PRELIMINARY HYDROLOGY REPORT
FOR

TTM 38264
Moreno Valley, CA

Prepared for:

Passco Pacifica
333 City Boulevard West, 17th Floor
Orange, CA 92866

Initial Report: January 6, 2022
Revised: April 26, 2022

Prepared by:

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Preliminary Drainage Report

Tuesday, April 26, 2022

INTRODUCTION

The following report and calculations were prepared to analyze the 2, 10 & 100-year storm runoff from the development of the TTM 38264 at the southeast corner of Quincy Street and Cottonwood Avenue in the City of Moreno Valley, Ca. An onsite extended detention basin is proposed for mitigation of incremental increase in runoff from the site and BMPs for treatment of site runoff.

SITE BACKGROUND

The proposed project is located on the south side of Cottonwood Avenue, easterly of Quincy Street, with Bay Avenue on the south side of the property. The property is vacant and undeveloped and generally slopes from northwest to southeast.

There are single family residential properties along the east side of the property and the partially improved Quincy Street Channel property adjacent to the site along the west property line.

The soil type for the area is Type B per Plate C-1.17 "Hydrologic Soils Group Map for Sunnymead" from the Riverside County Hydrology Manual.

METHODOLOGY

Subareas were determined based on the proposed grading of the site. A link-node model was created for each subarea, with flow path length and elevations shown for the upstream and downstream nodes for the subarea. Peak flowrates were determined for each subarea using the CivilDesign Corporation "RIV" rational method hydrology software. The results of those calculations are shown on the site hydrology map included with this report. Separate maps for the existing and developed condition are included with this report.

ANALYSES/DISCUSSION

Rational method hydrology calculations have been prepared for 2, 10 & 100-year existing and proposed condition for the project site. In the existing condition flows traverse the site in a sheet flow manner. The westerly portion of the site is approximately 7 -acres in size and is tributary to the Quincy Street Channel. Storm flows traverse this portion of the site from the northeast to the southwest into the Quincy Street Channel. The easterly portion of the site is nominally 12.5 acres in size with storm flows traversing the site from the northwest to the southeast. In the existing condition those flows exit site along the easterly property line at Belmont Parkway, and existing concrete lined ditch south of Belmont Parkway behind the homes and at Bay Avenue.

In the developed condition, the site has been designed to modify the flow pattern with flows being routed through the proposed onsite extended detention basin. A portion of Bay Avenue flows westerly towards the Quincy Channel; those surface flows are captured by a catch basin on the westerly side of the secondary entry street and conveyed to and through the extended detention basin.

The drainage areas and peak 2, 10 & 100-year discharges are summarized below:

Rational Method Calculations

Existing Condition

Node No.	Area (Ac.)	2-year discharge (cfs)	10-year discharge (cfs)	100-year discharge (cfs)	Tc min.
101	3.45	1.81	3.92	6.67	16.46
102	3.50	3.41	7.54	12.97	18.89
201	6.21	3.08	6.75	11.55	17.71
202	6.35	5.87	13.10	22.61	20.04

Proposed Condition

Node No.	Area (Ac.)	2-year discharge (cfs)	10-year discharge (cfs)	100-year discharge (cfs)	Tc min.
101	6.48	4.63	8.36	13.97	14.37
102	3.15	11.51	20.94	35.30	16.32
103	7.90	12.33	22.05	36.99	16.47

Quincy Street Channel and Bay Avenue extension

The project proposes to complete the concrete slope lining along the easterly side of the channel between Cottonwood Avenue and Bay Avenue. The project is designed to place the proposed building pads a minimum of 1' above the existing channel hinge point at top of slope along the westerly side. Bay Avenue will be extended to the west to connect to Quincy Street, with the channel improvements extending through Bay Avenue.

PROPOSED PROJECT BMP's

Due to the lack of downstream drainage facilities below Bay Avenue we have selected an extended detention basin onsite as the method for treatment of onsite flows. The details of the extended detention basin is described in detail in the Preliminary Water Quality Management Plan prepared for this project. Site drainage will be routed from the basin to the Quincy Street Channel.

CONCLUSION

Based on the calculations and proposed improvements, the onsite extended detention basin can handle the incremental increase of flow from the development of the site and match existing condition flow rates to the Quincy Street Channel and the proposed site development will not impact offsite properties.

Appendix A
Existing Condition Rational Method Calculations

2-year
10-year
100-year

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/05/22
File:cottonwood2ex.out

Cottonwood Collection TTM 38264
Existing Condition
2 year storm event
RMB

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

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

Program License Serial Number 6288

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [Sunnymead-Moreno] area used.
10 year storm 10 minute intensity = 2.010(In/Hr)
10 year storm 60 minute intensity = 0.820(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.554(In/Hr)
Slope of intensity duration curve = 0.5000

