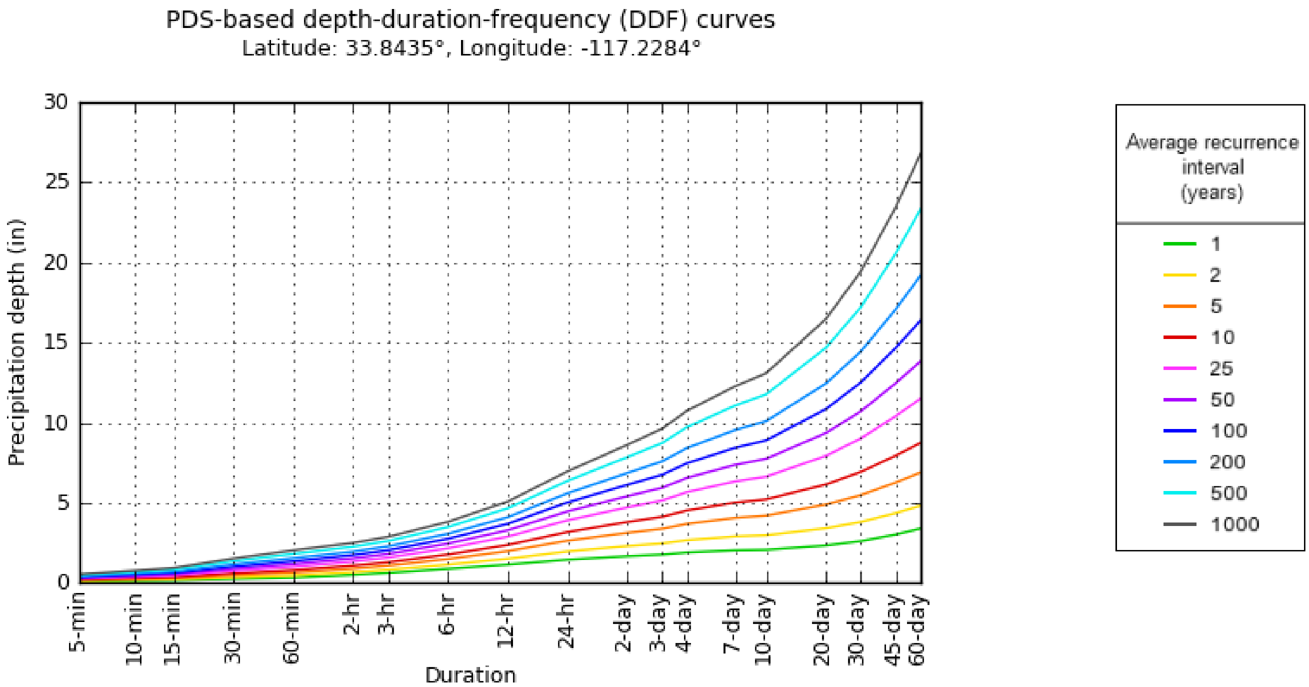
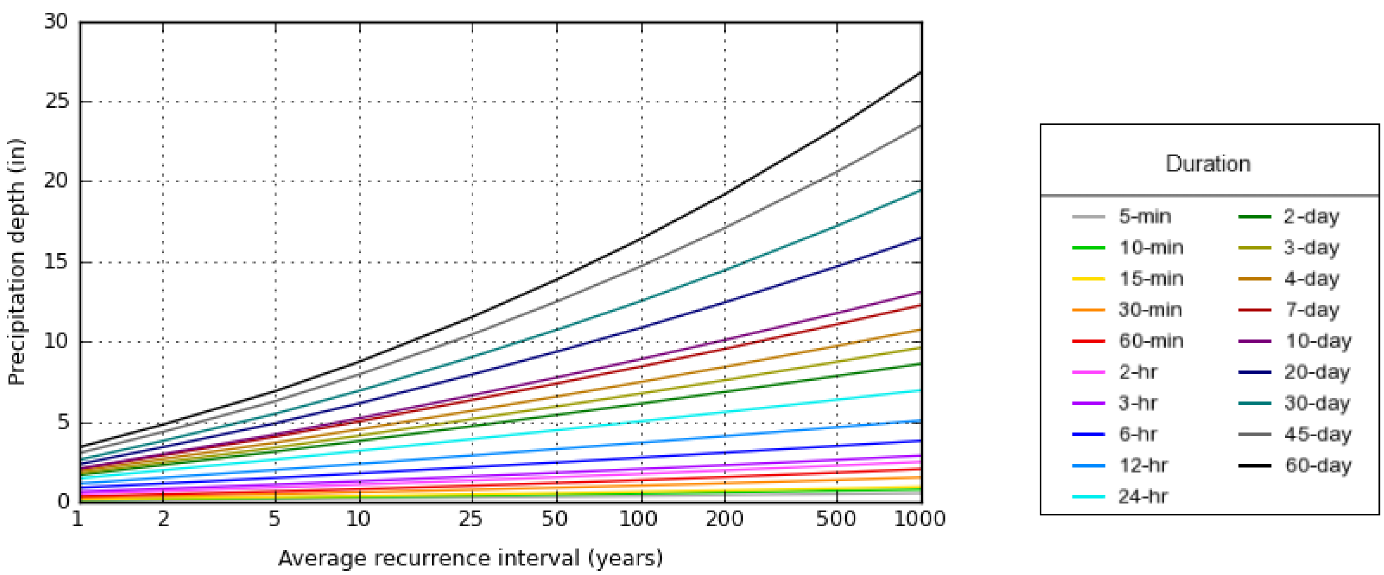
## PF graphical

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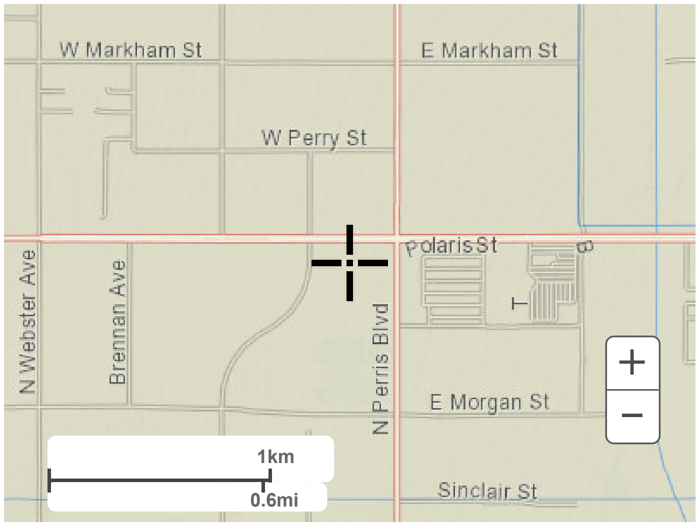
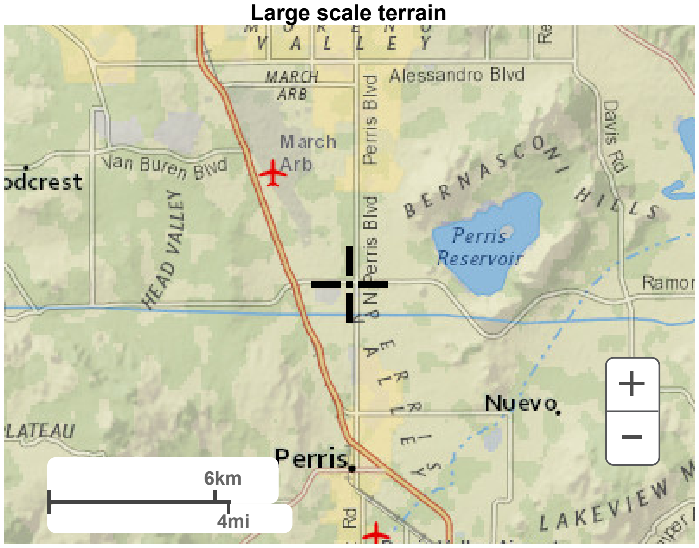
## Maps & aerials

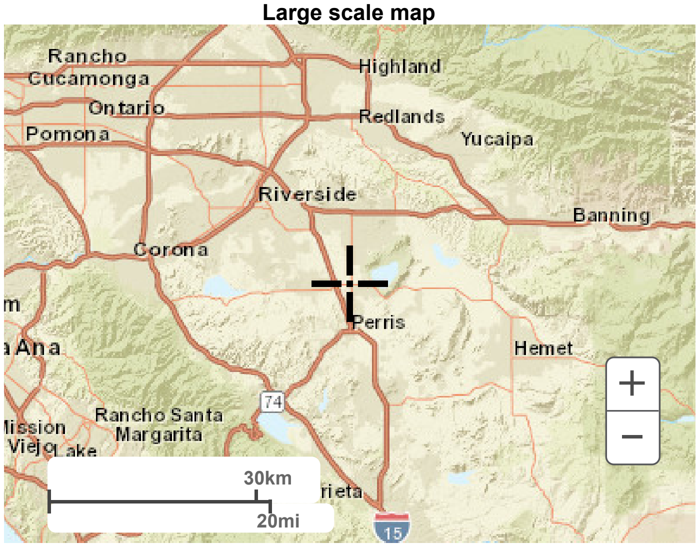
**Small scale terrain**



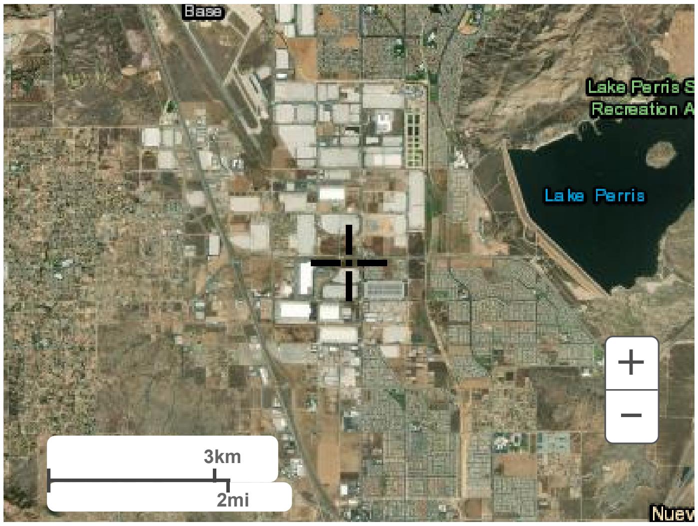

Large scale terrain




Large scale map




Large scale aerial

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

Disclaimer

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

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

**RCFC & WCD**
HYDROLOGY MANUAL

**RUNOFF INDEX NUMBERS FOR PERVIOUS AREA**

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

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

Notes:

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

**RCFC & WCD**
HYDROLOGY MANUAL

**RUNOFF INDEX NUMBERS FOR PERVIOUS AREA**

ACTUAL IMPERVIOUS COVER

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

Notes:

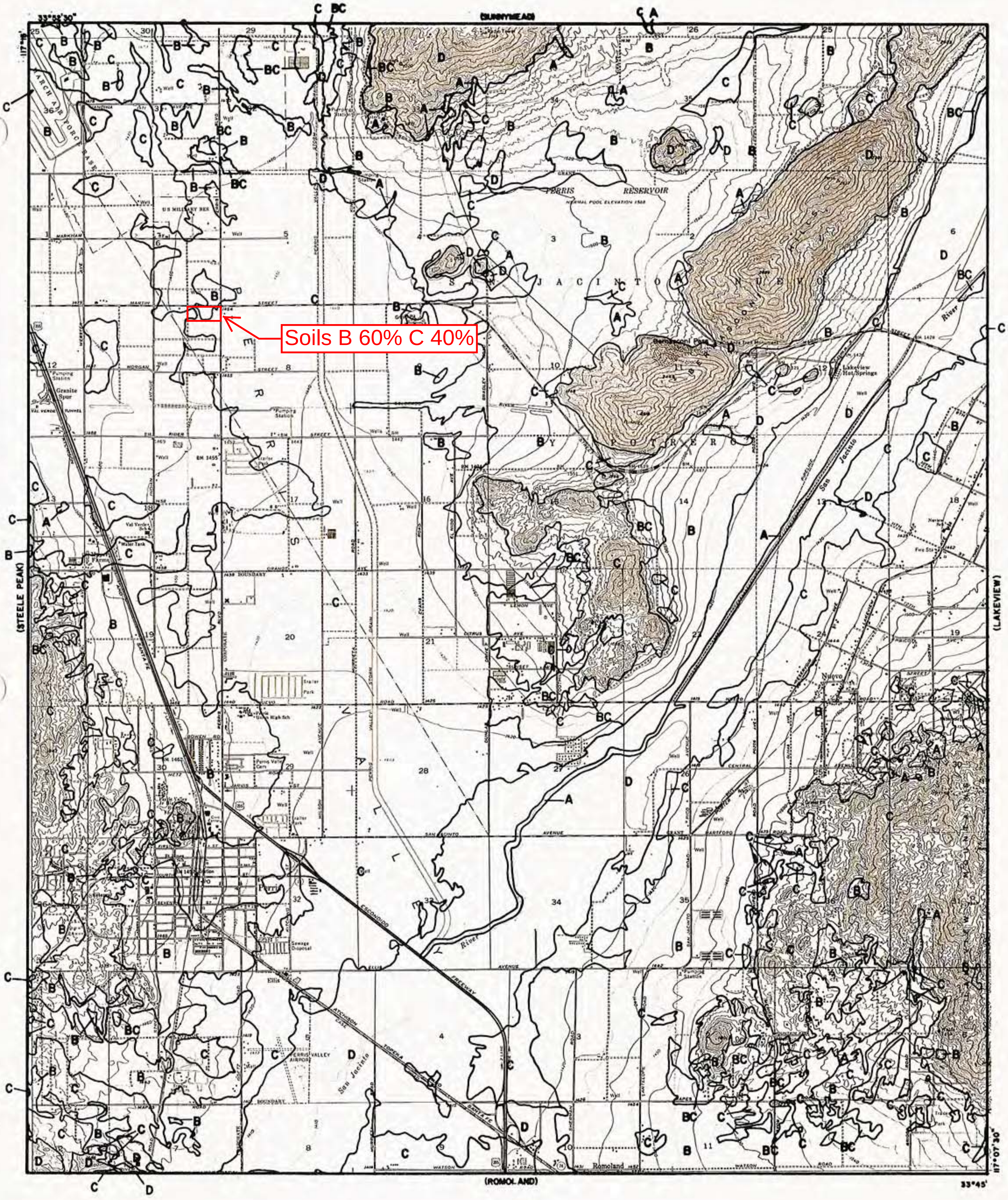
1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area should always be made, and a review of aerial photos, where available may assist in estimating the percentage of impervious cover in developed areas.

3. For typical horse ranch subdivisions increase impervious area 5 percent over the values recommended in the table above.



**IMPERVIOUS COVER FOR DEVELOPED AREAS**




**LEGEND**

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

**RCFC & WCD**

HYDROLOGY MANUAL

0 FEET 5000

# HYDROLOGIC SOILS GROUP MAP FOR PERRIS

PLATE C-1.30

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

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8.2
                  Study date  11/06/20 File: swcrp12.out


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


      Program License Serial Number 6232

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

       English Units used in output format



      ------------------------------------------------------------------
---
      SWC Ramona & Perris
      Existing Condition


      ------------------------------------------------------------------
--
      Drainage Area =      20.11(Ac.)  =      0.031 Sq. Mi.
      Drainage Area for Depth-Area Areal Adjustment =      20.11(Ac.)  =
0.031 Sq. Mi.
      Length along longest watercourse =    1418.00(Ft.)
      Length along longest watercourse measured to centroid =     629.00
(Ft.)
      Length along longest watercourse =      0.269 Mi.
      Length along longest watercourse measured to centroid =      0.119
Mi.
      Difference in elevation =       4.00(Ft.)
      Slope along watercourse =     14.8942 Ft./Mi.
      Average Manning's 'N' = 0.025
      Lag time =    0.097 Hr.
      Lag time =     5.83 Min.
      25% of lag time =     1.46 Min.
      40% of lag time =     2.33 Min.
      Unit time =     5.00 Min.
      Duration of storm = 1 Hour(s)
      User Entered Base Flow =     0.00(CFS)

      2 YEAR Area rainfall data:


      Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
```

```
        20.11              0.47                    9.37

 100 YEAR Area rainfall data:


 Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        20.11              1.35                   27.15

 STORM EVENT (YEAR) =    2.00
 Area Averaged 2-Year Rainfall =    0.466(In)
 Area Averaged 100-Year Rainfall =    1.350(In)

 Point rain (area averaged) =    0.466(In)
 Areal adjustment factor =   99.98 %
 Adjusted average point rain =    0.466(In)

 Sub-Area Data:
 Area(Ac.)         Runoff Index   Impervious %
     20.110           73.00         0.178
  Total Area Entered =     20.11(Ac.)


 RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
 AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)
(In/Hr)
 73.0  54.6      0.525     0.178        0.441       1.000
0.441
                                                       Sum (F) =
0.441
 Area averaged mean soil loss (F) (In/Hr) =  0.441
 Minimum soil loss rate ((In/Hr)) =  0.220
 (for 24 hour storm duration)
 Soil low loss rate (decimal) =   0.760
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 Slope of intensity-duration curve for a 1 hour storm =0.5000
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             U n i t  H y d r o g r a p h
                   VALLEY S-Curve
 ------------------------------------------------------------------
--
             Unit Hydrograph Data
 ------------------------------------------------------------------
---
 Unit time period   Time % of lag   Distribution   Unit Hydrograph
     (hrs)                           Graph %           (CFS)
 ------------------------------------------------------------------
---
     1   0.083         85.826         14.956              3.031
     2   0.167        171.652         46.157              9.355
     3   0.250        257.478         18.376              3.724
     4   0.333        343.304          7.880              1.597
     5   0.417        429.130          4.662              0.945
     6   0.500        514.955          2.916              0.591
     7   0.583        600.781          2.067              0.419
     8   0.667        686.607          1.367              0.277
     9   0.750        772.433          0.915              0.185
    10   0.833        858.259          0.705              0.143
```

```
                                    Sum = 100.000   Sum=      20.267
-----------------------------------------------------------------------
```

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 | Loss rate(In./Hr) Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 4.20 | 0.235 | ( 0.441) | 0.178 | 0.056 |
| 2 | 0.17 | 4.30 | 0.240 | ( 0.441) | 0.183 | 0.058 |
| 3 | 0.25 | 5.00 | 0.280 | ( 0.441) | 0.212 | 0.067 |
| 4 | 0.33 | 5.00 | 0.280 | ( 0.441) | 0.212 | 0.067 |
| 5 | 0.42 | 5.80 | 0.324 | ( 0.441) | 0.246 | 0.078 |
| 6 | 0.50 | 6.50 | 0.363 | ( 0.441) | 0.276 | 0.087 |
| 7 | 0.58 | 7.40 | 0.414 | ( 0.441) | 0.314 | 0.099 |
| 8 | 0.67 | 8.60 | 0.481 | ( 0.441) | 0.365 | 0.115 |
| 9 | 0.75 | 12.30 | 0.688 | 0.441 | ( 0.523) | 0.247 |
| 10 | 0.83 | 29.10 | 1.627 | 0.441 | ( 1.237) | 1.186 |
| 11 | 0.92 | 6.80 | 0.380 | ( 0.441) | 0.289 | 0.091 |
| 12 | 1.00 | 5.00 | 0.280 | ( 0.441) | 0.212 | 0.067 |

```
             (Loss Rate Not Used)
     Sum =     100.0                                 Sum =     2.2
      Flood volume = Effective rainfall      0.18(In)
       times area      20.1(Ac.)/[(In)/(Ft.)] =       0.3(Ac.Ft)
      Total soil loss =      0.28(In)
      Total soil loss =     0.471(Ac.Ft)
      Total rainfall =      0.47(In)
      Flood volume =       13499.1 Cubic Feet
      Total soil loss =       20512.3 Cubic Feet
      -----------------------------------------------------------------
--
       Peak flow rate of this hydrograph =     12.698(CFS)
      -----------------------------------------------------------------
--
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++
                          1 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      -----------------------------------------------------------------
--
                  Hydrograph in   5   Minute intervals ((CFS))

      -----------------------------------------------------------------
--
  Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0
20.0

-----------------------------------------------------------------------
    0+ 5       0.0012      0.17  Q         |         |         |
|
    0+10       0.0060      0.70  VQ        |         |         |
|
    0+15       0.0126      0.95  |Q        |         |         |
|
    0+20       0.0204      1.14  | Q       |         |         |
|
    0+25       0.0291      1.26  | QV      |         |         |
```

```
|
     0+30       0.0390       1.44  | Q  V     |         |         |
|
     0+35       0.0503       1.64  |  Q  V    |         |         |
|
     0+40       0.0631       1.87  |  Q    V |         |         |
|
     0+45       0.0804       2.51  |    Q    V         |         |
|
     0+50       0.1265       6.69  |         |  Q  V   |         |
|
     0+55       0.2139      12.70  |         |         |    Q V  |
|
     1+ 0       0.2561       6.12  |         | Q       |         |  V
|
     1+ 5       0.2785       3.25  |     Q   |         |         |    V
|
     1+10       0.2906       1.77  |  Q      |         |         |      V
|
     1+15       0.2979       1.06  | Q       |         |         |       V
|
     1+20       0.3029       0.72  |Q        |         |         |
V|
     1+25       0.3061       0.47  Q         |         |         |
V|
     1+30       0.3082       0.31  Q         |         |         |
V|
     1+35       0.3097       0.21  Q         |         |         |
V|
     1+40       0.3098       0.03  Q         |         |         |
V|
     1+45       0.3099       0.01  Q         |         |         |
V
-----------------------------------------------------------------------
```

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

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8.2
                Study date  11/06/20 File: swcrp32.out

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


      Program License Serial Number 6232

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

       English Units used in output format



      ------------------------------------------------------------------
---
      SWC Ramona & Perris
      Existing Condition


      ------------------------------------------------------------------
--
      Drainage Area =      20.11(Ac.)  =      0.031 Sq. Mi.
      Drainage Area for Depth-Area Areal Adjustment =      20.11(Ac.)  =
0.031 Sq. Mi.
      Length along longest watercourse =    1418.00(Ft.)
      Length along longest watercourse measured to centroid =     629.00
(Ft.)
      Length along longest watercourse =      0.269 Mi.
      Length along longest watercourse measured to centroid =      0.119
Mi.
      Difference in elevation =       4.00(Ft.)
      Slope along watercourse =     14.8942 Ft./Mi.
      Average Manning's 'N' = 0.025
      Lag time =    0.097 Hr.
      Lag time =     5.83 Min.
      25% of lag time =     1.46 Min.
      40% of lag time =     2.33 Min.
      Unit time =     5.00 Min.
      Duration of storm = 3 Hour(s)
      User Entered Base Flow =     0.00(CFS)

      2 YEAR Area rainfall data:


      Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
```

| | | |
|---|---|---|
| 20.11 | 0.82 | 16.47 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 2.04 | 41.02 |

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 0.819(In)
Area Averaged 100-Year Rainfall = 2.040(In)

Point rain (area averaged) = 0.819(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 0.819(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 73.00 | 0.178 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-1 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 73.0 | 54.6 | 0.525 | 0.178 | 0.441 | 1.000 | 0.441 |
| | | | | | Sum (F) = | 0.441 |

Area averaged mean soil loss (F) (In/Hr) = 0.441
Minimum soil loss rate ((In/Hr)) = 0.220
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.760

---------------------------------------------------------------------

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 | 85.826 | 14.956 | 3.031 |
| 2 | 0.167 | 171.652 | 46.157 | 9.355 |
| 3 | 0.250 | 257.478 | 18.376 | 3.724 |
| 4 | 0.333 | 343.304 | 7.880 | 1.597 |
| 5 | 0.417 | 429.130 | 4.662 | 0.945 |
| 6 | 0.500 | 514.955 | 2.916 | 0.591 |
| 7 | 0.583 | 600.781 | 2.067 | 0.419 |
| 8 | 0.667 | 686.607 | 1.367 | 0.277 |
| 9 | 0.750 | 772.433 | 0.915 | 0.185 |
| 10 | 0.833 | 858.259 | 0.705 | 0.143 |
| | | | Sum = 100.000 | Sum= 20.267 |

----------------------------------------------------------------------

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 | Loss rate(In./Hr) Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 1.30 | 0.128 | ( 0.441) | 0.097 | 0.031 |
| 2 | 0.17 | 1.30 | 0.128 | ( 0.441) | 0.097 | 0.031 |
| 3 | 0.25 | 1.10 | 0.108 | ( 0.441) | 0.082 | 0.026 |
| 4 | 0.33 | 1.50 | 0.147 | ( 0.441) | 0.112 | 0.035 |
| 5 | 0.42 | 1.50 | 0.147 | ( 0.441) | 0.112 | 0.035 |
| 6 | 0.50 | 1.80 | 0.177 | ( 0.441) | 0.134 | 0.042 |
| 7 | 0.58 | 1.50 | 0.147 | ( 0.441) | 0.112 | 0.035 |
| 8 | 0.67 | 1.80 | 0.177 | ( 0.441) | 0.134 | 0.042 |
| 9 | 0.75 | 1.80 | 0.177 | ( 0.441) | 0.134 | 0.042 |
| 10 | 0.83 | 1.50 | 0.147 | ( 0.441) | 0.112 | 0.035 |
| 11 | 0.92 | 1.60 | 0.157 | ( 0.441) | 0.119 | 0.038 |
| 12 | 1.00 | 1.80 | 0.177 | ( 0.441) | 0.134 | 0.042 |
| 13 | 1.08 | 2.20 | 0.216 | ( 0.441) | 0.164 | 0.052 |
| 14 | 1.17 | 2.20 | 0.216 | ( 0.441) | 0.164 | 0.052 |
| 15 | 1.25 | 2.20 | 0.216 | ( 0.441) | 0.164 | 0.052 |
| 16 | 1.33 | 2.00 | 0.197 | ( 0.441) | 0.149 | 0.047 |
| 17 | 1.42 | 2.60 | 0.256 | ( 0.441) | 0.194 | 0.061 |
| 18 | 1.50 | 2.70 | 0.265 | ( 0.441) | 0.202 | 0.064 |
| 19 | 1.58 | 2.40 | 0.236 | ( 0.441) | 0.179 | 0.057 |
| 20 | 1.67 | 2.70 | 0.265 | ( 0.441) | 0.202 | 0.064 |
| 21 | 1.75 | 3.30 | 0.324 | ( 0.441) | 0.246 | 0.078 |
| 22 | 1.83 | 3.10 | 0.305 | ( 0.441) | 0.232 | 0.073 |
| 23 | 1.92 | 2.90 | 0.285 | ( 0.441) | 0.217 | 0.068 |
| 24 | 2.00 | 3.00 | 0.295 | ( 0.441) | 0.224 | 0.071 |
| 25 | 2.08 | 3.10 | 0.305 | ( 0.441) | 0.232 | 0.073 |
| 26 | 2.17 | 4.20 | 0.413 | ( 0.441) | 0.314 | 0.099 |
| 27 | 2.25 | 5.00 | 0.491 | ( 0.441) | 0.373 | 0.118 |
| 28 | 2.33 | 3.50 | 0.344 | ( 0.441) | 0.261 | 0.083 |
| 29 | 2.42 | 6.80 | 0.668 | 0.441 | ( 0.508) | 0.227 |
| 30 | 2.50 | 7.30 | 0.717 | 0.441 | ( 0.545) | 0.276 |
| 31 | 2.58 | 8.20 | 0.806 | 0.441 | ( 0.612) | 0.365 |
| 32 | 2.67 | 5.90 | 0.580 | ( 0.441) | 0.441 | 0.139 |
| 33 | 2.75 | 2.00 | 0.197 | ( 0.441) | 0.149 | 0.047 |
| 34 | 2.83 | 1.80 | 0.177 | ( 0.441) | 0.134 | 0.042 |
| 35 | 2.92 | 1.80 | 0.177 | ( 0.441) | 0.134 | 0.042 |
| 36 | 3.00 | 0.60 | 0.059 | ( 0.441) | 0.045 | 0.014 |

(Loss Rate Not Used)

Sum = 100.0 Sum = 2.7

Flood volume = Effective rainfall 0.23(In)
times area 20.1(Ac.)/[(In)/(Ft.)] = 0.4(Ac.Ft)
Total soil loss = 0.59(In)
Total soil loss = 0.995(Ac.Ft)
Total rainfall = 0.82(In)
Flood volume = 16431.7 Cubic Feet
Total soil loss = 43349.5 Cubic Feet

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Peak flow rate of this hydrograph = 5.463(CFS)

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                          3 - H O U R    S T O R M
                       R u n o f f     H y d r o g r a p h
      ------------------------------------------------------------------
--
                    Hydrograph in   5   Minute intervals ((CFS))

      ------------------------------------------------------------------
--
  Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5
10.0

-----------------------------------------------------------------------
    0+ 5       0.0006      0.09  Q         |         |         |
|
    0+10       0.0033      0.38  VQ        |         |         |
|
    0+15       0.0066      0.48  VQ        |         |         |
|
    0+20       0.0101      0.51  |VQ       |         |         |
|
    0+25       0.0143      0.61  |VQ       |         |         |
|
    0+30       0.0190      0.68  | Q       |         |         |
|
    0+35       0.0242      0.75  | Q       |         |         |
|
    0+40       0.0293      0.74  | QV      |         |         |
|
    0+45       0.0348      0.81  |  Q      |         |         |
|
    0+50       0.0404      0.81  |  QV     |         |         |
|
    0+55       0.0457      0.76  |  QV     |         |         |
|
    1+ 0       0.0511      0.78  |  Q V    |         |         |
|
    1+ 5       0.0570      0.86  |  Q  V   |         |         |
|
    1+10       0.0636      0.96  |  Q  V   |         |         |
|
    1+15       0.0705      1.00  |   Q  V  |         |         |
|
    1+20       0.0774      1.01  |   Q   V |         |         |
|
    1+25       0.0844      1.02  |   Q   V |         |         |
|
    1+30       0.0923      1.15  |   Q    V|         |         |
|
    1+35       0.1006      1.20  |   Q     V         |         |
|
    1+40       0.1087      1.18  |   Q     |V        |         |
|
    1+45       0.1175      1.28  |    Q    | V       |         |
|
    1+50       0.1274      1.43  |    Q    |  V      |         |
|
    1+55       0.1372      1.43  |    Q    |   V     |         |
|
    2+ 0       0.1469      1.41  |    Q    |    V    |         |
|
```

```
    2+ 5       0.1567      1.43  |    Q    |     V   |         |
|
    2+10       0.1673      1.54  |     Q   |      V  |         |
|
    2+15       0.1800      1.85  |      Q  |        V|         |
|
    2+20       0.1939      2.02  |       Q |         V         |
|
    2+25       0.2094      2.24  |       Q |         | V       |
|
    2+30       0.2347      3.67  |         |   Q     |   V     |
|
    2+35       0.2685      4.92  |         |        Q|       V |
|
    2+40       0.3061      5.46  |         |         |Q        | V
|
    2+45       0.3310      3.61  |         |   Q     |         |    V
|
    2+50       0.3459      2.16  |       Q |         |         |     V
|
    2+55       0.3568      1.59  |     Q   |         |         |      V
|
    3+ 0       0.3653      1.23  |    Q    |         |         |       V
|
    3+ 5       0.3706      0.77  |  Q      |         |         |
V|
    3+10       0.3736      0.43  |Q        |         |         |
V|
    3+15       0.3753      0.25  |Q        |         |         |
V|
    3+20       0.3763      0.15  Q         |         |         |
V|
    3+25       0.3768      0.07  Q         |         |         |
V|
    3+30       0.3770      0.03  Q         |         |         |
V|
    3+35       0.3771      0.02  Q         |         |         |
V|
    3+40       0.3772      0.01  Q         |         |         |
V|
    3+45       0.3772      0.00  Q         |         |         |
V|
-----------------------------------------------------------------------
```

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


Study date 10/30/20 File: SWCRP62.out

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

Program License Serial Number 6232

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

English Units used in output format

------------------------------------------------------------------------
SWC Ramona & Perris
Existing Condition

------------------------------------------------------------------------
Drainage Area = 20.11(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.11(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1418.00(Ft.)
Length along longest watercourse measured to centroid = 629.00(Ft.)
Length along longest watercourse = 0.269 Mi.
Length along longest watercourse measured to centroid = 0.119 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 14.8942 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time = 0.097 Hr.
Lag time = 5.83 Min.
25% of lag time = 1.46 Min.
40% of lag time = 2.33 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 1.14 | 22.93 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 3.69 | 74.21 |

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 1.140(In)
Area Averaged 100-Year Rainfall = 3.690(In)

Point rain (area averaged) = 1.140(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.140(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 73.00 | 0.178 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-1 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 73.0 | 54.6 | 0.525 | 0.178 | 0.441 | 1.000 | 0.441 |
| | | | | | Sum (F) = | 0.441 |

Area averaged mean soil loss (F) (In/Hr) = 0.441
Minimum soil loss rate ((In/Hr)) = 0.220
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.760

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

---

Unit Hydrograph Data

| Unit time period | (hrs) | Time % of lag | Distribution Graph % | Unit Hydrograph (CFS) |
|---|---|---|---|---|
| 1 | 0.083 | 85.826 | 14.956 | 3.031 |
| 2 | 0.167 | 171.652 | 46.157 | 9.355 |
| 3 | 0.250 | 257.478 | 18.376 | 3.724 |
| 4 | 0.333 | 343.304 | 7.880 | 1.597 |
| 5 | 0.417 | 429.130 | 4.662 | 0.945 |
| 6 | 0.500 | 514.955 | 2.916 | 0.591 |
| 7 | 0.583 | 600.781 | 2.067 | 0.419 |
| 8 | 0.667 | 686.607 | 1.367 | 0.277 |
| 9 | 0.750 | 772.433 | 0.915 | 0.185 |
| 10 | 0.833 | 858.259 | 0.705 | 0.143 |
| | | | Sum = 100.000 | Sum= 20.267 |

---

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 | Loss rate(In./Hr) Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 0.50 | 0.068 | ( 0.441) | 0.052 | 0.016 |
| 2 | 0.17 | 0.60 | 0.082 | ( 0.441) | 0.062 | 0.020 |
| 3 | 0.25 | 0.60 | 0.082 | ( 0.441) | 0.062 | 0.020 |
| 4 | 0.33 | 0.60 | 0.082 | ( 0.441) | 0.062 | 0.020 |
| 5 | 0.42 | 0.60 | 0.082 | ( 0.441) | 0.062 | 0.020 |
| 6 | 0.50 | 0.70 | 0.096 | ( 0.441) | 0.073 | 0.023 |
| 7 | 0.58 | 0.70 | 0.096 | ( 0.441) | 0.073 | 0.023 |
| 8 | 0.67 | 0.70 | 0.096 | ( 0.441) | 0.073 | 0.023 |
| 9 | 0.75 | 0.70 | 0.096 | ( 0.441) | 0.073 | 0.023 |
| 10 | 0.83 | 0.70 | 0.096 | ( 0.441) | 0.073 | 0.023 |
| 11 | 0.92 | 0.70 | 0.096 | ( 0.441) | 0.073 | 0.023 |
| 12 | 1.00 | 0.80 | 0.109 | ( 0.441) | 0.083 | 0.026 |
| 13 | 1.08 | 0.80 | 0.109 | ( 0.441) | 0.083 | 0.026 |
| 14 | 1.17 | 0.80 | 0.109 | ( 0.441) | 0.083 | 0.026 |
| 15 | 1.25 | 0.80 | 0.109 | ( 0.441) | 0.083 | 0.026 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 16 | 1.33 | 0.80 | 0.109 | ( 0.441) | 0.083 | 0.026 |
| 17 | 1.42 | 0.80 | 0.109 | ( 0.441) | 0.083 | 0.026 |
| 18 | 1.50 | 0.80 | 0.109 | ( 0.441) | 0.083 | 0.026 |
| 19 | 1.58 | 0.80 | 0.109 | ( 0.441) | 0.083 | 0.026 |
| 20 | 1.67 | 0.80 | 0.109 | ( 0.441) | 0.083 | 0.026 |
| 21 | 1.75 | 0.80 | 0.109 | ( 0.441) | 0.083 | 0.026 |
| 22 | 1.83 | 0.80 | 0.109 | ( 0.441) | 0.083 | 0.026 |
| 23 | 1.92 | 0.80 | 0.109 | ( 0.441) | 0.083 | 0.026 |
| 24 | 2.00 | 0.90 | 0.123 | ( 0.441) | 0.094 | 0.030 |
| 25 | 2.08 | 0.80 | 0.109 | ( 0.441) | 0.083 | 0.026 |
| 26 | 2.17 | 0.90 | 0.123 | ( 0.441) | 0.094 | 0.030 |
| 27 | 2.25 | 0.90 | 0.123 | ( 0.441) | 0.094 | 0.030 |
| 28 | 2.33 | 0.90 | 0.123 | ( 0.441) | 0.094 | 0.030 |
| 29 | 2.42 | 0.90 | 0.123 | ( 0.441) | 0.094 | 0.030 |
| 30 | 2.50 | 0.90 | 0.123 | ( 0.441) | 0.094 | 0.030 |
| 31 | 2.58 | 0.90 | 0.123 | ( 0.441) | 0.094 | 0.030 |
| 32 | 2.67 | 0.90 | 0.123 | ( 0.441) | 0.094 | 0.030 |
| 33 | 2.75 | 1.00 | 0.137 | ( 0.441) | 0.104 | 0.033 |
| 34 | 2.83 | 1.00 | 0.137 | ( 0.441) | 0.104 | 0.033 |
| 35 | 2.92 | 1.00 | 0.137 | ( 0.441) | 0.104 | 0.033 |
| 36 | 3.00 | 1.00 | 0.137 | ( 0.441) | 0.104 | 0.033 |
| 37 | 3.08 | 1.00 | 0.137 | ( 0.441) | 0.104 | 0.033 |
| 38 | 3.17 | 1.10 | 0.150 | ( 0.441) | 0.114 | 0.036 |
| 39 | 3.25 | 1.10 | 0.150 | ( 0.441) | 0.114 | 0.036 |
| 40 | 3.33 | 1.10 | 0.150 | ( 0.441) | 0.114 | 0.036 |
| 41 | 3.42 | 1.20 | 0.164 | ( 0.441) | 0.125 | 0.039 |
| 42 | 3.50 | 1.30 | 0.178 | ( 0.441) | 0.135 | 0.043 |
| 43 | 3.58 | 1.40 | 0.192 | ( 0.441) | 0.146 | 0.046 |
| 44 | 3.67 | 1.40 | 0.192 | ( 0.441) | 0.146 | 0.046 |
| 45 | 3.75 | 1.50 | 0.205 | ( 0.441) | 0.156 | 0.049 |
| 46 | 3.83 | 1.50 | 0.205 | ( 0.441) | 0.156 | 0.049 |
| 47 | 3.92 | 1.60 | 0.219 | ( 0.441) | 0.166 | 0.053 |
| 48 | 4.00 | 1.60 | 0.219 | ( 0.441) | 0.166 | 0.053 |
| 49 | 4.08 | 1.70 | 0.233 | ( 0.441) | 0.177 | 0.056 |
| 50 | 4.17 | 1.80 | 0.246 | ( 0.441) | 0.187 | 0.059 |
| 51 | 4.25 | 1.90 | 0.260 | ( 0.441) | 0.198 | 0.062 |
| 52 | 4.33 | 2.00 | 0.274 | ( 0.441) | 0.208 | 0.066 |
| 53 | 4.42 | 2.10 | 0.287 | ( 0.441) | 0.218 | 0.069 |
| 54 | 4.50 | 2.10 | 0.287 | ( 0.441) | 0.218 | 0.069 |
| 55 | 4.58 | 2.20 | 0.301 | ( 0.441) | 0.229 | 0.072 |
| 56 | 4.67 | 2.30 | 0.315 | ( 0.441) | 0.239 | 0.076 |
| 57 | 4.75 | 2.40 | 0.328 | ( 0.441) | 0.250 | 0.079 |
| 58 | 4.83 | 2.40 | 0.328 | ( 0.441) | 0.250 | 0.079 |
| 59 | 4.92 | 2.50 | 0.342 | ( 0.441) | 0.260 | 0.082 |
| 60 | 5.00 | 2.60 | 0.356 | ( 0.441) | 0.270 | 0.085 |
| 61 | 5.08 | 3.10 | 0.424 | ( 0.441) | 0.322 | 0.102 |
| 62 | 5.17 | 3.60 | 0.492 | ( 0.441) | 0.374 | 0.118 |
| 63 | 5.25 | 3.90 | 0.533 | ( 0.441) | 0.405 | 0.128 |
| 64 | 5.33 | 4.20 | 0.575 | ( 0.441) | 0.437 | 0.138 |
| 65 | 5.42 | 4.70 | 0.643 | 0.441 | ( 0.489) | 0.202 |
| 66 | 5.50 | 5.60 | 0.766 | 0.441 | ( 0.582) | 0.325 |
| 67 | 5.58 | 1.90 | 0.260 | ( 0.441) | 0.198 | 0.062 |
| 68 | 5.67 | 0.90 | 0.123 | ( 0.441) | 0.094 | 0.030 |
| 69 | 5.75 | 0.60 | 0.082 | ( 0.441) | 0.062 | 0.020 |
| 70 | 5.83 | 0.50 | 0.068 | ( 0.441) | 0.052 | 0.016 |
| 71 | 5.92 | 0.30 | 0.041 | ( 0.441) | 0.031 | 0.010 |
| 72 | 6.00 | 0.20 | 0.027 | ( 0.441) | 0.021 | 0.007 |

(Loss Rate Not Used)

Sum = 100.0 Sum = 3.5

Flood volume = Effective rainfall 0.29(In)
times area 20.1(Ac.)/[(In)/(Ft.)] = 0.5(Ac.Ft)
Total soil loss = 0.85(In)
Total soil loss = 1.425(Ac.Ft)

```
      Total rainfall =      1.14(In)
      Flood volume =       21120.2 Cubic Feet
      Total soil loss =       62093.3 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      4.488(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          6 - H O U R    S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
---------------------------------------------------------------------------
  0+ 5       0.0003      0.05  Q         |         |         |         |
  0+10       0.0018      0.21  Q         |         |         |         |
  0+15       0.0039      0.31  VQ        |         |         |         |
  0+20       0.0063      0.34  VQ        |         |         |         |
  0+25       0.0088      0.36  VQ        |         |         |         |
  0+30       0.0115      0.39  VQ        |         |         |         |
  0+35       0.0144      0.43  |Q        |         |         |         |
  0+40       0.0175      0.44  |Q        |         |         |         |
  0+45       0.0206      0.45  |Q        |         |         |         |
  0+50       0.0238      0.46  |Q        |         |         |         |
  0+55       0.0269      0.46  |QV       |         |         |         |
  1+ 0       0.0302      0.47  |QV       |         |         |         |
  1+ 5       0.0337      0.51  | Q       |         |         |         |
  1+10       0.0373      0.52  | QV      |         |         |         |
  1+15       0.0409      0.52  | QV      |         |         |         |
  1+20       0.0445      0.53  | QV      |         |         |         |
  1+25       0.0481      0.53  | QV      |         |         |         |
  1+30       0.0518      0.53  | Q V     |         |         |         |
  1+35       0.0555      0.53  | Q V     |         |         |         |
  1+40       0.0591      0.53  | Q V     |         |         |         |
  1+45       0.0628      0.53  | Q  V    |         |         |         |
  1+50       0.0665      0.53  | Q  V    |         |         |         |
  1+55       0.0701      0.53  | Q  V    |         |         |         |
  2+ 0       0.0739      0.54  | Q   V   |         |         |         |
  2+ 5       0.0777      0.56  | Q   V   |         |         |         |
  2+10       0.0816      0.55  | Q   V   |         |         |         |
  2+15       0.0856      0.58  | Q    V  |         |         |         |
  2+20       0.0896      0.59  | Q    V  |         |         |         |
  2+25       0.0937      0.59  | Q    V  |         |         |         |
  2+30       0.0978      0.60  | Q     V |         |         |         |
  2+35       0.1019      0.60  | Q     V |         |         |         |
  2+40       0.1060      0.60  | Q     V |         |         |         |
  2+45       0.1102      0.61  | Q      V|         |         |         |
  2+50       0.1146      0.64  | Q      V|         |         |         |
  2+55       0.1191      0.65  | Q      V|         |         |         |
  3+ 0       0.1236      0.66  | Q       V         |         |         |
  3+ 5       0.1282      0.66  | Q       V         |         |         |
  3+10       0.1328      0.67  | Q       V         |         |         |
  3+15       0.1377      0.70  | Q       |V        |         |         |
  3+20       0.1426      0.72  | Q       |V        |         |         |
  3+25       0.1476      0.73  | Q       | V       |         |         |
  3+30       0.1530      0.78  |  Q      | V       |         |         |
  3+35       0.1587      0.83  |  Q      |  V      |         |         |
  3+40       0.1648      0.88  |  Q      |  V      |         |         |
  3+45       0.1711      0.91  |  Q      |   V     |         |         |
  3+50       0.1777      0.96  |  Q      |   V     |         |         |
  3+55       0.1845      0.98  |  Q      |    V    |         |         |
  4+ 0       0.1915      1.02  |   Q     |    V    |         |         |
```

```
4+ 5       0.1988      1.05  |   Q     |     V   |         |         |
4+10       0.2064      1.10  |   Q     |      V  |         |         |
4+15       0.2144      1.16  |   Q     |      V  |         |         |
4+20       0.2228      1.22  |   Q     |       V |         |         |
4+25       0.2316      1.29  |    Q    |        V|         |         |
4+30       0.2409      1.34  |    Q    |        V|         |         |
4+35       0.2503      1.37  |    Q    |         V         |         |
4+40       0.2602      1.43  |    Q    |         |V        |         |
4+45       0.2704      1.49  |    Q    |         | V       |         |
4+50       0.2810      1.54  |     Q   |         |  V      |         |
4+55       0.2919      1.58  |     Q   |         |   V     |         |
5+ 0       0.3031      1.63  |     Q   |         |    V    |         |
5+ 5       0.3150      1.73  |     Q   |         |    V    |         |
5+10       0.3285      1.96  |      Q  |         |      V  |         |
5+15       0.3437      2.21  |       Q |         |       V |         |
5+20       0.3605      2.43  |        Q|         |        V|         |
5+25       0.3797      2.80  |         |Q        |         |V        |
5+30       0.4062      3.85  |         |    Q    |         |  V      |
5+35       0.4372      4.49  |         |      Q  |         |     V   |
5+40       0.4545      2.52  |         Q         |         |      V  |
5+45       0.4647      1.48  |    Q    |         |         |       V |
5+50       0.4716      1.00  |   Q     |         |         |       V |
5+55       0.4765      0.72  | Q       |         |         |        V|
6+ 0       0.4800      0.51  | Q       |         |         |        V|
6+ 5       0.4823      0.33  |Q        |         |         |        V|
6+10       0.4836      0.19  Q         |         |         |        V|
6+15       0.4843      0.10  Q         |         |         |        V|
6+20       0.4846      0.04  Q         |         |         |        V|
6+25       0.4847      0.02
```

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


Study date 10/30/20 File: SWCRP242.out

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------------------------------------------------------------------------

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

Program License Serial Number 6232

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

English Units used in output format

---------------------------------------------------------------------
SWC Ramona & Perris
Existing Condition

--------------------------------------------------------------------
Drainage Area = 20.11(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.11(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1418.00(Ft.)
Length along longest watercourse measured to centroid = 629.00(Ft.)
Length along longest watercourse = 0.269 Mi.
Length along longest watercourse measured to centroid = 0.119 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 14.8942 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time = 0.097 Hr.
Lag time = 5.83 Min.
25% of lag time = 1.46 Min.
40% of lag time = 2.33 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] |
|---|---|---|
| 20.11 | 1.97 | 39.62 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 5.02 | 100.95 |

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 1.970(In)
Area Averaged 100-Year Rainfall = 5.020(In)

Point rain (area averaged) = 1.970(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.970(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 73.00 | 0.178 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-1 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 73.0 | 54.6 | 0.525 | 0.178 | 0.441 | 1.000 | 0.441 |
| | | | | | Sum (F) = | 0.441 |

Area averaged mean soil loss (F) (In/Hr) = 0.441
Minimum soil loss rate ((In/Hr)) = 0.220
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.760

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

---

Unit Hydrograph Data

| Unit time period | (hrs) | Time % of lag | Distribution Graph % | Unit Hydrograph (CFS) |
|---|---|---|---|---|
| 1 | 0.083 | 85.826 | 14.956 | 3.031 |
| 2 | 0.167 | 171.652 | 46.157 | 9.355 |
| 3 | 0.250 | 257.478 | 18.376 | 3.724 |
| 4 | 0.333 | 343.304 | 7.880 | 1.597 |
| 5 | 0.417 | 429.130 | 4.662 | 0.945 |
| 6 | 0.500 | 514.955 | 2.916 | 0.591 |
| 7 | 0.583 | 600.781 | 2.067 | 0.419 |
| 8 | 0.667 | 686.607 | 1.367 | 0.277 |
| 9 | 0.750 | 772.433 | 0.915 | 0.185 |
| 10 | 0.833 | 858.259 | 0.705 | 0.143 |
| | | | Sum = 100.000 | Sum= 20.267 |

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The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

| Unit | Time (Hr.) | Pattern Percent | Storm Rain (In/Hr) | Loss rate(In./Hr) Max | Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 0.07 | 0.016 | ( 0.782) | 0.012 | 0.004 |
| 2 | 0.17 | 0.07 | 0.016 | ( 0.779) | 0.012 | 0.004 |
| 3 | 0.25 | 0.07 | 0.016 | ( 0.776) | 0.012 | 0.004 |
| 4 | 0.33 | 0.10 | 0.024 | ( 0.773) | 0.018 | 0.006 |
| 5 | 0.42 | 0.10 | 0.024 | ( 0.770) | 0.018 | 0.006 |
| 6 | 0.50 | 0.10 | 0.024 | ( 0.767) | 0.018 | 0.006 |
| 7 | 0.58 | 0.10 | 0.024 | ( 0.764) | 0.018 | 0.006 |
| 8 | 0.67 | 0.10 | 0.024 | ( 0.761) | 0.018 | 0.006 |
| 9 | 0.75 | 0.10 | 0.024 | ( 0.758) | 0.018 | 0.006 |
| 10 | 0.83 | 0.13 | 0.032 | ( 0.755) | 0.024 | 0.008 |
| 11 | 0.92 | 0.13 | 0.032 | ( 0.752) | 0.024 | 0.008 |
| 12 | 1.00 | 0.13 | 0.032 | ( 0.749) | 0.024 | 0.008 |
| 13 | 1.08 | 0.10 | 0.024 | ( 0.746) | 0.018 | 0.006 |
| 14 | 1.17 | 0.10 | 0.024 | ( 0.743) | 0.018 | 0.006 |
| 15 | 1.25 | 0.10 | 0.024 | ( 0.740) | 0.018 | 0.006 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 16 | 1.33 | 0.10 | 0.024 | ( 0.737) | 0.018 | 0.006 |
| 17 | 1.42 | 0.10 | 0.024 | ( 0.734) | 0.018 | 0.006 |
| 18 | 1.50 | 0.10 | 0.024 | ( 0.731) | 0.018 | 0.006 |
| 19 | 1.58 | 0.10 | 0.024 | ( 0.728) | 0.018 | 0.006 |
| 20 | 1.67 | 0.10 | 0.024 | ( 0.725) | 0.018 | 0.006 |
| 21 | 1.75 | 0.10 | 0.024 | ( 0.722) | 0.018 | 0.006 |
| 22 | 1.83 | 0.13 | 0.032 | ( 0.719) | 0.024 | 0.008 |
| 23 | 1.92 | 0.13 | 0.032 | ( 0.717) | 0.024 | 0.008 |
| 24 | 2.00 | 0.13 | 0.032 | ( 0.714) | 0.024 | 0.008 |
| 25 | 2.08 | 0.13 | 0.032 | ( 0.711) | 0.024 | 0.008 |
| 26 | 2.17 | 0.13 | 0.032 | ( 0.708) | 0.024 | 0.008 |
| 27 | 2.25 | 0.13 | 0.032 | ( 0.705) | 0.024 | 0.008 |
| 28 | 2.33 | 0.13 | 0.032 | ( 0.702) | 0.024 | 0.008 |
| 29 | 2.42 | 0.13 | 0.032 | ( 0.699) | 0.024 | 0.008 |
| 30 | 2.50 | 0.13 | 0.032 | ( 0.696) | 0.024 | 0.008 |
| 31 | 2.58 | 0.17 | 0.039 | ( 0.694) | 0.030 | 0.009 |
| 32 | 2.67 | 0.17 | 0.039 | ( 0.691) | 0.030 | 0.009 |
| 33 | 2.75 | 0.17 | 0.039 | ( 0.688) | 0.030 | 0.009 |
| 34 | 2.83 | 0.17 | 0.039 | ( 0.685) | 0.030 | 0.009 |
| 35 | 2.92 | 0.17 | 0.039 | ( 0.682) | 0.030 | 0.009 |
| 36 | 3.00 | 0.17 | 0.039 | ( 0.679) | 0.030 | 0.009 |
| 37 | 3.08 | 0.17 | 0.039 | ( 0.677) | 0.030 | 0.009 |
| 38 | 3.17 | 0.17 | 0.039 | ( 0.674) | 0.030 | 0.009 |
| 39 | 3.25 | 0.17 | 0.039 | ( 0.671) | 0.030 | 0.009 |
| 40 | 3.33 | 0.17 | 0.039 | ( 0.668) | 0.030 | 0.009 |
| 41 | 3.42 | 0.17 | 0.039 | ( 0.665) | 0.030 | 0.009 |
| 42 | 3.50 | 0.17 | 0.039 | ( 0.663) | 0.030 | 0.009 |
| 43 | 3.58 | 0.17 | 0.039 | ( 0.660) | 0.030 | 0.009 |
| 44 | 3.67 | 0.17 | 0.039 | ( 0.657) | 0.030 | 0.009 |
| 45 | 3.75 | 0.17 | 0.039 | ( 0.654) | 0.030 | 0.009 |
| 46 | 3.83 | 0.20 | 0.047 | ( 0.652) | 0.036 | 0.011 |
| 47 | 3.92 | 0.20 | 0.047 | ( 0.649) | 0.036 | 0.011 |
| 48 | 4.00 | 0.20 | 0.047 | ( 0.646) | 0.036 | 0.011 |
| 49 | 4.08 | 0.20 | 0.047 | ( 0.643) | 0.036 | 0.011 |
| 50 | 4.17 | 0.20 | 0.047 | ( 0.641) | 0.036 | 0.011 |
| 51 | 4.25 | 0.20 | 0.047 | ( 0.638) | 0.036 | 0.011 |
| 52 | 4.33 | 0.23 | 0.055 | ( 0.635) | 0.042 | 0.013 |
| 53 | 4.42 | 0.23 | 0.055 | ( 0.632) | 0.042 | 0.013 |
| 54 | 4.50 | 0.23 | 0.055 | ( 0.630) | 0.042 | 0.013 |
| 55 | 4.58 | 0.23 | 0.055 | ( 0.627) | 0.042 | 0.013 |
| 56 | 4.67 | 0.23 | 0.055 | ( 0.624) | 0.042 | 0.013 |
| 57 | 4.75 | 0.23 | 0.055 | ( 0.622) | 0.042 | 0.013 |
| 58 | 4.83 | 0.27 | 0.063 | ( 0.619) | 0.048 | 0.015 |
| 59 | 4.92 | 0.27 | 0.063 | ( 0.616) | 0.048 | 0.015 |
| 60 | 5.00 | 0.27 | 0.063 | ( 0.614) | 0.048 | 0.015 |
| 61 | 5.08 | 0.20 | 0.047 | ( 0.611) | 0.036 | 0.011 |
| 62 | 5.17 | 0.20 | 0.047 | ( 0.608) | 0.036 | 0.011 |
| 63 | 5.25 | 0.20 | 0.047 | ( 0.606) | 0.036 | 0.011 |
| 64 | 5.33 | 0.23 | 0.055 | ( 0.603) | 0.042 | 0.013 |
| 65 | 5.42 | 0.23 | 0.055 | ( 0.600) | 0.042 | 0.013 |
| 66 | 5.50 | 0.23 | 0.055 | ( 0.598) | 0.042 | 0.013 |
| 67 | 5.58 | 0.27 | 0.063 | ( 0.595) | 0.048 | 0.015 |
| 68 | 5.67 | 0.27 | 0.063 | ( 0.592) | 0.048 | 0.015 |
| 69 | 5.75 | 0.27 | 0.063 | ( 0.590) | 0.048 | 0.015 |
| 70 | 5.83 | 0.27 | 0.063 | ( 0.587) | 0.048 | 0.015 |
| 71 | 5.92 | 0.27 | 0.063 | ( 0.585) | 0.048 | 0.015 |
| 72 | 6.00 | 0.27 | 0.063 | ( 0.582) | 0.048 | 0.015 |
| 73 | 6.08 | 0.30 | 0.071 | ( 0.579) | 0.054 | 0.017 |
| 74 | 6.17 | 0.30 | 0.071 | ( 0.577) | 0.054 | 0.017 |
| 75 | 6.25 | 0.30 | 0.071 | ( 0.574) | 0.054 | 0.017 |
| 76 | 6.33 | 0.30 | 0.071 | ( 0.572) | 0.054 | 0.017 |
| 77 | 6.42 | 0.30 | 0.071 | ( 0.569) | 0.054 | 0.017 |
| 78 | 6.50 | 0.30 | 0.071 | ( 0.567) | 0.054 | 0.017 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 79 | 6.58 | 0.33 | 0.079 | ( 0.564) | 0.060 | 0.019 |
| 80 | 6.67 | 0.33 | 0.079 | ( 0.562) | 0.060 | 0.019 |
| 81 | 6.75 | 0.33 | 0.079 | ( 0.559) | 0.060 | 0.019 |
| 82 | 6.83 | 0.33 | 0.079 | ( 0.557) | 0.060 | 0.019 |
| 83 | 6.92 | 0.33 | 0.079 | ( 0.554) | 0.060 | 0.019 |
| 84 | 7.00 | 0.33 | 0.079 | ( 0.551) | 0.060 | 0.019 |
| 85 | 7.08 | 0.33 | 0.079 | ( 0.549) | 0.060 | 0.019 |
| 86 | 7.17 | 0.33 | 0.079 | ( 0.546) | 0.060 | 0.019 |
| 87 | 7.25 | 0.33 | 0.079 | ( 0.544) | 0.060 | 0.019 |
| 88 | 7.33 | 0.37 | 0.087 | ( 0.541) | 0.066 | 0.021 |
| 89 | 7.42 | 0.37 | 0.087 | ( 0.539) | 0.066 | 0.021 |
| 90 | 7.50 | 0.37 | 0.087 | ( 0.537) | 0.066 | 0.021 |
| 91 | 7.58 | 0.40 | 0.095 | ( 0.534) | 0.072 | 0.023 |
| 92 | 7.67 | 0.40 | 0.095 | ( 0.532) | 0.072 | 0.023 |
| 93 | 7.75 | 0.40 | 0.095 | ( 0.529) | 0.072 | 0.023 |
| 94 | 7.83 | 0.43 | 0.102 | ( 0.527) | 0.078 | 0.025 |
| 95 | 7.92 | 0.43 | 0.102 | ( 0.524) | 0.078 | 0.025 |
| 96 | 8.00 | 0.43 | 0.102 | ( 0.522) | 0.078 | 0.025 |
| 97 | 8.08 | 0.50 | 0.118 | ( 0.519) | 0.090 | 0.028 |
| 98 | 8.17 | 0.50 | 0.118 | ( 0.517) | 0.090 | 0.028 |
| 99 | 8.25 | 0.50 | 0.118 | ( 0.515) | 0.090 | 0.028 |
| 100 | 8.33 | 0.50 | 0.118 | ( 0.512) | 0.090 | 0.028 |
| 101 | 8.42 | 0.50 | 0.118 | ( 0.510) | 0.090 | 0.028 |
| 102 | 8.50 | 0.50 | 0.118 | ( 0.507) | 0.090 | 0.028 |
| 103 | 8.58 | 0.53 | 0.126 | ( 0.505) | 0.096 | 0.030 |
| 104 | 8.67 | 0.53 | 0.126 | ( 0.503) | 0.096 | 0.030 |
| 105 | 8.75 | 0.53 | 0.126 | ( 0.500) | 0.096 | 0.030 |
| 106 | 8.83 | 0.57 | 0.134 | ( 0.498) | 0.102 | 0.032 |
| 107 | 8.92 | 0.57 | 0.134 | ( 0.496) | 0.102 | 0.032 |
| 108 | 9.00 | 0.57 | 0.134 | ( 0.493) | 0.102 | 0.032 |
| 109 | 9.08 | 0.63 | 0.150 | ( 0.491) | 0.114 | 0.036 |
| 110 | 9.17 | 0.63 | 0.150 | ( 0.489) | 0.114 | 0.036 |
| 111 | 9.25 | 0.63 | 0.150 | ( 0.486) | 0.114 | 0.036 |
| 112 | 9.33 | 0.67 | 0.158 | ( 0.484) | 0.120 | 0.038 |
| 113 | 9.42 | 0.67 | 0.158 | ( 0.482) | 0.120 | 0.038 |
| 114 | 9.50 | 0.67 | 0.158 | ( 0.479) | 0.120 | 0.038 |
| 115 | 9.58 | 0.70 | 0.165 | ( 0.477) | 0.126 | 0.040 |
| 116 | 9.67 | 0.70 | 0.165 | ( 0.475) | 0.126 | 0.040 |
| 117 | 9.75 | 0.70 | 0.165 | ( 0.472) | 0.126 | 0.040 |
| 118 | 9.83 | 0.73 | 0.173 | ( 0.470) | 0.132 | 0.042 |
| 119 | 9.92 | 0.73 | 0.173 | ( 0.468) | 0.132 | 0.042 |
| 120 | 10.00 | 0.73 | 0.173 | ( 0.466) | 0.132 | 0.042 |
| 121 | 10.08 | 0.50 | 0.118 | ( 0.463) | 0.090 | 0.028 |
| 122 | 10.17 | 0.50 | 0.118 | ( 0.461) | 0.090 | 0.028 |
| 123 | 10.25 | 0.50 | 0.118 | ( 0.459) | 0.090 | 0.028 |
| 124 | 10.33 | 0.50 | 0.118 | ( 0.457) | 0.090 | 0.028 |
| 125 | 10.42 | 0.50 | 0.118 | ( 0.454) | 0.090 | 0.028 |
| 126 | 10.50 | 0.50 | 0.118 | ( 0.452) | 0.090 | 0.028 |
| 127 | 10.58 | 0.67 | 0.158 | ( 0.450) | 0.120 | 0.038 |
| 128 | 10.67 | 0.67 | 0.158 | ( 0.448) | 0.120 | 0.038 |
| 129 | 10.75 | 0.67 | 0.158 | ( 0.446) | 0.120 | 0.038 |
| 130 | 10.83 | 0.67 | 0.158 | ( 0.443) | 0.120 | 0.038 |
| 131 | 10.92 | 0.67 | 0.158 | ( 0.441) | 0.120 | 0.038 |
| 132 | 11.00 | 0.67 | 0.158 | ( 0.439) | 0.120 | 0.038 |
| 133 | 11.08 | 0.63 | 0.150 | ( 0.437) | 0.114 | 0.036 |
| 134 | 11.17 | 0.63 | 0.150 | ( 0.435) | 0.114 | 0.036 |
| 135 | 11.25 | 0.63 | 0.150 | ( 0.433) | 0.114 | 0.036 |
| 136 | 11.33 | 0.63 | 0.150 | ( 0.431) | 0.114 | 0.036 |
| 137 | 11.42 | 0.63 | 0.150 | ( 0.428) | 0.114 | 0.036 |
| 138 | 11.50 | 0.63 | 0.150 | ( 0.426) | 0.114 | 0.036 |
| 139 | 11.58 | 0.57 | 0.134 | ( 0.424) | 0.102 | 0.032 |
| 140 | 11.67 | 0.57 | 0.134 | ( 0.422) | 0.102 | 0.032 |
| 141 | 11.75 | 0.57 | 0.134 | ( 0.420) | 0.102 | 0.032 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 142 | 11.83 | 0.60 | 0.142 | ( 0.418) | 0.108 | 0.034 |
| 143 | 11.92 | 0.60 | 0.142 | ( 0.416) | 0.108 | 0.034 |
| 144 | 12.00 | 0.60 | 0.142 | ( 0.414) | 0.108 | 0.034 |
| 145 | 12.08 | 0.83 | 0.197 | ( 0.412) | 0.150 | 0.047 |
| 146 | 12.17 | 0.83 | 0.197 | ( 0.410) | 0.150 | 0.047 |
| 147 | 12.25 | 0.83 | 0.197 | ( 0.408) | 0.150 | 0.047 |
| 148 | 12.33 | 0.87 | 0.205 | ( 0.405) | 0.156 | 0.049 |
| 149 | 12.42 | 0.87 | 0.205 | ( 0.403) | 0.156 | 0.049 |
| 150 | 12.50 | 0.87 | 0.205 | ( 0.401) | 0.156 | 0.049 |
| 151 | 12.58 | 0.93 | 0.221 | ( 0.399) | 0.168 | 0.053 |
| 152 | 12.67 | 0.93 | 0.221 | ( 0.397) | 0.168 | 0.053 |
| 153 | 12.75 | 0.93 | 0.221 | ( 0.395) | 0.168 | 0.053 |
| 154 | 12.83 | 0.97 | 0.229 | ( 0.393) | 0.174 | 0.055 |
| 155 | 12.92 | 0.97 | 0.229 | ( 0.391) | 0.174 | 0.055 |
| 156 | 13.00 | 0.97 | 0.229 | ( 0.389) | 0.174 | 0.055 |
| 157 | 13.08 | 1.13 | 0.268 | ( 0.387) | 0.204 | 0.064 |
| 158 | 13.17 | 1.13 | 0.268 | ( 0.385) | 0.204 | 0.064 |
| 159 | 13.25 | 1.13 | 0.268 | ( 0.384) | 0.204 | 0.064 |
| 160 | 13.33 | 1.13 | 0.268 | ( 0.382) | 0.204 | 0.064 |
| 161 | 13.42 | 1.13 | 0.268 | ( 0.380) | 0.204 | 0.064 |
| 162 | 13.50 | 1.13 | 0.268 | ( 0.378) | 0.204 | 0.064 |
| 163 | 13.58 | 0.77 | 0.181 | ( 0.376) | 0.138 | 0.043 |
| 164 | 13.67 | 0.77 | 0.181 | ( 0.374) | 0.138 | 0.043 |
| 165 | 13.75 | 0.77 | 0.181 | ( 0.372) | 0.138 | 0.043 |
| 166 | 13.83 | 0.77 | 0.181 | ( 0.370) | 0.138 | 0.043 |
| 167 | 13.92 | 0.77 | 0.181 | ( 0.368) | 0.138 | 0.043 |
| 168 | 14.00 | 0.77 | 0.181 | ( 0.366) | 0.138 | 0.043 |
| 169 | 14.08 | 0.90 | 0.213 | ( 0.364) | 0.162 | 0.051 |
| 170 | 14.17 | 0.90 | 0.213 | ( 0.363) | 0.162 | 0.051 |
| 171 | 14.25 | 0.90 | 0.213 | ( 0.361) | 0.162 | 0.051 |
| 172 | 14.33 | 0.87 | 0.205 | ( 0.359) | 0.156 | 0.049 |
| 173 | 14.42 | 0.87 | 0.205 | ( 0.357) | 0.156 | 0.049 |
| 174 | 14.50 | 0.87 | 0.205 | ( 0.355) | 0.156 | 0.049 |
| 175 | 14.58 | 0.87 | 0.205 | ( 0.353) | 0.156 | 0.049 |
| 176 | 14.67 | 0.87 | 0.205 | ( 0.352) | 0.156 | 0.049 |
| 177 | 14.75 | 0.87 | 0.205 | ( 0.350) | 0.156 | 0.049 |
| 178 | 14.83 | 0.83 | 0.197 | ( 0.348) | 0.150 | 0.047 |
| 179 | 14.92 | 0.83 | 0.197 | ( 0.346) | 0.150 | 0.047 |
| 180 | 15.00 | 0.83 | 0.197 | ( 0.344) | 0.150 | 0.047 |
| 181 | 15.08 | 0.80 | 0.189 | ( 0.343) | 0.144 | 0.045 |
| 182 | 15.17 | 0.80 | 0.189 | ( 0.341) | 0.144 | 0.045 |
| 183 | 15.25 | 0.80 | 0.189 | ( 0.339) | 0.144 | 0.045 |
| 184 | 15.33 | 0.77 | 0.181 | ( 0.337) | 0.138 | 0.043 |
| 185 | 15.42 | 0.77 | 0.181 | ( 0.336) | 0.138 | 0.043 |
| 186 | 15.50 | 0.77 | 0.181 | ( 0.334) | 0.138 | 0.043 |
| 187 | 15.58 | 0.63 | 0.150 | ( 0.332) | 0.114 | 0.036 |
| 188 | 15.67 | 0.63 | 0.150 | ( 0.331) | 0.114 | 0.036 |
| 189 | 15.75 | 0.63 | 0.150 | ( 0.329) | 0.114 | 0.036 |
| 190 | 15.83 | 0.63 | 0.150 | ( 0.327) | 0.114 | 0.036 |
| 191 | 15.92 | 0.63 | 0.150 | ( 0.325) | 0.114 | 0.036 |
| 192 | 16.00 | 0.63 | 0.150 | ( 0.324) | 0.114 | 0.036 |
| 193 | 16.08 | 0.13 | 0.032 | ( 0.322) | 0.024 | 0.008 |
| 194 | 16.17 | 0.13 | 0.032 | ( 0.321) | 0.024 | 0.008 |
| 195 | 16.25 | 0.13 | 0.032 | ( 0.319) | 0.024 | 0.008 |
| 196 | 16.33 | 0.13 | 0.032 | ( 0.317) | 0.024 | 0.008 |
| 197 | 16.42 | 0.13 | 0.032 | ( 0.316) | 0.024 | 0.008 |
| 198 | 16.50 | 0.13 | 0.032 | ( 0.314) | 0.024 | 0.008 |
| 199 | 16.58 | 0.10 | 0.024 | ( 0.312) | 0.018 | 0.006 |
| 200 | 16.67 | 0.10 | 0.024 | ( 0.311) | 0.018 | 0.006 |
| 201 | 16.75 | 0.10 | 0.024 | ( 0.309) | 0.018 | 0.006 |
| 202 | 16.83 | 0.10 | 0.024 | ( 0.308) | 0.018 | 0.006 |
| 203 | 16.92 | 0.10 | 0.024 | ( 0.306) | 0.018 | 0.006 |
| 204 | 17.00 | 0.10 | 0.024 | ( 0.305) | 0.018 | 0.006 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 205 | 17.08 | 0.17 | 0.039 | ( 0.303) | 0.030 | 0.009 |
| 206 | 17.17 | 0.17 | 0.039 | ( 0.302) | 0.030 | 0.009 |
| 207 | 17.25 | 0.17 | 0.039 | ( 0.300) | 0.030 | 0.009 |
| 208 | 17.33 | 0.17 | 0.039 | ( 0.299) | 0.030 | 0.009 |
| 209 | 17.42 | 0.17 | 0.039 | ( 0.297) | 0.030 | 0.009 |
| 210 | 17.50 | 0.17 | 0.039 | ( 0.296) | 0.030 | 0.009 |
| 211 | 17.58 | 0.17 | 0.039 | ( 0.294) | 0.030 | 0.009 |
| 212 | 17.67 | 0.17 | 0.039 | ( 0.293) | 0.030 | 0.009 |
| 213 | 17.75 | 0.17 | 0.039 | ( 0.291) | 0.030 | 0.009 |
| 214 | 17.83 | 0.13 | 0.032 | ( 0.290) | 0.024 | 0.008 |
| 215 | 17.92 | 0.13 | 0.032 | ( 0.288) | 0.024 | 0.008 |
| 216 | 18.00 | 0.13 | 0.032 | ( 0.287) | 0.024 | 0.008 |
| 217 | 18.08 | 0.13 | 0.032 | ( 0.285) | 0.024 | 0.008 |
| 218 | 18.17 | 0.13 | 0.032 | ( 0.284) | 0.024 | 0.008 |
| 219 | 18.25 | 0.13 | 0.032 | ( 0.283) | 0.024 | 0.008 |
| 220 | 18.33 | 0.13 | 0.032 | ( 0.281) | 0.024 | 0.008 |
| 221 | 18.42 | 0.13 | 0.032 | ( 0.280) | 0.024 | 0.008 |
| 222 | 18.50 | 0.13 | 0.032 | ( 0.279) | 0.024 | 0.008 |
| 223 | 18.58 | 0.10 | 0.024 | ( 0.277) | 0.018 | 0.006 |
| 224 | 18.67 | 0.10 | 0.024 | ( 0.276) | 0.018 | 0.006 |
| 225 | 18.75 | 0.10 | 0.024 | ( 0.275) | 0.018 | 0.006 |
| 226 | 18.83 | 0.07 | 0.016 | ( 0.273) | 0.012 | 0.004 |
| 227 | 18.92 | 0.07 | 0.016 | ( 0.272) | 0.012 | 0.004 |
| 228 | 19.00 | 0.07 | 0.016 | ( 0.271) | 0.012 | 0.004 |
| 229 | 19.08 | 0.10 | 0.024 | ( 0.269) | 0.018 | 0.006 |
| 230 | 19.17 | 0.10 | 0.024 | ( 0.268) | 0.018 | 0.006 |
| 231 | 19.25 | 0.10 | 0.024 | ( 0.267) | 0.018 | 0.006 |
| 232 | 19.33 | 0.13 | 0.032 | ( 0.266) | 0.024 | 0.008 |
| 233 | 19.42 | 0.13 | 0.032 | ( 0.264) | 0.024 | 0.008 |
| 234 | 19.50 | 0.13 | 0.032 | ( 0.263) | 0.024 | 0.008 |
| 235 | 19.58 | 0.10 | 0.024 | ( 0.262) | 0.018 | 0.006 |
| 236 | 19.67 | 0.10 | 0.024 | ( 0.261) | 0.018 | 0.006 |
| 237 | 19.75 | 0.10 | 0.024 | ( 0.260) | 0.018 | 0.006 |
| 238 | 19.83 | 0.07 | 0.016 | ( 0.258) | 0.012 | 0.004 |
| 239 | 19.92 | 0.07 | 0.016 | ( 0.257) | 0.012 | 0.004 |
| 240 | 20.00 | 0.07 | 0.016 | ( 0.256) | 0.012 | 0.004 |
| 241 | 20.08 | 0.10 | 0.024 | ( 0.255) | 0.018 | 0.006 |
| 242 | 20.17 | 0.10 | 0.024 | ( 0.254) | 0.018 | 0.006 |
| 243 | 20.25 | 0.10 | 0.024 | ( 0.253) | 0.018 | 0.006 |
| 244 | 20.33 | 0.10 | 0.024 | ( 0.252) | 0.018 | 0.006 |
| 245 | 20.42 | 0.10 | 0.024 | ( 0.251) | 0.018 | 0.006 |
| 246 | 20.50 | 0.10 | 0.024 | ( 0.249) | 0.018 | 0.006 |
| 247 | 20.58 | 0.10 | 0.024 | ( 0.248) | 0.018 | 0.006 |
| 248 | 20.67 | 0.10 | 0.024 | ( 0.247) | 0.018 | 0.006 |
| 249 | 20.75 | 0.10 | 0.024 | ( 0.246) | 0.018 | 0.006 |
| 250 | 20.83 | 0.07 | 0.016 | ( 0.245) | 0.012 | 0.004 |
| 251 | 20.92 | 0.07 | 0.016 | ( 0.244) | 0.012 | 0.004 |
| 252 | 21.00 | 0.07 | 0.016 | ( 0.243) | 0.012 | 0.004 |
| 253 | 21.08 | 0.10 | 0.024 | ( 0.242) | 0.018 | 0.006 |
| 254 | 21.17 | 0.10 | 0.024 | ( 0.241) | 0.018 | 0.006 |
| 255 | 21.25 | 0.10 | 0.024 | ( 0.241) | 0.018 | 0.006 |
| 256 | 21.33 | 0.07 | 0.016 | ( 0.240) | 0.012 | 0.004 |
| 257 | 21.42 | 0.07 | 0.016 | ( 0.239) | 0.012 | 0.004 |
| 258 | 21.50 | 0.07 | 0.016 | ( 0.238) | 0.012 | 0.004 |
| 259 | 21.58 | 0.10 | 0.024 | ( 0.237) | 0.018 | 0.006 |
| 260 | 21.67 | 0.10 | 0.024 | ( 0.236) | 0.018 | 0.006 |
| 261 | 21.75 | 0.10 | 0.024 | ( 0.235) | 0.018 | 0.006 |
| 262 | 21.83 | 0.07 | 0.016 | ( 0.234) | 0.012 | 0.004 |
| 263 | 21.92 | 0.07 | 0.016 | ( 0.234) | 0.012 | 0.004 |
| 264 | 22.00 | 0.07 | 0.016 | ( 0.233) | 0.012 | 0.004 |
| 265 | 22.08 | 0.10 | 0.024 | ( 0.232) | 0.018 | 0.006 |
| 266 | 22.17 | 0.10 | 0.024 | ( 0.231) | 0.018 | 0.006 |
| 267 | 22.25 | 0.10 | 0.024 | ( 0.231) | 0.018 | 0.006 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 268 | 22.33 | 0.07 | 0.016 | ( 0.230) | 0.012 | 0.004 |
| 269 | 22.42 | 0.07 | 0.016 | ( 0.229) | 0.012 | 0.004 |
| 270 | 22.50 | 0.07 | 0.016 | ( 0.228) | 0.012 | 0.004 |
| 271 | 22.58 | 0.07 | 0.016 | ( 0.228) | 0.012 | 0.004 |
| 272 | 22.67 | 0.07 | 0.016 | ( 0.227) | 0.012 | 0.004 |
| 273 | 22.75 | 0.07 | 0.016 | ( 0.227) | 0.012 | 0.004 |
| 274 | 22.83 | 0.07 | 0.016 | ( 0.226) | 0.012 | 0.004 |
| 275 | 22.92 | 0.07 | 0.016 | ( 0.225) | 0.012 | 0.004 |
| 276 | 23.00 | 0.07 | 0.016 | ( 0.225) | 0.012 | 0.004 |
| 277 | 23.08 | 0.07 | 0.016 | ( 0.224) | 0.012 | 0.004 |
| 278 | 23.17 | 0.07 | 0.016 | ( 0.224) | 0.012 | 0.004 |
| 279 | 23.25 | 0.07 | 0.016 | ( 0.223) | 0.012 | 0.004 |
| 280 | 23.33 | 0.07 | 0.016 | ( 0.223) | 0.012 | 0.004 |
| 281 | 23.42 | 0.07 | 0.016 | ( 0.222) | 0.012 | 0.004 |
| 282 | 23.50 | 0.07 | 0.016 | ( 0.222) | 0.012 | 0.004 |
| 283 | 23.58 | 0.07 | 0.016 | ( 0.222) | 0.012 | 0.004 |
| 284 | 23.67 | 0.07 | 0.016 | ( 0.221) | 0.012 | 0.004 |
| 285 | 23.75 | 0.07 | 0.016 | ( 0.221) | 0.012 | 0.004 |
| 286 | 23.83 | 0.07 | 0.016 | ( 0.221) | 0.012 | 0.004 |
| 287 | 23.92 | 0.07 | 0.016 | ( 0.221) | 0.012 | 0.004 |
| 288 | 24.00 | 0.07 | 0.016 | ( 0.221) | 0.012 | 0.004 |

(Loss Rate Not Used)

Sum = 100.0 Sum = 5.7

Flood volume = Effective rainfall 0.47(In)
times area 20.1(Ac.)/[(In)/(Ft.)] = 0.8(Ac.Ft)
Total soil loss = 1.50(In)
Total soil loss = 2.509(Ac.Ft)
Total rainfall = 1.97(In)
Flood volume = 34512.7 Cubic Feet
Total soil loss = 109290.3 Cubic Feet

--------------------------------------------------------------------
Peak flow rate of this hydrograph = 1.294(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 | 0.0004 | 0.05 | Q | | | | |
| 0+15 | 0.0008 | 0.06 | Q | | | | |
| 0+20 | 0.0013 | 0.07 | Q | | | | |
| 0+25 | 0.0020 | 0.09 | Q | | | | |
| 0+30 | 0.0027 | 0.10 | Q | | | | |
| 0+35 | 0.0034 | 0.11 | Q | | | | |
| 0+40 | 0.0042 | 0.11 | Q | | | | |
| 0+45 | 0.0050 | 0.11 | Q | | | | |
| 0+50 | 0.0058 | 0.12 | Q | | | | |
| 0+55 | 0.0067 | 0.14 | Q | | | | |
| 1+ 0 | 0.0077 | 0.15 | Q | | | | |
| 1+ 5 | 0.0087 | 0.14 | Q | | | | |
| 1+10 | 0.0096 | 0.13 | Q | | | | |
| 1+15 | 0.0104 | 0.12 | Q | | | | |
| 1+20 | 0.0112 | 0.12 | Q | | | | |
| 1+25 | 0.0121 | 0.12 | Q | | | | |
| 1+30 | 0.0129 | 0.12 | Q | | | | |
| 1+35 | 0.0137 | 0.12 | Q | | | | |
| 1+40 | 0.0145 | 0.12 | Q | | | | |
| 1+45 | 0.0152 | 0.12 | Q | | | | |

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1+50       0.0161      0.12  Q         |         |         |         |
1+55       0.0170      0.14  Q         |         |         |         |
2+ 0       0.0180      0.15  Q         |         |         |         |
2+ 5       0.0191      0.15  Q         |         |         |         |
2+10       0.0201      0.15  QV        |         |         |         |
2+15       0.0211      0.15  QV        |         |         |         |
2+20       0.0222      0.15  QV        |         |         |         |
2+25       0.0232      0.15  QV        |         |         |         |
2+30       0.0243      0.15  QV        |         |         |         |
2+35       0.0254      0.16  QV        |         |         |         |
2+40       0.0266      0.18  QV        |         |         |         |
2+45       0.0279      0.18  QV        |         |         |         |
2+50       0.0292      0.19  QV        |         |         |         |
2+55       0.0305      0.19  QV        |         |         |         |
3+ 0       0.0318      0.19  QV        |         |         |         |
3+ 5       0.0331      0.19  QV        |         |         |         |
3+10       0.0344      0.19  QV        |         |         |         |
3+15       0.0357      0.19  QV        |         |         |         |
3+20       0.0370      0.19  QV        |         |         |         |
3+25       0.0384      0.19  QV        |         |         |         |
3+30       0.0397      0.19  Q V       |         |         |         |
3+35       0.0410      0.19  Q V       |         |         |         |
3+40       0.0423      0.19  Q V       |         |         |         |
3+45       0.0436      0.19  Q V       |         |         |         |
3+50       0.0450      0.20  Q V       |         |         |         |
3+55       0.0465      0.22  Q V       |         |         |         |
4+ 0       0.0480      0.22  Q V       |         |         |         |
4+ 5       0.0496      0.23  Q V       |         |         |         |
4+10       0.0511      0.23  Q V       |         |         |         |
4+15       0.0527      0.23  Q V       |         |         |         |
4+20       0.0543      0.23  Q V       |         |         |         |
4+25       0.0561      0.25  |QV       |         |         |         |
4+30       0.0578      0.26  |QV       |         |         |         |
4+35       0.0597      0.26  |Q V      |         |         |         |
4+40       0.0615      0.27  |Q V      |         |         |         |
4+45       0.0633      0.27  |Q V      |         |         |         |
4+50       0.0652      0.27  |Q V      |         |         |         |
4+55       0.0672      0.29  |Q V      |         |         |         |
5+ 0       0.0693      0.30  |Q V      |         |         |         |
5+ 5       0.0713      0.29  |Q V      |         |         |         |
5+10       0.0730      0.26  |Q V      |         |         |         |
5+15       0.0747      0.24  Q  V      |         |         |         |
5+20       0.0764      0.24  Q  V      |         |         |         |
5+25       0.0782      0.26  |Q V      |         |         |         |
5+30       0.0800      0.26  |Q  V     |         |         |         |
5+35       0.0819      0.27  |Q  V     |         |         |         |
5+40       0.0839      0.29  |Q  V     |         |         |         |
5+45       0.0859      0.30  |Q  V     |         |         |         |
5+50       0.0880      0.30  |Q  V     |         |         |         |
5+55       0.0901      0.30  |Q  V     |         |         |         |
6+ 0       0.0922      0.30  |Q  V     |         |         |         |
6+ 5       0.0943      0.31  |Q  V     |         |         |         |
6+10       0.0966      0.33  |Q  V     |         |         |         |
6+15       0.0989      0.34  |Q  V     |         |         |         |
6+20       0.1013      0.34  |Q   V    |         |         |         |
6+25       0.1036      0.34  |Q   V    |         |         |         |
6+30       0.1060      0.34  |Q   V    |         |         |         |
6+35       0.1084      0.35  |Q   V    |         |         |         |
6+40       0.1109      0.37  |Q   V    |         |         |         |
6+45       0.1135      0.38  |Q   V    |         |         |         |
6+50       0.1161      0.38  |Q   V    |         |         |         |
6+55       0.1187      0.38  |Q   V    |         |         |         |
7+ 0       0.1214      0.38  |Q    V   |         |         |         |
```

```
 7+ 5       0.1240      0.38  |Q    V   |         |         |         |
 7+10       0.1266      0.38  |Q    V   |         |         |         |
 7+15       0.1293      0.38  |Q    V   |         |         |         |
 7+20       0.1319      0.39  |Q    V   |         |         |         |
 7+25       0.1347      0.41  |Q    V   |         |         |         |
 7+30       0.1376      0.41  |Q    V   |         |         |         |
 7+35       0.1405      0.42  |Q     V  |         |         |         |
 7+40       0.1436      0.44  |Q     V  |         |         |         |
 7+45       0.1467      0.45  |Q     V  |         |         |         |
 7+50       0.1498      0.46  |Q     V  |         |         |         |
 7+55       0.1531      0.48  |Q     V  |         |         |         |
 8+ 0       0.1565      0.49  |Q     V  |         |         |         |
 8+ 5       0.1600      0.50  | Q     V |         |         |         |
 8+10       0.1637      0.54  | Q     V |         |         |         |
 8+15       0.1675      0.56  | Q     V |         |         |         |
 8+20       0.1714      0.56  | Q     V |         |         |         |
 8+25       0.1753      0.57  | Q     V |         |         |         |
 8+30       0.1793      0.57  | Q      V|         |         |         |
 8+35       0.1833      0.58  | Q      V|         |         |         |
 8+40       0.1874      0.60  | Q      V|         |         |         |
 8+45       0.1915      0.61  | Q      V|         |         |         |
 8+50       0.1958      0.61  | Q      V|         |         |         |
 8+55       0.2001      0.63  | Q       V         |         |         |
 9+ 0       0.2046      0.64  | Q       V         |         |         |
 9+ 5       0.2091      0.66  | Q       V         |         |         |
 9+10       0.2139      0.70  | Q       V         |         |         |
 9+15       0.2188      0.71  | Q       |V        |         |         |
 9+20       0.2237      0.72  | Q       |V        |         |         |
 9+25       0.2289      0.75  | Q       |V        |         |         |
 9+30       0.2341      0.75  |  Q      |V        |         |         |
 9+35       0.2394      0.77  |  Q      | V       |         |         |
 9+40       0.2448      0.79  |  Q      | V       |         |         |
 9+45       0.2502      0.79  |  Q      | V       |         |         |
 9+50       0.2558      0.81  |  Q      | V       |         |         |
 9+55       0.2615      0.83  |  Q      |  V      |         |         |
10+ 0       0.2672      0.83  |  Q      |  V      |         |         |
10+ 5       0.2727      0.80  |  Q      |  V      |         |         |
10+10       0.2774      0.68  | Q       |   V     |         |         |
10+15       0.2817      0.63  | Q       |   V     |         |         |
10+20       0.2859      0.61  | Q       |   V     |         |         |
10+25       0.2900      0.60  | Q       |   V     |         |         |
10+30       0.2940      0.59  | Q       |   V     |         |         |
10+35       0.2982      0.61  | Q       |    V    |         |         |
10+40       0.3030      0.70  | Q       |    V    |         |         |
10+45       0.3081      0.73  | Q       |    V    |         |         |
10+50       0.3132      0.74  | Q       |    V    |         |         |
10+55       0.3184      0.75  |  Q      |     V   |         |         |
11+ 0       0.3236      0.76  |  Q      |     V   |         |         |
11+ 5       0.3288      0.76  |  Q      |     V   |         |         |
11+10       0.3339      0.74  | Q       |     V   |         |         |
11+15       0.3389      0.74  | Q       |      V  |         |         |
11+20       0.3440      0.73  | Q       |      V  |         |         |
11+25       0.3490      0.73  | Q       |      V  |         |         |
11+30       0.3541      0.73  | Q       |      V  |         |         |
11+35       0.3590      0.72  | Q       |       V |         |         |
11+40       0.3637      0.68  | Q       |       V |         |         |
11+45       0.3683      0.67  | Q       |       V |         |         |
11+50       0.3729      0.67  | Q       |       V |         |         |
11+55       0.3776      0.68  | Q       |        V|         |         |
12+ 0       0.3823      0.69  | Q       |        V|         |         |
12+ 5       0.3873      0.73  | Q       |        V|         |         |
12+10       0.3932      0.85  |  Q      |        V|         |         |
12+15       0.3994      0.90  |  Q      |         V         |         |
```

```
12+20       0.4058      0.93  |  Q      |         V         |         |
12+25       0.4124      0.96  |  Q      |         V         |         |
12+30       0.4191      0.98  |  Q      |         |V        |         |
12+35       0.4260      1.00  |  Q      |         |V        |         |
12+40       0.4331      1.04  |   Q     |         |V        |         |
12+45       0.4404      1.05  |   Q     |         | V       |         |
12+50       0.4478      1.07  |   Q     |         | V       |         |
12+55       0.4553      1.09  |   Q     |         | V       |         |
13+ 0       0.4628      1.10  |   Q     |         |  V      |         |
13+ 5       0.4707      1.13  |   Q     |         |  V      |         |
13+10       0.4791      1.22  |   Q     |         |   V     |         |
13+15       0.4878      1.26  |    Q    |         |   V     |         |
13+20       0.4966      1.28  |    Q    |         |    V    |         |
13+25       0.5055      1.29  |    Q    |         |    V    |         |
13+30       0.5144      1.29  |    Q    |         |    V    |         |
13+35       0.5229      1.23  |   Q     |         |     V   |         |
13+40       0.5301      1.04  |   Q     |         |     V   |         |
13+45       0.5367      0.97  |  Q      |         |      V  |         |
13+50       0.5432      0.94  |  Q      |         |      V  |         |
13+55       0.5495      0.92  |  Q      |         |      V  |         |
14+ 0       0.5557      0.90  |  Q      |         |       V |         |
14+ 5       0.5620      0.92  |  Q      |         |       V |         |
14+10       0.5688      0.98  |  Q      |         |       V |         |
14+15       0.5757      1.01  |   Q     |         |        V|         |
14+20       0.5827      1.01  |   Q     |         |        V|         |
14+25       0.5896      1.00  |  Q      |         |        V|         |
14+30       0.5964      1.00  |  Q      |         |         V         |
14+35       0.6033      1.00  |  Q      |         |         V         |
14+40       0.6102      1.00  |  Q      |         |         V         |
14+45       0.6170      1.00  |  Q      |         |         |V        |
14+50       0.6239      0.99  |  Q      |         |         |V        |
14+55       0.6306      0.97  |  Q      |         |         |V        |
15+ 0       0.6372      0.97  |  Q      |         |         | V       |
15+ 5       0.6438      0.96  |  Q      |         |         | V       |
15+10       0.6503      0.94  |  Q      |         |         | V       |
15+15       0.6567      0.93  |  Q      |         |         |  V      |
15+20       0.6630      0.92  |  Q      |         |         |  V      |
15+25       0.6692      0.90  |  Q      |         |         |  V      |
15+30       0.6754      0.89  |  Q      |         |         |   V     |
15+35       0.6813      0.87  |  Q      |         |         |   V     |
15+40       0.6868      0.79  |  Q      |         |         |   V     |
15+45       0.6920      0.76  |  Q      |         |         |   V     |
15+50       0.6972      0.75  | Q       |         |         |    V    |
15+55       0.7023      0.74  | Q       |         |         |    V    |
16+ 0       0.7074      0.74  | Q       |         |         |    V    |
16+ 5       0.7118      0.65  | Q       |         |         |    V    |
16+10       0.7145      0.38  |Q        |         |         |     V   |
16+15       0.7163      0.27  |Q        |         |         |     V   |
16+20       0.7179      0.23  Q         |         |         |     V   |
16+25       0.7193      0.20  Q         |         |         |     V   |
16+30       0.7205      0.18  Q         |         |         |     V   |
16+35       0.7217      0.16  Q         |         |         |     V   |
16+40       0.7226      0.14  Q         |         |         |     V   |
16+45       0.7235      0.13  Q         |         |         |     V   |
16+50       0.7243      0.12  Q         |         |         |     V   |
16+55       0.7251      0.12  Q         |         |         |     V   |
17+ 0       0.7259      0.12  Q         |         |         |     V   |
17+ 5       0.7268      0.13  Q         |         |         |     V   |
17+10       0.7279      0.16  Q         |         |         |     V   |
17+15       0.7291      0.18  Q         |         |         |     V   |
17+20       0.7304      0.18  Q         |         |         |     V   |
17+25       0.7317      0.19  Q         |         |         |     V   |
17+30       0.7330      0.19  Q         |         |         |      V  |
```

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 17+35 | 0.7343 | 0.19 | Q | \| | \| | \| | V | \| |
| 17+40 | 0.7356 | 0.19 | Q | \| | \| | \| | V | \| |
| 17+45 | 0.7369 | 0.19 | Q | \| | \| | \| | V | \| |
| 17+50 | 0.7382 | 0.19 | Q | \| | \| | \| | V | \| |
| 17+55 | 0.7393 | 0.17 | Q | \| | \| | \| | V | \| |
| 18+ 0 | 0.7405 | 0.16 | Q | \| | \| | \| | V | \| |
| 18+ 5 | 0.7415 | 0.16 | Q | \| | \| | \| | V | \| |
| 18+10 | 0.7426 | 0.16 | Q | \| | \| | \| | V | \| |
| 18+15 | 0.7437 | 0.16 | Q | \| | \| | \| | V | \| |
| 18+20 | 0.7448 | 0.15 | Q | \| | \| | \| | V | \| |
| 18+25 | 0.7458 | 0.15 | Q | \| | \| | \| | V | \| |
| 18+30 | 0.7469 | 0.15 | Q | \| | \| | \| | V | \| |
| 18+35 | 0.7479 | 0.15 | Q | \| | \| | \| | V | \| |
| 18+40 | 0.7488 | 0.13 | Q | \| | \| | \| | V | \| |
| 18+45 | 0.7496 | 0.12 | Q | \| | \| | \| | V | \| |
| 18+50 | 0.7504 | 0.11 | Q | \| | \| | \| | V | \| |
| 18+55 | 0.7511 | 0.09 | Q | \| | \| | \| | V | \| |
| 19+ 0 | 0.7517 | 0.09 | Q | \| | \| | \| | V | \| |
| 19+ 5 | 0.7523 | 0.09 | Q | \| | \| | \| | V | \| |
| 19+10 | 0.7530 | 0.10 | Q | \| | \| | \| | V | \| |
| 19+15 | 0.7537 | 0.11 | Q | \| | \| | \| | V | \| |
| 19+20 | 0.7545 | 0.12 | Q | \| | \| | \| | V | \| |
| 19+25 | 0.7555 | 0.14 | Q | \| | \| | \| | V | \| |
| 19+30 | 0.7565 | 0.14 | Q | \| | \| | \| | V | \| |
| 19+35 | 0.7575 | 0.14 | Q | \| | \| | \| | V | \| |
| 19+40 | 0.7583 | 0.13 | Q | \| | \| | \| | V | \| |
| 19+45 | 0.7592 | 0.12 | Q | \| | \| | \| | V | \| |
| 19+50 | 0.7599 | 0.11 | Q | \| | \| | \| | V | \| |
| 19+55 | 0.7606 | 0.09 | Q | \| | \| | \| | V | \| |
| 20+ 0 | 0.7612 | 0.09 | Q | \| | \| | \| | V | \| |
| 20+ 5 | 0.7618 | 0.09 | Q | \| | \| | \| | V | \| |
| 20+10 | 0.7625 | 0.10 | Q | \| | \| | \| | V | \| |
| 20+15 | 0.7633 | 0.11 | Q | \| | \| | \| | V | \| |
| 20+20 | 0.7640 | 0.11 | Q | \| | \| | \| | V | \| |
| 20+25 | 0.7648 | 0.11 | Q | \| | \| | \| | V | \| |
| 20+30 | 0.7656 | 0.11 | Q | \| | \| | \| | V | \| |
| 20+35 | 0.7664 | 0.11 | Q | \| | \| | \| | V | \| |
| 20+40 | 0.7671 | 0.11 | Q | \| | \| | \| | V | \| |
| 20+45 | 0.7679 | 0.11 | Q | \| | \| | \| | V | \| |
| 20+50 | 0.7687 | 0.11 | Q | \| | \| | \| | V | \| |
| 20+55 | 0.7693 | 0.09 | Q | \| | \| | \| | V | \| |
| 21+ 0 | 0.7699 | 0.08 | Q | \| | \| | \| | V | \| |
| 21+ 5 | 0.7705 | 0.09 | Q | \| | \| | \| | V | \| |
| 21+10 | 0.7712 | 0.10 | Q | \| | \| | \| | V | \| |
| 21+15 | 0.7720 | 0.11 | Q | \| | \| | \| | V | \| |
| 21+20 | 0.7727 | 0.11 | Q | \| | \| | \| | V | \| |
| 21+25 | 0.7733 | 0.09 | Q | \| | \| | \| | V | \| |
| 21+30 | 0.7739 | 0.08 | Q | \| | \| | \| | V | \| |
| 21+35 | 0.7745 | 0.09 | Q | \| | \| | \| | V | \| |
| 21+40 | 0.7752 | 0.10 | Q | \| | \| | \| | V | \| |
| 21+45 | 0.7759 | 0.11 | Q | \| | \| | \| | V | \| |
| 21+50 | 0.7767 | 0.11 | Q | \| | \| | \| | V | \| |
| 21+55 | 0.7773 | 0.09 | Q | \| | \| | \| | V | \| |
| 22+ 0 | 0.7778 | 0.08 | Q | \| | \| | \| | V | \| |
| 22+ 5 | 0.7784 | 0.09 | Q | \| | \| | \| | V | \| |
| 22+10 | 0.7791 | 0.10 | Q | \| | \| | \| | V | \| |
| 22+15 | 0.7799 | 0.11 | Q | \| | \| | \| | V | \| |
| 22+20 | 0.7806 | 0.11 | Q | \| | \| | \| | V | \| |
| 22+25 | 0.7812 | 0.09 | Q | \| | \| | \| | V | \| |
| 22+30 | 0.7818 | 0.08 | Q | \| | \| | \| | V | \| |
| 22+35 | 0.7824 | 0.08 | Q | \| | \| | \| | V | \| |
| 22+40 | 0.7829 | 0.08 | Q | \| | \| | \| | V | \| |
| 22+45 | 0.7834 | 0.08 | Q | \| | \| | \| | V | \| |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 22+50 | 0.7840 | 0.08 | Q | \| | \| | \| | V\| |
| 22+55 | 0.7845 | 0.08 | Q | \| | \| | \| | V\| |
| 23+ 0 | 0.7850 | 0.08 | Q | \| | \| | \| | V\| |
| 23+ 5 | 0.7856 | 0.08 | Q | \| | \| | \| | V\| |
| 23+10 | 0.7861 | 0.08 | Q | \| | \| | \| | V\| |
| 23+15 | 0.7866 | 0.08 | Q | \| | \| | \| | V\| |
| 23+20 | 0.7872 | 0.08 | Q | \| | \| | \| | V\| |
| 23+25 | 0.7877 | 0.08 | Q | \| | \| | \| | V\| |
| 23+30 | 0.7882 | 0.08 | Q | \| | \| | \| | V\| |
| 23+35 | 0.7887 | 0.08 | Q | \| | \| | \| | V\| |
| 23+40 | 0.7893 | 0.08 | Q | \| | \| | \| | V\| |
| 23+45 | 0.7898 | 0.08 | Q | \| | \| | \| | V\| |
| 23+50 | 0.7903 | 0.08 | Q | \| | \| | \| | V\| |
| 23+55 | 0.7908 | 0.08 | Q | \| | \| | \| | V\| |
| 24+ 0 | 0.7914 | 0.08 | Q | \| | \| | \| | V\| |
| 24+ 5 | 0.7918 | 0.07 | Q | \| | \| | \| | V\| |
| 24+10 | 0.7920 | 0.03 | Q | \| | \| | \| | V\| |
| 24+15 | 0.7921 | 0.02 | Q | \| | \| | \| | V\| |
| 24+20 | 0.7922 | 0.01 | Q | \| | \| | \| | V\| |
| 24+25 | 0.7922 | 0.01 | Q | \| | \| | \| | V\| |
| 24+30 | 0.7923 | 0.00 | Q | \| | \| | \| | V\| |
| 24+35 | 0.7923 | 0.00 | Q | \| | \| | \| | V\| |
| 24+40 | 0.7923 | 0.00 | Q | \| | \| | \| | V\| |
| 24+45 | 0.7923 | 0.00 | Q | \| | \| | \| | V |

-----------------------------------------------------------------------

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



Study date 11/06/20 File: swcrp15.out

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

Program License Serial Number 6232

-------------------------------------------------------------------

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

English Units used in output format

-------------------------------------------------------------------

SWC Ramona & Perris
Existing Condition

------------------------------------------------------------------

Drainage Area = 20.11(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.11(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1418.00(Ft.)
Length along longest watercourse measured to centroid = 629.00 (Ft.)
Length along longest watercourse = 0.269 Mi.
Length along longest watercourse measured to centroid = 0.119 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 14.8942 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time = 0.097 Hr.
Lag time = 5.83 Min.
25% of lag time = 1.46 Min.
40% of lag time = 2.33 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]   Rainfall(In)[2]   Weighting[1*2]

| | | |
|---|---|---|
| 20.11 | 0.47 | 9.37 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 1.35 | 27.15 |

STORM EVENT (YEAR) = 5.00
Area Averaged 2-Year Rainfall = 0.466(In)
Area Averaged 100-Year Rainfall = 1.350(In)

Point rain (area averaged) = 0.673(In)
Areal adjustment factor = 99.98 %
Adjusted average point rain = 0.673(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 73.00 | 0.178 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-1 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 73.0 | 54.6 | 0.525 | 0.178 | 0.441 | 1.000 | 0.441 |

Sum (F) = 0.441

Area averaged mean soil loss (F) (In/Hr) = 0.441
Minimum soil loss rate ((In/Hr)) = 0.220
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.760

---------------------------------------------------------------------

Slope of intensity-duration curve for a 1 hour storm =0.5000

----------------------------------------------------------------------

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

--------------------------------------------------------------------

Unit Hydrograph Data

---------------------------------------------------------------------

| Unit time period (hrs) | | Time % of lag | Distribution Graph % | Unit Hydrograph (CFS) |
|---|---|---|---|---|
| 1 | 0.083 | 85.826 | 14.956 | 3.031 |
| 2 | 0.167 | 171.652 | 46.157 | 9.355 |
| 3 | 0.250 | 257.478 | 18.376 | 3.724 |
| 4 | 0.333 | 343.304 | 7.880 | 1.597 |
| 5 | 0.417 | 429.130 | 4.662 | 0.945 |
| 6 | 0.500 | 514.955 | 2.916 | 0.591 |
| 7 | 0.583 | 600.781 | 2.067 | 0.419 |
| 8 | 0.667 | 686.607 | 1.367 | 0.277 |
| 9 | 0.750 | 772.433 | 0.915 | 0.185 |
| 10 | 0.833 | 858.259 | 0.705 | 0.143 |

```
                                    Sum = 100.000   Sum=      20.267
----------------------------------------------------------------------


 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   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)          Max   |   Low        (In/Hr)
   1   0.08     4.20      0.339       (  0.441)       0.258        0.081
   2   0.17     4.30      0.347       (  0.441)       0.264        0.083
   3   0.25     5.00      0.404       (  0.441)       0.307        0.097
   4   0.33     5.00      0.404       (  0.441)       0.307        0.097
   5   0.42     5.80      0.468       (  0.441)       0.356        0.112
   6   0.50     6.50      0.525       (  0.441)       0.399        0.126
   7   0.58     7.40      0.598          0.441    (  0.454)        0.157
   8   0.67     8.60      0.694          0.441    (  0.528)        0.254
   9   0.75    12.30      0.993          0.441    (  0.755)        0.552
  10   0.83    29.10      2.350          0.441    (  1.786)        1.909
  11   0.92     6.80      0.549       (  0.441)       0.417        0.132
  12   1.00     5.00      0.404       (  0.441)       0.307        0.097
             (Loss Rate Not Used)
     Sum =     100.0                                   Sum =     3.7
      Flood volume = Effective rainfall      0.31(In)
       times area      20.1(Ac.)/[(In)/(Ft.)] =       0.5(Ac.Ft)
      Total soil loss =      0.36(In)
      Total soil loss =     0.611(Ac.Ft)
      Total rainfall =      0.67(In)
      Flood volume =      22489.3 Cubic Feet
      Total soil loss =      26634.2 Cubic Feet
      ------------------------------------------------------------------
--
       Peak flow rate of this hydrograph =     21.055(CFS)
      ------------------------------------------------------------------
--
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++
                        1 - H O U R   S T O R M
                   R u n o f f     H y d r o g r a p h
      ------------------------------------------------------------------
--
                Hydrograph in   5   Minute intervals ((CFS))

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

----------------------------------------------------------------------
    0+ 5       0.0017      0.25  Q         |         |         |
|
    0+10       0.0087      1.01  VQ        |         |         |
|
    0+15       0.0182      1.38  |Q        |         |         |
|
    0+20       0.0295      1.64  | Q       |         |         |
|
    0+25       0.0420      1.82  | QV      |         |         |
```

```
|
    0+30       0.0563      2.08  | Q V      |         |         |
|
    0+35       0.0729      2.40  |  Q V     |         |         |
|
    0+40       0.0941      3.09  |   Q  V   |         |         |
|
    0+45       0.1291      5.07  |     Q   V          |         |
|
    0+50       0.2147     12.43  |          |     Q   |         |
|
    0+55       0.3597     21.06  |          |         |      VQ |
|
    1+ 0       0.4284      9.97  |          |  Q      |         |  V
|
    1+ 5       0.4646      5.26  |      Q   |         |         |    V
|
    1+10       0.4845      2.89  |  Q       |         |         |      V
|
    1+15       0.4966      1.76  | Q        |         |         |       V
|
    1+20       0.5048      1.19  |Q         |         |         |
V|
    1+25       0.5102      0.78  |Q         |         |         |
V|
    1+30       0.5137      0.51  Q          |         |         |
V|
    1+35       0.5159      0.32  Q          |         |         |
V|
    1+40       0.5162      0.04  Q          |         |         |
V|
    1+45       0.5163      0.01  Q          |         |         |
V
-----------------------------------------------------------------------
```

```
          U n i t   H y d r o g r a p h   A n a l y s i s
          Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2012, Version
8.2
                Study date  11/06/20 File: swcrp35.out

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

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


      Program License Serial Number 6232

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

       English Units used in output format



      ------------------------------------------------------------------
---
      SWC Ramona & Perris
      Existing Condition


      ------------------------------------------------------------------
--
      Drainage Area =      20.11(Ac.)  =      0.031 Sq. Mi.
      Drainage Area for Depth-Area Areal Adjustment =      20.11(Ac.)  =
0.031 Sq. Mi.
      Length along longest watercourse =    1418.00(Ft.)
      Length along longest watercourse measured to centroid =     629.00
(Ft.)
      Length along longest watercourse =      0.269 Mi.
      Length along longest watercourse measured to centroid =      0.119
Mi.
      Difference in elevation =       4.00(Ft.)
      Slope along watercourse =     14.8942 Ft./Mi.
      Average Manning's 'N' = 0.025
      Lag time =    0.097 Hr.
      Lag time =     5.83 Min.
      25% of lag time =     1.46 Min.
      40% of lag time =     2.33 Min.
      Unit time =     5.00 Min.
      Duration of storm = 3 Hour(s)
      User Entered Base Flow =     0.00(CFS)

      2 YEAR Area rainfall data:


      Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
```

| | | |
|---|---|---|
| 20.11 | 0.82 | 16.47 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 2.04 | 41.02 |

STORM EVENT (YEAR) = 5.00
Area Averaged 2-Year Rainfall = 0.819(In)
Area Averaged 100-Year Rainfall = 2.040(In)

Point rain (area averaged) = 1.105(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.105(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 73.00 | 0.178 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-1 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 73.0 | 54.6 | 0.525 | 0.178 | 0.441 | 1.000 | 0.441 |
| | | | | | Sum (F) = | 0.441 |

Area averaged mean soil loss (F) (In/Hr) = 0.441
Minimum soil loss rate ((In/Hr)) = 0.220
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.760

---

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 | 85.826 | 14.956 | 3.031 |
| 2 | 0.167 | 171.652 | 46.157 | 9.355 |
| 3 | 0.250 | 257.478 | 18.376 | 3.724 |
| 4 | 0.333 | 343.304 | 7.880 | 1.597 |
| 5 | 0.417 | 429.130 | 4.662 | 0.945 |
| 6 | 0.500 | 514.955 | 2.916 | 0.591 |
| 7 | 0.583 | 600.781 | 2.067 | 0.419 |
| 8 | 0.667 | 686.607 | 1.367 | 0.277 |
| 9 | 0.750 | 772.433 | 0.915 | 0.185 |
| 10 | 0.833 | 858.259 | 0.705 | 0.143 |
| | | | Sum = 100.000 | Sum= 20.267 |

---

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 | Loss rate(In./Hr) Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 1.30 | 0.172 | ( 0.441) | 0.131 | 0.041 |
| 2 | 0.17 | 1.30 | 0.172 | ( 0.441) | 0.131 | 0.041 |
| 3 | 0.25 | 1.10 | 0.146 | ( 0.441) | 0.111 | 0.035 |
| 4 | 0.33 | 1.50 | 0.199 | ( 0.441) | 0.151 | 0.048 |
| 5 | 0.42 | 1.50 | 0.199 | ( 0.441) | 0.151 | 0.048 |
| 6 | 0.50 | 1.80 | 0.239 | ( 0.441) | 0.181 | 0.057 |
| 7 | 0.58 | 1.50 | 0.199 | ( 0.441) | 0.151 | 0.048 |
| 8 | 0.67 | 1.80 | 0.239 | ( 0.441) | 0.181 | 0.057 |
| 9 | 0.75 | 1.80 | 0.239 | ( 0.441) | 0.181 | 0.057 |
| 10 | 0.83 | 1.50 | 0.199 | ( 0.441) | 0.151 | 0.048 |
| 11 | 0.92 | 1.60 | 0.212 | ( 0.441) | 0.161 | 0.051 |
| 12 | 1.00 | 1.80 | 0.239 | ( 0.441) | 0.181 | 0.057 |
| 13 | 1.08 | 2.20 | 0.292 | ( 0.441) | 0.222 | 0.070 |
| 14 | 1.17 | 2.20 | 0.292 | ( 0.441) | 0.222 | 0.070 |
| 15 | 1.25 | 2.20 | 0.292 | ( 0.441) | 0.222 | 0.070 |
| 16 | 1.33 | 2.00 | 0.265 | ( 0.441) | 0.202 | 0.064 |
| 17 | 1.42 | 2.60 | 0.345 | ( 0.441) | 0.262 | 0.083 |
| 18 | 1.50 | 2.70 | 0.358 | ( 0.441) | 0.272 | 0.086 |
| 19 | 1.58 | 2.40 | 0.318 | ( 0.441) | 0.242 | 0.076 |
| 20 | 1.67 | 2.70 | 0.358 | ( 0.441) | 0.272 | 0.086 |
| 21 | 1.75 | 3.30 | 0.438 | ( 0.441) | 0.333 | 0.105 |
| 22 | 1.83 | 3.10 | 0.411 | ( 0.441) | 0.312 | 0.099 |
| 23 | 1.92 | 2.90 | 0.385 | ( 0.441) | 0.292 | 0.092 |
| 24 | 2.00 | 3.00 | 0.398 | ( 0.441) | 0.302 | 0.095 |
| 25 | 2.08 | 3.10 | 0.411 | ( 0.441) | 0.312 | 0.099 |
| 26 | 2.17 | 4.20 | 0.557 | ( 0.441) | 0.423 | 0.134 |
| 27 | 2.25 | 5.00 | 0.663 | 0.441 | ( 0.504) | 0.222 |
| 28 | 2.33 | 3.50 | 0.464 | ( 0.441) | 0.353 | 0.111 |
| 29 | 2.42 | 6.80 | 0.902 | 0.441 | ( 0.685) | 0.461 |
| 30 | 2.50 | 7.30 | 0.968 | 0.441 | ( 0.736) | 0.527 |
| 31 | 2.58 | 8.20 | 1.087 | 0.441 | ( 0.826) | 0.646 |
| 32 | 2.67 | 5.90 | 0.782 | 0.441 | ( 0.595) | 0.341 |
| 33 | 2.75 | 2.00 | 0.265 | ( 0.441) | 0.202 | 0.064 |
| 34 | 2.83 | 1.80 | 0.239 | ( 0.441) | 0.181 | 0.057 |
| 35 | 2.92 | 1.80 | 0.239 | ( 0.441) | 0.181 | 0.057 |
| 36 | 3.00 | 0.60 | 0.080 | ( 0.441) | 0.060 | 0.019 |

(Loss Rate Not Used)

Sum = 100.0 Sum = 4.3

Flood volume = Effective rainfall 0.36(In)
times area 20.1(Ac.)/[(In)/(Ft.)] = 0.6(Ac.Ft)
Total soil loss = 0.74(In)
Total soil loss = 1.248(Ac.Ft)
Total rainfall = 1.10(In)
Flood volume = 26296.2 Cubic Feet
Total soil loss = 54360.0 Cubic Feet

-----------------------------------------------------------------------

Peak flow rate of this hydrograph = 10.134(CFS)

-----------------------------------------------------------------------

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```
                         3 - H O U R    S T O R M
                      R u n o f f     H y d r o g r a p h
      -----------------------------------------------------------------
--
                    Hydrograph in   5   Minute intervals ((CFS))

      -----------------------------------------------------------------
--
  Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0
20.0

-----------------------------------------------------------------------
    0+ 5       0.0009      0.13  Q         |         |         |
|
    0+10       0.0044      0.51  VQ        |         |         |
|
    0+15       0.0089      0.65  VQ        |         |         |
|
    0+20       0.0136      0.69  VQ        |         |         |
|
    0+25       0.0193      0.83  |Q        |         |         |
|
    0+30       0.0256      0.92  |Q        |         |         |
|
    0+35       0.0326      1.01  | Q       |         |         |
|
    0+40       0.0395      1.00  | Q       |         |         |
|
    0+45       0.0470      1.09  | QV      |         |         |
|
    0+50       0.0545      1.10  | QV      |         |         |
|
    0+55       0.0616      1.03  | Q V     |         |         |
|
    1+ 0       0.0689      1.05  | Q V     |         |         |
|
    1+ 5       0.0768      1.15  | Q  V    |         |         |
|
    1+10       0.0858      1.30  | Q  V    |         |         |
|
    1+15       0.0951      1.35  | Q   V   |         |         |
|
    1+20       0.1044      1.36  | Q   V   |         |         |
|
    1+25       0.1139      1.37  | Q    V  |         |         |
|
    1+30       0.1246      1.55  |  Q    V |         |         |
|
    1+35       0.1357      1.61  |  Q    V |         |         |
|
    1+40       0.1467      1.60  |  Q     V|         |         |
|
    1+45       0.1586      1.73  |  Q      V         |         |
|
    1+50       0.1718      1.92  |  Q      |V        |         |
|
    1+55       0.1851      1.93  |  Q      | V       |         |
|
    2+ 0       0.1982      1.90  |  Q      |  V      |         |
|
```

```
    2+ 5       0.2114      1.92  |  Q      |   V     |         |
|
    2+10       0.2257      2.07  |   Q     |   V     |         |
|
    2+15       0.2442      2.68  |    Q    |     V   |         |
|
    2+20       0.2670      3.31  |     Q   |      V  |         |
|
    2+25       0.2927      3.73  |      Q  |        V|         |
|
    2+30       0.3406      6.96  |         |  Q      | V       |
|
    2+35       0.4038      9.17  |         |       Q |     V   |
|
    2+40       0.4736     10.13  |         |         Q         |V
|
    2+45       0.5239      7.30  |         |   Q     |         |   V
|
    2+50       0.5514      3.99  |      Q  |         |         |     V
|
    2+55       0.5700      2.70  |    Q    |         |         |      V
|
    3+ 0       0.5838      2.01  |   Q     |         |         |       V
|
    3+ 5       0.5925      1.26  | Q       |         |         |
V|
    3+10       0.5976      0.74  |Q        |         |         |
V|
    3+15       0.6006      0.44  Q         |         |         |
V|
    3+20       0.6023      0.25  Q         |         |         |
V|
    3+25       0.6031      0.11  Q         |         |         |
V|
    3+30       0.6034      0.04  Q         |         |         |
V|
    3+35       0.6036      0.02  Q         |         |         |
V|
    3+40       0.6037      0.01  Q         |         |         |
V|
    3+45       0.6037      0.00  Q         |         |         |
V
----------------------------------------------------------------------
```

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


Study date 10/30/20 File: SWCRP65.out

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

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

Program License Serial Number 6232

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

English Units used in output format

------------------------------------------------------------------------
SWC Ramona & Perris
Existing Condition

------------------------------------------------------------------------
Drainage Area = 20.11(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.11(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1418.00(Ft.)
Length along longest watercourse measured to centroid = 629.00(Ft.)
Length along longest watercourse = 0.269 Mi.
Length along longest watercourse measured to centroid = 0.119 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 14.8942 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time = 0.097 Hr.
Lag time = 5.83 Min.
25% of lag time = 1.46 Min.
40% of lag time = 2.33 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 1.14 | 22.93 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 3.69 | 74.21 |

STORM EVENT (YEAR) = 5.00
Area Averaged 2-Year Rainfall = 1.140(In)
Area Averaged 100-Year Rainfall = 3.690(In)

Point rain (area averaged) = 1.737(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.737(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 73.00 | 0.178 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-1 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 73.0 | 54.6 | 0.525 | 0.178 | 0.441 | 1.000 | 0.441 |
| | | | | | Sum (F) = | 0.441 |

Area averaged mean soil loss (F) (In/Hr) = 0.441
Minimum soil loss rate ((In/Hr)) = 0.220
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.760

---

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 | 85.826 | 14.956 | 3.031 |
| 2 | 0.167 | 171.652 | 46.157 | 9.355 |
| 3 | 0.250 | 257.478 | 18.376 | 3.724 |
| 4 | 0.333 | 343.304 | 7.880 | 1.597 |
| 5 | 0.417 | 429.130 | 4.662 | 0.945 |
| 6 | 0.500 | 514.955 | 2.916 | 0.591 |
| 7 | 0.583 | 600.781 | 2.067 | 0.419 |
| 8 | 0.667 | 686.607 | 1.367 | 0.277 |
| 9 | 0.750 | 772.433 | 0.915 | 0.185 |
| 10 | 0.833 | 858.259 | 0.705 | 0.143 |
| | | | Sum = 100.000 | Sum= 20.267 |

---

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 | Loss rate(In./Hr) Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 0.50 | 0.104 | ( 0.441) | 0.079 | 0.025 |
| 2 | 0.17 | 0.60 | 0.125 | ( 0.441) | 0.095 | 0.030 |
| 3 | 0.25 | 0.60 | 0.125 | ( 0.441) | 0.095 | 0.030 |
| 4 | 0.33 | 0.60 | 0.125 | ( 0.441) | 0.095 | 0.030 |
| 5 | 0.42 | 0.60 | 0.125 | ( 0.441) | 0.095 | 0.030 |
| 6 | 0.50 | 0.70 | 0.146 | ( 0.441) | 0.111 | 0.035 |
| 7 | 0.58 | 0.70 | 0.146 | ( 0.441) | 0.111 | 0.035 |
| 8 | 0.67 | 0.70 | 0.146 | ( 0.441) | 0.111 | 0.035 |
| 9 | 0.75 | 0.70 | 0.146 | ( 0.441) | 0.111 | 0.035 |
| 10 | 0.83 | 0.70 | 0.146 | ( 0.441) | 0.111 | 0.035 |
| 11 | 0.92 | 0.70 | 0.146 | ( 0.441) | 0.111 | 0.035 |
| 12 | 1.00 | 0.80 | 0.167 | ( 0.441) | 0.127 | 0.040 |
| 13 | 1.08 | 0.80 | 0.167 | ( 0.441) | 0.127 | 0.040 |
| 14 | 1.17 | 0.80 | 0.167 | ( 0.441) | 0.127 | 0.040 |
| 15 | 1.25 | 0.80 | 0.167 | ( 0.441) | 0.127 | 0.040 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 16 | 1.33 | 0.80 | 0.167 | ( 0.441) | 0.127 | 0.040 |
| 17 | 1.42 | 0.80 | 0.167 | ( 0.441) | 0.127 | 0.040 |
| 18 | 1.50 | 0.80 | 0.167 | ( 0.441) | 0.127 | 0.040 |
| 19 | 1.58 | 0.80 | 0.167 | ( 0.441) | 0.127 | 0.040 |
| 20 | 1.67 | 0.80 | 0.167 | ( 0.441) | 0.127 | 0.040 |
| 21 | 1.75 | 0.80 | 0.167 | ( 0.441) | 0.127 | 0.040 |
| 22 | 1.83 | 0.80 | 0.167 | ( 0.441) | 0.127 | 0.040 |
| 23 | 1.92 | 0.80 | 0.167 | ( 0.441) | 0.127 | 0.040 |
| 24 | 2.00 | 0.90 | 0.188 | ( 0.441) | 0.143 | 0.045 |
| 25 | 2.08 | 0.80 | 0.167 | ( 0.441) | 0.127 | 0.040 |
| 26 | 2.17 | 0.90 | 0.188 | ( 0.441) | 0.143 | 0.045 |
| 27 | 2.25 | 0.90 | 0.188 | ( 0.441) | 0.143 | 0.045 |
| 28 | 2.33 | 0.90 | 0.188 | ( 0.441) | 0.143 | 0.045 |
| 29 | 2.42 | 0.90 | 0.188 | ( 0.441) | 0.143 | 0.045 |
| 30 | 2.50 | 0.90 | 0.188 | ( 0.441) | 0.143 | 0.045 |
| 31 | 2.58 | 0.90 | 0.188 | ( 0.441) | 0.143 | 0.045 |
| 32 | 2.67 | 0.90 | 0.188 | ( 0.441) | 0.143 | 0.045 |
| 33 | 2.75 | 1.00 | 0.208 | ( 0.441) | 0.158 | 0.050 |
| 34 | 2.83 | 1.00 | 0.208 | ( 0.441) | 0.158 | 0.050 |
| 35 | 2.92 | 1.00 | 0.208 | ( 0.441) | 0.158 | 0.050 |
| 36 | 3.00 | 1.00 | 0.208 | ( 0.441) | 0.158 | 0.050 |
| 37 | 3.08 | 1.00 | 0.208 | ( 0.441) | 0.158 | 0.050 |
| 38 | 3.17 | 1.10 | 0.229 | ( 0.441) | 0.174 | 0.055 |
| 39 | 3.25 | 1.10 | 0.229 | ( 0.441) | 0.174 | 0.055 |
| 40 | 3.33 | 1.10 | 0.229 | ( 0.441) | 0.174 | 0.055 |
| 41 | 3.42 | 1.20 | 0.250 | ( 0.441) | 0.190 | 0.060 |
| 42 | 3.50 | 1.30 | 0.271 | ( 0.441) | 0.206 | 0.065 |
| 43 | 3.58 | 1.40 | 0.292 | ( 0.441) | 0.222 | 0.070 |
| 44 | 3.67 | 1.40 | 0.292 | ( 0.441) | 0.222 | 0.070 |
| 45 | 3.75 | 1.50 | 0.313 | ( 0.441) | 0.238 | 0.075 |
| 46 | 3.83 | 1.50 | 0.313 | ( 0.441) | 0.238 | 0.075 |
| 47 | 3.92 | 1.60 | 0.334 | ( 0.441) | 0.253 | 0.080 |
| 48 | 4.00 | 1.60 | 0.334 | ( 0.441) | 0.253 | 0.080 |
| 49 | 4.08 | 1.70 | 0.354 | ( 0.441) | 0.269 | 0.085 |
| 50 | 4.17 | 1.80 | 0.375 | ( 0.441) | 0.285 | 0.090 |
| 51 | 4.25 | 1.90 | 0.396 | ( 0.441) | 0.301 | 0.095 |
| 52 | 4.33 | 2.00 | 0.417 | ( 0.441) | 0.317 | 0.100 |
| 53 | 4.42 | 2.10 | 0.438 | ( 0.441) | 0.333 | 0.105 |
| 54 | 4.50 | 2.10 | 0.438 | ( 0.441) | 0.333 | 0.105 |
| 55 | 4.58 | 2.20 | 0.459 | ( 0.441) | 0.349 | 0.110 |
| 56 | 4.67 | 2.30 | 0.479 | ( 0.441) | 0.364 | 0.115 |
| 57 | 4.75 | 2.40 | 0.500 | ( 0.441) | 0.380 | 0.120 |
| 58 | 4.83 | 2.40 | 0.500 | ( 0.441) | 0.380 | 0.120 |
| 59 | 4.92 | 2.50 | 0.521 | ( 0.441) | 0.396 | 0.125 |
| 60 | 5.00 | 2.60 | 0.542 | ( 0.441) | 0.412 | 0.130 |
| 61 | 5.08 | 3.10 | 0.646 | 0.441 | ( 0.491) | 0.205 |
| 62 | 5.17 | 3.60 | 0.750 | 0.441 | ( 0.570) | 0.309 |
| 63 | 5.25 | 3.90 | 0.813 | 0.441 | ( 0.618) | 0.372 |
| 64 | 5.33 | 4.20 | 0.876 | 0.441 | ( 0.665) | 0.435 |
| 65 | 5.42 | 4.70 | 0.980 | 0.441 | ( 0.745) | 0.539 |
| 66 | 5.50 | 5.60 | 1.167 | 0.441 | ( 0.887) | 0.726 |
| 67 | 5.58 | 1.90 | 0.396 | ( 0.441) | 0.301 | 0.095 |
| 68 | 5.67 | 0.90 | 0.188 | ( 0.441) | 0.143 | 0.045 |
| 69 | 5.75 | 0.60 | 0.125 | ( 0.441) | 0.095 | 0.030 |
| 70 | 5.83 | 0.50 | 0.104 | ( 0.441) | 0.079 | 0.025 |
| 71 | 5.92 | 0.30 | 0.063 | ( 0.441) | 0.048 | 0.015 |
| 72 | 6.00 | 0.20 | 0.042 | ( 0.441) | 0.032 | 0.010 |

(Loss Rate Not Used)

Sum = 100.0 Sum = 6.3

Flood volume = Effective rainfall 0.53(In)
times area 20.1(Ac.)/[(In)/(Ft.)] = 0.9(Ac.Ft)
Total soil loss = 1.21(In)
Total soil loss = 2.027(Ac.Ft)

```
      Total rainfall =      1.74(In)
      Flood volume =       38530.1 Cubic Feet
      Total soil loss =       88280.8 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     10.486(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          6 - H O U R    S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0005      0.08  Q         |         |         |         |
  0+10       0.0028      0.33  Q         |         |         |         |
  0+15       0.0060      0.47  Q         |         |         |         |
  0+20       0.0096      0.52  VQ        |         |         |         |
  0+25       0.0134      0.56  VQ        |         |         |         |
  0+30       0.0175      0.59  VQ        |         |         |         |
  0+35       0.0219      0.65  VQ        |         |         |         |
  0+40       0.0266      0.68  |Q        |         |         |         |
  0+45       0.0314      0.69  |Q        |         |         |         |
  0+50       0.0362      0.70  |Q        |         |         |         |
  0+55       0.0411      0.71  |Q        |         |         |         |
  1+ 0       0.0460      0.72  |QV       |         |         |         |
  1+ 5       0.0513      0.77  |QV       |         |         |         |
  1+10       0.0568      0.79  |QV       |         |         |         |
  1+15       0.0623      0.80  |QV       |         |         |         |
  1+20       0.0678      0.80  |Q V      |         |         |         |
  1+25       0.0734      0.81  |Q V      |         |         |         |
  1+30       0.0789      0.81  |Q V      |         |         |         |
  1+35       0.0845      0.81  |Q V      |         |         |         |
  1+40       0.0901      0.81  |Q  V     |         |         |         |
  1+45       0.0957      0.81  |Q  V     |         |         |         |
  1+50       0.1013      0.81  |Q  V     |         |         |         |
  1+55       0.1069      0.81  |Q  V     |         |         |         |
  2+ 0       0.1126      0.83  |Q   V    |         |         |         |
  2+ 5       0.1185      0.86  |Q   V    |         |         |         |
  2+10       0.1243      0.85  |Q   V    |         |         |         |
  2+15       0.1304      0.88  |Q   V    |         |         |         |
  2+20       0.1366      0.90  |Q    V   |         |         |         |
  2+25       0.1428      0.90  |Q    V   |         |         |         |
  2+30       0.1490      0.91  |Q    V   |         |         |         |
  2+35       0.1553      0.91  |Q     V  |         |         |         |
  2+40       0.1616      0.91  |Q     V  |         |         |         |
  2+45       0.1679      0.93  |Q     V  |         |         |         |
  2+50       0.1747      0.97  |Q     V  |         |         |         |
  2+55       0.1815      0.99  |Q      V |         |         |         |
  3+ 0       0.1884      1.00  | Q     V |         |         |         |
  3+ 5       0.1953      1.01  | Q     V |         |         |         |
  3+10       0.2024      1.02  | Q      V|         |         |         |
  3+15       0.2098      1.07  | Q      V|         |         |         |
  3+20       0.2173      1.09  | Q      V|         |         |         |
  3+25       0.2250      1.12  | Q       V         |         |         |
  3+30       0.2332      1.19  | Q       V         |         |         |
  3+35       0.2419      1.27  | Q       V         |         |         |
  3+40       0.2512      1.34  | Q       |V        |         |         |
  3+45       0.2607      1.39  | Q       |V        |         |         |
  3+50       0.2708      1.46  | Q       | V       |         |         |
  3+55       0.2811      1.50  | Q       | V       |         |         |
  4+ 0       0.2919      1.56  |  Q      |  V      |         |         |
```

```
4+ 5       0.3029      1.60  |  Q      |  V      |         |         |
4+10       0.3145      1.68  |  Q      |   V     |         |         |
4+15       0.3267      1.77  |  Q      |   V     |         |         |
4+20       0.3395      1.86  |  Q      |    V    |         |         |
4+25       0.3530      1.96  |  Q      |    V    |         |         |
4+30       0.3670      2.04  |   Q     |     V   |         |         |
4+35       0.3815      2.10  |   Q     |      V  |         |         |
4+40       0.3965      2.18  |   Q     |      V  |         |         |
4+45       0.4121      2.27  |   Q     |       V |         |         |
4+50       0.4283      2.35  |   Q     |        V|         |         |
4+55       0.4448      2.40  |   Q     |         V         |         |
5+ 0       0.4619      2.48  |   Q     |         V         |         |
5+ 5       0.4811      2.79  |    Q    |         |V        |         |
5+10       0.5076      3.84  |      Q  |         | V       |         |
5+15       0.5441      5.30  |         Q         |   V     |         |
5+20       0.5896      6.60  |         |  Q      |     V   |         |
5+25       0.6445      7.98  |         |    Q    |        V|         |
5+30       0.7134     10.00  |         |         Q         | V       |
5+35       0.7856     10.49  |         |         Q         |    V    |
5+40       0.8232      5.45  |         Q         |         |      V  |
5+45       0.8445      3.09  |     Q   |         |         |       V |
5+50       0.8586      2.05  |   Q     |         |         |       V |
5+55       0.8686      1.44  | Q       |         |         |        V|
6+ 0       0.8754      1.00  |Q        |         |         |        V|
6+ 5       0.8799      0.65  |Q        |         |         |        V|
6+10       0.8824      0.36  Q         |         |         |        V|
6+15       0.8837      0.19  Q         |         |         |        V|
6+20       0.8841      0.06  Q         |         |         |        V|
6+25       0.8843      0.03
```

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


Study date 10/30/20 File: SWCRP245.out

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------------------------------------------------------------------------

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

Program License Serial Number 6232

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

English Units used in output format

---------------------------------------------------------------------
SWC Ramona & Perris
Existing Condition

--------------------------------------------------------------------
Drainage Area = 20.11(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.11(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1418.00(Ft.)
Length along longest watercourse measured to centroid = 629.00(Ft.)
Length along longest watercourse = 0.269 Mi.
Length along longest watercourse measured to centroid = 0.119 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 14.8942 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time = 0.097 Hr.
Lag time = 5.83 Min.
25% of lag time = 1.46 Min.
40% of lag time = 2.33 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] |
|---|---|---|
| 20.11 | 1.97 | 39.62 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 5.02 | 100.95 |

STORM EVENT (YEAR) = 5.00
Area Averaged 2-Year Rainfall = 1.970(In)
Area Averaged 100-Year Rainfall = 5.020(In)

Point rain (area averaged) = 2.684(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.684(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 73.00 | 0.178 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-1 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 73.0 | 54.6 | 0.525 | 0.178 | 0.441 | 1.000 | 0.441 |
| | | | | | Sum (F) = | 0.441 |

Area averaged mean soil loss (F) (In/Hr) = 0.441
Minimum soil loss rate ((In/Hr)) = 0.220
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.760

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

---

Unit Hydrograph Data

| Unit time period | (hrs) | Time % of lag | Distribution Graph % | Unit Hydrograph (CFS) |
|---|---|---|---|---|
| 1 | 0.083 | 85.826 | 14.956 | 3.031 |
| 2 | 0.167 | 171.652 | 46.157 | 9.355 |
| 3 | 0.250 | 257.478 | 18.376 | 3.724 |
| 4 | 0.333 | 343.304 | 7.880 | 1.597 |
| 5 | 0.417 | 429.130 | 4.662 | 0.945 |
| 6 | 0.500 | 514.955 | 2.916 | 0.591 |
| 7 | 0.583 | 600.781 | 2.067 | 0.419 |
| 8 | 0.667 | 686.607 | 1.367 | 0.277 |
| 9 | 0.750 | 772.433 | 0.915 | 0.185 |
| 10 | 0.833 | 858.259 | 0.705 | 0.143 |
| | | | Sum = 100.000 | Sum= 20.267 |

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The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

| Unit | Time (Hr.) | Pattern Percent | Storm Rain (In/Hr) | Loss rate(In./Hr) Max | Loss rate(In./Hr) Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 0.07 | 0.021 | ( 0.782) | 0.016 | 0.005 |
| 2 | 0.17 | 0.07 | 0.021 | ( 0.779) | 0.016 | 0.005 |
| 3 | 0.25 | 0.07 | 0.021 | ( 0.776) | 0.016 | 0.005 |
| 4 | 0.33 | 0.10 | 0.032 | ( 0.773) | 0.024 | 0.008 |
| 5 | 0.42 | 0.10 | 0.032 | ( 0.770) | 0.024 | 0.008 |
| 6 | 0.50 | 0.10 | 0.032 | ( 0.767) | 0.024 | 0.008 |
| 7 | 0.58 | 0.10 | 0.032 | ( 0.764) | 0.024 | 0.008 |
| 8 | 0.67 | 0.10 | 0.032 | ( 0.761) | 0.024 | 0.008 |
| 9 | 0.75 | 0.10 | 0.032 | ( 0.758) | 0.024 | 0.008 |
| 10 | 0.83 | 0.13 | 0.043 | ( 0.755) | 0.033 | 0.010 |
| 11 | 0.92 | 0.13 | 0.043 | ( 0.752) | 0.033 | 0.010 |
| 12 | 1.00 | 0.13 | 0.043 | ( 0.749) | 0.033 | 0.010 |
| 13 | 1.08 | 0.10 | 0.032 | ( 0.746) | 0.024 | 0.008 |
| 14 | 1.17 | 0.10 | 0.032 | ( 0.743) | 0.024 | 0.008 |
| 15 | 1.25 | 0.10 | 0.032 | ( 0.740) | 0.024 | 0.008 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 16 | 1.33 | 0.10 | 0.032 | ( 0.737) | 0.024 | 0.008 |
| 17 | 1.42 | 0.10 | 0.032 | ( 0.734) | 0.024 | 0.008 |
| 18 | 1.50 | 0.10 | 0.032 | ( 0.731) | 0.024 | 0.008 |
| 19 | 1.58 | 0.10 | 0.032 | ( 0.728) | 0.024 | 0.008 |
| 20 | 1.67 | 0.10 | 0.032 | ( 0.725) | 0.024 | 0.008 |
| 21 | 1.75 | 0.10 | 0.032 | ( 0.722) | 0.024 | 0.008 |
| 22 | 1.83 | 0.13 | 0.043 | ( 0.719) | 0.033 | 0.010 |
| 23 | 1.92 | 0.13 | 0.043 | ( 0.717) | 0.033 | 0.010 |
| 24 | 2.00 | 0.13 | 0.043 | ( 0.714) | 0.033 | 0.010 |
| 25 | 2.08 | 0.13 | 0.043 | ( 0.711) | 0.033 | 0.010 |
| 26 | 2.17 | 0.13 | 0.043 | ( 0.708) | 0.033 | 0.010 |
| 27 | 2.25 | 0.13 | 0.043 | ( 0.705) | 0.033 | 0.010 |
| 28 | 2.33 | 0.13 | 0.043 | ( 0.702) | 0.033 | 0.010 |
| 29 | 2.42 | 0.13 | 0.043 | ( 0.699) | 0.033 | 0.010 |
| 30 | 2.50 | 0.13 | 0.043 | ( 0.696) | 0.033 | 0.010 |
| 31 | 2.58 | 0.17 | 0.054 | ( 0.694) | 0.041 | 0.013 |
| 32 | 2.67 | 0.17 | 0.054 | ( 0.691) | 0.041 | 0.013 |
| 33 | 2.75 | 0.17 | 0.054 | ( 0.688) | 0.041 | 0.013 |
| 34 | 2.83 | 0.17 | 0.054 | ( 0.685) | 0.041 | 0.013 |
| 35 | 2.92 | 0.17 | 0.054 | ( 0.682) | 0.041 | 0.013 |
| 36 | 3.00 | 0.17 | 0.054 | ( 0.679) | 0.041 | 0.013 |
| 37 | 3.08 | 0.17 | 0.054 | ( 0.677) | 0.041 | 0.013 |
| 38 | 3.17 | 0.17 | 0.054 | ( 0.674) | 0.041 | 0.013 |
| 39 | 3.25 | 0.17 | 0.054 | ( 0.671) | 0.041 | 0.013 |
| 40 | 3.33 | 0.17 | 0.054 | ( 0.668) | 0.041 | 0.013 |
| 41 | 3.42 | 0.17 | 0.054 | ( 0.665) | 0.041 | 0.013 |
| 42 | 3.50 | 0.17 | 0.054 | ( 0.663) | 0.041 | 0.013 |
| 43 | 3.58 | 0.17 | 0.054 | ( 0.660) | 0.041 | 0.013 |
| 44 | 3.67 | 0.17 | 0.054 | ( 0.657) | 0.041 | 0.013 |
| 45 | 3.75 | 0.17 | 0.054 | ( 0.654) | 0.041 | 0.013 |
| 46 | 3.83 | 0.20 | 0.064 | ( 0.652) | 0.049 | 0.015 |
| 47 | 3.92 | 0.20 | 0.064 | ( 0.649) | 0.049 | 0.015 |
| 48 | 4.00 | 0.20 | 0.064 | ( 0.646) | 0.049 | 0.015 |
| 49 | 4.08 | 0.20 | 0.064 | ( 0.643) | 0.049 | 0.015 |
| 50 | 4.17 | 0.20 | 0.064 | ( 0.641) | 0.049 | 0.015 |
| 51 | 4.25 | 0.20 | 0.064 | ( 0.638) | 0.049 | 0.015 |
| 52 | 4.33 | 0.23 | 0.075 | ( 0.635) | 0.057 | 0.018 |
| 53 | 4.42 | 0.23 | 0.075 | ( 0.632) | 0.057 | 0.018 |
| 54 | 4.50 | 0.23 | 0.075 | ( 0.630) | 0.057 | 0.018 |
| 55 | 4.58 | 0.23 | 0.075 | ( 0.627) | 0.057 | 0.018 |
| 56 | 4.67 | 0.23 | 0.075 | ( 0.624) | 0.057 | 0.018 |
| 57 | 4.75 | 0.23 | 0.075 | ( 0.622) | 0.057 | 0.018 |
| 58 | 4.83 | 0.27 | 0.086 | ( 0.619) | 0.065 | 0.021 |
| 59 | 4.92 | 0.27 | 0.086 | ( 0.616) | 0.065 | 0.021 |
| 60 | 5.00 | 0.27 | 0.086 | ( 0.614) | 0.065 | 0.021 |
| 61 | 5.08 | 0.20 | 0.064 | ( 0.611) | 0.049 | 0.015 |
| 62 | 5.17 | 0.20 | 0.064 | ( 0.608) | 0.049 | 0.015 |
| 63 | 5.25 | 0.20 | 0.064 | ( 0.606) | 0.049 | 0.015 |
| 64 | 5.33 | 0.23 | 0.075 | ( 0.603) | 0.057 | 0.018 |
| 65 | 5.42 | 0.23 | 0.075 | ( 0.600) | 0.057 | 0.018 |
| 66 | 5.50 | 0.23 | 0.075 | ( 0.598) | 0.057 | 0.018 |
| 67 | 5.58 | 0.27 | 0.086 | ( 0.595) | 0.065 | 0.021 |
| 68 | 5.67 | 0.27 | 0.086 | ( 0.592) | 0.065 | 0.021 |
| 69 | 5.75 | 0.27 | 0.086 | ( 0.590) | 0.065 | 0.021 |
| 70 | 5.83 | 0.27 | 0.086 | ( 0.587) | 0.065 | 0.021 |
| 71 | 5.92 | 0.27 | 0.086 | ( 0.585) | 0.065 | 0.021 |
| 72 | 6.00 | 0.27 | 0.086 | ( 0.582) | 0.065 | 0.021 |
| 73 | 6.08 | 0.30 | 0.097 | ( 0.579) | 0.073 | 0.023 |
| 74 | 6.17 | 0.30 | 0.097 | ( 0.577) | 0.073 | 0.023 |
| 75 | 6.25 | 0.30 | 0.097 | ( 0.574) | 0.073 | 0.023 |
| 76 | 6.33 | 0.30 | 0.097 | ( 0.572) | 0.073 | 0.023 |
| 77 | 6.42 | 0.30 | 0.097 | ( 0.569) | 0.073 | 0.023 |
| 78 | 6.50 | 0.30 | 0.097 | ( 0.567) | 0.073 | 0.023 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 79 | 6.58 | 0.33 | 0.107 | ( 0.564) | 0.082 | 0.026 |
| 80 | 6.67 | 0.33 | 0.107 | ( 0.562) | 0.082 | 0.026 |
| 81 | 6.75 | 0.33 | 0.107 | ( 0.559) | 0.082 | 0.026 |
| 82 | 6.83 | 0.33 | 0.107 | ( 0.557) | 0.082 | 0.026 |
| 83 | 6.92 | 0.33 | 0.107 | ( 0.554) | 0.082 | 0.026 |
| 84 | 7.00 | 0.33 | 0.107 | ( 0.551) | 0.082 | 0.026 |
| 85 | 7.08 | 0.33 | 0.107 | ( 0.549) | 0.082 | 0.026 |
| 86 | 7.17 | 0.33 | 0.107 | ( 0.546) | 0.082 | 0.026 |
| 87 | 7.25 | 0.33 | 0.107 | ( 0.544) | 0.082 | 0.026 |
| 88 | 7.33 | 0.37 | 0.118 | ( 0.541) | 0.090 | 0.028 |
| 89 | 7.42 | 0.37 | 0.118 | ( 0.539) | 0.090 | 0.028 |
| 90 | 7.50 | 0.37 | 0.118 | ( 0.537) | 0.090 | 0.028 |
| 91 | 7.58 | 0.40 | 0.129 | ( 0.534) | 0.098 | 0.031 |
| 92 | 7.67 | 0.40 | 0.129 | ( 0.532) | 0.098 | 0.031 |
| 93 | 7.75 | 0.40 | 0.129 | ( 0.529) | 0.098 | 0.031 |
| 94 | 7.83 | 0.43 | 0.140 | ( 0.527) | 0.106 | 0.033 |
| 95 | 7.92 | 0.43 | 0.140 | ( 0.524) | 0.106 | 0.033 |
| 96 | 8.00 | 0.43 | 0.140 | ( 0.522) | 0.106 | 0.033 |
| 97 | 8.08 | 0.50 | 0.161 | ( 0.519) | 0.122 | 0.039 |
| 98 | 8.17 | 0.50 | 0.161 | ( 0.517) | 0.122 | 0.039 |
| 99 | 8.25 | 0.50 | 0.161 | ( 0.515) | 0.122 | 0.039 |
| 100 | 8.33 | 0.50 | 0.161 | ( 0.512) | 0.122 | 0.039 |
| 101 | 8.42 | 0.50 | 0.161 | ( 0.510) | 0.122 | 0.039 |
| 102 | 8.50 | 0.50 | 0.161 | ( 0.507) | 0.122 | 0.039 |
| 103 | 8.58 | 0.53 | 0.172 | ( 0.505) | 0.131 | 0.041 |
| 104 | 8.67 | 0.53 | 0.172 | ( 0.503) | 0.131 | 0.041 |
| 105 | 8.75 | 0.53 | 0.172 | ( 0.500) | 0.131 | 0.041 |
| 106 | 8.83 | 0.57 | 0.183 | ( 0.498) | 0.139 | 0.044 |
| 107 | 8.92 | 0.57 | 0.183 | ( 0.496) | 0.139 | 0.044 |
| 108 | 9.00 | 0.57 | 0.183 | ( 0.493) | 0.139 | 0.044 |
| 109 | 9.08 | 0.63 | 0.204 | ( 0.491) | 0.155 | 0.049 |
| 110 | 9.17 | 0.63 | 0.204 | ( 0.489) | 0.155 | 0.049 |
| 111 | 9.25 | 0.63 | 0.204 | ( 0.486) | 0.155 | 0.049 |
| 112 | 9.33 | 0.67 | 0.215 | ( 0.484) | 0.163 | 0.052 |
| 113 | 9.42 | 0.67 | 0.215 | ( 0.482) | 0.163 | 0.052 |
| 114 | 9.50 | 0.67 | 0.215 | ( 0.479) | 0.163 | 0.052 |
| 115 | 9.58 | 0.70 | 0.225 | ( 0.477) | 0.171 | 0.054 |
| 116 | 9.67 | 0.70 | 0.225 | ( 0.475) | 0.171 | 0.054 |
| 117 | 9.75 | 0.70 | 0.225 | ( 0.472) | 0.171 | 0.054 |
| 118 | 9.83 | 0.73 | 0.236 | ( 0.470) | 0.180 | 0.057 |
| 119 | 9.92 | 0.73 | 0.236 | ( 0.468) | 0.180 | 0.057 |
| 120 | 10.00 | 0.73 | 0.236 | ( 0.466) | 0.180 | 0.057 |
| 121 | 10.08 | 0.50 | 0.161 | ( 0.463) | 0.122 | 0.039 |
| 122 | 10.17 | 0.50 | 0.161 | ( 0.461) | 0.122 | 0.039 |
| 123 | 10.25 | 0.50 | 0.161 | ( 0.459) | 0.122 | 0.039 |
| 124 | 10.33 | 0.50 | 0.161 | ( 0.457) | 0.122 | 0.039 |
| 125 | 10.42 | 0.50 | 0.161 | ( 0.454) | 0.122 | 0.039 |
| 126 | 10.50 | 0.50 | 0.161 | ( 0.452) | 0.122 | 0.039 |
| 127 | 10.58 | 0.67 | 0.215 | ( 0.450) | 0.163 | 0.052 |
| 128 | 10.67 | 0.67 | 0.215 | ( 0.448) | 0.163 | 0.052 |
| 129 | 10.75 | 0.67 | 0.215 | ( 0.446) | 0.163 | 0.052 |
| 130 | 10.83 | 0.67 | 0.215 | ( 0.443) | 0.163 | 0.052 |
| 131 | 10.92 | 0.67 | 0.215 | ( 0.441) | 0.163 | 0.052 |
| 132 | 11.00 | 0.67 | 0.215 | ( 0.439) | 0.163 | 0.052 |
| 133 | 11.08 | 0.63 | 0.204 | ( 0.437) | 0.155 | 0.049 |
| 134 | 11.17 | 0.63 | 0.204 | ( 0.435) | 0.155 | 0.049 |
| 135 | 11.25 | 0.63 | 0.204 | ( 0.433) | 0.155 | 0.049 |
| 136 | 11.33 | 0.63 | 0.204 | ( 0.431) | 0.155 | 0.049 |
| 137 | 11.42 | 0.63 | 0.204 | ( 0.428) | 0.155 | 0.049 |
| 138 | 11.50 | 0.63 | 0.204 | ( 0.426) | 0.155 | 0.049 |
| 139 | 11.58 | 0.57 | 0.183 | ( 0.424) | 0.139 | 0.044 |
| 140 | 11.67 | 0.57 | 0.183 | ( 0.422) | 0.139 | 0.044 |
| 141 | 11.75 | 0.57 | 0.183 | ( 0.420) | 0.139 | 0.044 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 142 | 11.83 | 0.60 | 0.193 | ( 0.418) | 0.147 | 0.046 |
| 143 | 11.92 | 0.60 | 0.193 | ( 0.416) | 0.147 | 0.046 |
| 144 | 12.00 | 0.60 | 0.193 | ( 0.414) | 0.147 | 0.046 |
| 145 | 12.08 | 0.83 | 0.268 | ( 0.412) | 0.204 | 0.064 |
| 146 | 12.17 | 0.83 | 0.268 | ( 0.410) | 0.204 | 0.064 |
| 147 | 12.25 | 0.83 | 0.268 | ( 0.408) | 0.204 | 0.064 |
| 148 | 12.33 | 0.87 | 0.279 | ( 0.405) | 0.212 | 0.067 |
| 149 | 12.42 | 0.87 | 0.279 | ( 0.403) | 0.212 | 0.067 |
| 150 | 12.50 | 0.87 | 0.279 | ( 0.401) | 0.212 | 0.067 |
| 151 | 12.58 | 0.93 | 0.301 | ( 0.399) | 0.228 | 0.072 |
| 152 | 12.67 | 0.93 | 0.301 | ( 0.397) | 0.228 | 0.072 |
| 153 | 12.75 | 0.93 | 0.301 | ( 0.395) | 0.228 | 0.072 |
| 154 | 12.83 | 0.97 | 0.311 | ( 0.393) | 0.237 | 0.075 |
| 155 | 12.92 | 0.97 | 0.311 | ( 0.391) | 0.237 | 0.075 |
| 156 | 13.00 | 0.97 | 0.311 | ( 0.389) | 0.237 | 0.075 |
| 157 | 13.08 | 1.13 | 0.365 | ( 0.387) | 0.277 | 0.088 |
| 158 | 13.17 | 1.13 | 0.365 | ( 0.385) | 0.277 | 0.088 |
| 159 | 13.25 | 1.13 | 0.365 | ( 0.384) | 0.277 | 0.088 |
| 160 | 13.33 | 1.13 | 0.365 | ( 0.382) | 0.277 | 0.088 |
| 161 | 13.42 | 1.13 | 0.365 | ( 0.380) | 0.277 | 0.088 |
| 162 | 13.50 | 1.13 | 0.365 | ( 0.378) | 0.277 | 0.088 |
| 163 | 13.58 | 0.77 | 0.247 | ( 0.376) | 0.188 | 0.059 |
| 164 | 13.67 | 0.77 | 0.247 | ( 0.374) | 0.188 | 0.059 |
| 165 | 13.75 | 0.77 | 0.247 | ( 0.372) | 0.188 | 0.059 |
| 166 | 13.83 | 0.77 | 0.247 | ( 0.370) | 0.188 | 0.059 |
| 167 | 13.92 | 0.77 | 0.247 | ( 0.368) | 0.188 | 0.059 |
| 168 | 14.00 | 0.77 | 0.247 | ( 0.366) | 0.188 | 0.059 |
| 169 | 14.08 | 0.90 | 0.290 | ( 0.364) | 0.220 | 0.070 |
| 170 | 14.17 | 0.90 | 0.290 | ( 0.363) | 0.220 | 0.070 |
| 171 | 14.25 | 0.90 | 0.290 | ( 0.361) | 0.220 | 0.070 |
| 172 | 14.33 | 0.87 | 0.279 | ( 0.359) | 0.212 | 0.067 |
| 173 | 14.42 | 0.87 | 0.279 | ( 0.357) | 0.212 | 0.067 |
| 174 | 14.50 | 0.87 | 0.279 | ( 0.355) | 0.212 | 0.067 |
| 175 | 14.58 | 0.87 | 0.279 | ( 0.353) | 0.212 | 0.067 |
| 176 | 14.67 | 0.87 | 0.279 | ( 0.352) | 0.212 | 0.067 |
| 177 | 14.75 | 0.87 | 0.279 | ( 0.350) | 0.212 | 0.067 |
| 178 | 14.83 | 0.83 | 0.268 | ( 0.348) | 0.204 | 0.064 |
| 179 | 14.92 | 0.83 | 0.268 | ( 0.346) | 0.204 | 0.064 |
| 180 | 15.00 | 0.83 | 0.268 | ( 0.344) | 0.204 | 0.064 |
| 181 | 15.08 | 0.80 | 0.258 | ( 0.343) | 0.196 | 0.062 |
| 182 | 15.17 | 0.80 | 0.258 | ( 0.341) | 0.196 | 0.062 |
| 183 | 15.25 | 0.80 | 0.258 | ( 0.339) | 0.196 | 0.062 |
| 184 | 15.33 | 0.77 | 0.247 | ( 0.337) | 0.188 | 0.059 |
| 185 | 15.42 | 0.77 | 0.247 | ( 0.336) | 0.188 | 0.059 |
| 186 | 15.50 | 0.77 | 0.247 | ( 0.334) | 0.188 | 0.059 |
| 187 | 15.58 | 0.63 | 0.204 | ( 0.332) | 0.155 | 0.049 |
| 188 | 15.67 | 0.63 | 0.204 | ( 0.331) | 0.155 | 0.049 |
| 189 | 15.75 | 0.63 | 0.204 | ( 0.329) | 0.155 | 0.049 |
| 190 | 15.83 | 0.63 | 0.204 | ( 0.327) | 0.155 | 0.049 |
| 191 | 15.92 | 0.63 | 0.204 | ( 0.325) | 0.155 | 0.049 |
| 192 | 16.00 | 0.63 | 0.204 | ( 0.324) | 0.155 | 0.049 |
| 193 | 16.08 | 0.13 | 0.043 | ( 0.322) | 0.033 | 0.010 |
| 194 | 16.17 | 0.13 | 0.043 | ( 0.321) | 0.033 | 0.010 |
| 195 | 16.25 | 0.13 | 0.043 | ( 0.319) | 0.033 | 0.010 |
| 196 | 16.33 | 0.13 | 0.043 | ( 0.317) | 0.033 | 0.010 |
| 197 | 16.42 | 0.13 | 0.043 | ( 0.316) | 0.033 | 0.010 |
| 198 | 16.50 | 0.13 | 0.043 | ( 0.314) | 0.033 | 0.010 |
| 199 | 16.58 | 0.10 | 0.032 | ( 0.312) | 0.024 | 0.008 |
| 200 | 16.67 | 0.10 | 0.032 | ( 0.311) | 0.024 | 0.008 |
| 201 | 16.75 | 0.10 | 0.032 | ( 0.309) | 0.024 | 0.008 |
| 202 | 16.83 | 0.10 | 0.032 | ( 0.308) | 0.024 | 0.008 |
| 203 | 16.92 | 0.10 | 0.032 | ( 0.306) | 0.024 | 0.008 |
| 204 | 17.00 | 0.10 | 0.032 | ( 0.305) | 0.024 | 0.008 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 205 | 17.08 | 0.17 | 0.054 | ( 0.303) | 0.041 | 0.013 |
| 206 | 17.17 | 0.17 | 0.054 | ( 0.302) | 0.041 | 0.013 |
| 207 | 17.25 | 0.17 | 0.054 | ( 0.300) | 0.041 | 0.013 |
| 208 | 17.33 | 0.17 | 0.054 | ( 0.299) | 0.041 | 0.013 |
| 209 | 17.42 | 0.17 | 0.054 | ( 0.297) | 0.041 | 0.013 |
| 210 | 17.50 | 0.17 | 0.054 | ( 0.296) | 0.041 | 0.013 |
| 211 | 17.58 | 0.17 | 0.054 | ( 0.294) | 0.041 | 0.013 |
| 212 | 17.67 | 0.17 | 0.054 | ( 0.293) | 0.041 | 0.013 |
| 213 | 17.75 | 0.17 | 0.054 | ( 0.291) | 0.041 | 0.013 |
| 214 | 17.83 | 0.13 | 0.043 | ( 0.290) | 0.033 | 0.010 |
| 215 | 17.92 | 0.13 | 0.043 | ( 0.288) | 0.033 | 0.010 |
| 216 | 18.00 | 0.13 | 0.043 | ( 0.287) | 0.033 | 0.010 |
| 217 | 18.08 | 0.13 | 0.043 | ( 0.285) | 0.033 | 0.010 |
| 218 | 18.17 | 0.13 | 0.043 | ( 0.284) | 0.033 | 0.010 |
| 219 | 18.25 | 0.13 | 0.043 | ( 0.283) | 0.033 | 0.010 |
| 220 | 18.33 | 0.13 | 0.043 | ( 0.281) | 0.033 | 0.010 |
| 221 | 18.42 | 0.13 | 0.043 | ( 0.280) | 0.033 | 0.010 |
| 222 | 18.50 | 0.13 | 0.043 | ( 0.279) | 0.033 | 0.010 |
| 223 | 18.58 | 0.10 | 0.032 | ( 0.277) | 0.024 | 0.008 |
| 224 | 18.67 | 0.10 | 0.032 | ( 0.276) | 0.024 | 0.008 |
| 225 | 18.75 | 0.10 | 0.032 | ( 0.275) | 0.024 | 0.008 |
| 226 | 18.83 | 0.07 | 0.021 | ( 0.273) | 0.016 | 0.005 |
| 227 | 18.92 | 0.07 | 0.021 | ( 0.272) | 0.016 | 0.005 |
| 228 | 19.00 | 0.07 | 0.021 | ( 0.271) | 0.016 | 0.005 |
| 229 | 19.08 | 0.10 | 0.032 | ( 0.269) | 0.024 | 0.008 |
| 230 | 19.17 | 0.10 | 0.032 | ( 0.268) | 0.024 | 0.008 |
| 231 | 19.25 | 0.10 | 0.032 | ( 0.267) | 0.024 | 0.008 |
| 232 | 19.33 | 0.13 | 0.043 | ( 0.266) | 0.033 | 0.010 |
| 233 | 19.42 | 0.13 | 0.043 | ( 0.264) | 0.033 | 0.010 |
| 234 | 19.50 | 0.13 | 0.043 | ( 0.263) | 0.033 | 0.010 |
| 235 | 19.58 | 0.10 | 0.032 | ( 0.262) | 0.024 | 0.008 |
| 236 | 19.67 | 0.10 | 0.032 | ( 0.261) | 0.024 | 0.008 |
| 237 | 19.75 | 0.10 | 0.032 | ( 0.260) | 0.024 | 0.008 |
| 238 | 19.83 | 0.07 | 0.021 | ( 0.258) | 0.016 | 0.005 |
| 239 | 19.92 | 0.07 | 0.021 | ( 0.257) | 0.016 | 0.005 |
| 240 | 20.00 | 0.07 | 0.021 | ( 0.256) | 0.016 | 0.005 |
| 241 | 20.08 | 0.10 | 0.032 | ( 0.255) | 0.024 | 0.008 |
| 242 | 20.17 | 0.10 | 0.032 | ( 0.254) | 0.024 | 0.008 |
| 243 | 20.25 | 0.10 | 0.032 | ( 0.253) | 0.024 | 0.008 |
| 244 | 20.33 | 0.10 | 0.032 | ( 0.252) | 0.024 | 0.008 |
| 245 | 20.42 | 0.10 | 0.032 | ( 0.251) | 0.024 | 0.008 |
| 246 | 20.50 | 0.10 | 0.032 | ( 0.249) | 0.024 | 0.008 |
| 247 | 20.58 | 0.10 | 0.032 | ( 0.248) | 0.024 | 0.008 |
| 248 | 20.67 | 0.10 | 0.032 | ( 0.247) | 0.024 | 0.008 |
| 249 | 20.75 | 0.10 | 0.032 | ( 0.246) | 0.024 | 0.008 |
| 250 | 20.83 | 0.07 | 0.021 | ( 0.245) | 0.016 | 0.005 |
| 251 | 20.92 | 0.07 | 0.021 | ( 0.244) | 0.016 | 0.005 |
| 252 | 21.00 | 0.07 | 0.021 | ( 0.243) | 0.016 | 0.005 |
| 253 | 21.08 | 0.10 | 0.032 | ( 0.242) | 0.024 | 0.008 |
| 254 | 21.17 | 0.10 | 0.032 | ( 0.241) | 0.024 | 0.008 |
| 255 | 21.25 | 0.10 | 0.032 | ( 0.241) | 0.024 | 0.008 |
| 256 | 21.33 | 0.07 | 0.021 | ( 0.240) | 0.016 | 0.005 |
| 257 | 21.42 | 0.07 | 0.021 | ( 0.239) | 0.016 | 0.005 |
| 258 | 21.50 | 0.07 | 0.021 | ( 0.238) | 0.016 | 0.005 |
| 259 | 21.58 | 0.10 | 0.032 | ( 0.237) | 0.024 | 0.008 |
| 260 | 21.67 | 0.10 | 0.032 | ( 0.236) | 0.024 | 0.008 |
| 261 | 21.75 | 0.10 | 0.032 | ( 0.235) | 0.024 | 0.008 |
| 262 | 21.83 | 0.07 | 0.021 | ( 0.234) | 0.016 | 0.005 |
| 263 | 21.92 | 0.07 | 0.021 | ( 0.234) | 0.016 | 0.005 |
| 264 | 22.00 | 0.07 | 0.021 | ( 0.233) | 0.016 | 0.005 |
| 265 | 22.08 | 0.10 | 0.032 | ( 0.232) | 0.024 | 0.008 |
| 266 | 22.17 | 0.10 | 0.032 | ( 0.231) | 0.024 | 0.008 |
| 267 | 22.25 | 0.10 | 0.032 | ( 0.231) | 0.024 | 0.008 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 268 | 22.33 | 0.07 | 0.021 | ( 0.230) | 0.016 | 0.005 |
| 269 | 22.42 | 0.07 | 0.021 | ( 0.229) | 0.016 | 0.005 |
| 270 | 22.50 | 0.07 | 0.021 | ( 0.228) | 0.016 | 0.005 |
| 271 | 22.58 | 0.07 | 0.021 | ( 0.228) | 0.016 | 0.005 |
| 272 | 22.67 | 0.07 | 0.021 | ( 0.227) | 0.016 | 0.005 |
| 273 | 22.75 | 0.07 | 0.021 | ( 0.227) | 0.016 | 0.005 |
| 274 | 22.83 | 0.07 | 0.021 | ( 0.226) | 0.016 | 0.005 |
| 275 | 22.92 | 0.07 | 0.021 | ( 0.225) | 0.016 | 0.005 |
| 276 | 23.00 | 0.07 | 0.021 | ( 0.225) | 0.016 | 0.005 |
| 277 | 23.08 | 0.07 | 0.021 | ( 0.224) | 0.016 | 0.005 |
| 278 | 23.17 | 0.07 | 0.021 | ( 0.224) | 0.016 | 0.005 |
| 279 | 23.25 | 0.07 | 0.021 | ( 0.223) | 0.016 | 0.005 |
| 280 | 23.33 | 0.07 | 0.021 | ( 0.223) | 0.016 | 0.005 |
| 281 | 23.42 | 0.07 | 0.021 | ( 0.222) | 0.016 | 0.005 |
| 282 | 23.50 | 0.07 | 0.021 | ( 0.222) | 0.016 | 0.005 |
| 283 | 23.58 | 0.07 | 0.021 | ( 0.222) | 0.016 | 0.005 |
| 284 | 23.67 | 0.07 | 0.021 | ( 0.221) | 0.016 | 0.005 |
| 285 | 23.75 | 0.07 | 0.021 | ( 0.221) | 0.016 | 0.005 |
| 286 | 23.83 | 0.07 | 0.021 | ( 0.221) | 0.016 | 0.005 |
| 287 | 23.92 | 0.07 | 0.021 | ( 0.221) | 0.016 | 0.005 |
| 288 | 24.00 | 0.07 | 0.021 | ( 0.221) | 0.016 | 0.005 |

(Loss Rate Not Used)

Sum = 100.0 Sum = 7.7

Flood volume = Effective rainfall 0.64(In)
times area 20.1(Ac.)/[(In)/(Ft.)] = 1.1(Ac.Ft)
Total soil loss = 2.04(In)
Total soil loss = 3.419(Ac.Ft)
Total rainfall = 2.68(In)
Flood volume = 47028.1 Cubic Feet
Total soil loss = 148922.3 Cubic Feet

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Peak flow rate of this hydrograph = 1.763(CFS)

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

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Hydrograph in 5 Minute intervals ((CFS))

| Time(h+m) | Volume Ac.Ft | Q(CFS) | 0 | 2.5 | 5.0 | 7.5 | 10.0 |
|---|---|---|---|---|---|---|---|
| 0+ 5 | 0.0001 | 0.02 | Q | | | | |
| 0+10 | 0.0005 | 0.06 | Q | | | | |
| 0+15 | 0.0011 | 0.08 | Q | | | | |
| 0+20 | 0.0018 | 0.10 | Q | | | | |
| 0+25 | 0.0027 | 0.13 | Q | | | | |
| 0+30 | 0.0037 | 0.14 | Q | | | | |
| 0+35 | 0.0047 | 0.15 | Q | | | | |
| 0+40 | 0.0057 | 0.15 | Q | | | | |
| 0+45 | 0.0068 | 0.15 | Q | | | | |
| 0+50 | 0.0079 | 0.16 | Q | | | | |
| 0+55 | 0.0092 | 0.19 | Q | | | | |
| 1+ 0 | 0.0105 | 0.20 | Q | | | | |
| 1+ 5 | 0.0119 | 0.19 | Q | | | | |
| 1+10 | 0.0131 | 0.17 | Q | | | | |
| 1+15 | 0.0142 | 0.16 | Q | | | | |
| 1+20 | 0.0153 | 0.16 | Q | | | | |
| 1+25 | 0.0164 | 0.16 | Q | | | | |
| 1+30 | 0.0175 | 0.16 | Q | | | | |
| 1+35 | 0.0186 | 0.16 | Q | | | | |
| 1+40 | 0.0197 | 0.16 | Q | | | | |
| 1+45 | 0.0208 | 0.16 | Q | | | | |

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1+50       0.0219      0.16  Q          |         |         |         |
1+55       0.0232      0.19  Q          |         |         |         |
2+ 0       0.0246      0.20  Q          |         |         |         |
2+ 5       0.0260      0.20  Q          |         |         |         |
2+10       0.0274      0.20  QV         |         |         |         |
2+15       0.0288      0.21  QV         |         |         |         |
2+20       0.0302      0.21  QV         |         |         |         |
2+25       0.0317      0.21  QV         |         |         |         |
2+30       0.0331      0.21  QV         |         |         |         |
2+35       0.0346      0.22  QV         |         |         |         |
2+40       0.0363      0.24  QV         |         |         |         |
2+45       0.0380      0.25  |Q         |         |         |         |
2+50       0.0397      0.25  |Q         |         |         |         |
2+55       0.0415      0.26  |Q         |         |         |         |
3+ 0       0.0433      0.26  |Q         |         |         |         |
3+ 5       0.0451      0.26  |Q         |         |         |         |
3+10       0.0469      0.26  |Q         |         |         |         |
3+15       0.0487      0.26  |Q         |         |         |         |
3+20       0.0505      0.26  |Q         |         |         |         |
3+25       0.0523      0.26  |Q         |         |         |         |
3+30       0.0541      0.26  |QV        |         |         |         |
3+35       0.0559      0.26  |QV        |         |         |         |
3+40       0.0577      0.26  |QV        |         |         |         |
3+45       0.0595      0.26  |QV        |         |         |         |
3+50       0.0613      0.27  |QV        |         |         |         |
3+55       0.0633      0.29  |QV        |         |         |         |
4+ 0       0.0654      0.30  |QV        |         |         |         |
4+ 5       0.0675      0.31  |QV        |         |         |         |
4+10       0.0697      0.31  |QV        |         |         |         |
4+15       0.0718      0.31  |QV        |         |         |         |
4+20       0.0740      0.32  |QV        |         |         |         |
4+25       0.0764      0.34  |QV        |         |         |         |
4+30       0.0788      0.35  |QV        |         |         |         |
4+35       0.0813      0.36  |Q V       |         |         |         |
4+40       0.0838      0.36  |Q V       |         |         |         |
4+45       0.0863      0.36  |Q V       |         |         |         |
4+50       0.0889      0.37  |Q V       |         |         |         |
4+55       0.0916      0.40  |Q V       |         |         |         |
5+ 0       0.0944      0.41  |Q V       |         |         |         |
5+ 5       0.0971      0.40  |Q V       |         |         |         |
5+10       0.0995      0.35  |Q V       |         |         |         |
5+15       0.1018      0.33  |Q V       |         |         |         |
5+20       0.1041      0.33  |Q V       |         |         |         |
5+25       0.1065      0.35  |Q V       |         |         |         |
5+30       0.1090      0.36  |Q  V      |         |         |         |
5+35       0.1116      0.37  |Q  V      |         |         |         |
5+40       0.1143      0.40  |Q  V      |         |         |         |
5+45       0.1171      0.41  |Q  V      |         |         |         |
5+50       0.1199      0.41  |Q  V      |         |         |         |
5+55       0.1227      0.41  |Q  V      |         |         |         |
6+ 0       0.1256      0.42  |Q  V      |         |         |         |
6+ 5       0.1285      0.42  |Q  V      |         |         |         |
6+10       0.1316      0.45  |Q  V      |         |         |         |
6+15       0.1348      0.46  |Q  V      |         |         |         |
6+20       0.1380      0.46  |Q   V     |         |         |         |
6+25       0.1412      0.47  |Q   V     |         |         |         |
6+30       0.1444      0.47  |Q   V     |         |         |         |
6+35       0.1477      0.48  |Q   V     |         |         |         |
6+40       0.1511      0.50  | Q  V     |         |         |         |
6+45       0.1547      0.51  | Q  V     |         |         |         |
6+50       0.1582      0.52  | Q  V     |         |         |         |
6+55       0.1618      0.52  | Q  V     |         |         |         |
7+ 0       0.1654      0.52  | Q   V    |         |         |         |
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 7+ 5       0.1690      0.52  | Q   V   |         |         |         |
 7+10       0.1725      0.52  | Q   V   |         |         |         |
 7+15       0.1761      0.52  | Q   V   |         |         |         |
 7+20       0.1798      0.53  | Q   V   |         |         |         |
 7+25       0.1836      0.55  | Q   V   |         |         |         |
 7+30       0.1875      0.56  | Q   V   |         |         |         |
 7+35       0.1915      0.58  | Q    V  |         |         |         |
 7+40       0.1956      0.60  | Q    V  |         |         |         |
 7+45       0.1998      0.61  | Q    V  |         |         |         |
 7+50       0.2042      0.63  | Q    V  |         |         |         |
 7+55       0.2087      0.65  | Q    V  |         |         |         |
 8+ 0       0.2132      0.67  | Q    V  |         |         |         |
 8+ 5       0.2180      0.69  | Q     V |         |         |         |
 8+10       0.2231      0.74  | Q     V |         |         |         |
 8+15       0.2283      0.76  |  Q    V |         |         |         |
 8+20       0.2336      0.77  |  Q    V |         |         |         |
 8+25       0.2389      0.77  |  Q    V |         |         |         |
 8+30       0.2443      0.78  |  Q     V|         |         |         |
 8+35       0.2497      0.79  |  Q     V|         |         |         |
 8+40       0.2553      0.81  |  Q     V|         |         |         |
 8+45       0.2610      0.82  |  Q     V|         |         |         |
 8+50       0.2668      0.84  |  Q     V|         |         |         |
 8+55       0.2727      0.86  |  Q      V         |         |         |
 9+ 0       0.2787      0.87  |  Q      V         |         |         |
 9+ 5       0.2849      0.90  |  Q      V         |         |         |
 9+10       0.2914      0.95  |  Q      V         |         |         |
 9+15       0.2981      0.97  |  Q      |V        |         |         |
 9+20       0.3049      0.99  |  Q      |V        |         |         |
 9+25       0.3119      1.02  |   Q     |V        |         |         |
 9+30       0.3190      1.03  |   Q     |V        |         |         |
 9+35       0.3262      1.04  |   Q     | V       |         |         |
 9+40       0.3335      1.07  |   Q     | V       |         |         |
 9+45       0.3410      1.08  |   Q     | V       |         |         |
 9+50       0.3485      1.10  |   Q     | V       |         |         |
 9+55       0.3563      1.12  |   Q     |  V      |         |         |
10+ 0       0.3641      1.14  |   Q     |  V      |         |         |
10+ 5       0.3716      1.09  |   Q     |  V      |         |         |
10+10       0.3779      0.92  |  Q      |   V     |         |         |
10+15       0.3838      0.86  |  Q      |   V     |         |         |
10+20       0.3895      0.83  |  Q      |   V     |         |         |
10+25       0.3951      0.81  |  Q      |   V     |         |         |
10+30       0.4007      0.80  |  Q      |   V     |         |         |
10+35       0.4064      0.83  |  Q      |    V    |         |         |
10+40       0.4129      0.95  |  Q      |    V    |         |         |
10+45       0.4198      0.99  |  Q      |    V    |         |         |
10+50       0.4267      1.01  |   Q     |    V    |         |         |
10+55       0.4338      1.02  |   Q     |     V   |         |         |
11+ 0       0.4409      1.03  |   Q     |     V   |         |         |
11+ 5       0.4480      1.03  |   Q     |     V   |         |         |
11+10       0.4549      1.01  |   Q     |     V   |         |         |
11+15       0.4618      1.00  |   Q     |      V  |         |         |
11+20       0.4687      1.00  |  Q      |      V  |         |         |
11+25       0.4756      1.00  |  Q      |      V  |         |         |
11+30       0.4825      1.00  |  Q      |      V  |         |         |
11+35       0.4892      0.98  |  Q      |       V |         |         |
11+40       0.4956      0.93  |  Q      |       V |         |         |
11+45       0.5019      0.91  |  Q      |       V |         |         |
11+50       0.5081      0.91  |  Q      |       V |         |         |
11+55       0.5145      0.93  |  Q      |        V|         |         |
12+ 0       0.5210      0.94  |  Q      |        V|         |         |
12+ 5       0.5278      0.99  |  Q      |        V|         |         |
12+10       0.5358      1.16  |   Q     |        V|         |         |
12+15       0.5443      1.23  |   Q     |         V         |         |
```

```
12+20       0.5530      1.27  |    Q    |         V         |         |
12+25       0.5620      1.31  |    Q    |         V         |         |
12+30       0.5711      1.33  |    Q    |         |V        |         |
12+35       0.5805      1.36  |    Q    |         |V        |         |
12+40       0.5902      1.41  |    Q    |         |V        |         |
12+45       0.6001      1.44  |    Q    |         | V       |         |
12+50       0.6101      1.46  |    Q    |         | V       |         |
12+55       0.6204      1.49  |    Q    |         | V       |         |
13+ 0       0.6307      1.50  |    Q    |         |  V      |         |
13+ 5       0.6413      1.54  |     Q   |         |  V      |         |
13+10       0.6528      1.67  |     Q   |         |   V     |         |
13+15       0.6647      1.72  |     Q   |         |   V     |         |
13+20       0.6767      1.74  |     Q   |         |    V    |         |
13+25       0.6888      1.75  |      Q  |         |    V    |         |
13+30       0.7009      1.76  |      Q  |         |    V    |         |
13+35       0.7125      1.68  |     Q   |         |     V   |         |
13+40       0.7223      1.42  |    Q    |         |     V   |         |
13+45       0.7314      1.32  |    Q    |         |      V  |         |
13+50       0.7401      1.27  |    Q    |         |      V  |         |
13+55       0.7487      1.25  |   Q     |         |      V  |         |
14+ 0       0.7572      1.23  |   Q     |         |       V |         |
14+ 5       0.7658      1.25  |    Q    |         |       V |         |
14+10       0.7750      1.34  |    Q    |         |       V |         |
14+15       0.7845      1.37  |    Q    |         |        V|         |
14+20       0.7940      1.38  |    Q    |         |        V|         |
14+25       0.8033      1.36  |    Q    |         |        V|         |
14+30       0.8127      1.36  |    Q    |         |         V         |
14+35       0.8221      1.36  |    Q    |         |         V         |
14+40       0.8314      1.36  |    Q    |         |         V         |
14+45       0.8408      1.36  |    Q    |         |         |V        |
14+50       0.8501      1.35  |    Q    |         |         |V        |
14+55       0.8592      1.33  |    Q    |         |         |V        |
15+ 0       0.8683      1.32  |    Q    |         |         | V       |
15+ 5       0.8773      1.31  |    Q    |         |         | V       |
15+10       0.8861      1.28  |    Q    |         |         | V       |
15+15       0.8948      1.27  |    Q    |         |         |  V      |
15+20       0.9035      1.25  |    Q    |         |         |  V      |
15+25       0.9119      1.23  |   Q     |         |         |  V      |
15+30       0.9203      1.22  |   Q     |         |         |   V     |
15+35       0.9284      1.18  |   Q     |         |         |   V     |
15+40       0.9358      1.08  |   Q     |         |         |   V     |
15+45       0.9430      1.04  |   Q     |         |         |   V     |
15+50       0.9500      1.02  |   Q     |         |         |    V    |
15+55       0.9570      1.01  |   Q     |         |         |    V    |
16+ 0       0.9639      1.00  |   Q     |         |         |    V    |
16+ 5       0.9700      0.88  |  Q      |         |         |    V    |
16+10       0.9735      0.52  | Q       |         |         |     V   |
16+15       0.9761      0.37  |Q        |         |         |     V   |
16+20       0.9782      0.31  |Q        |         |         |     V   |
16+25       0.9801      0.27  |Q        |         |         |     V   |
16+30       0.9818      0.25  Q         |         |         |     V   |
16+35       0.9833      0.22  Q         |         |         |     V   |
16+40       0.9847      0.19  Q         |         |         |     V   |
16+45       0.9858      0.17  Q         |         |         |     V   |
16+50       0.9870      0.16  Q         |         |         |     V   |
16+55       0.9881      0.16  Q         |         |         |     V   |
17+ 0       0.9892      0.16  Q         |         |         |     V   |
17+ 5       0.9904      0.17  Q         |         |         |     V   |
17+10       0.9919      0.22  Q         |         |         |     V   |
17+15       0.9936      0.24  Q         |         |         |     V   |
17+20       0.9953      0.25  Q         |         |         |     V   |
17+25       0.9970      0.25  |Q        |         |         |     V   |
17+30       0.9988      0.26  |Q        |         |         |      V  |
```

```
17+35       1.0005      0.26  |Q       |         |         |      V  |
17+40       1.0023      0.26  |Q       |         |         |      V  |
17+45       1.0041      0.26  |Q       |         |         |      V  |
17+50       1.0059      0.25  |Q       |         |         |      V  |
17+55       1.0075      0.23  Q         |         |         |      V  |
18+ 0       1.0090      0.22  Q         |         |         |      V  |
18+ 5       1.0104      0.22  Q         |         |         |      V  |
18+10       1.0119      0.21  Q         |         |         |      V  |
18+15       1.0134      0.21  Q         |         |         |      V  |
18+20       1.0148      0.21  Q         |         |         |      V  |
18+25       1.0163      0.21  Q         |         |         |      V  |
18+30       1.0177      0.21  Q         |         |         |      V  |
18+35       1.0191      0.20  Q         |         |         |      V  |
18+40       1.0203      0.18  Q         |         |         |      V  |
18+45       1.0215      0.17  Q         |         |         |      V  |
18+50       1.0225      0.16  Q         |         |         |      V  |
18+55       1.0234      0.13  Q         |         |         |      V  |
19+ 0       1.0242      0.12  Q         |         |         |      V  |
19+ 5       1.0251      0.12  Q         |         |         |      V  |
19+10       1.0260      0.14  Q         |         |         |       V |
19+15       1.0271      0.15  Q         |         |         |       V |
19+20       1.0282      0.16  Q         |         |         |       V |
19+25       1.0294      0.19  Q         |         |         |       V |
19+30       1.0308      0.20  Q         |         |         |       V |
19+35       1.0321      0.19  Q         |         |         |       V |
19+40       1.0333      0.17  Q         |         |         |       V |
19+45       1.0344      0.16  Q         |         |         |       V |
19+50       1.0355      0.15  Q         |         |         |       V |
19+55       1.0364      0.13  Q         |         |         |       V |
20+ 0       1.0372      0.12  Q         |         |         |       V |
20+ 5       1.0380      0.12  Q         |         |         |       V |
20+10       1.0390      0.14  Q         |         |         |       V |
20+15       1.0400      0.15  Q         |         |         |       V |
20+20       1.0411      0.15  Q         |         |         |       V |
20+25       1.0421      0.15  Q         |         |         |       V |
20+30       1.0432      0.15  Q         |         |         |       V |
20+35       1.0443      0.16  Q         |         |         |       V |
20+40       1.0453      0.16  Q         |         |         |       V |
20+45       1.0464      0.16  Q         |         |         |       V |
20+50       1.0474      0.15  Q         |         |         |       V |
20+55       1.0483      0.12  Q         |         |         |       V |
21+ 0       1.0491      0.12  Q         |         |         |       V |
21+ 5       1.0499      0.12  Q         |         |         |       V |
21+10       1.0509      0.14  Q         |         |         |       V |
21+15       1.0519      0.15  Q         |         |         |       V |
21+20       1.0529      0.14  Q         |         |         |        V|
21+25       1.0537      0.12  Q         |         |         |        V|
21+30       1.0545      0.11  Q         |         |         |        V|
21+35       1.0553      0.12  Q         |         |         |        V|
21+40       1.0563      0.14  Q         |         |         |        V|
21+45       1.0573      0.15  Q         |         |         |        V|
21+50       1.0583      0.14  Q         |         |         |        V|
21+55       1.0591      0.12  Q         |         |         |        V|
22+ 0       1.0599      0.11  Q         |         |         |        V|
22+ 5       1.0607      0.12  Q         |         |         |        V|
22+10       1.0617      0.14  Q         |         |         |        V|
22+15       1.0627      0.15  Q         |         |         |        V|
22+20       1.0637      0.14  Q         |         |         |        V|
22+25       1.0645      0.12  Q         |         |         |        V|
22+30       1.0653      0.11  Q         |         |         |        V|
22+35       1.0661      0.11  Q         |         |         |        V|
22+40       1.0668      0.11  Q         |         |         |        V|
22+45       1.0675      0.11  Q         |         |         |        V|
```

```
 22+50        1.0683       0.11  Q          |         |         |        V|
 22+55        1.0690       0.11  Q          |         |         |        V|
 23+ 0        1.0697       0.10  Q          |         |         |        V|
 23+ 5        1.0704       0.10  Q          |         |         |        V|
 23+10        1.0712       0.10  Q          |         |         |        V|
 23+15        1.0719       0.10  Q          |         |         |        V|
 23+20        1.0726       0.10  Q          |         |         |        V|
 23+25        1.0733       0.10  Q          |         |         |        V|
 23+30        1.0740       0.10  Q          |         |         |        V|
 23+35        1.0748       0.10  Q          |         |         |        V|
 23+40        1.0755       0.10  Q          |         |         |        V|
 23+45        1.0762       0.10  Q          |         |         |        V|
 23+50        1.0769       0.10  Q          |         |         |        V|
 23+55        1.0776       0.10  Q          |         |         |        V|
 24+ 0        1.0784       0.10  Q          |         |         |        V|
 24+ 5        1.0790       0.09  Q          |         |         |        V|
 24+10        1.0792       0.04  Q          |         |         |        V|
 24+15        1.0794       0.02  Q          |         |         |        V|
 24+20        1.0795       0.01  Q          |         |         |        V|
 24+25        1.0795       0.01  Q          |         |         |        V|
 24+30        1.0796       0.01  Q          |         |         |        V|
 24+35        1.0796       0.00  Q          |         |         |        V|
 24+40        1.0796       0.00  Q          |         |         |        V|
 24+45        1.0796       0.00  Q          |         |         |         V
-----------------------------------------------------------------------
```

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



Study date 11/06/20 File: swcrp110.out

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------------------------------------------------------------------------

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

Program License Serial Number 6232

---------------------------------------------------------------------

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

English Units used in output format

---------------------------------------------------------------------

SWC Ramona & Perris
Existing Condition

--------------------------------------------------------------------

Drainage Area = 20.11(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.11(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1418.00(Ft.)
Length along longest watercourse measured to centroid = 629.00 (Ft.)
Length along longest watercourse = 0.269 Mi.
Length along longest watercourse measured to centroid = 0.119 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 14.8942 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time = 0.097 Hr.
Lag time = 5.83 Min.
25% of lag time = 1.46 Min.
40% of lag time = 2.33 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]    Rainfall(In)[2]    Weighting[1*2]

| | | |
|---|---|---|
| 20.11 | 0.47 | 9.37 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 1.35 | 27.15 |

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 0.466(In)
Area Averaged 100-Year Rainfall = 1.350(In)

Point rain (area averaged) = 0.830(In)
Areal adjustment factor = 99.98 %
Adjusted average point rain = 0.830(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 73.00 | 0.178 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-2 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 73.0 | 73.0 | 0.327 | 0.178 | 0.274 | 1.000 | 0.274 |

Sum (F) = 0.274

Area averaged mean soil loss (F) (In/Hr) = 0.274
Minimum soil loss rate ((In/Hr)) = 0.137
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.760

---------------------------------------------------------------------

Slope of intensity-duration curve for a 1 hour storm =0.5000

----------------------------------------------------------------------

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

--------------------------------------------------------------------

Unit Hydrograph Data

---------------------------------------------------------------------

| Unit time period (hrs) | | Time % of lag | Distribution Graph % | Unit Hydrograph (CFS) |
|---|---|---|---|---|
| 1 | 0.083 | 85.826 | 14.956 | 3.031 |
| 2 | 0.167 | 171.652 | 46.157 | 9.355 |
| 3 | 0.250 | 257.478 | 18.376 | 3.724 |
| 4 | 0.333 | 343.304 | 7.880 | 1.597 |
| 5 | 0.417 | 429.130 | 4.662 | 0.945 |
| 6 | 0.500 | 514.955 | 2.916 | 0.591 |
| 7 | 0.583 | 600.781 | 2.067 | 0.419 |
| 8 | 0.667 | 686.607 | 1.367 | 0.277 |
| 9 | 0.750 | 772.433 | 0.915 | 0.185 |
| 10 | 0.833 | 858.259 | 0.705 | 0.143 |

```
                                    Sum = 100.000   Sum=      20.267
-----------------------------------------------------------------------
```

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 | Loss rate(In./Hr) Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 4.20 | 0.418 | 0.274 | ( 0.318) | 0.144 |
| 2 | 0.17 | 4.30 | 0.428 | 0.274 | ( 0.325) | 0.154 |
| 3 | 0.25 | 5.00 | 0.498 | 0.274 | ( 0.378) | 0.223 |
| 4 | 0.33 | 5.00 | 0.498 | 0.274 | ( 0.378) | 0.223 |
| 5 | 0.42 | 5.80 | 0.577 | 0.274 | ( 0.439) | 0.303 |
| 6 | 0.50 | 6.50 | 0.647 | 0.274 | ( 0.492) | 0.373 |
| 7 | 0.58 | 7.40 | 0.737 | 0.274 | ( 0.560) | 0.462 |
| 8 | 0.67 | 8.60 | 0.856 | 0.274 | ( 0.651) | 0.582 |
| 9 | 0.75 | 12.30 | 1.224 | 0.274 | ( 0.931) | 0.950 |
| 10 | 0.83 | 29.10 | 2.897 | 0.274 | ( 2.202) | 2.622 |
| 11 | 0.92 | 6.80 | 0.677 | 0.274 | ( 0.514) | 0.403 |
| 12 | 1.00 | 5.00 | 0.498 | 0.274 | ( 0.378) | 0.223 |

```
             (Loss Rate Not Used)
     Sum =     100.0                                  Sum =     6.7
      Flood volume = Effective rainfall      0.56(In)
       times area      20.1(Ac.)/[(In)/(Ft.)] =       0.9(Ac.Ft)
      Total soil loss =      0.27(In)
      Total soil loss =     0.460(Ac.Ft)
      Total rainfall =      0.83(In)
      Flood volume =       40533.2 Cubic Feet
      Total soil loss =       20022.2 Cubic Feet
      -----------------------------------------------------------------
--
       Peak flow rate of this hydrograph =     31.146(CFS)
      -----------------------------------------------------------------
--
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++
                        1 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      -----------------------------------------------------------------
--
                  Hydrograph in   5   Minute intervals ((CFS))

      -----------------------------------------------------------------
--
  Time(h+m) Volume Ac.Ft   Q(CFS)  0       10.0      20.0      30.0
40.0

-----------------------------------------------------------------------
    0+ 5       0.0030      0.44  Q         |         |         |
|
    0+10       0.0155      1.81  VQ        |         |         |
|
    0+15       0.0338      2.65  |VQ       |         |         |
|
    0+20       0.0584      3.57  | VQ      |         |         |
|
    0+25       0.0874      4.22  |  VQ     |         |         |
```

```
|
    0+30       0.1245       5.39  |    Q    |         |         |
|
    0+35       0.1710       6.74  |     QV  |         |         |
|
    0+40       0.2289       8.41  |       QV|         |         |
|
    0+45       0.3062      11.23  |         |Q V      |         |
|
    0+50       0.4473      20.49  |         |        VQ         |
|
    0+55       0.6618      31.15  |         |         |       V |Q
|
    1+ 0       0.7780      16.87  |         |     Q   |         |  V
|
    1+ 5       0.8428       9.41  |        Q|         |         |     V
|
    1+10       0.8773       5.00  |    Q    |         |         |      V
|
    1+15       0.8978       2.99  | Q       |         |         |       V
|
    1+20       0.9115       1.99  |Q        |         |         |
V|
    1+25       0.9204       1.29  |Q        |         |         |
V|
    1+30       0.9261       0.83  Q         |         |         |
V|
    1+35       0.9296       0.51  Q         |         |         |
V|
    1+40       0.9303       0.10  Q         |         |         |
V|
    1+45       0.9305       0.03  Q         |         |         |
V
-----------------------------------------------------------------------
```

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

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8.2
                Study date  11/06/20 File: swcrp310.out

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


      Program License Serial Number 6232

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

       English Units used in output format



      -----------------------------------------------------------------
---
      SWC Ramona & Perris
      Existing Condition


      -----------------------------------------------------------------
--
      Drainage Area =      20.11(Ac.)  =      0.031 Sq. Mi.
      Drainage Area for Depth-Area Areal Adjustment =      20.11(Ac.)  =
0.031 Sq. Mi.
      Length along longest watercourse =    1418.00(Ft.)
      Length along longest watercourse measured to centroid =     629.00
(Ft.)
      Length along longest watercourse =      0.269 Mi.
      Length along longest watercourse measured to centroid =      0.119
Mi.
      Difference in elevation =       4.00(Ft.)
      Slope along watercourse =     14.8942 Ft./Mi.
      Average Manning's 'N' = 0.025
      Lag time =    0.097 Hr.
      Lag time =     5.83 Min.
      25% of lag time =     1.46 Min.
      40% of lag time =     2.33 Min.
      Unit time =     5.00 Min.
      Duration of storm = 3 Hour(s)
      User Entered Base Flow =     0.00(CFS)

      2 YEAR Area rainfall data:


      Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
```

| | | |
|---|---|---|
| 20.11 | 0.82 | 16.47 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 2.04 | 41.02 |

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 0.819(In)
Area Averaged 100-Year Rainfall = 2.040(In)

Point rain (area averaged) = 1.321(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.321(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 73.00 | 0.178 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-2 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 73.0 | 73.0 | 0.327 | 0.178 | 0.274 | 1.000 | 0.274 |
| | | | | | Sum (F) = | 0.274 |

Area averaged mean soil loss (F) (In/Hr) = 0.274
Minimum soil loss rate ((In/Hr)) = 0.137
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.760

---------------------------------------------------------------------

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 | 85.826 | 14.956 | 3.031 |
| 2 | 0.167 | 171.652 | 46.157 | 9.355 |
| 3 | 0.250 | 257.478 | 18.376 | 3.724 |
| 4 | 0.333 | 343.304 | 7.880 | 1.597 |
| 5 | 0.417 | 429.130 | 4.662 | 0.945 |
| 6 | 0.500 | 514.955 | 2.916 | 0.591 |
| 7 | 0.583 | 600.781 | 2.067 | 0.419 |
| 8 | 0.667 | 686.607 | 1.367 | 0.277 |
| 9 | 0.750 | 772.433 | 0.915 | 0.185 |
| 10 | 0.833 | 858.259 | 0.705 | 0.143 |
| | | | Sum = 100.000 | Sum= 20.267 |

-----------------------------------------------------------------------

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 | Loss rate(In./Hr) Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 1.30 | 0.206 | ( 0.274) | 0.157 | 0.049 |
| 2 | 0.17 | 1.30 | 0.206 | ( 0.274) | 0.157 | 0.049 |
| 3 | 0.25 | 1.10 | 0.174 | ( 0.274) | 0.133 | 0.042 |
| 4 | 0.33 | 1.50 | 0.238 | ( 0.274) | 0.181 | 0.057 |
| 5 | 0.42 | 1.50 | 0.238 | ( 0.274) | 0.181 | 0.057 |
| 6 | 0.50 | 1.80 | 0.285 | ( 0.274) | 0.217 | 0.068 |
| 7 | 0.58 | 1.50 | 0.238 | ( 0.274) | 0.181 | 0.057 |
| 8 | 0.67 | 1.80 | 0.285 | ( 0.274) | 0.217 | 0.068 |
| 9 | 0.75 | 1.80 | 0.285 | ( 0.274) | 0.217 | 0.068 |
| 10 | 0.83 | 1.50 | 0.238 | ( 0.274) | 0.181 | 0.057 |
| 11 | 0.92 | 1.60 | 0.254 | ( 0.274) | 0.193 | 0.061 |
| 12 | 1.00 | 1.80 | 0.285 | ( 0.274) | 0.217 | 0.068 |
| 13 | 1.08 | 2.20 | 0.349 | ( 0.274) | 0.265 | 0.084 |
| 14 | 1.17 | 2.20 | 0.349 | ( 0.274) | 0.265 | 0.084 |
| 15 | 1.25 | 2.20 | 0.349 | ( 0.274) | 0.265 | 0.084 |
| 16 | 1.33 | 2.00 | 0.317 | ( 0.274) | 0.241 | 0.076 |
| 17 | 1.42 | 2.60 | 0.412 | 0.274 | ( 0.313) | 0.138 |
| 18 | 1.50 | 2.70 | 0.428 | 0.274 | ( 0.325) | 0.154 |
| 19 | 1.58 | 2.40 | 0.381 | 0.274 | ( 0.289) | 0.106 |
| 20 | 1.67 | 2.70 | 0.428 | 0.274 | ( 0.325) | 0.154 |
| 21 | 1.75 | 3.30 | 0.523 | 0.274 | ( 0.398) | 0.249 |
| 22 | 1.83 | 3.10 | 0.491 | 0.274 | ( 0.374) | 0.217 |
| 23 | 1.92 | 2.90 | 0.460 | 0.274 | ( 0.349) | 0.186 |
| 24 | 2.00 | 3.00 | 0.476 | 0.274 | ( 0.361) | 0.201 |
| 25 | 2.08 | 3.10 | 0.491 | 0.274 | ( 0.374) | 0.217 |
| 26 | 2.17 | 4.20 | 0.666 | 0.274 | ( 0.506) | 0.392 |
| 27 | 2.25 | 5.00 | 0.793 | 0.274 | ( 0.602) | 0.518 |
| 28 | 2.33 | 3.50 | 0.555 | 0.274 | ( 0.422) | 0.281 |
| 29 | 2.42 | 6.80 | 1.078 | 0.274 | ( 0.819) | 0.804 |
| 30 | 2.50 | 7.30 | 1.157 | 0.274 | ( 0.880) | 0.883 |
| 31 | 2.58 | 8.20 | 1.300 | 0.274 | ( 0.988) | 1.026 |
| 32 | 2.67 | 5.90 | 0.935 | 0.274 | ( 0.711) | 0.661 |
| 33 | 2.75 | 2.00 | 0.317 | ( 0.274) | 0.241 | 0.076 |
| 34 | 2.83 | 1.80 | 0.285 | ( 0.274) | 0.217 | 0.068 |
| 35 | 2.92 | 1.80 | 0.285 | ( 0.274) | 0.217 | 0.068 |
| 36 | 3.00 | 0.60 | 0.095 | ( 0.274) | 0.072 | 0.023 |
| | | (Loss Rate Not Used) | | | | |
| Sum = | | 100.0 | | | Sum = | 7.5 |

Flood volume = Effective rainfall 0.62(In)
times area 20.1(Ac.)/[(In)/(Ft.)] = 1.0(Ac.Ft)
Total soil loss = 0.70(In)
Total soil loss = 1.173(Ac.Ft)
Total rainfall = 1.32(In)
Flood volume = 45342.5 Cubic Feet
Total soil loss = 51105.2 Cubic Feet

-------------------------------------------------------------------
Peak flow rate of this hydrograph = 17.041(CFS)

-------------------------------------------------------------------

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```
                    3 - H O U R   S T O R M
                 R u n o f f     H y d r o g r a p h
      -----------------------------------------------------------------
--
               Hydrograph in   5   Minute intervals ((CFS))

      -----------------------------------------------------------------
--
  Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0
20.0

-----------------------------------------------------------------------
    0+ 5       0.0010      0.15  Q         |         |         |
|
    0+10       0.0053      0.61  VQ        |         |         |
|
    0+15       0.0106      0.77  VQ        |         |         |
|
    0+20       0.0163      0.83  VQ        |         |         |
|
    0+25       0.0231      0.99  VQ        |         |         |
|
    0+30       0.0307      1.10  |VQ       |         |         |
|
    0+35       0.0390      1.21  |VQ       |         |         |
|
    0+40       0.0473      1.20  |VQ       |         |         |
|
    0+45       0.0562      1.30  | Q       |         |         |
|
    0+50       0.0652      1.31  | Q       |         |         |
|
    0+55       0.0737      1.23  | Q       |         |         |
|
    1+ 0       0.0824      1.26  | QV      |         |         |
|
    1+ 5       0.0919      1.38  | QV      |         |         |
|
    1+10       0.1026      1.55  |  Q      |         |         |
|
    1+15       0.1137      1.62  |  QV     |         |         |
|
    1+20       0.1249      1.62  |  QV     |         |         |
|
    1+25       0.1370      1.76  |  Q V    |         |         |
|
    1+30       0.1533      2.37  |   QV    |         |         |
|
    1+35       0.1712      2.60  |    QV   |         |         |
|
    1+40       0.1881      2.46  |   Q  V  |         |         |
|
    1+45       0.2095      3.09  |     Q V |         |         |
|
    1+50       0.2373      4.04  |       QV|         |         |
|
    1+55       0.2653      4.07  |       Q V         |         |
|
    2+ 0       0.2921      3.89  |      Q  |V        |         |
|
```

```
    2+ 5       0.3199      4.03  |       Q | V       |         |
|
    2+10       0.3527      4.76  |        Q|  V      |         |
|
    2+15       0.3999      6.86  |         |  Q V    |         |
|
    2+20       0.4551      8.01  |         |     QV  |         |
|
    2+25       0.5112      8.15  |         |     Q  V|         |
|
    2+30       0.5993     12.79  |         |         |  V Q    |
|
    2+35       0.7078     15.75  |         |         |      V  |Q
|
    2+40       0.8252     17.04  |         |         |         |V  Q
|
    2+45       0.9145     12.97  |         |         |    Q    |    V
|
    2+50       0.9606      6.70  |         |  Q      |         |     V
|
    2+55       0.9899      4.25  |       Q |         |         |       V
|
    3+ 0       1.0108      3.04  |     Q   |         |         |       V
|
    3+ 5       1.0239      1.91  |  Q      |         |         |
V|
    3+10       1.0318      1.14  | Q       |         |         |
V|
    3+15       1.0364      0.67  |Q        |         |         |
V|
    3+20       1.0391      0.38  Q         |         |         |
V|
    3+25       1.0402      0.17  Q         |         |         |
V|
    3+30       1.0406      0.05  Q         |         |         |
V|
    3+35       1.0408      0.03  Q         |         |         |
V|
    3+40       1.0409      0.01  Q         |         |         |
V|
    3+45       1.0409      0.00  Q         |         |         |
V
-----------------------------------------------------------------------
```

SWCRP610

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


Study date 10/30/20 File: SWCRP610.out

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------------------------------------------------------------------------

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

Program License Serial Number 6232

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

English Units used in output format

---------------------------------------------------------------------
SWC Ramona & Perris
Existing Condition

--------------------------------------------------------------------
Drainage Area =      20.11(Ac.)  =      0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      20.11(Ac.)  =
0.031 Sq. Mi.
Length along longest watercourse =    1418.00(Ft.)
Length along longest watercourse measured to centroid =     629.00(Ft.)
Length along longest watercourse =      0.269 Mi.
Length along longest watercourse measured to centroid =      0.119 Mi.
Difference in elevation =       4.00(Ft.)
Slope along watercourse =     14.8942 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time =    0.097 Hr.
Lag time =     5.83 Min.
25% of lag time =     1.46 Min.
40% of lag time =     2.33 Min.
Unit time =     5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 1.14 | 22.93 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 3.69 | 74.21 |

STORM EVENT (YEAR) =   10.00
Area Averaged 2-Year Rainfall =    1.140(In)
Area Averaged 100-Year Rainfall =    3.690(In)

Point rain (area averaged) = 2.189(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 2.189(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 73.00 | 0.178 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-2 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 73.0 | 73.0 | 0.327 | 0.178 | 0.274 | 1.000 | 0.274 |
| | | | | | Sum (F) = | 0.274 |

Area averaged mean soil loss (F) (In/Hr) = 0.274
Minimum soil loss rate ((In/Hr)) = 0.137
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.760

---

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 | 85.826 | 14.956 | 3.031 |
| 2 | 0.167 | 171.652 | 46.157 | 9.355 |
| 3 | 0.250 | 257.478 | 18.376 | 3.724 |
| 4 | 0.333 | 343.304 | 7.880 | 1.597 |
| 5 | 0.417 | 429.130 | 4.662 | 0.945 |
| 6 | 0.500 | 514.955 | 2.916 | 0.591 |
| 7 | 0.583 | 600.781 | 2.067 | 0.419 |
| 8 | 0.667 | 686.607 | 1.367 | 0.277 |
| 9 | 0.750 | 772.433 | 0.915 | 0.185 |
| 10 | 0.833 | 858.259 | 0.705 | 0.143 |
| | | | Sum = 100.000 | Sum= 20.267 |