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

```
Initial area flow distance =   991.000(Ft.)
Top (of initial area) elevation =    70.500(Ft.)
Bottom (of initial area) elevation =    36.800(Ft.)
Difference in elevation =    33.700(Ft.)
Slope =    0.03401  s(percent)=       3.40
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.459 min.
Rainfall intensity =      1.059(In/Hr) for a     2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.495
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  60.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.807(CFS)
Total initial stream area =        3.450(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      101.000 to Point/Station      102.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =     36.800(Ft.)
End of natural channel elevation =     30.900(Ft.)
Length of natural channel  =   428.000(Ft.)
Estimated mean flow rate at midpoint of channel =      2.723(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.16(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0138
Corrected/adjusted channel slope =  0.0138
Travel time =    3.31 min.     TC =   19.76  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.474
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
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Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  60.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.966(In/Hr) for a     2.0 year storm
Subarea runoff =      1.604(CFS) for      3.500(Ac.)
Total runoff =      3.411(CFS)  Total area =       6.950(Ac.)
End of computations, total study area =            6.95 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  78.0
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Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/05/22
File:cottonwood2bex.out

Cottonwood Collection - TTM 38264
Existing Condition - Area B
2 year storm flows
RMB

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

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

Program License Serial Number 6288

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [Sunnymead-Moreno] area used.
10 year storm 10 minute intensity = 2.010(In/Hr)
10 year storm 60 minute intensity = 0.820(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.554(In/Hr)
Slope of intensity duration curve = 0.5000

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Process from Point/Station 200.000 to Point/Station 201.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 946.000(Ft.)
Top (of initial area) elevation = 70.100(Ft.)
Bottom (of initial area) elevation = 49.800(Ft.)
Difference in elevation = 20.300(Ft.)
Slope = 0.02146 s(percent)= 2.15
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 17.714 min.
Rainfall intensity = 1.020(In/Hr) for a 2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.487
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1) = 60.60
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 3.083(CFS)
Total initial stream area = 6.210(Ac.)
Pervious area fraction = 1.000

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Process from Point/Station 201.000 to Point/Station 202.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 49.800(Ft.)
End of natural channel elevation = 40.200(Ft.)
Length of natural channel = 538.000(Ft.)
Estimated mean flow rate at midpoint of channel = 4.659(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow = 2.77(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.0178
Corrected/adjusted channel slope = 0.0178
Travel time = 3.23 min. TC = 20.95 min.

Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.468
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000

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Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  60.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      0.938(In/Hr) for a     2.0 year storm
Subarea runoff =      2.787(CFS) for      6.350(Ac.)
Total runoff =      5.870(CFS)  Total area =      12.560(Ac.)
End of computations, total study area =           12.56 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  78.0
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Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/05/22
File:cottonwood10aex.out

Cottonwood Collection TTM 38264
Existing Condition
10 year storm event
Area A

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

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

Program License Serial Number 6288

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [Sunnymead-Moreno] area used.
10 year storm 10 minute intensity = 2.010(In/Hr)
10 year storm 60 minute intensity = 0.820(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.820(In/Hr)
Slope of intensity duration curve = 0.5000

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

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Initial area flow distance =   991.000(Ft.)
Top (of initial area) elevation =    70.500(Ft.)
Bottom (of initial area) elevation =    36.800(Ft.)
Difference in elevation =    33.700(Ft.)
Slope =    0.03401  s(percent)=       3.40
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.459 min.
Rainfall intensity =      1.566(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.726
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  78.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      3.920(CFS)
Total initial stream area =        3.450(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      101.000 to Point/Station      102.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =     36.800(Ft.)
End of natural channel elevation =     30.900(Ft.)
Length of natural channel  =   428.000(Ft.)
Estimated mean flow rate at midpoint of channel =      5.908(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.58(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0138
Corrected/adjusted channel slope =  0.0138
Travel time =    2.77 min.     TC =   19.23  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.715
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
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Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  78.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.449(In/Hr) for a    10.0 year storm
Subarea runoff =      3.623(CFS) for      3.500(Ac.)
Total runoff =      7.542(CFS)  Total area =       6.950(Ac.)
End of computations, total study area =            6.95 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  78.0
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Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/05/22
File:cottonwood10bex.out

Cottonwood Collection - TTM 38264
Existing Condition - Area B
10 year storm flows
RMB

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

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

Program License Serial Number 6288

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [Sunnymead-Moreno] area used.
10 year storm 10 minute intensity = 2.010(In/Hr)
10 year storm 60 minute intensity = 0.820(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.820(In/Hr)
Slope of intensity duration curve = 0.5000

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Process from Point/Station 200.000 to Point/Station 201.000
**** INITIAL AREA EVALUATION ****

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Initial area flow distance =   946.000(Ft.)
Top (of initial area) elevation =    70.100(Ft.)
Bottom (of initial area) elevation =    49.800(Ft.)
Difference in elevation =    20.300(Ft.)
Slope =    0.02146  s(percent)=       2.15
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   17.714 min.
Rainfall intensity =      1.509(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.720
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  78.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      6.752(CFS)
Total initial stream area =        6.210(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      201.000 to Point/Station      202.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =     49.800(Ft.)
End of natural channel elevation =     40.200(Ft.)
Length of natural channel  =   538.000(Ft.)
Estimated mean flow rate at midpoint of channel =     10.204(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.36(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0178
Corrected/adjusted channel slope =  0.0178
Travel time =    2.67 min.     TC =   20.39  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.710
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
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Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  78.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.407(In/Hr) for a    10.0 year storm
Subarea runoff =      6.344(CFS) for      6.350(Ac.)
Total runoff =     13.096(CFS)  Total area =      12.560(Ac.)
End of computations, total study area =           12.56 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  78.0
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Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/05/22
File:cottonwood100aex.out

Cottonwood Collection TTM 38264
Existing Condition
100 year storm event
Area A

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

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

Program License Serial Number 6288

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 [Sunnymead-Moreno] area used.
10 year storm 10 minute intensity = 2.010(In/Hr)
10 year storm 60 minute intensity = 0.820(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

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

```
Initial area flow distance =   991.000(Ft.)
Top (of initial area) elevation =    70.500(Ft.)
Bottom (of initial area) elevation =    36.800(Ft.)
Difference in elevation =    33.700(Ft.)
Slope =    0.03401  s(percent)=       3.40
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.459 min.
Rainfall intensity =      2.291(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.844
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  89.80
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      6.673(CFS)
Total initial stream area =        3.450(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      101.000 to Point/Station      102.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =     36.800(Ft.)
End of natural channel elevation =     30.900(Ft.)
Length of natural channel  =   428.000(Ft.)
Estimated mean flow rate at midpoint of channel =     10.058(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.94(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0138
Corrected/adjusted channel slope =  0.0138
Travel time =    2.43 min.     TC =   18.89  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.840
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
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Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  89.80
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.139(In/Hr) for a   100.0 year storm
Subarea runoff =      6.292(CFS) for      3.500(Ac.)
Total runoff =     12.965(CFS)  Total area =       6.950(Ac.)
End of computations, total study area =            6.95 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

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

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/05/22
File:cottonwood100bex.out

Cottonwood Collection - TTM 38264
Existing Condition - Area B
100 year storm flows
RMB

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

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

Program License Serial Number 6288

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 [Sunnymead-Moreno] area used.
10 year storm 10 minute intensity = 2.010(In/Hr)
10 year storm 60 minute intensity = 0.820(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

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Process from Point/Station 200.000 to Point/Station 201.000
**** INITIAL AREA EVALUATION ****

```
Initial area flow distance =   946.000(Ft.)
Top (of initial area) elevation =    70.100(Ft.)
Bottom (of initial area) elevation =    49.800(Ft.)
Difference in elevation =    20.300(Ft.)
Slope =    0.02146  s(percent)=       2.15
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   17.714 min.
Rainfall intensity =      2.209(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.842
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  89.80
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     11.551(CFS)
Total initial stream area =        6.210(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      201.000 to Point/Station      202.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of natural channel elevation =     49.800(Ft.)
End of natural channel elevation =     40.200(Ft.)
Length of natural channel  =   538.000(Ft.)
Estimated mean flow rate at midpoint of channel =     17.457(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.86(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0178
Corrected/adjusted channel slope =  0.0178
Travel time =    2.32 min.     TC =   20.04  min.


 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.839
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
```

Decimal fraction soil group D = 0.000
RI index for soil(AMC 3) = 89.80
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 2.077(In/Hr) for a 100.0 year storm
Subarea runoff = 11.061(CFS) for 6.350(Ac.)
Total runoff = 22.612(CFS) Total area = 12.560(Ac.)
End of computations, total study area = 12.56 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

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

Appendix B
Proposed Condition Rational Method Calculations

2-year
10-year
100-year

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 04/26/22 File:cwdev2.out

Cottonwood Collection - TTM 38264
2 year developed flow rates
RMB
2022-04-26

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

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

Program License Serial Number 6288

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [Sunnymead-Moreno] area used.
10 year storm 10 minute intensity = 2.010(In/Hr)
10 year storm 60 minute intensity = 0.820(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.554(In/Hr)
Slope of intensity duration curve = 0.5000

++

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

Initial area flow distance = 995.000(Ft.)

```
Top (of initial area) elevation =    67.000(Ft.)
Bottom (of initial area) elevation =    52.500(Ft.)
Difference in elevation =    14.500(Ft.)
Slope =    0.01457  s(percent)=       1.46
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.371 min.
Rainfall intensity =      1.133(In/Hr) for a     2.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.596
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  36.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.628(CFS)
Total initial stream area =        6.860(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =    52.500(Ft.)
End of street segment elevation =    40.600(Ft.)
Length of street segment  =   527.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  16.000(Ft.)
Distance from crown to crossfall grade break  =   0.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   4.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      8.156(CFS)
Depth of flow =   0.332(Ft.), Average velocity =   3.447(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.278(Ft.)
Flow velocity =   3.45(Ft/s)
Travel time =    2.55 min.     TC =   16.92  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
```

```
Runoff Coefficient = 0.588
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  36.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.044(In/Hr) for a     2.0 year storm
Subarea runoff =      6.883(CFS) for     11.220(Ac.)
Total runoff =     11.511(CFS)  Total area =      18.080(Ac.)
Street flow at end of street =     11.511(CFS)
Half street flow at end of street =      5.755(CFS)
Depth of flow =   0.365(Ft.), Average velocity =   3.734(Ft/s)
Flow width (from curb towards crown)=  11.893(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =    36.600(Ft.)
Downstream point/station elevation =    36.000(Ft.)
Pipe length  =    75.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.511(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    11.511(CFS)
Normal flow depth in pipe =   14.37(In.)
Flow top width inside pipe =   19.52(In.)
Critical Depth =   15.18(In.)
Pipe flow velocity =      6.56(Ft/s)
Travel time through pipe =    0.19 min.
Time of concentration (TC) =    17.11 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.837
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 1)  =  36.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    17.11 min.
Rainfall intensity =      1.038(In/Hr) for a     2.0 year storm
```

cwdev2

Subarea runoff = 0.722(CFS) for 0.830(Ac.)
Total runoff = 12.232(CFS) Total area = 18.910(Ac.)
End of computations, total study area = 18.91 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.482
Area averaged RI index number = 56.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 04/26/22 File:cwdev10.out

Cottonwood Collection - TTM 38264
10 year developed flow rates
RMB
2022-04-26

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

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

Program License Serial Number 6288

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [Sunnymead-Moreno] area used.
10 year storm 10 minute intensity = 2.010(In/Hr)
10 year storm 60 minute intensity = 0.820(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.820(In/Hr)
Slope of intensity duration curve = 0.5000

++

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

Initial area flow distance = 995.000(Ft.)

```
Top (of initial area) elevation =    67.000(Ft.)
Bottom (of initial area) elevation =    52.500(Ft.)
Difference in elevation =    14.500(Ft.)
Slope =    0.01457  s(percent)=       1.46
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.371 min.
Rainfall intensity =      1.676(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.727
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      8.355(CFS)
Total initial stream area =        6.860(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =    52.500(Ft.)
End of street segment elevation =    40.600(Ft.)
Length of street segment  =   527.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  16.000(Ft.)
Distance from crown to crossfall grade break  =   0.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   4.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     14.715(CFS)
Depth of flow =   0.390(Ft.), Average velocity =   3.958(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  13.162(Ft.)
Flow velocity =   3.96(Ft/s)
Travel time =    2.22 min.     TC =   16.59  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
```

```
Runoff Coefficient = 0.719
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.559(In/Hr) for a    10.0 year storm
Subarea runoff =     12.583(CFS) for     11.220(Ac.)
Total runoff =     20.938(CFS)  Total area =      18.080(Ac.)
Street flow at end of street =     20.938(CFS)
Half street flow at end of street =     10.469(CFS)
Depth of flow =   0.430(Ft.), Average velocity =   4.307(Ft/s)
Flow width (from curb towards crown)=  15.179(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =    36.600(Ft.)
Downstream point/station elevation =    36.000(Ft.)
Pipe length  =    75.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    20.938(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    20.938(CFS)
Normal flow depth in pipe =   20.53(In.)
Flow top width inside pipe =   16.88(In.)
Critical Depth =   19.67(In.)
Pipe flow velocity =      7.32(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =    16.76 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.864
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    16.76 min.
Rainfall intensity =      1.551(In/Hr) for a    10.0 year storm
```