---

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 | Loss rate(In./Hr) Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 0.50 | 0.131 | ( 0.274) | 0.100 | 0.032 |
| 2 | 0.17 | 0.60 | 0.158 | ( 0.274) | 0.120 | 0.038 |
| 3 | 0.25 | 0.60 | 0.158 | ( 0.274) | 0.120 | 0.038 |
| 4 | 0.33 | 0.60 | 0.158 | ( 0.274) | 0.120 | 0.038 |
| 5 | 0.42 | 0.60 | 0.158 | ( 0.274) | 0.120 | 0.038 |
| 6 | 0.50 | 0.70 | 0.184 | ( 0.274) | 0.140 | 0.044 |
| 7 | 0.58 | 0.70 | 0.184 | ( 0.274) | 0.140 | 0.044 |
| 8 | 0.67 | 0.70 | 0.184 | ( 0.274) | 0.140 | 0.044 |
| 9 | 0.75 | 0.70 | 0.184 | ( 0.274) | 0.140 | 0.044 |
| 10 | 0.83 | 0.70 | 0.184 | ( 0.274) | 0.140 | 0.044 |
| 11 | 0.92 | 0.70 | 0.184 | ( 0.274) | 0.140 | 0.044 |
| 12 | 1.00 | 0.80 | 0.210 | ( 0.274) | 0.160 | 0.050 |
| 13 | 1.08 | 0.80 | 0.210 | ( 0.274) | 0.160 | 0.050 |
| 14 | 1.17 | 0.80 | 0.210 | ( 0.274) | 0.160 | 0.050 |
| 15 | 1.25 | 0.80 | 0.210 | ( 0.274) | 0.160 | 0.050 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 16 | 1.33 | 0.80 | 0.210 | ( 0.274) | 0.160 | 0.050 |
| 17 | 1.42 | 0.80 | 0.210 | ( 0.274) | 0.160 | 0.050 |
| 18 | 1.50 | 0.80 | 0.210 | ( 0.274) | 0.160 | 0.050 |
| 19 | 1.58 | 0.80 | 0.210 | ( 0.274) | 0.160 | 0.050 |
| 20 | 1.67 | 0.80 | 0.210 | ( 0.274) | 0.160 | 0.050 |
| 21 | 1.75 | 0.80 | 0.210 | ( 0.274) | 0.160 | 0.050 |
| 22 | 1.83 | 0.80 | 0.210 | ( 0.274) | 0.160 | 0.050 |
| 23 | 1.92 | 0.80 | 0.210 | ( 0.274) | 0.160 | 0.050 |
| 24 | 2.00 | 0.90 | 0.236 | ( 0.274) | 0.180 | 0.057 |
| 25 | 2.08 | 0.80 | 0.210 | ( 0.274) | 0.160 | 0.050 |
| 26 | 2.17 | 0.90 | 0.236 | ( 0.274) | 0.180 | 0.057 |
| 27 | 2.25 | 0.90 | 0.236 | ( 0.274) | 0.180 | 0.057 |
| 28 | 2.33 | 0.90 | 0.236 | ( 0.274) | 0.180 | 0.057 |
| 29 | 2.42 | 0.90 | 0.236 | ( 0.274) | 0.180 | 0.057 |
| 30 | 2.50 | 0.90 | 0.236 | ( 0.274) | 0.180 | 0.057 |
| 31 | 2.58 | 0.90 | 0.236 | ( 0.274) | 0.180 | 0.057 |
| 32 | 2.67 | 0.90 | 0.236 | ( 0.274) | 0.180 | 0.057 |
| 33 | 2.75 | 1.00 | 0.263 | ( 0.274) | 0.200 | 0.063 |
| 34 | 2.83 | 1.00 | 0.263 | ( 0.274) | 0.200 | 0.063 |
| 35 | 2.92 | 1.00 | 0.263 | ( 0.274) | 0.200 | 0.063 |
| 36 | 3.00 | 1.00 | 0.263 | ( 0.274) | 0.200 | 0.063 |
| 37 | 3.08 | 1.00 | 0.263 | ( 0.274) | 0.200 | 0.063 |
| 38 | 3.17 | 1.10 | 0.289 | ( 0.274) | 0.220 | 0.069 |
| 39 | 3.25 | 1.10 | 0.289 | ( 0.274) | 0.220 | 0.069 |
| 40 | 3.33 | 1.10 | 0.289 | ( 0.274) | 0.220 | 0.069 |
| 41 | 3.42 | 1.20 | 0.315 | ( 0.274) | 0.240 | 0.076 |
| 42 | 3.50 | 1.30 | 0.341 | ( 0.274) | 0.260 | 0.082 |
| 43 | 3.58 | 1.40 | 0.368 | 0.274 | ( 0.279) | 0.093 |
| 44 | 3.67 | 1.40 | 0.368 | 0.274 | ( 0.279) | 0.093 |
| 45 | 3.75 | 1.50 | 0.394 | 0.274 | ( 0.299) | 0.120 |
| 46 | 3.83 | 1.50 | 0.394 | 0.274 | ( 0.299) | 0.120 |
| 47 | 3.92 | 1.60 | 0.420 | 0.274 | ( 0.319) | 0.146 |
| 48 | 4.00 | 1.60 | 0.420 | 0.274 | ( 0.319) | 0.146 |
| 49 | 4.08 | 1.70 | 0.447 | 0.274 | ( 0.339) | 0.172 |
| 50 | 4.17 | 1.80 | 0.473 | 0.274 | ( 0.359) | 0.199 |
| 51 | 4.25 | 1.90 | 0.499 | 0.274 | ( 0.379) | 0.225 |
| 52 | 4.33 | 2.00 | 0.525 | 0.274 | ( 0.399) | 0.251 |
| 53 | 4.42 | 2.10 | 0.552 | 0.274 | ( 0.419) | 0.277 |
| 54 | 4.50 | 2.10 | 0.552 | 0.274 | ( 0.419) | 0.277 |
| 55 | 4.58 | 2.20 | 0.578 | 0.274 | ( 0.439) | 0.304 |
| 56 | 4.67 | 2.30 | 0.604 | 0.274 | ( 0.459) | 0.330 |
| 57 | 4.75 | 2.40 | 0.630 | 0.274 | ( 0.479) | 0.356 |
| 58 | 4.83 | 2.40 | 0.630 | 0.274 | ( 0.479) | 0.356 |
| 59 | 4.92 | 2.50 | 0.657 | 0.274 | ( 0.499) | 0.382 |
| 60 | 5.00 | 2.60 | 0.683 | 0.274 | ( 0.519) | 0.409 |
| 61 | 5.08 | 3.10 | 0.814 | 0.274 | ( 0.619) | 0.540 |
| 62 | 5.17 | 3.60 | 0.946 | 0.274 | ( 0.719) | 0.671 |
| 63 | 5.25 | 3.90 | 1.024 | 0.274 | ( 0.779) | 0.750 |
| 64 | 5.33 | 4.20 | 1.103 | 0.274 | ( 0.838) | 0.829 |
| 65 | 5.42 | 4.70 | 1.235 | 0.274 | ( 0.938) | 0.960 |
| 66 | 5.50 | 5.60 | 1.471 | 0.274 | ( 1.118) | 1.197 |
| 67 | 5.58 | 1.90 | 0.499 | 0.274 | ( 0.379) | 0.225 |
| 68 | 5.67 | 0.90 | 0.236 | ( 0.274) | 0.180 | 0.057 |
| 69 | 5.75 | 0.60 | 0.158 | ( 0.274) | 0.120 | 0.038 |
| 70 | 5.83 | 0.50 | 0.131 | ( 0.274) | 0.100 | 0.032 |
| 71 | 5.92 | 0.30 | 0.079 | ( 0.274) | 0.060 | 0.019 |
| 72 | 6.00 | 0.20 | 0.053 | ( 0.274) | 0.040 | 0.013 |

(Loss Rate Not Used)

Sum = 100.0 Sum = 11.8

Flood volume = Effective rainfall 0.99(In)
times area 20.1(Ac.)/[(In)/(Ft.)] = 1.7(Ac.Ft)
Total soil loss = 1.20(In)
Total soil loss = 2.017(Ac.Ft)

```
      Total rainfall =      2.19(In)
      Flood volume =       71930.6 Cubic Feet
      Total soil loss =       87860.5 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     18.352(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        6 - H O U R   S T O R M
                   R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0         5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0007      0.10  Q         |         |         |         |
  0+10       0.0035      0.41  Q         |         |         |         |
  0+15       0.0075      0.59  VQ        |         |         |         |
  0+20       0.0121      0.66  VQ        |         |         |         |
  0+25       0.0169      0.70  VQ        |         |         |         |
  0+30       0.0220      0.74  VQ        |         |         |         |
  0+35       0.0276      0.82  VQ        |         |         |         |
  0+40       0.0335      0.85  VQ        |         |         |         |
  0+45       0.0395      0.87  VQ        |         |         |         |
  0+50       0.0456      0.88  |Q        |         |         |         |
  0+55       0.0517      0.89  |Q        |         |         |         |
  1+ 0       0.0580      0.91  |Q        |         |         |         |
  1+ 5       0.0647      0.97  |Q        |         |         |         |
  1+10       0.0716      1.00  |Q        |         |         |         |
  1+15       0.0785      1.01  |VQ       |         |         |         |
  1+20       0.0855      1.01  | Q       |         |         |         |
  1+25       0.0925      1.02  | Q       |         |         |         |
  1+30       0.0995      1.02  | Q       |         |         |         |
  1+35       0.1065      1.02  | Q       |         |         |         |
  1+40       0.1135      1.02  | Q       |         |         |         |
  1+45       0.1206      1.02  | Q       |         |         |         |
  1+50       0.1276      1.02  | QV      |         |         |         |
  1+55       0.1347      1.02  | QV      |         |         |         |
  2+ 0       0.1418      1.04  | QV      |         |         |         |
  2+ 5       0.1493      1.08  | QV      |         |         |         |
  2+10       0.1566      1.07  | QV      |         |         |         |
  2+15       0.1643      1.11  | QV      |         |         |         |
  2+20       0.1721      1.13  | Q V     |         |         |         |
  2+25       0.1799      1.14  | Q V     |         |         |         |
  2+30       0.1878      1.14  | Q V     |         |         |         |
  2+35       0.1957      1.15  | Q V     |         |         |         |
  2+40       0.2036      1.15  | Q V     |         |         |         |
  2+45       0.2116      1.17  | Q  V    |         |         |         |
  2+50       0.2201      1.23  | Q  V    |         |         |         |
  2+55       0.2287      1.25  | Q  V    |         |         |         |
  3+ 0       0.2374      1.26  | Q  V    |         |         |         |
  3+ 5       0.2461      1.27  | Q  V    |         |         |         |
  3+10       0.2550      1.29  | Q   V   |         |         |         |
  3+15       0.2643      1.35  | Q   V   |         |         |         |
  3+20       0.2738      1.38  | Q   V   |         |         |         |
  3+25       0.2835      1.41  | Q   V   |         |         |         |
  3+30       0.2938      1.49  | Q    V  |         |         |         |
  3+35       0.3049      1.61  |  Q   V  |         |         |         |
  3+40       0.3170      1.76  |  Q   V  |         |         |         |
  3+45       0.3301      1.90  |  Q   V  |         |         |         |
  3+50       0.3451      2.17  |   Q   V |         |         |         |
  3+55       0.3614      2.37  |   Q   V|         |         |         |
  4+ 0       0.3798      2.67  |    Q   V|         |         |         |
```

```
4+ 5       0.3996      2.88   |    Q   V|         |         |         |
4+10       0.4221      3.27   |     Q   V         |         |         |
4+15       0.4478      3.73   |      Q  V         |         |         |
4+20       0.4768      4.22   |       Q |V        |         |         |
4+25       0.5094      4.72   |        Q| V       |         |         |
4+30       0.5449      5.16   |         Q  V      |         |         |
4+35       0.5824      5.44   |         Q   V     |         |         |
4+40       0.6228      5.87   |         |Q   V    |         |         |
4+45       0.6665      6.35   |         | Q   V   |         |         |
4+50       0.7133      6.78   |         |  Q   V  |         |         |
4+55       0.7618      7.05   |         |   Q   V |         |         |
5+ 0       0.8133      7.48   |         |   Q    V|         |         |
5+ 5       0.8704      8.28   |         |     Q   |V        |         |
5+10       0.9398     10.08   |         |         Q V       |         |
5+15       1.0234     12.13   |         |         |   Q     |         |
5+20       1.1189     13.86   |         |         |      Q  |         |
5+25       1.2267     15.66   |         |         |        V|Q        |
5+30       1.3524     18.25   |         |         |         | V   Q   |
5+35       1.4788     18.35   |         |         |         |    VQ   |
5+40       1.5481     10.06   |         |         Q         |     V   |
5+45       1.5857      5.45   |         Q         |         |      V  |
5+50       1.6096      3.48   |     Q   |         |         |      V  |
5+55       1.6259      2.37   |   Q     |         |         |       V|
6+ 0       1.6370      1.61   |  Q      |         |         |       V|
6+ 5       1.6441      1.03   | Q       |         |         |       V|
6+10       1.6481      0.57   |Q        |         |         |       V|
6+15       1.6501      0.30   Q         |         |         |       V|
6+20       1.6508      0.09   Q         |         |         |       V|
6+25       1.6510      0.04
```

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


Study date 10/30/20 File: SWCRP2410.out

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

Program License Serial Number 6232

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

English Units used in output format

---------------------------------------------------------------------
SWC Ramona & Perris
Existing Condition

--------------------------------------------------------------------
Drainage Area = 20.11(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.11(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1418.00(Ft.)
Length along longest watercourse measured to centroid = 629.00(Ft.)
Length along longest watercourse = 0.269 Mi.
Length along longest watercourse measured to centroid = 0.119 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 14.8942 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time = 0.097 Hr.
Lag time = 5.83 Min.
25% of lag time = 1.46 Min.
40% of lag time = 2.33 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] |
|---|---|---|
| 20.11 | 1.97 | 39.62 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 5.02 | 100.95 |

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 1.970(In)
Area Averaged 100-Year Rainfall = 5.020(In)

Point rain (area averaged) = 3.225(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 3.225(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 73.00 | 0.178 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-2 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 73.0 | 73.0 | 0.327 | 0.178 | 0.274 | 1.000 | 0.274 |
| | | | | | Sum (F) = | 0.274 |

Area averaged mean soil loss (F) (In/Hr) = 0.274
Minimum soil loss rate ((In/Hr)) = 0.137
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.760

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

---

Unit Hydrograph Data

| Unit time period (hrs) | | Time % of lag | Distribution Graph % | Unit Hydrograph (CFS) |
|---|---|---|---|---|
| 1 | 0.083 | 85.826 | 14.956 | 3.031 |
| 2 | 0.167 | 171.652 | 46.157 | 9.355 |
| 3 | 0.250 | 257.478 | 18.376 | 3.724 |
| 4 | 0.333 | 343.304 | 7.880 | 1.597 |
| 5 | 0.417 | 429.130 | 4.662 | 0.945 |
| 6 | 0.500 | 514.955 | 2.916 | 0.591 |
| 7 | 0.583 | 600.781 | 2.067 | 0.419 |
| 8 | 0.667 | 686.607 | 1.367 | 0.277 |
| 9 | 0.750 | 772.433 | 0.915 | 0.185 |
| 10 | 0.833 | 858.259 | 0.705 | 0.143 |
| | | | Sum = 100.000 | Sum= 20.267 |

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The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

| Unit | Time (Hr.) | Pattern Percent | Storm Rain (In/Hr) | Loss rate(In./Hr) Max | Loss rate(In./Hr) Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 0.07 | 0.026 | ( 0.486) | 0.020 | 0.006 |
| 2 | 0.17 | 0.07 | 0.026 | ( 0.484) | 0.020 | 0.006 |
| 3 | 0.25 | 0.07 | 0.026 | ( 0.482) | 0.020 | 0.006 |
| 4 | 0.33 | 0.10 | 0.039 | ( 0.481) | 0.029 | 0.009 |
| 5 | 0.42 | 0.10 | 0.039 | ( 0.479) | 0.029 | 0.009 |
| 6 | 0.50 | 0.10 | 0.039 | ( 0.477) | 0.029 | 0.009 |
| 7 | 0.58 | 0.10 | 0.039 | ( 0.475) | 0.029 | 0.009 |
| 8 | 0.67 | 0.10 | 0.039 | ( 0.473) | 0.029 | 0.009 |
| 9 | 0.75 | 0.10 | 0.039 | ( 0.471) | 0.029 | 0.009 |
| 10 | 0.83 | 0.13 | 0.052 | ( 0.469) | 0.039 | 0.012 |
| 11 | 0.92 | 0.13 | 0.052 | ( 0.468) | 0.039 | 0.012 |
| 12 | 1.00 | 0.13 | 0.052 | ( 0.466) | 0.039 | 0.012 |
| 13 | 1.08 | 0.10 | 0.039 | ( 0.464) | 0.029 | 0.009 |
| 14 | 1.17 | 0.10 | 0.039 | ( 0.462) | 0.029 | 0.009 |
| 15 | 1.25 | 0.10 | 0.039 | ( 0.460) | 0.029 | 0.009 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 16 | 1.33 | 0.10 | 0.039 | ( 0.458) | 0.029 | 0.009 |
| 17 | 1.42 | 0.10 | 0.039 | ( 0.457) | 0.029 | 0.009 |
| 18 | 1.50 | 0.10 | 0.039 | ( 0.455) | 0.029 | 0.009 |
| 19 | 1.58 | 0.10 | 0.039 | ( 0.453) | 0.029 | 0.009 |
| 20 | 1.67 | 0.10 | 0.039 | ( 0.451) | 0.029 | 0.009 |
| 21 | 1.75 | 0.10 | 0.039 | ( 0.449) | 0.029 | 0.009 |
| 22 | 1.83 | 0.13 | 0.052 | ( 0.448) | 0.039 | 0.012 |
| 23 | 1.92 | 0.13 | 0.052 | ( 0.446) | 0.039 | 0.012 |
| 24 | 2.00 | 0.13 | 0.052 | ( 0.444) | 0.039 | 0.012 |
| 25 | 2.08 | 0.13 | 0.052 | ( 0.442) | 0.039 | 0.012 |
| 26 | 2.17 | 0.13 | 0.052 | ( 0.440) | 0.039 | 0.012 |
| 27 | 2.25 | 0.13 | 0.052 | ( 0.439) | 0.039 | 0.012 |
| 28 | 2.33 | 0.13 | 0.052 | ( 0.437) | 0.039 | 0.012 |
| 29 | 2.42 | 0.13 | 0.052 | ( 0.435) | 0.039 | 0.012 |
| 30 | 2.50 | 0.13 | 0.052 | ( 0.433) | 0.039 | 0.012 |
| 31 | 2.58 | 0.17 | 0.064 | ( 0.431) | 0.049 | 0.015 |
| 32 | 2.67 | 0.17 | 0.064 | ( 0.430) | 0.049 | 0.015 |
| 33 | 2.75 | 0.17 | 0.064 | ( 0.428) | 0.049 | 0.015 |
| 34 | 2.83 | 0.17 | 0.064 | ( 0.426) | 0.049 | 0.015 |
| 35 | 2.92 | 0.17 | 0.064 | ( 0.424) | 0.049 | 0.015 |
| 36 | 3.00 | 0.17 | 0.064 | ( 0.423) | 0.049 | 0.015 |
| 37 | 3.08 | 0.17 | 0.064 | ( 0.421) | 0.049 | 0.015 |
| 38 | 3.17 | 0.17 | 0.064 | ( 0.419) | 0.049 | 0.015 |
| 39 | 3.25 | 0.17 | 0.064 | ( 0.417) | 0.049 | 0.015 |
| 40 | 3.33 | 0.17 | 0.064 | ( 0.416) | 0.049 | 0.015 |
| 41 | 3.42 | 0.17 | 0.064 | ( 0.414) | 0.049 | 0.015 |
| 42 | 3.50 | 0.17 | 0.064 | ( 0.412) | 0.049 | 0.015 |
| 43 | 3.58 | 0.17 | 0.064 | ( 0.410) | 0.049 | 0.015 |
| 44 | 3.67 | 0.17 | 0.064 | ( 0.409) | 0.049 | 0.015 |
| 45 | 3.75 | 0.17 | 0.064 | ( 0.407) | 0.049 | 0.015 |
| 46 | 3.83 | 0.20 | 0.077 | ( 0.405) | 0.059 | 0.019 |
| 47 | 3.92 | 0.20 | 0.077 | ( 0.404) | 0.059 | 0.019 |
| 48 | 4.00 | 0.20 | 0.077 | ( 0.402) | 0.059 | 0.019 |
| 49 | 4.08 | 0.20 | 0.077 | ( 0.400) | 0.059 | 0.019 |
| 50 | 4.17 | 0.20 | 0.077 | ( 0.398) | 0.059 | 0.019 |
| 51 | 4.25 | 0.20 | 0.077 | ( 0.397) | 0.059 | 0.019 |
| 52 | 4.33 | 0.23 | 0.090 | ( 0.395) | 0.069 | 0.022 |
| 53 | 4.42 | 0.23 | 0.090 | ( 0.393) | 0.069 | 0.022 |
| 54 | 4.50 | 0.23 | 0.090 | ( 0.392) | 0.069 | 0.022 |
| 55 | 4.58 | 0.23 | 0.090 | ( 0.390) | 0.069 | 0.022 |
| 56 | 4.67 | 0.23 | 0.090 | ( 0.388) | 0.069 | 0.022 |
| 57 | 4.75 | 0.23 | 0.090 | ( 0.387) | 0.069 | 0.022 |
| 58 | 4.83 | 0.27 | 0.103 | ( 0.385) | 0.078 | 0.025 |
| 59 | 4.92 | 0.27 | 0.103 | ( 0.383) | 0.078 | 0.025 |
| 60 | 5.00 | 0.27 | 0.103 | ( 0.382) | 0.078 | 0.025 |
| 61 | 5.08 | 0.20 | 0.077 | ( 0.380) | 0.059 | 0.019 |
| 62 | 5.17 | 0.20 | 0.077 | ( 0.378) | 0.059 | 0.019 |
| 63 | 5.25 | 0.20 | 0.077 | ( 0.377) | 0.059 | 0.019 |
| 64 | 5.33 | 0.23 | 0.090 | ( 0.375) | 0.069 | 0.022 |
| 65 | 5.42 | 0.23 | 0.090 | ( 0.373) | 0.069 | 0.022 |
| 66 | 5.50 | 0.23 | 0.090 | ( 0.372) | 0.069 | 0.022 |
| 67 | 5.58 | 0.27 | 0.103 | ( 0.370) | 0.078 | 0.025 |
| 68 | 5.67 | 0.27 | 0.103 | ( 0.369) | 0.078 | 0.025 |
| 69 | 5.75 | 0.27 | 0.103 | ( 0.367) | 0.078 | 0.025 |
| 70 | 5.83 | 0.27 | 0.103 | ( 0.365) | 0.078 | 0.025 |
| 71 | 5.92 | 0.27 | 0.103 | ( 0.364) | 0.078 | 0.025 |
| 72 | 6.00 | 0.27 | 0.103 | ( 0.362) | 0.078 | 0.025 |
| 73 | 6.08 | 0.30 | 0.116 | ( 0.360) | 0.088 | 0.028 |
| 74 | 6.17 | 0.30 | 0.116 | ( 0.359) | 0.088 | 0.028 |
| 75 | 6.25 | 0.30 | 0.116 | ( 0.357) | 0.088 | 0.028 |
| 76 | 6.33 | 0.30 | 0.116 | ( 0.356) | 0.088 | 0.028 |
| 77 | 6.42 | 0.30 | 0.116 | ( 0.354) | 0.088 | 0.028 |
| 78 | 6.50 | 0.30 | 0.116 | ( 0.352) | 0.088 | 0.028 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 79 | 6.58 | 0.33 | 0.129 | ( 0.351) | 0.098 | 0.031 |
| 80 | 6.67 | 0.33 | 0.129 | ( 0.349) | 0.098 | 0.031 |
| 81 | 6.75 | 0.33 | 0.129 | ( 0.348) | 0.098 | 0.031 |
| 82 | 6.83 | 0.33 | 0.129 | ( 0.346) | 0.098 | 0.031 |
| 83 | 6.92 | 0.33 | 0.129 | ( 0.345) | 0.098 | 0.031 |
| 84 | 7.00 | 0.33 | 0.129 | ( 0.343) | 0.098 | 0.031 |
| 85 | 7.08 | 0.33 | 0.129 | ( 0.341) | 0.098 | 0.031 |
| 86 | 7.17 | 0.33 | 0.129 | ( 0.340) | 0.098 | 0.031 |
| 87 | 7.25 | 0.33 | 0.129 | ( 0.338) | 0.098 | 0.031 |
| 88 | 7.33 | 0.37 | 0.142 | ( 0.337) | 0.108 | 0.034 |
| 89 | 7.42 | 0.37 | 0.142 | ( 0.335) | 0.108 | 0.034 |
| 90 | 7.50 | 0.37 | 0.142 | ( 0.334) | 0.108 | 0.034 |
| 91 | 7.58 | 0.40 | 0.155 | ( 0.332) | 0.118 | 0.037 |
| 92 | 7.67 | 0.40 | 0.155 | ( 0.331) | 0.118 | 0.037 |
| 93 | 7.75 | 0.40 | 0.155 | ( 0.329) | 0.118 | 0.037 |
| 94 | 7.83 | 0.43 | 0.168 | ( 0.328) | 0.127 | 0.040 |
| 95 | 7.92 | 0.43 | 0.168 | ( 0.326) | 0.127 | 0.040 |
| 96 | 8.00 | 0.43 | 0.168 | ( 0.325) | 0.127 | 0.040 |
| 97 | 8.08 | 0.50 | 0.193 | ( 0.323) | 0.147 | 0.046 |
| 98 | 8.17 | 0.50 | 0.193 | ( 0.322) | 0.147 | 0.046 |
| 99 | 8.25 | 0.50 | 0.193 | ( 0.320) | 0.147 | 0.046 |
| 100 | 8.33 | 0.50 | 0.193 | ( 0.319) | 0.147 | 0.046 |
| 101 | 8.42 | 0.50 | 0.193 | ( 0.317) | 0.147 | 0.046 |
| 102 | 8.50 | 0.50 | 0.193 | ( 0.316) | 0.147 | 0.046 |
| 103 | 8.58 | 0.53 | 0.206 | ( 0.314) | 0.157 | 0.050 |
| 104 | 8.67 | 0.53 | 0.206 | ( 0.313) | 0.157 | 0.050 |
| 105 | 8.75 | 0.53 | 0.206 | ( 0.311) | 0.157 | 0.050 |
| 106 | 8.83 | 0.57 | 0.219 | ( 0.310) | 0.167 | 0.053 |
| 107 | 8.92 | 0.57 | 0.219 | ( 0.308) | 0.167 | 0.053 |
| 108 | 9.00 | 0.57 | 0.219 | ( 0.307) | 0.167 | 0.053 |
| 109 | 9.08 | 0.63 | 0.245 | ( 0.305) | 0.186 | 0.059 |
| 110 | 9.17 | 0.63 | 0.245 | ( 0.304) | 0.186 | 0.059 |
| 111 | 9.25 | 0.63 | 0.245 | ( 0.302) | 0.186 | 0.059 |
| 112 | 9.33 | 0.67 | 0.258 | ( 0.301) | 0.196 | 0.062 |
| 113 | 9.42 | 0.67 | 0.258 | ( 0.300) | 0.196 | 0.062 |
| 114 | 9.50 | 0.67 | 0.258 | ( 0.298) | 0.196 | 0.062 |
| 115 | 9.58 | 0.70 | 0.271 | ( 0.297) | 0.206 | 0.065 |
| 116 | 9.67 | 0.70 | 0.271 | ( 0.295) | 0.206 | 0.065 |
| 117 | 9.75 | 0.70 | 0.271 | ( 0.294) | 0.206 | 0.065 |
| 118 | 9.83 | 0.73 | 0.284 | ( 0.292) | 0.216 | 0.068 |
| 119 | 9.92 | 0.73 | 0.284 | ( 0.291) | 0.216 | 0.068 |
| 120 | 10.00 | 0.73 | 0.284 | ( 0.290) | 0.216 | 0.068 |
| 121 | 10.08 | 0.50 | 0.193 | ( 0.288) | 0.147 | 0.046 |
| 122 | 10.17 | 0.50 | 0.193 | ( 0.287) | 0.147 | 0.046 |
| 123 | 10.25 | 0.50 | 0.193 | ( 0.285) | 0.147 | 0.046 |
| 124 | 10.33 | 0.50 | 0.193 | ( 0.284) | 0.147 | 0.046 |
| 125 | 10.42 | 0.50 | 0.193 | ( 0.283) | 0.147 | 0.046 |
| 126 | 10.50 | 0.50 | 0.193 | ( 0.281) | 0.147 | 0.046 |
| 127 | 10.58 | 0.67 | 0.258 | ( 0.280) | 0.196 | 0.062 |
| 128 | 10.67 | 0.67 | 0.258 | ( 0.279) | 0.196 | 0.062 |
| 129 | 10.75 | 0.67 | 0.258 | ( 0.277) | 0.196 | 0.062 |
| 130 | 10.83 | 0.67 | 0.258 | ( 0.276) | 0.196 | 0.062 |
| 131 | 10.92 | 0.67 | 0.258 | ( 0.274) | 0.196 | 0.062 |
| 132 | 11.00 | 0.67 | 0.258 | ( 0.273) | 0.196 | 0.062 |
| 133 | 11.08 | 0.63 | 0.245 | ( 0.272) | 0.186 | 0.059 |
| 134 | 11.17 | 0.63 | 0.245 | ( 0.270) | 0.186 | 0.059 |
| 135 | 11.25 | 0.63 | 0.245 | ( 0.269) | 0.186 | 0.059 |
| 136 | 11.33 | 0.63 | 0.245 | ( 0.268) | 0.186 | 0.059 |
| 137 | 11.42 | 0.63 | 0.245 | ( 0.266) | 0.186 | 0.059 |
| 138 | 11.50 | 0.63 | 0.245 | ( 0.265) | 0.186 | 0.059 |
| 139 | 11.58 | 0.57 | 0.219 | ( 0.264) | 0.167 | 0.053 |
| 140 | 11.67 | 0.57 | 0.219 | ( 0.263) | 0.167 | 0.053 |
| 141 | 11.75 | 0.57 | 0.219 | ( 0.261) | 0.167 | 0.053 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 142 | 11.83 | 0.60 | 0.232 | ( 0.260) | 0.176 | 0.056 |
| 143 | 11.92 | 0.60 | 0.232 | ( 0.259) | 0.176 | 0.056 |
| 144 | 12.00 | 0.60 | 0.232 | ( 0.257) | 0.176 | 0.056 |
| 145 | 12.08 | 0.83 | 0.322 | ( 0.256) | 0.245 | 0.077 |
| 146 | 12.17 | 0.83 | 0.322 | ( 0.255) | 0.245 | 0.077 |
| 147 | 12.25 | 0.83 | 0.322 | ( 0.253) | 0.245 | 0.077 |
| 148 | 12.33 | 0.87 | 0.335 | 0.252 | ( 0.255) | 0.083 |
| 149 | 12.42 | 0.87 | 0.335 | 0.251 | ( 0.255) | 0.084 |
| 150 | 12.50 | 0.87 | 0.335 | 0.250 | ( 0.255) | 0.086 |
| 151 | 12.58 | 0.93 | 0.361 | 0.248 | ( 0.274) | 0.113 |
| 152 | 12.67 | 0.93 | 0.361 | 0.247 | ( 0.274) | 0.114 |
| 153 | 12.75 | 0.93 | 0.361 | 0.246 | ( 0.274) | 0.115 |
| 154 | 12.83 | 0.97 | 0.374 | 0.245 | ( 0.284) | 0.129 |
| 155 | 12.92 | 0.97 | 0.374 | 0.243 | ( 0.284) | 0.131 |
| 156 | 13.00 | 0.97 | 0.374 | 0.242 | ( 0.284) | 0.132 |
| 157 | 13.08 | 1.13 | 0.439 | 0.241 | ( 0.333) | 0.198 |
| 158 | 13.17 | 1.13 | 0.439 | 0.240 | ( 0.333) | 0.199 |
| 159 | 13.25 | 1.13 | 0.439 | 0.239 | ( 0.333) | 0.200 |
| 160 | 13.33 | 1.13 | 0.439 | 0.237 | ( 0.333) | 0.201 |
| 161 | 13.42 | 1.13 | 0.439 | 0.236 | ( 0.333) | 0.202 |
| 162 | 13.50 | 1.13 | 0.439 | 0.235 | ( 0.333) | 0.204 |
| 163 | 13.58 | 0.77 | 0.297 | ( 0.234) | 0.225 | 0.071 |
| 164 | 13.67 | 0.77 | 0.297 | ( 0.233) | 0.225 | 0.071 |
| 165 | 13.75 | 0.77 | 0.297 | ( 0.231) | 0.225 | 0.071 |
| 166 | 13.83 | 0.77 | 0.297 | ( 0.230) | 0.225 | 0.071 |
| 167 | 13.92 | 0.77 | 0.297 | ( 0.229) | 0.225 | 0.071 |
| 168 | 14.00 | 0.77 | 0.297 | ( 0.228) | 0.225 | 0.071 |
| 169 | 14.08 | 0.90 | 0.348 | 0.227 | ( 0.265) | 0.122 |
| 170 | 14.17 | 0.90 | 0.348 | 0.226 | ( 0.265) | 0.123 |
| 171 | 14.25 | 0.90 | 0.348 | 0.224 | ( 0.265) | 0.124 |
| 172 | 14.33 | 0.87 | 0.335 | 0.223 | ( 0.255) | 0.112 |
| 173 | 14.42 | 0.87 | 0.335 | 0.222 | ( 0.255) | 0.113 |
| 174 | 14.50 | 0.87 | 0.335 | 0.221 | ( 0.255) | 0.114 |
| 175 | 14.58 | 0.87 | 0.335 | 0.220 | ( 0.255) | 0.116 |
| 176 | 14.67 | 0.87 | 0.335 | 0.219 | ( 0.255) | 0.117 |
| 177 | 14.75 | 0.87 | 0.335 | 0.218 | ( 0.255) | 0.118 |
| 178 | 14.83 | 0.83 | 0.322 | 0.216 | ( 0.245) | 0.106 |
| 179 | 14.92 | 0.83 | 0.322 | 0.215 | ( 0.245) | 0.107 |
| 180 | 15.00 | 0.83 | 0.322 | 0.214 | ( 0.245) | 0.108 |
| 181 | 15.08 | 0.80 | 0.310 | 0.213 | ( 0.235) | 0.096 |
| 182 | 15.17 | 0.80 | 0.310 | 0.212 | ( 0.235) | 0.098 |
| 183 | 15.25 | 0.80 | 0.310 | 0.211 | ( 0.235) | 0.099 |
| 184 | 15.33 | 0.77 | 0.297 | 0.210 | ( 0.225) | 0.087 |
| 185 | 15.42 | 0.77 | 0.297 | 0.209 | ( 0.225) | 0.088 |
| 186 | 15.50 | 0.77 | 0.297 | 0.208 | ( 0.225) | 0.089 |
| 187 | 15.58 | 0.63 | 0.245 | ( 0.207) | 0.186 | 0.059 |
| 188 | 15.67 | 0.63 | 0.245 | ( 0.206) | 0.186 | 0.059 |
| 189 | 15.75 | 0.63 | 0.245 | ( 0.205) | 0.186 | 0.059 |
| 190 | 15.83 | 0.63 | 0.245 | ( 0.203) | 0.186 | 0.059 |
| 191 | 15.92 | 0.63 | 0.245 | ( 0.202) | 0.186 | 0.059 |
| 192 | 16.00 | 0.63 | 0.245 | ( 0.201) | 0.186 | 0.059 |
| 193 | 16.08 | 0.13 | 0.052 | ( 0.200) | 0.039 | 0.012 |
| 194 | 16.17 | 0.13 | 0.052 | ( 0.199) | 0.039 | 0.012 |
| 195 | 16.25 | 0.13 | 0.052 | ( 0.198) | 0.039 | 0.012 |
| 196 | 16.33 | 0.13 | 0.052 | ( 0.197) | 0.039 | 0.012 |
| 197 | 16.42 | 0.13 | 0.052 | ( 0.196) | 0.039 | 0.012 |
| 198 | 16.50 | 0.13 | 0.052 | ( 0.195) | 0.039 | 0.012 |
| 199 | 16.58 | 0.10 | 0.039 | ( 0.194) | 0.029 | 0.009 |
| 200 | 16.67 | 0.10 | 0.039 | ( 0.193) | 0.029 | 0.009 |
| 201 | 16.75 | 0.10 | 0.039 | ( 0.192) | 0.029 | 0.009 |
| 202 | 16.83 | 0.10 | 0.039 | ( 0.191) | 0.029 | 0.009 |
| 203 | 16.92 | 0.10 | 0.039 | ( 0.190) | 0.029 | 0.009 |
| 204 | 17.00 | 0.10 | 0.039 | ( 0.189) | 0.029 | 0.009 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 205 | 17.08 | 0.17 | 0.064 | ( 0.189) | 0.049 | 0.015 |
| 206 | 17.17 | 0.17 | 0.064 | ( 0.188) | 0.049 | 0.015 |
| 207 | 17.25 | 0.17 | 0.064 | ( 0.187) | 0.049 | 0.015 |
| 208 | 17.33 | 0.17 | 0.064 | ( 0.186) | 0.049 | 0.015 |
| 209 | 17.42 | 0.17 | 0.064 | ( 0.185) | 0.049 | 0.015 |
| 210 | 17.50 | 0.17 | 0.064 | ( 0.184) | 0.049 | 0.015 |
| 211 | 17.58 | 0.17 | 0.064 | ( 0.183) | 0.049 | 0.015 |
| 212 | 17.67 | 0.17 | 0.064 | ( 0.182) | 0.049 | 0.015 |
| 213 | 17.75 | 0.17 | 0.064 | ( 0.181) | 0.049 | 0.015 |
| 214 | 17.83 | 0.13 | 0.052 | ( 0.180) | 0.039 | 0.012 |
| 215 | 17.92 | 0.13 | 0.052 | ( 0.179) | 0.039 | 0.012 |
| 216 | 18.00 | 0.13 | 0.052 | ( 0.178) | 0.039 | 0.012 |
| 217 | 18.08 | 0.13 | 0.052 | ( 0.178) | 0.039 | 0.012 |
| 218 | 18.17 | 0.13 | 0.052 | ( 0.177) | 0.039 | 0.012 |
| 219 | 18.25 | 0.13 | 0.052 | ( 0.176) | 0.039 | 0.012 |
| 220 | 18.33 | 0.13 | 0.052 | ( 0.175) | 0.039 | 0.012 |
| 221 | 18.42 | 0.13 | 0.052 | ( 0.174) | 0.039 | 0.012 |
| 222 | 18.50 | 0.13 | 0.052 | ( 0.173) | 0.039 | 0.012 |
| 223 | 18.58 | 0.10 | 0.039 | ( 0.172) | 0.029 | 0.009 |
| 224 | 18.67 | 0.10 | 0.039 | ( 0.172) | 0.029 | 0.009 |
| 225 | 18.75 | 0.10 | 0.039 | ( 0.171) | 0.029 | 0.009 |
| 226 | 18.83 | 0.07 | 0.026 | ( 0.170) | 0.020 | 0.006 |
| 227 | 18.92 | 0.07 | 0.026 | ( 0.169) | 0.020 | 0.006 |
| 228 | 19.00 | 0.07 | 0.026 | ( 0.168) | 0.020 | 0.006 |
| 229 | 19.08 | 0.10 | 0.039 | ( 0.168) | 0.029 | 0.009 |
| 230 | 19.17 | 0.10 | 0.039 | ( 0.167) | 0.029 | 0.009 |
| 231 | 19.25 | 0.10 | 0.039 | ( 0.166) | 0.029 | 0.009 |
| 232 | 19.33 | 0.13 | 0.052 | ( 0.165) | 0.039 | 0.012 |
| 233 | 19.42 | 0.13 | 0.052 | ( 0.164) | 0.039 | 0.012 |
| 234 | 19.50 | 0.13 | 0.052 | ( 0.164) | 0.039 | 0.012 |
| 235 | 19.58 | 0.10 | 0.039 | ( 0.163) | 0.029 | 0.009 |
| 236 | 19.67 | 0.10 | 0.039 | ( 0.162) | 0.029 | 0.009 |
| 237 | 19.75 | 0.10 | 0.039 | ( 0.161) | 0.029 | 0.009 |
| 238 | 19.83 | 0.07 | 0.026 | ( 0.161) | 0.020 | 0.006 |
| 239 | 19.92 | 0.07 | 0.026 | ( 0.160) | 0.020 | 0.006 |
| 240 | 20.00 | 0.07 | 0.026 | ( 0.159) | 0.020 | 0.006 |
| 241 | 20.08 | 0.10 | 0.039 | ( 0.159) | 0.029 | 0.009 |
| 242 | 20.17 | 0.10 | 0.039 | ( 0.158) | 0.029 | 0.009 |
| 243 | 20.25 | 0.10 | 0.039 | ( 0.157) | 0.029 | 0.009 |
| 244 | 20.33 | 0.10 | 0.039 | ( 0.157) | 0.029 | 0.009 |
| 245 | 20.42 | 0.10 | 0.039 | ( 0.156) | 0.029 | 0.009 |
| 246 | 20.50 | 0.10 | 0.039 | ( 0.155) | 0.029 | 0.009 |
| 247 | 20.58 | 0.10 | 0.039 | ( 0.155) | 0.029 | 0.009 |
| 248 | 20.67 | 0.10 | 0.039 | ( 0.154) | 0.029 | 0.009 |
| 249 | 20.75 | 0.10 | 0.039 | ( 0.153) | 0.029 | 0.009 |
| 250 | 20.83 | 0.07 | 0.026 | ( 0.153) | 0.020 | 0.006 |
| 251 | 20.92 | 0.07 | 0.026 | ( 0.152) | 0.020 | 0.006 |
| 252 | 21.00 | 0.07 | 0.026 | ( 0.151) | 0.020 | 0.006 |
| 253 | 21.08 | 0.10 | 0.039 | ( 0.151) | 0.029 | 0.009 |
| 254 | 21.17 | 0.10 | 0.039 | ( 0.150) | 0.029 | 0.009 |
| 255 | 21.25 | 0.10 | 0.039 | ( 0.150) | 0.029 | 0.009 |
| 256 | 21.33 | 0.07 | 0.026 | ( 0.149) | 0.020 | 0.006 |
| 257 | 21.42 | 0.07 | 0.026 | ( 0.148) | 0.020 | 0.006 |
| 258 | 21.50 | 0.07 | 0.026 | ( 0.148) | 0.020 | 0.006 |
| 259 | 21.58 | 0.10 | 0.039 | ( 0.147) | 0.029 | 0.009 |
| 260 | 21.67 | 0.10 | 0.039 | ( 0.147) | 0.029 | 0.009 |
| 261 | 21.75 | 0.10 | 0.039 | ( 0.146) | 0.029 | 0.009 |
| 262 | 21.83 | 0.07 | 0.026 | ( 0.146) | 0.020 | 0.006 |
| 263 | 21.92 | 0.07 | 0.026 | ( 0.145) | 0.020 | 0.006 |
| 264 | 22.00 | 0.07 | 0.026 | ( 0.145) | 0.020 | 0.006 |
| 265 | 22.08 | 0.10 | 0.039 | ( 0.144) | 0.029 | 0.009 |
| 266 | 22.17 | 0.10 | 0.039 | ( 0.144) | 0.029 | 0.009 |
| 267 | 22.25 | 0.10 | 0.039 | ( 0.143) | 0.029 | 0.009 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 268 | 22.33 | 0.07 | 0.026 | ( 0.143) | 0.020 | 0.006 |
| 269 | 22.42 | 0.07 | 0.026 | ( 0.143) | 0.020 | 0.006 |
| 270 | 22.50 | 0.07 | 0.026 | ( 0.142) | 0.020 | 0.006 |
| 271 | 22.58 | 0.07 | 0.026 | ( 0.142) | 0.020 | 0.006 |
| 272 | 22.67 | 0.07 | 0.026 | ( 0.141) | 0.020 | 0.006 |
| 273 | 22.75 | 0.07 | 0.026 | ( 0.141) | 0.020 | 0.006 |
| 274 | 22.83 | 0.07 | 0.026 | ( 0.141) | 0.020 | 0.006 |
| 275 | 22.92 | 0.07 | 0.026 | ( 0.140) | 0.020 | 0.006 |
| 276 | 23.00 | 0.07 | 0.026 | ( 0.140) | 0.020 | 0.006 |
| 277 | 23.08 | 0.07 | 0.026 | ( 0.140) | 0.020 | 0.006 |
| 278 | 23.17 | 0.07 | 0.026 | ( 0.139) | 0.020 | 0.006 |
| 279 | 23.25 | 0.07 | 0.026 | ( 0.139) | 0.020 | 0.006 |
| 280 | 23.33 | 0.07 | 0.026 | ( 0.139) | 0.020 | 0.006 |
| 281 | 23.42 | 0.07 | 0.026 | ( 0.138) | 0.020 | 0.006 |
| 282 | 23.50 | 0.07 | 0.026 | ( 0.138) | 0.020 | 0.006 |
| 283 | 23.58 | 0.07 | 0.026 | ( 0.138) | 0.020 | 0.006 |
| 284 | 23.67 | 0.07 | 0.026 | ( 0.138) | 0.020 | 0.006 |
| 285 | 23.75 | 0.07 | 0.026 | ( 0.138) | 0.020 | 0.006 |
| 286 | 23.83 | 0.07 | 0.026 | ( 0.137) | 0.020 | 0.006 |
| 287 | 23.92 | 0.07 | 0.026 | ( 0.137) | 0.020 | 0.006 |
| 288 | 24.00 | 0.07 | 0.026 | ( 0.137) | 0.020 | 0.006 |

(Loss Rate Not Used)

Sum = 100.0 Sum = 10.6

Flood volume = Effective rainfall 0.88(In)
times area 20.1(Ac.)/[(In)/(Ft.)] = 1.5(Ac.Ft)
Total soil loss = 2.34(In)
Total soil loss = 3.922(Ac.Ft)
Total rainfall = 3.22(In)
Flood volume = 64537.8 Cubic Feet
Total soil loss = 170860.7 Cubic Feet

--------------------------------------------------------------------

Peak flow rate of this hydrograph = 4.018(CFS)

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

--------------------------------------------------------------------

Hydrograph in 5 Minute intervals ((CFS))

--------------------------------------------------------------------

| Time(h+m) | Volume Ac.Ft | Q(CFS) | 0 | 2.5 | 5.0 | 7.5 | 10.0 |
|---|---|---|---|---|---|---|---|
| 0+ 5 | 0.0001 | 0.02 | Q | \| | \| | \| | \| |
| 0+10 | 0.0007 | 0.08 | Q | \| | \| | \| | \| |
| 0+15 | 0.0013 | 0.10 | Q | \| | \| | \| | \| |
| 0+20 | 0.0022 | 0.12 | Q | \| | \| | \| | \| |
| 0+25 | 0.0032 | 0.15 | Q | \| | \| | \| | \| |
| 0+30 | 0.0044 | 0.17 | Q | \| | \| | \| | \| |
| 0+35 | 0.0056 | 0.18 | Q | \| | \| | \| | \| |
| 0+40 | 0.0069 | 0.18 | Q | \| | \| | \| | \| |
| 0+45 | 0.0081 | 0.18 | Q | \| | \| | \| | \| |
| 0+50 | 0.0095 | 0.20 | Q | \| | \| | \| | \| |
| 0+55 | 0.0110 | 0.23 | Q | \| | \| | \| | \| |
| 1+ 0 | 0.0127 | 0.24 | Q | \| | \| | \| | \| |
| 1+ 5 | 0.0143 | 0.23 | Q | \| | \| | \| | \| |
| 1+10 | 0.0157 | 0.21 | Q | \| | \| | \| | \| |
| 1+15 | 0.0171 | 0.20 | Q | \| | \| | \| | \| |
| 1+20 | 0.0184 | 0.19 | Q | \| | \| | \| | \| |
| 1+25 | 0.0197 | 0.19 | Q | \| | \| | \| | \| |
| 1+30 | 0.0210 | 0.19 | Q | \| | \| | \| | \| |
| 1+35 | 0.0224 | 0.19 | Q | \| | \| | \| | \| |
| 1+40 | 0.0237 | 0.19 | Q | \| | \| | \| | \| |
| 1+45 | 0.0250 | 0.19 | Q | \| | \| | \| | \| |

| | | | |
|---|---|---|---|
| 1+50 | 0.0263 | 0.20 | Q |
| 1+55 | 0.0279 | 0.23 | Q |
| 2+ 0 | 0.0295 | 0.24 | Q |
| 2+ 5 | 0.0312 | 0.24 | Q |
| 2+10 | 0.0329 | 0.25 | Q |
| 2+15 | 0.0346 | 0.25 | Q |
| 2+20 | 0.0363 | 0.25 | Q |
| 2+25 | 0.0380 | 0.25 | Q |
| 2+30 | 0.0398 | 0.25 | Q |
| 2+35 | 0.0416 | 0.26 | Q |
| 2+40 | 0.0436 | 0.29 | Q |
| 2+45 | 0.0456 | 0.30 | Q |
| 2+50 | 0.0477 | 0.31 | Q |
| 2+55 | 0.0499 | 0.31 | Q |
| 3+ 0 | 0.0520 | 0.31 | Q |
| 3+ 5 | 0.0541 | 0.31 | Q |
| 3+10 | 0.0563 | 0.31 | Q |
| 3+15 | 0.0585 | 0.31 | Q |
| 3+20 | 0.0606 | 0.31 | Q |
| 3+25 | 0.0628 | 0.31 | Q |
| 3+30 | 0.0649 | 0.31 | Q |
| 3+35 | 0.0671 | 0.31 | Q |
| 3+40 | 0.0693 | 0.31 | Q |
| 3+45 | 0.0714 | 0.31 | Q |
| 3+50 | 0.0737 | 0.32 | Q |
| 3+55 | 0.0761 | 0.35 | QV |
| 4+ 0 | 0.0786 | 0.36 | QV |
| 4+ 5 | 0.0811 | 0.37 | QV |
| 4+10 | 0.0837 | 0.37 | QV |
| 4+15 | 0.0863 | 0.37 | QV |
| 4+20 | 0.0889 | 0.38 | QV |
| 4+25 | 0.0918 | 0.41 | QV |
| 4+30 | 0.0947 | 0.43 | QV |
| 4+35 | 0.0977 | 0.43 | QV |
| 4+40 | 0.1007 | 0.43 | QV |
| 4+45 | 0.1037 | 0.44 | QV |
| 4+50 | 0.1067 | 0.45 | QV |
| 4+55 | 0.1100 | 0.48 | QV |
| 5+ 0 | 0.1134 | 0.49 | Q V |
| 5+ 5 | 0.1167 | 0.48 | Q V |
| 5+10 | 0.1196 | 0.42 | Q V |
| 5+15 | 0.1223 | 0.40 | Q V |
| 5+20 | 0.1251 | 0.40 | Q V |
| 5+25 | 0.1280 | 0.42 | Q V |
| 5+30 | 0.1310 | 0.43 | Q V |
| 5+35 | 0.1340 | 0.44 | Q V |
| 5+40 | 0.1373 | 0.47 | Q V |
| 5+45 | 0.1406 | 0.49 | Q V |
| 5+50 | 0.1440 | 0.49 | Q V |
| 5+55 | 0.1475 | 0.50 | Q V |
| 6+ 0 | 0.1509 | 0.50 | Q  V |
| 6+ 5 | 0.1544 | 0.51 | Q V |
| 6+10 | 0.1581 | 0.54 | Q V |
| 6+15 | 0.1619 | 0.55 | Q V |
| 6+20 | 0.1658 | 0.56 | Q V |
| 6+25 | 0.1696 | 0.56 | Q V |
| 6+30 | 0.1735 | 0.56 | Q V |
| 6+35 | 0.1774 | 0.57 | Q V |
| 6+40 | 0.1816 | 0.60 | Q V |
| 6+45 | 0.1858 | 0.61 | Q  V |
| 6+50 | 0.1901 | 0.62 | Q  V |
| 6+55 | 0.1944 | 0.62 | Q  V |
| 7+ 0 | 0.1987 | 0.62 | Q  V |

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 7+ 5       0.2030      0.63  | Q  V    |         |         |         |
 7+10       0.2073      0.63  | Q  V    |         |         |         |
 7+15       0.2116      0.63  | Q  V    |         |         |         |
 7+20       0.2160      0.64  | Q  V    |         |         |         |
 7+25       0.2206      0.67  | Q  V    |         |         |         |
 7+30       0.2252      0.68  | Q   V   |         |         |         |
 7+35       0.2300      0.69  | Q   V   |         |         |         |
 7+40       0.2350      0.72  | Q   V   |         |         |         |
 7+45       0.2401      0.74  | Q   V   |         |         |         |
 7+50       0.2453      0.75  |  Q  V   |         |         |         |
 7+55       0.2507      0.79  |  Q  V   |         |         |         |
 8+ 0       0.2562      0.80  |  Q  V   |         |         |         |
 8+ 5       0.2619      0.83  |  Q   V  |         |         |         |
 8+10       0.2680      0.89  |  Q   V  |         |         |         |
 8+15       0.2742      0.91  |  Q   V  |         |         |         |
 8+20       0.2806      0.92  |  Q   V  |         |         |         |
 8+25       0.2870      0.93  |  Q   V  |         |         |         |
 8+30       0.2935      0.93  |  Q   V  |         |         |         |
 8+35       0.3000      0.95  |  Q    V |         |         |         |
 8+40       0.3067      0.98  |  Q    V |         |         |         |
 8+45       0.3135      0.99  |  Q    V |         |         |         |
 8+50       0.3205      1.01  |   Q   V |         |         |         |
 8+55       0.3276      1.04  |   Q   V |         |         |         |
 9+ 0       0.3349      1.05  |   Q    V|         |         |         |
 9+ 5       0.3423      1.08  |   Q    V|         |         |         |
 9+10       0.3501      1.14  |   Q    V|         |         |         |
 9+15       0.3581      1.16  |   Q    V|         |         |         |
 9+20       0.3663      1.18  |   Q    V|         |         |         |
 9+25       0.3747      1.22  |   Q     V         |         |         |
 9+30       0.3832      1.24  |   Q     V         |         |         |
 9+35       0.3918      1.25  |    Q    V         |         |         |
 9+40       0.4007      1.29  |    Q    V         |         |         |
 9+45       0.4096      1.30  |    Q    |V        |         |         |
 9+50       0.4187      1.32  |    Q    |V        |         |         |
 9+55       0.4280      1.35  |    Q    |V        |         |         |
10+ 0       0.4374      1.36  |    Q    |V        |         |         |
10+ 5       0.4464      1.31  |    Q    | V       |         |         |
10+10       0.4540      1.11  |   Q     | V       |         |         |
10+15       0.4611      1.03  |   Q     | V       |         |         |
10+20       0.4680      1.00  |  Q      | V       |         |         |
10+25       0.4747      0.98  |  Q      | V       |         |         |
10+30       0.4813      0.96  |  Q      | V       |         |         |
10+35       0.4882      1.00  |   Q     |  V      |         |         |
10+40       0.4961      1.14  |   Q     |  V      |         |         |
10+45       0.5043      1.19  |   Q     |  V      |         |         |
10+50       0.5127      1.22  |   Q     |  V      |         |         |
10+55       0.5211      1.23  |   Q     |   V     |         |         |
11+ 0       0.5297      1.24  |   Q     |   V     |         |         |
11+ 5       0.5382      1.24  |   Q     |   V     |         |         |
11+10       0.5465      1.21  |   Q     |   V     |         |         |
11+15       0.5548      1.20  |   Q     |   V     |         |         |
11+20       0.5631      1.20  |   Q     |    V    |         |         |
11+25       0.5713      1.20  |   Q     |    V    |         |         |
11+30       0.5796      1.20  |   Q     |    V    |         |         |
11+35       0.5877      1.18  |   Q     |    V    |         |         |
11+40       0.5954      1.12  |   Q     |     V   |         |         |
11+45       0.6029      1.09  |   Q     |     V   |         |         |
11+50       0.6104      1.09  |   Q     |     V   |         |         |
11+55       0.6181      1.12  |   Q     |     V   |         |         |
12+ 0       0.6258      1.12  |   Q     |     V   |         |         |
12+ 5       0.6340      1.19  |   Q     |      V  |         |         |
12+10       0.6437      1.40  |    Q    |      V  |         |         |
12+15       0.6538      1.48  |    Q    |      V  |         |         |
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12+20       0.6644      1.53  |     Q   |      V  |         |         |
12+25       0.6754      1.61  |     Q   |       V |         |         |
12+30       0.6869      1.66  |     Q   |       V |         |         |
12+35       0.6991      1.78  |      Q  |       V |         |         |
12+40       0.7132      2.05  |       Q |        V|         |         |
12+45       0.7282      2.18  |       Q |        V|         |         |
12+50       0.7440      2.29  |        Q|         V         |         |
12+55       0.7609      2.46  |        Q|         V         |         |
13+ 0       0.7785      2.55  |         Q         |V        |         |
13+ 5       0.7978      2.80  |         |Q        |V        |         |
13+10       0.8215      3.45  |         |  Q      | V       |         |
13+15       0.8472      3.73  |         |   Q     | V       |         |
13+20       0.8738      3.86  |         |    Q    |  V      |         |
13+25       0.9011      3.95  |         |    Q    |   V     |         |
13+30       0.9287      4.02  |         |     Q   |    V    |         |
13+35       0.9540      3.67  |         |   Q     |    V    |         |
13+40       0.9709      2.45  |        Q|         |     V   |         |
13+45       0.9845      1.98  |      Q  |         |     V   |         |
13+50       0.9967      1.78  |      Q  |         |     V   |         |
13+55       1.0081      1.66  |     Q   |         |      V  |         |
14+ 0       1.0190      1.58  |     Q   |         |      V  |         |
14+ 5       1.0306      1.68  |     Q   |         |      V  |         |
14+10       1.0451      2.12  |       Q |         |       V |         |
14+15       1.0609      2.29  |        Q|         |       V |         |
14+20       1.0770      2.33  |        Q|         |        V|         |
14+25       1.0927      2.28  |        Q|         |        V|         |
14+30       1.1084      2.28  |        Q|         |        V|         |
14+35       1.1243      2.31  |        Q|         |         V         |
14+40       1.1404      2.33  |        Q|         |         V         |
14+45       1.1566      2.36  |        Q|         |         |V        |
14+50       1.1727      2.34  |        Q|         |         |V        |
14+55       1.1881      2.24  |       Q |         |         | V       |
15+ 0       1.2034      2.21  |       Q |         |         | V       |
15+ 5       1.2183      2.17  |       Q |         |         | V       |
15+10       1.2325      2.06  |       Q |         |         |  V      |
15+15       1.2465      2.03  |       Q |         |         |  V      |
15+20       1.2602      1.98  |      Q  |         |         |   V     |
15+25       1.2730      1.87  |      Q  |         |         |   V     |
15+30       1.2857      1.83  |      Q  |         |         |   V     |
15+35       1.2976      1.73  |     Q   |         |         |    V    |
15+40       1.3075      1.44  |    Q    |         |         |    V    |
15+45       1.3167      1.33  |    Q    |         |         |    V    |
15+50       1.3255      1.27  |    Q    |         |         |    V    |
15+55       1.3340      1.24  |   Q     |         |         |     V   |
16+ 0       1.3424      1.22  |   Q     |         |         |     V   |
16+ 5       1.3498      1.07  |   Q     |         |         |     V   |
16+10       1.3541      0.63  | Q       |         |         |     V   |
16+15       1.3572      0.45  |Q        |         |         |     V   |
16+20       1.3598      0.37  |Q        |         |         |     V   |
16+25       1.3620      0.33  |Q        |         |         |     V   |
16+30       1.3641      0.30  |Q        |         |         |     V   |
16+35       1.3659      0.27  |Q        |         |         |     V   |
16+40       1.3675      0.23  Q         |         |         |     V   |
16+45       1.3689      0.21  Q         |         |         |     V   |
16+50       1.3703      0.20  Q         |         |         |     V   |
16+55       1.3716      0.19  Q         |         |         |      V  |
17+ 0       1.3729      0.19  Q         |         |         |      V  |
17+ 5       1.3744      0.21  Q         |         |         |      V  |
17+10       1.3762      0.27  |Q        |         |         |      V  |
17+15       1.3782      0.29  |Q        |         |         |      V  |
17+20       1.3802      0.30  |Q        |         |         |      V  |
17+25       1.3823      0.30  |Q        |         |         |      V  |
17+30       1.3845      0.31  |Q        |         |         |      V  |
```

```
 17+35         1.3866        0.31   |Q          |          |          |       V   |
 17+40         1.3887        0.31   |Q          |          |          |       V   |
 17+45         1.3909        0.31   |Q          |          |          |       V   |
 17+50         1.3930        0.30   |Q          |          |          |       V   |
 17+55         1.3949        0.28   |Q          |          |          |       V   |
 18+ 0         1.3967        0.26   |Q          |          |          |       V   |
 18+ 5         1.3985        0.26   |Q          |          |          |       V   |
 18+10         1.4003        0.26   |Q          |          |          |       V   |
 18+15         1.4020        0.25   |Q          |          |          |       V   |
 18+20         1.4038        0.25   |Q          |          |          |       V   |
 18+25         1.4055        0.25   |Q          |          |          |       V   |
 18+30         1.4072        0.25   |Q          |          |          |       V   |
 18+35         1.4089        0.24   Q           |          |          |        V  |
 18+40         1.4103        0.21   Q           |          |          |        V  |
 18+45         1.4117        0.20   Q           |          |          |        V  |
 18+50         1.4130        0.19   Q           |          |          |        V  |
 18+55         1.4141        0.15   Q           |          |          |        V  |
 19+ 0         1.4151        0.14   Q           |          |          |        V  |
 19+ 5         1.4161        0.14   Q           |          |          |        V  |
 19+10         1.4172        0.17   Q           |          |          |        V  |
 19+15         1.4185        0.18   Q           |          |          |        V  |
 19+20         1.4198        0.19   Q           |          |          |        V  |
 19+25         1.4213        0.22   Q           |          |          |        V  |
 19+30         1.4229        0.24   Q           |          |          |        V  |
 19+35         1.4245        0.23   Q           |          |          |        V  |
 19+40         1.4260        0.21   Q           |          |          |        V  |
 19+45         1.4273        0.20   Q           |          |          |        V  |
 19+50         1.4286        0.18   Q           |          |          |        V  |
 19+55         1.4297        0.15   Q           |          |          |        V  |
 20+ 0         1.4306        0.14   Q           |          |          |        V  |
 20+ 5         1.4316        0.14   Q           |          |          |        V  |
 20+10         1.4328        0.17   Q           |          |          |        V  |
 20+15         1.4340        0.18   Q           |          |          |        V  |
 20+20         1.4353        0.18   Q           |          |          |        V  |
 20+25         1.4366        0.18   Q           |          |          |        V  |
 20+30         1.4378        0.19   Q           |          |          |        V  |
 20+35         1.4391        0.19   Q           |          |          |        V  |
 20+40         1.4404        0.19   Q           |          |          |        V  |
 20+45         1.4417        0.19   Q           |          |          |        V  |
 20+50         1.4429        0.18   Q           |          |          |        V  |
 20+55         1.4440        0.15   Q           |          |          |        V  |
 21+ 0         1.4449        0.14   Q           |          |          |         V|
 21+ 5         1.4459        0.14   Q           |          |          |         V|
 21+10         1.4471        0.17   Q           |          |          |         V|
 21+15         1.4483        0.18   Q           |          |          |         V|
 21+20         1.4495        0.17   Q           |          |          |         V|
 21+25         1.4505        0.15   Q           |          |          |         V|
 21+30         1.4514        0.14   Q           |          |          |         V|
 21+35         1.4524        0.14   Q           |          |          |         V|
 21+40         1.4536        0.17   Q           |          |          |         V|
 21+45         1.4548        0.18   Q           |          |          |         V|
 21+50         1.4560        0.17   Q           |          |          |         V|
 21+55         1.4570        0.15   Q           |          |          |         V|
 22+ 0         1.4579        0.14   Q           |          |          |         V|
 22+ 5         1.4589        0.14   Q           |          |          |         V|
 22+10         1.4600        0.17   Q           |          |          |         V|
 22+15         1.4613        0.18   Q           |          |          |         V|
 22+20         1.4625        0.17   Q           |          |          |         V|
 22+25         1.4635        0.15   Q           |          |          |         V|
 22+30         1.4644        0.14   Q           |          |          |         V|
 22+35         1.4653        0.13   Q           |          |          |         V|
 22+40         1.4662        0.13   Q           |          |          |         V|
 22+45         1.4671        0.13   Q           |          |          |         V|
```

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    22+50        1.4680       0.13  Q          |         |         |      V|
    22+55        1.4688       0.13  Q          |         |         |      V|
    23+ 0        1.4697       0.13  Q          |         |         |      V|
    23+ 5        1.4706       0.13  Q          |         |         |      V|
    23+10        1.4714       0.13  Q          |         |         |      V|
    23+15        1.4723       0.13  Q          |         |         |      V|
    23+20        1.4732       0.13  Q          |         |         |      V|
    23+25        1.4740       0.13  Q          |         |         |      V|
    23+30        1.4749       0.13  Q          |         |         |      V|
    23+35        1.4757       0.13  Q          |         |         |      V|
    23+40        1.4766       0.13  Q          |         |         |      V|
    23+45        1.4775       0.13  Q          |         |         |      V|
    23+50        1.4783       0.13  Q          |         |         |      V|
    23+55        1.4792       0.13  Q          |         |         |      V|
    24+ 0        1.4801       0.13  Q          |         |         |      V|
    24+ 5        1.4808       0.11  Q          |         |         |      V|
    24+10        1.4811       0.05  Q          |         |         |      V|
    24+15        1.4813       0.03  Q          |         |         |      V|
    24+20        1.4814       0.02  Q          |         |         |      V|
    24+25        1.4815       0.01  Q          |         |         |      V|
    24+30        1.4815       0.01  Q          |         |         |      V|
    24+35        1.4816       0.00  Q          |         |         |      V|
    24+40        1.4816       0.00  Q          |         |         |      V|
    24+45        1.4816       0.00  Q          |         |         |      V|
-----------------------------------------------------------------------
```

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


Study date 10/30/20 File: SWCRP12.out

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------------------------------------------------------------------------

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

Program License Serial Number 6232

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

English Units used in output format

------------------------------------------------------------------------
SWC Ramona & Perris
Proposed Condition

------------------------------------------------------------------------
Drainage Area = 20.11(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.11(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1669.00(Ft.)
Length along longest watercourse measured to centroid = 1035.00(Ft.)
Length along longest watercourse = 0.316 Mi.
Length along longest watercourse measured to centroid = 0.196 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 12.6543 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.077 Hr.
Lag time = 4.63 Min.
25% of lag time = 1.16 Min.
40% of lag time = 1.85 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 0.47 | 9.37 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 1.35 | 27.15 |

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 0.466(In)
Area Averaged 100-Year Rainfall = 1.350(In)

Point rain (area averaged) = 0.466(In)
Areal adjustment factor = 99.98 %
Adjusted average point rain = 0.466(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 61.00 | 0.900 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-1 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 61.0 | 41.0 | 0.660 | 0.900 | 0.125 | 1.000 | 0.125 |
| | | | | | Sum (F) = | 0.125 |

Area averaged mean soil loss (F) (In/Hr) = 0.125
Minimum soil loss rate ((In/Hr)) = 0.063
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.090

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Slope of intensity-duration curve for a 1 hour storm =0.5000

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

---

Unit Hydrograph Data

| Unit time period (hrs) | | Time % of lag | Distribution Graph % | Unit Hydrograph (CFS) |
|---|---|---|---|---|
| 1 | 0.083 | 107.878 | 21.601 | 4.378 |
| 2 | 0.167 | 215.756 | 48.792 | 9.889 |
| 3 | 0.250 | 323.634 | 14.560 | 2.951 |
| 4 | 0.333 | 431.512 | 6.653 | 1.348 |
| 5 | 0.417 | 539.389 | 3.696 | 0.749 |
| 6 | 0.500 | 647.267 | 2.334 | 0.473 |
| 7 | 0.583 | 755.145 | 1.376 | 0.279 |
| 8 | 0.667 | 863.023 | 0.988 | 0.200 |
| | | | Sum = 100.000 | Sum= 20.267 |

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The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

| Unit | Times (Hr.) | Pattern Percent | Storm Rain (In/Hr) | Loss rate(In./Hr) Max | Loss rate(In./Hr) Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 4.20 | 0.235 | ( 0.125) | 0.021 | 0.214 |
| 2 | 0.17 | 4.30 | 0.240 | ( 0.125) | 0.022 | 0.219 |
| 3 | 0.25 | 5.00 | 0.280 | ( 0.125) | 0.025 | 0.254 |
| 4 | 0.33 | 5.00 | 0.280 | ( 0.125) | 0.025 | 0.254 |
| 5 | 0.42 | 5.80 | 0.324 | ( 0.125) | 0.029 | 0.295 |
| 6 | 0.50 | 6.50 | 0.363 | ( 0.125) | 0.033 | 0.331 |
| 7 | 0.58 | 7.40 | 0.414 | ( 0.125) | 0.037 | 0.376 |
| 8 | 0.67 | 8.60 | 0.481 | ( 0.125) | 0.043 | 0.438 |
| 9 | 0.75 | 12.30 | 0.688 | ( 0.125) | 0.062 | 0.626 |
| 10 | 0.83 | 29.10 | 1.627 | 0.125 | ( 0.146) | 1.502 |
| 11 | 0.92 | 6.80 | 0.380 | ( 0.125) | 0.034 | 0.346 |
| 12 | 1.00 | 5.00 | 0.280 | ( 0.125) | 0.025 | 0.254 |

(Loss Rate Not Used)
Sum = 100.0 Sum = 5.1
Flood volume = Effective rainfall 0.43(In)

```
         times area      20.1(Ac.)/[(In)/(Ft.)] =       0.7(Ac.Ft)
        Total soil loss =      0.04(In)
        Total soil loss =     0.067(Ac.Ft)
        Total rainfall =      0.47(In)
        Flood volume =       31078.1 Cubic Feet
        Total soil loss =        2933.3 Cubic Feet
        --------------------------------------------------------------------
         Peak flow rate of this hydrograph =     19.381(CFS)
        --------------------------------------------------------------------
        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                            1 - H O U R   S T O R M
                       R u n o f f     H y d r o g r a p h
        --------------------------------------------------------------------
                    Hydrograph in   5   Minute intervals ((CFS))

        --------------------------------------------------------------------
  Time(h+m) Volume Ac.Ft   Q(CFS)  0         5.0      10.0      15.0      20.0
  ---------------------------------------------------------------------
    0+ 5       0.0064      0.94  VQ        |         |         |         |
    0+10       0.0276      3.07  |V    Q   |         |         |         |
    0+15       0.0545      3.91  |  V   Q  |         |         |         |
    0+20       0.0860      4.57  |   V    Q|         |         |         |
    0+25       0.1205      5.02  |     V   Q         |         |         |
    0+30       0.1600      5.73  |       V |Q        |         |         |
    0+35       0.2047      6.49  |         |VQ       |         |         |
    0+40       0.2558      7.43  |         |   Q     |         |         |
    0+45       0.3184      9.08  |         |      VQ |         |         |
    0+50       0.4222     15.08  |         |         |  V      Q         |
    0+55       0.5557     19.38  |         |         |         |V       Q |
    1+ 0       0.6278     10.47  |         |         Q         |    V    |
    1+ 5       0.6720      6.41  |         | Q       |         |      V  |
    1+10       0.6915      2.84  |    Q    |         |         |       V |
    1+15       0.7024      1.58  |  Q      |         |         |        V|
    1+20       0.7086      0.90  |Q        |         |         |        V|
    1+25       0.7121      0.52  |Q        |         |         |        V|
    1+30       0.7131      0.14  Q         |         |         |        V|
    1+35       0.7135      0.05  Q         |         |         |        V|
----------------------------------------------------------------------



 0.21  Q         |         |         |        V|
    1+40       0.3098      0.03  Q         |         |         |        V|
    1+45       0.3099      0.01  Q         |         |         |         V
----------------------------------------------------------------------
```

SWCRP32

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


Study date 10/30/20 File: SWCRP32.out

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------------------------------------------------------------------------

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

Program License Serial Number 6232

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

English Units used in output format

------------------------------------------------------------------------
SWC Ramona & Perris
Proposed Condition

------------------------------------------------------------------------
Drainage Area =      20.11(Ac.)  =      0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      20.11(Ac.)  =
0.031 Sq. Mi.
Length along longest watercourse =    1669.00(Ft.)
Length along longest watercourse measured to centroid =    1035.00(Ft.)
Length along longest watercourse =      0.316 Mi.
Length along longest watercourse measured to centroid =      0.196 Mi.
Difference in elevation =       4.00(Ft.)
Slope along watercourse =     12.6543 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.077 Hr.
Lag time =     4.63 Min.
25% of lag time =     1.16 Min.
40% of lag time =     1.85 Min.
Unit time =     5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 0.82 | 16.47 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 2.04 | 41.02 |

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    0.819(In)
Area Averaged 100-Year Rainfall =    2.040(In)

Point rain (area averaged) = 0.819(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 0.819(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 61.00 | 0.900 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-1 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 61.0 | 41.0 | 0.660 | 0.900 | 0.125 | 1.000 | 0.125 |
| | | | | | Sum (F) = | 0.125 |

Area averaged mean soil loss (F) (In/Hr) = 0.125
Minimum soil loss rate ((In/Hr)) = 0.063
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.090

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

---

Unit Hydrograph Data

| Unit time period | (hrs) | Time % of lag | Distribution Graph % | Unit Hydrograph (CFS) |
|---|---|---|---|---|
| 1 | 0.083 | 107.878 | 21.601 | 4.378 |
| 2 | 0.167 | 215.756 | 48.792 | 9.889 |
| 3 | 0.250 | 323.634 | 14.560 | 2.951 |
| 4 | 0.333 | 431.512 | 6.653 | 1.348 |
| 5 | 0.417 | 539.389 | 3.696 | 0.749 |
| 6 | 0.500 | 647.267 | 2.334 | 0.473 |
| 7 | 0.583 | 755.145 | 1.376 | 0.279 |
| 8 | 0.667 | 863.023 | 0.988 | 0.200 |
| | | | Sum = 100.000 | Sum= 20.267 |

---

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 | 1.30 | 0.128 | ( 0.125) | 0.011 | 0.116 |
| 2 | 0.17 | 1.30 | 0.128 | ( 0.125) | 0.011 | 0.116 |
| 3 | 0.25 | 1.10 | 0.108 | ( 0.125) | 0.010 | 0.098 |
| 4 | 0.33 | 1.50 | 0.147 | ( 0.125) | 0.013 | 0.134 |
| 5 | 0.42 | 1.50 | 0.147 | ( 0.125) | 0.013 | 0.134 |
| 6 | 0.50 | 1.80 | 0.177 | ( 0.125) | 0.016 | 0.161 |
| 7 | 0.58 | 1.50 | 0.147 | ( 0.125) | 0.013 | 0.134 |
| 8 | 0.67 | 1.80 | 0.177 | ( 0.125) | 0.016 | 0.161 |
| 9 | 0.75 | 1.80 | 0.177 | ( 0.125) | 0.016 | 0.161 |
| 10 | 0.83 | 1.50 | 0.147 | ( 0.125) | 0.013 | 0.134 |
| 11 | 0.92 | 1.60 | 0.157 | ( 0.125) | 0.014 | 0.143 |
| 12 | 1.00 | 1.80 | 0.177 | ( 0.125) | 0.016 | 0.161 |
| 13 | 1.08 | 2.20 | 0.216 | ( 0.125) | 0.019 | 0.197 |
| 14 | 1.17 | 2.20 | 0.216 | ( 0.125) | 0.019 | 0.197 |
| 15 | 1.25 | 2.20 | 0.216 | ( 0.125) | 0.019 | 0.197 |
| 16 | 1.33 | 2.00 | 0.197 | ( 0.125) | 0.018 | 0.179 |
| 17 | 1.42 | 2.60 | 0.256 | ( 0.125) | 0.023 | 0.233 |

```
18   1.50     2.70      0.265       (  0.125)      0.024        0.241
19   1.58     2.40      0.236       (  0.125)      0.021        0.215
20   1.67     2.70      0.265       (  0.125)      0.024        0.241
21   1.75     3.30      0.324       (  0.125)      0.029        0.295
22   1.83     3.10      0.305       (  0.125)      0.027        0.277
23   1.92     2.90      0.285       (  0.125)      0.026        0.259
24   2.00     3.00      0.295       (  0.125)      0.027        0.268
25   2.08     3.10      0.305       (  0.125)      0.027        0.277
26   2.17     4.20      0.413       (  0.125)      0.037        0.376
27   2.25     5.00      0.491       (  0.125)      0.044        0.447
28   2.33     3.50      0.344       (  0.125)      0.031        0.313
29   2.42     6.80      0.668       (  0.125)      0.060        0.608
30   2.50     7.30      0.717       (  0.125)      0.065        0.653
31   2.58     8.20      0.806       (  0.125)      0.073        0.733
32   2.67     5.90      0.580       (  0.125)      0.052        0.528
33   2.75     2.00      0.197       (  0.125)      0.018        0.179
34   2.83     1.80      0.177       (  0.125)      0.016        0.161
35   2.92     1.80      0.177       (  0.125)      0.016        0.161
36   3.00     0.60      0.059       (  0.125)      0.005        0.054
               (Loss Rate Not Used)
   Sum =     100.0                                     Sum =     8.9
      Flood volume = Effective rainfall      0.75(In)
       times area      20.1(Ac.)/[(In)/(Ft.)] =       1.2(Ac.Ft)
      Total soil loss =      0.07(In)
      Total soil loss =     0.124(Ac.Ft)
      Total rainfall =      0.82(In)
      Flood volume =       54400.9 Cubic Feet
      Total soil loss =        5380.3 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     12.921(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          3 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0         5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0035      0.51  VQ        |         |         |         |
  0+10       0.0149      1.66  V  Q      |         |         |         |
  0+15       0.0282      1.92  V  Q      |         |         |         |
  0+20       0.0424      2.06  |V  Q     |         |         |         |
  0+25       0.0592      2.45  |V  Q     |         |         |         |
  0+30       0.0779      2.70  | V  Q    |         |         |         |
  0+35       0.0980      2.92  |  V Q    |         |         |         |
  0+40       0.1179      2.89  |  V Q    |         |         |         |
  0+45       0.1394      3.13  |   V Q   |         |         |         |
  0+50       0.1606      3.08  |    VQ   |         |         |         |
  0+55       0.1805      2.89  |    Q    |         |         |         |
  1+ 0       0.2011      2.99  |    QV   |         |         |         |
  1+ 5       0.2240      3.32  |     QV  |         |         |         |
  1+10       0.2496      3.73  |      Q  |         |         |         |
  1+15       0.2762      3.85  |      QV |         |         |         |
  1+20       0.3026      3.83  |      Q V|         |         |         |
  1+25       0.3296      3.92  |      Q  V         |         |         |
  1+30       0.3604      4.47  |       Q |V        |         |         |
  1+35       0.3919      4.58  |        Q| V       |         |         |
  1+40       0.4231      4.53  |        Q|  V      |         |         |
  1+45       0.4575      4.99  |        Q|   V     |         |         |
  1+50       0.4955      5.52  |         |Q   V    |         |         |
  1+55       0.5331      5.45  |         Q      V  |         |         |
```

```
    2+ 0       0.5699      5.35  |         Q       V |         |         |
    2+ 5       0.6075      5.45  |         Q        V|         |         |
    2+10       0.6487      5.99  |         |Q        V         |         |
    2+15       0.6991      7.31  |         |   Q     | V       |         |
    2+20       0.7524      7.74  |         |    Q    |   V     |         |
    2+25       0.8078      8.05  |         |     Q   |    V    |         |
    2+30       0.8832     10.94  |         |         |Q      V |         |
    2+35       0.9695     12.53  |         |         |    Q    |V        |
    2+40       1.0585     12.92  |         |         |    Q    |  V      |
    2+45       1.1263      9.85  |         |        Q|         |     V   |
    2+50       1.1675      5.98  |         |Q        |         |      V  |
    2+55       1.1994      4.63  |        Q|         |         |       V |
    3+ 0       1.2241      3.59  |      Q  |         |         |        V|
    3+ 5       1.2375      1.94  |  Q      |         |         |        V|
    3+10       1.2435      0.87  |Q        |         |         |        V|
    3+15       1.2464      0.42  Q         |         |         |        V|
    3+20       1.2478      0.20  Q         |         |         |        V|
    3+25       1.2485      0.10  Q         |         |         |        V|
    3+30       1.2488      0.05  Q         |         |         |        V|
    3+35       1.2489      0.01  Q         |         |         |        V|
-----------------------------------------------------------------------


 0.02  Q         |         |         |        V|
    3+40       0.3772      0.01  Q         |         |         |        V|
    3+45       0.3772      0.00  Q         |         |         |        V|
-----------------------------------------------------------------------
```

SWCRP62

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


Study date 10/30/20 File: SWCRP62.out

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------------------------------------------------------------------------

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

Program License Serial Number 6232

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

English Units used in output format

--------------------------------------------------------------------
SWC Ramona & Perris
Proposed Condition

--------------------------------------------------------------------
Drainage Area = 20.11(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.11(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1669.00(Ft.)
Length along longest watercourse measured to centroid = 1035.00(Ft.)
Length along longest watercourse = 0.316 Mi.
Length along longest watercourse measured to centroid = 0.196 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 12.6543 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.077 Hr.
Lag time = 4.63 Min.
25% of lag time = 1.16 Min.
40% of lag time = 1.85 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 1.14 | 22.93 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 3.69 | 74.21 |

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 1.140(In)
Area Averaged 100-Year Rainfall = 3.690(In)

Point rain (area averaged) = 1.140(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.140(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 61.00 | 0.900 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-1 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 61.0 | 41.0 | 0.660 | 0.900 | 0.125 | 1.000 | 0.125 |
| | | | | | Sum (F) = | 0.125 |

Area averaged mean soil loss (F) (In/Hr) = 0.125
Minimum soil loss rate ((In/Hr)) = 0.063
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.090

---

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 | 107.878 | 21.601 | 4.378 |
| 2 | 0.167 | 215.756 | 48.792 | 9.889 |
| 3 | 0.250 | 323.634 | 14.560 | 2.951 |
| 4 | 0.333 | 431.512 | 6.653 | 1.348 |
| 5 | 0.417 | 539.389 | 3.696 | 0.749 |
| 6 | 0.500 | 647.267 | 2.334 | 0.473 |
| 7 | 0.583 | 755.145 | 1.376 | 0.279 |
| 8 | 0.667 | 863.023 | 0.988 | 0.200 |
| | | | Sum = 100.000 | Sum= 20.267 |

---

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 | Loss rate(In./Hr) Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 0.50 | 0.068 | ( 0.125) | 0.006 | 0.062 |
| 2 | 0.17 | 0.60 | 0.082 | ( 0.125) | 0.007 | 0.075 |
| 3 | 0.25 | 0.60 | 0.082 | ( 0.125) | 0.007 | 0.075 |
| 4 | 0.33 | 0.60 | 0.082 | ( 0.125) | 0.007 | 0.075 |
| 5 | 0.42 | 0.60 | 0.082 | ( 0.125) | 0.007 | 0.075 |
| 6 | 0.50 | 0.70 | 0.096 | ( 0.125) | 0.009 | 0.087 |
| 7 | 0.58 | 0.70 | 0.096 | ( 0.125) | 0.009 | 0.087 |
| 8 | 0.67 | 0.70 | 0.096 | ( 0.125) | 0.009 | 0.087 |
| 9 | 0.75 | 0.70 | 0.096 | ( 0.125) | 0.009 | 0.087 |
| 10 | 0.83 | 0.70 | 0.096 | ( 0.125) | 0.009 | 0.087 |
| 11 | 0.92 | 0.70 | 0.096 | ( 0.125) | 0.009 | 0.087 |
| 12 | 1.00 | 0.80 | 0.109 | ( 0.125) | 0.010 | 0.100 |
| 13 | 1.08 | 0.80 | 0.109 | ( 0.125) | 0.010 | 0.100 |
| 14 | 1.17 | 0.80 | 0.109 | ( 0.125) | 0.010 | 0.100 |
| 15 | 1.25 | 0.80 | 0.109 | ( 0.125) | 0.010 | 0.100 |
| 16 | 1.33 | 0.80 | 0.109 | ( 0.125) | 0.010 | 0.100 |
| 17 | 1.42 | 0.80 | 0.109 | ( 0.125) | 0.010 | 0.100 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 18 | 1.50 | 0.80 | 0.109 | ( 0.125) | 0.010 | 0.100 |
| 19 | 1.58 | 0.80 | 0.109 | ( 0.125) | 0.010 | 0.100 |
| 20 | 1.67 | 0.80 | 0.109 | ( 0.125) | 0.010 | 0.100 |
| 21 | 1.75 | 0.80 | 0.109 | ( 0.125) | 0.010 | 0.100 |
| 22 | 1.83 | 0.80 | 0.109 | ( 0.125) | 0.010 | 0.100 |
| 23 | 1.92 | 0.80 | 0.109 | ( 0.125) | 0.010 | 0.100 |
| 24 | 2.00 | 0.90 | 0.123 | ( 0.125) | 0.011 | 0.112 |
| 25 | 2.08 | 0.80 | 0.109 | ( 0.125) | 0.010 | 0.100 |
| 26 | 2.17 | 0.90 | 0.123 | ( 0.125) | 0.011 | 0.112 |
| 27 | 2.25 | 0.90 | 0.123 | ( 0.125) | 0.011 | 0.112 |
| 28 | 2.33 | 0.90 | 0.123 | ( 0.125) | 0.011 | 0.112 |
| 29 | 2.42 | 0.90 | 0.123 | ( 0.125) | 0.011 | 0.112 |
| 30 | 2.50 | 0.90 | 0.123 | ( 0.125) | 0.011 | 0.112 |
| 31 | 2.58 | 0.90 | 0.123 | ( 0.125) | 0.011 | 0.112 |
| 32 | 2.67 | 0.90 | 0.123 | ( 0.125) | 0.011 | 0.112 |
| 33 | 2.75 | 1.00 | 0.137 | ( 0.125) | 0.012 | 0.124 |
| 34 | 2.83 | 1.00 | 0.137 | ( 0.125) | 0.012 | 0.124 |
| 35 | 2.92 | 1.00 | 0.137 | ( 0.125) | 0.012 | 0.124 |
| 36 | 3.00 | 1.00 | 0.137 | ( 0.125) | 0.012 | 0.124 |
| 37 | 3.08 | 1.00 | 0.137 | ( 0.125) | 0.012 | 0.124 |
| 38 | 3.17 | 1.10 | 0.150 | ( 0.125) | 0.014 | 0.137 |
| 39 | 3.25 | 1.10 | 0.150 | ( 0.125) | 0.014 | 0.137 |
| 40 | 3.33 | 1.10 | 0.150 | ( 0.125) | 0.014 | 0.137 |
| 41 | 3.42 | 1.20 | 0.164 | ( 0.125) | 0.015 | 0.149 |
| 42 | 3.50 | 1.30 | 0.178 | ( 0.125) | 0.016 | 0.162 |
| 43 | 3.58 | 1.40 | 0.192 | ( 0.125) | 0.017 | 0.174 |
| 44 | 3.67 | 1.40 | 0.192 | ( 0.125) | 0.017 | 0.174 |
| 45 | 3.75 | 1.50 | 0.205 | ( 0.125) | 0.018 | 0.187 |
| 46 | 3.83 | 1.50 | 0.205 | ( 0.125) | 0.018 | 0.187 |
| 47 | 3.92 | 1.60 | 0.219 | ( 0.125) | 0.020 | 0.199 |
| 48 | 4.00 | 1.60 | 0.219 | ( 0.125) | 0.020 | 0.199 |
| 49 | 4.08 | 1.70 | 0.233 | ( 0.125) | 0.021 | 0.212 |
| 50 | 4.17 | 1.80 | 0.246 | ( 0.125) | 0.022 | 0.224 |
| 51 | 4.25 | 1.90 | 0.260 | ( 0.125) | 0.023 | 0.237 |
| 52 | 4.33 | 2.00 | 0.274 | ( 0.125) | 0.025 | 0.249 |
| 53 | 4.42 | 2.10 | 0.287 | ( 0.125) | 0.026 | 0.261 |
| 54 | 4.50 | 2.10 | 0.287 | ( 0.125) | 0.026 | 0.261 |
| 55 | 4.58 | 2.20 | 0.301 | ( 0.125) | 0.027 | 0.274 |
| 56 | 4.67 | 2.30 | 0.315 | ( 0.125) | 0.028 | 0.286 |
| 57 | 4.75 | 2.40 | 0.328 | ( 0.125) | 0.030 | 0.299 |
| 58 | 4.83 | 2.40 | 0.328 | ( 0.125) | 0.030 | 0.299 |
| 59 | 4.92 | 2.50 | 0.342 | ( 0.125) | 0.031 | 0.311 |
| 60 | 5.00 | 2.60 | 0.356 | ( 0.125) | 0.032 | 0.324 |
| 61 | 5.08 | 3.10 | 0.424 | ( 0.125) | 0.038 | 0.386 |
| 62 | 5.17 | 3.60 | 0.492 | ( 0.125) | 0.044 | 0.448 |
| 63 | 5.25 | 3.90 | 0.533 | ( 0.125) | 0.048 | 0.485 |
| 64 | 5.33 | 4.20 | 0.575 | ( 0.125) | 0.052 | 0.523 |
| 65 | 5.42 | 4.70 | 0.643 | ( 0.125) | 0.058 | 0.585 |
| 66 | 5.50 | 5.60 | 0.766 | ( 0.125) | 0.069 | 0.697 |
| 67 | 5.58 | 1.90 | 0.260 | ( 0.125) | 0.023 | 0.237 |
| 68 | 5.67 | 0.90 | 0.123 | ( 0.125) | 0.011 | 0.112 |
| 69 | 5.75 | 0.60 | 0.082 | ( 0.125) | 0.007 | 0.075 |
| 70 | 5.83 | 0.50 | 0.068 | ( 0.125) | 0.006 | 0.062 |
| 71 | 5.92 | 0.30 | 0.041 | ( 0.125) | 0.004 | 0.037 |
| 72 | 6.00 | 0.20 | 0.027 | ( 0.125) | 0.002 | 0.025 |
| | | | (Loss Rate Not Used) | | | |
| | Sum = | 100.0 | | | Sum = | 12.4 |

Flood volume = Effective rainfall 1.04(In)
times area 20.1(Ac.)/[(In)/(Ft.)] = 1.7(Ac.Ft)
Total soil loss = 0.10(In)
Total soil loss = 0.172(Ac.Ft)
Total rainfall = 1.14(In)
Flood volume = 75724.2 Cubic Feet

```
      Total soil loss =        7489.2 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     11.711(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          6 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0019       0.27  Q         |         |         |         |
  0+10       0.0084       0.94  VQ        |         |         |         |
  0+15       0.0170       1.25  V Q       |         |         |         |
  0+20       0.0264       1.37  V Q       |         |         |         |
  0+25       0.0363       1.43  V Q       |         |         |         |
  0+30       0.0468       1.53  |V Q      |         |         |         |
  0+35       0.0583       1.67  |V Q      |         |         |         |
  0+40       0.0702       1.73  |V Q      |         |         |         |
  0+45       0.0823       1.75  |V Q      |         |         |         |
  0+50       0.0943       1.76  | VQ      |         |         |         |
  0+55       0.1065       1.76  | VQ      |         |         |         |
  1+ 0       0.1190       1.82  | VQ      |         |         |         |
  1+ 5       0.1324       1.94  |  Q      |         |         |         |
  1+10       0.1460       1.98  |  Q      |         |         |         |
  1+15       0.1598       2.00  |  Q      |         |         |         |
  1+20       0.1736       2.01  |  VQ     |         |         |         |
  1+25       0.1875       2.01  |   Q     |         |         |         |
  1+30       0.2014       2.02  |   Q     |         |         |         |
  1+35       0.2153       2.02  |   Q     |         |         |         |
  1+40       0.2292       2.02  |   QV    |         |         |         |
  1+45       0.2431       2.02  |   QV    |         |         |         |
  1+50       0.2570       2.02  |   QV    |         |         |         |
  1+55       0.2709       2.02  |   Q V   |         |         |         |
  2+ 0       0.2852       2.07  |   Q V   |         |         |         |
  2+ 5       0.2999       2.14  |   Q V   |         |         |         |
  2+10       0.3145       2.11  |   Q  V  |         |         |         |
  2+15       0.3297       2.21  |   Q  V  |         |         |         |
  2+20       0.3452       2.24  |   Q  V  |         |         |         |
  2+25       0.3607       2.26  |   Q   V |         |         |         |
  2+30       0.3763       2.26  |   Q   V |         |         |         |
  2+35       0.3919       2.27  |   Q    V|         |         |         |
  2+40       0.4076       2.27  |   Q    V|         |         |         |
  2+45       0.4236       2.33  |   Q    V|         |         |         |
  2+50       0.4404       2.45  |   Q     V         |         |         |
  2+55       0.4576       2.49  |   Q     V         |         |         |
  3+ 0       0.4748       2.50  |    Q    V         |         |         |
  3+ 5       0.4921       2.51  |    Q    |V        |         |         |
  3+10       0.5098       2.57  |    Q    |V        |         |         |
  3+15       0.5284       2.70  |    Q    | V       |         |         |
  3+20       0.5473       2.74  |    Q    | V       |         |         |
  3+25       0.5666       2.81  |    Q    |  V      |         |         |
  3+30       0.5873       3.00  |    Q    |  V      |         |         |
  3+35       0.6094       3.22  |     Q   |   V     |         |         |
  3+40       0.6328       3.40  |     Q   |   V     |         |         |
  3+45       0.6571       3.52  |      Q  |    V    |         |         |
  3+50       0.6823       3.67  |      Q  |    V    |         |         |
  3+55       0.7084       3.78  |      Q  |     V   |         |         |
  4+ 0       0.7355       3.93  |      Q  |     V   |         |         |
  4+ 5       0.7633       4.04  |       Q |      V  |         |         |
  4+10       0.7925       4.24  |       Q |       V |         |         |
```

```
    4+15       0.8233     4.47  |       Q |       V |         |         |
    4+20       0.8558     4.71  |        Q|        V|         |         |
    4+25       0.8899     4.95  |        Q|         V         |         |
    4+30       0.9254     5.15  |         Q         |V        |         |
    4+35       0.9617     5.28  |         Q         | V       |         |
    4+40       0.9995     5.49  |         Q         | V       |         |
    4+45       1.0390     5.73  |         |Q        |  V      |         |
    4+50       1.0797     5.92  |         |Q        |   V     |         |
    4+55       1.1213     6.04  |         | Q       |    V    |         |
    5+ 0       1.1643     6.25  |         | Q       |     V   |         |
    5+ 5       1.2105     6.70  |         |  Q      |      V  |         |
    5+10       1.2632     7.66  |         |    Q    |        V|         |
    5+15       1.3228     8.65  |         |      Q  |         V         |
    5+20       1.3880     9.47  |         |       Q |         |V        |
    5+25       1.4594    10.36  |         |         Q         |  V      |
    5+30       1.5401    11.71  |         |         |  Q      |    V    |
    5+35       1.6166    11.11  |         |         | Q       |      V  |
    5+40       1.6614     6.50  |         |  Q      |         |       V |
    5+45       1.6888     3.99  |      Q  |         |         |       V |
    5+50       1.7074     2.70  |    Q    |         |         |        V|
    5+55       1.7207     1.93  |  Q      |         |         |        V|
    6+ 0       1.7295     1.27  | Q       |         |         |        V|
    6+ 5       1.7347     0.76  |Q        |         |         |        V|
    6+10       1.7366     0.28  Q         |         |         |        V|
    6+15       1.7375     0.13  Q         |         |         |        V|
    6+20       1.7380     0.07  Q         |         |         |        V|
    6+25       1.7383     0.03  Q         |         |         |        V|
    6+30       1.7384     0.01  Q         |         |         |        V|
    6+35       1.7384     0.00  Q         |         |         |         V
-----------------------------------------------------------------------


 0.01  Q         |         |         |        V|
    6+40       0.4848     0.00  Q         |         |         |        V|
    6+45       0.4849     0.00  Q         |         |         |         V
-----------------------------------------------------------------------
```

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


Study date 10/30/20 File: SWCRP242.out

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

Program License Serial Number 6232

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

English Units used in output format

---------------------------------------------------------------------
SWC Ramona & Perris
Proposed Condition

--------------------------------------------------------------------
Drainage Area = 20.11(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.11(Ac.) =
0.031 Sq. Mi.
Length along longest watercourse = 1669.00(Ft.)
Length along longest watercourse measured to centroid = 1035.00(Ft.)
Length along longest watercourse = 0.316 Mi.
Length along longest watercourse measured to centroid = 0.196 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 12.6543 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.077 Hr.
Lag time = 4.63 Min.
25% of lag time = 1.16 Min.
40% of lag time = 1.85 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] |
|---|---|---|
| 20.11 | 1.97 | 39.62 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 5.02 | 100.95 |

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 1.970(In)
Area Averaged 100-Year Rainfall = 5.020(In)

Point rain (area averaged) = 1.970(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.970(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 61.00 | 0.900 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-1 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 61.0 | 41.0 | 0.660 | 0.900 | 0.125 | 1.000 | 0.125 |
| | | | | | Sum (F) = | 0.125 |

Area averaged mean soil loss (F) (In/Hr) = 0.125
Minimum soil loss rate ((In/Hr)) = 0.063
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.090

---

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 | 107.878 | 21.601 | 4.378 |
| 2 | 0.167 | 215.756 | 48.792 | 9.889 |
| 3 | 0.250 | 323.634 | 14.560 | 2.951 |
| 4 | 0.333 | 431.512 | 6.653 | 1.348 |
| 5 | 0.417 | 539.389 | 3.696 | 0.749 |
| 6 | 0.500 | 647.267 | 2.334 | 0.473 |
| 7 | 0.583 | 755.145 | 1.376 | 0.279 |
| 8 | 0.667 | 863.023 | 0.988 | 0.200 |
| | | | Sum = 100.000 | Sum= 20.267 |

---

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 | Loss rate(In./Hr) Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 0.07 | 0.016 | ( 0.222) | 0.001 | 0.014 |
| 2 | 0.17 | 0.07 | 0.016 | ( 0.222) | 0.001 | 0.014 |
| 3 | 0.25 | 0.07 | 0.016 | ( 0.221) | 0.001 | 0.014 |
| 4 | 0.33 | 0.10 | 0.024 | ( 0.220) | 0.002 | 0.022 |
| 5 | 0.42 | 0.10 | 0.024 | ( 0.219) | 0.002 | 0.022 |
| 6 | 0.50 | 0.10 | 0.024 | ( 0.218) | 0.002 | 0.022 |
| 7 | 0.58 | 0.10 | 0.024 | ( 0.217) | 0.002 | 0.022 |
| 8 | 0.67 | 0.10 | 0.024 | ( 0.216) | 0.002 | 0.022 |
| 9 | 0.75 | 0.10 | 0.024 | ( 0.216) | 0.002 | 0.022 |
| 10 | 0.83 | 0.13 | 0.032 | ( 0.215) | 0.003 | 0.029 |
| 11 | 0.92 | 0.13 | 0.032 | ( 0.214) | 0.003 | 0.029 |
| 12 | 1.00 | 0.13 | 0.032 | ( 0.213) | 0.003 | 0.029 |
| 13 | 1.08 | 0.10 | 0.024 | ( 0.212) | 0.002 | 0.022 |
| 14 | 1.17 | 0.10 | 0.024 | ( 0.211) | 0.002 | 0.022 |
| 15 | 1.25 | 0.10 | 0.024 | ( 0.210) | 0.002 | 0.022 |
| 16 | 1.33 | 0.10 | 0.024 | ( 0.210) | 0.002 | 0.022 |
| 17 | 1.42 | 0.10 | 0.024 | ( 0.209) | 0.002 | 0.022 |

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| 18 | 1.50 | 0.10 | 0.024 | ( 0.208) | 0.002 | 0.022 |
| 19 | 1.58 | 0.10 | 0.024 | ( 0.207) | 0.002 | 0.022 |
| 20 | 1.67 | 0.10 | 0.024 | ( 0.206) | 0.002 | 0.022 |
| 21 | 1.75 | 0.10 | 0.024 | ( 0.205) | 0.002 | 0.022 |
| 22 | 1.83 | 0.13 | 0.032 | ( 0.205) | 0.003 | 0.029 |
| 23 | 1.92 | 0.13 | 0.032 | ( 0.204) | 0.003 | 0.029 |
| 24 | 2.00 | 0.13 | 0.032 | ( 0.203) | 0.003 | 0.029 |
| 25 | 2.08 | 0.13 | 0.032 | ( 0.202) | 0.003 | 0.029 |
| 26 | 2.17 | 0.13 | 0.032 | ( 0.201) | 0.003 | 0.029 |
| 27 | 2.25 | 0.13 | 0.032 | ( 0.201) | 0.003 | 0.029 |
| 28 | 2.33 | 0.13 | 0.032 | ( 0.200) | 0.003 | 0.029 |
| 29 | 2.42 | 0.13 | 0.032 | ( 0.199) | 0.003 | 0.029 |
| 30 | 2.50 | 0.13 | 0.032 | ( 0.198) | 0.003 | 0.029 |
| 31 | 2.58 | 0.17 | 0.039 | ( 0.197) | 0.004 | 0.036 |
| 32 | 2.67 | 0.17 | 0.039 | ( 0.196) | 0.004 | 0.036 |
| 33 | 2.75 | 0.17 | 0.039 | ( 0.196) | 0.004 | 0.036 |
| 34 | 2.83 | 0.17 | 0.039 | ( 0.195) | 0.004 | 0.036 |
| 35 | 2.92 | 0.17 | 0.039 | ( 0.194) | 0.004 | 0.036 |
| 36 | 3.00 | 0.17 | 0.039 | ( 0.193) | 0.004 | 0.036 |
| 37 | 3.08 | 0.17 | 0.039 | ( 0.192) | 0.004 | 0.036 |
| 38 | 3.17 | 0.17 | 0.039 | ( 0.192) | 0.004 | 0.036 |
| 39 | 3.25 | 0.17 | 0.039 | ( 0.191) | 0.004 | 0.036 |
| 40 | 3.33 | 0.17 | 0.039 | ( 0.190) | 0.004 | 0.036 |
| 41 | 3.42 | 0.17 | 0.039 | ( 0.189) | 0.004 | 0.036 |
| 42 | 3.50 | 0.17 | 0.039 | ( 0.188) | 0.004 | 0.036 |
| 43 | 3.58 | 0.17 | 0.039 | ( 0.188) | 0.004 | 0.036 |
| 44 | 3.67 | 0.17 | 0.039 | ( 0.187) | 0.004 | 0.036 |
| 45 | 3.75 | 0.17 | 0.039 | ( 0.186) | 0.004 | 0.036 |
| 46 | 3.83 | 0.20 | 0.047 | ( 0.185) | 0.004 | 0.043 |
| 47 | 3.92 | 0.20 | 0.047 | ( 0.185) | 0.004 | 0.043 |
| 48 | 4.00 | 0.20 | 0.047 | ( 0.184) | 0.004 | 0.043 |
| 49 | 4.08 | 0.20 | 0.047 | ( 0.183) | 0.004 | 0.043 |
| 50 | 4.17 | 0.20 | 0.047 | ( 0.182) | 0.004 | 0.043 |
| 51 | 4.25 | 0.20 | 0.047 | ( 0.181) | 0.004 | 0.043 |
| 52 | 4.33 | 0.23 | 0.055 | ( 0.181) | 0.005 | 0.050 |
| 53 | 4.42 | 0.23 | 0.055 | ( 0.180) | 0.005 | 0.050 |
| 54 | 4.50 | 0.23 | 0.055 | ( 0.179) | 0.005 | 0.050 |
| 55 | 4.58 | 0.23 | 0.055 | ( 0.178) | 0.005 | 0.050 |
| 56 | 4.67 | 0.23 | 0.055 | ( 0.178) | 0.005 | 0.050 |
| 57 | 4.75 | 0.23 | 0.055 | ( 0.177) | 0.005 | 0.050 |
| 58 | 4.83 | 0.27 | 0.063 | ( 0.176) | 0.006 | 0.057 |
| 59 | 4.92 | 0.27 | 0.063 | ( 0.175) | 0.006 | 0.057 |
| 60 | 5.00 | 0.27 | 0.063 | ( 0.175) | 0.006 | 0.057 |
| 61 | 5.08 | 0.20 | 0.047 | ( 0.174) | 0.004 | 0.043 |
| 62 | 5.17 | 0.20 | 0.047 | ( 0.173) | 0.004 | 0.043 |
| 63 | 5.25 | 0.20 | 0.047 | ( 0.172) | 0.004 | 0.043 |
| 64 | 5.33 | 0.23 | 0.055 | ( 0.172) | 0.005 | 0.050 |
| 65 | 5.42 | 0.23 | 0.055 | ( 0.171) | 0.005 | 0.050 |
| 66 | 5.50 | 0.23 | 0.055 | ( 0.170) | 0.005 | 0.050 |
| 67 | 5.58 | 0.27 | 0.063 | ( 0.169) | 0.006 | 0.057 |
| 68 | 5.67 | 0.27 | 0.063 | ( 0.169) | 0.006 | 0.057 |
| 69 | 5.75 | 0.27 | 0.063 | ( 0.168) | 0.006 | 0.057 |
| 70 | 5.83 | 0.27 | 0.063 | ( 0.167) | 0.006 | 0.057 |
| 71 | 5.92 | 0.27 | 0.063 | ( 0.166) | 0.006 | 0.057 |
| 72 | 6.00 | 0.27 | 0.063 | ( 0.166) | 0.006 | 0.057 |
| 73 | 6.08 | 0.30 | 0.071 | ( 0.165) | 0.006 | 0.065 |
| 74 | 6.17 | 0.30 | 0.071 | ( 0.164) | 0.006 | 0.065 |
| 75 | 6.25 | 0.30 | 0.071 | ( 0.163) | 0.006 | 0.065 |
| 76 | 6.33 | 0.30 | 0.071 | ( 0.163) | 0.006 | 0.065 |
| 77 | 6.42 | 0.30 | 0.071 | ( 0.162) | 0.006 | 0.065 |
| 78 | 6.50 | 0.30 | 0.071 | ( 0.161) | 0.006 | 0.065 |
| 79 | 6.58 | 0.33 | 0.079 | ( 0.160) | 0.007 | 0.072 |
| 80 | 6.67 | 0.33 | 0.079 | ( 0.160) | 0.007 | 0.072 |