cwdev10

Subarea runoff = 1.112(CFS) for 0.830(Ac.)
Total runoff = 22.050(CFS) Total area = 18.910(Ac.)
End of computations, total study area = 18.91 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.482
Area averaged RI index number = 56.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 04/26/22 File:cwdev100.out

Cottonwood Collection - TTM 38264
100 year developed flow rates
RMB
2022-04-26

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

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

Program License Serial Number 6288

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 [Sunnymead-Moreno] area used.
10 year storm 10 minute intensity = 2.010(In/Hr)
10 year storm 60 minute intensity = 0.820(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

++

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

Initial area flow distance = 995.000(Ft.)

```
Top (of initial area) elevation =    67.000(Ft.)
Bottom (of initial area) elevation =    52.500(Ft.)
Difference in elevation =    14.500(Ft.)
Slope =    0.01457  s(percent)=       1.46
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.371 min.
Rainfall intensity =      2.452(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.830
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =     13.966(CFS)
Total initial stream area =        6.860(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =    52.500(Ft.)
End of street segment elevation =    40.600(Ft.)
Length of street segment  =   527.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  16.000(Ft.)
Distance from crown to crossfall grade break  =   0.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   4.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     24.731(CFS)
Depth of flow =   0.450(Ft.), Average velocity =   4.508(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.000(Ft.)
Flow velocity =   4.51(Ft/s)
Travel time =    1.95 min.     TC =   16.32  min.
 Adding area flow to street
```

SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.826
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3) = 74.80
Pervious area fraction = 0.500; Impervious fraction = 0.500
Rainfall intensity = 2.301(In/Hr) for a 100.0 year storm
Subarea runoff = 21.337(CFS) for 11.220(Ac.)
Total runoff = 35.304(CFS) Total area = 18.080(Ac.)
Street flow at end of street = 35.304(CFS)
Half street flow at end of street = 17.652(CFS)
Depth of flow = 0.491(Ft.), Average velocity = 5.193(Ft/s)
Note: depth of flow exceeds top of street crown.
Flow width (from curb towards crown)= 16.000(Ft.)

++
Process from Point/Station 102.000 to Point/Station 103.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 36.600(Ft.)
Downstream point/station elevation = 36.000(Ft.)
Pipe length = 75.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 35.304(CFS)
Nearest computed pipe diameter = 30.00(In.)
Calculated individual pipe flow = 35.304(CFS)
Normal flow depth in pipe = 23.63(In.)
Flow top width inside pipe = 24.54(In.)
Critical Depth = 24.21(In.)
Pipe flow velocity = 8.51(Ft/s)
Travel time through pipe = 0.15 min.
Time of concentration (TC) = 16.47 min.

++
Process from Point/Station 102.000 to Point/Station 103.000
**** SUBAREA FLOW ADDITION ****

COMMERCIAL subarea type
Runoff Coefficient = 0.885
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3) = 74.80
Pervious area fraction = 0.100; Impervious fraction = 0.900

cwdev100

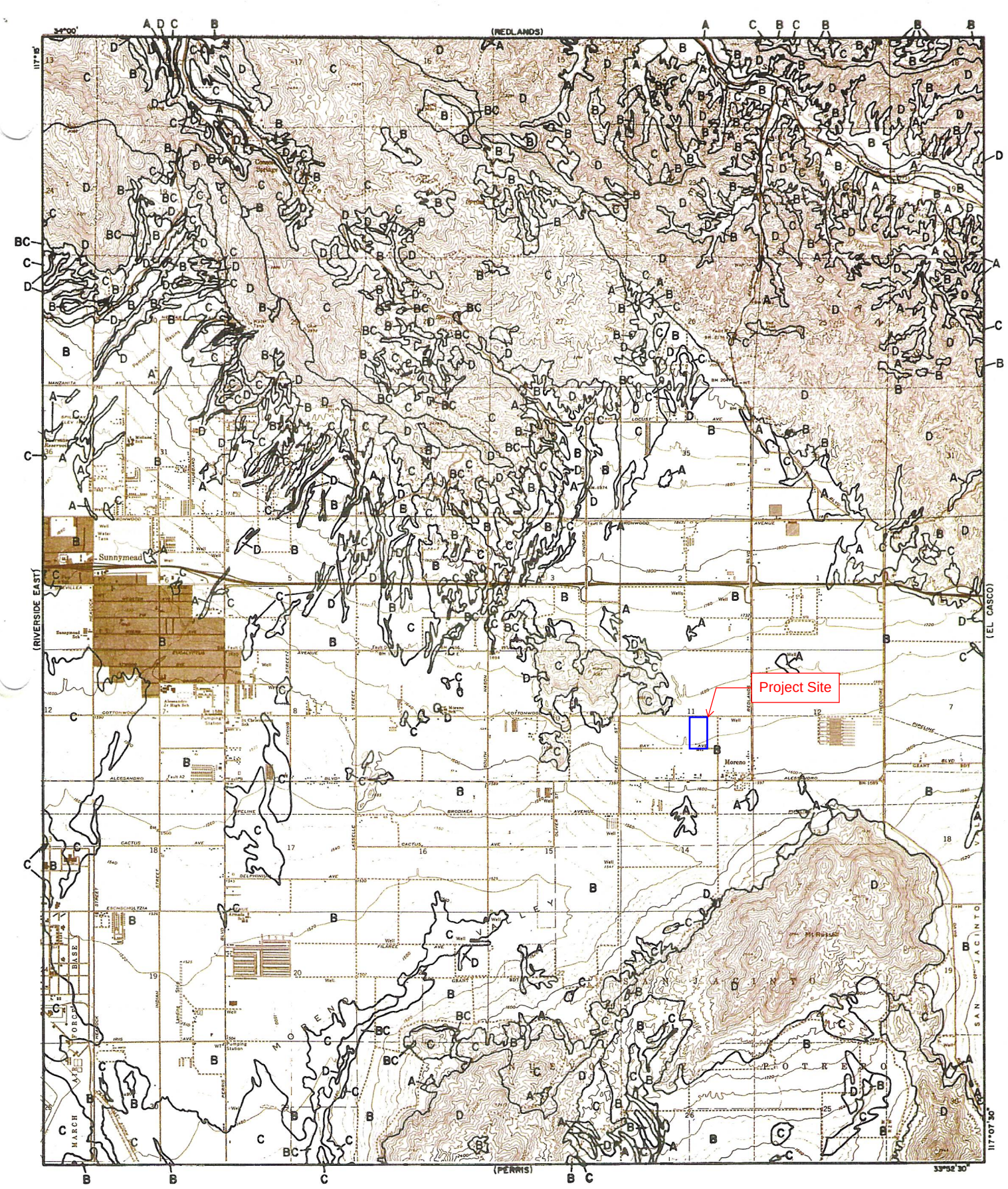
Time of concentration = 16.47 min.
Rainfall intensity = 2.291(In/Hr) for a 100.0 year storm
Subarea runoff = 1.683(CFS) for 0.830(Ac.)
Total runoff = 36.987(CFS) Total area = 18.910(Ac.)
End of computations, total study area = 18.91 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.482
Area averaged RI index number = 56.0

Appendix C
Reference Materials

Soils Map

Hydrology Maps



LEGEND

SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

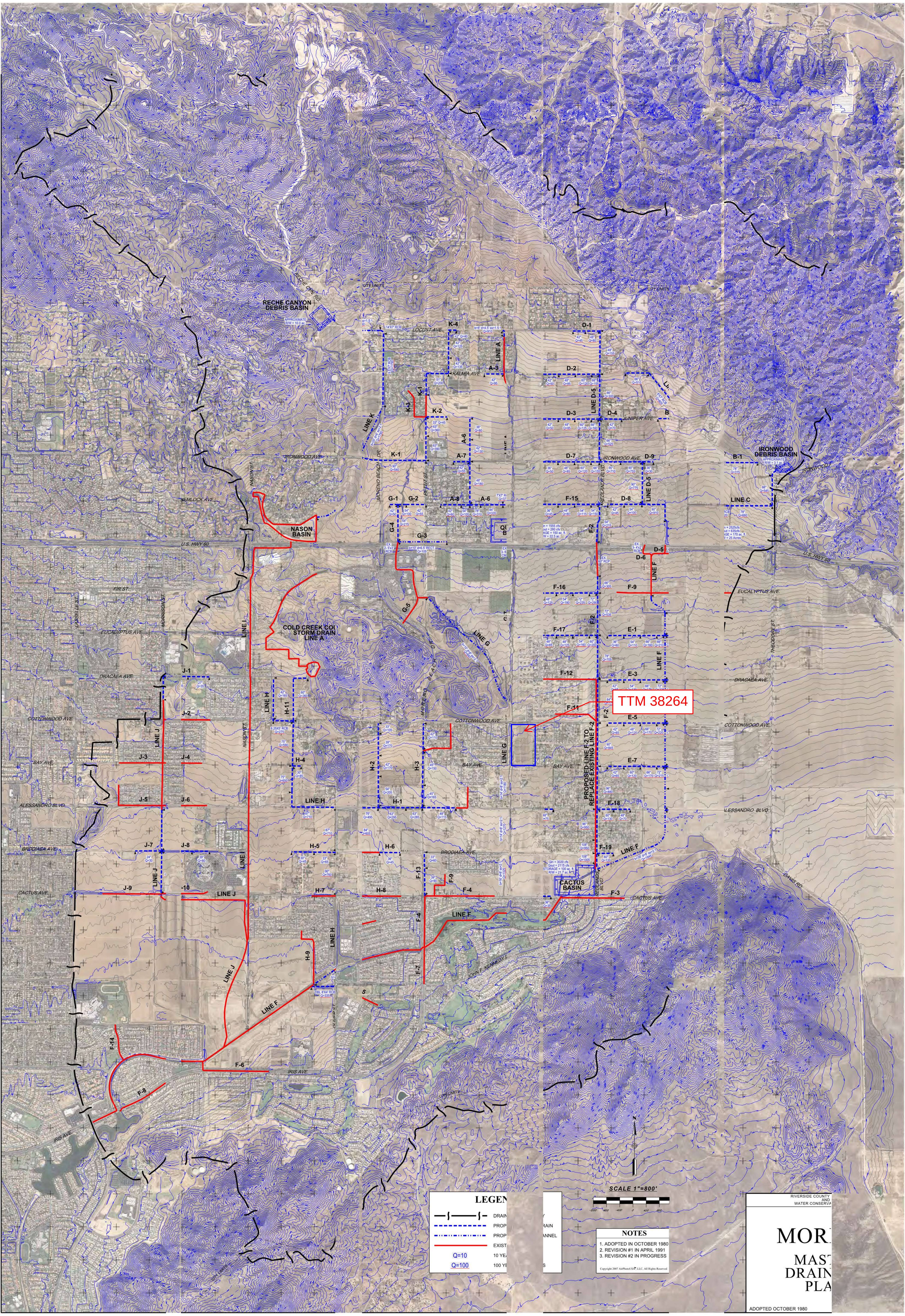
RCFC&WCD

HYDROLOGY MANUAL

0 FEET 5000

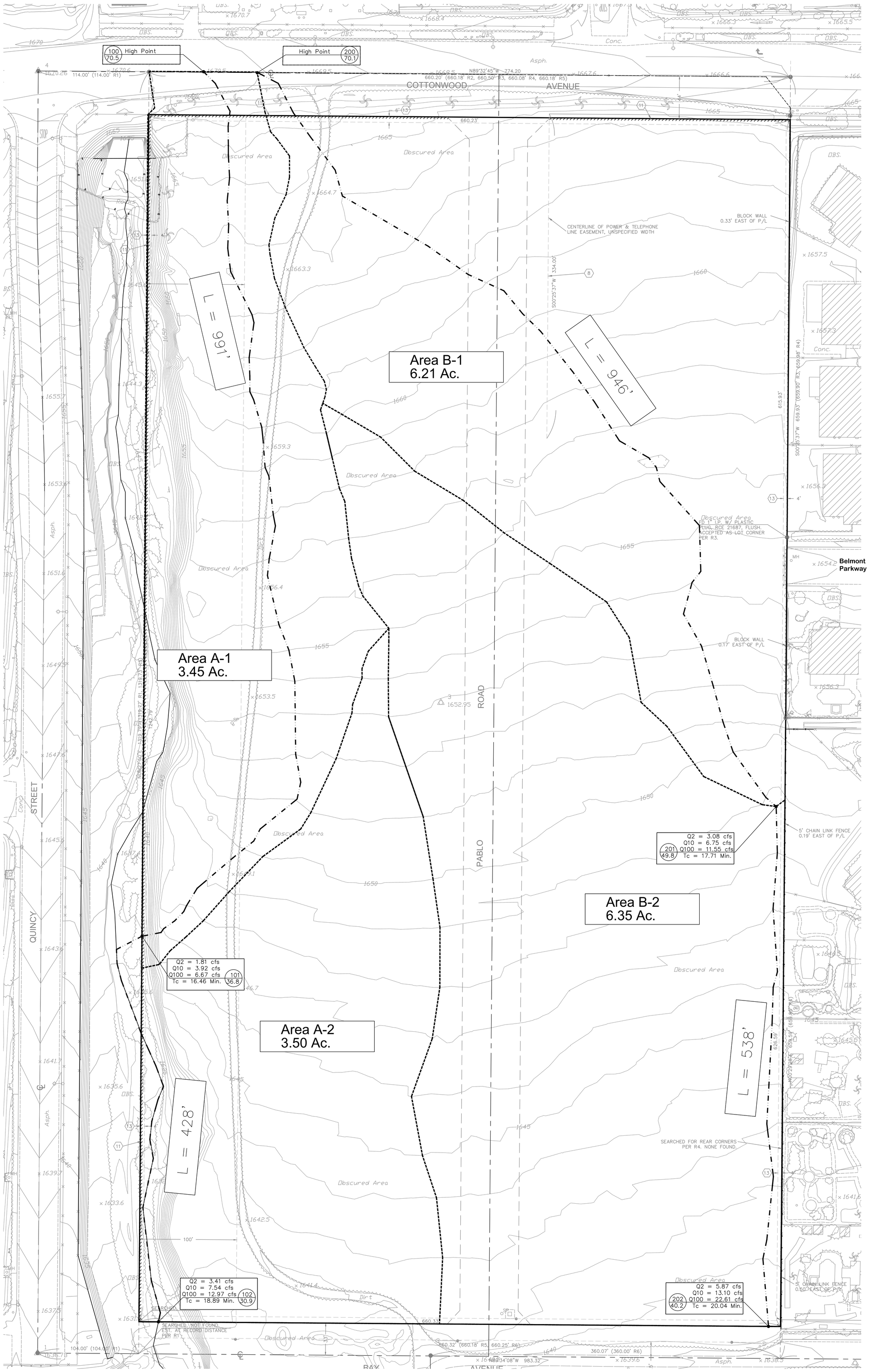
HYDROLOGIC SOILS GROUP MAP FOR SUNNYMEAD

PLATE C-1.17



TTM 38264
RECHE CANYON
DEBRIS BASIN
APPROXIMATE R/W = 10.0 ac.
IRONWOOD
DEBRIS BASIN
APPROXIMATE R/W = 3.1 ac.
NASON
BASIN
CACTUS
BASIN
Qin = 3020 cfs
Qout = 2115 cfs
STORAGE = 100 ac. ft.
R/W = 21.7 ac.
COLD CREEK CO
STORM DRAIN
LINE A
PROPOSED LINE F-2 TO
REPLACE EXISTING LINE F-2
LINE A
LINE C
LINE E
LINE F
LINE G
LINE H
LINE I
LINE J
LINE K