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| 81 | 6.75 | 0.33 | 0.079 | ( 0.159) | 0.007 | 0.072 |
| 82 | 6.83 | 0.33 | 0.079 | ( 0.158) | 0.007 | 0.072 |
| 83 | 6.92 | 0.33 | 0.079 | ( 0.158) | 0.007 | 0.072 |
| 84 | 7.00 | 0.33 | 0.079 | ( 0.157) | 0.007 | 0.072 |
| 85 | 7.08 | 0.33 | 0.079 | ( 0.156) | 0.007 | 0.072 |
| 86 | 7.17 | 0.33 | 0.079 | ( 0.155) | 0.007 | 0.072 |
| 87 | 7.25 | 0.33 | 0.079 | ( 0.155) | 0.007 | 0.072 |
| 88 | 7.33 | 0.37 | 0.087 | ( 0.154) | 0.008 | 0.079 |
| 89 | 7.42 | 0.37 | 0.087 | ( 0.153) | 0.008 | 0.079 |
| 90 | 7.50 | 0.37 | 0.087 | ( 0.153) | 0.008 | 0.079 |
| 91 | 7.58 | 0.40 | 0.095 | ( 0.152) | 0.009 | 0.086 |
| 92 | 7.67 | 0.40 | 0.095 | ( 0.151) | 0.009 | 0.086 |
| 93 | 7.75 | 0.40 | 0.095 | ( 0.151) | 0.009 | 0.086 |
| 94 | 7.83 | 0.43 | 0.102 | ( 0.150) | 0.009 | 0.093 |
| 95 | 7.92 | 0.43 | 0.102 | ( 0.149) | 0.009 | 0.093 |
| 96 | 8.00 | 0.43 | 0.102 | ( 0.148) | 0.009 | 0.093 |
| 97 | 8.08 | 0.50 | 0.118 | ( 0.148) | 0.011 | 0.108 |
| 98 | 8.17 | 0.50 | 0.118 | ( 0.147) | 0.011 | 0.108 |
| 99 | 8.25 | 0.50 | 0.118 | ( 0.146) | 0.011 | 0.108 |
| 100 | 8.33 | 0.50 | 0.118 | ( 0.146) | 0.011 | 0.108 |
| 101 | 8.42 | 0.50 | 0.118 | ( 0.145) | 0.011 | 0.108 |
| 102 | 8.50 | 0.50 | 0.118 | ( 0.144) | 0.011 | 0.108 |
| 103 | 8.58 | 0.53 | 0.126 | ( 0.144) | 0.011 | 0.115 |
| 104 | 8.67 | 0.53 | 0.126 | ( 0.143) | 0.011 | 0.115 |
| 105 | 8.75 | 0.53 | 0.126 | ( 0.142) | 0.011 | 0.115 |
| 106 | 8.83 | 0.57 | 0.134 | ( 0.142) | 0.012 | 0.122 |
| 107 | 8.92 | 0.57 | 0.134 | ( 0.141) | 0.012 | 0.122 |
| 108 | 9.00 | 0.57 | 0.134 | ( 0.140) | 0.012 | 0.122 |
| 109 | 9.08 | 0.63 | 0.150 | ( 0.140) | 0.013 | 0.136 |
| 110 | 9.17 | 0.63 | 0.150 | ( 0.139) | 0.013 | 0.136 |
| 111 | 9.25 | 0.63 | 0.150 | ( 0.138) | 0.013 | 0.136 |
| 112 | 9.33 | 0.67 | 0.158 | ( 0.138) | 0.014 | 0.143 |
| 113 | 9.42 | 0.67 | 0.158 | ( 0.137) | 0.014 | 0.143 |
| 114 | 9.50 | 0.67 | 0.158 | ( 0.136) | 0.014 | 0.143 |
| 115 | 9.58 | 0.70 | 0.165 | ( 0.136) | 0.015 | 0.151 |
| 116 | 9.67 | 0.70 | 0.165 | ( 0.135) | 0.015 | 0.151 |
| 117 | 9.75 | 0.70 | 0.165 | ( 0.134) | 0.015 | 0.151 |
| 118 | 9.83 | 0.73 | 0.173 | ( 0.134) | 0.016 | 0.158 |
| 119 | 9.92 | 0.73 | 0.173 | ( 0.133) | 0.016 | 0.158 |
| 120 | 10.00 | 0.73 | 0.173 | ( 0.132) | 0.016 | 0.158 |
| 121 | 10.08 | 0.50 | 0.118 | ( 0.132) | 0.011 | 0.108 |
| 122 | 10.17 | 0.50 | 0.118 | ( 0.131) | 0.011 | 0.108 |
| 123 | 10.25 | 0.50 | 0.118 | ( 0.131) | 0.011 | 0.108 |
| 124 | 10.33 | 0.50 | 0.118 | ( 0.130) | 0.011 | 0.108 |
| 125 | 10.42 | 0.50 | 0.118 | ( 0.129) | 0.011 | 0.108 |
| 126 | 10.50 | 0.50 | 0.118 | ( 0.129) | 0.011 | 0.108 |
| 127 | 10.58 | 0.67 | 0.158 | ( 0.128) | 0.014 | 0.143 |
| 128 | 10.67 | 0.67 | 0.158 | ( 0.127) | 0.014 | 0.143 |
| 129 | 10.75 | 0.67 | 0.158 | ( 0.127) | 0.014 | 0.143 |
| 130 | 10.83 | 0.67 | 0.158 | ( 0.126) | 0.014 | 0.143 |
| 131 | 10.92 | 0.67 | 0.158 | ( 0.126) | 0.014 | 0.143 |
| 132 | 11.00 | 0.67 | 0.158 | ( 0.125) | 0.014 | 0.143 |
| 133 | 11.08 | 0.63 | 0.150 | ( 0.124) | 0.013 | 0.136 |
| 134 | 11.17 | 0.63 | 0.150 | ( 0.124) | 0.013 | 0.136 |
| 135 | 11.25 | 0.63 | 0.150 | ( 0.123) | 0.013 | 0.136 |
| 136 | 11.33 | 0.63 | 0.150 | ( 0.122) | 0.013 | 0.136 |
| 137 | 11.42 | 0.63 | 0.150 | ( 0.122) | 0.013 | 0.136 |
| 138 | 11.50 | 0.63 | 0.150 | ( 0.121) | 0.013 | 0.136 |
| 139 | 11.58 | 0.57 | 0.134 | ( 0.121) | 0.012 | 0.122 |
| 140 | 11.67 | 0.57 | 0.134 | ( 0.120) | 0.012 | 0.122 |
| 141 | 11.75 | 0.57 | 0.134 | ( 0.119) | 0.012 | 0.122 |
| 142 | 11.83 | 0.60 | 0.142 | ( 0.119) | 0.013 | 0.129 |
| 143 | 11.92 | 0.60 | 0.142 | ( 0.118) | 0.013 | 0.129 |

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| 144 | 12.00 | 0.60 | 0.142 | ( 0.118) | 0.013 | 0.129 |
| 145 | 12.08 | 0.83 | 0.197 | ( 0.117) | 0.018 | 0.179 |
| 146 | 12.17 | 0.83 | 0.197 | ( 0.117) | 0.018 | 0.179 |
| 147 | 12.25 | 0.83 | 0.197 | ( 0.116) | 0.018 | 0.179 |
| 148 | 12.33 | 0.87 | 0.205 | ( 0.115) | 0.018 | 0.186 |
| 149 | 12.42 | 0.87 | 0.205 | ( 0.115) | 0.018 | 0.186 |
| 150 | 12.50 | 0.87 | 0.205 | ( 0.114) | 0.018 | 0.186 |
| 151 | 12.58 | 0.93 | 0.221 | ( 0.114) | 0.020 | 0.201 |
| 152 | 12.67 | 0.93 | 0.221 | ( 0.113) | 0.020 | 0.201 |
| 153 | 12.75 | 0.93 | 0.221 | ( 0.112) | 0.020 | 0.201 |
| 154 | 12.83 | 0.97 | 0.229 | ( 0.112) | 0.021 | 0.208 |
| 155 | 12.92 | 0.97 | 0.229 | ( 0.111) | 0.021 | 0.208 |
| 156 | 13.00 | 0.97 | 0.229 | ( 0.111) | 0.021 | 0.208 |
| 157 | 13.08 | 1.13 | 0.268 | ( 0.110) | 0.024 | 0.244 |
| 158 | 13.17 | 1.13 | 0.268 | ( 0.110) | 0.024 | 0.244 |
| 159 | 13.25 | 1.13 | 0.268 | ( 0.109) | 0.024 | 0.244 |
| 160 | 13.33 | 1.13 | 0.268 | ( 0.109) | 0.024 | 0.244 |
| 161 | 13.42 | 1.13 | 0.268 | ( 0.108) | 0.024 | 0.244 |
| 162 | 13.50 | 1.13 | 0.268 | ( 0.107) | 0.024 | 0.244 |
| 163 | 13.58 | 0.77 | 0.181 | ( 0.107) | 0.016 | 0.165 |
| 164 | 13.67 | 0.77 | 0.181 | ( 0.106) | 0.016 | 0.165 |
| 165 | 13.75 | 0.77 | 0.181 | ( 0.106) | 0.016 | 0.165 |
| 166 | 13.83 | 0.77 | 0.181 | ( 0.105) | 0.016 | 0.165 |
| 167 | 13.92 | 0.77 | 0.181 | ( 0.105) | 0.016 | 0.165 |
| 168 | 14.00 | 0.77 | 0.181 | ( 0.104) | 0.016 | 0.165 |
| 169 | 14.08 | 0.90 | 0.213 | ( 0.104) | 0.019 | 0.194 |
| 170 | 14.17 | 0.90 | 0.213 | ( 0.103) | 0.019 | 0.194 |
| 171 | 14.25 | 0.90 | 0.213 | ( 0.103) | 0.019 | 0.194 |
| 172 | 14.33 | 0.87 | 0.205 | ( 0.102) | 0.018 | 0.186 |
| 173 | 14.42 | 0.87 | 0.205 | ( 0.102) | 0.018 | 0.186 |
| 174 | 14.50 | 0.87 | 0.205 | ( 0.101) | 0.018 | 0.186 |
| 175 | 14.58 | 0.87 | 0.205 | ( 0.101) | 0.018 | 0.186 |
| 176 | 14.67 | 0.87 | 0.205 | ( 0.100) | 0.018 | 0.186 |
| 177 | 14.75 | 0.87 | 0.205 | ( 0.099) | 0.018 | 0.186 |
| 178 | 14.83 | 0.83 | 0.197 | ( 0.099) | 0.018 | 0.179 |
| 179 | 14.92 | 0.83 | 0.197 | ( 0.098) | 0.018 | 0.179 |
| 180 | 15.00 | 0.83 | 0.197 | ( 0.098) | 0.018 | 0.179 |
| 181 | 15.08 | 0.80 | 0.189 | ( 0.097) | 0.017 | 0.172 |
| 182 | 15.17 | 0.80 | 0.189 | ( 0.097) | 0.017 | 0.172 |
| 183 | 15.25 | 0.80 | 0.189 | ( 0.096) | 0.017 | 0.172 |
| 184 | 15.33 | 0.77 | 0.181 | ( 0.096) | 0.016 | 0.165 |
| 185 | 15.42 | 0.77 | 0.181 | ( 0.095) | 0.016 | 0.165 |
| 186 | 15.50 | 0.77 | 0.181 | ( 0.095) | 0.016 | 0.165 |
| 187 | 15.58 | 0.63 | 0.150 | ( 0.095) | 0.013 | 0.136 |
| 188 | 15.67 | 0.63 | 0.150 | ( 0.094) | 0.013 | 0.136 |
| 189 | 15.75 | 0.63 | 0.150 | ( 0.094) | 0.013 | 0.136 |
| 190 | 15.83 | 0.63 | 0.150 | ( 0.093) | 0.013 | 0.136 |
| 191 | 15.92 | 0.63 | 0.150 | ( 0.093) | 0.013 | 0.136 |
| 192 | 16.00 | 0.63 | 0.150 | ( 0.092) | 0.013 | 0.136 |
| 193 | 16.08 | 0.13 | 0.032 | ( 0.092) | 0.003 | 0.029 |
| 194 | 16.17 | 0.13 | 0.032 | ( 0.091) | 0.003 | 0.029 |
| 195 | 16.25 | 0.13 | 0.032 | ( 0.091) | 0.003 | 0.029 |
| 196 | 16.33 | 0.13 | 0.032 | ( 0.090) | 0.003 | 0.029 |
| 197 | 16.42 | 0.13 | 0.032 | ( 0.090) | 0.003 | 0.029 |
| 198 | 16.50 | 0.13 | 0.032 | ( 0.089) | 0.003 | 0.029 |
| 199 | 16.58 | 0.10 | 0.024 | ( 0.089) | 0.002 | 0.022 |
| 200 | 16.67 | 0.10 | 0.024 | ( 0.088) | 0.002 | 0.022 |
| 201 | 16.75 | 0.10 | 0.024 | ( 0.088) | 0.002 | 0.022 |
| 202 | 16.83 | 0.10 | 0.024 | ( 0.088) | 0.002 | 0.022 |
| 203 | 16.92 | 0.10 | 0.024 | ( 0.087) | 0.002 | 0.022 |
| 204 | 17.00 | 0.10 | 0.024 | ( 0.087) | 0.002 | 0.022 |
| 205 | 17.08 | 0.17 | 0.039 | ( 0.086) | 0.004 | 0.036 |
| 206 | 17.17 | 0.17 | 0.039 | ( 0.086) | 0.004 | 0.036 |

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| 207 | 17.25 | 0.17 | 0.039 | ( 0.085) | 0.004 | 0.036 |
| 208 | 17.33 | 0.17 | 0.039 | ( 0.085) | 0.004 | 0.036 |
| 209 | 17.42 | 0.17 | 0.039 | ( 0.084) | 0.004 | 0.036 |
| 210 | 17.50 | 0.17 | 0.039 | ( 0.084) | 0.004 | 0.036 |
| 211 | 17.58 | 0.17 | 0.039 | ( 0.084) | 0.004 | 0.036 |
| 212 | 17.67 | 0.17 | 0.039 | ( 0.083) | 0.004 | 0.036 |
| 213 | 17.75 | 0.17 | 0.039 | ( 0.083) | 0.004 | 0.036 |
| 214 | 17.83 | 0.13 | 0.032 | ( 0.082) | 0.003 | 0.029 |
| 215 | 17.92 | 0.13 | 0.032 | ( 0.082) | 0.003 | 0.029 |
| 216 | 18.00 | 0.13 | 0.032 | ( 0.082) | 0.003 | 0.029 |
| 217 | 18.08 | 0.13 | 0.032 | ( 0.081) | 0.003 | 0.029 |
| 218 | 18.17 | 0.13 | 0.032 | ( 0.081) | 0.003 | 0.029 |
| 219 | 18.25 | 0.13 | 0.032 | ( 0.080) | 0.003 | 0.029 |
| 220 | 18.33 | 0.13 | 0.032 | ( 0.080) | 0.003 | 0.029 |
| 221 | 18.42 | 0.13 | 0.032 | ( 0.080) | 0.003 | 0.029 |
| 222 | 18.50 | 0.13 | 0.032 | ( 0.079) | 0.003 | 0.029 |
| 223 | 18.58 | 0.10 | 0.024 | ( 0.079) | 0.002 | 0.022 |
| 224 | 18.67 | 0.10 | 0.024 | ( 0.078) | 0.002 | 0.022 |
| 225 | 18.75 | 0.10 | 0.024 | ( 0.078) | 0.002 | 0.022 |
| 226 | 18.83 | 0.07 | 0.016 | ( 0.078) | 0.001 | 0.014 |
| 227 | 18.92 | 0.07 | 0.016 | ( 0.077) | 0.001 | 0.014 |
| 228 | 19.00 | 0.07 | 0.016 | ( 0.077) | 0.001 | 0.014 |
| 229 | 19.08 | 0.10 | 0.024 | ( 0.077) | 0.002 | 0.022 |
| 230 | 19.17 | 0.10 | 0.024 | ( 0.076) | 0.002 | 0.022 |
| 231 | 19.25 | 0.10 | 0.024 | ( 0.076) | 0.002 | 0.022 |
| 232 | 19.33 | 0.13 | 0.032 | ( 0.076) | 0.003 | 0.029 |
| 233 | 19.42 | 0.13 | 0.032 | ( 0.075) | 0.003 | 0.029 |
| 234 | 19.50 | 0.13 | 0.032 | ( 0.075) | 0.003 | 0.029 |
| 235 | 19.58 | 0.10 | 0.024 | ( 0.075) | 0.002 | 0.022 |
| 236 | 19.67 | 0.10 | 0.024 | ( 0.074) | 0.002 | 0.022 |
| 237 | 19.75 | 0.10 | 0.024 | ( 0.074) | 0.002 | 0.022 |
| 238 | 19.83 | 0.07 | 0.016 | ( 0.073) | 0.001 | 0.014 |
| 239 | 19.92 | 0.07 | 0.016 | ( 0.073) | 0.001 | 0.014 |
| 240 | 20.00 | 0.07 | 0.016 | ( 0.073) | 0.001 | 0.014 |
| 241 | 20.08 | 0.10 | 0.024 | ( 0.073) | 0.002 | 0.022 |
| 242 | 20.17 | 0.10 | 0.024 | ( 0.072) | 0.002 | 0.022 |
| 243 | 20.25 | 0.10 | 0.024 | ( 0.072) | 0.002 | 0.022 |
| 244 | 20.33 | 0.10 | 0.024 | ( 0.072) | 0.002 | 0.022 |
| 245 | 20.42 | 0.10 | 0.024 | ( 0.071) | 0.002 | 0.022 |
| 246 | 20.50 | 0.10 | 0.024 | ( 0.071) | 0.002 | 0.022 |
| 247 | 20.58 | 0.10 | 0.024 | ( 0.071) | 0.002 | 0.022 |
| 248 | 20.67 | 0.10 | 0.024 | ( 0.070) | 0.002 | 0.022 |
| 249 | 20.75 | 0.10 | 0.024 | ( 0.070) | 0.002 | 0.022 |
| 250 | 20.83 | 0.07 | 0.016 | ( 0.070) | 0.001 | 0.014 |
| 251 | 20.92 | 0.07 | 0.016 | ( 0.070) | 0.001 | 0.014 |
| 252 | 21.00 | 0.07 | 0.016 | ( 0.069) | 0.001 | 0.014 |
| 253 | 21.08 | 0.10 | 0.024 | ( 0.069) | 0.002 | 0.022 |
| 254 | 21.17 | 0.10 | 0.024 | ( 0.069) | 0.002 | 0.022 |
| 255 | 21.25 | 0.10 | 0.024 | ( 0.068) | 0.002 | 0.022 |
| 256 | 21.33 | 0.07 | 0.016 | ( 0.068) | 0.001 | 0.014 |
| 257 | 21.42 | 0.07 | 0.016 | ( 0.068) | 0.001 | 0.014 |
| 258 | 21.50 | 0.07 | 0.016 | ( 0.068) | 0.001 | 0.014 |
| 259 | 21.58 | 0.10 | 0.024 | ( 0.067) | 0.002 | 0.022 |
| 260 | 21.67 | 0.10 | 0.024 | ( 0.067) | 0.002 | 0.022 |
| 261 | 21.75 | 0.10 | 0.024 | ( 0.067) | 0.002 | 0.022 |
| 262 | 21.83 | 0.07 | 0.016 | ( 0.067) | 0.001 | 0.014 |
| 263 | 21.92 | 0.07 | 0.016 | ( 0.066) | 0.001 | 0.014 |
| 264 | 22.00 | 0.07 | 0.016 | ( 0.066) | 0.001 | 0.014 |
| 265 | 22.08 | 0.10 | 0.024 | ( 0.066) | 0.002 | 0.022 |
| 266 | 22.17 | 0.10 | 0.024 | ( 0.066) | 0.002 | 0.022 |
| 267 | 22.25 | 0.10 | 0.024 | ( 0.066) | 0.002 | 0.022 |
| 268 | 22.33 | 0.07 | 0.016 | ( 0.065) | 0.001 | 0.014 |
| 269 | 22.42 | 0.07 | 0.016 | ( 0.065) | 0.001 | 0.014 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 270 | 22.50 | 0.07 | 0.016 | ( 0.065) | 0.001 | 0.014 |
| 271 | 22.58 | 0.07 | 0.016 | ( 0.065) | 0.001 | 0.014 |
| 272 | 22.67 | 0.07 | 0.016 | ( 0.065) | 0.001 | 0.014 |
| 273 | 22.75 | 0.07 | 0.016 | ( 0.064) | 0.001 | 0.014 |
| 274 | 22.83 | 0.07 | 0.016 | ( 0.064) | 0.001 | 0.014 |
| 275 | 22.92 | 0.07 | 0.016 | ( 0.064) | 0.001 | 0.014 |
| 276 | 23.00 | 0.07 | 0.016 | ( 0.064) | 0.001 | 0.014 |
| 277 | 23.08 | 0.07 | 0.016 | ( 0.064) | 0.001 | 0.014 |
| 278 | 23.17 | 0.07 | 0.016 | ( 0.064) | 0.001 | 0.014 |
| 279 | 23.25 | 0.07 | 0.016 | ( 0.064) | 0.001 | 0.014 |
| 280 | 23.33 | 0.07 | 0.016 | ( 0.063) | 0.001 | 0.014 |
| 281 | 23.42 | 0.07 | 0.016 | ( 0.063) | 0.001 | 0.014 |
| 282 | 23.50 | 0.07 | 0.016 | ( 0.063) | 0.001 | 0.014 |
| 283 | 23.58 | 0.07 | 0.016 | ( 0.063) | 0.001 | 0.014 |
| 284 | 23.67 | 0.07 | 0.016 | ( 0.063) | 0.001 | 0.014 |
| 285 | 23.75 | 0.07 | 0.016 | ( 0.063) | 0.001 | 0.014 |
| 286 | 23.83 | 0.07 | 0.016 | ( 0.063) | 0.001 | 0.014 |
| 287 | 23.92 | 0.07 | 0.016 | ( 0.063) | 0.001 | 0.014 |
| 288 | 24.00 | 0.07 | 0.016 | ( 0.063) | 0.001 | 0.014 |

(Loss Rate Not Used)

Sum = 100.0 Sum = 21.5

Flood volume = Effective rainfall 1.79(In)
times area 20.1(Ac.)/[(In)/(Ft.)] = 3.0(Ac.Ft)
Total soil loss = 0.18(In)
Total soil loss = 0.297(Ac.Ft)
Total rainfall = 1.97(In)
Flood volume = 130860.7 Cubic Feet
Total soil loss = 12942.3 Cubic Feet

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Peak flow rate of this hydrograph = 4.926(CFS)

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

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Hydrograph in 5 Minute intervals ((CFS))

| Time(h+m) | Volume Ac.Ft | Q(CFS) | 0 | 2.5 | 5.0 | 7.5 | 10.0 |
|---|---|---|---|---|---|---|---|
| 0+ 5 | 0.0004 | 0.06 | Q | \| | \| | \| | \| |
| 0+10 | 0.0018 | 0.20 | Q | \| | \| | \| | \| |
| 0+15 | 0.0035 | 0.25 | Q | \| | \| | \| | \| |
| 0+20 | 0.0056 | 0.30 | VQ | \| | \| | \| | \| |
| 0+25 | 0.0082 | 0.38 | VQ | \| | \| | \| | \| |
| 0+30 | 0.0110 | 0.41 | VQ | \| | \| | \| | \| |
| 0+35 | 0.0139 | 0.42 | VQ | \| | \| | \| | \| |
| 0+40 | 0.0169 | 0.43 | VQ | \| | \| | \| | \| |
| 0+45 | 0.0199 | 0.43 | VQ | \| | \| | \| | \| |
| 0+50 | 0.0231 | 0.47 | VQ | \| | \| | \| | \| |
| 0+55 | 0.0268 | 0.54 | V Q | \| | \| | \| | \| |
| 1+ 0 | 0.0306 | 0.56 | V Q | \| | \| | \| | \| |
| 1+ 5 | 0.0343 | 0.54 | V Q | \| | \| | \| | \| |
| 1+10 | 0.0376 | 0.47 | VQ | \| | \| | \| | \| |
| 1+15 | 0.0407 | 0.45 | VQ | \| | \| | \| | \| |
| 1+20 | 0.0438 | 0.45 | VQ | \| | \| | \| | \| |
| 1+25 | 0.0468 | 0.44 | VQ | \| | \| | \| | \| |
| 1+30 | 0.0499 | 0.44 | VQ | \| | \| | \| | \| |
| 1+35 | 0.0529 | 0.44 | VQ | \| | \| | \| | \| |
| 1+40 | 0.0559 | 0.44 | VQ | \| | \| | \| | \| |
| 1+45 | 0.0589 | 0.44 | VQ | \| | \| | \| | \| |
| 1+50 | 0.0621 | 0.47 | VQ | \| | \| | \| | \| |
| 1+55 | 0.0658 | 0.54 | V Q | \| | \| | \| | \| |

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2+ 0       0.0697      0.56  V Q       |         |         |         |
2+ 5       0.0736      0.57  V Q       |         |         |         |
2+10       0.0776      0.57  |VQ       |         |         |         |
2+15       0.0815      0.58  |VQ       |         |         |         |
2+20       0.0855      0.58  |VQ       |         |         |         |
2+25       0.0895      0.58  |VQ       |         |         |         |
2+30       0.0935      0.58  |VQ       |         |         |         |
2+35       0.0978      0.61  |VQ       |         |         |         |
2+40       0.1025      0.68  |VQ       |         |         |         |
2+45       0.1073      0.71  |VQ       |         |         |         |
2+50       0.1123      0.71  |VQ       |         |         |         |
2+55       0.1172      0.72  |VQ       |         |         |         |
3+ 0       0.1222      0.72  |VQ       |         |         |         |
3+ 5       0.1272      0.73  |VQ       |         |         |         |
3+10       0.1322      0.73  |VQ       |         |         |         |
3+15       0.1372      0.73  |VQ       |         |         |         |
3+20       0.1422      0.73  |VQ       |         |         |         |
3+25       0.1472      0.73  |VQ       |         |         |         |
3+30       0.1522      0.73  | Q       |         |         |         |
3+35       0.1572      0.73  | Q       |         |         |         |
3+40       0.1622      0.73  | Q       |         |         |         |
3+45       0.1673      0.73  | Q       |         |         |         |
3+50       0.1725      0.76  | VQ      |         |         |         |
3+55       0.1782      0.83  | VQ      |         |         |         |
4+ 0       0.1840      0.85  | VQ      |         |         |         |
4+ 5       0.1900      0.86  | VQ      |         |         |         |
4+10       0.1959      0.87  | VQ      |         |         |         |
4+15       0.2019      0.87  | VQ      |         |         |         |
4+20       0.2081      0.90  | VQ      |         |         |         |
4+25       0.2148      0.97  | VQ      |         |         |         |
4+30       0.2217      1.00  | VQ      |         |         |         |
4+35       0.2286      1.01  |  VQ     |         |         |         |
4+40       0.2356      1.01  |  VQ     |         |         |         |
4+45       0.2426      1.01  |  VQ     |         |         |         |
4+50       0.2498      1.05  |  VQ     |         |         |         |
4+55       0.2575      1.12  |  VQ     |         |         |         |
5+ 0       0.2654      1.14  |  VQ     |         |         |         |
5+ 5       0.2729      1.09  |  VQ     |         |         |         |
5+10       0.2794      0.95  |  Q      |         |         |         |
5+15       0.2857      0.91  |  Q      |         |         |         |
5+20       0.2921      0.93  |  Q      |         |         |         |
5+25       0.2989      0.99  |  Q      |         |         |         |
5+30       0.3058      1.00  |   Q     |         |         |         |
5+35       0.3130      1.04  |   Q     |         |         |         |
5+40       0.3206      1.11  |   Q     |         |         |         |
5+45       0.3285      1.14  |   Q     |         |         |         |
5+50       0.3364      1.15  |   Q     |         |         |         |
5+55       0.3443      1.16  |   Q     |         |         |         |
6+ 0       0.3523      1.16  |   Q     |         |         |         |
6+ 5       0.3606      1.19  |   Q     |         |         |         |
6+10       0.3693      1.27  |   VQ    |         |         |         |
6+15       0.3781      1.29  |    Q    |         |         |         |
6+20       0.3871      1.30  |    Q    |         |         |         |
6+25       0.3960      1.30  |    Q    |         |         |         |
6+30       0.4050      1.31  |    Q    |         |         |         |
6+35       0.4142      1.34  |    Q    |         |         |         |
6+40       0.4240      1.41  |    Q    |         |         |         |
6+45       0.4338      1.43  |    Q    |         |         |         |
6+50       0.4437      1.44  |    Q    |         |         |         |
6+55       0.4537      1.45  |    QV   |         |         |         |
7+ 0       0.4637      1.45  |    QV   |         |         |         |
7+ 5       0.4737      1.45  |    QV   |         |         |         |
7+10       0.4837      1.45  |    QV   |         |         |         |
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 7+15       0.4937      1.45  |    QV   |         |         |         |
 7+20       0.5040      1.49  |    QV   |         |         |         |
 7+25       0.5147      1.56  |     Q   |         |         |         |
 7+30       0.5255      1.58  |     Q   |         |         |         |
 7+35       0.5367      1.62  |     QV  |         |         |         |
 7+40       0.5484      1.69  |     QV  |         |         |         |
 7+45       0.5602      1.72  |     QV  |         |         |         |
 7+50       0.5723      1.76  |      Q  |         |         |         |
 7+55       0.5850      1.84  |      Q  |         |         |         |
 8+ 0       0.5979      1.86  |      Q  |         |         |         |
 8+ 5       0.6112      1.94  |      QV |         |         |         |
 8+10       0.6256      2.09  |       Q |         |         |         |
 8+15       0.6403      2.13  |       Q |         |         |         |
 8+20       0.6551      2.16  |       Q |         |         |         |
 8+25       0.6701      2.17  |       Q |         |         |         |
 8+30       0.6850      2.17  |       QV|         |         |         |
 8+35       0.7003      2.21  |       QV|         |         |         |
 8+40       0.7160      2.28  |        Q|         |         |         |
 8+45       0.7319      2.30  |        Q|         |         |         |
 8+50       0.7480      2.35  |        Q|         |         |         |
 8+55       0.7647      2.42  |        QV         |         |         |
 9+ 0       0.7815      2.45  |        QV         |         |         |
 9+ 5       0.7989      2.52  |         Q         |         |         |
 9+10       0.8173      2.67  |         Q         |         |         |
 9+15       0.8360      2.72  |         QV        |         |         |
 9+20       0.8551      2.77  |         |Q        |         |         |
 9+25       0.8747      2.85  |         |Q        |         |         |
 9+30       0.8945      2.88  |         |Q        |         |         |
 9+35       0.9147      2.92  |         |QV       |         |         |
 9+40       0.9353      3.00  |         | Q       |         |         |
 9+45       0.9562      3.03  |         | Q       |         |         |
 9+50       0.9774      3.07  |         | QV      |         |         |
 9+55       0.9990      3.15  |         | QV      |         |         |
10+ 0       1.0209      3.17  |         | QV      |         |         |
10+ 5       1.0413      2.97  |         |Q V      |         |         |
10+10       1.0584      2.48  |        Q|   V     |         |         |
10+15       1.0744      2.33  |        Q|   V     |         |         |
10+20       1.0900      2.27  |        Q|   V     |         |         |
10+25       1.1054      2.23  |       Q |   V     |         |         |
10+30       1.1206      2.21  |       Q |   V     |         |         |
10+35       1.1367      2.35  |        Q|    V    |         |         |
10+40       1.1553      2.69  |         Q    V    |         |         |
10+45       1.1745      2.80  |         |Q   V    |         |         |
10+50       1.1942      2.85  |         |Q   V    |         |         |
10+55       1.2139      2.87  |         |Q    V   |         |         |
11+ 0       1.2339      2.89  |         |Q    V   |         |         |
11+ 5       1.2536      2.87  |         |Q    V   |         |         |
11+10       1.2729      2.81  |         |Q    V   |         |         |
11+15       1.2921      2.78  |         |Q     V  |         |         |
11+20       1.3112      2.77  |         |Q     V  |         |         |
11+25       1.3303      2.77  |         |Q     V  |         |         |
11+30       1.3493      2.77  |         |Q     V  |         |         |
11+35       1.3680      2.70  |         Q       V |         |         |
11+40       1.3856      2.56  |         Q       V |         |         |
11+45       1.4029      2.52  |         Q       V |         |         |
11+50       1.4203      2.53  |         Q       V |         |         |
11+55       1.4381      2.59  |         Q        V|         |         |
12+ 0       1.4560      2.60  |         Q        V|         |         |
12+ 5       1.4755      2.83  |         |Q       V|         |         |
12+10       1.4984      3.33  |         |  Q     V|         |         |
12+15       1.5224      3.48  |         |  Q      V         |         |
12+20       1.5470      3.58  |         |   Q     V         |         |
12+25       1.5725      3.69  |         |   Q     V         |         |
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12+30       1.5982      3.73  |         |   Q     |V        |         |
12+35       1.6245      3.82  |         |    Q    |V        |         |
12+40       1.6519      3.98  |         |    Q    |V        |         |
12+45       1.6796      4.02  |         |     Q   | V       |         |
12+50       1.7077      4.08  |         |     Q   | V       |         |
12+55       1.7363      4.16  |         |     Q   |  V      |         |
13+ 0       1.7652      4.19  |         |     Q   |  V      |         |
13+ 5       1.7952      4.36  |         |      Q  |  V      |         |
13+10       1.8277      4.72  |         |       Q |   V     |         |
13+15       1.8610      4.83  |         |        Q|   V     |         |
13+20       1.8946      4.88  |         |        Q|    V    |         |
13+25       1.9284      4.91  |         |        Q|    V    |         |
13+30       1.9623      4.93  |         |        Q|     V   |         |
13+35       1.9939      4.59  |         |       Q |     V   |         |
13+40       2.0202      3.82  |         |    Q    |     V   |         |
13+45       2.0449      3.58  |         |   Q     |      V  |         |
13+50       2.0689      3.48  |         |  Q      |      V  |         |
13+55       2.0924      3.42  |         |  Q      |      V  |         |
14+ 0       2.1157      3.38  |         |  Q      |       V |         |
14+ 5       2.1397      3.49  |         |  Q      |       V |         |
14+10       2.1656      3.75  |         |    Q    |       V |         |
14+15       2.1920      3.84  |         |    Q    |        V|         |
14+20       2.2185      3.85  |         |    Q    |        V|         |
14+25       2.2447      3.80  |         |    Q    |        V|         |
14+30       2.2707      3.79  |         |    Q    |         V         |
14+35       2.2968      3.79  |         |    Q    |         V         |
14+40       2.3229      3.79  |         |    Q    |         V         |
14+45       2.3490      3.78  |         |    Q    |         |V        |
14+50       2.3748      3.75  |         |    Q    |         |V        |
14+55       2.4001      3.68  |         |   Q     |         |V        |
15+ 0       2.4253      3.66  |         |   Q     |         | V       |
15+ 5       2.4502      3.62  |         |   Q     |         | V       |
15+10       2.4746      3.54  |         |   Q     |         | V       |
15+15       2.4988      3.51  |         |   Q     |         |  V      |
15+20       2.5227      3.47  |         |  Q      |         |  V      |
15+25       2.5461      3.39  |         |  Q      |         |  V      |
15+30       2.5693      3.37  |         |  Q      |         |   V     |
15+35       2.5916      3.23  |         | Q       |         |   V     |
15+40       2.6118      2.94  |         |Q        |         |   V     |
15+45       2.6315      2.85  |         |Q        |         |    V    |
15+50       2.6508      2.81  |         |Q        |         |    V    |
15+55       2.6700      2.79  |         |Q        |         |    V    |
16+ 0       2.6892      2.78  |         |Q        |         |    V    |
16+ 5       2.7050      2.30  |        Q|         |         |     V   |
16+10       2.7134      1.23  |   Q     |         |         |     V   |
16+15       2.7197      0.91  |  Q      |         |         |     V   |
16+20       2.7250      0.76  |  Q      |         |         |     V   |
16+25       2.7297      0.68  | Q       |         |         |     V   |
16+30       2.7340      0.63  | Q       |         |         |     V   |
16+35       2.7380      0.57  | Q       |         |         |     V   |
16+40       2.7413      0.48  |Q        |         |         |     V   |
16+45       2.7444      0.46  |Q        |         |         |     V   |
16+50       2.7475      0.45  |Q        |         |         |     V   |
16+55       2.7506      0.44  |Q        |         |         |     V   |
17+ 0       2.7536      0.44  |Q        |         |         |     V   |
17+ 5       2.7571      0.50  | Q       |         |         |     V   |
17+10       2.7615      0.64  | Q       |         |         |     V   |
17+15       2.7662      0.68  | Q       |         |         |     V   |
17+20       2.7710      0.70  | Q       |         |         |     V   |
17+25       2.7759      0.71  | Q       |         |         |     V   |
17+30       2.7809      0.72  | Q       |         |         |      V  |
17+35       2.7859      0.72  | Q       |         |         |      V  |
17+40       2.7909      0.73  | Q       |         |         |      V  |
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17+45       2.7959      0.73  | Q       |         |         |      V  |
17+50       2.8007      0.70  | Q       |         |         |      V  |
17+55       2.8050      0.62  | Q       |         |         |      V  |
18+ 0       2.8091      0.60  | Q       |         |         |      V  |
18+ 5       2.8132      0.59  | Q       |         |         |      V  |
18+10       2.8173      0.59  | Q       |         |         |      V  |
18+15       2.8213      0.59  | Q       |         |         |      V  |
18+20       2.8253      0.58  | Q       |         |         |      V  |
18+25       2.8293      0.58  | Q       |         |         |      V  |
18+30       2.8333      0.58  | Q       |         |         |      V  |
18+35       2.8371      0.55  | Q       |         |         |      V  |
18+40       2.8404      0.48  |Q        |         |         |      V  |
18+45       2.8436      0.46  |Q        |         |         |      V  |
18+50       2.8464      0.42  |Q        |         |         |      V  |
18+55       2.8488      0.34  |Q        |         |         |      V  |
19+ 0       2.8510      0.32  |Q        |         |         |      V  |
19+ 5       2.8533      0.34  |Q        |         |         |      V  |
19+10       2.8560      0.40  |Q        |         |         |       V |
19+15       2.8589      0.42  |Q        |         |         |       V |
19+20       2.8621      0.46  |Q        |         |         |       V |
19+25       2.8657      0.53  | Q       |         |         |       V |
19+30       2.8696      0.56  | Q       |         |         |       V |
19+35       2.8733      0.54  | Q       |         |         |       V |
19+40       2.8765      0.47  |Q        |         |         |       V |
19+45       2.8796      0.45  |Q        |         |         |       V |
19+50       2.8825      0.42  |Q        |         |         |       V |
19+55       2.8848      0.34  |Q        |         |         |       V |
20+ 0       2.8870      0.32  |Q        |         |         |       V |
20+ 5       2.8893      0.34  |Q        |         |         |       V |
20+10       2.8921      0.40  |Q        |         |         |       V |
20+15       2.8950      0.42  |Q        |         |         |       V |
20+20       2.8979      0.43  |Q        |         |         |       V |
20+25       2.9009      0.43  |Q        |         |         |       V |
20+30       2.9038      0.43  |Q        |         |         |       V |
20+35       2.9068      0.43  |Q        |         |         |       V |
20+40       2.9098      0.44  |Q        |         |         |       V |
20+45       2.9128      0.44  |Q        |         |         |       V |
20+50       2.9156      0.40  |Q        |         |         |       V |
20+55       2.9179      0.33  |Q        |         |         |       V |
21+ 0       2.9201      0.31  |Q        |         |         |       V |
21+ 5       2.9224      0.33  |Q        |         |         |       V |
21+10       2.9251      0.40  |Q        |         |         |       V |
21+15       2.9280      0.42  |Q        |         |         |       V |
21+20       2.9307      0.39  |Q        |         |         |        V|
21+25       2.9330      0.33  |Q        |         |         |        V|
21+30       2.9351      0.31  |Q        |         |         |        V|
21+35       2.9374      0.33  |Q        |         |         |        V|
21+40       2.9402      0.40  |Q        |         |         |        V|
21+45       2.9430      0.42  |Q        |         |         |        V|
21+50       2.9457      0.39  |Q        |         |         |        V|
21+55       2.9480      0.33  |Q        |         |         |        V|
22+ 0       2.9501      0.31  |Q        |         |         |        V|
22+ 5       2.9524      0.33  |Q        |         |         |        V|
22+10       2.9552      0.40  |Q        |         |         |        V|
22+15       2.9581      0.42  |Q        |         |         |        V|
22+20       2.9608      0.39  |Q        |         |         |        V|
22+25       2.9630      0.33  |Q        |         |         |        V|
22+30       2.9652      0.31  |Q        |         |         |        V|
22+35       2.9672      0.30  |Q        |         |         |        V|
22+40       2.9693      0.30  |Q        |         |         |        V|
22+45       2.9713      0.29  |Q        |         |         |        V|
22+50       2.9733      0.29  |Q        |         |         |        V|
22+55       2.9753      0.29  |Q        |         |         |        V|
```

```
 23+ 0        2.9773       0.29  |Q          |         |         |        V|
 23+ 5        2.9793       0.29  |Q          |         |         |        V|
 23+10        2.9813       0.29  |Q          |         |         |        V|
 23+15        2.9833       0.29  |Q          |         |         |        V|
 23+20        2.9853       0.29  |Q          |         |         |        V|
 23+25        2.9873       0.29  |Q          |         |         |        V|
 23+30        2.9893       0.29  |Q          |         |         |        V|
 23+35        2.9913       0.29  |Q          |         |         |        V|
 23+40        2.9933       0.29  |Q          |         |         |        V|
 23+45        2.9953       0.29  |Q          |         |         |        V|
 23+50        2.9973       0.29  |Q          |         |         |        V|
 23+55        2.9994       0.29  |Q          |         |         |        V|
 24+ 0        3.0014       0.29  |Q          |         |         |        V|
 24+ 5        3.0029       0.23  Q           |         |         |        V|
 24+10        3.0035       0.09  Q           |         |         |        V|
 24+15        3.0038       0.04  Q           |         |         |        V|
 24+20        3.0040       0.02  Q           |         |         |        V|
 24+25        3.0041       0.01  Q           |         |         |        V|
 24+30        3.0041       0.01  Q           |         |         |        V|
 24+35        3.0041       0.00  Q           |         |         |        V|
-----------------------------------------------------------------------
```

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


Study date 10/30/20 File: SWCRP15.out

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

Program License Serial Number 6232

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

English Units used in output format

---------------------------------------------------------------------
SWC Ramona & Perris
Proposed Condition

--------------------------------------------------------------------
Drainage Area = 20.11(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.11(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1669.00(Ft.)
Length along longest watercourse measured to centroid = 1035.00(Ft.)
Length along longest watercourse = 0.316 Mi.
Length along longest watercourse measured to centroid = 0.196 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 12.6543 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.077 Hr.
Lag time = 4.63 Min.
25% of lag time = 1.16 Min.
40% of lag time = 1.85 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 0.47 | 9.37 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 1.35 | 27.15 |

STORM EVENT (YEAR) = 5.00
Area Averaged 2-Year Rainfall = 0.466(In)
Area Averaged 100-Year Rainfall = 1.350(In)

Point rain (area averaged) = 0.673(In)
Areal adjustment factor = 99.98 %
Adjusted average point rain = 0.673(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 61.00 | 0.900 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-1 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 61.0 | 41.0 | 0.660 | 0.900 | 0.125 | 1.000 | 0.125 |
| | | | | | Sum (F) = | 0.125 |

Area averaged mean soil loss (F) (In/Hr) = 0.125
Minimum soil loss rate ((In/Hr)) = 0.063
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.090

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Slope of intensity-duration curve for a 1 hour storm =0.5000

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

Unit Hydrograph Data

| | Unit time period (hrs) | Time % of lag | Distribution Graph % | Unit Hydrograph (CFS) |
|---|---|---|---|---|
| 1 | 0.083 | 107.878 | 21.601 | 4.378 |
| 2 | 0.167 | 215.756 | 48.792 | 9.889 |
| 3 | 0.250 | 323.634 | 14.560 | 2.951 |
| 4 | 0.333 | 431.512 | 6.653 | 1.348 |
| 5 | 0.417 | 539.389 | 3.696 | 0.749 |
| 6 | 0.500 | 647.267 | 2.334 | 0.473 |
| 7 | 0.583 | 755.145 | 1.376 | 0.279 |
| 8 | 0.667 | 863.023 | 0.988 | 0.200 |
| | | | Sum = 100.000 | Sum= 20.267 |

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 | Times (Hr.) | Pattern Percent | Storm Rain (In/Hr) | Loss rate(In./Hr) Max | Loss rate(In./Hr) Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 4.20 | 0.339 | ( 0.125) | 0.031 | 0.309 |
| 2 | 0.17 | 4.30 | 0.347 | ( 0.125) | 0.031 | 0.316 |
| 3 | 0.25 | 5.00 | 0.404 | ( 0.125) | 0.036 | 0.367 |
| 4 | 0.33 | 5.00 | 0.404 | ( 0.125) | 0.036 | 0.367 |
| 5 | 0.42 | 5.80 | 0.468 | ( 0.125) | 0.042 | 0.426 |
| 6 | 0.50 | 6.50 | 0.525 | ( 0.125) | 0.047 | 0.478 |
| 7 | 0.58 | 7.40 | 0.598 | ( 0.125) | 0.054 | 0.544 |
| 8 | 0.67 | 8.60 | 0.694 | ( 0.125) | 0.063 | 0.632 |
| 9 | 0.75 | 12.30 | 0.993 | ( 0.125) | 0.089 | 0.904 |
| 10 | 0.83 | 29.10 | 2.350 | 0.125 | ( 0.211) | 2.224 |
| 11 | 0.92 | 6.80 | 0.549 | ( 0.125) | 0.049 | 0.500 |
| 12 | 1.00 | 5.00 | 0.404 | ( 0.125) | 0.036 | 0.367 |

(Loss Rate Not Used)

Sum = 100.0 Sum = 7.4

Flood volume = Effective rainfall 0.62(In)

```
         times area      20.1(Ac.)/[(In)/(Ft.)] =       1.0(Ac.Ft)
        Total soil loss =      0.05(In)
        Total soil loss =     0.089(Ac.Ft)
        Total rainfall =      0.67(In)
        Flood volume =       45225.9 Cubic Feet
        Total soil loss =        3897.6 Cubic Feet
        --------------------------------------------------------------------
         Peak flow rate of this hydrograph =     28.544(CFS)
        --------------------------------------------------------------------
        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                            1 - H O U R    S T O R M
                       R u n o f f      H y d r o g r a p h
        --------------------------------------------------------------------
                    Hydrograph in   5   Minute intervals ((CFS))

        --------------------------------------------------------------------
  Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
  -----------------------------------------------------------------------
    0+ 5       0.0093      1.35  VQ        |         |         |         |
    0+10       0.0399      4.44  |V   Q    |         |         |         |
    0+15       0.0788      5.65  |  V   Q  |         |         |         |
    0+20       0.1242      6.59  |   V   Q |         |         |         |
    0+25       0.1741      7.24  |     V  Q|         |         |         |
    0+30       0.2310      8.27  |       V |Q        |         |         |
    0+35       0.2956      9.37  |         |VQ       |         |         |
    0+40       0.3695     10.73  |         |   Q     |         |         |
    0+45       0.4599     13.12  |         |      Q  |         |         |
    0+50       0.6115     22.02  |         |         |  V     Q|         |
    0+55       0.8081     28.54  |         |         |         |V      Q |
    1+ 0       0.9134     15.29  |         |         Q         |    V    |
    1+ 5       0.9777      9.34  |         | Q       |         |      V  |
    1+10       1.0062      4.14  |    Q    |         |         |       V |
    1+15       1.0221      2.30  |  Q      |         |         |        V|
    1+20       1.0311      1.31  |Q        |         |         |        V|
    1+25       1.0363      0.76  |Q        |         |         |        V|
    1+30       1.0377      0.20  Q         |         |         |        V|
    1+35       1.0382      0.07  Q         |         |         |         V
-----------------------------------------------------------------------



 0.32  Q         |         |         |        V|
    1+40       0.5162      0.04  Q         |         |         |        V|
    1+45       0.5163      0.01  Q         |         |         |         V
-----------------------------------------------------------------------
```

SWCRP35

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


Study date 10/30/20 File: SWCRP35.out

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

Program License Serial Number 6232

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

English Units used in output format

------------------------------------------------------------------------
SWC Ramona & Perris
Proposed Condition

------------------------------------------------------------------------
Drainage Area = 20.11(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.11(Ac.) =
0.031 Sq. Mi.
Length along longest watercourse = 1669.00(Ft.)
Length along longest watercourse measured to centroid = 1035.00(Ft.)
Length along longest watercourse = 0.316 Mi.
Length along longest watercourse measured to centroid = 0.196 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 12.6543 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.077 Hr.
Lag time = 4.63 Min.
25% of lag time = 1.16 Min.
40% of lag time = 1.85 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 0.82 | 16.47 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 2.04 | 41.02 |

STORM EVENT (YEAR) = 5.00
Area Averaged 2-Year Rainfall = 0.819(In)
Area Averaged 100-Year Rainfall = 2.040(In)

Point rain (area averaged) = 1.105(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.105(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 61.00 | 0.900 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-1 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 61.0 | 41.0 | 0.660 | 0.900 | 0.125 | 1.000 | 0.125 |
| | | | | | Sum (F) = | 0.125 |

Area averaged mean soil loss (F) (In/Hr) = 0.125
Minimum soil loss rate ((In/Hr)) = 0.063
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.090

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

---

Unit Hydrograph Data

| Unit time period (hrs) | | Time % of lag | Distribution Graph % | Unit Hydrograph (CFS) |
|---|---|---|---|---|
| 1 | 0.083 | 107.878 | 21.601 | 4.378 |
| 2 | 0.167 | 215.756 | 48.792 | 9.889 |
| 3 | 0.250 | 323.634 | 14.560 | 2.951 |
| 4 | 0.333 | 431.512 | 6.653 | 1.348 |
| 5 | 0.417 | 539.389 | 3.696 | 0.749 |
| 6 | 0.500 | 647.267 | 2.334 | 0.473 |
| 7 | 0.583 | 755.145 | 1.376 | 0.279 |
| 8 | 0.667 | 863.023 | 0.988 | 0.200 |
| | | | Sum = 100.000 | Sum= 20.267 |

---

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 | Loss rate(In./Hr) Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 1.30 | 0.172 | ( 0.125) | 0.016 | 0.157 |
| 2 | 0.17 | 1.30 | 0.172 | ( 0.125) | 0.016 | 0.157 |
| 3 | 0.25 | 1.10 | 0.146 | ( 0.125) | 0.013 | 0.133 |
| 4 | 0.33 | 1.50 | 0.199 | ( 0.125) | 0.018 | 0.181 |
| 5 | 0.42 | 1.50 | 0.199 | ( 0.125) | 0.018 | 0.181 |
| 6 | 0.50 | 1.80 | 0.239 | ( 0.125) | 0.021 | 0.217 |
| 7 | 0.58 | 1.50 | 0.199 | ( 0.125) | 0.018 | 0.181 |
| 8 | 0.67 | 1.80 | 0.239 | ( 0.125) | 0.021 | 0.217 |
| 9 | 0.75 | 1.80 | 0.239 | ( 0.125) | 0.021 | 0.217 |
| 10 | 0.83 | 1.50 | 0.199 | ( 0.125) | 0.018 | 0.181 |
| 11 | 0.92 | 1.60 | 0.212 | ( 0.125) | 0.019 | 0.193 |
| 12 | 1.00 | 1.80 | 0.239 | ( 0.125) | 0.021 | 0.217 |
| 13 | 1.08 | 2.20 | 0.292 | ( 0.125) | 0.026 | 0.265 |
| 14 | 1.17 | 2.20 | 0.292 | ( 0.125) | 0.026 | 0.265 |
| 15 | 1.25 | 2.20 | 0.292 | ( 0.125) | 0.026 | 0.265 |
| 16 | 1.33 | 2.00 | 0.265 | ( 0.125) | 0.024 | 0.241 |
| 17 | 1.42 | 2.60 | 0.345 | ( 0.125) | 0.031 | 0.314 |

```
18   1.50     2.70      0.358       (  0.125)       0.032        0.326
19   1.58     2.40      0.318       (  0.125)       0.029        0.290
20   1.67     2.70      0.358       (  0.125)       0.032        0.326
21   1.75     3.30      0.438       (  0.125)       0.039        0.398
22   1.83     3.10      0.411       (  0.125)       0.037        0.374
23   1.92     2.90      0.385       (  0.125)       0.035        0.350
24   2.00     3.00      0.398       (  0.125)       0.036        0.362
25   2.08     3.10      0.411       (  0.125)       0.037        0.374
26   2.17     4.20      0.557       (  0.125)       0.050        0.507
27   2.25     5.00      0.663       (  0.125)       0.060        0.603
28   2.33     3.50      0.464       (  0.125)       0.042        0.422
29   2.42     6.80      0.902       (  0.125)       0.081        0.820
30   2.50     7.30      0.968       (  0.125)       0.087        0.881
31   2.58     8.20      1.087       (  0.125)       0.098        0.989
32   2.67     5.90      0.782       (  0.125)       0.070        0.712
33   2.75     2.00      0.265       (  0.125)       0.024        0.241
34   2.83     1.80      0.239       (  0.125)       0.021        0.217
35   2.92     1.80      0.239       (  0.125)       0.021        0.217
36   3.00     0.60      0.080       (  0.125)       0.007        0.072
                 (Loss Rate Not Used)
   Sum =     100.0                                   Sum =    12.1
      Flood volume = Effective rainfall      1.01(In)
       times area      20.1(Ac.)/[(In)/(Ft.)] =       1.7(Ac.Ft)
      Total soil loss =      0.10(In)
      Total soil loss =     0.167(Ac.Ft)
      Total rainfall =      1.10(In)
      Flood volume =       73397.2 Cubic Feet
      Total soil loss =        7259.1 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     17.432(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          3 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0047      0.69  VQ        |         |         |         |
  0+10       0.0202      2.24  V   Q     |         |         |         |
  0+15       0.0380      2.60  V    Q    |         |         |         |
  0+20       0.0572      2.78  |V   Q    |         |         |         |
  0+25       0.0799      3.30  |V    Q   |         |         |         |
  0+30       0.1051      3.65  | V    Q  |         |         |         |
  0+35       0.1322      3.94  |  V   Q  |         |         |         |
  0+40       0.1590      3.90  |  V   Q  |         |         |         |
  0+45       0.1881      4.22  |   V   Q |         |         |         |
  0+50       0.2167      4.15  |    V  Q |         |         |         |
  0+55       0.2435      3.90  |    V Q  |         |         |         |
  1+ 0       0.2713      4.03  |     V Q |         |         |         |
  1+ 5       0.3022      4.49  |      VQ |         |         |         |
  1+10       0.3368      5.03  |      V  Q         |         |         |
  1+15       0.3726      5.20  |       V Q         |         |         |
  1+20       0.4082      5.17  |        VQ         |         |         |
  1+25       0.4447      5.30  |         Q         |         |         |
  1+30       0.4862      6.02  |         |VQ       |         |         |
  1+35       0.5288      6.19  |         | Q       |         |         |
  1+40       0.5709      6.11  |         | QV      |         |         |
  1+45       0.6173      6.74  |         |  QV     |         |         |
  1+50       0.6685      7.44  |         |   QV    |         |         |
  1+55       0.7192      7.36  |         |   Q  V  |         |         |
```

```
    2+ 0       0.7689       7.22  |         |   Q   V |         |         |
    2+ 5       0.8196       7.36  |         |   Q    V|         |         |
    2+10       0.8752       8.08  |         |     Q   V         |         |
    2+15       0.9432       9.86  |         |        Q| V       |         |
    2+20       1.0151      10.44  |         |         Q   V     |         |
    2+25       1.0899      10.86  |         |         |Q   V    |         |
    2+30       1.1916      14.76  |         |         |       VQ|         |
    2+35       1.3080      16.91  |         |         |         |V Q      |
    2+40       1.4281      17.43  |         |         |         |  VQ     |
    2+45       1.5196      13.29  |         |         |     Q   |     V   |
    2+50       1.5751       8.06  |         |     Q   |         |      V  |
    2+55       1.6182       6.24  |         | Q       |         |       V |
    3+ 0       1.6515       4.84  |        Q|         |         |        V|
    3+ 5       1.6696       2.62  |    Q    |         |         |        V|
    3+10       1.6777       1.18  | Q       |         |         |        V|
    3+15       1.6816       0.57  |Q        |         |         |        V|
    3+20       1.6835       0.27  Q         |         |         |        V|
    3+25       1.6844       0.14  Q         |         |         |        V|
    3+30       1.6849       0.06  Q         |         |         |        V|
    3+35       1.6850       0.01  Q         |         |         |        V|
-----------------------------------------------------------------------


 0.02  Q         |         |         |        V|
    3+40       0.6037       0.01  Q         |         |         |        V|
    3+45       0.6037       0.00  Q         |         |         |         V
-----------------------------------------------------------------------
```

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


Study date 10/30/20 File: SWCRP65.out

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

Program License Serial Number 6232

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

English Units used in output format

---------------------------------------------------------------------
SWC Ramona & Perris
Proposed Condition

--------------------------------------------------------------------
Drainage Area = 20.11(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.11(Ac.) =
0.031 Sq. Mi.
Length along longest watercourse = 1669.00(Ft.)
Length along longest watercourse measured to centroid = 1035.00(Ft.)
Length along longest watercourse = 0.316 Mi.
Length along longest watercourse measured to centroid = 0.196 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 12.6543 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.077 Hr.
Lag time = 4.63 Min.
25% of lag time = 1.16 Min.
40% of lag time = 1.85 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 1.14 | 22.93 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 3.69 | 74.21 |

STORM EVENT (YEAR) = 5.00
Area Averaged 2-Year Rainfall = 1.140(In)
Area Averaged 100-Year Rainfall = 3.690(In)

Point rain (area averaged) = 1.737(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.737(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 61.00 | 0.900 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-1 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 61.0 | 41.0 | 0.660 | 0.900 | 0.125 | 1.000 | 0.125 |
| | | | | | Sum (F) = | 0.125 |

Area averaged mean soil loss (F) (In/Hr) = 0.125
Minimum soil loss rate ((In/Hr)) = 0.063
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.090

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

---

Unit Hydrograph Data

| Unit time period | (hrs) | Time % of lag | Distribution Graph % | Unit Hydrograph (CFS) |
|---|---|---|---|---|
| 1 | 0.083 | 107.878 | 21.601 | 4.378 |
| 2 | 0.167 | 215.756 | 48.792 | 9.889 |
| 3 | 0.250 | 323.634 | 14.560 | 2.951 |
| 4 | 0.333 | 431.512 | 6.653 | 1.348 |
| 5 | 0.417 | 539.389 | 3.696 | 0.749 |
| 6 | 0.500 | 647.267 | 2.334 | 0.473 |
| 7 | 0.583 | 755.145 | 1.376 | 0.279 |
| 8 | 0.667 | 863.023 | 0.988 | 0.200 |
| | | | Sum = 100.000 | Sum= 20.267 |

---

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 | Loss rate(In./Hr) Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 0.50 | 0.104 | ( 0.125) | 0.009 | 0.095 |
| 2 | 0.17 | 0.60 | 0.125 | ( 0.125) | 0.011 | 0.114 |
| 3 | 0.25 | 0.60 | 0.125 | ( 0.125) | 0.011 | 0.114 |
| 4 | 0.33 | 0.60 | 0.125 | ( 0.125) | 0.011 | 0.114 |
| 5 | 0.42 | 0.60 | 0.125 | ( 0.125) | 0.011 | 0.114 |
| 6 | 0.50 | 0.70 | 0.146 | ( 0.125) | 0.013 | 0.133 |
| 7 | 0.58 | 0.70 | 0.146 | ( 0.125) | 0.013 | 0.133 |
| 8 | 0.67 | 0.70 | 0.146 | ( 0.125) | 0.013 | 0.133 |
| 9 | 0.75 | 0.70 | 0.146 | ( 0.125) | 0.013 | 0.133 |
| 10 | 0.83 | 0.70 | 0.146 | ( 0.125) | 0.013 | 0.133 |
| 11 | 0.92 | 0.70 | 0.146 | ( 0.125) | 0.013 | 0.133 |
| 12 | 1.00 | 0.80 | 0.167 | ( 0.125) | 0.015 | 0.152 |
| 13 | 1.08 | 0.80 | 0.167 | ( 0.125) | 0.015 | 0.152 |
| 14 | 1.17 | 0.80 | 0.167 | ( 0.125) | 0.015 | 0.152 |
| 15 | 1.25 | 0.80 | 0.167 | ( 0.125) | 0.015 | 0.152 |
| 16 | 1.33 | 0.80 | 0.167 | ( 0.125) | 0.015 | 0.152 |
| 17 | 1.42 | 0.80 | 0.167 | ( 0.125) | 0.015 | 0.152 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 18 | 1.50 | 0.80 | 0.167 | ( 0.125) | 0.015 | 0.152 |
| 19 | 1.58 | 0.80 | 0.167 | ( 0.125) | 0.015 | 0.152 |
| 20 | 1.67 | 0.80 | 0.167 | ( 0.125) | 0.015 | 0.152 |
| 21 | 1.75 | 0.80 | 0.167 | ( 0.125) | 0.015 | 0.152 |
| 22 | 1.83 | 0.80 | 0.167 | ( 0.125) | 0.015 | 0.152 |
| 23 | 1.92 | 0.80 | 0.167 | ( 0.125) | 0.015 | 0.152 |
| 24 | 2.00 | 0.90 | 0.188 | ( 0.125) | 0.017 | 0.171 |
| 25 | 2.08 | 0.80 | 0.167 | ( 0.125) | 0.015 | 0.152 |
| 26 | 2.17 | 0.90 | 0.188 | ( 0.125) | 0.017 | 0.171 |
| 27 | 2.25 | 0.90 | 0.188 | ( 0.125) | 0.017 | 0.171 |
| 28 | 2.33 | 0.90 | 0.188 | ( 0.125) | 0.017 | 0.171 |
| 29 | 2.42 | 0.90 | 0.188 | ( 0.125) | 0.017 | 0.171 |
| 30 | 2.50 | 0.90 | 0.188 | ( 0.125) | 0.017 | 0.171 |
| 31 | 2.58 | 0.90 | 0.188 | ( 0.125) | 0.017 | 0.171 |
| 32 | 2.67 | 0.90 | 0.188 | ( 0.125) | 0.017 | 0.171 |
| 33 | 2.75 | 1.00 | 0.208 | ( 0.125) | 0.019 | 0.190 |
| 34 | 2.83 | 1.00 | 0.208 | ( 0.125) | 0.019 | 0.190 |
| 35 | 2.92 | 1.00 | 0.208 | ( 0.125) | 0.019 | 0.190 |
| 36 | 3.00 | 1.00 | 0.208 | ( 0.125) | 0.019 | 0.190 |
| 37 | 3.08 | 1.00 | 0.208 | ( 0.125) | 0.019 | 0.190 |
| 38 | 3.17 | 1.10 | 0.229 | ( 0.125) | 0.021 | 0.209 |
| 39 | 3.25 | 1.10 | 0.229 | ( 0.125) | 0.021 | 0.209 |
| 40 | 3.33 | 1.10 | 0.229 | ( 0.125) | 0.021 | 0.209 |
| 41 | 3.42 | 1.20 | 0.250 | ( 0.125) | 0.023 | 0.228 |
| 42 | 3.50 | 1.30 | 0.271 | ( 0.125) | 0.024 | 0.247 |
| 43 | 3.58 | 1.40 | 0.292 | ( 0.125) | 0.026 | 0.266 |
| 44 | 3.67 | 1.40 | 0.292 | ( 0.125) | 0.026 | 0.266 |
| 45 | 3.75 | 1.50 | 0.313 | ( 0.125) | 0.028 | 0.285 |
| 46 | 3.83 | 1.50 | 0.313 | ( 0.125) | 0.028 | 0.285 |
| 47 | 3.92 | 1.60 | 0.334 | ( 0.125) | 0.030 | 0.304 |
| 48 | 4.00 | 1.60 | 0.334 | ( 0.125) | 0.030 | 0.304 |
| 49 | 4.08 | 1.70 | 0.354 | ( 0.125) | 0.032 | 0.322 |
| 50 | 4.17 | 1.80 | 0.375 | ( 0.125) | 0.034 | 0.341 |
| 51 | 4.25 | 1.90 | 0.396 | ( 0.125) | 0.036 | 0.360 |
| 52 | 4.33 | 2.00 | 0.417 | ( 0.125) | 0.038 | 0.379 |
| 53 | 4.42 | 2.10 | 0.438 | ( 0.125) | 0.039 | 0.398 |
| 54 | 4.50 | 2.10 | 0.438 | ( 0.125) | 0.039 | 0.398 |
| 55 | 4.58 | 2.20 | 0.459 | ( 0.125) | 0.041 | 0.417 |
| 56 | 4.67 | 2.30 | 0.479 | ( 0.125) | 0.043 | 0.436 |
| 57 | 4.75 | 2.40 | 0.500 | ( 0.125) | 0.045 | 0.455 |
| 58 | 4.83 | 2.40 | 0.500 | ( 0.125) | 0.045 | 0.455 |
| 59 | 4.92 | 2.50 | 0.521 | ( 0.125) | 0.047 | 0.474 |
| 60 | 5.00 | 2.60 | 0.542 | ( 0.125) | 0.049 | 0.493 |
| 61 | 5.08 | 3.10 | 0.646 | ( 0.125) | 0.058 | 0.588 |
| 62 | 5.17 | 3.60 | 0.750 | ( 0.125) | 0.068 | 0.683 |
| 63 | 5.25 | 3.90 | 0.813 | ( 0.125) | 0.073 | 0.740 |
| 64 | 5.33 | 4.20 | 0.876 | ( 0.125) | 0.079 | 0.797 |
| 65 | 5.42 | 4.70 | 0.980 | ( 0.125) | 0.088 | 0.892 |
| 66 | 5.50 | 5.60 | 1.167 | ( 0.125) | 0.105 | 1.062 |
| 67 | 5.58 | 1.90 | 0.396 | ( 0.125) | 0.036 | 0.360 |
| 68 | 5.67 | 0.90 | 0.188 | ( 0.125) | 0.017 | 0.171 |
| 69 | 5.75 | 0.60 | 0.125 | ( 0.125) | 0.011 | 0.114 |
| 70 | 5.83 | 0.50 | 0.104 | ( 0.125) | 0.009 | 0.095 |
| 71 | 5.92 | 0.30 | 0.063 | ( 0.125) | 0.006 | 0.057 |
| 72 | 6.00 | 0.20 | 0.042 | ( 0.125) | 0.004 | 0.038 |
| | | (Loss Rate Not Used) | | | | |
| Sum = | | 100.0 | | | Sum = | 19.0 |

Flood volume = Effective rainfall 1.58(In)
times area 20.1(Ac.)/[(In)/(Ft.)] = 2.6(Ac.Ft)
Total soil loss = 0.16(In)
Total soil loss = 0.262(Ac.Ft)
Total rainfall = 1.74(In)
Flood volume = 115397.9 Cubic Feet

SWCRP65

```
Total soil loss =       11413.0 Cubic Feet
 ----------------------------------------------------------------------
  Peak flow rate of this hydrograph =     17.847(CFS)
 ----------------------------------------------------------------------
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                   6 - H O U R   S T O R M
              R u n o f f     H y d r o g r a p h
 ----------------------------------------------------------------------
            Hydrograph in   5   Minute intervals ((CFS))

 ----------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0029      0.42  Q         |         |         |         |
  0+10       0.0128      1.44  V Q       |         |         |         |
  0+15       0.0259      1.90  V  Q      |         |         |         |
  0+20       0.0403      2.09  V   Q     |         |         |         |
  0+25       0.0553      2.19  V   Q     |         |         |         |
  0+30       0.0713      2.33  |V  Q     |         |         |         |
  0+35       0.0889      2.55  |V   Q    |         |         |         |
  0+40       0.1070      2.63  |V   Q    |         |         |         |
  0+45       0.1253      2.66  |V   Q    |         |         |         |
  0+50       0.1438      2.67  | V  Q    |         |         |         |
  0+55       0.1622      2.68  | V  Q    |         |         |         |
  1+ 0       0.1813      2.77  | V  Q    |         |         |         |
  1+ 5       0.2017      2.96  |  V Q    |         |         |         |
  1+10       0.2225      3.02  |  V  Q   |         |         |         |
  1+15       0.2435      3.04  |  V  Q   |         |         |         |
  1+20       0.2646      3.06  |  V  Q   |         |         |         |
  1+25       0.2857      3.07  |   V Q   |         |         |         |
  1+30       0.3069      3.07  |   V Q   |         |         |         |
  1+35       0.3281      3.08  |   V Q   |         |         |         |
  1+40       0.3493      3.08  |    VQ   |         |         |         |
  1+45       0.3705      3.08  |    VQ   |         |         |         |
  1+50       0.3917      3.08  |    VQ   |         |         |         |
  1+55       0.4128      3.08  |     Q   |         |         |         |
  2+ 0       0.4346      3.16  |     Q   |         |         |         |
  2+ 5       0.4571      3.26  |     Q   |         |         |         |
  2+10       0.4793      3.22  |     QV  |         |         |         |
  2+15       0.5025      3.37  |     QV  |         |         |         |
  2+20       0.5260      3.42  |     QV  |         |         |         |
  2+25       0.5497      3.44  |     Q V |         |         |         |
  2+30       0.5735      3.45  |     Q V |         |         |         |
  2+35       0.5973      3.46  |     Q  V|         |         |         |
  2+40       0.6211      3.46  |     Q  V|         |         |         |
  2+45       0.6455      3.55  |      Q V|         |         |         |
  2+50       0.6712      3.73  |      Q  V         |         |         |
  2+55       0.6973      3.79  |      Q  V         |         |         |
  3+ 0       0.7236      3.81  |      Q  V         |         |         |
  3+ 5       0.7499      3.83  |      Q  |V        |         |         |
  3+10       0.7769      3.92  |      Q  |V        |         |         |
  3+15       0.8053      4.11  |       Q | V       |         |         |
  3+20       0.8340      4.17  |       Q | V       |         |         |
  3+25       0.8635      4.28  |       Q |  V      |         |         |
  3+30       0.8950      4.57  |        Q|  V      |         |         |
  3+35       0.9287      4.90  |        Q|   V     |         |         |
  3+40       0.9644      5.18  |         Q   V     |         |         |
  3+45       1.0013      5.36  |         Q    V    |         |         |
  3+50       1.0398      5.60  |         |Q   V    |         |         |
  3+55       1.0795      5.76  |         |Q    V   |         |         |
  4+ 0       1.1208      6.00  |         |Q    V   |         |         |
  4+ 5       1.1632      6.16  |         | Q    V  |         |         |
  4+10       1.2078      6.47  |         | Q     V |         |         |
```

```
    4+15         1.2547        6.81  |         |  Q    V |         |         |
    4+20         1.3041        7.18  |         |   Q    V|         |         |
    4+25         1.3561        7.55  |         |    Q    V         |         |
    4+30         1.4102        7.85  |         |    Q    |V        |         |
    4+35         1.4655        8.04  |         |     Q   | V       |         |
    4+40         1.5232        8.37  |         |     Q   | V       |         |
    4+45         1.5833        8.73  |         |      Q  |  V      |         |
    4+50         1.6454        9.01  |         |       Q |   V     |         |
    4+55         1.7088        9.20  |         |       Q |    V    |         |
    5+ 0         1.7744        9.53  |         |        Q|     V   |         |
    5+ 5         1.8447       10.21  |         |         Q      V  |         |
    5+10         1.9251       11.67  |         |         |  Q     V|         |
    5+15         2.0159       13.18  |         |         |     Q   V         |
    5+20         2.1153       14.43  |         |         |       Q |V        |
    5+25         2.2240       15.79  |         |         |         |Q V      |
    5+30         2.3469       17.85  |         |         |         |    Q    |
    5+35         2.4636       16.94  |         |         |         |  Q   V  |
    5+40         2.5318        9.91  |         |        Q|         |       V |
    5+45         2.5736        6.07  |         | Q       |         |       V |
    5+50         2.6020        4.12  |       Q |         |         |        V|
    5+55         2.6222        2.94  |    Q    |         |         |        V|
    6+ 0         2.6356        1.94  |  Q      |         |         |        V|
    6+ 5         2.6435        1.15  | Q       |         |         |        V|
    6+10         2.6465        0.43  Q         |         |         |        V|
    6+15         2.6479        0.20  Q         |         |         |        V|
    6+20         2.6486        0.10  Q         |         |         |        V|
    6+25         2.6490        0.05  Q         |         |         |        V|
    6+30         2.6491        0.02  Q         |         |         |        V|
    6+35         2.6492        0.01  Q         |         |         |         V
-----------------------------------------------------------------------


 0.01  Q         |         |         |        V|
    6+40         0.8845        0.00  Q         |         |         |        V|
    6+45         0.8845        0.00  Q         |         |         |         V
-----------------------------------------------------------------------
```

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


Study date  10/30/20 File: SWCRP245.out

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------------------------------------------------------------------------

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

Program License Serial Number 6232

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

English Units used in output format

---------------------------------------------------------------------
SWC Ramona & Perris
Proposed Condition

--------------------------------------------------------------------
Drainage Area =      20.11(Ac.)  =      0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      20.11(Ac.)  =
0.031 Sq. Mi.
Length along longest watercourse =    1669.00(Ft.)
Length along longest watercourse measured to centroid =    1035.00(Ft.)
Length along longest watercourse =      0.316 Mi.
Length along longest watercourse measured to centroid =      0.196 Mi.
Difference in elevation =       4.00(Ft.)
Slope along watercourse =     12.6543 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.077 Hr.
Lag time =     4.63 Min.
25% of lag time =     1.16 Min.
40% of lag time =     1.85 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] |
|---|---|---|
| 20.11 | 1.97 | 39.62 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 5.02 | 100.95 |

STORM EVENT (YEAR) =    5.00
Area Averaged 2-Year Rainfall =    1.970(In)
Area Averaged 100-Year Rainfall =    5.020(In)

Point rain (area averaged) = 2.684(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.684(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 61.00 | 0.900 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-1 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 61.0 | 41.0 | 0.660 | 0.900 | 0.125 | 1.000 | 0.125 |
| | | | | | Sum (F) = | 0.125 |

Area averaged mean soil loss (F) (In/Hr) = 0.125
Minimum soil loss rate ((In/Hr)) = 0.063
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.090

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

---

Unit Hydrograph Data

| Unit time period | (hrs) | Time % of lag | Distribution Graph % | Unit Hydrograph (CFS) |
|---|---|---|---|---|
| 1 | 0.083 | 107.878 | 21.601 | 4.378 |
| 2 | 0.167 | 215.756 | 48.792 | 9.889 |
| 3 | 0.250 | 323.634 | 14.560 | 2.951 |
| 4 | 0.333 | 431.512 | 6.653 | 1.348 |
| 5 | 0.417 | 539.389 | 3.696 | 0.749 |
| 6 | 0.500 | 647.267 | 2.334 | 0.473 |
| 7 | 0.583 | 755.145 | 1.376 | 0.279 |
| 8 | 0.667 | 863.023 | 0.988 | 0.200 |
| | | | Sum = 100.000 | Sum= 20.267 |

---

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 | 0.021 | ( 0.222) | 0.002 | 0.020 |
| 2 | 0.17 | 0.07 | 0.021 | ( 0.222) | 0.002 | 0.020 |
| 3 | 0.25 | 0.07 | 0.021 | ( 0.221) | 0.002 | 0.020 |
| 4 | 0.33 | 0.10 | 0.032 | ( 0.220) | 0.003 | 0.029 |
| 5 | 0.42 | 0.10 | 0.032 | ( 0.219) | 0.003 | 0.029 |
| 6 | 0.50 | 0.10 | 0.032 | ( 0.218) | 0.003 | 0.029 |
| 7 | 0.58 | 0.10 | 0.032 | ( 0.217) | 0.003 | 0.029 |
| 8 | 0.67 | 0.10 | 0.032 | ( 0.216) | 0.003 | 0.029 |
| 9 | 0.75 | 0.10 | 0.032 | ( 0.216) | 0.003 | 0.029 |
| 10 | 0.83 | 0.13 | 0.043 | ( 0.215) | 0.004 | 0.039 |
| 11 | 0.92 | 0.13 | 0.043 | ( 0.214) | 0.004 | 0.039 |
| 12 | 1.00 | 0.13 | 0.043 | ( 0.213) | 0.004 | 0.039 |
| 13 | 1.08 | 0.10 | 0.032 | ( 0.212) | 0.003 | 0.029 |
| 14 | 1.17 | 0.10 | 0.032 | ( 0.211) | 0.003 | 0.029 |
| 15 | 1.25 | 0.10 | 0.032 | ( 0.210) | 0.003 | 0.029 |
| 16 | 1.33 | 0.10 | 0.032 | ( 0.210) | 0.003 | 0.029 |
| 17 | 1.42 | 0.10 | 0.032 | ( 0.209) | 0.003 | 0.029 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 18 | 1.50 | 0.10 | 0.032 | ( 0.208) | 0.003 | 0.029 |
| 19 | 1.58 | 0.10 | 0.032 | ( 0.207) | 0.003 | 0.029 |
| 20 | 1.67 | 0.10 | 0.032 | ( 0.206) | 0.003 | 0.029 |
| 21 | 1.75 | 0.10 | 0.032 | ( 0.205) | 0.003 | 0.029 |
| 22 | 1.83 | 0.13 | 0.043 | ( 0.205) | 0.004 | 0.039 |
| 23 | 1.92 | 0.13 | 0.043 | ( 0.204) | 0.004 | 0.039 |
| 24 | 2.00 | 0.13 | 0.043 | ( 0.203) | 0.004 | 0.039 |
| 25 | 2.08 | 0.13 | 0.043 | ( 0.202) | 0.004 | 0.039 |
| 26 | 2.17 | 0.13 | 0.043 | ( 0.201) | 0.004 | 0.039 |
| 27 | 2.25 | 0.13 | 0.043 | ( 0.201) | 0.004 | 0.039 |
| 28 | 2.33 | 0.13 | 0.043 | ( 0.200) | 0.004 | 0.039 |
| 29 | 2.42 | 0.13 | 0.043 | ( 0.199) | 0.004 | 0.039 |
| 30 | 2.50 | 0.13 | 0.043 | ( 0.198) | 0.004 | 0.039 |
| 31 | 2.58 | 0.17 | 0.054 | ( 0.197) | 0.005 | 0.049 |
| 32 | 2.67 | 0.17 | 0.054 | ( 0.196) | 0.005 | 0.049 |
| 33 | 2.75 | 0.17 | 0.054 | ( 0.196) | 0.005 | 0.049 |
| 34 | 2.83 | 0.17 | 0.054 | ( 0.195) | 0.005 | 0.049 |
| 35 | 2.92 | 0.17 | 0.054 | ( 0.194) | 0.005 | 0.049 |
| 36 | 3.00 | 0.17 | 0.054 | ( 0.193) | 0.005 | 0.049 |
| 37 | 3.08 | 0.17 | 0.054 | ( 0.192) | 0.005 | 0.049 |
| 38 | 3.17 | 0.17 | 0.054 | ( 0.192) | 0.005 | 0.049 |
| 39 | 3.25 | 0.17 | 0.054 | ( 0.191) | 0.005 | 0.049 |
| 40 | 3.33 | 0.17 | 0.054 | ( 0.190) | 0.005 | 0.049 |
| 41 | 3.42 | 0.17 | 0.054 | ( 0.189) | 0.005 | 0.049 |
| 42 | 3.50 | 0.17 | 0.054 | ( 0.188) | 0.005 | 0.049 |
| 43 | 3.58 | 0.17 | 0.054 | ( 0.188) | 0.005 | 0.049 |
| 44 | 3.67 | 0.17 | 0.054 | ( 0.187) | 0.005 | 0.049 |
| 45 | 3.75 | 0.17 | 0.054 | ( 0.186) | 0.005 | 0.049 |
| 46 | 3.83 | 0.20 | 0.064 | ( 0.185) | 0.006 | 0.059 |
| 47 | 3.92 | 0.20 | 0.064 | ( 0.185) | 0.006 | 0.059 |
| 48 | 4.00 | 0.20 | 0.064 | ( 0.184) | 0.006 | 0.059 |
| 49 | 4.08 | 0.20 | 0.064 | ( 0.183) | 0.006 | 0.059 |
| 50 | 4.17 | 0.20 | 0.064 | ( 0.182) | 0.006 | 0.059 |
| 51 | 4.25 | 0.20 | 0.064 | ( 0.181) | 0.006 | 0.059 |
| 52 | 4.33 | 0.23 | 0.075 | ( 0.181) | 0.007 | 0.068 |
| 53 | 4.42 | 0.23 | 0.075 | ( 0.180) | 0.007 | 0.068 |
| 54 | 4.50 | 0.23 | 0.075 | ( 0.179) | 0.007 | 0.068 |
| 55 | 4.58 | 0.23 | 0.075 | ( 0.178) | 0.007 | 0.068 |
| 56 | 4.67 | 0.23 | 0.075 | ( 0.178) | 0.007 | 0.068 |
| 57 | 4.75 | 0.23 | 0.075 | ( 0.177) | 0.007 | 0.068 |
| 58 | 4.83 | 0.27 | 0.086 | ( 0.176) | 0.008 | 0.078 |
| 59 | 4.92 | 0.27 | 0.086 | ( 0.175) | 0.008 | 0.078 |
| 60 | 5.00 | 0.27 | 0.086 | ( 0.175) | 0.008 | 0.078 |
| 61 | 5.08 | 0.20 | 0.064 | ( 0.174) | 0.006 | 0.059 |
| 62 | 5.17 | 0.20 | 0.064 | ( 0.173) | 0.006 | 0.059 |
| 63 | 5.25 | 0.20 | 0.064 | ( 0.172) | 0.006 | 0.059 |
| 64 | 5.33 | 0.23 | 0.075 | ( 0.172) | 0.007 | 0.068 |
| 65 | 5.42 | 0.23 | 0.075 | ( 0.171) | 0.007 | 0.068 |
| 66 | 5.50 | 0.23 | 0.075 | ( 0.170) | 0.007 | 0.068 |
| 67 | 5.58 | 0.27 | 0.086 | ( 0.169) | 0.008 | 0.078 |
| 68 | 5.67 | 0.27 | 0.086 | ( 0.169) | 0.008 | 0.078 |
| 69 | 5.75 | 0.27 | 0.086 | ( 0.168) | 0.008 | 0.078 |
| 70 | 5.83 | 0.27 | 0.086 | ( 0.167) | 0.008 | 0.078 |
| 71 | 5.92 | 0.27 | 0.086 | ( 0.166) | 0.008 | 0.078 |
| 72 | 6.00 | 0.27 | 0.086 | ( 0.166) | 0.008 | 0.078 |
| 73 | 6.08 | 0.30 | 0.097 | ( 0.165) | 0.009 | 0.088 |
| 74 | 6.17 | 0.30 | 0.097 | ( 0.164) | 0.009 | 0.088 |
| 75 | 6.25 | 0.30 | 0.097 | ( 0.163) | 0.009 | 0.088 |
| 76 | 6.33 | 0.30 | 0.097 | ( 0.163) | 0.009 | 0.088 |
| 77 | 6.42 | 0.30 | 0.097 | ( 0.162) | 0.009 | 0.088 |
| 78 | 6.50 | 0.30 | 0.097 | ( 0.161) | 0.009 | 0.088 |
| 79 | 6.58 | 0.33 | 0.107 | ( 0.160) | 0.010 | 0.098 |
| 80 | 6.67 | 0.33 | 0.107 | ( 0.160) | 0.010 | 0.098 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 81 | 6.75 | 0.33 | 0.107 | ( 0.159) | 0.010 | 0.098 |
| 82 | 6.83 | 0.33 | 0.107 | ( 0.158) | 0.010 | 0.098 |
| 83 | 6.92 | 0.33 | 0.107 | ( 0.158) | 0.010 | 0.098 |
| 84 | 7.00 | 0.33 | 0.107 | ( 0.157) | 0.010 | 0.098 |
| 85 | 7.08 | 0.33 | 0.107 | ( 0.156) | 0.010 | 0.098 |
| 86 | 7.17 | 0.33 | 0.107 | ( 0.155) | 0.010 | 0.098 |
| 87 | 7.25 | 0.33 | 0.107 | ( 0.155) | 0.010 | 0.098 |
| 88 | 7.33 | 0.37 | 0.118 | ( 0.154) | 0.011 | 0.107 |
| 89 | 7.42 | 0.37 | 0.118 | ( 0.153) | 0.011 | 0.107 |
| 90 | 7.50 | 0.37 | 0.118 | ( 0.153) | 0.011 | 0.107 |
| 91 | 7.58 | 0.40 | 0.129 | ( 0.152) | 0.012 | 0.117 |
| 92 | 7.67 | 0.40 | 0.129 | ( 0.151) | 0.012 | 0.117 |
| 93 | 7.75 | 0.40 | 0.129 | ( 0.151) | 0.012 | 0.117 |
| 94 | 7.83 | 0.43 | 0.140 | ( 0.150) | 0.013 | 0.127 |
| 95 | 7.92 | 0.43 | 0.140 | ( 0.149) | 0.013 | 0.127 |
| 96 | 8.00 | 0.43 | 0.140 | ( 0.148) | 0.013 | 0.127 |
| 97 | 8.08 | 0.50 | 0.161 | ( 0.148) | 0.014 | 0.147 |
| 98 | 8.17 | 0.50 | 0.161 | ( 0.147) | 0.014 | 0.147 |
| 99 | 8.25 | 0.50 | 0.161 | ( 0.146) | 0.014 | 0.147 |
| 100 | 8.33 | 0.50 | 0.161 | ( 0.146) | 0.014 | 0.147 |
| 101 | 8.42 | 0.50 | 0.161 | ( 0.145) | 0.014 | 0.147 |
| 102 | 8.50 | 0.50 | 0.161 | ( 0.144) | 0.014 | 0.147 |
| 103 | 8.58 | 0.53 | 0.172 | ( 0.144) | 0.015 | 0.156 |
| 104 | 8.67 | 0.53 | 0.172 | ( 0.143) | 0.015 | 0.156 |
| 105 | 8.75 | 0.53 | 0.172 | ( 0.142) | 0.015 | 0.156 |
| 106 | 8.83 | 0.57 | 0.183 | ( 0.142) | 0.016 | 0.166 |
| 107 | 8.92 | 0.57 | 0.183 | ( 0.141) | 0.016 | 0.166 |
| 108 | 9.00 | 0.57 | 0.183 | ( 0.140) | 0.016 | 0.166 |
| 109 | 9.08 | 0.63 | 0.204 | ( 0.140) | 0.018 | 0.186 |
| 110 | 9.17 | 0.63 | 0.204 | ( 0.139) | 0.018 | 0.186 |
| 111 | 9.25 | 0.63 | 0.204 | ( 0.138) | 0.018 | 0.186 |
| 112 | 9.33 | 0.67 | 0.215 | ( 0.138) | 0.019 | 0.195 |
| 113 | 9.42 | 0.67 | 0.215 | ( 0.137) | 0.019 | 0.195 |
| 114 | 9.50 | 0.67 | 0.215 | ( 0.136) | 0.019 | 0.195 |
| 115 | 9.58 | 0.70 | 0.225 | ( 0.136) | 0.020 | 0.205 |
| 116 | 9.67 | 0.70 | 0.225 | ( 0.135) | 0.020 | 0.205 |
| 117 | 9.75 | 0.70 | 0.225 | ( 0.134) | 0.020 | 0.205 |
| 118 | 9.83 | 0.73 | 0.236 | ( 0.134) | 0.021 | 0.215 |
| 119 | 9.92 | 0.73 | 0.236 | ( 0.133) | 0.021 | 0.215 |
| 120 | 10.00 | 0.73 | 0.236 | ( 0.132) | 0.021 | 0.215 |
| 121 | 10.08 | 0.50 | 0.161 | ( 0.132) | 0.014 | 0.147 |
| 122 | 10.17 | 0.50 | 0.161 | ( 0.131) | 0.014 | 0.147 |
| 123 | 10.25 | 0.50 | 0.161 | ( 0.131) | 0.014 | 0.147 |
| 124 | 10.33 | 0.50 | 0.161 | ( 0.130) | 0.014 | 0.147 |
| 125 | 10.42 | 0.50 | 0.161 | ( 0.129) | 0.014 | 0.147 |
| 126 | 10.50 | 0.50 | 0.161 | ( 0.129) | 0.014 | 0.147 |
| 127 | 10.58 | 0.67 | 0.215 | ( 0.128) | 0.019 | 0.195 |
| 128 | 10.67 | 0.67 | 0.215 | ( 0.127) | 0.019 | 0.195 |
| 129 | 10.75 | 0.67 | 0.215 | ( 0.127) | 0.019 | 0.195 |
| 130 | 10.83 | 0.67 | 0.215 | ( 0.126) | 0.019 | 0.195 |
| 131 | 10.92 | 0.67 | 0.215 | ( 0.126) | 0.019 | 0.195 |
| 132 | 11.00 | 0.67 | 0.215 | ( 0.125) | 0.019 | 0.195 |
| 133 | 11.08 | 0.63 | 0.204 | ( 0.124) | 0.018 | 0.186 |
| 134 | 11.17 | 0.63 | 0.204 | ( 0.124) | 0.018 | 0.186 |
| 135 | 11.25 | 0.63 | 0.204 | ( 0.123) | 0.018 | 0.186 |
| 136 | 11.33 | 0.63 | 0.204 | ( 0.122) | 0.018 | 0.186 |
| 137 | 11.42 | 0.63 | 0.204 | ( 0.122) | 0.018 | 0.186 |
| 138 | 11.50 | 0.63 | 0.204 | ( 0.121) | 0.018 | 0.186 |
| 139 | 11.58 | 0.57 | 0.183 | ( 0.121) | 0.016 | 0.166 |
| 140 | 11.67 | 0.57 | 0.183 | ( 0.120) | 0.016 | 0.166 |
| 141 | 11.75 | 0.57 | 0.183 | ( 0.119) | 0.016 | 0.166 |
| 142 | 11.83 | 0.60 | 0.193 | ( 0.119) | 0.017 | 0.176 |
| 143 | 11.92 | 0.60 | 0.193 | ( 0.118) | 0.017 | 0.176 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 144 | 12.00 | 0.60 | 0.193 | ( 0.118) | 0.017 | 0.176 |
| 145 | 12.08 | 0.83 | 0.268 | ( 0.117) | 0.024 | 0.244 |
| 146 | 12.17 | 0.83 | 0.268 | ( 0.117) | 0.024 | 0.244 |
| 147 | 12.25 | 0.83 | 0.268 | ( 0.116) | 0.024 | 0.244 |
| 148 | 12.33 | 0.87 | 0.279 | ( 0.115) | 0.025 | 0.254 |
| 149 | 12.42 | 0.87 | 0.279 | ( 0.115) | 0.025 | 0.254 |
| 150 | 12.50 | 0.87 | 0.279 | ( 0.114) | 0.025 | 0.254 |
| 151 | 12.58 | 0.93 | 0.301 | ( 0.114) | 0.027 | 0.274 |
| 152 | 12.67 | 0.93 | 0.301 | ( 0.113) | 0.027 | 0.274 |
| 153 | 12.75 | 0.93 | 0.301 | ( 0.112) | 0.027 | 0.274 |
| 154 | 12.83 | 0.97 | 0.311 | ( 0.112) | 0.028 | 0.283 |
| 155 | 12.92 | 0.97 | 0.311 | ( 0.111) | 0.028 | 0.283 |
| 156 | 13.00 | 0.97 | 0.311 | ( 0.111) | 0.028 | 0.283 |
| 157 | 13.08 | 1.13 | 0.365 | ( 0.110) | 0.033 | 0.332 |
| 158 | 13.17 | 1.13 | 0.365 | ( 0.110) | 0.033 | 0.332 |
| 159 | 13.25 | 1.13 | 0.365 | ( 0.109) | 0.033 | 0.332 |
| 160 | 13.33 | 1.13 | 0.365 | ( 0.109) | 0.033 | 0.332 |
| 161 | 13.42 | 1.13 | 0.365 | ( 0.108) | 0.033 | 0.332 |
| 162 | 13.50 | 1.13 | 0.365 | ( 0.107) | 0.033 | 0.332 |
| 163 | 13.58 | 0.77 | 0.247 | ( 0.107) | 0.022 | 0.225 |
| 164 | 13.67 | 0.77 | 0.247 | ( 0.106) | 0.022 | 0.225 |
| 165 | 13.75 | 0.77 | 0.247 | ( 0.106) | 0.022 | 0.225 |
| 166 | 13.83 | 0.77 | 0.247 | ( 0.105) | 0.022 | 0.225 |
| 167 | 13.92 | 0.77 | 0.247 | ( 0.105) | 0.022 | 0.225 |
| 168 | 14.00 | 0.77 | 0.247 | ( 0.104) | 0.022 | 0.225 |
| 169 | 14.08 | 0.90 | 0.290 | ( 0.104) | 0.026 | 0.264 |
| 170 | 14.17 | 0.90 | 0.290 | ( 0.103) | 0.026 | 0.264 |
| 171 | 14.25 | 0.90 | 0.290 | ( 0.103) | 0.026 | 0.264 |
| 172 | 14.33 | 0.87 | 0.279 | ( 0.102) | 0.025 | 0.254 |
| 173 | 14.42 | 0.87 | 0.279 | ( 0.102) | 0.025 | 0.254 |
| 174 | 14.50 | 0.87 | 0.279 | ( 0.101) | 0.025 | 0.254 |
| 175 | 14.58 | 0.87 | 0.279 | ( 0.101) | 0.025 | 0.254 |
| 176 | 14.67 | 0.87 | 0.279 | ( 0.100) | 0.025 | 0.254 |
| 177 | 14.75 | 0.87 | 0.279 | ( 0.099) | 0.025 | 0.254 |
| 178 | 14.83 | 0.83 | 0.268 | ( 0.099) | 0.024 | 0.244 |
| 179 | 14.92 | 0.83 | 0.268 | ( 0.098) | 0.024 | 0.244 |
| 180 | 15.00 | 0.83 | 0.268 | ( 0.098) | 0.024 | 0.244 |
| 181 | 15.08 | 0.80 | 0.258 | ( 0.097) | 0.023 | 0.234 |
| 182 | 15.17 | 0.80 | 0.258 | ( 0.097) | 0.023 | 0.234 |
| 183 | 15.25 | 0.80 | 0.258 | ( 0.096) | 0.023 | 0.234 |
| 184 | 15.33 | 0.77 | 0.247 | ( 0.096) | 0.022 | 0.225 |
| 185 | 15.42 | 0.77 | 0.247 | ( 0.095) | 0.022 | 0.225 |
| 186 | 15.50 | 0.77 | 0.247 | ( 0.095) | 0.022 | 0.225 |
| 187 | 15.58 | 0.63 | 0.204 | ( 0.095) | 0.018 | 0.186 |
| 188 | 15.67 | 0.63 | 0.204 | ( 0.094) | 0.018 | 0.186 |
| 189 | 15.75 | 0.63 | 0.204 | ( 0.094) | 0.018 | 0.186 |
| 190 | 15.83 | 0.63 | 0.204 | ( 0.093) | 0.018 | 0.186 |
| 191 | 15.92 | 0.63 | 0.204 | ( 0.093) | 0.018 | 0.186 |
| 192 | 16.00 | 0.63 | 0.204 | ( 0.092) | 0.018 | 0.186 |
| 193 | 16.08 | 0.13 | 0.043 | ( 0.092) | 0.004 | 0.039 |
| 194 | 16.17 | 0.13 | 0.043 | ( 0.091) | 0.004 | 0.039 |
| 195 | 16.25 | 0.13 | 0.043 | ( 0.091) | 0.004 | 0.039 |
| 196 | 16.33 | 0.13 | 0.043 | ( 0.090) | 0.004 | 0.039 |
| 197 | 16.42 | 0.13 | 0.043 | ( 0.090) | 0.004 | 0.039 |
| 198 | 16.50 | 0.13 | 0.043 | ( 0.089) | 0.004 | 0.039 |
| 199 | 16.58 | 0.10 | 0.032 | ( 0.089) | 0.003 | 0.029 |
| 200 | 16.67 | 0.10 | 0.032 | ( 0.088) | 0.003 | 0.029 |
| 201 | 16.75 | 0.10 | 0.032 | ( 0.088) | 0.003 | 0.029 |
| 202 | 16.83 | 0.10 | 0.032 | ( 0.088) | 0.003 | 0.029 |
| 203 | 16.92 | 0.10 | 0.032 | ( 0.087) | 0.003 | 0.029 |
| 204 | 17.00 | 0.10 | 0.032 | ( 0.087) | 0.003 | 0.029 |
| 205 | 17.08 | 0.17 | 0.054 | ( 0.086) | 0.005 | 0.049 |
| 206 | 17.17 | 0.17 | 0.054 | ( 0.086) | 0.005 | 0.049 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 207 | 17.25 | 0.17 | 0.054 | ( 0.085) | 0.005 | 0.049 |
| 208 | 17.33 | 0.17 | 0.054 | ( 0.085) | 0.005 | 0.049 |
| 209 | 17.42 | 0.17 | 0.054 | ( 0.084) | 0.005 | 0.049 |
| 210 | 17.50 | 0.17 | 0.054 | ( 0.084) | 0.005 | 0.049 |
| 211 | 17.58 | 0.17 | 0.054 | ( 0.084) | 0.005 | 0.049 |
| 212 | 17.67 | 0.17 | 0.054 | ( 0.083) | 0.005 | 0.049 |
| 213 | 17.75 | 0.17 | 0.054 | ( 0.083) | 0.005 | 0.049 |
| 214 | 17.83 | 0.13 | 0.043 | ( 0.082) | 0.004 | 0.039 |
| 215 | 17.92 | 0.13 | 0.043 | ( 0.082) | 0.004 | 0.039 |
| 216 | 18.00 | 0.13 | 0.043 | ( 0.082) | 0.004 | 0.039 |
| 217 | 18.08 | 0.13 | 0.043 | ( 0.081) | 0.004 | 0.039 |
| 218 | 18.17 | 0.13 | 0.043 | ( 0.081) | 0.004 | 0.039 |
| 219 | 18.25 | 0.13 | 0.043 | ( 0.080) | 0.004 | 0.039 |
| 220 | 18.33 | 0.13 | 0.043 | ( 0.080) | 0.004 | 0.039 |
| 221 | 18.42 | 0.13 | 0.043 | ( 0.080) | 0.004 | 0.039 |
| 222 | 18.50 | 0.13 | 0.043 | ( 0.079) | 0.004 | 0.039 |
| 223 | 18.58 | 0.10 | 0.032 | ( 0.079) | 0.003 | 0.029 |
| 224 | 18.67 | 0.10 | 0.032 | ( 0.078) | 0.003 | 0.029 |
| 225 | 18.75 | 0.10 | 0.032 | ( 0.078) | 0.003 | 0.029 |
| 226 | 18.83 | 0.07 | 0.021 | ( 0.078) | 0.002 | 0.020 |
| 227 | 18.92 | 0.07 | 0.021 | ( 0.077) | 0.002 | 0.020 |
| 228 | 19.00 | 0.07 | 0.021 | ( 0.077) | 0.002 | 0.020 |
| 229 | 19.08 | 0.10 | 0.032 | ( 0.077) | 0.003 | 0.029 |
| 230 | 19.17 | 0.10 | 0.032 | ( 0.076) | 0.003 | 0.029 |
| 231 | 19.25 | 0.10 | 0.032 | ( 0.076) | 0.003 | 0.029 |
| 232 | 19.33 | 0.13 | 0.043 | ( 0.076) | 0.004 | 0.039 |
| 233 | 19.42 | 0.13 | 0.043 | ( 0.075) | 0.004 | 0.039 |
| 234 | 19.50 | 0.13 | 0.043 | ( 0.075) | 0.004 | 0.039 |
| 235 | 19.58 | 0.10 | 0.032 | ( 0.075) | 0.003 | 0.029 |
| 236 | 19.67 | 0.10 | 0.032 | ( 0.074) | 0.003 | 0.029 |
| 237 | 19.75 | 0.10 | 0.032 | ( 0.074) | 0.003 | 0.029 |
| 238 | 19.83 | 0.07 | 0.021 | ( 0.073) | 0.002 | 0.020 |
| 239 | 19.92 | 0.07 | 0.021 | ( 0.073) | 0.002 | 0.020 |
| 240 | 20.00 | 0.07 | 0.021 | ( 0.073) | 0.002 | 0.020 |
| 241 | 20.08 | 0.10 | 0.032 | ( 0.073) | 0.003 | 0.029 |
| 242 | 20.17 | 0.10 | 0.032 | ( 0.072) | 0.003 | 0.029 |
| 243 | 20.25 | 0.10 | 0.032 | ( 0.072) | 0.003 | 0.029 |
| 244 | 20.33 | 0.10 | 0.032 | ( 0.072) | 0.003 | 0.029 |
| 245 | 20.42 | 0.10 | 0.032 | ( 0.071) | 0.003 | 0.029 |
| 246 | 20.50 | 0.10 | 0.032 | ( 0.071) | 0.003 | 0.029 |
| 247 | 20.58 | 0.10 | 0.032 | ( 0.071) | 0.003 | 0.029 |
| 248 | 20.67 | 0.10 | 0.032 | ( 0.070) | 0.003 | 0.029 |
| 249 | 20.75 | 0.10 | 0.032 | ( 0.070) | 0.003 | 0.029 |
| 250 | 20.83 | 0.07 | 0.021 | ( 0.070) | 0.002 | 0.020 |
| 251 | 20.92 | 0.07 | 0.021 | ( 0.070) | 0.002 | 0.020 |
| 252 | 21.00 | 0.07 | 0.021 | ( 0.069) | 0.002 | 0.020 |
| 253 | 21.08 | 0.10 | 0.032 | ( 0.069) | 0.003 | 0.029 |
| 254 | 21.17 | 0.10 | 0.032 | ( 0.069) | 0.003 | 0.029 |
| 255 | 21.25 | 0.10 | 0.032 | ( 0.068) | 0.003 | 0.029 |
| 256 | 21.33 | 0.07 | 0.021 | ( 0.068) | 0.002 | 0.020 |
| 257 | 21.42 | 0.07 | 0.021 | ( 0.068) | 0.002 | 0.020 |
| 258 | 21.50 | 0.07 | 0.021 | ( 0.068) | 0.002 | 0.020 |
| 259 | 21.58 | 0.10 | 0.032 | ( 0.067) | 0.003 | 0.029 |
| 260 | 21.67 | 0.10 | 0.032 | ( 0.067) | 0.003 | 0.029 |
| 261 | 21.75 | 0.10 | 0.032 | ( 0.067) | 0.003 | 0.029 |
| 262 | 21.83 | 0.07 | 0.021 | ( 0.067) | 0.002 | 0.020 |
| 263 | 21.92 | 0.07 | 0.021 | ( 0.066) | 0.002 | 0.020 |
| 264 | 22.00 | 0.07 | 0.021 | ( 0.066) | 0.002 | 0.020 |
| 265 | 22.08 | 0.10 | 0.032 | ( 0.066) | 0.003 | 0.029 |
| 266 | 22.17 | 0.10 | 0.032 | ( 0.066) | 0.003 | 0.029 |
| 267 | 22.25 | 0.10 | 0.032 | ( 0.066) | 0.003 | 0.029 |
| 268 | 22.33 | 0.07 | 0.021 | ( 0.065) | 0.002 | 0.020 |
| 269 | 22.42 | 0.07 | 0.021 | ( 0.065) | 0.002 | 0.020 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 270 | 22.50 | 0.07 | 0.021 | ( 0.065) | 0.002 | 0.020 |
| 271 | 22.58 | 0.07 | 0.021 | ( 0.065) | 0.002 | 0.020 |
| 272 | 22.67 | 0.07 | 0.021 | ( 0.065) | 0.002 | 0.020 |
| 273 | 22.75 | 0.07 | 0.021 | ( 0.064) | 0.002 | 0.020 |
| 274 | 22.83 | 0.07 | 0.021 | ( 0.064) | 0.002 | 0.020 |
| 275 | 22.92 | 0.07 | 0.021 | ( 0.064) | 0.002 | 0.020 |
| 276 | 23.00 | 0.07 | 0.021 | ( 0.064) | 0.002 | 0.020 |
| 277 | 23.08 | 0.07 | 0.021 | ( 0.064) | 0.002 | 0.020 |
| 278 | 23.17 | 0.07 | 0.021 | ( 0.064) | 0.002 | 0.020 |
| 279 | 23.25 | 0.07 | 0.021 | ( 0.064) | 0.002 | 0.020 |
| 280 | 23.33 | 0.07 | 0.021 | ( 0.063) | 0.002 | 0.020 |
| 281 | 23.42 | 0.07 | 0.021 | ( 0.063) | 0.002 | 0.020 |
| 282 | 23.50 | 0.07 | 0.021 | ( 0.063) | 0.002 | 0.020 |
| 283 | 23.58 | 0.07 | 0.021 | ( 0.063) | 0.002 | 0.020 |
| 284 | 23.67 | 0.07 | 0.021 | ( 0.063) | 0.002 | 0.020 |
| 285 | 23.75 | 0.07 | 0.021 | ( 0.063) | 0.002 | 0.020 |
| 286 | 23.83 | 0.07 | 0.021 | ( 0.063) | 0.002 | 0.020 |
| 287 | 23.92 | 0.07 | 0.021 | ( 0.063) | 0.002 | 0.020 |
| 288 | 24.00 | 0.07 | 0.021 | ( 0.063) | 0.002 | 0.020 |

```
                  (Loss Rate Not Used)
    Sum =     100.0                                   Sum =    29.3
       Flood volume = Effective rainfall      2.44(In)
        times area      20.1(Ac.)/[(In)/(Ft.)] =       4.1(Ac.Ft)
       Total soil loss =      0.24(In)
       Total soil loss =     0.405(Ac.Ft)
       Total rainfall =      2.68(In)
       Flood volume =     178314.9 Cubic Feet
       Total soil loss =      17635.5 Cubic Feet
       --------------------------------------------------------------------
        Peak flow rate of this hydrograph =      6.713(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       0.0006      0.09  Q          |         |         |         |
   0+10       0.0025      0.28  VQ         |         |         |         |
   0+15       0.0048      0.34  VQ         |         |         |         |
   0+20       0.0076      0.41  VQ         |         |         |         |
   0+25       0.0112      0.52  V Q        |         |         |         |
   0+30       0.0150      0.56  V Q        |         |         |         |
   0+35       0.0190      0.57  V Q        |         |         |         |
   0+40       0.0230      0.59  V Q        |         |         |         |
   0+45       0.0271      0.59  V Q        |         |         |         |
   0+50       0.0314      0.64  V Q        |         |         |         |
   0+55       0.0365      0.73  V Q        |         |         |         |
   1+ 0       0.0417      0.76  V  Q       |         |         |         |
   1+ 5       0.0468      0.73  V Q        |         |         |         |
   1+10       0.0512      0.64  V Q        |         |         |         |
   1+15       0.0555      0.62  V Q        |         |         |         |
   1+20       0.0597      0.61  V Q        |         |         |         |
   1+25       0.0638      0.60  V Q        |         |         |         |
   1+30       0.0680      0.60  V Q        |         |         |         |
   1+35       0.0721      0.60  V Q        |         |         |         |
   1+40       0.0762      0.59  V Q        |         |         |         |
   1+45       0.0803      0.59  V Q        |         |         |         |
   1+50       0.0846      0.64  V Q        |         |         |         |
   1+55       0.0897      0.73  V Q        |         |         |         |
```

```
2+ 0       0.0949      0.76  V  Q      |         |         |         |
2+ 5       0.1003      0.78  V  Q      |         |         |         |
2+10       0.1057      0.78  |V Q      |         |         |         |
2+15       0.1111      0.79  |V Q      |         |         |         |
2+20       0.1166      0.79  |V Q      |         |         |         |
2+25       0.1220      0.79  |V Q      |         |         |         |
2+30       0.1275      0.79  |V Q      |         |         |         |
2+35       0.1332      0.84  |V Q      |         |         |         |
2+40       0.1396      0.93  |V Q      |         |         |         |
2+45       0.1463      0.96  |V Q      |         |         |         |
2+50       0.1530      0.97  |V Q      |         |         |         |
2+55       0.1597      0.98  |V Q      |         |         |         |
3+ 0       0.1665      0.99  |V Q      |         |         |         |
3+ 5       0.1733      0.99  |V Q      |         |         |         |
3+10       0.1802      0.99  |V Q      |         |         |         |
3+15       0.1870      0.99  |V Q      |         |         |         |
3+20       0.1938      0.99  |V Q      |         |         |         |
3+25       0.2006      0.99  |V Q      |         |         |         |
3+30       0.2074      0.99  | VQ      |         |         |         |
3+35       0.2143      0.99  | VQ      |         |         |         |
3+40       0.2211      0.99  | VQ      |         |         |         |
3+45       0.2279      0.99  | VQ      |         |         |         |
3+50       0.2350      1.03  | V Q     |         |         |         |
3+55       0.2428      1.13  | V Q     |         |         |         |
4+ 0       0.2508      1.16  | V Q     |         |         |         |
4+ 5       0.2589      1.17  | V Q     |         |         |         |
4+10       0.2670      1.18  | V Q     |         |         |         |
4+15       0.2751      1.18  | V Q     |         |         |         |
4+20       0.2836      1.23  | V Q     |         |         |         |
4+25       0.2928      1.33  | V  Q    |         |         |         |
4+30       0.3021      1.36  | V  Q    |         |         |         |
4+35       0.3115      1.37  |  V Q    |         |         |         |
4+40       0.3210      1.38  |  V Q    |         |         |         |
4+45       0.3305      1.38  |  V Q    |         |         |         |
4+50       0.3404      1.43  |  V Q    |         |         |         |
4+55       0.3509      1.53  |  V  Q   |         |         |         |
5+ 0       0.3616      1.56  |  V  Q   |         |         |         |
5+ 5       0.3718      1.48  |  V Q    |         |         |         |
5+10       0.3807      1.30  |  V Q    |         |         |         |
5+15       0.3893      1.24  |  VQ     |         |         |         |
5+20       0.3980      1.26  |  V Q    |         |         |         |
5+25       0.4073      1.35  |  V Q    |         |         |         |
5+30       0.4167      1.37  |   VQ    |         |         |         |
5+35       0.4265      1.42  |   VQ    |         |         |         |
5+40       0.4369      1.52  |   V Q   |         |         |         |
5+45       0.4476      1.55  |   V Q   |         |         |         |
5+50       0.4584      1.57  |   V Q   |         |         |         |
5+55       0.4692      1.58  |   V Q   |         |         |         |
6+ 0       0.4801      1.58  |   V Q   |         |         |         |
6+ 5       0.4913      1.63  |   V Q   |         |         |         |
6+10       0.5032      1.72  |   V Q   |         |         |         |
6+15       0.5153      1.75  |    V Q  |         |         |         |
6+20       0.5274      1.77  |    V Q  |         |         |         |
6+25       0.5396      1.77  |    V Q  |         |         |         |
6+30       0.5519      1.78  |    V Q  |         |         |         |
6+35       0.5644      1.82  |    V Q  |         |         |         |
6+40       0.5777      1.92  |    V Q  |         |         |         |
6+45       0.5911      1.95  |    V Q  |         |         |         |
6+50       0.6047      1.96  |    V Q  |         |         |         |
6+55       0.6182      1.97  |     VQ  |         |         |         |
7+ 0       0.6319      1.98  |     VQ  |         |         |         |
7+ 5       0.6455      1.98  |     VQ  |         |         |         |
7+10       0.6591      1.98  |     VQ  |         |         |         |
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 7+15       0.6728      1.98  |     VQ  |         |         |         |
 7+20       0.6867      2.02  |     V Q |         |         |         |
 7+25       0.7013      2.12  |     V Q |         |         |         |
 7+30       0.7161      2.15  |     V Q |         |         |         |
 7+35       0.7313      2.21  |      VQ |         |         |         |
 7+40       0.7472      2.31  |      V Q|         |         |         |
 7+45       0.7634      2.34  |      V Q|         |         |         |
 7+50       0.7799      2.40  |      V Q|         |         |         |
 7+55       0.7972      2.51  |      V  Q         |         |         |
 8+ 0       0.8147      2.54  |      V  Q         |         |         |
 8+ 5       0.8329      2.64  |       V Q         |         |         |
 8+10       0.8525      2.85  |       V |Q        |         |         |
 8+15       0.8725      2.91  |       V |Q        |         |         |
 8+20       0.8927      2.94  |       V |Q        |         |         |
 8+25       0.9131      2.95  |       V |Q        |         |         |
 8+30       0.9335      2.96  |        V|Q        |         |         |
 8+35       0.9542      3.01  |        V| Q       |         |         |
 8+40       0.9756      3.11  |        V| Q       |         |         |
 8+45       0.9972      3.14  |        V| Q       |         |         |
 8+50       1.0193      3.20  |        V| Q       |         |         |
 8+55       1.0420      3.30  |         V  Q      |         |         |
 9+ 0       1.0650      3.33  |         V  Q      |         |         |
 9+ 5       1.0886      3.44  |         V  Q      |         |         |
 9+10       1.1137      3.64  |         V   Q     |         |         |
 9+15       1.1391      3.70  |         |V  Q     |         |         |
 9+20       1.1651      3.77  |         |V   Q    |         |         |
 9+25       1.1919      3.89  |         |V   Q    |         |         |
 9+30       1.2189      3.92  |         |V   Q    |         |         |
 9+35       1.2463      3.98  |         | V  Q    |         |         |
 9+40       1.2745      4.09  |         | V   Q   |         |         |
 9+45       1.3029      4.13  |         | V   Q   |         |         |
 9+50       1.3318      4.18  |         |  V  Q   |         |         |
 9+55       1.3613      4.29  |         |  V   Q  |         |         |
10+ 0       1.3911      4.32  |         |  V   Q  |         |         |
10+ 5       1.4189      4.04  |         |  V  Q   |         |         |
10+10       1.4422      3.37  |         |  QV     |         |         |
10+15       1.4640      3.18  |         | Q V     |         |         |
10+20       1.4853      3.09  |         | Q V     |         |         |
10+25       1.5062      3.04  |         | Q V     |         |         |
10+30       1.5269      3.00  |         | Q V     |         |         |
10+35       1.5489      3.20  |         | Q  V    |         |         |
10+40       1.5742      3.67  |         |   QV    |         |         |
10+45       1.6005      3.81  |         |    Q    |         |         |
10+50       1.6272      3.88  |         |    Q    |         |         |
10+55       1.6542      3.92  |         |    QV   |         |         |
11+ 0       1.6813      3.94  |         |    QV   |         |         |
11+ 5       1.7082      3.91  |         |    QV   |         |         |
11+10       1.7345      3.82  |         |    QV   |         |         |
11+15       1.7607      3.79  |         |    Q V  |         |         |
11+20       1.7867      3.78  |         |    Q V  |         |         |
11+25       1.8127      3.77  |         |    Q V  |         |         |
11+30       1.8387      3.77  |         |    Q V  |         |         |
11+35       1.8640      3.68  |         |   Q   V |         |         |
11+40       1.8880      3.49  |         |  Q    V |         |         |
11+45       1.9116      3.43  |         |  Q    V |         |         |
11+50       1.9353      3.44  |         |  Q    V |         |         |
11+55       1.9596      3.53  |         |   Q    V|         |         |
12+ 0       1.9841      3.55  |         |   Q    V|         |         |
12+ 5       2.0106      3.85  |         |    Q   V|         |         |
12+10       2.0418      4.53  |         |       QV|         |         |
12+15       2.0745      4.74  |         |       Q V         |         |
12+20       2.1080      4.88  |         |        QV         |         |
12+25       2.1427      5.03  |         |         Q         |         |
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12+30       2.1777      5.09  |         |         QV        |         |
12+35       2.2136      5.21  |         |         QV        |         |
12+40       2.2509      5.42  |         |         |Q        |         |
12+45       2.2887      5.48  |         |         |QV       |         |
12+50       2.3269      5.56  |         |         | Q       |         |
12+55       2.3660      5.67  |         |         | QV      |         |
13+ 0       2.4053      5.71  |         |         | QV      |         |
13+ 5       2.4462      5.94  |         |         |  Q      |         |
13+10       2.4905      6.43  |         |         |   VQ    |         |
13+15       2.5358      6.58  |         |         |   V Q   |         |
13+20       2.5816      6.65  |         |         |    VQ   |         |
13+25       2.6277      6.69  |         |         |    VQ   |         |
13+30       2.6739      6.71  |         |         |     Q   |         |
13+35       2.7170      6.26  |         |         |    QV   |         |
13+40       2.7528      5.20  |         |         Q     V   |         |
13+45       2.7865      4.88  |         |        Q|      V  |         |
13+50       2.8191      4.74  |         |       Q |      V  |         |
13+55       2.8512      4.66  |         |       Q |      V  |         |
14+ 0       2.8830      4.61  |         |       Q |       V |         |
14+ 5       2.9157      4.75  |         |       Q |       V |         |
14+10       2.9509      5.11  |         |         Q       V |         |
14+15       2.9869      5.23  |         |         Q        V|         |
14+20       3.0230      5.24  |         |         Q        V|         |
14+25       3.0586      5.17  |         |         Q        V|         |
14+30       3.0942      5.16  |         |         Q         V         |
14+35       3.1297      5.16  |         |         Q         V         |
14+40       3.1653      5.16  |         |         Q         V         |
14+45       3.2008      5.16  |         |         Q         |V        |
14+50       3.2360      5.11  |         |         Q         |V        |
14+55       3.2705      5.01  |         |         Q         |V        |
15+ 0       3.3048      4.98  |         |        Q|         | V       |
15+ 5       3.3387      4.93  |         |        Q|         | V       |
15+10       3.3720      4.82  |         |        Q|         | V       |
15+15       3.4049      4.79  |         |        Q|         |  V      |
15+20       3.4375      4.73  |         |       Q |         |  V      |
15+25       3.4694      4.62  |         |       Q |         |  V      |
15+30       3.5010      4.59  |         |       Q |         |   V     |
15+35       3.5313      4.40  |         |      Q  |         |   V     |
15+40       3.5589      4.01  |         |     Q   |         |   V     |
15+45       3.5857      3.89  |         |    Q    |         |    V    |
15+50       3.6121      3.83  |         |    Q    |         |    V    |
15+55       3.6383      3.80  |         |    Q    |         |    V    |
16+ 0       3.6643      3.78  |         |    Q    |         |    V    |
16+ 5       3.6859      3.13  |         | Q       |         |     V   |
16+10       3.6974      1.67  |     Q   |         |         |     V   |
16+15       3.7060      1.24  |   Q     |         |         |     V   |
16+20       3.7131      1.04  |   Q     |         |         |     V   |
16+25       3.7196      0.93  |  Q      |         |         |     V   |
16+30       3.7255      0.86  |  Q      |         |         |     V   |
16+35       3.7309      0.78  |  Q      |         |         |     V   |
16+40       3.7354      0.65  | Q       |         |         |     V   |
16+45       3.7397      0.62  | Q       |         |         |     V   |
16+50       3.7439      0.61  | Q       |         |         |     V   |
16+55       3.7480      0.60  | Q       |         |         |     V   |
17+ 0       3.7522      0.60  | Q       |         |         |     V   |
17+ 5       3.7568      0.68  | Q       |         |         |     V   |
17+10       3.7629      0.87  |  Q      |         |         |     V   |
17+15       3.7693      0.93  |  Q      |         |         |     V   |
17+20       3.7759      0.96  |  Q      |         |         |     V   |
17+25       3.7826      0.97  |  Q      |         |         |     V   |
17+30       3.7893      0.98  |  Q      |         |         |      V  |
17+35       3.7961      0.99  |  Q      |         |         |      V  |
17+40       3.8029      0.99  |  Q      |         |         |      V  |
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17+45       3.8098      0.99  |  Q      |         |         |      V  |
17+50       3.8163      0.95  |  Q      |         |         |      V  |
17+55       3.8222      0.85  |  Q      |         |         |      V  |
18+ 0       3.8278      0.82  |  Q      |         |         |      V  |
18+ 5       3.8334      0.81  |  Q      |         |         |      V  |
18+10       3.8389      0.80  |  Q      |         |         |      V  |
18+15       3.8444      0.80  |  Q      |         |         |      V  |
18+20       3.8499      0.79  |  Q      |         |         |      V  |
18+25       3.8553      0.79  |  Q      |         |         |      V  |
18+30       3.8608      0.79  |  Q      |         |         |      V  |
18+35       3.8660      0.75  | Q       |         |         |      V  |
18+40       3.8704      0.65  | Q       |         |         |      V  |
18+45       3.8747      0.62  | Q       |         |         |      V  |
18+50       3.8787      0.57  | Q       |         |         |      V  |
18+55       3.8819      0.46  |Q        |         |         |      V  |
19+ 0       3.8848      0.43  |Q        |         |         |      V  |
19+ 5       3.8880      0.46  |Q        |         |         |      V  |
19+10       3.8917      0.55  | Q       |         |         |       V |
19+15       3.8957      0.57  | Q       |         |         |       V |
19+20       3.8999      0.62  | Q       |         |         |       V |
19+25       3.9049      0.72  | Q       |         |         |       V |
19+30       3.9101      0.76  |  Q      |         |         |       V |
19+35       3.9152      0.73  | Q       |         |         |       V |
19+40       3.9196      0.64  | Q       |         |         |       V |
19+45       3.9239      0.62  | Q       |         |         |       V |
19+50       3.9278      0.57  | Q       |         |         |       V |
19+55       3.9310      0.46  |Q        |         |         |       V |
20+ 0       3.9339      0.43  |Q        |         |         |       V |
20+ 5       3.9371      0.46  |Q        |         |         |       V |
20+10       3.9409      0.55  | Q       |         |         |       V |
20+15       3.9448      0.57  | Q       |         |         |       V |
20+20       3.9488      0.58  | Q       |         |         |       V |
20+25       3.9528      0.59  | Q       |         |         |       V |
20+30       3.9569      0.59  | Q       |         |         |       V |
20+35       3.9609      0.59  | Q       |         |         |       V |
20+40       3.9650      0.59  | Q       |         |         |       V |
20+45       3.9691      0.59  | Q       |         |         |       V |
20+50       3.9729      0.55  | Q       |         |         |       V |
20+55       3.9761      0.45  |Q        |         |         |       V |
21+ 0       3.9790      0.43  |Q        |         |         |       V |
21+ 5       3.9821      0.46  |Q        |         |         |       V |
21+10       3.9859      0.55  | Q       |         |         |       V |
21+15       3.9898      0.57  | Q       |         |         |       V |
21+20       3.9935      0.54  | Q       |         |         |        V|
21+25       3.9966      0.45  |Q        |         |         |        V|
21+30       3.9995      0.42  |Q        |         |         |        V|
21+35       4.0026      0.45  |Q        |         |         |        V|
21+40       4.0063      0.55  | Q       |         |         |        V|
21+45       4.0103      0.57  | Q       |         |         |        V|
21+50       4.0140      0.54  | Q       |         |         |        V|
21+55       4.0170      0.45  |Q        |         |         |        V|
22+ 0       4.0199      0.42  |Q        |         |         |        V|
22+ 5       4.0231      0.45  |Q        |         |         |        V|
22+10       4.0268      0.55  | Q       |         |         |        V|
22+15       4.0307      0.57  | Q       |         |         |        V|
22+20       4.0344      0.54  | Q       |         |         |        V|
22+25       4.0375      0.45  |Q        |         |         |        V|
22+30       4.0404      0.42  |Q        |         |         |        V|
22+35       4.0432      0.41  |Q        |         |         |        V|
22+40       4.0460      0.41  |Q        |         |         |        V|
22+45       4.0488      0.40  |Q        |         |         |        V|
22+50       4.0515      0.40  |Q        |         |         |        V|
22+55       4.0543      0.40  |Q        |         |         |        V|
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  23+ 0        4.0570       0.40  |Q         |         |         |        V|
  23+ 5        4.0597       0.40  |Q         |         |         |        V|
  23+10        4.0625       0.40  |Q         |         |         |        V|
  23+15        4.0652       0.40  |Q         |         |         |        V|
  23+20        4.0679       0.40  |Q         |         |         |        V|
  23+25        4.0706       0.40  |Q         |         |         |        V|
  23+30        4.0734       0.40  |Q         |         |         |        V|
  23+35        4.0761       0.40  |Q         |         |         |        V|
  23+40        4.0788       0.40  |Q         |         |         |        V|
  23+45        4.0816       0.40  |Q         |         |         |        V|
  23+50        4.0843       0.40  |Q         |         |         |        V|
  23+55        4.0870       0.40  |Q         |         |         |        V|
  24+ 0        4.0897       0.40  |Q         |         |         |        V|
  24+ 5        4.0919       0.31  |Q         |         |         |        V|
  24+10        4.0927       0.12  Q          |         |         |        V|
  24+15        4.0931       0.06  Q          |         |         |        V|
  24+20        4.0933       0.03  Q          |         |         |        V|
  24+25        4.0935       0.02  Q          |         |         |        V|
  24+30        4.0935       0.01  Q          |         |         |        V|
  24+35        4.0935       0.00  Q          |         |         |        V|
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SWCRP110

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


Study date 10/30/20 File: SWCRP110.out

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------------------------------------------------------------------------

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

Program License Serial Number 6232

---------------------------------------------------------------------

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

English Units used in output format

---------------------------------------------------------------------

SWC Ramona & Perris
Proposed Condition

--------------------------------------------------------------------

Drainage Area = 20.11(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.11(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1669.00(Ft.)
Length along longest watercourse measured to centroid = 1035.00(Ft.)
Length along longest watercourse = 0.316 Mi.
Length along longest watercourse measured to centroid = 0.196 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 12.6543 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.077 Hr.
Lag time = 4.63 Min.
25% of lag time = 1.16 Min.
40% of lag time = 1.85 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 0.47 | 9.37 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 1.35 | 27.15 |

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 0.466(In)
Area Averaged 100-Year Rainfall = 1.350(In)

Point rain (area averaged) = 0.830(In)
Areal adjustment factor = 99.98 %
Adjusted average point rain = 0.830(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 61.00 | 0.900 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-2 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 61.0 | 61.0 | 0.459 | 0.900 | 0.087 | 1.000 | 0.087 |
| | | | | | Sum (F) = | 0.087 |

Area averaged mean soil loss (F) (In/Hr) = 0.087
Minimum soil loss rate ((In/Hr)) = 0.044
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.090

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Slope of intensity-duration curve for a 1 hour storm =0.5000

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

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Unit Hydrograph Data

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| Unit time period (hrs) | | Time % of lag | Distribution Graph % | Unit Hydrograph (CFS) |
|---|---|---|---|---|
| 1 | 0.083 | 107.878 | 21.601 | 4.378 |
| 2 | 0.167 | 215.756 | 48.792 | 9.889 |
| 3 | 0.250 | 323.634 | 14.560 | 2.951 |
| 4 | 0.333 | 431.512 | 6.653 | 1.348 |
| 5 | 0.417 | 539.389 | 3.696 | 0.749 |
| 6 | 0.500 | 647.267 | 2.334 | 0.473 |
| 7 | 0.583 | 755.145 | 1.376 | 0.279 |
| 8 | 0.667 | 863.023 | 0.988 | 0.200 |
| | | | Sum = 100.000 | Sum= 20.267 |

---

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 | Timu (Hr.) | Pattern Percent | Storm Rain (In/Hr) | Loss rate(In./Hr) Max | Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 4.20 | 0.418 | ( 0.087) | 0.038 | 0.380 |
| 2 | 0.17 | 4.30 | 0.428 | ( 0.087) | 0.039 | 0.390 |
| 3 | 0.25 | 5.00 | 0.498 | ( 0.087) | 0.045 | 0.453 |
| 4 | 0.33 | 5.00 | 0.498 | ( 0.087) | 0.045 | 0.453 |
| 5 | 0.42 | 5.80 | 0.577 | ( 0.087) | 0.052 | 0.525 |
| 6 | 0.50 | 6.50 | 0.647 | ( 0.087) | 0.058 | 0.589 |
| 7 | 0.58 | 7.40 | 0.737 | ( 0.087) | 0.066 | 0.670 |
| 8 | 0.67 | 8.60 | 0.856 | ( 0.087) | 0.077 | 0.779 |
| 9 | 0.75 | 12.30 | 1.224 | 0.087 | ( 0.110) | 1.137 |
| 10 | 0.83 | 29.10 | 2.897 | 0.087 | ( 0.261) | 2.809 |
| 11 | 0.92 | 6.80 | 0.677 | ( 0.087) | 0.061 | 0.616 |
| 12 | 1.00 | 5.00 | 0.498 | ( 0.087) | 0.045 | 0.453 |

(Loss Rate Not Used)
Sum = 100.0 Sum = 9.3
Flood volume = Effective rainfall 0.77(In)

```
 times area      20.1(Ac.)/[(In)/(Ft.)] =       1.3(Ac.Ft)
Total soil loss =      0.06(In)
Total soil loss =     0.098(Ac.Ft)
Total rainfall =      0.83(In)
Flood volume =       56300.2 Cubic Feet
Total soil loss =        4255.2 Cubic Feet
--------------------------------------------------------------------
 Peak flow rate of this hydrograph =     35.922(CFS)
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    1 - H O U R   S T O R M
               R u n o f f     H y d r o g r a p h
--------------------------------------------------------------------
             Hydrograph in   5   Minute intervals ((CFS))

--------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0       10.0      20.0      30.0      40.0
-----------------------------------------------------------------------
  0+ 5       0.0115      1.67  VQ        |         |         |         |
  0+10       0.0492      5.47  |V   Q    |         |         |         |
  0+15       0.0971      6.96  |  V  Q   |         |         |         |
  0+20       0.1531      8.13  |   V   Q |         |         |         |
  0+25       0.2146      8.93  |     V Q |         |         |         |
  0+30       0.2848     10.20  |       V Q         |         |         |
  0+35       0.3644     11.55  |         |Q        |         |         |
  0+40       0.4555     13.23  |         |   QV    |         |         |
  0+45       0.5676     16.27  |         |      QV |         |         |
  0+50       0.7581     27.67  |         |         | V   Q   |         |
  0+55       1.0055     35.92  |         |         |         |V   Q    |
  1+ 0       1.1369     19.08  |         |        Q|         |    V    |
  1+ 5       1.2169     11.62  |         |Q        |         |      V  |
  1+10       1.2525      5.16  |    Q    |         |         |       V |
  1+15       1.2723      2.88  | Q       |         |         |        V|
  1+20       1.2836      1.64  |Q        |         |         |        V|
  1+25       1.2901      0.95  Q         |         |         |        V|
  1+30       1.2918      0.25  Q         |         |         |        V|
  1+35       1.2925      0.09  Q         |         |         |         V
-----------------------------------------------------------------------



0.51  Q         |         |         |        V|
  1+40       0.9303      0.10  Q         |         |         |        V|
  1+45       0.9305      0.03  Q         |         |         |         V
-----------------------------------------------------------------------
```

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

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                  Study date  10/30/20 File: SWCRP310.out

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


Program License Serial Number 6232

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

 English Units used in output format



---------------------------------------------------------------------
SWC Ramona & Perris
Proposed Condition


--------------------------------------------------------------------
Drainage Area =      20.11(Ac.)  =      0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      20.11(Ac.)  =
0.031 Sq. Mi.
Length along longest watercourse =    1669.00(Ft.)
Length along longest watercourse measured to centroid =    1035.00(Ft.)
Length along longest watercourse =      0.316 Mi.
Length along longest watercourse measured to centroid =      0.196 Mi.
Difference in elevation =       4.00(Ft.)
Slope along watercourse =     12.6543 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.077 Hr.
Lag time =     4.63 Min.
25% of lag time =     1.16 Min.
40% of lag time =     1.85 Min.
Unit time =     5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       20.11            0.82                   16.47

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       20.11            2.04                   41.02

STORM EVENT (YEAR) =   10.00
Area Averaged 2-Year Rainfall =    0.819(In)
Area Averaged 100-Year Rainfall =    2.040(In)
```

Point rain (area averaged) = 1.321(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.321(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 61.00 | 0.900 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-2 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 61.0 | 61.0 | 0.459 | 0.900 | 0.087 | 1.000 | 0.087 |
| | | | | | Sum (F) = | 0.087 |

Area averaged mean soil loss (F) (In/Hr) = 0.087
Minimum soil loss rate ((In/Hr)) = 0.044
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.090

---

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 | 107.878 | 21.601 | 4.378 |
| 2 | 0.167 | 215.756 | 48.792 | 9.889 |
| 3 | 0.250 | 323.634 | 14.560 | 2.951 |
| 4 | 0.333 | 431.512 | 6.653 | 1.348 |
| 5 | 0.417 | 539.389 | 3.696 | 0.749 |
| 6 | 0.500 | 647.267 | 2.334 | 0.473 |
| 7 | 0.583 | 755.145 | 1.376 | 0.279 |
| 8 | 0.667 | 863.023 | 0.988 | 0.200 |
| | | | Sum = 100.000 | Sum= 20.267 |

---

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 | Loss rate(In./Hr) Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 1.30 | 0.206 | ( 0.087) | 0.019 | 0.188 |
| 2 | 0.17 | 1.30 | 0.206 | ( 0.087) | 0.019 | 0.188 |
| 3 | 0.25 | 1.10 | 0.174 | ( 0.087) | 0.016 | 0.159 |
| 4 | 0.33 | 1.50 | 0.238 | ( 0.087) | 0.021 | 0.216 |
| 5 | 0.42 | 1.50 | 0.238 | ( 0.087) | 0.021 | 0.216 |
| 6 | 0.50 | 1.80 | 0.285 | ( 0.087) | 0.026 | 0.260 |
| 7 | 0.58 | 1.50 | 0.238 | ( 0.087) | 0.021 | 0.216 |
| 8 | 0.67 | 1.80 | 0.285 | ( 0.087) | 0.026 | 0.260 |
| 9 | 0.75 | 1.80 | 0.285 | ( 0.087) | 0.026 | 0.260 |
| 10 | 0.83 | 1.50 | 0.238 | ( 0.087) | 0.021 | 0.216 |
| 11 | 0.92 | 1.60 | 0.254 | ( 0.087) | 0.023 | 0.231 |
| 12 | 1.00 | 1.80 | 0.285 | ( 0.087) | 0.026 | 0.260 |
| 13 | 1.08 | 2.20 | 0.349 | ( 0.087) | 0.031 | 0.317 |
| 14 | 1.17 | 2.20 | 0.349 | ( 0.087) | 0.031 | 0.317 |
| 15 | 1.25 | 2.20 | 0.349 | ( 0.087) | 0.031 | 0.317 |
| 16 | 1.33 | 2.00 | 0.317 | ( 0.087) | 0.029 | 0.289 |
| 17 | 1.42 | 2.60 | 0.412 | ( 0.087) | 0.037 | 0.375 |

```
18   1.50     2.70      0.428       (  0.087)       0.039        0.390
19   1.58     2.40      0.381       (  0.087)       0.034        0.346
20   1.67     2.70      0.428       (  0.087)       0.039        0.390
21   1.75     3.30      0.523       (  0.087)       0.047        0.476
22   1.83     3.10      0.491       (  0.087)       0.044        0.447
23   1.92     2.90      0.460       (  0.087)       0.041        0.418
24   2.00     3.00      0.476       (  0.087)       0.043        0.433
25   2.08     3.10      0.491       (  0.087)       0.044        0.447
26   2.17     4.20      0.666       (  0.087)       0.060        0.606
27   2.25     5.00      0.793       (  0.087)       0.071        0.721
28   2.33     3.50      0.555       (  0.087)       0.050        0.505
29   2.42     6.80      1.078          0.087    (  0.097)        0.991
30   2.50     7.30      1.157          0.087    (  0.104)        1.070
31   2.58     8.20      1.300          0.087    (  0.117)        1.213
32   2.67     5.90      0.935       (  0.087)       0.084        0.851
33   2.75     2.00      0.317       (  0.087)       0.029        0.289
34   2.83     1.80      0.285       (  0.087)       0.026        0.260
35   2.92     1.80      0.285       (  0.087)       0.026        0.260
36   3.00     0.60      0.095       (  0.087)       0.009        0.087
               (Loss Rate Not Used)
   Sum =     100.0                                     Sum =    14.5
      Flood volume = Effective rainfall      1.21(In)
       times area      20.1(Ac.)/[(In)/(Ft.)] =       2.0(Ac.Ft)
      Total soil loss =      0.11(In)
      Total soil loss =     0.191(Ac.Ft)
      Total rainfall =      1.32(In)
      Flood volume =       88110.8 Cubic Feet
      Total soil loss =        8336.8 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     21.203(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          3 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
-----------------------------------------------------------------------
  0+ 5       0.0057      0.82  VQ        |         |         |         |
  0+10       0.0241      2.68  V  Q      |         |         |         |
  0+15       0.0455      3.10  V   Q     |         |         |         |
  0+20       0.0684      3.32  |V  Q     |         |         |         |
  0+25       0.0956      3.95  |V   Q    |         |         |         |
  0+30       0.1256      4.36  | V  Q    |         |         |         |
  0+35       0.1581      4.71  |  V  Q   |         |         |         |
  0+40       0.1902      4.66  |  V  Q   |         |         |         |
  0+45       0.2249      5.04  |   V Q   |         |         |         |
  0+50       0.2591      4.97  |    VQ   |         |         |         |
  0+55       0.2912      4.66  |    VQ   |         |         |         |
  1+ 0       0.3244      4.82  |     Q   |         |         |         |
  1+ 5       0.3613      5.36  |      Q  |         |         |         |
  1+10       0.4027      6.01  |      VQ |         |         |         |
  1+15       0.4456      6.22  |       Q |         |         |         |
  1+20       0.4882      6.19  |       QV|         |         |         |
  1+25       0.5318      6.33  |       Q V         |         |         |
  1+30       0.5814      7.20  |        Q|V        |         |         |
  1+35       0.6323      7.40  |        Q| V       |         |         |
  1+40       0.6826      7.31  |        Q|  V      |         |         |
  1+45       0.7381      8.06  |         Q   V     |         |         |
  1+50       0.7994      8.90  |         |Q   V    |         |         |
  1+55       0.8600      8.80  |         |Q     V  |         |         |
```

```
  2+ 0       0.9195      8.64  |          |Q       V |         |         |
  2+ 5       0.9801      8.80  |          |Q        V|         |         |
  2+10       1.0466      9.66  |          | Q        V         |         |
  2+15       1.1278     11.80  |          |     Q    | V       |         |
  2+20       1.2138     12.48  |          |      Q   |   V     |         |
  2+25       1.3036     13.03  |          |       Q  |    V    |         |
  2+30       1.4263     17.83  |          |          |  Q    V |         |
  2+35       1.5678     20.55  |          |          |      Q  |V        |
  2+40       1.7138     21.20  |          |          |       Q |  V      |
  2+45       1.8241     16.01  |          |          |Q        |     V   |
  2+50       1.8909      9.70  |          | Q        |         |      V  |
  2+55       1.9426      7.50  |          Q          |         |       V |
  3+ 0       1.9826      5.81  |       Q  |          |         |        V|
  3+ 5       2.0043      3.15  |    Q     |          |         |        V|
  3+10       2.0141      1.42  |Q         |          |         |        V|
  3+15       2.0188      0.69  Q          |          |         |        V|
  3+20       2.0210      0.32  Q          |          |         |        V|
  3+25       2.0221      0.17  Q          |          |         |        V|
  3+30       2.0226      0.08  Q          |          |         |        V|
  3+35       2.0227      0.02  Q          |          |         |        V|
-----------------------------------------------------------------------


0.03  Q         |         |         |        V|
  3+40       1.0409      0.01  Q          |          |         |        V|
  3+45       1.0409      0.00  Q          |          |         |         V
-----------------------------------------------------------------------
```

SWCRP610

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


Study date 10/30/20 File: SWCRP610.out

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------------------------------------------------------------------------

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

Program License Serial Number 6232

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

English Units used in output format

---------------------------------------------------------------------
SWC Ramona & Perris
Proposed Condition

--------------------------------------------------------------------
Drainage Area = 20.11(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.11(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1669.00(Ft.)
Length along longest watercourse measured to centroid = 1035.00(Ft.)
Length along longest watercourse = 0.316 Mi.
Length along longest watercourse measured to centroid = 0.196 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 12.6543 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.077 Hr.
Lag time = 4.63 Min.
25% of lag time = 1.16 Min.
40% of lag time = 1.85 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 1.14 | 22.93 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 3.69 | 74.21 |

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 1.140(In)
Area Averaged 100-Year Rainfall = 3.690(In)

Point rain (area averaged) = 2.189(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 2.189(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 61.00 | 0.900 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-2 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 61.0 | 61.0 | 0.459 | 0.900 | 0.087 | 1.000 | 0.087 |
| | | | | | Sum (F) = | 0.087 |

Area averaged mean soil loss (F) (In/Hr) = 0.087
Minimum soil loss rate ((In/Hr)) = 0.044
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.090

---

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 | 107.878 | 21.601 | 4.378 |
| 2 | 0.167 | 215.756 | 48.792 | 9.889 |
| 3 | 0.250 | 323.634 | 14.560 | 2.951 |
| 4 | 0.333 | 431.512 | 6.653 | 1.348 |
| 5 | 0.417 | 539.389 | 3.696 | 0.749 |
| 6 | 0.500 | 647.267 | 2.334 | 0.473 |
| 7 | 0.583 | 755.145 | 1.376 | 0.279 |
| 8 | 0.667 | 863.023 | 0.988 | 0.200 |
| | | | Sum = 100.000 | Sum= 20.267 |

---

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 | 0.50 | 0.131 | ( 0.087) | 0.012 | 0.120 |
| 2 | 0.17 | 0.60 | 0.158 | ( 0.087) | 0.014 | 0.143 |
| 3 | 0.25 | 0.60 | 0.158 | ( 0.087) | 0.014 | 0.143 |
| 4 | 0.33 | 0.60 | 0.158 | ( 0.087) | 0.014 | 0.143 |
| 5 | 0.42 | 0.60 | 0.158 | ( 0.087) | 0.014 | 0.143 |
| 6 | 0.50 | 0.70 | 0.184 | ( 0.087) | 0.017 | 0.167 |
| 7 | 0.58 | 0.70 | 0.184 | ( 0.087) | 0.017 | 0.167 |
| 8 | 0.67 | 0.70 | 0.184 | ( 0.087) | 0.017 | 0.167 |
| 9 | 0.75 | 0.70 | 0.184 | ( 0.087) | 0.017 | 0.167 |
| 10 | 0.83 | 0.70 | 0.184 | ( 0.087) | 0.017 | 0.167 |
| 11 | 0.92 | 0.70 | 0.184 | ( 0.087) | 0.017 | 0.167 |
| 12 | 1.00 | 0.80 | 0.210 | ( 0.087) | 0.019 | 0.191 |
| 13 | 1.08 | 0.80 | 0.210 | ( 0.087) | 0.019 | 0.191 |
| 14 | 1.17 | 0.80 | 0.210 | ( 0.087) | 0.019 | 0.191 |
| 15 | 1.25 | 0.80 | 0.210 | ( 0.087) | 0.019 | 0.191 |
| 16 | 1.33 | 0.80 | 0.210 | ( 0.087) | 0.019 | 0.191 |
| 17 | 1.42 | 0.80 | 0.210 | ( 0.087) | 0.019 | 0.191 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 18 | 1.50 | 0.80 | 0.210 | ( 0.087) | 0.019 | 0.191 |
| 19 | 1.58 | 0.80 | 0.210 | ( 0.087) | 0.019 | 0.191 |
| 20 | 1.67 | 0.80 | 0.210 | ( 0.087) | 0.019 | 0.191 |
| 21 | 1.75 | 0.80 | 0.210 | ( 0.087) | 0.019 | 0.191 |
| 22 | 1.83 | 0.80 | 0.210 | ( 0.087) | 0.019 | 0.191 |
| 23 | 1.92 | 0.80 | 0.210 | ( 0.087) | 0.019 | 0.191 |
| 24 | 2.00 | 0.90 | 0.236 | ( 0.087) | 0.021 | 0.215 |
| 25 | 2.08 | 0.80 | 0.210 | ( 0.087) | 0.019 | 0.191 |
| 26 | 2.17 | 0.90 | 0.236 | ( 0.087) | 0.021 | 0.215 |
| 27 | 2.25 | 0.90 | 0.236 | ( 0.087) | 0.021 | 0.215 |
| 28 | 2.33 | 0.90 | 0.236 | ( 0.087) | 0.021 | 0.215 |
| 29 | 2.42 | 0.90 | 0.236 | ( 0.087) | 0.021 | 0.215 |
| 30 | 2.50 | 0.90 | 0.236 | ( 0.087) | 0.021 | 0.215 |
| 31 | 2.58 | 0.90 | 0.236 | ( 0.087) | 0.021 | 0.215 |
| 32 | 2.67 | 0.90 | 0.236 | ( 0.087) | 0.021 | 0.215 |
| 33 | 2.75 | 1.00 | 0.263 | ( 0.087) | 0.024 | 0.239 |
| 34 | 2.83 | 1.00 | 0.263 | ( 0.087) | 0.024 | 0.239 |
| 35 | 2.92 | 1.00 | 0.263 | ( 0.087) | 0.024 | 0.239 |
| 36 | 3.00 | 1.00 | 0.263 | ( 0.087) | 0.024 | 0.239 |
| 37 | 3.08 | 1.00 | 0.263 | ( 0.087) | 0.024 | 0.239 |
| 38 | 3.17 | 1.10 | 0.289 | ( 0.087) | 0.026 | 0.263 |
| 39 | 3.25 | 1.10 | 0.289 | ( 0.087) | 0.026 | 0.263 |
| 40 | 3.33 | 1.10 | 0.289 | ( 0.087) | 0.026 | 0.263 |
| 41 | 3.42 | 1.20 | 0.315 | ( 0.087) | 0.028 | 0.287 |
| 42 | 3.50 | 1.30 | 0.341 | ( 0.087) | 0.031 | 0.311 |
| 43 | 3.58 | 1.40 | 0.368 | ( 0.087) | 0.033 | 0.335 |
| 44 | 3.67 | 1.40 | 0.368 | ( 0.087) | 0.033 | 0.335 |
| 45 | 3.75 | 1.50 | 0.394 | ( 0.087) | 0.035 | 0.359 |
| 46 | 3.83 | 1.50 | 0.394 | ( 0.087) | 0.035 | 0.359 |
| 47 | 3.92 | 1.60 | 0.420 | ( 0.087) | 0.038 | 0.382 |
| 48 | 4.00 | 1.60 | 0.420 | ( 0.087) | 0.038 | 0.382 |
| 49 | 4.08 | 1.70 | 0.447 | ( 0.087) | 0.040 | 0.406 |
| 50 | 4.17 | 1.80 | 0.473 | ( 0.087) | 0.043 | 0.430 |
| 51 | 4.25 | 1.90 | 0.499 | ( 0.087) | 0.045 | 0.454 |
| 52 | 4.33 | 2.00 | 0.525 | ( 0.087) | 0.047 | 0.478 |
| 53 | 4.42 | 2.10 | 0.552 | ( 0.087) | 0.050 | 0.502 |
| 54 | 4.50 | 2.10 | 0.552 | ( 0.087) | 0.050 | 0.502 |
| 55 | 4.58 | 2.20 | 0.578 | ( 0.087) | 0.052 | 0.526 |
| 56 | 4.67 | 2.30 | 0.604 | ( 0.087) | 0.054 | 0.550 |
| 57 | 4.75 | 2.40 | 0.630 | ( 0.087) | 0.057 | 0.574 |
| 58 | 4.83 | 2.40 | 0.630 | ( 0.087) | 0.057 | 0.574 |
| 59 | 4.92 | 2.50 | 0.657 | ( 0.087) | 0.059 | 0.598 |
| 60 | 5.00 | 2.60 | 0.683 | ( 0.087) | 0.061 | 0.621 |
| 61 | 5.08 | 3.10 | 0.814 | ( 0.087) | 0.073 | 0.741 |
| 62 | 5.17 | 3.60 | 0.946 | ( 0.087) | 0.085 | 0.861 |
| 63 | 5.25 | 3.90 | 1.024 | 0.087 | ( 0.092) | 0.937 |
| 64 | 5.33 | 4.20 | 1.103 | 0.087 | ( 0.099) | 1.016 |
| 65 | 5.42 | 4.70 | 1.235 | 0.087 | ( 0.111) | 1.147 |
| 66 | 5.50 | 5.60 | 1.471 | 0.087 | ( 0.132) | 1.384 |
| 67 | 5.58 | 1.90 | 0.499 | ( 0.087) | 0.045 | 0.454 |
| 68 | 5.67 | 0.90 | 0.236 | ( 0.087) | 0.021 | 0.215 |
| 69 | 5.75 | 0.60 | 0.158 | ( 0.087) | 0.014 | 0.143 |
| 70 | 5.83 | 0.50 | 0.131 | ( 0.087) | 0.012 | 0.120 |
| 71 | 5.92 | 0.30 | 0.079 | ( 0.087) | 0.007 | 0.072 |
| 72 | 6.00 | 0.20 | 0.053 | ( 0.087) | 0.005 | 0.048 |

(Loss Rate Not Used)

Sum = 100.0 Sum = 24.0

Flood volume = Effective rainfall 2.00(In)
times area 20.1(Ac.)/[(In)/(Ft.)] = 3.4(Ac.Ft)
Total soil loss = 0.19(In)
Total soil loss = 0.318(Ac.Ft)
Total rainfall = 2.19(In)
Flood volume = 145933.0 Cubic Feet

SWCRP610

```
           Total soil loss =       13858.1 Cubic Feet
           --------------------------------------------------------------------
            Peak flow rate of this hydrograph =     22.965(CFS)
           --------------------------------------------------------------------
           ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                                 6 - H O U R    S T O R M
                            R u n o f f      H y d r o g r a p h
           --------------------------------------------------------------------
                        Hydrograph in   5   Minute intervals ((CFS))

           --------------------------------------------------------------------
     Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
     -----------------------------------------------------------------------
       0+ 5       0.0036      0.52  Q         |         |         |         |
       0+10       0.0161      1.81  V Q       |         |         |         |
       0+15       0.0326      2.40  V  Q      |         |         |         |
       0+20       0.0507      2.63  V  Q      |         |         |         |
       0+25       0.0697      2.75  V  Q      |         |         |         |
       0+30       0.0899      2.93  |V Q      |         |         |         |
       0+35       0.1120      3.21  |V  Q     |         |         |         |
       0+40       0.1349      3.32  |V  Q     |         |         |         |
       0+45       0.1579      3.35  |V  Q     |         |         |         |
       0+50       0.1812      3.37  | V Q     |         |         |         |
       0+55       0.2044      3.38  | V Q     |         |         |         |
       1+ 0       0.2285      3.49  | V Q     |         |         |         |
       1+ 5       0.2542      3.73  |  VQ     |         |         |         |
       1+10       0.2804      3.80  |  V Q    |         |         |         |
       1+15       0.3068      3.84  |  V Q    |         |         |         |
       1+20       0.3334      3.85  |  V Q    |         |         |         |
       1+25       0.3600      3.87  |   VQ    |         |         |         |
       1+30       0.3867      3.87  |   VQ    |         |         |         |
       1+35       0.4134      3.88  |   VQ    |         |         |         |
       1+40       0.4401      3.88  |    Q    |         |         |         |
       1+45       0.4668      3.88  |    Q    |         |         |         |
       1+50       0.4935      3.88  |    Q    |         |         |         |
       1+55       0.5202      3.88  |    QV   |         |         |         |
       2+ 0       0.5476      3.98  |    QV   |         |         |         |
       2+ 5       0.5760      4.11  |    QV   |         |         |         |
       2+10       0.6039      4.05  |    Q V  |         |         |         |
       2+15       0.6332      4.25  |    Q V  |         |         |         |
       2+20       0.6628      4.31  |    Q V  |         |         |         |
       2+25       0.6927      4.33  |    Q  V |         |         |         |
       2+30       0.7226      4.35  |    Q  V |         |         |         |
       2+35       0.7526      4.36  |    Q  V |         |         |         |
       2+40       0.7826      4.36  |    Q   V|         |         |         |
       2+45       0.8134      4.47  |    Q   V|         |         |         |
       2+50       0.8458      4.70  |     Q   V         |         |         |
       2+55       0.8787      4.77  |     Q   V         |         |         |
       3+ 0       0.9118      4.81  |     Q   V         |         |         |
       3+ 5       0.9450      4.82  |     Q   |V        |         |         |
       3+10       0.9790      4.94  |     Q   |V        |         |         |
       3+15       1.0147      5.18  |     Q   | V       |         |         |
       3+20       1.0509      5.26  |      Q  | V       |         |         |
       3+25       1.0881      5.40  |      Q  | V       |         |         |
       3+30       1.1277      5.75  |      Q  |  V      |         |         |
       3+35       1.1703      6.18  |       Q |  V      |         |         |
       3+40       1.2152      6.52  |       Q |   V     |         |         |
       3+45       1.2617      6.75  |        Q|    V    |         |         |
       3+50       1.3103      7.05  |        Q|    V    |         |         |
       3+55       1.3603      7.26  |        Q|     V   |         |         |
       4+ 0       1.4123      7.55  |         Q     V   |         |         |
       4+ 5       1.4658      7.76  |         Q      V  |         |         |
       4+10       1.5219      8.15  |         Q       V |         |         |
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```
    4+15       1.5810      8.59  |         |Q      V |         |         |
    4+20       1.6433      9.05  |         | Q      V|         |         |
    4+25       1.7088      9.51  |         | Q       V         |         |
    4+30       1.7769      9.89  |         |  Q      |V        |         |
    4+35       1.8467     10.13  |         |  Q      | V       |         |
    4+40       1.9193     10.54  |         |   Q     | V       |         |
    4+45       1.9951     11.00  |         |   Q     |  V      |         |
    4+50       2.0733     11.36  |         |    Q    |   V     |         |
    4+55       2.1532     11.60  |         |    Q    |    V    |         |
    5+ 0       2.2358     12.00  |         |     Q   |     V   |         |
    5+ 5       2.3245     12.87  |         |      Q  |      V  |         |
    5+10       2.4257     14.70  |         |        Q|       V |         |
    5+15       2.5403     16.63  |         |         | Q       V         |
    5+20       2.6662     18.29  |         |         |   Q     |V        |
    5+25       2.8049     20.14  |         |         |     Q   |  V      |
    5+30       2.9631     22.96  |         |         |         Q    V    |
    5+35       3.1137     21.88  |         |         |        Q|      V  |
    5+40       3.2009     12.66  |         |     Q   |         |       V |
    5+45       3.2542      7.74  |         Q         |         |       V |
    5+50       3.2903      5.24  |     Q   |         |         |        V|
    5+55       3.3160      3.73  |   Q     |         |         |        V|
    6+ 0       3.3329      2.46  |  Q      |         |         |        V|
    6+ 5       3.3430      1.46  |Q        |         |         |        V|
    6+10       3.3468      0.55  Q         |         |         |        V|
    6+15       3.3485      0.26  Q         |         |         |        V|
    6+20       3.3494      0.13  Q         |         |         |        V|
    6+25       3.3499      0.07  Q         |         |         |        V|
    6+30       3.3501      0.03  Q         |         |         |        V|
    6+35       3.3502      0.01  Q         |         |         |        V|
-----------------------------------------------------------------------


 0.01  Q         |         |         |        V|
    6+40       1.6513      0.01  Q         |         |         |        V|
    6+45       1.6513      0.00  Q         |         |         |         V
-----------------------------------------------------------------------
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U n i t   H y d r o g r a p h   A n a l y s i s


Study date 10/30/20 File: SWCRP2410.out

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

Program License Serial Number 6232

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

English Units used in output format

---------------------------------------------------------------------
SWC Ramona & Perris
Proposed Condition

--------------------------------------------------------------------
Drainage Area = 20.11(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.11(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1669.00(Ft.)
Length along longest watercourse measured to centroid = 1035.00(Ft.)
Length along longest watercourse = 0.316 Mi.
Length along longest watercourse measured to centroid = 0.196 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 12.6543 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.077 Hr.
Lag time = 4.63 Min.
25% of lag time = 1.16 Min.
40% of lag time = 1.85 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] |
|---|---|---|
| 20.11 | 1.97 | 39.62 |

100 YEAR Area rainfall data:

| Area(Ac.)[1] | Rainfall(In)[2] | Weighting[1*2] |
|---|---|---|
| 20.11 | 5.02 | 100.95 |

STORM EVENT (YEAR) = 10.00
Area Averaged 2-Year Rainfall = 1.970(In)
Area Averaged 100-Year Rainfall = 5.020(In)

Point rain (area averaged) = 3.225(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 3.225(In)

Sub-Area Data:

| Area(Ac.) | Runoff Index | Impervious % |
|---|---|---|
| 20.110 | 61.00 | 0.900 |

Total Area Entered = 20.11(Ac.)

| RI AMC2 | RI AMC-2 | Infil. Rate (In/Hr) | Impervious (Dec.%) | Adj. Infil. Rate (In/Hr) | Area% (Dec.) | F (In/Hr) |
|---|---|---|---|---|---|---|
| 61.0 | 61.0 | 0.459 | 0.900 | 0.087 | 1.000 | 0.087 |
| | | | | | Sum (F) = | 0.087 |

Area averaged mean soil loss (F) (In/Hr) = 0.087
Minimum soil loss rate ((In/Hr)) = 0.044
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.090

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

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Unit Hydrograph Data

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| Unit time period (hrs) | | Time % of lag | Distribution Graph % | Unit Hydrograph (CFS) |
|---|---|---|---|---|
| 1 | 0.083 | 107.878 | 21.601 | 4.378 |
| 2 | 0.167 | 215.756 | 48.792 | 9.889 |
| 3 | 0.250 | 323.634 | 14.560 | 2.951 |
| 4 | 0.333 | 431.512 | 6.653 | 1.348 |
| 5 | 0.417 | 539.389 | 3.696 | 0.749 |
| 6 | 0.500 | 647.267 | 2.334 | 0.473 |
| 7 | 0.583 | 755.145 | 1.376 | 0.279 |
| 8 | 0.667 | 863.023 | 0.988 | 0.200 |
| | | | Sum = 100.000 | Sum= 20.267 |

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The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

| Unit | Time (Hr.) | Pattern Percent | Storm Rain (In/Hr) | Loss rate(In./Hr) Max | Low | Effective (In/Hr) |
|---|---|---|---|---|---|---|
| 1 | 0.08 | 0.07 | 0.026 | ( 0.155) | 0.002 | 0.023 |
| 2 | 0.17 | 0.07 | 0.026 | ( 0.154) | 0.002 | 0.023 |
| 3 | 0.25 | 0.07 | 0.026 | ( 0.153) | 0.002 | 0.023 |
| 4 | 0.33 | 0.10 | 0.039 | ( 0.153) | 0.003 | 0.035 |
| 5 | 0.42 | 0.10 | 0.039 | ( 0.152) | 0.003 | 0.035 |
| 6 | 0.50 | 0.10 | 0.039 | ( 0.152) | 0.003 | 0.035 |
| 7 | 0.58 | 0.10 | 0.039 | ( 0.151) | 0.003 | 0.035 |
| 8 | 0.67 | 0.10 | 0.039 | ( 0.151) | 0.003 | 0.035 |
| 9 | 0.75 | 0.10 | 0.039 | ( 0.150) | 0.003 | 0.035 |
| 10 | 0.83 | 0.13 | 0.052 | ( 0.149) | 0.005 | 0.047 |
| 11 | 0.92 | 0.13 | 0.052 | ( 0.149) | 0.005 | 0.047 |
| 12 | 1.00 | 0.13 | 0.052 | ( 0.148) | 0.005 | 0.047 |
| 13 | 1.08 | 0.10 | 0.039 | ( 0.148) | 0.003 | 0.035 |
| 14 | 1.17 | 0.10 | 0.039 | ( 0.147) | 0.003 | 0.035 |
| 15 | 1.25 | 0.10 | 0.039 | ( 0.146) | 0.003 | 0.035 |
| 16 | 1.33 | 0.10 | 0.039 | ( 0.146) | 0.003 | 0.035 |
| 17 | 1.42 | 0.10 | 0.039 | ( 0.145) | 0.003 | 0.035 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 18 | 1.50 | 0.10 | 0.039 | ( 0.145) | 0.003 | 0.035 |
| 19 | 1.58 | 0.10 | 0.039 | ( 0.144) | 0.003 | 0.035 |
| 20 | 1.67 | 0.10 | 0.039 | ( 0.144) | 0.003 | 0.035 |
| 21 | 1.75 | 0.10 | 0.039 | ( 0.143) | 0.003 | 0.035 |
| 22 | 1.83 | 0.13 | 0.052 | ( 0.142) | 0.005 | 0.047 |
| 23 | 1.92 | 0.13 | 0.052 | ( 0.142) | 0.005 | 0.047 |
| 24 | 2.00 | 0.13 | 0.052 | ( 0.141) | 0.005 | 0.047 |
| 25 | 2.08 | 0.13 | 0.052 | ( 0.141) | 0.005 | 0.047 |
| 26 | 2.17 | 0.13 | 0.052 | ( 0.140) | 0.005 | 0.047 |
| 27 | 2.25 | 0.13 | 0.052 | ( 0.139) | 0.005 | 0.047 |
| 28 | 2.33 | 0.13 | 0.052 | ( 0.139) | 0.005 | 0.047 |
| 29 | 2.42 | 0.13 | 0.052 | ( 0.138) | 0.005 | 0.047 |
| 30 | 2.50 | 0.13 | 0.052 | ( 0.138) | 0.005 | 0.047 |
| 31 | 2.58 | 0.17 | 0.064 | ( 0.137) | 0.006 | 0.059 |
| 32 | 2.67 | 0.17 | 0.064 | ( 0.137) | 0.006 | 0.059 |
| 33 | 2.75 | 0.17 | 0.064 | ( 0.136) | 0.006 | 0.059 |
| 34 | 2.83 | 0.17 | 0.064 | ( 0.136) | 0.006 | 0.059 |
| 35 | 2.92 | 0.17 | 0.064 | ( 0.135) | 0.006 | 0.059 |
| 36 | 3.00 | 0.17 | 0.064 | ( 0.134) | 0.006 | 0.059 |
| 37 | 3.08 | 0.17 | 0.064 | ( 0.134) | 0.006 | 0.059 |
| 38 | 3.17 | 0.17 | 0.064 | ( 0.133) | 0.006 | 0.059 |
| 39 | 3.25 | 0.17 | 0.064 | ( 0.133) | 0.006 | 0.059 |
| 40 | 3.33 | 0.17 | 0.064 | ( 0.132) | 0.006 | 0.059 |
| 41 | 3.42 | 0.17 | 0.064 | ( 0.132) | 0.006 | 0.059 |
| 42 | 3.50 | 0.17 | 0.064 | ( 0.131) | 0.006 | 0.059 |
| 43 | 3.58 | 0.17 | 0.064 | ( 0.131) | 0.006 | 0.059 |
| 44 | 3.67 | 0.17 | 0.064 | ( 0.130) | 0.006 | 0.059 |
| 45 | 3.75 | 0.17 | 0.064 | ( 0.129) | 0.006 | 0.059 |
| 46 | 3.83 | 0.20 | 0.077 | ( 0.129) | 0.007 | 0.070 |
| 47 | 3.92 | 0.20 | 0.077 | ( 0.128) | 0.007 | 0.070 |
| 48 | 4.00 | 0.20 | 0.077 | ( 0.128) | 0.007 | 0.070 |
| 49 | 4.08 | 0.20 | 0.077 | ( 0.127) | 0.007 | 0.070 |
| 50 | 4.17 | 0.20 | 0.077 | ( 0.127) | 0.007 | 0.070 |
| 51 | 4.25 | 0.20 | 0.077 | ( 0.126) | 0.007 | 0.070 |
| 52 | 4.33 | 0.23 | 0.090 | ( 0.126) | 0.008 | 0.082 |
| 53 | 4.42 | 0.23 | 0.090 | ( 0.125) | 0.008 | 0.082 |
| 54 | 4.50 | 0.23 | 0.090 | ( 0.125) | 0.008 | 0.082 |
| 55 | 4.58 | 0.23 | 0.090 | ( 0.124) | 0.008 | 0.082 |
| 56 | 4.67 | 0.23 | 0.090 | ( 0.124) | 0.008 | 0.082 |
| 57 | 4.75 | 0.23 | 0.090 | ( 0.123) | 0.008 | 0.082 |
| 58 | 4.83 | 0.27 | 0.103 | ( 0.122) | 0.009 | 0.094 |
| 59 | 4.92 | 0.27 | 0.103 | ( 0.122) | 0.009 | 0.094 |
| 60 | 5.00 | 0.27 | 0.103 | ( 0.121) | 0.009 | 0.094 |
| 61 | 5.08 | 0.20 | 0.077 | ( 0.121) | 0.007 | 0.070 |
| 62 | 5.17 | 0.20 | 0.077 | ( 0.120) | 0.007 | 0.070 |
| 63 | 5.25 | 0.20 | 0.077 | ( 0.120) | 0.007 | 0.070 |
| 64 | 5.33 | 0.23 | 0.090 | ( 0.119) | 0.008 | 0.082 |
| 65 | 5.42 | 0.23 | 0.090 | ( 0.119) | 0.008 | 0.082 |
| 66 | 5.50 | 0.23 | 0.090 | ( 0.118) | 0.008 | 0.082 |
| 67 | 5.58 | 0.27 | 0.103 | ( 0.118) | 0.009 | 0.094 |
| 68 | 5.67 | 0.27 | 0.103 | ( 0.117) | 0.009 | 0.094 |
| 69 | 5.75 | 0.27 | 0.103 | ( 0.117) | 0.009 | 0.094 |
| 70 | 5.83 | 0.27 | 0.103 | ( 0.116) | 0.009 | 0.094 |
| 71 | 5.92 | 0.27 | 0.103 | ( 0.116) | 0.009 | 0.094 |
| 72 | 6.00 | 0.27 | 0.103 | ( 0.115) | 0.009 | 0.094 |
| 73 | 6.08 | 0.30 | 0.116 | ( 0.115) | 0.010 | 0.106 |
| 74 | 6.17 | 0.30 | 0.116 | ( 0.114) | 0.010 | 0.106 |
| 75 | 6.25 | 0.30 | 0.116 | ( 0.114) | 0.010 | 0.106 |
| 76 | 6.33 | 0.30 | 0.116 | ( 0.113) | 0.010 | 0.106 |
| 77 | 6.42 | 0.30 | 0.116 | ( 0.113) | 0.010 | 0.106 |
| 78 | 6.50 | 0.30 | 0.116 | ( 0.112) | 0.010 | 0.106 |
| 79 | 6.58 | 0.33 | 0.129 | ( 0.112) | 0.012 | 0.117 |
| 80 | 6.67 | 0.33 | 0.129 | ( 0.111) | 0.012 | 0.117 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 81 | 6.75 | 0.33 | 0.129 | ( 0.111) | 0.012 | 0.117 |
| 82 | 6.83 | 0.33 | 0.129 | ( 0.110) | 0.012 | 0.117 |
| 83 | 6.92 | 0.33 | 0.129 | ( 0.110) | 0.012 | 0.117 |
| 84 | 7.00 | 0.33 | 0.129 | ( 0.109) | 0.012 | 0.117 |
| 85 | 7.08 | 0.33 | 0.129 | ( 0.109) | 0.012 | 0.117 |
| 86 | 7.17 | 0.33 | 0.129 | ( 0.108) | 0.012 | 0.117 |
| 87 | 7.25 | 0.33 | 0.129 | ( 0.108) | 0.012 | 0.117 |
| 88 | 7.33 | 0.37 | 0.142 | ( 0.107) | 0.013 | 0.129 |
| 89 | 7.42 | 0.37 | 0.142 | ( 0.107) | 0.013 | 0.129 |
| 90 | 7.50 | 0.37 | 0.142 | ( 0.106) | 0.013 | 0.129 |
| 91 | 7.58 | 0.40 | 0.155 | ( 0.106) | 0.014 | 0.141 |
| 92 | 7.67 | 0.40 | 0.155 | ( 0.105) | 0.014 | 0.141 |
| 93 | 7.75 | 0.40 | 0.155 | ( 0.105) | 0.014 | 0.141 |
| 94 | 7.83 | 0.43 | 0.168 | ( 0.104) | 0.015 | 0.153 |
| 95 | 7.92 | 0.43 | 0.168 | ( 0.104) | 0.015 | 0.153 |
| 96 | 8.00 | 0.43 | 0.168 | ( 0.103) | 0.015 | 0.153 |
| 97 | 8.08 | 0.50 | 0.193 | ( 0.103) | 0.017 | 0.176 |
| 98 | 8.17 | 0.50 | 0.193 | ( 0.102) | 0.017 | 0.176 |
| 99 | 8.25 | 0.50 | 0.193 | ( 0.102) | 0.017 | 0.176 |
| 100 | 8.33 | 0.50 | 0.193 | ( 0.101) | 0.017 | 0.176 |
| 101 | 8.42 | 0.50 | 0.193 | ( 0.101) | 0.017 | 0.176 |
| 102 | 8.50 | 0.50 | 0.193 | ( 0.100) | 0.017 | 0.176 |
| 103 | 8.58 | 0.53 | 0.206 | ( 0.100) | 0.019 | 0.188 |
| 104 | 8.67 | 0.53 | 0.206 | ( 0.099) | 0.019 | 0.188 |
| 105 | 8.75 | 0.53 | 0.206 | ( 0.099) | 0.019 | 0.188 |
| 106 | 8.83 | 0.57 | 0.219 | ( 0.099) | 0.020 | 0.200 |
| 107 | 8.92 | 0.57 | 0.219 | ( 0.098) | 0.020 | 0.200 |
| 108 | 9.00 | 0.57 | 0.219 | ( 0.098) | 0.020 | 0.200 |
| 109 | 9.08 | 0.63 | 0.245 | ( 0.097) | 0.022 | 0.223 |
| 110 | 9.17 | 0.63 | 0.245 | ( 0.097) | 0.022 | 0.223 |
| 111 | 9.25 | 0.63 | 0.245 | ( 0.096) | 0.022 | 0.223 |
| 112 | 9.33 | 0.67 | 0.258 | ( 0.096) | 0.023 | 0.235 |
| 113 | 9.42 | 0.67 | 0.258 | ( 0.095) | 0.023 | 0.235 |
| 114 | 9.50 | 0.67 | 0.258 | ( 0.095) | 0.023 | 0.235 |
| 115 | 9.58 | 0.70 | 0.271 | ( 0.094) | 0.024 | 0.246 |
| 116 | 9.67 | 0.70 | 0.271 | ( 0.094) | 0.024 | 0.246 |
| 117 | 9.75 | 0.70 | 0.271 | ( 0.093) | 0.024 | 0.246 |
| 118 | 9.83 | 0.73 | 0.284 | ( 0.093) | 0.026 | 0.258 |
| 119 | 9.92 | 0.73 | 0.284 | ( 0.093) | 0.026 | 0.258 |
| 120 | 10.00 | 0.73 | 0.284 | ( 0.092) | 0.026 | 0.258 |
| 121 | 10.08 | 0.50 | 0.193 | ( 0.092) | 0.017 | 0.176 |
| 122 | 10.17 | 0.50 | 0.193 | ( 0.091) | 0.017 | 0.176 |
| 123 | 10.25 | 0.50 | 0.193 | ( 0.091) | 0.017 | 0.176 |
| 124 | 10.33 | 0.50 | 0.193 | ( 0.090) | 0.017 | 0.176 |
| 125 | 10.42 | 0.50 | 0.193 | ( 0.090) | 0.017 | 0.176 |
| 126 | 10.50 | 0.50 | 0.193 | ( 0.089) | 0.017 | 0.176 |
| 127 | 10.58 | 0.67 | 0.258 | ( 0.089) | 0.023 | 0.235 |
| 128 | 10.67 | 0.67 | 0.258 | ( 0.089) | 0.023 | 0.235 |
| 129 | 10.75 | 0.67 | 0.258 | ( 0.088) | 0.023 | 0.235 |
| 130 | 10.83 | 0.67 | 0.258 | ( 0.088) | 0.023 | 0.235 |
| 131 | 10.92 | 0.67 | 0.258 | ( 0.087) | 0.023 | 0.235 |
| 132 | 11.00 | 0.67 | 0.258 | ( 0.087) | 0.023 | 0.235 |
| 133 | 11.08 | 0.63 | 0.245 | ( 0.086) | 0.022 | 0.223 |
| 134 | 11.17 | 0.63 | 0.245 | ( 0.086) | 0.022 | 0.223 |
| 135 | 11.25 | 0.63 | 0.245 | ( 0.086) | 0.022 | 0.223 |
| 136 | 11.33 | 0.63 | 0.245 | ( 0.085) | 0.022 | 0.223 |
| 137 | 11.42 | 0.63 | 0.245 | ( 0.085) | 0.022 | 0.223 |
| 138 | 11.50 | 0.63 | 0.245 | ( 0.084) | 0.022 | 0.223 |
| 139 | 11.58 | 0.57 | 0.219 | ( 0.084) | 0.020 | 0.200 |
| 140 | 11.67 | 0.57 | 0.219 | ( 0.084) | 0.020 | 0.200 |
| 141 | 11.75 | 0.57 | 0.219 | ( 0.083) | 0.020 | 0.200 |
| 142 | 11.83 | 0.60 | 0.232 | ( 0.083) | 0.021 | 0.211 |
| 143 | 11.92 | 0.60 | 0.232 | ( 0.082) | 0.021 | 0.211 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 144 | 12.00 | 0.60 | 0.232 | ( 0.082) | 0.021 | 0.211 |
| 145 | 12.08 | 0.83 | 0.322 | ( 0.081) | 0.029 | 0.293 |
| 146 | 12.17 | 0.83 | 0.322 | ( 0.081) | 0.029 | 0.293 |
| 147 | 12.25 | 0.83 | 0.322 | ( 0.081) | 0.029 | 0.293 |
| 148 | 12.33 | 0.87 | 0.335 | ( 0.080) | 0.030 | 0.305 |
| 149 | 12.42 | 0.87 | 0.335 | ( 0.080) | 0.030 | 0.305 |
| 150 | 12.50 | 0.87 | 0.335 | ( 0.079) | 0.030 | 0.305 |
| 151 | 12.58 | 0.93 | 0.361 | ( 0.079) | 0.033 | 0.329 |
| 152 | 12.67 | 0.93 | 0.361 | ( 0.079) | 0.033 | 0.329 |
| 153 | 12.75 | 0.93 | 0.361 | ( 0.078) | 0.033 | 0.329 |
| 154 | 12.83 | 0.97 | 0.374 | ( 0.078) | 0.034 | 0.340 |
| 155 | 12.92 | 0.97 | 0.374 | ( 0.077) | 0.034 | 0.340 |
| 156 | 13.00 | 0.97 | 0.374 | ( 0.077) | 0.034 | 0.340 |
| 157 | 13.08 | 1.13 | 0.439 | ( 0.077) | 0.039 | 0.399 |
| 158 | 13.17 | 1.13 | 0.439 | ( 0.076) | 0.039 | 0.399 |
| 159 | 13.25 | 1.13 | 0.439 | ( 0.076) | 0.039 | 0.399 |
| 160 | 13.33 | 1.13 | 0.439 | ( 0.075) | 0.039 | 0.399 |
| 161 | 13.42 | 1.13 | 0.439 | ( 0.075) | 0.039 | 0.399 |
| 162 | 13.50 | 1.13 | 0.439 | ( 0.075) | 0.039 | 0.399 |
| 163 | 13.58 | 0.77 | 0.297 | ( 0.074) | 0.027 | 0.270 |
| 164 | 13.67 | 0.77 | 0.297 | ( 0.074) | 0.027 | 0.270 |
| 165 | 13.75 | 0.77 | 0.297 | ( 0.074) | 0.027 | 0.270 |
| 166 | 13.83 | 0.77 | 0.297 | ( 0.073) | 0.027 | 0.270 |
| 167 | 13.92 | 0.77 | 0.297 | ( 0.073) | 0.027 | 0.270 |
| 168 | 14.00 | 0.77 | 0.297 | ( 0.072) | 0.027 | 0.270 |
| 169 | 14.08 | 0.90 | 0.348 | ( 0.072) | 0.031 | 0.317 |
| 170 | 14.17 | 0.90 | 0.348 | ( 0.072) | 0.031 | 0.317 |
| 171 | 14.25 | 0.90 | 0.348 | ( 0.071) | 0.031 | 0.317 |
| 172 | 14.33 | 0.87 | 0.335 | ( 0.071) | 0.030 | 0.305 |
| 173 | 14.42 | 0.87 | 0.335 | ( 0.071) | 0.030 | 0.305 |
| 174 | 14.50 | 0.87 | 0.335 | ( 0.070) | 0.030 | 0.305 |
| 175 | 14.58 | 0.87 | 0.335 | ( 0.070) | 0.030 | 0.305 |
| 176 | 14.67 | 0.87 | 0.335 | ( 0.070) | 0.030 | 0.305 |
| 177 | 14.75 | 0.87 | 0.335 | ( 0.069) | 0.030 | 0.305 |
| 178 | 14.83 | 0.83 | 0.322 | ( 0.069) | 0.029 | 0.293 |
| 179 | 14.92 | 0.83 | 0.322 | ( 0.068) | 0.029 | 0.293 |
| 180 | 15.00 | 0.83 | 0.322 | ( 0.068) | 0.029 | 0.293 |
| 181 | 15.08 | 0.80 | 0.310 | ( 0.068) | 0.028 | 0.282 |
| 182 | 15.17 | 0.80 | 0.310 | ( 0.067) | 0.028 | 0.282 |
| 183 | 15.25 | 0.80 | 0.310 | ( 0.067) | 0.028 | 0.282 |
| 184 | 15.33 | 0.77 | 0.297 | ( 0.067) | 0.027 | 0.270 |
| 185 | 15.42 | 0.77 | 0.297 | ( 0.066) | 0.027 | 0.270 |
| 186 | 15.50 | 0.77 | 0.297 | ( 0.066) | 0.027 | 0.270 |
| 187 | 15.58 | 0.63 | 0.245 | ( 0.066) | 0.022 | 0.223 |
| 188 | 15.67 | 0.63 | 0.245 | ( 0.065) | 0.022 | 0.223 |
| 189 | 15.75 | 0.63 | 0.245 | ( 0.065) | 0.022 | 0.223 |
| 190 | 15.83 | 0.63 | 0.245 | ( 0.065) | 0.022 | 0.223 |
| 191 | 15.92 | 0.63 | 0.245 | ( 0.064) | 0.022 | 0.223 |
| 192 | 16.00 | 0.63 | 0.245 | ( 0.064) | 0.022 | 0.223 |
| 193 | 16.08 | 0.13 | 0.052 | ( 0.064) | 0.005 | 0.047 |
| 194 | 16.17 | 0.13 | 0.052 | ( 0.063) | 0.005 | 0.047 |
| 195 | 16.25 | 0.13 | 0.052 | ( 0.063) | 0.005 | 0.047 |
| 196 | 16.33 | 0.13 | 0.052 | ( 0.063) | 0.005 | 0.047 |
| 197 | 16.42 | 0.13 | 0.052 | ( 0.062) | 0.005 | 0.047 |
| 198 | 16.50 | 0.13 | 0.052 | ( 0.062) | 0.005 | 0.047 |
| 199 | 16.58 | 0.10 | 0.039 | ( 0.062) | 0.003 | 0.035 |
| 200 | 16.67 | 0.10 | 0.039 | ( 0.062) | 0.003 | 0.035 |
| 201 | 16.75 | 0.10 | 0.039 | ( 0.061) | 0.003 | 0.035 |
| 202 | 16.83 | 0.10 | 0.039 | ( 0.061) | 0.003 | 0.035 |
| 203 | 16.92 | 0.10 | 0.039 | ( 0.061) | 0.003 | 0.035 |
| 204 | 17.00 | 0.10 | 0.039 | ( 0.060) | 0.003 | 0.035 |
| 205 | 17.08 | 0.17 | 0.064 | ( 0.060) | 0.006 | 0.059 |
| 206 | 17.17 | 0.17 | 0.064 | ( 0.060) | 0.006 | 0.059 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 207 | 17.25 | 0.17 | 0.064 | ( 0.059) | 0.006 | 0.059 |
| 208 | 17.33 | 0.17 | 0.064 | ( 0.059) | 0.006 | 0.059 |
| 209 | 17.42 | 0.17 | 0.064 | ( 0.059) | 0.006 | 0.059 |
| 210 | 17.50 | 0.17 | 0.064 | ( 0.058) | 0.006 | 0.059 |
| 211 | 17.58 | 0.17 | 0.064 | ( 0.058) | 0.006 | 0.059 |
| 212 | 17.67 | 0.17 | 0.064 | ( 0.058) | 0.006 | 0.059 |
| 213 | 17.75 | 0.17 | 0.064 | ( 0.058) | 0.006 | 0.059 |
| 214 | 17.83 | 0.13 | 0.052 | ( 0.057) | 0.005 | 0.047 |
| 215 | 17.92 | 0.13 | 0.052 | ( 0.057) | 0.005 | 0.047 |
| 216 | 18.00 | 0.13 | 0.052 | ( 0.057) | 0.005 | 0.047 |
| 217 | 18.08 | 0.13 | 0.052 | ( 0.056) | 0.005 | 0.047 |
| 218 | 18.17 | 0.13 | 0.052 | ( 0.056) | 0.005 | 0.047 |
| 219 | 18.25 | 0.13 | 0.052 | ( 0.056) | 0.005 | 0.047 |
| 220 | 18.33 | 0.13 | 0.052 | ( 0.056) | 0.005 | 0.047 |
| 221 | 18.42 | 0.13 | 0.052 | ( 0.055) | 0.005 | 0.047 |
| 222 | 18.50 | 0.13 | 0.052 | ( 0.055) | 0.005 | 0.047 |
| 223 | 18.58 | 0.10 | 0.039 | ( 0.055) | 0.003 | 0.035 |
| 224 | 18.67 | 0.10 | 0.039 | ( 0.055) | 0.003 | 0.035 |
| 225 | 18.75 | 0.10 | 0.039 | ( 0.054) | 0.003 | 0.035 |
| 226 | 18.83 | 0.07 | 0.026 | ( 0.054) | 0.002 | 0.023 |
| 227 | 18.92 | 0.07 | 0.026 | ( 0.054) | 0.002 | 0.023 |
| 228 | 19.00 | 0.07 | 0.026 | ( 0.054) | 0.002 | 0.023 |
| 229 | 19.08 | 0.10 | 0.039 | ( 0.053) | 0.003 | 0.035 |
| 230 | 19.17 | 0.10 | 0.039 | ( 0.053) | 0.003 | 0.035 |
| 231 | 19.25 | 0.10 | 0.039 | ( 0.053) | 0.003 | 0.035 |
| 232 | 19.33 | 0.13 | 0.052 | ( 0.053) | 0.005 | 0.047 |
| 233 | 19.42 | 0.13 | 0.052 | ( 0.052) | 0.005 | 0.047 |
| 234 | 19.50 | 0.13 | 0.052 | ( 0.052) | 0.005 | 0.047 |
| 235 | 19.58 | 0.10 | 0.039 | ( 0.052) | 0.003 | 0.035 |
| 236 | 19.67 | 0.10 | 0.039 | ( 0.052) | 0.003 | 0.035 |
| 237 | 19.75 | 0.10 | 0.039 | ( 0.051) | 0.003 | 0.035 |
| 238 | 19.83 | 0.07 | 0.026 | ( 0.051) | 0.002 | 0.023 |
| 239 | 19.92 | 0.07 | 0.026 | ( 0.051) | 0.002 | 0.023 |
| 240 | 20.00 | 0.07 | 0.026 | ( 0.051) | 0.002 | 0.023 |
| 241 | 20.08 | 0.10 | 0.039 | ( 0.050) | 0.003 | 0.035 |
| 242 | 20.17 | 0.10 | 0.039 | ( 0.050) | 0.003 | 0.035 |
| 243 | 20.25 | 0.10 | 0.039 | ( 0.050) | 0.003 | 0.035 |
| 244 | 20.33 | 0.10 | 0.039 | ( 0.050) | 0.003 | 0.035 |
| 245 | 20.42 | 0.10 | 0.039 | ( 0.050) | 0.003 | 0.035 |
| 246 | 20.50 | 0.10 | 0.039 | ( 0.049) | 0.003 | 0.035 |
| 247 | 20.58 | 0.10 | 0.039 | ( 0.049) | 0.003 | 0.035 |
| 248 | 20.67 | 0.10 | 0.039 | ( 0.049) | 0.003 | 0.035 |
| 249 | 20.75 | 0.10 | 0.039 | ( 0.049) | 0.003 | 0.035 |
| 250 | 20.83 | 0.07 | 0.026 | ( 0.049) | 0.002 | 0.023 |
| 251 | 20.92 | 0.07 | 0.026 | ( 0.048) | 0.002 | 0.023 |
| 252 | 21.00 | 0.07 | 0.026 | ( 0.048) | 0.002 | 0.023 |
| 253 | 21.08 | 0.10 | 0.039 | ( 0.048) | 0.003 | 0.035 |
| 254 | 21.17 | 0.10 | 0.039 | ( 0.048) | 0.003 | 0.035 |
| 255 | 21.25 | 0.10 | 0.039 | ( 0.048) | 0.003 | 0.035 |
| 256 | 21.33 | 0.07 | 0.026 | ( 0.047) | 0.002 | 0.023 |
| 257 | 21.42 | 0.07 | 0.026 | ( 0.047) | 0.002 | 0.023 |
| 258 | 21.50 | 0.07 | 0.026 | ( 0.047) | 0.002 | 0.023 |
| 259 | 21.58 | 0.10 | 0.039 | ( 0.047) | 0.003 | 0.035 |
| 260 | 21.67 | 0.10 | 0.039 | ( 0.047) | 0.003 | 0.035 |
| 261 | 21.75 | 0.10 | 0.039 | ( 0.047) | 0.003 | 0.035 |
| 262 | 21.83 | 0.07 | 0.026 | ( 0.046) | 0.002 | 0.023 |
| 263 | 21.92 | 0.07 | 0.026 | ( 0.046) | 0.002 | 0.023 |
| 264 | 22.00 | 0.07 | 0.026 | ( 0.046) | 0.002 | 0.023 |
| 265 | 22.08 | 0.10 | 0.039 | ( 0.046) | 0.003 | 0.035 |
| 266 | 22.17 | 0.10 | 0.039 | ( 0.046) | 0.003 | 0.035 |
| 267 | 22.25 | 0.10 | 0.039 | ( 0.046) | 0.003 | 0.035 |
| 268 | 22.33 | 0.07 | 0.026 | ( 0.045) | 0.002 | 0.023 |
| 269 | 22.42 | 0.07 | 0.026 | ( 0.045) | 0.002 | 0.023 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 270 | 22.50 | 0.07 | 0.026 | ( 0.045) | 0.002 | 0.023 |
| 271 | 22.58 | 0.07 | 0.026 | ( 0.045) | 0.002 | 0.023 |
| 272 | 22.67 | 0.07 | 0.026 | ( 0.045) | 0.002 | 0.023 |
| 273 | 22.75 | 0.07 | 0.026 | ( 0.045) | 0.002 | 0.023 |
| 274 | 22.83 | 0.07 | 0.026 | ( 0.045) | 0.002 | 0.023 |
| 275 | 22.92 | 0.07 | 0.026 | ( 0.045) | 0.002 | 0.023 |
| 276 | 23.00 | 0.07 | 0.026 | ( 0.044) | 0.002 | 0.023 |
| 277 | 23.08 | 0.07 | 0.026 | ( 0.044) | 0.002 | 0.023 |
| 278 | 23.17 | 0.07 | 0.026 | ( 0.044) | 0.002 | 0.023 |
| 279 | 23.25 | 0.07 | 0.026 | ( 0.044) | 0.002 | 0.023 |
| 280 | 23.33 | 0.07 | 0.026 | ( 0.044) | 0.002 | 0.023 |
| 281 | 23.42 | 0.07 | 0.026 | ( 0.044) | 0.002 | 0.023 |
| 282 | 23.50 | 0.07 | 0.026 | ( 0.044) | 0.002 | 0.023 |
| 283 | 23.58 | 0.07 | 0.026 | ( 0.044) | 0.002 | 0.023 |
| 284 | 23.67 | 0.07 | 0.026 | ( 0.044) | 0.002 | 0.023 |
| 285 | 23.75 | 0.07 | 0.026 | ( 0.044) | 0.002 | 0.023 |
| 286 | 23.83 | 0.07 | 0.026 | ( 0.044) | 0.002 | 0.023 |
| 287 | 23.92 | 0.07 | 0.026 | ( 0.044) | 0.002 | 0.023 |
| 288 | 24.00 | 0.07 | 0.026 | ( 0.044) | 0.002 | 0.023 |

(Loss Rate Not Used)

Sum = 100.0 Sum = 35.2

Flood volume = Effective rainfall 2.93(In)
times area 20.1(Ac.)/[(In)/(Ft.)] = 4.9(Ac.Ft)
Total soil loss = 0.29(In)
Total soil loss = 0.486(Ac.Ft)
Total rainfall = 3.22(In)
Flood volume = 214212.6 Cubic Feet
Total soil loss = 21185.9 Cubic Feet

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Peak flow rate of this hydrograph = 8.064(CFS)

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

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Hydrograph in 5 Minute intervals ((CFS))

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Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5       0.0007      0.10  Q         |         |         |         |
  0+10       0.0030      0.34  VQ        |         |         |         |
  0+15       0.0058      0.40  VQ        |         |         |         |
  0+20       0.0092      0.49  VQ        |         |         |         |
  0+25       0.0134      0.62  V Q       |         |         |         |
  0+30       0.0180      0.67  V Q       |         |         |         |
  0+35       0.0228      0.69  V Q       |         |         |         |
  0+40       0.0276      0.70  V Q       |         |         |         |
  0+45       0.0325      0.71  V Q       |         |         |         |
  0+50       0.0378      0.76  V  Q      |         |         |         |
  0+55       0.0438      0.88  V  Q      |         |         |         |
  1+ 0       0.0501      0.92  V  Q      |         |         |         |
  1+ 5       0.0562      0.88  V  Q      |         |         |         |
  1+10       0.0615      0.77  V  Q      |         |         |         |
  1+15       0.0667      0.74  V Q       |         |         |         |
  1+20       0.0717      0.73  V Q       |         |         |         |
  1+25       0.0767      0.73  V Q       |         |         |         |
  1+30       0.0816      0.72  V Q       |         |         |         |
  1+35       0.0866      0.72  V Q       |         |         |         |
  1+40       0.0915      0.71  V Q       |         |         |         |
  1+45       0.0964      0.71  V Q       |         |         |         |
  1+50       0.1017      0.77  V  Q      |         |         |         |
  1+55       0.1078      0.88  V  Q      |         |         |         |
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2+ 0       0.1141      0.92  V  Q      |         |         |         |
2+ 5       0.1205      0.93  V  Q      |         |         |         |
2+10       0.1270      0.94  |V Q      |         |         |         |
2+15       0.1335      0.95  |V Q      |         |         |         |
2+20       0.1400      0.95  |V Q      |         |         |         |
2+25       0.1466      0.95  |V Q      |         |         |         |
2+30       0.1531      0.95  |V Q      |         |         |         |
2+35       0.1600      1.00  |V  Q     |         |         |         |
2+40       0.1678      1.12  |V  Q     |         |         |         |
2+45       0.1757      1.15  |V  Q     |         |         |         |
2+50       0.1838      1.17  |V  Q     |         |         |         |
2+55       0.1919      1.18  |V  Q     |         |         |         |
3+ 0       0.2000      1.18  |V  Q     |         |         |         |
3+ 5       0.2082      1.19  |V  Q     |         |         |         |
3+10       0.2164      1.19  |V  Q     |         |         |         |
3+15       0.2246      1.19  |V  Q     |         |         |         |
3+20       0.2328      1.19  |V  Q     |         |         |         |
3+25       0.2410      1.19  |V  Q     |         |         |         |
3+30       0.2492      1.19  | V Q     |         |         |         |
3+35       0.2574      1.19  | V Q     |         |         |         |
3+40       0.2656      1.19  | V Q     |         |         |         |
3+45       0.2738      1.19  | V Q     |         |         |         |
3+50       0.2823      1.24  | V Q     |         |         |         |
3+55       0.2917      1.36  | V  Q    |         |         |         |
4+ 0       0.3013      1.39  | V  Q    |         |         |         |
4+ 5       0.3110      1.41  | V  Q    |         |         |         |
4+10       0.3207      1.42  | V  Q    |         |         |         |
4+15       0.3305      1.42  | V  Q    |         |         |         |
4+20       0.3407      1.48  | V  Q    |         |         |         |
4+25       0.3517      1.60  | V   Q   |         |         |         |
4+30       0.3629      1.63  | V   Q   |         |         |         |
4+35       0.3743      1.65  |  V  Q   |         |         |         |
4+40       0.3857      1.65  |  V  Q   |         |         |         |
4+45       0.3971      1.66  |  V  Q   |         |         |         |
4+50       0.4089      1.72  |  V  Q   |         |         |         |
4+55       0.4215      1.83  |  V   Q  |         |         |         |
5+ 0       0.4344      1.87  |  V   Q  |         |         |         |
5+ 5       0.4467      1.78  |  V   Q  |         |         |         |
5+10       0.4574      1.56  |  V  Q   |         |         |         |
5+15       0.4677      1.49  |  V Q    |         |         |         |
5+20       0.4781      1.52  |  V  Q   |         |         |         |
5+25       0.4893      1.62  |  V  Q   |         |         |         |
5+30       0.5006      1.64  |   V Q   |         |         |         |
5+35       0.5123      1.70  |   V Q   |         |         |         |
5+40       0.5249      1.82  |   V  Q  |         |         |         |
5+45       0.5377      1.86  |   V  Q  |         |         |         |
5+50       0.5506      1.88  |   V  Q  |         |         |         |
5+55       0.5637      1.89  |   V  Q  |         |         |         |
6+ 0       0.5768      1.90  |   V  Q  |         |         |         |
6+ 5       0.5902      1.95  |   V  Q  |         |         |         |
6+10       0.6045      2.07  |   V   Q |         |         |         |
6+15       0.6190      2.11  |    V  Q |         |         |         |
6+20       0.6336      2.12  |    V  Q |         |         |         |
6+25       0.6483      2.13  |    V  Q |         |         |         |
6+30       0.6630      2.14  |    V  Q |         |         |         |
6+35       0.6781      2.19  |    V  Q |         |         |         |
6+40       0.6940      2.31  |    V   Q|         |         |         |
6+45       0.7101      2.34  |    V   Q|         |         |         |
6+50       0.7264      2.36  |    V   Q|         |         |         |
6+55       0.7427      2.37  |     V  Q|         |         |         |
7+ 0       0.7591      2.37  |     V  Q|         |         |         |
7+ 5       0.7754      2.38  |     V  Q|         |         |         |
7+10       0.7918      2.38  |     V  Q|         |         |         |
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 7+15       0.8082      2.38  |     V  Q|         |         |         |
 7+20       0.8250      2.43  |     V  Q|         |         |         |
 7+25       0.8425      2.55  |     V   Q         |         |         |
 7+30       0.8603      2.58  |     V   Q         |         |         |
 7+35       0.8785      2.65  |      V  Q         |         |         |
 7+40       0.8976      2.77  |      V  |Q        |         |         |
 7+45       0.9170      2.81  |      V  |Q        |         |         |
 7+50       0.9369      2.89  |      V  |Q        |         |         |
 7+55       0.9577      3.01  |      V  | Q       |         |         |
 8+ 0       0.9787      3.05  |      V  | Q       |         |         |
 8+ 5       1.0005      3.17  |       V | Q       |         |         |
 8+10       1.0241      3.42  |       V |  Q      |         |         |
 8+15       1.0481      3.49  |       V |  Q      |         |         |
 8+20       1.0724      3.53  |       V |   Q     |         |         |
 8+25       1.0969      3.55  |       V |   Q     |         |         |
 8+30       1.1214      3.56  |        V|   Q     |         |         |
 8+35       1.1463      3.62  |        V|   Q     |         |         |
 8+40       1.1720      3.74  |        V|   Q     |         |         |
 8+45       1.1980      3.77  |        V|    Q    |         |         |
 8+50       1.2245      3.84  |        V|    Q    |         |         |
 8+55       1.2518      3.96  |         V    Q    |         |         |
 9+ 0       1.2793      4.00  |         V     Q   |         |         |
 9+ 5       1.3078      4.13  |         V     Q   |         |         |
 9+10       1.3379      4.37  |         V      Q  |         |         |
 9+15       1.3685      4.45  |         |V     Q  |         |         |
 9+20       1.3997      4.53  |         |V      Q |         |         |
 9+25       1.4318      4.67  |         |V      Q |         |         |
 9+30       1.4643      4.71  |         |V      Q |         |         |
 9+35       1.4973      4.79  |         | V      Q|         |         |
 9+40       1.5311      4.92  |         | V      Q|         |         |
 9+45       1.5653      4.96  |         | V      Q|         |         |
 9+50       1.5999      5.03  |         |  V      Q         |         |
 9+55       1.6354      5.15  |         |  V      Q         |         |
10+ 0       1.6712      5.19  |         |  V      Q         |         |
10+ 5       1.7046      4.85  |         |  V     Q|         |         |
10+10       1.7325      4.05  |         |   V Q   |         |         |
10+15       1.7588      3.82  |         |   VQ    |         |         |
10+20       1.7843      3.71  |         |   Q     |         |         |
10+25       1.8094      3.65  |         |   Q     |         |         |
10+30       1.8343      3.61  |         |   Q     |         |         |
10+35       1.8608      3.84  |         |    Q    |         |         |
10+40       1.8911      4.41  |         |    V Q  |         |         |
10+45       1.9227      4.58  |         |    V  Q |         |         |
10+50       1.9548      4.66  |         |    V  Q |         |         |
10+55       1.9872      4.70  |         |     V Q |         |         |
11+ 0       2.0198      4.73  |         |     V Q |         |         |
11+ 5       2.0521      4.70  |         |     V Q |         |         |
11+10       2.0837      4.59  |         |     V Q |         |         |
11+15       2.1151      4.56  |         |      VQ |         |         |
11+20       2.1464      4.54  |         |      VQ |         |         |
11+25       2.1776      4.53  |         |      VQ |         |         |
11+30       2.2088      4.53  |         |      VQ |         |         |
11+35       2.2393      4.42  |         |      QV |         |         |
11+40       2.2681      4.19  |         |     Q V |         |         |
11+45       2.2965      4.12  |         |     Q V |         |         |
11+50       2.3250      4.14  |         |     Q V |         |         |
11+55       2.3541      4.24  |         |     Q  V|         |         |
12+ 0       2.3835      4.26  |         |      Q V|         |         |
12+ 5       2.4154      4.63  |         |       QV|         |         |
12+10       2.4529      5.45  |         |        V|Q        |         |
12+15       2.4921      5.69  |         |         V Q       |         |
12+20       2.5324      5.86  |         |         V  Q      |         |
12+25       2.5740      6.04  |         |         V   Q     |         |
```

```
12+30       2.6161      6.11  |         |         |V  Q     |         |
12+35       2.6592      6.25  |         |         |V   Q    |         |
12+40       2.7041      6.51  |         |         |V    Q   |         |
12+45       2.7494      6.59  |         |         | V   Q   |         |
12+50       2.7954      6.67  |         |         | V   Q   |         |
12+55       2.8423      6.81  |         |         |  V   Q  |         |
13+ 0       2.8895      6.86  |         |         |  V   Q  |         |
13+ 5       2.9386      7.13  |         |         |  V    Q |         |
13+10       2.9919      7.73  |         |         |   V     Q         |
13+15       3.0463      7.91  |         |         |   V     |Q        |
13+20       3.1014      7.99  |         |         |    V    |Q        |
13+25       3.1567      8.04  |         |         |    V    | Q       |
13+30       3.2122      8.06  |         |         |     V   | Q       |
13+35       3.2640      7.52  |         |         |     V   Q         |
13+40       3.3070      6.25  |         |         |   Q V   |         |
13+45       3.3475      5.87  |         |         |  Q   V  |         |
13+50       3.3867      5.69  |         |         | Q    V  |         |
13+55       3.4252      5.60  |         |         | Q    V  |         |
14+ 0       3.4633      5.54  |         |         | Q     V |         |
14+ 5       3.5026      5.71  |         |         | Q     V |         |
14+10       3.5450      6.14  |         |         |   Q   V |         |
14+15       3.5882      6.28  |         |         |    Q   V|         |
14+20       3.6316      6.30  |         |         |    Q   V|         |
14+25       3.6744      6.21  |         |         |   Q    V|         |
14+30       3.7171      6.20  |         |         |   Q     V         |
14+35       3.7598      6.20  |         |         |   Q     V         |
14+40       3.8025      6.20  |         |         |   Q     V         |
14+45       3.8451      6.19  |         |         |   Q     |V        |
14+50       3.8874      6.14  |         |         |   Q     |V        |
14+55       3.9289      6.02  |         |         |   Q     |V        |
15+ 0       3.9701      5.99  |         |         |  Q      | V       |
15+ 5       4.0109      5.92  |         |         |  Q      | V       |
15+10       4.0508      5.79  |         |         |  Q      | V       |
15+15       4.0904      5.75  |         |         |  Q      |  V      |
15+20       4.1296      5.68  |         |         | Q       |  V      |
15+25       4.1678      5.56  |         |         | Q       |  V      |
15+30       4.2058      5.52  |         |         | Q       |   V     |
15+35       4.2422      5.29  |         |         |Q        |   V     |
15+40       4.2754      4.82  |         |        Q|         |   V     |
15+45       4.3076      4.67  |         |       Q |         |    V    |
15+50       4.3393      4.60  |         |       Q |         |    V    |
15+55       4.3707      4.57  |         |       Q |         |    V    |
16+ 0       4.4020      4.54  |         |       Q |         |    V    |
16+ 5       4.4279      3.76  |         |    Q    |         |     V   |
16+10       4.4418      2.01  |       Q |         |         |     V   |
16+15       4.4520      1.49  |    Q    |         |         |     V   |
16+20       4.4607      1.25  |    Q    |         |         |     V   |
16+25       4.4684      1.12  |   Q     |         |         |     V   |
16+30       4.4755      1.04  |   Q     |         |         |     V   |
16+35       4.4819      0.94  |  Q      |         |         |     V   |
16+40       4.4874      0.78  |  Q      |         |         |     V   |
16+45       4.4925      0.75  | Q       |         |         |     V   |
16+50       4.4976      0.73  | Q       |         |         |     V   |
16+55       4.5026      0.73  | Q       |         |         |     V   |
17+ 0       4.5075      0.72  | Q       |         |         |     V   |
17+ 5       4.5132      0.82  |  Q      |         |         |     V   |
17+10       4.5204      1.05  |   Q     |         |         |     V   |
17+15       4.5281      1.12  |   Q     |         |         |     V   |
17+20       4.5360      1.15  |   Q     |         |         |     V   |
17+25       4.5441      1.17  |   Q     |         |         |     V   |
17+30       4.5522      1.18  |   Q     |         |         |      V  |
17+35       4.5603      1.19  |   Q     |         |         |      V  |
17+40       4.5685      1.19  |   Q     |         |         |      V  |
```

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 17+45 | 4.5767 | 1.19 | Q | | | | V |
| 17+50 | 4.5846 | 1.14 | Q | | | | V |
| 17+55 | 4.5916 | 1.02 | Q | | | | V |
| 18+ 0 | 4.5984 | 0.99 | Q | | | | V |
| 18+ 5 | 4.6051 | 0.97 | Q | | | | V |
| 18+10 | 4.6117 | 0.96 | Q | | | | V |
| 18+15 | 4.6183 | 0.96 | Q | | | | V |
| 18+20 | 4.6249 | 0.95 | Q | | | | V |
| 18+25 | 4.6315 | 0.95 | Q | | | | V |
| 18+30 | 4.6380 | 0.95 | Q | | | | V |
| 18+35 | 4.6442 | 0.90 | Q | | | | V |
| 18+40 | 4.6496 | 0.78 | Q | | | | V |
| 18+45 | 4.6548 | 0.75 | Q | | | | V |
| 18+50 | 4.6595 | 0.68 | Q | | | | V |
| 18+55 | 4.6633 | 0.56 | Q | | | | V |
| 19+ 0 | 4.6669 | 0.52 | Q | | | | V |
| 19+ 5 | 4.6707 | 0.55 | Q | | | | V |
| 19+10 | 4.6752 | 0.65 | Q | | | | V |
| 19+15 | 4.6799 | 0.68 | Q | | | | V |
| 19+20 | 4.6851 | 0.75 | Q | | | | V |
| 19+25 | 4.6911 | 0.87 | Q | | | | V |
| 19+30 | 4.6973 | 0.91 | Q | | | | V |
| 19+35 | 4.7034 | 0.88 | Q | | | | V |
| 19+40 | 4.7087 | 0.77 | Q | | | | V |
| 19+45 | 4.7138 | 0.74 | Q | | | | V |
| 19+50 | 4.7185 | 0.68 | Q | | | | V |
| 19+55 | 4.7224 | 0.56 | Q | | | | V |
| 20+ 0 | 4.7259 | 0.52 | Q | | | | V |
| 20+ 5 | 4.7297 | 0.55 | Q | | | | V |
| 20+10 | 4.7342 | 0.65 | Q | | | | V |
| 20+15 | 4.7389 | 0.68 | Q | | | | V |
| 20+20 | 4.7437 | 0.70 | Q | | | | V |
| 20+25 | 4.7486 | 0.70 | Q | | | | V |
| 20+30 | 4.7534 | 0.71 | Q | | | | V |
| 20+35 | 4.7583 | 0.71 | Q | | | | V |
| 20+40 | 4.7633 | 0.71 | Q | | | | V |
| 20+45 | 4.7682 | 0.71 | Q | | | | V |
| 20+50 | 4.7727 | 0.66 | Q | | | | V |
| 20+55 | 4.7765 | 0.55 | Q | | | | V |
| 21+ 0 | 4.7800 | 0.51 | Q | | | | V |
| 21+ 5 | 4.7838 | 0.55 | Q | | | | V |
| 21+10 | 4.7883 | 0.65 | Q | | | | V |
| 21+15 | 4.7930 | 0.68 | Q | | | | V |
| 21+20 | 4.7975 | 0.65 | Q | | | | V |
| 21+25 | 4.8011 | 0.54 | Q | | | | V |
| 21+30 | 4.8046 | 0.51 | Q | | | | V |
| 21+35 | 4.8084 | 0.55 | Q | | | | V |
| 21+40 | 4.8129 | 0.65 | Q | | | | V |
| 21+45 | 4.8176 | 0.68 | Q | | | | V |
| 21+50 | 4.8220 | 0.65 | Q | | | | V |
| 21+55 | 4.8257 | 0.54 | Q | | | | V |
| 22+ 0 | 4.8292 | 0.51 | Q | | | | V |
| 22+ 5 | 4.8330 | 0.55 | Q | | | | V |
| 22+10 | 4.8375 | 0.65 | Q | | | | V |
| 22+15 | 4.8422 | 0.68 | Q | | | | V |
| 22+20 | 4.8466 | 0.65 | Q | | | | V |
| 22+25 | 4.8503 | 0.54 | Q | | | | V |
| 22+30 | 4.8538 | 0.51 | Q | | | | V |
| 22+35 | 4.8572 | 0.49 | Q | | | | V |
| 22+40 | 4.8606 | 0.49 | Q | | | | V |
| 22+45 | 4.8639 | 0.48 | Q | | | | V |
| 22+50 | 4.8672 | 0.48 | Q | | | | V |
| 22+55 | 4.8705 | 0.48 | Q | | | | V |

```
   23+ 0        4.8737       0.48  |Q          |         |         |        V|
   23+ 5        4.8770       0.48  |Q          |         |         |        V|
   23+10        4.8803       0.48  |Q          |         |         |        V|
   23+15        4.8836       0.48  |Q          |         |         |        V|
   23+20        4.8868       0.48  |Q          |         |         |        V|
   23+25        4.8901       0.48  |Q          |         |         |        V|
   23+30        4.8934       0.48  |Q          |         |         |        V|
   23+35        4.8967       0.48  |Q          |         |         |        V|
   23+40        4.9000       0.48  |Q          |         |         |        V|
   23+45        4.9032       0.48  |Q          |         |         |        V|
   23+50        4.9065       0.48  |Q          |         |         |        V|
   23+55        4.9098       0.48  |Q          |         |         |        V|
   24+ 0        4.9131       0.48  |Q          |         |         |        V|
   24+ 5        4.9156       0.37  |Q          |         |         |        V|
   24+10        4.9166       0.14  Q           |         |         |        V|
   24+15        4.9171       0.07  Q           |         |         |        V|
   24+20        4.9174       0.04  Q           |         |         |        V|
   24+25        4.9175       0.02  Q           |         |         |        V|
   24+30        4.9176       0.01  Q           |         |         |        V|
   24+35        4.9176       0.00  Q           |         |         |        V|
-----------------------------------------------------------------------
```

| SWC Ramone & Perris Pre-Development | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Storm Duration | | | | | | | |
| | 1 hour | | 3 hour | | 6 hour | | 24 hour | |
| Frequency | Q Peak | Volume | Q Peak | Volume | Q Peak | Volume | Q Peak | Volume |
| 2 year | 12.7 | 0.31 | 5.5 | 0.38 | 4.5 | 0.48 | 1.3 | 0.8 |
| 5 year | 21.1 | 0.52 | 10.1 | 0.60 | 10.5 | 0.88 | 1.8 | 1.08 |
| 10 year | 31.1 | 0.93 | 17.0 | 1.04 | 18.4 | 1.65 | 4.0 | 1.48 |

| SWC Ramone & Perris Post-Development | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Storm Duration | | | | | | | |
| | 1 hour | | 3 hour | | 6 hour | | 24 hour | |
| Frequency | Q Peak | Volume | Q Peak | Volume | Q Peak | Volume | Q Peak | Volume |
| 2 year | 19.4 | 0.71 | 12.9 | 1.25 | 11.7 | 1.74 | 4.9 | 3.00 |
| 5 year | 28.5 | 1.04 | 17.4 | 1.69 | 17.9 | 2.65 | 6.7 | 4.09 |
| 10 year | 35.9 | 1.29 | 21.2 | 2.02 | 23 | 3.35 | 8.1 | 4.92 |

| | Volume | |
|---|---|---|
| SWC Ramona & Perris | [cf] | [ac-ft] |
| Pre Development 10yr 24hr | 64,538 | 1.48 |
| Post Development 10yr 24hr | 214,211 | 4.92 |
| Total Vol Required | 149,672 | 3.44 |
| Total Vol Provided | 151,320 | 3.47 |

# Appendix B

```
                  Riverside County Rational Hydrology Program

      CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2012 Version
8.0
            Rational Hydrology Study        Date: 11/09/20
File:swcrpstormdrain.out
      ------------------------------------------------------------------
------
      SWC Ramona & Perris
      Rational Storm Drain Sizing
      1002, 1202, 1402

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

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

      ------------------------------------------------------------------
------


      Program License Serial Number 6232

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

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

      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     1001.000 to Point/Station
1002.000
      **** INITIAL AREA EVALUATION ****
      __________________________________________________________________
____
      Initial area flow distance =   197.000(Ft.)
      Top (of initial area) elevation =    56.000(Ft.)
      Bottom (of initial area) elevation =    54.000(Ft.)
      Difference in elevation =     2.000(Ft.)
```

```
Slope =    0.01015  s(percent)=       1.02
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.217 min.
Rainfall intensity =      3.401(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.891
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  78.96
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.637(CFS)
Total initial stream area =        0.540(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            0.54 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  61.2
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2012 Version 8.0

Rational Hydrology Study Date: 11/09/20

File:swcrpstormdrain.out

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SWC Ramona & Perris
Rational Storm Drain Sizing
902, 1102, 1302, 1502

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

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

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Program License Serial Number 6232

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

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

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 901.000 to Point/Station 902.000

**** INITIAL AREA EVALUATION ****

______________________________________________________________________

Initial area flow distance = 218.000(Ft.)
Top (of initial area) elevation = 52.000(Ft.)
Bottom (of initial area) elevation = 51.000(Ft.)
Difference in elevation = 1.000(Ft.)

```
Slope =    0.00459  s(percent)=       0.46
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.589 min.
Rainfall intensity =      3.085(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.891
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  78.96
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.226(CFS)
Total initial stream area =        0.810(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            0.81 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  61.2
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2012 Version 8.0

Rational Hydrology Study        Date: 11/09/20

File:swcrpstormdrain.out

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SWC Ramona & Perris
Rational Storm Drain Sizing
1602

------------------------------------------------------------------------

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

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

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Program License Serial Number 6232

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

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

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 1601.000 to Point/Station 1602.000

**** INITIAL AREA EVALUATION ****

______________________________________________________________________

Initial area flow distance = 377.000(Ft.)
Top (of initial area) elevation = 56.000(Ft.)
Bottom (of initial area) elevation = 53.000(Ft.)
Difference in elevation = 3.000(Ft.)