LINE D-5
CITY LIMITS
RECHE CYN. RD.
LOCUST AVE.
KALMIA AVE.
JUNIPER AVE.
IRONWOOD AVE.
HEMLOCK AVE.
U.S. HWY 60
FIR ST.
EUCALYPTUS AVE.
DRACAEA AVE.
COTTONWOOD AVE.
BAY AVE.
ALESSANDRO BLVD.
BRODIAEA AVE.
CACTUS AVE.
IRIS AVE.
JOHN F. KENNEDY D
DAVIS RD.
NASON ST.
MORENO BEACH DR.
PETTIT ST.
REDLANDS BLVD.
THEODORE ST.
LASSELLE ST.
MORRISON ST.
OLIVER ST.
SCALE 1"=800'
LEGEN
DRAIN
PROP
RAIN
PROP
ANNEL
EXIST
Q=10
10 YE
Q=100
100 YE
NOTES
1. ADOPTED IN OCTOBER 1980
2. REVISION #1 IN APRIL 1991
3. REVISION #2 IN PROGRESS
Copyright 2007 AirPhotoUSA, LLC, All Rights Reserved
RIVERSIDE COUNTY
AND
WATER CONSERVA
MOR
MAST
DRAIN
PLA
ADOPTED OCTOBER 1980