```
Slope =    0.00796  s(percent)=       0.80
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.463 min.
Rainfall intensity =      2.924(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.890
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  78.96
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      3.463(CFS)
Total initial stream area =        1.330(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            1.33 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  61.2
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2012 Version 8.0
Rational Hydrology Study Date: 11/09/20
File:swcrpstormdrain.out

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SWC Ramona & Perris
Rational Storm Drain Sizing
1802

------------------------------------------------------------------------

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

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

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Program License Serial Number 6232

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

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

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

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Process from Point/Station 1801.000 to Point/Station 1802.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 281.000(Ft.)
Top (of initial area) elevation = 55.800(Ft.)
Bottom (of initial area) elevation = 53.800(Ft.)
Difference in elevation = 2.000(Ft.)

```
Slope =    0.00712  s(percent)=       0.71
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.694 min.
Rainfall intensity =      3.064(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.891
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  78.96
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.119(CFS)
Total initial stream area =        0.410(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            0.41 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  61.2
```

```
                  Riverside County Rational Hydrology Program

      CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2012 Version
8.0
            Rational Hydrology Study        Date: 11/09/20
File:swcrpstormdrain.out
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      SWC Ramona & Perris
      Rational Storm Drain Sizing
      1702

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

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

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      Program License Serial Number 6232

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

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

      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




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++++
      Process from Point/Station     1701.000 to Point/Station
1702.000
      **** INITIAL AREA EVALUATION ****
      __________________________________________________________________
____
      Initial area flow distance =   185.000(Ft.)
      Top (of initial area) elevation =    56.000(Ft.)
      Bottom (of initial area) elevation =    54.500(Ft.)
      Difference in elevation =     1.500(Ft.)
```

```
Slope =    0.00811  s(percent)=       0.81
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.342 min.
Rainfall intensity =      3.368(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.891
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  78.96
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      0.811(CFS)
Total initial stream area =        0.270(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            0.27 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  61.2
```

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                  Riverside County Rational Hydrology Program

      CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2012 Version
8.0
            Rational Hydrology Study        Date: 11/09/20
File:swcrpstormdrain.out
      ------------------------------------------------------------------
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      SWC Ramona & Perris
      Rational Storm Drain Sizing
      1902

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

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

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      Program License Serial Number 6232

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

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

      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




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++++
      Process from Point/Station     1901.000 to Point/Station
1902.000
      **** INITIAL AREA EVALUATION ****
      __________________________________________________________________
____
      Initial area flow distance =   132.000(Ft.)
      Top (of initial area) elevation =    55.000(Ft.)
      Bottom (of initial area) elevation =    53.000(Ft.)
      Difference in elevation =     2.000(Ft.)
```

```
Slope =    0.01515  s(percent)=       1.52
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Warning: TC computed to be less than 5 min.; program is assuming
```
the

```
time of concentration is 5 minutes.
Initial area time of concentration =    5.000 min.
Rainfall intensity =      3.785(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.892
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  78.96
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      0.912(CFS)
Total initial stream area =        0.270(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            0.27 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  61.2
```

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                  Riverside County Rational Hydrology Program

      CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2012 Version
8.0
            Rational Hydrology Study        Date: 11/09/20
File:swcrpstormdrain.out
      ------------------------------------------------------------------
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      SWC Ramona & Perris
      Rational Storm Drain Sizing
      102

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

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

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

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

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

      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




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++++
      Process from Point/Station      101.000 to Point/Station
102.000
      **** INITIAL AREA EVALUATION ****
      __________________________________________________________________
____
      Initial area flow distance =   372.000(Ft.)
      Top (of initial area) elevation =  1459.000(Ft.)
      Bottom (of initial area) elevation =  1456.500(Ft.)
      Difference in elevation =     2.500(Ft.)
```

```
Slope =    0.00672  s(percent)=       0.67
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.707 min.
Rainfall intensity =      2.884(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.890
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  78.96
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.181(CFS)
Total initial stream area =        0.460(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            0.46 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  61.2
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2012 Version 8.0
Rational Hydrology Study        Date: 11/09/20
File:swcrpstormdrain.out

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SWC Ramona & Perris
Rational Storm Drain Sizing
202

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

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

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Program License Serial Number 6232

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

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

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

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

______________________________________________________________________

Initial area flow distance =   312.000(Ft.)
Top (of initial area) elevation =    56.000(Ft.)
Bottom (of initial area) elevation =    54.000(Ft.)
Difference in elevation =     2.000(Ft.)

```
Slope =    0.00641  s(percent)=       0.64
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.192 min.
Rainfall intensity =      2.971(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.890
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  78.96
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.487(CFS)
Total initial stream area =        0.940(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            0.94 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  61.2
```

```
                  Riverside County Rational Hydrology Program

      CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2012 Version
8.0
            Rational Hydrology Study        Date: 11/09/20
File:swcrpstormdrain.out
      ------------------------------------------------------------------
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      SWC Ramona & Perris
      Rational Storm Drain Sizing
      402

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

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

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      Program License Serial Number 6232

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

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

      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




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++++
      Process from Point/Station      401.000 to Point/Station
402.000
      **** INITIAL AREA EVALUATION ****
      __________________________________________________________________
____
      Initial area flow distance =   558.000(Ft.)
      Top (of initial area) elevation =    58.000(Ft.)
      Bottom (of initial area) elevation =    55.000(Ft.)
      Difference in elevation =     3.000(Ft.)
```

```
Slope =    0.00538  s(percent)=      0.54
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.707 min.
Rainfall intensity =      2.606(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  78.96
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.086(CFS)
Total initial stream area =        0.900(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            0.90 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  61.2
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2012 Version 8.0
Rational Hydrology Study        Date: 11/09/20
File:swcrpstormdrain.out

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SWC Ramona & Perris
Rational Storm Drain Sizing
502

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

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

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Program License Serial Number 6232

------------------------------------------------------------------------

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

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

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

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Process from Point/Station      501.000 to Point/Station 502.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =   677.000(Ft.)
Top (of initial area) elevation =    56.800(Ft.)
Bottom (of initial area) elevation =    53.400(Ft.)
Difference in elevation =     3.400(Ft.)

```
Slope =    0.00502  s(percent)=       0.50
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.727 min.
Rainfall intensity =      2.492(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  78.96
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      7.975(CFS)
Total initial stream area =        3.600(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            3.60 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  61.2
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2012 Version 8.0
Rational Hydrology Study        Date: 11/09/20
File:swcrpstormdrain.out

------------------------------------------------------------------------

SWC Ramona & Perris
Rational Storm Drain Sizing
602

------------------------------------------------------------------------

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

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

------------------------------------------------------------------------

Program License Serial Number 6232

------------------------------------------------------------------------

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

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

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

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Process from Point/Station      601.000 to Point/Station 602.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =   550.000(Ft.)
Top (of initial area) elevation =    57.000(Ft.)
Bottom (of initial area) elevation =    54.000(Ft.)
Difference in elevation =     3.000(Ft.)

```
Slope =    0.00545  s(percent)=       0.55
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.615 min.
Rainfall intensity =      2.617(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  78.96
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.513(CFS)
Total initial stream area =        0.650(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            0.65 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  61.2
```

```
                Riverside County Rational Hydrology Program

      CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2012 Version
8.0
            Rational Hydrology Study        Date: 11/09/20
File:swcrpstormdrain.out
      ------------------------------------------------------------------
------
      SWC Ramona & Perris
      Rational Storm Drain Sizing
      702

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

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

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

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

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

      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      701.000 to Point/Station
702.000
      **** INITIAL AREA EVALUATION ****
      __________________________________________________________________
____
      Initial area flow distance =   620.000(Ft.)
      Top (of initial area) elevation =    56.000(Ft.)
      Bottom (of initial area) elevation =    53.000(Ft.)
      Difference in elevation =     3.000(Ft.)
```

```
Slope =    0.00484  s(percent)=       0.48
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.406 min.
Rainfall intensity =      2.526(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  78.96
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      6.176(CFS)
Total initial stream area =        2.750(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            2.75 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  61.2
```

```
                    Riverside County Rational Hydrology Program

      CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2012 Version
8.0
            Rational Hydrology Study        Date: 11/09/20
File:swcrpstormdrain.out
      ------------------------------------------------------------------
------
      SWC Ramona & Perris
      Rational Storm Drain Sizing
      802

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

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

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

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

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

      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




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++++
      Process from Point/Station      801.000 to Point/Station
802.000
      **** INITIAL AREA EVALUATION ****
      __________________________________________________________________
____
      Initial area flow distance =   419.000(Ft.)
      Top (of initial area) elevation =    58.000(Ft.)
      Bottom (of initial area) elevation =    54.000(Ft.)
      Difference in elevation =     4.000(Ft.)
```