TTM 38264
Existing Condition
Hydrology Map



HYDROLOGY LEGEND

Q100 = 100–YEAR FLOW RATE

Q10 = 10–YEAR FLOW RATE

Q2 = 2–YEAR FLOW RATE

Tc = TIME OF CONCENTRATION – MINUTES

L = FLOW PATH LENGTH IN FEET

101 / 54.8 NODE NUMBER / ELEVATION

DRAINAGE AREA BOUNDARY

DRAINAGE FLOW PATH

HYDROLOGY DATA

100 YEAR – 1 YEAR RAINFALL INTENSITY = 1.20 INCH

10 YEAR – 1 HOUR RAINFALL INTENSITY = 0.82 INCH

SLOPE USED FOR RAINFALL INTENSITY CURVE = 0.600

AMC I USED FOR 2–YEAR STORM RUNOFF CALCULATIONS
AMC II USED FOR 10–YEAR STORM RUNOFF CALCULATIONS
AMC III USED FOR 100–YEAR STORM RUNOFF CALCULATIONS

ASSUMED HYDROLOGIC LAND USE: UNDEVELOPED

SOIL TYPE B

REGISTERED PROFESSIONAL ENGINEER
ROBERT MARK BEERS
No. 39405
Exp. 12–31–23
CIVIL
STATE OF CALIFORNIA

ROBERT BEERS
8175 Limonite Avenue, Suite E
Jurupa Valley, CA 92509
Ph. (951) 317–2041 Fax (909) 360–2070

Date Robert M. Beers R.C.E. 39405

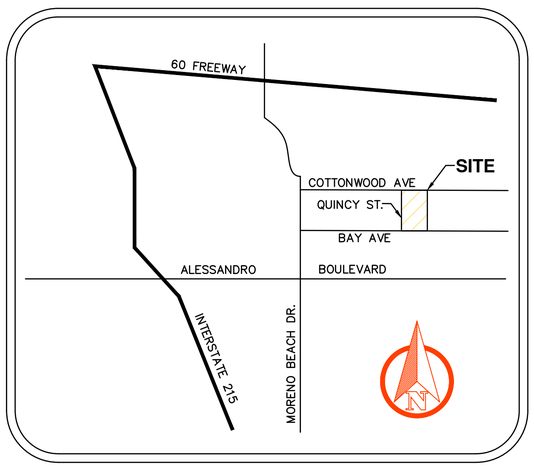
PREPARED FOR:
Passco Pacifica LLC
333 City Boulevard West
17th Floor
Orange, CA 92866
PHONE: (714) 609–7257

TTM 38264
Existing Conditoion
Hydrology Map
City of Moreno Valley
California

DATE Jan. 05 2022
JOB NO.
DRAWN BY R.A.H.
CHECKED BY R.M.B.
SHEET H–1

D:\Documents\Oscar Graham\Moreno Valley - Cottonwood\Hydrology\2021-12-30\Maps\Existing Condition\TTM 38264_ex_condition.dwg, 1/8/2022 4:28:22 PM, AutoCAD PDF (High Quality Print).pc3

TTM 38264
Developed Condition
Hydrology Map



VICINITY MAP
N.T.S.

HYDROLOGY LEGEND

Q100 = 100–YEAR FLOW RATE

Q10 = 10–YEAR FLOW RATE

Q2 = 2–YEAR FLOW RATE

Tc = TIME OF CONCENTRATION – MINUTES

L = FLOW PATH LENGTH IN FEET

101 / 54.8 — NODE NUMBER / ELEVATION

DRAINAGE AREA BOUNDARY

DRAINAGE FLOW PATH

HYDROLOGY DATA

100 YEAR – 1 YEAR RAINFALL INTENSITY = 1.20 INCH

10 YEAR – 1 HOUR RAINFALL INTENSITY = 0.82 INCH

SLOPE USED FOR RAINFALL INTENSITY CURVE = 0.600

AMC I USED FOR 2 YEAR STORM RUNOFF CALCULATIONS
AMC II USED FOR 10 YEAR STORM RUNOFF CALCULATIONS
AMC III USED FOR 100 YEAR STORM RUNOFF CALCULATIONS

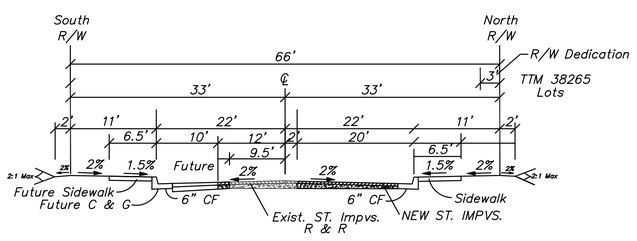
ASSUMED HYDROLOGIC LAND USE OF SFR ¼ acre

Soil Type B

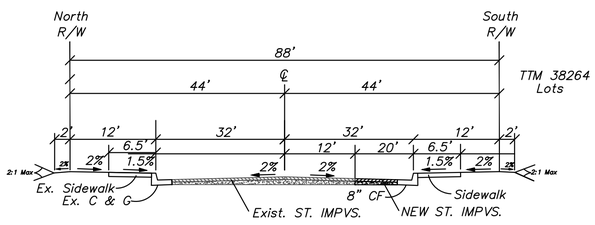
Area 1
6.86 Ac.

Area 2
11.22 Ac.

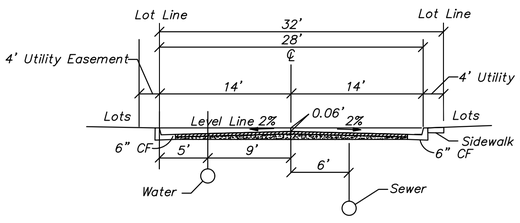
Area 3
0.83 Ac.



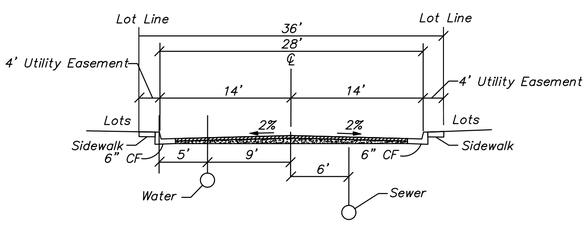
Typical Section MVSI–106B–0
Bay Street
3" AC over 6" AB (PRELIM SECTION)



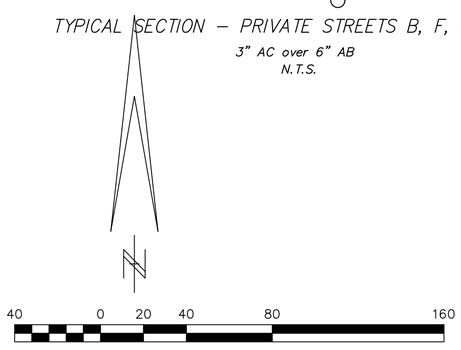
Typical Section MVSI–105A–0
Cottonwood Avenue
4" AC over 6" AB (PRELIM SECTION)

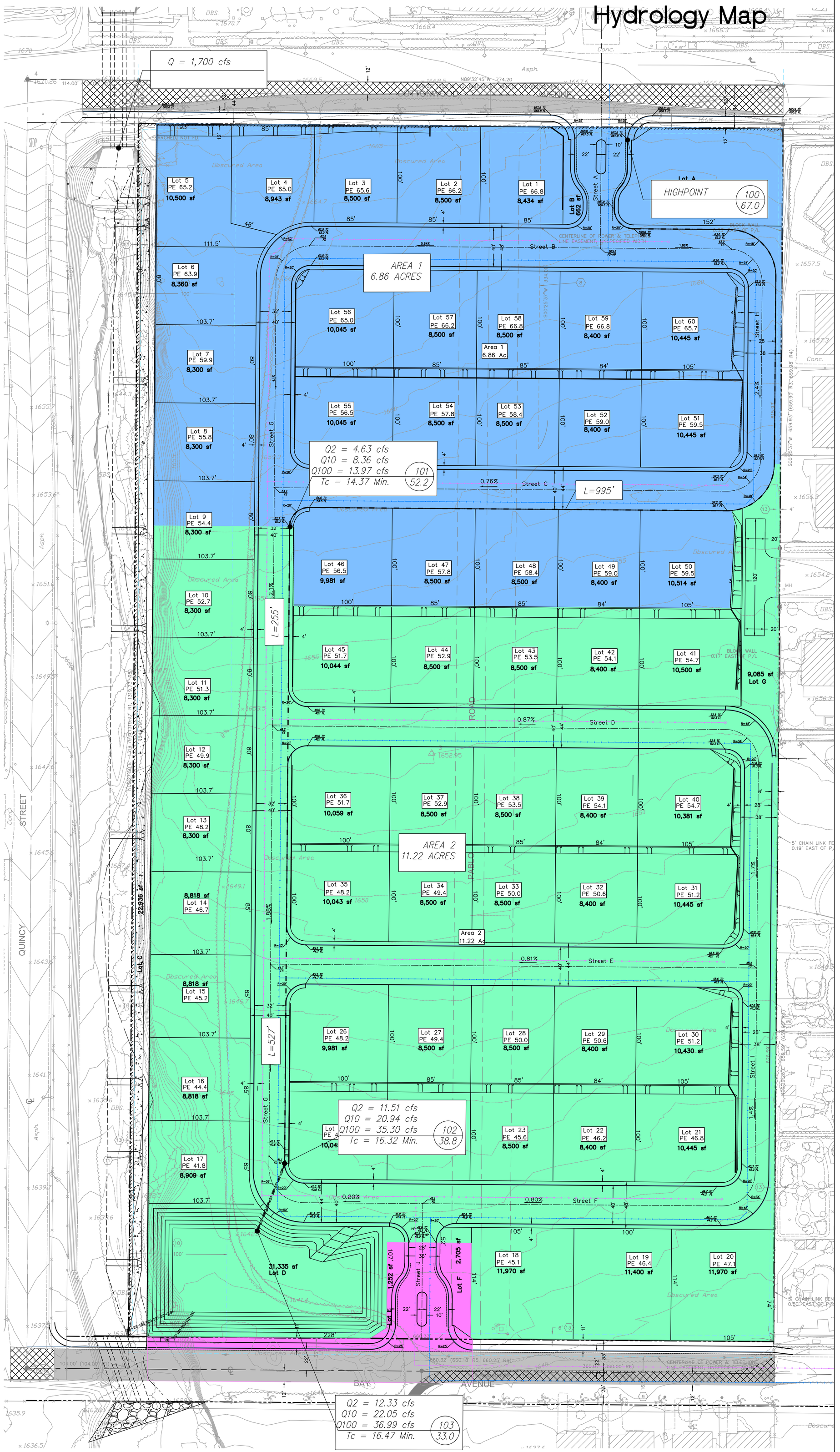


TYPICAL SECTION – PRIVATE STREETS C, D & E
3" AC over 6" AB
N.T.S.



TYPICAL SECTION – PRIVATE STREETS B, F, G, I, K
3" AC over 6" AB
N.T.S.





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REGISTERED PROFESSIONAL ENGINEER — ROBERT MARK BEERS — No. 39405 Exp. 12–31–23 — CIVIL — STATE OF CALIFORNIA

2022-04-26
Date

Robert M. Beers
Robert M. Beers R.C.E. 39405

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TTM 38264
Developed Condition
Hydrology Map
City of Moreno Valley
California

DATE April 26, 2022
JOB NO.
DRAWN BY R.A.H.
CHECKED BY R.M.B.
SHEET H–2