```
Slope =    0.00955  s(percent)=       0.95
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.512 min.
Rainfall intensity =      2.916(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.890
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.600
Decimal fraction soil group C = 0.400
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  78.96
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      4.128(CFS)
Total initial stream area =        1.590(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            1.59 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  61.2
```

| Control Point | Area [sf] | Area [ac] | Q10 [CFS]* | Q100 [CFS] | SD Sizing |
|---|---|---|---|---|---|
| | | | | | |
| 102 | 19,915 | 0.46 | 0.8 | 1.2 | 18" Pipe |
| 202 | 40,729 | 0.94 | 1.7 | 2.5 | 18" Pipe |
| Removed | | | | | |
| 402 | 39,288 | 0.90 | 1.5 | 2.1 | Curb Opening On-Grade |
| 502 | 156,975 | 3.60 | 5.6 | 8.0 | 24" Pipe |
| 602 | 28,129 | 0.65 | 1.1 | 1.5 | Curb Opening On-Grade |
| 702 | 119,779 | 2.75 | 4.3 | 6.2 | 36" Pipe |
| 802 | 69,327 | 1.59 | 2.9 | 4.1 | 18" Pipe |
| 902 | 35,250 | 0.81 | 1.6 | 2.2 | 18" Pipe |
| 1002 | 23,550 | 0.54 | 1.1 | 1.6 | 18" Pipe |
| 1102 | 35,250 | 0.81 | 1.6 | 2.2 | 18" Pipe |
| 1202 | 23,550 | 0.54 | 1.1 | 1.6 | 18" Pipe |
| 1302 | 35,250 | 0.81 | 1.6 | 2.2 | 18" Pipe |
| 1402 | 23,550 | 0.54 | 1.1 | 1.6 | 18" Pipe |
| 1502 | 35,250 | 0.81 | 1.6 | 2.2 | 18" Pipe |
| 1602 | 57,844 | 1.33 | 2.4 | 3.5 | 18" Pipe |
| 1702 | 11,654 | 0.27 | 0.6 | 0.8 | Curb Opening On-Grade |
| 1802 | 17,778 | 0.41 | 0.8 | 1.1 | Curb Opening On-Grade |
| 1902 | 11,831 | 0.27 | 0.6 | 0.9 | 18" Pipe |

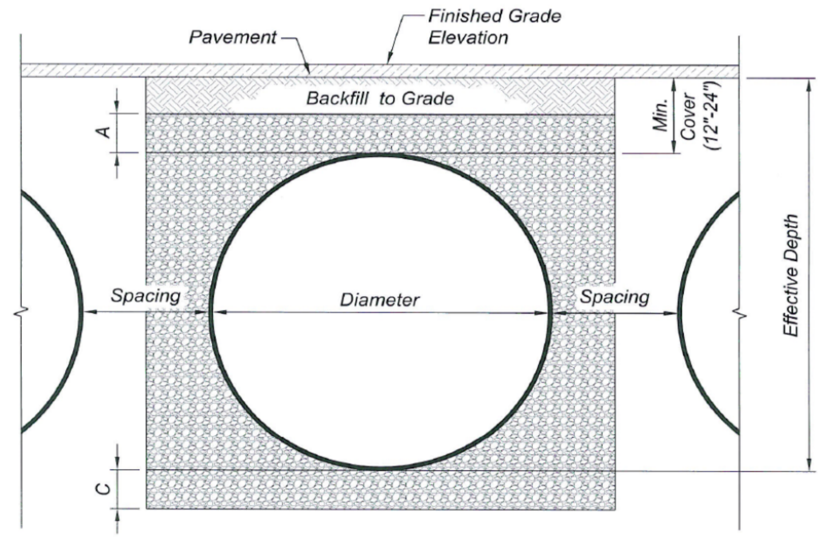
# Appendix C

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

CONTECH STORMWATER SOLUTIONS INC.

CONTECH® CMP DETENTION SYSTEMS

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


## Project Summary

| | |
|---|---|
| Date: | 10/30/2020 |
| Project Name: | SWC Ramona & Perris - Central Pipes |
| City / County: | Perris |
| State: | CA |
| Designed By: | CM |
| Company: | United Engineering |
| Telephone: | |

**Enter Information in Blue Cells**

## Corrugated Metal Pipe Calculator

| | | |
|---|---|---|
| Storage Volume Required (cf): | 103,573 | |
| Limiting Width (ft): | 75.00 | |
| Invert Depth Below Asphalt (ft): | 10.50 | |
| Solid or Perforated Pipe: | Perforated | |
| Shape Or Diameter (in): | 96 | 50.27 $ft^2$ Pipe Area |
| Number Of Headers: | 1 | |
| 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 | |

## System Sizing

| | | | |
|---|---|---|---|
| Pipe Storage: | 74,343 | cf | |
| Porous Stone Storage: | 30,081 | cf | |
| Total Storage Provided: | 104,423 | cf | 100.8% Of Required Storage |
| Number of Barrels: | 6 | barrels | |
| Length per Barrel: | 236.0 | ft | |
| Length Per Header: | 63.0 | ft | |
| Rectangular Footprint (W x L): | 67. ft x 248. ft | | |

## CONTECH Materials

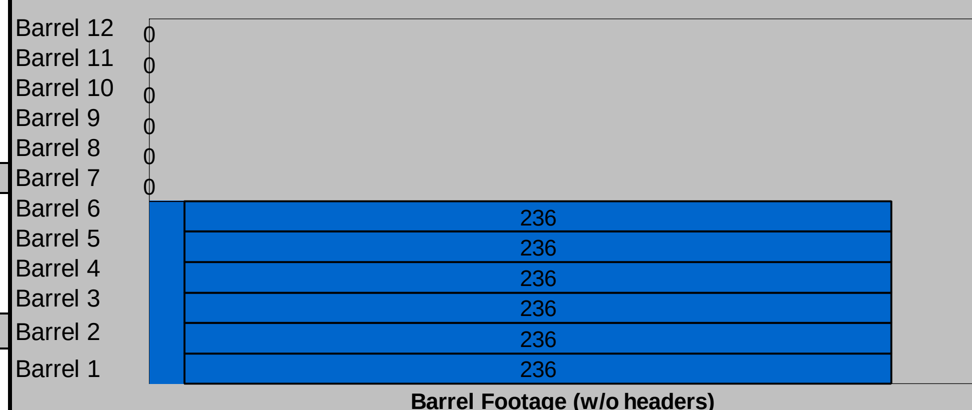
| | | |
|---|---|---|
| Total CMP Footage: | 1,479 | ft |
| Approximate Total Pieces: | 63 | pcs |
| Approximate Coupling Bands: | 62 | bands |
| Approximate Truckloads: | 32 | trucks |

## Construction Quantities**

| | | |
|---|---|---|
| Total Excavation: | 6462 | cy |
| Porous Stone Backfill For Storage: | 2785 | cy stone |
| Backfill to Grade Excluding Stone: | 923 | cy fill |

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

## System Layout



# DYODS ™
## Design Your Own Detention System

CONTECH STORMWATER SOLUTIONS INC.

CONTECH CMP DETENTION SYSTEMS

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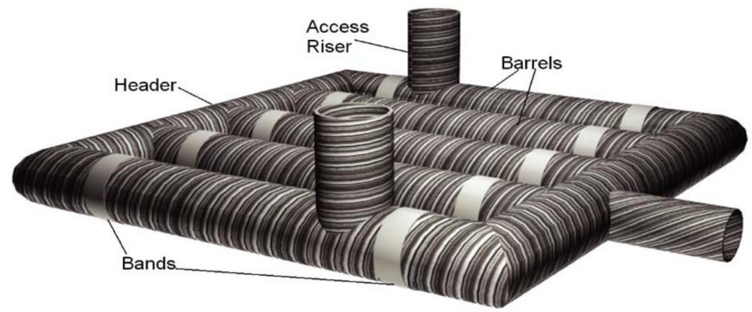
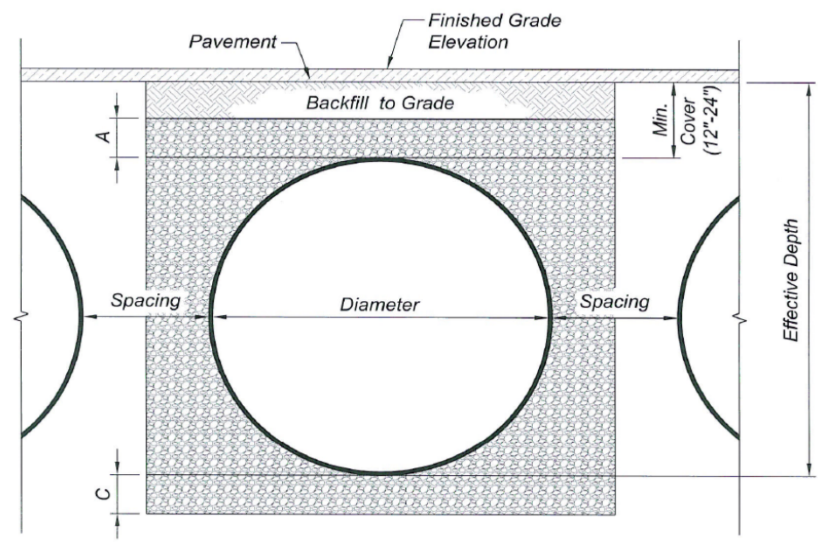
and pricing send completed worksheet to:
**dyods@contech-cpi.com**




## Project Summary

| | |
|---|---|
| Date: | 10/30/2020 |
| Project Name: | SWC Ramona & Perris - East Pipes |
| City / County: | Perris |
| State: | CA |
| Designed By: | CM |
| Company: | United Engineering |
| Telephone: | |

**Enter Information in Blue Cells**



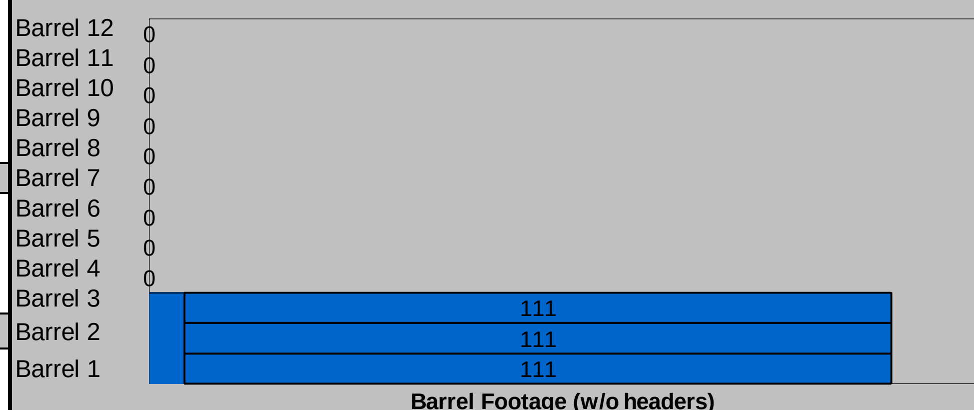

## Corrugated Metal Pipe Calculator

| | | |
|---|---|---|
| Storage Volume Required (cf): | 25,594 | |
| Limiting Width (ft): | 40.00 | |
| Invert Depth Below Asphalt (ft): | 10.50 | |
| Solid or Perforated Pipe: | Perforated | |
| Shape Or Diameter (in): | 96 | 50.27 $ft^2$ Pipe Area |
| Number Of Headers: | 1 | |
| 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 | |

## System Sizing

| | | | |
|---|---|---|---|
| Pipe Storage: | 18,246 | cf | |
| Porous Stone Storage: | 7,757 | cf | |
| Total Storage Provided: | 26,003 | cf | 101.6% Of Required Storage |
| Number of Barrels: | 3 | barrels | |
| Length per Barrel: | 111.0 | ft | |
| Length Per Header: | 30.0 | ft | |
| Rectangular Footprint (W x L): | 34. ft x 123. ft | | |

## System Layout




## CONTECH Materials

| | | |
|---|---|---|
| Total CMP Footage: | 363 | ft |
| Approximate Total Pieces: | 17 | pcs |
| Approximate Coupling Bands: | 16 | bands |
| Approximate Truckloads: | 9 | trucks |

## Construction Quantities**

| | | |
|---|---|---|
| Total Excavation: | 1627 | cy |
| Porous Stone Backfill For Storage: | 718 | cy stone |
| Backfill to Grade Excluding Stone: | 233 | cy fill |

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

# DYODS™
## Design Your Own Detention System

CONTECH STORMWATER SOLUTIONS INC.

CONTECH CMP DETENTION SYSTEMS

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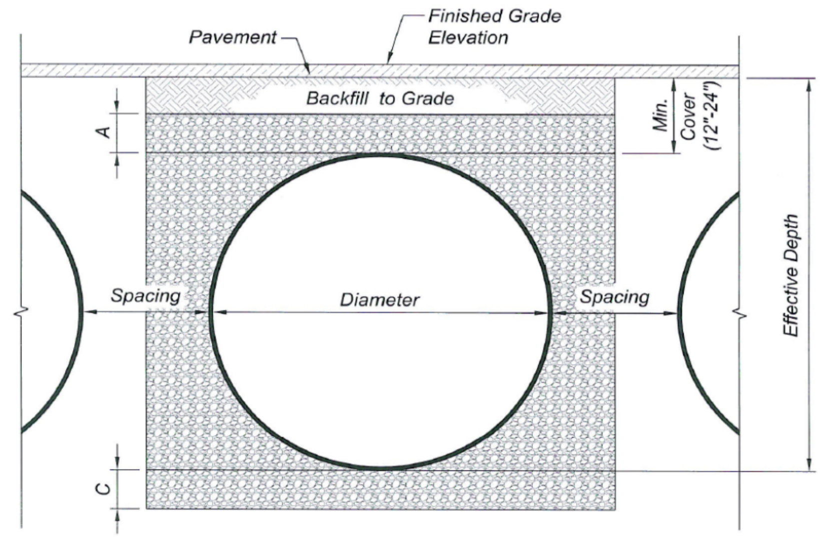
and pricing send completed worksheet to:
**dyods@contech-cpi.com**


## Project Summary

| | |
|---|---|
| Date: | 10/30/2020 |
| Project Name: | SWC Ramona & Perris - West Pipes |
| City / County: | Perris |
| State: | CA |
| Designed By: | CM |
| Company: | United Engineering |
| Telephone: | |

**Enter Information in Blue Cells**

## Corrugated Metal Pipe Calculator

| | | |
|---|---|---|
| Storage Volume Required (cf): | 20,505 | |
| Limiting Width (ft): | 40.00 | |
| Invert Depth Below Asphalt (ft): | 10.50 | |
| Solid or Perforated Pipe: | Perforated | |
| Shape Or Diameter (in): | 96 | 50.27 $ft^2$ Pipe Area |
| Number Of Headers: | 1 | |
| 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 | |

## System Sizing

| | | | |
|---|---|---|---|
| Pipe Storage: | 14,627 | cf | |
| Porous Stone Storage: | 6,267 | cf | |
| Total Storage Provided: | 20,894 | cf | 101.9% Of Required Storage |
| Number of Barrels: | 3 | barrels | |
| Length per Barrel: | 87.0 | ft | |
| Length Per Header: | 30.0 | ft | |
| Rectangular Footprint (W x L): | 34. ft x 99. ft | | |

## CONTECH Materials

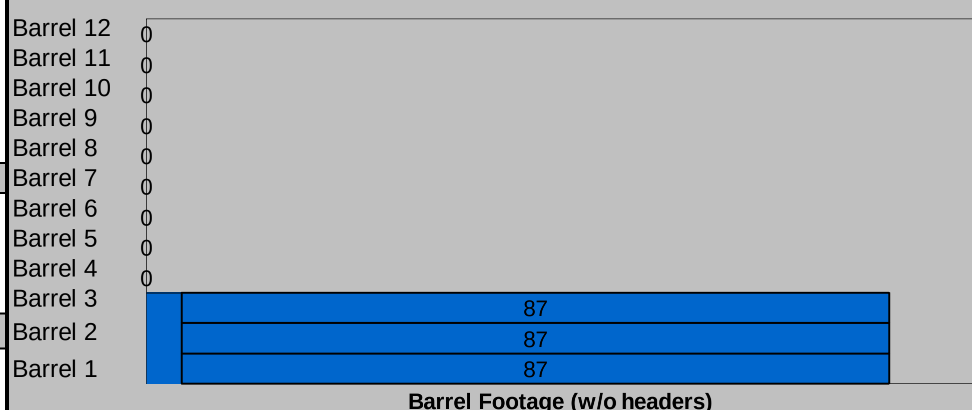
| | | |
|---|---|---|
| Total CMP Footage: | 291 | ft |
| Approximate Total Pieces: | 14 | pcs |
| Approximate Coupling Bands: | 13 | bands |
| Approximate Truckloads: | 7 | trucks |

## Construction Quantities**

| | | |
|---|---|---|
| Total Excavation: | 1309 | cy |
| Porous Stone Backfill For Storage: | 580 | cy stone |
| Backfill to Grade Excluding Stone: | 187 | cy fill |

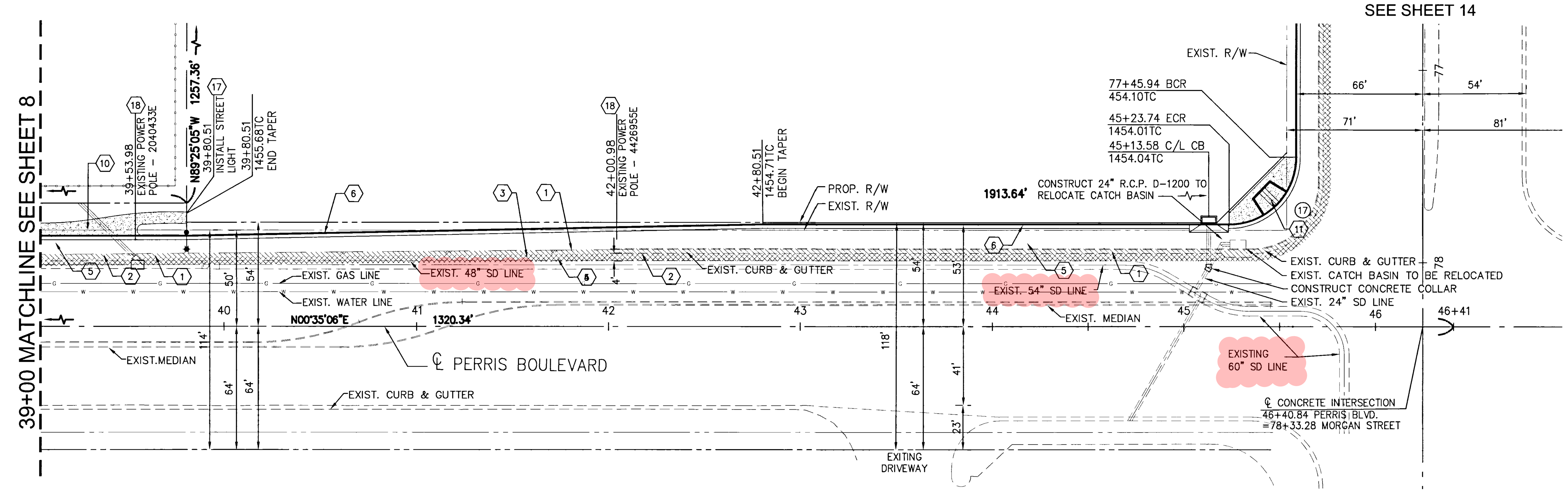
***Construction quantities are approximate and should be verified upon final design*

## System Layout



# Appendix D


| PROFILE SCALES |
|---|
| HORIZ: 1" = 40' |
| VERT: 1" = 4' |




# PERRIS BOULEVARD

STA. 39+50.00 TO STA. 45+50.00

SCALE 1"=40'

0 20 40 80 120 160

SCALE: 1 INCH = 40 FEET

## CURVE DATA

| | RADIUS | DELTA | LENGTH | TANGENT |
|---|---|---|---|---|
| 17 | 35.00' | 89°59'37" | 54.97' | 35.00' |

## STREET CONSTRUCTION NOTES:

1. REMOVE AND DISPOSE OF EXISTING A.C. PAVEMENT & BASE, CURB OR EXISTING CONCRETE CURB & GUTTER, SIDEWALK
2. SAW CUT FOR SMOOTH JOINT.
3. COLD PLANE AND OVERLAY EXISTING A.C. PAVEMENT (MIN. 2")
4. PLACE 5.5" THICK A.C. PAVING OVER 10" CLASS II AB. (MORGAN TENTATIVE SECTION)
4A. PLACE 6" THICK A.C. PAVING OVER 12" CLASS II AB. (INDIAN TENTATIVE SECTION)
5. PLACE 6.5" THICK A.C. PAVING OVER 12" CLASS II AB. (PERRIS TENTATIVE SECTION)
6. CONSTRUCT TYPE A-8 CURB & GUTTER (8"CF) PER RIVERSIDE COUNTY STD. NO. 201.
7. CONSTRUCT TYPE "D" CURB PER RIVERSIDE COUNTY STD. NO. 204.
8. CONSTRUCT COMMERCIAL DRIVEWAY PER RIV. COUNTY STD. NO. 207A.
9. CONSTRUCT 6' WIDE, 4" THK. CONCRETE SIDEWALK PER RIV. COUNTY STD. NO. 401
10. CONSTRUCT 6' MIN., 4" THK. MEANDERING SIDEWALK PER RIV. COUNTY STD. NO. 404
11. CONSTRUCT CURB RAMP "CASE A" PER RIVERSIDE COUNTY STD. NO. 403
12. CONSTRUCT BUS TURNOUT PER RIVERSIDE COUNTY STD. NO. 814.
13. CONSTRUCT MEDIAN TAPER PER STANDARD PLANS FOR PUBLIC WORKS STD. STD. NO. 140-2. (L=120')
14. CONSTRUCT MEDIAN FLARE PER STANDARD PLANS FOR PUBLIC WORKS STANDARD NO. 141-1. (L=50')
15. CONSTRUCT CATCH BASIN PER RCFC STD. NO. CB100 (W AND V SHOWN ON PLAN)
16. CONSTRUCT LOCAL DEPRESSION PER RCFC STD. NO. LD201
17. STREET LIGHTS TO BE INSTALLED AND SUPPLIED BY SCE PER RIVERSIDE COUNTY STD. NO. 1001
18. REMOVE AND RELOCATE EXISTING POWER POLE (UNDERGROUND IF BELOW 65KV)
19. EXISTING POWER POLE TO REMAIN
20. CONSTRUCT 6" THICK CONCRETE PAVEMENT (4000 PSI)
21. ADJUST EXISTING MANHOLE TO GRADE.
22. CONSTRUCT TYPE A-6 CURB & GUTTER (6"CF) PER RIVERSIDE COUNTY STD. NO. 200.

## PAVING LEGEND

- A.C. PAVEMENT
- A.C. OVERLAY
- A.C. REMOVAL
- CONCRETE

Underground Service Alert
Call: TOLL FREE 1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

| MARK | REVISIONS | APPR. | DATE |
|---|---|---|---|

DESIGNED BY: JAS DRAWN BY: JAS CHECKED BY: TT

CITY OF PERRIS ENGINEERING DEPARTMENT
APPROVED BY: DATE:
RECOMMENDED DATE:

SEAL-DESIGN ENGINEER
REGISTERED PROFESSIONAL ENGINEER TERESITO N. TABIOLO RCE No. 38826 Exp. 3-31-09 CIVIL STATE OF CALIFORNIA

PLANS PREPARED UNDER THE SUPERVISION OF:
7-9-08
TERESITO N. TABIOLO, RCE NO. 38826, EXP. 03/31/2009 DATE
APPROVED BY:
CITY OF PERRIS, CITY OF ENGINEER DATE 7-10-08

KCT CONSULTANTS, INC.
Civil Engineers - Surveyors - Planners
P.O. Box 5705 Riverside, CA 92517-5705
4344 Latham St., Suite 200, Riverside, CA 92501
Phone: 951-341-8940 Fax: 951-341-8945
e-mail: kctinc@kctconsultants.com

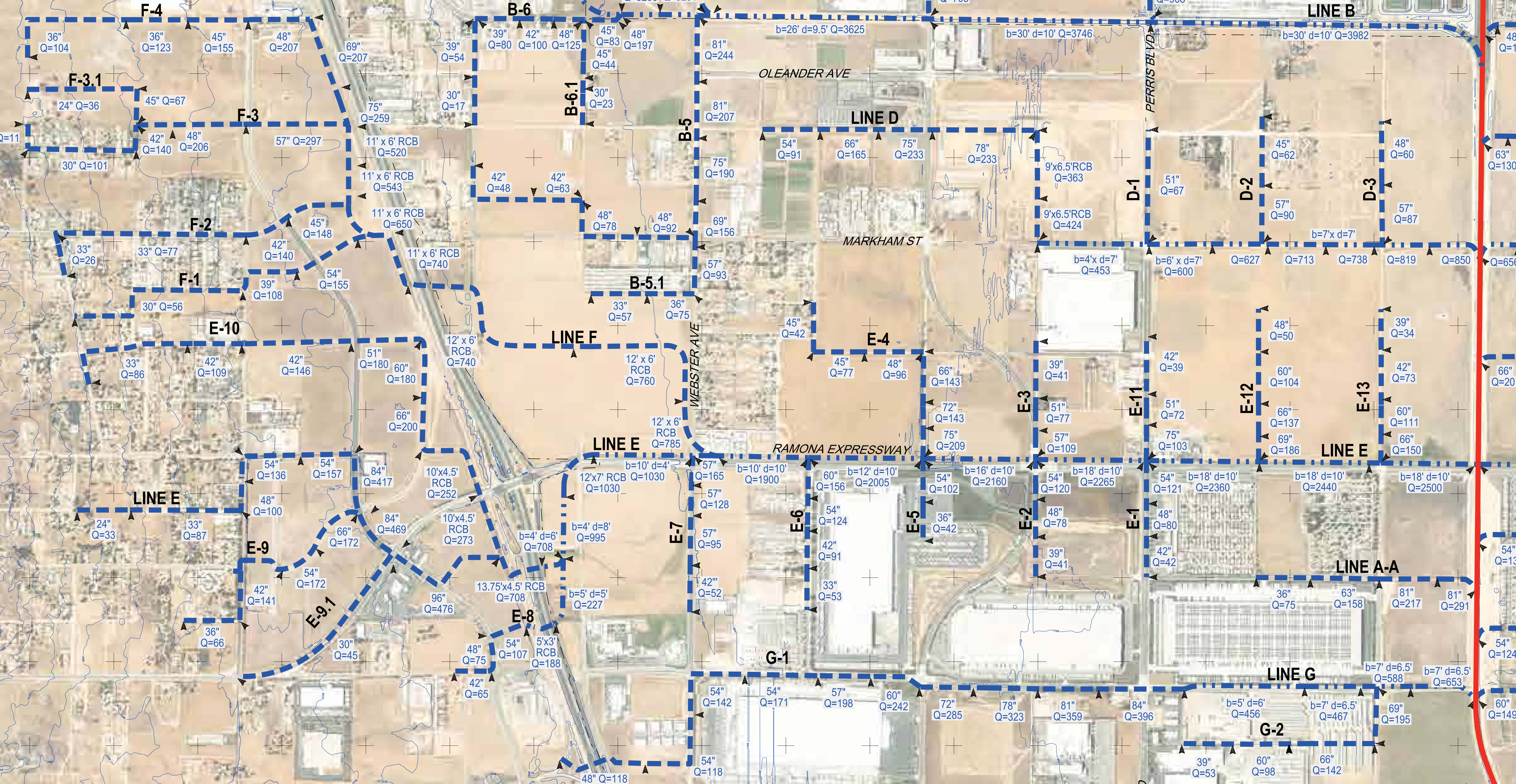
SCALE: 1"=40'
DATE: JULY 2008
BENCH MARK: Z-6843 ELEVATION: 1454.258
1 ½" BRASS DISK AT INTERSECTION OF RAMONA EXPWY AND PERRIS BLVD.

CITY OF PERRIS
STREET IMPROVEMENT & STORM DRAIN PLANS
PERRIS BOULEVARD
STA. 39+00.00 TO STA. 46+40.84
FOR: RIDGE PROPERTY TRUST 1386-01

9 OF 16 SHEETS

CITY FILE No. P8-891

P-486


F-4
B-6
LINE B
36" Q=104
36" Q=123
45" Q=155
48" Q=207
69" Q=207
39" Q=54
39" Q=80
42" Q=100
48" Q=125
45" Q=83
48" Q=197
45" Q=44
b=26' d=9.5' Q=3625
b=30' d=10' Q=3746
b=30' d=10' Q=3982
81" Q=244
OLEANDER AVE
PERRIS BLVD
F-3.1
45" Q=67
24" Q=36
F-3
B-6.1
30" Q=17
30" Q=23
75" Q=259
81" Q=207
B-5
LINE D
Q=11
42" Q=140
48" Q=206
57" Q=297
11' x 6' RCB Q=520
30" Q=101
11' x 6' RCB Q=543
54" Q=91
66" Q=165
75" Q=233
78" Q=233
45" Q=62
48" Q=60
63" Q=130
75" Q=190
9'x6.5'RCB Q=363
D-1
51" Q=67
D-2
D-3
42" Q=48
42" Q=63
57" Q=90
57" Q=87
F-2
11' x 6' RCB Q=650
45" Q=148
48" Q=78
48" Q=92
69" Q=156
9'x6.5'RCB Q=424
b=7'x d=7'
MARKHAM ST
33" Q=26
33" Q=77
42" Q=140
11' x 6' RCB Q=740
57" Q=93
b=4'x d=7' Q=453
b=6' x d=7' Q=600
Q=627
Q=713
Q=738
Q=819
Q=850
Q=656
F-1
39" Q=108
54" Q=155
B-5.1
30" Q=56
33" Q=57
36" Q=75
E-10
45" Q=42
LINE F
E-4
48" Q=50
39" Q=34
12' x 6' RCB Q=740
33" Q=86
42" Q=109
42" Q=146
51" Q=180
60" Q=180
12' x 6' RCB Q=760
WEBSTER AVE
45" Q=77
48" Q=96
66" Q=143
39" Q=41
42" Q=39
60" Q=104
42" Q=73
66" Q=20
E-3
E-11
E-12
E-13
66" Q=200
72" Q=143
51" Q=77
51" Q=72
66" Q=137
60" Q=111
12' x 6' RCB Q=785
75" Q=209
57" Q=109
75" Q=103
69" Q=186
66" Q=150
LINE E
RAMONA EXPRESSWAY
54" Q=136
54" Q=157
84" Q=417
10'x4.5' RCB Q=252
b=10' d=4' Q=1030
12'x7' RCB Q=1030
57" Q=165
b=10' d=10' Q=1900
60" Q=156
b=12' d=10' Q=2005
54" Q=102
b=16' d=10' Q=2160
54" Q=120
b=18' d=10' Q=2265
54" Q=121
b=18' d=10' Q=2360
b=18' d=10' Q=2440
b=18' d=10' Q=2500
48" Q=100
57" Q=128
54" Q=124
E-6
E-5
E-2
E-1
48" Q=78
48" Q=80
24" Q=33
33" Q=87
66" Q=172
84" Q=469
10'x4.5' RCB Q=273
b=4' d=6' Q=708
b=4' d=8' Q=995
E-7
57" Q=95
36" Q=42
E-9
42" Q=91
39" Q=41
42" Q=42
LINE A-A
54" Q=13
54" Q=172
42" Q=141
E-9.1
96" Q=476
13.75'x4.5' RCB Q=708
b=5' d=5' Q=227
42" Q=52
33" Q=53
36" Q=75
63" Q=158
81" Q=217
81" Q=291
36" Q=66
E-8
30" Q=45
54" Q=107
5'x3' RCB Q=188
48" Q=75
G-1
54" Q=124
42" Q=65
LINE G
b=7' d=6.5' Q=588
b=7' d=6.5' Q=653
54" Q=142
54" Q=171
57" Q=198
60" Q=242
72" Q=285
78" Q=323
81" Q=359
84" Q=396
b=5' d=6' Q=456
b=7' d=6.5' Q=467
69" Q=195
60" Q=149
G-2
54" Q=118
48" Q=118
39" Q=53
60" Q=98
66" Q=142

# Appendix E

# GEOTECHNICAL UPDATE & PERCOLATION TEST REPORT

## WAREHOUSE BUILDING
## SOUTHWEST CORNER OF RAMONA EXPRESSWAY & PERRIS BOULEVARD
## PERRIS, CALIFORNIA

GEOCON
WEST, INC.
GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

**PREPARED FOR**

**PACIFIC DEVELOPMENT PARTNERS, LLC**
**SAN JUAN CAPISTRANO, CALIFORNIA**

**APRIL 28, 2020**
**PROJECT NO. T2400-22-02**

GEOCON
WEST, INC.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. T2400-22-02
April 28, 2020

Pacific Development Partners, LLC
30220 Rancho Viejo Road, Suite B
San Juan Capistrano, California 92675

Attention: Mr. Lars Anderson

Subject: GEOTECHNICAL UPDATE & PERCOLATION TEST REPORT
WAREHOUSE BUILDING
SOUTHWEST CORNER OF
RAMONA EXPRESSWAY & PERRIS BOULEVARD
PERRIS, CALIFORNIA

Dear Mr. Anderson:

In accordance with your authorization of Proposal No. IE-2431, Geocon West Inc. (Geocon) herein submits the results of our geotechnical update and percolation test results for the subject site. The accompanying report presents the results of our study, and the conclusions and recommendations pertaining to the geotechnical aspects of the proposed warehouse building. The site is considered suitable for proposed development, provided the recommendations of this report are followed.

Should you have questions regarding this report, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

**GEOCON WEST, INC.**

Luke C. Weidman
GIT 891

Andrew T. Shoashekan
EIT 151871

PROFESSIONAL GEOLOGIST
LISA A. BATTIATO
No. 2316
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Lisa A. Battiato
CEG 2316

Mehrab Jesmani
PhD, PE 81452

REGISTERED PROFESSIONAL ENGINEER
MEHRAB JESMANI
No. C 81452
EXP. 09/30/21
CIVIL
STATE OF CALIFORNIA

LW:ATS:LAB:MJ:hd

(e-mail) Addressee

## TABLE OF CONTENTS

# GEOTECHNICAL UPDATE
# & PERCOLATION TEST REPORT

## 1. PURPOSE AND SCOPE

This report presents the results of our geotechnical update and percolation testing as it pertains to the construction of the proposed warehouse building at a site located immediately southwest of the corner of Ramona Expressway and Perris Boulevard, in the City of Perris, California (see *Vicinity Map*, Figure 1). Geocon performed a geotechnical investigation at the site in 2006 which serves as the basis for this update.

The purpose of this study was to evaluate the existing site geology and subsurface soil conditions, identify geologic and geotechnical constraints that may affect development of the property, and provide geotechnical recommendations as they pertain to the proposed development based on the 2019 California Building Code (CBC). The scope of this investigation also included a review of readily available published and unpublished geologic literature (see *List of References*).

The scope of this study included performing a site reconnaissance, drilling and testing of percolation borings, collecting and testing of soil samples, reviewing our 2006 geotechnical report for the site, performing engineering analyses, and preparing this report.

Our original subsurface investigation was performed on August 4 and 7, 2006. We drilled, logged, and sampled eighteen geotechnical borings to depths ranging between 16 and 51½ feet. On March 15 and 16, 2020 we drilled, logged, and sampled seven percolation test borings to depths of 5 and 11 feet in areas where storm water infiltration systems are proposed. The *Geologic Map* (Figure 2) presents the approximate locations of the geotechnical and percolation test borings. *Appendix A* provides a detailed discussion of the field investigation including logs of the borings and percolation test results.

Laboratory testing was performed on select soil samples collected during our field investigations. Our laboratory testing program consisted of in-situ dry density and moisture content, maximum dry density and optimum moisture content, direct shear strength, collapse/swell potential, consolidation characteristics, expansion index/potential, corrosion screening, and grain size distribution. Details of the laboratory tests and a summary of the test results are presented in *Appendix B.*

The recommendations presented herein are based on the engineering evaluation of data obtained from our field investigations and our understanding of the development as presently proposed. If project details vary significantly from those described herein, Geocon should be contacted to evaluate the necessity for review and possible revision of this report.

## 2. SITE AND PROJECT DESCRIPTION

The subject site is located on the southwest corner of the intersection of Ramona Expressway and Perris Boulevard, in the City of Perris, California. The site is currently vacant with grass, weeds, and small shrubs within the interior, and some stumps of recently cut trees in the northeast corner. Based on available historic aerial photographs provided by *Historic Aerials* (NETR Online), it appears the site was previously utilized as a sod farm until sometime between 2005 and 2009. Storm water mitigation systems exist on the northwestern and northeastern corners of the site. The existing site grades range from approximately elevation 1,455 feet above Mean Sea Level (MSL) in the east to 1,462 feet above MSL in the west. The site is at latitude 33.8436 and longitude -117.2283.

Based on the referenced *Conceptual Site Plan* (2019) we understand the proposed development will consist of a 352,240-square-foot industrial building with a warehouse and associated offices. Parking and driveway areas will surround the building. Storm water infiltration swales are proposed along the western, northern, and eastern property boundaries. Based on the current site topography and surrounding grades, we anticipate cuts and fills will be on the order of 10 feet or less (exclusive of remedial grading).

Although we have not been provided structural loading information at this time, we expect that the proposed building will generally consist of reinforced concrete tilt-up walls supported on a conventional shallow foundation with a concrete slab-on-grade system, with column loads of up to 200 kips and wall loads of up to 10 kips per linear foot. Our preliminary geotechnical recommendations are based on these load assumptions; Geocon should be contacted to provide additional recommendations if higher loads are used in design.

The findings, conclusions, and recommendations presented herein are based on our site reconnaissance, field investigations and testing, laboratory testing, engineering analyses, and review of published geologic literature. Additionally, if project plans differ from the project descriptions provided herein, Geocon should be contacted for review of the plans and possible revisions to this report.

## 3. GEOLOGIC SETTING

The subject site, like the rest of southern California, is located within a seismically active region near the margin between the North American and Pacific tectonic plates. The site is located within the Perris Valley which is bounded on the west by the Perris Erosion Surface, the east by several granitic hills and mountains, most notably of which are the Lakeview Mountains, the north by the Box Springs Mountains, and the south by a relatively undefined area of the Menifee Valley (Jenkins, 1965). The Perris Valley is a north-northwest trending alluvial basin which has been filled with sediment emanating from the surrounding bedrock highlands. Drainage within the valley is to the south and west.

Major faults within this area include the San Jacinto Valley (Casa Loma and Claremont branches) and San Bernardino segments of the San Jacinto fault, and the Glen Ivy and Wildomar segments of the Elsinore fault. The Casa Loma fault is nearest to the site. Distances to local faults from the subject site are listed in Table 5.2 of this report.

# 4. SOIL AND GEOLOGIC CONDITIONS

During our 2006 and current field investigations, we encountered Pleistocene-age very old alluvium to the maximum depth explored of 51½ feet below the ground surface; this geologic unit was encountered across the site in its entirety. This geologic unit is depicted on the *Geologic Map* (Figure 2) and its nomenclature follows that of D.M. Morton (2003).

## 4.1 Very Old Alluvial Fan Deposits (Qvof)

The very old alluvial fan deposits were encountered in all of our borings from the surface to the maximum depths explored of 51½ feet. As encountered the unit was observed to consist of moist, brown, dark brown, and reddish brown, loose to dense sand with varying amounts of silt and clay. Discontinuous layers of silt and clay were observed within the main body of sand encountered.

# 5. GROUNDWATER

Groundwater or seepage were not encountered during either of our field investigations (2006 and 2020) at the site. According to the California Department of Water Resources' *Water Data Library*, well data recorded within the last ten years indicates the depth to shallow groundwater to range between 9 and 53 feet below ground surface within two miles of the site. Although groundwater was not encountered during our field investigations, it is not uncommon for seepage conditions to develop where none previously existed. Perched water and seepage are dependent on seasonal precipitation, irrigation, land use, among other factors, and vary as a result. Proper surface drainage will be important to future performance of the improvements.

# 6. GEOLOGIC HAZARDS

## 6.1 Faulting

The numerous faults in southern California include active, potentially active, and inactive faults. The criteria for these major groups are based on criteria developed by the California Geological Survey (CGS, formerly known as CDMG) for the Alquist-Priolo Earthquake Fault Zone Program (Bryant and Hart, 2007). By definition, an active fault is one that has had surface displacement within Holocene time (about the last 11,000 years). A potentially active fault has demonstrated surface displacement during Quaternary time (approximately the last 1.6 million years) but has had no known Holocene movement. Faults that have not moved in the last 1.6 million years are considered inactive.

The site is not within a currently established State of California Alquist-Priolo Earthquake Fault Zone (APEFZ) or a Riverside County Fault Hazard Zone (RCFHZ) for surface fault rupture hazards. No active or potentially active faults with the potential for surface fault rupture are known to pass directly beneath the site.

According to the *Fault Activity Map of California* (2010), the closest active fault to the site is the Casa Loma fault, located 8 miles southeast of the site. Faults within a 50-mile radius of the site are listed in Table 6.1.

**TABLE 6.1**
**KNOWN ACTIVE FAULTS WITHIN 50 MILES OF THE SITE**

| Fault Name | Distance from Site (miles) | Direction from Site | Maximum Earthquake Magnitude (Mw) |
|---|---|---|---|
| Casa Loma | 8 | SE | 6.9 |
| Claremont | 8 | NE | 6.7 |
| Main St. | 15 | SW | 6.8 |
| Glen Ivy North | 15 | SW | 6.8 |
| Chino | 20 | W | 6.7 |
| Mill Creek | 21 | N | 7.5 |
| Clark | 22 | SE | 7.2 |
| Whittier | 24 | W | 6.8 |
| San Gorgonio Pass | 25 | E | 7.0 |
| Cucamonga | 26 | NW | 7.0 |
| San Jacinto | 28 | N | 6.8 |
| Glen Helen | 28 | N | 6.7 |
| North Branch | 38 | N | 7.1 |
| Sky Hi Ranch | 42 | N | 7.2 |
| Helendale | 42 | N | 7.3 |
| Coachella | 44 | E | 7.5 |
| Johnson Valley | 46 | N | 6.7 |
| Burnt Mountain | 49 | NE | 6.5 |
| Homestead Valley | 50 | N | 7.3 |

Historic earthquakes in southern California of magnitude 6.0 and greater, their magnitude, distance, and direction from the site are listed in Table 5.1.2.

**TABLE 5.1.2**
**HISTORIC EARTHQUAKE EVENTS WITH REPECT TO THE SITE**

| Earthquake (Oldest to Youngest) | Date of Earthquake | Magnitude | Distance to Epicenter (Miles) | Direction to Epicenter |
|---|---|---|---|---|
| Near Redlands | July 23, 1923 | 6.3 | 11 | N |
| Long Beach | March 10, 1933 | 6.4 | 45 | WSW |
| Tehachapi | July 21, 1952 | 7.5 | 129 | NW |
| San Fernando | February 9, 1971 | 6.6 | 78 | WNW |
| Whittier Narrows | October 1, 1987 | 5.9 | 51 | WNW |
| Sierra Madre | June 28, 1991 | 5.8 | 53 | WNW |
| Landers | June 28, 1992 | 7.3 | 52 | ENE |
| Big Bear | June 28, 1992 | 6.4 | 34 | NE |
| Northridge | January 17, 1994 | 6.7 | 79 | WNW |
| Hector Mine | October 16, 1999 | 7.1 | 76 | NE |
| Ridgecrest China Lake Fault | July 5, 2019 | 7.1 | 134 | N |

## 6.2 Ground Rupture

Ground surface rupture occurs when movement along a fault is sufficient to cause a gap or rupture where the upper edge of the fault zone intersects that earth surface. The potential for ground rupture is considered to be very low due to the absence of active or potentially active faults at the subject site.

## 6.3 Liquefaction

Liquefaction is a phenomenon in which loose, saturated, relatively cohesionless soil deposits lose shear strength during strong ground motions. Primary factors controlling liquefaction include intensity and duration of ground motion, gradation characteristics of the subsurface soils, in-situ stress conditions, and the depth to groundwater. Seismically induced settlement may occur whether the potential for liquefaction exists or not.

The current standard of practice as outlined in the *Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction in California* (SCEC, 1999) requires a liquefaction analysis to a depth of 50 feet below the lowest portion of the proposed structure. Liquefaction typically occurs in areas where the soils below the water table are composed of poorly consolidated, fine to medium-grained, primarily sandy soil. In addition to the requisite soil conditions, the ground acceleration and duration of the earthquake must also be of a sufficient level to induce liquefaction.

According to the Riverside County Information Technology (RCIT) *Map My County* public web data, the site is located within an area mapped as having a "low" potential for liquefaction.

We performed a liquefaction analysis of the soils underlying the site using the spreadsheet template LIQ2_30.WQ1 developed by Thomas F. Blake (1996). This program utilizes the 1996 NCEER method of analysis. Our liquefaction potential evaluation was performed by utilizing a groundwater depth of greater than 50 feet, a magnitude 8.1 earthquake, and the site-specific peak horizontal acceleration for the site.

Due to the lack of shallow groundwater, liquefaction is not a design consideration for the site. However, an evaluation of seismically induced "dry-sand" settlement indicates some of the alluvium below the planned improvements and anticipated depth of engineered fill could be prone to seismic settlement during a high-magnitude earthquake. The resulting seismic settlement is estimated to be up to 1½ inch. Differential seismic settlement of the soils is expected to be on the order of ¾ of an inch over a horizontal distance of 30 feet. An analysis of seismically induced "dry-sand" settlement is included on Figure 3.

## 6.4 Expansive Soil

The geologic units near the ground surface at the site generally consist of sand with lesser extents of silt and clay. Laboratory testing on samples indicated this soil is "non-expansive" as defined by 2019 CBC Section 1803.5.3, with Expansion Indices of 3 and 18 for the site, which are classified as "very low" (Expansion Index [EI] between 0 and 20) in accordance with ASTM D4829.

## 6.4 Hydrocompression

Hydrocompression is the tendency of unsaturated soil structure to collapse upon wetting resulting in the overall settlement of the affected soil and overlying foundations or improvements supported thereon. Potentially compressible soils underlying the site are typically removed and recompacted during remedial site grading. However, if compressible soil is left in-place, a potential for settlement due to hydrocompression of the soil exists.

Laboratory testing indicates that potentially collapsible surficial soil exists on the north-central portion of the site in proximity to borings B-15 and B-16, where select samples collected from the borings were tested for hyrdocompression, producing test results of 3.4 and 1.6 percent, respectively, when water was added at a pressure of 2,000 psf. This increased potential for collapse is likely associated with a lower in-situ moisture content when comparing the test results against hydrocompression tests performed on samples collected in the other borings.

## 6.5 Seiches and Tsunamis

Seiches are large waves which overspill from a large body of water  due to aseismic event. The site is located approximately 2.1 miles east-southeast of the Perris Reservoir. Based on the California Department of Water Resources' online *Dam Breach Inundation Map*, an inundation scenario indicates the site could be impacted by flooding.

A tsunami is a series of long-period waves generated in the ocean by a sudden displacement of large volumes of water. Causes of tsunamis include underwater earthquakes, volcanic eruptions, or offshore slope failures. The site is located approximately 37 miles from the Pacific Ocean at an elevation greater than 1,400 feet MSL. Therefore, the risk of tsunamis affecting the site is negligible and not a design consideration.

## 6.6 Flooding

The site is located in a mapped area of minimal flood hazard, as per information provided by the Federal Emergency Management Agency Flood Map Service Center, *Flood Map 06065C1430H*, effective August 18, 2014.

## 6.7 Landslides

Due to the relatively level topography at the site, we opine that landslides are not present at the property or at a location that could impact the subject site.

## 6.7 Rock Fall Hazards

Rock falls are not a design consideration due to the lack of natural bedrock slopes above and adjacent to the site.

## 6.7 Slope Stability

Although a grading plan was not provided for our review as of the date of this report, we expect that graded slopes on the order of 8 feet or less will be incorporated in the design of the detention basins that are located along the northern, western, and eastern site boundaries. In general, permanent cut and fill slopes, or fill over cut slopes, inclined no steeper than 2:1 (h:v) with slope heights of 8 feet or less will possess Factors of Safety equal to or greater than 1.5 under static loading and 1.1 under pseudo-static loading, assuming they are constructed of on-site materials compacted as recommended herein. Graded slopes should be designed in accordance with the requirements of the local building codes of the City of Perris and the 2019 CBC. Proposed slopes should be reviewed when a grading plan is available and additional recommendations provided as needed.

# 7. SITE INFILTRATION

Percolation testing was performed in general accordance with Table 1 Infiltration Basin Option 2 of Appendix A of the Riverside County – *Low Impact Development BMP Design Handbook* (Handbook). The percolation tests were performed in general accordance with Section 2.3 *Shallow Percolation Test* (for test holes 10 feet or less in depth) and *Deep Percolation Test* (for test holes greater than 10 feet in depth) methods. Seven percolation tests were conducted within borings P-1 through P-7. The tests were performed at depths of approximately 5 and 11 feet below ground surface. Test borings were drilled using 8-inch-diameter hollow-stem augers. A 3-inch-diameter perforated PVC pipe encased in silt filter sock was placed in each test hole and approximately 2 inches of gravel was placed at the bottom of the perforated PVC pipe. The percolation tests were performed approximately 24 hours after the borings were presaturated. The shallow test holes (5 feet in depth) were filled with a minimum of 20 inches of water, with readings taken at 30-minute intervals. The deep test holes (11 feet in depth) were filled with water to within approximately 4 feet of the ground surface, with readings taken at 30-minute intervals.

The percolation test locations are depicted on the *Geologic Map* (Figure 2). Percolation test logs are presented in *Appendix A* of this report, with the percolation test results summarized in Table 7.0. Percolation test results should be provided to the civil engineer or storm water mitigation system designer. The *Handbook* requires a factor of safety of 3 be applied to the values below based on the test method used.

The in-situ field percolation tests performed provide short-term infiltration rates, which apply mainly to the initiation of the infiltration process due to the short time of the test (hours instead of days) and the amount of water used. Where appropriate the short-term infiltration rates shall be converted to long-term infiltration rates using reduction factors depending upon the degree of infiltrate quality, maintenance access and frequency, site variability, subsurface stratigraphy variation, and other factors. The small-scale percolation testing cannot model the complexity of the effect of interbedded layers of different soil composition, and our test results should be considered only as index values of infiltration rates.

**TABLE 7.0**
**INFILTRATION TEST RATES FOR PERCOLATION AREAS**

| Parameter | P-1 | P-2 | P-3 | P-4 | P-5 | P-6 | P-7 |
|---|---|---|---|---|---|---|---|
| **Depth (inches)** | 5 | 5 | 11 | 5 | 5 | 11 | 5 |
| **Test Type** | Normal | Normal | Normal | Normal | Normal | Normal | Normal |
| **Change in head over time: ΔH (inches)** | 0.0 | 0.2 | 1.1 | 0.2 | 0.2 | 2.3 | 0.8 |
| **Average head: Havg (inches)** | 30.7 | 24.5 | 83.1 | 22.8 | 23.9 | 81.5 | 26 |
| **Time Interval (minutes): Δt (minutes)** | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| **Radius of test hole: r (inches)** | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| **Tested Infiltration Rate: It (inches/hour)** | 0.00 | 0.04 | 0.10 | 0.04 | 0.04 | 0.11 | 0.12 |

# 8. CONCLUSIONS AND RECOMMENDATIONS

## 8.1 General

8.1.1 From a geotechnical engineering standpoint, the site is suitable for construction of the proposed industrial / warehouse development provided the recommendations presented herein are implemented in design and construction of the project.

8.1.2 Potential geologic hazards at the site include seismic shaking, unsuitable near surface alluvium, hydrocompression, and potentially expansive soils.

8.1.3 The site is located approximately 8 miles from the nearest active fault. Based on our background research and previous investigation, it is our opinion active, potentially active, or inactive faults do not extend across the site. Risks associated with seismic activity consist of the potential for moderate to strong seismic shaking.

8.1.4 Our field investigation indicates the site is underlain by very old alluvial fan deposits. The upper portion of the alluvium across the site is not considered suitable for the support of compacted fill and settlement-sensitive structures. Remedial grading of the surficial soil will be required as discussed herein. The existing site soils are suitable for re-use as engineered fill provided the recommendations in the *Grading* section of this report are followed.

8.1.5 Granular soils having little to no cohesion may be subject to caving in un-shored excavations and should be expected at the site.

8.1.6 Remedial grading will address the hydrocompression potential of the near-surface soils on the north-central portion of the site in proximity to borings B-15 and B-16.

8.1.7 Changes in the design, location or elevation of improvements, as outlined in this report, should be reviewed by this office. Once final grading plans become available, they should be reviewed by this office to evaluate the necessity for review and possible revision of this report.

## 8.2 Excavation and Soil Characteristics

8.2.1 The *in-situ* soils should generally be excavatable with moderate effort using conventional earth moving equipment in proper functioning order.

8.2.2 The soils encountered during this investigation should be considered "non-expansive" (expansion index [EI] of 20 or less) as defined by the 2019 CBC, Section 1813.5.3. Table 8.2.2 presents soil classifications based on the expansion index. Based on the laboratory test results, we expect that the soil encountered will possess a "very low" expansion potential (EI between 0 and 20). Should medium to highly expansive soils be encountered at the site, they should be selectively graded to not be placed within 4 feet of the proposed improvements.

**TABLE 8.2.2**
**SOIL CLASSIFICATION BASED ON EXPANSION INDEX**

| Expansion Index (EI) | Expansion Classification | 2019 CBC Expansion Classification |
|---|---|---|
| **0 – 20** | **Very Low** | **Non-Expansive** |
| 21 – 50 | Low | Expansive |
| 51 – 90 | Medium | |
| 91 – 130 | High | |
| Greater Than 130 | Very High | |

8.2.3 Laboratory tests were performed on a representative sample of the site materials to measure the percentage of water-soluble sulfate content. *Appendix B* presents results of the laboratory water-soluble sulfate content tests. Test results indicate the on-site materials tested possess a sulfate content of up to 0.014% (140 parts per million [ppm]) equating to an exposure class of "S0" to concrete structures as defined by 2019 CBC Section 1904.3 and ACI 318. Table 8.2.3 below presents a summary of concrete requirements set forth by 2019 CBC Section 1904.3 and ACI 318.

**TABLE 8.2.3**
**REQUIREMENTS FOR CONCRETE**
**EXPOSED TO SULFATE-CONTAINING SOLUTIONS**

| Sulfate Exposure Class | Water-Soluble Sulfate Percent by Weight | Cement Type | Maximum Water to Cement Ratio by Weight | Minimum Compressive Strength (psi) |
|---|---|---|---|---|
| **S0** | **0.00-0.10** | **--** | **--** | **2,500** |
| S1 | 0.10-0.20 | II | 0.50 | 4,000 |
| S2 | 0.20-2.00 | V | 0.45 | 4,500 |
| S3 | > 2.00 | V+Pozzolan or Slag | 0.45 | 4,500 |

8.2.4 The presence of water-soluble sulfates is not a visually discernible characteristic; therefore, other soil samples from the site could yield different concentrations. Additionally, over time landscaping activities along the access roads or from nearby developments (i.e., addition of fertilizers and other soil nutrients) may affect the concentration.

8.2.5 Laboratory testing indicates the site soils have a minimum electrical resistivity of 811 ohm-cm, possess up to 340 parts per million (ppm) chloride, possess up to 140 ppm sulfate, and have a low tested pH of 6.5. As shown in Table 8.2.5 below, the site would be classified as "corrosive" to buried improvements, in accordance with the Caltrans Corrosion Guidelines (Caltrans, 2018).

**TABLE 8.2.5**
**CALTRANS CORROSION GUIDELINES**

| Corrosion Exposure | Resistivity (ohm-cm) | Chloride (ppm) | Sulfate (ppm) | pH |
|---|---|---|---|---|
| **Corrosive** | **<1,100** | 500 or greater | 1,500 or greater | 5.5 or less |

8.2.6 Geocon does not practice in the field of corrosion engineering; therefore, based on the corrosivity of site soils, further evaluation by a corrosion engineer should be performed for site improvements susceptible to corrosion.

## 8.3 Grading

8.3.1 Earthwork operations should be observed and the compacted fill tested by representatives of Geocon.

8.3.2 Grading should be performed in accordance with the recommendations provided herein, the *Recommended Grading Specifications* contained in *Appendix C* of this report, and the grading ordinances of the City of Perris.

8.3.3 A preconstruction conference should be held at the site prior to the beginning of grading operations with a representative of the City of Perris, contractor, civil engineer, and geotechnical engineer in attendance. Special soil handling requirements can be discussed at that time.

8.3.4 Site preparation should commence with the removal of existing improvements from areas to be graded. The areas to receive compacted fill shall be stripped of vegetation, existing undocumented fill (if present), and loose or disturbed soils.

8.3.5 The upper portion of alluvium within a 1:1 (h:v) projection of the limits of grading should be removed to expose competent alluvium having a minimum of 85 percent relative compaction as determined by ASTM D1557. Removals in proposed building structure areas should extend to depths on the order of 4 to 8 feet below the ground surface, or at least 3 feet below the bottom of planned foundations; remedial removal depths for structural areas are depicted on the *Geologic Map* (Figure 2). Removals in pavement and walkway areas should extend at least 3 feet below subgrade and into competent alluvium. Areas of loose, dry, or compressible soils will require a deeper excavation and processing prior to fill placement. The actual depth of removal should be evaluated by the engineering geologist during grading operations. Where over-excavation and compaction is to be conducted, the excavations should be extended laterally beyond the building footprint for a minimum distance of 5 feet or a distance equal to the depth of removal, whichever is greater. The bottom of the excavations should be scarified to a depth of at least 1 foot, moisture conditioned to 0 to 2 percent above optimum moisture content, and properly compacted to at least 90 percent of the maximum dry density as determined by ASTM D1557.

8.3.6 Where relatively loose, soft, or wet soils are encountered in the site excavations, subgrade stabilization will be required prior to placing fill or installing utilities. Where required, subgrade stabilization can be achieved by over-excavating the loose or soft materials and replacing with compacted fill, placing a reinforcing geogrid at the bottom of the excavation, placing 3-inch diameter rock in the soft bottom and working the rock into soil until it is stabilized, placing gravel wrapped in filter fabric at the bottom of the excavation, or other method recommended by the contractor with guidance by the engineering geologist based on the conditions encountered. Where used, gravel should consist of a 12- to 18- inch thick layer of washed angular ¾ inch gravel atop a filter fabric (Mirafi 500X or equivalent) on the excavation bottom. The filter fabric should be placed in a manner so that the gravel does not have direct contact with the soil. Once the gravel is placed and vibrated to a relatively dense state, a top layer of filter fabric should be placed to cover the gravel. Recommendations for stabilizing excavation bottoms should be based on an evaluation in the field by Geocon at the time of construction.

8.3.7 The site soils are suitable for re-use as an engineered fill provided oversize material (greater than 6 inches) and deleterious debris is removed. Deleterious debris must not be mixed with the fill soils. Asphalt and concrete should not be mixed with the fill soils unless approved by the geotechnical engineer. Existing underground improvements planned for removal should be excavated and the resulting depressions properly backfilled in accordance with the procedures described herein.

8.3.8 Import fill (if necessary) should consist of granular materials with a "low" expansion potential (EI of 50 or less), less corrosive than onsite soils, generally free of deleterious material and contain no rock fragments larger than 6 inches. Geocon should be notified of the import soil source and should perform geotechnical laboratory testing of import soil to evaluate its suitability prior to its arrival at the site for use as fill material. Environmental testing of import fill should be performed by the project environmental consultant in accordance with City of Perris requirements.

8.3.9 Excavated site soils should be thoroughly blended and moisture conditioned prior to placement and compaction. Fill and backfill soils should be placed in horizontal loose layers no thicker than will allow for adequate bonding and compaction (approximately 6 to 8 inches thick), moisture conditioned to 0 to 2 percent above optimum moisture content, and compacted to at least 90 percent of the maximum dry density, as determined by ASTM D1557. Fill materials placed below the moisture content recommended will require additional moisture conditioning prior to placing additional fill.

## 8.4 Earthwork Grading Factors

8.4.1 Estimates of shrinkage factors are based on empirical judgments comparing the material in its existing or natural state as encountered in the exploratory excavations to a compacted state. Variations in natural soil density and in compacted fill density render shrinkage value estimates very approximate. As an example, the contractor can compact the fill to a dry density of 90 percent or higher of the laboratory maximum dry density. Thus, the contractor has an approximately 10 percent range of control over the fill volume. Based on our experience with similar site soils, the shrinkage of the alluvium is expected to be on the order of 5 to 10 percent, when compacted to at least 90 percent of the laboratory maximum dry density. This estimate is for preliminary quantity estimates only. Due to the variations in the actual shrinkage/bulking factors, a balance area should be provided to accommodate variations.

## 8.5 Utility Trench Backfill

8.5.1 Utility trenches should be properly backfilled in accordance with the requirements of the City of Perris and the latest edition of the *Standard Specifications for Public Works Construction* (Greenbook). The pipes should be bedded with well graded crushed rock or clean sands (Sand Equivalent greater than 30) to a depth of at least one foot over the pipe. <u>The use of uniformly graded crushed rock is only acceptable if used in conjunction with filter fabric to prevent the gravel from having direct contact with soil.</u> The remainder of the trench backfill may be derived from onsite soil or approved import soil, compacted as necessary, until the required compaction is obtained. Backfill of utility trenches should not contain rocks greater than 3 inches in diameter. The use of 2-sack slurry and controlled low strength material (CLSM) are also acceptable as backfill. However, consideration should be given to the possibility of differential settlement where the slurry ends and earthen backfill begins. These transitions should be minimized and additional stabilization should be considered at these transitions.

8.5.2 Utility trench backfill should be placed in layers no thicker than will allow for adequate bonding and compaction. Utility backfill should be compacted to a dry density of at least 90 percent of the laboratory maximum dry density and moisture conditioned at 0 to 2 percent above optimum moisture content as determined by ASTM D1557. Backfill at the finish subgrade elevation of new pavements should be compacted to at least 95 percent of the maximum dry density. Backfill materials placed below the recommended moisture content may require additional moisture conditioning prior to placing additional fill.

## 8.6 Seismic Design Criteria

8.6.1 The following table summarizes site-specific design criteria obtained from the 2019 California Building Code (CBC; Based on the 2018 International Building Code [IBC] and ASCE 7-16), Chapter 16 Structural Design, Section 1613 Earthquake Loads. The data was calculated using the online application *Seismic Design Maps*, provided by OSHPD. The short spectral response uses a period of 0.2 second. We evaluated the Site Class based on the discussion in Section 1613.2.2 of the 2019 CBC and Table 20.3-1 of ASCE 7-16. The values presented below are for the risk-targeted maximum considered earthquake ($MCE_R$).

**TABLE 8.6.1**
**2019 CBC SEISMIC DESIGN PARAMETERS**

| Parameter | Value | 2019 CBC Reference |
|---|---|---|
| Site Class | D | Section 1613.2.2 |
| $MCE_R$ Ground Motion Spectral Response Acceleration – Class B (short), $S_S$ | 1.5g | Figure 1613.2.1(1) |
| $MCE_R$ Ground Motion Spectral Response Acceleration – Class B (1 sec), $S_1$ | 0.579g | Figure 1613.2.1(2) |
| Site Coefficient, $F_A$ | 1.0 | Table 1613.2.3(1) |
| Site Coefficient, $F_V$ | *1.721 | Table 1613.2.3(2) |
| Site Class Modified $MCE_R$ Spectral Response Acceleration (short), $S_{MS}$ | 1.5g | Section 1613.2.3 (Eqn 16-36) |
| Site Class Modified $MCE_R$ Spectral Response Acceleration – (1 sec), $S_{M1}$ | *0.996 | Section 1613.2.3 (Eqn 16-37) |
| 5% Damped Design Spectral Response Acceleration (short), $S_{DS}$ | 1.0g | Section 1613.2.4 (Eqn 16-38) |
| 5% Damped Design Spectral Response Acceleration (1 sec), $S_{D1}$ | *0.664 | Section 1613.2.4 (Eqn 16-39) |

**Note:** Per Section 11.4.8 of ASCE/SEI 7-16, a ground motion hazard analysis shall be performed for projects for Site Class "E" sites with Ss greater than or equal to 1.0g and for Site Class "D" and "E" sites with S1 greater than 0.2g. Section 11.4.8 also provides exceptions which indicates that the ground motion hazard analysis may be waived provided the exceptions are followed. Using the code based values presented in the table above, in lieu of performing a ground motion hazard analysis, requires the exceptions outlined in ASCE 7-16 Section 11.4.8 be followed.

*See Section 11.4.8

8.6.2 The table below presents the mapped maximum considered geometric mean ($MCE_G$) seismic design parameters for projects located in Seismic Design Categories of D through F in accordance with ASCE 7-16.

**TABLE 8.6.2**
**ASCE 7-16 PEAK GROUND ACCELERATION**

| Parameter | Value | ASCE 7-16 Reference |
|---|---|---|
| Mapped $MCE_G$ Peak Ground Acceleration, PGA | 0.5g | Figure 22-7 |
| Site Coefficient, $F_{PGA}$ | 1.1 | Table 11.8-1 |
| Site Class Modified $MCE_G$ Peak Ground Acceleration, $PGA_M$ | 0.55g | Section 11.8.3 (Eqn 11.8-1) |

8.6.3 The Maximum Considered Earthquake Ground Motion (MCE) is the level of ground motion that has a 2 percent chance of exceedance in 50 years, with a statistical return period of 2,475 years. According to the 2019 California Building Code and ASCE 7-16, the MCE is to be utilized for the evaluation of liquefaction, lateral spreading, seismic settlements, and it is our understanding that the intent of the Building code is to maintain "Life Safety" during a MCE event.

8.6.4 Deaggregation of the MCE peak ground acceleration was performed using the USGS online Unified Hazard Tool, 2014 Conterminous U.S. Dynamic edition (v4.2.0). The result of the deaggregation analysis indicates that the predominant earthquake contributing to the MCE peak ground acceleration is characterized as a 8.1 magnitude event occurring at a hypocentral distance of 13.7 kilometers from the site.

8.6.5 Conformance to the criteria in the above tables for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a large earthquake occurs. The primary goal of seismic design is to protect life, not to avoid all damage, since such design may be economically prohibitive.

## 8.7 Shallow Foundation and Concrete Slabs-On-Grade

8.7.1 The foundation recommendations presented herein are for the proposed building subsequent to the recommended grading. We understand that the future building will be supported on a conventional shallow foundation with concrete slabs-on-grade, deriving support in newly placed engineered fill.

8.7.2 The foundation for the structure may consist of either continuous strip footings and/or isolated spread footings. Conventionally reinforced continuous footings should be at least 24 inches wide and extend at least 2 feet below lowest adjacent pad grade. Isolated spread footings should have a minimum width of 48 inches and should extend at least 2 feet below lowest adjacent pad grade. At least 4 feet of compacted fill should be placed below the bottom level of foundations (see the *Grading* section of this report for earthwork recommendations). Footings subject to heavy structural loading should be tied-up to each other by tie beams and/or grade beams. A wall/column footing dimension detail depicting footing embedment is provided on Figure 4.

8.7.3 From a geotechnical engineering standpoint, concrete slabs-on-grade for the structure should be at least 4 inches thick and be reinforced with at least No. 3 steel reinforcing bars placed 24 inches on center in both directions. The concrete slab-on-grade recommendations are based on soil support characteristics only. The project structural engineer should evaluate the structural requirements of the concrete slab for supporting equipment and storage loads. A thicker concrete slab may be required for heavier loading conditions. To reduce the effects of differential settlement on the foundation system, thickened slabs and/or an increase in steel reinforcement can provide a benefit to reduce concrete cracking

8.7.4 Following remedial grading, foundations for the buildings may be designed for an allowable soil bearing pressure of 3,000 psf (dead plus live load). The allowable bearing pressure may be increased by one-third for transient loads due to wind or seismic forces.

8.7.5 The maximum expected static settlement for the planned structures, supported on conventional foundation systems with the above allowable bearing pressures and deriving support in engineered fill, is estimated to be on the order of 1¾ inch and to occur below the heaviest loaded structural element, with differential static settlement to be on the order of ~~¾~~ 1 inch over a horizontal distance of 40 feet; settlement of the foundation system is expected to occur on initial application of loading. Seismic settlement is estimated to be on the order of 1½ inch, with differential seismic settlement to be on the order of ¾ of an inch over a horizontal distance of 30 feet.

8.7.6 Once the design and foundation loading configuration proceeds to a more finalized plan, the estimated settlements within this report should be reviewed and revised, if necessary.

8.7.7 Steel reinforcement for continuous footings should consist of at least two No. 4 steel reinforcing bars placed horizontally in the footings, one near the top and one near the bottom. Steel reinforcement for the spread footings should be designed by the project structural engineer.

8.7.8 Foundation excavation bottoms must be observed and approved in writing by a qualified representative of Geocon, prior to placement of reinforcing steel or concrete.

8.7.9 Slabs that may receive moisture-sensitive floor coverings or may be used to store moisture-sensitive materials should be underlain by a vapor retarder. The vapor retarder design should be consistent with the guidelines presented in the American Concrete Institute's (ACI) Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials (ACI 302.2R-06). The vapor retarder used should be specified by the project architect or developer based on the type of floor covering that will be installed and if the structure will possess a humidity-controlled environment.

8.7.10 The bedding sand thickness should be evaluated by the project foundation engineer, architect, and/or developer. However, we should be contacted to provide recommendations if the bedding sand is thicker than 4 inches. Placement of 3 inches and 4 inches of sand is common practice in southern California for 5-inch and 4-inch thick slabs, respectively. The foundation engineer should provide appropriate concrete mix design criteria and curing measures that may be utilized to assure proper curing of the slab to reduce the potential for rapid moisture loss and subsequent cracking and/or slab curl. We suggest that the foundation design engineer present the concrete mix design and proper curing methods on the foundation plans. It is critical that the foundation contractor understands and follows the recommendations presented on the foundation plans.

8.7.11 Special subgrade presaturation is not deemed necessary prior to placing concrete; however, the exposed foundation and slab subgrade soil should be moisturized to maintain a moist condition between 0 and 2 percent above optimum moisture content.

8.7.12 The recommendations of this report are intended to reduce the potential for cracking of slabs due to expansive soil (if present), differential settlement of existing soil or soil with varying thicknesses. However, even with the incorporation of the recommendations presented herein, foundations, walls, and slabs-on-grade placed on such conditions may still exhibit some cracking due to soil movement and/or shrinkage. The occurrence of concrete shrinkage cracks is independent of the supporting soil characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, proper concrete placement and curing, and by the placement of crack control joints at periodic intervals, in particular where re-entrant slab corners occur.

8.7.13 Geocon should be consulted to provide additional design parameters as required by the structural engineer.

### 8.8 Miscellaneous Foundations

8.8.1 Foundations for small outlying structures, such as block walls up to 6 feet in height, planter walls or trash enclosures which will not be tied to the proposed structure may be supported on conventional shallow foundations bearing on a minimum of 2 feet of newly placed engineered fill which extends laterally at least 2 feet beyond the foundation area. Where excavation and compaction cannot be performed or is undesirable, such as adjacent to property lines, foundations may derive support in the undisturbed alluvium generally found at or below a depth of 3 feet, and should be deepened as necessary to maintain a minimum 5 foot embedment below grade.

8.8.2 If the soils exposed in the excavation bottom are soft, compaction of the soft soils will be required prior to placing steel or concrete. Miscellaneous foundations may be designed for a bearing value of 1,500 psf, and should be a minimum of 12 inches in width and a minimum of 24 inches in depth below the lowest adjacent grade, bearing on the recommended thickness of engineered fill. The allowable bearing pressure may be increased by up to one-third for transient loads due to wind or seismic forces.

8.8.3 Foundation excavations should be observed and approved in writing by the geotechnical engineer, prior to the placement of reinforcing steel and concrete to verify that the excavations and exposed soil conditions are consistent with those anticipated.

## 8.9 Retaining Walls

8.9.1 The recommendations presented below are generally applicable to the design of rigid concrete or masonry retaining walls having a maximum height of 10 feet that have been backfilled with select granular site soils or import with a “low” expansion potential (EI of 50 or less). In the event that cantilever walls higher than 10 feet are planned, Geocon should be contacted for additional recommendations.

8.9.2 Retaining walls not restrained at the top and having a level backfill surface should be designed for an active soil pressure equivalent to the pressure exerted by a fluid density of 40 pounds per cubic foot (pcf). Where the backfill will be inclined at no steeper than 2:1 (horizontal to vertical), an active soil pressure of 65 pcf is recommended. These soil pressures assume that the backfill materials within an area bounded by the wall and a 1:1 plane extending upward from the base of the wall possess an EI of 50 or less. For walls where backfill materials do not conform to the criteria herein, Geocon should be consulted for additional recommendations.

8.9.3 Unrestrained walls are those that are allowed to rotate more than 0.001H (where H equals the height of the retaining portion of the wall in feet) at the top of the wall. Where walls are restrained from movement at the top, the walls should be designed for a soil pressure equivalent to the pressure exerted by a fluid density of 62 pcf.

8.9.4 The structural engineer should determine the seismic design category for the project in accordance with Section 1613 of the 2019 CBC. If the project possesses a seismic design category of D, E, or F, proposed retaining walls in excess of 6 feet in height should be designed with seismic lateral pressure (Section 1803.5.12 of the 2019 CBC).

8.9.5 An incremental seismic load of 25 pcf should be used for design of walls that support more than 6 feet of backfill in accordance with Section 1803.5.12 of the 2019 CBC. The pressure should be taken as an inverted triangular distribution with the zero-pressure point at the toe of the wall and 25H (psf where H in feet) at the top of the wall, where H is the wall height in feet. The point of application of the dynamic thrust may be taken at 0.6H above the toe of the wall. This seismic load should be applied in addition to the active earth pressure. The earth pressure is based on half of two-thirds of $PGA_M$ calculated from ASCE 7-10 Section 11.8.3.

8.9.6 Unrestrained walls will move laterally when backfilled and loading is applied. The amount of lateral deflection is dependent on the wall height, the type of soil used for backfill, and loads acting on the wall. The retaining walls and improvements above the retaining walls should be designed to incorporate an appropriate amount of lateral deflection as determined by the structural engineer.

8.9.7 Retaining walls should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces and waterproofed as required by the project architect. The soil immediately adjacent to the backfilled retaining wall should be composed of free draining material completely wrapped in Mirafi 140N (or equivalent) filter fabric for a lateral distance of 1 foot for the bottom two-thirds of the height of the retaining wall. The upper one-third should be backfilled with less permeable compacted fill to reduce water infiltration. Alternatively, a drainage panel, such as a Miradrain 6000 or equivalent, can be placed along the back of the wall. Typical retaining wall drainage details are shown on Figure 5. The use of drainage openings through the base of the wall (weep holes) is not recommended where the seepage could be a nuisance or otherwise adversely affect the property adjacent to the base of the wall. The recommendations herein assume a properly compacted backfill (EI of 50 or less) with no hydrostatic forces or imposed surcharge load. If conditions different than those described are expected or if specific drainage details are desired, Geocon should be contacted for additional recommendations.

8.9.8 Wall foundations should be designed in accordance with the above foundation recommendations.

## 8.10 Lateral Design

8.10.1 Resistance to lateral loading may be provided by friction acting at the base of foundations, slabs and by passive earth pressure. A passive pressure exerted by an equivalent fluid weight of 300 pounds per cubic foot (pcf) with a maximum earth pressure of 3,000 psf should be used for the design of footings or shear keys poured neat against newly compacted fill. The allowable passive pressure assumes a horizontal surface extending at least 5 feet, or three times the surface generating the passive pressure, whichever is greater. The upper 12 inches of material in areas not protected by floor slabs or pavement should not be included in design for passive resistance.

8.10.2 If friction is to be used to resist lateral loads, an allowable coefficient of friction between newly compacted fill soil and concrete of 0.35 should be used for design. When combining passive pressure and friction for lateral resistance, the passive component should be reduced by one-third.

## 8.11 Exterior Concrete Flatwork

8.11.1 Exterior concrete flatwork not subject to vehicular traffic should be constructed in accordance with the recommendations herein assuming the subgrade materials possess a "low" expansion potential (expansion index of 50 or less). Subgrade soils should be compacted to 90 percent relative compaction, at 0 to 2 percent above optimum moisture content. Slab panels should be a minimum of 4 inches thick and when in excess of 8 feet square should be reinforced with No. 3 reinforcing bars spaced 24 inches center-to-center in both directions to reduce the potential for cracking. In addition, concrete flatwork should be provided with crack control joints to reduce and/or control shrinkage cracking. Crack control spacing should be determined by the project structural engineer based upon the slab thickness and intended usage. Criteria of the American Concrete Institute (ACI) should be taken into consideration when establishing crack control spacing.

8.11.2 The exterior flatwork has the potential for distress should the subgrade soils become wet or saturated. Subgrade soil for exterior slabs not subjected to vehicle loads should be compacted in accordance with criteria presented in the grading section prior to concrete placement. Subgrade soil should be properly compacted and the moisture content of subgrade soil should be verified prior to placing concrete.

8.11.3 Even with the incorporation of the recommendations of this report, the exterior concrete flatwork has a potential to experience some uplift due to expansive soil beneath grade or differential settlement. The steel reinforcement should overlap continuously in flatwork to reduce the potential for vertical offsets within flatwork.

8.11.4 Where exterior flatwork abuts the structure at entrant or exit points, the exterior slab should be dowelled into the structure's foundation stem wall. This recommendation is intended to reduce the potential for differential elevations that could result from differential settlement or minor heave of the flatwork. Dowelling details should be designed by the project structural engineer.

8.11.5 The recommendations presented herein are intended to reduce the potential for cracking of exterior slabs as a result of differential movement. However, even with the incorporation of the recommendations presented herein, slabs-on-grade will still crack. The occurrence of concrete shrinkage cracks is independent of the soil supporting characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, the use of crack control joints and proper concrete placement and curing. Crack control joints should be spaced at intervals no greater than 12 feet. Literature provided by the Portland Concrete Association (PCA) and American Concrete Institute (ACI) present recommendations for proper concrete mix, construction, and curing practices, and should be incorporated into project construction.

## 8.12 Preliminary Pavement Recommendations

8.12.1 The final pavement sections for driveways and parking lot areas should be based on the R-value of the subgrade soils encountered at final subgrade elevation. The civil engineer should evaluate the final traffic index for the pavements. Pavements should be designed and constructed in accordance with County of Riverside *Ordinance 461* when final Traffic Indices and R-value test results of subgrade soil are completed. We have assumed an R-value of 30 for on-site soils and have utilized an R-Value of 78 for Class 2 Aggregate Base material, for the purposes of this preliminary analysis. Preliminary flexible pavement sections are presented in Table 8.12.1.

**TABLE 8.12.1**
**PRELIMINARY FLEXIBLE PAVEMENT SECTIONS**

| Location | Assumed Traffic Index | Assumed Subgrade R-Value | Asphalt Concrete (inches) | Class 2 Aggregate Base (inches) |
|---|---|---|---|---|
| Parking Lots and Access Roads - **Light** Vehicular Traffic Loads and Equipment | 6.0 | 30 | 4 | 8 |
| Parking Lots and Access Roads – **Medium and Heavy** Vehicular Traffic Loads and Equipment | 9.0 | 30 | 6 | 12 |

8.12.2 The upper 12 inches of the subgrade soil should be compacted to a dry density of at least 95 percent of the laboratory maximum dry density at 0 to 2 percent over optimum moisture content beneath pavement sections.

8.12.3 Prior to construction of new pavement sections, remedial grading should be performed in accordance with the earthwork recommendations in this report. Asphalt concrete should conform to Section 203-6 of the Greenbook. Class 2 aggregate base materials should conform to Section 26-1.02A of the "*Standard Specifications of the State of California, Department of Transportation"* (Caltrans). Aggregate base materials should be compacted to a dry density of at least 95 percent of the laboratory maximum dry density near to slightly above optimum moisture content. Asphalt concrete should be compacted to a density of 95 percent of the laboratory Hveem density in accordance with ASTM D 1561.

8.12.4 A rigid Portland cement concrete (PCC) pavement section should be placed in driveway aprons and cross gutters, and may be used in driveways and parking areas where desired. We calculated the rigid pavement section in general conformance with the procedure recommended by the American Concrete Institute, Report ACI 330R-08, *Guide for Design and Construction of Concrete Parking Lots* using the parameters presented in Table 8.12.4.

**TABLE 8.12.4**
**RIGID PAVEMENT DESIGN PARAMETERS**

| Design Parameter | Design Value |
|---|---|
| Modulus of subgrade reaction, k | 100 pci |
| Modulus of rupture for concrete, $M_R$ | 500 psi |
| Traffic Category, TC | C and D |
| Average daily truck traffic, ADTT | 300 and 700 |

8.12.5 Based on the criteria presented herein, the PCC pavement sections should have a minimum thickness as presented in Table 8.12.5.

**TABLE 8.12.5**
**RIGID PAVEMENT RECOMMENDATIONS**

| Location | Portland Cement Concrete (inches) |
|---|---|
| Light Truck Traffic (TC = C) | 7.5 |
| Medium and Heavy Truck Traffic (TC = D) | 8.0 |

8.12.6 The PCC pavement should be placed over subgrade soil that is compacted to a dry density of at least 95 percent of the laboratory maximum dry density at 0 to 2 percent above optimum moisture content. This pavement section is based on a minimum concrete compressive strength of approximately 3,500 psi (pounds per square inch). Aggregate base material will not be required beneath concrete improvements.

8.12.7 A thickened edge or integral curb should be constructed on the outside of concrete slabs subjected to wheel loads. The thickened edge should be 1.2 times the slab thickness or a minimum thickness of 2 inches, whichever results in a thicker edge, and taper back to the recommended slab thickness 4 feet behind the face of the slab (e.g., a 9-inch-thick slab would have an 11-inch-thick edge). Reinforcing steel will not be necessary within the concrete for geotechnical purposes with the possible exception of dowels at construction joints as discussed herein.

8.12.8 To control the location and spread of concrete shrinkage cracks, crack-control joints (weakened plane joints) should be included in the design of the concrete pavement slab in accordance with the referenced ACI report.

8.12.9 The performance of pavement is highly dependent on providing positive surface drainage away from the edge of the pavement. Ponding of water on or adjacent to the pavement surfaces will likely result in pavement distress and subgrade failure. Drainage from landscaped areas should be directed to controlled drainage structures. Landscape areas adjacent to the edge of asphalt pavements are not recommended due to the potential for surface or irrigation water to infiltrate the underlying permeable aggregate base and cause distress. Where such a condition cannot be avoided, consideration should be given to incorporating measures that will significantly reduce the potential for subsurface water migration into the aggregate base. If planter islands are planned, the perimeter curb should extend at least 6 inches below the level of the base materials.

## 8.13 Elevator Pit Design

8.13.1 If used, the elevator pit slab and retaining walls should be designed by the project structural engineer. Elevator pit slab and walls may be designed in accordance with the recommendations in the foundation and retaining wall sections of this report.

8.13.2 Additional active pressure should be added for a surcharge condition due to sloping ground, vehicular traffic or adjacent foundations and should be designed for each condition as the project progresses.

8.13.3 If retaining wall drainage is to be provided, the drainage system should be designed in accordance with the retaining wall section of this report, and the typical retaining wall drainage details shown on Figure 5.

8.13.4 We recommend that the exterior walls and slab be waterproofed to prevent excessive moisture inside of the elevator pit. Waterproofing design and installation is not the responsibility of the geotechnical engineer.

## 8.14 Elevator Piston

8.14.1 If a plunger-type elevator piston is installed for this project, a deep drilled excavation will be required. It is important to verify that the drilled excavation is not situated immediately adjacent to a foundation or shoring pile, or the drilled excavation could compromise the existing foundation or pile support, especially if the drilling is performed subsequent to the foundation or pile construction.

8.14.2 Some caving is expected and the contractor should be prepared to use casing and should have it readily available at the commencement of drilling activities. Continuous observation of the drilling and installation of the elevator piston by the geotechnical engineer is required.

8.14.3 The annular space between the piston casing and drilled excavation wall should be filled with a minimum of 2-sack slurry pumped from the bottom up. As an alternative, pea gravel may be utilized. The use of soil to backfill the annular space is not acceptable.

## 8.15 Temporary Excavations and Shoring

8.15.1 Excavations of up to 10 feet in vertical height are expected during the construction of the site improvements. The contractor’s competent person should evaluate the necessity for lay back of vertical cut areas. Vertical excavations up to 5 feet may be attempted where loose soils or caving sands are not present, and where not surcharged by existing structures or vehicle/construction equipment loads.

8.15.2 Vertical excavations greater than 5 feet will require sloping or shoring measures in order to provide a stable excavation. Due to existing improvements adjacent to the site and the relatively loose nature of the site soils, we expect shoring will be needed.

8.15.3 We expect that braced shoring, such as conventionally braced shields, cross-braced hydraulic shoring, or driven sheet piles will be utilized; however, the selection of the shoring system is the responsibility of the contractor. Shoring systems should be designed by a California licensed civil or structural engineer with experience in designing shoring systems.

8.15.4 We recommend that an equivalent fluid pressure based on the table below be utilized for design of temporary shoring. These pressures are based on the assumption that the shoring is supporting a level backfill and there are no hydrostatic pressures above the bottom of the excavation.

**TABLE 8.15.4**
**RECOMMENDED SHORING PRESSURES**

| HEIGHT OF SHORED EXCAVATION (FEET) | EQUIVALENT FLUID PRESSURE (Pounds Per Cubic Foot) (ACTIVE PRESSURE) | Equivalent Fluid Pressure (Pounds Per Cubic Foot) (Active Pressure with 2:1 Slope | EQUIVALENT FLUID PRESSURE (Pounds Per Cubic Foot) (AT-REST PRESSURE) |
|---|---|---|---|
| Up to 10 | 35 | 60 | 55 |

8.15.5 Active pressures can only be achieved when movement in the soil (earth wall) occurs. If movement in the soil is not acceptable, such as adjacent to an existing structure or where braced shoring will be utilized, the at-rest pressure should be considered for design purposes.

8.15.6 Additional active pressure should be added for a surcharge condition due to sloping ground, construction equipment, vehicular traffic, or adjacent structures and should be designed for each condition as the project progresses.

8.15.7 In addition to the recommended earth pressure, the upper 5 feet of the shoring adjacent to roadways or driveway areas should be designed to resist a uniform lateral pressure of 100 psf, acting as a result of an assumed 300 psf surcharge behind the shoring due to normal street traffic. If the traffic is kept back at least 10 feet from the shoring, the traffic surcharge may be neglected. Higher surcharge loads may be required to account for construction equipment.

8.15.8 It is difficult to accurately predict the amount of deflection of a shored embankment. Some deflection will occur. We recommend that the deflection be minimized to prevent damage to existing structures and adjacent improvements. Where public right-of-ways are present or adjacent offsite structures do not surcharge the shoring excavation, the shoring deflection should be limited to less than 1 inch at the top of the shored embankment. Where offsite structures are within the shoring surcharge area, we recommend the beam deflection be limited to less than ½ inch at the elevation of the adjacent offsite foundation, and no deflection at all if deflections will damage existing structures. The allowable deflection is dependent on many factors, such as the presence of structures and utilities near the top of the embankment and will be assessed and designed by the project shoring engineer.

## 8.16 Surface Drainage

8.16.1 Proper site drainage is critical to reduce the potential for differential soil movement, erosion and subsurface seepage. Under no circumstances should water be allowed to pond adjacent to footings. The site should be graded and maintained such that surface drainage is directed away from structures in accordance with 2019 CBC 1804.4 or other applicable standards. In addition, surface drainage should be directed away from the top of slopes into swales or other controlled drainage devices. Roof and pavement drainage should be directed into conduits that carry runoff away from the proposed structure.

8.16.2 Underground utilities should be leak free. Utility and irrigation lines should be checked periodically for leaks, and detected leaks should be repaired promptly. Detrimental soil movement could occur if water is allowed to infiltrate the soil for prolonged periods of time.

8.16.3 Landscaping planters adjacent to paved areas are not recommended due to the potential for surface or irrigation water to infiltrate the pavement's subgrade and base course. We recommend that area drains be used to collect excess irrigation water and transmit it to drainage structures or impervious above-grade planter boxes. In addition, where landscaping is planned adjacent to pavement, we recommend construction of a cutoff wall or the use of an impermeable geosynthetic along the edge of the pavement that extends at least 6 inches below the bottom of the base material.

8.16.4 If not properly constructed, there is a potential for distress to improvements and properties located hydrologically down gradient or adjacent to infiltration areas. Factors such as the amount of water to be detained, its residence time, and soil permeability have an important effect on seepage transmission and the potential adverse impacts that may occur if the storm water management features are not properly designed and constructed. We have not performed a hydrogeology study at the site. Down-gradient and adjacent structures may be subjected to seeps, movement of foundations and slabs, or other impacts as a result of water infiltration.

## 8.17 Plan Review

8.17.1 Geocon should review the grading and foundation plans for the project prior to final submittal to verify that the plans have been prepared in substantial conformance with the recommendations of this report. Additional analyses may be required after review of the project plans.

## LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon West, Inc. should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon West, Inc.

2. This report is issued with the understanding that it is the responsibility of the owner, or of their representative, to ensure that the information and recommendations contained herein are brought to the attention of the engineer and contractor for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

3. The findings of this report are valid as of the date of this report. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

4. The firm that performed the geotechnical investigation for the project should be retained to provide testing and observation services during construction to provide continuity of geotechnical interpretation and to check that the recommendations presented for geotechnical aspects of site development are incorporated during site grading, construction of improvements, and excavation of foundations. If another geotechnical firm is selected to perform the testing and observation services during construction operations, that firm should prepare a letter indicating their intent to assume the responsibilities of project Geotechnical Engineer of Record. A copy of the letter should be provided to the regulatory agency for their records. In addition, that firm should provide revised recommendations concerning the geotechnical aspects of the proposed development, or a written acknowledgement of their concurrence with the recommendations presented in our report. They should also perform additional analyses deemed necessary to assume the role of Geotechnical Engineer of Record.

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0' 2000' 4000'
SCALE: 1" = 2000'

N

SOURCE: Google Earth, 2020

VICINITY MAP

GEOCON WEST, INC.
GEOTECHNICAL, ENVIRONMENTAL, MATERIALS
41571 CORNING PLACE #101, MURRIETA, CALIFORNIA 92562
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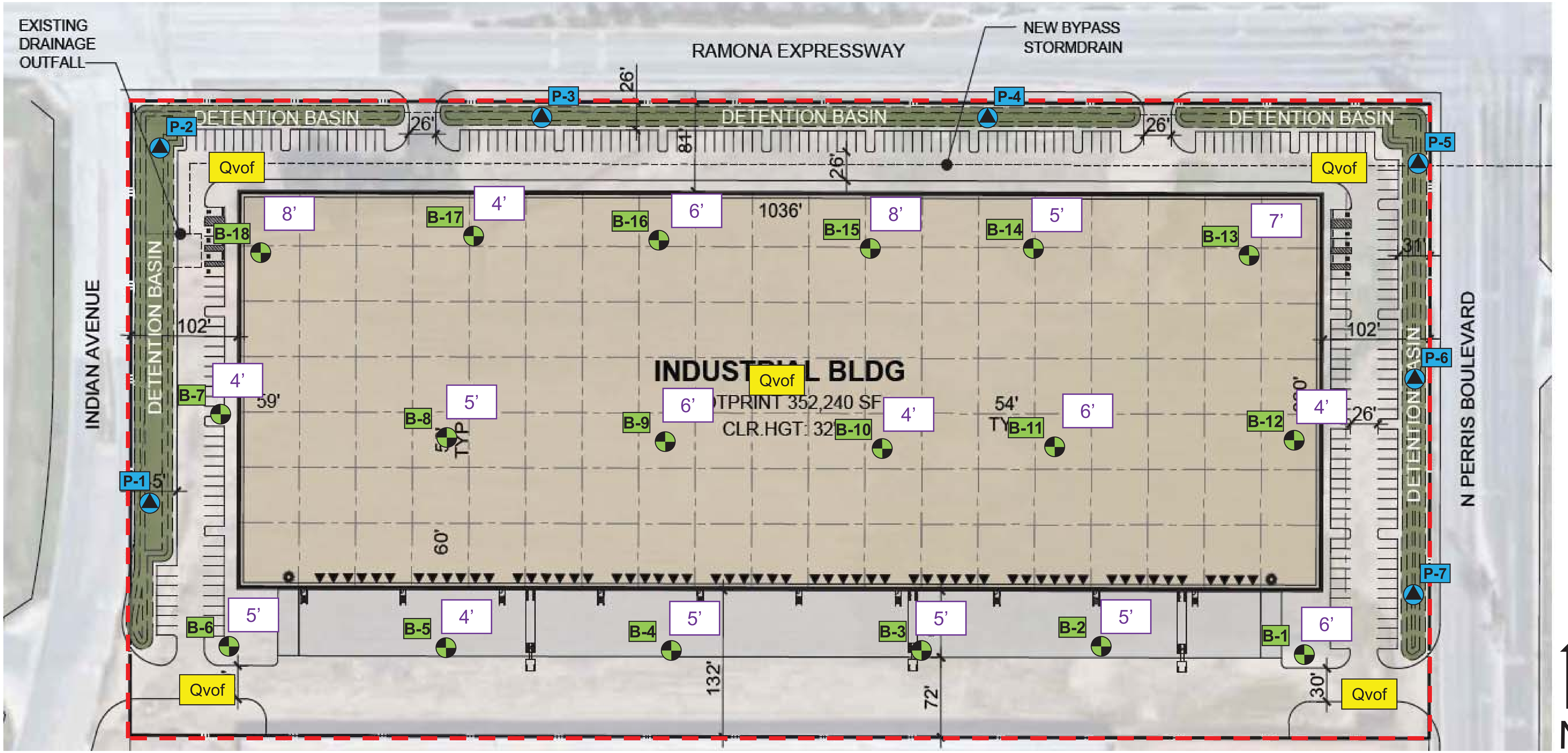
WAREHOUSE BUILDING
SWC OF RAMONA EXPRESSWAY
& PERRIS BOULEVARD
PERRIS, CALIFORNIA

| | | | | | |
|---|---|---|---|---|---|
| LCW | | | APRIL 2020 | PROJECT NO. T2400-22-02 | FIG. 1 |




Source: Pacific Development Partners, LLC., *Conceptual Site Plan*, dated July, 2019.

0 100 200

SCALE 1" = 100'

## GEOCON LEGEND

Locations are approximate

B-18 ....... GEOTECHNICAL BORING LOCATION (2006)

P-7 ....... PERCOLATION TEST BORING LOCATION

8' ....... ANTICIPATED REMOVAL DEPTHS IN BUILDING STRUCTURE AREAS. SEE REPORT FOR REMOVAL DEPTHS IN ALL OTHER AREAS.

....... PROJECT LIMITS

Qvof ....... VERY OLD ALLUVIAL FAN DEPOSITIS

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GEOTECHNICAL, ENVIRONMENTAL, MATERIALS
41571 CORNING PLACE #101, MURRIETA, CALIFORNIA 92562
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LCW

GEOLOGIC MAP

WAREHOUSE BUILDING
SWC OF RAMONA EXPRESSWAY
& PERRIS BOULEVARD
PERRIS, CALIFORNIA

APRIL 2020 | PROJECT NO. T2400-22-02 | FIG. 2

GEOCON

Project : WAREHOUSE BUILDING
File No. : T2400-22-02
Boring : B-4 (with other boring data incorporated)

# TECHNICAL ENGINEERING AND DESIGN GUIDES AS ADAPTED FROM THE US ARMY CORPS OF ENGINEERS, NO. 9
# EVALUATION OF EARTHQUAKE-INDUCED SETTLEMENTS IN DRY SANDY SOILS
# MAXIMUM CONSIDERED EARTHQUAKE

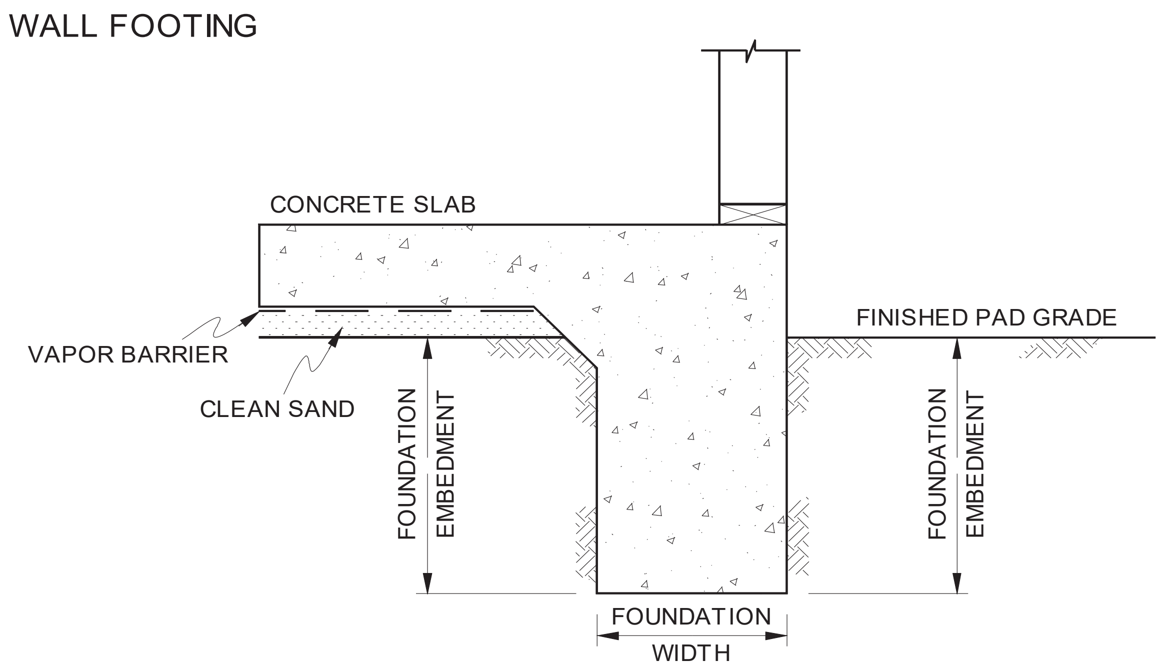
MCE EARTHQUAKE INFORMATION:

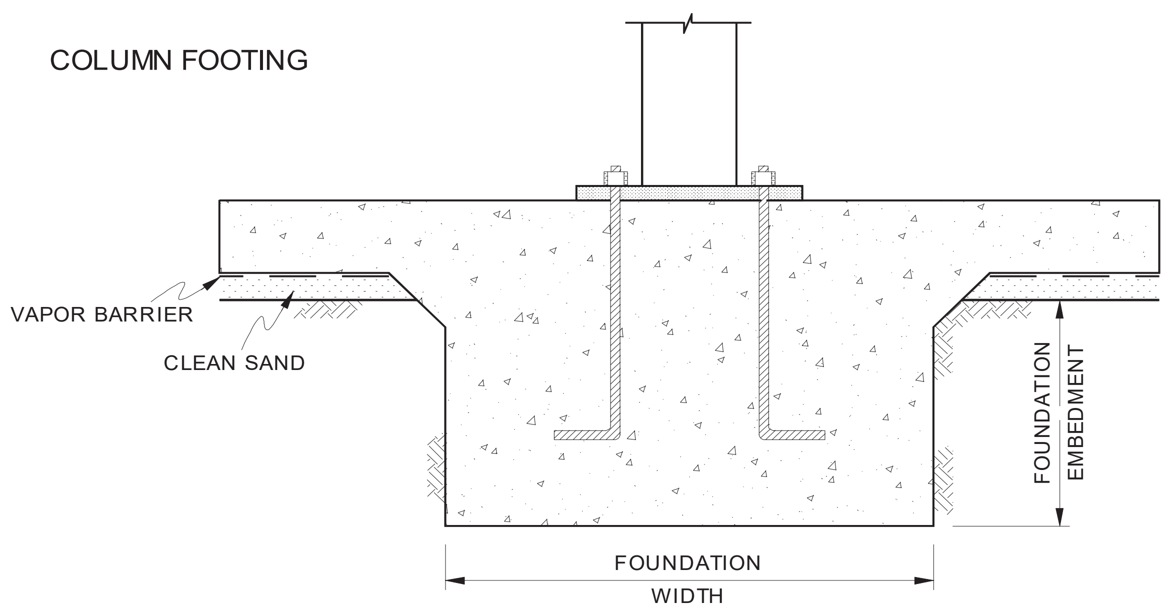
| | |
|---|---|
| Earthquake Magnitude: | 8.10 |
| Peak Horiz. Acceleration (g): | 0.550 |

| Depth of Base of Strata (ft) | Thickness of Layer (ft) | Depth of Mid-point of Layer (ft) | Soil Unit Weight (pcf) | Overburden Pressure at Mid-point (tsf) | Mean Effective Pressure at Mid-point (tsf) | Average Cyclic Shear Stress [Tav] | Field SPT [N] | Correction Factor [Cer] | Relative Density [Dr] (%) | Correction Factor [Cn] | Corrected [N]60 | rd Factor | Maximum Shear Mod. [Gmax] (tsf) | [yeff]*[Geff] [Gmax] | yeff Shear Strain | [yeff]*100% | Volumetric Strain M7.5 [E15} (%) | Number of Strain Cycles [Nc] | Corrected Vol. Strains [Ec] | Estimated Settlement [S] (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 1.0 | 0.5 | 132.6 | 0.03 | 0.02 | 0.012 | 11 | 1.3 | 77.0 | 2.0 | 31.7 | 1.0 | 210.762 | 5.57E-05 | 7.80E-05 | 0.008 | 4.49E-03 | 21.3669 | 5.27E-03 | 0.001 |
| 2.0 | 1.0 | 1.5 | 132.6 | 0.10 | 0.07 | 0.036 | 11 | 1.3 | 77.0 | 2.0 | 31.7 | 1.0 | 365.050 | 9.45E-05 | 1.90E-04 | 0.019 | 1.09E-02 | 21.3669 | 1.28E-02 | 0.003 |
| 3.0 | 1.0 | 2.5 | 132.6 | 0.17 | 0.11 | 0.059 | 11 | 1.3 | 77.0 | 2.0 | 31.7 | 1.0 | 471.277 | 1.20E-04 | 1.70E-04 | 0.017 | 9.79E-03 | 21.3669 | 1.15E-02 | 0.003 |
| 4.0 | 1.0 | 3.5 | 132.6 | 0.23 | 0.16 | 0.083 | 11 | 1.3 | 77.0 | 2.0 | 31.7 | 1.0 | 557.623 | 1.39E-04 | 1.70E-04 | 0.017 | 9.79E-03 | 21.3669 | 1.15E-02 | 0.003 |
| 5.0 | 1.0 | 4.5 | 135.8 | 0.30 | 0.20 | 0.107 | 17 | 1.3 | 90.7 | 1.9 | 42.6 | 1.0 | 698.966 | 1.40E-04 | 1.50E-04 | 0.015 | 6.05E-03 | 21.3669 | 7.10E-03 | 0.002 |
| 6.0 | 1.0 | 5.5 | 135.8 | 0.37 | 0.25 | 0.131 | 17 | 1.3 | 90.7 | 1.7 | 39.1 | 1.0 | 752.674 | 1.57E-04 | 1.50E-04 | 0.015 | 6.70E-03 | 21.3669 | 7.86E-03 | 0.002 |
| 7.0 | 1.0 | 6.5 | 135.8 | 0.43 | 0.29 | 0.155 | 17 | 1.3 | 90.7 | 1.5 | 36.5 | 1.0 | 800.669 | 1.71E-04 | 1.50E-04 | 0.015 | 7.28E-03 | 21.3669 | 8.54E-03 | 0.002 |
| 8.0 | 1.0 | 7.5 | 135.8 | 0.50 | 0.34 | 0.179 | 9 | 1.3 | 61.3 | 1.4 | 21.5 | 1.0 | 721.908 | 2.15E-04 | 4.50E-04 | 0.045 | 4.12E-02 | 21.3669 | 4.83E-02 | 0.012 |
| 9.0 | 1.0 | 8.5 | 135.8 | 0.57 | 0.38 | 0.203 | 9 | 1.3 | 61.3 | 1.4 | 20.6 | 1.0 | 758.335 | 2.29E-04 | 4.50E-04 | 0.045 | 4.33E-02 | 21.3669 | 5.08E-02 | 0.012 |
| 10.0 | 1.0 | 9.5 | 136.5 | 0.64 | 0.43 | 0.226 | 13 | 1.3 | 70.6 | 1.3 | 25.6 | 1.0 | 862.266 | 2.21E-04 | 4.50E-04 | 0.045 | 3.34E-02 | 21.3669 | 3.92E-02 | 0.009 |
| 11.0 | 1.0 | 10.5 | 136.5 | 0.71 | 0.47 | 0.250 | 13 | 1.3 | 70.6 | 1.2 | 24.7 | 1.0 | 896.147 | 2.31E-04 | 4.50E-04 | 0.045 | 3.49E-02 | 21.3669 | 4.09E-02 | 0.010 |
| 12.0 | 1.0 | 11.5 | 136.5 | 0.78 | 0.52 | 0.274 | 13 | 1.3 | 70.6 | 1.2 | 23.9 | 0.9 | 928.195 | 2.40E-04 | 3.70E-04 | 0.037 | 2.99E-02 | 21.3669 | 3.50E-02 | 0.008 |
| 13.0 | 1.0 | 12.5 | 136.5 | 0.84 | 0.57 | 0.297 | 13 | 1.3 | 70.6 | 1.1 | 23.2 | 0.9 | 958.665 | 2.49E-04 | 3.70E-04 | 0.037 | 3.09E-02 | 21.3669 | 3.63E-02 | 0.009 |
| 14.0 | 1.0 | 13.5 | 139.1 | 0.91 | 0.61 | 0.320 | 12 | 1.3 | 61.7 | 1.1 | 22.5 | 0.9 | 986.358 | 2.57E-04 | 3.70E-04 | 0.037 | 3.22E-02 | 21.3669 | 3.77E-02 | 0.009 |
| 15.0 | 1.0 | 14.5 | 139.1 | 0.98 | 0.66 | 0.344 | 12 | 1.3 | 61.7 | 1.0 | 21.9 | 0.9 | 1014.718 | 2.64E-04 | 3.70E-04 | 0.037 | 3.31E-02 | 21.3669 | 3.89E-02 | 0.009 |
| 16.0 | 1.0 | 15.5 | 139.1 | 1.05 | 0.70 | 0.367 | 12 | 1.3 | 61.7 | 1.0 | 21.4 | 0.9 | 1041.961 | 2.70E-04 | 3.70E-04 | 0.037 | 3.41E-02 | 21.3669 | 4.00E-02 | 0.010 |
| 17.0 | 1.0 | 16.5 | 139.1 | 1.12 | 0.75 | 0.390 | 12 | 1.3 | 61.7 | 1.0 | 21.0 | 0.9 | 1068.204 | 2.76E-04 | 3.70E-04 | 0.037 | 3.50E-02 | 21.3669 | 4.10E-02 | 0.010 |
| 18.0 | 1.0 | 17.5 | 139.1 | 1.19 | 0.80 | 0.413 | 12 | 1.3 | 61.7 | 0.9 | 20.5 | 0.9 | 1093.545 | 2.82E-04 | 3.70E-04 | 0.037 | 3.58E-02 | 21.3669 | 4.20E-02 | 0.010 |
| 19.0 | 1.0 | 18.5 | 139.1 | 1.26 | 0.84 | 0.436 | 12 | 1.3 | 61.7 | 0.9 | 20.2 | 0.9 | 1118.067 | 2.87E-04 | 3.70E-04 | 0.037 | 3.66E-02 | 21.3669 | 4.29E-02 | 0.010 |
| 20.0 | 1.0 | 19.5 | 136.5 | 1.33 | 0.89 | 0.458 | 21 | 1.3 | 75.3 | 0.9 | 31.9 | 0.9 | 1337.828 | 2.49E-04 | 3.70E-04 | 0.037 | 2.11E-02 | 21.3669 | 2.48E-02 | 0.006 |
| 21.0 | 1.0 | 20.5 | 136.5 | 1.40 | 0.94 | 0.479 | 21 | 1.3 | 75.3 | 0.9 | 31.3 | 0.9 | 1362.864 | 2.52E-04 | 3.70E-04 | 0.037 | 2.16E-02 | 21.3669 | 2.54E-02 | 0.006 |
| 22.0 | 1.0 | 21.5 | 136.5 | 1.47 | 0.98 | 0.501 | 21 | 1.3 | 75.3 | 0.8 | 30.7 | 0.9 | 1387.188 | 2.56E-04 | 3.70E-04 | 0.037 | 2.21E-02 | 21.3669 | 2.59E-02 | 0.006 |
| 23.0 | 1.0 | 22.5 | 136.5 | 1.53 | 1.03 | 0.522 | 21 | 1.3 | 75.3 | 0.8 | 30.2 | 0.9 | 1410.853 | 2.59E-04 | 3.00E-04 | 0.030 | 1.83E-02 | 21.3669 | 2.15E-02 | 0.005 |
| 24.0 | 1.0 | 23.5 | 136.5 | 1.60 | 1.07 | 0.543 | 21 | 1.3 | 75.3 | 0.8 | 29.7 | 0.9 | 1433.907 | 2.62E-04 | 3.00E-04 | 0.030 | 1.87E-02 | 21.3669 | 2.19E-02 | 0.005 |
| 25.0 | 1.0 | 24.5 | 136.5 | 1.67 | 1.12 | 0.563 | 26 | 1.3 | 78.2 | 0.8 | 36.4 | 0.9 | 1566.555 | 2.46E-04 | 3.00E-04 | 0.030 | 1.46E-02 | 21.3669 | 1.72E-02 | 0.004 |
| 26.0 | 1.0 | 25.5 | 136.5 | 1.74 | 1.16 | 0.584 | 26 | 1.3 | 78.2 | 0.8 | 35.8 | 0.9 | 1589.664 | 2.48E-04 | 3.00E-04 | 0.030 | 1.49E-02 | 21.3669 | 1.75E-02 | 0.004 |
| 27.0 | 1.0 | 26.5 | 136.5 | 1.81 | 1.21 | 0.604 | 26 | 1.3 | 78.2 | 0.8 | 35.2 | 0.9 | 1612.238 | 2.50E-04 | 3.00E-04 | 0.030 | 1.52E-02 | 21.3669 | 1.78E-02 | 0.004 |
| 28.0 | 1.0 | 27.5 | 136.5 | 1.88 | 1.26 | 0.623 | 26 | 1.3 | 78.2 | 0.7 | 34.7 | 0.9 | 1634.307 | 2.52E-04 | 3.00E-04 | 0.030 | 1.55E-02 | 21.3669 | 1.82E-02 | 0.004 |
| 29.0 | 1.0 | 28.5 | 136.5 | 1.94 | 1.30 | 0.643 | 26 | 1.3 | 78.2 | 0.7 | 34.2 | 0.9 | 1655.903 | 2.54E-04 | 3.00E-04 | 0.030 | 1.57E-02 | 21.3669 | 1.85E-02 | 0.004 |
| 30.0 | 1.0 | 29.5 | 136.5 | 2.01 | 1.35 | 0.662 | 29 | 1.3 | 77.8 | 0.7 | 38.2 | 0.9 | 1748.230 | 2.45E-04 | 3.00E-04 | 0.030 | 1.38E-02 | 21.3669 | 1.62E-02 | 0.004 |
| 31.0 | 1.0 | 30.5 | 136.5 | 2.08 | 1.39 | 0.680 | 29 | 1.3 | 77.8 | 0.7 | 37.7 | 0.9 | 1769.594 | 2.47E-04 | 3.00E-04 | 0.030 | 1.40E-02 | 21.3669 | 1.64E-02 | 0.004 |
| 32.0 | 1.0 | 31.5 | 136.5 | 2.15 | 1.44 | 0.699 | 29 | 1.3 | 77.8 | 0.7 | 37.2 | 0.9 | 1790.542 | 2.48E-04 | 3.00E-04 | 0.030 | 1.42E-02 | 21.3669 | 1.67E-02 | 0.004 |
| 33.0 | 1.0 | 32.5 | 136.5 | 2.22 | 1.48 | 0.717 | 29 | 1.3 | 77.8 | 0.7 | 36.8 | 0.9 | 1811.093 | 2.49E-04 | 3.00E-04 | 0.030 | 1.45E-02 | 21.3669 | 1.69E-02 | 0.004 |
| 34.0 | 1.0 | 33.5 | 136.5 | 2.28 | 1.53 | 0.734 | 29 | 1.3 | 77.8 | 0.7 | 36.3 | 0.8 | 1831.269 | 2.50E-04 | 3.00E-04 | 0.030 | 1.47E-02 | 21.3669 | 1.72E-02 | 0.004 |
| 35.0 | 1.0 | 34.5 | 139.1 | 2.35 | 1.58 | 0.752 | 18 | 1.3 | 58.1 | 0.7 | 24.9 | 0.8 | 1639.594 | 2.84E-04 | 3.00E-04 | 0.030 | 2.30E-02 | 21.3669 | 2.70E-02 | 0.006 |
| 36.0 | 1.0 | 35.5 | 139.1 | 2.42 | 1.62 | 0.769 | 18 | 1.3 | 58.1 | 0.7 | 24.7 | 0.8 | 1657.859 | 2.85E-04 | 3.00E-04 | 0.030 | 2.33E-02 | 21.3669 | 2.74E-02 | 0.007 |
| 37.0 | 1.0 | 36.5 | 139.1 | 2.49 | 1.67 | 0.786 | 18 | 1.3 | 58.1 | 0.6 | 24.4 | 0.8 | 1675.824 | 2.85E-04 | 3.00E-04 | 0.030 | 2.36E-02 | 21.3669 | 2.77E-02 | 0.007 |
| 38.0 | 1.0 | 37.5 | 139.1 | 2.56 | 1.72 | 0.803 | 18 | 1.3 | 58.1 | 0.6 | 24.2 | 0.8 | 1693.504 | 2.86E-04 | 3.00E-04 | 0.030 | 2.39E-02 | 21.3669 | 2.80E-02 | 0.007 |
| 39.0 | 1.0 | 38.5 | 136.5 | 2.63 | 1.76 | 0.819 | 23 | 1.3 | 62.5 | 0.6 | 28.7 | 0.8 | 1816.221 | 2.70E-04 | 3.00E-04 | 0.030 | 1.95E-02 | 21.3669 | 2.28E-02 | 0.005 |
| 40.0 | 1.0 | 39.5 | 136.5 | 2.70 | 1.81 | 0.835 | 23 | 1.3 | 62.5 | 0.6 | 28.4 | 0.8 | 1833.712 | 2.70E-04 | 3.00E-04 | 0.030 | 1.97E-02 | 21.3669 | 2.31E-02 | 0.006 |
| 41.0 | 1.0 | 40.5 | 139.1 | 2.77 | 1.85 | 0.850 | 19 | 1.3 | 54.3 | 0.6 | 24.4 | 0.8 | 1766.726 | 2.84E-04 | 3.00E-04 | 0.030 | 2.36E-02 | 21.3669 | 2.76E-02 | 0.007 |
| 42.0 | 1.0 | 41.5 | 139.1 | 2.84 | 1.90 | 0.865 | 19 | 1.3 | 54.3 | 0.6 | 24.2 | 0.8 | 1783.521 | 2.84E-04 | 3.00E-04 | 0.030 | 2.38E-02 | 21.3669 | 2.79E-02 | 0.007 |
| 43.0 | 1.0 | 42.5 | 139.1 | 2.91 | 1.95 | 0.880 | 19 | 1.3 | 54.3 | 0.6 | 24.0 | 0.8 | 1800.080 | 2.84E-04 | 3.00E-04 | 0.030 | 2.41E-02 | 21.3669 | 2.82E-02 | 0.007 |
| 44.0 | 1.0 | 43.5 | 139.1 | 2.98 | 1.99 | 0.895 | 19 | 1.3 | 54.3 | 0.6 | 23.8 | 0.8 | 1816.414 | 2.85E-04 | 3.00E-04 | 0.030 | 2.43E-02 | 21.3669 | 2.85E-02 | 0.007 |
| 45.0 | 1.0 | 44.5 | 139.1 | 3.05 | 2.04 | 0.909 | 19 | 1.3 | 54.3 | 0.6 | 23.6 | 0.8 | 1832.532 | 2.85E-04 | 1.00E-02 | 1.000 | 8.19E-01 | 21.3669 | 9.60E-01 | 0.230 |
| 46.0 | 1.0 | 45.5 | 136.5 | 3.12 | 2.09 | 0.923 | 28 | 1.3 | 63.3 | 0.6 | 31.2 | 0.8 | 2033.756 | 2.59E-04 | 1.00E-02 | 1.000 | 5.86E-01 | 21.3669 | 6.87E-01 | 0.165 |
| 47.0 | 1.0 | 46.5 | 136.5 | 3.18 | 2.13 | 0.936 | 28 | 1.3 | 63.3 | 0.6 | 31.0 | 0.8 | 2050.166 | 2.59E-04 | 1.00E-02 | 1.000 | 5.92E-01 | 21.3669 | 6.94E-01 | 0.167 |
| 48.0 | 1.0 | 47.5 | 136.5 | 3.25 | 2.18 | 0.949 | 28 | 1.3 | 63.3 | 0.6 | 30.7 | 0.8 | 2066.370 | 2.59E-04 | 1.00E-02 | 1.000 | 5.98E-01 | 21.3669 | 7.01E-01 | 0.168 |
| 49.0 | 1.0 | 48.5 | 136.5 | 3.32 | 2.22 | 0.961 | 28 | 1.3 | 63.3 | 0.6 | 30.5 | 0.8 | 2082.376 | 2.58E-04 | 1.00E-02 | 1.000 | 6.03E-01 | 21.3669 | 7.07E-01 | 0.170 |
| 50.0 | 1.0 | 49.5 | 136.5 | 3.39 | 2.27 | 0.973 | 28 | 1.3 | 63.3 | 0.6 | 30.2 | 0.8 | 2098.188 | 2.58E-04 | 1.00E-02 | 1.000 | 6.09E-01 | 21.3669 | 7.14E-01 | 0.171 |

TOTAL SETTLEMENT = **1.34**

FIGURE 3




NOTE: SEE REPORT FOR FOUNDATION WIDTH AND DEPTH RECOMMENDATION

NO SCALE

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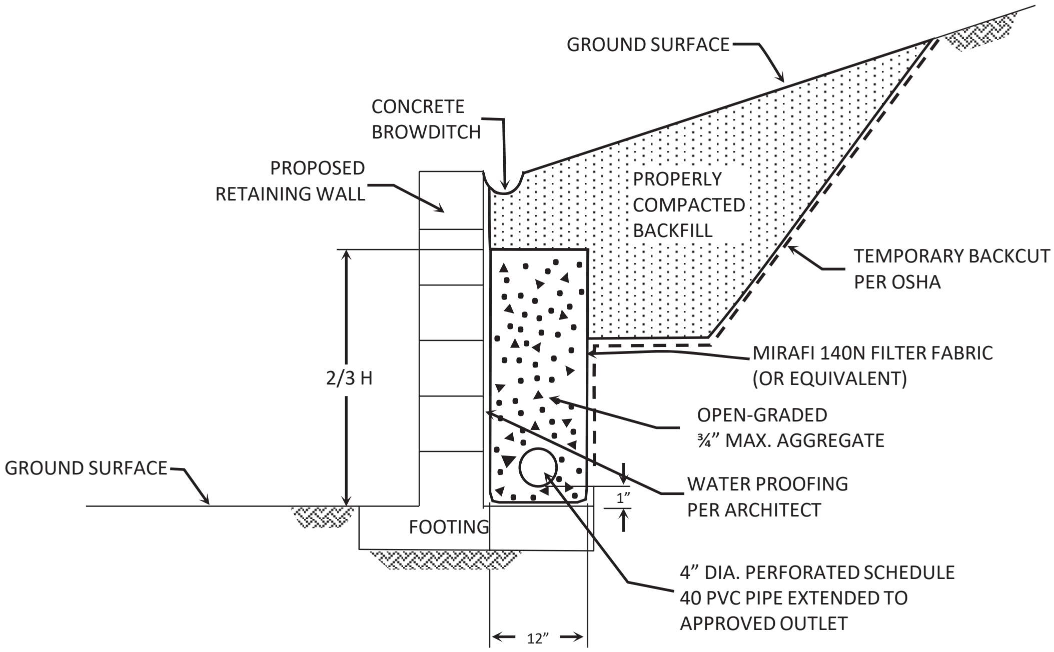
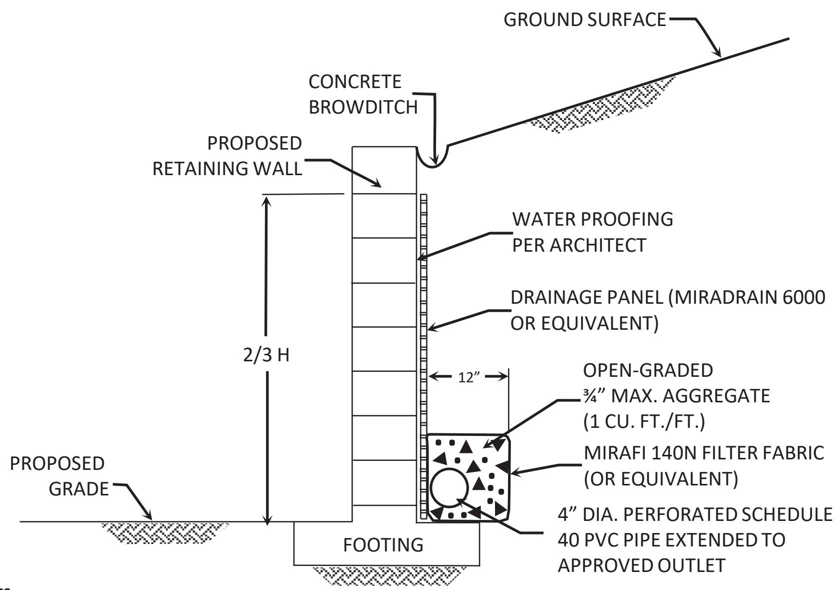
# WALL / COLUMN FOOTING DETAIL

WAREHOUSE BUILDING
SWC OF RAMONA EXPRESSWAY
& PERRIS BOULEVARD
PERRIS, CALIFORNIA

| APRIL 2020 | PROJECT NO. T2400-22-02 | FIG. 4 |
|---|---|---|




**NOTES:**

DRAIN SHOULD BE UNFORMLY SLOPED TO GRAVITY OUTLET
OR TO A SUMP WHERE WATER CAN BE REMOVED BY PUMPIMG

CONCRETE BROW DITCH RECOMMENDED FOR SLOPE HEIGHTS
GREATER THAN 6 FEET

NO SCALE

# TYPICAL RETAINING WALL DRAIN DETAIL

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WAREHOUSE BUILDING
SWC OF RAMONA EXPRESSWAY
& PERRIS BOULEVARD
PERRIS, CALIFORNIA

| | | |
|---|---|---|
| APRIL 2020 | PROJECT NO. T2400-22-02 | FIG. 5 |

# APPENDIX A

## APPENDIX A

## FIELD INVESTIGATION

Field work for our investigation included a site reconnaissance, subsurface explorations, soil sampling, and percolation testing. Our original subsurface exploration took place on August 4 and 7, 2006, where we drilled, logged, and sampled eighteen geotechnical borings to depths ranging between 16 and 51½ feet. On March 15 and 16, 2020 we drilled, logged, and sampled seven percolation test borings to depths of 5 and 11 feet in areas where storm water infiltration systems are proposed. All borings were drilled utilizing a truck mounted CME-75 hollow-stem auger drilling rig. The *Geologic Map*, Figure 2, presents the locations of our exploratory borings.

We collected bulk and relatively undisturbed samples from the borings by driving a 3-inch O. D. California Modified Sampler and a 2-inch O. D. Split-Spoon Sampler into the “undisturbed” soil mass with blows from a 140-pound hammer falling 30 inches. The California Modified Sampler was equipped with 1-inch high by 2³/₈-inch inside diameter brass sampler rings to facilitate removal and testing. The samplers were driven 18 inches into the bottom of the excavations. Blow counts are recorded for every 6 inches the sampler is driven. The penetration resistances shown on the boring logs are shown in terms of blows per foot. The values indicated on the boring logs are the sum of the last 12 inches of the sampler if driven 18 inches. If the sampler was not driven for 18 inches, an approximate value is calculated in term of blows per foot or the final 6-inch interval is reported. These values are not to be taken as N-values, adjustments have not been applied. Relatively undisturbed samples and bulk samples of disturbed soils were transported to our laboratory for testing. We estimated elevations shown on the boring logs from either *Google Earth Pro* or other available topographic information.

We visually examined the soil conditions encountered within the borings, classified, and logged them in general conformance with the Unified Soil Classification System (USCS). Logs of the geotechnical and percolation test borings are presented on Figures A-1 through A-25. The logs depict the general soil and geologic conditions encountered and the depth at which we obtained the soil samples.

Percolation testing was performed on March 17, 2020 in accordance with *Riverside County Flood Control and Water Conservation District, LID BMP Manual, Appendix A*. The percolation tests were run in general accordance with Section 2.3 *Shallow Percolation Test* (for test holes 10 feet or less in depth) and *Deep Percolation Test* (for test holes greater than 10 feet in depth) methods. The percolation test data is presented on Figures A-26 and A-32.

PROJECT NO. T2400-22-01

## BORING B 1

ELEV. (MSL.) ~1455' DATE COMPLETED 08-04-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | B1-1 | | | CL | **ALLUVIUM** Stiff, moist, brown, Sandy CLAY | | | |
| 2 | B1-2 | | | | | 18 | 123.6 | 12.5 |
| 4 | | | | SM | Medium dense, moist, brown, Silty, fine to medium SAND | | | |
| | B1-3 | | | | | 17 | | |
| 6 | | | | | | | | |
| 8 | B1-4 | | | | | 19 | 120.6 | 13.2 |
| 10 | B1-5 | | | | | 17 | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| | B1-6 | | | | | 22 | | |
| 16 | | | | | BORING TERMINATED AT 16 FEET<br>No groundwater encountered | | | |

**Figure A-1,**
**Log of Boring B 1, Page 1 of 1**

T2400-22-01.GPJ

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2400-22-01

# BORING B 2

ELEV. (MSL.) ~1455' DATE COMPLETED 08-04-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | SM | **ALLUVIUM** Dense, moist, brown, Silty, fine to medium SAND; some mica | | | |
| 2 | B2-1 | | | | | 52 | | |
| 4 | B2-2 | | | | -Becomes loose and fine grained at 5' | 13 | 107.3 | 12.9 |
| 6 | | | | | | | | |
| 8 | B2-3 | | | SP | Medium dense, moist, brown, fine to coarse SAND; trace silt | 41 | 121.6 | 6.7 |
| 10 | B2-4 | | | | | 29 | | |
| 12 | | | | | | | | |
| 14 | B2-5 | | | SM | Medium dense, moist, brown, Silty, fine SAND | 23 | | |
| 16 | | | | | BORING TERMINATED AT 16 FEET No groundwater encountered | | | |

**Figure A-2,**
**Log of Boring B 2, Page 1 of 1**

T2400-22-01.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2400-22-01

# BORING B 3

ELEV. (MSL.) ~1455' DATE COMPLETED 08-04-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | SC | **ALLUVIUM** Medium dense, moist, brown, Clayey, fine to medium SAND | | | |
| 2 | B3-1 | | | | | 35 | | |
| 4 | | | | | | | | |
| | B3-2 | | | SM | Medium dense, moist, brown, Silty, fine to medium SAND | 33 | 129.0 | 10.3 |
| 6 | | | | | | | | |
| 8 | B3-3 | | | | | 22 | 119.5 | 10.6 |
| 10 | B3-4 | | | SP | Medium dense, moist, brown, fine to medium SAND; trace silt | 24 | | |
| 12 | | | | | | | | |
| 14 | | | | SM | Medium dense, moist, brown, Silty, fine SAND; trace clay | | | |
| | B3-5 | | | | | 19 | | |
| 16 | | | | | BORING TERMINATED AT 16 FEET No groundwater encountered | | | |

**Figure A-3,**
**Log of Boring B 3, Page 1 of 1**

T2400-22-01.GPJ

| SAMPLE SYMBOLS | | | |
|---|---|---|---|
| | ... SAMPLING UNSUCCESSFUL | ... STANDARD PENETRATION TEST | ... DRIVE SAMPLE (UNDISTURBED) |
| | ... DISTURBED OR BAG SAMPLE | ... CHUNK SAMPLE | ... WATER TABLE OR SEEPAGE |

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

## BORING B 4

ELEV. (MSL.) ~1455' DATE COMPLETED 08-04-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | B4-1 | | | SM | **ALLUVIUM**<br>Medium dense, moist, brown, Silty, fine to medium SAND; trace clay | | | |
| 2 | B4-2 | | | | | 11 | | |
| 4 | | | | | | | | |
| 6 | B4-3 | | | | | 27 | 120.7 | 12.5 |
| 8 | B4-4 | | | | -Becomes fine grained at 7' | 9 | | |
| 10 | B4-5 | | | | -Becomes fine to medium grained at 10' | 21 | | |
| 12 | | | | | | | | |
| 14 | | | | ML | Stiff, moist, brown, Sandy SILT | | | |
| 16 | B4-6 | | | | | 12 | | |
| 18 | | | | | | | | |
| 20 | B4-7 | | | SM | Medium dense, moist, brown, Silty, fine to medium SAND | 34 | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| 26 | B4-8 | | | | | 26 | | |
| 28 | | | | | | | | |

T2400-22-01.GPJ

**Figure A-4,**
**Log of Boring B 4, Page 1 of 2**

| SAMPLE SYMBOLS | | | |
|---|---|---|---|
| | ... SAMPLING UNSUCCESSFUL | ... STANDARD PENETRATION TEST | ... DRIVE SAMPLE (UNDISTURBED) |
| | ... DISTURBED OR BAG SAMPLE | ... CHUNK SAMPLE | ... WATER TABLE OR SEEPAGE |

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

## BORING B 4

ELEV. (MSL.) ~1455' DATE COMPLETED 08-04-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 30 | B4-9 | | | | | 46 | | |
| 35 | B4-10 | | | ML | Very stiff, moist, brown SILT; trace sand | 18 | | |
| 39 | | | | SM | Medium dense, moist, brown, Silty, fine to medium SAND | | | |
| 40 | B4-11 | | | ML | Very stiff, moist, brown SILT; trace sand | 37 | | |
| 45 | B4-12 | | | | | 19 | | |
| 46 | | | | SM | Medium dense, moist, brown, Silty, very fine SAND | | | |
| 50 | B4-13 | | | | | 44 | | |

BORING TERMINATED AT 51 FEET
No groundwater encountered

**Figure A-4,**
**Log of Boring B 4, Page 2 of 2**

T2400-22-01.GPJ

SAMPLE SYMBOLS
☐ ... SAMPLING UNSUCCESSFUL
▨ ... DISTURBED OR BAG SAMPLE
◧ ... STANDARD PENETRATION TEST
◪ ... CHUNK SAMPLE
■ ... DRIVE SAMPLE (UNDISTURBED)
▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

## BORING B 5

ELEV. (MSL.) ~1455' DATE COMPLETED 08-04-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | SC | **ALLUVIUM** Medium dense, moist, brown, Clayey, fine to medium SAND | | | |
| 2 | | | | | | | | |
| | B5-1 | | | | | 22 | 128.0 | 10.9 |
| 4 | | | | | | | | |
| | B5-2 | | | | | 29 | 121.8 | 11.9 |
| 6 | | | | | | | | |
| | | | | SM | Medium dense, moist, brown, Silty, fine to medium SAND | | | |
| 8 | B5-3 | | | | | 32 | | |
| 10 | B5-4 | | | | | 20 | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| | B5-5 | | | | -Becomes fine grained at 15' | 18 | | |
| 16 | | | | | BORING TERMINATED AT 16 FEET No groundwater encountered | | | |

**Figure A-5,**
**Log of Boring B 5, Page 1 of 1**

T2400-22-01.GPJ

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

# BORING B 6

ELEV. (MSL.) **~1455'** DATE COMPLETED **08-04-2006**

EQUIPMENT **CME 75** BY: **K. COX**

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | B6-1 | | | SM | **ALLUVIUM**<br>Medium dense, moist, brown, Silty, fine to medium SAND | | | |
| 2 | B6-2 | | | | | 18 | 124.2 | 9.9 |
| 4 | | | | | | | | |
| 6 | B6-3 | | | | | 30 | 127.3 | 11.9 |
| 8 | B6-4 | | | | -Becomes fine grained at 7' | 41 | 118.3 | 13.6 |
| 10 | B6-5 | | | | -Becomes fine to medium grained at 10' | 26 | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | B6-6 | | | | -Becomes fine grained at 15' | 36 | | |
| | | | | | BORING TERMINATED AT 16 FEET<br>No groundwater encountered | | | |

**Figure A-6,**
**Log of Boring B 6, Page 1 of 1**

T2400-22-01.GPJ

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2400-22-01

## BORING B 7

ELEV. (MSL.) **~1455'** DATE COMPLETED **08-04-2006**

EQUIPMENT **CME 75** BY: **K. COX**

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | SC | **ALLUVIUM** Medium dense, moist, brown, Clayey, fine to medium SAND | | | |
| 2 | B7-1 | | | | | 24 | 123.2 | 12.5 |
| 4 | B7-2 | | | SM | Medium dense, moist, brown, Silty, fine to medium SAND | 29 | 122.2 | 14.8 |
| 6 | | | | | | | | |
| 8 | B7-3 | | | SP | Medium dense, moist, brown, fine to medium SAND; trace silt | 30 | | |
| 10 | B7-4 | | | | -Becomes clean, fine to medium sand at 10' | 14 | | |
| 12 | | | | | | | | |
| 14 | B7-5 | | | SC | Medium dense, moist, brown, Clayey, fine to medium SAND | 33 | | |
| 16 | | | | | BORING TERMINATED AT 16 FEET<br>No groundwater encountered | | | |

**Figure A-7,**
**Log of Boring B 7, Page 1 of 1**

T2400-22-01.GPJ

| SAMPLE SYMBOLS | | | |
|---|---|---|---|
| | ... SAMPLING UNSUCCESSFUL | ... STANDARD PENETRATION TEST | ... DRIVE SAMPLE (UNDISTURBED) |
| | ... DISTURBED OR BAG SAMPLE | ... CHUNK SAMPLE | ... WATER TABLE OR SEEPAGE |

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2400-22-01

# BORING B 8

ELEV. (MSL.) ~1455' DATE COMPLETED 08-04-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | B8-1 | | | SM | **ALLUVIUM**<br>Medium dense, moist, brown, Silty, fine to coarse SAND | | | |
| 2 | | | | | | | | |
| | B8-2 | | | | | 14 | 123.4 | 9.5 |
| 4 | | | | | | | | |
| | B8-3 | | | | | 26 | 125.1 | 8.6 |
| 6 | | | | | | | | |
| 8 | B8-4 | | | | -Becomes fine to medium grained at 7½' | 32 | | |
| 10 | B8-5 | | | SP | Medium dense, moist, brown, fine to medium SAND; trace silt | 33 | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| | B8-6 | | | SM | Medium dense, moist, brown, Silty, fine to medium SAND | 35 | | |
| 16 | | | | | BORING TERMINATED AT 16 FEET<br>No groundwater encountered | | | |

**Figure A-8,**
**Log of Boring B 8, Page 1 of 1**

T2400-22-01.GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◧ ... STANDARD PENETRATION TEST
- ◩ ... CHUNK SAMPLE
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

# BORING B 9

ELEV. (MSL.) ~1455' DATE COMPLETED 08-04-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | SM | **ALLUVIUM**<br>Medium dense, moist, brown, Silty, fine to medium SAND | | | |
| 2 | | | | | | | | |
| | B9-1 | | | | | 18 | 122.7 | 5.9 |
| 4 | | | | | | | | |
| | B9-2 | | | | | 18 | 124.2 | 11.1 |
| 6 | | | | | | | | |
| 8 | B9-3 | | | | | 32 | 120.8 | 11.3 |
| 10 | B9-4 | | | | | 23 | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| | B9-5 | | | | -Becomes fine grained at 15' | 34 | | |
| 16 | | | | | BORING TERMINATED AT 16 FEET<br>No groundwater encountered | | | |

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**Figure A-9,**
**Log of Boring B 9, Page 1 of 1**

| SAMPLE SYMBOLS | | | |
|---|---|---|---|
| | ... SAMPLING UNSUCCESSFUL | ... STANDARD PENETRATION TEST | ... DRIVE SAMPLE (UNDISTURBED) |
| | ... DISTURBED OR BAG SAMPLE | ... CHUNK SAMPLE | ... WATER TABLE OR SEEPAGE |

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

## BORING B 10

ELEV. (MSL.) ~1455' DATE COMPLETED 08-04-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | SM | **ALLUVIUM**<br>Loose, moist, brown, Silty, fine to medium SAND | | | |
| 2 | | | | | | | | |
| | B10-1 | | | | | 13 | 120.9 | 6.6 |
| 4 | | | | | | | | |
| | B10-2 | | | | -Becomes medium dense at 5' | 26 | 130.0 | 10.0 |
| 6 | | | | | | | | |
| 8 | B10-3 | | | | | 38 | 126.0 | 12.5 |
| 10 | B10-4 | | | | | 22 | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| | B10-5 | | | | -Becomes fine grained at 15' | 39 | | |
| 16 | | | | | BORING TERMINATED AT 16 FEET<br>No groundwater encountered | | | |

**Figure A-10,**
**Log of Boring B 10, Page 1 of 1**

T2400-22-01.GPJ

| SAMPLE SYMBOLS | | | |
|---|---|---|---|
| | ... SAMPLING UNSUCCESSFUL | ... STANDARD PENETRATION TEST | ... DRIVE SAMPLE (UNDISTURBED) |
| | ... DISTURBED OR BAG SAMPLE | ... CHUNK SAMPLE | ... WATER TABLE OR SEEPAGE |

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2400-22-01

# BORING B 11

ELEV. (MSL.) ~1455' DATE COMPLETED 08-04-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | B11-1 | | | SC | **ALLUVIUM**<br>Loose, moist, brown, Clayey, fine SAND | | | |
| 2 | B11-2 | | | | | 12 | 121.5 | 13.0 |
| 4 | B11-3 | | | SM | Loose, moist, brown, Silty, fine to medium SAND | 14 | 121.9 | 11.4 |
| 8 | B11-4 | | | | | 13 | | |
| | | | | SP | Medium dense, moist, brown, clean SAND | | | |
| 10 | B11-5 | | | | | 20 | | |
| | | | | ML | Stiff, moist, brown, Sandy SILT | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| | B11-6 | | | SM | Medium dense, moist, brown, Silty, fine to medium SAND | 30 | | |
| 16 | | | | | BORING TERMINATED AT 16 FEET<br>No groundwater encountered | | | |

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**Figure A-11,**
**Log of Boring B 11, Page 1 of 1**

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2400-22-01

# BORING B 12

ELEV. (MSL.) ~1455' DATE COMPLETED 08-04-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | SM | **ALLUVIUM**<br>Medium dense, moist, brown, Silty, fine to medium SAND | | | |
| 2 | | | | | | | | |
| | B12-1 | | | | | 41 | 128.8 | 11.8 |
| 4 | | | | | | | | |
| | B12-2 | | | | | 31 | 123.8 | 13.4 |
| 6 | | | | | | | | |
| 8 | B12-3 | | | | | 22 | | |
| | | | | SP | Medium dense, moist, brown, fine to coarse SAND; trace silt | | | |
| 10 | B12-4 | | | | | 18 | | |
| | | | | SM | Medium dense, moist, brown, Silty, fine to medium SAND | | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| | B12-5 | | | | -Becomes fine grained at 15' | 29 | | |
| 16 | | | | | BORING TERMINATED AT 16 FEET<br>No groundwater encountered | | | |

**Figure A-12,**
**Log of Boring B 12, Page 1 of 1**

T2400-22-01.GPJ

| SAMPLE SYMBOLS | | | |
|---|---|---|---|
| | ☐ ... SAMPLING UNSUCCESSFUL | ◧ ... STANDARD PENETRATION TEST | ■ ... DRIVE SAMPLE (UNDISTURBED) |
| | ⊠ ... DISTURBED OR BAG SAMPLE | ◪ ... CHUNK SAMPLE | ▼ ... WATER TABLE OR SEEPAGE |

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2400-22-01

# BORING B 13

ELEV. (MSL.) ~1455' DATE COMPLETED 08-07-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | B13-1 | | | SM | **ALLUVIUM** Medium dense, moist, brown, Silty, fine to medium SAND | | | |
| 2 | B13-2 | | | | | 14 | 123.5 | 7.4 |
| 4 | | | | | | | | |
| | B13-3 | | | | | 2 | | |
| 6 | | | | SC | Loose, moist, olive-brown, Clayey, fine to medium SAND | | | |
| 8 | B13-4 | | | | | 24 | 117.1 | 17.2 |
| | | | | SM | Medium dense, moist, brown, Silty, fine to medium SAND | | | |
| 10 | B13-5 | | | | | 10 | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| | B13-6 | | | | | 38 | | |
| 16 | | | | ML | Very stiff, moist, brown SILT; trace sand | | | |
| 18 | | | | | | | | |
| 20 | B13-7 | | | | | 21 | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| | B13-8 | | | SM | Very dense, moist, brown, Silty, fine to coarse SAND, some gravel | 84/11" | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |

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**Figure A-13,**
**Log of Boring B 13, Page 1 of 2**

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

## BORING B 13

ELEV. (MSL.) ~1455' DATE COMPLETED 08-07-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 30 | B13-9 | | | ML | Stiff, moist, light brown SILT; trace sand and gravel | 10 | | |
| 32 | | | | | | | | |
| 34 | | | | | | | | |
| 36 | B13-10 | | | | -Becomes brown | 20 | | |
| 38 | | | | | | | | |
| 40 | B13-11 | | | CL | Stiff, moist, brown CLAY; trace sand | 15 | | |
| 42 | | | | | | | | |
| 44 | | | | | | | | |
| 46 | B13-12 | | | ML | Very stiff, moist, brown SILT; trace sand | 34 | | |
| 48 | | | | | | | | |
| 50 | B13-13 | | | SM | Medium dense, moist, brown, Silty, fine to medium SAND | 28 | | |

BORING TERMINATED AT 51½ FEET
No groundwater encountered

**Figure A-13,**
**Log of Boring B 13, Page 2 of 2**

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SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. T2400-22-01

## BORING B 14

ELEV. (MSL.) ~1455' DATE COMPLETED 08-07-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | SM | **ALLUVIUM**<br>Medium dense, moist, brown, Silty, fine to medium SAND | | | |
| 2 | | | | | | | | |
| | B14-1 | | | | | 43 | | |
| 4 | | | | | | | | |
| | B14-2 | | | | | 39 | 128.0 | 7.4 |
| 6 | | | | | | | | |
| 8 | B14-3 | | | | | 39 | | |
| 10 | B14-4 | | | | | 37 | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| | B14-5 | | | | | 27 | | |
| 16 | | | | ML | Very stiff, moist, brown, SILT; trace sand | | | |
| | | | | | BORING TERMINATED AT 16 FEET<br>No groundwater encountered | | | |

T2400-22-01.GPJ

**Figure A-14,**
**Log of Boring B 14, Page 1 of 1**

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2400-22-01

# BORING B 15

ELEV. (MSL.) ~1455' DATE COMPLETED 08-07-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | B15-1 | | | SM | **ALLUVIUM**<br>Medium dense, moist, brown, Silty, fine to medium SAND; voids | | | |
| 2 | B15-2 | | | | | 37 | | |
| 4 | | | | | | | | |
| 6 | B15-3 | | | | | 30 | 116.9 | 4.7 |
| 8 | B15-4 | | | | -Becomes dense with no voids at 7' | 47 | | |
| 10 | B15-5 | | | ML | Very stiff, moist, brown SILT | 38 | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| 16 | B15-6 | | | | | 18 | | |
| | | | | | BORING TERMINATED AT 16 FEET<br>No groundwater encountered | | | |

T2400-22-01.GPJ

**Figure A-15,**
**Log of Boring B 15, Page 1 of 1**

| SAMPLE SYMBOLS | | | |
|---|---|---|---|
| | ... SAMPLING UNSUCCESSFUL | ... STANDARD PENETRATION TEST | ... DRIVE SAMPLE (UNDISTURBED) |
| | ... DISTURBED OR BAG SAMPLE | ... CHUNK SAMPLE | ... WATER TABLE OR SEEPAGE |

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2400-22-01

# BORING B 16

ELEV. (MSL.) ~1455' DATE COMPLETED 08-07-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | SM | **ALLUVIUM**<br>Medium dense, moist, brown, Silty, fine to medium SAND | | | |
| 2 | B16-1 | | | | | 37 | | |
| 4 | | | | | | | | |
| 6 | B16-2 | | | | | 31 | 128.7 | 6.8 |
| 8 | B16-3 | | | | | 40 | 120.6 | 6.4 |
| 10 | B16-4 | | | | | 26 | | |
| 12 | | | | | | | | |
| 14 | | | | ML | Stiff, moist, brown SILT; trace sand | | | |
| 16 | B16-5 | | | | | 15 | | |
| | | | | | BORING TERMINATED AT 16 FEET<br>No groundwater encountered | | | |

T2400-22-01.GPJ

**Figure A-16,**
**Log of Boring B 16, Page 1 of 1**

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

# BORING B 17

ELEV. (MSL.) ~1455' DATE COMPLETED 08-07-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | SM | **ALLUVIUM** Medium dense, moist, brown, Silty, fine to medium SAND | | | |
| 2 | | | | | | | | |
| | B17-1 | | | | | 28 | 129.5 | 10.2 |
| 4 | | | | | | | | |
| | B17-2 | | | | | 27 | 129.1 | 10.1 |
| 6 | | | | | | | | |
| 8 | B17-3 | | | | | 35 | 123.6 | 9.1 |
| 10 | B17-4 | | | SP | Medium dense, moist, brown, fine to coarse SAND; trace silt | 22 | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| | B17-5 | | | SM | Medium dense, moist, brown, Silty, fine to medium SAND | 29 | | |
| 16 | | | | | BORING TERMINATED AT 16 FEET<br>No groundwater encountered | | | |

T2400-22-01.GPJ

**Figure A-17,**
**Log of Boring B 17, Page 1 of 1**

| SAMPLE SYMBOLS | | | |
|---|---|---|---|
| | ... SAMPLING UNSUCCESSFUL | ... STANDARD PENETRATION TEST | ... DRIVE SAMPLE (UNDISTURBED) |
| | ... DISTURBED OR BAG SAMPLE | ... CHUNK SAMPLE | ... WATER TABLE OR SEEPAGE |

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

# BORING B 18

ELEV. (MSL.) ~1455' DATE COMPLETED 08-07-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | B18-1 | | | SM | **ALLUVIUM** Medium dense, moist, brown, Silty, fine to medium SAND | | | |
| 2 | B18-2 | | | | | 22 | | |
| 4 | | | | | | | | |
| | B18-3 | | | | -Becomes fine grained at 5' | 39 | 124.6 | 12.4 |
| 6 | | | | | | | | |
| 8 | B18-4 | | | | -Becomes loose at 7½' | 8 | | |
| 10 | B18-5 | | | | | 11 | | |
| 12 | | | | | | | | |
| 14 | | | | | | | | |
| | B18-6 | | | | | 7 | | |
| 16 | | | | | | | | |
| 18 | | | | | | | | |
| 20 | B18-7 | | | | -Becomes dense at 20' | 45 | | |
| 22 | | | | | | | | |
| 24 | | | | | | | | |
| | B18-8 | | | ML | Very stiff, moist, brown, Sandy SILT | 21 | | |
| 26 | | | | | | | | |
| 28 | | | | | | | | |

**Figure A-18,**
**Log of Boring B 18, Page 1 of 2**

T2400-22-01.GPJ

| SAMPLE SYMBOLS | | | |
|---|---|---|---|
| | ... SAMPLING UNSUCCESSFUL | ... STANDARD PENETRATION TEST | ... DRIVE SAMPLE (UNDISTURBED) |
| | ... DISTURBED OR BAG SAMPLE | ... CHUNK SAMPLE | ... WATER TABLE OR SEEPAGE |

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. T2400-22-01

# BORING B 18

ELEV. (MSL.) ~1455' DATE COMPLETED 08-07-2006

EQUIPMENT CME 75 BY: K. COX

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 30 | B18-9 | | | | | 21 | | |
| 35 | B18-10 | | | SM | Medium dense, moist, brown, Silty, fine SAND | 20 | | |
| 40 | B18-11 | | | ML | Very stiff, moist, brown, Sandy SILT | 54 | | |
| 45 | B18-12 | | | | | 16 | | |
| 50 | B18-13 | | | SM | Dense, moist, brown, Silty, fine to medium SAND | 65 | | |

BORING TERMINATED AT 51 FEET
No groundwater encountered

T2400-22-01.GPJ

**Figure A-18,**
**Log of Boring B 18, Page 2 of 2**

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

## BORING P-1

ELEV. (MSL.) **1460** DATE COMPLETED **03/16/2020**

EQUIPMENT **CME 75** BY: **Weidman**

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | SM | **VERY OLD ALLUVIUM (Qvof)**<br>Silty SAND, medium dense, moist, dark brown; fine to coarse sand; suficial grass | | | |
| 2 | | | | | | | | |
| 4 | P1@4.5-5' | | | ML | Sandy SILT, stiff, moist, dark brown; fine to medium sand | | | |

Total Depth = 5'
Groundwater not encountered
Backfilled with cuttings 03/17/2020

**Figure A-19,**
**Log of Boring P-1, Page 1 of 1**

T2400-22-02 BORING LOGS.GPJ

| SAMPLE SYMBOLS | | | |
|---|---|---|---|
| | ... SAMPLING UNSUCCESSFUL | ... STANDARD PENETRATION TEST | ... DRIVE SAMPLE (UNDISTURBED) |
| | ... DISTURBED OR BAG SAMPLE | ... CHUNK SAMPLE | ... WATER TABLE OR SEEPAGE |

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

## BORING P-2

ELEV. (MSL.) **1459** DATE COMPLETED **03/16/2020**

EQUIPMENT **CME 75** BY: **Weidman**

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | SM | **VERY OLD ALLUVIUM (Qvof)**<br>Silty SAND, medium dense, moist, dark brown; fine to coarse sand; suficial grass | | | |
| 2 | | | | | -Becomes brown; increase in fine and medium sand | | | |
| 4 | P2@4.5-5' | | | | -Increase in coarse sand | | | |

Total Depth = 5'
Groundwater not encountered
Backfilled with cuttings 03/17/2020

**Figure A-20,**
**Log of Boring P-2, Page 1 of 1**

T2400-22-02 BORING LOGS.GPJ

| SAMPLE SYMBOLS | | | |
|---|---|---|---|
| | ... SAMPLING UNSUCCESSFUL | ... STANDARD PENETRATION TEST | ... DRIVE SAMPLE (UNDISTURBED) |
| | ... DISTURBED OR BAG SAMPLE | ... CHUNK SAMPLE | ... WATER TABLE OR SEEPAGE |

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2400-22-02

# BORING P-3

ELEV. (MSL.) **1458** DATE COMPLETED **03/16/2020**

EQUIPMENT **CME 75** BY: **Weidman**

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | SM | **VERY OLD ALLUVIUM (Qvof)** Silty SAND, medium dense, moist, dark brown; fine to coarse sand; suficial gravel | | | |
| 2 | | | | | | | | |
| 4 | | | | | | | | |
| 6 | | | | | | | | |
| 8 | | | | | -Increase in coarse sand | | | |
| 10 | P3@10.5-11 | | | ML | Sandy SILT, stiff, moist, reddish brown; fine to medium sand; gravel lens | | | |
| | | | | | Total Depth = 11'<br>Groundwater not encountered<br>Backfilled with cuttings 03/17/2020 | | | |

**Figure A-21,**
**Log of Boring P-3, Page 1 of 1**

T2400-22-02 BORING LOGS.GPJ

| SAMPLE SYMBOLS | | | |
|---|---|---|---|
| | ... SAMPLING UNSUCCESSFUL | ... STANDARD PENETRATION TEST | ... DRIVE SAMPLE (UNDISTURBED) |
| | ... DISTURBED OR BAG SAMPLE | ... CHUNK SAMPLE | ... WATER TABLE OR SEEPAGE |

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

## BORING P-4

ELEV. (MSL.) **1458** DATE COMPLETED **03/16/2020**

EQUIPMENT **CME 75** BY: **Weidman**

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | SM | **VERY OLD ALLUVIUM (Qvof)**<br>Silty SAND, medium dense, moist, dark brown; fine to coarse sand; suficial grass | | | |
| 2 | | | | | | | | |
| 4 | | | | | -Becomes reddish brown; dense | | | |
| | P4@4.5-5' | | | | | | | |

Total Depth = 5'
Groundwater not encountered
Backfilled with cuttings 03/17/2020

**Figure A-22,**
**Log of Boring P-4, Page 1 of 1**

T2400-22-02 BORING LOGS.GPJ

| SAMPLE SYMBOLS | | | |
|---|---|---|---|
| | ... SAMPLING UNSUCCESSFUL | ... STANDARD PENETRATION TEST | ... DRIVE SAMPLE (UNDISTURBED) |
| | ... DISTURBED OR BAG SAMPLE | ... CHUNK SAMPLE | ... WATER TABLE OR SEEPAGE |

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. T2400-22-02

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | BORING P-5<br>ELEV. (MSL.) 1458 DATE COMPLETED 03/16/2020<br>EQUIPMENT CME 75 BY: Weidman | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| | | | | | MATERIAL DESCRIPTION | | | |
| 0<br>2 | | | | SM | **VERY OLD ALLUVIUM (Qvof)**<br>Silty SAND, medium dense, moist, dark brown; fine to coarse sand; suficial grass | | | |
| 4 | P5@4.5-5' | | | ML | Sandy SILT, stiff, moist, dark reddish brown; fine to medium sand | | | |
| | | | | | Total Depth = 5'<br>Groundwater not encountered<br>Backfilled with cuttings 03/17/2020 | | | |

**Figure A-23,**
**Log of Boring P-5, Page 1 of 1**

T2400-22-02 BORING LOGS.GPJ

| SAMPLE SYMBOLS | | | |
|---|---|---|---|
| | ... SAMPLING UNSUCCESSFUL | ... STANDARD PENETRATION TEST | ... DRIVE SAMPLE (UNDISTURBED) |
| | ... DISTURBED OR BAG SAMPLE | ... CHUNK SAMPLE | ... WATER TABLE OR SEEPAGE |

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2400-22-02

## BORING P-6

ELEV. (MSL.) **1458** DATE COMPLETED **03/16/2020**

EQUIPMENT **CME 75** BY: **Weidman**

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | SM | **VERY OLD ALLUVIUM (Qvof)**<br>Silty SAND, medium dense, moist, dark brown; fine to coarse sand; suficial gravel | | | |
| 2 | | | | | -Becomes damp | | | |
| 4 | | | | | | | | |
| 6 | | | | | -Becomes brown; increase in coarse sand | | | |
| 8 | | | | | -Becomes very dense | | | |
| 10 | P6@10.5-11 | | | | -Becomes dark brown; dense; moist | | | |
| | | | | | Total Depth = 11'<br>Groundwater not encountered<br>Backfilled with cuttings 03/17/2020 | | | |

**Figure A-24,**
**Log of Boring P-6, Page 1 of 1**

T2400-22-02 BORING LOGS.GPJ

| SAMPLE SYMBOLS | | | |
|---|---|---|---|
| | ... SAMPLING UNSUCCESSFUL | ... STANDARD PENETRATION TEST | ... DRIVE SAMPLE (UNDISTURBED) |
| | ... DISTURBED OR BAG SAMPLE | ... CHUNK SAMPLE | ... WATER TABLE OR SEEPAGE |



GEOCON

# BORING P-7

ELEV. (MSL.) **1458** DATE COMPLETED **03/16/2020**

EQUIPMENT **CME 75** BY: **Weidman**

| DEPTH IN FEET | SAMPLE NO. | LITHOLOGY | GROUNDWATER | SOIL CLASS (USCS) | MATERIAL DESCRIPTION | PENETRATION RESISTANCE (BLOWS/FT.) | DRY DENSITY (P.C.F.) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | SM | **VERY OLD ALLUVIUM (Qvof)**<br>Silty SAND, medium dense, moist, dark brown; fine to coarse sand; suficial grass | | | |
| 2 | | | | | | | | |
| | | | | | -Increase in coarse sand | | | |
| 4 | P7@4.5-5' | | | | | | | |
| | | | | | Total Depth = 5'<br>Groundwater not encountered<br>Backfilled with cuttings 03/17/2020 | | | |

**Figure A-25,**
**Log of Boring P-7, Page 1 of 1**

T2400-22-02 BORING LOGS.GPJ

| SAMPLE SYMBOLS | | | |
|---|---|---|---|
| | ... SAMPLING UNSUCCESSFUL | ... STANDARD PENETRATION TEST | ... DRIVE SAMPLE (UNDISTURBED) |
| | ... DISTURBED OR BAG SAMPLE | ... CHUNK SAMPLE | ... WATER TABLE OR SEEPAGE |

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

## PERCOLATION TEST REPORT

| | | | |
|---|---|---|---|
| **Project Name:** | PDP Perris Perc UGI | **Project No.:** | T2400-22-02 |
| **Test Hole No.:** | P-1 | **Date Excavated:** | 3/16/2020 |
| **Length of Test Pipe:** | 60.0 inches | **Soil Classification:** | ML |
| **Height of Pipe above Ground:** | 0.0 inches | **Presoak Date:** | 3/16/2020 |
| **Depth of Test Hole:** | 60.0 inches | **Perc Test Date:** | 3/17/2020 |
| **Check for Sandy Soil Criteria Tested by:** | Weidman | **Percolation Tested by:** | Weidman |

**Water level measured from BOTTOM of hole**

### Sandy Soil Criteria Test

| Trial No. | Time | Time Interval (min) | Total Elapsed Time (min) | Initial Water Level (in) | Final Water Level (in) | Δ in Water Level (in) | Percolation Rate (min/inch) |
|---|---|---|---|---|---|---|---|
| 1 | 8:35 AM<br>9:00 AM | 25 | 25 | 32.6 | 32.4 | 0.2 | 104.2 |
| 2 | 9:00 AM<br>9:25 AM | 25 | 50 | 32.4 | 32.3 | 0.1 | 208.3 |

**Soil Criteria: Normal**

### Percolation Test

| Reading No. | Time | Time Interval (min) | Total Elapsed Time (min) | Initial Water Head (in) | Final Water Head (in) | Δ in Water Level (in) | Percolation Rate (min/inch) |
|---|---|---|---|---|---|---|---|
| 1 | 9:25 AM<br>9:55 AM | 30 | 30 | 32.3 | 32.3 | 0.0 | No Rate |
| 2 | 9:55 AM<br>10:25 AM | 30 | 60 | 32.3 | 32.3 | 0.0 | No Rate |
| 3 | 10:25 AM<br>10:55 AM | 30 | 90 | 32.3 | 32.3 | 0.0 | No Rate |
| 4 | 10:55 AM<br>11:25 AM | 30 | 120 | 32.3 | 32.3 | 0.0 | No Rate |
| 5 | 11:25 AM<br>11:55 AM | 30 | 150 | 32.3 | 32.3 | 0.0 | No Rate |
| 6 | 11:55 AM<br>12:25 PM | 30 | 180 | 30.8 | 30.8 | 0.0 | No Rate |
| 7 | 12:25 PM<br>12:55 PM | 30 | 210 | 30.8 | 30.8 | 0.0 | No Rate |
| 8 | 12:55 PM<br>1:25 PM | 30 | 240 | 30.8 | 30.8 | 0.0 | No Rate |
| 9 | 1:25 PM<br>1:55 PM | 30 | 270 | 30.8 | 30.7 | 0.1 | 250.0 |
| 10 | 1:55 PM<br>2:25 PM | 30 | 300 | 30.7 | 30.7 | 0.0 | No Rate |
| 11 | 2:25 PM<br>2:55 PM | 30 | 330 | 30.7 | 30.7 | 0.0 | No Rate |
| 12 | 2:55 PM<br>3:25 PM | 30 | 360 | 30.7 | 30.7 | 0.0 | No Rate |

| | |
|---|---|
| **Infiltration Rate (in/hr):** | 0.0 |
| **Radius of test hole (in):** | 4 |
| **Average Head (in):** | 30.7 |

**Figure A-26**

| PERCOLATION TEST REPORT | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Project Name:** | | PDP Perris Perc UGI | | | **Project No.:** | | T2400-22-02 |
| **Test Hole No.:** | | P-2 | | | **Date Excavated:** | | 3/16/2020 |
| **Length of Test Pipe:** | | | 60.0 | inches | **Soil Classification:** | | SM |
| **Height of Pipe above Ground:** | | | 0.0 | inches | **Presoak Date:** | | 3/16/2020 |
| **Depth of Test Hole:** | | | 60.0 | inches | **Perc Test Date:** | | 3/17/2020 |
| **Check for Sandy Soil Criteria Tested by:** | | | | Weidman | **Percolation Tested by:** | | Weidman |
| **Water level measured from BOTTOM of hole** | | | | | | | |
| | | | | | | | |
| **Sandy Soil Criteria Test** | | | | | | | |
| **Trial No.** | **Time** | **Time Interval (min)** | **Total Elapsed Time (min)** | **Initial Water Level (in)** | **Final Water Level (in)** | **Δ in Water Level (in)** | **Percolation Rate (min/inch)** |
| 1 | 8:36 AM<br>9:01 AM | 25 | 25 | 31.3 | 30.6 | 0.7 | 34.7 |
| 2 | 9:01 AM<br>9:26 AM | 25 | 50 | 30.6 | 29.9 | 0.7 | 34.7 |
| | | **Soil Criteria: Normal** | | | | | |
| | | | | | | | |
| **Percolation Test** | | | | | | | |
| **Reading No.** | **Time** | **Time Interval (min)** | **Total Elapsed Time (min)** | **Initial Water Head (in)** | **Final Water Head (in)** | **Δ in Water Level (in)** | **Percolation Rate (min/inch)** |
| 1 | 9:26 AM<br>9:56 AM | 30 | 30 | 29.9 | 29.3 | 0.6 | 50.0 |
| 2 | 9:56 AM<br>10:26 AM | 30 | 60 | 29.3 | 28.8 | 0.5 | 62.5 |
| 3 | 10:26 AM<br>10:56 AM | 30 | 90 | 28.8 | 27.7 | 1.1 | 27.8 |
| 4 | 10:56 AM<br>11:26 AM | 30 | 120 | 27.7 | 27.0 | 0.7 | 41.7 |
| 5 | 11:26 AM<br>11:56 AM | 30 | 150 | 28.0 | 26.3 | 1.7 | 17.9 |
| 6 | 11:56 AM<br>12:26 PM | 30 | 180 | 26.3 | 25.9 | 0.4 | 83.3 |
| 7 | 12:26 PM<br>12:56 PM | 30 | 210 | 25.9 | 25.8 | 0.1 | 250.0 |
| 8 | 12:56 PM<br>1:26 PM | 30 | 240 | 25.8 | 25.2 | 0.6 | 50.0 |
| 9 | 1:26 PM<br>1:56 PM | 30 | 270 | 25.2 | 25.1 | 0.1 | 250.0 |
| 10 | 1:56 PM<br>2:26 PM | 30 | 300 | 25.1 | 24.8 | 0.2 | 125.0 |
| 11 | 2:26 PM<br>2:56 PM | 30 | 330 | 24.8 | 24.6 | 0.2 | 125.0 |
| 12 | 2:56 PM<br>3:26 PM | 30 | 360 | 24.6 | 24.4 | 0.2 | 125.0 |
| | | | | | | | |
| **Infiltration Rate (in/hr):** | | | 0.04 | | | | |
| **Radius of test hole (in):** | | | 4 | | | | **Figure A-27** |
| **Average Head (in):** | | | 24.5 | | | | |

## PERCOLATION TEST REPORT

| | | | |
|---|---|---|---|
| **Project Name:** | PDP Perris Perc UGI | **Project No.:** | T2400-22-02 |
| **Test Hole No.:** | P-3 | **Date Excavated:** | 3/16/2020 |
| **Length of Test Pipe:** | 132.0 inches | **Soil Classification:** | ML |
| **Height of Pipe above Ground:** | 0.0 inches | **Presoak Date:** | 3/16/2020 |
| **Depth of Test Hole:** | 132.0 inches | **Perc Test Date:** | 3/17/2020 |
| **Check for Sandy Soil Criteria Tested by:** | Weidman | **Percolation Tested by:** | Weidman |

**Water level measured from BOTTOM of hole**

### Sandy Soil Criteria Test

| Trial No. | Time | Time Interval (min) | Total Elapsed Time (min) | Initial Water Level (in) | Final Water Level (in) | Δ in Water Level (in) | Percolation Rate (min/inch) |
|---|---|---|---|---|---|---|---|
| 1 | 8:37 AM<br>9:02 AM | 25 | 25 | 104.4 | 96.5 | 7.9 | 3.2 |
| 2 | 9:02 AM<br>9:27 AM | 25 | 50 | 96.5 | 93.4 | 3.1 | 8.0 |

**Soil Criteria: Normal**

### Percolation Test

| Reading No. | Time | Time Interval (min) | Total Elapsed Time (min) | Initial Water Head (in) | Final Water Head (in) | Δ in Water Level (in) | Percolation Rate (min/inch) |
|---|---|---|---|---|---|---|---|
| 1 | 9:27 AM<br>9:57 AM | 30 | 30 | 93.4 | 90.5 | 2.9 | 10.4 |
| 2 | 9:57 AM<br>10:27 AM | 30 | 60 | 90.5 | 88.9 | 1.6 | 19.2 |
| 3 | 10:27 AM<br>10:57 AM | 30 | 90 | 88.9 | 87.5 | 1.4 | 20.8 |
| 4 | 10:57 AM<br>11:27 AM | 30 | 120 | 87.5 | 85.2 | 2.3 | 13.2 |
| 5 | 11:27 AM<br>11:57 AM | 30 | 150 | 85.2 | 84.0 | 1.2 | 25.0 |
| 6 | 11:57 AM<br>12:27 PM | 30 | 180 | 84.0 | 83.2 | 0.8 | 35.7 |
| 7 | 12:27 PM<br>12:57 PM | 30 | 210 | 83.2 | 82.6 | 0.6 | 50.0 |
| 8 | 12:57 PM<br>1:27 PM | 30 | 240 | 88.8 | 87.1 | 1.7 | 17.9 |
| 9 | 1:27 PM<br>1:57 PM | 30 | 270 | 87.1 | 86.2 | 1.0 | 31.2 |
| 10 | 1:57 PM<br>2:27 PM | 30 | 300 | 86.2 | 84.7 | 1.4 | 20.8 |
| 11 | 2:27 PM<br>2:57 PM | 30 | 330 | 84.7 | 83.6 | 1.1 | 27.8 |
| 12 | 2:57 PM<br>3:27 PM | 30 | 360 | 83.6 | 82.6 | 1.1 | 27.8 |

| | |
|---|---|
| **Infiltration Rate (in/hr):** | 0.1 |
| **Radius of test hole (in):** | 4 |
| **Average Head (in):** | 83.1 |

**Figure A-28**

# PERCOLATION TEST REPORT

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Project Name:** | | PDP Perris Perc UGI | | | **Project No.:** | | T2400-22-02 |
| **Test Hole No.:** | | P-4 | | | **Date Excavated:** | | 3/16/2020 |
| **Length of Test Pipe:** | | | 60.0 | inches | **Soil Classification:** | | SM |
| **Height of Pipe above Ground:** | | | 0.0 | inches | **Presoak Date:** | | 3/16/2020 |
| **Depth of Test Hole:** | | | 60.0 | inches | **Perc Test Date:** | | 3/17/2020 |
| **Check for Sandy Soil Criteria Tested by:** | | | | Weidman | **Percolation Tested by:** | | Weidman |

**Water level measured from BOTTOM of hole**

**Sandy Soil Criteria Test**

| Trial No. | Time | Time Interval (min) | Total Elapsed Time (min) | Initial Water Level (in) | Final Water Level (in) | Δ in Water Level (in) | Percolation Rate (min/inch) |
|---|---|---|---|---|---|---|---|
| 1 | 8:38 AM<br>9:03 AM | 25 | 25 | 29.3 | 29.0 | 0.2 | 104.2 |
| 2 | 9:03 AM<br>9:28 AM | 25 | 50 | 29.0 | 28.2 | 0.8 | 29.8 |

**Soil Criteria: Normal**

**Percolation Test**

| Reading No. | Time | Time Interval (min) | Total Elapsed Time (min) | Initial Water Head (in) | Final Water Head (in) | Δ in Water Level (in) | Percolation Rate (min/inch) |
|---|---|---|---|---|---|---|---|
| 1 | 9:28 AM<br>9:58 AM | 30 | 30 | 28.2 | 27.7 | 0.5 | 62.5 |
| 2 | 9:58 AM<br>10:28 AM | 30 | 60 | 27.7 | 27.5 | 0.2 | 125.0 |
| 3 | 10:28 AM<br>10:58 AM | 30 | 90 | 27.5 | 26.3 | 1.2 | 25.0 |
| 4 | 10:58 AM<br>11:28 AM | 30 | 120 | 26.3 | 25.1 | 1.2 | 25.0 |
| 5 | 11:28 AM<br>11:58 AM | 30 | 150 | 25.1 | 24.2 | 0.8 | 35.7 |
| 6 | 11:58 AM<br>12:28 PM | 30 | 180 | 24.2 | 23.3 | 1.0 | 31.3 |
| 7 | 12:28 PM<br>12:58 PM | 30 | 210 | 24.7 | 24.4 | 0.4 | 83.3 |
| 8 | 12:58 PM<br>1:28 PM | 30 | 240 | 24.4 | 24.1 | 0.2 | 125.0 |
| 9 | 1:28 PM<br>1:58 PM | 30 | 270 | 24.1 | 23.8 | 0.4 | 83.3 |
| 10 | 1:58 PM<br>2:28 PM | 30 | 300 | 23.8 | 23.4 | 0.4 | 83.3 |
| 11 | 2:28 PM<br>2:58 PM | 30 | 330 | 23.4 | 22.9 | 0.5 | 62.5 |
| 12 | 2:58 PM<br>3:28 PM | 30 | 360 | 22.9 | 22.7 | 0.2 | 125.0 |

| | | |
|---|---|---|
| **Infiltration Rate (in/hr):** | 0.04 | |
| **Radius of test hole (in):** | 4 | **Figure A-29** |
| **Average Head (in):** | 22.8 | |

## PERCOLATION TEST REPORT

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Project Name:** | | PDP Perris Perc UGI | | | **Project No.:** | | T2400-22-02 |
| **Test Hole No.:** | | P-5 | | | **Date Excavated:** | | 3/16/2020 |
| **Length of Test Pipe:** | | | 60.0 | inches | **Soil Classification:** | | ML |
| **Height of Pipe above Ground:** | | | 0.0 | inches | **Presoak Date:** | | 3/16/2020 |
| **Depth of Test Hole:** | | | 60.0 | inches | **Perc Test Date:** | | 3/17/2020 |
| **Check for Sandy Soil Criteria Tested by:** | | | | Weidman | **Percolation Tested by:** | | Weidman |

**Water level measured from BOTTOM of hole**

### Sandy Soil Criteria Test

| Trial No. | Time | Time Interval (min) | Total Elapsed Time (min) | Initial Water Level (in) | Final Water Level (in) | Δ in Water Level (in) | Percolation Rate (min/inch) |
|---|---|---|---|---|---|---|---|
| 1 | 8:39 AM<br>9:04 AM | 25 | 25 | 33.5 | 32.4 | 1.1 | 23.1 |
| 2 | 9:04 AM<br>9:29 AM | 25 | 50 | 32.4 | 31.4 | 1.0 | 26.0 |

**Soil Criteria: Normal**

### Percolation Test

| Reading No. | Time | Time Interval (min) | Total Elapsed Time (min) | Initial Water Head (in) | Final Water Head (in) | Δ in Water Level (in) | Percolation Rate (min/inch) |
|---|---|---|---|---|---|---|---|
| 1 | 9:29 AM<br>9:59 AM | 30 | 30 | 31.4 | 30.5 | 1.0 | 31.3 |
| 2 | 9:59 AM<br>10:29 AM | 30 | 60 | 30.5 | 29.6 | 0.8 | 35.7 |
| 3 | 10:29 AM<br>10:59 AM | 30 | 90 | 29.6 | 28.9 | 0.7 | 41.7 |
| 4 | 10:59 AM<br>11:29 AM | 30 | 120 | 28.9 | 28.2 | 0.7 | 41.7 |
| 5 | 11:29 AM<br>11:59 AM | 30 | 150 | 26.8 | 26.3 | 0.5 | 62.5 |
| 6 | 11:59 AM<br>12:29 PM | 30 | 180 | 26.3 | 25.9 | 0.4 | 83.3 |
| 7 | 12:29 PM<br>12:59 PM | 30 | 210 | 25.9 | 25.4 | 0.5 | 62.5 |
| 8 | 12:59 PM<br>1:29 PM | 30 | 240 | 25.4 | 25.1 | 0.4 | 83.3 |
| 9 | 1:29 PM<br>1:59 PM | 30 | 270 | 25.1 | 24.8 | 0.2 | 125.0 |
| 10 | 1:59 PM<br>2:29 PM | 30 | 300 | 24.8 | 24.6 | 0.2 | 125.0 |
| 11 | 2:29 PM<br>2:59 PM | 30 | 330 | 24.6 | 24.0 | 0.6 | 50.0 |
| 12 | 2:59 PM<br>3:29 PM | 30 | 360 | 24.0 | 23.8 | 0.2 | 125.0 |

| | | |
|---|---|---|
| **Infiltration Rate (in/hr):** | 0.04 | |
| **Radius of test hole (in):** | 4 | **Figure A-30** |
| **Average Head (in):** | 23.9 | |

| PERCOLATION TEST REPORT | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| **Project Name:** | | PDP Perris Perc UGI | | | **Project No.:** | | T2400-22-02 |
| **Test Hole No.:** | | P-6 | | | **Date Excavated:** | | 3/16/2020 |
| **Length of Test Pipe:** | | | 132.0 | inches | **Soil Classification:** | | SM |
| **Height of Pipe above Ground:** | | | 0.0 | inches | **Presoak Date:** | | 3/16/2020 |
| **Depth of Test Hole:** | | | 132.0 | inches | **Perc Test Date:** | | 3/17/2020 |
| **Check for Sandy Soil Criteria Tested by:** | | | | Weidman | **Percolation Tested by:** | | Weidman |
| **Water level measured from BOTTOM of hole** | | | | | | | |
| | | | | | | | |
| **Sandy Soil Criteria Test** | | | | | | | |
| **Trial No.** | **Time** | **Time Interval (min)** | **Total Elapsed Time (min)** | **Initial Water Level (in)** | **Final Water Level (in)** | **Δ in Water Level (in)** | **Percolation Rate (min/inch)** |
| 1 | 8:40 AM<br>9:05 AM | 25 | 25 | 93.6 | 86.0 | 7.6 | 3.3 |
| 2 | 9:05 AM<br>9:30 AM | 25 | 50 | 86.0 | 82.7 | 3.4 | 7.4 |
| | | **Soil Criteria: Normal** | | | | | |
| | | | | | | | |
| | | **Percolation Test** | | | | | |
| **Reading No.** | **Time** | **Time Interval (min)** | **Total Elapsed Time (min)** | **Initial Water Head (in)** | **Final Water Head (in)** | **Δ in Water Level (in)** | **Percolation Rate (min/inch)** |
| 1 | 9:30 AM<br>10:00 AM | 30 | 30 | 82.7 | 80.3 | 2.4 | 12.5 |
| 2 | 10:00 AM<br>10:30 AM | 30 | 60 | 92.4 | 88.1 | 4.3 | 6.9 |
| 3 | 10:30 AM<br>11:00 AM | 30 | 90 | 88.1 | 84.4 | 3.7 | 8.1 |
| 4 | 11:00 AM<br>11:30 AM | 30 | 120 | 99.5 | 95.6 | 3.8 | 7.8 |
| 5 | 11:30 AM<br>12:00 PM | 30 | 150 | 91.2 | 87.6 | 3.6 | 8.3 |
| 6 | 12:00 PM<br>12:30 PM | 30 | 180 | 87.6 | 85.1 | 2.5 | 11.9 |
| 7 | 12:30 PM<br>1:00 PM | 30 | 210 | 85.1 | 82.3 | 2.8 | 10.9 |
| 8 | 1:00 PM<br>1:30 PM | 30 | 240 | 92.2 | 89.5 | 2.6 | 11.4 |
| 9 | 1:30 PM<br>2:00 PM | 30 | 270 | 89.5 | 87.4 | 2.2 | 13.9 |
| 10 | 2:00 PM<br>2:30 PM | 30 | 300 | 87.4 | 84.8 | 2.5 | 11.9 |
| 11 | 2:30 PM<br>3:00 PM | 30 | 330 | 84.8 | 82.7 | 2.2 | 13.9 |
| 12 | 3:00 PM<br>3:30 PM | 30 | 360 | 82.7 | 80.4 | 2.3 | 13.2 |
| | | | | | | | |
| **Infiltration Rate (in/hr):** | | | 0.11 | | | | |
| **Radius of test hole (in):** | | | 4 | | | | **Figure A-31** |
| **Average Head (in):** | | | 81.5 | | | | |

## PERCOLATION TEST REPORT

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Project Name:** | | PDP Perris Perc UGI | | | **Project No.:** | | T2400-22-02 |
| **Test Hole No.:** | | P-7 | | | **Date Excavated:** | | 3/16/2020 |
| **Length of Test Pipe:** | | | 60.0 | inches | **Soil Classification:** | | SM |
| **Height of Pipe above Ground:** | | | 0.0 | inches | **Presoak Date:** | | 3/16/2020 |
| **Depth of Test Hole:** | | | 60.0 | inches | **Perc Test Date:** | | 3/17/2020 |
| **Check for Sandy Soil Criteria Tested by:** | | | | Weidman | **Percolation Tested by:** | | Weidman |

**Water level measured from BOTTOM of hole**

### Sandy Soil Criteria Test

| Trial No. | Time | Time Interval (min) | Total Elapsed Time (min) | Initial Water Level (in) | Final Water Level (in) | Δ in Water Level (in) | Percolation Rate (min/inch) |
|---|---|---|---|---|---|---|---|
| 1 | 8:41 AM<br>9:06 AM | 25 | 25 | 28.3 | 27.6 | 0.7 | 34.7 |
| 2 | 9:06 AM<br>9:31 AM | 25 | 50 | 27.6 | 26.5 | 1.1 | 23.1 |

**Soil Criteria: Normal**

### Percolation Test

| Reading No. | Time | Time Interval (min) | Total Elapsed Time (min) | Initial Water Head (in) | Final Water Head (in) | Δ in Water Level (in) | Percolation Rate (min/inch) |
|---|---|---|---|---|---|---|---|
| 1 | 9:31 AM<br>10:01 AM | 30 | 30 | 26.5 | 26.2 | 0.4 | 83.3 |
| 2 | 10:01 AM<br>10:31 AM | 30 | 60 | 26.2 | 25.4 | 0.7 | 41.7 |
| 3 | 10:31 AM<br>11:01 AM | 30 | 90 | 25.4 | 25.0 | 0.5 | 62.5 |
| 4 | 11:01 AM<br>11:31 AM | 30 | 120 | 25.0 | 24.5 | 0.5 | 62.5 |
| 5 | 11:31 AM<br>12:01 PM | 30 | 150 | 24.0 | 22.8 | 1.2 | 25.0 |
| 6 | 12:01 PM<br>12:31 PM | 30 | 180 | 22.8 | 21.6 | 1.2 | 25.0 |
| 7 | 12:31 PM<br>1:01 PM | 30 | 210 | 21.6 | 18.8 | 2.8 | 10.9 |
| 8 | 1:01 PM<br>1:31 PM | 30 | 240 | 29.9 | 28.8 | 1.1 | 27.8 |
| 9 | 1:31 PM<br>2:01 PM | 30 | 270 | 28.8 | 28.1 | 0.7 | 41.7 |
| 10 | 2:01 PM<br>2:31 PM | 30 | 300 | 28.1 | 27.2 | 0.8 | 35.7 |
| 11 | 2:31 PM<br>3:01 PM | 30 | 330 | 27.2 | 26.4 | 0.8 | 35.7 |
| 12 | 3:01 PM<br>3:31 PM | 30 | 360 | 26.4 | 25.6 | 0.8 | 35.7 |

| | | |
|---|---|---|
| **Infiltration Rate (in/hr):** | 0.12 | |
| **Radius of test hole (in):** | 4 | **Figure A-32** |
| **Average Head (in):** | 26.0 | |

# APPENDIX B

## APPENDIX B

## LABORATORY TESTING

We performed laboratory tests in accordance with current, generally accepted test methods of ASTM International (ASTM) or other suggested procedures. For our laboratory testing program of our 2006 geotechnical investigation, we analyzed selected soil samples for in-situ dry density and moisture content, maximum dry density and optimum moisture content, direct shear strength, collapse/swell potential, consolidation characteristics, expansion index/potential, and corrosion screening. For our current laboratory testing program, we determined the grain size distribution of the soil encountered at the bottom of our percolation test borings. The results of our laboratory testing are presented on Figures B-1 through B-11.

## APPENDIX B

## LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. Selected undisturbed samples were tested to evaluate their in-place dry density and moisture content, shear strength, collapse potential, and consolidation characteristics. Disturbed bulk samples were tested to obtain maximum dry density and optimum moisture content, expansion characteristics, soluble sulfate content, potential of hydrogen, resistivity, and chloride content. Results of the laboratory tests are presented in tabular and graphic form herewith.

**TABLE B-I**
**SUMMARY OF LABORATORY MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT TEST RESULTS**
**ASTM D 1557-02**

| Sample No. | Description | Maximum Dry Density (pcf) | Optimum Moisture Content (% dry wt.) |
|---|---|---|---|
| B1-1 | SM - Dark brown, Silty, fine to coarse SAND | 133.5 | 7.5 |
| B11-1 | SM - Dark brown, Silty, fine to coarse SAND | 136.4 | 8.1 |
| B18-1 | SM - Gray brown, Silty, fine to medium SAND , with little clay | 131.9 | 8.4 |

**TABLE B-II**
**SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS**
**ASTM D4829-03**

| Sample No. | Moisture Content | | Dry Density (pcf) | Expansion Index |
|---|---|---|---|---|
| | Before Test (%) | After Test (%) | | |
| B1-1* | 8.7 | 18.1 | 116.6 | 18 |
| B8-1* | 7.5 | 14.7 | 121.7 | 3 |

* Expansion index was corrected in accordance with §10.2.3 of ASTM D4829.

## TABLE B-III
## SUMMARY OF DIRECT SHEAR TEST RESULTS

| Sample No. | Dry Density (pcf) | Moisture Content (%) | Unit Cohesion (psf) | Angle of Shear Resistance (degrees) |
|---|---|---|---|---|
| B11-1 | 122.8 | 8.0 | 180 | 31 |
| B18-1 | 117.0 | 10.0 | 210 | 26 |

Samples remolded to 90 percent relative compaction at near or slightly above optimum moisture content.

## TABLE B-IV
## SUMMARY OF LABORATORY WATER-SOLUBLE SULFATE TEST RESULTS
## CALIFORNIA TEST NO. 417

| Sample No. | Water-Soluble Sulfate | Sulfate Exposure* |
|---|---|---|
| B4-4 | 0.014% | Negligible |
| B15-1 | 0.002% | Negligible |

* Per UBC Table 19-A-4.

## TABLE B-V
## SUMMARY OF SINGLE-POINT CONSOLIDATION (COLLAPSE) TESTS
## ASTM D-2435-96

| Sample Number | In-situ Dry Density (pcf) | Moisture Content Before Test | Axial Load with Water Added (psf) | Consolidation Before Water Added (%) | Percent Collapse |
|---|---|---|---|---|---|
| B1-4 | 120.6 | 13.2 | 2,000 | 1.7 | 0.1 |
| B2-2 | 107.3 | 12.9 | 2,000 | 2.1 | 0.8 |
| B3-3 | 119.5 | 10.6 | 2,000 | 1.9 | 0.4 |
| B5-1 | 128.0 | 10.9 | 2,000 | 1.6 | 0.0 |
| B6-2 | 124.2 | 9.9 | 2,000 | 1.5 | 0.3 |
| B6-3 | 127.3 | 11.9 | 2,000 | 2.8 | 0.7 |
| B7-2 | 122.2 | 14.8 | 2,000 | 1.8 | 0.3 |
| B8-2 | 123.4 | 9.5 | 2,000 | 1.6 | 0.6 |
| B9-2 | 124.2 | 11.1 | 2,000 | 1.6 | 0.2 |
| B9-3 | 120.8 | 11.3 | 2,000 | 1.4 | 0.3 |
| B10-2 | 130.0 | 10.0 | 2,000 | 1.9 | 0.2 |
| B11-2 | 121.5 | 13.0 | 2,000 | 2.1 | 0.4 |
| B11-3 | 121.9 | 11.4 | 2,000 | 1.5 | 0.2 |
| B12-1 | 128.8 | 11.8 | 2,000 | 2.0 | 0.7 |
| B13-4 | 117.1 | 17.2 | 2,000 | 1.7 | 0.2 |
| B15-3 | 116.9 | 4.7 | 2,000 | 1.5 | 3.4 |
| B16-2 | 128.7 | 6.8 | 2,000 | 1.5 | 1.6 |
| B17-2 | 129.1 | 10.1 | 2,000 | 1.9 | 0.4 |

Negative sign indicates soil expansion

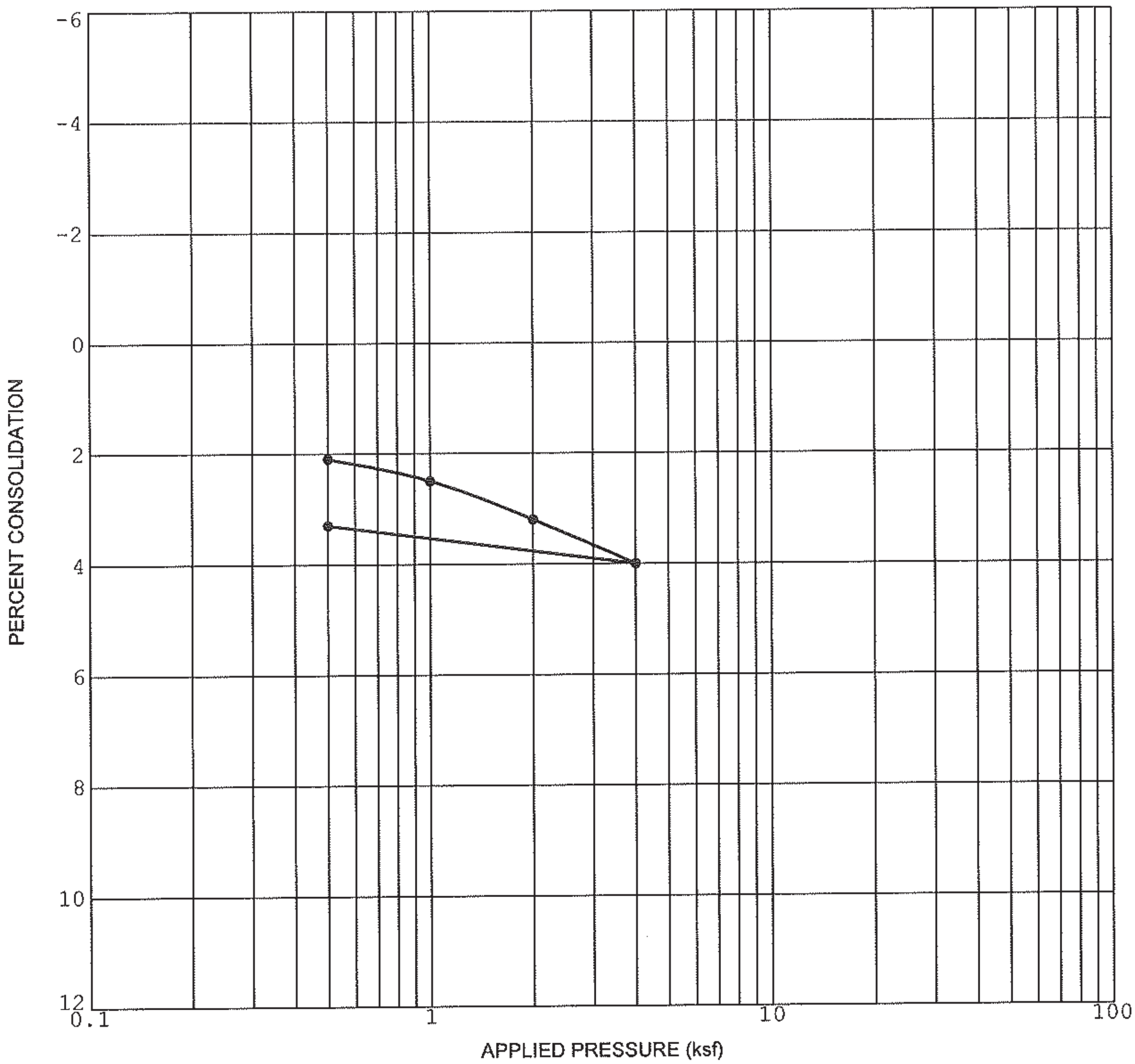
## TABLE B-VI
## SUMMARY OF PH, RESISTIVITY AND CHLORIDE TESTS

| Sample No. | pH | Chloride (ppm) | Resistivity (Ohm-cm) |
|---|---|---|---|
| B4-1 | 7.4 | 340 | 811 |
| B15-1 | 6.5 | 21 | 5408 |

Resistivity and pH tests were performed in accordance with Cal Trans Test 532.

PROJECT NO. T2400-22-01

SAMPLE NO. B4-3




| | |
|---|---|
| Initial Dry Density (pcf) | 120.7 |
| Initial Water Content (%) | 12.5 |

| | |
|---|---|
| Initial Saturation (%) | 88.7 |
| Sample Saturated at (ksf) | 2.0 |

CONSOLIDATION CURVE

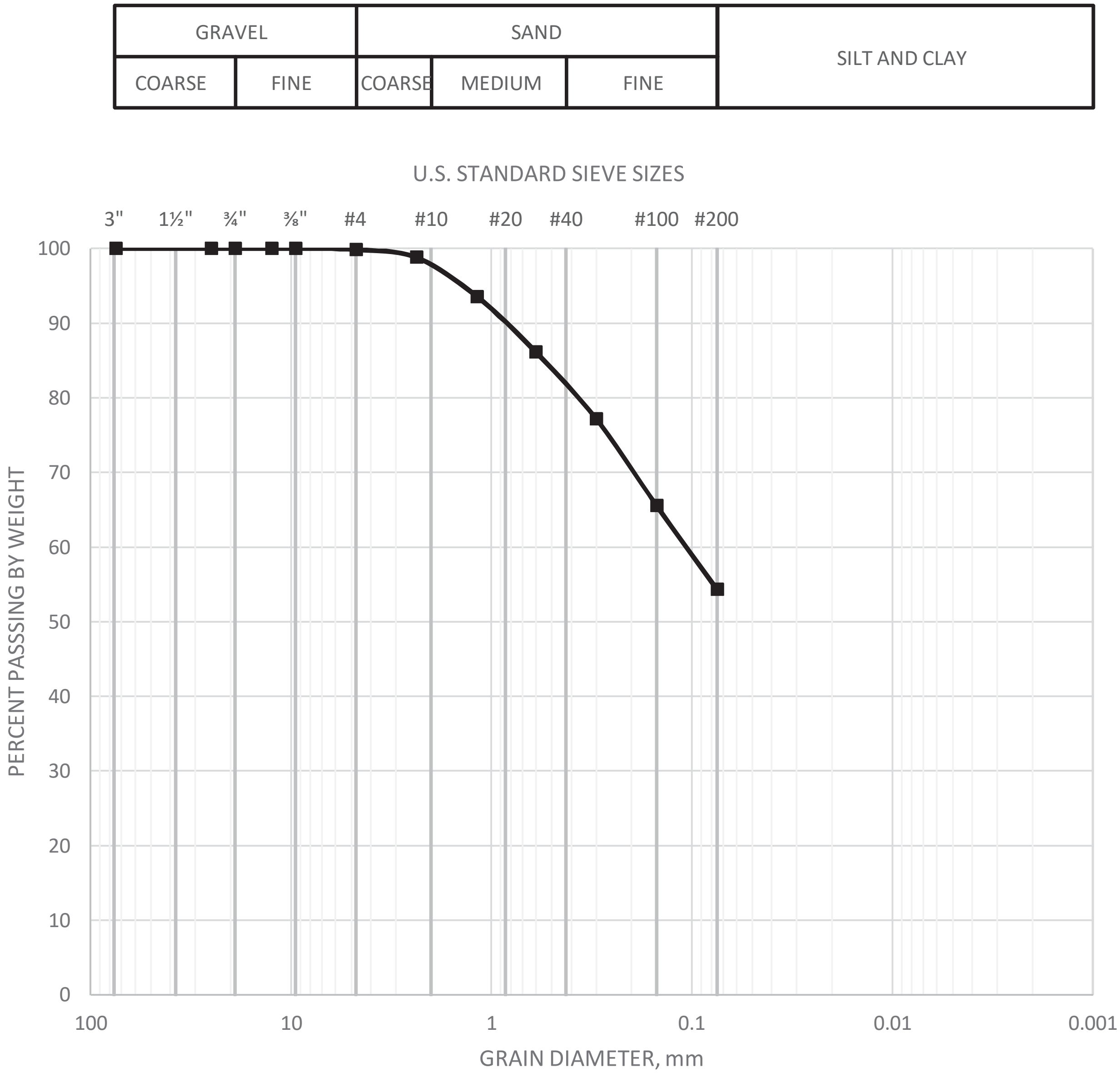
RAMONA CROSSING

PARIS, CALIFORNIA

T2400-22-01.GPJ

GEOCON

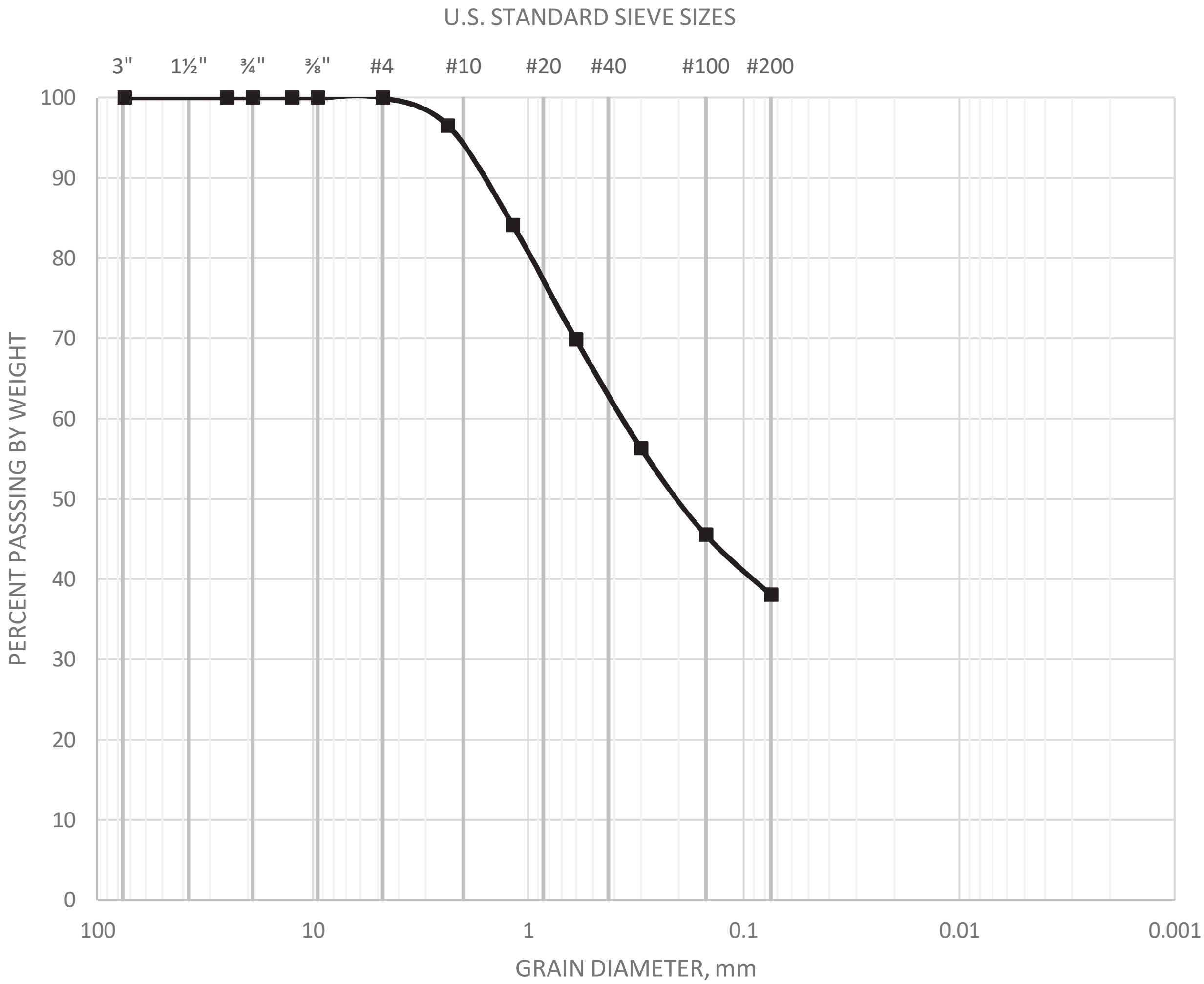
Figure B-4




| SAMPLE | CLASSIFICATION | D60 | D30 | D10 |
|---|---|---|---|---|
| P1@4.5-5' | Sandy SILT (ML), dark brown | | | |

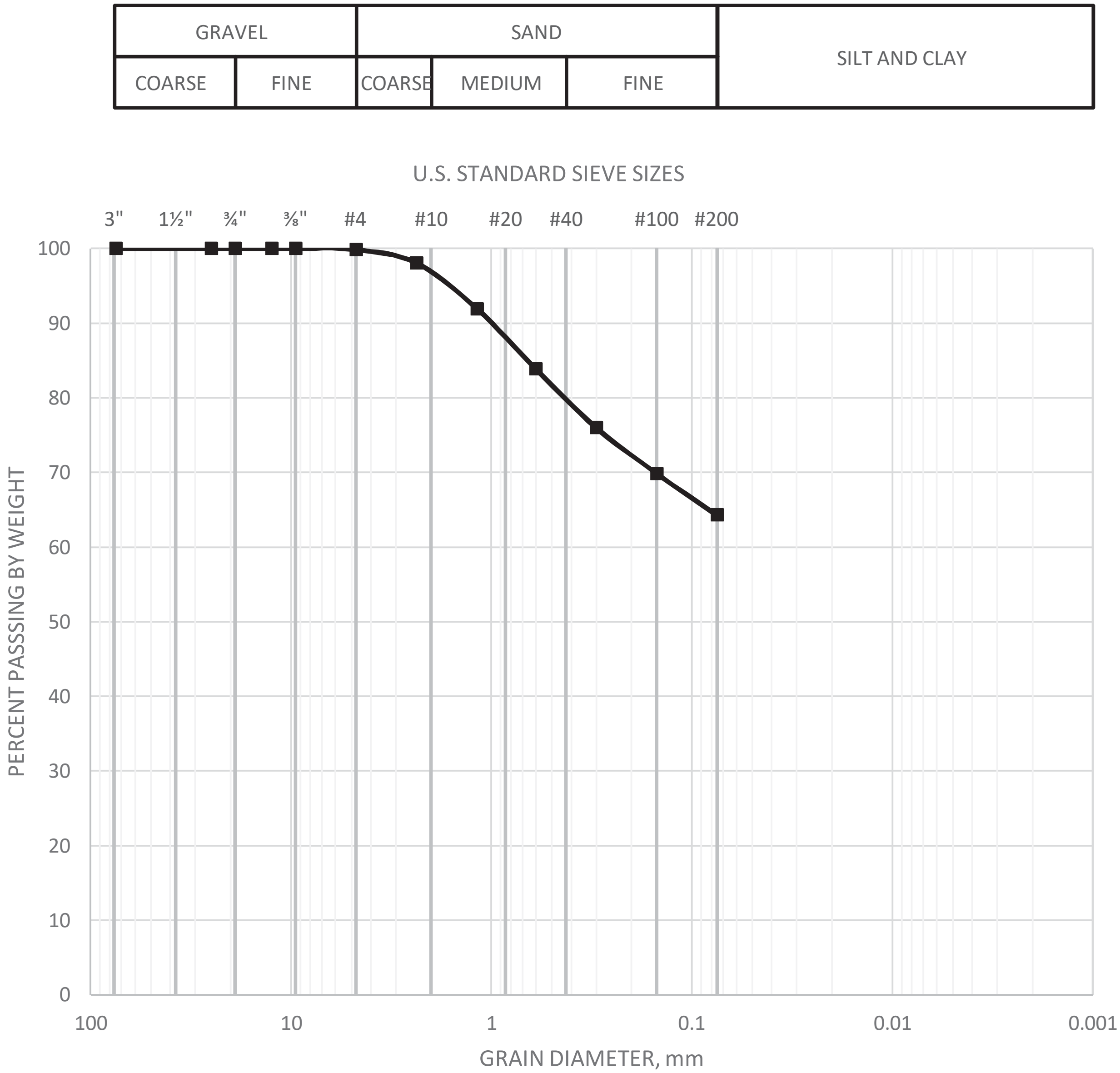
| | | |
|---|---|---|
| GEOCON | **GRAIN SIZE DISTRIBUTION**<br>ASTM D-422 | Project No.: T2400-22-02 |
| | | WAREHOUSE BUILDING<br>SWC RAMONA EXPRESSWAY & PERRIS BOULEVARD<br>PERRIS, CALIFORNIA |
| | Checked by: MJ | April 2020 Figure B-5 |

| GRAVEL | | SAND | | | SILT AND CLAY |
|---|---|---|---|---|---|
| COARSE | FINE | COARSE | MEDIUM | FINE | |



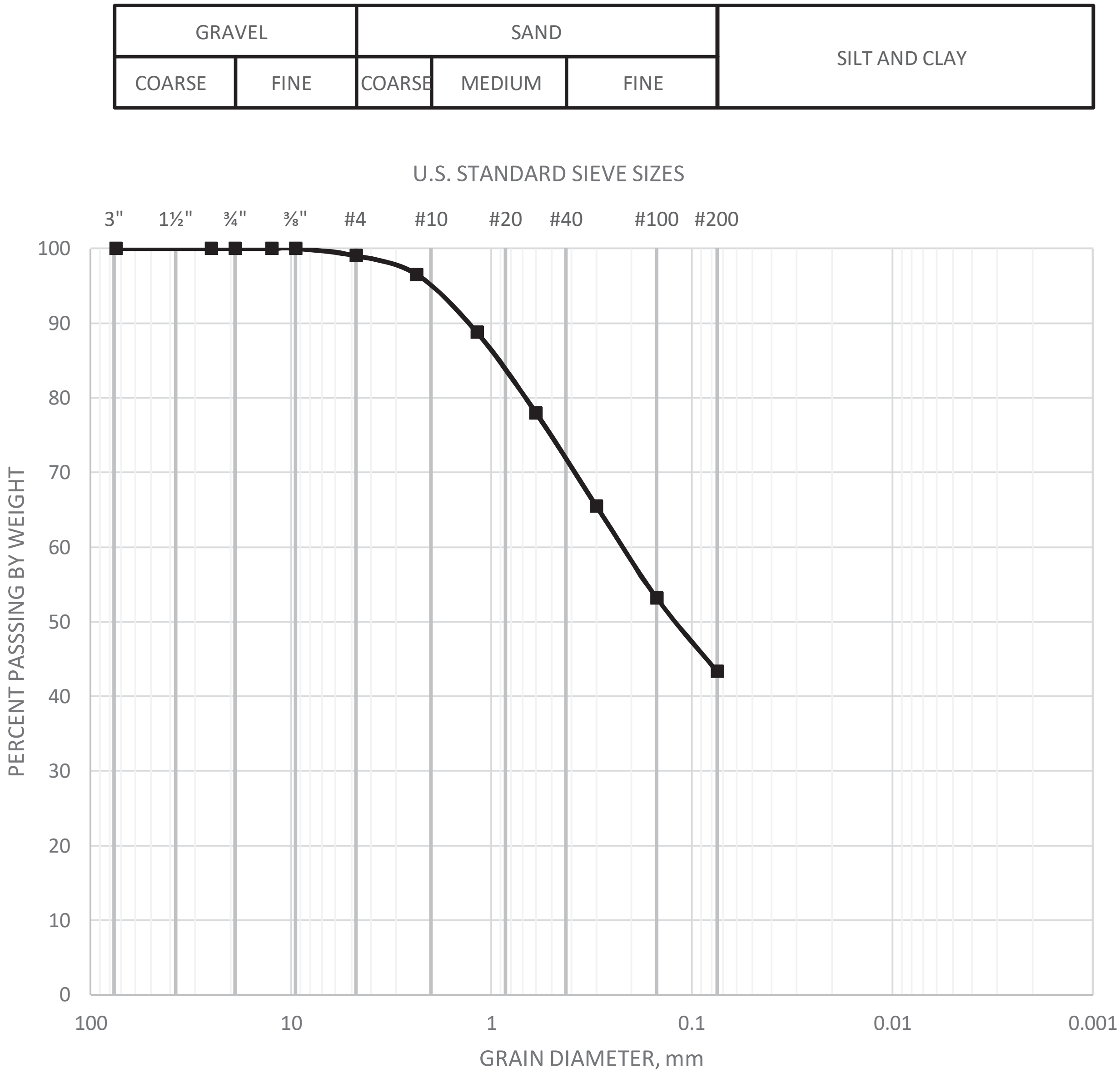

| SAMPLE | CLASSIFICATION | D60 | D30 | D10 |
|---|---|---|---|---|
| P2@4.5-5' | Silty SAND (SM), brown | 0.38 | 0.04 | 0.005 |

| | | |
|---|---|---|
| GEOCON | **GRAIN SIZE DISTRIBUTION**<br>ASTM D-422 | Project No.: T2400-22-02<br>WAREHOUSE BUILDING<br>SWC RAMONA EXPRESSWAY & PERRIS BOULEVARD<br>PERRIS, CALIFORNIA |
| | Checked by: MJ | April 2020 Figure B-6 |



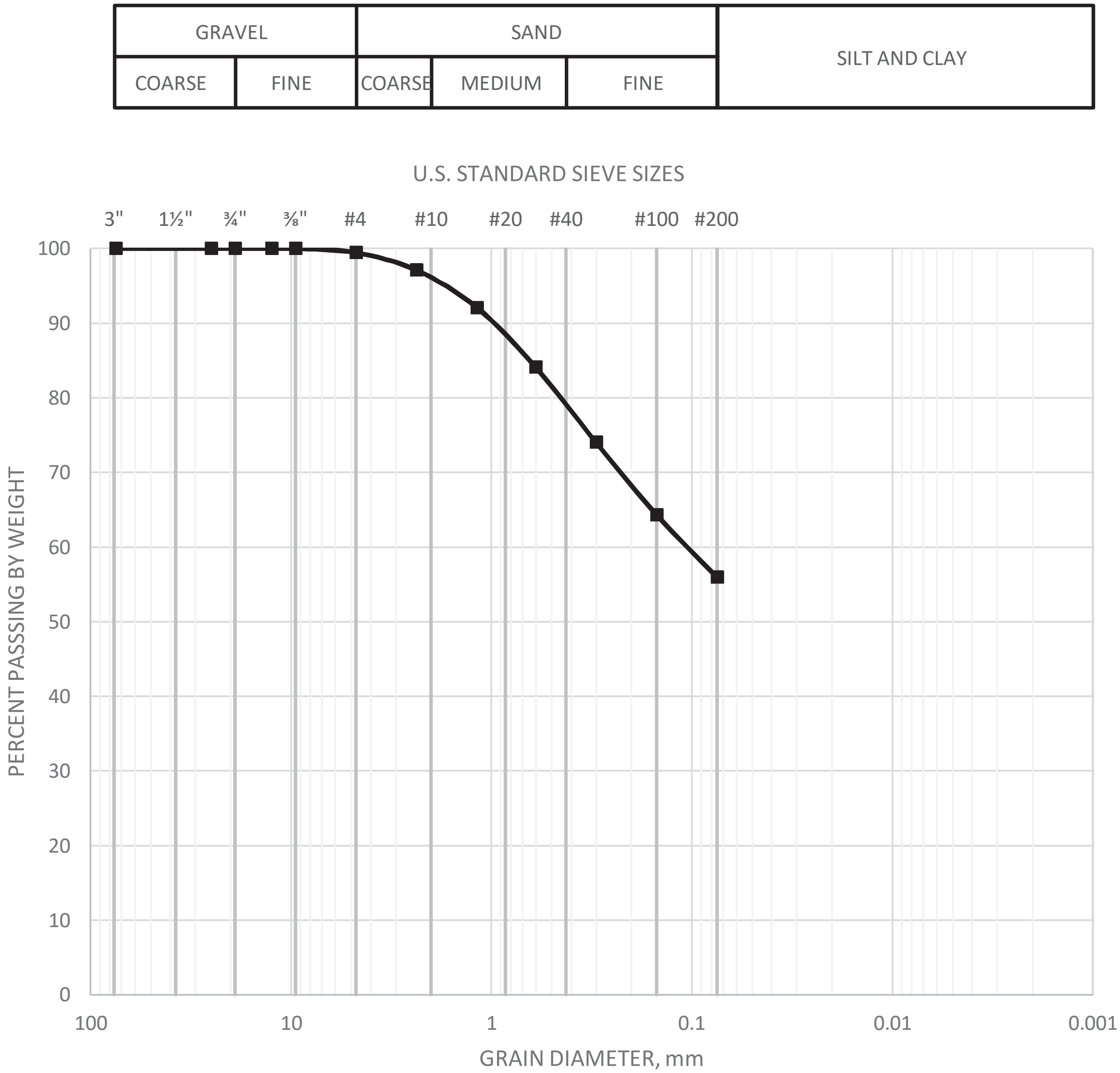

| SAMPLE | CLASSIFICATION | D60 | D30 | D10 |
|---|---|---|---|---|
| P3@10.5-11' | Sandy SILT (ML), reddish brown | | | |

| | | |
|---|---|---|
| GEOCON | **GRAIN SIZE DISTRIBUTION**<br>ASTM D-422 | Project No.: T2400-22-02<br>WAREHOUSE BUILDING<br>SWC RAMONA EXPRESSWAY & PERRIS BOULEVARD<br>PERRIS, CALIFORNIA |
| | Checked by: MJ | April 2020 Figure B-7 |



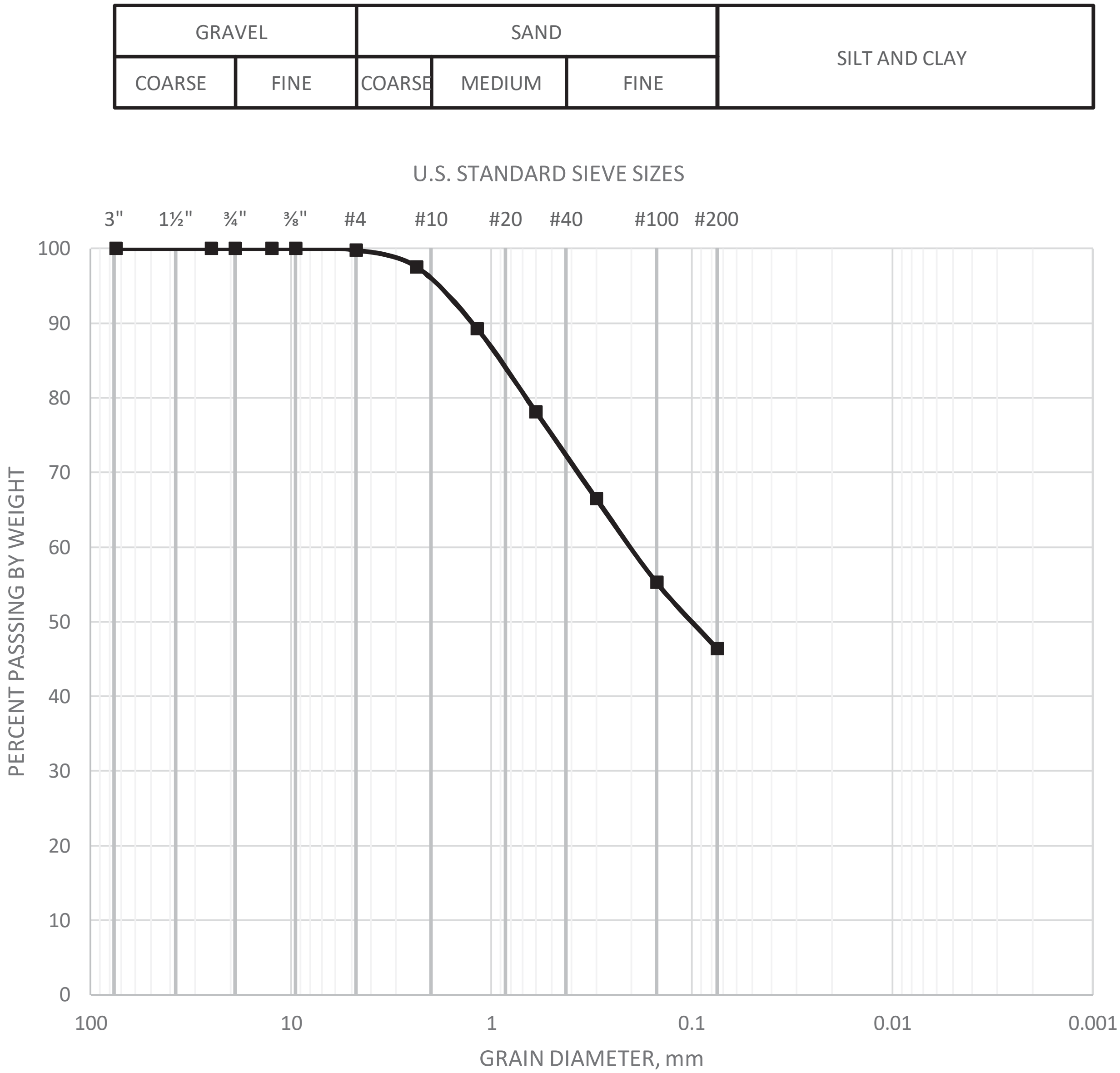

| SAMPLE | CLASSIFICATION | D60 | D30 | D10 |
|---|---|---|---|---|
| P4@4.5-5' | Silty SAND (SM), reddish brown | 0.22 | 0.027 | 0.009 |

| | | |
|---|---|---|
| GEOCON | **GRAIN SIZE DISTRIBUTION**<br>ASTM D-422 | Project No.: T2400-22-02 |
| | | WAREHOUSE BUILDING<br>SWC RAMONA EXPRESSWAY & PERRIS BOULEVARD<br>PERRIS, CALIFORNIA |
| | Checked by: MJ | April 2020 Figure B-8 |




| SAMPLE | CLASSIFICATION | D60 | D30 | D10 |
|---|---|---|---|---|
| P5@4.5-5' | Sandy SILT (ML), dark reddish brown | | | |

| | | |
|---|---|---|
| GEOCON | **GRAIN SIZE DISTRIBUTION**<br>ASTM D-422 | Project No.: T2400-22-02 |
| | | WAREHOUSE BUILDING<br>SWC RAMONA EXPRESSWAY & PERRIS BOULEVARD<br>PERRIS, CALIFORNIA |
| | Checked by: MJ | April 2020 Figure B-9 |




| SAMPLE | CLASSIFICATION | D60 | D30 | D10 |
|---|---|---|---|---|
| P6@10.5-11' | Silty SAND (SM), dark brown | 0.21 | 0.02 | 0.004 |

GEOCON

**GRAIN SIZE DISTRIBUTION**

ASTM D-422

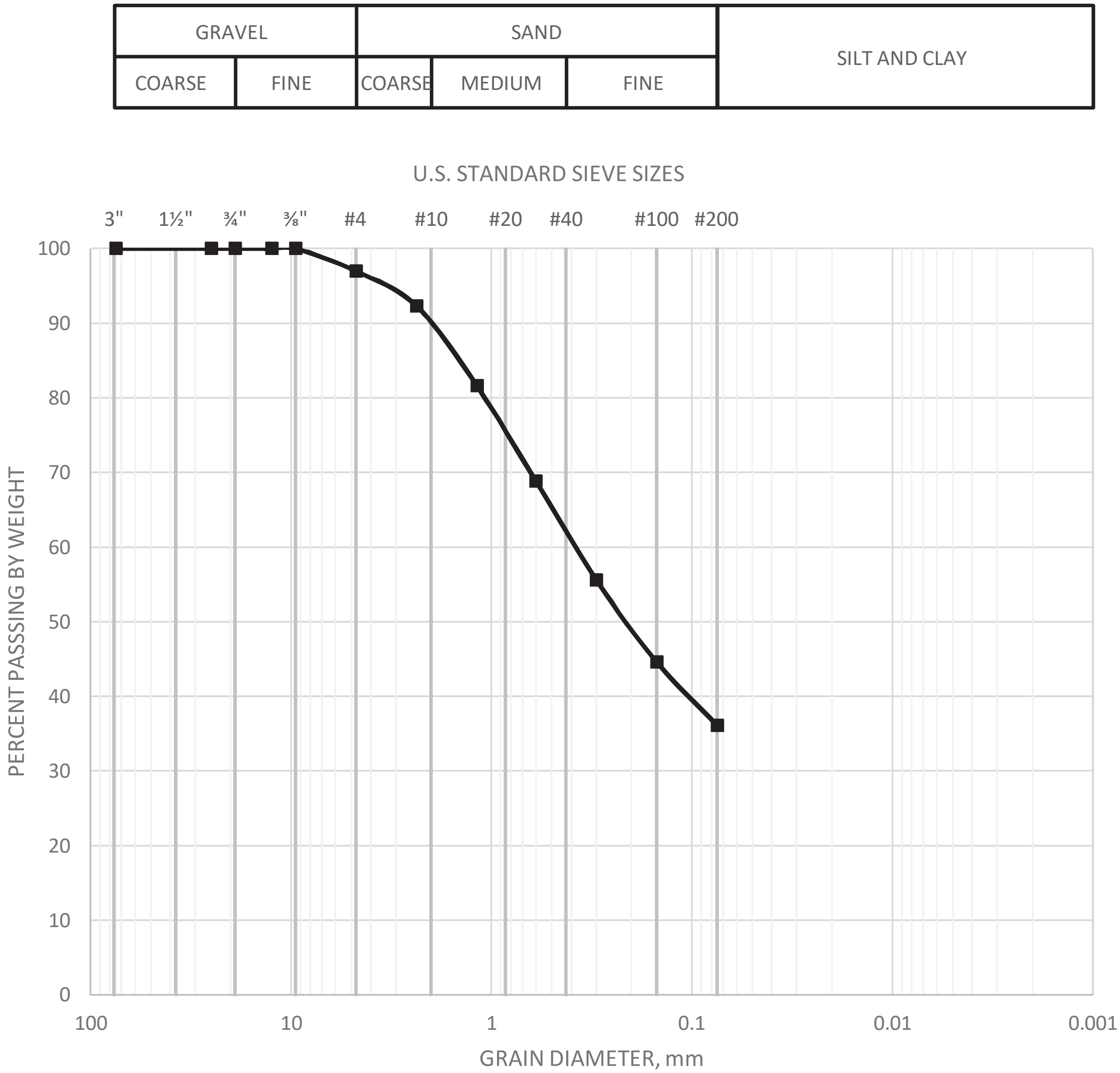
Checked by: MJ

Project No.: T2400-22-02

WAREHOUSE BUILDING
SWC RAMONA EXPRESSWAY & PERRIS BOULEVARD
PERRIS, CALIFORNIA

April 2020

Figure B-10




| SAMPLE | CLASSIFICATION | D60 | D30 | D10 |
|---|---|---|---|---|
| P7@4.5-5' | Silty SAND with trace gravel (SM), dark brown | 0.4 | 0.044 | 0.008 |

| | | |
|---|---|---|
| GEOCON | **GRAIN SIZE DISTRIBUTION**<br>ASTM D-422 | Project No.: T2400-22-02 |
| | | WAREHOUSE BUILDING<br>SWC RAMONA EXPRESSWAY & PERRIS BOULEVARD<br>PERRIS, CALIFORNIA |
| | Checked by: MJ | April 2020 Figure B-11 |

# APPENDIX C

# APPENDIX C

## RECOMMENDED GRADING SPECIFICATIONS

**FOR**

## WAREHOUSE BUILDING
## SOUTHWEST CORNER OF RAMONA EXPRESSWAY &
## PERRIS BOULEVARD
## PERRIS, CALIFORNIA

## PROJECT NO. T2400-22-02

# RECOMMENDED GRADING SPECIFICATIONS

## 1. GENERAL

1.1 These Recommended Grading Specifications shall be used in conjunction with the Geotechnical Report for the project prepared by Geocon. The recommendations contained in the text of the Geotechnical Report are a part of the earthwork and grading specifications and shall supersede the provisions contained hereinafter in the case of conflict.

1.2 Prior to the commencement of grading, a geotechnical consultant (Consultant) shall be employed for the purpose of observing earthwork procedures and testing the fills for substantial conformance with the recommendations of the Geotechnical Report and these specifications. The Consultant should provide adequate testing and observation services so that they may assess whether, in their opinion, the work was performed in substantial conformance with these specifications. It shall be the responsibility of the Contractor to assist the Consultant and keep them apprised of work schedules and changes so that personnel may be scheduled accordingly.

1.3 It shall be the sole responsibility of the Contractor to provide adequate equipment and methods to accomplish the work in accordance with applicable grading codes or agency ordinances, these specifications and the approved grading plans. If, in the opinion of the Consultant, unsatisfactory conditions such as questionable soil materials, poor moisture condition, inadequate compaction, and/or adverse weather result in a quality of work not in conformance with these specifications, the Consultant will be empowered to reject the work and recommend to the Owner that grading be stopped until the unacceptable conditions are corrected.

## 2. DEFINITIONS

2.1 **Owner** shall refer to the owner of the property or the entity on whose behalf the grading work is being performed and who has contracted with the Contractor to have grading performed.

2.2 **Contractor** shall refer to the Contractor performing the site grading work.

2.3 **Civil Engineer** or **Engineer of Work** shall refer to the California licensed Civil Engineer or consulting firm responsible for preparation of the grading plans, surveying and verifying as-graded topography.

2.4 **Consultant** shall refer to the soil engineering and engineering geology consulting firm retained to provide geotechnical services for the project.

2.5 **Soil Engineer** shall refer to a California licensed Civil Engineer retained by the Owner, who is experienced in the practice of geotechnical engineering. The Soil Engineer shall be responsible for having qualified representatives on-site to observe and test the Contractor's work for conformance with these specifications.

2.6 **Engineering Geologist** shall refer to a California licensed Engineering Geologist retained by the Owner to provide geologic observations and recommendations during the site grading.

2.7 **Geotechnical Report** shall refer to a soil report (including all addenda) which may include a geologic reconnaissance or geologic investigation that was prepared specifically for the development of the project for which these Recommended Grading Specifications are intended to apply.

## 3. MATERIALS

3.1 Materials for compacted fill shall consist of any soil excavated from the cut areas or imported to the site that, in the opinion of the Consultant, is suitable for use in construction of fills. In general, fill materials can be classified as *soil* fills, *soil-rock* fills or *rock* fills, as defined below.

3.1.1 **Soil fills** are defined as fills containing no rocks or hard lumps greater than 12 inches in maximum dimension and containing at least 40 percent by weight of material smaller than ¾ inch in size.

3.1.2 **Soil-rock fills** are defined as fills containing no rocks or hard lumps larger than 4 feet in maximum dimension and containing a sufficient matrix of soil fill to allow for proper compaction of soil fill around the rock fragments or hard lumps as specified in Paragraph 6.2. **Oversize rock** is defined as material greater than 12 inches.

3.1.3 **Rock fills** are defined as fills containing no rocks or hard lumps larger than 3 feet in maximum dimension and containing little or no fines. Fines are defined as material smaller than ¾ inch in maximum dimension. The quantity of fines shall be less than approximately 20 percent of the rock fill quantity.

3.2 Material of a perishable, spongy, or otherwise unsuitable nature as determined by the Consultant shall not be used in fills.

3.3 Materials used for fill, either imported or on-site, shall not contain hazardous materials as defined by the California Code of Regulations, Title 22, Division 4, Chapter 30, Articles 9 and 10; 40CFR; and any other applicable local, state or federal laws. The Consultant shall not be responsible for the identification or analysis of the potential presence of hazardous materials. However, if observations, odors or soil discoloration cause Consultant to suspect the presence of hazardous materials, the Consultant may request from the Owner the termination of grading operations within the affected area. Prior to resuming grading operations, the Owner shall provide a written report to the Consultant indicating that the suspected materials are not hazardous as defined by applicable laws and regulations.

3.4 The outer 15 feet of *soil-rock* fill slopes, measured horizontally, should be composed of properly compacted *soil* fill materials approved by the Consultant. *Rock* fill may extend to the slope face, provided that the slope is not steeper than 2:1 (horizontal:vertical) and a soil layer no thicker than 12 inches is track-walked onto the face for landscaping purposes. This procedure may be utilized provided it is acceptable to the governing agency, Owner and Consultant.

3.5 Samples of soil materials to be used for fill should be tested in the laboratory by the Consultant to determine the maximum density, optimum moisture content, and, where appropriate, shear strength, expansion, and gradation characteristics of the soil.

3.6 During grading, soil or groundwater conditions other than those identified in the Geotechnical Report may be encountered by the Contractor. The Consultant shall be notified immediately to evaluate the significance of the unanticipated condition

## 4. CLEARING AND PREPARING AREAS TO BE FILLED

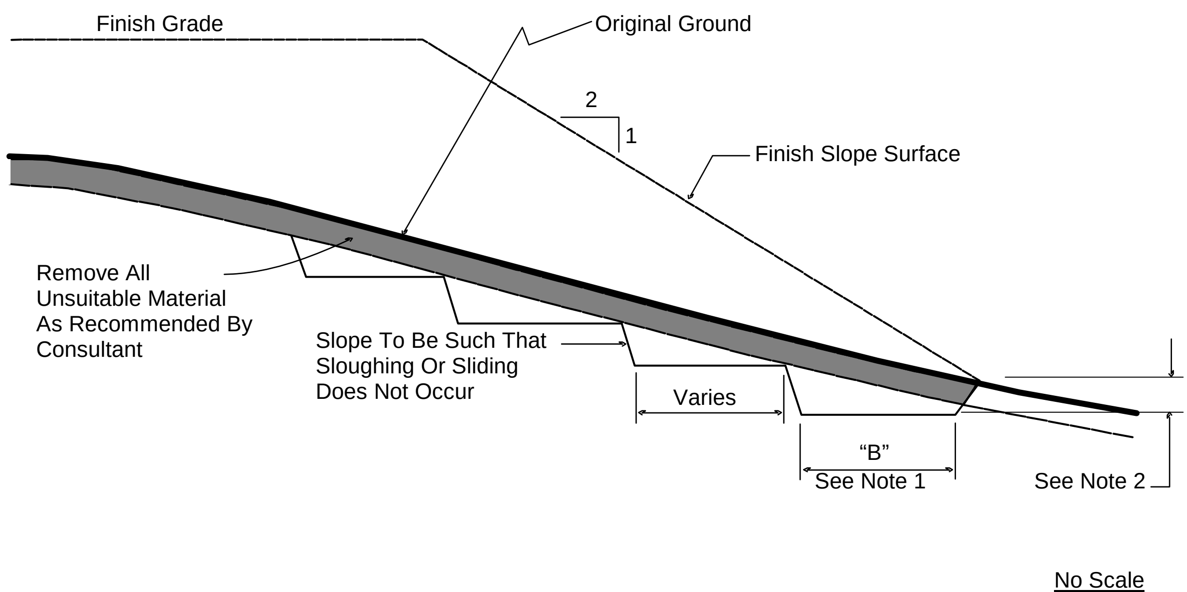
4.1 Areas to be excavated and filled shall be cleared and grubbed. Clearing shall consist of complete removal above the ground surface of trees, stumps, brush, vegetation, man-made structures, and similar debris. Grubbing shall consist of removal of stumps, roots, buried logs and other unsuitable material and shall be performed in areas to be graded. Roots and other projections exceeding 1½ inches in diameter shall be removed to a depth of 3 feet below the surface of the ground. Borrow areas shall be grubbed to the extent necessary to provide suitable fill materials.

4.2 Asphalt pavement material removed during clearing operations should be properly disposed at an approved off-site facility or in an acceptable area of the project evaluated by Geocon and the property owner. Concrete fragments that are free of reinforcing steel may be placed in fills, provided they are placed in accordance with Section 6.2 or 6.3 of this document.

4.3 After clearing and grubbing of organic matter and other unsuitable material, loose or porous soils shall be removed to the depth recommended in the Geotechnical Report. The depth of removal and compaction should be observed and approved by a representative of the Consultant. The exposed surface shall then be plowed or scarified to a minimum depth of 6 inches and until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment to be used.

4.4 Where the slope ratio of the original ground is steeper than 5:1 (horizontal:vertical), or where recommended by the Consultant, the original ground should be benched in accordance with the following illustration.

TYPICAL BENCHING DETAIL




DETAIL NOTES: (1) Key width "B" should be a minimum of 10 feet, or sufficiently wide to permit complete coverage with the compaction equipment used. The base of the key should be graded horizontal, or inclined slightly into the natural slope.

(2) The outside of the key should be below the topsoil or unsuitable surficial material and at least 2 feet into dense formational material. Where hard rock is exposed in the bottom of the key, the depth and configuration of the key may be modified as approved by the Consultant.

4.5 After areas to receive fill have been cleared and scarified, the surface should be moisture conditioned to achieve the proper moisture content, and compacted as recommended in Section 6 of these specifications.

## 5. COMPACTION EQUIPMENT

5.1 Compaction of *soil* or *soil-rock* fill shall be accomplished by sheepsfoot or segmented-steel wheeled rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers, or other types of acceptable compaction equipment. Equipment shall be of such a design that it will be capable of compacting the *soil* or *soil-rock* fill to the specified relative compaction at the specified moisture content.

5.2 Compaction of *rock* fills shall be performed in accordance with Section 6.3.

## 6. PLACING, SPREADING AND COMPACTION OF FILL MATERIAL

6.1 *Soil* fill, as defined in Paragraph 3.1.1, shall be placed by the Contractor in accordance with the following recommendations:

6.1.1 *Soil* fill shall be placed by the Contractor in layers that, when compacted, should generally not exceed 8 inches. Each layer shall be spread evenly and shall be thoroughly mixed during spreading to obtain uniformity of material and moisture in each layer. The entire fill shall be constructed as a unit in nearly level lifts. Rock materials greater than 12 inches in maximum dimension shall be placed in accordance with Section 6.2 or 6.3 of these specifications.

6.1.2 In general, the *soil* fill shall be compacted at a moisture content at or above the optimum moisture content as determined by ASTM D 1557.

6.1.3 When the moisture content of *soil* fill is below that specified by the Consultant, water shall be added by the Contractor until the moisture content is in the range specified.

6.1.4 When the moisture content of the *soil* fill is above the range specified by the Consultant or too wet to achieve proper compaction, the *soil* fill shall be aerated by the Contractor by blading/mixing, or other satisfactory methods until the moisture content is within the range specified.

6.1.5 After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted by the Contractor to a relative compaction of at least 90 percent. Relative compaction is defined as the ratio (expressed in percent) of the in-place dry density of the compacted fill to the maximum laboratory dry density as determined in accordance with ASTM D 1557. Compaction shall be continuous over the entire area, and compaction equipment shall make sufficient passes so that the specified minimum relative compaction has been achieved throughout the entire fill.

6.1.6 Where practical, soils having an Expansion Index greater than 50 should be placed at least 3 feet below finish pad grade and should be compacted at a moisture content generally 2 to 4 percent greater than the optimum moisture content for the material.

6.1.7 Properly compacted *soil* fill shall extend to the design surface of fill slopes. To achieve proper compaction, it is recommended that fill slopes be over-built by at least 3 feet and then cut to the design grade. This procedure is considered preferable to track-walking of slopes, as described in the following paragraph.

6.1.8 As an alternative to over-building of slopes, slope faces may be back-rolled with a heavy-duty loaded sheepsfoot or vibratory roller at maximum 4-foot fill height intervals. Upon completion, slopes should then be track-walked with a D-8 dozer or similar equipment, such that a dozer track covers all slope surfaces at least twice.

6.2 *Soil-rock* fill, as defined in Paragraph 3.1.2, shall be placed by the Contractor in accordance with the following recommendations:

6.2.1 Rocks larger than 12 inches but less than 4 feet in maximum dimension may be incorporated into the compacted *soil* fill, but shall be limited to the area measured 15 feet minimum horizontally from the slope face and 5 feet below finish grade or 3 feet below the deepest utility, whichever is deeper.

6.2.2 Rocks or rock fragments up to 4 feet in maximum dimension may either be individually placed or placed in windrows. Under certain conditions, rocks or rock fragments up to 10 feet in maximum dimension may be placed using similar methods. The acceptability of placing rock materials greater than 4 feet in maximum dimension shall be evaluated during grading as specific cases arise and shall be approved by the Consultant prior to placement.

6.2.3 For individual placement, sufficient space shall be provided between rocks to allow for passage of compaction equipment.

6.2.4 For windrow placement, the rocks should be placed in trenches excavated in properly compacted *soil* fill. Trenches should be approximately 5 feet wide and 4 feet deep in maximum dimension. The voids around and beneath rocks should be filled with approved granular soil having a Sand Equivalent of 30 or greater and should be compacted by flooding. Windrows may also be placed utilizing an "open-face" method in lieu of the trench procedure, however, this method should first be approved by the Consultant.

6.2.5 Windrows should generally be parallel to each other and may be placed either parallel to or perpendicular to the face of the slope depending on the site geometry. The minimum horizontal spacing for windrows shall be 12 feet center-to-center with a 5-foot stagger or offset from lower courses to next overlying course. The minimum vertical spacing between windrow courses shall be 2 feet from the top of a lower windrow to the bottom of the next higher windrow.

6.2.6 Rock placement, fill placement and flooding of approved granular soil in the windrows should be continuously observed by the Consultant.

6.3 *Rock* fills, as defined in Section 3.1.3, shall be placed by the Contractor in accordance with the following recommendations:

6.3.1 The base of the *rock* fill shall be placed on a sloping surface (minimum slope of 2 percent). The surface shall slope toward suitable subdrainage outlet facilities. The *rock* fills shall be provided with subdrains during construction so that a hydrostatic pressure buildup does not develop. The subdrains shall be permanently connected to controlled drainage facilities to control post-construction infiltration of water.

6.3.2 *Rock* fills shall be placed in lifts not exceeding 3 feet. Placement shall be by rock trucks traversing previously placed lifts and dumping at the edge of the currently placed lift. Spreading of the *rock* fill shall be by dozer to facilitate *seating* of the rock. The *rock* fill shall be watered heavily during placement. Watering shall consist of water trucks traversing in front of the current rock lift face and spraying water continuously during rock placement. Compaction equipment with compactive energy comparable to or greater than that of a 20-ton steel vibratory roller or other compaction equipment providing suitable energy to achieve the required compaction or deflection as recommended in Paragraph 6.3.3 shall be utilized. The number of passes to be made should be determined as described in Paragraph 6.3.3. Once a *rock* fill lift has been covered with *soil* fill, no additional *rock* fill lifts will be permitted over the *soil* fill.

6.3.3 Plate bearing tests, in accordance with ASTM D 1196, may be performed in both the compacted *soil* fill and in the *rock* fill to aid in determining the required minimum number of passes of the compaction equipment. If performed, a minimum of three plate bearing tests should be performed in the properly compacted *soil* fill (minimum relative compaction of 90 percent). Plate bearing tests shall then be performed on areas of *rock* fill having two passes, four passes and six passes of the compaction equipment, respectively. The number of passes required for the *rock* fill shall be determined by comparing the results of the plate bearing tests for the *soil* fill and the *rock* fill and by evaluating the deflection variation with number of passes. The required number of passes of the compaction equipment will be performed as necessary until the plate bearing deflections are equal to or less than that determined for the properly compacted *soil* fill. In no case will the required number of passes be less than two.

6.3.4 A representative of the Consultant should be present during *rock* fill operations to observe that the minimum number of “passes” have been obtained, that water is being properly applied and that specified procedures are being followed. The actual number of plate bearing tests will be determined by the Consultant during grading.

6.3.5 Test pits shall be excavated by the Contractor so that the Consultant can state that, in their opinion, sufficient water is present and that voids between large rocks are properly filled with smaller rock material. In-place density testing will not be required in the *rock* fills.

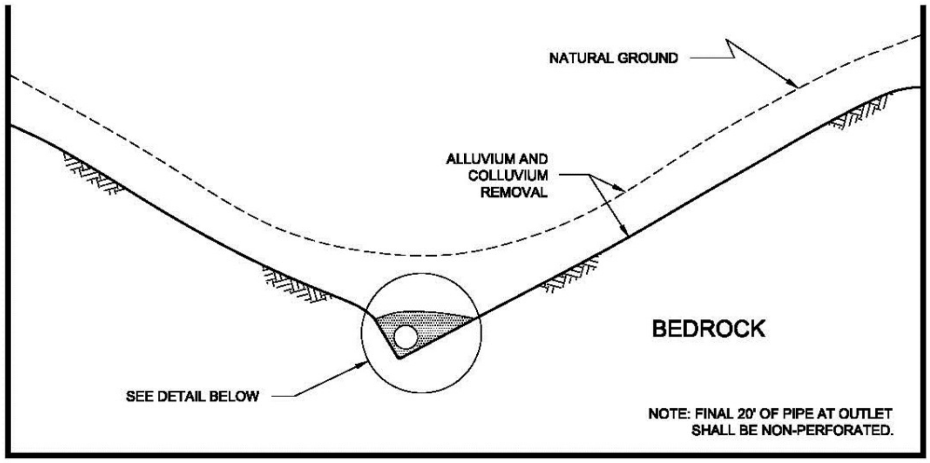
6.3.6 To reduce the potential for “piping” of fines into the *rock* fill from overlying *soil* fill material, a 2-foot layer of graded filter material shall be placed above the uppermost lift of *rock* fill. The need to place graded filter material below the *rock* should be determined by the Consultant prior to commencing grading. The gradation of the graded filter material will be determined at the time the *rock* fill is being excavated. Materials typical of the *rock* fill should be submitted to the Consultant in a timely manner, to allow design of the graded filter prior to the commencement of *rock* fill placement.

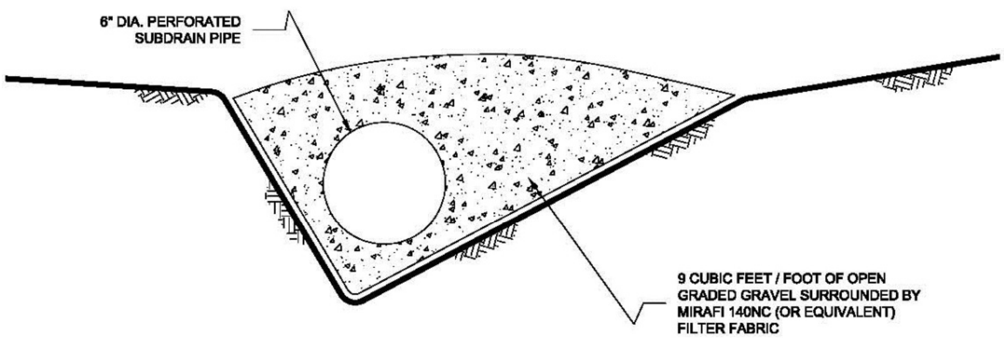
6.3.7 *Rock* fill placement should be continuously observed during placement by the Consultant.

## 7. SUBDRAINS

7.1 The geologic units on the site may have permeability characteristics and/or fracture systems that could be susceptible under certain conditions to seepage. The use of canyon subdrains may be necessary to mitigate the potential for adverse impacts associated with seepage conditions. Canyon subdrains with lengths in excess of 500 feet or extensions of existing offsite subdrains should use 8-inch-diameter pipes. Canyon subdrains less than 500 feet in length should use 6-inch-diameter pipes.

TYPICAL CANYON DRAIN DETAIL




**NOTES:**

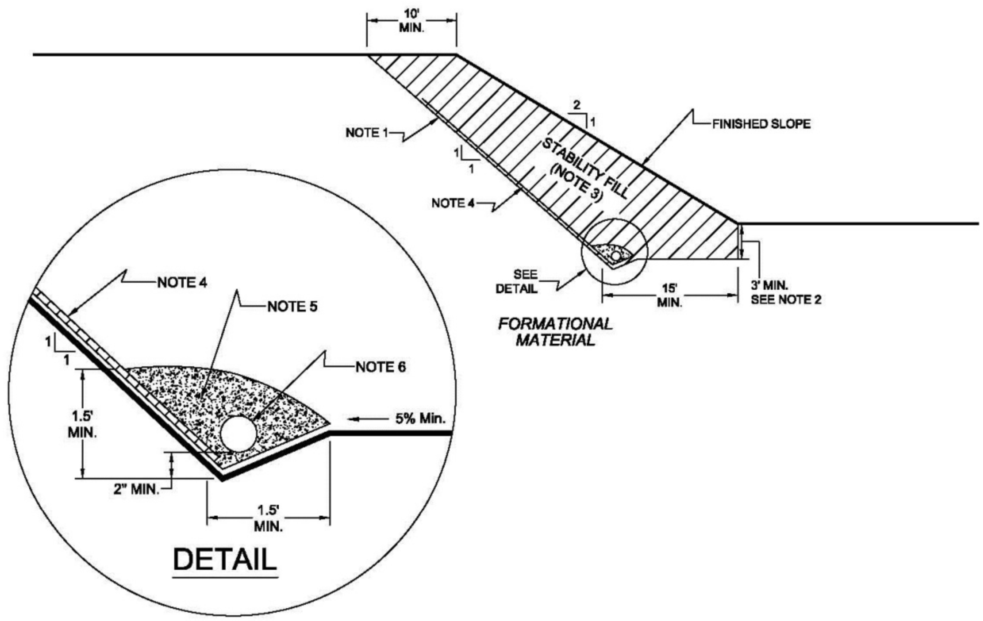
1......8-INCH DIAMETER, SCHEDULE 80 PVC PERFORATED PIPE FOR FILLS IN EXCESS OF 100-FEET IN DEPTH OR A PIPE LENGTH OF LONGER THAN 500 FEET.

2......6-INCH DIAMETER, SCHEDULE 40 PVC PERFORATED PIPE FOR FILLS LESS THAN 100-FEET IN DEPTH OR A PIPE LENGTH SHORTER THAN 500 FEET.

**NO SCALE**

7.2 Slope drains within stability fill keyways should use 4-inch-diameter (or lager) pipes.

TYPICAL STABILITY FILL DETAIL




**NOTES:**

1.....EXCAVATE BACKCUT AT 1:1 INCLINATION (UNLESS OTHERWISE NOTED).

2.....BASE OF STABILITY FILL TO BE 3 FEET INTO FORMATIONAL MATERIAL, SLOPING A MINIMUM 5% INTO SLOPE.

3.....STABILITY FILL TO BE COMPOSED OF PROPERLY COMPACTED GRANULAR SOIL.

4.....CHIMNEY DRAINS TO BE APPROVED PREFABRICATED CHIMNEY DRAIN PANELS (MIRADRAIN G200N OR EQUIVALENT) SPACED APPROXIMATELY 20 FEET CENTER TO CENTER AND 4 FEET WIDE. CLOSER SPACING MAY BE REQUIRED IF SEEPAGE IS ENCOUNTERED.

5.....FILTER MATERIAL TO BE 3/4-INCH, OPEN-GRADED CRUSHED ROCK ENCLOSED IN APPROVED FILTER FABRIC (MIRAFI 140NC).

6.....COLLECTOR PIPE TO BE 4-INCH MINIMUM DIAMETER, PERFORATED, THICK-WALLED PVC SCHEDULE 40 OR EQUIVALENT, AND SLOPED TO DRAIN AT 1 PERCENT MINIMUM TO APPROVED OUTLET.

NO SCALE

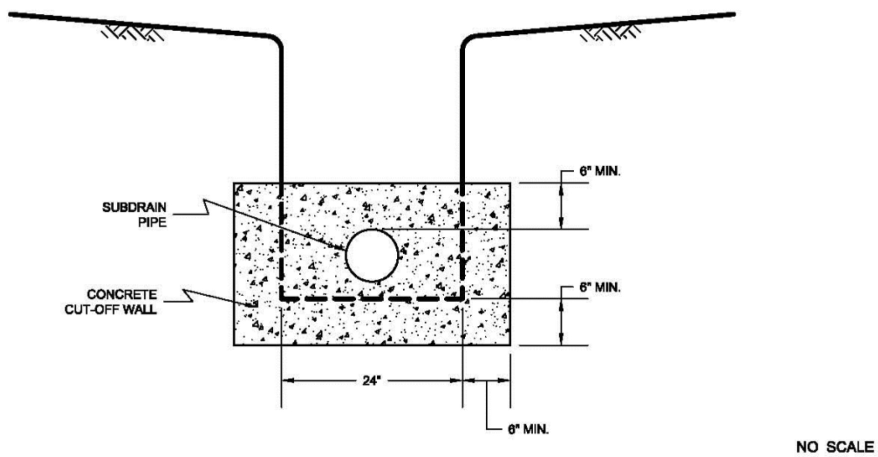
7.3 The actual subdrain locations will be evaluated in the field during the remedial grading operations. Additional drains may be necessary depending on the conditions observed and the requirements of the local regulatory agencies. Appropriate subdrain outlets should be evaluated prior to finalizing 40-scale grading plans.

7.4 *Rock* fill or *soil-rock* fill areas may require subdrains along their down-slope perimeters to mitigate the potential for buildup of water from construction or landscape irrigation. The subdrains should be at least 6-inch-diameter pipes encapsulated in gravel and filter fabric. *Rock* fill drains should be constructed using the same requirements as canyon subdrains.

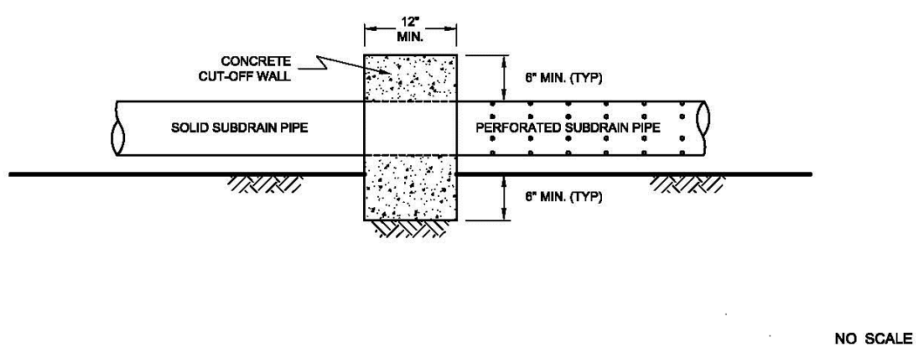
7.5 Prior to outletting, the final 20-foot segment of a subdrain that will not be extended during future development should consist of non-perforated drainpipe. At the non-perforated/ perforated interface, a seepage cutoff wall should be constructed on the downslope side of the pipe.

TYPICAL CUT OFF WALL DETAIL

**FRONT VIEW**

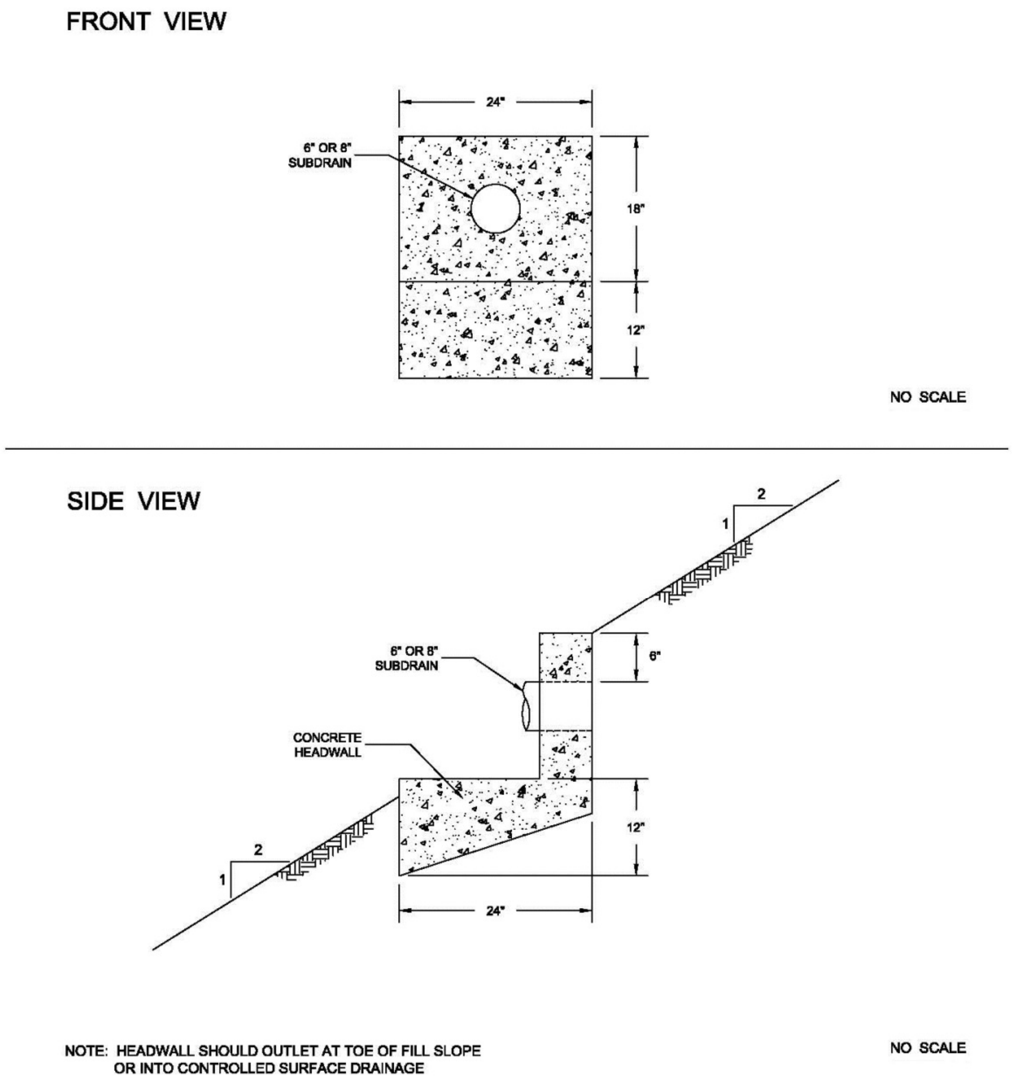



**SIDE VIEW**




7.6 Subdrains that discharge into a natural drainage course or open space area should be provided with a permanent headwall structure.

TYPICAL HEADWALL DETAIL




7.7 The final grading plans should show the location of the proposed subdrains. After completion of remedial excavations and subdrain installation, the project civil engineer should survey the drain locations and prepare an "as-built" map showing the drain locations. The final outlet and connection locations should be determined during grading operations. Subdrains that will be extended on adjacent projects after grading can be placed on formational material and a vertical riser should be placed at the end of the subdrain. The grading contractor should consider videoing the subdrains shortly after burial to check proper installation and functionality. The contractor is responsible for the performance of the drains.

## 8. OBSERVATION AND TESTING

8.1 The Consultant shall be the Owner's representative to observe and perform tests during clearing, grubbing, filling, and compaction operations. In general, no more than 2 feet in vertical elevation of *soil* or *soil-rock* fill should be placed without at least one field density test being performed within that interval. In addition, a minimum of one field density test should be performed for every 2,000 cubic yards of *soil* or *soil-rock* fill placed and compacted.

8.2 The Consultant should perform a sufficient distribution of field density tests of the compacted *soil* or *soil-rock* fill to provide a basis for expressing an opinion whether the fill material is compacted as specified. Density tests shall be performed in the compacted materials below any disturbed surface. When these tests indicate that the density of any layer of fill or portion thereof is below that specified, the particular layer or areas represented by the test shall be reworked until the specified density has been achieved.

8.3 During placement of *rock* fill, the Consultant should observe that the minimum number of passes have been obtained per the criteria discussed in Section 6.3.3. The Consultant should request the excavation of observation pits and may perform plate bearing tests on the placed *rock* fills. The observation pits will be excavated to provide a basis for expressing an opinion as to whether the *rock* fill is properly seated and sufficient moisture has been applied to the material. When observations indicate that a layer of *rock* fill or any portion thereof is below that specified, the affected layer or area shall be reworked until the *rock* fill has been adequately seated and sufficient moisture applied.

8.4 A settlement monitoring program designed by the Consultant may be conducted in areas of *rock* fill placement. The specific design of the monitoring program shall be as recommended in the Conclusions and Recommendations section of the project Geotechnical Report or in the final report of testing and observation services performed during grading.

8.5 We should observe the placement of subdrains, to check that the drainage devices have been placed and constructed in substantial conformance with project specifications.

8.6 Testing procedures shall conform to the following Standards as appropriate:

### 8.6.1 Soil and Soil-Rock Fills:

8.6.1.1 Field Density Test, ASTM D 1556, *Density of Soil In-Place By the Sand-Cone Method.*

8.6.1.2 Field Density Test, Nuclear Method, ASTM D 6938, *Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth).*

8.6.1.3 Laboratory Compaction Test, ASTM D 1557, *Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-Pound Hammer and 18-Inch Drop*.

8.6.1.4. Expansion Index Test, ASTM D 4829, *Expansion Index Test*.

## 9. PROTECTION OF WORK

9.1 During construction, the Contractor shall properly grade all excavated surfaces to provide positive drainage and prevent ponding of water. Drainage of surface water shall be controlled to avoid damage to adjoining properties or to finished work on the site. The Contractor shall take remedial measures to prevent erosion of freshly graded areas until such time as permanent drainage and erosion control features have been installed. Areas subjected to erosion or sedimentation shall be properly prepared in accordance with the Specifications prior to placing additional fill or structures.

9.2 After completion of grading as observed and tested by the Consultant, no further excavation or filling shall be conducted except in conjunction with the services of the Consultant.

## 10. CERTIFICATIONS AND FINAL REPORTS

10.1 Upon completion of the work, Contractor shall furnish Owner a certification by the Civil Engineer stating that the lots and/or building pads are graded to within 0.1 foot vertically of elevations shown on the grading plan and that all tops and toes of slopes are within 0.5 foot horizontally of the positions shown on the grading plans. After installation of a section of subdrain, the project Civil Engineer should survey its location and prepare an *as-built* plan of the subdrain location. The project Civil Engineer should verify the proper outlet for the subdrains and the Contractor should ensure that the drain system is free of obstructions.

10.2 The Owner is responsible for furnishing a final as-graded soil and geologic report satisfactory to the appropriate governing or accepting agencies. The as-graded report should be prepared and signed by a California licensed Civil Engineer experienced in geotechnical engineering and by a California Certified Engineering Geologist, indicating that the geotechnical aspects of the grading were performed in substantial conformance with the Specifications or approved changes to the Specifications.

# Appendix F

# HYDROLOGY & HYDRAULIC ANALYSIS FOR THE LOWE'S HOME IMPROVEMENT WAREHOUSE

## DP 99-0167

## CITY OF PERRIS

## APPENDIX A

**OCTOBER 1999**

REVISED NOVEMBER 1999

**ALBERT A. WEBB ASSOCIATES**
**3788 McCRAY STREET**
**RIVERSIDE, CA 92508**
**Phone - (909) 686-1070**
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**LIST OF EXHIBITS**



**LIST OF PLATES**

# SECTION 1 - INTRODUCTION

The purpose of this report is to address the hydraulic and hydrologic design requirements for the proposed development of the Lowe's Home Improvement Warehouse in the City of Perris of Western Riverside County. The proposed detention basin is located in the northeasterly corner of Development Plan 99-0167.

On-site runoff will be mitigated by the of a series of detention basins that are intended to reduce the 100 year runoff for the developed condition to a rate at or below the historical runoff for a variety of storm events. This reduction in runoff will reduce downstream impacts. Ultimately, the basin discharge will be conveyed in underground conduits to the proposed Line "E" of the Master Plan of Drains for the Perris Valley Area. In the interim, a graded daylight channel will be constructed from the basin outlet pipe and will daylight on the adjacent property. A grading and drainage agreement has been obtained from the adjacent property owner.

The on-site detention basins will also be used to control pollutant discharge in accordance to the requirements of the National Pollutant Discharge Elimination Standards (NPDES) and the City of Perris. All detention basins shall be landscaped and maintained in accordance with the City of Perris requirements.

The on-site storm drain systems have been designed to adequately collect and convey on-site drainage to the proposed detention basins while keeping flooding depths a minimum of one foot below the finished floor elevation as required by the City of Perris.

The off-site runoff tributary from the west was analyzed for the existing condition. In the ultimate condition, the installation of the aforementioned Line "E" and Laterals 'E-6" through "E-9" will collect and convey all off-site drainage to the north side of the Ramona Expressway. In the meantime, interim drainage facilities in the form of a landscape drainage channel will be proposed within the right-of-way of the Ramona Expressway. This channel will be included within the landscape maintenance of the site.

# SECTION 2 - HYDROLOGY

Hydrological information for analyzing the on-site and off-site runoff was obtained by utilizing the Synthetic Unit Hydrograph method outlined in the Hydrology Manual by the Riverside County Flood Control and Water Conservation District. Unit Hydrographs were prepared for the 100-year storm event for the 1-hour, 3 hour, 6 hour, and 24 hour storm duration for the off-site area tributary to the northwest corner of the site and the on-site area for both the developed and undeveloped condition.

Off-site runoff was based upon current development within the watershed which consists of single-family residential, undeveloped graded areas, agricultural, and commercial areas. For the purposes of the analysis, it was assumed that 75% of the area was undeveloped and the remaining 25% was developed with 40% of that area being impervious.

Based on the storm drain facilities that are constructed, field investigations, and a review of aerial photographs, it was determined that main collection point of this runoff is the intersection of Brennan Avenue and the Ramona Expressway. This intersection historically floods during heavy rainfall periods. Although there is an existing channel on either side of the intersection, the intersection is lower than inlet of the channel and a low flow swale has been graded to allow the intersection to drain. However, this swale is overgrown with vegetation and effectively has no capacity. Therefore, the intersection continues to flood.

On-site runoff was analyzed in the existing and proposed conditions. The current use of the area is for a turf farm that is irrigated and harvested on a regular basis. Although the proposed development has several large landscaped areas, the site will be predominately impervious. In order to determine the appropriate mitigation levels, it was assumed that 90% of the site would be impervious.

A summary of the hydrology results for the on-site and off-site runoff is presented in Table 1.

**Table 1 – Summary of 100-Year Hydrology Results for the Off-site and On-site Runoff for the Lowe's Home Improvement Warehouse**

| Storm Duration | Off-site Runoff | Undeveloped On-site Runoff | Developed On-site Runoff |
|---|---|---|---|
| 1-Hour | 1165.0 cfs | 158.6 cfs | 238.5 cfs |
| 3-Hour | 857.0 cfs | 109.8 cfs | 167.0 cfs |
| 6-Hour | 735.7 cfs | 89.0 cfs | 144.6 cfs |
| 24-Hour | 348.1 cfs | 26.2 cfs | 62.1 cfs |

Since there has been concerns raised over the traffic impacts associates with the flooding that occurs on the Ramona Expressway, additional hydrology studies were prepared for the offsite area tributary to the intersection of Brennan Avenue and the Ramona Expressway. These studies included the analysis of the 1, 3, 6, and 24-hour storm duration for the 2 and 10-year storm events. Since the 100-year storm over the entire watershed would have widespread impacts throughout the watershed and would over shadow any traffic impacts at the intersection of Brennan Avenue and the Ramona Expressway, it was decided to analyze the storms that are more frequent to the area and would cause repeated impacts. Since the 2-year and the 10-year storm events are more common storm events to the regions, these storms were analyzed. The results of these additional studies, which are represented in Table 2, were used to compare the hydraulic capacity of the proposed channel along the Ramona Expressway.

**Table 2 – Off-site Runoff Summary for the 2, 10, & 100-Year Storm Events**

| Storm Duration | 2-Year Runoff | 10-Year Runoff | 100-Year Runoff |
|---|---|---|---|
| 1-Hour | 323.0 cfs | 663.0 cfs | 1165.0 cfs |
| 3-Hour | 220.0 cfs | 471.0 cfs | 857.0 cfs |
| 6-Hour | 197.0 cfs | 410.0 cfs | 735.7 cfs |
| 24-Hour | 40.1 cfs | 122.0 cfs | 348.1 cfs |

In addition to performing the Unit Hydrograph Analysis for sizing the detention basins, a Rational Method Analysis was prepared for sizing the on-site storm drain and drop inlet basins. This study was prepared in accordance with the design guidelines established in the Hydrology Manual for the Riverside County Flood Control & Water Conservation District.

# SECTION 3 - HYDRAULICS

The retention basin routing studies were prepared using the Modified Puls Method computer program. The outlet-rating curve for the double 18" pipes was based upon a pressure condition where the outlet of the pipes is flooded to the soffit of the pipes. Additional hydraulic calculations for the onsite storm drain system and the hydraulic capacity for the Ramona Expressway was also prepared.

The outlet rating curve for the service spillway was determined using the. computer program for various ponding depths. The results of program showing the water surface elevation in the basin for selected depths is shown in Table 2.

**Table 3 –Spillway Calculations Double 18" RCP Outlet**

| Elevation (Ft) | Depth (H, Ft) | Q (cfs) |
|---|---|---|
| 1454.0 | 0 | 0 |
| 1456.0 | 2 | 9.5 |
| 1458.0 | 4 | 20 |
| 1460.0 | 6 | 27.6 |
| 1462.0 | 8 | 33.7 |
| 1464.0 | 10.0 | 39 |

The retention basin hydraulic characteristics for depth and discharge are shown in Table 3.

Retention basin routing was performed for all 100-year storm events in developed condition. Based upon the results for the basin routing, the peak outflow occurs for the 24-hour storm duration. The results for the basin discharge are shown in Table 4.

In addition to performing the retention basin routing analysis, hydraulic analysis were also performed for the on-site storm drain system and the drop inlets. The hydraulic analysis is attached to this report.

**Table 4 – Detention Basin Storage vs. Discharge Summary**

| Elevation | Depth (Ft.) | Storage (Ac.-Ft.) | Discharge (cfs) |
|---|---|---|---|
| 1454.0 | 0.0 | 0.0 | 0.0 |
| 1456.0 | 2.0 | 5.4 | 9.5 |
| 1458.0 | 4.0 | 10.8 | 19.5 |
| 1460.0 | 6.0 | 16.2 | 27.6 |
| 1462.0 | 8.0 | 21.6 | 33.7 |
| 1464.0 | 10.0 | 27.0 | 39.0 |

**Table 5 – 100 Year Retention Basin Discharge Summary**

| Storm Duration | Undeveloped Condition Runoff | Inflow Runoff | Outflow Runoff |
|---|---|---|---|
| 1-Hour | 158.6 cfs | 238.5 cfs | 17.2 cfs |
| 3-Hour | 109.8 cfs | 167.0 cfs | 23.1 cfs |
| 6-Hour | 89.0 cfs | 144.6 cfs | 25.4 cfs |
| 24-Hour | 26.2 cfs | 62.1 cfs | 27.5 cfs |

In addition to performing the On-site analysis, a hydraulic capacity analysis was performed for the Ramona Expressway and the proposed landscaped channel that will help convey Off-site past the proposed development. The hydraulic analysis was performed at a series of cross-sections shown on the attached exhibit. At each cross-section, the analysis was performed for the total capacity of the cross-section, (i.e., the road closed), for a single lane of traffic being open, and for the capacity of the channel. The results are shown in Table 6.

**Table 6 – Ramona Expressway Cross-Section Capacity**

| Cross-Section | Road Closed Capacity | Single Lane Capacity | Channel Capacity |
|---|---|---|---|
| "A" | 600.0 cfs | 490.0 cfs | 446.0 cfs |
| "B" | 625.0 cfs | 500.0 cfs | 452.0 cfs |
| "C&D" | 285.0 cfs | 175.0 cfs | 130.0 cfs |
| "E" | 225.0 cfs | 140.0 cfs | 94.0 cfs |

Based upon these capacities and the results for the Off-site Runoff Analysis, the Ramona Expressway will be closed for the 100-year flood events. However, this is to be expected during such events and will only be solved with the construction of the ultimate flood control facilities. In the more common storm event, i.e., the 2-year event, the runoff is contained in the channel for cross-sections "A" and "B", with the shorter duration storm events, i.e., the 1-hour and 3 hour durations, causing the Ramona Expressway to be flooded down at the intersection of Indian Avenue (Re-aligned) while providing adequate drainage at the intersection of Brennan Avenue. Since these storms are relatively short in duration, the area will drain quickly and traffic impacts will be minimized.

# Appendix G

PM 36512

ALBERT A. WEBB ASSOCIATES

# Technical Memorandum

PROFESSIONAL REGISTERED ENGINEER JOSEPH CHRISTIAN CALDWELL No. C 57239 CIVIL STATE OF CALIFORNIA

To: Habib Motlagh, City Engineer, City of Perris

From: Joseph Caldwell, P.E., Director of Stormwater Engineering

Date: March 12, 2014

Re: Perris Valley Commerce Center MDP – Line E Update

RECEIVED
MAY 06 2014
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT DEVELOPMENT REVIEW/PLAN CHECK

The following Technical Memorandum is prepared to provide the technical backup for the modification of the Line E system of the Perris Valley Commerce Center (PVCC) Master Drainage Plan (MDP). The realignment of Indian Avenue northerly of Ramona Expressway, along with the construction of a storm drain in the realigned road, has resulted in an 124 acres north of Markham Street that was originally tributary to the Line D system to now be tributary to the Line E system.

The Riverside County Flood Control & Water Conservation District (RCFC&WCD) has requested that the PVCC MDP be updated to reflect the changes to the Line D and Line E systems. The Line D update was prepared as part of the backup for the Line D Improvement Plans (MS149).

The results attached to this Technical Memorandum will supersede Section 7 of the PVCC MDP Report dated May 2010. For this current analysis, the "E2" subarea of the Line E system was updated to reflect the modified drainage boundary. Based on this, a new synthetic Unit Hydrograph Analysis was prepared for this sub area. The 100-year 3, 6, and 24-hour events were re-routed to determine the new flow rates for Line E.

Consistent with the previous analysis, the subareas were divided and used to prorate flows to the individual MDP laterals. The WSPG model was updated to account for the revised flows and modifications in facility alignment. The MDP drawings were then updated to match the realigned, resized facility. Finally, the cost estimate was updated to reflect the changes to the system.

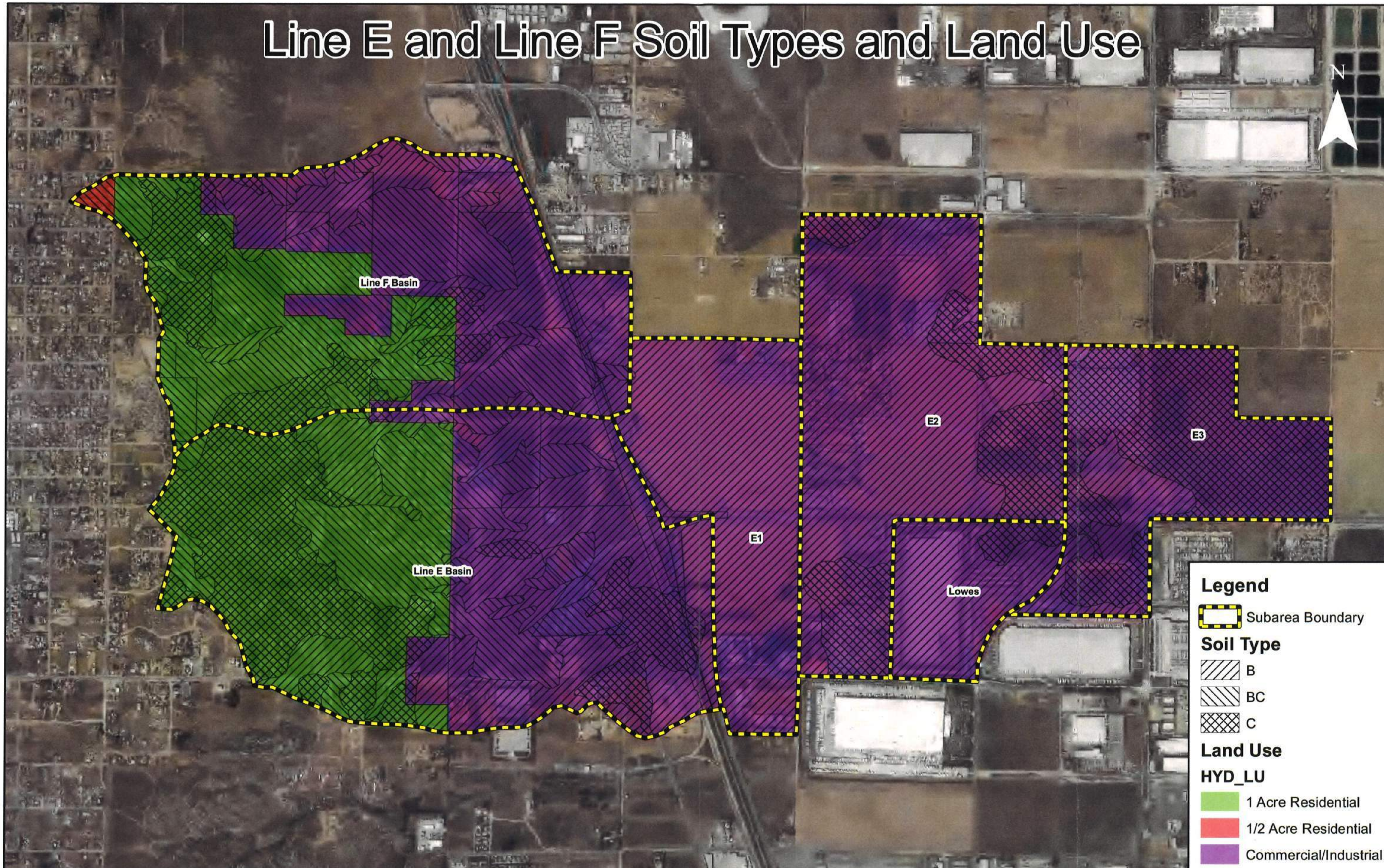
At the request of the City, RCFC&WCD will review these changes. Upon approval by the District, the backup contained with this Technical Memorandum will replace Section 7 of the PVCC MDP.

## COMMENTS

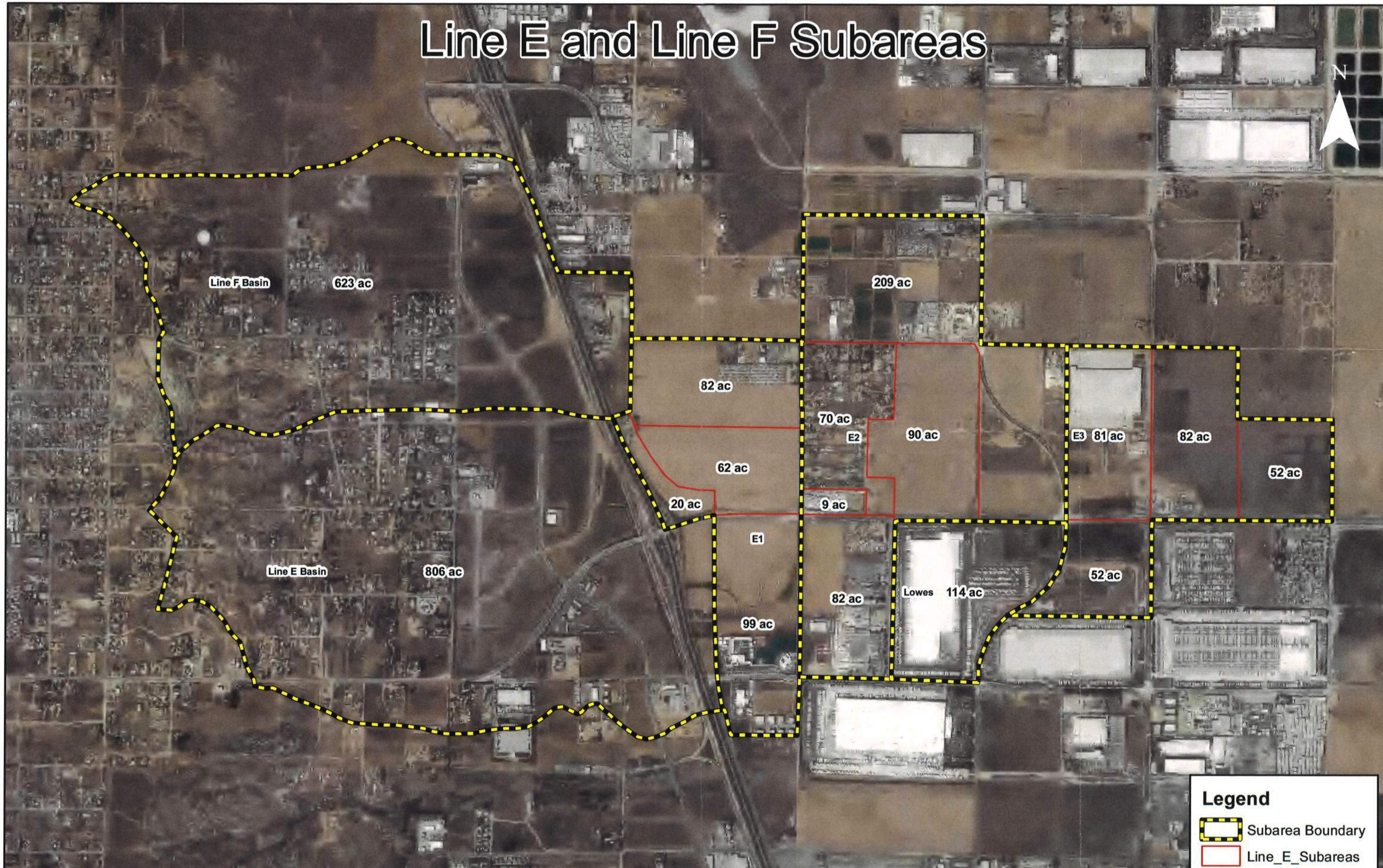
Line E extends from the Perris Valley Storm Drain to the Line E Basin at the upstream end of the facility. The minimum slope of the underground portion of Line E is s=0.0025. Typically the District requires underground facilities to have a minimal slope of s=0.003. Due to the physical constraints that existing in this area the District has agreed to maintain this facility with its substandard slope. A copy of this correspondence is included in Appendix A of this report. During a September 2, 2009 meeting at the City of Perris, the District agreed to allow the Lowes Detention Basin to be utilized as part of the routing analysis. A copy of the Lowes Basin routing curve is included in Appendix B of this report. It should be noted that the Lowes Basin bottom elevation is 1454.0 while the HGL in Line E is approximately 1455.5. The runoff from the Lowes site will peak much sooner than the runoff in Line E. Because of this it is reasonable to take credit for this storage volume. The downstream portion of Line E is a proposed earthen trapezoidal channel. The WSPG model for this channel uses a Manning's n Value of 0.030. This assumes that any vegetation in the channel will have constant maintenance. A maintenance permit will likely be required from the resource agencies to maintain the channel in this manner. If during final design a permit cannot be obtained, the channel design and Manning's N Value should be adjusted accordingly.

It should be noted that the area East of Redlands Avenue, South of Line D, North of Ramona Expressway and West of the PVSD is not included in the Line E watershed. This area is reserved for a future planned scalping basin for the PVSD.

# Hydrology


Line E and Line F Soil Types and Land Use
N
Line F Basin
Line E Basin
E1
E2
E3
Lowes
Legend
Subarea Boundary
Soil Type
B
BC
C
Land Use
HYD_LU
1 Acre Residential
1/2 Acre Residential
Commercial/Industrial

# Line E and Line F Subareas



# Perris Valley Commerce Center - Specific Plan

### Line E and Line F Land Use/Soil Type Summary

| Aub Area (Acres) | Soil Type | | | |
|---|---|---|---|---|
| Land Use | B | BC | C | Grand Total |
| **E1** | **263** | **0** | | **263** |
| Commercial/Industrial | 263 | 0 | | 263 |
| **E2** | **324** | | **136** | **460** |
| Commercial/Industrial | 324 | | 136 | 460 |
| **E3** | **54** | | **213** | **267** |
| Commercial/Industrial | 54 | | 213 | 267 |
| **Line E Basin** | **308** | **229** | **268** | **806** |
| 1 Acre Residential | 62 | 118 | 203 | 384 |
| Commercial/Industrial | 246 | 111 | 65 | 422 |
| **Line F Basin** | **188** | **326** | **109** | **623** |
| 1 Acre Residential | 17 | 160 | 93 | 270 |
| 1/2 Acre Residential | | 6 | | 6 |
| Commercial/Industrial | 171 | 161 | 16 | 348 |
| **Lowes** | **102** | | **12** | **114** |
| Commercial/Industrial | 102 | | 12 | 114 |
| **Grand Total** | **1239** | **556** | **739** | **2534** |

# Perris Valley Commerce Center Specific Plan
# Line E & Line F

## Geometry Parameters

| | Area | Length | Lc | Elevation Change | | | |
|---|---|---|---|---|---|---|---|
| Subarea | acres | feet | feet | High | Low | Δ | Manning's n |
| usEbasin | 806 | 8,570 | 4,005 | 1814 | 1492 | 322 | 0.020 |
| usFbasin | 623 | 8,900 | 4,030 | 1783 | 1498 | 285 | 0.020 |
| E1 | 263 | 3,720 | 1,080 | 1497 | 1479 | 18 | 0.015 |
| E2 | 460 | 6,245 | 2,360 | 1484 | 1458 | 26 | 0.015 |
| Lowes | 114 | 3,300 | 1,650 | 1477 | 1460 | 17 | 0.015 |
| E3 | 267 | 5,700 | 2,650 | 1462 | 1448 | 14 | 0.015 |

Perris Valley Commerce Center Specific Plan
Unit Hydrograph Summary Table

| | 100 Year - 3 Hour | | 100 Year - 6 Hour | | 100 Year - 24 Hour | |
|---|---|---|---|---|---|---|
| **Sub Area** | **Flow (cfs)** | **Vol (ac-ft)** | **Flow (cfs)** | **Vol (ac-ft)** | **Flow (cfs)** | **Vol (ac-ft)** |
| **US E Basin** | 1016 | 90.7 | 953 | 106.4 | 404 | 148.4 |
| **US F Basin** | 783 | 72.5 | 738 | 86.4 | 319 | 120.8 |
| **E1** | 396 | 34.8 | 332 | 42.1 | 135 | 56.5 |
| **E2** | 640 | 61.7 | 560 | 75.3 | 235 | 102.2 |
| **Lowes** | 170 | 15.2 | 144 | 18.4 | 59 | 24.8 |
| **E3** | 365 | 36.7 | 322 | 45.5 | 139 | 63.3 |

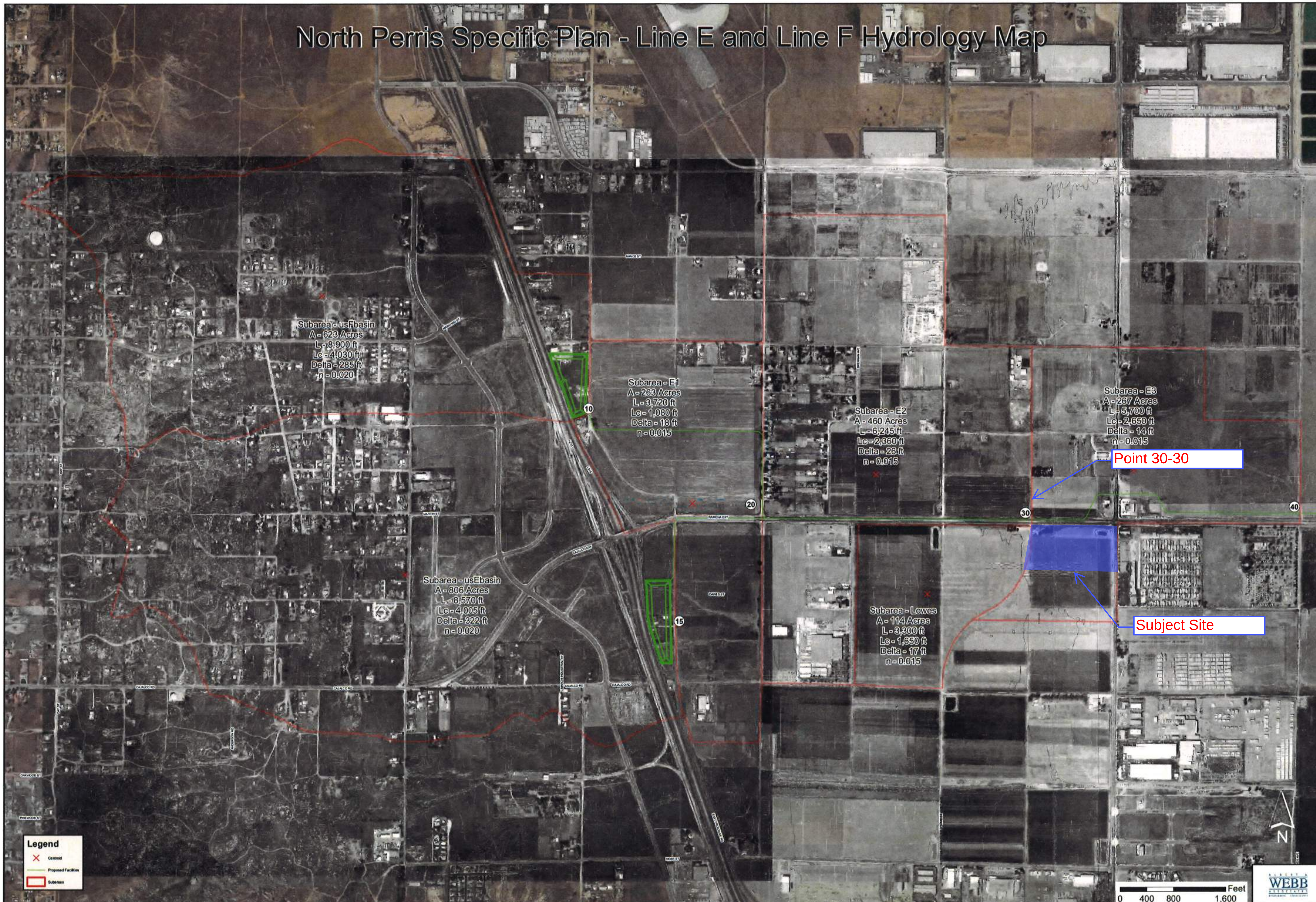
| Perris Valley Commerce Center Specific Plan<br>Line E & Line F Routing Summary | | | | |
|---|---|---|---|---|
| **Routing Node** | **3-Hour 100-Year** | **6-Hour 100-Year** | **24-Hour 100-Year** | **Descriptions** |
| | **CFS** | **CFS** | **CFS** | |
| 10 | **783** | 738 | 319 | **Flow Into Line F Basin** |
| 10-10 | 35 | 39 | **43** | **Line F Basin Routing** |
| 10-20 | 35 | 39 | **43** | **Route Flow To Webster** |
| 15 | **1016** | 953 | 404 | **Flow Into Line E Basin** |
| 15-15 | 73 | 77 | **82** | **Line E Basin Routing** |
| 15-20 | 73 | 77 | **82** | **Route Flow To Webster** |
| 20-20 | 108 | 115 | **125** | **Combine Basin Flows** |
| 20-20 | **481** | 430 | 231 | **Add Area E1** |
| 20-30 | **471** | 422 | 230 | **Line E** |
| 30-30 | **1044** | 944 | 461 | **Add Area E2** |
| 30-30 | **170** | 144 | 59 | **Flow into Lowes Basin** |
| 30-30 | **22** | 25 | 25 | **Route Lowes Basin** |
| 30-30 | **1064** | 967 | 480 | **Combine Flows** |
| 30-40 | **998** | 911 | 472 | **Line E** |
| 40-40 | **1254** | 1151 | 602 | **Add Area E3** |

| Perris Valley Commerce Center Specific Plan<br>Line E and Line F - Flow Proration | | | | |
|---|---|---|---|---|
| **Subarea** | | Acres | Flow | |
| **E1** | Paterson Flows (North - Line E) | 20 | 27 | |
| | Redirected Lat B-5 Flow at Webster & Perry | 82 | 111 | |
| | Webster North (Line F) | 62 | 95 | ** |
| | Webster South (Lat E-7) | 99 | 134 | |
| | **Total** | **263** | **356** | *** |
| **E2** | | | | |
| | Brennan North | 9 | 11 | |
| | Brennan South (Lat E-6) | 82 | 100 | |
| | Revised Lat E-4 (450' E of Brennan) | 70 | 86 | |
| | Old Indian Avenue North (PVLC) | 90 | 110 | |
| | Barrett Avenue North (Lat E-3/PVLC) | 209 | 256 | |
| | **Total** | **460** | **563** | * |
| **Lowes** | Barrett Avenue South (Religned Indian - Lowes - Lat E-2) | **114** | **20** | * |
| **E3** | | | | |
| | Perris Blvd North (Lat E-11) | 81 | 58 | |
| | Perris Blvd South (Lat E-1) | 52 | 37 | |
| | Lateral E-12 | 82 | 58 | |
| | Redlands Ave (Lat E-13) | 52 | 37 | |
| | **Total** | **267** | **190** | * |

* Flows are increases from routing study, not peak subarea flows

** In WSPG Model an additional 33 cfs is included to account for Line F Basin outflow.

*** 356 cfs is difference betweeen 481 cfs (3 hour peak at node 20-20 Add Area E1) and 125 cfs (24 Hour Peak - Combine Basin Flows) - See Routing Summary



North Perris Specific Plan - Line E and Line F Hydrology Map
Subarea - usFbasin
A - 623 Acres
L - 8,900 ft
Lc - 4,030 ft
Delta - 285 ft
n - 0.020
Subarea - E1
A - 263 Acres
L - 3,720 ft
Lc - 1,080 ft
Delta - 18 ft
n - 0.015
Subarea - E2
A - 460 Acres
L - 6,245 ft
Lc - 2,360 ft
Delta - 26 ft
n - 0.015
Subarea - E3
A - 267 Acres
L - 5,700 ft
Lc - 2,650 ft
Delta - 14 ft
n - 0.015
Point 30-30
Subject Site
Subarea - usEbasin
A - 806 Acres
L - 8,570 ft
Lc - 4,005 ft
Delta - 322 ft
n - 0.020
Subarea - Lowes
A - 114 Acres
L - 3,300 ft
Lc - 1,650 ft
Delta - 17 ft
n - 0.015
10
15
20
30
40
RAMONA EXY
CAJALCO EXY
CAJALCO RD
DAWES ST
MARKHAM ST
Legend
Centroid
Proposed Facilities
Subareas
N
Feet
0 400 800 1,600
WEBB

# Appendix H

# ON-SITE HYDROLOGY STUDY
# AND
# WQMP CALCULATIONS

## FOR

# DPR-05-0493

**Nortwest Corner of Perris Boulevard and Morgan Avenue**
**Perris, CA**

**Prepared for:**

**Ridge Property Trust**
201 Covina Avenue, Suite 200
Long Beach, CA 90803

**Prepared by:**

**KCT CONSULTANTS, INC.**
4344 Latham Street, Suite 200
Riverside, CA 92501
(951) 341-8940

______________________________ ______________
Teresito N. Tabiolo Date
RCE 38826, Exp. 03-31-09

HYDROLOGY MAP
SHEET 1 OF 1
SCALE 1"=100'
SCALE: 1 INCH = 100 FEET
0 50 100 200 300 400
N
INDIAN AVENUE
MORGAN AVENUE
PERRIS BOULEVARD
AREA "A" A=12.4 AC
AREA "B" A=6.7 AC
AREA "C" A=38.5 AC
AREA "D" A=13.9 AC
AREA "E" A=10.9 AC
AREA "F" A=2.7 AC
OUTLET FLOW Q100=60.3CFS Q10=41.1CFS
TOTAL FLOW @ BASIN Q100=60.3CFS Q10=41.1CFS
TOTAL FLOW @ BASIN Q100=75.8CFS Q10=51.7CFS
OUTLET FLOW Q100=75.8CFS Q10=51.7CFS
OUTLET FLOW Q100=28.3CFS Q10=19.4CFS
TOTAL FLOW Q100=28.3CFS Q10=19.4CFS
TOTAL FLOW Q100=15.6CFS Q10=10.8CFS
OUTLET FLOW Q100=15.6CFS Q10=10.8CFS
KCT W.O.: 1362-01